

Clean Technology Innovations Journey in India

R K Rai

Secretary

Bureau of Energy Efficiency



Bureau of Energy Efficiency (BEE)

- Bureau of Energy Efficiency (BEE) a Statuary Body
- Set up by Gol on 1st March 2002 under the provisions of the **Energy Conservation Act, 2001**
- with the mission to “*assist in developing **policies and strategies** with a thrust on **self-regulation and market principles**, within the overall framework of the Energy Conservation Act, 2001” and primary objective of *reducing **energy intensity** of the Indian economy**

Activities of BEE

Strengthening Institutional Capacity of Partners

- Strengthening of State Designated Agencies (SDAs)
- International Cooperation

Demand Side Management

- Agriculture DSM
- Municipal DSM
- Energy Efficiency in SMEs
- Capacity Building of DISCOMs

Transport Sector

- Fuel Efficiency Norms
- Plug-in Electric Vehicle (PEV)

Equipment & Appliances

- Standards & Labelling
- Super Energy Efficient Programme (SEEP)

Awareness Programs

- General Awareness
- Energy Conservation Awards
- Painting Competition

National Mission for Enhanced Energy Efficiency (NMEEE)

- Perform, Achieve and Trade (PAT)
- Market Transformation for Energy Efficiency (MTEE)
- Framework for Energy Efficiency Economic Development (FEEED)
- Energy Efficiency Financing Platform (EEFP)

Buildings EE

- ECBC Commercial
- Star Labelling of Commercial Buildings
- ECBC Residential
- Star Labelling of Residential Buildings



Facility for Low Carbon Technology Deployment

Phase I (2013-17)



GCIP India received 767 Applications for 4 annual Innovation Competitions

84 Cleantech Innovators with **Innovative Technologies** from 41 cities were mentored by GCIP over 2013-17

GCIP components found to be beneficial by the Cleantech entrepreneurs



Nearly 35% of the 84 cleantech innovators, are currently in the market and have succeeded in raising investments worth over INR 140 crores (USD 20 million).

	Ranking Order
Opportunities to showcase technology	1 st
Training for business plan development	2 nd
Mentorship on business development	3 rd
Connection with an investor network	4 th
Connection with potential business partners	5 th
Technical advice through sector experts	6 th



Recognition of Indian Innovators in GCIP Global Forum



Saathi Eco Innovation is the **GCIP GLOBAL WINNER** of 2017 for 100% biodegradable sanitary pads from banana-waste fibres and uses zero chemicals

Promethean Energy won the GCIP Global Category for **ENERGY EFFICIENCY** in 2015 for efficiently recovering waste heat from Air Conditioning systems

Atomberg Technologies won for **EE** in 2016 for most efficient ceiling fans in the world

NavAlt Solar & Electric Boat in the **RENEWABLE ENERGY** category in 2017. A single solar ferry displaced the use of 42,000 litres of diesel in a year

Aspartika Biotech for **WASTE BENEFICIATION** in 2017 for utilizing discarded pupae from silk reeling industries to converting it into Omega3 fatty acids for human and animal consumption



GCIP Global Winners from India

Facility for Low Carbon Technology Deployment

Phase II

Joint Initiative of



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



Bureau of Energy Efficiency



Global Environment Facility

*National
Counterparts*



#startupindia



Confederation of Indian Industry

Business and Beyond

125 Years: 1895-2020



Indian Society of Heating Refrigerating and Air-Conditioning Engineers



Sangam AIC

Energy | Innovation | Capital



intellecap



Objectives of FLCTD Project



- Identify technology gap areas having scope for energy saving
- Select innovative technology solutions that address the gap
- Facilitate demonstration and Validate efficacy
- Facilitate Scale-up



Technology Verticals for Innovation Challenge

- Waste Heat Recovery
- Space Conditioning
- Pump & Pumping System

3 Additional Technology Verticals to be Announced in July 2020

Project Website

www.low-carbon-innovation.org

The screenshot shows the website for the Facility for Low Carbon Technology Deployment (FLCTD). The main banner features the text "Facility for Low Carbon Technology Deployment" and "UNIDO-BEE-GEF Initiative" with a "2020 CHALLENGE OPEN" button. The "About FLCTD" section states that the facility is jointly implemented by the Bureau of Energy Efficiency (BEE) and the United Nations Industrial Development Organization (UNIDO), and is supported by the Global Environment Facility (GEF). The website also includes a navigation menu, social media links, and a Twitter feed.

What FLCTD Project Offers



Financial support up to **US \$50,000** for Demonstration & Validation in field conditions



Technical Mentoring by CII-GBC and Subject Experts



De-risking of innovations before commercial launch



Industry Linkages



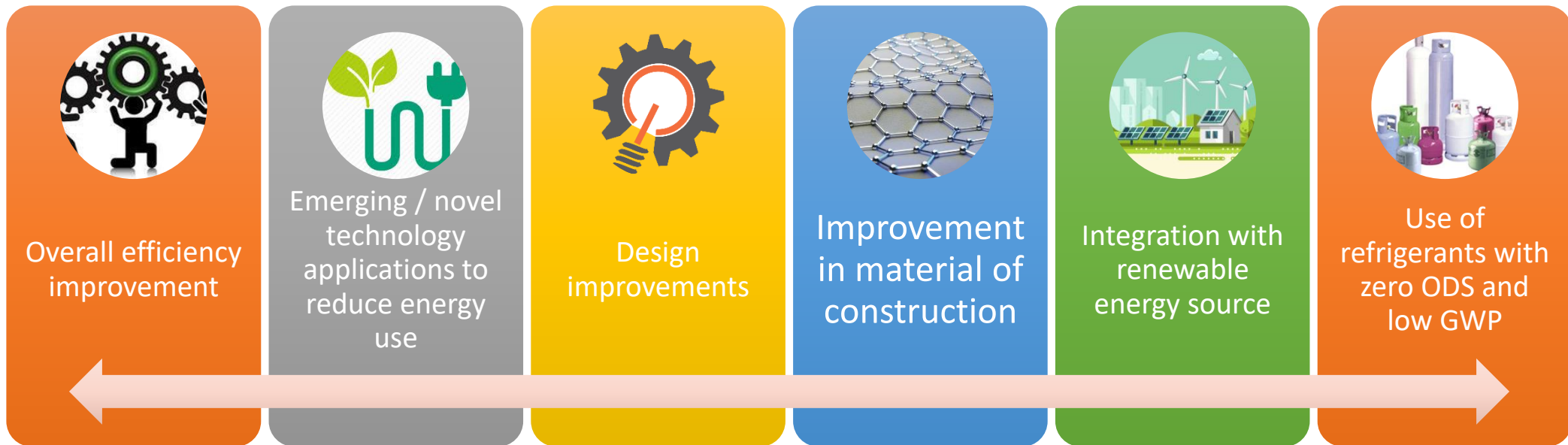
Financial Mentoring and Fund Raising Support

Who Can Participate

- Entrepreneurs / Startups,
- Indian Technical Institutes / Universities,
- Research Institutes,
- Not-for-profit Organizations,
- Micro, Small and Medium Enterprises
- Industries,
- Public Sector Enterprises
- **Consortium** of Indian companies, non-profit organization, associations, academic institution, R&D organization
- Indian Start-up companies **in collaboration** with Industry/Academia/research institutes/ are highly encouraged to apply
- Technologies funded under Department of Science and Technology (DST) and other government schemes, at pre-market phase TRL 4 - TRL 6 and ready for field demonstration



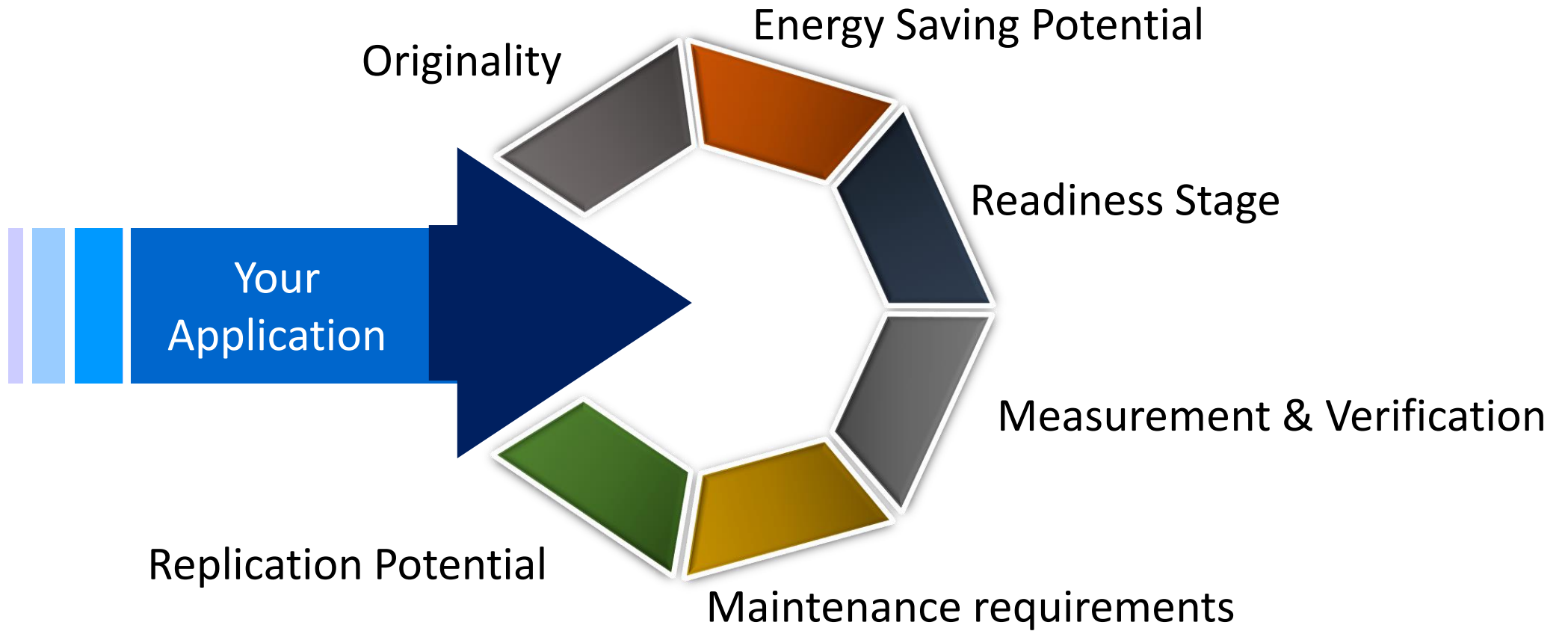
Qualifiers for Innovation



All innovative solutions should demonstrate replication potential



Screening Criteria



Financial Support

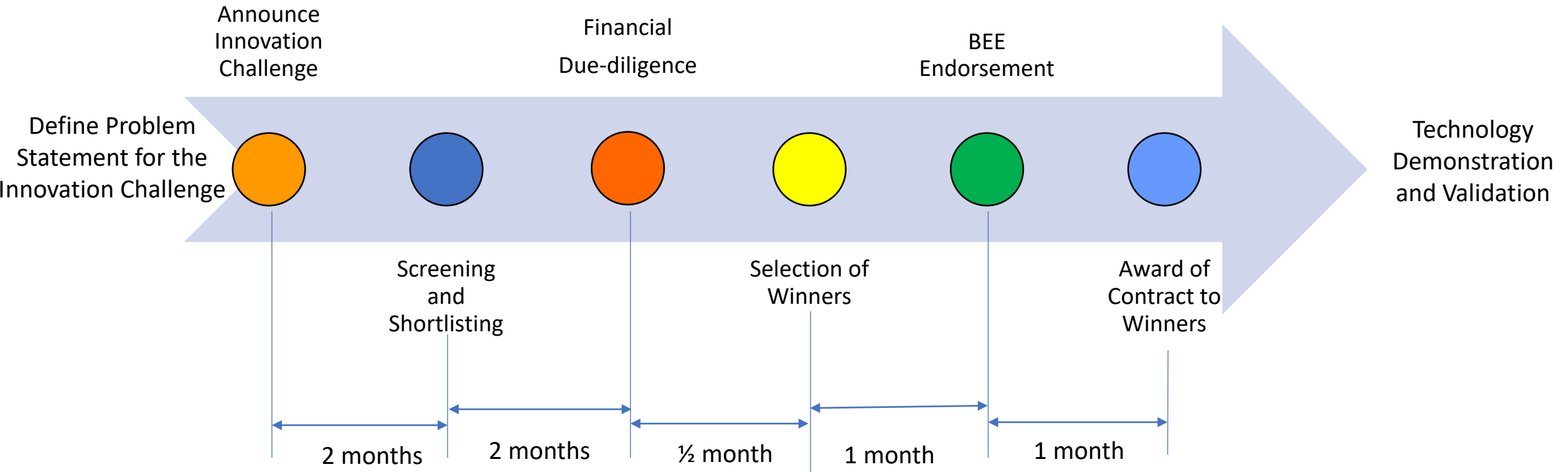
Allowable Costs



1. Capital expenditure for the demonstration
2. Consumables related to technology demonstration
3. Intangibles - quality control tests; modelling and simulation; tests in accredited laboratory for validations,
4. Operating Expenses for technology demonstration -
Manpower cost, staff travel to technology demonstration sites



Time line of Innovation Challenge for Winner Selection



Facility for Low Carbon Technology Deployment

Outcome of Previous Year's Challenge

2018 & 2019



Overview of 2018 Winners



❖ 13 winners awarded INR 3.5 Crore (US \$ 504,814)

- WHR – 3 nos.
- Space Conditioning – 6 nos.
- Pumps and Pumping systems – 4 nos.

❖ Pilot site identification and baselining completed

- M&V completed for 7 Innovations

Waste Heat Recovery : 2018 Winners

 Oorja Energy Engineering Services Pvt Ltd Hyderabad	 Promethean Energy Pvt Ltd Mumbai	 Village Industrial Power Pvt Ltd Pune
Innovation: Radiant Heat Recovery from Rotary Kilns in Cement Plants	Innovation: Heat Recovery in Milk Chilling Centers	Innovation: Heat Recovery in Traditional Jaggeries to Reduce Fuel Consumption
Target Sectors/Industries: Cement Steel	Target Sectors/Industries: Food Processing	Target Sectors/Industries: Jaggery making units

Space Conditioning : 2018 Winners

 Basil Energetics Private Limited Chennai	 Inficold India Pvt Ltd Ghaziabad	 Metafabs Metafabs Thiruvananthapuram	 PLUSS Technology for a Better World Pluss Advanced Technologies Gurgaon	 Promethean Spentia Technologies Pune	 TESSOL Thermal Energy Services Solutions Mumbai
Innovation: DC powered Air-conditioners	Innovation: Retrofittable Instant Milk Chilling System	Innovation: Refrigeration Solution in Fishing Trawlers	Innovation: Deep freezer with Thermal Energy Storage for Enhanced Energy Efficiency	Innovation: Thermal Energy Storage based Mobile Cold-Storage	Innovation: Application of Thermal Energy Storage Battery Swap for Cold-chain
Target Sectors/Industries: Domestic Sector Commercial Sector	Target Sectors/Industries: Dairy and milk collection	Target Sectors/Industries: Food value chain Fishing	Target Sectors/Industries: Cold-chain Sector	Target Sectors/Industries: Food Value-chain Farm-produce Aggregators	Target Sectors/Industries: Food Value-chain Pharmaceuticals Value-chain

Pumps and Pumping Systems : 2018 Winners

 Basil Energetics Private Limited Chennai	 Khethworks Pvt. Ltd Pune	 Shakti Pumps (I) Ltd Indore	 Sunmoksha Pvt. Ltd Bengaluru
Innovation: DC Powered High-speed Pumps	Innovation: Portable Solar Pump for Smallholder Farmers	Innovation: Energy efficient Slip-Start Synchronous Motor-based Water Pumps	Innovation: Smart AQUAnet™ IoT-based Efficient Water Management System
Target Sectors/Industries: Domestic Sector Commercial Sector	Target Sectors/Industries: Agriculture	Target Sectors/Industries: Industrial Sector Domestic Sector	Target Sectors/Industries: Agriculture

Overview of 2019 Winners



❖ 17 Winners

❖ INR 5.3 Crores committed for technology demonstration & validation

 Promethean Energy Pvt Ltd Mumbai	 ENCON Thermal Engineers Haryana	 Oorja Energy Engineering Services Pvt Ltd Hyderabad	 Opel Energy Systems Pune	 Centre for Energy, Environment and Productivity Chennai	 Forbes Marshall Pune	 Aspiration Energy Pvt Ltd and Energy and Emission Lab Chennai
Innovation: Waste Heat Recovery from Textile Dyeing Process	Innovation: Regenerative Burners	Innovation: Low Grade Heat Based Power Generation in Cement Industry from Exhaust & Cooler Gases	Innovation: Waste Heat Recovery on Small Engine Test Beds	Innovation: Heat Energy from Hot Effluents in Textile Industry	Innovation: Steam Engines	Innovation: High Temperature Heat Pump
Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries:

Waste Heat Recovery

 Promethean Spenta Technologies Pune	 Tan90 Thermal Solutions Private Limited Chennai	 New Leaf Dynamic Technologies (P) Ltd New Delhi	 Inficold India Pvt Ltd Ghaziabad	 Swadha Energies Chennai
Innovation: Can Cooling System for Milk Collection in Villages	Innovation: Portable Cold Storages	Innovation: Refrigeration Systems Powered by Farm Waste	Innovation: Solar Milk Cooler for Farm Level Cooling	Innovation: Comprehensive Solution for Centralized AC System
Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries:

Space Conditioning

 Farm-Hand Ltd Auroville	 Shakti Pumps (I) Ltd Indore	 Scientific and Industrial Testing and Research Centre (Si'Tarc) Coimbatore	 Sense It Out Intelligent Solutions Pvt Ltd Pune	 AquaSub Coimbatore
Innovation: Smart & Affordable Precision Irrigation Solutions	Innovation: Micro Smart Pump	Innovation: Smart Submersible Pumpset with Rewindable Permanent Magnet Submersible Motor	Innovation: SICCA (Sensor-based Intelligent Crop Centric Automation)	Innovation: Energy Efficient Submersible and End Suction Monoblock Pump with Reluctance Motor
Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries: 	Target Sector/Industries:

Pumps and Pumping Systems

Outcome of FLCTD 3rd Annual Innovation Challenge 2020

177 Entries

Waste Heat Recovery – 69

Space Conditioning – 64

Pumps & Motors - 44

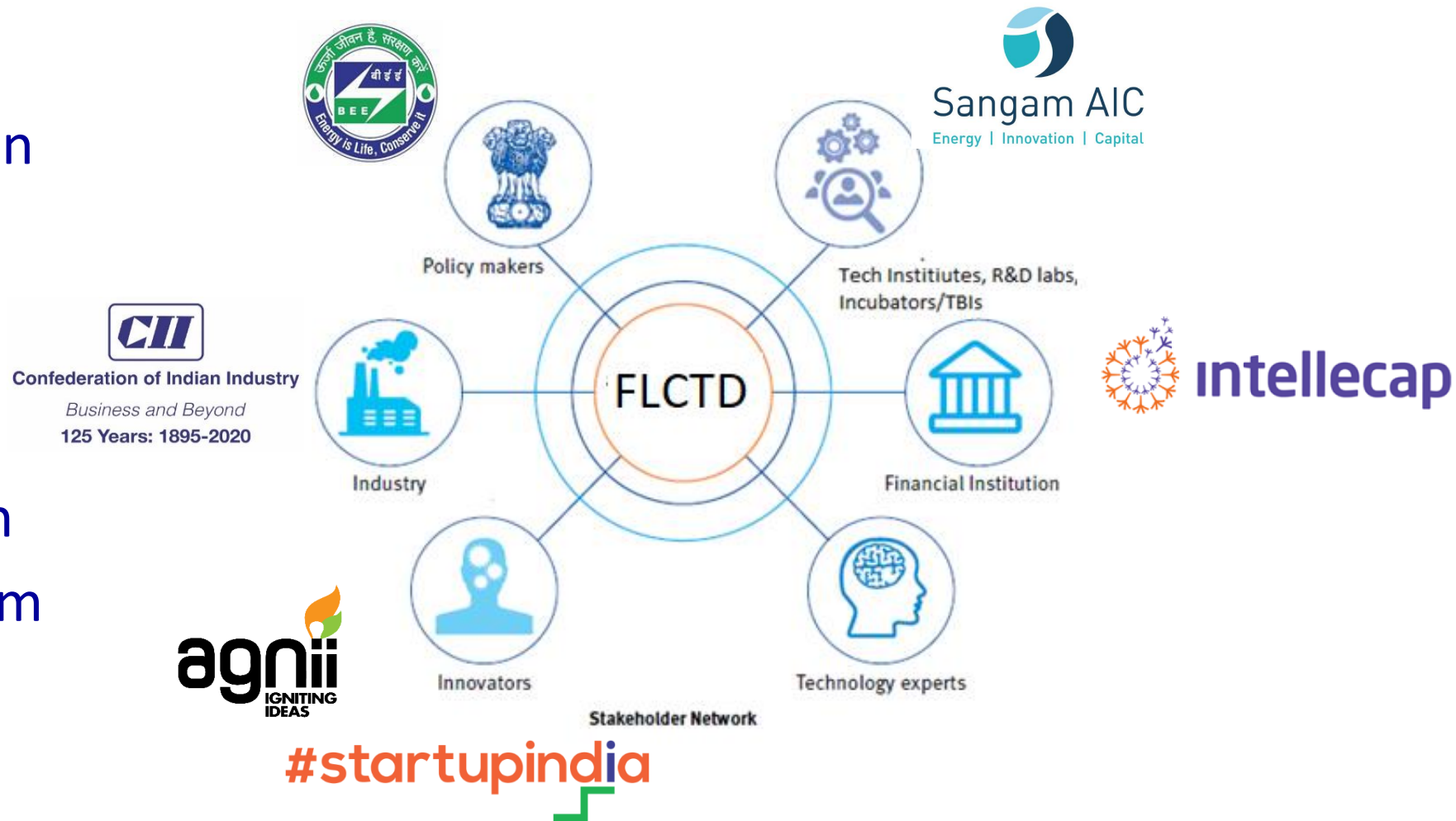
Application Review and Shortlisting – July to September

Project Goals



□ Scale-up innovative solutions for adoption by industrial and commercial users

□ Strengthen cleantech innovation eco-system



THANK YOU



HOW TO SET AND KEEP x gas lighting - Google Se x Low Carbon Innovation - FLC x +

https://www.low-carbon-innovation.org

FLCTD
Promoting Innovation and Deployment of Low Carbon Technologies

gef UNIDO

ABOUT FLCTD CHALLENGE WINNERS EVENTS CONTACT | SCIP CLEANTECH@UNIDO MY ACCOUNT

CII Confederation of Indian Industry 125 Years: 1955-2020 ISHRAE intelicap AIC-Sangam agni #startupindia

Social Links: f t in

Facility for Low Carbon Technology Deployment

UNIDO-BEE-GEF Initiative

[APPLY TO FLCTD ACCELERATOR](#)

About FLCTD

FLCTD Introduction Video

- Facility for Low Carbon Technology Deployment (FLCTD) is jointly implemented by the Bureau of Energy Efficiency (BEE) and the United Nations Industrial Development Organization (UNIDO).
- FLCTD is supported by the Global Environment Facility (GEF).

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