Gujarat Powering India's Clean Energy Drive ●

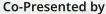






THE VIBRANT GUJARAT

















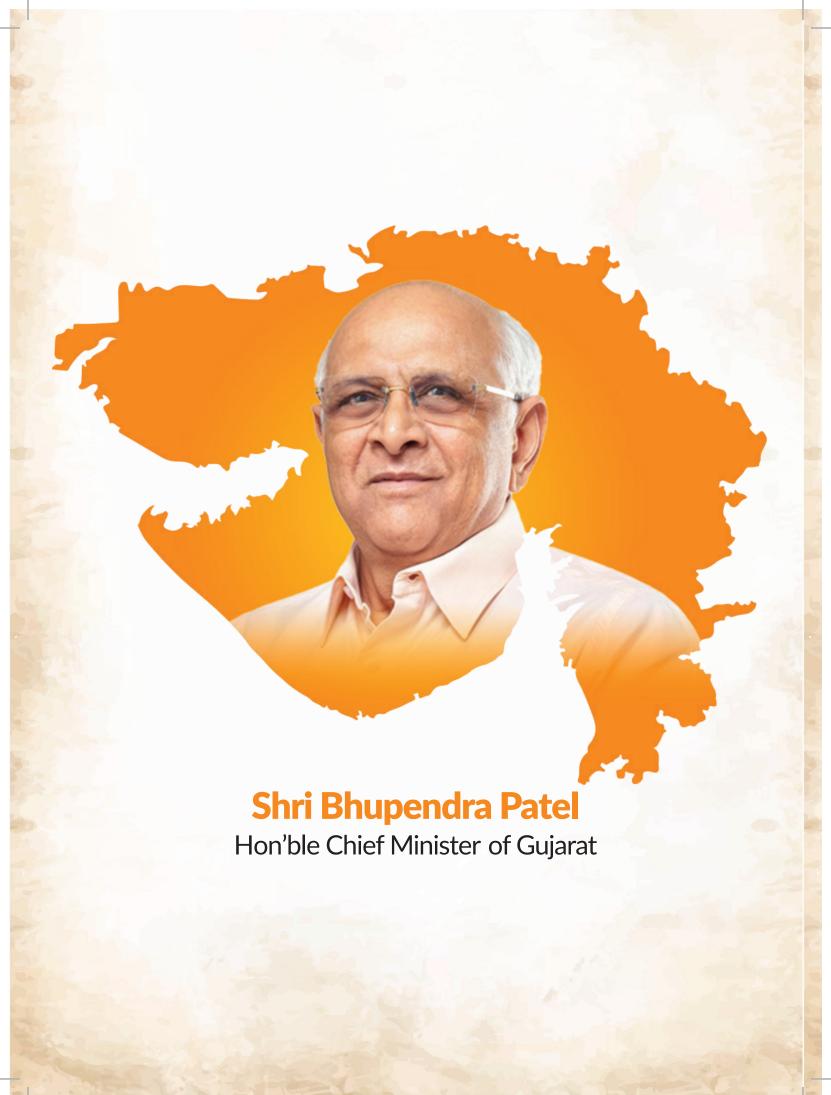






Our thoughts and actions must always help preserve our 'One Earth', protect the interests of our 'One Family', and move towards a Green 'One Future'

Shri Narendra Modi Hon'ble Prime Minister of India









Bhupendra Patel

Chief Minister, Gujarat State

Dt. 22-12-2023

Message

Gujarat has established itself as a global business destination for next generation, sustainable manufacturing and service industry that stimulate development and balanced regional growth. The world is well aware that entrepreneurship and business is always in the veins of Gujarati people. Honourable Prime Minister Shree Narendrabhai Modi has initiated Vibrant Gujarat Global Summit with an aim to showcase mettle of our SMSEs before the world and to provide a global platform to our products. He encourages people to pursue green energy with a view to decrease pollution and energy cost and increase power production of Gujarat by establishing solar, wind and renewable energy power plants and Solar-Rooftops across the state.

I am much pleased to learn that Gujarat Power Corporation Limited GPCL) in association with Elets Technomedia Pvt. Ltd. are jointly publishing a special Souvenir on the energy and petrochemical sector. I am delighted to learn that the special edition will be released at Vibrant Gujarat Global Investors' Summit 2024. I hope, the informative data and columns inserted within the souvenir will catalyze the transition towards a sustainable and energy-efficient future among future Startups and youth-centric initiatives. I extend my heartiest best wishes to the entire editorial team, avid readers and all the stakeholders for the success of the publication and for a bright future ahead.

(Bhupendra Patel)



Shri Kanubhai Mohanlal Desai

Hon'ble Minister - Finance, Energy & Petrochemicals Government of Gujarat

KANUBHAI DESAI



No. FEPShybhe /202 3

Minister,

Finance, Energy & Petrochemicals,

Government of Gujarat,

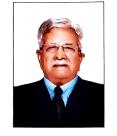
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Date: 29-12-2023



I congratulate our Energy & Petrochemicals Department of Gujarat for bringing this special souvenir dedicated to the energy landscape of Gujarat in association with Elets Technomedia Pvt. Ltd.

Gujarat has always been at the forefront of India's energy and petrochemical industry, and this special issue promises to capture the essence of the state's remarkable journey. I believe it will serve as a valuable resource for stakeholders, policymakers, and visionaries, offering insights into the innovative strides being made in the energy sector.

Gujarat ranks 1st in total installed capacity among all states with installed capacity of approx. 48.5 GW. Gujarat also ranks 1st in residential rooftop solar with impressive 82% of share in the installed capacity of the country. The per capita consumption of India is 1255 units whereas Gujarat is 2283 units. This shows state's commitment towards achieving socio-economic growth.

As the Energy and Petrochemical Minister, I wholeheartedly support such initiatives that promote our state's progress and prosperity.

My Best Wishes.

(Kanubhai Desai)



Shri Harsh Sanghavi

Hon'ble Minister of State

Home and Police Housing, Industries, Cultural Activities (State Minister), Sports, Youth Service, Co-ordination of Voluntary Organization, Non-Resident Gujarati's Division, Transport, Gruh Rakshak Dal and Gram Rakshak Dal, Civil Defense, Jail Border Security (All Independent Charge)

Government of Gujarat

Harsh Sanghavi



No.: Mos/Home/Ind./SY&CD/Tra./NRG/

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Home and Police Housing, Industries, Cultural Activities (State Minister), Sports, Youth Service, Co-ordination of voluntary organization, Non-resident Gujarati's Division, Transport, Gruh Rakshak Dal and Gram Rakshak Dal, Civil Defense, Jail, Border Security (All Independent Charge),

Government of Gujarat

Date: 2 8 DEC 2023

Message

I am grateful to the Energy and Petrochemicals department of Gujarat and Elets Technomedia for their collaborative efforts in creating a special souvenir highlighting Gujarat's energy prowess. This initiative underscores the state's commitment to innovation and sustainable development in the energy sector.

As we prepare for the Vibrant Gujarat Global Investors' Summit 2024, this souvenir will serve as a valuable showcase of our state's achievements and potential in the energy industry. Gujarat has consistently been at the forefront of the nation's energy landscape and this publication will further illuminate our accomplishments.

I extend my appreciation to all those involved in the creation of this souvenir. It is a testament to our collective vision and determination to make Gujarat a global energy leader. I look forward to its launch at the summit and the opportunities it will bring to our vibrant state.

My Best Wishes!

Yours sincerely,

(Harsh Sanghavi)



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पंकज अग्रवाल, भा.प्र.से. सचिव Pankaj Agarwal, I.A.S. Secretary





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Message

I am happy to learn that Gujarat Energy & Petrochemicals Department and Elets Technomedia is bringing forth a special souvenir highlighting Gujarat's achievements in the field of energy.

India's power sector has transformed during the last decade, driven primarily by climate change and energy security concerns. India's Intended Nationally Determined Contributions (INDCs) envisaged 50% non-fossil fuel capacity and 45% reduction in emissions intensity as compared to the 2005 level. Since then, there has been substantial addition of renewable energy (RE) and transmission capacities.

Gujarat has been a trailblazer in the energy sector, setting benchmarks for sustainable and efficient power generation, transmission, and distribution. The State's commitment to innovation, renewable energy, and its leadership have made it a shining example for the entire nation. The State of Gujarat is playing a pivotal role in this energy transition. State has successfully demonstrated its commitment towards clean energy with installed Renewable Capacity of 21.6 GW at present in which the addition of about 11 GW has taken place during last 4 years. The Gujarat government has rolled out the renewable energy policy in Oct 2023 with an aim to generate 50 per cent of power through renewable energy sources by 2030. Ground mounted solar, rooftop solar, floating solar, canal top solar as well as wind, rooftop wind and wind-solar hybrid projects will be covered under the policy.

The forthcoming launch of the souvenir at the Vibrant Gujarat Global Investors' Summit 2024 is a great step in our collective pursuit of fostering clean energy in the country. I believe that the special souvenir will not only be a testament to Gujarat's achievements but also serve as a source of inspiration for all stakeholders in the energy sector, motivating us to work together towards a brighter and greener future.

(Pankaj Agarwal)















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Mamta Verma, IAS Principal Secretary



Energy & Petrochemicals DepartmentGovernment of Gujarat

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Message

I extend my congratulations to Elets Technomedia for the launch of a special souvenir Energy and Petrochem to showcase the sectorial potential of the vibrant state of Gujarat.

The Government of Gujarat is committed to contribute towards India's Hon'ble Prime Minister's declaration of Nationally Determined Goals at COP 26 i.e., "The Panchamrit".

Energy and Petrochemical sector has played a vital role in the State's economic growth and societal development and it has been possible with the strong political will, industry/consumer friendly policies and robust infrastructure/value chain available in the State.

The State is leveraging the resources for combating multifaceted concerns related to energy security, climate challenge and to provide Round the clock clean power at affordable cost & thereby reduce carbon emissions from the State GDP.

The launch of this souvenir at the Vibrant Gujarat Global Summit 2024 will provide a valuable supportive resource in combating Climate challenges through reduction of carbon footprints, promotion of energy efficiency and adoption of emerging initiatives in the energy sector such as floating solar, offshore wind, green hydrogen, energy storage etc.

Best Wishes!

Mamta Verma, IAS

Principal Secretary,

Energy & Petrochemicals Department

Government of Gujarat

Torrent Group has a strong presence in Pharmaceuticals, Power and City Gas Distribution sectors



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- Distributing over 28 billion units of power annually to over 4 million customers
- Unmatched 99.9% reliability in its license area
- One of the lowest T&D losses in the country, in its license area



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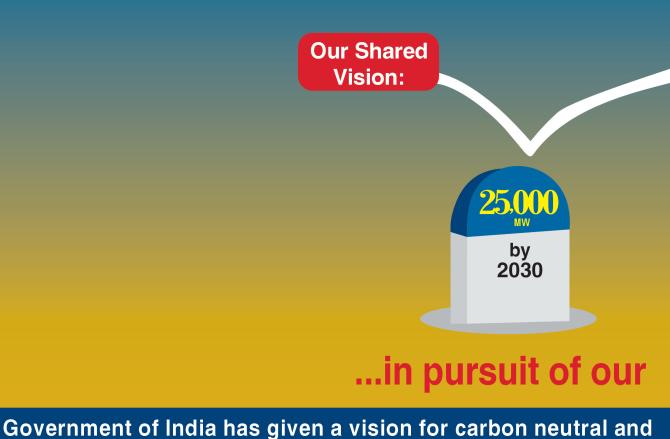
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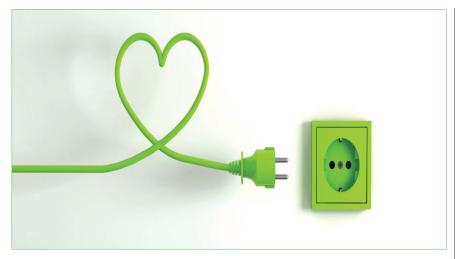
HON'BLE PRIME MINISTER'S VISION

Sparks Gujarat's Emergence as a Global Green Hydrogen Hub

By Garima Pant. Associate Editor (ENN)

Embarking on a visionary journey, Gujarat, under the leadership of Prime Minister Modi, is set to redefine its global standing by emerging as a powerhouse in green hydrogen technology. ujarat's extensive coastline and business-friendly policies make it an ideal location for the burgeoning green hydrogen sector, driven by Prime Minister Modi's vision. The Prime Minister envisions Gujarat becoming the world's largest green hydrogen center, attracting \$8-10 billion in clean energy investments. "A sprawling green hydrogen ecosystem will be built along our shores, producing significant amounts of this fuel for India's transition away from fossil fuels," emphasized Prime Minister Narendra Modi.

Recognizing green hydrogen's transformative impact on global geopolitics in this century's evolving energy landscape, PM Modi sees Gujarat well-placed to lead in the worldwide adoption of hydrogen cell technologies, especially as automakers explore this innovative avenue. "Green hydrogen is the energy of the future. The



entire global system will shift. All energy sources will shift. And the pioneers in green hydrogen will be the leaders. Gujarat has already developed a policy in this area, and the Indian government has also taken steps in this direction. On Gujarati soil, we'll witness investments coming from all over the world," according to the Prime Minister.

The Prime Minister's forward-thinking vision aligns seamlessly with Mahatma Gandhi's principles of sustainable development. The transition to green fuels in Gujarat not only addresses air pollution concerns but also stimulates a substantial influx of investments, generating thousands of local jobs, particularly in coastal regions like Kachchh and Bhavnagar.

Already setting the foundation to become India's green hydrogen manufacturing hub, Gujarat is securing its dominance in the industrial sector. Key players, including Reliance, Adani, ArcelorMittal, and Torrent, have pledged substantial investments in green energy projects, solidifying the state's position. The recent collaboration with Erisha E Mobility, which specializes in green hydrogen technologies, further accentuates Gujarat's commitment to sustainable energy solutions.

Erisha E Mobility's Rs. 5,000 crore investment in Gujarat aims to establish a comprehensive ecosystem leveraging the

state's abundant solar and wind resources. This initiative is expected to reinforce Gujarat's leadership in India's clean energy transition, bolstered by proactive policies encouraging private investment in the green hydrogen sector.

The partnership with NHPC for the proposed 750 MW Kuppa Pumped Hydro Storage Project exemplifies the

collaborative efforts towards sustainable energy solutions. NHPC's estimated Rs. 4,000 crore investment, supported by the Government of Gujarat, underscores the potential of pumped hydro storage projects as effective solutions for energy storage, providing significant employment opportunities and contributing to the local economy.

KP Group's substantial investment of Rs. 17,690 crores, as outlined in two MoUs with the Gujarat government, solidifies the state's position in the renewable energy sector. The investment spans various renewable energy projects, including a significant allocation for the establishment of a green hydrogen plant.

Aligned with PM Modi's visionary outlook, India, driven by Gujarat's initiatives, is poised to lead the way in green hydrogen technology and its diverse applications, contributing to the global mission of creating a cleaner and more sustainable world.



GUJARAT POWERING

India's Energy Transformation

With ambitious goals, pioneering policies, and substantial investments, India currently holds the rank of the fourth-largest nation globally in overall renewable energy capacity. In this phenomenal transformation, Gujarat is playing a crucial role in complementing India's strides in the realm of renewable energy. **Abhineet Kumar** from **Elets News Network,** delves into Gujarat's impressive journey, shedding light on significant accomplishments, future targets, and the contributions of various institutes and agencies in shaping the nation's clean energy landscape.

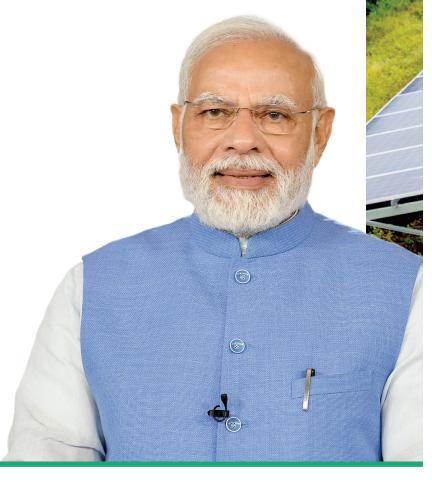
ndia has demonstrated its capability to achieve the objectives before time when it comes to renewable energy resources. The country has achieved the target of 40% contributions from non-fossil fuels in the installed electricity capacity 9 years before the target date. It also achieved thetarget of 10% ethanol blending in petrol five months before the deadline and is striving to achieve 20% ethanol blending in petrol by 2025-26 instead of 2030. Additionally, India will install electric capacity worth 500 GW, from non-fossil sources by 2030, shared Hon'ble Prime Minister Modi during a post-budget webinar on 'Green Growth' in February this year.

Prime Minister Modi says India's future development will be based on three pillars for green growth and energy transmission. Increasing the production of renewable energy; reducing the use of fossil fuel in the economy and finally, moving towards a "gas-based economy" in the country.

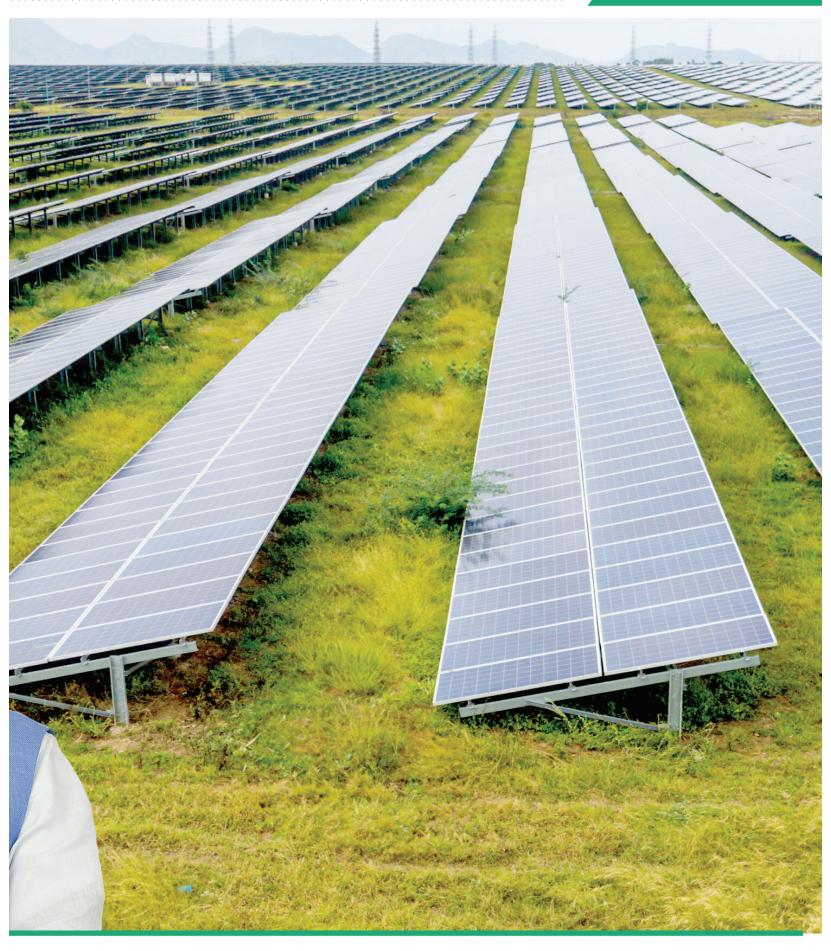
This approach undergirded the announcement of schemes such as ethanol blending, Pradhan Mantri Kisan Urja Suraksha Evam Mahabhiyan (PM-KUSUM, a scheme for

Shri Narendra Modi

Hon'ble Prime Minister of India



COVER STORY





solarising agriculture), incentives for solar manufacturing, rooftop solar scheme, coal gasification, and battery storage in the Budgets of the past few years.

Since 2014-15, India has witnessed a phenomenal increase in renewable power generation, excluding large hydro projects. The generation capacity has surged nearly threefold, escalating from 61 billion units (BU) to an impressive 180 BU. This exponential growth is a testament to India's commitment to reducing its reliance on traditional fossil fuels and embracing cleaner alternatives.

SOLAR POWER DOMINANCE

Solar power has emerged as a frontrunner in India's renewable energy portfolio, experiencing unprecedented growth over the past few years. The installed solar capacity has skyrocketed from 2.6 gigawatts (GW) to a staggering 70.10 GW since 2014, marking an approximately 30-fold increase. This surge not only demonstrates the country's dedication to harnessing solar potential but also positions India as a global leader in solar energy adoption.

The International Solar Alliance (ISA), an

international intergovernmental organisation established through a treaty, seeks to raise over USD 1000 billion in investment by 2030 to facilitate extensive deployment of solar energy. Conceived on November 30, 2015, by Prime Minister Narendra Modi and President of France Francois Hollande, the ISA's goal is to amplify solar energy adoption, lower the costs associated with solar power generation by aggregating demand for solar finance, technologies, innovation, research and development, and capacity building.

Under the visionary concept of 'One Sun One World One Grid' (OSOWOG), as advocated by the Hon'ble Prime Minister of India, the goal is to connect global solar resources. The premise behind OSOWOG is that 'The Sun Never Sets,' ensures a continuous presence of sunlight at various geographic locations worldwide. The Ministry of New and Renewable Energy (MNRE) is spearheading a comprehensive study to develop a long-term vision, implementation plan, roadmap, and institutional framework for OSOWOG.

The International Solar Alliance is actively involved as the implementing agency, and the study is being

conducted by a consortium of consultants including Électricité de France (EDF), Application Européenne de Technologies et de Services (AETS), and The Energy and Resources Institute (TERI). The inception report was submitted previously, followed by the submission of the revised phase-1 report later on. The study is anticipated to be completed in the near future.

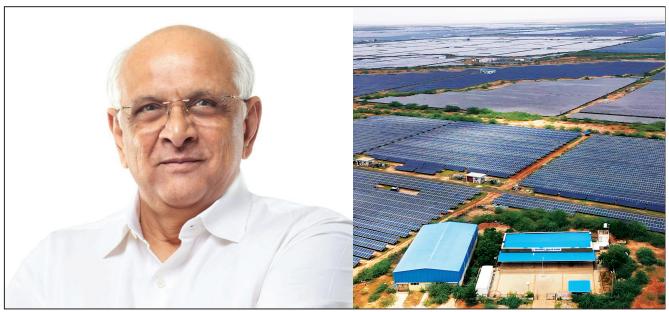
WIND ENERGY ADVANCEMENTS

In tandem with solar power, India has made significant strides in wind energy capacity. Since 2014, the wind energy capacity has doubled, reaching 42.6 GW. This growth showcases the nation's multi-pronged approach to renewable energy, tapping into various sources to create a diversified and resilient energy landscape.

The country's focus on sustainable energy sources has resulted in a substantial 71,814 million units of electricity being generated from wind energy during the fiscal year 2022-23.

The major wind energy producing States for the year 2022-23 were Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu and Telangana.

GUJARAT LEADING THE COUNTRY IN RENEWABLE ENERGY



Source: GPCL

Shri Bhupendra Patel Hon'ble Chief Minister of Gujarat

ujarat, with its eyes set on the ambitious 2030 targets, stands out as a trailblazer in India's pursuit of a sustainable future. This vibrant state has become a symbol of proactive commitment, playing a crucial role in bolstering the nation's renewable energy capacity. As the world grapples with the challenges of climate change, Gujarat's approach towards embracing wind and solar power serves as a blueprint for others to follow.

Hon'ble Prime Minister remarked that "Energy security and water security are vital in the 21st century" during the inauguration of Khavda Hybrid RE park in Kachchh, Gujarat, which is also set to be the largest RE park in the world. The vast project in western spread over 1,80,000 acres will contain solar panels, solar energy storage units, and

windmills. The energy project in PM Modi's home state will account for a large chunk of India's ambitious target of generating 175 GW in renewable energy by 2022 and 450 GW by 2030.

One of Gujarat's remarkable initiatives is the implementation of a Waste Land policy, which involves leasing vast expanses of land for the development of solar, wind, and hybrid energy parks dedicated to green hydrogen production. The state has given in-principle approval for utilising 1.99 lakh hectares of waste land, signalling a significant step towards harnessing renewable energy resources.

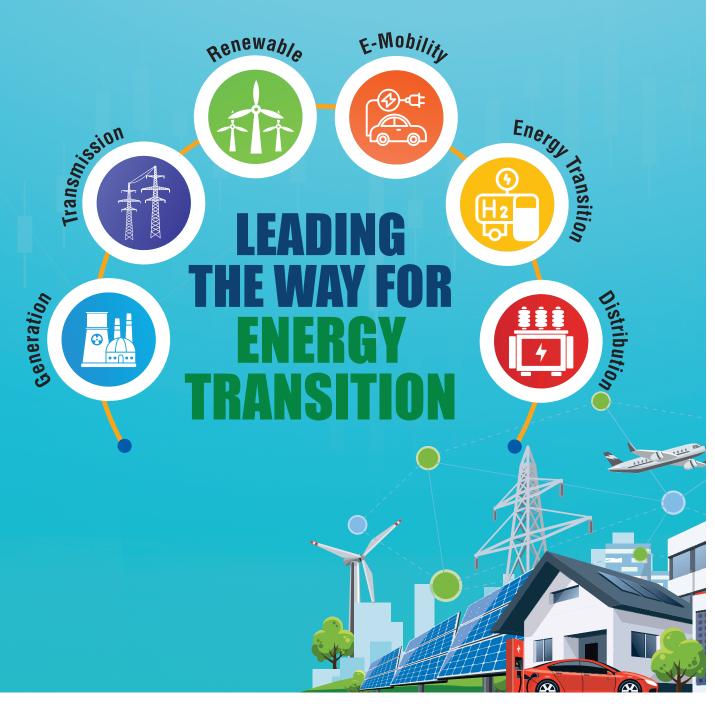
"Our Renewable Energy Policy will enable Gujarat to source 50% of its energy from renewable (RE) sources and will help achieve India's ambitious target of reducing carbon emissions by 45% by 2030. Gujarat currently

contributes 15% to India's RE capacity and is one of the fastest growing renewable energy-producing regions." emphasised Bhupendrabhai Patel, Chief Minister of Gujarat.

"Gujarat is committed to contributing towards Prime Minister Narendra Modi's vision of Viksit Bharat @ 2047. Our mission is to make Gujarat a key contributor to India's USD 5 Trillion economy plan. The Vibrant Gujarat Global Summit 2024, themed "Gateway to the Future" will play a pivotal role in achieving this vision. I am confident that the VGGS which is the first Summit in Amrit Kaal will be a golden opportunity for investors looking to engage with Gujarat for its immense growth potential", said the hon'ble CM during a recent press interaction.

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Source: GPCL



GPCL transforming **Gujarat's** energy landscape

stablished with the objective of augmenting power generation in the state of Gujarat, Gujarat Power Corporation Limited (GPCL) has evolved into a dynamic player, contributing significantly to the nation's power infrastructure. With a focus on sustainable energy solutions, GPCL engages in the development, operation, and of power maintenance projects, encompassing a diverse range of energy sources.

The corporation's commitment to innovation environmental responsibility underscores its pursuit of efficient and ecofriendly power generation. As a key contributor to India's energy landscape,

GPCL continues to drive advancements in the realm of power production and distribution.

Founded on June 28, 1990, under the Companies Act, 1956, GPCL is a state government company backed by the Government of Gujarat. It primarily focuses on renewable energy projects and plays a pivotal role in facilitating and developing energy initiatives within the state.

GPCL identifies power projects using various conducts feasibility collaborates with private and joint sector partners, secures necessary clearances (e.g., environmental, land acquisition), and ensures fuel supply. Additionally, it holds the status of a nodal agency for solar park and other renewable projects, as designated by the Government of Gujarat.

The primary goal of GPCL is to discover power generation initiatives that utilize different fuel sources, with a special emphasis on renewable energy. It aims to create techno-economic feasibility reports for these power projects, pinpoint appropriate private sector or PSU partners, and collaboratively undertake these power projects. In cases where no interested party



steps forward, GPCL may also independently execute these projects. Furthermore, GPCL assists private sector and PSU developers in establishing power projects within the state.

VISION

GPCL's vision is to establish a solid foundation for the implementation of both conventional and non-conventional power projects, and to position Gujarat State as a leader in clean and green technology, ensuring a better and more sustainable future.

MISSION

The mission is to foster private sector participation to enhance the power generation capacity of Gujarat. This involves:

- Preparing techno-economic feasibility reports for various projects.
- Obtaining all the necessary statutory and administrative approvals for identified projects, including land acquisition.
- Developing a comprehensive master plan for the power system in Gujarat
- Monitoring various power schemes undertaken by both public and private enterprises.
- Promoting power generation through the utilisation of non-conventional sources of energy.

In pursuit of its clean energy transition, GPCL has undertaken the development of several solar parks in the state of Gujarat, contributing significantly to the region's renewable energy initiatives. 5 500





CHARANKA SOLAR PARK

Integration of Battery Energy Storage System

ujarat, India's clean energy landscape, hosts the renowned Gujarat Solar Park-1, also known as Charanka Solar Park. Spanning an expansive 2179 hectares in Patan district, this solar power plant boasts an impressive installed generation capacity of around 730 MW, solidifying Gujarat's commitment to renewable energy.

GPCL owns 5 MW and 10 MW plants in Charanka, serving as a milestone in its renewable energy journey. This project sets the stage for a groundbreaking

venture – the establishment of a Greenfield Battery Energy Storage System (BESS) integrated with the existing solar setup.

The primary goal of this innovative project is to optimise the utilisation of the 5 MW solar plant, complete with a 66 KV/220 KV Substation and associated transmission lines. GPCL envisions capturing the entire energy generated by the solar facility and storing it within the BESS. This stored energy will then be utilised during nonsolar peak hours, showcasing a commitment to efficiency and

sustainability.

The Gujarat Solar Park-1, inaugurated in 2012 by the then Chief Minister Narendra Modi, has grown significantly since its inception. Initially home to about 250 MW capacity, it became the world's third-largest photovoltaic power station by April 2012, with a total commissioning of 214 megawatts.

Today, the solar park hosts an installed generation capacity of approximately 730 MW, contributed by 36 developers within the park. Notable additions include a 30 MW Solar PV plant by Gujarat Alkalies and Chemicals Limited (GACL) and a 10 MW project by Gujarat Narmada Valley Fertilisers and Chemicals (GNFC).

Looking to the future, GPCL is set to launch another groundbreaking project within Gujarat Solar Park. The forthcoming Greenfield 5 MW SPV Ground Mounted Project will incorporate a substantial 15/20 MWh BESS. This ambitious venture aims to maximise operational efficiency by storing solar energy during peak hours and distributing it during non-solar peak hours.

The Gujarat Solar Park is known for its innovation as it concentrates a large number of solar power units in one location, significantly reducing costs (by 40%) and lowering solar tariffs, promoting the development of large-scale solar power projects. Despite numerous challenges and complexities, GPCL has successfully implemented this high-value project in a short time, contributing significantly to India's position as the Solar Capital of the World and bringing pride to Gujarat.





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DHOLERA SOLAR PARK

estled in the Mahadevapura-Bhangarh village near the Dholera region of Ahmedabad district, Gujarat, the Dholera Ultra Mega Solar Park (UMSP) is a sprawling venture spanning around 2,000 hectares of wasteland, specifically categorised under CRZ 1(B). This ambitious initiative is under the exclusive ownership of the Dholera Special Investment Region Authority (DSIRA). The first phase of the project, boasting a substantial capacity of 1,000 MW, has already made significant strides, with Tata Power Renewable Energy Ltd successfully commissioning 300 MW in March 2022.

The Dholera Ultra Mega Solar Park has been strategically established on land controlled by DSIRA, securing "inprinciple" approvals from both the Ministry of New and Renewable Energy (MNRE) and DICDL for the provision of recycled and potable water. The inaugural phase comprises 20 plots, and the comprehensive plan outlines a total of 96 plots for both Phase-I and the subsequent Phase-II.

Looking ahead to Phase-II, the Dholera UMSP is poised for a substantial expansion, with a targeted capacity of 4,000 MW. Notably, the project has already inked power procurement agreements with the

Solar Energy Corporation of India (SECI), underscoring its commitment to bolstering India's renewable energy portfolio. As the solar park continues to take shape, GPCL has assumed the role of the selected developer for Phase-I, steering the development towards fruition.

The Dholera Ultra Mega Solar Park with its expansive scale, innovative approach to land utilisation, and commitment to sustainable practices such as water recycling epitomises the nation's proactive stance in harnessing solar energy to meet its growing power demands. As it forges ahead into Phase-II, the Dholera UMSP stands as a testament to India's commitment to a greener, more sustainable future, bolstering its position as a key player in the global renewable energy arena.







RAGHANESDA SOLAR PARK

n 2014, the Government of Gujarat embarked on an ambitious initiative to harness solar energy by initiating plans for the Raghanesda Ultra Mega Solar Park in Banaskantha District. This colossal project was envisioned with a staggering capacity of 700 MW, reflecting the state's commitment to renewable energy. The Ministry of New and Renewable Energy (MNRE) of the Government of India gave its nod of approval for the establishment of this solar park at Raghanesda on December 1, 2014.

Source: GPCL

Taking a pivotal step towards its realisation, the Energy and Petrochemicals Department of Government of Gujarat played a crucial role. In a significant development on December 18, 2014, the Energy and Petrochemicals Department, through an official letter, appointed Gujarat Power Corporation Limited (GPCL) as the implementing agency for the development of the 700 MW Ultra Mega Solar Park in Rahhanesda. This decision was in accordance with the approval granted by MNRE. To facilitate this

expansive solar endeavour, the Government of Gujarat allocated a substantial expanse of approximately 1,392 hectares of wasteland for the development of the Raghanesda Solar Park

Situated around 271 km northwest of Ahmedabad, the Raghanesda Ultra Mega Solar Park site in Raghanesda village became a focal point for renewable energy enthusiasts and policymakers alike. The infrastructure groundwork for this monumental project has been diligently laid out, encompassing essential elements such as roads, water supply, communication networks, bunds, and power infrastructure. This comprehensive infrastructure development ensures the seamless functioning of the solar park.

As of now, the Raghanesda Ultra Mega Solar Park has made significant strides towards its energy production goals. A remarkable 600 MW of solar power projects have already been commissioned, marking a substantial achievement in the journey towards a sustainable energy future. Additionally, there is an ongoing effort to add another 100 MW to the existing capacity, indicating the project's dynamic and evolving nature.

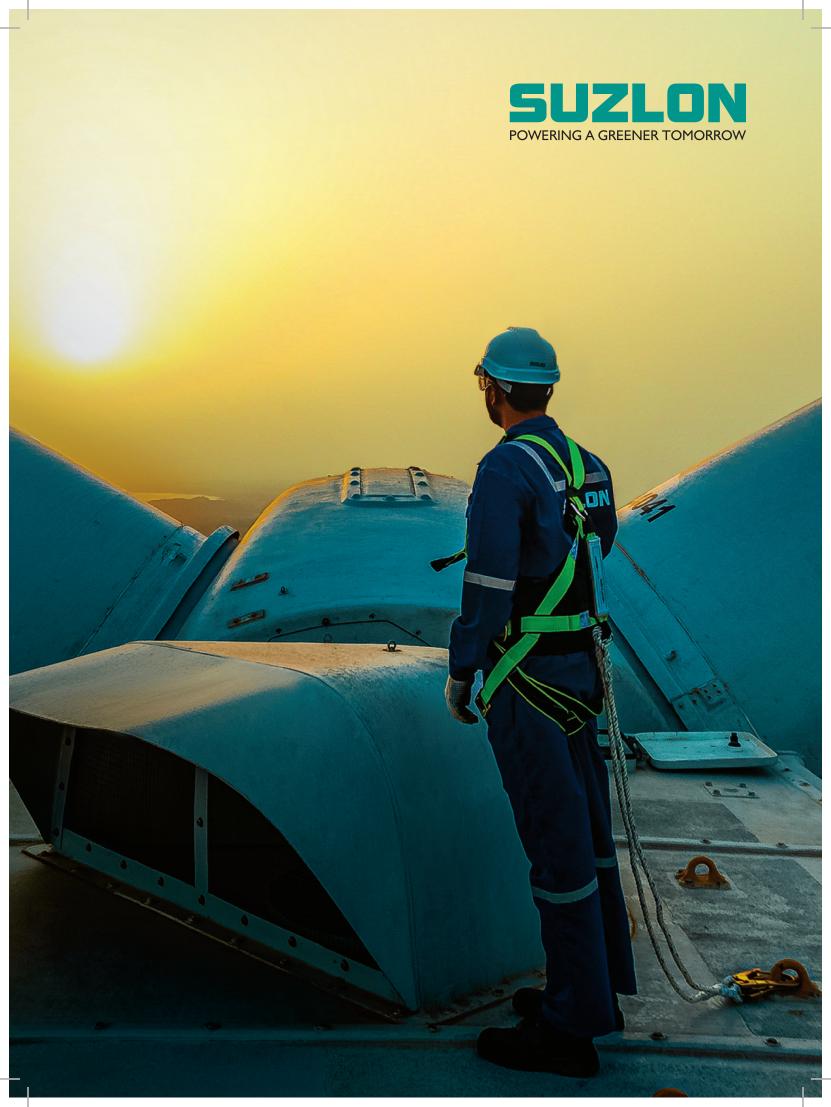
The Raghanesda Ultra Mega Solar Park stands as a testament to the proactive approach taken by the Government of Gujarat in embracing renewable energy solutions. The successful development and ongoing expansion of this solar park not only contribute to the state's energy security but also serve as a model for sustainable development that can be replicated across the nation.





Reinventing a sustainable future with stellar Renewable Energy solutions

As a key player on the global Renewable Energy landscape, Suzlon becomes the first Indian Wind Energy company to reach over 20 GW* of worldwide Wind Energy installations.





CURRENT STATUS OF RENEWABLE ENERGY IN GUJARAT

ligned with India's ambitious national target of achieving 450 GW of renewable energy capacity by 2030, set by the Hon'ble Prime Minister, the State of Gujarat has taken significant strides in the realm of renewable energy. This progress is in sync with the country's broader objectives and reflects a strong commitment to sustainable development. Over the last decade, Gujarat has seen a remarkable increase in its renewable energy capacity, growing from 8 GW to a striking 22.7 GW. This growth not only establishes Gujarat as a leader in India's green energy revolution but also positions it as a global model for sustainable energy practices. "Gujarat is actively collaborating with the

Government of India to establish itself as the global "Green Hydrogen Capital". We have pioneered an incentive scheme, the "Aatmanirbhar Gujarat Scheme Assistance to Industries", aimed at promoting Green Hydrogen Projects. Gujarat's strategic focus extends to developing the entire value chain for Green Hydrogen. Abundant renewable energy resources, vital for Green Hydrogen generation, are readily available in the state. With India's longest seacoast, Gujarat has a substantial water supply that can be efficiently desalinated for Green Hydrogen production. The Gujarat government has earmarked 1.99 lakh hectare of Government waste land to five companies for development of RE power plant for Green Hydrogen production. Furthermore, the state's 49 ports (1 major and 48 non-major) position it as an ideal gateway for exporting Green Hydrogen/Ammonia to the global market." says Bhupendrabhai Patel, Chief Minister of Gujarat

The state's dedication to renewable energy is further evidenced by its per capita power consumption, which is about double the national average. This underscores the state's reliance on renewable sources and its alignment with the country's goal of installing 100 GW of renewable energy capacity by 2030. In pursuit of this, Gujarat has set its own ambitious targets, showcasing leadership and vision in this critical area.

Adding to this momentum, Gujarat has signed pioneering investment agreements totaling 7.17 trillion rupees (approximately \$86.07 billion) with 58 corporations in sectors such as energy, oil and gas, and chemicals. These agreements, inked ahead of the biennial Vibrant Gujarat Global Summit, aim to attract a record number of international and domestic investors, thereby cementing Gujarat's role in defining India's energy future.

Gujarat's journey in renewable energy serves as a beacon of progress and a template for other states and nations. By effectively implementing wind, solar, and hybrid technologies, Gujarat demonstrates the potential of sustainable practices in transforming the world, proving that economic prosperity and environmental stewardship can indeed coexist.







THE WINDS OF CHANGE

ujarat has taken some monumental steps towards harnessing offshore wind energy. The appointment of Gujarat Power Corporation Limited (GPCL) as the designated state agency for offshore wind energy development underscores the unwavering commitment sustainable energy practices and aligns with India's ambitious goal of achieving 500 GW of renewable energy capacity by 2030.

In its newfound role, GPCL assumes a pivotal position in advancing offshore wind projects. Serving as a central point of contact, GPCL will collaborate with national entities, facilitating seamless progress in offshore wind energy development. This strategic move is a testament to Gujarat's proactive approach in shaping a green and sustainable energy future.

A significant milestone in this endeavour is the successful completion of the initial study conducted in the Bay of Cambay. This study highlights the immense potential of the region, revealing a staggering 36 GW offshore wind potential. Gujarat, with its long coastline spanning 1,600 km, emerges as a key hub for offshore wind projects.

Location

Off the coast of Gujarat nearly 25 km away from the Pipavav Port, Bhavanagar.

Capacity 32-36 GW

Average Wind Speed

~ 7.0-7.5m/s in the proposed area where LIDAR commissioned in 2017.

Will provide round the clock power with estimated 35-40% CUF.

"GPCL" as a State Nodal Agency will assist the developers for development of 32-36 GW offshore wind projects with/without VGF. The state government's comprehensive report on offshore wind power generation further accentuates Gujarat's prowess in renewable energy. The report indicates that the coastline has the potential for generating between 32 GW and 35 GW of offshore wind power. Considering the present wind power generation of 9,860.6 MW, Gujarat's offshore wind initiatives signify a substantial leap towards achieving the national renewable energy target.

Identifying five zones along the coastline as conducive to offshore wind power generation, the state government has strategically planned for optimal utilisation of resources. These zones, covering a combined area of 8,159 sq km, have the potential to produce 37.2 GW of power, marking a significant contribution to the state's clean energy portfolio.

These zones are strategically located along the Saurashtra, South Gujarat, and the Gulf of Khambhat coastlines, maximising the utilisation of Gujarat's extensive coastal stretch.

Beyond the commendable energy generation capacity, Gujarat's offshore wind initiatives promise multifaceted benefits. The drive towards renewable energy not only addresses the pressing need for cleaner power sources but also fosters job creation, reduces greenhouse gas emissions, and aligns seamlessly with India's broader clean energy agenda.

As Gujarat charts this pioneering course in offshore wind energy, it not only secures a sustainable energy future for the state but also positions itself as a beacon of innovation and progress in the realm of renewable energy on the national stage. With GPCL leading the charge, Gujarat's journey towards a cleaner and greener future is poised for remarkable success.





KHAVDA - WORLD'S LARGEST RENEWABLE ENERGY PARK IN KACHCHH

o contribute significantly to the Government of India's renewable energy targets and address global sustainable development and climate change concerns, the Government of Gujarat has prioritised the development of renewable energy in the state. In 2019, the Government introduced a policy for the allotment of government wasteland for the establishment of large Wind, Solar, and Wind-Solar Hybrid Parks. The key objectives include harnessing government barren land in renewable energy-rich areas, efficiently utilising transmission networks through hybrid capacity in parks, reducing generation variability by combining multiple renewable energy sources, and promoting technological development in areas like wind, solar, and storage.

To fulfill these goals, the Government of

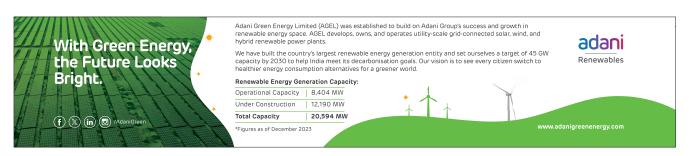
Government of Gujarat has earmarked a vast area of 72,400 hectares of government wasteland in Khavda, Kachchh, located on the Indo-Pakistan border, for the development of a RE park.

Gujarat has earmarked a vast area of 72,400 hectares of government wasteland in Khavda, Kachchh, located on the Indo-Pakistan border, for the development of a RE park. This ground breaking project is set to become the world's largest Renewable Energy park at a single location, showcasing a diverse range of renewable energy sources, predominantly wind and solar, along with energy storage technologies.

In an effort to significantly contribute to the Government of India's renewable energy (RE) goals of 500 GW by 2030, and to support the global sustainable development agenda while addressing climate change concerns, the Government of Gujarat has taken a major step in promoting renewable energy within the state.

This initiative, aligned with the 2019 policy for allocating government wasteland for the development of large wind, solar, and wind-solar hybrid parks, aims to achieve several key objectives.

One of the paramount benefits of the Khavda Renewable Energy Park lies in its strategic use of otherwise unproductive land. By repurposing these arid expanses, the park not only mitigates the environmental impact of traditional





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Petronet LNG Limited







Source: GPCL

energy projects but also ensures the efficient use of resources. This approach aligns with the broader goal of creating a cleaner and greener future for the region.

Furthermore, the park is set to play a pivotal role in reducing the overall cost of power. The economies of scale achieved through the centralised production of renewable energy will contribute to cost-effectiveness, making clean energy more accessible to a larger population. This, in turn, holds the potential to alleviate the burden of energy costs on households and industries alike.

Anotable aspect of the Khavda Renewable Energy Park is its capacity to generate employment opportunities. As the park becomes operational, numerous job openings will emerge, spanning across various skill sets and sectors. This not only bolsters the local economy but also fosters skill development and knowledge transfer in the renewable energy sector.

- Utilizing government-owned barren land in areas rich in renewable energy resources for the development of substantial RE projects.
- Enhancing the efficiency of the transmission network through the integration of hybrid capacities in RE parks.
- Minimizing the variability of renewable energy generation by combining different RE sources at a single location.
- Fostering technological advancement and embracing best practices in emerging fields like wind, solar, energy storage, etc.

In terms of technological advancements, the park serves as a testing ground for cutting-edge technologies, particularly in the realm of energy storage. The integration of

innovative storage solutions enhances the reliability and stability of the power grid, addressing the intermittent nature of renewable energy sources.

Additionally, the Khavda Renewable Energy Park promotes the optimization of transmission infrastructure. High-capacity transmission corridors eliminate the need for multiple lines from individual projects, streamlining land use and mitigating right-of-way issues. This approach enhances the overall efficiency of energy transmission, ensuring that the generated power reaches its intended destinations seamlessly.

In conclusion, the Khavda Renewable Energy Park is a visionary initiative that goes beyond power generation, aiming to create a sustainable and inclusive model for socio-economic growth. Through its multifaceted impact on land utilisation, cost-effectiveness, employment generation, and technological advancements, this park is poised to usher in a new era of green progress for Gujarat and beyond.



INDIA'S INTEGRATED ENERGY MAJOR

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GUJARAT'S SIGNIFICANT CONTRIBUTION TO INDIA'S ENVIRONMENTAL COMMITMENTS

The Gujarat Government is steadfast in its efforts to increase the non-fossil fuel energy capacity. We are investing heavily in renewable energy sources to ensure we are on the right path to meet the national goal of achieving 500 GW of non-fossil energy capacity by 2030, shares **Kanubhai Mohanlal Desai, Minister - Finance, Energy & Petrochemicals, Government of Gujarat** in an exclusive interview with **Hemangini S. Rajput & Muskan Jaiswal** of **Elets News Network (ENN).** Edited excerpts:



What are Government of Gujarat's initiatives in the field of environmental sustainability and green technologies that will be showcased at the Vibrant Gujarat Global Summit 2024?

Resonating with the Hon'ble Prime Minister's goals set at the COP26 Conference in Glasgow, our focus includes achieving significant milestones such as 100 GW of non-fossil energy capacity in State and 50% of our energy from renewable sources by 2030. We are also committed to reducing our carbon emissions by one billion tonnes and decreasing carbon intensity below 45% by 2030, with a goal of achieving net-zero emissions by 2070.

Additionally, the Vibrant Gujarat Global Summit 2024, will focus on cutting-edge areas such as semiconductors, green hydrogen, and electric mobility. We have an array of seminars and conferences lined up, covering topics like Industry 4.0, smart city development, renewable

energy, carbon neutrality, waste & water reuse and many more.

Furthermore, Finland, as a partner country for the summit, will exhibit sustainable solutions in various fields. A dedicated Country Session on January 11th will emphasize our strong bilateral trade ties, showcasing Finland's commitment to carbon neutrality.

What measures are being taken by the Government of Gujarat to contribute to India's commitment to the Nationally Determined Goals as declared by the Hon'ble Prime Minister at COP26, specifically in the context of the five point agenda to fight climate change or "The Panchamrit"?

The Government of Gujarat is actively contributing to India's commitment to the Nationally Determined Goals, in line with the Hon'ble Prime Minister's declaration at COP26, specifically in

the context of "The Panchamrit."

Firstly, the State has been a frontrunner in attracting the investment in renewable sector through conducive policy framework. Gujarat has tripled its renewable capacity from 7.5 GW in 2018 to 22 GW in 2023 which demonstrates its unwavering commitment.

Secondly, we are committed to ensuring that 50 per cent of our energy

The Government of Gujarat is fully committed to supporting India's ambitious goals set forth in "The Panchamrit" at the COP26.



requirements come from renewable sources by 2030. Our policies and incentives are tailored to encourage the rapid expansion of renewable energy infrastructure. This includes not only large-scale projects but also decentralized energy solutions to empower rural communities.

Thirdly, in our quest to reduce carbon emissions, we are implementing various green initiatives. These include promoting electric mobility, enhancing energy efficiency in industrial processes, and encouraging sustainable practices in urban and rural development.

Lastly, our long-term vision aligns with the goal of achieving net-zero emissions by 2070. To this end, we are not only focusing on expanding our renewable energy capacity but also investing in research and innovation to develop new technologies and sustainable practices. This includes fostering collaborations with national and international experts and institutions.

In short, the Government of Gujarat is fully committed to supporting India's ambitious goals set forth in "The Panchamrit" at the COP26. Through proactive policies, strategic investments, and collaborative efforts, we are dedicated to ensuring a sustainable and green future for Gujarat and contributing significantly to India's environmental commitments.

With the ambitious goal of reaching an impressive 100 GW of Renewable Capacity within the State by 2030, what is the current state of affairs, and can we anticipate a forthcoming roadmap for accomplishing this milestone at the upcoming Vibrant Gujarat Global Summit 2024?

Gujarat, under the visionary leadership of Hon'ble Prime Minister Shri Narendra Modi, has set forth ambitious objectives, targeting the generation capacity of 100 With an impressive wind power capacity of 11,176 MW and a solar power capacity of 10,516 MW, Gujarat stands as India's second-best state for renewable capacity

GW from renewables by 2030. This aligns seamlessly with the national goal of achieving 500 GW by the same year.

The success of the Jyotigram Scheme emphasizes the State's commitment to ensuring 24 hr electricity capacity. This initiative, which has reached even the remotest areas, including the tribal district Dang of Gujarat, brought 24 hours of electricity to these regions.

We have taken significant strides in providing continuous electricity to every village in Gujarat, making it the first State in India to achieve 24-hour power supply post implementation of the Jyotigram scheme in year 2004.

Even the Hon'ble Prime Minister of India while delving into the State's achievements in renewable energy had noted, "Gujarat benefits from both wind and solar energy." With an impressive wind power capacity of 11,176 MW and a solar power capacity of 10,516 MW, Gujarat stands as India's second-best State for renewable capacity.

We are very proud to announce that Gujarat's total installed capacity of 48,500 MW has established Gujarat as the leader in this aspect throughout the country.

Addressing the global commitment to carbon neutrality and with due emphasis to our Hon'ble Prime Minister Modi's vision for a carbon-neutral world by 2070. Gujarat's dedication to sustainable and environmentally conscious energy practices is noteworthy. These accomplishments and commitments will

undoubtedly be part of the comprehensive roadmap to be discussed at the upcoming Vibrant Gujarat Global Summit 2024.

What can be the other sectors that can expect major investment apart from the sectors that have shown illustrious growth in the last decade?

The Vibrant Gujarat Summit 2024 is set to showcase a major emphasis on hydrogen production along with renewable energy, and we are targetting major investment in renewable and semiconductor technologies at this year Vibrant Gujarat Summit.

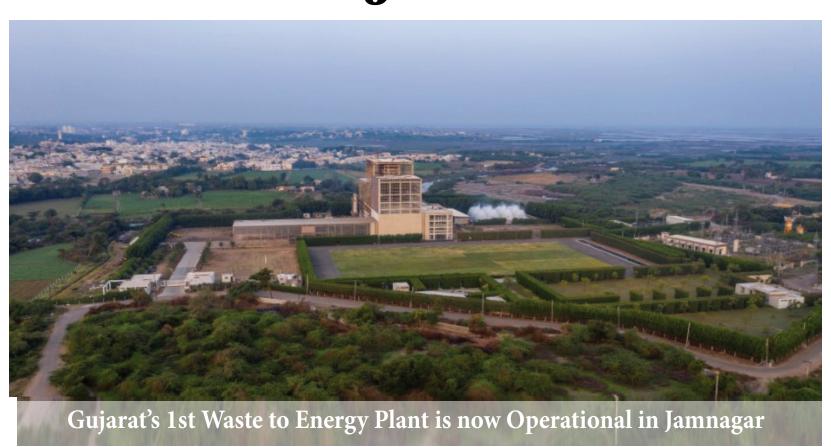
As Gujarat positions itself as a trailblazer in the renewable energy landscape, the Vibrant Gujarat Global Summit 2024 is poised to demonstrate the State's unwavering commitment to forging a green and technologically advanced future. This strategic investment direction aligns with the State's vision for pioneering advancements in both clean energy and innovative semiconductor technologies.

How can large battery storage stabilize Gujarat's power grids with the intermittent electricity from solar and wind energy?

The State caters more than 24,500 MW peak demand as it is envisaged to grow rapidly. The energy storage will play a crucial role in transition to clean and green energy.

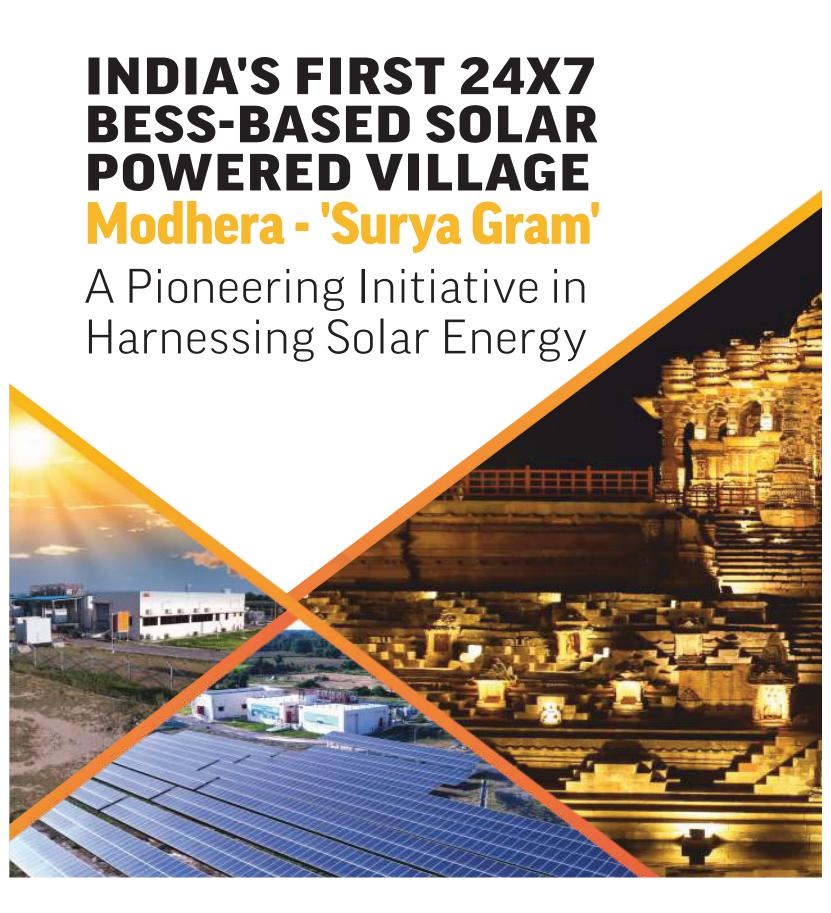
Edited by **Srajan Agarwal** & **Sheeba Chauhan** | Elets News Network (ENN).

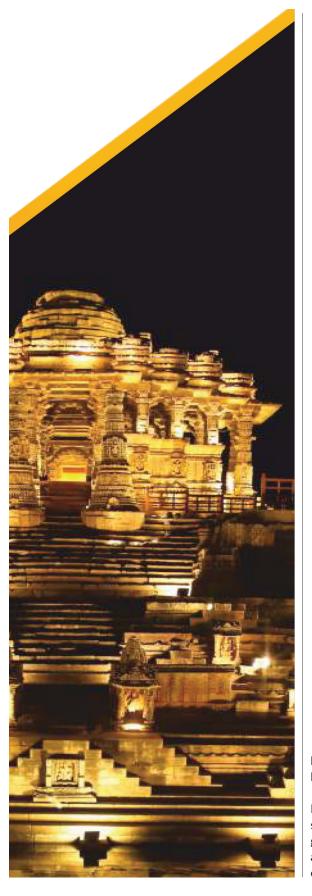
Taking the First Step towards a Garbage Free Gujarat











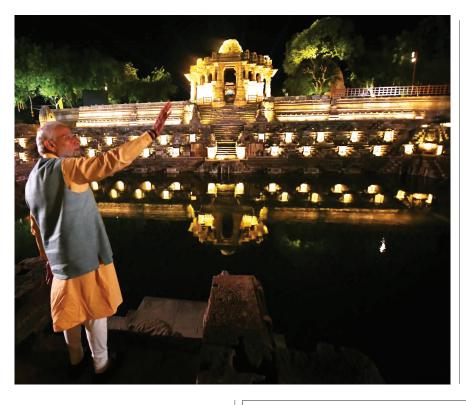


"Whenever there will be talks of solar power, Modhera will be the first name to emerge. Because here everything is running on solar power. Whether it is light, farm....even effort is being made to run buses, vehicles on solar power. For a self-reliant India of the 21st century, we must encourage such efforts for our energy needs. I am working day and night to take the country in the direction of providing (energy security) for Gujarat, the country, and to our coming generation," said Hon'ble Prime Minister Narendra Modiduring the launch of Modhera Sun Temple.

DERIVING INSPIRATION FOR PROGRESS FROM THE SUN

In Indian culture, the sun is worshipped since it sustains us, provides warmth and gives energy to all life on earth. The ancient practice of venerating natural elements and their association with humans was dedicated to the Sun God, considered the prime force and energy of the life cycle.

The temple at Modhera occupies a pride of place among Gujarat's religious destinations. India is never short of sunshine and the innumerable benefits



energy than solar power to which we can connect India's vast power requirements to, and safeguard ourselves and the environment.

India's 1st integrated state of the art solar project, was conceptualised by the Government of India, along with the Government of Gujarat and implemented through Gujarat Power Corporation Limited. It solarised the town of Modhera, in Mehsana, Gujarat. Since its completion, it is fulfilling the domestic, agricultural and commercial electricity needs of Modhera through solar energy.

The Solarisation of the town was a key part of the discovery of new frontiers for application of renewable energy. It enabled the country to move an important step forward towards realising our goal of becoming a Green Energy nation.

that it bestows. In the course of our efforts to reduce the nation's dependence on conventional sources of power, many of which are polluting and costly, we were faced with a possibility: Can the iconic Modhera Sun Temple be lit by Solar Power?

It was then felt there can be no better way to show our devotion than by illuminating the beautiful precincts of the Sun Temple & villages through solar power.

MODHERA TEMPLE DEDICATED TO THE SUN LIT BY THE SUN

Solar power plant along with BESS is providing round-the-clock illumination to the Modhera Temple. It puts the spotlight on conversion of solar energy into power to light the temple.

As the sun brightens the day, so too does solar power shed light on the modhera village and sun temple.

BLESSED BY CLEAN ENERGY, THROUGH SMART TECHNOLOGY

There is perhaps no cleaner and unlimited

A new dawn over Modhera

Modhera was the first-of-its-kind project that saw the exclusive supplying of the renewable power (solar energy) round the clock.

A 6 MW (PV) ground-mounted solar power plant with 15MWh Battery Energy Storage System (BESS) has been set up at Modhera which provides round the clock solar power to the entire village. 100% Smart meter connection in a rural area and its Smart Energy Center ensures management of energy at a micro

Modhera village's dependency on conventional sources of electricity generation has been completely eradicated after the implementation of Solar BESS project in their village

The solar project has also helped the villagers to waive off their electricity bills by 60-100%



Replacement of conventional meters by **smart meters** for close to 1700 residential and commercial connections



State of the Art real time Smart Energy Center **remote monitoring** the demand –supply situation of the village



1383 Numbers of 1 kW Solar Rooftop Systems is given in Modhera, Samlanapura & Sujjanpura



Government buildings are made self-sufficient by installing 316 KW capacity solar roof top systems



Usage of electric vehicles is being encouraged through ultramodern Solar Energy based electric vehicle charging station



THE MODHERA SOLAR PROJECT: USHERING IN A BRIGHT FUTURE

A 6 MW (PV) ground-mounted solar power plant with 15MWh Battery Energy storage System (BESS) has been set up near Modhera village. The Battery Energy Storage System feeds solar power 24X7 to the village. 1383 grid-connected Solar Rooftop Systems (1 kW each) (Modhera- 1177, Samlanapura- 105, Sujanpura- 101) have been installed, helping the village to unburden itself from the consumption of conventional energy. Gujarat Power Corporation Limited has also set up Smart Energy Components such as smart energy metres for individual households and 11 kV feeders, solar EV charging stations, smart streetlights and interpretation centre cum museum near the Sun Temple.

WORDS THAT ILLUMINATE THE HAPPINESS GENERATED

"We have benefited a lot from solar. Earlier my light bill used to be high in the whole society, but today we sleep in the air conditioner all night. Before solar people did not believe it but now everyone is taking advantage of it."

- Ramila Ben, Village Modhera

"We have benefited a lot from solar. The bill which used to come Rs.1000-2000 rupees earlier, now in reverse we are receiving Rs. 200-300 credit in our electricity bill."

- Dahyabhai Modhera, Village Modhera

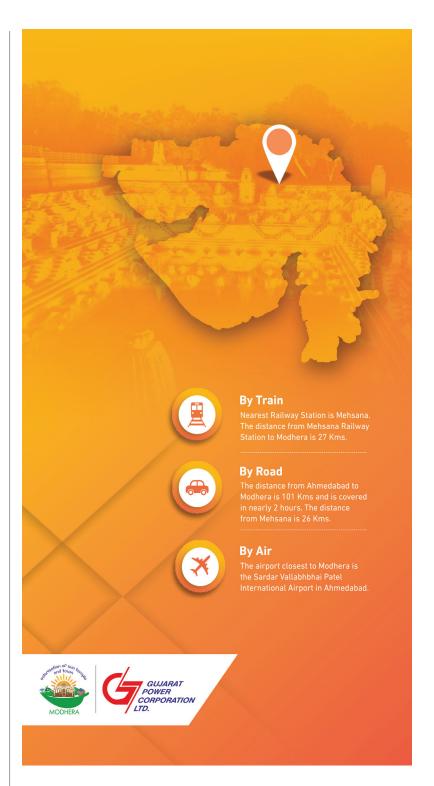
"Solar rooftop has been installed in our school. Our school has 10 smart classes, 10 projectors and 22 rooms with 4 fans and 4 tube lights. Its bill used to be Rs 4500 to 5000, but today the billing has stopped due to the installation of solar panels and in the last 6 months 16-17 thousand rupees credit in our electricity bill."

— Mahendra Bhai Nai, Principal, Modhera Anupam School

"We have benefited a lot from the solar panels. Earlier we used to receive huge electricity bills; but nowadays, we don't have to pay anything at all. I want to say, "Thank you!" to Modi Ji."

Rutvi Patel, Amarpura Vas Village Modhera

"The whole village has benefited, including me after the installation of Solar PV Panels. Earlier,



we used to pay for electricity; but now we do not have to pay anything. We have received freedom from the hassle of paying electricity bills, thanks to Solar installations."

 Bipin Patel, Village Modhera Inputs credit: Gujarat Power Corporation Limited



VIABILITY GAP FUNDING PAVES THE WAY FOR INDIA'S RENEWABLE STORAGE REVOLUTION

s Gujarat looks towards a sustainable future, the Union Cabinet's approval of the Viability Gap Funding (VGF) scheme comes significant milestone. This initiative is not just a leap in India's energy policy but a transformative moment for Gujarat, which has been pioneering in harnessing solar and wind energy. With an ambitious outlay of Rs 9,400 crore, this scheme promises to address one of the most pressing challenges in the renewable sector: energy storage. For Gujarat, a state with vast renewable resources, this move unlocks the potential for more efficient use of its wind and solar power.

This groundbreaking scheme, pivotal in fortifying the nation's renewable energy sector through a robust storage system, resonates strongly with Gujarat's progressive energy vision. The state, already a leader in solar power generation, can now envisage a future where excess energy is not wasted but stored and utilized effectively. The development of 4,000 MWh of Battery Energy Storage Systems (BESS) by fiscal year 2031 under this scheme is a gamechanger, promising to enhance Gujarat's energy security and sustainability.

In a pivotal moment that reshaped the trajectory of India's energy landscape, the Union Cabinet approved a groundbreaking

scheme aimed at fortifying the nation's renewable energy sector. This visionary initiative, backed by viability gap funding (VGF), unfolded as a strategic response to the imperative need for a robust storage system capable of harnessing excess wind and solar power.

With an initial outlay of Rs 9,400 crore, including substantial budgetary support of Rs 3,760 crore, the scheme charted a course for the future of renewable energy storage. The VGF, disbursed over three years from fiscal year 2024 to fiscal year 2026, was capped at 40 per cent of the capital cost. This foresighted investment propelled the development

of 4,000 megawatt hours (MWh) of Battery Energy Storage System (BESS) projects by the fiscal year 2031.

The selection of BESS developers eligible for VGF grants unfolded through a rigorous competitive bidding process, fostering healthy competition and innovation. Public and private sector entities actively participated, ensuring a transparent and merit-based allocation of funds for the development of energy storage projects.

In recent years, Gujarat has made significant strides in renewable energy. As of 2023, the state boasted a remarkable capacity of over 10 GW in solar energy, making it a national leader in solar power generation. Additionally, Gujarat has been proactive in implementing green initiatives, such as the Suryashakti Kisan Yojana (SKY), which empowers farmers to generate solar power and sell surplus energy back to the grid. This not only boosts their income but also contributes to the state's renewable energy goals.

Furthermore, Gujarat's recent push towards wind energy complements its solar achievements. With an installed capacity of over 7 GW in wind energy, the state is harnessing its coastal wind potential to further diversify its renewable energy portfolio. These initiatives, coupled with the new VGF scheme, position Gujarat not just as a participant but as a leader in India's renewable energy storage revolution. This comprehensive approach to renewable energy, integrating both generation and storage, sets a precedent for other states and highlights Gujarat's commitment to a sustainable energy future.

During a media briefing on the cabinet's decisions, Anurag Thakur, Union Minister for Information & Broadcasting, underscored the imperative of storing excess renewable energy. He explained, "If the production of electricity is more than the demand, then how do you store that, since we presently don't have such facilities in the country? Therefore, we



introduced this scheme to develop capacities to store excess renewable energy produced in energy storage systems."

The Minister emphasized the effective utilization of stored energy to bridge supply gaps during peak hours, providing a viable solution to the challenge of intermittent energy production. He highlighted the dual benefits of reducing carbon emissions and decreasing the country's reliance on fossil fuels, marking a significant achievement in the pursuit of a sustainable energy future.

Beyond its role in enhancing renewable energy integration into the electricity grid, the scheme aimed to minimize wastage while optimizing the utilization of transmission networks. This strategic approach not only obviated the need for costly infrastructure upgrades but also ensured that consumers of distribution companies were among the primary beneficiaries.

The Minister elaborated on this aspect, stating, "An important aspect of the scheme is that consumers of distribution companies will be among its first beneficiaries. Companies availing VGF for setting up BESS infrastructure are required to give 85 per cent of the

power to distribution companies. The rest can then be shared with other consumers."

For the state of Gujarat, the VGF scheme is more than just a policy; it is a roadmap towards a greener, more sustainable future. As the state continues to play a critical role in India's renewable energy expansion, this initiative aligns perfectly with its ambition to become a renewable energy powerhouse. The scheme's focus on reducing carbon emissions and reliance on fossil fuels reflects Gujarat's commitment to environmental stewardship and sustainable development.

In conclusion, the Viability Gap Funding scheme is not just a transformative step for India but a strategic win for Gujarat. It propels the state further along its path of renewable energy leadership, setting a benchmark for other states to follow. This forward-thinking approach, building upon earlier government efforts and integrating innovative storage solutions, cements Gujarat's position at the vanguard of India's journey towards a sustainable, green energy future. This scheme, in essence, is a testament to the state's unwavering commitment to innovation. sustainability, and a brighter, cleaner future for all.

GUJARAT ENERGY TRANSITION A CUT ABOVE!

From developing Asia's largest solar park - Charanka, to constructing the world's largest Renewable Energy Park in Kachchh, from being the first State to launch a Renewable Energy policy to emerging as a leader in Green hydrogen production, Gujarat leads the nation in the clean energy transition, shares **Mamta Verma, IAS** - Principal Secretary, Energy & Petrochemicals Department, Government of Gujarat, in an exclusive interaction with **Hemangini S Rajput** & Muskan Jaiswal of Elets News Network (ENN). Edited excerpts:

Gujarat accounts for 20-25% of India's green hydrogen market, driven by industries with high decarbonization challenges. Oil refineries contribute to 65% of the State's hydrogen demand, while fertiliser production and other industries contribute the remaining 35%. What steps are being taken to the Green Hydrogen increase production in Gujarat?

In alignment with India's strategic vision for energy independence and the pursuit of Net Zero by 2070, the National Green Hydrogen Mission (NHM) was unveiled on January 13, 2023. This mission, with the ambitious goal of achieving a domestic green hydrogen production of 5 million tonnes per annum (MTPA) by 2030, will position India as a global leader in green hydrogen production. The NHM aims to add 125 GW of renewable energy generation capacity, accompanied by a substantial investment of INR 8 lakh crore in the green hydrogen ecosystem by 2030.

Earlier this year, we allotted nearly 199,000 hectares of land in Banaskantha and Kachchh districts for setting up green hydrogen projects, with a 40-year lease. This will provide a steady recurring revenue to the State exchequer.



>> MAMTA VERMA. IAS Principal Secretary - Energy & Petrochemicals Department Government of Gujarat

energy installations planned on this land is immense. The companies have proposed setting up a combined 99,814 MW of solar and wind power projects, exclusively dedicated to the production green hydrogen. Once fully operational, these renewable energy projects are expected to facilitate a production of nearly 40 lakh metric tonnes of emissions-free hydrogen annually.

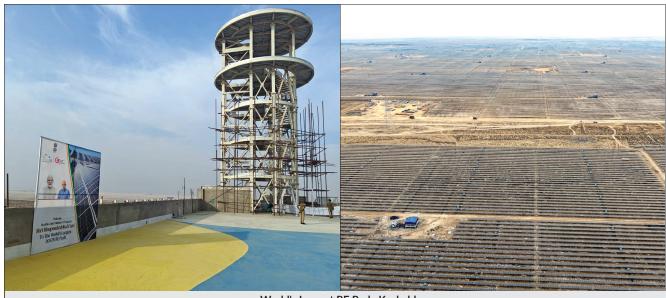
More importantly, the scale of renewable | This will not only make Gujarat a global

leader in green hydrogen but also go a long way in decarbonizing our energyintensive industries and help achieve our climate goals.

In another major project commissioned in 2022, Larsen & Toubro's green hydrogen plant in Hazira uses an electrolyzer capacity of 800 kW along with a 990 kW rooftop solar plant and 500 kWh battery storage. This pilot project will provide valuable insights into integrating intermittent renewable power on a large scale for hydrogen production.

We are in discussions with multiple global green hydrogen producers and technology firms to bring more investment and set up large gigawattscale renewable energy-based hydrogen plants across the State. This will help significantly boost our green hydrogen production and utilization in the coming years.

LNG Terminal Projects in Gujarat can be termed the most prominent projects for sustainable development. Could you throw some light on the progress and their expected contribution to the State's energy infrastructure? Furthermore, how is the Government ensuring the safety and environmental compliance of these terminals?



World's Largest RE Park, Kachchh

Gujarat is home to 3 operational LNG terminals which accounts for 66% of India's total regasification capacity. Two more terminals of 5 MTPA capacity each are in advanced stages of being commissioned, thereby making Gujarat the gateway for LNG imports into India. LNG terminal projects in Gujarat stand as pivotal contributors to sustainable development initiatives, with continuous updates on their progress available through official channels. These projects, integral to the State's energy infrastructure, undergo stringent safety measures and environmental compliance ensured by the Government. To mitigate potential risks associated with LNG terminals, robust safety protocols and environmental

impact assessments are diligently implemented.

The significance of LNG Terminal Projects for sustainable development is highlighted by their advanced stages and the promise of enhancing the State's energy infrastructure. There is a strategic focus on capacity enhancement, aiming to increase terminal capacities for more efficient energy distribution. The Government's commitment to safety and environmental compliance is underscored by the enforcement of strict regulations, regular inspections and collaboration with relevant stakeholders. This concerted effort ensures the sustainable operation of LNG terminals,

aligning with Gujarat's commitment to responsible and eco-friendly energy development.

Can you provide an overview of the key initiatives and projects that the Energy & Petrochemicals Department is currently working on to promote sustainable energy and petrochemical development in Gujarat?

I, as the Principal Secretary of Energy & Petrochemicals Department in the Gujarat Government, am proud to highlight our State's achievements and ongoing efforts in promoting sustainable energy and petrochemical development. Thanks to the visionary leadership of our Hon'ble Prime Minister and the former Chief Minister of Gujarat, Shri Narendra Modi, our State has emerged as a leader in renewable energy.

We established the first Climate Change Department in the country, dedicated to implementing measures for sustainability, energy transition, and achieving net-zero goals. Gujarat is also the pioneer in issuing policies on renewable energy, providing incentives to encourage its development. Presently, we lead the



nation in installed wind power capacity, constituting 25% of the country's total capacity. In fact, Gujarat Government has been very proactive in the renewable energy space since many years now. For instance in 2009, the Gujarat Government announced a solar policy to increase the sector's growth and power supply affordability. Additionally, Gujarat boasts the highest installed rooftop solar capacity, contributing to 26% of India's overall rooftop solar capacity.

In terms of total installed capacity, Gujarat ranks first among all states in India, showcasing an impressive capacity of approximately 48.5 GW. Gujarat also takes the lead in residential rooftop solar, holding an impressive 82% share of the country's installed capacity. Notably surpassing India's per capita electricity consumption, Gujarat stands at 2283 units, emphasising our commitment to socio-economic growth.

The long-awaited Hydrogen Valley Project has been launched in Gujarat, aiming to establish a localized hydrogen value chain serving multiple sectors such as mobility, industry, and energy. The Hydrogen Valley Innovation Cluster in Gujarat aligns with India's goal to create clean Hydrogen Valleys by 2030. In the fiscal year 2022-23, Gujarat Gas Ltd. accomplished India's inaugural Pilot Project for a CGD business, incorporating Green Hydrogen blending with DPNG supplies at NTPC Kawas Township. This successful initiative involved blending of 5% Hydrogen into the DPNG network, providing sustainable energy to over 150 households.

Furthermore, we are actively involved in groundbreaking projects such as the Charanka Solar Park, and also in the process of developing the world's largest 30 GW RE Park. These initiatives underscore Gujarat's unwavering dedication to fostering innovation, sustainable development, and economic growth.

Gujarat has been a leader in renewable energy production.



Could you share some insights into the State's achievements and plans in the renewable energy sector, such as solar and wind energy?

Gujarat has been a leader in renewable energy production, showcasing a proactive commitment to India's ambitious 2030 targets. With 10.5 GW of solar capacity and 11.1 GW of wind capacity, the State plays a pivotal role in the nation's green energy transition. The Gujarat Government's proactive efforts are evident in projects like the "Gujarat Solar Park," Asia's largest, covering over 2179 hectares in Charanka village, Patan district. Commissioned by 36 developers, the park has 730 MW of solar projects and 4.2 MW of wind power.

A key initiative we have undertaken is to provide renewable energy access to the villages near Modhera. Under this initiative, we have installed a 6 MW ground-mounted solar power plant alongside a 15 MWh Battery Energy Storage System at Modhera village. The battery storage plays a vital role in ensuring solar power generated during the day is available around the clock for village residents.

The Raghanesda and Dholera solar parks are also operational and contributing towards the clean energy goals of the State of Gujarat. Nestled in the Mahadevapura-Bhangarh village near the Dholera region of Ahmedabad district, Gujarat, the

Dholera Ultra Mega Solar Park (UMSP) is a sprawling venture spanning around 2,000 hectares of wasteland.

Similarly, in 2014, the Government of Gujarat embarked on an ambitious initiative to harness solar energy by initiating plans for the Raghanesda Ultra Mega Solar Park in Banaskantha District. These initiatives not only combat climate change but also emphasize state-of-theart infrastructure and environmental preservation.

How does energy storage technology in Gujarat help in managing the State's high energy demands and contribute to reducing dependency on fossil fuels?

The State's industrial prominence also brings with it high energy demands. Energy storage technology in Gujarat can play a vital role in balancing these energy demands, especially during peak usage hours. By storing excess energy generated during periods of low demand, such as midday for solar power when industrial demand might be lower, this energy can be used during the evening when demand spikes. This not only enhances the overall efficiency of the energy system but also helps in reducing dependency on traditional fossil fuel-based power plants, aligning with national goals for reducing carbon emissions.

Edited by **Abhineet Kumar**, Elets News Network (ENN).



Welspun New Energy is delighted to partner with the **Government of Gujarat** to power the Nation's clean energy drive

Building a vibrant energy ecosystem in Gujarat for a sustainable future

- Assent for developing Renewable Energy (RE) on ~20,000 acres of land in Gujarat for production of Green Hydrogen, with proposed investment of INR 40,000 crore
- Participated to secure land at Kandla Port for setting up Green Hydrogen ecosystem
- 1,000 MW of RE projects in pipeline for manufacturing units based in Gujarat

Pioneering energy transition in line with India's Net Zero goal

- Successful bidder in SIGHT scheme for development of 20,000 MTPA Green Hydrogen facility
- MoU with leading Hydrogen hubs for export of domestically produced Green Molecules

HOME TEXTILES | ADVANCED TEXTILES | FLOORINGS | BUILDING MATERIALS | INFRASTRUCTURE | WAREHOUSING | NEW ENERGY















Wardwizard's >>> Pioneering Journey



The Indian EV Landscape has sought a position of being one of the highly dynamic and rapidly evolving industries in the past decade. Amidst this, Wardwizard Innovations & Mobility Ltd. steered by the visionary leadership of Mr. Yatin Gupte, stands as a beacon of innovation, orchestrating a transformative shift in the nation's mobility arena. The convergence of heightened environmental awareness, rapid technological strides and proactive government policies set the stage for a monumental evolution in sustainable transportation.

As the first-ever listed entity on the Bombay Stock Exchange (BSE) dedicated to EV manufacturing, Wardwizard has been a frontrunner in shaping the future of sustainable mobility in India since 2016. This unique distinction underscores the company's commitment to pioneering advancements in the EV sector, setting new standards for excellence and contributing significantly to the transformative journey of the nation's automotive industry.

EV Ancillary Cluster



Wardwizard goes beyond EV manufacturing, aspiring to be a catalyst and driving force behind India's EV revolution. Spanning across an area of 100 acres stands India's first EV Ancillary Cluster envisioned to electrify the entire ecosystem and align seamlessly with the state's vision of green mobility. The cluster, fueled by the vision of self-reliance, shall drive research and development of electric two and three-wheelers, setting up a motor assembly line, lithium-ion cell production, and developing ancillaries under one roof to manufacture essential components like Motor, Battery, Chassis, Steel parts, Chargers, Controllers, all under one roof at Vadodara.



A monumental development in this phase is the Memorandum of Understanding (MOU) of Rs. 2,000 crores inked with the Government of Gujarat for establishing an EV ancillary cluster in Vadodara. This visionary move aims to make Gujarat the next sought-after EV Hub of India. This move shall not only boost the EV infrastructure of the state but shall also generate 5000+ employment opportunities.



Driving the Global Research and Development wing of the Company and acting as a Partnership Platform with Global Giants, comes the establishment of Wardwizard Global Pte. Ltd in Singapore, the Global R&D Center of Wardwizard. The Centre plays a vital role in the sector's evolution with unparalleled research and innovation ability. Recently, the Centre has undertaken a strategic partnership with A&S Power to manufacture cutting-edge Li-ion cell technology. The synergy with A&S Power, a renowned technology provider, exemplifies Wardwizard's vision to drive research, innovation, and the development of cutting-edge next-generation Li-ion cell technology. As the first milestone of this OEM agreement, Wardwizard has successfully manufactured has successfully manufactured the first batch of GAJA 26650 5000mAh cells. This move is instrumental in realizing the vision of establishing India's first EV ancillary cluster in Gujarat.

Alliance with BEEAH Group, UAE



The strategic alliance with the BEEAH Group (BG) headquartered and coowned by the Sharjah Government, amplifies Wardwizard's commitment to advancing the electric vehicle industry globally. This collaboration aims to promote electric vehicle usage across GCC countries and African nations.

Patnership with Triton EV (TEV)



Wardwizard collaborated with Triton EV, a U.S.-based EV manufacturer for manufacturing battery-operated trucks in India and the UAE. The association also includes partnering for the technology transfer of hydrogen battery packs in two and three-wheelers by Triton EV.

EV Excellence Center at Dogra Regimental Centre, Ayodhya



Beyond EV manufacturing, Wardwizard has embarked on a transformative journey by contributing to the holistic growth of the EV ecosystem. In a strategic move towards skill development, Wardwizard signed an MOU with the Dogra Regiment, establishing Wardwizard's EV Centre of Excellence in Faizabad, Uttar Pradesh. This collaboration aims to provide specialized skill development opportunities in the flourishing Electric Vehicle (EV) industry for 'Agniveers' and other retired army officers.

Wardwizard's visionary investments echo its commitment to fortifying the EV ecosystem in India. With 10+ distinctive products ranging from low-speed EV two-wheelers to advanced high-speed EV scooters & bikes, and electric three-wheelers catering to the commercial segment, the commitment to providing innovative and sustainable solutions remains unwavering. The Company's footprint has expanded significantly, with a network of over 750+ touchpoints in 19 states & 3 union territories across 400+ cities, ensuring that our sustainable mobility solutions are accessible to the farthest corners of India. As the company continues to make strides in technological advancements and green mobility, Wardwizard stands poised at the forefront of India's electric vehicle revolution.



ARUN MAHESH BABU, IAS Managing Director Gujarat Power Corporation Limited & Uttar Gujarat Vij Company Limited



GUJARAT

IS ACTIVELY EXPLORING AND PRIORITIZING RENEWABLE ENERGY SOURCES

In the dynamic landscape of India's energy sector, where sustainable practices and technological innovation take center stage, Gujarat Power Corporation Ltd (GPCL) emerges as a pioneering force. With a strategic focus on renewable energy, grid modernization, and cutting-edge technologies, GPCL is at the forefront of shaping a resilient and eco-friendly energy future for the state of Gujarat, shared **Arun Mahesh Babu, IAS**, Managing Director, Gujarat Power Corporation Limited & Uttar Gujarat Vij Company Limited in an exclusive interaction with **Hemangini S Rajput** of **Elets News Network (ENN)**. *Edited excerpts:*



Due to the increasing focus on renewable energy in India, how is Gujarat Power Corporation Ltd adapting its strategies to integrate more renewable sources like solar and wind power into its energy mix? What challenges and opportunities do you foresee in this transition?

Gujarat has unveiled its renewable energy policy focusing on leveraging the State's potential of 36 GW of solar and 143 GW of wind capacity to enable a cost-effective and reliable power supply. GPCL, as designated Nodal agency for solar and other renewable energy projects by the Government of Gujarat, is leading from the front and is well committed to achieving the Hon'ble Prime Minister's vision to fight climate change and achieve Zero Carbon Emissions by 2070.

The State's Renewable power generation capacity stands at 22,435 MW as of today, intending to become

a global hub for the Renewable Power sector and has laid out an ambitious plan for hydrogen manufacturing in the State. Out of total installed power generation, approximately 46.24 % is Renewable Energy which makes ~12.5% of India's total Installed Renewable Energy capacity (including large hydro).

We have started the World's Biggest RE Park at Khavda in Kachchh, with a total generation capacity of 30GW by December 2026. This will be the first of its kind, which will have multiple energy generation sources mainly Wind, Solar and equipped with Battery Based Energy Storage systems (BESS).

The Renewable Energy sector offers opportunities for job creation, ranging from manufacturing and installation to research and development, by diversifying the energy mix, we are on the path of creating a more resilient and robust energy system, reducing

vulnerability to supply disruptions and price fluctuations.

Advancements in renewable energy technologies are necessary to improve efficiency, reduce costs, and address challenges associated with intermittent storage. As the current estimated cost of 6-Hour BESS is around 10 Crore/MW, developing costeffective and efficient energy storage technologies is crucial for storing excess energy generated during peak times and supplying it during periods of low renewable energy production. The large-scale deployment of renewable energy infrastructure may impact ecosystems and biodiversity, balancing the need for clean energy with environmental conservation is also one of the challenges.

Could you elaborate on the steps Gujarat Power Corporation Ltd is taking towards grid modernization and infrastructure development to meet the growing demand for electricity in the state?



Gujarat has unveiled its renewable energy policy focusing on leveraging the State's potential of 36 GW of solar and 143 GW of wind capacity to enable a costeffective and reliable power supply.

We are working on deploying energy storage systems to store excess energy during periods of high generation and release it during peak demand times, pumped storage, or other storage solutions to enhance grid flexibility.

The Modhera Sun Temple & Village is fully solarized with a 6 MW Grid Connected Ground-Mounted Solar PV Power Plant & 15MWh Battery-based Energy Storage System that shows our capabilities in new technology implementation.

How are you leveraging cutting-edge technologies like AI and IoT to enhance the efficiency and reliability of power distribution in Uttar Gujarat Vij Co Ltd? Can you share any specific projects or initiatives in this area?

At GPCL, we leverage AI (Artificial Intelligence) and IoT (Internet of Things) to enhance the efficiency and reliability of electricity distribution in a state. We have already started deploying sensors across the power grid to monitor and collect data on voltage, current, power quality, and other relevant parameters.

We are establishing a robust data collection and management system to handle the massive amounts of data generated by IoT sensors and other devices. Our goal is to make the grid dynamically adjust voltage levels, reroute power, and implement a proper load balancer.

Implementing AI algorithms is crucial for analyzing the collected data, identifying patterns, anomalies, and gaining deep insights. For example, determining which month generally has the highest energy requirement, identifying the peak time every day, and forecasting the energy requirement in upcoming months are essential. Predictive models play a key role in addressing potential failures, identifying areas prone to outages, and optimizing energy distributions. GPCL is planning to upgrade the existing infrastructure to enable bidirectional communication between devices. allowing real-time data exchange.

Uttar Gujarat Vij Co Ltd was awarded as the Best-Performing Power

Distribution Utility by the Central Board of Irrigation & Power (CBIP), New Delhi, in 2020. To upgrade the existing infrastructure for betterment of monitoring of consumed power, authorities are implementing smart metering systems across the state. These measures will further enhance power distribution efficiency.

In light of the urgent need for sustainable practices, what are the key environmental goals for your organization, and how are you planning to achieve them? What measures are you implementing to reduce the carbon footprint of power generation and distribution?

To maintain global warming within the desired thresholds of 2°C, ideally, no more than 1.5°C, worldwide greenhouse gas (GHG) emissions must decrease by 25 to 50 per cent over the current decade. In the pursuit of a greener and more sustainable future, Gujarat has implemented the Centre's Carbon Credit Trading Scheme (CCTS) in the state.

An MOU was signed between the Government of Gujarat, the Energy Policy Institute University of Chicago, and J-PAL of South Asia. As a result of this MOU, Gujarat is set to become the first state in the country to consider carbon market planning. The state has initiated a significant pilot project for the Trading Scheme for 'Particulate Matter' in Surat, in collaboration with the Forest. Environment, and Climate Change Department, Central Pollution Control Board, and Gujarat Pollution Control Board. About 350 highly polluted industries in Surat are benefitting from this project, leading to a 24% reduction in emissions and a consequent improvement in air quality.

Gujarat is actively exploring and prioritizing renewable energy sources, such as solar, wind, hydro, and geothermal power. The state is in the process of setting up offshore windmills with a capacity of 32-36 GW. Additionally, onshore windmills along the seashore of Bhavnagar are planned. This ambitious project envisions a wind power generation capacity of 2GW.

By 7th January 2024, Government of Gujarat signed 20 MoUs for a proposed investment of INR 9 L Crore in the field of Green Hydrogen. The aim is to make Gujarat a preferred destination for green hydrogen and derivatives production and exports, with a target of 10,000 tons per annum (TPA) green hydrogen production capacity by 2025. There is also potential to reach a capacity of 1 million tons per annum (MTPA) by 2030, supporting India's ambition of becoming energy independent by 2047.

As a leader in the energy sector, what are your future endeavors and vision for the industry? How do you plan to influence the direction of energy development and policy in India in the coming years?

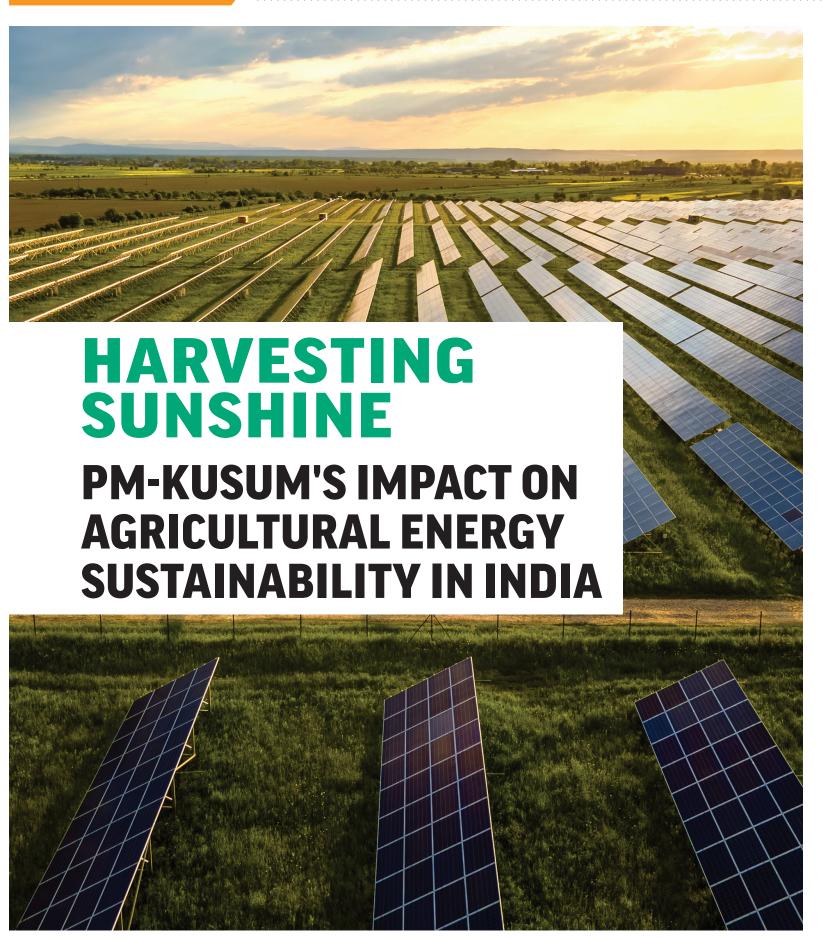
We're tackling issues like making clean energy financially viable, finding ways to



The Modhera Sun
Temple & Village is
fully solarized with a
 6 MW Grid
Connected GroundMounted Solar PV
Power Plant &
15MWh Batterybased Energy Storage
System that shows
our capabilities in
new technology
implementation.

scale projects up, and deciding which clean technologies to invest in, all while competing with different energy options, each country has its unique challenges and opportunities like Gujarat has been blessed with 1600 km of coastline which is great opportunity for onshore and offshore wind projects, similarly Rajasthan has Thar desert which they are utilizing for solar parks.

Solving nation's energy challenge, is a big task. So, we're encouraged to come up with fresh ideas and work together, to create a cleaner and more secure energy system. The Country needs an affordable, reliable, and sustainable energy system, and for this global undertaking, we need stakeholders from across the private sector, Government, and academia. Factors like robust economic growth, the adoption of renewable energy, collaboration with other nations, and working together regionally are all crucial pieces of the puzzle for the future of energy. With our collective efforts, these challenges will become opportunities for a cleaner and sustainable world.



pitomizing the development mantra of Sabka Saath, Sabka Vikas, Sabka Vishwas, Sabka Prayas in its truest form, the Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahabhiyan (PM KUSUM) has reaped a rich harvest for the farmers across the nation when it comes to meeting their energy needs and harvesting the supreme sun energy for the irrigation in their farmlands.

The scheme implemented by the Ministry of New and Renewable Energy (MNRE) Government of India across the country is aimed at offering cleaner and cheaper alternatives to diesel-run agricultural pump sets used by farmers to irrigate farmlands with solar power-run agricultural pumps. Moreover, it also supports the idea of ensuring daytime power supply to the farmers using solar energy for irrigation purposes.

The main objective of the PM KUSUM scheme is to add solar capacity with central financial support including service charges to the implementing agencies. The scheme has three major components which are as under:

- Component A: Solar capacity through the installation of small Solar Power Plants of individual plants of capacity up to 2 MW.
- Component B: Installation of standalone Solar Powered Agriculture Pumps.
- Component C: Solarization of Gridconnected Agriculture Pumps.

SALIENT FEATURES OF THE SCHEME

Component A

- Solar energy-based power plants (SEPP) of capacity up to 2 MW within the periphery of 5 KM from the Substation may be set up by individual farmers/groups of farmers/ cooperatives/ panchayats/ Farmer Producer Organisations (FPO)/ Water User associations (WUA).
- The solar power generated will be purchased by DISCOMs at a feed-in-



tariff (FiT) viz. Pre-fixed levelised tariff @2.95 per unit subject to approval of Gujarat Electricity Regulatory Commission (GERC).

Component B

- Individual farmers will be supported to install standalone solar Agriculture pumps of capacity up to 7.5 HP in off-grid areas, where grid supply is not available.
- Financial Mechanism
 - □ 30% CFA from MNRE up to 7.5 HP
 - ☐ 30% Subsidy from the State Government
 - ☐ 40% Contribution by Farmer
- Challenges
 - ☐ Under the State of Gujarat grid is available in most of the areas, however there are areas where the grid is to be passed through the forest areas, where installation of grid is techno/commercially not viable due to additional expenditure incurred

- towards Compensatory afforestation charges and N.P.V (Net Present Value) charges.
- ☐ Moreover, in forest areas the farmers have relatively lesser land areas i.e. less than 1 Acre land.

Special Provision made under Gujarat

- □ In Gujarat special provision is made to provide additional subsidy in case of a line passing through a forest area and where grid connection is techno/ commercially not viable. In such cases, an applicant of the TASP area does not have to pay any contribution, while other than the TASP area, the applicant needs to pay only minimum fixed charges on a per KW basis as approved by GERC.
- ☐ Under the State of Gujarat, beneficiaries of forest areas having a minimum agricultural land area of 0.2 acres are allowed.

Component C: Individual Pump Solarisation (IPS)

- Individual farmers having gridconnected agriculture pumps will be supported by solarise pumps.
- The farmer will be able to use the generated solar power to meet the irrigation needs and the excess solar power will be sold to DISCOMs.
- Financial mechanism:
 - ☐ 30% CFA from MNRE up to 7.5 HP
 - ☐ 30% Subsidy from the State Government
 - 40% Contribution by Farmer

Component C: Feeder Level Solarisation (FLS)

- Solar plants of capacity that can cater to the requirement of the agriculture load of the selected feeder can be installed by competitive bidding through RESCO mode for a project period of 25 years.
- CFA of 30% on the cost of installation of a solar power plant (up to Rs. 1.05 Cr/MW) will be provided to the RESCO.

In Gujarat, an incentive of Rs. 0.10
per unit (for consuming power less
than benchmark consumption) will
be provided to farmers for saving
water/ energy based on
Benchmarked consumption.

Challenges:

- ☐ Initially upper ceiling for bidding tariff was fixed @ Rs. 2.40 per unit
- Lack of economies of scale for small-scale diffusion of about 1 MW.
- ☐ Technical qualification criteria viz. execution of supply, installation & commissioning of grid-connected solar power plant with a cumulative capacity of 500 kWp considering the capacity of individual solar power plants of 3 kWp or more during the last five years.
- ☐ Financial qualification criteria viz. positive net worth of last three financial years and in case of JV at least one member must full fill this requirement.

- ☐ Other Conditions viz. in principle land documents within 90 days from the date of issuance of work order after which PPA shall be signed, final land documents shall be submitted by SPG within 4 months after the date of signing the PPA.
- Amendments made to overcome the challenges:
 - ☐ Remove the upper ceiling for quoting the tariff under the FLS tender and allow the bidders to quote the tariff.
 - ☐ To increase the viability of the project the eligible feeder is to be clubbed together in such a way that the plant capacity is formed to the tune of 4 MW.

To get more participation and discovery of reasonable and competitive tariffs, the following steps are initiated which are as under:

Bidder type:

□ Instead of only the Developer (Company Ltd/Pvt Ltd/LLP/Partnership/Proprietorship) bidding the tender, it is suggested that Company-Ltd/Pvt Ltd/LLP/Partnership/Proprietorship/an individual/group of farmers/cooperatives/panchayats/Farmer Producer Organizations (FPO)/Water User associations (WUA) or any legal body can participate and bid the tender

Technical experience Criteria:

☐ Technical qualification criteria are removed.

• Financial Criteria:

- ☐ Positive Net-Worth:-To get more participation leading to competition, the criteria relaxed to ask positive Net worth of the last year.
- Joint Venture: to remove such restriction for the formation of JV so that individuals/farmers/firms with more than two can form a JV to participate in the bid.

Land document:

☐ The land documents shall be produced by the bidder at the



time of commissioning of the project.

• Computation of Solar Plant capacity & Bucket Filling:

- □ Instead of above 80% of 7.5HP connections of 11 KV feeder criteria, to cover all the feeders of the selected substation covering AG consumers' load up to 7.5 HP.
- ☐ For a quoted solar capacity, the bidder is allowed to set up the project at multiple locations with a minimum project size of 0.5 MW and a maximum project size of 4 MW in a given sub-station.

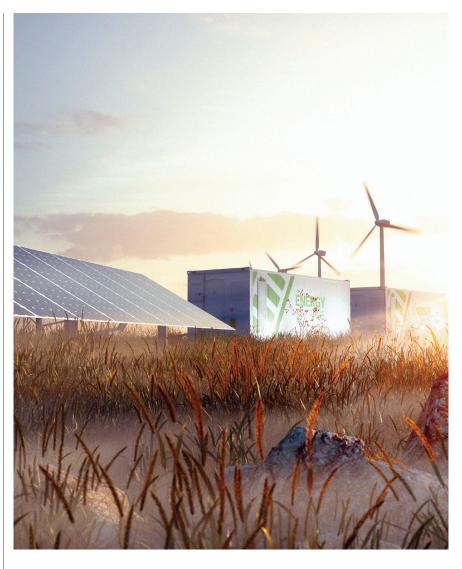
PRESENT STATUS OF THE SCHEME

Standalone Solar Power Agriculture Pumps

- Total 2459 number of farmers from the state of Gujarat have received benefits under the Scheme
- Financial assistance provided to 2459 no. of farmers is as under:
 - ☐ CFA from MNRE (30%) Rs. 2582.97 lakh
 - ☐ State subsidy (including additional subsidy) Rs. 5580.68 lakh
- MNRE has Sanctioned 5623 Nos. of pump sets.
 - ☐ GoG's Budget:- Rs. 152.120 Cr
 - ☐ Total of 9 vendors allotted to Gujarat by MNRE are empaneled.
 - ☐ The PM KUSUM state portal was made open to accept applications from the beneficiary farmers for one month from 12-10-2023 and a total of 16,410 applications were received on the portal.
 - ☐ Issuance of Notice to Proceed (NTP) to the Agency to commence the work is under progress.

Component C: Feeder Level Solarisation (FLS)

- MNRE's Allocation to Gujarat: 3 lakh Ag. pump sets
 - ☐ Unconditional acceptance of Letter of Intent (LoI) for around 637.118 MW capacity has been received from the successful



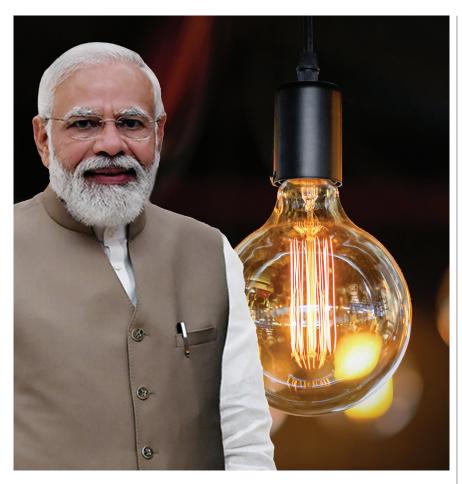
bidders, which is equivalent to solarization of around 2.83 Lakh AG Pumps.

- Out of the above, a Letter of Acceptance (LoA) was issued for 569.646 MW Solar Capacity of around 2.5 lakh Agriculture consumers.
- MNRE's Allocation to Gujarat: 1.25 lakh Ag. pump sets
 - □ PGVCL & UGVCL have invited tenders against the same for 2,34,787 no. of farmers covering a total solar plant capacity of 572 MW and further course of action on the same is under progress.
- MNRE's Allocation to Gujarat: 2.00 lakh Ag. pump sets

- ☐ Further course of action on the same is under progress.
- ☐ Tender invitations by DISCOMs are under process.

The PM-KUSUM Scheme holds immense potential to revolutionize India's agricultural energy landscape, providing sustainable and reliable energy solutions to farmers while contributing to the country's broader energy goals. Accelerated and streamlined implementation, coupled with addressing on-the-ground challenges, will be crucial to realizing the scheme's full impact.

Views shared by **Gujarat Urja Vikas Nigam Limited**



JYOTIGRAM YOJANA ILLUMINATING RURAL GUJARAT

he Jyotigram Yojana is a pioneering initiative, conceptualized and implemented during Narendra Modi's tenure as the Chief Minister of Gujarat, India. This scheme, launched in 2003, was aimed at revolutionizing the power sector in rural Gujarat, addressing both agricultural and domestic power needs. At its core, the Jyotigram Yojana sought to provide reliable, round-the-clock, three-phase power supply to rural areas. This was a significant shift from the erratic and limited power supply that rural regions were accustomed to.

The success of the Jyotigram Yojana has been widely recognized and has served as a model for other states in India. Its holistic approach to addressing both the agricultural and domestic power needs in rural areas has been a significant step in the direction of rural development and sustainability.

The innovative approach of the Jyotigram Yojana involved segregating agricultural and non-agricultural power feeders. This segregation enabled the government to supply uninterrupted power to rural households, schools, hospitals, and industries, while simultaneously providing a dedicated and scheduled power supply to the agricultural sector for irrigation purposes. This not only ensured efficient use of electricity but also promoted better planning in irrigation practices.

One of the remarkable outcomes of this scheme was the reduction in the dependency on diesel-run pumps for irrigation, leading to a decrease in the overall cost of farming and a significant reduction in the carbon footprint. Additionally, the constant power supply improved the quality of life in rural areas, facilitating better education due to lighting, improved access to information through television and radio, and enhanced healthcare services with the availability of power in clinics and hospitals.

The Jyotigram Yojana also played a crucial role in curbing the illegal tapping of electricity and reducing the technical losses in the power distribution network. This was achieved by upgrading the rural electricity infrastructure and implementing strict measures against power theft. The financial health of the power sector in Gujarat saw considerable improvement as a result.

The success of the Jyotigram Yojana has been widely recognized and has served as a model for other states in India. Its holistic approach to addressing both the agricultural and domestic power needs in rural areas has been a significant step in the direction of rural development and sustainability. The scheme not only highlights the importance of reliable power supply in rural upliftment but also showcases the potential of well-planned infrastructure projects in transforming the lives of people.



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HARVESTING THE SUPREME ENERGY OF THE SUN GUJARAT'S LEADERSHIP IN RENEWABLE ENERGY



ujarat, under the visionary leadership of Hon'ble Prime Minister Shri Narendra Modi, has emerged as a trailblazer in promoting solar innovation and renewable energy adoption across India. With a commendable

2000 MW capacity and an impressive 82% contribution to India's total rooftop solar installations under the MNRE's Phase-II Programme, Gujarat has established itself as the leading state in solar advancements.

EMBRACING A SUSTAINABLE FUTURE

Gujarat has actively promoted the adoption of solar energy through forward-thinking initiatives, achieving significant milestones in just four years. Over 5 lakh consumers in the state have embraced

rooftop solar systems, amassing a total capacity of 2000 MW. This achievement aligns with the national goal of achieving 40 GW cumulative capacity from rooftop solar, with a significant 4 GW targeted for the residential sector.

SURYA-GUJARAT SCHEME: ILLUMINATING GREEN ENERGY

The "SURYA-Gujarat" scheme, initiated in August 2019, exemplifies Gujarat's commitment to green energy. Offering a 40% subsidy for individual owners for the first 3KW and 20% for up to 10KW, the scheme also provides a 20% subsidy to Group Housing Societies (GHS) and Residential Welfare Associations (RWA) for mass penetration.

MNRE'S PHASE-II RTS PROGRAMME: CENTRAL AND STATE GOVERNMENT COLLABORATION

The MNRE's Phase-II RTS Programme, also known as "SURYA URJA ROOFTOP YOJNA," was launched by the Central Government to achieve a cumulative capacity of 40 GW from rooftop solar projects. In August 2019, the Government of Gujarat entrusted the implementation of solar rooftops in the state to GUVNL, a holding company of four subsidiaries - DGVCL, MGVCL, UGVCL, and PGVCL.

SCHEME OVERVIEW

The SURYA-Gujarat scheme is effective since August 2019, targeting residential consumers, GHS, and RWA. Subsidies range from 40% for the first 3 KW to 20% for 3 to 10 KW for residential connections and 20% for up to 500 KW for common facility connections of GHS/RWA. The surplus power purchase rate is set at Rs. 2.25 per unit for the first five years.

SOLAR POLICY AND INITIATIVES

The success of the scheme is attributed to the unwavering political will of the State Government. The solar policy of

net metering, absence of capacity restrictions, arrangements for sale of power generation, no banking charges for residential rooftop consumers, and up to 40% subsidy benefit to consumers have collectively propelled the adoption of solar power.

SMOOTH TENDERING PROCESS

Gujarat's DISCOMs actively engaged in a streamlined tendering process, ensuring simplicity and transparency. A separate category for experienced and new entrepreneurs encouraged widespread participation, fostering healthy competition.

DEVELOPMENT OF CONSUMER AND STATE PORTALS

The development of the "www. suryagujarat.com" portal, along with the state portal "https://suryagujarat.guvnl.in," allowed for a transparent and efficient application process. Training and capacity accreditation of numerous agencies, played a pivotal role in executing the scheme efficiently.

TASK-WISE TIMELINE AND PERFORMANCE-BASED QUOTAS

DISCOMs monitored a task-wise timeline to ensure the seamless execution of the scheme. The introduction of performance-based quotas for vendors encouraged competition and efficiency, contributing to the overall success of the program.

GRIEVANCE REDRESSAL MECHANISM AND BI-DIRECTIONAL METERS

An online grievance redressal mechanism and the proactive planning of bulk purchases for bi-directional meters demonstrated Gujarat's commitment to customer satisfaction and simplifying the installation process for consumers.

TIMELY DISBURSEMENT OF SUBSIDY AND MNRE'S SUPPORT

The timely allocation of corpus funds by the State Government and the support from the Ministry of New and Renewable Energy (MNRE) further solidified the success of the scheme. MNRE's Phase-II Rooftop Solar (RTS) program played a crucial role, allocating the highest capacity of approximately 2190 MW to Gujarat DISCOMs.

PRESENT STATUS AND ACHIEVEMENTS

Since the inception of the scheme, more than 5 lakh consumers have installed rooftop systems, contributing to a total capacity of above 2000 MW. Gujarat stands at the top position in the country for the installation of solar rooftop systems, contributing 31% of India's total solar rooftop installations. Moreover, Gujarat contributes an impressive 82% of India's total solar rooftop installations under MNRE's Phase-II program.

ECONOMIC AND ENVIRONMENTAL IMPACT

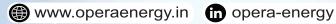
From 2019 to FY 2022-2023, residential rooftop consumers injected a total of 921.67 million surplus units into the grid, resulting in earnings amounting to Rs. 207 Crores. This not only benefits consumers but also provides DISCOMs with cheaper power without transmission and distribution losses.

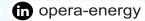
CONCLUSION

Gujarat's exemplary journey in promoting solar rooftop installations showcases the state's dedication to sustainable practices and sets an inspiring example for the rest of the nation. The collective efforts of the State and Central Government have paved the way for a greener and more sustainable future, making Gujarat a leader in renewable energy adoption in India.

Views shared by **Gujarat Urja Vikas Nigam Limited**.







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GUJARAT- A TORCHBEARER FOR THE POWER SECTOR'S SECOND-GENERATION REFORMS AND A ROLE MODEL FOR THE ENTIRE NATION

he Energy and Petrochemicals Department of the Government of Gujarat has taken a series of measures that have boosted the standard of living and positively contributed to the overall socio-economic development activities in the state. These measures have created a positive impact and added value for citizens across the length and breadth of Gujarat, enhancing the ease of living and doing business.

Under the energy transition phase and ease of living initiative, various measures and programmes are being implemented by the State's Electricity Distribution, Generation, and Transmission Companies, functioning under the leadership of the holding company - Gujarat Urja Vikas Nigam Limited (GUVNL).

These measures include the transformation of the power sector's landscape in the

state through a series of steps, including revamping the overall network, adding capacity, particularly in Renewable Energy, improving the operational reliability of the network and power supply to all, offering a range of digital services to HT and non-HT customers, including doorstep services, providing daytime power supply to farmers, maintaining a quality billing system, centralising and streamlining various procedures/work to reduce the service delivery time, promoting green energy,















Around 68% market share in Natural Gas Transmission in India.

and implementing newer technologies for the benefit of customers.

Following the unbundling of the power sector and subsequent reforms, Gujarat has remained a key leader in the power sector with policy-driven measures and action-cum-goal-oriented plans to achieve several milestones.

The various initiatives and their key features being implemented by GUVNL and Companies are as follows:

Innovations for "Ease of Living" -Transforming Gujarat's Power Landscape

The 'Ease of Living' Index comprises 78 indicators, classified across 15 categories and organised under four pillars: physical, institutional, social, and economic. 'Power Supply' is one of the 15 categories.

GUVNL and its subsidiary companies are actively involved in the distribution of electrical power to a diverse range of HT-LT consumers, promoting the 'Ease of Living' in Gujarat's power distribution sector. The companies have implemented various initiatives and measures aimed at improving the quality of life for citizens by providing reliable, efficient, affordable electricity, and services.

Revamping the New Connection Traditional Process

In our unwavering dedication to

enhancing the quality and efficiency of services, and in alignment with the principles of 'Ease of Doing Business' (EoDB) and 'Ease of Living' (EoL), GUVNL is resolute in its pursuit of streamlining existing procedures for granting new electricity connections. In line with this commitment, GUVNL has introduced significant procedural reforms, including the development of an online platform known as 'e-Vidhvut Seva' and the establishment of a 'Centralized Processing Centre (CPC)' for uniformity in document submission and to render hassle-free services to the consumer.

Upon the successful deployment of and 'e-Vidhyut Seva' 'Centralized Processing (CPC)', we embarked on a new endeavour to enhance experience for our esteemed 'High Tension (HT) Consumers'. Introducing the all-in-one webbased solution, the 'HT Connection Gateway: Call & Apply', designed to the streamline process documents, thereby ensuring the delivery of a seamless and efficient experience for our high-valued customers.

• 'CALL AND APPLY' Concept

Contact DISCOMs for services (new connections, load changes,

- name changes) via the Central Processing Centre (CPC).
- ☐ Call CPC using the number on the DISCOM's website.

- ☐ CPC can complete forms for applicants, or applicants may self-serve on the website.
- ☐ Upon registration, receive a unique request number.
- ☐ Post-registration, an SMS with the request number is sent to the registered mobile.

Extending services to applicants' doorsteps

- ☐ For a site visit for HT Connection, applicants can click 'Visit Request' or call the CPC directly.
- ☐ The CPC schedules the visit upon request registration.
- ☐ During the visit, the team registers an account on the portal, scans and uploads documents, and completes E-verification via OTP.
- ☐ A Service Request (SR) is generated for online payment and registration completion.
- ☐ If documents are missing, the CPC team coordinates with the applicant for a follow-up meeting.

FEATURES:

"e-Vidhyut Seva" Portal

- Integrated with DIGI-Locker.
- Eliminates the need for consumers to visit the Subdivision office.
- Allows pre-payment of charges.
- Provides real-time updates on the status of applications.
- Digital delivery has made the entire process transparent, convenient, and user-friendly.

"CENTRALISED PROCESSING CENTRE (CPC)"

- DISCOM-wise formation of dedicated CPC.
- Faceless, paperless, cashless (digital).
- Processing of applications by a dedicated team.
- Ensures quick processing of applications & release of connections with transparency.





- Decouples public dealing from the subdivision.
- The subdivision would only release the connection.

"HT CONNECTION GATEWAY: CALL & APPLY"

- DISCOM team is on the move, delivering ease of living to the doorstep.
- DISCOM wise Helpline No.
- A dedicated CPC team will visit consumers with a tablet.
- Doorstep processing/assistance for quicker service.
- Saves precious time for consumers by eliminating visits to the division office.
- Call: DGVCL- 63570 80694, MGVCL 9227807979, PGVCL-9313926166, UGVCL- 6356620021
- Apply: https://portal.guvnl.in

QUALITY BILLING

Smart metering will revolutionize the billing services of utilities. Instead of relying on billing through manual reading/GPRS, smart meters

automatically collect consumption data and transmit it to Distribution companies.

- Accuracy & Real-time data: Provides precise, real-time data on energy consumption, resulting in accurate billing.
- Remote reading: Enables remote data collection, eliminating the need for manual meter reading and reducing human errors.
- Billing Transparency: Offers customers a better understanding of their bills and energy usage, fostering trust and transparency.
- Data analytics: The data collected can be analysed to optimize operations, plan for future capacity, and identify consumption patterns.
- Time-of-use billing: Supports timeof-use pricing and enables billing based on it.
- Enhanced customer services: Utility companies can respond faster to inquiries, provide usage insights, and offer better customer service.

BILL PAYMENT FACILITIES

 Digital Seva Setu to collect energy bill payments through e-gram at

- gram panchayats.
- Bill payment facility at branches of various banks.
- Digi Locker Integration.
- Dynamic QR code on the bill to simplify the process of Vij bill payment.
- Instant online payment acknowledgment through SMS.
- MoU with Gol CSC (Common Service Centres) for collecting energy bill payments.
- Tie-up with online merchants.
- Bharat Bill Payments System (BBPS).

OPERATIONAL RELIABILITY

Gujarat has developed a robust energy infrastructure to ensure efficient power transmission and distribution across the state, facilitating 24x7 reliable electricity supply to 1.71 Cr valued consumers. Gujarat DISCOMs are continuously working on regular maintenance of networks and maintaining a robust system for Quick Response to restoring Faults.

GEOURJA

In-house designed software platform, a mobile-based application, crafted for the precise GPS survey of electrical networks.

Geo-mapping of the entire Gujarat Power network:

- HT Line 4.93 lakh km
- LT Line 2.37 lakh km
- Transformers 18.45 lakh
- HT Consumers 21.500 Nos.
- LT Consumers 181.45 lakh

FEATURES:

- A key tool for restoring power during the Biparjoy Cyclone within 72 hours.
- Ability to dynamically update, add, or modify information within the electrical network.
- Empower users to maintain an accurate and up-to-date real-time network.
- Ensures precision and adaptability in managing electrical infrastructure.

- Makes the process user-friendly and efficient.
- Helps to carry out surveys for new connections.
- Identification of the exact location of consumers.

OUTAGE MANAGEMENT SYSTEM (OMS)

The Outage Management System (OMS) is the key enabler of identifying and predicting distribution-level outages streamed into the power network Outage Management System with Geospatial Information for DISCOMs and GETCO.

FEATURES:

- Availability of power can be easily viewed from anywhere, anytime.
- Effective maintenance can be done due to the analysis of location-wise faults
- Outage entry done by GETCO and reasons entered by DISCOMs.

SMART FEEDER MONITORING SYSTEM (SFMS)

SFMS is being implemented under the RDSS scheme on all 66 KV S/s. In this system, the interruption of 11 KV feeders will be recorded automatically instead of the manual entry done by substations in the OMS portal. Moreover, it will also give the live power status of feeders on the live Geo Urja platform. This will further help the fault centre and customer care centre for prompt actions.

FEATURES:

- Real-time monitoring of Substations and feeders.
- Quicker detection and prompt response to faults and outages.
- Provides the live power status of feeders on the live Geo Urja platform.
- Interruption of 11 KV feeders will be recorded automatically instead of the manual entry done by substations in the OMS portal.



 Integration of SFMS with SCADA for a comprehensive view of the entire distribution network.

GRIEVANCE REDRESSAL

- Efficient 3-tier grievance redressal mechanisms to address consumer concerns and complaints:
 - I. Circle/Zonal level Forum
 - II. Company Level forum
 - III. Ombudsman
- Chatbot Ask Deepti in place for all 4 DISCOMs to assist consumers.
- DISCOMs have established centralised toll-free Customer Care centres:
 - ☐ DGVCL: 1800 233 3003/19123 MGVCL: 1800 233 2670/19124
 - ☐ PGVCL: 1800 233 155333/19122 UGVCL: 1800 233 155335/19121
- WhatsApp nos. for consumer complaints:
 - □ DGVCL: 6357097832
 - ☐ MGVCL: 9925218002,
 - ☐ PGVCL: 9512019122, UGVCL: 9825819121

FEATURES:

- Commitment to address concerns and providing satisfactory solutions.
- Prevents issues from escalating into major conflicts or disputes.

 Builds a positive reputation, trust, and credibility.

Rooftop Solar (https://suryagujarat.guvnl.com)

Gujarat stands at 1st Position in the country for the installation of more than 5.10 lakh Solar Rooftop systems with an aggregate capacity of 2024 MW. The Gol has circulated Gujarat's Model of Awareness activities to all States in the Country.

- Enhancement of the lifestyle among residents and the socio-economic pattern in society.
- Leads to an increase in Per Capita Consumption of electricity.

CONCLUSION

GUVNL's initiatives are propelling Gujarat towards a future where power distribution is synonymous with efficiency, transparency, and reliability. As the state continues to embrace technological advancements, the power sector stands as a beacon of progress, contributing significantly to the overall "Ease of Living" for its citizens.

Views shared by *Gujarat Urja Vikas Nigam Limited*

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FUTURE ROADMAP OF INDIA'S ENERGY SECTOR

The economic growth of India is among the highest in the world, the scale of transformation happening is stunning that has lifted millions of people out of poverty. As India aspires to become a developed nation by 2047, this calls for significant buildup of infrastructure and expansion of manufacturing base which in turn gives as rise the energy demand by 2-2.5 times from the existing level. India is among the few countries which have been successfully managing the emerging trilemma (energy affordability, energy security and sustainability) despite global economic turbulence and rising energy costs. Renewables and Nuclear power will play critical role in energy transition but we cannot wish away using coal sustainably to meet the energy demand.



BROKEN RECORD

The 2023 World Emissions Gap report, titled "Broken Record," highlights that temperature records are continually being broken, while emissions also continue to increase. The report emphasizes that the emissions gap is as large as 24 Giga tonne (under a 2°C scenario) and 36 Giga tonne (under a 1.5°C scenario) in 2050, even when unconditional Nationally Determined Contributions (NDCs) and Net Zero pledges are taken into account. The first Global Stock Take (GST), undertaken in 2023 during the Conference of Parties COP28, clearly notes that there are pre-2020 gaps among the developed economies.

The GST minces no words when it states that 4/5th of the total carbon budget (with a 50% probability of limiting the temperature rise to 1.5°C) is already consumed. Furthermore, most developed nations have peaked in the past (USA: 2007, Germany: 1990, and France: 1991), and their NDCs currently call for net zero by 2050.

India is a climate action leader and is effectively managing energy trilemma: Contrary to fossil-fuel-led economic growth witnessed in developed economies, India's development is largely low-carbon and inclusive. Until 2021, India's contribution to cumulative global Greenhouse Gas (GHG) emissions is less than 4%, and India's per-capita emissions are 1.9 tons in 2021, which is less than half of the world average of 4.7 tons, 1/4th of China, and 1/7th of the percapita emissions of the United States.

India is among the best-performing countries in the Climate Change Performance Index (CCPI 2023) and is rated the best among G-20 countries. India ranks 3rd in the world in terms of installed renewable energy capacity. India has raised its ambition by submitting revised NDCs, which include: i) increasing the non-fossil share to 50% by 2030, ii) reducing the emission intensity of GDP by 45% by 2030



>> VENUGOPAL MOTHKOOR Senior Specialist, NITI Aayog



» RAJNATH RAM
Advisor (Energy), NITI Aayog

over 2005 levels, and iii) increasing the carbon sink to 2.5-3 billion tons by 2030. Against these targets, India has already achieved a non-fossil-based capacity of 43.7%, an emission intensity reduction of 33%, and an additional carbon sink of 1.97 billion tons. The Government of India has announced several policy measures to decarbonize the economy, including Renewable Purchase Obligations, Green Hydrogen Mission, Solarization of the

agriculture sector, Viability Gap funding for energy storage, PLI scheme for highefficiency solar cells and modules, PLI scheme for Advanced Chemistry Cell Manufacturing, etc.

India is among the few countries that have successfully managed the emerging trilemma (energy affordability, energy security, and sustainability) despite global economic turbulence and rising energy costs. Some of the major achievements include:

- While ensuring energy access and affordability, the government has provided last-mile connectivity and electricity connections to households. The electricity tariffs in India are kept stable by the government, especially when prices rose worldwide, particularly in Europe due to the Russia-Ukraine conflict. The residential electricity tariffs in India are kept reasonably low at \$0.07/KWh, compared to \$0.52/KWh in Germany and \$0.18/ KWh in the United States, to meet the huge developmental aspirations of a growing economy. Access to clean cooking fuels for the poor population is heavily subsidized through government programs. Under Pradhan Mantri's Ujjwala Yojana (PMUY), the government has provided clean cooking access to 98 million targeted households through LPG connections. Due to such pro-poor measures, India has successfully lifted 135 million people out of multi-dimensional poverty during 2015-16 to 2019-
- To address the issue of energy security, India has been making consistent efforts to diversify its resources through increased adoption of renewables/clean fuels, mandates such as ethanol blending and Compressed BioGas (CBG) blending, increased domestic exploration and production of oil and gas resources, increased demand for electrification, and the promotion of various energy efficiency



Under Pradhan Mantri's Ujjwala Yojana (PMUY), the government has provided clean cooking access to 98 million targeted households through LPG connections. Due to such pro-poor measures, India has successfully lifted 135 million people out of multi-dimensional poverty during 2015-16 to 2019-20.

measures. India has also increased the number of crude suppliers to the country from 27 countries in 2006-07 to 39 in 2021-22.

INDIA'S DEVELOPMENTAL ASPIRATIONS

Today, India is the fifth-largest economy

and the third-largest energy consumer in the world. According to IMF 2023 estimates, India's per capita income is about \$2.6 thousand USD, compared to countries like Japan with a per capita income of \$33.95 thousand USD, South Korea with \$33.15 thousand USD, and the USA with \$80.41 thousand USD. India's per capita primary energy



consumption, which is 1/5th of China's and 1/10th of the US, will increase considerably as India aspires to become a developed nation by 2047. While the goal of a developed economy implies significant growth in urban, industrial, and infrastructural services, and consequently energy requirements, the goal of energy independence means reducing and diversifying energy imports, ensuring stable and affordable energy prices, and maintaining a reliable supply of energy.

INDIA'S GREEN GROWTH STRATEGY

The Indian government has identified Green Growth as one of its priorities. Compared to the limited extent of decoupling emissions from growth seen in developed countries, India's developmental trajectory reflects low energy consumption and low emissions. The key elements of Green Growth, as outlined in India's Long-Term Low Emissions Development strategy, include:

i) Increase in non-fossil-based electricity installation systems

- ii) Develop an integrated, efficient, inclusive low-carbon transport system
- iii) Promote adaptation in urban design, energy, and material efficiency in buildings, and sustainable urbanization
- iv) Promote economy-wide decoupling of growth from emissions and the development of an efficient, innovative low-emission industrial system
- v) CO2 abatement and related engineering solutions
- vi) Enhancing forest and vegetation cover consistent with socio-economic and ecological considerations. The green growth model also aims to be inclusive (with affordable tariffs) by promoting access to modern clean energy for all, leaving no one behind. Technologies should not only be low-carbon/green but also capable of delivering energy at affordable prices.

It is often argued that electricity prices will come down with a higher share of renewables, as they have zero or low operational costs. However, these arguments ignore the fact that there is a significant capital cost in the setup of Renewable Energy (RE) and also large grid costs. A recent study by McKinsey finds that the delivered cost of electricity will be 20% higher in 2050 than in 2020 due to an increase in costs associated with grid flexibility, transmission, and distribution. A recent study by the Forum of Regulators in India finds the total tariff cost of delivering RE-based energy is Rs 4.11 per unit, which is more expensive than the average tariff of a nuclear plant at Rs 3.43 in 2019. Intermittency will be the main factor that pushes costs up as we approach closer to net zero. The rising electricity prices can place an enormous burden on an economy with huge developmental aspirations.

ROADMAP FOR FUTURE ENERGY TRANSITION

The Green Development Pact G20 negotiated during India's Presidency outlines the need for the development of clear national pathways that align long-term ambition with short- and medium-term goals. NITI Aayog has released the India Energy Security Scenarios (IESS) 2047, a scenario-building tool that can be leveraged to develop decarbonization pathways for the country until 2047. As India has embarked on achieving Net Zero by 2070, the following changes are observed in the energy mix until 2047 under Business as Usual (BAU) and Net Zero scenarios:

- Growing Energy Demand: Energy needs will grow by 2-2.5 times to meet the developmental aspirations of a growing economy. India's percapita primary energy consumption will almost double from 7,017 kWh in 2022 to 12,547-13,477 kWh by 2047.
- Doubling of Demand Electrification: Demand electrification is expected to more than double by 2047 and reach 40% from current levels of 19%. The electricity sector, which accounts for almost 40% of total greenhouse gases (GHGs), is critical for India to decarbonize. According to many research studies, decarbonization of the electricity sector should be the primary focus for India to reach net zero by 2070.
- Increase in Non-Fossil Capacity: India's installed capacity of nonfossil is expected to increase from 43.7% to 61%-65% by 2030 and 85%-90% by 2047. Renewable Energy (RE) capacity is expected to grow from 177 GW in 2023 to 512 GW by 2030 and 1819 GW in 2047 in the Net Zero scenario.
- Share of Coal in Primary Energy Mix:
 Coal, which accounts for almost 50%
 of the primary energy in 2022, will
 see its share decline to 29%-37% by
 2047 due to a shift towards clean
 fuels. However, coal continues to
 play a critical role despite the rapid
 growth of RE due to the high cost of
 energy storage. To maintain



electricity tariffs within an affordable range for addressing energy poverty and meeting the growing energy demand, India will continue to rely on coal. Coal adoption, however, will tilt towards clean coal technologies such as Coal Gasification with Carbon Capture Storage (CCS), Carbon Capture Utilization and Storage (CCUS), and Coal to Chemicals.

- Role of Nuclear Energy: Being among the lowest life cycle emission fuels, nuclear will play a major role in the decarbonization of the electricity sector. The share of nuclear power is expected to increase from 1.6% in primary energy to 12.5% in 2047.
- Lower Emissions: India's per-capita GHG emissions will reach only 3-4 tons by 2047, still below the world average of 4.7 tons witnessed in 2022. India has already reduced its emission intensity of GDP by 33% in 2019 over the 2005 level. Furthermore, India can achieve the ambitious target of reducing emission intensity of GDP by 45% by 2030 from the 2005 level with the successful implementation of several announced policies, including Green Hydrogen the

Mission. Emission intensity to GDP will fall by ~80% over the 2005 level in 2047, indicating that India will successfully decouple economic growth from emissions as it embraces Green Growth strategies.

While the country is taking every step to transition, the key challenges impacting the energy transition include:

- Availability of Finance Scale: Various research studies put investment requirements for net-zero in the range of USD 10-14 trillion by 2070 (or an average of over USD 200-250 billion annually) in comparison to current investment levels, which stand at ~USD 44 billion per annum, leaving a significant financing gap. Bridging this gap poses challenges, such as the potential impact on other developmental priorities. Additionally, transitioning away from fossil fuels, which contribute substantially to government revenue, could result in a huge loss to the exchequer. Premature retirement of fossil assets may also increase stranded costs.
- Availability of Finance Quality: Most of the finance available is in the form of loans rather than grants.

Secondly, interest rates are high at 9-10.5% in India compared to 3-5% in developed economies. India's Green Bond market is still underdeveloped (\$21.6 billion USD Vs USA is \$380 billion and China is \$287 billion) with issues concerning liquidity, low yields, and greenwashing.

- Fairer credit rating system: The current credit rating does not truly reflect the size of the economy and its ability to pay back. India, the fifth-largest economy in the world, is rated BBB-/Baa3, the lowest rung of investment grade. Such a low rating negatively impacts private finance flow. Therefore, there is a need for fairer credit rating systems.
- Role of Multilateral Development Banks (MDBs): Multilateral Development Banks (MDBs) need to triple their annual sustainable lending to \$390 billion USD per year (\$300 billion in non-concessional form and \$90 billion in concessional form) to support growth in emerging economies.
- Technology transfer: One also has to be cognizant of the fact that many technologies required for global net zero are not available at scale today, such as Hydrogen-based Steel/



INVESTMENTS IN GUJARAT

Till date: Over ₹1 Lakh Crore



Additional via MoUs: ₹55,000 Crore



Energy Transition ₹30,000 Crore



Power ₹16,000 Crore



Ports ₹10,000 Crore

India's Green Bond market is still underdeveloped (\$21.6 billion USD Vs USA is \$380 billion and China is \$287 billion) with issues concerning liquidity, low yields, and greenwashing.

Cement, Steel and Aluminum production with CCUS, etc. Global collaboration and technology transfer will be crucial for accelerating innovation and adoption. Technology transfer should be on mutually agreed terms, including concessional and preferential terms for developing countries.

- Need for a diverse, resilient, and robust supply chain in critical minerals: IEA estimates that the demand for critical minerals will quadruple by 2050. Critical mineral extraction is heavily concentrated, notably Graphite (China, 79%), Cobalt (DRC, 70%), rare earths (China, 60%), and Lithium (Australia, 55%). The level of concentration is even higher for processing, with China dominating across the board. According to IESS 2047, RE capacity is expected to grow from 177 GW in 2023 to 512 GW by 2030 and 1819 GW in 2047 in the Net Zero scenario. Such an increase in RE demand will increase the demand for critical minerals even in the Indian context.
- Global developments: Recent developments such as the Inflation Reduction Act (IRA), Carbon Border Adjustment Mechanism (CBAM), and Climate Club stoke fears of protectionism. IRA local content requirements may result in a shift in investment away from developing economies. Further, compliance costs are bound to rise due to the need for monitoring, calculating,

reporting, and verifying emissions under CBAM. Unilateral enforcement of standards/measures by the Climate Club may negatively impact developing countries.

INDIA'S LEADERSHIP ROLE IN SHAPING THE GLOBAL CLIMATE AGENDA

Climate change is a global collective action problem that can only be tackled through multilateralism and international cooperation. As a responsible international actor, India has recently developed several forward-looking and participatory global initiatives, partnerships, and coalitions. These include:

- International Solar Alliance (ISA): ISA aims to increase the use and quality of solar energy to meet energy needs in an affordable manner. India is providing financial. capacity-building, organizational assistance to ISA. ISA is recognized as one of the fastestgrowing international organizations. At COP26 in Glasgow, India and the United Kingdom also announced the international network interconnected transnational solar grids, called the Green Grids Initiative -One Sun. One World. One Grid.
- Coalition for Disaster-Resilient Infrastructure (CDRI): CDRI aims to promote the resilience of new and existing infrastructure systems to growing climate risks and disasters.
- Leadership Group on Industry
 Transition (LeadIT): LeadIT aims to identify low-carbon business

opportunities, cooperate on net-zero technology innovation, and exchange knowledge on sectoral roadmaps for hard-to-abate sectors.

- the spirit South-South ln of cooperation, the India-UN Development Partnership Fund established in 2017 aims to support countries in the Pacific Islands, Africa, and the Caribbean with climate early warning systems, solar home systems, solar pumps, and projects to repair damage due to climate-induced weather events.
- Global Biofuels Alliance (GBA): GBA
 is an India-led initiative to develop an
 alliance of governments, international
 organizations, and industry to
 facilitate the adoption of biofuels.
 The initiative aims to position biofuels
 as a key to the energy transition and
 contribute to jobs and economic
 growth.

In conclusion, it is to state that India is already leading the clean energy transition agenda. While the country today is effectively managing the energy trilemma of affordability, access, security and sustainability, the future demand of energy by 2047 is expected to increase by 2-2.5 times. The sustainable use of coal and nuclear power will play a crucial role in meeting this rising energy demand and addressing the trilemma in the future. The access to low-cost finance will be critical for clean energy adoption. The responsibility of pursuing clean energy transition agenda falls on both Centre and State Governments. To foster the spirit of cooperative federalism, NITI Aayog has already started engaging with states for developing state specific energy transition roadmaps.

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- Rajnath Ram, Advisor (Energy), NITI Aayog

Disclaimer: The views expressed by authors are personal



GUJARAT'S GREEN ENERGY REVOLUTION PIONEERING INDIA'S SUSTAINABLE ENERGY TRANSFORMATION

ujarat, since establishing the Gujarat Energy Development Agency (GEDA) in 1979, has been at the forefront of India's renewable energy revolution. As the first nodal agency in the country dedicated to non-conventional energy sources, GEDA laid the groundwork for what would become a nationwide shift towards sustainable energy practices.

WIND ENERGY DOMINANCE

The state's journey in renewable energy began with a focus on wind power. In

1993, Gujarat launched India's first wind policy, a visionary move that led to the state achieving an impressive installed capacity of 10,382 MW, the highest in the country. This bold step not only demonstrated Gujarat's commitment to harnessing natural resources but also set a precedent for other states to follow.

SOLAR ENERGY PROWESS

In solar energy, Gujarat has been equally influential. The state's installed capacity of 10,031 MW ranks it second nationally.

This remarkable achievement is a result of the state's proactive approach, beginning with the launch of its solar policy in 2009. Gujarat's leadership in solar energy is further highlighted by its top rank in solar rooftop installations, a testament to the state's comprehensive approach to harnessing solar power.

HYBRID AND OTHER RENEWABLE ENERGY

Gujarat's innovation in the renewable energy sector is further evident in its pioneering of wind-solar hybrid energy. In 2018, the state introduced the country's first Hybrid Policy, leading to an installed capacity of 1,373 MW. Beyond wind and solar, Gujarat has diversified its renewable portfolio with 83.90 MW in small hydro power, 81.55 MW in biomass energy, and 7.5 MW in waste-to-energy projects.

COMPREHENSIVE RENEWABLE INITIATIVES

The GEDA has been instrumental in rolling out a range of initiatives to boost renewable energy. Notable achievements include Asia's first 600 MW Solar Power Park at Charanka, commissioning 6,846 MW of grid-connected solar power projects, and leading the nation in wind energy with a capacity of 10,382 MW. Additionally, Gujarat has focused on biomass projects and has been proactive in the bio-energy sector.

SUSTAINABLE DEVELOPMENT EFFORTS

Gujarat's commitment to sustainable development extends beyond energy generation. The state has implemented various energy conservation measures, Beyond wind and solar, Gujarat has diversified its renewable portfolio with 83.90 MW in small hydro power, 81.55 MW in biomass energy, and 7.5 MW in waste-to-energy projects.

including the installation of solar rooftop systems on over 2,451 government buildings and promoting energy-efficient lighting and appliances in educational institutions. These initiatives reflect Gujarat's holistic approach to environmental sustainability.

VISION FOR THE FUTURE: GUJARAT 2024

Under the Vibrant Gujarat initiative, the state is ambitiously planning to enhance its green infrastructure further. This includes expanding solar rooftop installations across government buildings, reinforcing Gujarat's position as a leader in renewable energy.

RENEWABLE ENERGY IN BUILDINGS

AND TRANSPORTATION

The state has also made significant strides in installing solar water heating systems in over 559 buildings and establishing numerous biogas plants, showcasing its commitment to diverse renewable energy sources. In the realm of transportation, Gujarat is promoting sustainable mobility through subsidies for battery-operated vehicles, marking a significant step towards reducing carbon emissions.

POLICY FRAMEWORK AS A CATALYST

Gujarat's array of policies, including the Wind Power Policy of 2016, the Renewable Energy Policy of 2023, and others, have been instrumental in guiding the state's green growth. These policies highlight a comprehensive and strategic approach to energy generation, conservation, and sustainable development.

Gujarat's journey towards a sustainable and green future is a shining example of visionary policy-making and robust implementation. The state's wideranging initiatives in renewable energy and sustainability not only position Gujarat as a leader in India's energy landscape but also as a global example of how regional initiatives can lead to significant environmental changes. With its continued focus on innovation and sustainability, Gujarat is poised to remain at the forefront of the global green revolution.





GIDC PIONEERING INITIATIVES FOR GREEN MANUFACTURING AND SKILL DEVELOPMENT

Green hydrogen production has been earmarked as a thrust sector, meaning it receives special attention and benefits under the state's incentive schemes. These incentives are part of a broader strategy by the Gujarat government to promote cleaner and greener manufacturing practices, shares **Rahul Gupta, IAS,** Vice Chairman & Managing Director, Gujarat Industrial Development Corporation in an exclusive interaction with **Kaanchi Chawla** and **Shalini Rawat** of **Elets News Network (ENN).** *Edited excerpts:*



>> RAHUL GUPTA, IAS
Vice Chairman & Managing Director,
Gujarat Industrial Development
Corporation

What policy incentives and infrastructural support is the state government providing to attract green investments in Gujarat?

In Gujarat, the state government has

implemented a series of policy incentives and infrastructural support to foster green investments, particularly in the field of green hydrogen production. A notable initiative is the specific land allotment policy, introduced by the Energy and Petrochemicals Department. This policy is designed to facilitate project proponents who are keen on establishing a manufacturing base in Gujarat for green hydrogen production. Under this policy, land is allotted by the government to support these green projects.

Green hydrogen production has been earmarked as a thrust sector, meaning it receives special attention and benefits under the state's incentive schemes. These incentives are part of a broader strategy by the Gujarat government to promote cleaner and greener manufacturing practices. The incentives are not limited to land allotment but extend to various other schemes. These schemes are structured to not only incentivize but also actively encourage manufacturers to adopt environmentally friendly manufacturing

processes, aligning with the state's commitment to sustainable development and green energy.

In light of the increasing global focus on sustainable development, could you elaborate on the measures that the Gujarat Industrial Development Corporation (GIDC) is implementing to ensure that industrial expansion in Gujaratisenvironmentally sustainable?

Certainly, there are two key initiatives that GIDC is undertaking in this regard. Firstly, we have introduced the 'Smart GIDC Industrial Estates' concept. These estates are smart not only in terms of digitisation but also in sustainability. By sustainability, I mean the development of specialised common infrastructure facilities tailored to specific industrial needs. For instance, in a chemical industrial estate, where effluent production is significant and environmentally hazardous. promotes the establishment of common effluent treatment plants and deep sea disposal pipelines. We are also developing sites for the disposal of solid wastes (T-S-



D-F sites), ensuring that industrial effluents do not harm the environment.

Secondly, such infrastructure requires substantial capital investment, often beyond the capacity of individual industrial units. By providing these common facilities, GIDC aims to reduce the investment burden on these units. enhancing their competitiveness both nationally and globally. Additionally, as part of our sustainability efforts, we have embarked on deep-sea disposal pipeline projects at four different locations - Vapi, Sarigam, Surat, Ankleshwar. These areas, primarily hubs for chemical industries, will benefit from this initiative. With an investment of over 2,000 crore rupees, these pipelines will significantly reduce environmental pollution.

In the spirit of 'Vibrant Gujarat', what initiatives has GIDC taken to promote Gujarat as an attractive destination for both domestic and international investors?

In the runup to the summit, we have announcedestablishment of numerous

sector-specific industrial parks. A key attraction for international investors is the availability of 'plug and play' infrastructure. This concept entails providing investors with ready-to-use facilities, eliminating the need for them to construct or arrange basic amenities like electricity, water, and gas. The GIDC is spearheading this initiative by developing parks tailored to specific industries. For instance, a Ceramic park is underway at Jambudia in Morbi, a Medical Device park at Nagalpar in

Rajkot, a PM Mitra Textile park at Navsari, and a Bulk Drug park in Jambusar. In Bharuch, we're focusing on food processing parks, and in Rajkot and Banaskantha, seafood processing parks are in development. These parks will offer specialised infrastructure, reducing the need for investors to invest in these facilities themselves. This approach is poised to attract a substantial number of domestic and international investors to these sectors, significantly boosting industrial growth in Gujarat.

How are the funds allocated for developing parks contributing to the welfare of rural communities?

The creation of industrial estates or parks in any region primarily benefits the local community in two significant ways. Firstly, it leads to the generation of employment opportunities. The establishment of these parks often results in numerous job openings for the local residents.

Secondly, the development of an industrial park typically stimulates the growth of ancillary and service industries in the surrounding area. This, in turn, further supports the local economy by enhancing the service sector, which is known for being a substantial source of employment. Therefore, these developments contribute to both direct and indirect job creation and economic growth in the area.













How is GIDC contributing to skill development and employment generation in Gujarat, especially in the context of the new industrial projects?

The Gujarat Industrial Development Corporation (GIDC) has a policy of offering land within its estates for specific developmental purposes. For instance, if someone wishes to establish a skill development centre or a mini Industrial Training Institute (ITI), GIDC offers the land at 50% of the standard allotment price. This initiative places significant emphasis on skill

development, particularly in light of emerging sectors like semiconductors, green hydrogen, electric mobility, drone technology. and space-related manufacturing. These industries require a unique skill set that may not currently be widely available. Therefore, by providing land at subsidised rates, GIDC enables the establishment of centres of excellence and mini ITIs within its estates. These centres aim to train and upskill individuals, preparing them for employment in these industries located within the same estate.

What measures are being taken by



GIDC to ensure the smooth implementation of the 'Make in India' initiative at the state level?

The GIDC may not have specific measures uniquely targeting the 'Make in India' initiative, as its primary function is to attract both domestic and international businesses for manufacturing, which inherently supports the initiative. However, the Government of Gujarat's Industrial Policy 2020 encompasses 'Aatmanirbhar Gujarat' schemes, designed to assist industries. This policy places significant emphasis on the 'Make in India' initiative by offering incentives to young entrepreneurs, thus fostering a culture of risk-taking. Additionally, it promotes value addition within the state, supports employmentintensive activities, and encourages start-ups and micro, small and medium enterprises (MSMEs). The policy is firmly aligned with the ethos of 'Make in India'.

Regarding the support mechanisms for startups and entrepreneurs, particularly in innovation and







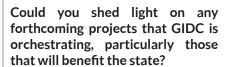
research, what role does GIDC play in supporting start-ups and incubation centres in Gujarat?

Within the GIDC framework, there's a significant emphasis on aiding Micro, Small, and Medium Enterprises (MSMEs) and startups. A key policy is the provision of land at concessional rates. This is crucial since startups and MSMEs often face capital constraints, especially in terms of working capital. Recognising this, GIDC offers land to these entities at rates substantially lower than those for larger industries. This is part of a broader initiative to

encourage and promote these enterprises in their initial stages.

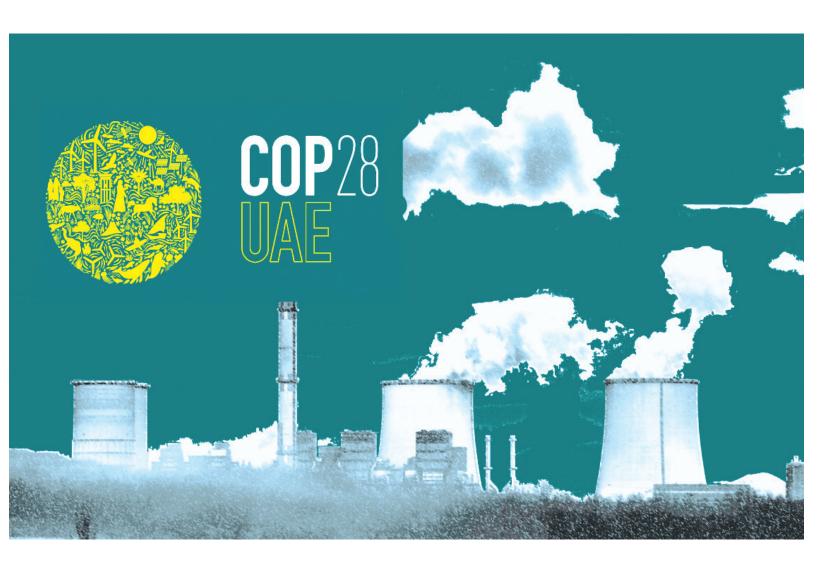
Furthermore, the Government of Gujarat has introduced a special provision to further empower MSMEs and startups. Under this provision, any MSME wishing to establish a new unit in Gujarat can do so without needing to secure certain approvals and permissions for the first three years. This means that an MSME can purchase land and commence operations without the immediate need for building approvals or other permissions. The government provides a window of three

and a half years (including an additional six months) for these entities to obtain the necessary permissions and approvals at any point within that time frame. This approach significantly eases the initial operational burdens for startups and MSMEs in the region.



GIDC is actively engaged in the creation of industrial estates within the state of Gujarat, along with the development of industrial infrastructure. We have several infrastructural projects underway, including the deep sea disposal pipeline project. Currently, we are working on establishing numerous new industrial estates. To give you an idea, 18 estates are already under development, with another 18 planned for the future. In the coming 18 months, we expect to launch about 36 new industrial estates in stages. So, there's a significant amount of activity in the pipeline.





A REFLECTION ON COP28 PROGRESS, CHALLENGES, AND THE URBAN IMPERATIVE IN CLIMATE ACTION

By Abhineet Kumar, Senior-Sub Editor (ENN)







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he 28th Conference of Parties (COP28) held in Dubai from November 30 to December 13, 2023, marked a significant juncture in the global effort to address climate change. While the conference had its share of successes, especially in operationalizing the Loss and Damage Fund and adopting key agendas, it also faced challenges, particularly in negotiations around the Global Stocktake (GST).

THE GLOBAL STOCKTAKE (GST) AND FOSSIL FUEL TRANSITION

The GST at COP28 served as a crucial evaluation of collective progress on mitigation, adaptation, and means of implementation, aiming to inform countries as they prepare their next round of nationally determined contributions (NDCs) due in 2025. While the GST decision called on countries to contribute to global efforts in transitioning away from fossil fuels and phasing down unabated coal power, concerns were raised about the lack of a clear reference to fossil fuel phaseout, weak language on coal and methane, and loopholes related to "transitional fuels." The outcome falls short of providing clear pathways for countries to incorporate into their 2025 NDCs, leaving some disappointed.

OTHER OUTCOMES OF COP28

The conference saw the adoption of the framework for the Global Goal on Adaptation (GGA), outlining strategies to guide its implementation by 2030. Additionally, the consortium of the UN Office for Disaster Risk Reduction and the UN Office for Project Services was designated as the host of the Santiago Network on loss and damage. The launch of the work programme on just transition pathways was another significant development, emphasizing the importance of a smooth transition

to a low-carbon economy.

URBANIZATION AND CLIMATE CHANGE

An essential focus of COP28 was the acknowledgment of the increasing urbanization globally and implications for climate change. With 55% of the global population now living in urban areas and an expected rise to 68% by 2050, cities play a crucial role in achieving climate goals. A ministerial meeting on urbanization and climate change highlighted the need for inclusive governance, with city representatives and civil society organizations advocating for direct actions in cities.

THE URBAN IMPERATIVE

City representatives, including Rafal Trzaskowski, ENVE chair and Mayor of Warsaw, emphasized the need to

An essential focus of COP28 was the acknowledgment of the increasing urbanization globally and its implications for climate change. With 55% of the global population now living in urban areas and an expected rise to 68% by 2050, cities play a crucial role in achieving climate goals.

formally recognize the role of subnational governments in global climate change negotiations. Calls were made for direct financing and technical assistance to cities and regions, recognizing their pivotal role in driving climate ambition, creating green jobs, reducing air pollution, and improving overall well-being. The push for multi-level green deal governance and revisions to energy and climate action regulations gained momentum, challenging traditional federal government authorities.

CHALLENGES IN THE GLOBAL SOUTH

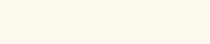
Cities in the Global South face unique challenges, including vulnerability, lack of empowerment for city leaders, a predominant informal sector, and the urgency for adaptation to climate-induced disasters. Efforts to attract investments have widened the gap between the rich and the poor, with significant portions of the urban population residing in slums. To address these issues, a radical shift in governance processes, supported by a climate atlas and financial assistance from COP outcomes, is deemed necessary.

LOOKING AHEAD

COP28 may not have delivered a resounding statement on ending fossil fuels, but it triggered crucial discussions and set the stage for addressing urban challenges in climate action. The conference highlighted the intricate connections between climate action, social justice, and the pivotal role of cities. Moving forward, acknowledging the urban imperative and fostering inclusive governance at all levels will be essential to effectively combat climate change and achieve the ambitious goals set in the Paris Agreement.







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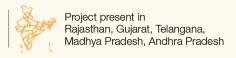
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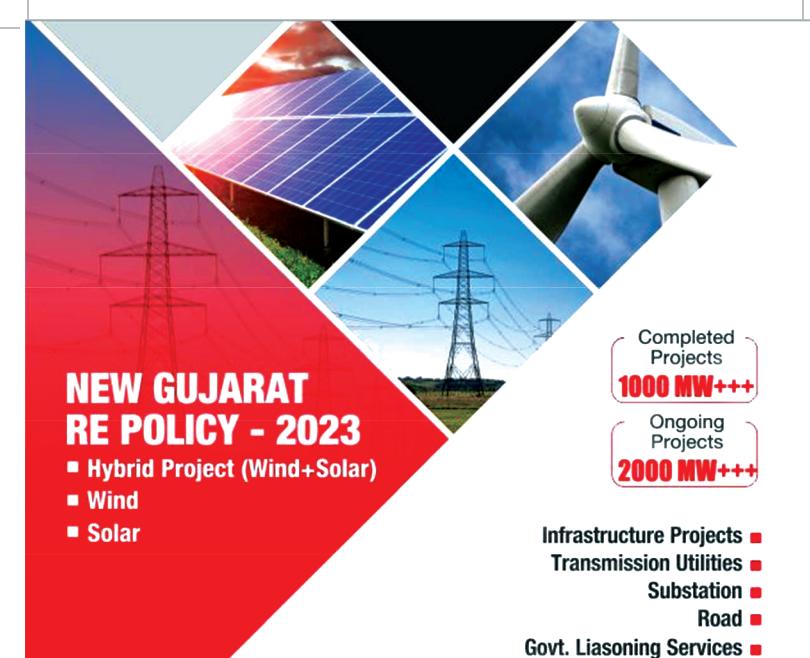


GUJARAT'S LEAP INTO A SUSTAINABLE TOMORROW

In a bold stride towards a cleaner and more sustainable future, the Government of India has set the stage for a nationwide transition to clean energy, committing to achieving 50% of cumulative electric power installed capacity from non-fossil fuel-based resources by 2030. At the forefront of this green revolution is the state of Gujarat, proudly demonstrating its commitment to clean energy with a current installed Renewable Capacity of 21.6 GW, including a remarkable addition of 11 GW over the last four years.

rime Minister Narendra Modi's emphasis on steering the nation towards achieving the target of net zero emissions by 2070 through increasing the use of green energy sources was given a major impetus in the previous union budget. "This Budget (2022-24) will play a key role in establishing India as a lead player in the global green energy market. That is why, today, I invite every stakeholder of the energy world to invest in India", the Prime Minister said. Referring to the global efforts for diversification of the energy supply chain, the Prime Minister said that this Budget provided a great opportunity for every green energy investor to invest in India. This will also be very useful for the startups in the sector, he added.

Recognizing the transformative shifts occurring in the electricity sector and spurred by a desire to expedite efforts for de-carbonization, the Government of Gujarat has introduced the Gujarat Renewable Energy Policy 2023. This policy catalyzes the establishment of renewable









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energy generation projects based on Wind, Solar, and Wind-Solar Hybrid technologies.

The core objective of the Renewable Energy Policy 2023 is to provide a simplified framework, fostering environment conducive to development of renewable projects in the state. The ultimate aim is to attract investments, fueling growth in the Renewable Sector and facilitating a substantial augmentation of Renewable Energy capacity by 2030. Gujarat recognizes the potential for offshore wind energy development, a clean and reliable energy source that can significantly reduce the carbon footprint, contributing to a cleaner environment. Steps are being taken to harness the full potential of offshore wind energy, cementing Gujarat's position as a trailblazer in sustainable energy practices.

With proven technologies and achieved economies of scale, Wind & Solar projects are poised to become instrumental in leveraging Gujarat's potential of 36 GW of solar capacity and 143 GW of wind capacity. The government's focus is not only on increasing renewable capacity but also on better resource utilization to enable a cost-effective and reliable power supply to consumers. This is to be achieved through the large-scale adoption of renewable energy, with Wind-Solar hybrid projects playing a crucial role in ensuring a smooth transition to a clean energy regime.

The Gujarat Renewable Energy Policy 2023 is not merely a set of guidelines; it is a strategic vision aimed at ensuring energy security and supporting the economic development of the state. Beyond negating the state's carbon footprints, the policy strives to contribute to society by supplying renewable power to consumers in other states, establishing Gujarat as a beacon of sustainable energy practices.

VISION

The vision of the Gujarat Renewable



"Solar energy is going to be a major source of energy needs not only today but in the 21st century, because solar energy is Sure, Pure and Secure."

NARENDRA MODI Hon'ble Prime Minister of India

Energy Policy-2023 is to tap the state's renewable energy potential to the maximum extent possible. It aims to attract participation from industries, MSMEs, organizations, and consumers, fostering a rapid transition to clean energy sources. The policy envisions making quality, reliable, and cost-competitive renewable power available to consumers within a conducive policy framework, ultimately contributing to the achievement of the 50% non-fossil fuel-based energy target by 2030.

OBJECTIVES

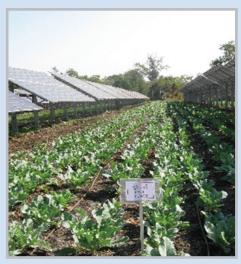
The objectives outlined in the Gujarat Renewable Energy Policy-2023 are comprehensive. They range from tapping the state's renewable energy potential to ensuring energy security, reducing dependency on fossil fuels, supplying

daytime power to agricultural consumers, and promoting decentralized renewable energy generation. The policy also aims to reduce the carbon footprint, hedge energy costs, promote investment, employment, skill enhancement, local manufacturing, startups, and encourage research and development in the renewable energy sector. Additionally, it seeks to promote energy efficiency by creating awareness about energy consumption patterns.

As Gujarat embarks on this transformative journey, the Renewable Energy Policy-2023 is a testament to the state's dedication to a sustainable, greener tomorrow. Through strategic initiatives, technological advancements, and a collaborative approach, Gujarat is poised to redefine its energy landscape and serve as an inspiring example for other regions seeking a cleaner, more sustainable future.









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- Developing 2375 MW Renewable Energy Park at Great Rann of Kutch, Near Village Khavda, Gujarat
- 1100 MW Solar Power Projects are under execution at Great Rann of Kutch, Near Village Khavda, Gujarat
- First utility in the Country to use environment friendly CFBC Technology in 4X125 MW, Surat Lignite Power Station (SLPP).
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>> ALKA YADAV
Director, Green Energy Transition
Research Institute (GETRI)

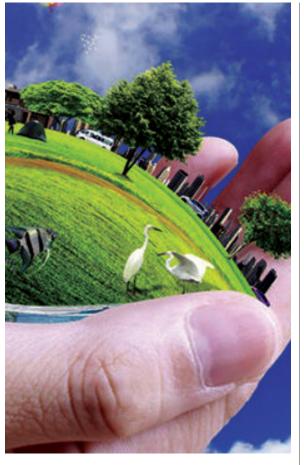


GREEN ENERGY TRANSITION RESEARCH INSTITUTE (GETRI)

CHARTING A COURSE FOR SUSTAINABLE ENERGY EXCELLENCE

he Green Energy Transition Research Institute (GETRI), formerly known as the Gujarat Energy Training and Research Institute (GETRI), is an ISO 9001: 2015, CEA accredited, and DUNS registered institution located in Vadodara, Gujarat. It is an autonomous institute promoted by Gujarat Urja Vikas Nigam Limited (GUVNL) and its group companies. Registered under the Bombay Public Trust Act, GETRI was founded in 2005 with the core mission of fostering continuous development among employees by offering comprehensive training and research programmes. These programmes are designed to keep participants updated on the latest developments in the ever-evolving energy sector and to help them implement best practices in their work.

To provide training at GUVNL's subsidiary companies' doorsteps, GETRI has 15 training units called Gujarat Energy Knowledge Centres (GEKCs) across the state. These include 13 Centres for Distribution, one for Transmission, and one for Generation.



In addition to its role in training and capacity building, GETRI also holds a crucial mandate as a think tank. It serves as a knowledge hub and advisory body for both the government of Gujarat and the power sector. This role involves providing valuable insights, conducting research, and offering recommendations on policy matters, industry trends, and sustainable energy practices.

GETRI further extends its influence by undertaking consultancy projects. These projects involve collaborating with government bodies, power sector organisations, and other stakeholders to provide expert guidance and solutions for various energy-related challenges and initiatives. With its extensive expertise and resources, GETRI contributes significantly to the overall growth and development of the energy sector in Gujarat and beyond.

GETRI has been making remarkable strides in the energy sector, positioning itself as a leading hub for knowledge dissemination, innovation, and research in the field of sustainable and green energy. GETRI's commitment to excellence is evidenced by its recent initiatives and accomplishments that reflect its forward-looking approach and dedication to driving positive change in the energy landscape.

I. TRANSFORMING INTO THE GREEN ENERGY TRANSITION RESEARCH INSTITUTE (GETRI)

In a reflection of its evolving mission and expanded scope, GETRI has undergone a significant transformation, including its renaming to the Green Energy Transition Research Institute. This evolution is not merely a change in name but a reflection of the organisation's dedication to adapting to the pressing global need for sustainable and environmentally responsible energy solutions. This change not only aligns with GETRI's commitment to sustainable energy but also signifies its

focus on catalysing and facilitating the transition towards cleaner, greener energy sources and technologies.

The new name, the Green Energy Transition Research Institute, is a clear indicator of the institute's commitment to a more sustainable future. This name change signals a departure from its previous focus solely on energy training and research in Gujarat to a broader, more comprehensive agenda that encompasses the broader concept of green energy transition. The new name underscores a profound shift towards promoting cleaner and greener energy sources and technologies.

GETRI's revised mission goes beyond its earlier role of providing education and research related to energy in the state of Gujarat. Through its two verticals: training and C-NET, it now seeks to play a pivotal role in driving and facilitating the transition towards sustainable energy practices on a global scale. The Institute aims to have a broader and more significant impact, both nationally and internationally, by advocating for and actively contributing to the adoption of cleaner and greener energy solutions.

II. CENTRE FOR NET ZERO ENERGY TRANSITION (C-NET)

(i) Think Tank Fostering Energy Innovation As the energy landscape continues to evolve rapidly, the need for innovative solutions and expert guidance in the quest for sustainability becomes increasingly vital. GUVNL established the Centre for Net Zero Energy Transition (C-NET) at GETRI, Vadodara, in 2022. C-NET stands as a testament to GUVNL's dedication to innovation and thought leadership. Functioning as a dynamic think tank, this cell is strategically focused on addressing the challenges and opportunities associated with decarbonisation and net zero goals.

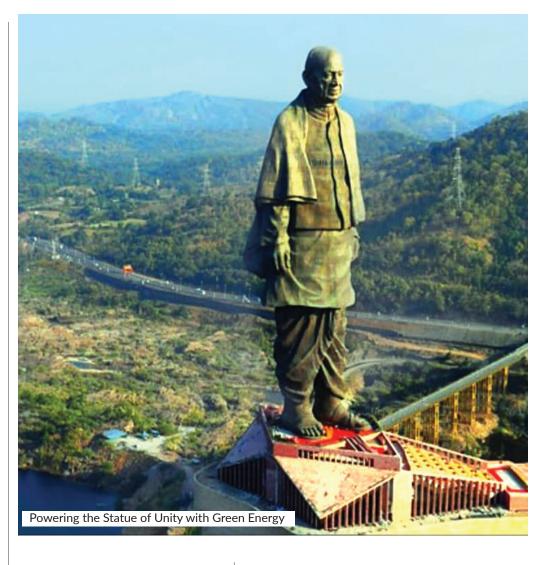
The vertical of GETRI serves as a catalyst for generating cutting-edge ideas,

Through robust research, analysis, and collaboration, C-NET aims to shape policies, technologies, and practices that contribute to a cleaner and more sustainable energy ecosystem.

strategies, and solutions to steer the energy sector towards a low-carbon future. Through robust research, analysis, and collaboration, C-NET aims to shape policies, technologies, and practices that contribute to a cleaner and more sustainable energy ecosystem. This visionary move of creating C-NET signifies an acknowledgment of power utilities' role in driving the transformation towards a sustainable energy future. C-NET serves as a knowledge hub, generating innovative ideas, strategies, and solutions that accelerate the energy sector's transition to net zero emissions.

C-NET, an integral part of GETRI, represents a dynamic leap forward in the journey towards a sustainable, ecofriendly, and net-zero energy future. A few of its noteworthy works are as follows:

- Report on short term strategies for mitigating variability in RE generation
- Cost benefit and comparative analysis of Grid scale Solar PV Project vis-à-vis Solar projects under PM KUSUM for feeder solarisation
- Optimum Generation Mix Study in consultation with CEA (Underway)
- Analysis of Wind Generation in the last 5 years
- Analysis of Grid absorption Capacity in view of RE Policy
- Trend of Deviations at the Gujarat Boundary- a five-year analysis
- Report on Analysis of breakdown cost of GSECL's plants
- Report on analysis of resiliency and fitness of Urban Distribution Network in selected 10 cities of Gujarat state (ongoing study)
- Identifying potential sites for high Wind/ Hybrid RE Projects
- Green Hydrogen Policy background note covering sector-specific studies
- Comments on draft SoP floated by MNRE for implementation
- Socio-economic analysis of Solar Rooftop penetration in the Gujarat State
- Strategies and recommendations on sustainability issues in Energy (SDG goals beyond 2030)
- Technical challenges faced by



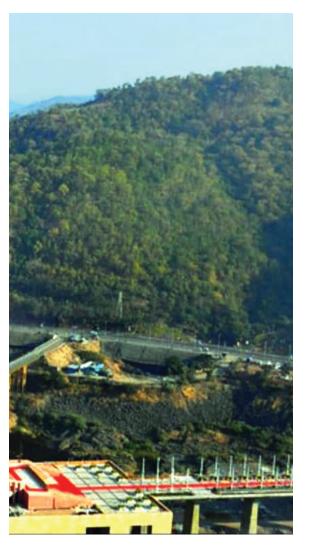
DISCOMs on account of increasing penetration of Solar rooftop in Gujarat State (ongoing study)

One of C-NET's notable strengths lies in its ability to bridge the gap between knowledge and action. By acting as a think tank, it engages in in-depth research, analysis, and scenario planning, offering strategic guidance to stakeholders and policymakers. This allows them to make informed decisions and develop forward-thinking strategies that align with the global imperative of reducing carbon emissions and mitigating climate change.

(ii) Consultancy- Empowering Utilities Nationwide

Recognizing the need to extend its

impact beyond its premises, C-NET, GETRI has embarked on a new journey of consultancy. This strategic move enables GETRI to leverage its extensive expertise and knowledge to offer specialised consulting services to utilities across the nation. It is actively taking up consultancy projects, working hand in hand with businesses, governmental bodies, and organisations to help them navigate the intricate pathways to net-zero energy. The expertise and insights offered by C-NET empower these entities to develop customised, sustainable solutions that not only reduce their carbon footprint but also improve operational efficiency profitability. Some of noteworthy assignments undertaken by C-NET are as under.



POWERING THE STATUE OF UNITY WITH GREEN ENERGY

The C-NET had secured its first consultancy assignment from the Statue of Unity Area Development and Tourism Governance Authority (SOUADTGA) in Kevadiya, Gujarat. This assignment involves the preparation of a pre-feasibility report for establishing a renewable energy system within the SOUADTGA jurisdiction to enhance the share of green energy at the Statue of Unity (SoU). Additionally, this assignment involves the preparation of tender documents for the selection of an EPC (Engineering, Procurement, and Construction) Contractor to set up 4 MW Solar Plants at identified sites within the SOUADTGA territory. The assignment also includes the techno-commercial

evaluation of bids for selecting the EPC contractor. Marking a significant milestone, C-NET successfully completed its first assignment in October 2023. Subsequently, the groundwork for the renewable energy initiative was inaugurated by the Honourable Prime Minister Shri Narendra Modi on the 31st of October, 2023.

Assisting Visakhapatnam Port Authority, Vizag, Andhra Pradesh to fulfil its vision of a Green and sustainable port.

C-NET has secured another consultancy engagement, from one of the busiest ports in the country, the Visakhapatnam Port Authority (VPA) in Vizag, Andhra Pradesh. The assignment's primary focus is to develop a comprehensive prefeasibility and technical evaluation report for the installation of Solar PV plants at specified locations within the VPA's domain. The project scope includes a thorough site assessment, detailed techno-commercial analysis, and a comprehensive risk assessment of the potential project sites. The overarching aim of this initiative is to elevate the proportion of renewable energy in VPA's energy portfolio, aligning with their commitment to fostering a green and sustainable port environment.

By engaging in consulting projects, GETRI aims to enhance operational efficiency, promote best practices, and drive innovative solutions that address the diverse challenges faced by utilities in the ever-evolving energy sector.

GETRI's Centre for Net Zero Energy Transition aims to be a beacon of hope and progress in the energy industry's ongoing journey towards sustainability. Its unique dual role as a think tank and consultancy powerhouse positions it at the forefront of innovation and expertise, facilitating the transition to cleaner, more sustainable energy sources while helping organisations align with net-zero goals. With the relentless dedication and forward-looking approach of C-NET, the path to a greener, more sustainable future

is not only clearer but more attainable than ever before.

III. TRAINING AND CAPACITY BUILDING

The Institute envisions becoming a premier training hub in the Power Sector, fostering innovation, sustainability, and excellence in global energy. Through comprehensive programs, it cultivates a skilled workforce for sustainable energy solutions, technological advancements, and operational excellence.

With a dedicated annual Training Budget and set targets, GETRI collaborates with esteemed institutions like IIM Ahmedabad, Bengaluru, and Lucknow, XLRI Jamshedpur, IIT Gandhinagar, IIT Madras, IIIT Gwalior, CEPT University, PDEU Gandhinagar, and NTPC School of Business. These partnerships aim to elevate middle and senior-level managers within the affiliated companies, facilitating personal and professional growth towards top-tier leadership.

Throughout the year, GETRI conducts programs in Power Generation, Transmission, and Distribution, primarily for promoter companies such as Gujarat Urja Vikas Nigam Ltd. (GUVNL), Gujarat State Electricity Corporation Ltd. (GSECL), Gujarat Energy Transmission Company Ltd. (GETCO), and four DISCOMs: PGVCL, UGVCL, MGVCL, and DGVCL. Additionally, it extends its expertise to capacity building and training for utility officers across state and national boundaries.

Since its establishment in 2005, GETRI has trained over 990,000 personnel in the Power Sector across various hierarchies, accumulating over 15.9 lakh man-days.

GETRI's Training Vertical's Notable Recent Initiatives and Achievements:

a. Capacity Building in Energy Regulation: Successfully conducted a capacity building program for 45 electricity regulators from South Asian countries (Bangladesh, Bhutan, India, Nepal, and Sri











Lanka) on "Energy Regulation for Energy Cooperation and Exchange of Electricity in South Asia." The comprehensive training, spanning three weeks, covered key modules on power system planning, tariff & licensing, and power exchange/ trading. The program, funded by USAID, elevated GETRI's visibility nationally and in South Asia.

b. Specialised Training for Powergrid Corporation of India Ltd. (PGCIL) Officers:

- Conducted two batches of training on i. "Power Distribution Systems," featuring a unique 60:40 hands-on to classroom training ratio. Received positive feedback from 38 officers, enhancing their understanding of distribution business intricacies.
- ii. Organised a one-week training on "Solar PV Plants: Conceptualization Commissioning and O&M," empowering 25 PGCIL engineers in designing, operating, and maintaining

- solar PV plants for sustainable energy transitions.
- iii. Online Training on Solar PV Basics: Hosted a concise three-day online session focusing on the fundamentals of solar PV plants and operations. Attended by 30 PGCIL officers, the training strengthened their foundational knowledge in harnessing solar energy.

c. Condition Monitoring Training for **NPCIL Officers:**

Successfully completed two batches of training for 70 Nuclear Power Corporation of India Ltd. (NPCIL) officers on "Condition Monitoring of Power Plant Equipment," enabling them to assess and optimise critical components' performance in power generation and transmission systems, improving reliability and efficiency.

GETRI's initiatives spanned specialised training programs, empowering regulators, engineers, and officers across various domains within the power sector, contributing significantly to enhancement and fostering sustainable energy practices.

IV. COLLABORATIONS WITH PREMIER INSTITUTIONS AND ORGANIZATIONS

GETRI's pursuit of excellence is further amplified through strategic collaborations with prominent academic and research institutions. A series of technical collaborations have been established with renowned entities such as IIMs, IITs, IIIT, XLRI, NSB, GIZ, CEEW, and AEEE. These collaborations facilitate knowledge exchange, joint research endeavours, and the cross-pollination of ideas, enriching GETRI's intellectual ecosystem and fostering holistic approaches to energy challenges. The programs at these esteemed Institutions are designed to enhance the knowledge and expertise of our employees in specific areas of energy-





NAVIGATE TOWARDS A MORE SUSTAINABLE FUTURE WITH GETRI

Where the pursuit of excellence converges with innovative energy solutions









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- Founded in 2005, it is an autonomous institute promoted by Gujarat Urja Vikas Nigam Limited (GUVNL) and its group companies with the core mission of fostering the continuous development of employees by offering training and research programmes.
- To provide training at GUVNL's subsidiary companies' doorsteps, GETRI has 15 training units called Gujarat Energy Knowledge Centres (GEKCs) across the state.

- GETRI also holds a crucial mandate as a think tank by serving as a knowledge hub and advisory body for both the government of Gujarat and the power sector.
- Introduced Centre for Net Zero energy Transition (C-NET) in 2022, a think tank, focused towards shaping sustainable energy policies and practices
- Through robust research, analysis, and collaboration, C-NET aims to shape policies, technologies, and practices that contribute to a cleaner and more sustainable energy ecosystem

Reach out to us:

Green Energy Transition Research Institute Opp. ISCON Heights, Besides 132 kV Gotri Substation, Vadodara 390021, Gujarat, India www.getri.org



related research, policy, and technology. This further underscores GETRI's commitment to continuous learning and professional development, ensuring that its workforce remains at the forefront of the latest advancements in the energy field.

V. NATIONAL LEVEL SEMINARS: NURTURING KNOWLEDGE SHARING

GETRI continues to be a beacon of knowledge dissemination through its national-level seminars. These seminars provide a platform for thought leaders, experts, practitioners, and enthusiasts to converge and discuss the latest developments, trends, and innovations in the energy sector. By facilitating dialogue and knowledge sharing, GETRI contributes to the collective growth and advancement of the energy domain.

GETRI's commitment to staying at the forefront of emerging energy trends is evident through the diverse range of topics covered in its seminars. Past seminars have delved into prominent and cutting-edge subjects such as Decarbonization, Battery Energy Storage Systems (BESS), Green Hydrogen, Offshore Wind, and Power Trading. These topics reflect the institute's dedication to exploring the latest developments and technologies that are shaping the future of energy.

Moreover, GETRI's forward-looking approach is showcased through its recently concluded seminars, which promise to be

equally enlightening and relevant. Some of these include seminars on Renewable Energy Transition - Road Travelled and Opportunities Ahead, Digital Technologies in Energy Transition, Financing Options in Energy Transition, Decarbonization of the Energy Sector in Gujarat, Green Hydrogen, Carbon Trading & Carbon Markets, and Offshore Wind. These topics are both timely and crucial, as they address key aspects of the energy sector's evolution, such as the transition to renewable energy sources, the role of digital technologies, financial considerations, and the importance of energy efficiency in achieving sustainability goals.

In essence, GETRI's commitment to hosting national-level seminars underscores its role as a key knowledge hub within the energy sector. These seminars not only provide a space for informed dialogue but also contribute to the dissemination of knowledge, helping to shape the future of energy by keeping stakeholders informed and engaged in the latest developments and strategies. Through these initiatives, GETRI continues to make a meaningful impact in advancing the energy sector's growth and sustainability.

VI. RENOVATION OF GETRI BUILDING: STATE-OF-THE-ART TRAINING CENTRE AND THINK TANK

In line with its transition to the Green Energy Transition Research Institute (GETRI), the institute has undertaken a

significant refurbishment of its building. This renewal includes cutting-edge training aids and modern infrastructure, underscoring GETRI's commitment to delivering top-notch training experiences. Moreover, this revamped administration building now functions as a pivotal think tank and consultancy hub in the domain of energy transition. Equipped with state-of-the-art technology and resources, GETRI plays a key role in fostering innovative thinking, conducting research, and providing consultancy services to drive sustainable practices in the evolving energy landscape.

GETRI's latest initiatives underscore its steadfast commitment to driving the green energy transition and fostering a sustainable energy future. Through the establishment of the Centre for Net Zero Energy Transition (C-NET), expansion into consultancy services, strategic collaborations, capacity building and training, national-level seminars, and infrastructure improvements. GETRI continues to lead the way in advancing knowledge, promoting innovation, and shaping the energy landscape for the better. The institution's transformation into the Green Energy Transition Research Institute reflects its visionary approach and dedication to catalysing positive change in the energy

Views expressed by: Alka Yadav, Director, Green Energy Transition Research Institute (GETRI)

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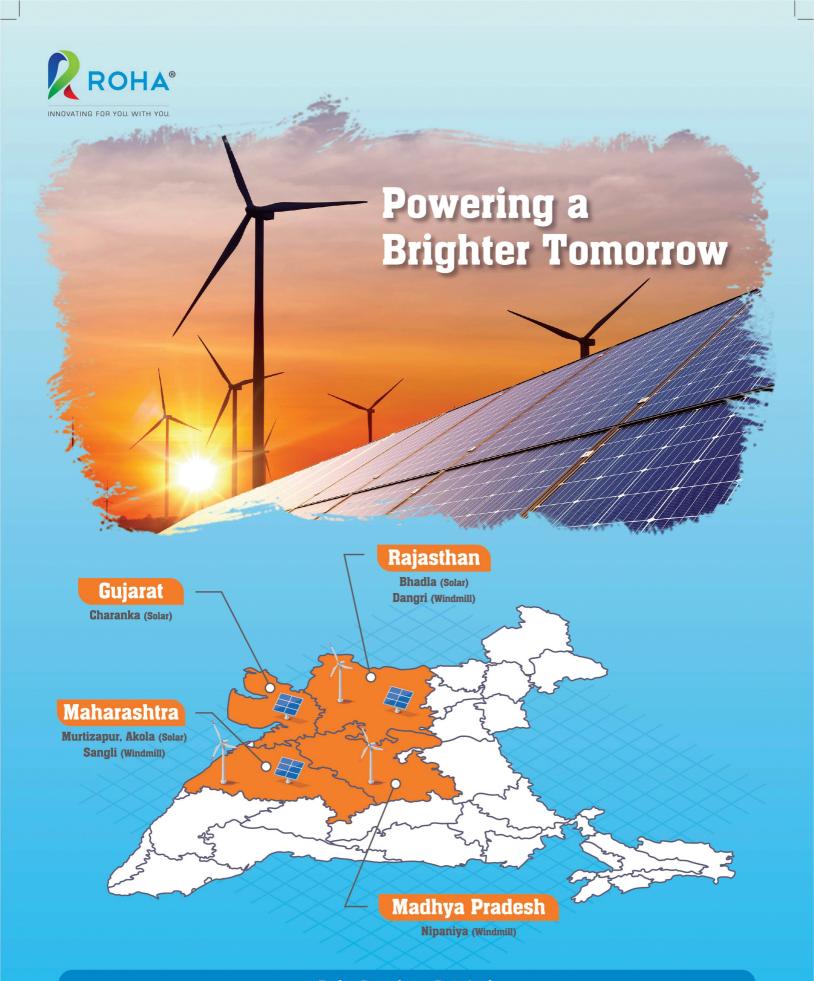


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INDIA'S PROGRESSIVE LEAP INTO SMART ENERGY MANAGEMENT UGCL

n today's rapidly evolving technological landscape, India positions itself as a leading innovator in the global energy sector. The nation's ambitious 'Make in India' and 'Smart Cities' initiatives transcend beyond mere slogans, embodying a profound commitment to forging a future that is both sustainable and efficient. This transformative journey is anchored by two critical pillars: a significant leap in energy management and a decisive shift toward harnessing renewable energy resources. India's approach goes beyond merely addressing the rising demands for power; it represents a conscientious effort to meet these demands in a manner that is ecologically responsible and sustainable for future generations. This commitment reflects India's dedication to pioneering solutions that align with global environmental goals while fostering economic growth and energy security.

THE ADVENT OF SMART GRIDS

India's strategic approach to revolutionising its energy sector is epitomised by the adoption and development of Smart Grid technologies. Led by the Ministry of Power, the Indian Smart Grid Forum (ISGF) plays a critical role in this transformation. This forum is not just an administrative body, it's a think tank that amalgamates the expertise and visions of government bodies, the private sector, and academic scholars. The aim is to set comprehensive standards and create robust policies that facilitate the widespread deployment of Smart Grids across the country.

These Smart Grids are not merely advanced versions of the conventional electricity grid;



they represent a paradigm shift in how energy is distributed and managed. Envisioned as dynamic and responsive networks, these grids are designed to handle India's burgeoning electricity demand while prioritising sustainability.

SMART METERS

Smart meters are a cornerstone technology within the Smart Grid framework. These advanced meters are a substantial upgrade over traditional electricity meters, offering a plethora of benefits that align with the modern energy needs of India. Their capabilities extend beyond mere energy measurement to include detailed data management, improved cost-efficiency, and eco-friendly features.

These meters are instrumental in handling the massive amounts of data generated within the Smart Grid. They track and analyse energy consumption in real-time, providing valuable insights into usage patterns. This data is pivotal for consumers, enabling them to make informed decisions about their energy use. It also empowers utility companies with the ability to manage loads effectively and plan for future energy requirements. Furthermore, the government benefits from this data for policy-making, ensuring energy distribution is aligned with national sustainability goals.

ADVANCED METERING INFRA

The implementation of Advanced Metering Infrastructure (AMI) marks a significant leap in India's energy sector. AMI systems transform the traditional, one-way electricity supply model into a dynamic, interactive network. This system enables two-way communication between utility providers and consumers, allowing for the exchange of real-time data on electricity usage.

AMI's role extends beyond mere communication, it allows for the remote monitoring and controlling of energy consumption, facilitating a more proactive approach to managing energy demand. This

system is pivotal in encouraging consumers to participate actively in energy management, providing them with real-time information about their energy usage and costs. It also aids utility companies in implementing dynamic pricing models, demand response programs, and efficiently integrating renewable energy sources into the grid.

THE SMART GRID NARODA PILOT PROJECT

The Smart Grid Naroda Pilot Project, funded by the Ministry of Power and Uttar Gujarat Vij Company Limited (UGVCL), stands as a testament to India's commitment to innovative energy solutions. Selected as one of eight pilot projects nationwide, it serves as a model for the future of India's power This distribution system. project encompasses a broad spectrum functionalities, including Advanced Metering Infrastructure for both residential and industrial consumers, effective peak load management, and seamless integration of renewable energy sources.

The Naroda project is particularly noteworthy for its comprehensive approach. It includes the deployment of smart meters across a wide user base, the establishment of a robust communication network for data transmission, and the integration of renewable energy resources like solar and wind power. This pilot project is more than a test of technology; it's a blueprint for scalable and sustainable energy management across India.

R-APDRP PROJECT IN AHMEDABAD PERIPHERY

UGVCL's involvement in the Restructured Accelerated Power Development and Reforms Program (R-APDRP) in the Ahmedabad Town periphery area, covering 1.44 lakh consumers, is another significant step in this direction. The project focuses on real-time monitoring and control of the distribution system through SCADA/DMS systems, encompassing distribution substations and 11 KV networks. It aims to provide uninterrupted power, reduce technical and commercial losses, and include the installation of components like RMU,

Sectionalisers, and FPIs for improved decision-making and fault management.

SMART GRID NARODA PILOT PROJECT UNDER UGVCL

In addition to the Smart Grid Naroda Pilot Project funded by the Ministry of Power and UGVCL, the UGVCL is implementing this project under the National Smart Grid Mission (NSGM) in the Naroda urban subdivision of Sabarmati Circle. This includes the installation of over 27,000 smart meters, with key functionalities like AMI for residential and industrial consumers. peak load management, renewable integration, and outage management through SCADA. The project aims to enhance the reliability, quality, and security of supply, featuring automatic meter reading, bill generation, remote connect/ disconnect, net-metering for solar rooftop consumers, and real-time alert information.

CONSUMER ENGAGEMENT AND BENEFITS

UGVCL has developed a consumer portal and mobile application under the Smart Grid Pilot Project, enabling consumers to monitor their energy consumption, payment, and billing history. This project aims to achieve consumer satisfaction through accurate billing, mobile application access, and demand-side management.

FUTURE PLANS AND OBJECTIVES OF UGVCL

UGVCL plans to propose the inclusion of more towns to extend the benefits of reliable power to a larger number of consumers, aiming for optimum consumer satisfaction. In the context of smart meters, UGVCL's objective is to assure systematic energy management with active participation from end-users and utility companies. Additionally, UGVCL intends to propose the installation of more than 35 lakh smart meters across 24 sub-divisions under the RDSS scheme, signifying its commitment to future energy management and smart grid development.

These initiatives by UGVCL reflect their

commitment to improving power distribution and management through advanced technology and consumer engagement, contributing to the broader goals of efficient, reliable, and sustainable power supply.

In essence, these initiatives collectively signify India's dedicated pursuit of a more efficient, reliable, and sustainable energy future. The integration of advanced technologies like Smart Grids, smart meters, and AMI, along with strategic programs like R-APDRP, positions India as a leader in smart energy management on the global stage.

LOOKING FORWARD

As India progresses towards a more sustainable and efficient energy future, it faces a multitude of challenges and opportunities. The integration of renewable energy sources, upgrading the national power grid, and the widespread implementation of smart technologies are significant undertakings. However, the potential rewards are substantial, promising not only a more effective energy system but also contributing to a cleaner environment.

The nation's journey towards developing a smart and sustainable energy ecosystem is a model of innovation and commitment. The nation's efforts in advancing Smart Grid and smart meter technologies are critical steps toward a future where energy management is intelligent and environmentally responsible. UGVCL will propose to include more towns to provide reliable power to consumers and will aim to achieve an optimum level of consumer satisfaction shortly. This journey, supported by government initiatives, technological advancements, and a dedication to sustainability, exemplifies how a country can transform its energy landscape and set a global standard for efficient and ecofriendly energy management. [5] 900

Views expressed by **Arun Mahesh Babu**, IAS, Managing Director, Uttar
Gujarat Vij Company Limited & Gujarat
Power Corporation Limited



DGVCL'S VISION FOR A BRIGHTER GUJARAT

Since 2007, DGVCL has initiated and adopted IT-based solutions for various activities such as new load demands, load enhancement, billing, outage management, material management, spot billing, and complaint resolution mechanisms. Yogesh Choudhary, IAS, Managing Director, Dakshin Gujarat Vij Company Ltd., shared this insight during an exclusive interview with Hemangini S Rajput of Elets News Networks.

DGVCL has been recognized for its commitment to renewable energy, notably winning the 'Outstanding State Discom Supporting Green Energy Uptake' award. How does DGVCL plan to further its initiatives in renewable energy in the coming years?

The Government of Gujarat and GUVNL have been very bullish on renewable energy. GUVNL has exponentially increased tie-ups with renewable energy, while Discoms have been actively facilitating this transition, including the rooftop and open-access space. More



>> YOGESH CHOUDHARY, IAS Managing Director, Dakshin Gujarat Vij Company Ltd.

than 800 MW of residential rooftop capacity has been installed in DGVCL's area in the last 3 years under the Surya Gujarat Yojana alone.

Wind energy holds significant potential in the RE sector. DGVCL is planning to publish a tender to invite proposals for setting up Rooftop Wind Projects (KW scale) on a pilot basis, in line with the Gujarat RE Policy 2023, to assess the feasibility and viability of wind energy generation on rooftops, parallel to solar rooftops, promoting hybrid generation for consumer self-sustainability. Furthermore, DGVCL's more than 600 KM coastal area can be leveraged to boost rooftop wind capacity installation and MW-scale projects.

The Government of Gujarat has recently announced the ambitious Renewable Policy 2023, providing supportive provisions to captive users for self-sustainability. Over 200 MW capacity has already been registered under RE Policy 2023 by DGVCL HT/EHT Consumers, slated for commissioning within this year. This capacity addition will enable DGVCL to shift more agricultural consumption to daytime (i.e., Solar Hours) instead of nighttime.

The Ministry of New & Renewable Energy (MNRE), Government of Gujarat, has introduced various schemes/incentives such as PM-KUSUM (A, B, C) for agricultural consumers. DGVCL has initiated the goal of creating at least 1 solar village in each district under its distribution area.

The introduction of smart prepaid meter boxes is a significant step towards modernising the power distribution system. Could you elaborate on the expected impacts of this initiative on efficiency and consumer satisfaction?

Smart prepaid energy meters are ready to revolutionise the energy industry, impacting efficiency and consumer satisfaction significantly, as they offer real-time monitoring, control, and payment flexibility, leading to several key impacts:

In terms of efficiency, they enhance operational efficiency by reducing energy theft through better monitoring and control. These meters ensure accurate billing and revenue protection for the Discom. They streamline operations, automate meter readings, reduce manual errors, and provide remote functionalities, thereby reducing manual interventions and operational costs, as well as consumer disputes.

Secondly, real-time data empowers consumers to actively monitor and manage their energy usage, leading to more efficient consumption patterns and reduced energy wastage. It also provides payment flexibility to consumers, leading to higher consumer satisfaction.

In essence, smart prepaid energy meters drive efficiency gains by curbing losses, optimizing operations, and significantly boosting consumer satisfaction through greater control, transparency, and tailored payment options.

DGVCL has been consistently acknowledged for its operational excellence and financial management. What are the new financial management strategies or tools that DGVCL is considering adopting in the upcoming fiscal year?

DGVCL has performed exceedingly well in financial performance over the last many years. Our AT&C losses are among the lowest in the country, and the collection efficiency has been 100%. For any Discom, AT&C losses are the barometer based on which financial sustainability can be ascertained. Any financial strategy will have to be formulated considering this concept, i.e., keeping distribution losses at low levels combined with 100% collection efficiency. The installation of smart meters at our locations will further help us achieve this objective.

As material cost forms a substantial component of capital expenditure,



More than 800 MW of residential rooftop capacity has been installed in DGVCL's area in the last 3 years under the Surya Gujarat Yojana alone.

measures are being taken to overhaul the material resource planning system, with optimum inventory levels prescribed to maintain inventory carrying costs at lower levels.

Currently, over 55% of consumers are paying their bills digitally. We are targeting over 90-95% of consumers to pay digitally without the need to physically visit the sub-divisions. We have already tied up with common service centers and some banks for collection near the doorstep of consumers. This will enable faster realization of revenue with minimal transaction cost. Accordingly, working capital requirements can be managed more efficiently.

In an era of rapid technological advancement, how has DGVCL integrated new technologies to enhance its operations and services? What impact has this on efficiency and customer satisfaction?

Since 2007, DGVCL has initiated and adopted IT-based solutions for various activities such as new load demands, load enhancement, billing, outage management, material management, spot billing, and complaint resolution mechanisms. All these activities have been conducted through various IT solutions like E-Urja, OMS, Geo-urja, AMR, CCC, Urja-Mitra, IAS, and many more.

Due to the use of these IT solutions, transparency in processes and data

analysis has become faster. The timelines for various activities, such as new connections or outage timing, have been reduced, resulting in better and higher-quality customer service. SMS alerts to consumers for emergency shutdowns (ESD) and planned shutdowns (PSD) & billing information were started long back, improving the consumer experience. Multiple digital payment options are provided to consumers. Power-related complaints can be submitted through the DGVCL mobile application, followed up within Standard Operating Procedures (SoP).

For new HT connections, an "HT CPC-Call and Apply" portal has been started. Every HT application for new, additional load, and reduction of load is attended to personally by dedicated staff from the corporate office. For LT connections, a Central Processing Centre (CPC) has been initiated for accepting applications for new connections, reduction of load, additional load, and change of name. This has significantly reduced the time taken for new connections.

GIS mapping of HT/LT networks has been done on the Geo Urja application, and surveys of all applications are conducted through the same. This is bringing a lot of operational efficiency to the system. Apart from all these initiatives, continuous business process reengineering is constantly adopted to improve operations with the help of IT systems.

Under your tenure, DGVCL has seen several innovative initiatives. Could you share some of these initiatives that you are particularly proud of and explain how they have contributed to the company's success?

During my tenure at DGVCL, we have focused on improving operational efficiency on all fronts, mainly the timeline for providing new connections, inventory control, and bringing IT initiatives to reduce operational

timelines. A central processing center for document verification of new applications and back-office teams at the division level has significantly reduced the timeline for connections. Implementation of an inhouse developed Inventory accounting system has reduced overall inventory levels within the Discom. For urban and industrial feeders, we have initiated system improvement works to create a robust network, which has started to show results in terms of a reduction in downtime for feeders.

Gujarat Discoms have adopted the eOffice initiative of the Government of Gujarat known as 'eSarkar,' which has reduced physical paperwork and timelines for clearing files. We have focused on many HR issues that have resulted in overall improved work satisfaction among employees.

Finally, reflecting on DGVCL's journey so far, what do you consider the most significant challenge the company has overcome, and what lessons have been learned that are shaping its future strategies?

Working during the Covid-19 lockdown and the second wave was perhaps the most challenging time, but we sailed through it due to the immense resilience shown by the workforce. We lost over 30 employees during the second wave. Lockdown and containment zones in various parts of the country affected the delivery schedules of materials. Migrant labourers working with contractors moved back to their hometowns, leading to a shortage of trained manpower for some time. On top of all these, industrial consumptions declined drastically, putting a lot of pressure on revenues and collections.

The entire DGVCL team showed immense courage and dedication towards their work, and we were able to provide uninterrupted power supply to our esteemed consumers during those tough times.

ROOFTOP SOLAR PGICL REVOLUTION IN PGVCL



aschim Gujarat Vij Company Ltd. is a state owned DISCOM of Western Gujarat that supplies electricity to 66 Lakh Consumers in 12 districts of Saurastra and Kachchh region of Gujarat namely, Rajkot, Jamnagar, Junagadh, Porbandar, Bhuj, Bhavnagar, Surendranagar, Amreli, Botad, Morbi, Devbhumi Dwarka and Gir Somnath. Various Distributed Renewable Energy projects are being implemented by PGVCL as per the State Renewable Energy Policies.

Under the SURYA-Gujarat Scheme, more than 1.50 Lakh Residential consumers have installed Solar Rooftops with the aggregated installed capacity of 605 MW and more are in pipe line. Under this scheme, Solar Projects set up by residential consumers on their rooftop / premises shall be allowed irrespective of consumer sanctioned load. Residential beneficiaries have received a

subsidy of 40% for up to 3 kilowatts (kW) system and a subsidy of 20% for a system of above 3 kW and up to 10 kW. The Energy Accounting shall be carried out on Billing Cycle basis.

Surplus Energy generated from the solar project after set off on billing cycle basis is purchased by DISCOM at Rs.2.25 / unit for the first 5 years from commissioning of project and thereafter for the remaining term of the project at 75% of the simple average of tariff discovered and contracted under competitive bidding process conducted by GUVNL as per the policy guideline. The total Rooftop Solar Installed capacity comprising of Residential, C&A and Govt. sector is 820 MW as on Dec-2023

The success of the large number of Rooftop installations is achieved through various outreach activities carried out by Field

Offices, Application process on Unified fully digitized web portal so that consumer gets update on their application stages through e-mail and SMS and large number of the Empaneled Agencies.

Not only that, under the PM-KUSUM-Component C of Feeder Level Solarization, PGVCL has issued LOA for 416 MW to solarized more than 2 lakh Agriculture pump sets. Also, the tender having 300+ MW capacity is under finalization. There are small ground mounted plants having capacity of 145 MW already installed and 62 MW Grid connected Solar Irrigation Pump sets at LT Voltage level. PGVCL has also aimed to solarize more households in Rural area and therefore targeted to make at least 1 village per district to solarize it fully in this year.

Views expressed by: R. J. Vala, Chief Engineer (Project), PGVCL



MADHYA GUJARAT VIJ COMPANY LIMITED PIONEERING POWER DISTRIBUTION AND RENEWABLE ENERGY

adhya Gujarat Vij Company Limited (MGVCL), a key entity in the power sector, has significantly transformed the landscape of electricity distribution and renewable energy in Central Gujarat. Serving a vast consumer base of about 33 lakh across seven districts, MGVCL's journey from a conventional power distributor to a pioneer in energy efficiency and sustainable practices is remarkable.

JOURNEY TOWARDS OPERATIONAL EXCELLENCE: REDUCING LOSSES

One of the most notable achievements of MGVCL is its success in reducing transmission and distribution losses. In 2005-06, these losses stood at a high of 18.72%, a figure that has been impressively reduced to just 8.37% by 2022-23. This significant reduction is not only a testament to MGVCL's commitment to operational efficiency but also to its dedication to adopting sustainable energy practices.

ILLUMINATING THE RURAL LANDSCAPE: A COMMITMENT TO ELECTRIFICATION

MGVCL's commitment to rural electrification is a cornerstone of its operational philosophy. The company has successfully provided electricity to over 4,000 villages in Gujarat, demonstrating its dedication to bridging the urban-rural divide. These efforts have not only lit up homes but have also fuelled economic growth and development in these areas, fundamentally changing the lives of millions.

ADVANCING RENEWABLE ENERGY: SOLAR POWER INITIATIVES

In alignment with global energy trends and the national agenda, MGVCL has made significant strides in promoting renewable energy. A striking example of this is the adoption of solar rooftop connections by 132530 of its consumers,



amounting to an installed capacity of 687.205 MW. MGVCL's focus on solar power is a strategic step towards reducing dependency on traditional energy sources and minimising environmental impact.

A TRADITION OF EXCELLENCE: AWARDS AND RECOGNITIONS

MGVCL's pioneering efforts have been widely recognised, earning it numerous awards and accolades. The company has been honoured with the National Energy Conservation Award, the Best Performing Power Distribution Company Award, and the Skoch Order-of-Merit Award. Additionally, MGVCL has received three prestigious awards in the renewable energy category, a clear indication of its leadership and innovation in the energy sector.

REVOLUTIONISING CUSTOMER SERVICE: DIGITAL AND EFFICIENT

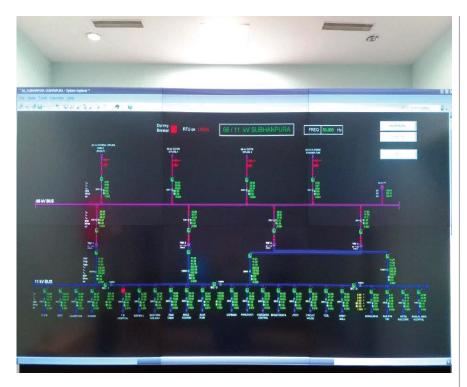
In the realm of customer service, MGVCL has set a high standard. The introduction of online facilities for various services and a user-friendly mobile application have revolutionised the way consumers interact with the company. These digital platforms enable seamless management of connections, bill payments, and efficient complaint resolution, highlighting MGVCL's commitment to consumer satisfaction.

THE CENTRAL PROCESSING CENTER: A PARADIGM SHIFT

The establishment of a Central Processing Center (CPC) for handling new connection applications marks a significant improvement in operational efficiency. This initiative is designed to streamline the application process, reducing the time taken for sanctioning and enhancing the overall customer experience.

EMBRACING THE FUTURE: SMART GRID IMPLEMENTATION

MGVCL's vision for the future is ambitious and forward-looking. A key aspect of this vision is the implementation of smart grids,



Introduction of smart meters at MGVCL marks another significant stride toward improving operational efficiency and enhancing the overall consumer experience. This initiative contributes to the establishment of a robust digital energy infrastructure.

including the installation of prepaid smart meters at consumer premises and transformer levels. This move towards smart grid technology will provide MGVCL with real-time data, enabling better management of the distribution network and reducing power outages. The introduction of SCADA-based systems in Vadodara and other cities is another step towards enhancing operational efficiency and reliability.

EXPANDING THE RENEWABLE ENERGY PORTFOLIO

Continuing its commitment to renewable energy, MGVCL plans to further expand its solar power initiatives. The company aims to augment the share of solar power in its total energy mix, setting ambitious targets for installing additional capacity under various solar schemes. This expansion not only aligns with national

energy goals but also reinforces MGVCL's role as a catalyst in the transition to renewable energy.

ELEVATING CUSTOMER SERVICE TO NEW HEIGHTS

MGVCL is also focused on further improving its customer services. The upcoming Central Command and Control Center will be a state-of-the-art facility dedicated to effective and efficient redressal of consumer grievances. This center, equipped with dedicated manpower and advanced technology, will ensure that customer issues are addressed promptly and satisfactorily.

PROMOTING ENERGY EFFICIENCY AND CONSERVATION

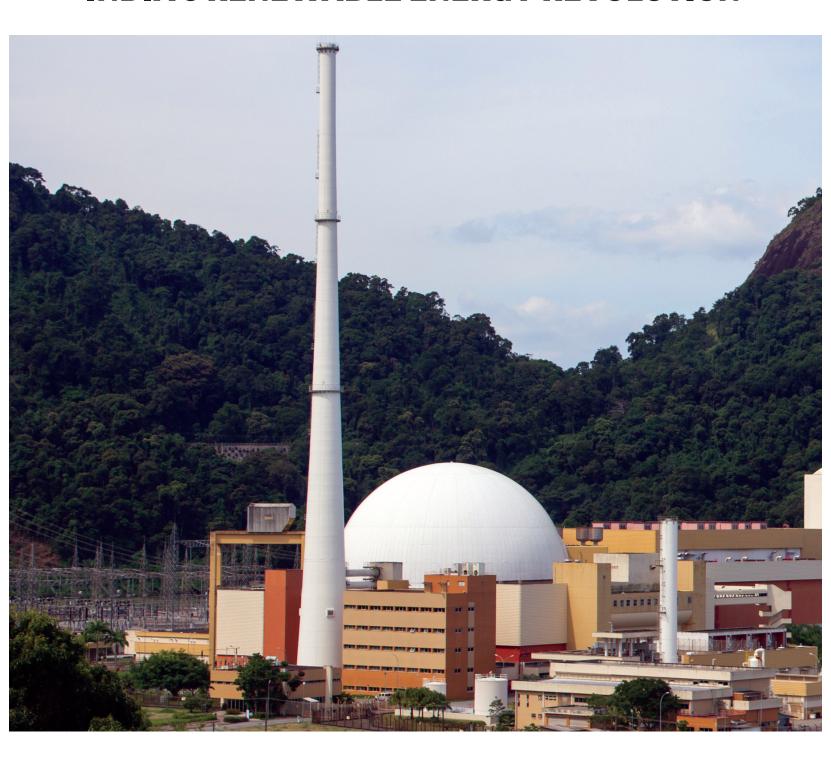
In its quest for sustainability, MGVCL is actively promoting energy efficiency and conservation. The company plans to engage in consumer awareness activities and conduct energy audits of its offices to ensure optimal energy utilisation. These initiatives are aimed at educating consumers about the importance of energy conservation and implementing practices that reduce energy wastage.

TO SUM IT UP

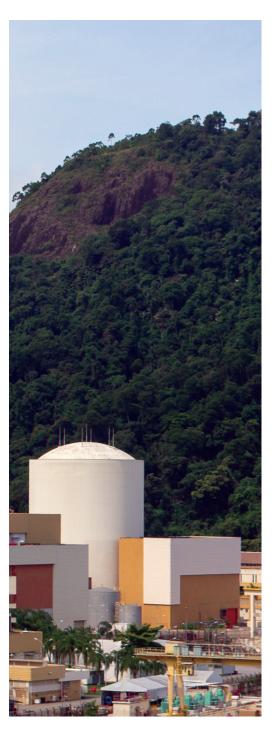
Madhya Gujarat Vij Company Limited's journey is a testament to its unwavering commitment to excellence, innovation, and sustainability. Through its significant achievements in reducing losses, electrifying rural areas, promoting renewable energy, and enhancing customer service, MGVCL established itself as a leader in the power distribution sector. With its ambitious plans, MGVCL is poised to continue its trajectory of growth and innovation, powering a brighter and greener future for the communities it serves.

Views expressed by **Tejas Parmar**, **IAS**, Managing Director, Madhya Gujarat Vij Company Ltd

GUJARAT LEADS THE CHARGE IN INDIA'S RENEWABLE ENERGY REVOLUTION



>>> SRAJAN AGARWAL (ENN)



ndia's ambitious goal to transition to clean energy is gaining momentum, driven by the pledge to achieve 50% of cumulative electric power capacity from non-fossil fuel sources by 2030. In this transformative journey, the state of Gujarat has emerged as a trailblazer, demonstrating unwavering commitment to clean, sustainable energy.

Gujarat's achievements in clean energy are nothing short of remarkable. With an impressive 20 GW of installed renewable capacity, over 11 GW of which has been added in the past four years, the state stands as a testament to the potential of clean energy sources, particularly wind, solar, and solar-wind hybrid technologies.

GUJARAT'S REMARKABLE JOURNEY IN RENEWABLE ENERGY

Over the past decade, Gujarat has made significant strides in the renewable energy sector, seeing its capacity skyrocket from 8 GW to an impressive 22.7 GW. This surge positions Gujarat not just as a leader in India's green energy revolution but also as a global example of sustainable development. state's capita electricity The per consumption, nearly double the national average, underscores its commitment to and reliance on renewable energy sources. In alignment with India's ambitious target of achieving 100 GW renewable energy installed capacity by 2030, Gujarat has set its own challenging goals, demonstrating both leadership and vision in this crucial sector.

GUJARAT'S GREEN HYDROGEN INITIATIVES AND SEMINARS

In a move to further bolster its position in the renewable energy landscape, Gujarat is set to host two significant seminars on January 12. The themes, "Gujarat - The Green Hydrogen Destination of India" and "Watts to Gigawatts - To meet Round the Clock Clean Energy", reflect the state's focus on innovative and sustainable energy solutions. These seminars are not just platforms for discussion but also a testament to Gujarat's proactive approach in exploring

and harnessing new energy frontiers.

In a recent landmark development, Gujarat signed initial investment agreements worth ₹7.17 trillion (\$86.07 billion) with 58 companies operating in sectors like energy, oil and gas, and chemicals. These agreements were signed in anticipation of the biennial Vibrant Gujarat Global Summit 2024, scheduled in Gandhinagar from Jan. 10 to Jan. 12. This event is expected to attract a record number of foreign and domestic investors, spotlighting Gujarat's role in shaping India's energy future.

MAJOR INVESTMENTS BY NTPC AND TORRENT POWER

NTPC Renewable Energy Limited and Torrent Power, two major players in the energy sector, have signed significant agreements as part of these investment plans. NTPC proposed an investment of ₹900 billion (\$10.80 billion) to develop 15 GW renewable energy parks and projects, primarily to meet the agricultural sector's power needs. They also plan to invest ₹700 billion (\$8.40 billion) in diverse projects, including fuel cell electric vehicle mobility and green chemical production. Similarly, Torrent Power plans to invest ₹474 billion (\$5.69 billion) in solar power projects, green hydrogen and ammonia manufacturing plants, and distribution networks in key cities.

SIMPLIFYING RENEWABLE ENERGY DEVELOPMENT

The policy is designed to streamline the process of developing renewable energy projects in Gujarat. It seeks to attract significant investments in the sector, thereby bolstering the state's economic growth and sustainability.

Gujarat sets its sights high with a goal of achieving a cumulative renewable energy capacity of 100 GW by 2030. This plan involves an investment of around Rs 5 lakh crores and the use of approximately 4,00,000 acres of land.

The policy aims to provide daytime power to agricultural consumers, reducing energy

costs for residents. It also focuses on promoting investment, employment, skill enhancement, local manufacturing, startups, research, and the deployment of innovative technologies in the renewable energy sector.

ELIGIBILITY AND INCENTIVES

Projects commissioned during the operative period of the policy are eligible for incentives, which are applicable for 25 years from the commissioning date or the project's defined lifespan.

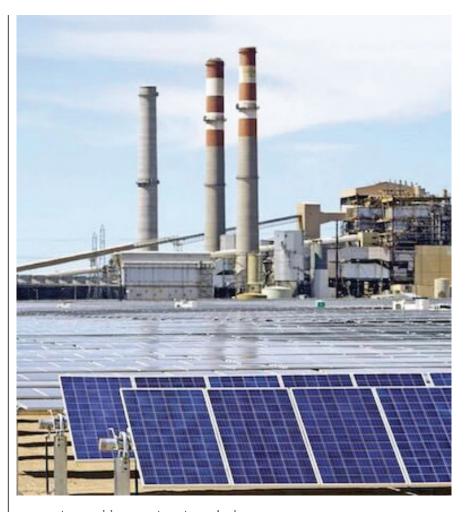
The policy covers a wide range of projects, including ground-mounted solar, rooftop solar, floating solar, canal top solar, wind, rooftop wind, and wind-solar hybrid projects. Projects can be set up for either captive use or for selling electricity to third parties, with no capacity restriction.

TYPES OF RENEWABLE ENERGY PROJECTS

- Solar projects that can be established in solar parks, on government revenue land, or on private land, offering flexibility in project development.
- Solar rooftop projects under net metering or gross metering arrangements, promoting small-scale solar adoption.
- Enhancing the utilization of water bodies for energy generation.
- Small-scale wind projects for consumer use or for selling power to DISCOMs, under applicable regulations. It also includes windsolar hybrid projects in both existing and new project categories.
- Projects under the REC mechanism for captive use or third-party sale are included. Energy accounting and banking will follow GERC regulations, with exemptions for certain residential consumers.
- DISCOMs are mandated to supply 100% renewable energy upon requisition at a Green Power Supply Tariff set by GERC.

GUJARAT'S RENEWABLE ENERGY POLICY 2023

Gujarat's Renewable Energy Policy 2023



represents a visionary step towards sustainable energy development. The policy, effective from its date of notification until June 2028, is a strategic effort to transition Gujarat towards renewable energy, with an ambitious target of generating 50% of its power from renewable sources by 2030. This initiative aligns with India's broader environmental commitments and the global push for a greener future.

The policy covers a wide array of renewable energy projects, focusing on wind, solar, and wind-solar hybrid technologies. These include ground-mounted solar, rooftop solar, floating solar, canal top solar, and wind-hybrid projects. An integral part of this policy is the removal of capacity restrictions, which previously limited the amount of renewable energy a company could produce. This change allows firms to meet up to 100% of their energy needs through renewable sources.

Over the past decade, Gujarat has made significant strides in the renewable energy sector, seeing its capacity skyrocket from 8 GW to an impressive 22.7 GW.



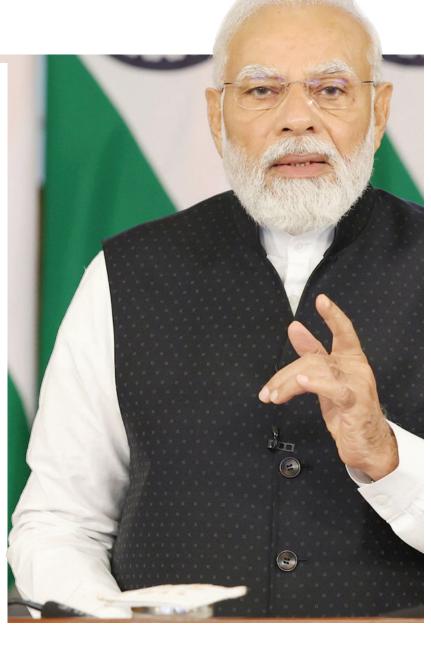
PM Modi's

94th Mann ki Baat

Addressing the 94th episode of his Mann ki Baat radio programme, PM Modi said, "Today, solar energy is one such topic, in which the entire world sees its future. And for Indians, Sun has not only been worshipped for centuries but has also been at the centre of our lifestyle."

"Linking its traditional experience with modern science, India is amongst the leading nations in generating electricity from solar energy," PM Modi added. The Prime Minister added that solar energy has transformed the lives of the poor and middle class in India.

PM Modi highlighted instances of several farmers benefiting from the central government's Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM Kusum) scheme, utilizing solar energy in their agricultural practices.



Gujarat's geographical advantage, with its extensive coastline of 1,600 km, offers an ideal setting for wind energy production, significantly contributing to its renewable energy capacity. The state, already a leader in wind power, aims to further capitalize on this advantage by encouraging various projects.

To realize these goals, the policy has outlined several features and incentives. These include the facilitation of unlimited capacity renewable energy projects, renewable energy settlement against consumer consumption, and provisions for 100% renewable energy supply upon

customer request. Moreover, it introduces options like net metering or gross metering for rooftop projects and encourages the development of small-scale rooftop wind projects. The policy also supports offshore wind projects and the repowering of wind turbine generators.

From an investment standpoint, the policy is expected to attract approximately ₹5 lakh crore, leveraging around 4,00,000 acres of land. The Gujarat Energy Development Agency (GEDA) will serve as the nodal agency for project registration, validation, and monitoring, ensuring

smooth implementation and progress tracking.

A highlight of the policy is the planned Gujarat Hybrid Renewable Energy Park. Set to be the world's largest hybrid renewable energy park, it will be located near Vighakot village in the Kachchh district. This park is expected to generate 30 gigawatts of electricity using both solar panels and wind turbines, covering an area of 1.79 lakh acres. It aims to create around one lakh job opportunities and attract significant investments, contributing to both economic growth and environmental sustainability.

PM MODI'S VISION FOR GUJARAT'S ENERGY DEVELOPMENT



Under Prime Minister Narendra Modi's leadership, there have been significant advancements in Gujarat's power and energy sector, particularly in the fields of renewable energy and modernizing the power distribution system.

Renewable Energy Developments: Gujarat has made notable strides in expanding its renewable energy capacity. The state has launched large-scale projects, such as the Kachchh (NTPC) Solar Park, with a pre-construction capacity of 4,750 MW, and the Bhuj (Alfanar) wind farm, currently operating at 300 MW. These projects are part of a broader strategy to increase renewable energy sources in the state and reflect a commitment to sustainable energy practices.

Rooftop Solar Programme: Prime Minister Modi has also been instrumental in promoting the use of solar energy through initiatives like the National Solar Rooftop Portal. This portal simplifies the process for consumers to install rooftop solar systems, including registration, technical approval, and subsidy disbursement. The programme aims to install rooftop solar across more than 10 lakh households, contributing to the national goal of adding green energy capacity.

Revamped Distribution Sector Scheme: An important initiative under PM Modi's tenure is the Revamped Distribution Sector Scheme, launched with an outlay of Rs. 3,03,758 crore over five years. This scheme is focused on improving the operational efficiencies and financial sustainability of Distribution Companies (DISCOMs). It includes the modernization and strengthening of distribution infrastructure, aiming to enhance the reliability and quality of power supply to end consumers. The plan also proposes the installation of 25 crore Smart Prepaid meters nationwide.

RENEWABLE ENERGY: THE PATH TO SUSTAINABILITY

Renewable energy, encompassing solar power, wind energy, hydroelectric power, emerging renewables, and nuclear energy, is a vital component in the journey toward sustainability. The latest statistics and trends in 2023 offer a comprehensive view of how these energy sources are shaping the global energy landscape.

SOLAR POWER

Solar energy continues to surge, with declining module prices, the increasing uptake of distributed solar PV systems, and policy support for large-scale deployment driving higher annual solar additions. This growth is evident across major markets like China, the European Union, the United States, and India. The crisis triggered by Russia's invasion of Ukraine has particularly accelerated solar energy deployment in the European Union as part of efforts to reduce dependence on Russian natural gas imports.

RECENT DEVELOPMENTS

- India has set ambitious targets for renewable energy capacity, with a significant focus on solar power. The goal is to achieve 100 GW of solar capacity by 2022 as part of a broader 175 GW renewable energy target.
- The emphasis on developing gridconnected solar projects has been increasing, with various tenders and auctions being conducted to attract investments.
- Headquartered in India, ISA is a treatybased international organization. It's an initiative by India to promote solar energy and reduce dependence on fossil fuels among countries lying between the Tropics of Cancer and Capricorn.
- There's a rising trend of corporate and industrial entities adopting solar energy to reduce their carbon footprint and energy costs.

WIND ENERGY

India's wind energy sector, a key component of its renewable energy landscape, is







The Indian power sector has attracted significant foreign direct investment, totaling US\$ 16.58 billion from April 2000 to March 2023.

Source: IBEF



making significant strides in 2023, with both onshore and offshore developments.

ONSHORE WIND ENERGY

 As of June 30, 2023, India's installed wind energy capacity stood at 43,773 MW. The major wind energyproducing states in 2022-23 included Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu,

- and Telangana.
- The Central Electricity Authority estimates that by the end of 2029-30, the likely installed capacity of wind energy in India will be 99,895 MW. This is in alignment with India's commitment to achieve 500 GW of installed electricity capacity from non-fossil sources by 2030.

OFFSHORE WIND ENERGY

- India is still categorized as a 'new market' in the global offshore wind energysector. Detailed Environmental Impact Assessments (EIAs) are crucial for advancing this sector, particularly for planned projects off the coasts of Gujarat and Tamil Nadu.
- The offshore wind sector in India faces challenges such as the need for heavy initial capital, lack of specialized vessels or ports to support turbine installation and maintenance, and environmental concerns related to marine ecosystems.
- Despite these challenges, the World Bank-Group ESMAP has mapped 174 GW of fixed and floating offshore wind potential off India's coastline, with significant resources found off

Tamil Nadu and Gujarat

EMERGING RENEWABLES

India is advancing significantly in the field of renewable energy, with various initiatives and developments led by the government to foster a transition to green energy. Here is an overview of the latest initiatives and developments in the renewable energy sector in India, along with the latest data and statistics:

GOVERNMENT INITIATIVES AND DEVELOPMENTS

- Green Hydrogen Mission: The government has allocated Rs. 19,700 crore for the Green Hydrogen Mission, aiming to produce 5 MMT annually by 2030. This initiative is pivotal for transitioning to low carbon intensity and reducing dependence on fossil fuels.
- Battery Energy Storage Systems: The Ministry of Power has announced a viability gap funding scheme for the development of Battery Energy Storage Systems with a capacity of 4,000 MWh, supporting the storage and stability of renewable energy.
- Investment in Renewable Energy: The Union Budget 2023 has allocated Rs. 35,000 crore for priority capital investments towards energy transition and net-zero objectives. Additionally, there's a significant investment of Rs. 20,700 crore for strengthening the interstate transmission system for integrating 13 GW of renewable energy from Ladakh.
- Promotion of Alternative Fertilizers and Natural Farming: Initiatives like the "PM Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth" are being promoted to support alternative fertilizers and balanced use of chemical fertilizers. One crore farmers are expected to adopt natural farming over the next three years.
- Waste to Wealth Plants: 500 new plants under the GOBARdhan scheme are planned, with a total investment of Rs 10,000 crore, emphasizing the



Hon'ble Prime Minister Shri Narendra Modi on Budget 2023-24

"The Gobardhan Yojana is an important component of India's biofuel strategy. In this budget, the government has announced plans to set up 500 new plants under the Gobardhan Yojana. These are not like old-fashioned plants. The government will spend ₹10,000 crore on these modern plants", he added. The private sector is getting attractive incentives for producing compressed biogas from agri-waste and municipal solid waste, said PM Modi.



- circular economy.
- Renewable Generation Obligation (RGO): Generating companies establishing coal/lignite-based thermal generating stations are required to establish renewable energy generating capacity or procure and supply renewable energy equivalent to a minimum of 40% of their capacity for projects expected to achieve COD on or after April 1, 2023.
- Solar and Wind Energy: Policies like the Solar Rooftop Phase II and the Wind-Solar Hybrid Policy have been launched to promote the extensive use of solar and wind energy. The

- government has set a target of 30 GW of offshore wind power by 2030.
- Foreign Direct Investment: 100% FDI under the automatic route is permitted for renewable energy generation and distribution projects.
- Renewable Energy Bidding Trajectory: The government plans to add 50 GW of renewable energy capacity annually for the next five years to achieve the target of 500 GW by 2030.

INDIA'S MISSION FOR CARBON NEUTRALITY BY 2047

India's energy sector is rapidly evolving to embrace a sustainable and green future



with ambitious targets and comprehensive strategies to achieve carbon neutrality by 2047. This transition is driven by the nation's significant growth in energy demand, commitment to clean energy, and innovative policies and investments.

SOLAR AND WIND ENERGY

India has achieved the world's lowest renewable energy prices, propelling the nation towards energy independence in an economically and environmentally advantageous way. The government has set a target of installing over 500 GW of non-fossil electricity generation capacity by 2030, striving for an 80% clean grid by 2040 and 90% by 2047. These efforts are supported by the discovery of significant lithium reserves, which are crucial for manufacturing electric vehicles and grid-scale battery storage systems.

ELECTRIFICATION AND EV ADOPTION

Electrification, particularly in the transportation sector, is another key focus area. India aims to have 30% of all vehicles on its roads running on electricity by 2030, with a specific focus on electric two-wheelers and three-wheelers. Policies and incentives, such as tax exemptions, subsidies, and the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme, have been introduced to support this transition.

INVESTMENT IN GREEN TECHNOLOGIES

India is attracting significant investments in sectors like battery storage, electric vehicles (EVs), and green hydrogen, facilitated by policies allowing 100% foreign direct investment in renewable energy. The government's Production-

Linked Incentive (PLI) scheme is encouraging domestic manufacturing of solar panels and enhancing supply chain resilience.

ENERGY EFFICIENCY AND CONSERVATION

Efforts are also being made to improve energy efficiency and conservation. Initiatives like the Energy Conservation Building Code and the Perform, Achieve, and Trade scheme are targeting energy efficiency in buildings and industries. The development of smart grids is another crucial step towards enhancing electricity distribution efficiency.

COMMITMENT TO CARBON NEUTRALITY

The government is committed to reducing its emissions intensity by 45% from 2005 levels by 2030 and meeting over half of its energy requirements from renewable sources. The target includes achieving 50% installed non-fossil energy capacity by 2030 and advancing to BS-VI emission standards.

Gujarat's leading role in India's ambitious quest for a sustainable future, marked by a decisive shift to renewable energy. This strategic move aligns seamlessly with the national objectives, highlighting Gujarat's pivotal role in India's commitment to a greener tomorrow. The state's renewable energy policy, coupled with substantial investments and innovative initiatives, not only addresses the urgent environmental concerns but also catalyzes economic growth and technological advancement.

By successfully harnessing wind, solar, and hybrid technologies, Gujarat stands as a beacon of progress and a model for other states and countries to emulate. The transformation of this vibrant Indian state into a renewable energy powerhouse is a testament to the potential of sustainable practices in reshaping our world, proving that economic growth and environmental stewardship can indeed go hand in hand.

OPERA ENERGY PROPELLING GUJARAT TOWARD A GREENER AND MORE SUSTAINABLE FUTURE Operaenergy Leading the Renewable Revolution

pera Energy Private Limited, incorporated in the year 2012, having its corporate office in Ahmedabad, Gujarat, India has successfully commissioned Wind, Solar, and Hybrid Projects of 1 GW capacity in the state and a total capacity addition of 1.4 GW across India. Currently, Opera Energy has 1 GW plus projects that are under construction at various stages in Gujarat and is one of the prominent, leading developers in the renewable energy sector in the state.

Opera Energy has participated in the recent COP 28 summit in Dubai and has played a key role in establishing global partnerships by executing MoUs with various countries such as Sierra Leone, Kenya, and Ethiopia.

The organization is in advanced discussions with various international wind technology providers and new generation storage technologies for bringing improved, advanced technologies to India for increasing the renewable energy capacity addition and re ducing carbon emissions for sustainable development in the state of Gujarat and compliance of ESG commitments.

Gujarat, being one of the Wind-rich states with the highest capacity in the wind segment of the country, is the best destination for investments in the renewable energy sector. This has been possible only because of the forward-thinking policies and transparent administration by the Government of Gujarat.



In support of this visionary landscape, Opera Energy is proud to announce plans for the development of a 50 MW Hybrid Project at Rajula, Amreli District, Gujarat. This substantial investment of rupees 700 crore demonstrates our commitment to leveraging Gujarat's conducive environment for renewable energy initiatives and furthering its position as a hub for innovation.

Our initiative aims not just to contribute to Gujarat's impressive energy profile but also to drive forward its vision for a sustainable future. Leveraging state-of-the-art technologies and collaborative partnerships, we aspire to set new benchmarks in renewable energy projects, building upon Gujarat's exemplary achievements.

As we anticipate the Vibrant Gujarat Global Investors' Summit, we are honored to be part of this pivotal moment. Our participation not only signifies our commitment to supporting the state's energy goals but also underscores our vision of propelling Gujarat towards a greener and more sustainable future by reducing the dependence on fossil fuels.

Together, we look forward to paving the way toward a brighter, more sustainable energy future for Gujarat and showcasing an inspiring precedent for the nation.

Views expressed by **Manimaran Krishnan**, Director Business Development, k.manimaran@operaenergy.in

Fighting Climate Change

UPL OpenAg°

There is no other sky
Where all the hues meet
There is no other forest
Where the birds tweet

There is no other river, shoreline or creek.
Where waves, dreams, and beauty meet.

The silent fields, the setting sun The blossoming valleys

And the endless canyons

There is no other heaven or planet

But one. One Earth.



Let's nurture it together

OUR SOLUTIONS



Seeds



Crop Establishment Solutions



Drought Mitigation Technologies



Bio-solutions



Sustainable Crop Programs

OUR IMPACT

5.5 Trillion

litres of water saved annually with our efforts to make the sugar value chain sustainable

5 Billion

tonnes of CO₂ mitigated globally every year with Sustainable Soybean Cultivation

1 Billion

tonne of food loss prevented globally, through our post-harvest solutions Up to 48% reduction in methane emissions achieved in our Sustainable Rice Programs

Scan to learn more about Fighting Climate Change







Purifying Progress

A Commitment to Excellence in

Food Grade Phosphoric Acid

Manufacturing

In a strategic move to reduce the Nation's dependence on imported Food Grade Phosphoric Acid, GACL established a state-of-the-art plant in Dahej with a capacity of 33,870 MTA. Food Grade Phosphoric Acid, a critical chemical with applications in various industries, including Sugar Refining, Edible Oil Refining, Beverages etc. is currently imported at a substantial volume of 35,000 MTA annually. With the latest Food Grade Phosphoric Acid initiative, GACL is not only contributing to the chemical industry's growth but is also aligning with the national objective of reducing dependency on imported chemicals, promoting the vision of "Atmanirbhar Bharat".

The Food Safety and Standards Authority of India (FSSAI) has granted a significant license to GACL under the FSS Act, 2006, solidifying GACL's position as one of the most reliable and leading manufacturers of Food Grade Phosphoric Acid (85%) in the chemical industry.

Products

Caustic soda lye
Hydrochloric acid
Liquid chlorine
Caustic soda flakes
Caustic soda prills
Compressed hydrogen gas
Anhydrous sodium sulphate

Sodium hypochlorite Methyl chloride Methylene chloride Chloroform Carbon tetrachloride Hydrogen peroxide Sodium chlorate Hydrazine Hydrate
Phosphoric Acid (Technical Grade)
Food Grade Phosphoric Acid
Anhydrous aluminium chloride
Poly aluminium chloride
Stable bleaching powder
Chlorinated paraffin

Caustic potash lye Caustic potash flakes Potassium carbonate Scalewin Biowin Bleachwin

Gujarat Alkalies and Chemicals Limited

(An ISO Certified Company)

(Promoted by Govt. of Gujarat)

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GUJARAT'S PATH TO SUSTAINABLE DEVELOPMENT AND ECONOMIC GROWTH

Gujarat has been investing heavily in creating a robust infrastructure that supports industrial growth and global investments, shares **Rakesh Shankar**, **IAS**, Secretary (Planning), General Administration Department, Government of Gujarat with **Hemangini Rajput** of **Elets News Network (ENN)**. Edited excerpts:

How is the state government aligning its programs and policies to achieve the Sustainable Development Goals by 2030? What progress has been made so far and what are the key priorities?

The state government is undertaking a comprehensive approach to meet the Sustainable Development Goals (SDGs) by 2030. This involves integrating SDGs into both national and sub-national policies and programs, ensuring that all aspects of governance and development contribute to these goals. In Gujarat, for example, the government has formed Thematic Working Groups (TWGs) for inter-sectoral action plans on SDGs, each focusing on specific themes, goals, and indicators to ensure targeted efforts.

A robust institutional framework supports this integration. High-Power Committees, typically led by senior officials like the Chief Secretary, oversee the progress of these working groups. State Vision Documents, such as Gujarat's Sustainable Vision 2030, are crafted to align with the 2030 targets, tailored to the state's unique needs and capabilities.



>> RAKESH SHANKAR, IAS
Secretary (Planning)
General Administration Department
Government of Gujarat

To monitor progress effectively, the government utilizes tools like the National Indicator Framework (NIF) and District Indicator Framework (DIF), providing comprehensive sets of indicators at both national and district levels. This localization ensures that strategies are relevant and effective in addressing local challenges. Additionally, dynamic and

interactive monitoring frameworks like the Gujarat State Wide Indicator Framework Tool (G-SWIFT) offer realtime tracking of progress across various departments and districts.

As the Secretary for Planning, what role does your department play in integrating SDGs into the state development plan?

In my role as the Secretary for Planning, our department is instrumental in weaving Sustainable Development Goals (SDGs) into the fabric of the state's development plan. This integration is essential to ensure that our state's policies, programs, and initiatives are in harmony with the sustainable development objectives set by the United Nations.

Our primary task involves strategically aligning the state development plan with the SDGs. This process requires a thorough examination of existing policies to identify their overlap with the SDGs and to modify or introduce new policies to fill any gaps. For example, in aligning with SDG 3, which focuses on Good Health and Well-being, we rigorously analyze current health policies, evaluate their effectiveness towards this goal, and recommend necessary amendments or new initiatives. This task demands collaborative efforts across various departments, embracing a approach that encompasses social, economic, and environmental facets.

Another critical responsibility is the creation and implementation of robust monitoring and evaluation frameworks, essential for measuring progress against each SDG target. For instance, in the context of SDG 4, which emphasizes Quality Education, we establish specific indicators to track educational achievements and progress. These frameworks require setting up data collection systems, benchmarks, and regular reporting mechanisms, facilitating the assessment of the impact of different policies and programs on the SDGs and enabling data-driven decision-making.



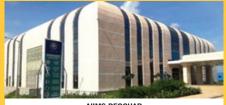


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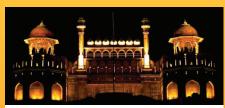
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What strategies is the state adopting to promote sustainable consumption and production patterns?

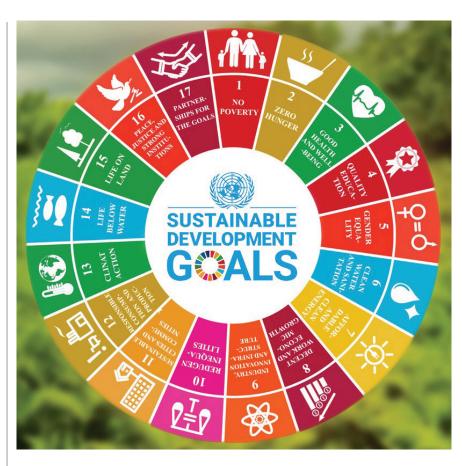
The state is adopting a range of strategies to promote sustainable consumption and production patterns, recognising the critical role these play in achieving the Sustainable Development Goals (SDGs), particularly SDG 12. These strategies are designed to balance economic growth with environmental sustainability and social equity.

Firstly, the state is focusing on enhancing public awareness and education. This involves campaigns and programs aimed at educating citizens about the importance sustainable consumption production. Schools and universities are incorporating sustainability into their curricula, and public campaigns are highlighting the benefits of practices like recycling, energy efficiency, responsible consumption. By increasing public awareness, the state aims to encourage a shift in consumer behaviour towards more sustainable choices.

Another key strategy is the promotion of green technologies and industries. The state is offering incentives for businesses that adopt sustainable practices, such as tax breaks, subsidies, or grants. These incentives are designed to reduce the financial burden of transitioning to greener technologies. The state is also investing in research and development in areas like renewable energy, sustainable agriculture, and waste management, fostering innovation that can lead to more sustainable production methods.

The state is also implementing stricter environmental regulations and standards. These regulations are aimed at reducing the environmental impact of production processes.

Encouraging sustainable public procurement is another important strategy. The state, as a significant consumer, is adopting procurement policies that prioritise products and



services that are environmentally friendly and socially responsible. This not only directly reduces the environmental footprint of the state's operations but also sets an example for the private sector and encourages the growth of sustainable industries.

Finally, the state is working on developing infrastructure that supports sustainable practices. This includes investments in public transport to reduce reliance on private vehicles, the development of recycling facilities to manage waste more effectively, and the creation of green spaces in urban areas. Such infrastructure is essential for providing the public and businesses with the means to adopt more sustainable practices.

How can industries and businesses be encouraged to adopt green practices?

Promoting green practices in industries and businesses is vital for achieving

sustainable development, and there are several strategies the state can implement to encourage and support this transformation.

Financial incentives play a significant role in motivating businesses to adopt greener practices. These incentives could be in the form of tax reductions, subsidies, or grants for those investing in sustainable technologies or implementing ecofriendly practices. For instance, businesses using renewable energy sources might receive tax benefits, or subsidies could be offered for purchasing energy-efficient equipment. Such financial motivations can be a powerful catalyst for businesses to embrace sustainability.

Another critical strategy is the establishment of robust environmental regulations and standards. These guidelines should cover aspects like pollution control, waste management, and resource efficiency. Ensuring compliance through penalties for non-adherence,

while also recognizing and rewarding businesses that meet or surpass these standards, can push companies towards more environmentally responsible practices.

Investing in research and development for green technologies is another key area. State funding in this domain can make sustainable options more accessible and affordable businesses. for Collaborations between the government, academic institutions, and industries can lead to innovations in renewable energy, sustainable materials. and waste management.

Public-Private Partnerships in sustainability projects can create a synergistic effect. By combining resources, expertise, and networks from both sectors, these partnerships can drive more effective and extensive sustainability initiatives.

Lastly, facilitating access to green finance is crucial. Many businesses face financial barriers in adopting sustainable practices. The state can help by providing access to special loans, grants, or investment funds dedicated to environmental projects.

By integrating these strategies, the state can foster a business environment where adopting green practices is a wise and profitable decision, aligning economic growth with environmental sustainability for the benefit of businesses, society, and the planet.

What steps are being taken to strengthen infrastructure, encourage new industries, and make the state a global investment hub as part of Mission 2047?

Mission 2047, aimed at transforming India into a global investment hub, encompasses various strategies focused on strengthening infrastructure, encouraging new industries, and attracting global investments. Gujarat, often referred to as the 'Growth Engine of India', serves as a prime example of this

mission in action.

Firstly, the state's approach to infrastructure development is pivotal. Gujarat has been investing heavily in creating a robust infrastructure that supports industrial growth and global investments. This includes the development of world-class transportation networks, like highways and ports, and ensuring reliable power supply and modern urban infrastructure. These developments not only bolster the state's industrial backbone but also make it an attractive destination for foreign investors. The emphasis on infrastructure with aligns several Sustainable Development Goals (SDGs), particularly those focusing on industry, innovation, and infrastructure (SDG 9).

Secondly, the promotion of new industries is a key focus. Gujarat's strategy involves diversifying its industrial base beyond traditional sectors. This includes fostering growth in sectors such as renewable energy, technology, and biotechnology. The state is leveraging its geographical advantage and policy incentives to attract investments in these areas. Initiatives like Special Economic Zones (SEZs) and technology parks are instrumental in this regard. These efforts contribute to SDG 8 (Decent Work and Economic Growth) by creating new job opportunities and fostering competitive business а environment.

Thirdly, to become a global investment hub, Gujarat is actively engaging with international partners and investors. The state government organizes summits and roadshows to showcase its investment opportunities on the global stage. Policies that ease doing business, such as simplifying regulations and offering tax incentives, are crucial in this aspect. These measures not only attract foreign direct investment but also encourage multinational corporations to set up their operations in the state, contributing significantly to economic growth and aligning with SDG 17 (Partnerships for the Goals).

As the state aims to become carbon neutral by 2050, what targets have been set to increase renewable energy and transition to electric mobility?

Gujarat is committed to achieving carbon neutrality by 2050, a goal that aligns with the Sustainable Development Goals (SDGs). This ambition is centered around two main strategies: increasing renewable energy utilization and transitioning towards electric mobility.

The state's renewable energy targets are ambitious, leveraging Gujarat's geographical advantage in solar power. It envisages a progressive increase in the use of renewables in its energy mix, with goals that could mirror those of other regions with aggressive renewable energy policies. The target might include achieving approximately 40-50% renewable energy by 2030, increasing to about 70-80% by 2040, and aiming for near-total reliance on renewable sources by 2050. This would entail a significant boost in solar energy capacity, augmented by wind and other renewable energies.

In the realm of electric mobility, Gujarat's roadmap could include progressive targets, beginning with about 25-30% of new vehicle registrations being electric vehicles (EVs) by 2025, and escalating to 50-60% by 2035. The ultimate aim would likely be a complete or near-total transition to Electric Vehicles in both public and private sectors by 2050. Achieving this goal would require parallel advancements in EV infrastructure, including the widespread availability of charging stations and supportive policy incentives.

These targets are part of a comprehensive and integrated strategy that includes enhancing energy efficiency, promoting sustainable urban planning, and reducing emissions across various sectors. Gujarat's approach is expected to be in line with SDGs, especially those related to clean energy, sustainable cities, and climate action. Such an integrated method is crucial for addressing the multifaceted challenges of attaining carbon neutrality.

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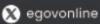
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TRANSFORMING GUJARAT'S ENERGY LANDSCAPE PDEU'S MISSION FOR A SUSTAINABLE TOMORROW

With a strong focus on R&D, particularly in the context of Vibrant Gujarat 2024, Pandit Deendayal Energy University (PDEU) is at the forefront of the nation's energy transition mission, shared **Dr. S Sundar Manoharan**, Director General, PDEU, in an exclusive interaction with **Shalini Rawat** & **Muskan Jaiswal** of **Elets News Network (ENN)**.





>> DR. S SUNDAR MANOHARAN
Director General, PDEU

The Vibrant Gujarat Global Investor Summit has always been instrumental in attracting investments to the state. How does Pandit Deendayal Energy University (PDEU) contribute to this initiative and what opportunities does it offer to the investors?

I'm delighted to share that PDEU has been a pivotal academic partner for Vibrant Gujarat since its beginning, over a decade ago. Annually, PDEU has been instrumental in connecting multiple universities, resulting in numerous MOUs being signed. As a staunch academic supporter, PDEU has significantly contributed to the success

of the Vibrant Gujarat event. Post-Covid, the scale of Vibrant Gujarat has expanded, attracting a larger pool of investors to the summit. We're proud not only to facilitate and host various events but also to showcase our own innovative technologies that invite industry collaborations. This has enabled us to transition to a more business-to-business (B2B) approach in our engagement with Vibrant Gujarat.

PDEU, renowned for its extensive research in renewable energy technologies such as solar, wind, and bioenergy, has significantly bolstered the state's attractiveness to investors. Could you shed light on some of the innovative research and development initiatives currently underway in the fieldofclean energy and sustainability?

PDEU's mission is to cultivate energy ambassadors for the nation. Our focus extends beyond mere investment and enterprise; we are committed to developing skills relevant to renewable energy and other sectors amid the energy transition. Our students are educated to be energy-efficient and environmentally conscious, understanding the link between energy and climate change.

We have been training our students as energy ambassadors. Bridging the gap between industry and academia is a key goal, achieved by integrating industry-specific skills and technologies into our curriculum. We go beyond laboratory research to address industry needs directly, showcasing cutting-edge technologies in fields like advanced manufacturing, next-generation computing, satellite launching, and energy storage.

PDEU is pioneering in the academic world with the launch of a solar manufacturing plant, combining business models with student-centric training. Our programs foster innovation and entrepreneurship among students, extending beyond PDEU to the wider Gujarat region.

We are also at the forefront of Industry 4.0, focusing on disruptive technologies such as carbon dioxide capture, crucial decarbonization and transition, and digital twin technologies for efficient energy resource mapping. Our biofuel initiatives align with the Government of India's G20 summit goals, and we are integrating artificial intelligence and the Internet of Things into energy management and learning. Our collaboration with industry partners is essential. We have received significant funding from companies like Shell and British Petroleum for projects like green hydrogen production and training







women in energy management. These partnerships facilitate carbon-neutral initiatives and skill training in cutting-edge technologies.

Our response to the COVID-19 pandemic includes the establishment of new Centers of Excellence, focusing on diverse areas from solar energy to automobile engineering. We have

launched innovative projects in energy storage and other sectors, and are leading in semiconductor skill training and manufacturing.

PDEU's commitment to skill development is evident in our 16 automotive excellence modules and various other training programs. The faculty's entrepreneurial spirit and the



students' eagerness to learn drive our success.

We have made significant advancements in research and development, as shown by our climbing H-index and numerous patents. Our faculty are involved in funded projects, contributing to the university's growing reputation.

Innovation and incubation are key aspects of our approach. With government support, we have fostered over a hundred startups, generating substantial revenue. Our initiatives also encourage faculty-led startups, reflecting our commitment to entrepreneurship.

In conclusion, PDEU is dedicated to reinventing energy, creating ambassadors who can navigate the shift from conventional to non-conventional energy resources. Our approach isn't limited to research and development; we are committed to implementing practical, sustainable solutions in collaboration with industry partners, fostering entrepreneurship along the way.

PDEU conducts specialized training programs tailored to nurture a skilled workforce crucial for the seamless implementation of green energy projects. Can you share specific details about these specialized training programs?

Yes, our skill development program operates on multiple levels. Firstly, within our curriculum, in line with the national education policy, 33% of total credits are dedicated to skill training. This isn't conducted in a traditional classroom setting but through experiential learning or industry engagement. For example, out of 100 credits, 30 are exclusively allocated for skill training. This approach forms the first tier of our program.

The second tier involves departmental or school-based certification, where students receive certification based on their practical experience and contact hours.

The third tier is our partnership with various industries to offer certification courses that include mandatory training

time. This is designed to enhance employability.

The fourth level extends our collaboration to include the National Skill Development Corporation (NSDC) and industry partners. We co-brand these certification courses with their logos, further increasing their value in the job market.

Apart from these, we have initiatives with companies like IBM, RedHat, and others, offering certification courses integrated within our curriculum. However, we're shifting from the conventional certification model to more field and industry-oriented programs.

Our most significant achievement is bringing the industry directly onto our campus. This eliminates the need to send students out for training, as they can now receive comprehensive, handson experience right within the university environment. This in-house industry presence significantly intensifies and enriches our skill development efforts.

Numerous startups and innovators are actively pursuing sustainable energy solutions. How does PDEU support them, and do you believe the surge of startups can create a substantial impact in achieving our sustainable energy goals?

We have numerous success stories resulting from our involvement with Skill India and various startup initiatives. Our support for budding entrepreneurs extends beyond a mere three-year grooming period; we continue to guide them afterward. A key aspect of our approach is identifying disruptive technologies and introducing them to angel investors and venture capitalists. This enables us to generously fund promising ideas, assisting in the creation of necessary infrastructure and financial backing. Our dual strategy fosters a mutually beneficial environment. ensuring startups feel supported and secure when they join us.

In Gandhi Nagar, for instance, one can witness the impact of our initiatives. The city boasts several green parks and traffic signals surrounded by lush vegetation. Solar trees, a product of our innovation, dot the landscape, whether along highways or byways. These are just a few examples of the technologies developed at PDEU.

Our innovations aren't limited to environmental solutions. We've also ventured into sustainable construction, like creating low-cost tiles from polymer and construction waste. Our endeavors span various sectors, including health, energy, and infrastructure, with many industries collaborating within the PDEU Innovation and Incubation Centre (PDEU – IIC).

Support for these ventures comes not only from the Government of India but also from the Government of Gujarat, particularly for student startups. Our robust support system is open to all students, regardless of their year of study. We provide significant funding, up to two lakhs, to undergraduate students at PDEU for their startups and research projects. In the past five years, we've invested over 2.63 crores in student startups and research. facilitating their growth. Our success rate is impressive, with around 70% of these startups scaling up successfully. This high success ratio underscores the extensive support and resources we provide to our students.

In the coming years, what role do you foresee Gujarat playing in India's transition to a greener and more sustainable energy landscape? Moreover, how does PDEU plan to contribute to this transition?

PDEU and the government of Gujarat are closely aligned, particularly in the area of energy transition, which resonates with the vision of our honorable Prime Minister. Across



Gujarat, the commitment to energy transition is evident, whether it's in renewable energy, decarbonization, or climate change initiatives. This focus is reflected everywhere, from highways to local paths.

Our curriculum and industry engagements at PDEU are primarily shaped by the energy demands and policies set forth by the government. This alignment ensures that our research and efforts directly address the needs of the government's energy transition plans. We've noticed a significant increase in involvement with academia, a trend that's become increasingly prominent in Gujarat. Industries are actively seeking partnerships with academic institutions, a change from the past when such collaborations were less common.

Today, the integration of industry into academia is widespread, not just within a few educational institutions but across the state. Many higher education institutes in Gujarat boast partnerships

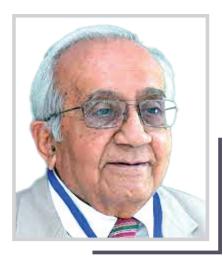
with 10 to 20 industries, a testament to a thriving academic-industrial landscape. This synergy accelerates the government's vision as academia and industry work hand-in-hand.

Vibrant Gujarat serves as a crucial convergence point for these three key stakeholders - government, academia, and industry. The addition of society as the fourth coordinate completes this model. When these sectors collaborate, societal impact becomes the primary focus. Our efforts are directed towards societal benefits, launching initiatives that directly improve community well-being.

Looking ahead to Vibrant Gujarat 2024, the goal is to further strengthen this collaboration among all stakeholders. This unified approach aims to build not only a stronger state but also a robust nation, with a focus on the well-being and advancement of society as a whole.

Edited by **Abhineet Kumar**, of Elets News Network

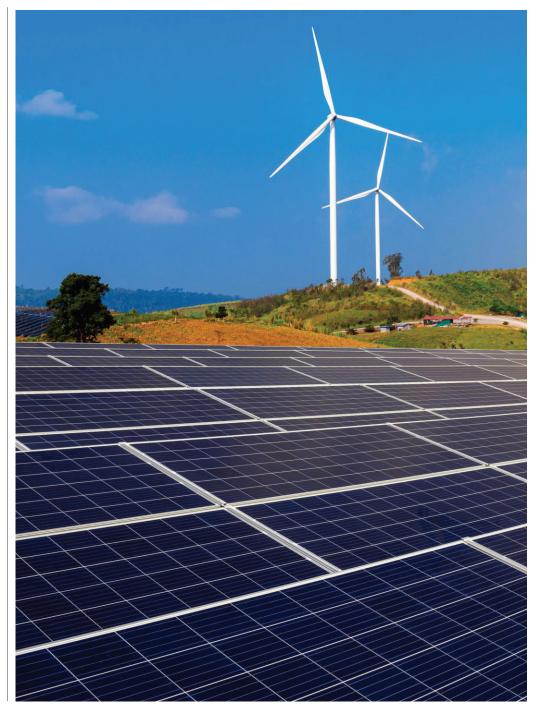
GUJARAT'S ENERGY FUTURE



>> KIRIT S PARIKHChairman, Integrated Research and Action for Development, IRADe

ujarat has done well in several areas. It has been India's growth engine. With a share of 5% of the national population in 2021-22, it had a share of 8.27% in the national GDP, 18.14% in the industrial net value added, 30.6% in India's trade export, and 15.1% in per capita power consumption. Also, 42.5% of its population was urbanised in 2011 compared to 31% of the country. Its GDP grew at a CAGR of 10.9% over five years from 2017-18 to 2021-22.

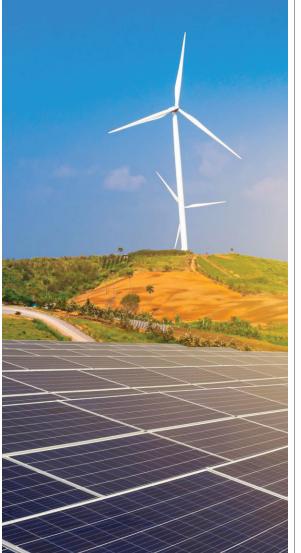
It has also done well in certain social indicators. Infant mortality has come down to 23 in 2020 from 53 in 2004, and maternal mortality is down to 57 over 2018-20 from 202 in 1999-01. At this rate, within a decade or so, these should reach international levels. The one area in which Gujarat lags is



the child sex ratio, which was 890 in 2011 and among 28 states 6th from the bottom.

India's national plan for energy transition is based on our realities; One to augment and grow energy infrastructure but to do this so that it is green and based on renewable energy. We need to double our energy production and consumption by the end of the decade. Two, to provide for affordable

Table: Electricity requirements of Gujarat in bkWh							
Projection Parameter	8% SGDP Growth Rate			10% SGDP Growth Rate			
	2025	2030	2035	2025	2030	2035	
Constant Elasticity	147	201	274	175	258	378	
Falling Elasticity	140	185	243	164	231	324	
Service-led – Falling Elasticity	140	185	242	168	236	332	
Industry-led – Falling Elasticity	150	203	278	179	262	386	
Source: IRADe (2015)							



energy so that the needs of the poorest are secured, and three, to develop domestic supply chains for new energy systems.

Rapid economic growth has required rapid growth of energy supply. Here, electricity supply is critical as other energy sources can be imported. Gujarat has also done well here. It has kept pace with growth in electricity demand, which has been growing at more than 5% per year. Over the past 10 years, the peak demand shortfall has been mostly below half a percent. Only in four instances, it has been around 1 %. In 2018 once, it was 7%. In September 2023, peak demand deficit was 1.1%. The deficit was zero in October 2023.

In the power sector, renewables have to play an increasing role as the world deals with the threat of climate change. The installed capacity of renewables on March 31, 2022 in Gujarat, was 16588 MW out of a total installed capacity of 40138 MW, including a share of 7595 MW from Central Sector plants. The capacity of fossil fuel plants was about 23000 MW.

Gujarat has 180215 MW of renewable power generation potential, which is 12.09% of India's potential. Of this, 142560 MW is wind power @120 m height, 35770 MW is solar, and 1885 MW is others. So, in future also, Gujarat will not have any problem in meeting renewable power targets.

ELECTRICITY REQUIREMENTS

The table above shows Gujarat's electricity requirements under alternative scenarios of GDP growth rate and GDP structure, whether industry-dominated or service-led.

Thus power supply may have to increase from 129 bkWh in 2021-22 to as much as 386 bkWh in 2035.

ELECTRICITY SUPPLY OPTIONS

Electricity supply options include fossil fuels largely imported, renewables available in the state and reducing requirements.

Energy Efficiency: This is the most important resource as the demand side measures (DSM) could substantially reduce electricity or capacity requirements. We have assumed that the impact of DSM is reflected in our falling elasticity assumption. The difference in peak demand in 2035 between constant elasticity and falling one is 11% for an 8% growth rate and 14% for a 10% growth rate. We have, therefore, explored supply options for scenarios with only falling elasticity.

Renewable: Renewables, such as wind and solar, provide substantial scope but have their limitations as they are not available on demand and require balancing power from balancing sources such as hydro, open cycle gas plants, or electricity storage.

Thus, in exploring the supply options, we have given particular attention to the absorption of substantial levels of renewable capacities and their implications for costs, balancing capacities, and emissions.

To see what kind of development would be needed, we look at scenarios developed with an optimisation model, of industry-led 10% growth with falling elasticities which shows a requirement of 386 bkWh in 2035.

In these scenarios, various resource availability constraints are imposed. Thus these are feasible scenarios. In the scenario with no emphasis on renewables, they are still selected as the coal, lignite, and nuclear capacities reach their upper bounds. When solar and wind capacities are forced to high levels, open-cycle gasbased plants are needed to balance the renewable power. This reduces the combined cycle gas-based plants due to the constraint on the availability of gas. Because a solar or a wind plant generates power at 20% to 25% plant factor compared to a coal-based plant with a potential of 80% plant factor, the installed capacity required to meet the same electricity demand increases substantially. This, of course, increases the investment requirement and lowinterest long-term loans become critical. The cost of electricity increases to Rs 2.84 per kWh from Rs 2.57 when renewables are pushed.

Some broad conclusions and characteristics emerge from these scenarios. Coal is the cheapest source, followed by lignite and closed-cycle gas. The cost of power increases with demand, which increases with growth rate and industrial growth. Renewables increase the cost further and restricting coal leads to even higher cost. Balancing renewables with open-cycle gas costs less than balancing with solar PV with storage (a scenario not presented here).

Table:10% SGDP growth rate - Industry led - falling Elasticities - MW installed in 2035

	No emphasis on Renewables	Emphasis on Renewables
Renewables	38833	98051
Wind on Shore	26755	35000
Solar PV	7718	60000
Others- hydro-biomass	3360	3051
Nuclear	7960	7960
Fossil Fuels	77224	78344
Gas open cycle	8224	13068
Gas combined cycle	15000	11277
Coal-Lignite	54000	54000
Total	124017	184356
Peak Demand (MW)	80266	80266
Peak/installed (%)	65	44
Cost (Rs/kWh) @ 2011-12 prices	2.57	2.84

Source: IRADe (2015), Environmentally Sustainable and Integrated Energy Plan for Gujarat State, A report prepared for GPCL

The peak-to-installed capacity ratio falls dramatically with renewables.

THE ROAD AHEAD

Renewables are Gujarat's main energy resources. It is inescapable that renewable generation is expanded. In the absence of renewables coal based generation has to be even more and then both local air pollution as well as CO2 emissions would be higher. Gujarat began to push solar in 2011 through solar parks that provided

land, transmission lines for evacuation and a guaranteed tariff. Subsequently it has moved to reverse bidding where entrepreneurs bid for the tariff they want and the lowest bidder gets to build the plant. However, for a number of years Gujarat was not able to fulfil its RPO (renewable portfolio obligation). Since distribution companies (DISCOMS) had long term power purchase agreements (PPAs) with coal power producers, they found it cheaper to buy coal power than to pay for capacity charge to the coal power firms plus the price of renewable power. The DISCOMS should enter into PPAs keeping in mind their future RPO requirements. In turn, the Central Government should prescribe RPOs keeping the existing PPAs in mind.

Gujarat can meet its electricity requirement while meeting its climate change obligations even with a growth rate of 10 % of GDP and the growth that is led by industry. It has the needed wind and solar power potential.

Views expressed by Kirit S Parikh, Chairman, Integrated Research and Action for Development, IRADe.

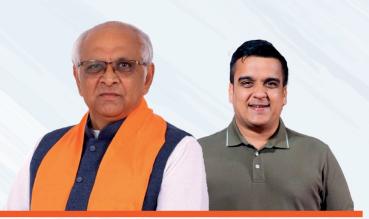












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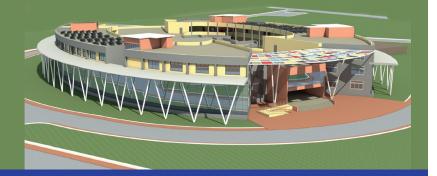
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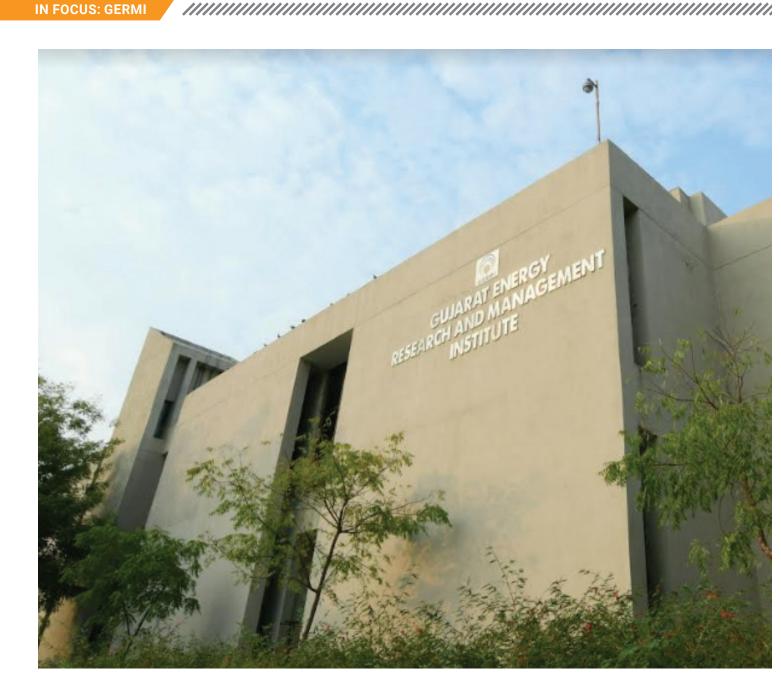
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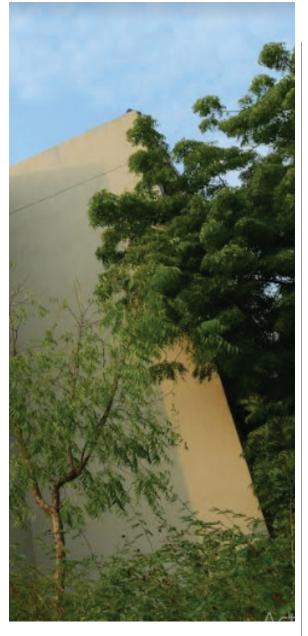
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Swarnim Gujarat Sports University



GUJARAT ENERGY RESEARCH & MANAGEMENT INSTITUTE TRANSFORMING THE ENERGY LANDSCAPE OF THE STATE









Recognizing the critical intersection of solar power and electric vehicle infrastructure, GERMI has taken the lead in developing a comprehensive curriculum for the training program titled "Solar Power for EV Charging Station." Going a step further, GERMI has executed innovative "train-the-trainer" programs, a testament to its commitment to knowledge dissemination. By empowering educators and professionals with the tools to impart specialised skills, GERMI catalyses a multiplier effect, ensuring that the benefits of expertise ripple through the community.

The institute has been honoured with the prestigious title of "Centre of Excellence" by the Skill Council for Green Jobs (SCGJ), underscoring its pivotal role in nurturing talent for the green job sector. In a nation teeming with institutions, GERMI has carved a niche as "The Best Solar Training Centre" across India, a title that echoes the institute's commitment to delivering top-notch training in the energy domain. Numbers speak volumes; the institute has conducted an impressive 250+training sessions, equipping over 10,000

n the dynamic landscape of Gujarat's solar and e-mobility revolution, GERMI emerges as a true trailblazer, weaving a narrative of innovation, expertise, and commitment. The institute wears many hats, playing pivotal roles as an advisor, implementing agency, project management consultant, and thirdparty inspector, shaping the state's sustainable future. At the forefront of Gujarat's electric vehicle transformation, GERMI proudly serves as the architect behind the state's pioneering policy, "Electric Vehicle Policy-2021." GERMI's impact extends beyond policymaking; it resonates in the educational realm as well.





individuals with the skills needed to thrive in the dynamic energy sector. GERMI's story unfolds as a tale of transformation, as GERMI has extended its reach to the agricultural heartbeats of the state. From pilot to policy to implementation and education, GERMI has played a pivotal role in the SKY (Suryashakti Kisan Yojana) scheme for the state. GERMI has implemented a pilot Agri Voltaics and assisted the Government in the SKY policy drafting. GERMI has also trained more than 1000 farmers under the SKY scheme, a testament to GERMI's commitment to empowering every facet of society.

With pioneering projects like utility-scale battery energy storage systems, GERMI has not just harnessed power but stored the potential for a more resilient and sustainable energy future. Along the waterways of Gujarat, GERMI, with its fondness for redefining norms, etched history with the world's first canal-top solar endeavour. Charting an Offshore Wind Roadmap for Gujarat, GERMI is poised to add another chapter to its legacy of triumphs. The winds of change harnessed off the shores are set to propel Gujarat into a future where clean energy knows no bounds.

GERMI's connection with DisComs strengthens the energy fabric of Gujarat.

Each year, around 1000 DisCom Engineers undergo transformational training, reinforcing GERMI's commitment to knowledge dissemination.

In a pivotal recognition, the Gujarat Pollution Control Board (GPCB) has bestowed upon GERMI the esteemed title of Energy Auditor. Leveraging state-of-the-art laboratory facilities, GERMI stands at the forefront of environmental monitoring services. From assessing ambient air quality (PM10, PM2.5, SO2, NO2) to stack air monitoring (SPM, SO2, NO2), GERMI is committed to ensuring environmental compliance. The institute's expertise extends to comprehensive water and

wastewater analysis, alongside precision noise and illumination monitoring. GERMI's impact reaches beyond monitoring; it offers crucial services in design verification and adequacy certification for industries, particularly in the realm of effluent treatment plants (ETP) and air pollution control measures (APCM).

GERMI's approvals and recognitions in the field of biogas and renewable energy signify a substantial impact. Endorsed as a Third-Party Inspection entity for institutional biogas plants by the Gujarat Energy Development Agency (GEDA), GERMI has played a pivotal role in ensuring the efficiency and compliance of over 150 biogas installations in Gujarat. Moreover, GERMI's approval by the Ministry of New and Renewable Energy (MNRE) for the technical appraisal of large-scale bio-CNG plants highlights its expertise in the broader bio-energy landscape. Being empaneled by Oil India Limited (OIL) further solidifies GERMI's standing, as it actively contributes as a project management consultant for the establishment of compressed biogas (CBG) Plants.

GERMI ventured into a groundbreaking R&D project supported by the Climate Change Department (CCD). The mission is to revolutionise waste management at the grassroots level and address the sanitation needs of rural families. With





unwavering dedication, GERMI successfully installed 15 units of biogas plants in the nearby villages of Gandhinagar. This endeavour not only showcased the institute's technical prowess but also marked a significant leap toward providing sustainable solutions to rural communities.

EMERGING TECHNOLOGIES

In the intricate realm of Geological and Geophysical Data Interpretation,

Exploration. Development. Production companies. GERMI has forged formidable collaborations in advancing the Petroleum sector. Teaming up with Central Mine Planning & Design Institute Limited (CMPDI) and Oil and Natural Gas Corporation (ONGC), GERMI has embarked on a journey of technology development that is reshaping the landscape of seismic data interpretation. The collaborative efforts have birthed software marvels Spectral

At the forefront of Gujarat's electric vehicle transformation, GERMI proudly serves as the architect behind the state's pioneering policy, "Electric Vehicle Policy-2021".

GERMI emerges as a beacon of expertise, seamlessly weaving together research, consultancy, and training services for India's Hydrocarbon Enhancement, Reverse Time Migration, and Pore Pressure Prediction, each a testament to GERMI's commitment to refining data resolution and imaging.

GERMI has pioneered the creation of proprietary software for 2D Reverse Time Migration (RTM) and Full Waveform Inversion (FWI). These inhouse tools are tailored for the intricate imaging of complex geological environments and well-log interpretation, setting GERMI apart as an architect in the domain.

GERMI has emerged as a pioneering service provider, standing tall as one of the go-to entities for G&G data evaluation in the country. Collaborations with CMPDI and ONGC for technology development further underscore GERMI's pivotal role in shaping the landscape of oil and gas exploration. From block evaluation to reservoir characterization, reservoir simulation, reserve estimation, and technocommercial evaluations, GERMI has left an indelible mark across diverse fields.

RENEWABLE STRIDE

In the area of renewable energy, the organisation's tale evolves as a narrative of impactful endeavours and expansive reach. Having spearheaded over 500 MW of Solar PV Projects, GERMI's journey encompasses extensive Project



Management Consultancy for megawatt-scale ground-mounted PV projects, Solar Park initiatives, and even innovative Canal-top projects. Its clientele includes esteemed entities like GSECL, GIPCL, GACL, GSFC, ONGC, GAIL, and more, reflecting its diverse and impactful collaborations with both state and central governments, as well private organisations. The geographical footprint of GERMI's influence spans across Odisha. Jharkhand, Haryana, Jammu & Kashmir, and Andhra Pradesh, showcasing its commitment to making renewable energy accessible and impactful on a national scale. Looking ahead, GERMI is poised to extend its presence to Himachal Pradesh, Bihar, and Uttar Pradesh, not just as a participant but as a trusted TPI. Beyond national borders, GERMI has left a lasting mark on the international stage. It has aligned forces with esteemed international agencies such as the World Bank Group, BMZ in Germany, and IFC, serving as a beacon of consultancy excellence in the global renewable energy sector.

India's First Solar-powered village dedicated to the Nation by Hon'ble PM is one of the historical milestones,

where GERMI is a pioneer stakeholder of this project.

RESEARCH

In the field of petroleum research, the organisation has a captivating story of exploration and achievement. At its core, the institute delves into hydrocarbon exploration tools, opening new frontiers in synthetic combustion fuel, biodiesel, biogas, and qualitative water resource management through CO2 sequestration. The narrative extends to demand-driven activities like hydrogen development, marking a dynamic approach to energy solutions. The last three to four years have been a tapestry of progress, adorned with one national and eleven international publications in esteemed journals. GERMI's commitment to pushing boundaries is further reflected in patent applications, with one already awarded and two in process, focusing on seaweed cellulose-based supercapacitors and storage batteries.

Over the past decade, GERMI has played a pivotal role in biogas development and CO_2 sequestration techniques, offering effective tools in the pursuit of decarbonization. Looking ahead, the

institute envisions expanding its facilities to meet industrial needs, introducing technologies for green hydrogen production, enhancing biogas production, and enriching water resource evaluation and remedial measures. The story culminates with a forward-looking approach during the Vibrant Gujarat Global Investors' Summit-2024.

ABOUT GERMI

Gujarat Energy Research & Management Institute (GERMI) is a Centre of Excellence in the energy sector, promoted by Gujarat State Petroleum Corporation Limited (GSPC), a Government of Gujarat undertaking. GERMI was established with a vision to be a leading one-stop institution for the gamut of educational, training, and research requirements of the energy sector. The institute develops the talent pool, conducts research and training, provides support to the government for policy drafting, roadmap preparation, and implementation, and assists in devising techno-economically feasible solutions. GERMI is engaged in advanced-level research in Petroleum, Renewable Energy, e-Mobility, Energy Storage, Green Hydrogen, and Climate.

UPL'S SCIENTIFIC APPROACH FOR SUSTAINABLE AGRICULTURE

he Science-Based Approach for Sustainable Agriculture is revolutionizing farming practices by incorporating evidence-based techniques to boost productivity while preserving the environment and natural resources. This approach fosters a sustainable future, responsibly meeting global demands and securing the well-being of humanity and the planet. Our science-based targets validated & approved by the United Nations initiated SBTi.

At UPL, we firmly advocate for our vision by aligning our efforts with the Global agenda for sustainable development, actively supporting and inculcating all 17 Sustainable Development Goals (SDGs). UPL is a signatory of the United Nations Global Compact (UNGC) initiative, committing to uphold the 10 UNGC basic principles that contribute to the broader sustainable development goals set by the United Nations.

At UPL, we believe that Sustainability is the best opportunity for businesses to drive smarter innovation and profitable growth. We are constantly working to reduce our environmental footprint and find innovative product solutions as our commitment to environmental protection extends beyond the scope of legal requirements. We are committed to the chemical industry's Responsible Care™ initiative and have set out the basic principles of this commitment in our Global Environmental Footprint Reduction Plan.

UPL SUSTAINABILITY VISION, GOALS & TARGET

Our sustainability vision, goals & targets align with sustainable development goals (SDGs), the Paris Agreement on Climate Change and UN-initiated Science-Based Targets.

SUSTAINABILITY GOAL NO. 1

Reduce 20% specific water consumption, 25% specific CO2 emission & 25% specific waste disposal by 2025 from baseline FY 2020

Achievement

- Reduced 40% specific Water Consumption
- Reduced 21% specific CO2 Emissions
- Reduced 57% Specific Waste Disposal

UPL Initiatives

- We have implemented wastewater recycling & reuse mechanisms and utilised scale-ban technology coupled with Reverse Osmosis technology to optimise water consumption and minimising water waste.
- Expanding our renewable energy capabilities in collaboration with CleanMax, We added the solar-wind hybrid capacity of 61 MW, comprising 33 MW of wind and 28 MW of solar.
- We have reduced our waste disposal to landfills through waste identification, characterisation and segregation mechanisms. We have recycled 3,105 MT of Plastic waste through EPR program. Out of a total 1,70,831 MT Total solid hazardous waste disposed of 1,02,308 MT Total solid hazardous waste recycled/co-processed.

SUSTAINABILITY GOAL NO. 2

Achieve 50% of revenues from differentiated and sustainable solutions by 2027.

Achievement

 Achieved 28% revenues from differentiated and sustainable solutions by 2023

UPL Initiatives

We have added Zeba, NPP BioSolutions for sustainable

agriculture. We are offering an integrated portfolio of agriculture solutions encompassing everything from seeds and conventional crop protection products to BioSolutions and post-harvest products, as well as physical and digital services.

SUSTAINABILITY GOAL NO. 3

Achieve 60% Sustainable sourcing by 2025.

Achievement

 Achieved 30% sustainable sourcing by 2023

UPL Initiatives

We implemented sustainable sourcing frameworks and conducted a supplier engagement program for sustainable sourcing. We calculated scope 3 emissions and set science-based targets to reduce 42% of scope 3 emissions by 2035 from the 2020 baseline.

SUSTAINABILITY GOAL NO. 4

Achieve 3 million Lives to be impacted through livelihood, education, health and sanitation projects by 2025.

Achievement

• Impacted 1.5 million lives by 2023

UPL Initiatives

- We have collaborated with the Oxford India Centre for Sustainable Development (OICSD) to shape discussions regarding sustainable development in India.
- We have partnered with the FIFA
 Foundation to leverage football as a
 platform for raising awareness about
 important social and environmental
 issues, including the positive impact
 of sustainable development,
 environmental protection, youth
 education, and leading a healthy and
 active lifestyle within society.
- We participated in the Cocoa & Forests Initiative (CFI) in Ghana and Ivory Coast, focusing on forest protection and restoration, sustainable production and farmers' livelihoods, and community engagement and social inclusion.

NPTI POWERING CHANGE IN ENERGY SECTOR

The important segment which is going to come up as a challenge in the power sector is cyber security. It is very important for us to make our systems cyber resilient as we have been witnessing a constant cyber-attack in our grids recently. Highlighting the sustainability of the power sector, **Dr. Tripta Thakur**, Director General, National Power Training Institute (NPTI), shares her insights in an exclusive interaction with **Garima Pant** of **Elets News Network (ENN)**. *Edited excerpts:*

Could you tell us about the contributions of your organisations in terms of initiatives that you are taking towards the energy sector?

I represent the National Power Training Institute (NPTI) which is an apex body of the Ministry of Power. We have 11 centres across the country and thus have a PAN India presence. NPTI was formed with the basic objective of providing training and capacity building in the power sector.

India has made amazing progress in the electricity industry, and the only thing where we are still lacking is energy distribution. We would like to make distribution financially viable so that we can genuinely pay for TRANSCOs and GENCOs, as money comes back into the system only through distribution sector. So, if distribution is not healthy, generation and transmission will not be financially viable.

Consequently, the Ministry of Power, Government of India has taken important initiatives in the form of the Revamped Distribution Sector Scheme (RDSS) scheme. Capacity building and training is an important component of this scheme. So, NPTI has been assigned as a nodal agency for providing capacity building and training under this RDSS scheme. As



DR. TRIPTA THAKURDirector General, NPTI

we all know, technology is improving rapidly and we are all looking forward to smart meters in this scheme for improving DISCOM infrastructure.

We have trained around 7000 power professionals across all Distribution Companies (DISCOMS), and we have very ambitious training targets not only to provide the basics about the new technology, like Advanced Metering Infrastructure (AMI), but also to make them understand the more complicated structure of AMI. This training will also let them understand Supervisory Control and Data Acquisition (SCADA) which is

going to come up in Indian Electricity Sector.

In terms of the key skills that are needed to strengthen the human resources in the power sector, what, according to you, are the key skills in the present times?

As we are moving towards digitalisation, we are really looking forward towards Industry 4.0. For this upcoming automation and digitisation, engineers need to be trained and kept abreast with latest technologies.

The important segment which is going to come up as a challenge in the power sector is cyber security. It is very important for us to make our systems cyber resilient as we have been witnessing a constant cyber-attack in our grids recently. So, if anything goes wrong with the grids, it is going to disrupt us. NPTI is providing cyber security certification, and we are the only agency that is authorised by the Ministry of Power to provide the certification.

It is also mandatory for all people who are in the generation, transmission, or distribution profession to get certified in cyber security. Currently, we are providing certification at the basic level. And we are planning to provide

certification at the intermediate level and advanced level. We have, till now, trained about 2400 power professionals in the basic certification program for cyber security.

So, these certifications and pro training initiatives you talked about, are they done through a publicprivate partnership, or is it purely a government initiative?

When we really want to provide the best knowledge to our manpower, it becomes imperative to take industry's assistance. I have been regularly interacting with industry experts and am taking their constant help to design my courses in order to deliver the best results.

If you could tell us about the technology tools that are being used by NPTI to deliver training to make the workforce future-ready?

Our basic certification training program is in high demand and it is needed by all the power professionals because cyber security is a very new thing and is changing rapidly. So, we need experts in this area, and would really like to provide this basic certification to everyone.

We have developed a Learning Management System (LMS) for online training. We are providing these training programs for two weeks. One week is completely for theory and one week is dedicated to hands-on training. So, we are using technology like the cloud for providing hands-on online training to all the participants through online mode.

Tell us about the challenges you face while implementing out these initiatives.

Training & capacity building is important for any organization, and it should be a priority but this ecosystem is missing in India.

The demand for cybersecurity professionals is huge, not only in India but everywhere. So, we are also coming



up with a 6-month Post-Graduation Diploma in Computer Application (PGDCA) online certification training program for cyber security.

We are also training all the load dispatch people through our programs. So, anybody sitting in the load dispatch centres needs to become a certified trainer, only then can they operate in load dispatch centres.

If we talk about sustainability, it is important to take care of the environment also. In Delhi, the Air Quality Index (AQI) is very poor, especially during the time when Parali is burning. Since last year, NPTI, with the mission Samarth, has been working very hard to train the people in the whole value chain. We are starting the awareness through farmers, and then we are connecting farmers to the pellet manufacturers, and finally we are connecting the pellet manufacturers to the thermal power plant.

In the government's thermal power plant, blending of 5%-10% pellets can be done in coal. So, there is a complete need for mixing all these three important stakeholders.

I feel that there are two challenges that the country is facing today – one is energy security, and the other one is an environmental concern. The solution for both is to use more and more renewable energy in the future.

What are your thoughts on how sustainability can be embedded in the energy segment and the reforms that are needed at the central and state level to take this mission forward?

We all know that the electricity sector is a different kind of sector. The state has its own thinking and so is the case with Centre, mainly due to our federal structure. But everyone is working in harmony with each other this time when we talk about the RDSS scheme. Because everyone is concerned about improving the financial viability of DISCOM and addressing the environmental concern.

The Ministry of Power and NPTI is working in tandem to address the imbalance that is taking place in the environment. The Ministry of Power is working towards LiFE (Lifestyle for Environment). Through this, we are actually trying to raise environmental awareness and also aim to promote the lifestyle for the environment which is also the life mission of Pradhan Mantri Modi ji.



>> NAND LAL SHARMA
Chairman & Managing Director (CMD)
SJVN Limited

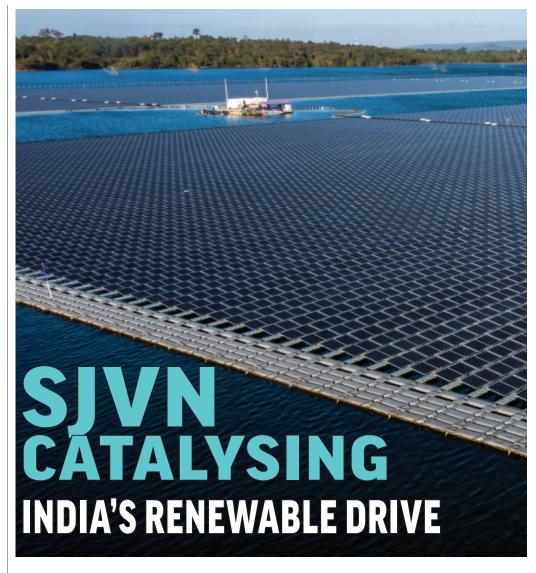
What are the current challenges and opportunities in the power generation sector, particularly in the context of renewable energy?

Availability & Acquisition of Land within limited time, dependency on external markets for supply of modules, limited connectivity in ISTS Network and limited EPC players in wind energy market currently pose challenges in the renewable energy development sector.

Whereas opportunity lies ahead in Floating and Offshore Renewable Projects, upcoming technologies like Green Hydrogen & Ammonia, Battery Energy Storage Systems, kicking off on utility scale along with continuous regulatory support from the Government of India.

How is SJVN adapting to changing market dynamics and regulatory environments?

SJVN has already aligned itself with the Government of India goal of achieving 500



SJVN has ventured aggressively into solar, wind, floating solar sector and is looking forward to participating in green hydrogen and BESS sector to adapt to the changing market needs, shares Nand Lal Sharma, Chairman & Managing Director (CMD), SJVN Limited in an exclusive interaction with **Abhineet Kumar** of **Elets News Network (ENN).** *Edited excerpts:*

GW Renewable Energy by 2030. SJVN has a current portfolio of 56,894.4 MW, out of which 2226 MW is under operation, 4303 MW is under Construction, 12803 MW is under Pre-construction and S&I stage and

37,562 MW capacity Projects are under allotment. SJVN has ventured aggressively into solar, wind, floating solar sector and is looking forward to participating in the green hydrogen and BESS sector to adapt



to the changing market needs.

SJVN has been designated as Renewable Energy Implementing Agency (REIA) by Government of India, being only the 4th PSU as REIA. SJVN has already awarded FDRE projects of the scale of approx. 2.5 GW with a target to achieve more than 10 GW in current FY 2023-24.

SJVN has aligned itself to the needs of Indian Power Sector & is focusing equally on base load demands through development of Thermal Power (1320 MW Buxar Thermal Power Plant) & Large Hydropower Plants like Italian (3097 MW) in Dibang Basin, Arunachal Pradesh.

SJVN is involved in various

hydroelectric and renewable energy projects. How do you ensure the successful completion of such large-scale projects?

We have always actively advocated for

One Basin One Developer scheme for Hydro Projects which ensures optimum utilisation of resources, faster adaptability to local issues/factors & mitigation measures thereof. SJVN has always proudly contributed to the local area development, upliftment of local communities through CSR which helps in greater local support for our projects.

SJVN has always focused on timely completion of projects with no cost and time overrun through proper & vigilant planning & monitoring, utilising its competent design and construction manpower, with the use of latest technology available and prompt decision making.

What strategies are in place to ensure financial sustainability and growth for SJVN?

SJVNs track record of Operational Excellence (NJHPS and RHPS) and timely completion of its Construction Project with robust financials for the last decade has led to greater trust of financial institutions and market forces along with Gol in SJVN.

Hence, SJVN has been able to secure funding at lower rates from National and International Institutions/ Banks/ organisations. Recently SJVN has secured Rs. 10,000 crores Construction Finance Facility through SBI CAP to fund its upcoming renewable power projects from a consortium of leading domestic and international lenders.

Most important factor for sustainability





SJVN has a current portfolio of 56,894.4 MW, out of which 2226 MW is under operation, 4303 MW is under Construction, 12803 MW is under Pre-construction and S&I stage and 37,562 MW capacity Projects are under allotment.

& growth is timely execution of under construction projects, for which SJVN is very focused and we believe in creating value for all stakeholders.

How does SJVN address environmental concerns associated with hydropower projects?

The environment policy of SJVN represents its commitment to a clean and safe environment. SJVN strictly abides by the various acts, rules and regulations of state and central govt. for the protection of the environment.

SJVN has actively engaged with local communities and local bodies for successful implementation of

environment protection measures and activities, and various afforestation drives have been conducted. Sewerage plans & Treatment Plants and water schemes for conserving water bodies, catchment area protection plan and other mitigation measures have been meticulously implemented.

Even during construction, SJVN takes all necessary measures to mitigate noise & air pollution and collaborates with the local public for their implementation.

In what ways is SJVN leveraging technology and innovation to enhance its operations and efficiency?

SJVN leverages technological advancement and innovation for timely completion of

under construction projects, to mitigate or minimize the adversities like use of advance warning systems for flash floods in river basins, use of drones for supervision and monitoring of construction activities.

Further, SJVN has utilised technological advancement to venture into upcoming technologies like development of pilot projects for use of green hydrogen at existing power stations. SJVN also uses advanced technologies to have efficient and clean generations like use of supercritical technology for upcoming thermal projects etc.

SJVN already has a state of art & India's first hard coating facility in its premier NJHPS for hard coating the turbine runners. Earlier, the hard coating was conducted in foreign countries costing millions to SJVN. With the in house hard coating facility, SJVN not only saved millions from costing components but this also has considerably reduced the lead time for maintenance i.e. increased operational efficiency of the plant.

SJVN is also developing a pilot membrane-based floating solar project in the state of Goa, which in near future will definitely help in increasing the efficiency and profitability of its Floating Solar Projects.



TECHNOLOGIES MAKING RAJKOT SMARTER

From handling traffic congestion to waste management, addressing environmental concerns and citizens' grievances, Rajkot is making full use of emerging technologies to make the city smart and livable, shares **Anand Patel, IAS**, Municipal Commissioner, Rajkot Municipal Corporation in an exclusive interaction with **Abhineet Kumar** & **Shalini Rawat** of **Elets News Network (ENN)**. *Edited excerpts*:

As the Municipal Commissioner, what is your vision for the development and growth of Rajkot?

Rajkot has a rich history and a promising future. My vision for Rajkot revolves around sustainable development, community engagement, and creating a city that thrives on innovation.

First and foremost, I'd focus on infrastructure. Upgrading and modernizing transportation systems, ensuring efficient waste management, and promoting ecofriendly initiatives would be top priorities. A city that moves smoothly and cares for its environment is a city on the right track.

Next, I'd emphasize education and skill development. Investing in schools, colleges, and vocational training centers will empower the youth and contribute to a knowledgeable and skilled workforce. A city's progress is intricately tied to the education and capabilities of its residents.

Community participation is vital. I'd encourage citizen involvement in decision-making processes through town hall meetings, surveys, and other platforms. This inclusivity ensures that the development aligns with the needs and aspirations of the people.

Economic growth is key, and I'd strive to attract businesses that align with



ANAND PATEL, IAS Municipal Commissioner
Rajkot Municipal Corporation

Rajkot's strengths and values. This could range from supporting local industries to fostering a culture of entrepreneurship and innovation.

Rajkot Municipal Corporation (RMC) is dedicated to enhancing the city's green cover by planting 7 to 8 lakh trees in the areas surrounding Aji and Nyari dam, as well as the Nakarawadi dumping site. This initiative reflects RMC's commitment to environmental sustainability and fostering a greener and healthier urban environment. By strategically focusing on

these locations, the corporation aims to contribute significantly to the overall greenery and ecological balance in the city.

Lastly, I'd promote cultural and recreational activities. Parks, museums, and events that celebrate the city's heritage and diversity create a vibrant and connected community. After all, a city isn't just buildings and roads; it's the heartbeat of its people.

How do you plan to address the city's infrastructure challenges, such as traffic congestion and waste management, to ensure sustainable urban development?

To tackle traffic congestion, we would like to initiate a comprehensive traffic management plan. This would involve expanding and improving road networks, augmenting multilayer parking, extending smart traffic signaling systems to higher number of junctions, and promoting alternative modes of transportation like cycling and enhancing public transit. We might also explore the possibility of creating pedestrian-friendly zones to enhance safety and encourage a more active lifestyle.

Waste management is a critical issue, and my approach would include a multipronged strategy. We would like to



Traffic Congestion - Rajkot

Rajkot Municipal Corporation (RMC) is dedicated to enhancing the city's green cover by planting 7 to 8 lakh trees in the areas surrounding Aji and Nyari dam, as well as the Nakarawadi dumping site.

invest in advanced waste separation and recycling facilities, promote waste-to-energy initiatives, and launch public awareness campaigns on reducing, reusing, and recycling. Community involvement would be key—encouraging residents to actively participate in waste management practices.

Additionally, I'd explore smart technologies for monitoring and managing both traffic and waste. Implementing intelligent systems can lead to more efficient resource utilization and better decision-making.

Of course, sustainable urban development requires a long-term vision. I'd work on creating and enforcing policies that prioritize environmental sustainability, ensuring that the city's growth doesn't come at the cost of its natural resources.

Are there any innovative approaches or technologies you are considering to improve the city's infrastructure?

As part of the smart city initiative, Rajkot was one of the pioneers to implement surveillance projects and ensure safety and security of citizens. Now, since the video feed alone is not doing the job for the urban local body, RMC is moving ahead in adopting the need of the hour – video analytics solution to address chronic issues pertaining to the encroachment, wrong parking, littering, spitting and animal detection on roads. This shall help achieve smooth traffic flow along with the cleanliness on roads.

Quality of Road was and is the prime focus of RMC and to further strengthen our focus, Artificial Intelligence (AI) driven road assessment shall be undertaken to capture anomalies on road, resurface related issues etc. This shall provide a 360 degree outlook to the city authorities and also ensure quality roads for the citizens.

Encroachment removal in densed market areas has always been a challenge for many of the ULBs and to mitigate the gap between hawkers and city authorities, RMC shall implement body worn cameras based surveillance and video recording of routine enforcement activity. This shall strengthen the enforcement process end to end and citizens shall get benefit in peak hours.

In waste management, we would look into deploying sensor-based smart bins that notify collection services when they're full. This not only improves efficiency but also reduces the chances of overflowing bins. Additionally, investing in waste-to-energy technologies, such as anaerobic digestion or thermal treatment, can help turn waste into a valuable resource.

Further, smart city platforms that integrate various services and data sources can be instrumental in effective governance. These platforms can enable better decision-making by providing real-time insights into various aspects of city management, from traffic patterns to energy consumption to grievance management to property tax collection.

These are just a few innovative ideas, and the key is to continually explore and adopt technologies that align with the city's goals and contribute to a more sustainable and livable environment.

Can you highlight any successful community-driven initiatives that have been implemented under your leadership?

The active involvement of social groups and citizens in cleanliness drives and waste management initiatives is a testament to the community's commitment to building a better and more sustainable city. It's heartening to



Waste Management Via Technology-Rajkot Installs GPS Devices On Waste Collection Truck

see the synergy between the local government and its residents in creating a cleaner and more environmentally conscious Rajkot.

The emphasis on citizen education programs is particularly noteworthy. When people are informed and engaged, it not only enhances the effectiveness of waste management but also fosters a sense of shared responsibility. It's a beautiful example of how a community can come together to address common challenges.

Waste segregation at the source is a key step towards efficient waste management, and it's wonderful that Rajkot citizens are actively participating in this process. This not only streamlines the waste disposal system but also contributes to the larger goal of sustainable living.

These initiatives underscore the importance of collaboration between the local government and its residents. By empowering communities and tapping into their unique strengths, we can create a city that is not only well-managed but also a great place to live.

Rajkot is part of the Smart Cities Mission. What key smart city initiatives have been implemented or are in the pipeline to enhance

the city's efficiency and livability?

Rajkot's engagement with the Smart Cities Mission stands as a testament to its forward-thinking approach to urban development. Leveraging the opportunity presented by the mission, the city has embarked on a non-conventional project, focusing on a greenfield area-based development (ABD) as part of its smart city initiative.

This ambitious project spans over 930

acres, and its centerpiece is a robust underground infrastructure. This includes smart roads, potable water networks, recycled water networks, sewer networks, stormwater drains, ICT and power ducts, smart street lights, and a clear and recycled water reservoir for the Bus Rapid Transit System (BRTS). Additionally, the development incorporates 50 acres of green and landscape areas, with a significant 23-acre public water body nearing completion. The surrounding area is envisioned to host multiple activity centers, designed to capture the attention and engagement of the city's residents.

Rajkot's pioneering efforts extend beyond physical infrastructure. The city was an early adopter of a city-wide surveillance network, resulting in an 18% reduction in crime rates. The implementation of the Integrated Command and Control Center (ICCC), featuring a traffic enforcement system, has played a crucial role in instilling traffic discipline at key junctions.

In the second phase of development, Rajkot has honed its focus on smart traffic signals, an enhanced transportation management system, and city-wide optical fiber communication to provide seamless connectivity to all offices of the Rajkot



Integrated Command and Control Centre, Rajkot

Vibrant Gujarat Global Investors Summit, 2024 160 www.eletsonline.com



The city has also undertaken an underground utilities survey covering the entire city, along with geo-tagging all properties.

Municipal Corporation (RMC). The city has also undertaken an underground utilities survey covering the entire city, along with geo-tagging all properties. The culmination of these efforts is the creation of a Geographical Information System (GIS) portal, boasting over 100 layers of information related to the city's assets. The RMC has made this portal public, facilitating information dissemination to the citizens.

The integration of technology extends to governance through the establishment of a smart city platform. This centralized hub provides real-time data on various urban aspects, ranging from energy consumption to air quality and traffic insights. It empowers decision-makers and citizens alike with valuable insights for better planning, resource allocation, and emergency management. During the COVID-19

pandemic, Rajkot swiftly repurposed its ICCC into a COVID war room, ensuring

efficient public service delivery.

RMC has cleverly introduced its services on WhatsApp, streamlining access to online services for its citizens. The use of a familiar platform like WhatsApp ensures convenience for people of all age groups. By simply sending a 'Hi' message to the designated number (+91-9512301973), citizens can access a range of RMC services (172+ services), making it a user-friendly experience. This initiative not only saves time for citizens but also provides them with language options for more personalized



communication in English or Gujarati. RMC has successfully implemented advanced Citizen Grievance Redressal System to efficiently handle and resolve citizen concerns, leading to a substantial boost in trust satisfaction. The svstem's standout features include multiple user-friendly options for complaint registration, automated escalation processes, requirement of a PIN for closure of critical complaints and feedback mechanism. Well-defined service level agreements at each official level ensure timely resolution, Addressing environmental sustainability and building resilience to climate change is a top priority. In Rajkot, we've initiated a range of measures to promote ecofriendliness and climate resilience.

The city is investing in green spaces, tree planting initiatives, and the creation of urban parks. These not only enhance the aesthetic appeal of the city but also contribute to improved air quality and overall well-being.

To reduce the carbon footprint, we're actively promoting the use of renewable

adapting urban planning to mitigate the impact of climate change.

RMC's adoption of Miyawaki plantation cover drives involves planting a variety of native trees in a compact space, creating a dense and thriving forest ecosystem. This initiative not only contributes to increasing green cover but also promotes biodiversity, improves air quality, and enhances the overall ecological balance in the city.

RMC's implementation of dual plumbing systems in the greenfield area is a forward-thinking approach to water conservation. This system separates potable water from recycled or non-potable water, providing an alternative water source for non-drinking purposes like irrigation and flushing. By reducing the demand for fresh water in non-essential applications, this initiative helps conserve precious water resources and promotes sustainable water management practices.

Atal Sarovar, a water conservation project, is a testament to RMC's dedication to preserving water resources. This initiative likely involves the construction of reservoirs or ponds to capture and store rainwater, preventing runoff and replenishing groundwater. Water conservation projects like Atal Sarovar contribute to mitigating water scarcity issues, especially in regions prone to seasonal variations in rainfall.

Moreover, awareness campaigns on sustainable practices, waste reduction, and the importance of environmental conservation are regularly conducted to foster a culture of environmental responsibility among residents.

These environmental initiatives collectively reflect RMC's holistic approach to addressing ecological challenges. By embracing innovative afforestation methods, implementing sustainable water management practices, and conserving water resources, RMC is actively contributing to a greener and more environmentally resilient Rajkot.

By simply sending a 'Hi' message to the designated number (+91-9512301973), citizens can access a range of RMC services (172+ services), making it a user-friendly experience.

accompanied by a feedback mechanism and the option for citizens to reopen dissatisfactory complaints, promoting transparency and citizen involvement. This initiative of RMC is the recipient of the very prestigious National E-Governance Award, 2022.

As these initiatives mark just the beginning, Rajkot is poised to continue its journey of technological adoption. The city envisions adopting more projects driven by artificial intelligence (AI) to address real-life challenges in real-time, solidifying its commitment to becoming a smarter, more efficient, and livable city.

Given the increasing concern for environmental sustainability, what steps are being taken to make Rajkot more eco-friendly and resilient to climate change? energy sources.RMC leading from the front has implemented a 4 MW solar plant in an open space to promote green and renewable energy.

RMC has implemented water recharge in various areas of the city, planning to have oxygen park in each ward of the city, ensure green building norms for each new building plan approval, conversion of traditional diesel buses to E Bus, incentivize the E auto adoption by giving INR 30,000 subsidy to auto owners and INR 1,000 subsidy on purchase of eco friendly bicycles etc. RMC plans on replacing all the diesel City Buses with CNG & Electric Buses in the coming year.

Infrastructure projects are being designed with climate resilience in mind. This includes ensuring that roads, buildings, and other structures can withstand extreme weather events and









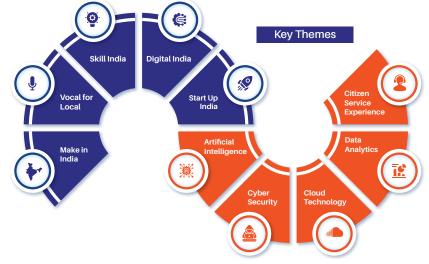
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GUJARAT'S ENERGY SECTOR TRANSFORMATION



ARJUN KRISHNAN Associate Researcher Centre for Civil Society

ujarat, is transforming its landscape with ambitious renewable energy landscape. shift. This aligning with national renewable energy goals, involves diversifying its energy mix to cut carbon emissions significantly. Policy reforms, infrastructure enhancements, technological innovation are central to this strategy. Gujarat is becoming a sustainable energy frontrunner, adeptly balancing energy requirements with environmental preservation and economic expansion.

RENEWABLE ENERGY INITIATIVES

Gujarat has markedly accelerated its renewable energy initiatives, seeking to diversify its energy mix while cutting carbon emissions. A key milestone was setting ambitious goals to boost the state's renewable capacity. By 2021, Gujarat aimed to substantially expand



its solar and wind capacities, focusing on exploiting the vast potential of these resources. This plan aligned with a broader state objective to support India's 175 GW of renewable energy goal by 2022, highlighting Gujarat's crucial role in the national energy sector (Tabassum & Shastry, 2021).

To achieve this, the Gujarat government introduced policy reforms and infrastructure upgrades. The state unveiled favourable solar and wind energy policies, offering subsidies and incentives to attract investment. A notable initiative was developing Charanka Solar Park, one of Asia's largest, significantly enhancing Gujarat's solar output. Moreover, the government nurtured an environment conducive to private and public-private ventures, vital for renewable infrastructure growth. These policy and infrastructure strides were crucial for meeting renewable targets and reinforcing Gujarat as a

sustainable energy leader.

Technological innovation in renewable energy is another focus in Gujarat. The state invests in research to enhance renewable technology efficiency and affordability. This encompasses exploring new energy forms like bioenergy and geothermal power. Gujarat's ambitions extend beyond current goals, setting new standards by:

- Integrating renewables across sectors.
- Upgrading grids for renewable integration.
- Investigating novel technologies, including energy storage.

These initiatives are poised to cement Gujarat's status as a renewable energy innovator, significantly contributing to India's energy security and sustainability objectives.

WATER-ENERGY NEXUS

The state, renowned for its agricultural

and industrial prowess, faces unique challenges in balancing water supply with energy demands. Gujarat's approach to this nexus is underpinned by the recognition that water resource management significantly influences energy consumption and vice versa. This insight spurred reforms to optimise water and energy use in agriculture and



industry, the state's primary consumers of these resources.

The Gujarat Energy Department has effectively implemented reforms to encourage micro-irrigation systems and rationalise agricultural power tariffs. These initiatives directly tackle issues of groundwater over-extraction and energy security. By 2022, these measures had significantly promoted sustainable agriculture while enhancing energy efficiency. For example, expanding micro-irrigation schemes not only conserved water but also reduced the energy required for large-scale water extraction. Adjusting power tariffs in agriculture sought to curb excessive electricity use for groundwater extraction, conserving water and energy. These reforms have successfully balanced agricultural productivity with conservation, resource addressing

challenges like groundwater overextraction and energy security, which are vital for the state's agricultural and economic stability (Viswanathan. Bahinipati, & Mohanty, 2022).

Adopting micro-irrigation systems has cut water usage by up to 60% in certain areas while also decreasing the energy needed for irrigation by about 30%. This dual advantage bolsters sustainable agricultural practices and aids in meeting the state's energy efficiency goals. The Gujarat Energy Department plans to augment these initiatives incorporating renewable energy sources, such as solar energy, into irrigation practices. This integration will lessen dependence on conventional energy sources and enhance the sustainability of water resource management.

Manufacturing and Industrial Development (photo- Industry Gujarat) Gujarat's manufacturing and industrial sectors have seen notable growth, significantly boosting state and national economies. This growth is marked by a surge in energy-intensive industries like plastic. and petroleum production. The expansion of these sectors highlights Gujarat's position as a key industrial hub in India, mainly due to the state's focus on energy efficiency and sustainable practices (Malhotra, 2008).

Since 2016, the correlation between energy consumption and industrial growth in Gujarat has been positive. Contributing over 18% to India's industrial GDP, the state underscores the crucial role of energy in driving industrial progress. Analysis shows that Gujarat's industries have increased energy efficiency while sustaining high growth. This improvement stems from adopting modern technologies and the state's shift towards renewable energy, ensuring a stable, sustainable energy supply for industrial development (Stephen & Parmar, 2018).

POWER PLANT EFFICIENCY

power plant efficiency, particularly in management. demand-side These improvements could cut the state's power shortages by approximately 25%. This efficiency is vital for supporting Gujarat's growing industrial energy needs while ensuring environmental sustainability (Garg, Maheshwari, Mahapatra, & Kumar, 2011). Notably, the state's solar power plants, such as the 25 MW grid-connected facility in Mithapur, demonstrate remarkable efficiency. This plant's performance ratio (PR) ranges from 74% to 80%, with a cumulative utility factor (CUF) between 16% and 24%, closely matching expected and actual performance, thus highlighting the state's efficient solar power capabilities.

These advancements strengthen Gujarat's renewable energy portfolio and establish benchmarks for solar power efficiency in India (Bhullar & Lalwani, 2018). Gujarat's thermal power plants have also seen significant efficiency improvements. A prime example is the inauguration of India's first GT26-based combined cycle plant near Utran, Gujarat. This plant, equipped with a bypass stack for simple cycle operation, ranks among the country's most efficient power plants. The efficiency of these thermal power plants is crucial for Gujarat, as the state heavily relies on them for its extensive industrial and residential energy needs. These technological innovations enhance power plants' operational efficiency and help reduce Gujarat's energy sector's carbon footprint (Nanda & Shah, 2009).

INNOVATIVE PROJECTS AND **TECHNOLOGICAL ADVANCEMENTS**

The Gandhinagar Rooftop Photovoltaic Programme, a pioneering initiative, transformed the capital city into a sustainable urban energy model. This programme entailed installing rooftop solar panels citywide, significantly contributing to its energy mix. It championed renewable energy and Gujarat has significantly advanced fostered community involvement in energy generation, setting a standard for other cities (Bhatt & Jani, 2015). Similarly, the Solar City-Smart Grid Project exemplifies integrating smart grid technology with renewable sources, boosting energy efficiency and reliability in urban settings.

The state leads in adopting innovative solutions like wind-solar hybrid systems, merging the benefits of wind and solar power to optimise energy generation and reduce intermittency. This strategy has markedly enhanced the state's renewable energy capacity, supporting its ambition to achieve 175 GW of renewable energy by 2025 (Elavarasan et al., 2020). Additionally, Gujarat is exploring offshore wind energy projects, capitalising on its extensive coastline for significant wind



energy production.

The department has initiated projects aimed at energy-efficient building designs and green infrastructure. A key example is implementing the Energy Conservation Building Code (ECBC) in Gujarat, targeting a 20% reduction in building electricity usage by 2050 (Yu et al., 2017). These initiatives contribute to energy savings and environmental sustainability. Moreover, the state is upgrading public transport systems, incorporating electric buses, and encouraging electric vehicle use to lower carbon emissions and improve air quality.

ENERGY EDUCATION AND WORKFORCE DEVELOPMENT

Gujarat has significantly enhanced its

education initiatives. energy acknowledging the critical importance of skilled professionals in the energy sector. In partnership with the Gujarat Energy Department, state educational institutions have launched specialised programs in renewable energy, energy management, and sustainable practices. These programs aim to cultivate a new generation of professionals with the knowledge and skills essential for the burgeoning renewable energy sector. Although specific enrollment and program success statistics are not readily available, this increased emphasis on energy education aligns with the state's broader renewable energy goals, as highlighted in recent analyses of renewable energy development in Gujarat (Elavarasan et al., 2020).

The state's efforts in energy workforce development have been substantial, focusing on skill enhancement and training in various energy-related areas. Gujarat has established training centres and technical and vocational programs concentrating on renewable energy technologies, energy efficiency, and grid management. These initiatives are vital for addressing the skill gaps and labour shortages that pose significant challenges in Gujarat's renewable energy sector. For example, renewable energy enterprises have encountered financial risks and a scarcity of skilled labour, highlighting the necessity for a competent workforce (Haldar & Tripathi, 2022).

Beyond local efforts, the Gujarat Energy Department has partnered with international institutions organisations to bolster its energy education and workforce development programs. These collaborations have brought global expertise and resources to Gujarat, enabling knowledge exchange, research collaborations, and capacity-building initiatives. international partnerships are vital in staying abreast of global energy trends technological advancements, ensuring that Gujarat's energy sector workforce remains competitive and well-prepared for future challenges.

CONCLUSION

Gujarat's multifaceted and innovative approach to renewable energy and sustainable development establishes a new benchmark in the energy sector. The state's initiatives, which include extensive solar parks and pioneering rooftop photovoltaic programs, demonstrate a profound commitment to environmental stewardship and economic advancement. Gujarat enhances its energy security and contributes significantly to India's pursuit of a sustainable, energy-efficient future by integrating renewable energy in diverse sectors, promoting energy education, and cultivating a skilled workforce.

Views expressed by Arjun Krishnan, Associate Researcher, Centre for Civil Society.

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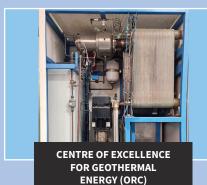


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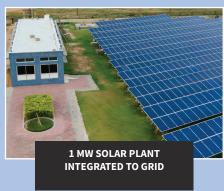


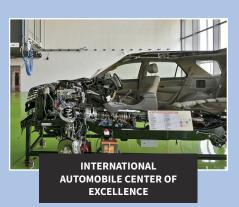


















THE ENERGY AGENDA FOR A CLIMATE-RISKED WORLD



nergy is a determinant of our economic well-being. We know that. But today, it is crucial that we discuss the future trajectory of energy, particularly clean energy, for the global challenges that confront us. We need to reset the global agenda for energy.

India's national plan for energy transition is based on our realities; One to augment and grow energy infrastructure but to do this so that it is green and based on renewable energy. We need to double our energy

production and consumption by the end of the decade. Two, to provide for affordable energy so that the needs of the poorest are secured, and three, to develop domestic supply chains for new energy systems.

Given the enormity of the crisis that awaits the world, India is not just walking the talk, but it is running the talk. India has not been a historical contributor to greenhouse gas emissions – from 1870 to 2019, its emissions have added up to a miniscule 4 per cent of the global total. It is

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lambasted as the world's third highest polluter in 2019, but its scale of emissions, 2.88 CO2 gigatonnes (Gt) as compared to the highest polluter (China at 10.6 Gt) and second highest (US at 5 Gt), are not comparable, not by a stretch. And, we have a huge need to grow our economy and meet the energy needs of millions of our people. So, from every angle, we did not have to take these global targets to reduce our carbon emissions.

The question also is why should the world differentiate between coal and natural gas, when both are fossil fuels. This is also a question of climate justice and most importantly, the feasibility of moving at speed and scale to reduce fossil fuel emissions responsible for heating the Planet. The fact is, roughly 70 per cent of the world's population has not contributed to the stock of emissions in the atmosphere but is today highly dependent on coal for energy. Richer countries have made the transition from coal to natural gas, which is somewhat cleaner-it emits roughly half the carbon dioxide emitted by coal, in addition to methane. However given their enormous appetite for energy, these countries' past and current emissions are high; disproportionate to their share of the global carbon budget. Now, the burden of the transition to clean energy has been shifted to countries that are least responsible for the stock of emissions and least capable of making the switch. This is not only unjust but also unrealistic. It makes the fight against climate change even more intractable and difficult.

What, then, are the options ahead? Let me discuss this in the context of India, where we need to address the issue of toxic air pollution because of coal burning. We cannot become defenders of coal however bad global politics may be. It is in our interest to reduce local air pollution and to combat climate change. But we need to do this



based on our imperatives. The strategy should be to vastly increase the rates of electrification in the country so that we can reduce coal combustion in millions of industrial boilers that are inefficient and highly polluting, and move towards electrification of vehicles, which in turn will reduce air pollution in our cities.

The zillion-dollar question then is, how will this electricity be produced? Our first task is to reduce dependence on coal even as we vastly increase our energy supply. This means doing more of what the Indian government is also committed to doing; limiting coal and investing in cleaner natural gas and renewable energy. Reducing India's coal power dependence in the electricity mix to 50 per cent from over 70 per cent now would mean upping our target for renewable energy from 450 GW to 650-700 GW by 2030. This scale of transformation will need financing, especially if we want to keep the cost of new renewable energy capacity low so that energy is affordable. This is where international partnerships must be sought; both to reduce the cost of finances and to provide additional finance.

The global community needs to rework its proposals. The transition to clean energy means focusing on making the cost of finances to the emerging world, which is 2-6x higher than the developed OECD countries, much lower and more accessible. Second, the global energy transition pathway has to be for all fossil fuels-coal and natural gas. This would not only show that richer countries have exhausted their quota for using natural gas but also make gas available at affordable costs to emerging countries that face the twin problems of local and global emissions. Let's be clear, the science of climate change is also the politics of inclusion and responsibility. This is where we must get it right.

All this means that we have accepted a massive transformation of our energy systems, which will be designed for the future and compliant with climate change goals. The big issue that must concern us as we move ahead – and this will remain the discussion for the future – will be to ensure that growth is equitable and that the poor in the country are not denied their right to development in this new energy future. The per capita emissions of India



remain low because we have massive numbers of people who still need energy for their development. Now, in the future, as we have set ourselves the goal to grow without pollution, we must work on increasing clean, but affordable, energy for the poor.

So, I would argue that, given these challenges, it is time that we began an altogether different discourse about clean energy and renewable power. We need to reinvent the clean energy imperative. We need to redefine its objective so that it can meet societal needs. It must meet the poor's energy, clean air, and climate change needs.

So, how will it happen? The fact is that energy security for vast numbers of the poor requires an energy delivery system that is different. It will require reaching energy, which costs less but is advanced and cleaner, into households that cannot even afford to buy basic fuel or light. It will

require cutting the length of supply lines, leakages and losses, and everything else that makes energy costs more so that it is affordable. There is no clear idea of what will work. But what is clear is that we have to push the envelope so that renewable energy becomes transformational – not because it is produced – but because it is an agent of transformation of society and the environment.

What is clear is that we need to ask deliberately what it would take to put clean energy into the hands of the poor. For this, we will need to do everything to make the transition to clean power. Similarly, we need to ask how clean and renewable energy can work to clean up local air in our cities. It is not just about battery vehicles, but clean power to power the batteries. It is not about shifting the source of pollution. But cleaning it up. Every house needs to generate this clean power; every vehicle – ideally a bus or cycle – and every

industry needs to be powered from this source. This is where we need to go.

The same is the case with the wicked problem of cooking energy of the poor woman. We need clean energy to be the basis of the electricity that powers the cookstove – from solar, and wind to biogas and all other ways in which it can be supplied into the hearth. It can do this if it is available; if it is convenient, affordable, and clean. The basis for this transition has to be the health of the last person, in this case, the woman behind the cookstove.

Clean and renewable energy has to be the moral and economic imperative for a sustainable and more inclusive world.

Views expressed by Sunita Narain, Centre for Science and Environment.













PIONEERING SUSTAINABLE DEVELOPMENT THROUGH RESPONSIBLE MINING IN JAMMU AND KASHMIR

The Department of Geology & Mining, Jammu & Kashmir, in association with Elets Technomedia, is organising the 'J&K Geology & Mining Conclave' on 15th February, 2024 in Sher-i-Kashmir International Confrence Centre (SKICC), Srinagar. This event will function as a central hub for exchanging knowledge, collaborative efforts, and informed decision-making within geology and mining. With the rich geological diversity and abundant mineral resources in Jammu and Kashmir, there is an urgent need for innovative technological solutions to harness these resources efficiently and in an

environmentally sustainable manner.

PROGRAMME CHAIR



Dr Rashmi Singh, IAS Administrative Secretary Department of Geology and Mining Jammu & Kashmir

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BALANCING GROWTH WITH EQUITY: INDIA'S JOURNEY TO AN AFFORDABLE, SECURE, AND SUSTAINABLE ENERGY FUTURE



merging from 2023 with a highly successful G20 Presidency and a climate Conference of Parties with deep clean energy commitments, India stands at he forefront of a revolutionary

» ARUNABHA GHOSHCEO

Council on Energy, Environment, and Water (CEEW)

>> KARTHIK GANESAN

Director of Research Coordination Council on Energy, Environment, and Water (CEEW) transformation in its energy landscape, propelled by the imperatives of a surging economy and a growing population. The stakes are global, with India's energy policies bearing substantial significance in the realms of climate change and sustainable development. As the world's third-largest energy consumer and importer, India grapples with the challenge of enhancing energy consumption to uplift living standards in a rapidly urbanizing economy, while also addressing the needs of rural India through bespoke policies.

In this critical decade, India must address the energy trilemma — ensuring security, sustainability, and affordability — together. It needs to secure its energy sources to reduce external dependence and ensure energy reaches all at affordable prices without being an environmental burden. As the journey unfolds, challenges are intertwined with vast opportunities for job creation, sustainable growth, and solidifying India's leadership on the global energy landscape.

ENSURING ENERGY SUSTAINABILITY WITH RENEWABLES

The trajectory of India's sustainable energy future is illuminated by the pillars of Renewable Energy (RE), particularly solar and wind power. We cannot transition away from fossil fuels in the next few decades if we do not substantially increase our renewable capacity. This is the core imperative of ensuring energy reaches all citizens and drives India's economic development.

When it comes to renewables, solar energy has taken the lead in India. The country has gone from 2,000 MW of solar power capacity in 2010 to 72,018 MW in 2023. India's geographical advantage positions it uniquely for solar energy exploitation. The government's commitment to developing solar parks and promoting decentralized solar systems, especially in rural areas, with a focus on driving livelihood applications and indeed tapping into solar energy in ways that avoid conflict with land use —

rooftops, farmlands, and captive land is commendable. This approach not only drives growth in the renewable sector but also ensures energy democratization. In fact, a recent study by the Council on Energy, Environment, and Water (CEEW) found that over 25 crore households across India have the potential to deploy 637 GW of solar energy on rooftops. At around 3.2 GW, Gujarat houses nearly 30 per cent of India's current rooftop solar capacity, the highest in India. At the same time, India's wind energy sector, which seeded the renewable energy industry in the country - both by creating manufacturing opportunities and deployment of technology - is seeing a much-needed revival. Wind capacity addition in FY23 doubled compared to FY22 and stood at 2.3 GW (vs. 1.1 GW in FY22), and it has already touched 1.5 GW during the first half of FY24.

old wind turbines, which dot the landscape in high-potential areas such as Gujarat, Tamil Nadu, Karnataka, among others, and also tapping into the vast potential for offshore wind energy, which can be more reliable and complement the demand pattern of the country. Our quest for round-the-clock electricity sources will require us to tap into wind potential and balance solar energy effectively.

Both these sectors will also generate significant jobs. A CEEW-NRDC-SCGJ analysis shows that if India meets its commitment to install 500 GW of nonfossil fuel-based energy capacity by 2030, it will generate jobs for one million people.

States have been at the front and center of hastening India's clean energy transition. Gujarat, for instance, recently released its Renewable Energy Policy 2023. The policy aims to augment the



At around 3.2 GW, Gujarat houses nearly 30 per cent of India's current rooftop solar capacity, the highest in India. state's RE capacity in line with the national target of 50 per cent non-fossil fuel-based installed electricity capacity by 2030. To achieve this target, the state estimates investments worth INR 5 lakh crore that utilize approximately 400,000 acres of land.

BUILDING ENERGY SECURITY BY DIVERSIFYING NON-FOSSIL ENERGY SOURCES

Amid the centrality of renewable energy

(RE) in India's energy transition, a diverse energy mix, including nuclear and hydroelectricity, remains pivotal. Simultaneously, investments in smart grids and energy storage systems become imperative to manage the variability of renewable energy and ensure grid stability to keep our economy powered.

On the supply side, this includes investing in the future of nuclear energy and hydroelectricity. Recent years have seen the uncertainties that come with large hydropower projects — availability of water and unprecedented meteorological events that have the potential to nullify significant investments in the sector. A recent report from the Central Electricity Authority (CEA) highlights that an additional capacity addition of 389 MW of large hydropower capacity is prospectively required till 2030, apart from the capacity of 11,494 MW of hydro projects which are currently under construction.

Charting the role of new hydro projects in

human resources exist for India to be able to aim for this scale. In addition, there is a need for a large infusion of resources into indigenous R&D that addresses the emerging opportunity of small and modular reactors with increased safety that could potentially mitigate the need for long timelines for site acquisition in clusters and can distribute the technology across the geography.

JUMP TO RENEWABLES NEEDS ENERGY STORAGE AND SMARTER SYSTEMS

Just as important as these technologies are investments in smart grids and energy storage systems that would be fundamental for managing the variability of renewable energy and enhancing India's power grid stability. Smart metering has already become the centerpiece of the reform of the power distribution sector. India has understood that to drive cost-recovery, demand management, and nudging the adoption of energy efficiency in retail consumers are key.



the power system and also ensuring important riverine ecosystems in areas with hydro potential are maintained must be the prerogative of central and state policymakers. Similarly, India has publicly funded nuclear programs that must now be harnessed to deliver an annual addition in the gigawatt scale each year. The establishment is mature, and the trained

While India may be a slower adopter of energy storage, on account of the high cost of the technology, its critical role in integrating high levels of renewables into our power mix is now well established. As has been proven with clean energy capacity deployment, the right set of regulations, incentives, and market design can also make the energy storage market thrive. It can

create an adequate installed base that will leverage new provisions in the ancillary services market and take the benefit of time-of-day reflective tariffs that will increasingly become common across consumers.

DECARBONISING INDIAN INDUSTRIES FOR A NET-ZERO FUTURE

Yet another significant need and opportunity lie in decarbonizing industrial energy. While the industry's contribution to GDP has remained steady over the years, there are global headwinds that will impact its competitiveness in exports and, indeed, the survival of traditional processes and products. CEEW studies show that hard-to-abate sectors like steel and cement will require an additional capital expenditure (CAPEX) of USD 627 billion to achieve netzero carbon emissions.

India must drive innovation and the widespread adoption of clean electricity, energy-efficient technology, low-carbon fuels, and materials. This can be achieved through a combination of policies and regulations such as the National Green Hydrogen Mission, Renewable Purchase Obligations, Energy Storage Obligations, Green Open Access Rules, among others, as well as market-based instruments such as emission standards and the carbon credits trading scheme. India's ambitious Green Hydrogen Mission (the second-largest in the world) is an example of thinking at scale, which can pave the way for investment and projects. The ongoing design of the Indian Carbon Market can also create new opportunities for several industrial sectors. Of course, overcoming infrastructure constraints and streamlining regulatory processes is vital in providing industry stakeholders certainty while making new investments.

MAKING ENERGY AFFORDABLE FOR ALL

As India enters a new phase of growth that will see it edge closer to being a developed economy, the country will need to balance growth with equity. A sustainable energy future involves addressing energy inequity by making it affordable, transitioning to electric cooking technologies, and driving

electrification in transport. This will ensure our transition is citizen-centric. India has achieved remarkable strides in advancing energy accessibility. In 2015, at the commencement of the Sustainable Development Goals, India held the record for the highest number of individuals globally lacking access to electricity. Over the past decade, approximately 700 million Indians gained access to clean cooking energy, while around 350 million obtained electricity access for the first time.

The largest burden of energy inequity today is arguably the sustained use of solid fuels in poorer households. A CEEW-T20 report estimates this number to be around 447 million people in India. The Pradhan Mantri Ujiwala Yojana (PMUY) has been a phenomenal success in delivering close to 10 crore new LPG connections in a span of seven years. But the commodity still remains out of reach for many poor households, and the sustained use of LPG remains a challenge as refills are expensive. In the short to medium term, sustained and substantive subsidies targeting poorer households will need to be continued. This will enable them to witness the multiple benefits of adopting clean cooking. In the long term, shifting preferences to electric cooking technologies, investing in R&D to improve efficiency, usability, and compatibility would be important. Notwithstanding new technological developments, in a future that is nearly 100 per cent electric, this transition is a certainty.

PROPELLING INDIA'S EV REVOLUTION

Simultaneously, shifting away from fossil fuels requires improving our public transport systems and transitioning to electric vehicles (EVs). India has clear policies aimed at driving the electrification of transport through two rounds of the FAME scheme. A third phase of FAME is in the pipeline with a budget outlay of INR 26,400 crore . The impact on the ground is evident. A CEEW study shows that states with EV policies incorporating consumer incentives experienced a 2X market growth compared to states without such incentives . Larger incentives are also

associated with more visible market growth. States with higher incentives, such as Assam, Goa, and Gujarat, recorded a nearly 20X growth in the six-month period after the notification of their incentive policies.

The more recent PM-eBus Seva has placed the focus squarely on improving public transit and electrifying it in smaller towns. This should be the way forward to ensure that smaller towns, which will drive urban growth in the decades ahead, learn from the challenges that larger cities face in creating affordable mobility options for all with a lower environmental footprint. This approach also sets an example for other developing countries whose trajectories can be much different from the developed world's focus on private car ownership.

Moreover, the focus of electrifying the transportation system must be on creating a domestic manufacturing ecosystem that continues to maintain India's place as a global manufacturing powerhouse for automobiles. Today, a large number of small and medium enterprises contribute to the success of India's automobile sector, especially for two- and three-wheelers, and they must be supported in making the transition to electric vehicles. However, this is also as much an opportunity ripe for newer firms to emerge and establish new paradigms in transporting people and cargo. The benefits of electrifying transport are significant — it weans India off the critical import dependency on crude oil and improves environmental and public health outcomes in already crowded cities. A CEEW study estimates a 16 percent reduction in oil demand leading to savings of INR 1 lakh crore in the oil import bill if 30 percent of the vehicle stock is powered through electricity by 2030.

India's energy revolution is not just a national imperative but a global gamechanger — and India can become a green superpower. From harnessing solar and wind power to revitalizing nuclear and hydroelectricity, India charts a diversified path. Smart grids and energy storage amplify the resilience of renewable sources, while electrifying transport and decarbonising industries mark bold strides towards a sustainable future. As India steers towards being a developed economy, balancing growth with equity becomes paramount. The commitment to innovation and a skilled workforce ensures India's leadership in the global energy landscape, promising not just challenges but a surge of opportunities for a greener, brighter tomorrow.

Views expressed by: Arunabha Ghosh and Karthik Ganesan

Arunabha Ghosh is the CEO, and Karthik Ganesan is the Director of Research Coordination at the Council on Energy, Environment, and Water (CEEW). (The views expressed are personal.)



GUJARAT'S PUBLIC DISTRIBUTION SYSTEM PIONEERING INCLUSIVE WELFARE

ujarat is undergoing a significant transformation as it modernizes its Public Distribution System (PDS), making it more efficient and technologically advanced. Led by Chief Minister Bhupendrabhai Patel and inspired by Prime Minister Narendra Modi's vision. this transformation goes bevond administrative changes, showcasing a commitment to improving the lives of the state's citizens. The introduction of innovative technologies and intelligent strategies ensures improved access to fundamental necessities like food grains and other essential commodities for the state's inhabitants covered under National Food Security Act (NFSA). This overhaul is not just about simplifying and speeding up processes; it is about nurturing the well-being of Gujarat's most vulnerable communities and leading by example for others to emulate.

At the core of this transformation is the upgradation of over 15,600 Fair Price Shops across the state. These shops are crucial for people who rely on them for affordable food and supplies. Now, with the introduction of digital tools and systems, these shops are becoming more efficient and reliable. Things like digitalization of process of issuing ration cards and GPS tracking for deliveries are making the whole process more transparent and fair. This big shift towards using technology shows Gujarat's commitment to bring positive change and making sure that everyone, especially those in need, benefits from these improvements.

TACKLING FOOD SECURITY

The state of Gujarat has implemented a multifaceted approach to tackle food security challenges and promote nutritional welfare. The Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY), extended for five years to provide food security to people



» SHRI KUNVARJIBHAI BAVALIYA

Hon'ble Minister, Water Resources and Water Supply & Food, Civil Supply and Consumer Protection Affairs Government of Gujarat

covered under the National Food Security Act (NFSA) has played pivotal role by providing free food grains to millions, categorizing beneficiaries and ensuring targeted distribution. Covering approximately 3.5 crore people in Gujarat and a staggering 80 crore across India, PMGKAY is instrumental in mitigating hunger and food scarcity. The success of both PMGKAY and NFSA lies in their targeted approach and the state's efficient distribution mechanisms, addressing immediate hunger concerns and upholding the right to food for millions.

In addition, Gujarat's commitment to nutritional welfare is evident through supporting Government of India innovative initiatives like implementation of the Rice Fortification Pilot Project in the Narmada district. This project, aimed at combating Anemia and Malnutrition, the project is extended in entire state by distributing fortified rice free of cost to 72 lakh families.

The state's strategic choice of the Narmada district showcases a proactive approach to addressing health challenges in aspirational district areas. Furthermore, Gujarat's PDS system ensures diverse commodity distribution at subsidised rates, including Tuver Dal, Gram (Chana), Sugar, Edible oil, and Double Fortified Salt. This comprehensive approach not only stabilizes market prices for Essential Commodities but also ensures a balanced and nutritious diet for EWS, contributing to both short-term relief and long-term health benefits.

TECHNOLOGICAL INTEGRATION Digitization of Ration Cards

Gujarat's transition towards digitalisation of ration cards marks a significant leap in PDS modernization. These cards, now embedded with barcodes and integrated with Aadhaar, offer precise beneficiary identification. The impact of this change is substantial, affecting many individuals. This integration has drastically reduced the occurrence of fraudulent activities and misappropriation of resources, ensuring that subsidised food grains reach the rightful beneficiaries. The



» SHRI BHIKUSINHJI PARMAR

Hon'ble Minister of State, Food and Civil Supply, Social Justice and Empowerment Government of Guiarat digitization process also speeds up the distribution, making it more efficient and user-friendly.

Robust Distribution under NFSA

The implementation of the National Food Security Act (NFSA) has been enhanced by the digitized system. This system categorizes beneficiaries into Antyodaya families (the poorest of the poor) and Priority House Holds (PHHs), streamlining the process of distributing essential commodities. This digital framework has made the distribution process more transparent and accountable, ensuring that the benefits reach the intended recipients without delays or bureaucratic hurdles.

Double Fortified Salt for Healthier Communities

The distribution of double-fortified salt, enriched with essential micronutrients like iodine and iron, addresses widespread micronutrient deficiencies. This initiative particularly benefits children and women, who are often more vulnerable to Anemia and other micronutrient-related health issues. The availability of this double fortified salt at a nominal rate is a significant step in enhancing the overall health profile of the NFSA population.

Revolutionizing Fair Price Shops through Technological Integration

Since 2014, Gujarat's Fair Price Shops (eFPS) have undergone transformative а computerization, enhancing the efficiency and transparency of the Public Distribution System (PDS). This integration of technology has streamlined processes such as stock management and beneficiary data, reducing discrepancies and boosting accountability. The digitization of supply chain from Food Corporation of India's (FCI) godowns to Gujarat State Civil Supplies Corporation Limited, Gandhinagar has further simplified and expedited distribution. Additionally, the Door Step Delivery (DSD) Scheme. where the state covers transportation costs upto F.P.S, has significantly improved distribution logistics, easing the burden on shopkeepers and enhancing the overall efficiency of the system.



>> SHRIR.C.MEENA, IAS

Principal Secretary
Food, Civil Supplies & Consumer
Affairs Department
Government of Gujarat

Revolutionizing Supply Chain Efficiency

Gujarat has implemented advanced measures to enhance the efficiency of its PDS supply chain. The adoption of an ICT logistic system with GPS tracking allows real-time monitoring of transport and door step delivery vehicles, improving the overall efficiency and security of the supply chain. This integration facilitates live tracking of vehicle movements, aiding in planning more efficient delivery routes, reducing costs, and ensuring timely commodity delivery. Monitoring over 6000 CCTV cameras in installed in all godowns of GSCSCL adds transparency, ensuring proper stock management and timely preventive measures against irregularities.

Innovative Distribution Systems and Beneficiary Engagement

Gujarat's commitment to innovation is evident in the transition to an Aadhaarbased distribution system, increasing security and efficiency. The 'One Nation One Ration Card Scheme' promotes national and state portability, allowing NFSA beneficiaries to access their entitlements from any fair price shop in the country. The 'My Ration' mobile application enhances beneficiary engagement by providing comprehensive information in Gujarati about PDS and ration card services. This empowers users to make informed decisions about their entitlements, ration card status, and Fair Price Shop details.

Health & Nutrition Initiatives

Gujarat's PDS goes beyond food distribution, contributing to health and nutrition. The 'Pradhan Mantri Ujjwala Yojana' (PMUY) ensures clean cooking fuel for needy families, reducing indoor air pollution and improving the health of women and children. Encouraging millet cultivation under the International Millet Year initiative promotes healthier dietary options and supports farmers. Additionally, the enforcement of legal metrology laws enhances consumer protection, ensuring compliance commercial transactions and fostering trust in the market system. Gujarat's PDS stands as a global benchmark for effective public service delivery, integrating technology and innovative practices to securely reach benefits to its citizens.



» SHRI TUSHAR DHOLAKIA, IAS

Director of Food and Civil Supply

Gujarat has significantly improved its Public Distribution System by using advanced technology and effective welfare policies, setting a strong example for others. These changes are crucial as they provide essential food and basic needs to those who require them most. Gujarat's approach has been successful and offers valuable lessons for other regions on enhancing public service systems. This progress is not just about local achievements; it's a model for the world, showing how well-planned and executed strategies can ensure fair access to food and nutrition for everyone. Looking forward, Gujarat's initiative inspires hope for a future where everyone has equal access to necessary resources.

EMPOWERING INDIA'S ENERGY FUTURE SECI'S LEADING ROLE IN GREEN TRANSITION

n the pursuit of sustainable development, securing a stable and eco-friendly energy supply has emerged as a paramount concern for nations worldwide. India, as the third-largest consumer of energy globally, faces a unique set of challenges in navigating the complexities of climate change, geopolitical influences, and the constant flux in oil markets. Solar Energy Corporation of India (SECI) has been taking proactive initiatives to propel the nation's transition to a more sustainable and resilient energy paradigm.

I. ENERGY SECURITY

India is the third largest energyconsuming country in the world. It has become one of the largest sources of energy demand growth globally and has made significant progress towards its universal electrification target for residential users. Per capita electricity consumption in India is around a third of the world average but it is expected increase. Climate change, geopolitical dynamics, and fluctuating oil prices underscore the need for a strategic approach to energy security. The country has made significant strides in universal electrification for residential users but faces ongoing challenges.

II. TRANSITIONING TO A GREEN FUTURE

India's commitment to a green future is evident in its ambitious targets, including reaching net-zero emissions by 2070



≫ R P Gupta, (IAS Retd.) Chairman & Managing Director, Solar Energy Corporation of India

and sourcing fifty percent of electricity from renewable energy by 2030. The Renewable Energy (RE) capacity additions globally are projected to surge, with solar photovoltaic capacity leading the way. The Central Electricity Authority (CEA) estimates the total installed capacity of non-fossil fuel sources in India at 500.64 GW by 2029-30.

III. CURRENT INSTALLED RE CAPACITY IN INDIA

As of October 2023, India has made substantial progress in its renewable energy capacity. Wind power, solar power, small hydropower, and other sources contribute to a cumulative achievement of 132,132.44 MW. This progress aligns with the national goal of increasing the share of renewables in the energy mix.

IV. ROLE OF SECI IN INDIA'S GREEN ENERGY TRANSITION

SECI plays a pivotal role in facilitating India's transition to green energy. Initiatives such as the Strategic Interventions for Green Hydrogen Transition (SIGHT) scheme and the establishment of Battery Energy Storage Systems (BESS) showcase SECI's commitment to innovation.

SECI's involvement in the Ultra Mega RE project in Ladakh, with 9 GW of solar and 4 GW of wind-based generation, demonstrates its dedication to large-scale, sustainable projects. The organization's role in implementing the Production Linked Incentive (PLI) Scheme for High-Efficiency Solar PV Modules further strengthens its position as a catalyst for industry development.

SECI's competitive bidding process, leading to the awarding of over 60 GW of project capacity, is estimated to attract investments exceeding 2.7 Lakh Crores in the Indian RE sector. The organization, acting as an intermediary power procurer, has signed Power Sale Agreements for over 50.392 GW, encompassing solar, wind, hybrid, and round-the-clock RE supply.

India's energy sector is at a crossroads, with a growing emphasis on renewable energy and sustainability. SECI's initiatives are instrumental in driving this transition, from green hydrogen projects to energy storage systems and the implementation of innovative schemes. As India continues to progress towards its green energy targets, SECI's role as a key enabler remains crucial.

Views expressed by R P Gupta (IAS Retd.), Chairman & Managing Director, Solar Energy Corporation of India

REC - REDEFINING ENERGY INDUSTRY

REC is committed to both financial strength and broader societal impact, positioning itself as a premier financing institution for the nation's development, shares **Vivek Kumar Dewangan**, **Chairman and Managing Director**, **REC Limited** in an exclusive interaction with **Rajiv Ranjan** of **Elets News Network (ENN)**.

What is the outlook of REC for FY 2025?

Our primary focus is improving the quality of our loan assets, underlining our commitment to reliability and stability. Additionally, remaining competitive in the market by mobilizing resources at a cheaper level will be one of our key focus areas. Our aggressive support to the RE transition of Govt of India aligns with the broader societal responsibilities towards sustainable practices. Moreover, diversification is a strategic move, and expanding into core infrastructure and logistics sectors is on our agenda. This expansion is geared towards amplifying our footprint and contributing to the nation's infrastructural development. With a clear vision in place, our goal is to achieve 6 Lakh Crore loan assets based Company by FY 2025. These initiatives collectively underscore our commitment to both financial strength and broader societal impact, positioning REC as a premier Financing institution for the development of the Nation, for a promising future.

How is REC promoting green financing for the Indian power sector?

REC's loan book in the renewable energy space has grown from Rs.75.06 billion i.e. 3% of REC's loan book of Rs.2.39 trillion in FY 2017-18 to Rs.298.33 billion i.e. 6% of REC loan book of Rs.4.74 trillion in FY 2022-23. This figure is expected to increase

exponentially owing to approvals of Rs.499.29 billion in the first half of FY 2023-24 and we target to increase our renewable energy portfolio to 30% of the loan book by FY2030.

REC is looking forward to financing of the entire RE power value chain. REC RE financial assistance includes Projects viz. Wind, Solar, Hybrid, Round the Clock (RTC), E-Bus, Pumped Storage Projects (PSP), Solar Cell and Module manufacturing, Waste to Energy Projects, Projects under KUSUM Scheme etc. Furthermore, we are actively pursuing financing of Green Hydrogen and Ammonia, Ethanol production open to new and upcoming technology based initiatives in space. These technologies have immense potential in terms of energy storage, decarbonization, and reducing reliance on traditional fossil fuels. Aggressive efforts in this direction would reduce the cost as well as demand for fossil fuels to create a sustainable future and thriving planet for future generations.

Can you elaborate on REC's role in the Revamped Distribution Sector Scheme (RDSS)?

RDSS has an investment outlay of over Rs 3 lakh crore over four years, with the Gol providing a grant of only Rs 97,000 crore. The remaining will come from states or through financing. REC and PFC are going to finance about Rs 1.2 lakh crore. REC is taking care of 19 states and 36 out of 56 discoms. We're not just



>> VIVEK KUMAR DEWANGAN

Chairman and Managing Director REC Limited

the financing arm but also involved in preparing detailed project reports and implementation. We act as the project monitoring agency as well.

What are the key initiatives of REC under its Corporate Social Responsibility (CSR) policy?

On the CSR front, we have been following the guidelines the Department of Public Enterprises issued. For the last two or three years, the Department of Public Enterprises has given us the guideline that 60 per cent of expenditure should be on health and sanitation, which we have been able to adhere to. Besides health and sanitation, we also focus on rural development and infrastructure. We have signed anMoU with the National Sports Development Fund and are financing three major games - badminton, boxing, and athletics. We are committed to giving grants up to Rs 100 crore over the next three years, and we hope that we will be able to nurture the potential players who can win medals for the country.

SUSTAINING LIFE

GUJARAT'S BLUEPRINT FOR WATER SOURCE SECURITY



ater, a cornerstone of economic growth, is vital for sustaining agriculture, powering industries, fostering technological advancements, and, more importantly, sustaining life. As the essential catalyst for prosperity, a reliable water supply is indispensable, shaping the foundation for thriving economies and vibrant communities. In Gujarat's narrative of water resilience, the intrinsic link between water and economic advancement takes center stage, showcasing the profound impact of sustainable water management on the state's growth trajectory.

Leveraging advanced technologies and community engagement to sustainably manage its water resources, Gujarat leads in strategic innovations—ranging from inter-basin water transfer to the state water grid, thus crafting a blueprint for lasting water security for generations to come.

Two decades ago, Gujarat confronted formidable challenges marked by recurrent droughts, conflicts arising from water scarcity, and heavy dependence on arrangements such as trains and tankers to fulfill essential

drinking water requirements. This persistent water shortage had a cascading effect on crucial sectors like agriculture, dairy, and industry, resulting in substantial economic losses.

Guiarat underwent a transformative phase post-2000, adopting multifaceted approach to combat water scarcity. Key strategies included interbasin water transfers, the establishment of the State Water Grid, and an emphasis on community participation. In recent years, the state also prioritised exploring developing alternate conventional water sources such as desalination plants and the reuse of wastewater. These measures collectively propelled Guiarat towards a more sustainable and resilient water future.

MULTI-LAYERED ARRANGEMENT OF SURFACE WATER DISTRIBUTION: ENSURING SOURCE SUSTAINABILITY & WATER SECURITY

Gujarat's innovative surface water distribution model encompasses a multi-layered approach strategically designed for source sustainability and fortified water security. The first layer involves the efficient use of the Narmada canal—the world's longest concrete-lined canal—to transfer bulk water to Kachchh, Saurashtra, and North Gujarat, addressing immediate needs in high-need areas.

The second layer focuses on creating robust distribution infrastructure. The SAUNI scheme, dedicated to channeling surplus Narmada water, fills reservoirs in Saurashtra, while the Water Grid initiative ensures equitable water distribution across the state, creating a reliable water supply system, especially during summer. This comprehensive infrastructure stands as a testament to Gujarat's commitment to a balanced and efficient water distribution system.

The third layer emphasises the distribution of water to villages and urban areas through regional water supply schemes, facilitated by the Jal Jeevan Mission and the Atal Mission for Rejuvenation and Urban Transformation. This approach not only meets the immediate demands of communities but also lays the

groundwork for sustained access to clean water.

The fourth layer incorporates community-managed water supply schemes, facilitating last-mile connectivity and supply. By actively involving communities in water management, Gujarat strengthens the resilience of its water distribution system, fostering a sense of ownership and cooperation among local residents.

CLIMATE CHANGE RESILIENCE

Gujarat's unwavering commitment to climate change resilience environmental responsibility prominently exemplified through its strategic diversification of water sources. Currently implementing five desalination plants along its coastline on a PPP mode, contributing 370 MLD, Gujarat is at the forefront of leveraging technology to combat the immediate impacts of climate change on freshwater availability. proactive approach aims to leverage alternate water sources while reducing dependence on freshwater sources.

Looking forward, Gujarat's vision extends to tapping into 2000 MLD water from non-conventional sources in the next 25 years, including expanding desalination plant capacity along the coast. This ambitious plan underscores the state's foresight in adapting to evolving climate patterns and addressing the long-term challenges posed to freshwater sources.

PROMOTING CIRCULAR ECONOMY THROUGH REUSE OF WASTEWATER

In the context of the circular economy, the treatment and reuse of domestic, commercial sewage, and industrial effluent emerge as pivotal solutions. This not only combats water scarcity but also aligns economic growth with environmental preservation. Thus, the Government of Gujarat came up with a

concrete plan, strategically unfolding the "Reuse of Treated Wastewater Policy," launched on May 28, 2018. The policy aims to maximise the collection and treatment of sewage generated, and reuse the treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources.

As outlined in the policy framework, the directive regarding the utilisation of treated wastewater emphasises the principle of substituting fresh water for specific purposes. The policy mandates the compulsory use of treated wastewater for nonpotable purposes by establishments such as Thermal Power Plants, Guiarat Industrial Development Corporation (GIDC) estates, industrial units in Special Investment Regions (SIR), industrial parks, and large industrial units. This requirement applies to entities located within a 50-kilometer radius from the Sewage Treatment Plant (STP) or city limits, ensuring the widespread adoption of treated wastewater in the specified regions.

Today, 796 MLD wastewater is already being reused (i.e., around 18% of the total fresh water use in urban areas), additional 109 MLD of wastewater treatment plants are in the tender/ execution stage, and 790 MLD are in the planning stage. This would substitute the use of 1696 MLD of fresh water, thereby reducing the burden on fresh water sources. It should be noted that more than 5000 MLD sewage is generated in the state. The state envisions harnessing this substantial volume of wastewater, intending to utilise about 4000 MLD for industrial purposes through partnerships and irrigation. To tap into this reuse potential, the state is rapidly expanding wastewater collection and treatment infrastructure in the region.

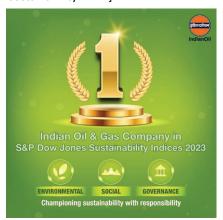
Views expressed by - Gujarat Water Supply Sewerage Board (GWSSB)

Green Transition of IndianOil

ndianOil is a leading energy player in India and is committed to providing affordable energy across the length and breadth of the country. We also recognize that the world is changing, and we must adapt to these changes if we are to remain relevant and competitive in the long term.

As a leader in the energy and fuels business in the country, we view sustainable business practices as a defining element of competitiveness to maintain our status, equity and standing, both in the market and in society. There has been a proactive effort by us to offer greener products like IndiGreen, XP95, XP 100, Xtragreen, Xtra Tej, SERVO Raftaar, etc.

IndianOil ranked India's most sustainable Oil and Gas Company in the 2023 edition of the S&P Dow Jones Sustainability Indices (DJSI) Corporate Sustainability Assessment (CSA) [Picture 1: Dow Jones Sustainability Index].



IndianOil is the leader among Indian Corporates in the Oil & Gas sector as per the Global Rankings on Transition released by Bloomberg New Energy Finance (BNEF). Globally, IndianOil has been ranked 22nd in the rankings. On forward outlook and future-oriented actions, IndianOil's actions in energy transition have been recognized as "actions stronger than target". IndianOil has also topped Oil & Gas Corporates for low carbon investments as a share of total Capex, with IndianOil's share of low carbon investments being 1.8% of its total CAPEX as per the report.

IndianOil believes that sustainability is the definitive way forward and has committed to becoming operationally net-zero by 2046. Today, IndianOil meets 9% of the Nation's energy needs and aspires to grow this share to 12% by 2030. In that direction, IndianOil is also committed to expanding its energy portfolio as the "Energy of India".

IndianOil has already made deep forays into the green energy space. IndianOil is implementing various Biofuels projects and initiatives in Ethanol, Bio-Diesel, Compressed Bio Gas (CBG), Organic Manure, Sustainable Aviation Fuel (SAF), and Waste to Energy. Under the Ethanol Blending programme, a blending rate of 12% ethanol in petrol has been reached. IndianOil has set up its 2G and 3G Ethanol Plants at Panipat and CBG Plants at Gorakhpur & Jaipur. CBG sales have been initiated by IndianOil from 69 Retail Outlets across India under the brand name 'IndiGreen'. The Company is exploring the production of Sustainable Aviation Fuel from Ethanol towards the establishment of India as an aviation refuelling hub for green fuels. IndianOil is also exploring the production of Biodiesel from used cooking oil and tree Bourne Oilseeds in addition to conventional feedstock.

The portfolio of renewable energy stands at 241 MW, which is being expanded through new wind, solar, hydel and pumped hydro projects. Additionally, there is also greening of the supply chain through solarizing 22,460 Retail Outlets with an installed capacity of 135 MW. Initiatives in EVs are being intensified through setting up charging stations and battery swapping stations.

IndianOil has signed a MoU with Gujarat Industries Power Company Ltd. (GIPCL) for setting up Renewable Energy Power Plants on 6th December 2023. Under this MoU, both parties would consider creating a Joint Venture company to identify and develop Solar/Wind/Hybrid Power projects in Gujarat to offer varied power solutions to power consumers like round-the-clock power, green chemicals, etc. This MoU would enable both parties to achieve their respective sustainability targets and aid the nation's efforts to achieve net zero by 2070.

Hydrogen is the fuel of the future. IndianOil has initiated dispensing of Hydrogen fuel in Gujarat Refinery and R&D Centre, Faridabad. IndianOil has formed a Joint Venture Company with ReNew Power Private Limited (ReNew) and Larson & Toubro Limited (L&T) for Green Hydrogen Business. IndianOil R&D Centre is also fully oriented towards the development of low-carbon technologies and products including production and dispensing of Green Hydrogen.

INDIA'S FIRST 2G ETHANOL PLANT

IndianOil's 100 kilo-litres per day 2G Ethanol Plant at Panipat was dedicated to

the Nation by Hon'ble Prime Minister on 10.08.2022. The project has been set up using indigenous technology which will utilize around 200 TMTPA Paddy straw as feedstock to produce 100 KLPD ethanol. This ethanol will be utilized for blending into Petrol. [Picture 2: 2G Ethanol Plant]



Bio-Ethanol is a near carbon-neutral renewable fuel, which burns cleaner and when blended, helps in the complete combustion of Petrol. The Plant would, therefore, reduce the Green House Gas (GHG) emissions of ~0.3 MMTCO2e/ annum. The project shall also assist in domestic fuel production, reduction, Climate Change mitigation, and energy security. Creating an end-use for the agri-crop residue would provide an additional income generation opportunity for the farmers. The 2G Ethanol Project will provide direct employment to about 220 people involved in the plant operation. Further ~1250 indirect employment will be generated in the supply chain for rice straw cutting, handling, and storage.

IndianOil was able to collect ~100,000 tons of paddy straw for its 2G Ethanol Plant during the harvesting season of 2023.

COMPRESSED BIO GAS (CBG) PLANT AT GORAKHPUR

A 200 tons per day Paddy Straw to CBG Plant has been set up at Gorakhpur, UP using technology developed by IndianOil R&D Centre. The CBG Plant will produce 22 TPD CBG and Organic Manure. The Plant shall employ more than 100 direct manpower and additional manpower from biomass supply to CBG sale. IndianOil has created a biomass supply chain for the

Plant with support and recognition from Govt. of Uttar Pradesh. [Picture 3: CBG Plant at Gorakhpur]



Further IndianOil has set up a 100 TPD Cattle Dung to CBG Plant in Jaipur, Rajasthan and a 100 TPD Cattle Dung to CBG Plant is under construction in Gwalior, MP. IndianOil is also in the process of setting up multiple CBG Plants across the country. [Picture 4: CBG Plant at Jaipur]



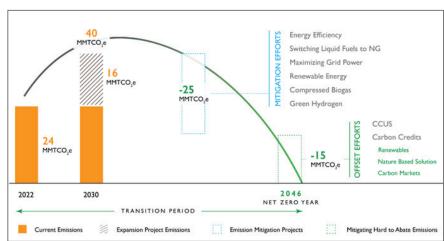
NET ZERO BY 2046

Sustainability is the definitive way forward and we have committed to become operationally Net-Zero by 2046. As IndianOil embarks on the net-zero journey in the right earnest, the

Company already has a well-crafted blueprint in place. It adopts a multi-pronged approach to take gradually towards the net zero destination. IndianOil has envisaged that an investment of over Rs. 2 lakh crore will be required to achieve the target by the year 2046. Several emission mitigation pathways like green hydrogen, biofuels, renewables, carbon offsetting through ecosystem restoration, and Carbon Capture Utilisation and Storage (CCUS), among others, are being implemented and explored. [Picture 5: Net Zero Roadmap]

As a recognition of its Green Transition, IndianOil has received various prestigious awards including the 'Green Ribbon Champion' award by Network 18 for its contribution to 'Green Initiative of the Year towards Environment Conversation'. 'Corporate of the Year' in ESG Prithvi Awards 2023, Special Commendation award for Compressed Biogas - Company of the Year in FIPI Awards 2023 and "INDIA's Best Gas Economy and Sustainable Alternative Energy Enterprise - CBG / Bio-CNG (SATAT+) Mega Initiative" award at the 16th ENERTIA Awards 2023. [Picture 6: Union Petroleum Minister, presenting the prestigious 'Green Ribbon Champion' award to Chairman, IndianOil]





TORRENT POWER FOSTERING CLEAN & GREEN ENERGY

Torrent Group has scaled new heights marked by new forays and noticeable milestones in the past years. Torrent Power's MD, **Jinal Mehta** shares the business philosophy and the Group's vision in an exclusive interaction with **Abhineet Kumar** & **Parth Asthana** of **Elets News Networks (ENN)**. Edited excerpts:



What are the business areas of Torrent Group and as you move on the growth path, what do you identify as the group's key strengths?

Torrent Group has diversified operations with group revenues of Rs. 37,600 crore (approx. USD 4.5 billion) having a focus on the Health and Energy Sector. In Health, we have a presence in pharma, whereas, in Energy, our presence is in the entire power value chain of generation, transmission, distribution, and city gas distribution.

Our key strengths are our Group's core values that ensure value for stakeholders with sustainability. These values - laid down by our founder, are the pillars on which Torrent builds its future. With these core values i.e. Integrity, Passion for Excellence, Participative Decision Making, Concern for Society & Environment, Fairness with Care, and Transparency, we have transformed ourselves from a humble startup fifty years ago, into a globally-respected diversified business organisation.

What strategies has Torrent Power implemented to navigate the evolving energy landscape, especially considering the increasing focus on renewable energy sources and sustainability?

Torrent has identified renewable energy (RE) based generation as the sustainable growth driver for its power business. Currently, out of its total portfolio of 4.27



GW, 1.2 GW is renewables. It is systematically increasing the share of RE in its generation portfolio. About 1 GW of RE is under execution and another 4 GW is in the pipeline with a target to increase its RE capacity to 5 GW in the next 3-4 years. In addition to increasing its RE capacity, it is also working on Green Hydrogen and Pump Storage Hydro projects.

With the global push towards decarbonization, how is Torrent Power working towards reducing its carbon footprint and promoting cleaner energy alternatives in its operations?

Torrent Power strives to adopt green and sustainable practices in its operations and services and has taken several measures to reduce its carbon footprint including increasing its share of RE in its generation portfolio, reducing T&D losses in all its distribution units, zero liquid discharge at all the generation plants to minimise water consumption, 100% of fly ash utilisation, multiple tree plantations drives with approx. 6 lakh trees already been planted.

How does Torrent Power plan to address the challenges and opportunities posed by advancements in technology, such as smart grids and digitalization, in the power distribution sector?

Torrent has supplied about 28 BU to its 4 Mn Consumers during FY 23. In our endeavour to achieve passion for

excellence in distribution, we adopted new technologies in our operations. Torrent Power already possesses the wherewithal in terms of IT and communication systems to implement Smart Grid in its license areas. Torrent has a critical advantage in terms of end-to-end SCADA connectivity along with AMR metering for high value consumers and distribution automation. We have implemented various interventions of automation, communication & IT systems to monitor, measure, and control power flows in real-time, and identify losses. This has helped us to achieve a distribution loss of 2.62% for its license business for FY 2022-23: which is one of the lowest across the country and comparable to global benchmarks.

In the context of changing regulatory frameworks and policies in the energy sector, what initiatives is Torrent Power undertaking to ensure compliance and adaptability to these changes?

In the recent past, the Ministry of Power has notified various forward-looking rules and notifications for the power sector such as rights of consumers, changes in law, late payment surcharge, etc. To ensure compliance and adaptability, Torrent has initiated a deep dive into the existing systems to ensure readiness to adapt to these changes and ensure prompt and responsive customer services while ensuring adherence to all regulatory requirements. Torrent is also ensuring sufficient capacity building of its manpower to not just meet but excel at the benchmarks set by the Ministry.

How does Torrent Power plan to enhance its energy infrastructure resilience, considering the increasing frequency and intensity of extreme weather events and the potential impacts of climate change on the power sector?

Torrent has at the start of its journey in the power sector identified the critical need for undergrounding of distribution networks to safeguard the same from extreme weather events and frequent disruptions. In turn, Torrent has created a majority underground network along with compact distribution substations across its distribution segment. Further, for extra high voltage networks where undergrounding is technically and financially challenging, Torrent has installed galvanised lattice and monopole towers having smaller footprints thereby minimising risks from the impacts of climate change.



A FORTUNE 500 COMPANY INDIA





In the rich tapestry of India's flourishing economic landscape, Gujarat particularly stands as a trailblazer of progress, driven by the visionary leadership of our Honourable Prime Minister, Shri Narendra Modi. The Vibrant Gujarat Global Summit, conceptualized in 2003, has evolved into a global forum, showcasing the state's unwavering commitment to inclusive growth & sustainable development.

Gujarat's transformative journey over the past two decades has positioned it as one of India's most industrialized and urbanized states. With an entrepreneurial spirit at its core, the state has become a preferred investment destination, leading the nation across a wide range of sectors. In the realm of renewable energy, Gujarat has emerged as a frontrunner particularly in solar vertical. The state's commitment to sustainable development aligns seamlessly with the nation's net-zero goals. Gujarat's contribution to the clean energy sector has been instrumental in reshaping India's energy landscape, setting a strong precedent for others to follow. Navigating through the complexities of the global energy transition, the state's vast potential in harnessing solar energy has not only propelled its own growth but has also contributed significantly to India's journey towards a greener and more sustainable future.

As we envision the future of the renewable energy sector in 2024, and beyond, the significance of policies such as Basic Customs Duty (BCD), Approved List of Models and Manufacturers (ALMM), and Production-Linked Incentives (PLI) has given an Impetus to the growth of Renewable sector in the country. Let us leverage these policies to chart a bold new course for domestic manufacturing, fortifying our journey towards a self-reliant and greener India.

The Vibrant Gujarat Global Summit is thus a time to collectively reflect on Gujarat's immense contributions to the renewable energy sector and delve into the transformative potential of the progressive policies which will shape the future of our industry. Together, we set the stage for a nation in which clean energy not only fuels progress and prosperity but also lays the foundation for a truly sustainable and resilient tomorrow.

Hitesh Doshi
Chairman & Managing Director,
Waaree Group





A Global Leader in Renewable Energy Solutions



he Suzlon Group stands as one of the foremost providers of renewable energy solutions worldwide, boasting approximately ~20.3 GW* of wind energy capacity installed across 17 countries. Headquartered at Suzlon One Earth in Pune, India, the Group comprises Suzlon Energy Limited and its subsidiaries. A vertically integrated organization, Suzlon has in-house

research and development (R&D) centers in Germany, the Netherlands, Denmark, and India, with world-class manufacturing facilities spanning 14 locations in India.

With an operational track record exceeding 28 years, the Group maintains a diverse workforce of over 6,000 employees. Suzlon also holds the distinction of being India's leading wind energy service company, managing the largest service

portfolio of over 14.3 GW in wind energy assets. Additionally, the Group has achieved an installed capacity of approximately ~6 GW outside India. The 3 MW Series wind turbine technology platform represents the latest addition to its comprehensive product portfolio, which is anchored by the 2 MW and 3 MW series of wind turbines.

*Global installations of Suzlon manufactured wind turbine generators. Data as on 30th September 2023

NATION'S PRIDE: ADANI GREEN DEVELOPING THE WORLD'S LARGEST RE PARK IN KHAVDA



dani Green Energy Limited (AGEL), India's largest renewable energy company, is pioneering the development of the world's largest renewable energy (RE) park, boasting an impressive 17 GW capacity. This colossal venture aligns with India's ambitious target of achieving 500 GW RE capacity by 2030 and is set to transform the barren landscape of Khavda, Gujarat, into a powerhouse of clean energy.

Situated near the Vighakot BSF post in

Kachchh district, the world's largest RE park of 30 GW spans a staggering 72,400 hectares, making it almost as big as Singapore. Identified under the Gujarat government's wasteland policy 2019, the site has been allocated to six developers, with Adani Green taking the lead as the major contributor with 17 GW capacity.

Leveraging its proven project execution capabilities, technological expertise, and operational excellence, Adani Green is set to replicate its success in building and operating India's first and the world's largest wind-solar hybrid cluster in Jaisalmer. This latest endeavor will play a pivotal role in expediting India's transition to clean energy.

The RE park being developed by Adani Green is spread across 28,500 hectares and is expected to generate a whopping 52,000 million units of electricity annually, offsetting about 37 million tons of Co2 emissions annually. This immense energy output can power over 14 million homes each year, benefiting states such as Gujarat, Andhra Pradesh, Chhattisgarh, Maharashtra, Tamil



Nadu, Delhi, Tripura, Jammu and Kashmir, Odisha, Bihar, and West Bengal.

In line with India's Atmanirbhar Bharat vision, Adani Green is not only focusing on clean energy production but also on developing indigenous and resilient supply chains. The company is spearheading innovative solutions at the Khavda project, including deploying India's largest onshore wind turbine generators, bifacial solar PV modules, horizontal single-axis tracker systems, TopCon N-type solar cells, and the Adani Group's cutting-edge Energy Network Operation Centre (ENOC) platform.

Moreover, the project integrates



sustainable practices, utilising waterless cleaning robots to address dust accumulation on solar panels, contributing to the United Nations Sustainable Development Goal 6 by conserving water in the arid Kachchh region.

AGEL is actively engaged in community development initiatives across several villages in the region, focusing on education, health, women empowerment, water conservation, and enhancing community infrastructure as part of its corporate social responsibility efforts. This demonstrates AGEL's holistic commitment to enhancing the social and natural capital in the region.



"We are working towards building the world's largest RE park at an accelerated pace and contribute towards India's decarbonization goals. With a balance integration of both solar and wind, the project will redefine the landscape of largescale renewable energy development globally. The barren wasteland in Khavda, Gujarat, is set to become the hub of green energy generation and job creation. The project will play a pivotal role in realising our vision of achieving 45 GW capacity by 2030, contributing to India's transition to a low-carbon economy."

SAGAR ADANI

Executive Director Adani Green Energy Limited

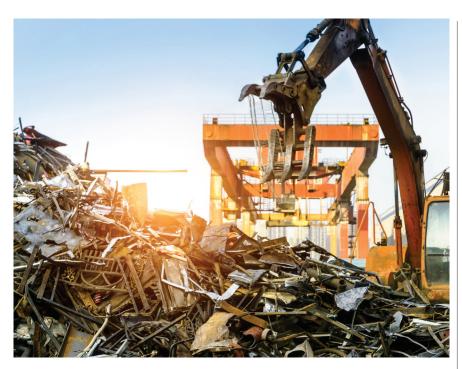
The Khavda project serves as a beacon of sustainable progress and AGEL's unwavering resolve to accelerate India's clean energy transition.

www.adanigreenenergy.com





ARCELORMITTAL NIPPON STEEL INDIA ADVANCES STEEL SCRAP RECYCLING STRATEGY TO BOOST SUSTAINABILITY AND RESOURCE EFFICIENCIES



rcelorMittal Nippon Steel India (AM/NS India), a joint venture between ArcelorMittal and Nippon Steel, two of the world's leading steelmakers, is accelerating efforts to lower its carbon emissions by maximizing steel scrap utilization in its steelmaking processes.

AM/NS India will soon establish three dedicated scrap processing centres – one at the flagship plant in Hazira and the other in Ahmedabad in Gujarat; and one at Khopoli, Maharashtra – by December 2024 with an estimated investment of Rs 100 crore, as part of its comprehensive roadmap that focuses on increasing scrap mix

utilisation. The company has also set up dedicated teams to implement the strategy. Post-commissioning of these facilities, AM/NS India plans to establish more such units in strategic locations.

AM/NS India has reduced its CO2 emissions intensity by nearly 32% towards the end of CY2022 (compared to 2015 levels). Through increasing scrap mix contribution along with other levers such as greening the grid power consumption, AM/NS India aims to further reduce its emissions intensity.

With a current steelmaking capacity of 9 MTPA, AM/NS India sees substantial potential for maximising the use of

steel scrap during steelmaking to support its decarbonisation efforts. The company currently has a scrap mix of 3-5% of its total steelmaking capacity in the Electric Arc Furnace (EAF). This scrap strategy aims to achieve a 9% scrap mix by the end of 2025 and will be realised through a combination of the newly introduced Basic Oxygen Furnace and the existing EAF.

Mr. Dilip Oommen, Chief Executive Officer, ArcelorMittal Nippon Steel India (AM/NS India), said, "In line with our commitment to sustainability and guided by our brand promise 'Smarter Steels, Brighter Futures', we aim to significantly increase the scrap mix simultaneously reducing dependence on steelmaking from primary raw materials like iron ore and coal. We will also substantially minimise the number of byproducts generated in our steel manufacturing process and reduce the environmental impact, besides promoting a more circular and sustainable approach to resource management."

Beyond operational initiatives, AM/NS India is also actively engaging and collaborating with a range of stakeholders, including customers, policymakers and the scientific community, to explore ways to advance a secure and sustainable supply chain for raw materials. By nurturing these collaborative relationships, AM/NS India intends to act as a catalyst to expedite decarbonization efforts within and beyond the steel industry, contributing to India's larger efforts to step up climate action and spur a sustainable, circular economy.

ESSAR SHAPING A SUSTAINABLE FUTURE

Renewed focus on Decarbonisation, Decentralisation, and Digitalisation

stablished in 1969 by the Ruia family, Essar has been an active participant in India's progress by contributing significantly to Innovation and development across various sectors. With over 50 years of entrepreneurial expertise and a track record of strategic investments in sectors ranging from Ports, Steel Making, Oil refining, Retail, Power generation, IT, ITES, and many more, Essar has solidified its reputation as a creator of value of complex global scale assets.

Gujarat stands as a cornerstone, in shaping Essar's journey of growth and development. The company's investments in essential industrial and infrastructure projects have not only enriched the state's industrial landscape but have also established a model showcasing Gujarat's potential as an investment hub. Over the past 40 years, Essar has invested more than Rs 1 lakh crore into diverse projects within Gujarat, generating over 20,000 job opportunities.

Today, in the face of an urgent need to combat climate change, the global landscape is rapidly embracing cleaner alternatives. Essar, aligning itself with this global movement, was one of the first corporates to embark on a journey of transformation, redefining its corporate ethos to spearhead a sustainable era. With a renewed focus on a leaner, cleaner balance sheet, Essar is charting its path to a resurgence by anchoring strategies around three themes: core Decarbonisation, Decentralisation, and Digitalisation, all of which are shaping the



future trajectory of its investments.

Dedicated to transitioning its current assets towards a greener economy, Essar is actively investing in forwardlooking ventures. These encompass green hydrogen production, biofuels, natural gas production, and logistics, as well as eco-friendly steel manufacturing. These strategic investments aim to transform industry sectors from being heavily carbon-dependent to fostering a clean energy ecosystem. Essar's robust portfolio spans four pivotal verticals: Energy, Infrastructure & Logistics, Metals & Mining, and Technology & Retail, housing world-class businesses geared toward sustainability innovation.

ENERGY

Energy remains a focal point, with Essar Energy Transition ("EET") leading the

charge in creating the UK's prime energy transition hub in North West England.

Essar prioritises hydrogen as the fuel of the future. The company aims to establish a comprehensive green fuel ecosystem and plans to invest a total of Rs 28,800 crore (US\$3.6 billion) in developing a range of low-carbon energy transition projects over the next five years. Of this amount, Rs 19,200 crore (US\$ 2.4 billion) will be invested across its site at Stanlow, between Liverpool and Manchester, and Rs 9,600 crore (US\$ 1.2 billion) will be allocated in India.

Essar's EET Future Energy Limited has penned an MOU for Rs 30,000 crore investment to develop a 1 Gigawatt Green Hydrogen Electrolyser in Devbhoomi Dwarka District, Gujarat, fostering substantial employment opportunities.

Similarly, Essar Power revealed plans for an additional Rs 16,000 crore investment in Phase-II expansion at the Salaya-Dev Bhoomi Dwarka Thermal Power Plant. This initiative will generate job prospects for about 1,000 skilled and unskilled workers. The planned expansion will be based on Ultra Super Critical technology which would increase the efficiency of the power plant by 20%.

On the other hand, Essar Exploration & Production is actively developing diversified conventional and unconventional hydrocarbon assets with promising prospects in India and Vietnam. The Raniganj block has a resource base of 12 TCF (Trillion Cubic Feet) Coal Bed Methane (CBM). The company is contributing significantly to the Nation's vision of being a gasbased economy.

INFRASTRUCTURE & LOGISTICS

In the infrastructure and logistics realm, Essar manages ports and terminals in India and the UK, with interests in project construction in India and the Middle East. Essar Ports, India's fastest-growing private port and terminal developer and operator, plans to construct a Commercial Port in Salaya, Devbhoomi Dwarka District. With an initial investment of Rs. 10,000 crore, this project aims to transform Salaya port into a bustling logistics hub, creating jobs for about 5,000 individuals with diverse skills.

Within this sector, Essar Green Mobility Solutions focuses on reducing carbon emissions in India's logistics sector. It achieves this goal by establishing an LNG ecosystem through investments in companies like Blue Energy Motors, GreenLine Mobility Solutions, and Ultra Gas & Energy.

Blue Energy Motors is at the forefront of manufacturing India's first fleet of LNGpowered heavy-duty trucks. Simultaneously, GreenLine Mobility Solutions is transforming the country's road logistics by ensuring the



Stanlow Refinery, UK

widespread availability of Blue Energy Motors' innovative LNG-powered long-haul trucks. Meanwhile, Ultra Gas & Energy is establishing an expansive network of Green Fuel Hubs nationwide, streamlining the efficient distribution of LNG.

METALS & MINING

Essar is engaged in a series of promising ventures within the Steel Industry, all focused on integrating "Green Technologies" to significantly reduce carbon emissions throughout the steel production process.

In line with Essar's commitment to Green Steel, the company is initiating a ground-breaking project to establish a 4 million-tonne Integrated Steel Plant (ISP) in Ras Al-Khair, Kingdom of Saudi Arabia (KSA), signalling a major leap toward environmentally sustainable steel manufacturing.

Additionally, Essar is actively developing a 14-MTPA Iron Ore Pellet project in Odisha, India, aimed at meeting the escalating demand for steel. This project will deliver top-quality pellets of DR and BF grade.

Furthermore, under this vertical, Essar is involved in Mesabi Metallics, an advanced 7 MTPA iron ore mining and pelletisation initiative in Northern Minnesota, USA. Leveraging North

America's proven iron ore reserves, this project is catalysing the steel industry's shift towards eco-friendly practices.

TECHNOLOGY & RETAIL

In the technology and retail sector, Essar has made strategic investments in Black Box, fostering interest in digital solutions and customer experience platforms across India, Europe, and the USA. The company stands out as one of the fastest-growing global technology solution integrators, boasting a robust presence in over 35 countries across 6 continents.

Additionally, within this vertical, Pluckk operates as a digitally integrated platform specialising in the sale of fresh fruits and vegetables. This platform is revolutionising the F&V industry and experiencing a remarkable growth rate of 4X.

LEADING BY EXAMPLE

Essar stands as a beacon of progressive change, leading the charge towards a sustainable future. Through its strong commitment to green initiatives, innovative investments, and pioneering projects across diverse industries, Essar aims to redefine the benchmarks of sustainability and strives to inspire a global movement towards a cleaner, greener, and more sustainable tomorrow for generations to come.

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Developing india's Renew able energy sector and Helping country towards Its sustain able future



सोलर एनर्जी कॉरपोरेशन ऑफ इंडिया लिमिटेड (भारत सरकार का उपक्रम)

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- Credit Rating of AAA
- Making profits since 2014-15
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- Spearheading India's RE mission with innovative and path breaking innovations
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