Innovation has become an integral part of the society. We have seen in last one decade that innovations have transformed the society radically, which was never dreamt of and modernized our living for the purpose of wealth and happiness. All the unique and radical break through done so far have to be designed and engineered very innovatively for integrated solution in the field of electrical, because electricity is the only form of energy driving everything today.

It is expected that SWITCH-2016 will be catalyst to incubate startup and confirm the commitments from financial institutions/investors to support these startups.

SWITCH 2016, a global Expo in Electrical Engineering, will attract and bring together all stakeholders of energy security on common platform to share ideas and innovations for improvement according to the ground realities and needs of our society.

Innovations can only be best implemented and put to use through cost effective manufacturing. MSMEs and SSIs must catch-up the latest state of art Lean Manufacturing, Production Efficiency and Material Optimization processes, for their survival in today’s world of Global Sourcing.

Asset management in any power utility is answer to long term sustainability and reliable power supply system. Present electricity grid is huge with many obsolete and aged equipments, so it requires an integrated asset management system driven by software tools to provide automated decision making in Grid Control, System Operation, Health Indexing, Refurbishment or Replacement, Inventory Control and Investment Prioritization.

SWITCH-2016 will have participation from wide range of stakeholders like manufacturers, utilities, research institutes, academicians, regulators, policy makers, investors, consultants and last but not the least, students to showcase their Innovations. In the process, we will bridge the gap between Research Scholars and Industry to work on issues relevant to Indian Power Industry.

We are committed to the cause of our people, our country and our planet. We will continue to live by the ethos and principles of responsible business practices and look upon all our stakeholders to support us in this endeavour.

India is expected to be fifth largest country in terms of energy consumption by 2025 and it is for sure that fossil fuel resources will not remain enough. Moreover, the threat of global warming due to GHG emission and carbon footprints are visible in recent times by the burning of these fossil fuels. We have no alternative but to rely upon Renewable Energy resources both wind and solar and harness them to fullest extent. While conversion of RE to electrical energy, it brings lot of challenges in grid integration because of its low PLF, variability and uncertainty. Innovations in selection of right technology for windmills size, control devices for reactive power and harmonics management, thin film photovoltaic technology etc will make a difference. Forecast mechanisms play a crucial role in anticipating load balancing, ancillary services and energy storage.

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**OBJECTIVES & TAKE AWAY**

- **Showcase 100 Innovations and stage demonstration by 20 selected innovators.**
- **To adopt integrated approach to “maximize output from our investment in RE” and “use it effectively and efficiently everywhere in the system and products”.**
- **Switch 2016 to act as catalyst and incubate startup by financial institutions/investors.**
- **To learn and share the best practices in ‘manufacturing and asset management’, both commercial and technical, for sustainable business model.”**
## M 1

**Innovations**

To provide a platform for startups

6-7-8-9-10 Oct, 2016

**Objective**

To foster and support new ideas and technologies.

To bridge the gap between research scholars and industries.

**Stakeholders**

Students, research scholars, academia, national and international technical institutes, entrepreneurs, R&D organisations, IT companies, global investors & industrialists, financial institutions and capital ventures.

**Event Details**

Shortlist 100 innovations and showcase 20 before the jury.

Parallel tracks on 30 topics.

**Conclusion & Future Action Plan**

Investors are expected to pick up these innovations for commercialisation. Electrical Industry will make use of this event for a long term partnership with research scholars and institutes for product development and improvement.

Knowledge Partner

ABB

## M 2

**Technologies**

Manufacturing process for cost effective products

8 Oct, 2016

**Objective**

Cost optimisation - Lean manufacturing, indigenisation of technologies, economy of scale, adoption of strategies according to the product mix, automation & robotics and quality control.

**Stakeholders**

Manufacturers, academia, industrial engineering institutes, R&D organisation, IT & automation companies, MSME, SSI, global investors & industrialists, financial institutions and capital ventures.

**Event Details**

In-depth deliberations led by leading manufacturing units will focus on best practices for cost effective production in electrical industries. Selective case studies will also be taken up.

**Conclusion & Future Action Plan**

Provide opportunities to MSME & SSI for vendor base of main and sub components in electrical industry.

Knowledge Partner

ABB

## M 3

**Asset Management**

Renovation & modernisation of aged assets

9 Oct, 2016

**Objective**

Modernisation from the point of view of obsolete design and technology, maintenance strategy and cost, diagnostic techniques, life cycle assessment, T&D losses, system availability, inventory management, safety.

**Stakeholders**

National and international utility engineers, equipment suppliers, academia, EPC contractors, repair & refurbishment agencies, maintenance agencies, engineering consultants.

**Event Details**

It will emphasize on integrated approach for renovation and modernization of aged assets for 24X7 power supply to end consumers. Tangible and intangible benefits including safety from investment in R&M will be shared through case studies.

**Conclusion & Future Action Plan**

It is expected that utilities will have better understanding of R&M to enable them to take decisions on critical components for their systems. Repair and refurbishment agencies will have clear idea on development of their skill and resources.

Knowledge Partner

ABB

## M 4

**Renewable Energy Portfolio**

Energy Efficiency and Sustainable Solution

10 Oct, 2016

**Objective**

Harnessing Renewable Energy to fullest extent and understand challenges in grid integration

**Stakeholders**

RE Developers, Utilities, Regulators, Manufacturers, Academia, Engineering Consultants, Central and State Ministries & Nodal Agencies of RE.

**Event Details**

To deliberate characteristics of RE generation and its impact on grid management. Innovations in selection of right technology for windmills size, control devices for reactive power and harmonics management, thin film photo-voltaic technology etc will be discussed.

**Conclusion & Future Action Plan**

Technically and Commercially viable business model for Rooftop and distributed generation having Micro Grid for remote pockets, where conventional power supply is a challenge. RE forecast mechanism along with load balancing / ancillary services and Energy Storage system.

Knowledge Partner

ABB

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**Knowledge Partner**

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**Knowledge Partner**

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**Knowledge Partner**

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**Knowledge Partner**

ABB
The backbone of any industrial revolution is innovation. Over the ages, young companies or start-ups have led the way in bringing innovation to jaded industries and sparking a turn-around for them.

SWITCH-2016 recognizes the potential of these disruptive and highly innovative organizations and the immense amount of positives that can be derived off them. The Innovation and Start-up forum at Switch 2016 is angled to provide these mavericks of the industry a platform to reach out to their peers and customers. Over and above the priceless opportunity for networking this forum will also provide start-ups and innovators a chance to understand the various policies put in place by the government to ensure innovation in industry.

The objective – To provide start-ups and innovators the perfect policy and infrastructure eco-system to function and flourish, along with a multi-pronged support system of mentors, guides and government policy.

ENTRIES INVITED FOR
- Innovations
- Case Studies
- Interested Participants

A ground-Breaking idea

Innovation essentially begins with one disruptive idea and the conviction to see it through. It is the latter part which more often than not is a problem for most innovators. The conviction to see an idea through is often dampened by a lack of faith in one’s surroundings, government policies among many other reasons. Switch 2016’s Innovation and Start-up Forum ensures that your idea gets the right guidance and direction from the best in the field. The process of innovation requires fresh ideas like human need oxygen.

This platform essentially works towards making the people more aware about the potential of their idea while informing them how they can safeguard against intellectual property theft. With a stellar team comprised of policy makers, industry leaders and captains, this platform works towards getting a good idea its true worth.

Incubation

An idea that is never acted upon remains just that, an idea. The Innovation and Start-up Forum provide the perfect opportunity to get the right incubator for a path-breaking idea. Making sure that your idea is being worked on from all angles, ensuring that there are no wrinkles when you finally reach the monetization stage, is essential for the success of any concept.

Switch 2016, represents the coming together of some of the best and brightest in the electrical and associated industries, along with policy makers and marketing maestros. It represents an amazing opportunity for start-ups and innovators to find an incubator for their ideas.

Mentorship

Even those scaling Mt. Everest rely on their indomitable guides to help them make it to the top, start-ups are no different. Finding the right mentor could make or break your fledgling idea or organization. Switch Global Expo’s Innovation and Technology Summit puts you in touch with some of the most experienced hands in the industry to multiply your chances for success.

If you have the right idea and the zeal to see it through, the Innovation and Technology Summit will put you in touch with some of the most experienced and qualified individuals to help mentor your start-up.

Monetization

Taking your idea from a mere concept to implementation and monetization is essentially what every innovator wants. However, there are scores of traps along the way where a young organization can easily flounder. The process mentioned above, which will be followed at the Switch Global Expo Innovation and Technology Summit, is designed to ease an idea into the monetization stage successfully navigating these hurdles.

From providing the right incubation platform to a hands-on mentor assures half the battle won. The forum provides start-ups and innovators the right guidance to take their idea step-by-step into the monetization stage. Ensuring that there are no loose ends is prima facie in making an idea or start-up successful, a support system for young organization and innovators helps assure them of successful monetization.

The forum provides start-ups and innovators the right guidance to take their idea step-by-step into the monetization stage.

The Perfect Policy Eco-System

The Gujarat Government’s Scheme for Assistance to Start-ups/Innovation, 2015-2019, is geared towards furthering Gujarat’s image as a business and start-up friendly state. The policy provides an opportunity for individuals, groups, universities or organizations to get the right support, monetarily and in terms of expertise, to build their idea to fruition.

Over and above ample financial support, this policy also considers the importance of providing mentorship and expert support for potential start-ups and ideas. Moreover, the government also promises free access to universities, libraries, government laboratories among many other spaces for selected innovators. Up to Rs. 10 Lakhs of assistance for cost of raw materials and components, up to Rs. 10 Lakhs for marketing and publicity, VAT related incentives, Rs. 10,000 a month for the innovators sustenance are just a few of the benefits being rolled out for this sector.

The start-ups or innovators selected will also be eligible for other MSME schemes from the government. The application for this scheme is something that often stumps a lot of young innovators that is where the Innovation and Technology Forum steps in. The forum provides you the perfect guidance from policy makers and industry leaders on how to make the most of these policies.
In this Module, one can participate as Innovator, Case study presenter or participant. To participate as Innovator/Case study presenter, one has to submit a brief synopsis of the working innovation done by him/her or the case study in website www.switchglobalexpo.com on 30 technical topics given in the website / brochure within the stipulated time frame.

The top 100 innovations will be judged based on our predefined parameters and will get a free stall in the Innovation pavilion and further top 20 innovations will get a chance to present their innovation in the presence of the Jury.
TECHNOLOGIES
Manufacturing process for cost effective products

Manufacturing capability is an integral part of industrial growth, which accounts for every segment of the society and its prosperity. It converts technological knowledge into product through right Materials, Resources and Hands on Skills.

The maximum employment opportunities come from manufacturing sector and therefore, in order to sustain business, one has to be alert.

“Make in India” mission of our Hon’ble Prime Minister is fully capitalizing on Young India demography through State of the Art Manufacturing Technologies and Processes.

The Industrial Revolution from Industry 1.0 to 4.0 has been primarily driven by specific key factors to achieve the cost optimization and consistency in quality:

- Quality Assurance
- Economy of Scale
- Automation and IT
- Lean Manufacturing Processes
- Innovation and disruptive technologies.
- Internet of Things (IoT)
- Big Data Analytics

While Quality System and Quality Tools gave fillip to cost competitiveness and waste control management in the era of industrial revolution 1.0 & 2.0, the subsequent Revolution 3.0 & 4.0 are capitalizing on manufacturing processes through Automation and IT tools for large production capacity.

INDUSTRY 4.0
From steam engines to smart factories

1712 – Industry 1.0
Thomas Newcomen builds the first steam engine.

1870 – Industry 2.0
Electricity is used for industrial production.

1969 – Industry 3.0
Programmable logic.

Today – Industry 4.0
Communication between people, services, and things.

ENTRIES INVITED FOR
• Technical Papers
• Case Studies
• Interested Participants
**The next level of manufacturing.** Drivers: productivity, quality and efficiency

Combining world-class productivity with minimal environmental footprint will take manufacturing in India to the next level. Summit will present cutting edge industrial automation solutions, lean practices and innovative indigenization that will increase energy efficiency, reduce costs and optimize the use of resources, ushering in the fourth Industrial Revolution.

**SESSION 1**

**QUALITY ECOSYSTEM**

All modern organizations need to move from Quality Control to Quality Assurance. From training suppliers to create a quality working environment for their manpower and sourcing the right material to creating a robust and rigorous operational system that delivers on the assurance of quality to customers - true success is achieved only when quality is inherited in the process.

**SESSION 2**

**MAKING IN INDIA FOR INDIA AND THE WORLD**

Every organization depends on some suppliers for raw materials and input components. Suppliers today are regarded as partners of the enterprise. Localization of materials and indigenization of technologies create a solid foundation, while delivering products best suited for local markets in terms of durability and price.

**SESSION 3**

**AUTOMATION IN MANUFACTURING**

Automation will play an important role in making in India smart, efficient and reliable. Presentation of case studies on deployment of Manufacturing Execution System (MES), eSourcing for effective supply chain management etc.

**SESSION 4**

**LEAN CONCEPT**

The Lean mission is to develop leaders that live the lean system, transform the company into a true learning organization that continuously improves, meets the needs of its customers, and positions itself for long-term success. Achieving higher quality at a lower cost in shorter throughput time, is the core of lean manufacturing. Benefits are not limited to cost savings. The process involves employees at all levels and instills ownership, responsibility and creating a vibrant work culture. Case study presentations of KAIZEN, GEMBA, PDCA, 4Q & 5S.

**SESSION 5**

**THE INTERNET OF THINGS SERVICES AND PEOPLE**

Internet of Things (IoT) is about a lot of industrial devices networked together to capture, analyze and to create new insights and predict future outcomes. In IoT, existing data and system integration with new data sources to create business model is plausible. It can benefit in managing everything from anywhere, reducing hardware cost with one network technology, moving control and information at “will”. Real-time intelligence and sensors at every level of manufacturing process can help industries manifold like remote access, better asset tracking & utilization, employee productivity, better energy efficiency and finally optimize production time & cost.

Special parallel sessions on 8th Oct.’16 by authors on technical topics in Manufacturing Technologies.

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**REGISTRATION**

In this module, one can participate as Case study/technical paper presenter or participant. To participate as Case study/Technical paper presenter, one has to submit a brief synopsis on Manufacturing Technologies related to 30 technical topics given in the website / brochure within the stipulated timeframe. Selected case studies and technical papers will be presented by authors in special parallel sessions on 8th Oct.’16.
Even though the coal and hydro resources are located in Northern and Eastern part of our country, we are able to evacuate and transmit power throughout the country at a single frequency. Apart from conventional generation, which has a quantum of 2,59,239 MW today, along with hydro, gas as well as nuclear power generation, we are now putting thrust on Renewable Energy (RE) generation. The RE installed capacity has a 13% share in terms of installed capacity and a 5-6 % share in terms of energy in the country.

Nothing can move forward without a viable financial model which includes Network Development, Operation & Maintenance expenditure, Administrative cost and Invisible losses. One has to make a prudent investment plan with clear justifications and clarity on the cost benefit analysis from the investment made in new projects, maintenance infrastructure tools and System Improvement Plans. The later is gaining prominence as aged and obsolete technology assets in T&D grid are the major cause of breakdown maintenance and unsafe operation.

It will finally evolve around four Key Performance Indicators (KPI) of the utility.

**UTILITY OBLIGATIONS TO CONSUMERS**

- Affordable Cost
- System Availability
- Quality of Power
- T&D losses (AT&C for DISCOMs)
WHAT IS THE WAY FORWARD TO FULFILL THESE KPI?

It is good that we have strong knowledge base in Advanced Control & Monitoring Devices, Diagnostic Equipments & Tools, Installation Techniques, Hotline Maintenance Tools etc. and top of it, we have IT and Communication (IT&C) Skills to use O&M data meaningfully.

An Asset Management System (AMS) which integrates Assets, Functions & Stakeholders, O&M Resources, state-of-the-art T&D technologies and grid operation, environment & safety, is the only way forward.

IT&C infrastructures would be backbone to provide these crucial decision making tools. Such AMS has to be structured in the organization with ownership under four pillar processes:
INTEGRATION OF AMS PROCESSES

There is no doubt that there will be a high investment in the initial stages, but it will be cost-effective and economical in the long run by adopting AMS processes. It is, therefore, necessary that our decision to invest in any of the above processes has to be very thorough and doable.

Utility has to be in a proactive mode and vary these cost inputs wisely on regular intervals within the gambit of utility's KPIs and performance review. All the processes are interlinked and investment in a particular process has visible impact on improvement in other processes. The performance review of each process, as per the matrix of Integrated AMS, must look at such visible impacts and then take corrective and preventive action to have a balanced investment in all four processes.

A reasonably good maturity level of utility in terms of knowledge, skills and ownership is the primary requirement in order to ensure seamless integration between the four processes to sustain AMS in the long run.
### MATRIX FOR INTEGRATED ASSET MANAGEMENT SYSTEM

#### MAINTENANCE PROCESS

<table>
<thead>
<tr>
<th>BUSINESS DRIVERS</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid breakdown Maintenance</td>
<td>System Availability</td>
</tr>
<tr>
<td>Maintenance schedule – predictive</td>
<td>Optimize operation cost</td>
</tr>
<tr>
<td>Optimize maintenance time</td>
<td>Monitor Grid vulnerability</td>
</tr>
<tr>
<td>Periodic overhauling</td>
<td>Grid monitoring &amp; control (Load Dispatches)</td>
</tr>
<tr>
<td>Minimize outage time &amp; fast restoration</td>
<td>RE Integration</td>
</tr>
</tbody>
</table>

- Diagnostic data analysis tools to provide pre-warning
- Health index
- Reliability Based Condition Monitoring
- Maintenance free equipment like condition base diagnostic tool (pro-active)
- To fix criteria
- Benchmark based on diagnostic history
- Hot Line Maintenance Infrastructure
- Disaster Management Plan
- Failure data analysis

#### GRID MANAGEMENT PROCESS

**BUSINESS DRIVERS**
- Protection System coordination
- Automation System (Digital Technology)
- PMU & WAMS – Analytics
- Real time data capturing & analysis tools
- Forecast mechanism
- Distributed Generation
- Spinning reserve

**ACTIONS**
- System Availability
- Optimize operation cost
- Monitor Grid vulnerability
- Grid monitoring & control (Load Dispatches)
- RE Integration

#### NETWORK DEVELOPMENT PROCESS

**BUSINESS DRIVERS**
- Congestion control & redundancy
- Support system for grid security
- Maximize line capacity
- Quality of power
- T & D losses

**ACTIONS**
- In-1 Transmission Criteria
- Balance between main and sub-transmission
- VAR Compensation
- Innovative Conductor
- Grid Stabilization Solutions
- Distributed Generation
- Link lines
- Power Factor Improvement

#### BUSINESS DRIVERS**
- Protecting assets
- Modernisation & upgradation
- Obligation of Protecting assets
- Obligation of maintaining assets

### SYSTEM IMPROVEMENT PROCESS

**BUSINESS DRIVERS**
- Identify aged assets
- Identify obsolete technology
- Environment & Safety
- Energy Accounting
- T&D Losses

**ACTIONS**
- Asset Mapping
- Retirement policy
- R&M plan
- Bio-degradable materials
- Metering Infrastructure
- Identifying root cause – Energy Efficiency

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**INNOVATION & TECHNOLOGY SUMMIT**

Switch Global Expo, Vadodara
6-7-8-9-10 Oct, 2016

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**M3 9 OCT 2016**

**ASSET MANAGEMENT**
Renovation & modernisation of aged assets
Today assets of utilities have become huge and substantial quantum out of this, is aged and obsolete. On top of it, grid operation requires 100% availability of transmission system for 24x7 uninterrupted power supply. It is not easy to manage with administrative and technical constraints like “Must Run” status of RE, Regulatory Norms, Aged Assets, Consumer Expectations, Government Policies and finally develop network with growing power demand. An Integrated Asset Management System (AMS) is must to integrate all the organization processes and sustain financials of the company through balance investment.

The performance of the utility evolves around four Key Performance Indicators (KPIs) - Affordable Cost of power, System Availability, Quality of Power and T&D losses. To fulfill these KPIs, Asset Management System shall have to integrate the Assets, Functions, O&M Resources, Grid Operation Performance & Maintenance, Environment and Safety. We will have to assign the ownership through well defined processes - Maintenance Process, Grid Management Process, System Improvement Process and Network Development Process. These processes are interlinked and impact each other in performance evaluation. Utility has to benchmark the KPIs in each process and seamless interface will result into world class utility.

In the maintenance process, we have moved from preventive & periodic maintenance to proactive diagnostic condition monitoring, both offline and online. We are able to gauge likely failures and cut down corrective maintenance (break-down). The cost optimization in maintenance is a real issue, so, we have options like maintenance free equipments, carrying out only required maintenance, that too without shut down and retire the equipment at an appropriate time. There has to be qualitative tool to account for such options and equipment Health Index would meet expectations of maintenance cost optimization. Case study on initiative so far taken will be presented followed by panel discussion.

Special parallel sessions on 9th Oct.'16 by authors on technical topics in Asset Management.
The impact of climate change is visible and one can recall what Mr. Al Gore alarmed at one point of time in his documentary – “An Inconvenient Truth”. All over the world, the energy experts have understood the need of clean energy from Renewable Sources and it would be life line of the human living in coming days.

Globally, sharing of RE in the energy basket is growing very fast. The average annual growth rate during the past ten years (2005 to 2014) was 23% and the world wind power could supply upto 2000 GW by 2050 and by 2050, it could provide 25 – 30% of global electricity supply. 2015 was an unprecedented year, as annual installations crossed the 60 GW mark for the first time in the history with a total investment of USD 329bn in the Clean Energy Sector.

India stood at 4th position in Wind Energy capacity globally with 25088 MW (5.9%) in 2015 and 10th position in Solar Energy capacity with 5050 MW (2.6%). India has installed capacity of 26769 MW in Wind and 6763 MW in Solar as on 31.03.2016.

We better catch up fast to fulfill our energy security mission through RE. The vision of our Honorable Prime Minister for 100 GW of Solar and 60 GW of Wind has set the ball rolling. We will have to adopt integrated approach to “maximize output from our investment in RE” and “use it effectively and efficiently everywhere in the system and products”.

**Entries Invited for**
- Technical Papers
- Case Studies
- Interested Participants

**Key Actionable Points**
- **Grid Integration of RE**
  - While the Solar output is fairly known according to movement of the Sun, the Wind Energy output is quite variable, uncertain and intermittent. It is not only varying according to the season, but also during the day. As the installed capacity is growing up, the grid operator has a challenge of load balancing for reliable grid operation. In Gujarat, maximum output is available, when demand is low during monsoon. Moreover, there is low demand locally, so robust transmission system is required. These challenges in power grid operation are managed through ramping up/ramping down of conventional generation plant. In long run, we have to plan for the forecast mechanism, pumped storage, spinning reserve and energy storage system.

- **RE Management Centre**
  - It is absolutely essential to have full scale real time data capturing and communication system for forecasting, scheduling, spinning reserves, power quality and management of grid, exclusively for RE. RE Management Centre will have to be planned and stakeholders of RE to share the responsibility. We should not miss at this juncture that large scale power injection from Solar PV at distribution level is equally threatening and would require similar management centre.

- **Grid Code, Grid Connectivity Obligations and Regulatory Intervention**
  - So far, it is not followed strictly, but now onwards, we will have to ensure that grid connectivity obligations are complied by Wind and Solar developers. Many obligations are to be taken care at manufacturing stage and validated at site during commissioning. Regulatory intervention will be catalyst to safeguard the interest of stakeholder and balance the ecosystem of RE.
RENEWABLE ENERGY POTENTIAL AND SELECTION OF RIGHT TECHNOLOGY

India stood at 4th position in Wind Energy capacity globally with 25088 MW (5.9%) in 2015 and 10th position in Solar Energy capacity with 5050 MW (2.6%). India has installed capacity of 26769 MW in Wind and 6763 MW in Solar as on 31.03.2016. Prohibited cost of RE did not attract investment, however, the threat of climate change/GHG emission compelled us to gracefully accept the need of clean energy. Economy of scale has brought down cost to reasonable level. This is the right time to map the potential of RE, both Wind and Solar and accordingly deploy wind turbine and solar panel technologies, that will give highest output and justify our investment in long run. This session will explain climate and geographical considerations in adopting right technology at affordable cost to tap the wind and solar potential to the fullest. The selection WTG according to grid code requirement for seamless integration shall also be covered.

In Solar power, selection of PV technology and tracking systems are crucial for maximum output in diverse weather conditions in different part of India.

PLANNING FOR GRID INTEGRATION OF RE (PART-I)

The subject matter of Wind Energy characteristics for its variability, uncertainty and intermittency has been fully understood. An annual capacity factor of wind farms ranges from 20 to 40% according to season of location. Many a time, variation in output is ranging from 1 to 2 GW within few hours in Gujarat. Load Despatch Centers are managing these variations, particularly in peak wind season, through ramping up/ramping down of conventional generation. It is OK so far as the wind energy today is only 5% in energy terms, but we have to be ready for tomorrow, otherwise it will be nightmare for grid operator to control and secure grid operation. We have to learn lesson from best practices like forecasting, pumped storage, spinning reserve, energy storage etc. followed in RE rich countries. Experts will explain what are all technical options available to us for grid integration of Wind Energy.

In respect of Solar power, grid integration is manageable, however, we have to be cautious, when the power injection is at sub-transmission/Distribution level from rooftop PV. A target of 100 GW comprising of 40% rooftop PV definitely calls for readiness in Distribution System Operation and accurate scheduling of power.

PLANNING FOR GRID INTEGRATION OF RE (PART-II)

Having understood the issues and grid integration challenges of RE for secured grid operation, it is time to share the responsibility among all stakeholders. First of all, it calls for Renewable Energy Management Centre (REMC) which will be focal point for forecasting, scheduling, spinning reserve planning, energy storage management, reactive power control and grid security systems. Developers have to fulfil the requirement of grid connectivity, grid code, SCADA & data transmission for forecasting & weather monitoring system. Utility has to install transmission infrastructure with support system for evacuation and ensure that RE capacity is not stranded.

For Solar power integration, larger issue is utilizing the full capacity and have a good energy storage system. In case of distributed generation and micro grid of solar, energy storage and state of art control system for uninterrupted power supply are must.

This session will discuss an integrated plan for grid integration of RE and way forward.

GRID CODE, GRID CONNECTIVITY OBLIGATIONS AND REGULATORY INTERVENTION

While regulatory intervention has been adequate, we lack in compliance of grid operation requirements and their monitoring system. Many obligations are to be taken care at manufacturing stage and validated at site during commissioning. This session will cover the importance and impact of these obligations on reliable grid operation and quality power output from RE generation sources.

INNOVATION IN WIND AND SOLAR TECHNOLOGIES AND PRODUCT

Intense Research and Innovation in RE are taking place all over the world with specific objectives – how to harness RE to maximum extent, how to tap it efficiently at affordable cost, how to store it and how to modify devices to use RE for power need? In Wind, we have today single WTG of 8 MW capacity with 164 mt. blade and 220 mt. tip height. Off-shore wind mills and technology to install them are amazing. In Solar space, Innovations from simple domestic power management to high-tech Aeroplane have been achieved. Electric vehicle operating with battery powered by Solar power is our future to keep the environment pollution free. Effective utilization of space over the building roof, water canal, bridges etc. with Solar PV panel is proven and we have to look for new avenues.

This session will emphasise the need and value of such Innovations, which are transforming the society.

Special parallel sessions on 10th Oct.’16 by authors on technical topics in Renewable Energy.

REGISTRATION

In this module, one can participate as Case study/technical paper presenter or participant. To participate as Case study/Technical paper presenter, one has to submit a brief synopsis in website www.switchglobalexpo.com on Renewable Energy covered under 30 technical topics given in the website / brochure within the stipulated timeframe. Selected case studies and technical papers will be presented by authors in special parallel sessions on 10th Oct.’16.

M4 RENEWABLE ENERGY PORTFOLIO - Energy Efficiency & Sustainable Solution

<table>
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<tr>
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<th>Short listing Confirmation</th>
<th>Final Submission</th>
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M4 RENEWABLE ENERGY PORTFOLIO - Energy Efficiency & Sustainable Solution
### TOPICS FOR INNOVATION AND TECHNICAL PAPERS

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<th>Support Structures and Insulation for overhead line</th>
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<td>• Selection of fuel</td>
<td></td>
<td>• AVR &amp; Governor Mechanism</td>
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<td>• Up-rating line capacity</td>
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<td></td>
<td>• Coal blending</td>
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<td>• PSS tuning</td>
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<td>• Narrow base towers</td>
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<td></td>
<td>• Ash content</td>
<td></td>
<td>• Automation and Data Control System</td>
<td></td>
<td>• Compact Towers</td>
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<td>• Coal washing</td>
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<td>• Simulator</td>
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<td>• Innovative structure materials</td>
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<td>• Insulated cross arms</td>
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<tr>
<th>S4</th>
<th>Conductors &amp; Cables</th>
<th>S5</th>
<th>Substation Automation System</th>
<th>S6</th>
<th>Grid Support System</th>
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<tbody>
<tr>
<td></td>
<td>• HTLS conductor</td>
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<td>• Remote Controlled Substation</td>
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<td>• Conductor core material</td>
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<td>• Upgradation of existing conductor capacity</td>
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<td>• Optical Fiber &amp; FOTE</td>
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<td>• Conductor material with low loss</td>
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<td>• Automatic Power Factor Correction (APFC)</td>
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<td>• Heat resistance insulation for cables</td>
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<td>• Insulation treeing effect</td>
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<tr>
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<th>Load Dispatch - Grid Operation</th>
<th>S8</th>
<th>Communication Technologies in T&amp;D</th>
<th>S9</th>
<th>Transmission Maintenance</th>
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<tbody>
<tr>
<td></td>
<td>• PMU &amp; WAMS data analytics</td>
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<td>• Radio Frequency (RF) communication</td>
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<td>• Grid Stabilization Solution</td>
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<td>• Power Line Carrier Communication (PLCC)</td>
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<td>• Renewable Energy Management Center (REMC)</td>
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<td>• Optical Ground Wire (OPGW) and Fibre Optic Terminal Equipment (FOTE)</td>
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<td>• Distribution System Operator</td>
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<th>S10</th>
<th>Reliability Centered Maintenance</th>
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<th>Asset Management</th>
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<tbody>
<tr>
<td></td>
<td>• Diagnostic equipments</td>
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<td>• Earthing System for high resistive ground</td>
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<td>• Diagnostic tools</td>
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<td>• Surveillance System</td>
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<td>• Long lasting electrodes</td>
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<td>• Life Assessment and Retirement of equipment</td>
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<td>• Intelligent monitoring system</td>
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<th>S13</th>
<th>Distribution Grid Management</th>
<th>S14</th>
<th>Distribution Grid Maintenance</th>
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<th>Energy Metering</th>
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<tr>
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<td>• Distribution System Operator</td>
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<td>• Distribution System Operator</td>
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<td>• Smart Meters at affordable cost</td>
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<td>• Distribution Automation System</td>
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<td>• Fault Passage Indicators</td>
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<td>• Consumer end metering - Remotely at Utility Control Station by using current &amp; voltage sensors connected to consumer service line</td>
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<td>• Demand Side Management</td>
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<td>• Outage Management System</td>
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<td>• Grid monitoring and data capturing</td>
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### INNOVATION TECHNOLOGY SUMMIT

Switch Global Expo, Vadodara
6-7-8-9-10 Oct, 2016
**S16 AT&C Losses reduction**
- Energy Accounting
- Anti theft meters
- Reactive power management
- Arial Bunch Conductor

**S17 Energy conservation and Efficiency**
- AT&C loss reduction
- Smart metering
- Solar pumps
- Home automation system
- Drip irrigation system
- EV charging system run by solar PV
- Efficient distribution transformers

**S18 IoT in Electrical sector**
- Consumer IoT
- Industrial IoT
- Device Hardening, Content Protection - Encryption
- IoT for better asset utilization, employee productivity
- IoT Execution Model

**S19 Big Data Analytics**
- Data filtering, analyzing and quickly converting data into intelligence - Actionable Information
- Big data analytics for power utilities
- Efficient grid operation
- Asset Management - Reducing operational cost
- Enhanced Customer Management
- Real-Time Predictive Analytics

**S20 Geospatial technology (Global Information System) for Electrical sector**
- Asset Mapping
- GIS application in Disaster Management
- Mobile workforce management
- Integration with SCADA, organizational ERP
- Storage system with compactness, efficiency and longevity

**S21 Cyber Security**
- Internal, External, Accidental threats and mitigation techniques
- System Hardening - Integrated feature of system (equipment / software) itself
- Vulnerability assessment, handling and response system
- Security Audits - Making communication secure
- Cyber security in industry IoT

**S22 Robotics in Electrical System**
- Robotics for O&M in power utilities
- Robots for manufacturing process

**S23 Solar PV system**
- Solar Panel testing
- Solar Tracking system
- Solar Rooftop system
- PV material for maximum output
- Solar Panel cooling system

**S24 RE Integration**
- Distributed generation
- Load balancing mechanism
- RE forecasting
- Reactive Power Management
- Low Voltage Ride Through (LVRT)
- Storage technologies

**S25 Microgrid**
- Hybrid system
- Electrifying remote pockets where conventional system is not feasible
- Micro hydral plants
- Low Voltage DC Distribution

**S26 Energy Storage Systems**
- Battery storage
- Hydrogen storage
- Pump storage
- Storage capacitors
- Storage system with compactness, efficiency and longevity

**S27 Electrical product Manufacturing**
- Lean manufacturing & Automation
- Product quality plan
- Development of vendors
- Durable materials
- Cost optimization through economy of scale

**S28 Nano Technology**
- Switchgear and cable insulation material
- Transformer mineral oil
- Synthetic ester oil
- Polymers for insulation
- Anti-corrosive material for coastal area
- Conductor material with low resistance

**S29 Safety**
- Live line indicators
- Live line maintenance
- Fire detection and protection systems

**S30 Smart Cities**
- Interface with other infrastructure for common services
- Solar Power System for in-house consumption
- EVs
- Central data recording system for consumer services redressal
- Emergency medical system
- Electricity driven Transport
- Central surveillance system
- Street lighting system
- FO Communication network
- Underground cabling
- Weather forecasting and Warning system
- Disaster Management
- Electrical supply back-up system
- Energy saving appliances
- Solid waste power plants
- Peak traffic control mechanism