ISGF, A PPP Initiative of Ministry of Power, Govt of India

Working Towards Accelerating the Electric Grid Modernization and Smart Infrastructure in India
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1. About ISGF

❖ A Public Private Partnership initiative of Ministry of Power, Government of India established in 2011 and registered as a Not-for-Profit Society
❖ Responsible for accelerated development of smart grid technologies in the Indian power sector with development of global standards, technology selection, training and capacity building
❖ 200+ members comprising of ministries, utilities, technology providers, academia, and research
❖ Evolved as a Think-Tank of global repute on Smart Grids and Smart Cities
❖ 8 Working Groups: Grid Modernization & Smart Cities; IoT, Smart Metering, AI & Analytics; Digital Architecture and Cyber Security; Policy, Regulations and Business Models; Renewables & Microgrids; Flexibility & Electric Mobility; Smart Gas; Smart Water

Key Objectives of ISGF

❖ Policy advocacy, standards development, training and capacity building for utilities
❖ Knowledge dissemination on emerging technologies and best practices through case studies, reports, white papers, bi-lateral and multi-lateral workshops, technical seminars etc.
❖ Support Utilities and Regulators for Grid Modernization and Smart Grid Roadmaps and Regulations
❖ Platform for exchange of ideas and information to support development of use case scenarios for India
❖ Conduct feasibility studies on new technologies and assist in pilot deployments

Key Expertise of ISGF

<table>
<thead>
<tr>
<th>Domains of Expertise</th>
<th>Functional Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smart Grid</strong></td>
<td><strong>Policy Advocacy</strong></td>
</tr>
<tr>
<td><strong>Renewables and Microgrid</strong></td>
<td><strong>Development of Standards</strong></td>
</tr>
<tr>
<td><strong>E-Mobility</strong></td>
<td><strong>Roadmaps</strong></td>
</tr>
<tr>
<td><strong>Energy Storage</strong></td>
<td><strong>Rollout Strategies and Plans</strong></td>
</tr>
<tr>
<td><strong>Smart Metering</strong></td>
<td><strong>Feasibility Report &amp; DPR</strong></td>
</tr>
<tr>
<td><strong>Smart Cities</strong></td>
<td><strong>RFP Preparation &amp; Evaluation</strong></td>
</tr>
<tr>
<td><strong>Cyber Security</strong></td>
<td><strong>Research &amp; Studies</strong></td>
</tr>
<tr>
<td><strong>Smart Water and Gas</strong></td>
<td><strong>Training &amp; Capacity Building</strong></td>
</tr>
<tr>
<td><strong>International Delegations to Smart Grid Events and Bilateral Workshops</strong></td>
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</tr>
</tbody>
</table>
2. ISGF Team

2.1 General Body (ISGF Members)

ISGF members are from the ministries, government institutions, regulatory bodies, utilities, industry, non-profit organizations, educational and research entities and students from renowned institutions.

ISGF Membership Categories

ISGF Members in Year 2019 – 20

To view the latest full list of ISGF Members, please visit: https://indiasmartgrid.org/member_list.php

Benefits of ISGF Membership
Participation in Policy Initiatives for Government of India, State Governments, Regulators and Utilities

❖ Contribute towards formulation of national policies and programs related to smart grids, renewable energy, and smart cities domains.
❖ Engage with policy makers, utilities, smart city commissioners/CEOs, regulators, system integrators, OEMs, academia and research, and industry associations in India.
❖ Participate in development of National Standards in India through ISGF in committees of Bureau of Indian Standards (BIS).
❖ Contribute towards research reports and white papers prepared by ISGF Working Groups which are often translated to policies and programs
❖ Participate actively in the technology sessions and workshops conducted by ISGF. Contribute towards technology topics of common interest, both related to business and related to the need of the country.

Advisory Support to Members Organizations

❖ Assistance for testing and certification of products in India
❖ Assistance for undertaking Proof of Concept and Technology Demonstration Projects in India
❖ Get advance information on smart grid policies and programs Seek guidance for technology and best practices from the panel of experts from academia, industry and utilities
❖ Have access to smart grid technology and developments across the globe and participate in international smart grid forum like GSGF, IEC, IEEE, etc
❖ Avail substantial discounts for participation in India Smart Utility Week (www.isuw.in), Distribution Utility Meet (DUM) and other ISGF events, training programs and workshops
❖ Participate in major national and international events where ISGF is co-organizer/supporting partner (complimentary registration/ substantial discounts in participation fee and exhibition booths for all major events related to utility sectors across the globe)
❖ Assistance from ISGF Team in conducting training and capacity building programs
❖ Assistance for holding focused workshops with key utility customers and policy makers
❖ Get visibility to a larger audience working in the same domain (mainly applicable to start-up companies) and build an ecosystem enabling business activities

Other Benefits

❖ Regular promotions through India Smart Grid Knowledge Portal (ISGKP); ISGF Social Media Channels; ISGF Smart Grid Bulletin; and ISGF Global Mailing List
❖ Support in selection and recruitment of professionals and ecosystem partners
❖ Focused workshops for ISGF Members with utilities and key decision makers

For more details, please visit ISGF website page: http://indiasmartgrid.org/membership.php
2.2 Board of Governors (BoGs)

The Office Bearers of ISGF are elected from amongst its Members every year. The elected Office
Bearers for the Financial Year 2019 -2020 are as mentioned below:

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESIDENT</strong></td>
<td>Reji Kumar Pillai</td>
<td>(India Smart Grid Forum)</td>
</tr>
<tr>
<td><strong>GENERAL SECRETARY AND CONVENOR</strong></td>
<td>Sushil Kumar</td>
<td>(GAIL India Limited)</td>
</tr>
<tr>
<td><strong>TREASURER</strong></td>
<td>V. K. Kanjlia</td>
<td>(Central Board of Irrigation and Power)</td>
</tr>
<tr>
<td><strong>RESEARCH AND ACADEMIA MEMBER</strong></td>
<td>Chandan Chowdhary</td>
<td>(Indian School of Business)</td>
</tr>
<tr>
<td><strong>UTILITY MEMBER</strong></td>
<td>Sanjay Kumar Banga</td>
<td>(Tata Power Delhi Distribution Limited)</td>
</tr>
<tr>
<td><strong>UTILITY MEMBER</strong></td>
<td>Raman Srivastava</td>
<td>(Indraprastha Gas Limited)</td>
</tr>
<tr>
<td><strong>INDUSTRY MEMBER</strong></td>
<td>Shalabh Srivastava</td>
<td>(RTI Global India Private Limited)</td>
</tr>
<tr>
<td><strong>INDUSTRY MEMBER</strong></td>
<td>Mashal Dhawan</td>
<td>(Smart Energy Water)</td>
</tr>
<tr>
<td><strong>INDUSTRY MEMBER</strong></td>
<td>Venu Nuguri</td>
<td>(ABB India Limited)</td>
</tr>
<tr>
<td><strong>INDUSTRY MEMBER</strong></td>
<td>Rohini Srivathsa</td>
<td>(Microsoft India Private Limited)</td>
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</tbody>
</table>
### 2.4 ISGF Working Groups (WGs)

ISGF has eight working groups focussed on different aspects of Smart Grids as mentioned below:

<table>
<thead>
<tr>
<th>WG#</th>
<th>Working Groups</th>
<th>Chair</th>
<th>Vice Chair (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WG-1</td>
<td>Grid Modernization &amp; Smart Cities</td>
<td>Ram Pillai, Adani Electricity, Mumbai</td>
<td>Pradeep Yemula, IIT, Hyderabad</td>
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<td>Vijayan SR, ABB India Limited</td>
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<tr>
<td>WG-2</td>
<td>IoT, Smart Metering, AI &amp; Analytics</td>
<td>Ajoy Rajani, India Smart Grid Forum</td>
<td>Anil Sharma, Dakshin Haryana Bijli Vitran Nigam</td>
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<tr>
<td>WG-3</td>
<td>Digital Architecture and Cyber Security</td>
<td>Faruk Kazi, VJTI, Mumbai</td>
<td>Shailendra Fuloria, Eaton</td>
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</tbody>
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**ISGF**

**India Smart Grid Forum**

**ANNUAL REPORT 2019 - 2020**

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<table>
<thead>
<tr>
<th>WG-4</th>
<th>Policy, Regulations and Business Models</th>
<th>Pankaj Batra</th>
<th>Former Central Electricity Authority, GoI</th>
<th>Rajendra Ambekar</th>
<th>Maharashtra Electricity Regulatory Commission</th>
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<tr>
<td>WG-5</td>
<td>Renewables &amp; Microgrids</td>
<td>Ravi Seethapathy</td>
<td>Biosirus Inc, Canada</td>
<td>Sujeet Mishra</td>
<td>Ministry of Railways, GoI</td>
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<tr>
<td>WG-6</td>
<td>Flexibility &amp; Electric Mobility</td>
<td>Girish Ghatikar</td>
<td>EPRI, USA</td>
<td>VACANT</td>
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<tr>
<td>WG-7</td>
<td>Smart Gas</td>
<td>To Be Elected</td>
<td></td>
<td>Davinder Paul Singh</td>
<td>Indraprastha Gas Limited</td>
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<tr>
<td>WG-8</td>
<td>Smart Water</td>
<td>To Be Elected</td>
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<td>To Be Elected</td>
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</tbody>
</table>
### 2.3 ISGF Mentors and Advisors

The Mentors and Advisors of ISGF are elected from amongst its Members every year. The elected Mentors and Advisors for the Financial Year 2019 - 2020 are as mentioned below:

#### ISGF Mentors

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organization/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Umashankar</td>
<td>Former Power Secretary</td>
<td>Ministry of Power, Govt of India</td>
</tr>
<tr>
<td>Kirit Parikh</td>
<td>Former Member Energy &amp; Infra</td>
<td>Planning Commission, Govt of India</td>
</tr>
<tr>
<td>Richard Schomberg</td>
<td></td>
<td>EDF &amp; IEC France</td>
</tr>
<tr>
<td>RR Mehta</td>
<td>Former CEO</td>
<td>Reliance Energy, Mumbai</td>
</tr>
<tr>
<td>Ashok Jhunjhunwala</td>
<td>Professor</td>
<td>IIT- Madras, Chennai</td>
</tr>
</tbody>
</table>

#### ISGF Advisors

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organization/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rahul Tongia</td>
<td>Fellow</td>
<td>Brookings India</td>
</tr>
<tr>
<td></td>
<td>Founding Advisor, ISGF</td>
<td></td>
</tr>
<tr>
<td>Vijay L Sonavane</td>
<td>Former Member</td>
<td>Maharashtra Electricity Regulatory Commission</td>
</tr>
<tr>
<td>Padmaja Ruparel</td>
<td>Co-Founder IAN &amp; Founding</td>
<td>IAN Fund Indian Angel Network</td>
</tr>
<tr>
<td>Uttam Mane</td>
<td>Former CGM IT, MSEDCL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Former BoG Member, ISGF</td>
<td></td>
</tr>
<tr>
<td>Keshab Mukherjee</td>
<td>Former NTPC</td>
<td>Kolkata</td>
</tr>
</tbody>
</table>
2.4 ISGF Secretariat

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aashima Chaney</td>
<td>Manager</td>
</tr>
<tr>
<td>Anand Singh</td>
<td>Senior Manager</td>
</tr>
<tr>
<td>Balasubramanyam Karnam</td>
<td>Smart Energy Specialist</td>
</tr>
<tr>
<td>Bindeshwary Rai</td>
<td>Senior Manager - Programs and Partnerships</td>
</tr>
<tr>
<td>Parul Shribatham</td>
<td>Research Analyst</td>
</tr>
<tr>
<td>Reena Suri</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Ronkini Shome</td>
<td>Senior Manager - Advisory Services and Trainings</td>
</tr>
<tr>
<td>Shuvam Sarkar Roy</td>
<td>Smart Energy Specialist</td>
</tr>
<tr>
<td>Sneha Singhania</td>
<td>Manager - Digital Communications and Marketing</td>
</tr>
<tr>
<td>Suddhasatta Kundu</td>
<td>Senior Manager - Technical Advisory</td>
</tr>
<tr>
<td>Waqar Shaikh</td>
<td>Assistant Manager - Finance and Accounts</td>
</tr>
<tr>
<td>Yashika Maheshwari</td>
<td>Assistant Manager - Communications</td>
</tr>
</tbody>
</table>

3. ISGF Activities

3.1 Work with Ministries, Government Institutions, Utilities and Electricity Regulatory Commissions

<table>
<thead>
<tr>
<th>Ministry of Power (MoP), Government of India</th>
<th>Ministry of New and Renewable Energy (MNRE), Government of India</th>
<th>Department of Telecommunications (DoT), Government of India</th>
<th>Ministry of Railways, Government of India</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISGF worked with various stakeholders and Ministry of Power (MoP) in finalization of Model Smart Grid Regulations that have been approved by the Forum of Regulators</td>
<td>ISGF worked with Ministry of New and Renewable Energy (MNRE) on National Mission on Energy Storage and Renewable Energy Integration Programs</td>
<td>ISGF worked closely with Department of Telecommunications (DoT) for (i) Rollout of IPv6 for Power Sector, (ii) M2M Communications Roadmap, (iii) Release of 7 MHz of license free spectrum for M2M Communications</td>
<td>ISGF is engaged with Ministry of Railways for the development of Smart Microgrids for Railway Stations in India</td>
</tr>
</tbody>
</table>
| **Bureau of Indian Standard (BIS)** | • ISGF worked with various stakeholders in finalization of Indian Standards for Smart Meters (IS 16444-2015 and IS:15958 Part -2 in 2016) which was published by Bureau of Indian Standard (BIS). Presently working with BIS in formulation of EVSE Standards (IS:17017 series) and Standards for Electric Vehicle charging Infrastructure and large scale RE integration:  
  o Standard for EV Charging Infrastructure  
  o Smart Infrastructure  
  o Large Scale Integration for Renewable Energy  
  o Low-Voltage Direct Current (LVDC) |
| **Central Electricity Authority (CEA)** | • ISGF contributed actively in the formulation of technical specifications and functional requirements of Advanced Metering Infrastructure (AMI) at Central Electricity Authority (CEA); Presently working with CEA on several other key initiatives |
| **State Electricity Regulatory Commissions** | • ISGF is part of advisory committees of several State Electricity Regulatory Commissions:  
  o Assam Electricity Regulatory Commission  
  o Haryana Electricity Regulatory Commission  
  o Uttar Pradesh Electricity Regulatory Commission |
| **NITI Aayog** | • Knowledge Partner with NITI Aayog for the India Energy Security Scenario 2047 Version-1 & 2 |
| **National Critical Information Infrastructure Protection Centre (NCIIPC)** | • Worked with National Critical Information Infrastructure Protection Centre (NCIIPC) on Framework for Cyber Security Preparedness Assessment of Electric Utilities; and assessed 7 Utilities  
  • Prepared a Manual on Cyber Security for Power Systems in collaboration with NCIIPC |
<table>
<thead>
<tr>
<th>Forum of Regulators (FOR)</th>
<th>• Worked with FOR on formulation of Model Smart Grid Regulations issued in 2015</th>
</tr>
</thead>
</table>
| Bangalore Electricity Supply Company Limited (BESCOM) | • Smart Grid Roadmap for BESCOM  
• Smart Grid Maturity Model (SGMM) Assessment |
| PT PLN, Indonesia | • Smart Grid Roadmap for PT PLN Indonesia |
| West Bengal Transport Corporation (WBTC), Kolkata | • Assistance to WBTC for Establishment of Charging Infrastructure for Electric Buses in Kolkata |

3.2 ISGF Advisory Assignments

- Implementation Plan for Electrification of Public Transportation in Kolkata (2017)
- Study on Infrastructure and Enabling Environment for Road Electric Transport in SAARC Member States (2018)
- Smart Grid Roadmap for Bangalore Electricity Supply Company (BESCOM) (2019)
- Smart Grid Roadmap for PT PLN, Indonesia - World’s second largest electric utility (2019)
- Energy Storage System (ESS) Roadmap for India (2019)
- Assistance to West Bengal Transport Corporation (WBTC) for Establishment of Charging Infrastructure for Electric Buses in Kolkata and Preparation of EOI and RFP for WBTC for Procurement of Electric Buses under FAME 2 Scheme (2019)
- Planning Electric Vehicle Charging Infrastructure in Bangalore City (Ongoing)
- Designing of Time of use Electricity Tariff in the State of Gujarat (Ongoing)
Demonstration of Peer-2-Peer (P2P) Trading of Rooftop Solar Energy on Blockchain in Uttar Pradesh, India (Ongoing)

4. Knowledge Dissemination

4.1 ISGF White Papers, Technical Reports and Other Publications of 2019-20

To view the latest full list of ISGF Whitepapers, Technical Reports and publications, please visit: https://indiasmartgrid.org/resourcecenter.php

4.2 ISGF Smart Grid Bulletins (Monthly Newsletter)

Periodicity - Monthly | Circulation - 60,000 + copies monthly

ISGF publishes Smart Grid Bulletin, a monthly Newsletter since January 2014. About 2,500 copies are circulated to key decision makers in Indian power sector in print; and more than 60,000 electronic copies are circulated to professionals around the world.

ISGF Smart Grid Bulletin covers key achievements and highlights of (i) Smart Grid developments around the world; (ii) Key Appointments and Transfers; (iii) Smart Grid Technology, Projects, Regulatory Updates and Standards Updates; (iv) Smart Grid Pilot Project in India Updates; (v) Smart Grid Events; (vi) Announcement of all the ISGF Training Programs, Conference, Workshops, Competitions, Technical Paper Presentations and ISGF Innovation Awards.

To read all the issues of monthly bulletin visit weblink: http://indiasmartgrid.org/newsletter.php
4.3 India Smart Grid Knowledge Portal

ISGF with its mandate to create a platform for exchange of ideas and information on Smart Grids, launched India Smart Grid Knowledge Portal (ISGKP – www.indiasmartgrid.org) in January 2013.

- ISGKP is one of the most popular portals for all the updates and news about Indian Smart Grid Sector
- ISGKP is visited by several thousand monthly visitors from across the globe
- ISGKP covers latest Global News on Technology Updates, Case Studies, Best Practices, Policies and Reports
- Whitepapers, Technical Reports, Training Programs, Workshops, Webinars, Conferences by

Demography’s with Maximum Visitors

ISGF and its members and various other updates about the activities of ISGF are published in the portal

4.4 ISGF Social Media Handles

- To build the relationships, to connect and to communicate with its people, ISGF is present on several social media channels
- The social media platforms enable ISGF to share the updates on ISGF Programs, Activities, ISGF Events, ISGF Projects, Reports and Whitepapers, ISGF Monthly Smart Grid Bulletin, Announcements, Greetings and Daily News about the Industry to the world
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4.5 Previous ISGF Publications and Reports

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5. Advisory Services

5.1 Energy Storage Roadmap

ISGF in association with India Energy Storage Alliance (IESA) is developing an Energy Storage Road Map for India from the period 2018-2032. The project is supported to ISGF by MacArthur Foundation. This project will help policy makers and utilities in decision making related to investments in energy storage for integration of renewable energy leading to a reliable and low carbon grid in India. The outcome of the study will be: (a) Energy Storage Roadmap for India (b) Energy Storage India Tool (ESIT) that will help conducting cost-benefit analysis of various energy storage technologies, Guidelines for determining the Variable Renewable Energy (VRE) hosting capacity on LV and MV grids.

5.2 Smart Grid Roadmap for BESCOM

ISGF is preparing Smart Grid Roadmap for Bangalore Electricity Supply Company (BESCOM). Smart Grid Roadmap would be a strategic plan that would outline activities BESCOM can undertake over a specified timeframe to achieve stated goals and its expected outcomes. The roadmap is also drafted in alignment with the on-going programs such as R-APDRP, IPDS and DDUGVY and builds on the assets being created under these programs and other existing systems in a manner that would complement each other. The draft roadmap has been discussed at different forums and the diverse stakeholders’ views are being incorporated in the final version.

5.3 Smart Grid Maturity Model (SGMM) Assessment

Smart Grid Maturity Model (SGMM) tool was initially prepared by a set of technology companies and American Productivity and Quality Council with inputs from several leading utilities. The tool is presently maintained by the Software Engineering Institute (SEI) at Carnegie Mellon University. ISGF along with its member organisations have the capability to undertake SGMM survey of utilities.

“Smart Grids can be an anchor infrastructure for the Smart City. This is what ISGF has been advocating!”

ISGF published a White Paper “Leveraging Smart Grid Assets for Building Smart Cities at Marginal cost”. The key concept proposed was to consider smart grid as the anchor infrastructure and some of the automation IT systems of smart grids could be extended to other infrastructure domains such as water distribution, gas distribution, traffic and security etc.; and extending the billing, collection and customer care systems to other domains at marginal cost and operate efficiently. All state-owned electricity distribution companies (DISCOM’s) in India are implementing a set of basic IT and Automation solutions under the R-APDRP scheme of the Ministry of Power, Govt of India.

5.4 Social Media for Utilities

ISGF has deployed a plan for DISCOM’s Customer Engagement and Education to support Indian Power Utilities to connect with their customers through Social Media Platforms to track customer complaints and queries to promote energy efficiency measures, imparting safety tips influencing consumer behaviour and forging positive consumer relationships particularly during power outages and storm recovery efforts. Utilities can provide better services by integrating social media in their outage management, crisis/disaster handling, billing and collection and other customer related issues. In addition, social media can be a platform for promotion of clean energy, DSM/DR activities, tariff plans, electric vehicle usage etc. For utilities, understanding the benefits of social media and building an
engaging presence has become a business imperative. It can also prove as an effective tool for branding and promotion of Goodwill.

**ISGF has assisted following Utilities:**

- Bangalore Electricity Supply Company (BESCOM) for building effective social media presence and engagement with its customers
- Customer Education at Uttar Haryana Bijli Vitran Nigam (UHBVN), Panipat Smart Grid Pilot Project through Social Media and other Customer Education Tools

**5.5 Study Development of Roadmap for Implementation of Smart Grid-Concepts, Practices and Technologies in SAARC Region - SAARC Energy Center**

SAARC Energy Centre has awarded the project “Development of Roadmap for Implementation of Smart Grid-Concepts, Practices and Technologies in SAARC Region” to India Smart Grid Forum on 16th May 2018. The objective of the study is to develop a smart grid framework and to identify a list of potential smart grid interventions along with a clear way forward for all the stakeholders in each of member states in terms of policy & regulatory requirement, strategy to be adopted, institutional changes etc. for smooth transition from existing grid to smart grid.

ISGF is carrying out detailed assessment of power sector of the SAARC member states in terms of existing demand supply scenario, generation base, planned transmission and distribution projects, renewable energy penetration, system and commercial losses, grid reliability, last mile connectivity etc. Based on the assessment, requirement of smart grid applications and related activities will be identified and various international best practices on smart grid deployment and technology development will be reviewed along with assessment of strategy adopted by utilities in implementing those technologies.

**5.6 Study on Infrastructure and Enabling Environment for Road Electric Transport in SAARC Member States - SAARC Energy Centre**

SAARC Energy Centre has awarded the project “Study on Infrastructure and Enabling Environment for Road Electric Transport in SAARC Member States” to ISGF on 1st June 2018. The objective of the study is to identify and evaluate key enablers of electric vehicle implementation and assess the readiness of SAARC member countries in terms of policy, technology, commercial and institutional aspects. Based on the assessment, implementable action points will be developed to facilitate electric vehicle penetration in SAARC member states.

The project involves assessment of global electric vehicle scenario and development in the electric vehicle related infrastructure in terms of charging infrastructure, standards for carrying out vehicle grid communication, reliable distribution network along with policy measures and innovative business models adopted to ensure sustainable implementation and efficient operation. It also features assessment of the AS-IS scenario and readiness of SAARC member states to understand the key issues and future requirements for adoption of electric vehicle and implementation of its related infrastructure.
ISGF will carry out the assessment by evaluating the key steps taken in accelerating EV deployment by the top three global leaders like China, United States and Norway and will develop a framework for the SAARC member states to understand the infrastructural, commercial, institutional and regulatory requirement based on the assessment carried out during AS-IS study. ISGF will also leverage its experience and understanding of the EV market in order to identify the market development factors and come out with implementable suggestion to cater the growth of electric vehicles in the SAARC region. The suggestions will be featured as action points on policy and regulatory requirement, incentive mechanism, investment facilitation and institutional changes etc. which will help the SAARC member states to carry out successful implementation of electric vehicle and related infrastructure.

ISGF will also share its learnings from the previous projects like developing implementation roadmap for electrification of public transportation in Kolkata city, where it performed route analysis, review of charging standards, developed business models to optimise charging station investment, cost benefit analysis etc. to ensure successful delivery of the project.

5.7 Feasibility Study on Introducing Electric Vehicles in the Indian Sundarbans Landscape with special focus on the forest fringe island parts of Sundarbans – World Wide Fund for Nature (WWF-India)

ISGF in association with WWF-India which is a conservation organization having international network is doing a Feasibility Study on introducing electric vehicles in the Indian Sundarbans. The project requires ISGF to carry out review and assessment of existing policies and regulations on electric vehicle published by different states along with availability of electric vehicle technology in the market including standards for charging infrastructure, battery, motor etc. Route assessment study had been conducted based on the passenger density, coverage of important infrastructure like schools, hospitals by these routes, number of vehicles operating in the route etc. Based on this assessment along with the review of physical and electrical infrastructure, institutional structure and availability of financing options, an action plan has been developed to accelerate the deployment of electric vehicle in the Sundarbans area focusing mainly on electric three-wheeler. A public outreach advocacy program will be carried out to provide the stakeholders at grass root level with adequate knowledge on technology, operating procedure and benefits of electric vehicle in terms of commercial, social and environment benefits and also to understand their viewpoint on the implementation of the same in the Sundarbans area.

5.8 Energy Storage System Roadmap for India

India launched one of the World’s largest renewable energy (RE) programs in 2015 with a target of 175 GW RE by 2022. In order to integrate the intermittent RE resources with the grid, energy storage systems (ESS) are necessary. Grid level ESS are essential to store surplus energy at the time of over-generation and feed this energy into the grid during peak hours besides smoothening the intermittency of the variable generation from the RE resources. Apart from grid support applications, ESS are required in India for a variety of applications such as electric vehicles (EV), uninterrupted power supply (UPS) systems, DG set replacement, telecom towers and other applications. ISGF prepared an ESS Roadmap for India for the period 2019-2032. This work was carried out in coordination with key government agencies and ministries and estimated a total ESS requirement of 178.5 GWh till 2022.
5.9 Blockchain based P2P Trading Platform for Trading of Rooftop Solar Energy - Demonstration Project in UPPCL

Increased adoption of distributed generation, energy storage, and other smart devices are working in tandem to generate new opportunities and threats for centralized control operations and energy markets. Blockchain provides businesses with a potential route to better navigate these changes by optimizing the use of ever-increasing volumes of energy data and providing organizations and individuals with new ways of transacting and building a trustworthy energy transaction management network without the need for a central authority. In recent years, the installation of decentralized energy systems, mainly solar photovoltaics, has been the most cost-effective solution to rising energy access rates.

ISGF has been awarded a project by Uttar Pradesh Power Corporation Ltd. (UPPCL) in partnership with Power Ledger, Australia, as Uttar Pradesh Electricity Regulatory Commission (UPERC) has released ground-breaking regulations to enable peer-to-peer (P2P) trading in Uttar Pradesh, India. By allowing P2P trading between rooftop solar owners and neighbouring households, these regulations facilitate community net metering. This move will serve as a demonstration of the feasibility and efficacy of blockchain as a technology that helps with recent changes to RTPV regulations.

5.10 ToU Tariff Framework for Gujarat

The energy sector is among the major emitters of greenhouse gases. Demand Side Management (DSM) is an important method of reducing and managing energy consumption at the user end. Due to the cooling needs of the various industrial, commercial and residential users, the demand for electricity is greatest in the afternoon during the summer months. Load Shedding and the Use of Peak Power Plants are two of the most common methods of handling such heavy loads in India. One of the most innovative and economical DSM tool of countering climate change is the implementation of Time of Day (ToD) or Time of Use (ToU) Tariff. Gujarat has introduced the Time of Day (ToD) tariff; and bringing this to Time of Use (ToU) will serve as a case for evaluating the policy's effect on generation companies, transmission and distribution consumers, and subsequently the environment.

5.11 Study for Electric Vehicle Charging Infrastructure Planning and Rollout for Bangalore City, Karnataka, India

India's decarbonization policies to tackle greenhouse gas (GHG) emissions and drive new economic opportunities while enhancing citizens' quality of life have made the transport sector one of the Government's main areas of focus. To address this issue, GoI launched National Electric Mobility Mission Plan (NEMMP) in 2013, which aims to achieve national fuel security by promoting hybrid and electric vehicles in the country. The Government has also introduced the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles Scheme under NEMMP 2020 to rapidly track this development. Under the FAME II scheme, Indian government has approved the setting up of 2,636 EV charging stations around the country spread across 62 cities in 24 states and union territories.

Bangalore is one of India's leading cities for adopting electric vehicles, with efforts by both private and public players to track the transition quickly as envisaged in Karnataka's electric vehicle policy. Bangalore Electricity Supply Company (BESCOM) has developed a plan for installing 678 public charging stations. In addition, Bangalore is expected to install 112 charging points at 82 locations.
5.12 Scaling up of Electric Mobility Deployment for the Transport Department of West Bengal, India

With FAME II scheme of Govt of India in place, West Bengal Transportation Corporation (WBTC) had intended to procure 500 electric buses for four cities namely, Kolkata, new Town, Haldia, Asansol-Durgapur and Siliguri-Jalpaiguri. To facilitate this procurement World Bank had requested ISGF to provide advisory service to WBTC and help them with preparation of Expression of Interest to be submitted to Department of Heavy Industries (DHI) for availing subsidy for procurement of electric buses. The scope of the project “Advisory Services on scaling up of Electric Mobility Deployment for the Transport Department of West Bengal, India” also involved preparation of bid document including Request for Proposal and Operators Agreement for selection of operator and procurement of the electric buses for which DHI has allocated subsidy to WBTC.

ISGF has also organised an EV summit in Kolkata along with World Bank and WBTC to facilitate experience sharing and stakeholder consultation and provided international experts to share their experience and recommendations on battery technology, electric bus and charging station operation and grid integration which will catalyse the growth of electric vehicle deployment in the state of West Bengal.

In addition, ISGF is also preparing a Roadmap for Private Sector Participation in EV in the state of West Bengal which will define the steps that need to be undertaken on policy, institutional development, business model etc. to accelerate the participation of private sector in electrification of public transportation in the state.

5.13 EOI and DPR preparation for Alfanar Company for availing incentives under Fame India Scheme Phase II for deployment of EV charging infrastructure within cities

Under the FAME-II Scheme, Govt of India (GoI) intends to support the development of EV charging infrastructure by extending the capital grant to different organizations working with city government for the promotion of the use of Electric Vehicles (EVs). Accordingly, an EOI has been issued by Department of Heavy Industries (DHI) for inviting proposals from Urban Local Bodies (ULBs)/municipal corporations, PSUs (State/Central) and public/private entities desirous for development of EV charging infrastructure in different states/cities.

Alfanar Company of Saudi Arabia has requested ISGF to prepare the Expression of Interests (EOIs) to be submitted to Urban Local Bodies (ULBs)/Municipal Corporations for availing incentives for deployment of EV charging stations in 21 cities. In addition to the EOIs, ISGF has also prepared detailed Project Report on implementation of EV charging stations in those cities including business model evaluation and detailed cost and revenue assessment associated with EV charging station deployment.

Establishment of Charging Infrastructure to Support Deployment of Electric Buses in Kolkata

West Bengal Transport Corporation (WBTC) has procured 80 electric buses under FAME scheme, to initiate the process of transition of public transportation to electric vehicles. WBTC will also implement 60 slow charging stations and 20 fast charging stations in its nine depots and nine bus terminus to support the EV implementation process.

The project on “Establishment of Charging Infrastructure to Support Deployment of Electric Buses” in Kolkata was awarded to ISGF by World Bank in order to ensure successful pilot implementation and operation of the electric buses and charging stations procured by West Bengal Transport Corporation.
for Kolkata city. The project requires ISGF to review the technical specification of both the electric bus, its components like battery, motor and the chargers that are being supplied by Tata Motors as a part of this project. As a part of this review, ISGF will carry out detailed assessment of electricity input requirement, readiness of the electrical facilities to support the charging infrastructure like transformer capacity, distribution cabling etc. and will also carry out site assessment of the bus depots where charging stations will be installed to figure out any additional civil work requirement in those sites.

In addition to assessment of technical requirements, ISGF will also support WBTC in preparation of bidding documents for procurement of contractor services, standard operating procedures for operation of the electrical infrastructure including battery, charging stations etc. and will also assess the future possibilities of PPP arrangements and private investment in the charging infrastructure domain and provide recommendation for the same. Capacity building exercises for the concerned stakeholders will also be carried out in the form knowledge exchange workshops, training programs for reskilling of vehicle mechanics etc.

ISGF will leverage its experience from previous projects to ensure successful delivery of the project. For example, ISGF previously carried out a project on “Implementation Plan for Electrification of Public Transportation in Kolkata” where it had carried out route analysis, assessment of battery chemistry, charging rate and sizing, power requirement etc. and provided recommendation on optimization of both investment and asset utilization.
6.0 ISGF Events and Workshops

6.1 ISGF Events

6.1.1 India Smart Utility Week 2020

ISGF’s flagship annual event, the India Smart Utility Week (ISUW), an International Conference and Exhibition on Smart Energy and Smart Mobility for Smart Cities, was held from 03 – 07 March 2020 in New Delhi. ISUW 2020 was attended by 1570 participants from 23 countries. Key themes of ISUW 2020 were: (i) Towards a Net Zero Energy Power Sector and (ii) Towards a Carbon Neutral Transport Sector. The event had 13 Thematic Sessions, 4 Special Plenaries, 5 Bi-lateral Workshops, 7 Parallel Events, 4 Tracks of Master Classes and 2 Technical Tours. In total 269 eminent experts spoke in the event. ISUW 2020 Conference and Exhibition was inaugurated on 4th March 2020. The Dignitaries present at the Inaugural Ceremony were Sanjeev Nandan Sahai, Secretary, Ministry of Power, Government of India (GoI); Ashutosh Sharma, Secretary, Department of Science and Technology, GoI; Ugo Astuto, EU Ambassador to India; Barry Gardiner, Member of Parliament for Brent North, House of Commons and Shadow Secretary of State for International Trade and Climate Change, UK Neil Chatterjee, Chairman, Federal Energy Regulatory Commission, USA; Debasish U Banerjee, Managing Director, CESC Kolkata; Stephen Dutnall, Technical Officer and SyC SE Secretary, IEC; N Venu, Managing Director, ABB POWERGRID India; Praveer Sinha, CEO and Managing Director, Tata Power Company Ltd; and Reji Kumar Pillai, President, ISGF and Chairman, GSGF. Honourable Minister for Power, New and Renewable Energy and Skill Development and Entrepreneurship Raj Kumar Singh delivered a special address at ISUW 2020. On March 04, 2020 at the plenary session on Regulations Enabling Energy Transition along with PK Pujari, Chairman, Central Electricity Regulatory Commission (CERC), India; Neil Chatterjee, Chairman, Federal Energy Regulatory Commission (FERC), USA; Barry Gardiner, Member of Parliament for Brent North, House of Commons and Shadow Secretary of State for International Trade and Climate Change, UK; and Eija-Riitta Korhola, Former MP, European Parliament. ISUW 2020 offered an excellent platform for utility and government officials, regulators, experts from technology providers and academia for networking and experience sharing with their peers from around the globe. The event was supported by Ministries of Power; New and Renewable Energy; Science and Technology; Housing and Urban Affairs; Commerce and Industry; Environment, Forest and Climate Change; Jal Shakti; Niti Aayog; Smart Cities Mission; and institutions such as Ease of Doing Business, IESA, IEEE, GSGF, MacArthur Foundation, CIGRE, CBIP, ISB, AHEM, ISGAN, VJTI, IEC, CEN, CENLEC, TERI, CEEW, NCIPC, CII, WWF, APUEA, GBCI, TIE DELHINCR, IGEF, ICLEI, FSR, AEEE, DER LABS, Brookings India, IEEE, PhD Chamber of Commerce, Bus World Academy, Natural Gas Society, National Water Mission, Think SmartGrid, France, Central Water Mission, Agnii, JSCA, ACMA, NEERI and GERMU. ISUW 2020 witnessed deliberations on the key issues and trends in Power, Water, Gas, and Electric Mobility domains. Over 264 senior officers from Indian utilities, regulatory commissions and government departments participated to discuss on the latest developments, trends and technologies. ISUW 2020 witnessed launches of (i) Sweden – India Joint Call on Smart Grids; (ii) European Union – India Joint Call on Integrated Local Energy Systems; and (iii) SEW Innovation Fund. ISUW 2020 had four Special Plenary sessions on: (i) Regulations Enabling Energy Transition, (ii) Power Systems Security in the Era of Cyber Wars, (iii) Women in Energy and Energy Transition; and (iv) Future Skills for the Jobs in 2030s. Parallel workshops on variety of topics were organised at ISUW 2020 such as (i) Global Perspectives on Energy Transition and Smart Grids – in collaboration with Global Smart Grid Federation; (ii) Interconnection of Regional Grids in Asia: SAARC Grid – GCC Grid – ASEAN Grid; (iii) Optimizing Electricity Grids by District Energy System Integration in partnership with APUEA; to these workshops and sessions, 5 Bilateral Smart Grid workshops were held with USA, European Commission, Sweden, France and Switzerland to facilitate joint research, project partnerships and
collaborations, experience sharing and knowledge dissemination. As part of ISUW 2020, an exhibition was also organised to showcase latest technology and projects on various domains of Smart Grid from India and around the world. There were 31 exhibitors who exhibited at the event. European Union brought 15 successful Smart Grid Projects executed in Europe that are relevant to India as part of the European Pavilion at ISUW 2020. The Master Class Themes at ISUW 2020 were: (i) Digitalization (ii) E-Mobility (iii) Advanced Cyber Security; and (iv) Energy Storage Systems. Two Technical Tours were also arranged on the last day which took participants to (i) Smart Grid Lab and 10 MWh Battery Energy Storage System (BESS) at Tata Power DDL, New Delhi and (ii) Renewable Energy Management Centre (REMC) and National Power Systems Control Centre, New Delhi. The Valedictory Session of ISUW 2020 was chaired by PR Kumar, CEO BSES Yamuna Power Ltd and Reji Pillai, President, ISGF and Chairman, GSGF. The 4th edition of ISGF Innovation Awards Ceremony was held on 6th March 2020 along with ISUW 2020 Gala Dinner. These awards are given to recognize and promote some of the outstanding innovations by utilities, technology providers and start-ups. This year ISGF received 127 nominations from 84 organisations for 8 award categories. 27 winners were felicitated at the awards ceremony of ISGF Innovation Awards. Overall, ISUW 2020 was an enriching experience for all stakeholders.

6.1.2 ISGF Innovation Awards 2020

ISGF hosted 04th Edition of the ISGF Innovation Awards as part of sixth edition of ISGW 2020 which recognized individuals and organizations from public and private utilities, service providers, urban local bodies, technology companies, researchers and academia that have set new benchmarks in Smart Grid and Smart City domains. The prestigious awards showcase the globally growing smart ecosystem and foster global partnerships.
Winners of 04th ISGF Innovation Awards 2020:

Best Smart Grid Project in India by Utility
Power System Operation Corporation Ltd (POSOCO)
Diamond Category

Best Smart Grid Project in India by Utility
BSES Yamuna Power Limited
Platinum Category

Best Smart Grid Project in India by Utility
TATA Power Delhi Distribution Limited
Gold Category

Best Smart Grid Project in India by Technology
Company
SunMoksha Power Private Limited
Diamond Category

Best Smart Grid Project in India by Technology
Company
Fluentgrid Limited
Platinum Award

Best Smart Grid Project in India by Technology
Company
Larsen & Toubro Construction Limited
Gold Award
Most Reliable Supply of Electricity by Utility in India
BSES Rajdhani Power Limited
Diamond Award

Most Reliable Supply of Electricity by Utility in India
The Tata Power Company Limited
Platinum Award

Most Reliable Supply of Electricity by Utility in India
Adani Electricity Mumbai Limited
Gold Award

Smart Technology
Kreate Energy (I) Pvt Ltd
Diamond Award

Smart Technology
TATA Power Delhi Distribution Limited
Diamond Award

Smart Technology
GPS Renewables Private Limited
Platinum Award
Smart Technology
Solinas Integrity Private Limited
Platinum Award

Smart Technology
Larsen & Toubro Construction Limited
Gold Award

Smart Technology
TATA Power Delhi Distribution Limited
Gold Award

Smart Technology
Adani Gas Limited
Gold Award

Innovative EV of the year – EV and EVSE Rollouts
Bangalore Electricity Supply Company Limited
Diamond Award

Innovative EV of the Year – Two Wheeler
Liger Mobility Private Limited
Diamond Award
Innovative EV of the Year – Three Wheeler
Strom Motors (E14 Technologies Pvt Ltd)
Platinum Award

Innovative EV of the Year – EV and EVSE Rollouts
Energy Efficiency Services Limited
Gold Award

Smart Start-up of the Year
Nocca Robotics Private Limited
Diamond Award

Smart Start-up of the Year
Greenovative Energy Pvt Ltd
Gold Award

Smart Start-up of the Year
GLYD – A Mahindra Initiative
Platinum Award
6.1.3 Distribution Utility Meet (DUM-2019)

ISGF organised the third edition of Distribution Utility Meet (DUM) 2019 from 07 to 08 November 2019 in New Delhi, hosted by BSES Rajdhani Power Company Limited, BSES Yamuna Power Company Limited, Tata Power Delhi Distribution Limited and The Tata Power Company Ltd. DUM is a platform that provides a unified voice to influence and enable the DISCOM community to leverage each other’s experiences for successful nationwide smart grid roll outs and to bridge the gap between strategy and execution. Majority of Electric Utilities in India gathered at DUM 2019 and shared their experiences and challenges in Grid Modernization. DUM 2019 was inaugurated by Shatrujeet Singh Kapur, CMD, UHBVN and DHBVN. Other dignitaries who addressed the audience included PR Kumar, CEO, BSES Yamuna Power Company Limited; Ganesh Srinivasan, Chief Corp Operations – T&D, The Tata Power Company Ltd; Amal Sinha, CEO, BSES Rajdhani Power Limited and Jean Michael, Director, Florence School of Regulations. DUM 2019 was attended by more than 350 Utility Officials from 45+ Indian Utilities. International Utilities such as KEPCO, ENEL, EDF State Grid of China and Nepal Electricity Authority were present in the conference. DUM 2019 addressed themes such as New Programs and Projects for 24x7 Quality Power, Sustainability of DISCOMs, Grid Integration of DER and EV’s, New Technologies and Challenges, Utility Enablement and Voice of the Customer in the Digital Era. This year, a Special Session with City Gas Distribution Utilities was also organised during DUM. ISGF has been organizing DUM since 2017. The first edition of DUM in 2017 was hosted by Bangalore Electricity
Supply Company (BESCOM) in November 2017 in Bangalore and the second edition was hosted by The Tata Power Company Ltd., Mumbai and Tata Power Delhi Distribution Limited in November 2018 in Mumbai.

6.2 ISGF Training and Capacity Building Programs
6.2.1 Advance Metering Infrastructure (July 2019)

The metering industry has taken rapid strides in the recent past few years by traversing from automated meter reading (AMR) to smart metering, using bi-directional communication, thereby enabling greater benefits to electricity distribution companies (DISCOMs), customers and society. AMI is a new concept that involves in-depth knowledge of three distinct technologies: metrology, telecommunications and IT. The DISCOMs are well versed with the electrical technologies of the electricity grid, but when it comes to telecommunications and IT, their expertise is limited. Besides the fact that AMI is an evolving technology adds to the challenge. With this background ISGF had organised a 2 days Training Program on Advance Metering Infrastructure (AMI) from 04 – 05 July 2019 in New Delhi to impart knowledge about the nuances of smart metering, architectures, standards, business models and implementation experiences of past projects. The course was inaugurated by AK Verma, Joint Secretary, Ministry of Power. The Course was attended by 55 participants from Distribution Utilities, Academic Institutions and Industry. The course was tutored by various experts from India and Overseas such as Glen a Pritchard -PECO Energy, USA; Cedric Lavenu, Expert Research Engineer, EDF, France; Kaveh Razazian, CTO, Sagemcom, France; Ajoy Rajani, Chair of ISGF WG Group on IoT, Smart Metering, AI and Analytics; Vikas Kashyap, ISGF; Rajeev Kharyal, General Manager, TPDDL; Marc Delandre, Chairman, G3PLC Alliance; and Pankaj Batra, Former Chairperson CEA and WG Chair on Policy, Regulations and Business Models

6.2.2 Electric Vehicles and Charging Infrastructure (July 2019)

India has taken various initiatives to stimulate demand and expedite the adoption of Electric Vehicles (Evs) in the country. GoI has set an ambitious plan to introduce 6-7 million Evs by 2022. In order to achieve this target, it is necessary to build charging infrastructure and electricity distribution grid upgrades. GoI has already issued clarification that anyone can setup public charging stations. Sustainable business models for running charging stations need to be evolved. Above all, it is important to create talent pool of professionals to build a conducive ecosystem around the entire gamut of EV business. With this background ISGF organised a 2 days Training Program from 18 – 19
July 2019 at New Delhi which was attended by over 50 participants from Electric Utilities, Transport Operators, EV and Component Manufacturers, Academia and Research, Manufacturers etc. The course was tutored by Ravi Seethapathy, GSGF – Ambassador for Americas and Chairman, Biosirus, Canada; Akshima T Ghate, Principal, Rocky Mountain Institute; Rahul Walawalkar, President & MD, IESA; Prabhjot Kaur, CEO, Centre for Battery Engineering and Evs, IIT-Madras; Aditya Ramji, Economist, Mahindra Electric; Paresh Bhatt, Chief of New Business, Tata Power Company Ltd; Aishwarya Raman, Associate Director, Ola Mobility Institute; Aqueel Ahmed, CARET, Aligarh Muslim University (AMU).

6.2.3 Cyber Security for Power Systems

Smart Grid is a modernized electric grid that uses the Information and Communication Technology (ICT) referred to as the next-generation power system and expected to improve the reliability, resiliency and efficiency of future power systems with larger share of Renewable Energy (RE) sources. In today’s world, reliability requires Cyber Security. A cyber-attack on the power grid could result in complete disruption of all activities in the society. Cyber Security is a growing concern and a key success factor for smart grid deployment. With a mandate to build capacity of Electricity Distribution Company personnel, ISGF regularly organises training programs on various domains of Smart Grids. ISGF, in association with the National Critical Information Infrastructure Protection Center (NCIIPC) and Veermata Jijabai Technological Institute (VJTI), Mumbai has conducted Six Training programs on Cyber Security for Power Systems in the past 4 years. ISGF in participation with NCIIPC and VJTI organised the 7th Training Program on Cyber Security for Power Systems on 29 – 30 August 2019, New Delhi. The course was attended by 36 participants from Utilities, Academic Institutions and Research Organizations. The program was inaugurated with special addresses from Dr Ajeet Bajpai, Director General, NCIIPC; Dr Muktesh Chander, Special Commissioner – Operations, Delhi Police; and Kamlesh Kumar Mishra, Director, Ministry of Power, Government of India.
6.2.4 NITI Aayog, Ministry of Power and ISGF Jointly Organized Key Stakeholder Consultation Workshop on the Energy Storage System (ESS) Roadmap for India

ISGF has prepared an Energy Storage Roadmap for India with the objective to help policy makers and utilities in decision making related to investments in energy storage for integration of renewable energy leading to a reliable and low carbon grid in India. The project evaluates the impact of distributed energy generation sources and electric vehicles on the distribution grid and the techno-commercial viability of energy storage solutions to overcome the grid integration challenges. The Roadmap was developed in association with India Energy Storage Alliance (IESA) and supported through a grant from MacArthur Foundation. On 16th July 2019, NITI Aayog, Ministry of Power and ISGF jointly organized the Key Stakeholder Consultation Workshop in New Delhi for presenting the Draft Energy Storage System Roadmap for India and take suggestions for finalizing the Roadmap. Workshop started with the Welcome Address by Reji Kumar Pillai, President, ISGF and Special Address by Anand Kumar, Chairman, GERC; Arbind Prasad, Chairperson, JERC and Inaugural Address delivered by RP Gupta, Additional Secretary-Energy, NITI Aayog. The session was followed by the panel discussion on Policies and Regulatory Support for Energy Storage Systems chaired by Anand Kumar and moderated by Ravi Seethapathy. An interactive session on Early Experience with Energy Storage Systems in India was Chaired and Moderated by Vishal Kapoor, Director, Ministry of Power. Giga-Scale Battery Manufacturing Program in India-Overview was presented by NITI Aayog.
6.2.5 Brainstorming Session on Addressing India’s Urban Water Crisis using Smart Technologies

ISGF has continuously worked for development and advocacy of Smart Grids and Smart Cities in India since its inception, it now plans to replicate its journey of the Smart Grid domain in the Smart Water Distribution Domain. ISGF organized a Brainstorming Session on “Addressing India’s Urban Water Crisis Using Smart Technologies “on 17th July 2019 at CBIP Building, Chanakyapuri, New Delhi, India. The Brainstorming session was attended by senior officials from India’s leading water utilities, technology providers, top-notch domestic and international technical experts. Dr Smita Misra, Lead Water and Sanitation, World Bank Delivered the inaugural address and shared her views and world bank’s initiatives on the water sector in the country. Presentations were made by Avinash Kumar, Vice President, SEW, Ravi Seethapathy, Executive Chairman, Biosirus Inc. Canada and Neville Bhasin, Forbes Marshall and Ajay Pradhan, CEO, Cetus Consulting and Solution Services, Sukanya Randhawa, AI Researcher, IBM and Klas Lundgren, Senior Adviser Asia, Solarwater PLC. The stakeholders discussed trends, share best practices in the water domain.

6.2.6 Brainstorming Session on Next Round of Programs and Projects to ensure 24X7 Power for All

The emergence of India as a strong economic power is receiving widespread recognition in the world. Having completed household electrification through SAUBHAGYA, next challenge is to provide 24x7 electricity to all the households for which new technologies and smart grid systems are required. To achieve this goal, Government of India (GoI) has launched several programs with multi-billion-dollar funding. Although India has successfully completed village electrification and universal access to electricity for all, still it is a long march for the Indian power sector to achieve the goal for 24x7 quality Power for All. To explore and gather ideas from different stakeholders regarding this goal, a Brainstorming Session on “Next Round of Programs and Projects to ensure 24x7 Power for All” was organized by ISGF on 23 April 2019 in New Delhi. The event was supported by Ministry of Power, Govt of India and National Smart Grid Mission. The Brainstorming Session witnessed participation of key experts from Government, Think Tanks, International Development Agencies, Regulators, Academia
and Research. RP Gupta, Additional Secretary –Energy, NITI Aayog and Arun Verma, Joint Secretary, Ministry of Power chaired the session.

6.2.7 Technical Workshop on Power Quality of Smart Grids & EV Charging Infrastructure by ISGF, Business Sweden, & Swedish Energy Agency

ISGF in collaboration with Business Sweden & Swedish Energy Agency organised a Technical Workshop on Power Quality of Smart Grids & EV Charging Infrastructure on 28 August 2019. The objective of the workshop was to build on the previous dialogues held between India and Sweden. The aim was to find opportunities for collaboration related to Smart Grid technologies and rapid yet profitable expansion of Electric Vehicle charging infrastructure through new insights on technology, enabling policy framework, and the role of various stakeholders. Business Sweden, Swedish Energy Agency (SEA) and ISGF in association with Swedish Smart Grid Forum (SSGF) have organized three Sweden-India Smart Grid workshops as part of ISGF’s annual flagship event India Smart Grid Week (ISGW) in 2016, 2017 and 2018.

6.2.8 SAARC Energy Centre Dissemination Workshop for the Study on “Development of Roadmap for Implementation of Smart Grid: Concepts, Practices and Technologies in SAARC”

ISGF has been awarded the project Study “Development of Roadmap for Implementation of Smart Grid-Concepts, Practices and Technologies in SAARC Region” by SAARC Energy Centre, ISGF had carried out detailed assessment of power sector of the eight SAARC member states and developed a smart grid framework along with a milestone matrix defining the key smart grid activities needed to enhance the business and operational performance of the utilities. ISGF also identified various projects that need to be implemented in SAARC member states as part of near-term smart grid interventions. To disseminate the findings of the study among the leaders from the power sector in SAARC member states, SAARC Energy Center in collaboration with Department of Hydropower and
6.2.9 Stakeholder Workshop in Design of Time of Use (ToU) Electricity Tariff in the State of Gujarat

ISGF has embarked on a project “Design of Time of Use (ToU) Electricity Tariff in the State of Gujarat”, with the objective to review and analyse the effect of real time pricing of electricity on consumers behaviour and its subsequent impact on generation, transmission and distribution utilities of Gujarat. This project is funded by Shakti Sustainable Energy Foundation (SSEF) and is supported by Gujarat Energy & Petrochemicals Department (GEPD) and Gujarat Electricity Regulatory Commission (GERC). On 6th December 2019, ISGF organised Stakeholders Consultation Workshop in Gujarat to take feedback from stakeholders for detailed design and implementation strategy. The workshop was inaugurated by Shri Anand Kumar, Chairman, GERC and special address was delivered by Shri Pankaj Joshi, Principal Secretary, GEPD and Shri Mahesh Singh, Managing Director, UGVCL.

6.3 Bilateral Workshops and Roundtables
6.3.1 Third France-India Workshop, New Delhi, India

France-India workshop was organized in March 2020 at New Delhi on the sidelines of India Smart Utility Week 2020 in collaboration with Think Smart Grids which brought a powerful delegation from France comprising of seasoned experts and technocrats.

The workshop was addressed by a line of senior leaders from government departments, solution providers and research institutes to share information on French expertise and technologies and solutions being successfully implemented in France. Also, to find out the challenges and corresponding issues plaguing energy market and to provide right solutions for them. The Welcome Address was given by Valerie-Anne Lencznar, Managing Director of Think Smart grids. The Special addresses were given by AK Verma, Former Joint Secretary, Ministry of Power and Antoine Jourdain, CTO, Enedis AK
Verma was also chair of the session which was moderated by Anant Venkateswaran, ISGF and Aurélien Southpointe, Head of Industries & Cleantech department in India, Business France.

The workshop was broadly divided into two parts. Session 1 dealt about topics like (I) Microgrids and Islanded Networks (II) New Technologies for Distribution Utilities (III) Financing Smart Energy: Perspective and New Trends in India. The presenters of this session from French as well as from Indian sides were- Christophe Feuillard, EDF International Networks, Vice President for Asia; Stéphane Jamet, Head of Microgrids, Enedis; MK Gupta, CEO, TATA Microgrid; Ashok Das, Founder and CEO, Sun Moksha; Manish Kumar, Director Digital Sales, GE Power; Deepak Pandey, Operations Leader, GE Software solutions – South Asia; Philippe Serres, Regional Director South Asia, AFD; Kedar Sawant – Project Manager, Energy, Environment and Digital Transition, AFD. Session 2 discussed on the challenges of Data for Tomorrow Utilities”. The Key topics discussed in this session were (I) Practical experience of implementing successful Smart Grid project relevant to the Indian Market and (II) T&D Asset Performance Management Systems. The session two were presented by Paul da Cruz, Global Head of Business Development – Energy and Utilities, ATOS; Muralidharan Ramachandran, Director, ATOS India; Anil Kadam, Solution Architect, Schneider Electric India; Anil Kadam, Solution Architect, Schneider Electric India; Paul Da Cruz, Atos; Rakesh Pandey, AGM, NTPC. The closing remark was given by Dana Purcarescu, Deputy Chief of Mission, French embassy.

6.3.2 Eighth EU – India Smart Grid Workshop, Paris, France

ISGF in collaboration with the European Commission (EC), organized the 8th EU – India Smart Grid Workshop and 3rd EU – India Electricity Market Regulation Workshop in Paris, France. These workshops were held in conjunction with European Utility Week (EUW 2019) scheduled from 12 – 14 November 2019 in Paris. The workshop was attended by high-level officials from Ministry of Power, Govt of India; Electricity Distribution Companies; Central and State Regulatory Commissions and Technology Companies in India and Europe. The importance of EU-India cooperation on Smart Grid has been underlined in the Joint Declaration on a Clean Energy and Climate Partnership adopted by EU and India on the occasion of the visit by India’s Prime Minister Modi to the European Leaders in Brussels on 30 March 2016. As a continuation of this dialogue, further projects and research exchanges between EU and India are envisaged in the near future. In the past, several EU-India Smart Grid Workshops have been organized in Europe and India by ISGF and EC from 2015 onwards: Nice (June 2015), Bornholm, Denmark (September 2016) and New Delhi (March 2016, March 2017, March 2018, March 2019), Florence, Italy (November 2019). The workshop focused on the integration of storage and EV in Smart Grids. The trends, issues, policy and regulatory frameworks that dictate the future of ESS.
6.3.3 EU – India Smart Grid Workshop, New Delhi, India

Office of DG ENER in association with ISGF jointly organized the Ninth India EU workshop in Delhi on March 2020 at New Delhi, India. The inaugural address for the session was given by Mrityunjay Kumar Narayan, Joint Secretary, Ministry of Power and Matthieu Craye, European Commission, DG ENERGY. The sessions were moderated by Christophe Arnoult, EDF. The workshop was broadly divided into two parts. Session 1 - GRID SCALE ENERGY STORAGE: SYSTEM NEEDS, MARKET DESIGN AND REGULATORY ISSUES. The panelists of this session were Praveer Sinha, CEO & MD, Tata Power Company Ltd; Subir Sen, Executive Director, POWERGRID; Patrick Clerens, Secretary General Energy Technologies Europe, European Association for the Storage of Energy (EASE); Pradyumna Bhagwat, Research Fellow, Florence School of Regulations; Amit Kumar, Partner (Clean Energy), PwC India; Luis Miguel Costa, Head of Digital Solutions, L&T; Naveen Nagpal, General Manager (Renewables, BESS & E-mobility), BSES Rajdhani Power Ltd. Session 2 talked about GRID SCALE ENERGY STORAGE SYSTEM Projects In European Union And India.

The panelists were Rémy Garaude-Verdier, Energy Storage in the Interflex Project, Enedis; Álvaro Nofuentes Prieto, Energy Storage in the Crossbow Project, ETRA; Jitendra Nalwaya, Head – System Operation & Sustainability, BYPL; Sebastian Marx, Director Public Affairs, Texel Energy Storage; Rupam Raja, Director, Fluence, India. Given the need for India and Europe to integrate more Renewable Energy Sources (RES) and therefore the need to provide more flexibility to the power system, it is important to develop, demonstrate and deploy Energy Storage Systems (ESS) for flexibility at grid scale. ESS at grid level could offer balancing services (FCR, FRR) and contributes to power quality (e.g. voltage control and angular stability). This workshop started by setting the scene from a TSO perspective and the challenges the TSOs face with increasing share of RES in the energy system, from the European as well as from the Indian perspectives. Then Market Design was addressed by on the one hand showing the state of thinking of the Indian Regulator to be followed by sharing regulatory experiences from Europe (existing regulatory framework and possibilities to evolve for a better ESS uptake). Finally, project developers as well as equipment suppliers shared examples of successful grid scale energy storage projects.

6.3.4 Fourth Sweden India Smart Grid Workshop

The Swedish Energy Agency and Team Sweden in India had organised the 4th Edition of Sweden India Round Table in New Delhi, India as part of ISUW 2020. This edition of the roundtable discussions had been focused on the theme “Development of Sustainable, Secure and Efficient Smart Grids”. The discussion had been led by Anant Venkateswaran, Swedish embassy, Department of Science and Technology; the Swedish Energy Agency. Several Swedish companies participated alongside a host of local actors including distribution companies, universities and private sector. As integral part of ISUW 2020, the round table had brought together a line-up of leaders within the Smart Grid sector from both countries who had discussed both challenges and opportunities across various segments of smart grids.
The roundtable a) Continued the active knowledge exchange between India and Sweden within the area of Smart Grids and Electric Vehicle infrastructure b) Highlighted areas of challenges and opportunities and for collaboration with India and c) Provided input to the upcoming joint call for submission. The round table also provided a detailed overview of the India Sweden Joint Call on Smart Grids which will be supported by the Swedish Energy Agency and Department of Science & Technology, Government of India.

The opening remarks were given by Sanjay Bajpai, Head of Technology Missions Division (Energy, Water & all Other), Department of Science & Technology and Ludvig Lindstrom, Country Manager India, Swedish Energy Agency. The panelists of the sessions were Sandip Sinha, Vice President Microgrid and Head Renewables, ABB; Abhishek Ranjan, AVP – Renewables & DSM, Power Planning & Scheduling, BSES Rajdhani Power Ltd. (BRPL); Ashok Das, Founder and CEO, Sun Moksha; Andreas Winter, Co-CEO, Swedish Neutral; Amrish Kubavat, Business Development Manager, Metrum; Awadhesh Jha, Vice President – Charge & Drive and Sustainability, Fortum Charge & Drive India Pvt. Ltd; Anil Arora, Country Head, Cleanmotion.

6.3.5 Brainstorming /Roundtable on Interconnection of Regional Grids in ASEAN-SAARC and GCC Regions

A roundtable session was conducted on the topic “Interconnection of Regional Grids in Asia: ASEAN SAARC/BIMSTEC-GCC Grids” on 15th March 2019 in New Delhi as part of ISUW 2019. The roundtable was attended by key stakeholders from GCC, SAARC/BIMSTEC and ASEAN regions. The participants expressed interest on the concept and discussed various aspects of the Pan Asian Grid Interconnectivity. The technological, economic, environmental and social benefits were discussed in detail. The feasibility of various options and points of interconnections were looked into. Two potential interconnections were identified: (i) Oman-Gujarat undersea HVDC cable link and; (ii) Manipur-Myanmar-Thailand overhead line. A regional power market can only be functional in an interconnected regime. There is a regional power exchange already operational in the GCC region. There are domestic power exchanges operational in India. Efforts are on to initiate exchange based regional trade in the SAARC and ASEAN regions. Establishment of a South Asian Regional Power Exchange (SARPEx) has been recommended. The establishment of a regional power exchange in the very near future in the ASEAN region is also likely. The roundtable was attended by nine participants including the Ministry of Power, Power System Operation Corporation (POSOCO), United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), representatives of the Government of Bhutan and Sri Lanka, and private sector representatives from the power sector, involved in cross-border electricity trade. The discussion centred on the benefits of regional cooperation, the recent changes in the Guidelines for the Government of India and the subsequent
issue of the CERC CBET Regulations, grid interconnection status in ASEAN, SAARC / BIMSTEC and GCC regions, defined and existing interconnections, feasibility study for identified interconnections, other conditions which require interconnection and the development of power markets and future measures.

6.3.6 Smart City Water Distribution

Water is a critical resource that lies at the heart of social and economic growth. Water is essential for survival, and its absence can impact the health, food security, and livelihoods of families across the world. India’s water resources are under immense pressure due to declining per capita water availability, lack of storage capacity, and spatial and temporal variation. ISGF conducted The Smart City Water Distribution Workshop in collaboration with Council on Energy, Environment and Water (CEEW) on March 2019 at Hotel Lalit, New Delhi on the side-lines of India Smart Utility Week (ISUW 2020). The Workshop was attended and witnessed by participants and delegates from Ministries, Municipal Corporations, and several Technology Solution providers from India and Abroad. The workshop started with a welcome address by Gaurang Rathi, Municipal Commissioner, Varanasi. The workshop was broadly divided in two parts: PART:1 - Water Distribution System in the Digital Era: Challenges, Opportunities and Solutions. The session was chaired and moderated by Ajay Pradhan, President and CEO, C2S2. The panellists of this session were Sunil Kumar, Director, Basin Planning, Central Water Commission and Dherminder Mohan, Regional Head, Forbes Marshall. PART:2 - Water Resource Utilization: Future Strategy, Innovations & New Approach for Emerging Technologies.

This session was chaired by G Asok Kumar, Mission Director, National Water Mission and moderated by Neville Bhasin, Business Developer, Forbes Marshall. The panellists were Abbha Sargaonkar, Sr Principal Scientist, NEERI; RD Yogi, Executive Engineer, Delhi Jal Board, Delhi Govt; RP Singh, VP, Strategic Partnership, Smart Energy Water; Ali Hosseini, CEO, SenRa.
6.3.7 US - India Smart Grid Workshop

The electric utility industry is in the midst of a global transformation which includes a strong focus on deploying new technologies to increase system digitalization as well as adjust to the decentralization of the electricity assets. Distribution utilities are challenged to embrace new business models to respond to these system changes, while increasing system reliability, resiliency, and sustainability. The Fifth US –India workshop was organized in conjunction with the India Smart Utility Week (ISUW) 2020 on 4 March 2020 in New Delhi. The Inaugural address was given by Dinah McDougall, Commercial Officer, Embassy of USA in India. The workshop was broadly divided into two parts. The panel talked about learnings in the United States and India on deployment and use of smart grid infrastructure, distributed energy resources (DERs) and software systems to respond to a shifting global landscape. Panel One speakers comprised of Neil Chatterjee, Chairman, Federal Energy Regulatory Commission; Larisa Dobriansky, Chief Business & Policy Innovation Officer for General Microgrids Inc. and former Deputy Assistant Secretary for National Energy Policy, US Department of Energy; Shalabh Srivastava, Country Director, RTI International India; Vish Ganti, Country Head, Autogrid discussed on models, utility use-cases, and examine value of the new systems to the utility and customer. Panellists also provided their perspective on what is an ideal market structure to best position electric utilities to support the grid of the future. Panel Two comprised of speakers from utility domain UN Behera, Chairperson, OERC; Mukesh Khuller, Member, MERC; Sabyasachi Pattanaik, Director-Regulatory Affair & Market Development, Oracle Utilities; Mukesh Dadhich, Assistant Vice President, BSES Yamuna Power Limited. This panel discussed about the policies and programs India is pursuing to leapfrog to E-Mobility and the challenges faced by utilities in creation of adequate EV charging stations to support the E-Mobility plans. In this panel, Indian Utilities and US Companies will share their experiences and views in supporting electric vehicles.

6.3.8 Workshop on Smart City Gas Distribution

ISGF conducted The Smart City Gas Distribution Workshop in collaboration with Indraprastha Gas Limited (IGL), Gas Authority of India (GAIL) and Natural Gas Society (NGS) on 15th March 2019 at Manekshaw Centre, New Delhi. The session was held on the side-lines of India Smart Utility Week. The workshop was divided in three sessions with three chairs convening the sessions. Session1 dealt on topic New Technologies, Innovations and Trends in CGDs. This session was chaired by Raman Srivastava, Chief General Manager, IGL. The panellists of this session were: - Sushil Kumar, Deputy General Manager, GAIL; Vinay Dixit, National Manager, Itron; Dharmendra Tomar, Dy. General Manager, Tata Communications’ Ramaswamy, Director, Oracle Utilities. Session 2 was on Customer Perspective; Current Requirements and Key issues. This session was chaired by Jiledar, Consultant, PNGRB and former Managing Director, Green Gas Limited. The panelists of this session were Sandeep Trehan, Founder and President, Think Gas; Anshumali Bhushan,
Co-Founder & Director, Genesis; Tarun Katiyar, General Manager, TPDDL. The final session of this was workshop was on Regulatory Perspective and Emerging Trends in Natural Gas Vehicles and was chaired by Vipin Chittoda, Convener, Natural Gas Society. The panellists of this session were Ranjan Dwivedi, Managing Director, Central UP Gas Ltd; Piyush Tripathi, Senior Vice President, Adani Gas; Amitabh Ranjan, DGM, GAIL; PK Banerjee, ED, SIAM; Raghav Mathur, Lead Energy Specialist, ICF.

6.3.9 World Smart Energy Standardization Co-ordination Workshop with IEC- IEEE

Third IEC – IEEE World Energy Standardization Coordination workshop was organized on at New Delhi, India. The purpose of this workshop was to facilitate what mechanisms are being used within each region to analyse existing smart energy standards that are provided by international and regional Standard Development Organizations (SDO). And how these findings are fed-back to SDO’s for the purpose of accelerating the progress towards a ubiquitous smart grid/smart energy system. The session was inaugurated by Jayanta Roy Chowdhury, Scientist-G & DDG, Standardization-Products & Methods, BIS. The workshop was chaired and moderated by Kishor Narang, Chairman, LITD-28, BIS committee on Smart Infrastructure. The speakers who took part in the workshop were Rajeev Sharma, Scientist F & Head (Electrotechnical Department), Bureau of Indian Standards; Abhishek Ranjan, Additional Vice President and Head Renewable, DSM & EE and Energy Analytics, BSES Rajdhani Power Limited; P V Mathew, Scientist-E, ETD & Member Secretary ETD-51, Bureau of Indian Standards; PK Agarwal, Director, POSOCO; Rajesh Kunnath, Founder, Radio Studio; Vimal Mahendru, President, Legrand-India; Vimal Mahendru, President, Legrand-India; Amarjeet Kumar, Founder & CEO, Shrama Technologies Pvt Ltd; Arun Kumar Mishra, Director, NPMU Tulika Pandey, Director, NeGD DEITY, Ministry of Electronics and Information Technology Ganesh Das, COO – Clean Energy International Incubation Centre, Tata Power-DDL; Deepak Pandey, Head – Digital Grid Business of GE T&D India Limited; Ashish Tandon, Director-Sales & Marketing, Landis+Gyr India. The closing remarks of the session was given by Reji Kumar Pillai, ISGF.

6.3.10th Workshop on Optimizing Electricity Grids by District Energy System Integration – in Collaboration with APUEA

ISGF in association with Asia Pacific Urban Energy Association (APUEA) had organized a workshop on 06 March 2020 in New Delhi. The session was chaired by RR Mehta, Former CEO, Reliance Energy and moderated by Sanjay Dube, IIEC and Peter Lundberg, APUEA. The workshop was divided in three parts. Part One dealt with District Energy Developments - Global and Indian Scenario. The panellists of the session were Teruhisa Oi, Asian Development Bank (ADB); Benjamin Hickman, UN District Energy in Cities Initiative (UN DES), (Video); Disha Sharma, International Energy Agency (IEA); Prameet
Gupta, Tabreed. Part Two dealt with Integrated Energy Applications: SMART GRIDS – PEAK LOAD SHAVING – ENERGY STORAGE – DEMAND SIDE RESPONSE (DSR) Akshay Mangal, Broad; Harshul Khanna, Johnson Controls; Rahul Tongia, Brooking Institution & India Smart Grid Forum; Jignesh Rawat, Danfoss. Part Three dealt with Developing, Financing and Manage Energy Utilities and the speakers were Teruhisa OI, Asian Development Bank; Anant Joshi, International Institute for Energy Conservation; Markus Wypier, GIZ; Rajeev Sharma, VP Engineering and Construction, GIFT City, Gujarat.

7.0 Delegations Led by ISGF

7.1 Indian Delegation to CIRED

ISGF lead a delegation comprising of senior officials from Bangalore Electricity Supply Co Ltd, Delhi Electricity Regulatory Commission, Central Electricity Regulatory Commission, Independent Power Producers Association of India and The Energy and Resources Institute (TERI) from India to CIRED 2019 in Madrid, Spain held from 03 - 06 June 2019. CIRED, the leading forum where the Electricity Distribution Community meets, is held every two years in different venues in Europe with a worldwide perspective and participation. CIRED 2019 offered the opportunity to interact face-to-face with up to 2000 key leaders in the field of Electricity Distribution. Meetings were organized for Indian delegation with senior officials from Endesa, largest electric utility company in Spain, Red Eléctrica, transmission system operator (TSO) of Spain, IDEA (representing the Energy Secretary of State), body attached to the Ministry for Ecological Transition, through the State Secretariat of Energy, Iberdrola, Spanish public multinational electric utility. President ISGF, Reji Kumar Pillai and General Manager, Reena Suri conducted a Tutorial for participants of CIRED on Blockchain for Utilities along with their co-presenter David Vangulick, Head of the Long-Term Planning Team for ORES (Gas & Electricity Networks Operator), Belgium.

7.2 Indian Delegation at Innovation for Cool Earth Forum (ICEF 2019) in Tokyo

The sixth annual meeting of the Innovation for Cool Earth Forum (ICEF 2019) was held in Tokyo on 09 – 10 October 2019, with more than 1,000 participants from government institutions, international organizations, industry, and academia, from approximately 70 countries and regions. The theme of this year’s forum was “Bending down the emissions trajectory by Innovation and Green Finance.” ICEF’s mission is to facilitate discussion and encourage cooperation among participants with a view to promoting technological and social innovation in the field of energy and environment. During ICEF 2019, various topics were taken up in the three plenary sessions. In addition, twelve different approaches to accelerating innovation—six in the social context and six in the technological context—were chosen and discussed in depth in concurrent sessions. Indian Delegation Participated in ICEF 2019 was led by Mr. Reji Pillai, President, ISGF. The important participants from India included Mr. Dhesi, Chairman, HERC; Trilok Chand Gupta, Additional Chief Secretary – Energy, Haryana; Pravinder Singh Chauhan, Member, HERC; Naresh Sardana, Member, HERC; Starujeet Singh Kapoor, CMD, UHBVN & DHBVN; Aajay Mathur, DG, TERI; Dheeraj Kumar, Representative, NEDO – India; AM Siddiqui, Representative, NEDO – India.
7.3 Indian Delegation to Korea Smart Grid Week 2019 from October 16-18 in Seoul, South Korea

ISGF had taken an official delegation from India to the Korea Smart Grid Week (KSGW) 2019 which was held from October 16-18 in Seoul, South Korea. KSGW has been growing in conjunction with Korean Smart Grid Industry. It serves as a mutual exchange arena for sharing strategies and cases for global market advancements, market opportunity, up-to-date technologies with all players. KSGW conference is visited by world class experts and the exhibition covers more than 200+ Leading Smart Grid Companies and 30,000+ Buyers.

7.4 Indian Delegation to DistribuTECH 2020 from January 28 – 30 in San Antonio, TX, USA

ISGF with support from US Department of Commerce (USDOC) of the American Embassy, New Delhi had taken an official delegation from India to the DTECH 2020 which was held from January 28 – 30, 2020, San Antonio, TX, USA. DistribuTECH (DTECH) is the premier North American trade show for equipment vendors and service providers from across the transmission, distribution, and smart grid technology industries, attracting around 12,000 attendees and around 500 exhibitors from around 70 countries. The event had attendees from electric utilities, water utilities, gas utilities, federal power agencies, energy service companies, energy service providers, energy end users (retailers, hospitals, data centres, etc) and a wide-range of manufacturers and vendors.

8.0 International Collaborations

8.1 Global Smart Grid Federation (GSGF)

GSGF is a global stakeholder organization comprising of national smart grid organizations, leading utilities, academia and think tanks from 5 continents which is committed to create smarter, cleaner electrical systems around the world. From November 2016, ISGF President Reji Kumar Pillai has been unanimously elected as the Chairman of GSGF and re-elected for the second term in 2018. ISGF was instrumental in formation of a Working Group on Cyber Security under the Global Smart Grid Federation (GSGF) which is chaired by one of our experts (Dr Shailendra Fuloria). The objective of this working group is to publish a report containing best practices, current scenario and the level of maturity of the implementing cyber security for utilities. ISGF is also serving as the technical secretariat for GSGF since March 2018.

8.2 IEC – IEEE
ISGF conducts IEC-IEEE World Smart Energy Standardization Coordination Workshop in March 2017, 2018, 2019 and March 2020 in Delhi, India.

8.3 Green Business Certification Inc (GBCI)
ISGF and GBCI signed a MoU which sets forth the principles, intent, and scope of the cooperation between both the organisations to collaborate on sustainable power market transformation in India and Southeast Asia. The objectives of ISGF and GBCI under this cooperation are to promote sound and rigorous sustainable power system standards in India and Southeast Asia. GBCI is a fully owned subsidiary of GBCI, a US non-profit organization that owns the Performance Excellence in Electricity Renewal (PEER) Rating System and promotes the certification of PEER for sustainable power systems performance globally. Performance Excellence in Electricity Renewal (PEER) is a dynamic, adaptive rating process designed to measure and improves sustainable power system performance. The PEER program provides a set of criteria for guiding design and assessing the performance of sustainable project grids. The program is designed to arm electricity professionals with key performance outcomes, capabilities, design considerations, metrics and examples of best practices that will enable customer satisfaction. PEER System was announced during India Smart Grid Week 2018.

8.4 New Energy Research and Industrial Technology Development Organisation (NEDO), Japan
NEDO has successfully demonstrated Japanese technologies in Panipat by completing smart grid pilot project, which is inaugurated by Chief Minister of Haryana on 25-Jan-2018. On NEDO's request ISGF has conducted a study “Smart Grid Market Scenarios in India” describing the various Smart Grid Technologies that have been implemented in the electricity Distribution Companies (DISCOMs) in India so far to help NEDO to choose the next level of projects that can be supported through Japanese assistance.

8.5 WI-SUN Alliance
The Wi-SUN Alliance has collaborated with ISGF (ISGF) to accelerate deployment of standards-based, scalable and interoperable wireless communications.
8.6 Think SmartGrids, France
ISGF and Think Smartgrids Association, France, have entered into a Memorandum of Understanding (MoU). The objectives of this MoU are to establish a framework for mutual cooperation in the field of Smart Grids. An exchange program of students and professionals between India and France is also envisaged under the scope of this MoU. The signing ceremony took place on 08 March 2018 during the Gala Dinner of the India Smart Grid Week (ISGW) 2018. The formalization of the signing between Philippe Monloubou, President of the Think SmartGrids Association and Reji Kumar Pillai, President, ISGF took place on 10 March 2018 as part of the state visit to India by the President of the French Republic, Emmanuel Macron, on the occasion of the bilateral economic event organized between France and India in New Delhi. The first India-France workshop on smart grids for smart cities was also held on 07 March 2018 during the India Smart Grid Week 2018 in New Delhi, India.

8.7 Energy Web Foundation (EWF), Switzerland
ISGF and Energy Web Foundation have signed an MoU on Energy Blockchain Innovation and Promotion in India. ISGF and Energy Web Foundation (EWF) from Switzerland have signed an MoU in April 2018 to conduct collaborative research and education activities and to organise workshops and events related to Energy Blockchain Innovations in India. The MoU was signed between ISGF President, Reji Kumar Pillai and EWF President, Herve Touati and Vice President Ewald Hesse. Both the MoU between ISGF and Energy Web Foundation on Energy Blockchain Innovation and Promotion in India organisations also agreed to engage relevant stakeholders from energy and blockchain companies, service providers, regulators, academic community with goal to promote energy blockchain innovation to foster a democratized decarbonized energy market.

8.8. SAARC Energy Centre
SAARC Energy Centre has awarded the project “Study on Infrastructure and Enabling Environment for Road Electric Transport in SAARC Member States” to ISGF on 1st June 2018. The objective of the study is to identify and evaluate key enablers of electric vehicle implementation and assess the readiness of SAARC member countries in terms of policy, technology, commercial and institutional aspects. Based on the assessment, implementable action points will be developed to facilitate electric vehicle penetration in SAARC member states. SAARC Energy Centre has also awarded the project Study “Development of Roadmap for Implementation of Smart Grid-Concepts, Practices and Technologies in SAARC Region” to ISGF on 16th May 2018. The objective of the study is to develop a smart grid framework and to identify a list of potential smart grid interventions along with a clear way forward for all the
stakeholders in each of member states in terms of policy & regulatory requirement, strategy to be adopted, institutional changes etc. for smooth transition from existing grid to smart grid.

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<th>8.9 CEN and CENELEC</th>
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<td>CEN, the European Committee for Standardization, is an association that brings together the National Standardization Bodies of 34 European countries. CEN is one of three European Standardization Organizations (together with CENELEC and ETSI) that have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as being responsible for developing and defining voluntary standards at European level. CENELEC is the European Committee for Electrotechnical Standardization and is responsible for standardization in the electrotechnical engineering field. The organizations are collaborating to promote the international harmonization of standards in the framework of ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission); cooperate on a technical level and share information on the development and promotion of standards in the fields of Smart Grids and Smart Meters.</td>
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<th>8.10 Edison Electric Institute (EEI), USA</th>
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<td>The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. ISGF and EEI both have signed a MOU for the facilitation of modernization and transformation of smart grids. Both the parties will further these goals by periodically sharing experience, best practices and pursuing joint activities that advance the interest of both the parties.</td>
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<th>8.11 The World Bank</th>
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<td>World Bank awarded the project on “Establishment of Charging Infrastructure to Support Deployment of Electric Buses” in Kolkata in order to ensure successful pilot implementation and operation of the electric buses and charging stations procured by West Bengal Transport Corporation for Kolkata city. The project required ISGF to review the technical specification of both the electric bus, its components like battery, motor and the chargers that are being supplied by Tata Motors as a part of this project. ISGF and World Bank have also jointly organised a Brainstorming Session on Fast Tracking E-Mobility Plans in India on 25 September 2018 in New Delhi. The objective of the day long Brainstorming Session was to bring together senior management professionals and experts from different segments of entire value chain of the EV ecosystem to discuss on existing challenges and innovative methods that need to be adopted to accelerate the E-mobility deployment in India.</td>
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has also helped World Bank to understand the respective business cases from different stakeholders and subsequently facilitate them in charting out concerned action plan to support the growth of E-mobility in India. The session witnessed a wide range of participation from manufacturers of EVs, charging stations and batteries, fleet operators, state transport authorities, investors and other stakeholders.

8.12 ASEAN Secretariat, Jakarta
ISGF received interest from ASEAN Secretariat, Jakarta for conducting series of study tours for participants from ASEAN Member Countries on Smart Grid Foundation Course Workshop, Cyber Security Workshop. ISGF organised the Smart Grid Foundation Course for ASEAN Delegates with a grant from ASEAN Secretariat from 01st to 05th October 2018 in New Delhi India. The delegates joined from Indonesia, Brunei, Singapore, Cambodia, Vietnam, Malaysia, Laos PDR and Thailand. The Workshop was attended by the Working Group members of HWG-3 Project on the Smart Grid Roadmap of ASEAN Member Countries and staff of the HAPUA, HWG-3 Secretariat and the ASEAN Centre for Energy.

8.13 World Wide Fund (WWF-India)
ISGF and WWF-India, Climate Change and Energy Division have signed a contract to conduct a feasibility study on introducing electric vehicles in the Indian Sundarbans Landscape with special focus on the forest fringe island parts of Sundarbans. Also, preparing a feasibility study report and an action plan on October 2018.

8.14 Energy Blockchain Consortium (EBC), USA
The Energy Blockchain Consortium (EBC), USA is the first and only Energy specific consortium that addresses Energy problems and solutions based upon an open architecture approach. In January 2019, ISGF and EBC did a tie-up in which Reji Pillai, President, ISGF was appointed as Chairman – India of Energy Blockchain Consortium (EBC) India Chapter.

8.15 International Smart Grid Action Network (ISGAN)
ISGAN is the short name for the International Energy Agency (IEA) Technology Collaboration Programme (TCP) for a Co-operative Programme on Smart Grids (ISGAN – International Smart Grids Action Network). It is also an initiative of the Clean Energy Ministerial (CEM) and was formally established at CEM2 in Abu Dhabi, in 2011 as an Implementing Agreement under a framework of the International Energy Agency (IEA).
**International Smart Grid Action Network (ISGAN) creates a strategic platform to support high-level government attention and action for the accelerated development and deployment of smarter, cleaner electricity grids around the world.**

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<th><strong>8.16 The Smart Grid Interoperability Panel (SGIP)</strong></th>
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<td>The Smart Electric Power Alliance (SEPA) is a non-profit organization that envisions a carbon-free energy system by 2050. We are one of many entities globally required to make this vision a reality.</td>
<td><a href="http://www.sgip.org">www.sgip.org</a></td>
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<th><strong>8.17 International Council on Large Electric Systems (CIGRE), France</strong></th>
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<td>CIGRE operates the world’s foremost knowledge programme, spanning 16 domains of work encompassing all the core areas of the power system. Across these domains 250+ Working Groups draw and build on practical expertise to solve existing and future challenges facing the power system. CIGRE’s knowledge programme includes an extensive range of local and international events, culminating every two years at the Paris Session in France – a unique thought leadership congress and the number one global power system event. Over the last 100 years the work of CIGRE has contributed to many of the key technical cornerstones of the modern power system. CIGRE’s renowned publications, developed through the collaborative sharing of ‘real world experiences’, are in many cases the authoritative source of reference information.</td>
<td><a href="http://www.cigre.org">www.cigre.org</a></td>
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<th><strong>8.18 Seconded European Standardization Expert for India (SESEI), EU</strong></th>
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<td>The Seconded European Standardization Expert for India (SESEI) project was launched in March 2013. Its general objective is to raise awareness on the European Standardization System, values, and assets in India. The project is supported and operated by the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC) and the European Telecommunications Standards Institute (ETSI), as well as by the European Commission’s Directorate General for Enterprise and Industry (EC DG ENTR) and by the European Free Trade Association (EFTA). The SESEI’s mission is to enhance the visibility of European standardization activities, increase the cooperation between Indian and European standardization bodies and support European companies facing standardization related issues hampering market access to India. The project also supports India in standardization related aspects of its integration in the WTO trading system, by identifying all potential opportunities for enhanced</td>
<td><a href="http://www.eustandards.in">www.eustandards.in</a></td>
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international cooperation and global harmonization of standards. Ultimately, the SESEI project aims at reducing the Technical Barriers to Trade (TBT) both between EU and India and globally, thus supporting European and Indian industries by facilitating international trade.

### 9.0 Indian Collaborations

#### 9.1 Aligarh Muslim University (AMU)
ISGF and Aligarh Muslim University (AMU) have signed a MoU for the facilitation of campus Microgrid in AMU Campus, Aligarh. Both AMU and ISGF have also agreed that they shall encourage interactions between the Engineers, Scientists, Research fellows, faculty members and students of both the organizations.

https://www.amu.ac.in/

#### 9.2 India Energy Storage Alliance (IESA)
IESA (an ISGF Member organization) and ISGF have been working towards promoting Electric Energy Storage (EES) and microgrid technologies and their applications in India. Also, IESA and ISGF have been providing insights to technology developers and system integrators on the policy landscape and business opportunities in India through frequent interaction with key stakeholders.

https://indiaesa.info/

#### 9.3 Shakti Sustainable Energy Foundation (SSEF)
ISGF with support from Shakti Sustainable Energy Foundation (SSEF) has conducted a study to prepare for making transport electrification targets of Government of India a reality. The study has valuable contribution of West Bengal Transport Corporation, World Bank, CESC and Ideation Technologies. The study proposes prioritized EV and charging infrastructure deployment plans for electrification of public transport under most efficient and economical terms. Finally, the study prescribes policy changes to scale the deployment of EVs. The analysis framework and results in this study can be adopted, as a model to deploy EVs in other Indian cities, to create new business and manufacturing opportunities, and improve energy security and air-quality. Apart from that ISGF with support from Shakti Sustainable Energy Foundation embarked on a task of compiling “Smart Grid Handbook for Regulators & Policymakers.”

https://shaktifoundation.in/
### 9.4 YES Bank

YES Bank and ISGF signed an MoU with regards to advisory, consultancy, project development assignments, and knowledge-based initiatives in India and internationally, in the Electric Vehicles sector and other domains of interest to both organisations. The areas for cooperation mutually agreed upon are:

1. Electric Vehicles (EVs): Utilizing their organizational expertise, the organisations will work towards implementing collaborative work, which would include advisory services related to drafting EV policies for states in India, preparation of EV implementation roadmap and other related studies to government entities and multilaterals for various projects in EV sector.

2. Knowledge Partnership and Publications: The organisations could jointly publish reports, white papers, research papers, concept notes etc. on pertinent and emerging issues, to be released and published at various national and international forums. The Parties would also look at joint knowledge partnerships in key event platforms offered by industry chambers, central ministries, state governments and the private sector.

[https://www.yesbank.in/](https://www.yesbank.in/)

### 9.5 Veermata Jijabai Technological Institute (VJTI)

ISGF in collaboration with VJTI established the SCADA Cyber Physical System Laboratory. The main purpose of the test bench is to perform study on risk evaluation and mitigation framework for critical infrastructure and industrial control systems. ISGF also conducts training with VJTI as its Knowledge partner on “Cyber Security for Power Systems” and till date many editions have been successfully conducted.

[https://www.vjti.ac.in/](https://www.vjti.ac.in/)

### 9.6 MacArthur Foundation

ISGF has worked on a project funded by MacArthur Foundation to prepare Energy Storage Roadmap for India for the period 2018-2032 that will help policy makers and utilities in decision making related to investments in energy storage for integration of renewable energy leading to a reliable and low carbon grid in India. With guidance from Ministry of New and Renewable Energy (key stakeholder), ISGF is working on this Roadmap in collaboration with India Energy Storage Alliance (IESA).

[https://www.macfound.org/](https://www.macfound.org/)
9.7 Alliance for Energy Efficiency Economy (AEEE)
ISGF has signed a LOA with Alliance for Energy Efficiency Economy (AEEE) to partner in areas of mutual interest. AEE is a not-for-profit society for policy advocacy and energy efficiency market establishment. It advocates for data driven and evidence-based energy efficiency policies that will unleash innovation and entrepreneurship within the country to create an energy efficient economy.

https://www.aeee.in/
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