



CAG

Citizen consumer and civic Action Group

CONFERENCE PROCEEDINGS REPORT

CONSUMER ENGAGEMENT IN THE ELECTRICITY SECTOR

29.11.2019 & 30.11.2019
HOTEL SAVERA, CHENNAI

Citizen consumer and civic Action Group (CAG) organised a national conference on 'Consumer engagement in the electricity sector' on 29.11.2019 and 30.11.2019.

This report is a summary of the conference proceedings. The sessions and discussions of the two-day conference have been recorded and are available on CAG's YouTube page.

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CONSUMER ENGAGEMENT IN THE ELECTRICITY SECTOR

BACKGROUND & INTRODUCTION TO THE NATIONAL CONFERENCE

Introduction

Citizen consumer and civic Action Group (CAG) Chennai, organised a national conference on “Consumer Engagement in the Electricity Sector” with a central focus on themes including (i) electricity governance, (ii) renewable energy and (iii) energy efficiency. The conference brought together distinguished speakers from across the country; each, at the helm of pertinent initiatives aimed at improving a range of aspects in the electricity sector including consumer participation, electricity markets, electricity governance, renewable energy, energy conservation, energy efficiency, and emerging technologies. While the first day of the conference was focused on understanding how consumers participate and engage in the electricity sector; the second day inquired into the future of consumer engagement in the electricity sector.

Background

The Indian electricity sector as we know it has been evolving with emerging technologies, enhanced governance mechanisms, and growing spaces for consumer engagement. Over the decades, significant structural reforms and policy changes have been driven by the Electricity Act 2003, with increased emphasis on consumer protection.

Apart from contributing to installed capacity, progress of electrification and quality of service, the structural reforms driven by the Act have largely influenced the patterns of electricity governance and participation it promotes thereof. As of today, the regulatory and institutional framework of the electricity sector largely supports an ecosystem that enables consumers to engage in the functioning of the sector. Developing technologies further strengthen the means for engagement. Yet, the quintessential question that we are posed with pertains to the extent to which consumers are able to effectively utilise the prevailing scope and means for engagement.

OBJECTIVES

This conference was convened with the principal objective of exploring the various ways in which the quality and quantity of consumer engagement can be enhanced. The conference further aimed (i) to initiate dialogue and exchange around approaches to consumer engagement across the states; (ii) to highlight the priorities, contributions and challenges in promoting renewable energy and emerging technologies in the electricity sector; and (iii) to reflect on the innovative role of various stakeholders in investing and formulating sustainable ways to engage in the sector.

The conference began with a welcome address by Mrs S. Saroja, Director, CAG and an introduction by Mr. K. Vishnu Mohan Rao, Senior Researcher, CAG who briefed the participants about the objective and agenda for the two-day conference. The sessions of the conference commenced after the Inaugural address, delivered by Mrs. M. Asia Mariam, I.A.S., Managing Director, Tamil Nadu Energy Development Agency (TEDA).

CAG's work in Tamil Nadu electricity sector

MRS S. SAROJA, DIRECTOR, CAG

Mrs. S. Saroja welcomed one and all to the two-day national conference and introduced CAG and its vision to protect the rights of citizens in consumer, civic and environmental issues. She provided an overview of CAG's work in the energy sector and highlighted the critical role the organisation has been playing in actively advocating for transparency and accountability in the power sector in TN. She spoke about the various CAG initiatives and its resulting accomplishments in ensuring reforms in the state's electricity sector. Key initiatives and relevant work highlighted include, association with the State Advisory Committee (SAC), involvement in the formulation of various policies, and facilitation of greater public participation and collaboration of stakeholders. Further, Mrs. Saroja enumerated the various efforts that have been made by CAG and its partners as part of 'Tamil Nadu Electricity Governance Initiative (TEGI)' including network building, research, information dissemination, outreach, advocacy, media engagement and capacity building. While speaking about having extended such efforts beyond TEGI, she drew attention to the objectives behind the efforts which entail ensuring environmental and social

sustainability of the energy sector. In conclusion, she remarked that it is essential to promote the use of sustainable sources for energy generation while ensuring equity and justice in access to energy, and stringent environment clearance procedures.



Introduction to the conference

MR. K.VISHNU MOHAN RAO, SENIOR RESEARCHER, CAG

Following Mrs. Saroja's overview of CAG and its presence in the TN electricity sector, Mr. Vishnu shed light on the organisation's commitment to promote good governance. He thanked the speakers and participants of the conference who have walked the path along with CAG on several counts, and introduced them to the key objective of the conference - "To understand how consumers participate and engage in the electricity sector". He envisaged that the two days of conference would present adequate opportunity to explore ways to enhance the quality and quantity of consumer engagement in the electricity sector. He then provided a glimpse of all the sessions lined up for the two days under broad themes of electricity governance, electricity markets, consumer participation, renewable energy, energy conservation, energy efficiency, and emerging technologies. He concluded by stating that the conference aimed to bring together various stakeholders in the electricity sector, working in different capacities to promote and facilitate good governance in the sector.

TEDA and its role in bridging gaps between stakeholders in the electricity sector

**MRS. M. ASIA MARIAM,
I.A.S.,
MANAGING DIRECTOR,
TEDA**



Dialogue around the introduction session was driven by the identified need to bridge the gap between consumers, discoms, regulators, and state and central governments. As a timely and valuable addition to this discussion, Mrs. M. Asia Mariam, I.A.S., Managing Director, Tamil Nadu Energy Development Agency (TEDA) delivered her inaugural address. She spoke at length about TEDA's mission to facilitate good governance in the sector and its role in bridging prevailing gaps between stakeholders. Her speech was informative and provided the audience with a comprehensive understanding of TEDA and its role. She added that TEDA promotes solar energy in the agricultural sector and encourages households to install rooftop solar. She further highlighted several initiatives and policy support extended by TEDA and listed details of select schemes promoting solar energy such as PM KUSUM and Phase II of grid connected rooftop solar programme. Mrs. Mariam, recorded that TEDA had successfully completed the Chief Minister's Solar Powered GreenHouse Scheme which aimed at constructing houses with solar powered lighting systems over a period of 5 years

from 2011-12 to 2015-16 in rural areas. She further affirmed that nearly 2 lakh 82 thousand houses benefited from the said scheme. She also spoke about an ongoing initiative to set up solar panels in government offices. She reflected that these were exciting times with significant focus on renewable energy and expressed her pleasure in being part of the conference and engaging with stakeholders working with similar goals. Mrs. Mariam signed off by thanking CAG for inviting her as the guest of honour for the National conference and appreciated the good work done by the organisation in creating awareness and building capacity among electricity consumers in TN.

On day 1 of the national conference, the first few sessions were on the theme - Electricity Governance. The sessions aimed to establish the need to encourage citizen/consumer engagement in the sector and explored various ways to improve the same.

¹ Ministry of New and Renewable Energy (MNRE) launched the Pradhan Mantri Kisan Urja Suraksha evem Utthan Mahabhiyan (KUSUM) Scheme for farmers for installation of solar pumps and grid connected solar and other renewable power plants in the country – In Agricultural sector, for the new KUSUM scheme 30% subsidy is given by MNRE, another 30% is given by state²

² MNRE provides subsidies for the solar energy generated through the roof top solar from domestic houses. In Phase II of the scheme MNRE, the Central Financial Assistance (CFA) has been restructured and higher CFA up to 40 % will be given for RTS systems up to 3 kW capacity.

I. ELECTRICITY GOVERNANCE

Governance involves interactions among structures, processes and institutions that determine how power is exercised, how decisions are taken, and how citizens or other stakeholders have their say.³ Governance refers to all the ways in which groups of people collectively make choices and the concept of good governance lays significant emphasis on citizens having a say in the choices made thereof. With the structural reforms of EA 2003 and independent state and central regulatory processes, the electricity sector in India provides capacities for citizens to 'have their say'. Such capacities include scope for consumers to represent their interests, to participate in the decision making process and to have access to grievance redressal mechanisms. However, despite such provisions, regulators and policy makers are not always able to take adequate measures to protect consumers' interests. And, there is always the concern that the governance mechanisms could be influenced by the utility so as to allow unnecessary costs and burdens to be passed on to consumers. Further, governance problems also occur when consumers are not informed or empowered enough to be sufficiently represented in planning, policy, regulation and grievance redressal mechanisms. The resulting lack of quality in representation and participation could lead to skewing consumer interests in favour of the utility assigned to state governments. Given the context, it is of paramount importance that informed citizens and civil society are built and empowered to 'have a say' and thereby promote good governance in the electricity sector.

In the first part of the morning session, ways to ensure better representation, participation and protection of consumer interests was widely discussed. Further, institutionalised consumer and CSO engagement was discussed in detail with initiatives and experiences from Rajasthan, Tamil Nadu and Uttar Pradesh.

I.1.Consumer Assistance Cells, CUTS

MR. ANURAG MISHRA, CUTS

The first session of the day was delivered by Mr. Anurag Mishra, who is a member of the Consumer Unity and Trust Society (CUTS), an organisation based in Jaipur, Rajasthan which was started in 1983 from a grassroot initiative. He introduced the 'Consumer Assistance Cells (CONASCs), a model for grassroot capacity development and improvement of service quality; and, elaborated on its role and functions within Rajasthan's electricity participation framework. He then gave an overview of the three-tiers of grievance redressal forums with insights from the Rajasthan context. Mr. Anurag Mishra spoke in detail about the Rajasthan experience with consumers and civil societies. He further briefed upon the CONASC model of work, training of its members, complaint handling and working with the distribution company (discom).

³ Plumptre, T & Graham J (1999), 'Governance And Good Governance International And Aboriginal Perspectives'. Institute On Governance.

He emphasised on the need to improve consumer participation in regulatory affairs, institutionalize consumer / CSO engagement, and enhance the grievance redressal ecosystem. Mr. Mishra concluded with defined goals for the way forward such as (i) building evidence for policy interventions, (ii) on the spot resolution of complaints, (iii) utilising existing grievance redressal mechanisms, and (iv) ensuring incorporation of technology.

I.2. Electricity Consumer Cells, CAG

MR. G.N. BHARATH RAM, CAG
MR. M.K. BALAJI, CAG

Following the Rajasthan experience, researchers from CAG shared the approach, insights and findings from their three-year journey with Electricity Consumer Cells - an initiative to empower Tamil Nadu electricity consumers by educating them about the various aspects of the electricity sector. Mr. G.N. Bharath Ram, researcher, CAG, presented about the outreach and capacity building programmes that were extended to seven districts in Tamil Nadu. He² recorded that over the years there has been increased awareness and interest towards electricity topics among consumers. Based on the various enquiries received at the ECCs, it was represented that consumers were increasingly interested in solar energy and especially, rooftop solar. He further unpacked the various kinds of complaints that were registered with ECCs and indicated that the major complaints in TN districts revolve around issues with power supply quality. Mr. Bharath then listed the various activities conducted for different consumer categories and showcased knowledge products made available by the cells, such as pamphlets, booklets, posters and newsletters.

In conclusion he added that information dissemination is the key to improving consumer awareness and encouraging consumer participation. Mr. Balaji.M.K, researcher, CAG then added to the presentation with insights from consumer awareness puppet shows and outreach sessions held in schools. He highlighted that the key is to begin with young adults and children as they provide a refreshing take on electricity topics and reflect an infectious inquisitiveness that can help develop a sustainable approach to interacting with consumers.

I.3. Electricity consumers and compliance, CEEW

MS. KANIKA BALANI, CEEW

Ms. Kanika Balani, Council on Energy, Environment and Water (CEEW), shared the Uttar Pradesh electricity experience and presented on consumer issues in the state's electricity sector. She introduced a study undertaken by CEEW on compliance levels and drivers of compliance in the electricity distribution sector in UP. She highlighted the findings of the study which indicate that (i) the problem of hard theft in UP appeared over stated as soft theft through MBC was identified as a major contributor to discoms' losses in UP; (ii) consumer compliance has a strong correlation with the compliance by utility, and (iii) diversity in social, economic, demographic, and political-capital endowments of various regions needs the Government to adopt tailored strategy. Following this, Ms. Balani spoke in detail about the sowbhagya scheme, its³ effectiveness, issues around electrification and other general findings such as lack of awareness and responsiveness. In conclusion, she stressed on the need for

consumer awareness, the pertinence of bridging the trust gap between discom and consumers, and the necessity to improve billing and payment infrastructure.

On state level initiatives to promote consumer engagement:

Although the three states appeared to face different complaints/concerns in their electricity sector, an inquiry into the status-quo and the nature of findings suggests largely similar recommendations and way forward. The researchers quipped on how they were essentially speaking about the same identified needs, only, in different languages. The exercise appeared to provide an opportunity to share and compare state level experiences around consumer awareness, protection, and participation in the electricity sector. The central discussions around the topic were focused on issues such as ensuring the sustainability of initiatives like CONASCs and ECCs; and further, securing² the discoms' buy-in for the same.

Following the broad discussions around consumer engagement in the sector, the subsequent sessions approached engagement from the perspectives of specific categories of consumers including agriculture, Micro, Small scale and Medium Enterprises (MSME) and residential. In addition to consumer categories, the theme was pursued from the markets and environment angle, as well.

I.4. Engaging agricultural consumers in the electricity sector

MR. CAUVERY DHANAPAL, TAMIL NADU FARMERS ASSOCIATION

Mr. Cauvery Dhanapal, President, Tamil Nadu Vivasaya Sangangalin Koottiyakkam, presented the much needed insights on the topic - 'Agriculture and electricity'. Through his speech, Mr. Dhanapal, not only painted a picture of agricultural consumers and their concerns around engaging in the electricity sector, but also touched upon a range of topics and issues including, energy-water-nexus, subsidies, the political and economic factors driving the subsidies, and solarisation of agriculture. He remarked that although INR 750 crores have been allocated towards providing free electricity to the agriculture sector, nearly 4 lakh agrarians are waiting for a new free electricity connection, as of today. He then listed the various issues and challenges of the seasonal employment such as fall in productivity, groundwater depletion, lack of government support, and dearth of interventions that could produce sustainable solutions for the sector. He said that in the light of the established fact that the agriculture sector is already struggling, solarisation in the sector would prove unsuccessful if farmers are not given adequate subsidy and warranty for solar. Overall, he emphasised on the need (i) to fasttrack facilitation of free electricity connections, (ii) to extend subsidies for solar installations and (iii) to provide energy efficient pump sets.

I.5. Micro, Small scale and Medium Enterprises (MSMEs) and electricity sector

MR. HINDUNATHAN, TANSTIA

The next session on micro, small scale and medium enterprises and the electricity sector was delivered by Mr. Hindunathan, a member of Tamil Nadu Small and Tiny Industries Association (TANSTIA). While Mr. Dhanapal focused on obstacles in incorporating solar energy in his sector, Mr. Hindunathan spoke about the advantages of shifting to renewable energy. He cited that MSMEs are engaged in producing and manufacturing electrical components for numerous commercial and household electrical equipment; and subsequently highlighted that with the advent of renewable energy, MSMEs benefit from increased employment opportunities as they are also being involved in producing components for rooftop solar and windmills. He recorded that the TN government is encouraging MSMEs by providing continuous electricity and subsidising solar equipment. He further highlighted the wind energy capacity available to TN (one of the top five states in export) and the subsidies given by the government for the production of electricity through wind mills. In conclusion, Mr. Hindunathan reflected that MSMEs will play a key role in the electricity sector, especially in renewable energy transition and further envisaged a future of economic growth through promotion of the 'Make in India' initiative.

While the two sessions had contrasting approaches to the respective consumer category's engagement in the electricity sector, they both spoke about renewable energy transition in their respective sector. Apart from highlighting the various benefits and obstacles to such a transition, both of them

drew attention to the need for focused and targeted implementation of government schemes and initiatives.

I.6. Electricity markets in India - impact on consumers of Tamil Nadu

MS. RASIIKA ATHWALE, RAP

Following the accounts of specific consumer categories, Ms. Rasika Athwale, Regulatory Assistance Project (RAP) took to presenting the benefits of the wholesale electricity markets for all kinds of electricity consumers in TN. She began with an emphasis on the need for the state to rethink its energy policy and posed a fundamental question around the logic behind TN's approach of catering to the energy demands of its domestic consumers alone. She stated that TN has a natural advantage, especially with respect to renewable energy sources and that the state policy makers need to exploit this further and reach out to a larger consumer base beyond the state's boundaries. She then spoke about how consumers would benefit from wholesale markets through the (i) comparison shopping that it allows, (ii) low-cost and better quality that it guarantees and finally, (iii) the enhanced decision making that it enables. She reflected that the future of consumer engagement in the electricity sector needs to be driven by the 3M approach - more markets, more transparency and more active consumers. In summary, Ms. Rashika spoke about the importance of exploiting the state's comparative advantage, targeting efforts to reform policies both at the national and state level, promoting transparency in pricing and empowering consumers by making choices available for them.

I.7. Role of electricity bills in improved decision making

MS. PAVITHRA RAMESH, CAG

In keeping with the theme of empowering consumers, Ms. Pavithra Ramesh, CAG presented on the role of electricity bills in enhancing consumer participation and improving their decision making. She began by highlighting the prevailing scope for participation as supported by the provisions of the Electricity Act, 2003 (EA 2003) and further emphasised there is a strong need to effectively utilise the same. She further supported the narrative with an analysis of consumer participation trends in Tamil Nadu and highlighted findings that indicate reduced participation in the sector between 2003 and 2017, especially in the tariff setting process. Given the need to improve consumer participation, Ms. Pavithra introduced electricity bill as a tool for governance, engagement and communication; and further reflected that the bill is a key instrument for regular two-way communication between distribution companies (discoms) and consumers. She concluded by stating that in India, at present, these bills present an opportunity to shape consumer understanding promote better communication, enhance participatory governance and enable improved decision making.

I.8. Understanding the energy-environment nexus - Why should citizens involve themselves?

MS. SHARADHA NARAYANAN, CAG.

As the last topic in the theme of electricity governance, the most pertinent energy-environment nexus and the need for consumer

engagement in the space was presented by Ms. Sharadha Narayanan, CAG. She brought out the various adverse effects of thermal power generation on the environment and ecosystem. She drew attention to (i) the tremendous air pollution caused by the thermal power plants (TPPs) which has resulted in the death of 12,00,000 people, so far and (ii) the extensive use of groundwater for TPPs which could otherwise be used by lakhs of communities (Mettur dam alone has been estimated to utilise water that can be consumed by 6,91,585 consumers). Drawing from the adverse effects of TPPs, Ms. Sharadha elaborated on the interlinkages between reduced energy consumption, conservation of water, protection of land and maintenance of air quality. She concluded that consumers need to go beyond using alternative, renewable sources of energy and focus on making behavioural changes and taking conscious decisions towards reducing their consumption patterns.

PANEL DISCUSSION ON ELECTRICITY GOVERNANCE:



At the end of the sessions on electricity governance, a discussion was conducted whereby the speakers came forward to answer questions related to all that had been presented. The discussions were largely an inquiry into the various concerns raised through the course of the day, ranging from the need to improve the

quality of infrastructure, the increasing discom losses, declining trends in consumer participation to gaps in implementation of government schemes and the need to rethink energy policy in line with changing times. The resulting consensus identified enhanced consumer engagement as a means to stimulate reforms in the electricity sector. Finally, various recommendations to promote consumer engagement were discussed. This included (i) increasing consumer awareness, (ii) encouraging formalised institutional support to facilitate information dissemination, network building, training and capacity building, research, and advocacy, (iii) promoting transparency, and (iv) developing initiatives to further support the transition in the sector both in terms of renewable energy and electricity markets.

II. RENEWABLE ENERGY

The electricity sector has been facing several issues over the past few decades. The prominent ones include the widening gap between demand and supply of electricity, and the adverse effects that the conventional sources of energy have on the environment. At the wake of global climate emergency and its worsening effects on the environment and the ecosystem, opting for renewable sources to meet our ever-increasing energy demand has become the need of the hour. In addition to reducing the impact of energy generation on the environment, renewable sources of energy could provide for a range of economic and social benefits including energy access, energy security, price stability, employment opportunities,⁴ economic growth and sustainable development. Given the context, transitioning to renewable sources of energy can be seen as a rather inevitable move for the electricity sector, world over.

Tamil Nadu, was listed among the top nine renewable energy markets in the world.⁵ Blessed with various forms of renewable energy sources viz., Wind, Solar, Biomass, Biogas, Small Hydro, etc. Tamil Nadu can be seen taking measures to promote renewable energy both in terms of policy and capacity addition. As of today, renewables alone constitute 40% of the installed capacity in TN. The State has a total solar installed capacity of 2,725 MW and has the highest wind power capacity in the country with an installed capacity of 8,468 MW.⁶

Although TN is one of the leading renewable energy producers in the country, the state faces several barriers in sustaining its momentum in renewable energy adoption. This includes poor financial health of the state discom, slowing wind generation, payment delays in the regional wind market, curtailment, grid integration, implementation gaps in the solar energy policy 2012 and certain restrictive policies on net-metering that appear to hinder the adoption of rooftop solar. At this juncture, it is crucial for the renewable energy sector to focus on distributed energy generation and exploit the scope for consumers to become prosumers and play a vital role in promoting the sector and shaping the state's energy mix.

The sessions lined up for the second half of the day focused mainly on the various sources of renewable energy, the case for renewable energy transition and the role of consumers in shaping the future of the renewable energy sector.

II.1. Role of prosumers in promoting a vibrant and sustainable electricity sector

MR. TOINE VAN MEGEN, AVC

Mr. Toine Van Megen, Auroville Consulting (AVC) began by introducing the concept of prosumers i.e., consumers who take to producing. He spoke about the need for distributed energy generation, solar energy, and energy storage solutions.

⁴ IRENA (2016), 'Renewable Energy Benefits: Measuring The Economics'. IRENA, Abu Dhabi.

⁵ Down To Earth (2019), 'Renewable Energy In India'

⁶ Energy Department, Tamil Nadu Government (2020), 'Policy Note 2019-2020'

He built a case with cost comparisons to prove that solar can be cheaper than conventional sources of energy. He further explained about how investing in solar for all kinds of consumers would be a hedging exercise that is bound to be fruitful in the long run. He elaborated on the need to adapt an integrated approach to making decisions around energy consumption. He said that consumption should be governed by need as against greed and driven by energy conservation, energy efficiency and renewable energy. He reiterated the importance of an energy budget and presented a future grid that would be characterised by decentralisation, autonomy and personal power plants - one where electricity is generated everywhere and by everyone. He concluded by suggesting that distributed renewable energy generation is the future and that prosumers will play a major role in shaping the same.

II.2. Wind energy and open access consumers:

MR. AJAY DEVARAJ, IPWA

While the role of prosumers was discussed with respect to solar energy, open access consumers were focused upon during Mr. Ajay Devaraj's session on wind energy. Mr. Ajay Devaraj, Indian Wind Power Association (IPWA), started his presentation by talking about wind energy in India and the Electricity Act, 2003. With reference to the act, he explained the concept of open access as the non-discriminatory provision for the use of transmission lines or distribution system by any licensee or consumer engaged in generation. He further provided an overview of wind energy in India and elaborated on the paradox of high potential but low growth in the wind energy

industry. He elucidated that the industry can be attractive for large players with deep pockets as against medium and small players who are left in the lurch. Speaking about attractiveness he highlighted that the government chooses who you can sell energy to and that it always chooses loss making DISCOMs with no capacity to pay. In his closing comments, Mr. Devaraj stressed on the importance of collaboration in the sector and the need to synchronize policy, regulatory and business models.

II.3. ITC-Grand experience in wind energy

MR. N. RAMAMURTHY, ITC HOTELS

Following the comprehensive account on the wind energy industry in India, Mr. N. Ramamurthy, chief engineer of ITC Grand Chola, Chennai, shared the hotel's experience in promoting energy efficiency and adopting wind energy. He began with highlighting the importance of incorporating energy efficiency at the design level and presented ITC Grand Chola's compliance and commitment to building an energy efficient design certified by ECBC & GRIHA.⁷ He remarked that the hotels rely on commercially available technology which is heavily reliant on wind energy - with 7 wind turbines totalling to 14.6 MW and catering to 88% of their energy needs. He then presented the energy consumption patterns at ITC in relation with the generation of wind units and the benefits they reaped with reduced electricity bills, over a period time. In addition to emphasising on the economic and environmental benefits of relying on renewable energy,

⁷ i. Energy Conservation Building Code (ECBC) was developed by an Expert Committee, set up by India's Bureau of Energy Efficiency, with support and guidance from United States Agency for International Development (USAID) to promote energy efficiency in the building sector, at a design level.

ii. Green Rating for Integrated Habitat Assessment (GRIHA) is a national rating system for green buildings/energy efficient buildings in India initiated by the Ministry of New and Renewable Energy (MNRE). It was developed to help 'design and evaluate' buildings based on the environmental performance of a building holistically over its entire life cycle

he summarised the various challenges they faced including (i) evacuation issues, (ii) wind availability, (iii) delayed payments and (iv) weather events. He concluded by stating that government policies need to be strengthened to support ease in adoption of wind energy.

II.4. Renewable energy & Rooftop solar

MR. DINESH SALEM NATRAJAN, SOOTLESS ENERGY & CAG

Mr. Dinesh Salem Natrajan, co-founder of Sootless Energy and advisor at CAG, presented the investment in rooftop solar as locking in energy cost for the future. He enumerated the benefits of rooftop solar such as (i) producing own energy for use, (ii) no losses in transporting energy, (iii) less potential for future policy impacts, and (iii)

independence and flexibility during power outages. He shared cost comparisons and projected financials to build his case around ‘why invest in rooftop solar.’ He further strengthened the case through comparisons with conventional sources of energy and other renewable sources. Drawing from the comparisons he highlighted that solar energy is the most lucrative among all since it could be generated anywhere without a shade. In conclusion he argued that consumers - commercial and residential alike, need to look at the decision to invest in rooftop solar as choosing their legacy. To invest in rooftop solar, he said, would mean choosing clean and green energy for generations to come and more and more consumers should be making that choice before it's too late.

II.5. Communicating and advocating for rooftop solar

MR. SANDEEP, PURPOSE

While Mr. Dinesh had set the context with his

session on ‘Why rooftop solar’; Mr. Sandeep from Purpose, followed with more on rooftop solar with focus on how to communicate and advocate for the cause. He began with an Introduction to Purpose and its labs that drive campaigning innovation on world’s biggest issues. He then spoke from the experience from working on campaigns specific to promotion of rooftop solar. He described that their campaign approach towards rooftop solar was mainly to reinvigorate a positive narrative around clean energy by working with local implementing partners and aim for widespread consumer engagement through digitalization, political agendas, office activation and through the media. He explained that the strategies used for creating content were driven by the objective to promote well established, beneficial technologies which are cost advantageous and impactful on the environment. He concluded with success stories from UP and asserted that strategies such as (i) getting celebrities onboard to promote the cause, (ii) using various forms of media from radio shows to social media to spread the message, (iii) conducting activities and events that encourage consumer participation, and (iv) using mobile activation to accelerate the campaign, will go a long way in reaching wider audiences and creating awareness.

II.6. Residential rooftop solar tool kit

MR. RANDHEER SINGH, CAG

After discussions around ‘why invest in rooftop solar’ and ‘how to promote rooftop solar’ the next session by Mr. Randheer Singh, CAG focused on addressing the pertinent question - ‘how should consumers make decisions around installation of rooftop solar?’

He began with an overview on how to install rooftop solar (RTS) and explained TN's revised solar policy. He then introduced his user friendly tool which requires consumers to key in merely two mandatory fields - (i) State of residence and (ii) Annual power consumption. Based on the input, the toolkit would calculate parameters such as required capacity, cost, return on investment and payback period. After going over the working of the tool he presented a sample report that covered additional parameters such as insurance policy, maintenance, cost adjustments, guarantee and warranty. He concluded by stating that it is important to do a thorough analysis before making a decision around rooftop solar installation and that the objective of the toolkit is to make the decision making process easier for residential consumers.

II.7. Commercial consumers and renewable energy

MR. DEEPAK KRISHNAN, WRI

The last speaker for the day was Mr. Deepak Krishnan who spoke about renewable energy transition for commercial and industrial consumers. He cited that the commercial and industrial (C&I) power purchase agreement market for renewable energy has grown leaps and bounds over the past decade. He further remarked that it helps that procurement options are available globally and that there are multiple means for procuring. He spoke about various sourcing models including energy attribute certificate, corporate power certificate, utility green procurement, production for self-consumption, etc. He then went on to talk about how aggregation and collaborative procurement can pave the forward, and concluded that green tariffs could be the solution.

Green tariffs are special tariffs offered by utilities with a 100% renewable energy component to eligible consumers and they can help (i) retain existing large C&I consumers, (ii) attract new C&I consumers, (iii) provide additional revenue from premium offerings, and (iv) hedge against the volatility of market dynamics.

PANEL DISCUSSION ON RENEWABLE ENERGY:



As the day drew to an end, the speakers gathered to discuss the on the topics covered during the sessions on renewable energy. The discussion was moderated by Mr. Toine Van Megen, AVC. The initial round of discussion reflected immense interest in the ITC Grand Chola experience and the success that the hotel has tasted in terms of adopting energy efficiency at a design level and installing renewable energy. Mr. Megen pointed out that several leading groups of hotels still follow conventional energy and methods and therefore lose out on immense energy savings. Subsequently, questions around open access for MSME were raised and Mr. Deepak identified the 1MW limit for open access as a challenge to be acknowledged and addressed. Following discussions revolved around unelectrified rural regions and the effectiveness of solar in such regions. Mr. Dinesh confirmed that the pricing and installation could be worked out in such

cases based on the minimum requirement, post study of technical feasibilities, and the initial investment in cases of minimum requirement such as lighting. Several region specific problems and solar success stories were shared in response to the discussions around solar and lack of awareness and information dissemination was recognised as a major challenge with respect to residential rooftop solar. After dwelling in challenges such as slowing growth in the wind energy sector and intense arguments around lack of sufficient financing solutions for renewable energy, the discussions drew to an end. In conclusion it was agreed upon that the renewable energy sector in India, especially in Tamil Nadu, is still in its initial stages and that policy support, competitive markets and consumer engagement were key to building a prospective future for the sector.

Closing remarks, Day 1: Ms. Lakshmi Venugopal, SET-TN manager, delivered a fitting speech at the closing ceremony. In addition to summarising the various topics discussed through the day, Ms. Lakshmi highlighted the potential and opportunities that lie ahead in the future of the electricity sector. She reflected that at this juncture, the electricity sector in Tamil Nadu suggests a myriad of possibilities in terms of collaboration, consumer engagement and institutional support. Speaking about the role of consumers she said that each one of us are a consumer at the end of the day; and as consumers we should be carrying out our duties as much as we stand up for our rights.

III. FUTURE OF CONSUMER ENGAGEMENT IN THE ELECTRICITY SECTOR

The second day of the conference was structured in an attempt to unpack the various trends and changes in the electricity sector. The objective was to envisage the future of the sector and further discussed how emerging technologies and consumer engagement will evolve over time. The day began with a panel discussion that engaged eminent speakers in an inquiry into the future of the sector.

Reimagining the Electricity Sector and Consumer Engagement

- A Panel Discussion

The central objective of the discussion was to reimagine the electricity sector and inquire into how the sector would evolve in a future timeline of 2040, on account of (i) electricity markets and competition, (ii) legal and regulatory landscape, (iii) renewable energy, (iv) energy efficiency, (v) energy mobility, (vi) energy governance and (vii) consumer engagement. The session brought together eminent speakers from across the country to opine on each of the above highlighted aspects in the electricity sector.

Speakers: The panel included key speakers such as Ms. Geeta Gouri, Ex-competition commissioner/APERC; Mr. NL Rajah, Senior advocate and advisor, CAG; Mr. Toine van Megen, Auroville Consulting; Mr. Abhishek Jain, Bijili Bachao; Mr. Vishnu Mohanakumar, Institute for Transportation and Development Policy, and Ms. Richa Prasad, Shakti Sustainable Energy Foundation.



Drivers of the discussion: The main objective of the discussion was to understand how people working on different aspects of the electricity sector perceive the future of the sector, a few decades down the lane. Some of the key questions that defined the discussions were around (i) the role of state and evolution of the governance framework; and, (ii) the role of consumers and scope for consumer engagement, in a future timeline of 2040. With respect to governance framework, much of the discussion revolved around whether the sector in 2040, would be more centralised, semi-hierarchical, modular or decentralised. Subsequently, the various opportunities and challenges that the sector could face in 2040 were discussed from multiple angles including renewable energy, emerging technologies, energy efficiency, energy governance, and energy markets. The final round of discussions were focused on exploring where and how consumers would be placed in the electricity sector in 2040. The resulting discourse involved inquiring into how consumers would be engaged; reflecting if they will be empowered with more information; rethinking their position in the sector; and foreseeing the nature of issues they may face in 2040.

III.1. Electric Mobility

MR. VISHNU MOHANAKUMAR, ITDP

Mr. Vishnu Mohanakumar, Institute for Transportation and Development Policy, ITDP registered that E-vehicles are as old as the automobile industry and that they are picking up momentum, due to the emerging climate change crisis. He highlighted that the current mobility paradigms cannot be kept up, given that transport contributes to 24% of global GHG emissions. He then captured the rise of electric mobility in India and introduced the policy measures that support e-vehicles such as Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) India Scheme. He further elaborated on how electric buses could move cities in 2040 and dwelt on determining factors such as finance, infrastructure for charging, and maintenance. He finally added that although electric mobility and connected mobility could define the future, consumers should actively opt for shared mobility and make conscious decisions with respect to their commute.

III.2. Energy Efficiency

MR. ABISHEK JAIN, BIJLI BACHAO

Mr. Abishek Jain commented that “20 years is not a long time. Things will continue to be centralised, for decentralisation by 2040 would involve a lot of work.” He highlighted that while there is scope for improvement in efficiency of household appliances; there is a strong need to push Indian manufacturers to make more efficient appliances, especially air conditioners. He drew attention to the increase in the number of appliances used and remarked that we should be focusing on increasing efficiency of the appliances and improving demand side management, instead.

He further recorded that smart meters and itemised electricity bills, added with information around energy usage comparison with similar households, would go a long way in empowering consumers. He added that providing such detailed billing information to consumers would not only empower them; but, also act as a driver of change and in turn promote energy conservation and efficiency.

III.3. Renewable Energy

MR. TOINE VAN MEGEN, AVC

Mr. Toine van Megen, Auroville Consulting, stated that his vision for 2040 is 100% renewable energy in the electricity sector. He added that the sun is the only source of energy which is produced, transmitted and distributed to every home naturally; And, therefore solarisation would be a healthy transition for the sector in 2040. He said that with consumers turning into prosumers, a solar rich sector would result in a vibrant economy. He spoke at length about the role of discoms and regulators in ensuring that everyone is supported in their transition to renewable energy. He further highlighted the need for infrastructural support to an extent where a local community is provided with a local grid. He concluded by saying that while he recommends the shift to solar energy, he vehemently recommends the flattening of the need curve and demand-side management.

III.4. Electricity Governance

MS. RICHA PRASAD (SSEF)

Ms. Richa Prasad, Shakti Sustainable Energy Foundation (SSEF), introduced the nature of work carried out by the philanthropic community and highlighted that the community has been

engaged in tackling sustainability and climate change. Speaking about energy transition and the electricity sector in 2040 or 2050, she presented the governance landscape in the electricity sector as of today, and further drew attention to how the sector can move towards decentralisation. She highlighted that as of now, only 10% of the sector is decentralized and that the percentage is likely to increase in the future with the states assisting in this. She added that decentralisation of the electricity sector can be achieved by 2040 through promotion of distributed electricity, energy efficiency, demand response and energy storage. She then discussed how consumers become prosumers with decentralisation; and further remarked that digitalisation would aid the process and that consumers would become more connected. She even addressed the question of whether consumers will have more power in the future. According to her, the answer is no, because then the equilibrium gets affected. She concluded by discussing the cons of “prosumers” and envisaged that competition might become a problem.

III.5. Competition

MS. GEETA GOURI, EX-COMPETITION COMMISSION

While speaking about her vision for the electricity sector in 2040, Ms. Geeta Gouri, Ex-Competition Commission/APERC brought a range of topics to light - from subsidies, stressed assets, competition, markets to politics and role of consumers. She claimed that there's nothing wrong with subsidies and added that the link between the electricity board and politics has many special provisions for consumers. She emphasised that subsidies will continue to play a key role in the future of the electricity sector and that there is a need to formulate a calibrated approach to

rationalising subsidies. She further drew from her experience to comment on the energy mix of the future and recorded that although the sector will have sizeable renewable energy contribution, transition to 100% renewable energy will not be possible. She said that coal will continue to be a prominent portion of the energy mix, even by 2040. She concluded by stating that we should allow the creation of electricity markets, encourage participation of private players, and that competition commission should have the right to penalise as necessary.

III.6. Regulatory Framework

MR. N.L. RAJAH, SENIOR ADVOCATE

Mr. NL Rajah, Senior advocate and an advisor at CAG, began by highlighting the importance of understanding the energy sector and spoke about the need to recognise electricity as a part of the democratic framework. He said that the thought of the electricity sector in 2040 incites a vision of a growing economy fueled by new ideas. With respect to the regulatory framework he said that although the electricity legislation has evolved over the years and the Electricity Act 2003 introduced several reforms, the sector is not adequately working towards the reformative goals. He also said there is a need for the independent regulator to make the act effective and that the level of the independent regulator should be a high court judge. He then stated that there is a need to further realign the act to make it part of our democratic governance policies. He further cited the severe electricity crunch in Tamil Nadu between 2008 and 2012 to highlight that the ground reality indicates politics as having a bigger influence in the sector than the regulation.

He reflected that the government and politics need to be distanced from the scheme of the act. In conclusion, he said energy efficiency can reduce losses and impact the fiscal deficit of the country; and that focusing on supply would be a brainless way of handling energy.

The discussions that followed focused on the role of distribution companies (discoms) in the future, competition between discoms and emerging prosumers, and the process of tariff determination. It was opined that the role of discoms would be cemented in aspects such as maintenance of the grid and the micro grid, market development and facilitation of buying and selling of power. Additionally, it was agreed upon that the future of discom and the working model that is evolving in the sector will continue to be interlinked with politics. Several other scenarios with multiple players taking up diverse roles were envisaged. And it was believed that the regulator would determine the tariff based on the Aggregate Revenue Requirement (ARR) submitted by each one of the players as against the current scenario.

IV. ENERGY EFFICIENCY

To reduce energy consumption and increase savings, energy conservation promotes lesser usage; whereas, energy efficiency promotes using lesser energy to perform the same task. As of today, there are energy efficient variants to almost all electrical appliances ranging from air conditioners (fixed & variable speeds), ceiling fans, colour televisions, direct cool refrigerators, frost-free refrigerators, LED lamps, to water heaters and washing machines. Further, the labelling system or the star rating system (varying from 1-5) developed by the Bureau of Energy Efficiency (BEE) helps consumers make informed decisions while purchasing their appliances. When a consumer buys a 5 star rated appliance instead of a 4 star or 3 star, he/she can be assured that for the same usage, the appliance would consume lesser energy in comparison. But, such an efficient appliance comes at a higher cost, making energy efficiency an investment intensive measure although it promises a long-term payback and cost savings. In contrast, energy conservation prescribes behavioural changes that ensure lesser usage for example, switching off appliances when not in use, making use of natural light and ventilation as much as possible, etc. Both energy efficiency and energy conservation measures can individually help consumers reduce consumption and increase savings and when practiced together, the consumer can ensure greater savings both in terms of energy and cost.

The following session, designed by Mrs. Sumathy Krishnan, Technology Informatics Design Endeavor (TIDE) aimed to understand consumers'

approach to energy conservation and energy efficiency. She adapted a creative format to conduct an interactive session where a panel of experts had to comment and advise on audience responses to a poll conducted on the theme of energy conservation and efficiency.

Expert Panel: The panel consisted of experts working in various capacities to promote energy conservation and energy efficiency. The members include, M. Abhishek Jain, Bijili Bachao; Mr. Bharath Jayaraj, WRI; Ms. Anupama Mohanram, Green Evolution; Mr. Ramesh, Energy Efficiency Services Limited (EESL); Mr. Jeya Kumar Raju and K. Vishnu Mohan Rao, CAG. The session was moderated by Mrs. Sumathy Krishnan, TIDE.

IV.1. Setting the context

MRS. SUMATHY KRISHNAN, TIDE

Mrs. Sumathy began on a lighter note and commented on how the importance of electricity has grown leaps and bounds, only to join the list of essentials in life along with air, water, food, clothing and shelter. She then affirmed that we have reached a point in energy consumption where the primary need is to revisit consumption patterns and inquire if it is sustainable. She remarked that the importance of energy conservation and efficiency is derived from the lack of sustainability in the current consumption trends. She further added that there is a need to draw the line between need and want by promoting mindful consumption. She cited that households contribute to about 24% of India's total energy consumption

and established that each consumer has a huge role to play in ensuring that energy is used in an efficient manner.

IV.2. Keynote speech

MR. PADU S PADMANABHAN, ALT.TECH FOUNDATION

In his keynote speech, Mr. Padu S Padmanabhan, Alt.Tech Foundation, traced the evolution of energy efficiency from the time it took root in India in the year 1964. He spoke about the first institutional arrangement for energy efficiency in the developing world i.e. Petroleum Conservation Research Association and its continued work towards promoting energy efficiency in various sectors of the economy. He highlighted that apart from the climate mitigation argument, energy efficiency in the Indian context could be an important strategy to impact the nation's fiscal deficit. He then moved on to the micro level and elaborated that consumers can save anywhere between 25% to 30% of energy by adopting energy efficiency. He added that the core benefits of energy efficiency go beyond climate mitigation and energy saving. The core benefits summarised by Mr. Padmanabhan include, impact on health, improvement in indoor air quality, and increase in productivity. In his closing comments he stressed on the importance of technology to advance energy efficiency measures and cited the advent of smart meters, demand response and consumer engagement as key to change the pattern of energy use.

Audience Poll & Expert Interactions

Mrs. Sumathy Krishnan administered an audience poll to gauge consumer understanding around energy conservation and efficiency. Following which experts were asked to opine and advise based on the audience poll and response.



i. What would consumers like to hear more/read more in the area of energy conservation and energy efficiency?

Case studies and return on investment (RoI) were identified as the top most priority by the participating audience members. In response, Mr. Abhishek Jain introduced 'Bijli Bachao' which has evolved into a source of information and forum for exchange that focuses on saving energy. He said that this initiative has been able to put together case studies from consumer experiences. He then spoke about how analysing RoI would involve a personalised approach based on a consumer's personal income, consumption patterns and state level subsidies, among others. He acknowledged that there is limited availability of resources and initiatives that cater exclusively to energy saving. He added that there are several technological solutions to energy efficiency, as of today. And, recommended Brushless DC fans as a lucrative alternative that can increase energy savings,

considering that ceiling fans tend to be one of the highest consumers of electricity in a household, second only to air conditioners.

ii. How much more will it cost to construct an energy efficient home compared to a conventional home?

Given that there was an inconclusive audience response around cost projections for building an energy efficient home, architect Ms. Anupama Mohanram, Green Evolution stepped in to advise on whether it is a luxury to transform a conventional home into a green/energy efficient home. Ms. Anupama emphasised on the importance of passive design to ensure adequate natural lighting and ventilation. She suggested that a passive design should be perceived as an investment through which the cost of cooling can be significantly reduced in the long-term. She explained that opting to adopt a passive design doesn't necessarily translate into a higher investment decision. She elaborated that there are ways to build green homes in a cost effective manner such as (i) choosing materials cautiously - eg. using hollow terracotta blocks. These large blocks with hollow cavities cost the same as regular bricks and tend to let in merely half the amount of heat as regular bricks, (ii) cutting down on additional materials or resources in the civil construction - eg. leaving external walls or ceiling unplastered, and (iii) using water saving technologies. In conclusion she remarked that green buildings, as of today, are a necessity rather than luxury to foster occupant health, promote environmental benefits and ensure cost savings in the long-run.

iii. What is the most important motivating factor for consumers to purchase energy efficient appliances at their homes?

Projected cost savings, positive impact on environment and financing/subsidy were identified as the key motivating factors in the audience poll. Following the poll results, Mr. Bharath Jayaraj, World Resources Institute, was asked to advise on how consumers can be motivated to switch to energy efficiency. In response, Mr. Bharath identified several barriers that need to be addressed cumulatively. This included absence of credible, objective and trustworthy information; lack of adequate adoption of passive designs; lack of effective implementation of building standards/codes; and, the cost involved in purchasing energy efficient appliances. In conclusion, he highlighted that there is a strong need for stakeholders including government, utility and consumers to prioritise energy efficiency.

iv. What are the energy intensive appliances in an average Indian household?

In line with the results of the poll, Mr. Ramesh (EESL) confirmed that fans, refrigerators, television and lighting contribute to a significant amount of household energy consumption. He explained that replacing inefficient appliances can result in energy and cost savings in the long run. He further enumerated (i) energy efficient alternatives like LED bulbs, tubelights and BEE 5-star energy efficient fans; and (ii) initiatives that promote energy efficiency like Unnat Jyoti by Affordable LEDs for All (UJALA) programme and Street Lighting National Programme (SLNP). He added that energy efficiency initiatives being implemented by EESL have cumulatively led to energy savings of over 3,700 crore kWh. Speaking of retrofitting and replacing conventional appliances, Mr. Ramesh mentioned that there is an immediate need to address

challenges with respect to disposal and waste management.

v. Are consumers aware of platforms where their concerns can be represented?

It was observed that the audience members were largely aware of such platforms. Mr. Jeya Kumar and Mr. K. Vishnu Mohan Rao, CAG were then asked to speak about such platforms and elaborate on consumer awareness around them, based on their experience with Electricity Consumer Cells (ECCs). Mr. Vishnu outlined the grievance redressal mechanisms available for electricity consumers and highlighted the active role of consumer grievance redressal forums (CGRF). He further drew attention to the white meter card (TN electricity bill) and the TANGEDCO website which carry information about CGRF. While he briefed about CAG's initiatives and knowledge materials that are aimed to create awareness around CGRF, Mr. Jeya Kumar added that there are similar efforts and initiatives taken by the government as well. He cited examples such as public notices in newspapers and 'Grievance Day' meetings conducted by district collectors on a monthly basis. From CAG's ECC experience it was recorded there is a strong need to go beyond creating awareness about these forums and ensure that the messaging empowers consumers to communicate their grievances through the right channels.

The discussions around energy efficiency were primarily driven by the need for information dissemination. Experts on the panel acknowledged that it should be made easier for consumers to access comprehensive information about electrical appliances, their performance, and efficiency levels. Mr. Padmanabhan opined that such information should be supplemented with a vendor

rating system to help consumers make sound choices. He remarked that while the star labelling system can be helpful in choosing efficient appliances, vendor rating could prove beneficial for consumers in verifying the credibility of the vendors and quality of the appliances. Mr. Abhishek added that vendor reliability is a huge concern and that the investment it demands makes it challenging to address, at the moment. In further discussions, the idea of increased consumption being approached as a sign of development was explored. The approach was identified as counterproductive for the cause of energy efficiency and energy conservation. In conclusion, it was emphasised that mindful consumption and energy conservation is as important as energy efficiency.

V. EMERGING TECHNOLOGIES

The electricity sector is evolving into a dynamic place with technological advances and growing energy consciousness. The emerging technologies have made the sector rethink the way energy is being consumed and reinvent solutions with consumers at the focal point.

In recent times, technological solutions can be seen taking social, economic and environmental costs into account. Climate mitigation and mindful consumption can be seen as the driving factors of most emerging technologies ranging from e-vehicles and smart grids to energy monitors and Internet Of Things. Each of these technological solutions could have immense influence in shaping the future of the electricity sector.

The Government of India (GoI) has been actively supporting the adoption of e-vehicles and advanced metering initiatives (AMI). Several infrastructure building measures have been approved across 24 states and UTs in a bid to push electric vehicle (EV) adoption in the country, under the second phase of Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME or FAME-II) scheme. The Ministry of Power has extended funding towards 14 smart grid pilot projects in different distribution companies across the country, based on the recommendations of the India Smart Grid Task Force.⁸

Altogether, the emerging technologies are bound to define the way consumers are engaged in the sector and the technological solutions suggest a paradigm shift with promotion of green energy and energy conservation.

V.1. Electric mobility - How will it impact consumers

MR. VISHNU MOHAN KUMAR, ITDP

In his session on electric mobility, Mr. Vishnu Mohan Kumar, ITDP focused on electric vehicles (EVs), drivers of EVs and the future of EVs from the perspective of consumers. He established the need for transition to e-vehicles as inevitable based on our current mobility paradigm and projected that we would have travelled over 3,500,000 tonne kilometers by 2050. He presented the increased global GHG and CO₂ emissions as steering the transition to e-mobility. Highlighting the rise of electric mobility Mr. Vishnu said that there are over 7 million EVs (cars, buses and two-wheelers) across countries, as of 2019. He added that over the years, the cost of EV ownership has only been improving. He added that it is crucial to focus on planning, financing, operating, charging, maintaining and supporting the electrification of vehicles. And then, he listed the Indian government's incentives to promote electric mobility such as tax reduction on EVs and tax exemption of e-buses, among others. He concluded by saying that consumers/citizens have the most important role to play in choosing how to commute and investing in electric mobility.

⁸ **Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India)** Scheme was formulated under the The National Electric Mobility Mission Plan (NEMMP) 2020 to promote manufacturing of electric and hybrid vehicle technology and to ensure sustainable growth of the same: <https://www.fame-india.gov.in/>

⁹ **India Smart Grid Forum** is a Public Private Partnership initiative of Ministry of Power (MoP), Government of India for accelerated development of smart grid technologies in the Indian power sector: <http://www.indiasmartgrid.org/about-us.php>

V.2. Implementation of smart grid in Puducherry

**MR. VIVEKANANDAN,
PUDUCHERRY ELECTRICITY
DEPARTMENT**

Mr. Vivekanandan, AE, Smart Grid, Puducherry Electricity Department presented on Puducherry's smart grid initiative and elaborated on its basic architecture, functionalities, benefits and challenges. He explained that smart grid technology promotes energy efficiency, reliability and affordability through monitoring, analysis, control and integration. He affirmed that in addition to improving quality & reliability of power supply the technology will empower consumers and promote consumer engagement with greater control over their energy use. He said that the puducherry initiative will facilitate detailed techno economic study for such deployments in the rest of the country. He added that with the growing maturity in technologies, such smart grid projects may serve in better and efficient energy delivery systems benefitting the utility as well as the consumers. However, he believed that the real challenge is on how the data collected is utilized for various data analytics.

V.3. Energy storage systems

**MR. DINESH SALEM NATARAJAN,
SOOTLESS ENERGY**

Mr. Dinesh Salem Natarajan, Sootless Energy, introduced a range of energy storage technologies including batteries, pumped hydro, steam, rocks, compressed air, and flywheel. Speaking of batteries Mr. Dinesh highlighted that the most important factor that determines its efficiency is the ambient temperature. To elaborate on its efficiency, he drew from the working of a sponge

and reflected the need to focus on cautious charging to ensure optimal energy discharge. Further, commenting on the economics of energy storage systems, he highlighted its round trip efficiency as a determining factor. He spoke about energy storage systems as a less expensive replacement for diesel power with benefits such as maximum use of on-site renewables, minimum demand charges and excess load management. Although he cited several benefits, he emphasised that energy storage systems are not economical for all. On the closing note he added that it could become more economic for everyone in the future with better technology or if consumption tariff increases.

V.4. Blockchain technologies

MR. DHEER PATEL, RAP

In his session Mr. Dheer Patel reflected on the changing dynamics of the electricity sector and further elaborated on blockchain technologies and consumer participation in the sector. He explained that blockchain as a type of distributed ledger that enables distributed energy resources and supports execution of transactions real-time. He drew parallels with a food delivery application which facilitates distribution of food from several independent home chefs and correlated the example to energy markets supported by blockchain technology. He briefed on the several benefits to promoting distributed ledger including transparency of data, incorruptibility & immutability, smart contracts, and potential to drive new business models. He highlighted that the role of prosumers can be strengthened through blockchain where micro-grids and

blockchain-enabled smart meters would facilitate peer to peer trading. He remarked that this model of business would support grid management and demand flexibility. In conclusion, he added that blockchain is not a single business model but an opportunity to develop or pursue various ideas and that regulatory framework should enable such innovative business models.

V.5. Role of energy monitoring applications in engaging consumers

MR. DAYAL NATHAN, ENERGYLY

The importance of mindful consumption and the need for energy conservation had been widely discussed through the course of the day. Mr. Dayal Nathan's session on energy monitoring applications was a valuable addition to the discourse around adopting behavioural changes to conserve energy. He began with an explanation of how energy monitors work and the benefits consumers could reap from the data it provides. He explained that the energy monitoring meter connects to your machines through current transformers (CTs) and sends power & machine data to cloud through Wireless gateway. He then presented a sample energy monitoring application which displays power & machine data, scheduler, alerts & reports. He enumerated the various advantages of energy monitoring such as analysis of power data, centralized monitoring, remote control of machines and equipment, transparency, alerts on power pilferage and device level comparison. He recorded that energy monitoring is the first step towards making energy conscious decisions and concluded that there is a strong need for faster smart meter implementation, consumer feedback based power tariff and more behavioural energy efficiency projects.

V.6. Role of IoT in enhancing consumer engagement

MR. DHEER PATEL, RAP

Dr. Parvathy described the internet of things, or IoT, as a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. She further elaborated on the role of IoT in building energy efficient smart homes for electricity consumers. She explained that IoT can enable people to remotely monitor and control a range of appliances including thermostats, hot water heaters, lighting etc. and cited an example of an existing IoT application called Nest. She envisaged that IoT will connect 50 billion devices by 2050 and that as a result, the future will be more electric, more electric, more connected, more distributed and more efficient. In conclusion, she opined that the latest advances in technology have tremendous potential to benefit people by increasing efficiency and reducing waste. She added that by leveraging the latest IoT technologies, consumers are not only saving money, but are also doing their part to cut down on pollution and contribute to climate mitigation.

PANEL DISCUSSION ON EMERGING TECHNOLOGIES:

Discussions around emerging technologies reflected an interest in inquiring about the tangible results and success rates of pilot projects. Longevity, investment and cost-benefit analysis were other driving factors of the discourse.



Speaking of tangible results and success rates, Mr. Vivekanandan cited that there was a 22% line loss in Puducherry before the smart grid project was initiated. And that the line losses have been curtailed to around 10% after the smart grid project. He added that the project has also resulted in reduced meter failures and errors in meter reading/assessment. Prepaid meters and communication to consumers were further discussed and it was acknowledged that implementation in rural areas are bound to face roadblocks.

On the viability of energy monitoring, it was ascertained that the return on investment for an average residential consumer would be negligible or negative making the investment largely unprofitable for household consumers; but lucrative for commercial and industrial consumers. Discussions around energy monitoring also highlighted that installation of meters for monitoring alone will not guarantee energy and cost savings. There was widespread consensus that the monitoring initiative would merely empower consumers to make informed decisions around their energy consumption and that the consumers' willingness to adapt energy conservation measures alone will ensure savings. Further, the benefits of monitoring energy at an appliance level were explored. And, it was agreed upon that as against smart meters which provide consumption data of the household, energy monitoring meters that provide data at an appliance level can be helpful for discoms in demand side management.

Blockchain technology was perceived as an interesting solution to problems in the energy market. It was observed that rethinking the way stakeholders in the electricity sector participate and realigning institutional and policy support were factors that would determine the success of the technology.

The final round of discussions were focused on the adoption of e-vehicles and the need to insure the vehicles against extreme weather conditions were identified as its major drawback. Altogether, the sessions garnered increased interest towards technological solutions to energy efficiency and conservation.

Closing remarks, day 2: In her closing remarks, Ms. Lakshmi Venugopal, SET-TN manager, reflected that the future of the electricity sector is promising with endless possibilities. She recollected the various themes, topics and discussions of the conference and commented that it is reassuring that several initiatives across the country are working towards similar goals. She thanked the speakers and participants for the immense value they added to the two-day experience and further remarked that the experiences and knowledge shared would positively impact the course of work in building a more responsible and sustainable electricity sector.

Reflections & Conclusion

The several themes explored and the discussions that entailed largely reflect that in the electricity sector, all roads lead to consumer engagement.

The conference brought together prominent speakers who are actively working towards promoting pertinent aspects in the sector including energy conservation, energy efficiency, renewable energy, emerging technologies and electricity governance. As of today, initiatives promoting each of the above highlighted aspects are increasingly developed with consumers at the focal point.

The various state level initiatives aimed at promoting electricity governance highlight similar outcomes and takeaways from their experience. It was observed that there is a strong need to improve consumer participation in regulatory affairs, institutionalize consumer/CSO engagement, and enhance the grievance redressal ecosystem. Further, envisaging the future of the electricity sector suggests a vibrant and sustainable sector propelled by distributed renewable energy generation with prosumers playing a significant role in shaping the same. At the same time, given the extremity of the climate crisis, it can be identified that in addition to the renewable energy transition there is a strong need for consumers to focus on making behavioural changes and taking conscious decisions towards reducing their consumption patterns. In summary, while renewable energy, energy efficiency and energy conservation can be seen as definitive goals for a sustainable future; decentralisation, emerging technologies, improved consumer engagement, and synchronized policy, regulatory and business models can be seen as the solutions that will accelerate achievement of the said goals.