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# Seminar on Climate and Renewable Energy Policies for Gujarat towards Net Zero 2070

**Co-organizing Institutions: IIMA, IIT Gandhinagar, ITF Under the aegis of Climate Change Department, Government of Gujarat**

**Event Date: 15th February 2023**

**Location: CR, 2nd floor, JSW-SPP, New Campus, IIM Ahmedabad**

## Seminar Report

### ❖ Context and objective

As announced by the Hon'ble Prime Minister of India, Shri Narendra Modi at COP26, the world needs to follow the mantra of LiFE, i.e., Lifestyle For Environment – A global movement to affect paradigm shift from mindless and destructive consumption to deliberate utilization. Negative environmental externalities have to be internalized – be it GHG emissions, local air pollution, land degradation, water pollution etc. LiFE would guide major transformative actions for leading the world towards its objective of Net Zero emissions.

The journey towards net zero 2070 for India would need substantiating the indispensable role played by states like Gujarat, leading renewable energy transformations. Gujarat is blessed with abundant land, over 300 days of sunshine a year and vast shoreline fit for wind power harnessing. This has contributed to the Renewable Energy sector in Gujarat growing annually by 22% since 2011.

As renewable energy in Gujarat advances, new challenges are being faced at the policy making as well as implementation stages. These need to be deliberated through a holistic approach that leads to modern and practical solutions and alternatives. For instance, grid flexibility and management of fossil-based power would become important considerations for deploying more renewable energy necessitating managing the load curves. Energy storage including flow batteries and electric vehicles would also require closer scrutiny.

The objective of this event was to discuss the various new technical paradigms in the areas of energy policy and renewable energy, under an overarching framework of climate change using the current trends and emerging ecosystems that are implementable on ground.

The seminar was held to answer several questions such as:

- How can we enhance development indicators even with lower energy consumption in Gujarat through energy efficiency practices both on supply and demand sides?
- What is the future for Energy Efficiency obtained through Demand Side Management?
- What could be the role of non-fossil energy sources in a Net Zero emission scenario through appropriate policies in Gujarat?
- What role would Electric Vehicles play in optimizing the logistics and supply chains?
- What are up and coming practical renewable energy policy suggestions in solar, wind, bioenergy, and green hydrogen?
- What could be the role of buildings and greener built spaces towards NZ?
- What are the possible integration areas for energy, water use efficiency and agriculture?
- How can we utilize the AYUSH Ministry in achieving the Prime Minister's LiFE Mission goals?
- What are additional policies needed over and above the existing policies, and specific implementation challenges in existing policies Gujarat would need to address in renewable, climate change and Net Zero domains?



Moreover, the event promoted an open discussion between policymakers, industry leaders and researchers on the following themes:

❖ **Renewable Energy Development in Gujarat**

The session concentrated on gaining insight into recent developments in solar and wind energy and its implementation for contributing to the Net zero emissions target. It also discussed the future of fossil fuels in an era of sustainable development through technologies like smart grids, CCUS, and prospective expansion of bioenergy in Gujarat.

❖ **Emerging Technologies and Policies**

The session deliberated on new technical paradigms in RE, mainly within Transportation through Hydrogen Fuel Cell/Battery Operated Electric Vehicles and scope of EVs in logistics policy. Green Hydrogen and its role in the future of sustainable transportation.

❖ **Natural Resource Management**

It broadly explored two integrated verticals of water conservancy and sustainable agricultural practices. It analysed the scope of sewage water treatment for industrial, institutional, and agricultural uses. It also looked into water efficient grains like millets, agricultural market policy, fertilizer & urea policy, solar powered water pumps, etc.

❖ **Integrating climate change policies with Health and LiFE Mission**

The session discussed the future and development of the AYUSH ministry under Govt. of India and its possible role in achieving the ideals of Hon'ble PM's LiFE Mission as integrated with climate change policies. It also analyzed national health schemes like Health Mission and its integration with AYUSH.

❖ **Speakers and Attendees**

The seminar was attended by a total of 41 participants. This consisted of 16 Speakers and 25 attendees.

The detailed list of participants is attached at Annexure-1.

❖ **Key Takeaways from all the Sessions**

**Session 1:**

Looking at new and innovative business practices.

- To ensure that the renewable energy cost curve can keep going down.
- Future hybridization concepts need to be studied in depth for policy drafting.
- Round the clock power, peak power, wind solar battery storage and energy storage, etc.
- 24x7 power is not demanded by industries, most are 12x7.
- Increased focus on the demand side to develop policies that give decentralized power access for

businesses at lower costs.

- RPO is only applicable on thermal power plants.
- Needs to be extended to other areas like transport, pharmaceuticals, etc.
- Survival of micro grids is a big question as without a common grid we can't have common cost & price.
- Hence the need for a centralized grid can't be ruled out in order to ensure centralized pricing.
- Small wind turbines, i.e., less than 1MgW should be developed.
- Need to curate policies for the same at micro grid level.
- Bioenergy missions should be structured with different ministries like agriculture, power, etc., coming together.
- A road map needs to be developed for this utilization of bioenergy.

#### Session 2:

- Need for investment in GH2 and electrolyser manufacturing in india.
- Reduction in cost of demineralised water needed to make the value chain cost efficient.
- Hydrogen from chlor-alkali plants is a key solution, which is readily available at very low cost.
- This Hydrogen can be used for Kick-starting Hydrogen applications,equipment, approvals and usage.
- Green building concept is often green washed so that builders can sell at a premium.
- Need for actual checks and accountability to be in place to ensure off paper implementation of green practices.
- Sourcing of green materials for green building should be given priority.
- Building and community level grid interactive technologies should be promoted

#### Session 3:

- Connecting off-grid solar tube-wells to the grid is to be done.
- Need for getting an unmetered tube-well connection to be metered.
- Packaged sewage treatment plants should be brought into use.
- Will help in sewage water treatment at rural or micro level usage.
- Preparation needed for better policy negotiations for Gujarat for the Inter-State Narmada water review 2024.
- Need to strengthen wastewater policy in Gujarat.
- Bringing rationality in terms of Pricing and Implementation.

- Push for Zero Liquid Discharge cities.
- Need for scientific river specific mandates.
- To ensure maximum growth through E-flow assessment. This would also make environmental clearance easier.

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- Studies needed on water footprinting of crops.

To prepare a better and more comprehensive GTU agricultural plan for states.

#### Session 4:

- AYUSH has the right credentials for climate friendly, climate resilient and No GHG system with well-being of people.
- Need for Autonomous bodies and separate set of rules for revalidation of AAYUSH for better public acceptance.
- Homeopathy needs more promotion.
- It requires less medicinal products, is energy efficient, a healthy practice and eco-friendly.
- Growth in the health care sector has led to more carbon footprint.
- More rational policy to integrate AYUSH can bring down carbon footprint, improve healthcare.
- Deforestation has led to decreased and degraded availability of ayurvedic medicines.
- Forestation plan for Ayurvedic plants is needed.
- Emissions from healthcare needs to be give more attention.
- By encouraging renewable energy for health infrastructure, Finding alternatives for disposable items and Zero energy emission from health equipment.

#### Common Takeaways:

- Thrust on actual economics in each area such as energy, water, agriculture and health.
- Demand side to be as vital as supply side in policy and projects.
- Connected ministries and departments to be brought together as stakeholders for the success of policies.
- Structuring of policies to give fillip to genuine business models.
- Periodical reviews of every policy for modification.

## ❖ Detailed Minutes of the Meeting

### → Inaugural Session

- Opening and welcome address by Mr. S.B Dangayach.
- Lighting of the lamp by Mr. Kirit Naik, Dr. Narendra Bhatt, Mr. Bharat Jain

### Speakers:

1. Prof. Amit Garg- IIM Ahmedabad
2. Mr. S.B. Dangayach- Founder Trustee, Innovative Thought Forum

### Introductory address by Mr. S.B. Dangayach

- Need to develop a positive nexus between development and environmental betterment.
- The 19th and 20th century were led by development that neglected the environment. However, now with environmental regulations and laws in place, there lies a big scope of environmentally positive growth.
- There is no dearth of policies in India, the main challenge is their proper implementation.
- Development of a holistic approach towards the nexus between energy, environment, development, health, etc.

### Introductory address by Prof. Amit Garg

- Objective to deepen the existing policies whilst identifying policy gaps for achieving Net Zero emissions for Gujarat.
- Can be done with the help of Kaya Identity for Gujarat.
- Mapping of key energy policies at the state and national level is being done to help achieve the targets.
- Nuclear energy is a part of the solution towards NZ 2070. It has to be appropriately included.

### → Session One: Renewable Energy Development in Gujarat

### Speakers:

1. Mr. Divyesh Desai (Session Coordinator)- Visiting Faculty, IIM-Ahmedabad
2. Mr. Vinod Kala- Founder, Emergent Ventures India
3. Mr. Jami Hossain- Vice President and Technical Chair, World Wind Energy Association
4. Mr. S.V. Jaltare- Former Director, MSEDCL

### Introductory address by Mr. Divyesh Desai (Session Coordinator)

- There has been consistent focus and effort by the government to make India a low carbon economy.
- This move from fossil fuels to clean energy is a huge and demanding challenge for the government as well as for industries.

- Hence, the need of the hour is to improve dialogue between these two stakeholders to become a cleaner economy as soon as possible.
- Need to keep innovating and creating new solutions to achieve cost effective RE growth.

▪ **Suggested Policy Recommendation(s):**

1. Enhance dialogue between government and industries for achieving net zero targets.

**Discussion by Mr. Vinod Kala**

- Economic viability of energy transition to renewable sources has always been in question.
- Cost of renewable energy generation has been getting lower and will continue to do so.
- Energy storage costs have been rising recently but are projected to go down as well with increased usage.
- Upcoming Sodium-ion batteries will be even cheaper and bring costs further down.
- Industries should look positively towards obtaining renewable energy and feel confident that the cost curve will definitely decline.
- Need to look at businesses more creatively and view RE as an additional service provided by you to the customers.
- Industrial consumers are charged more to subsidize retail consumers. Industries are already paying tax but then they also end up paying cross subsidy surcharge or open access charge.
- Subsidies given to installation companies and not to consumers. Subsidy companies' money from the government is pending so they stop installing more.
- Gujarat's renewable energy portfolio is very ideal to meet its needs.
- Economic viability of cleaner energy needs to be focused on more deeply.
- Utility charges may seem high at first but are easy to recover in the long run through cross subsidizing.
- Lithium ion has become the cheapest storage source lately. These batteries can last for 7000-10000 cycles for whole life. The depth of discharge up to 90% in them.
- There needs to be increased focus on usage of renewable energy for creating green hydrogen, running electric vehicles and energy storage.
- A reasonable open access charge (Rs. 1KWh) to utilities can lower down the scale and additional services.

▪ **Suggested Policy Recommendation(s):**

1. Financial hurdles to production and access to RE are plentiful at all levels; subsidy challenges, high battery costs, cross subsidy and open access charge and storage costs. There needs to be streamlining and coordination between these different charges to reduce the burden on industries.

**Discussion by Mr. S.V. Jaltare**

- The installed capacity of RE generation is 25 % of total installed capacity of generation in the State of

Maharashtra. However during peak load period, the contribution of RE sources is only 3-6 % in catering towards the demand. On the contrary, during lean load period, RE contribution is around 21-26 %. Hence the electricity grid has stability issues and technical challenges of absorbing RE power of uncertain nature.

- Maharashtra has nearly 41 lakhs of consumers and a load ranging from 3 HP to 20 HP. Measuring the electricity utilized by agriculture is a stupendous task and also a very costly affair. Further, the accuracy of the reading is a big question.
- Gujarat is taking power to the tune of 7000 MW from the Central Grid. The deviation from schedule attracts heavy penalties. For controlling and reducing deviation, installation of Battery Energy Storage System ( BESS) can be a pragmatic option.
- It would also be beneficial for giant manufacturing hubs to have energy storage supply solutions.
- Agricultural consumption of energy is difficult to measure. But anything that cannot be measured cannot be controlled. Hence centralized measurement on AG separated feeders or Distribution Transformer level is an optimal solution.
- Survival of micro grids is a big question as without a common grid we can't have common cost & price. Hence the need for a centralized grid can't be ruled out to ensure centralized pricing.
- It is estimated that a 100 MW plant will need Rs. 1000 crore investment for Battery and Energy Storage system.
- The costs of Battery and Energy Storage systems are projected to come down from \$151 per KW/hr to \$50 by 2030, however, it needs to be much quicker for positive industry results.
  - **Suggested Policy Recommendation(s):**
- 1. A balance needs to be maintained between decentralized and centralized grid usage in the country by deepening and integrating both wherever possible; Decentralized grids can ensure energy efficiency, however they are difficult to measure for cost estimation, whereas, centralized grid ensures proper costing but leads to energy leakages.

#### Discussion by Mr. Jami Hossain

- Wind power potential of India was earlier estimated at 45 GW for the whole country but now new estimates by National Institute of Wind Energy (NIWE) peg it at 600 GW and in Gujarat at around 1500 GW. However, other assessments (LBNL/ Hossain 2011) have come up with higher estimates
- Moreover, offshore Wind energy potential is estimated at 35 GW for Gujarat.
- The most recent development in the field is solar-wind hybridization. This is a great model for Gujarat as there is high potential for solar based generation in the daytime and abundant coastal winds at night time. Hence, it helps in increasing the plant load factor when a Wind-Solar hybrid model is used. Hybrid models are also possible with other sources of energy such as biomass
- Currently projects are set up under reverse auction regime, while earlier a system of Feed-in Tariffs was followed. Feed-in tariffs differed across the states, making it possible for a balanced RE development across India. However, under reverse auctions, a balanced development is challenging.



- Hybridization concepts such as Round the clock power, Peak power, Wind solar- battery storage and energy storage need to be studied deeply to create new policies for future development..
- It is clear that renewable energy can meet almost 80% of power requirements. If the operation of thermal power plants is flexible, much higher renewable energy components can be integrated into the power system.
- Size of the wind turbines has been increasing in recent times. However, Small wind turbines, i.e., less than 1MW are also needed to come up for micro grid level projects with appropriate policy measures. These can be used for rural electrification or a relatively smaller captive C&I segment. .
- Smaller vertical rooftop wind turbines (like rooftop solar) should be explored for further development.
- Individuals are only allowed to have one wind turbine as the government does not want thermal power plants to become defunct NPAs. Hence, TPPs have been given 10-15 years to recover its costs so that the move to renewable energy can be smoother.
- Cooking energy needs can be met by hydrogen.
- Stand-alone wind turbines that only generate hydrogen are under development in Europe.

▪ **Suggested Policy Recommendation(s):**

1. The RE market is constantly developing new technologies such as wind-solar hybridization, small wind turbines for micro grid integration, clean cooking energy by using hydrogen, etc. Policymakers need to work alongside these technical advancements to create appropriate policy measures to guide the growth of new technologies.

**General Discussion Points from the Session**

- Bioenergy is not treated equal to other renewable energy resources. There needs to be a stronger market for bioenergy sources like liquid slurry.
- Fertilizer usage for bioenergy gives best results
- Bioenergy missions should be structured with different ministries coming together like Agri, power, etc. A road map needs to be developed for this utilization of bioenergy.
- Needs to be a better collection of biomass feedstock to generate more bioenergy, ethanol and green chemicals. However, the biogas programme is not properly recognized by the Agriculture Ministry and hence faces immense challenges.
- There needs to be increased focus on the demand side as 24x7 power is not demanded by industries, most are 12x7.
- Renewable Purchase Obligation (RPO) is only applicable on thermal power plants. It needs to be expanded to other areas like industry, transportation, pharmaceuticals, etc.

▪ **Suggested Policy Recommendation(s):**

1. There exists a space to create a policy that can provide decentralized power access for businesses at lower costs since most of them can run with 12x7 power supply.



2. There should be an appointed nodal agency that gives training for the implementation of new technical RE factors along with domain experts.

→ **Session Two: Emerging Technologies and Policies**

**Speakers:**

1. Mr. Kirit Naik (Session Coordinator)- Energy Expert and Former Director, Centre for Fuel Studies and Research
2. Mr. Rajan Rawal- Professor, CEPT Uni. and Senior Advisor CARBSE at CEPT Research and Development Foundation.
3. Mr. Pankaj Patel- CEO, Abellon
4. Mr. Anupam Jalote- Former CEO, iCreate
5. Mr Pankaj Pujara- Executive Director, GACL

**Discussion by Mr. Kirit Naik**

- For years humankind has been using much more energy in the form of fossil fuels than it is capable of regenerating. Hence, alternative green-regenerative resources need to be produced at a reasonable cost.
- GOI's goal is to make India a Green Hydrogen hub by producing 5 million metric tonnes per annum by 2030.
- Key elements of the hydrogen infrastructure are: points of production of Power-Hydrogen, Storage of Power-Hydrogen, transmission & distribution systems, end use options and refueling station networks.
- The biggest challenge is deciding who will bear the costs of Green Hydrogen?
- Several upcoming technologies can help solve these challenges such as one being done by SunHydrogen Inc., where they produce renewable hydrogen using sunlight and water using panels that house multiple hydrogen generators using nanoparticle-based green hydrogen technology. If this technology achieves commercial success, it will do the work of two elements of the Green Hydrogen value chain (Power Generation and hydrogen production via electrolysis) and hence bring down the total capital cost requirement across the whole value chain.
- Looking at the total investment required across the value chain, if 5 MMMTA green hydrogen production were to be achieved by 2030, it would necessitate average capital expenditure of roughly Rs. 31250-Rs. 36458 Crores month after month for the next ninety six months.
- H2One Station Unit made by Toshiba as a one container model for Hydrogen Filling Stations for FCEV (Fuel Cell Electric Vehicle).
- Need for investment in GH2 and electrolyser manufacturing in india. It is said that demineralized water is needed as input to electrolysers. Capital cost of DM Water systems for above capacity needs to be added to the whole value chain cost.
- Transmission and conversion losses between AC and DC power need to be reduced for Green Hydrogen.
- US Department of Energy, Las Vegas Valley Water District, and Proton Energy Systems, the Center for

Energy Research developed a refueling station for renewable hydrogen that was powered by solar energy.

- H2One Station Unit made by Toshiba as a one container model.
- When electricity is produced using methane (natural gas or biogas) as a feedstock in the high-temperature fuel cell, additional hydrogen is produced within the fuel cell stack leading to a hydrogen-rich stream of gas leaving the fuel cell unit. Thus, 125 kilograms per day of hydrogen can be produced along with an electrical output of 250 kW, based on over 8,500 hours of system testing and a “pressure swing adsorption” (PSA) process for hydrogen separation.
- Recycled mixed paper waste to produce “greener than green” hydrogen.

▪ **Suggested Policy Recommendation(s):**

1. Current costs of Green Hydrogen production in India are very high. Government needs to focus on attracting investments in GH<sub>2</sub> and electrolyser manufacturing. This can be done in integration with several new technical advancements (such as H2One Station, PSA process, etc.) for producing GH<sub>2</sub> economically.

**Discussion by Mr. Pankaj Pujara**

- The current challenges with Green Hydrogen lie with its production, distribution, consumption pattern, distribution network, regulatory framework and costs.
- Generating Green Hydrogen by electrolysis of water requires about 55 kwh/kg, which is about Rs. 440/kg @ Rs 8/kwh (Rs 110/kg @ Rs 2/kwh) at generation end. The affordable price for Green Hydrogen is Rs.100 – 150/kg. at users’ end.
- The market price of Compressed Hydrogen from Chlor-alkali plants is 200-250/kg plus transportation cost of about Rs.80 – 100 / kg within 50 – 100 km. The generation is decentralized.
- This Hydrogen can be used for Kick-starting Green Hydrogen Economy. By incentivizing chlor-alkali sector for use of Green power to maximum extent will turn this Hydrogen into Green Hydrogen, hence, saving investment on new Green Hydrogen installations
- This hydrogen can be used in the mobility sector and also at construction/mining sites.
- Since hydrogen produced in chlor-alkali plants is generated through electrolysis of water (mixed with some common salt), this hydrogen can be considered green to the extent the power used for the electrolysis is renewable.
- This will reduce (a) the cost of green hydrogen drastically (b) save on huge capital costs being incurred on installing new electrolysers for generating Green Hydrogen (c) save a lot of time, since electrolysers in chlor-alkali plants are already operative all over India (65% in Gujarat), many of which are already operating partially on renewable energy and (d) make Green Hydrogen readily available for various applications in mobility (cars, buses, trucks and rail), at construction sites & at mining sites replacing diesel powered equipment.

▪ **Suggested Policy Recommendation(s):**

1. Creating a policy document that highlights the scope for usage of Chlor-alkali produced GH<sub>2</sub> within the

mobility, construction and mining sectors.

#### Discussion by Mr. Rajan Rawal

- Key solution to reaching Net Zero emissions is to analyze how to reduce our consumption rather than how to generate more power and energy.
- We need to focus on producing technology that utilizes less resources.
- Energy should be studied from both operational and embedded energy perspectives.
- The Amended Energy Conservation Act 2001 gave birth to the Bureau of Energy Efficiency (BEE).
- BEE produced a code on Energy Efficient buildings, called ECBC and ENS. But the market driven green building rating programs that are voluntary in nature led to further greenwashing in the sector as these ratings are usually limited on paper for a market push to sell them at a premium. ECBC and ENS should be implemented at the state level.
- The building sector has several custodians such as MoHUA at the national level and ULBs at the local level, this leads to a lot of confusion regarding whose responsibility the building is.
- There is no real accountability or check on the actual construction of the building with green practices in place.
- Green building and urban energy efficiency needs to be managed at mission mode for at least 5 years before being given to any ministry. There is also a lack of a Department of Energy at the National level, there is only a ministry that deals with the topic.
- Should be increased focus on creating an agency or a department that tackles the demand side of energy in India.
- The ECBC Code exists but its implementation is very improper as there are no checks in place to verify adherence to the Code. Hence, there exists an implementation gap.
- Good step forward would be to reduce the carbon intensity of steel, cement, bricks, etc., to have emission reduction at the root itself rather than attempting to make new concepts for 'green buildings'. Hence, if the govt is considering policies it should be for sourcing of green building materials.

#### ▪ Suggested Policy Recommendation(s):

1. There exists a severe lack of accountability and checks and balances within the construction sector. Lack of implementation of building code stems from authority confusion that needs to be tackled as the building sector has several custodians such as MoHUA at the national level and ULBs at the local level.
2. There exists a space for the creation of a Department of Energy at the National level or a Department to tackle the demand side of energy in India.

#### Discussion by Mr. Anupam Jalote

- There needs to be an effort to produce energy efficient Electric Vehicles, i.e., usage of renewable energy in charging and producing EVs. EVs can become 2x cleaner when recharged with RE.
- EVs are most efficient at a certain RPM. The new switch electric motors used in HVACs are very stable.

- Variable frequency drive useful for energy efficiency remains the same despite low RPM
- Usage of EV buses by states saves 8rs per/km.
- To grow energy storage solutions there should be an availability of appropriate technology at appropriate price points.
- A good area to look into are Aluminum air batteries (produced in Israel) which are not stable yet but can definitely be improved upon for stability.
- Hydrogen should not just be automotive fuel. It is a brilliant energy storage reserve and its alternative uses should also be explored.

▪ **Suggested Policy Recommendation(s):**

1. A broader roadmap for EVs can be drawn up which suggests measures on recharging EVs with renewable energy to maximize its clean energy potential.

**Discussion by Mr. Pankaj Patel**

- Need of the hour is to focus on developing a circular economy model for India.
- At the current rate, almost 60% of all things produced need to be recycled in order to achieve Net Zero goals. Hence, there lie only two options with us, i.e., reduce our consumption or increase our recycling potential.
- Social infrastructure needs to be revisited to analyze and stop environmental leakages.
- Fused materials such as in phones need better understanding to ensure most efficient recycling practices with long term environmental viability.
- We need a comprehensive policy for Gujarat to harness all its renewable energy potential, even from recycled sources.
- Currently, the same REC is given for 1 MW of energy used from any renewable source. However, there should be different REC values attached to different sources of RE as some practices end up negating emission effects more than others.
- For eg., the REC given for Solar and Bioenergy is the same, even though direct sourcing of waste by companies to produce bioenergy prevents waste from ending up in landfills and releasing methane. Hence, double benefits to the environment are seen in such scenarios.
- The land use plan in Gujarat needs improvement. It should go beyond just agriculture and buildings.
- Introduction of new clean fuel supply to street vendors such as tea shops, sweet shops, etc., through RE sources like biomass pellets will be a huge step towards less fossil fuel consumption.
- Bamboo forests should be grown and promoted as they possess a lot of potential for bioenergy. However, this development will take 2-4 more years to become popular. They can also be made highly sustainable by using greywater for irrigation as these are non-consumption plants.

▪ **Suggested Policy Recommendation(s):**

1. Every state should create an in-depth land use plan which includes exploration of RE positive spaces such as surface mining of bioenergy, solar parks etc.
2. Need of the hour is to focus greatly on a circular economy model for India. Recycling of materials and intensive WTE plans are crucial for the Net-Zero mission.

→ **Session Three: Natural Resource Management**

**Speakers:**

1. Prof. Tushaar Shah (Session Coordinator)- Emeritus Professor, IRMA
2. Mr. D.J. Yadav- Director & CEO, Arvind Envisol Ltd
3. Mr. Shawahiq Siddiqui- Founder, IELO

**Introductory Address by Mr. Tushaar Shah**

- Opportunities for change in water, energy, food and environment disciplines
- There exist a thick relationship between these disciplines and Gujarat is the best example for Water-Energy-Food-Environment Nexus
- Practical and implementable things that can be done to bring change in this nexus are to be looked upon.

**Discussion by Prof. Tushaar Shah:**

- Gujarat is by far the oldest example for a gridlock between energy and water. A bulk of irrigated land depends on Groundwater which requires pumping where water-energy nexus comes into action
- 20 lacs tube wells 15.5 lakhs are metered tube wells having by monthly bills for which farmers are charged at 60 paisa/unit
- 50000 unmetered tube wells use as much energy as 1.5 million metered tube wells.
- According to the CAG report 2016, the average kWh used for the metered tube wells was 7100 units and 25515 units for unmetered tube wells. The avg subsidy for metered connection was 13600 rupees/year and for unmetered connection was 1,77,741 rupees/year.
- The average subsidy per unit for metered connection was 1.94 rupees and 6.97 rupees for unmetered connection.
- These unmetered tube-wells are a dead weight on Gujarat's economy. Need for unmetered tube wells to be metered is a challenge for the Water, Groundwater and Energy sector.
- In case of flat tariff connections, the connection between groundwater scarcity and energy cost gets snapped.
- 2/3rd tubewell connections in Gujarat are metered making it better than other states.
- The SKY scheme includes only 4500 solar tube wells, which are connected to the grid; 35000 are still off-grid.

- Saving energy in irrigation and selling more of it has emerged as an attractive livelihood option. 90% farmers who were first buyers are now net sellers.
- The Surya Urja Rooftop Yojana-Gujarat (SURYA-Gujarat) gives Urban-rich 30% capital subsidy and freedom from paying 7 rupees/unit for 7000 units/year. If the same policy is applied for the SKY scheme it can lead to flat tariff connections will solarize and get metered and the metered tube well owners would give up subsidy and start selling energy.
- Single policy recommendation for Suryashakti Kisan Yojana (SKY) and Surya Urja Rooftop Yojana-Gujarat (SURYA-Gujarat) in Gujarat will help harness water energy nexus to max efficiency.

▪ **Suggested Policy Recommendation(s):**

1. An action plan is needed to achieve complete metering of all tube-wells to reduce their dead weight on Gujarat's economy.
2. Increase focus on hybrid policies such as solar powered tube wells with micro irrigation facilities that can help generate more electricity whilst using less water resources.

**Discussion by Mr. D.J. Yadav:**

- One of the major issues faced by industries in renewable energy is the definition of group-captive power plants.
- Currently the industries can put only 50% of their contract demand equivalent amount of renewable power capacity, which should be removed.
- Implementation of banking charges on amount of electricity generated through renewable assets should be logical
- Consistency of the policy and alignment of Central and State government policy are the key to success.
- Central government has defined that banking charges should be given for one month and charges can be taken but the amount of charges to be taken is left with local bodies is the main issue faced by industries
- Three segments of water: Industry, Agriculture and Sewage. The low lying fruit and high potential area is the sewage water.
- There is a need to treat 70% of sewage water in India, which remains untreated and spoils the good water and soil.
- The high court case against the ahmedabad industries lead to stopping of discharging industry effluents in sewage water which makes the treatment of sewage water not feasible.
- The industries require greywater; thus untreated sewage water can be directly given to them free of cost which can lead to a lesser cost burden for Urban Local Bodies (ULBs).
- By supplying sewage water to industries, treatment cost, load on sewage network and energy cost on pumping can be reduced.
- Packaged Sewage Treatment Plants: FRP tanks that can be installed underground in Gardens can save transportation and treatment cost of sewage water and save fresh water being used for the purpose.



- Packaged sewage treatment plants should be brought into use. It will help in sewage water treatment at rural or micro level usage. (This will be a big cost saver for the ULBs both and pumping and treatment cost. The sewage line capital expenses can be avoided for new areas and for old areas where a sewage line exists the capacity of lines will be released to avoid overflowing. In addition this will save fresh water being used for gardening, washing and construction purposes.
- Proposal for industries to directly treat sewage as it will lessen the costs of ULBs and provide greywater much needed by industries. An auction system can be put into place.

Untreated sewage shall be offered to Industry at no cost as ULBs will save the complete pumping and treatment cost and their lines capacities will be released. In addition their fresh water demand will reduce. The treated sewage water shall be offered at cost to Industries to save fresh water.

▪ **Suggested Policy Recommendation(s):**

1. Streamlining of policies at national, state and local levels is needed to make Renewable Energy production, financing and access easier for industries.
2. Sewage water treatment and utilization policy needs to be developed efficiently along with a possible suctioning system of sewage water to industries for its treatment and subsequent usage.

**Discussion by Mr. Shawahiq Siddiqui:**

- For Agri-Forestry, 3 verticals to be looked for in a good policy are Motivational aspect, Enabling aspect and Implementation aspect.
- Comprehensive Water data: Where is the water, Quantity, and Quality of water, and what needs to be done to access and use this water is of utmost importance.
- Policy for water in Gujarat mainly focuses on motivational and enabling aspects
- Comprehensive evaluation of all policies across sectors on implementation of strategies is recommended
- Preparation needs to be done to claim more water based on increasing socio-economic needs for 2024 Narmada water review.
- There is no clause in favor of Gujarat in Narmada water clause to increase the water supply based on prior use rights of river water.
- Gujarat waste water policy (2018) has no pricing formula for wastewater, lacks information about investors and buyers, and lacks infrastructure for implementing the policy.
- There is a need for rationality in terms of Pricing and Implementability to strengthen the urban wastewater policy in Gujarat.
- Concept of Zero liquid discharge (ZLD) should be implemented in cities.
- There has been no attempt to make scientific studies of West flowing rivers of India which can ensure maximum growth through E-flow assessment. This would also make environmental clearances easier.
- Generation of green belts, strip forest, gauchar forest and wasteland forest need to be promoted.



- The PM has pledged to restore 26 million hectares of land by 2030. Linkage of this Land restoration plan with wastewater management is to be contemplated.
- Money lies with CAMPA and state forest agencies. This money can be used to make forests across the state in any topography.
- Need for a Comprehensive review of all the NRM policies in Gujarat to strengthen their implementable aspects (finance, monitoring, results, incentives). As of now policies are theoretical.
- Creating a concept of (cities as ) wastewater catchments. 80% of all freshwater supplied to cities must return back to productive/economic uses and be incentivized. Need for revising wastewater policy of Gujarat on these lines.
- Preparing for negotiations for the share of water from Narmada for Gujarat.
- Need for the state's green mission, agro-forestry- land degradation targets to be linked with wastewater reuse targets and certification system put in place.
  - **Suggested Policy Recommendation(s):**
    1. Carrying out a comprehensive water data drive to understand: where is water present, quantity, and quality of water, and what needs to be done to access and use this water.
    2. Amendments are needed within Gujarat wastewater policy (2018) as it has no pricing formula for wastewater, lacks information about investors and buyers, and lacks infrastructure for implementing the policy.

#### **General Discussion Points from the Session**

- Urban local bodies can't give away sewage for free as it is a public good. An auctioning system can be put into place for companies to purchase sewage.
- After being treated, the industrial wastewater is disposed into the ultimate disposal locations with no further use. Hence, in order to make use of the resource, further wastewater treatment can be provided to optimize the potential for recycling and reusing in the industrial cluster while lowering the need for freshwater (Gujarat has Common Effluent Treatment Plants at 35 places and created 850 MLD treatment capacity with required additional treatment, the treated waste water can be recycled and reused).
- Optimizing use of irrigation practices, water and energy in accordance to the amount of water requirement of crops.
- Identifying multiple Groundwater recharging opportunities for maintaining groundwater reserves.
- Establishing an effective and continuous groundwater monitoring will aid in guarding quantity and quality of groundwater.
- Increasing plantation drives on the banks or shoal of rivers/rivulets/tributaries to minimize the soil erosion due to meandering paths as well as fast-movement of water in the water bodies.

**Suggested Policy Recommendation:**

- Industrial Wastewater treatment Policy needs to be redefined to provide an inevitable scope of identifying the possibilities of recycling and reusing the treated wastewater in the industrial clusters.
  - **Suggested Policy Recommendation(s):**
    1. Water footprinting of different crops is needed to promote sustainable agriculture and responsible water consumption.
    2. Water accounting should be focused on in different areas like agriculture, local body usage, industry usage, etc. across the state to have updated real figures for creating efficient policies.

→ **Session Four: Integrating Climate Change Policies with Health and LiFE Mission**

**Speakers:**

1. Mr. S.B. Dangayach (Session Coordinator)- Founder Trustee, Innovative Thought Forum
2. Dr. Narendra S. Bhatt- Consultant Ayurveda, Research and Industry

**Discussion by Mr. S.B. Dangayach**

- The term “Vasudhaiva kutumbakam” stands for One earth, One family, One future which indicates all of us being interconnected and responsible for all of our actions.
- The profit has to be ethical taking into account the environment, the universe and self.
- Consumerism is to be seen as deliberate, well thought out and considerate consumption that is not polluting and harmful to the environment.
- The health sector needs to be looked at holistically through a combination of ethics, environment and economics.
- Resource management from the demand side holds key importance.
- The National Health Policy of 2017 is promotive, preventive, rehabilitative, palliative and curative in nature.
- Focus needs to be emphasized on emission free health practices like Yoga and Naturopathy as it is very healthy and does not lead to any emissions.
- Homeopathy is a complete green practice as it requires very less medicinal content, is energy efficient, healthy and eco-friendly.
- Homeopathy lacks attention and requires greater research and promotion. It is an all rounder sustainable practice for use in human health, animal health, agriculture (as crop enrichers), horticulture, floriculture, and aquaculture.
- Autonomous system and separate set of rules for revalidation of AYUSH for greater acceptance by people should be considered.
- To keep in line with the Bhopal Declaration, we should be focusing on integrative health systems for the

country i.e. Traditional practices + Allopathy.

- AYUSH has the right credentials for developing a no greenhouse gas emission system, climate friendly and climate resilient policies along with the well-being of people.

▪ **Suggested Policy Recommendation(s):**

1. Earnest implementation of National Health Policy 2017 to help reduce the carbon footprint of healthcare.
2. Creation of an autonomous body to revalidate new and repurposed AYUSH drugs in tune with individual knowledge systems whilst ensuring its safety and efficacy.

**Discussion by Dr. Narendra S. Bhatt**

- Ayurveda views all life in a cyclic form. Hence, promotes healthy consumption and a circular economy process.
- Lifestyle disorders have been on the rise due to increased work-life imbalance.
- Transportation, transformation and formation defines the complexity of human beings which needs to be studied deeper.
- The shifting of work hour to one hour prior will help in utilizing natural sunlight and conserve energy, whilst improving people's health and lifestyle practices by waking early.
- Ayurveda practices establishing balance between the physical attributes termed as Ahar, Vihar and Ausadhi.
- Deforestation has led to decreased and degraded availability of ayurvedic medicines
- There is a need for therapeutic relevance or application oriented standardization model for ayurvedic plants.
- A study on the effects of air conditioners on human bodies should be performed.
- The out of pocket medical costs of the country are pretty high at the moment. A paper on the economics aspect of ayurveda which can lead to reducing the medical cost to 5% can be taken up.
- Environmental policies should be developed by keeping in mind the impact they have on individuals in the region.
- We need to study how carbon footprint can be reduced with the right kind of policy with cohesiveness of various departments.
- Emissions from healthcare are given minimum attention as of now. Need of the hour is for: 1) Alternatives for Disposable items and recyclable packaging, 2) Encourage renewable energy for such infrastructure and 3) Zero energy emission from health equipment.

▪ **Suggested Policy Recommendation(s):**

1. Enhanced policies are needed for application-oriented standardization of ayurvedic and homeopathic plants for maximizing their efficiency and growth.

2. Zero emissions roadmap for the health sector through interventions like recyclable packaging, utilization of renewable energy in health setups, focus on ayurvedic medicines, etc.

→ **Concluding Session**

**Speakers:**

3. Prof. Amit Garg- IIM Ahmedabad
4. Mr. S.B. Dangayach- Founder Trustee, Innovative Thought Forum

**Concluding address by Prof. Vimal Mishra**

Thanking everyone for a variety of new learnings spread across all the sectors discussed. We can definitely develop several policy briefs with the help of these discussions. Climate mitigation is a long process hence we need to keep developing new ideas and technologies to keep achieving our targets quickly and efficiently.

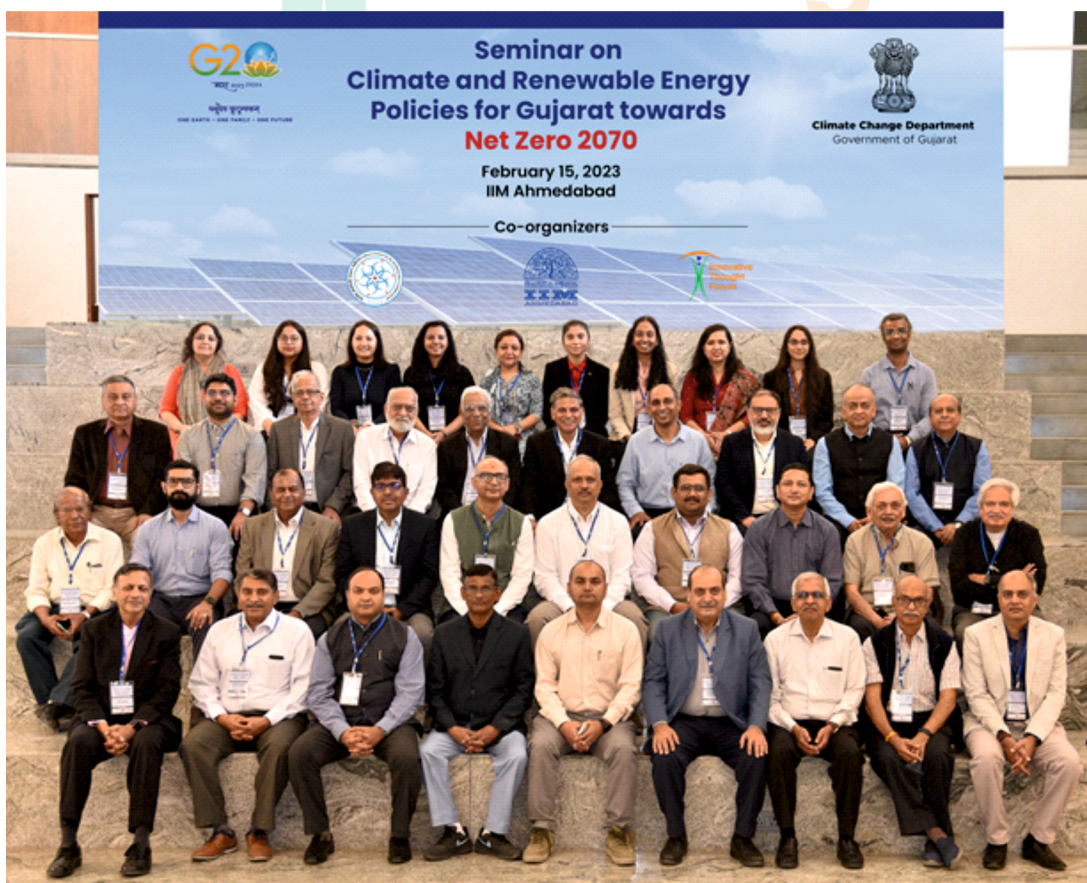
**Concluding address by Prof. Amit Garg**

Recapturing important and key takeaways for policy changes towards Net Zero Emissions in Gujarat.

**Concluding address Mr. S.B. Dangayach**

Thanks, and regards to all speakers and other participants for making the seminar successful through their fruitful discussion.

❖ **Group Photograph**





**Annexure- 1**

Sr. No.	Name	Affiliation	Speaker/ Attendee
1	Amit Garg	IIM Ahmedabad	Speaker
2	Anupam Jalote	iCreate	Speaker
3	Ariba Khan	CEPT University	Attendee
4	Bharat Jain	Gujarat Cleaner Production Centre	Attendee
5	Bhavya Pathak	CEPT University	Attendee
6	D.J. Yadav	Arvind Envisol Ltd	Speaker
7	Dhara Thakkar	IIM Ahmedabad	Attendee
8	Divya Arora	IIM Ahmedabad	Attendee
9	Divesh Desai	IIM Ahmedabad	Speaker
10	Gaurang Patel	JRK Group and IPA Gujarat	Attendee
11	Jami Hossain	World Wind Energy Association	Speaker
12	Jigar Shah	IIM Ahmedabad	Attendee
13	Jyoti Maheshwari	IIM Ahmedabad	Attendee
14	Karan Dangayach	Accura Tradelink Pvt Ltd	Attendee
15	Ketan Shah		Attendee
16	Kirit Naik	Centre for Fuel Studies and Research	Speaker
17	Kumar Shantanu Bharadwaj	Climate Change Dept, GoG	Attendee
18	Mukesh Bhandari	Firefly	Attendee
19	Namrata Ghosh	IIM Ahmedabad	Attendee
20	Narendra S. Bhatt	Ayurveda Consultant	Speaker
21	Nikhil Bhargava	GACL	Attendee
22	Pallavi Rachel George	IIM Ahmedabad	Attendee
23	Pankaj Patel	Abellon Clean Energy	Speaker
24	Pankaj Pujara	GACL	Speaker
25	Paresh M. Shah	SSNN Ltd.	Attendee
26	Rajan Rawal	CEPT University	Speaker
27	Rajesh Baldania	Climate Change Dept, GoG	Attendee
28	Ritwika Verma	IIM Ahmedabad	Attendee
29	Rutva Patel	IIM Ahmedabad	Attendee
30	S.B. Dangayach	Innovative Thought Forum	Speaker
31	S.V. Jaltare	MSEDCL	Speaker
32	Sanjay Kumar Jain	IIM Ahmedabad	Attendee
33	Sailesh Patwari	NEPL	Attendee
34	Shawahiq Siddiqui	IELO	Speaker
35	Shivang Swaminarayan	Homoeopathic Medical Association of India	Attendee
36	Sushant Sahoo	DRR & Climate Change, UNICEF	Attendee
37	Tushaar Shah	IRMA	Speaker
38	Varunesh Kumar	Veeral Controls Pvt Ltd	Attendee
39	Vidhee Avashia	IIM Ahmedabad	Attendee
40	Vimal Mishra	IIT Gandhinagar	Speaker
41	Vinod Kala	Emergent Ventures India	Speaker