E-Workshop on projects funded under Norwegian Framework Agreement between the Norwegian Ministry of Foreign Affairs and The Energy Resources Institute (TERI), New Delhi

Theme: 'Sustainability and Clean Energy'

Project Partners: TERI (India) and University of Agder (Norway)

Date and Time: 7th Aug 2020 (12:00 to 16:15 IST / 08:30 to 12:45 CET)

Background:

The overall goal of the framework agreement under theme of sustainability and Clean Energy' is to enhance sustainable development through clean energy technologies. Three sub-projects, which have been implemented under this agreement, along with key takeaways are as under:

1. To analyze technical challenges for integrating solar PV systems (with and without energy storage) and develop standardized architecture as well as road map to accelerate the solar PV based microgrid development in India (Mar 2017 – July 2020).
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    - To study different microgrid architectures and roles of urban microgrids to maximize use of renewable energy and balancing using battery storage
    - Study, simulate, design and develop suitable microgrid for TERI's Campus and demonstrate the advanced control algorithm for the same
    - Study of similar microgrids developed at University of Agder, Norway and
    - Develop road map for urban microgirds in the context of India
    - Develop capacities of Indian partners through PhD and technical training program.

2. Develop a recycling plan for solar PV module and battery technology used in microgrid applications. (Mar 2017 – July 2020). Key takeaways include:
    - Ensuring safe and efficient recycling of c-Si solar PV modules and new battery technologies (lead acid, lithium ion, lithium iron phosphate) through creation of an overall framework and guidelines, which will reduce the amount of waste solar PV modules and batteries going to landfill and contribute to reduction in GHG emissions.

- Elements of framework consists of an institutional framework, detailed role of PRO, and a systems integrator to operationalize a robust collection and recycling (C&R) mechanism, including recommendations for a Nationalized Recycling Plan and cost estimates for C&R of c-Si solar cell and new battery waste.
- To arrive at a comprehensive framework, knowledge sharing, dialogue, collaborations for stakeholder feedback has been important and is ongoing. Policy makers have implemented elements from the recommended framework for recycling of solar PV module and new battery technology used in microgrids applications.

3. To establish technical feasibility and financial viability of biomass gasifier combined with ORC based Heat Engine for combined heat and power application for agro enterprises as well as to assess the market potential and mapping of potential clusters. (Feb 2019 – July 2020). Key takeaways include:
   - To conduct a needs analysis to assess the heat/cooling and electricity needs of micro/small industrial applications such as dairy, agro-processing, fruit, and vegetable storage in rural areas.
   - To develop technical specification document combining biomass gasifier (as a heat source) and heat engine;
   - Techno-economic feasibility of a 40 kW TERI developed gasifier combined with heat engine technology was established/studied.
   - Modeling of scenarios & Stakeholder consultation and Dissemination (Workshops)
   - Engaging with the stakeholders within the subsector to inform them about the technology, its economic benefits and also to understand their energy needs and replication potential

Objective of the Workshop:

The basic objective of this online workshop organized by TERI in collaboration with University of Agder (Norway) is to share insights and learning from these sub-projects with a view to have deliberations with key stakeholders and get feed-back which would further guide to take forward these outcomes. These sub-projects also capture the expertise present in Norway in these specific sectors and can be leveraged through mutually beneficial partnerships.

Participation:

We, TERI and University of Agder, Norway, are delighted to invite you for participation in this online workshop and contribute to deliberations. The participation is by invitation only.

The Workshop is structured in three separate sessions focused around each of the topics. There would be joint presentations from the project partners from TERI and University of Agder, Norway, followed up by Q&A sessions.

We request you to kindly accept this invite and block your calendar for **Friday, 7th August 2020 (12:00 PM- 16:15 PM (IST).**

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Agenda

12:00 - 12:10	Welcome and Introduction: **Dr. Ashvini Kumar, Senior Director, TERI** **(**Overview of WP1, WP2, WP3)
12:10 - 12:20	TERI-NFA Framework Agreement: **Dr Shilpi Kapur, Senior Fellow, TERI**
12:20 - 12:30	Representative (Dean / Vice Rector) of the University of Agder (Norway) (UiA's contribution on sustainability development and clean energy)
12:30 - 12:40	Address: **Mr. Dinesh D. Jagdale, Joint Secretary, Ministry of New and Renewable Energy, Government of India**
12:40 - 13:40	**Session 1:** PV based micro-grid: performance evaluation and implementation **Moderator: Dr. Ashvini Kumar, Senior Director, TERI** • Presentation by Mr. Shirish Garud, Senior Fellow, TERI and Prof. Mohan Kolhe, UiA • Questions and Answers
13:40 - 13:50	**Virtual Break**
13:50 - 14:50	**Session 2**: Policy framework on PV and battery recycling considering global developments **Moderator: Prof. Mohan Kolhe, University of Agder, Norway** • Presentation by Dr. Suneel Pandey, Senior Fellow and Director TERI and Mr. Arvind Sharma, UiA • Questions and Answers
14:50 - 15:00	**Virtual Break**
15:00 - 16:00	**Session 3**: Biomass gasifier-based ORC heat engine: applications in Indian scenario **Moderator: Mr. Sunil Dhingra, Senior Fellow and Associate Director,TERI** • Presentation by Mr. N.K. Ram, Senior Fellow and Area Convenor, TERI and Prof. Mohan Kolhe, UiA • Questions and Answers
16:00 - 16:15	Overall Feedback and summing up • UiA representative • TERI representative • Royal Norwegian Embassy, New Delhi