



MISSION INNOVATION
Accelerating the Clean Energy Revolution

Mission Innovation
Challenge IC#2
Off-grid Access to Electricity

“Off Grid Access to Electricity- India’s Perspective”

12th July 2017

Paris, France

Presented by:

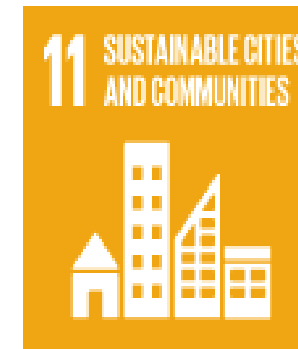
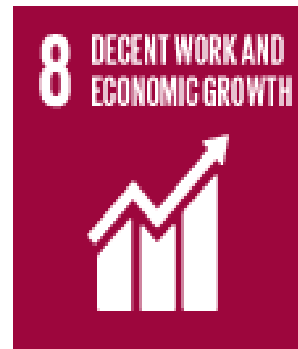
Vineet Saini
DST, India



SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

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Sustainable
Energy for
All by 2030



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Mission Innovation Challenge IC#2 Off-grid Access to Electricity

Objective (1) Individual Homes

To support sufficient reduction in price and performance of renewable power system by 2020.

Objective (2) Remote Communities

To demonstrate in diverse geographic and climatic conditions, the robust, reliable and autonomous operation of renewable power systems at a significantly lower cost than today.



Energy Access

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Image in 2012. (NASA Earth Observatory images by Joshua Stevens)



Image in 2016. (NASA Earth Observatory images by Joshua Stevens)



India : Glimpse of Energy Access

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Population	1,326,801,576
Total area	3.287 million km ²
Urban Agglomeration /Town	7935
Villages	649481 (> 99% have been electrified)
Energy mix (Power for all programme)	coal, gas, nuclear power, oil, hydro power, renewable energy
Electricity consumption	1114.41 TWH
Electricity generation capacity	330 GW
Overall network losses	22.7 %



Hon'ble Prime Minister
of India

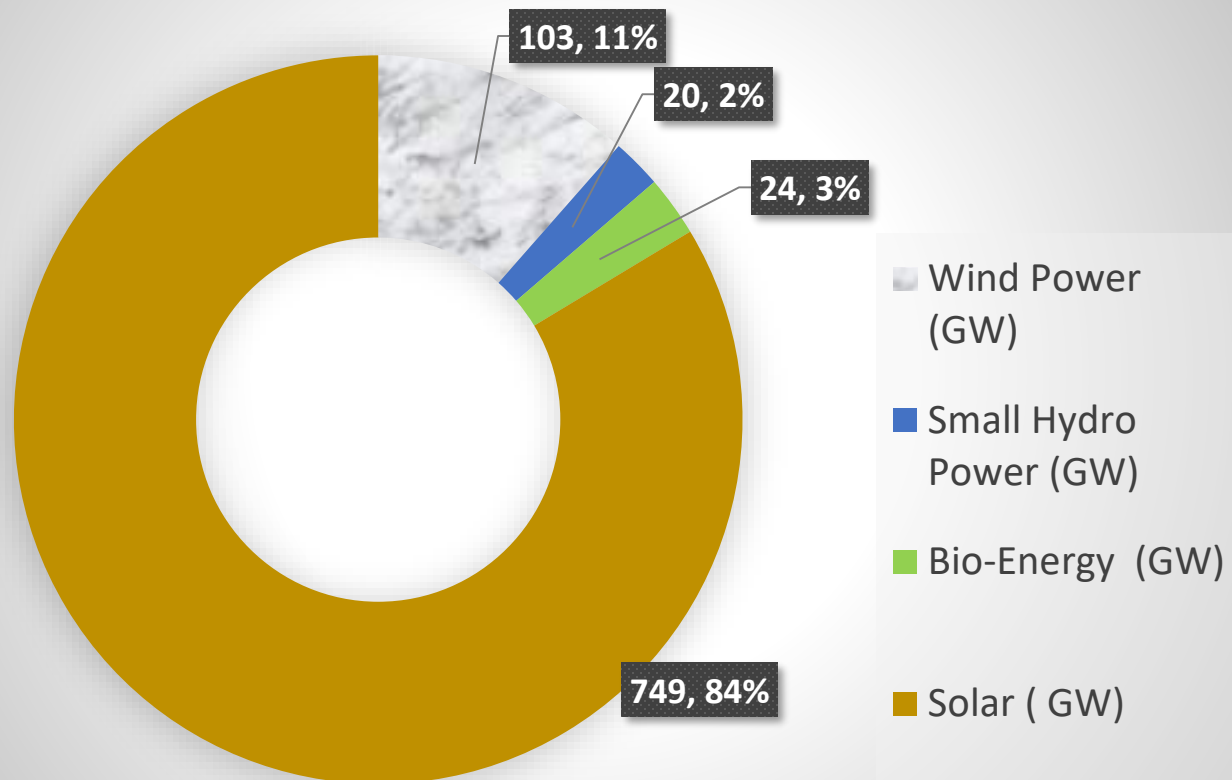
DEENDAYAL UPADHYAYA
GRAM JYOTI YOJANA
(Scheme of Govt. of India
for Rural Areas)



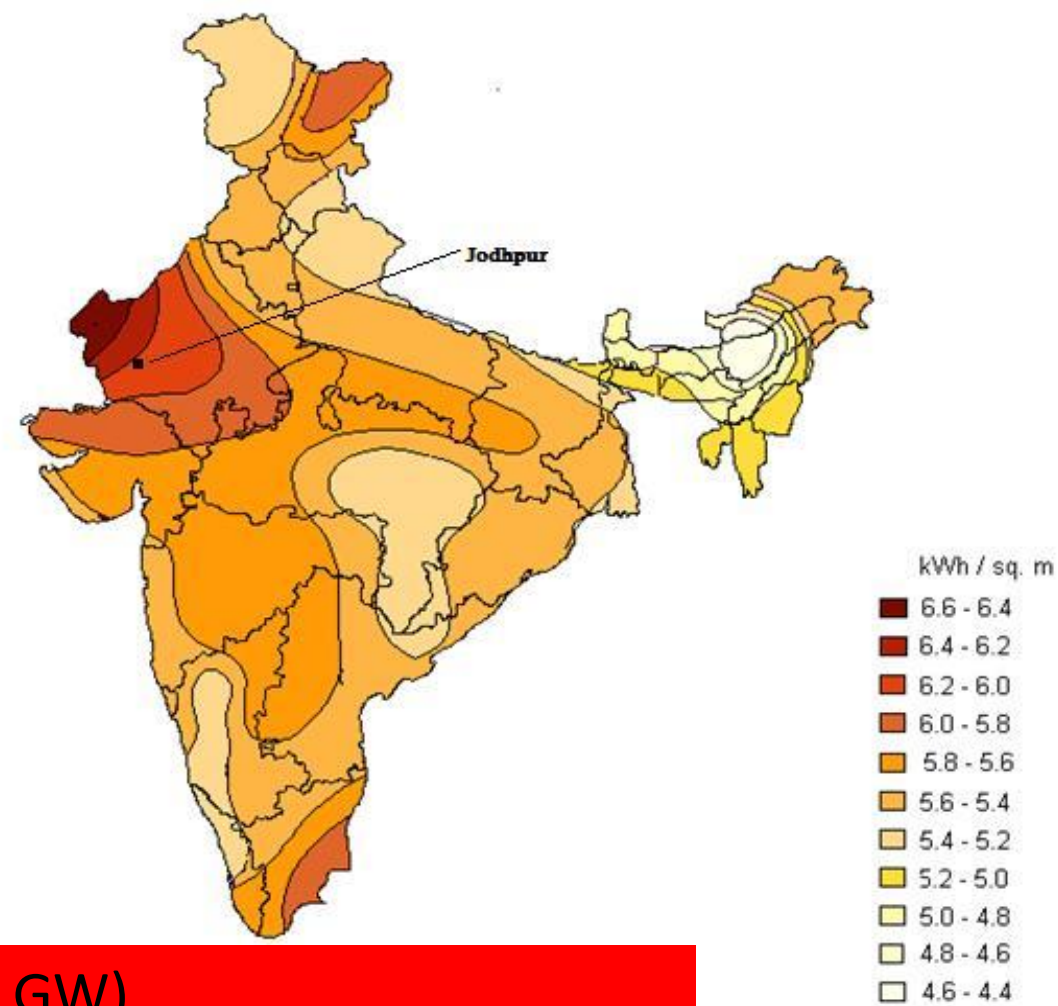
RENEWABLE ENERGY POTENTIAL (~900 GW)

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INDIA



Solar Irradiation

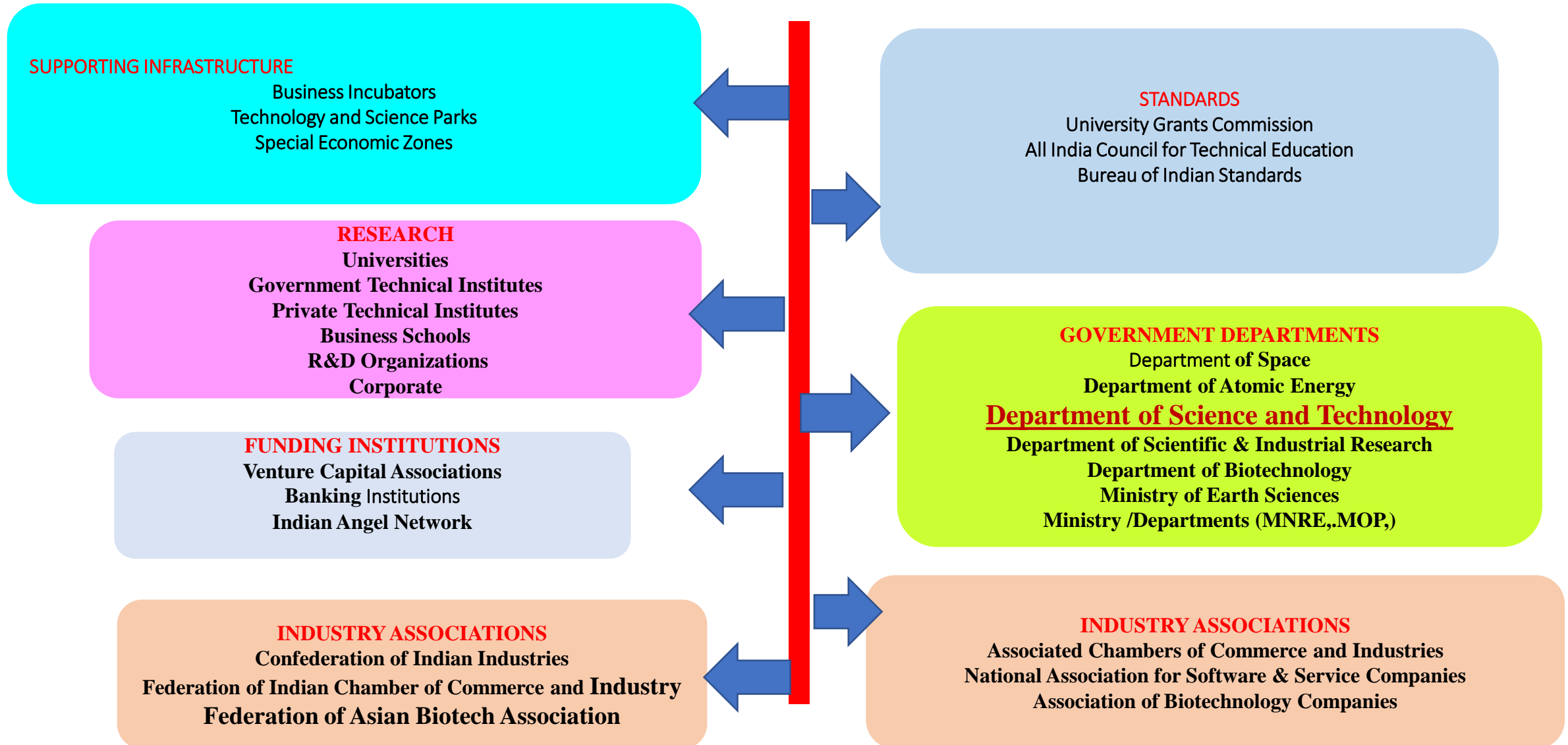


World largest renewable deployment programme (175 GW)



R&D Ecosystem in India

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Clean Energy & Energy Efficiency R&D Initiatives

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- ❖ Research Initiative on **Solar Energy**
- ❖ Promote **Habitat Energy Efficiency** to improve energy performance of buildings and cities
- ❖ Research Initiative on **Energy materials** with focus on energy storage
- ❖ National Mission on **Cleaner alternate fuels** viz Methanol & DME from high ash Indian coal
- ❖ National Mission on Advanced **Ultra Super Critical Technology** for Cleaner Coal technologies.
- ❖ Technology Mission on Indian Railways for **Engine efficiency**, bogey design and improved reliability
- ❖ **Collaborative programmes with international partners** resulted in **scientific breakthrough** in the areas of solar energy, energy efficient buildings, smart grids and energy storage with measurable benefits and significant reduction in energy use

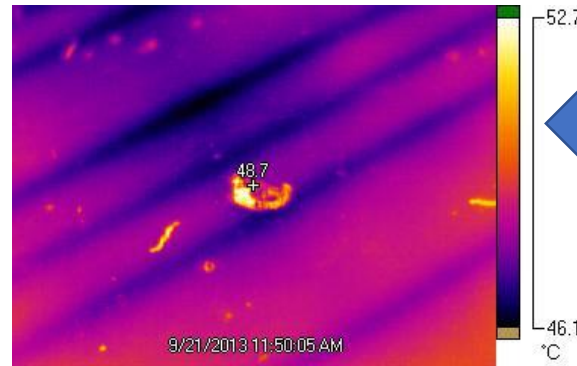


Clean Energy Research Achievements

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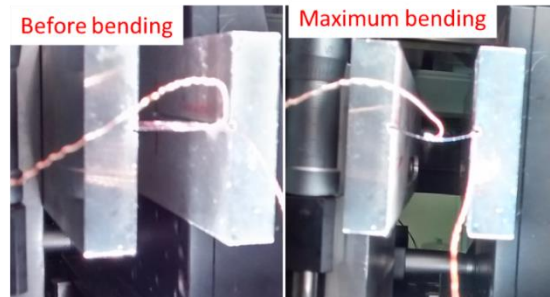


Effect of tilt angle on dust accumulation (test site at IITB)



Hot Spots created by dust

Mitigating Harsh Environments on Photovoltaics – Impact of dust, heat, humidity and pollution



Manufacturing for Future -Roll to Roll Processing of PV on Flexible Substrates



Efficient thermocline based molten salt storage



Pathways for efficient harnessing of Solar Thermal Energy : Indigenous components for Supercritical CO₂ power plant



Clean Energy Research Achievements

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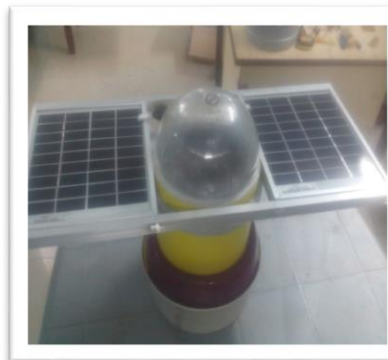
Testing System for Energy Efficient Windows for commercial buildings



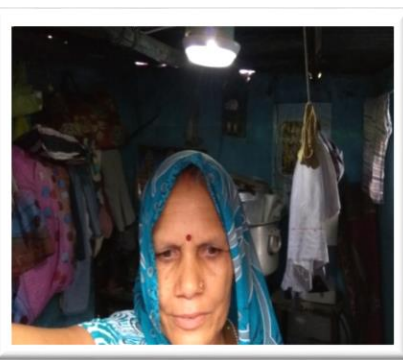
Smart power strip for monitoring loads



Dedicated Outdoor Air System for energy efficient cooling



Surya Jyoti – Micro Solar Dome in Operation

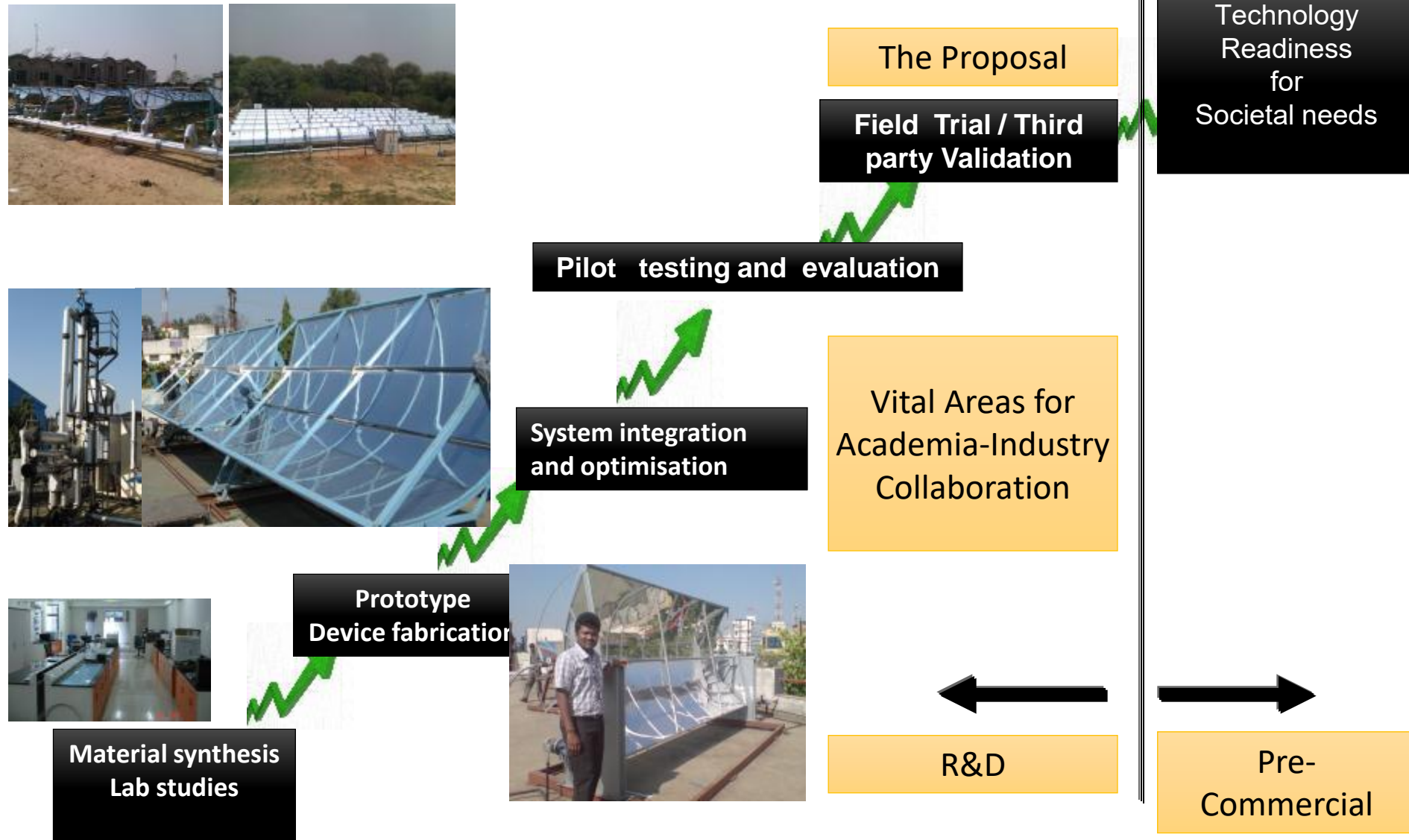


Energy Efficient Phase change material tiles



Non Linear Pathways from Lab to Land

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Hybrid Solar Biomass Distributed power generation –DST-Thermax-UOP

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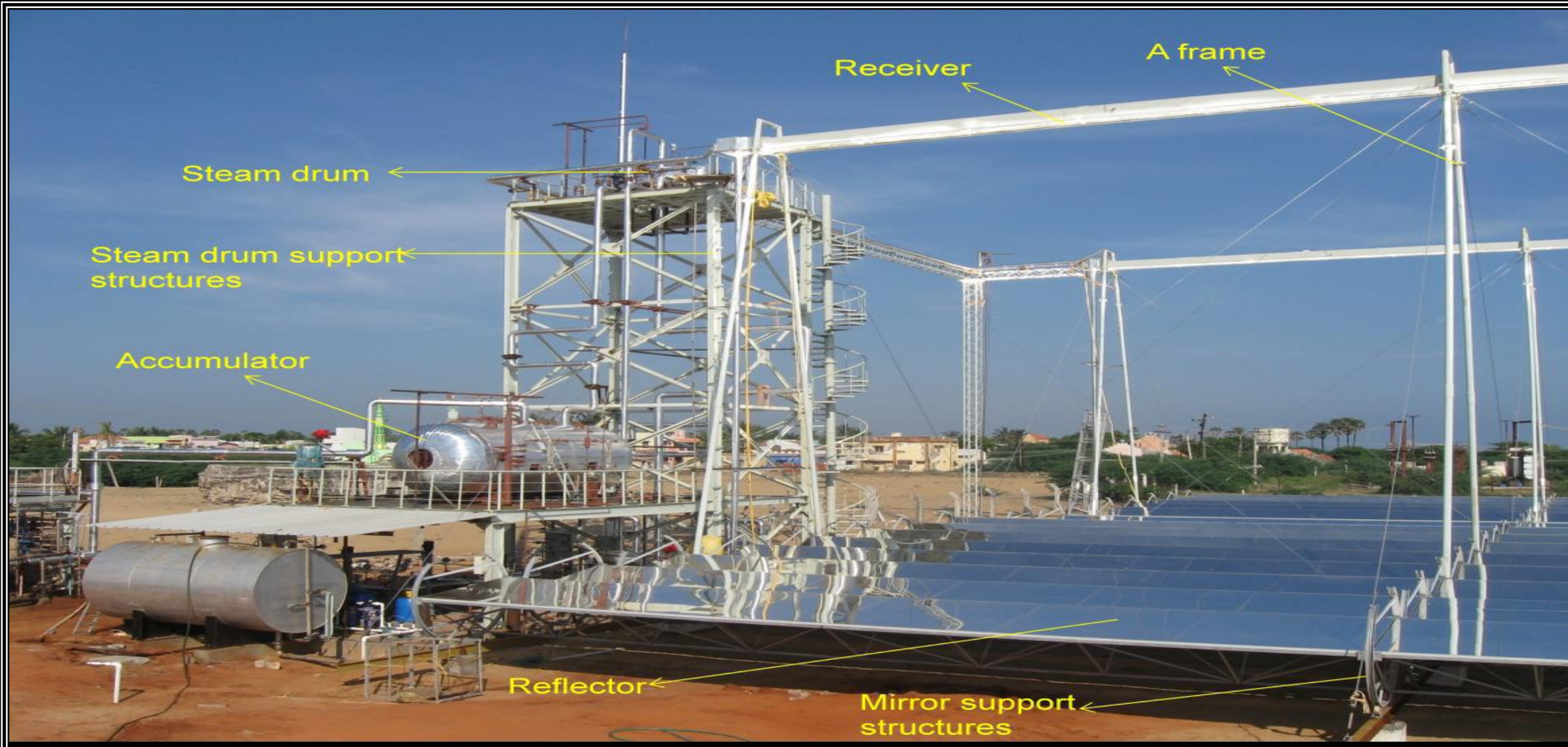
Solar Block





Solar- Sea Water desalination plant in Ramanathapuram district of Tamil Nadu

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Solar Based MED System in Association with KGDS

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- ❖ *Utilisation of concentrated solar thermal energy for supplying potable water to costal community in Narippaiyur (Ramanathapuram)*
- ❖ *Solar- Multi Effect Desalination (MED) System delivers 6000 LPH ultra-pure industrial grade water and can also be used for drinking water.*
- ❖ *Integration of Linear Fresnel Reflector based solar thermal steam generating system with the MED system and performance evaluation*
- ❖ *Patent filing in process*
- ❖ *Commissioned in February 2013*



Agri-Voltaics



Agri-voltaics



**Installed 10 KW Solar Power
Plant on the Agricultural
Land**



**Installed Solar Water
Pump nearby the
Agricultural Land**

From Solar panels for example a solar plant of 10KW is installed in a farm field

Panel	Cost(Appro)	units generated/day	Sale Rs.7/unit
10kw	Rs.6 lakhs	50 units/day (if sun is for 5hrs)	Earn Rs. 350/day
		100units/day (if sun is 10hrs)	Earn Rs.700/day



First MI-India Workshop : “Off Grid Access to Electricity Innovation Challenge” 23rd May 2017, IIT Delhi

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**Mission Innovation
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Mission Innovation – INDIA

Funding Opportunity Announcement (FoA): Off Grid Access to Electricity

Fund amount : **US \$ 5 millions**

Number of Awards : **10**

Start date Notification of Intent (NoI)

8th June, 2017

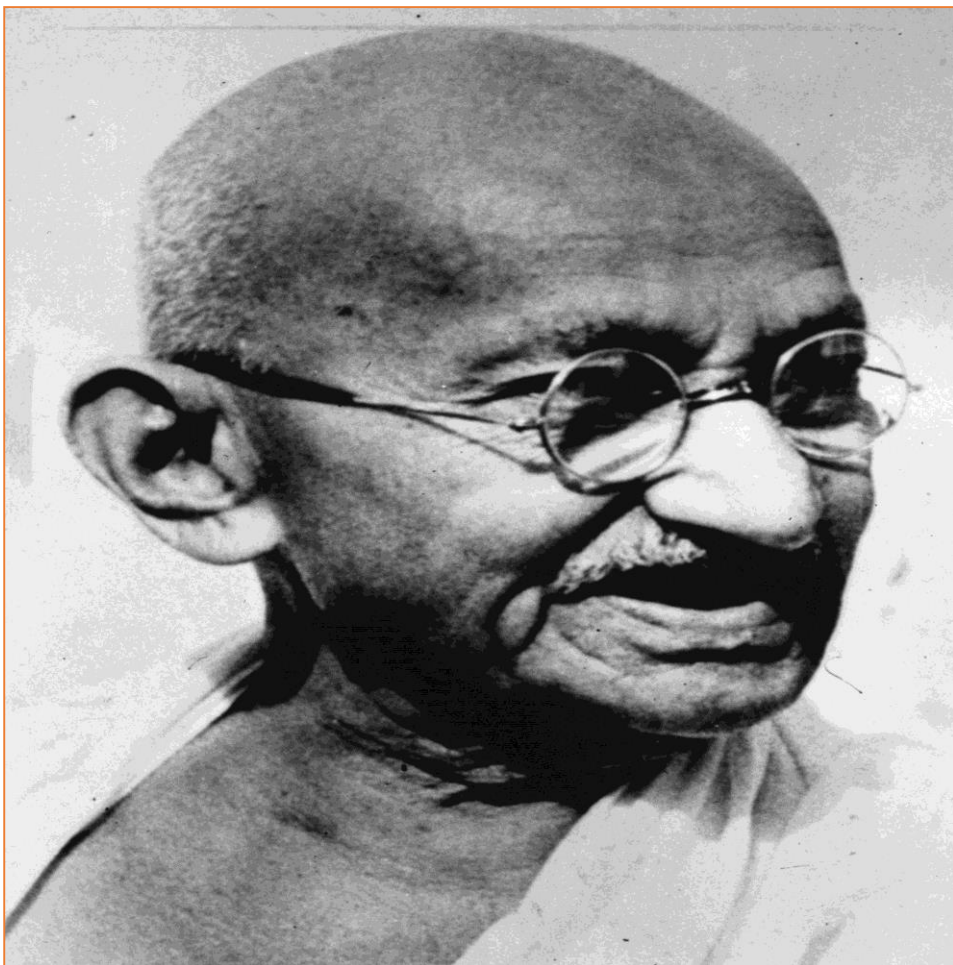
Last date of submission of Nols Form

31st August, 2017

Web link at

<http://dst.gov.in/callforproposals/funding-opportunity-announcement-foa-grid-access-electricity>

Institutions/industries of Mission Innovation (MI) member countries (mission-innovation.net) are welcome for collaborative solution



“The Earth has enough resources to meet people’s needs, but will never have enough to satisfy people’s Greed”

- *Mahatma Gandhi*



Thank you