



UNIVERSITY OF AGDER



Norwegian Embassy



## Thematic Track cum Workshop at WSDS 2018

### Smart Micro-Grids: New Mantra for Distributed Generation?

India, over the last few decades, has witnessed significant growth in industrial production and income, rising middle class population, and urbanization. This has substantially impacted India's resource consumption patterns, requirement of energy and resources, as also the related environmental implications. Sustaining an 8%–10% growth rate over the next 25 years and pursuing its sustainable development and poverty alleviation goals is a daunting challenge for India. The challenge is further magnified by risks posed by climate change. There is, thus, an urgent need for an increased understanding of these dynamics at multiple levels and sectors to enable the design of measures that accelerate the transition towards clean energy along with efficiency in resource use, as well as promote an informed debate and awareness on related issues. Against this backdrop, **The Norwegian Ministry of Foreign Affairs** has initiated a three year long (2016-2019) cooperation through Framework Agreement for strengthening India-Norway co-operation on 'Climate Change and Sustainable Development', which is also envisaged as the next phase of the earlier co-operation between the two countries [The Energy and Resources Institute \(TERI\)](#) and the [University of Agder \(Norway\)](#) have partnered under this Agreement on the theme of 'Sustainability and Clean Energy'. This theme draws on India's commitment under Nationally Determined Contributions (NDCs) to achieve 40% electric power from non-fossil fuel based energy resources by 2030. The work under this theme currently focusses on following two research areas:

- To analyse technical challenges for integrating solar photovoltaic (PV) systems (with and without energy storage) in the distribution network and developing smart micro-grid architecture and a road map to accelerate the solar PV-based microgrid development in India.
- Develop a recycling plan for solar PV module and new battery technologies used in microgrids applications.

As part of the project activity, [The Energy and Resources Institute \(TERI\)](#) and the [University of Agder \(Norway\)](#) are organizing a joint Thematic Track cum Workshop, under the Framework Agreement with the Norwegian Ministry of Foreign Affairs, on "Recent Advancements in Smart Micro-Grid: Smart Micro-Grid Architecture for Facilitating PV Penetration" at the [World Sustainable Development Summit, WSDS 2018](#) on Feb 15, 2018.

#### Thematic Track Background

India is successfully implementing one of the largest renewable energy capacity expansion programmes in the world and has a target to install 175 GW of renewable energy by 2022. For India, this is the right time to study the impact of Solar PV penetration into the distribution network and to identify appropriate solutions for overcoming related challenges. In the existing system most of the solar PV systems are connected to inject power into the network without giving effective contribution for managing voltage and power flows. Most of these issues can be resolved through designing an

innovative smart micro-grid architecture for facilitating PV penetration especially in the distribution network.

The focus of this thematic track will to analyse integration of solar PV system with other distributed energy sources via intelligent power conditioning devices within the distributed network for making it a smart micro-grid. It will also provide overview on impact of micro-grid deployment on future power system networks for the design of smart grid / green grid, energy supply and demand scenario, and energy efficiency. The smart micro-grid will employ innovative products and services together with intelligent monitoring and control communications to facilitate secure integration and operation of solar PV systems with other distributed generators while considering demand side management.

### Topics Covered

- Impact of increasing solar PV penetration into the distributed network.
- Role of batteries as energy storage for facilitating PV penetration.
- Power conditioning devices to operate intelligently for making micro-grid self-sufficient.
- Grid interaction of building integrated PV system.
- Techno-economic operation of the distributed generators with demand side management.
- Cyber security for microgrids.

### Key Outcomes

This workshop will provide participants an overview of:

- The development of decentralised smart-micro grid architecture for enabling smaller scale electricity systems based on solar PV system / distributed energy systems to operate harmoniously with the main grid.
- Environment-friendly distributed energy systems and their impact on policy making.
- The implications of solar PV based distributed generation systems, enhancing the intelligence of generation and demand, systems behaviour and economics - both practical and theoretical aspects.

### Who Should Participate?

Energy engineers, renewable energy technologists, managers, industry professionals, power systems planners, energy policy makers wishing to acquire a thorough understanding of future power systems / smart grids that are based on environmentally benign distributed generation energy technologies and especially solar PV system.