



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



SUSTAINABLE DEVELOPMENT GOAL 9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

UNIDO Interventions on Energy Efficiency for MSMEs

By

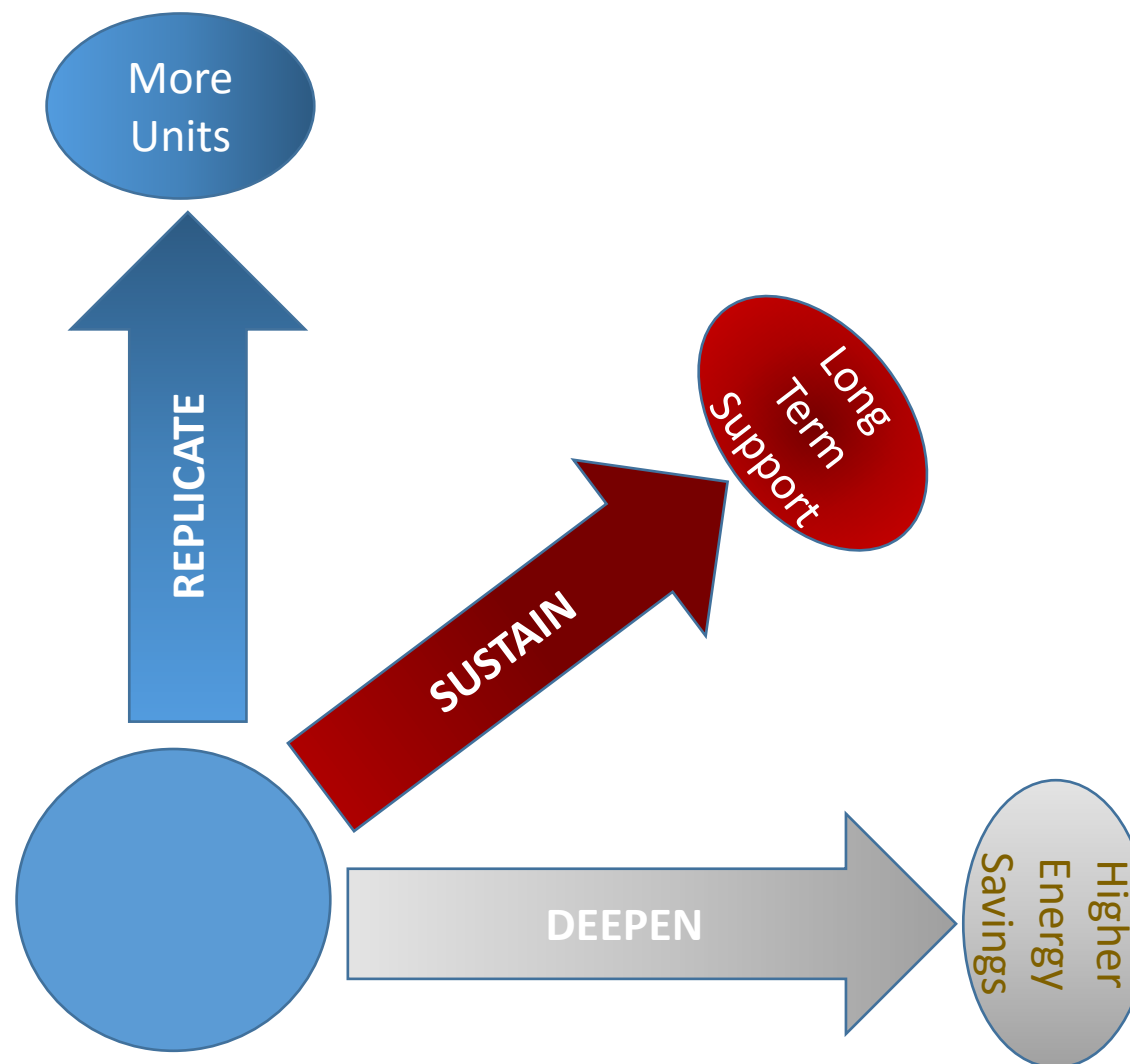
Debajit Das

(National Project Coordinator)

d.das@unido.org



UNIDO India: Three Tier Intervention



Market Transformation Project Objective

1

To **promote the implementation** of energy efficiency in the MSME sector

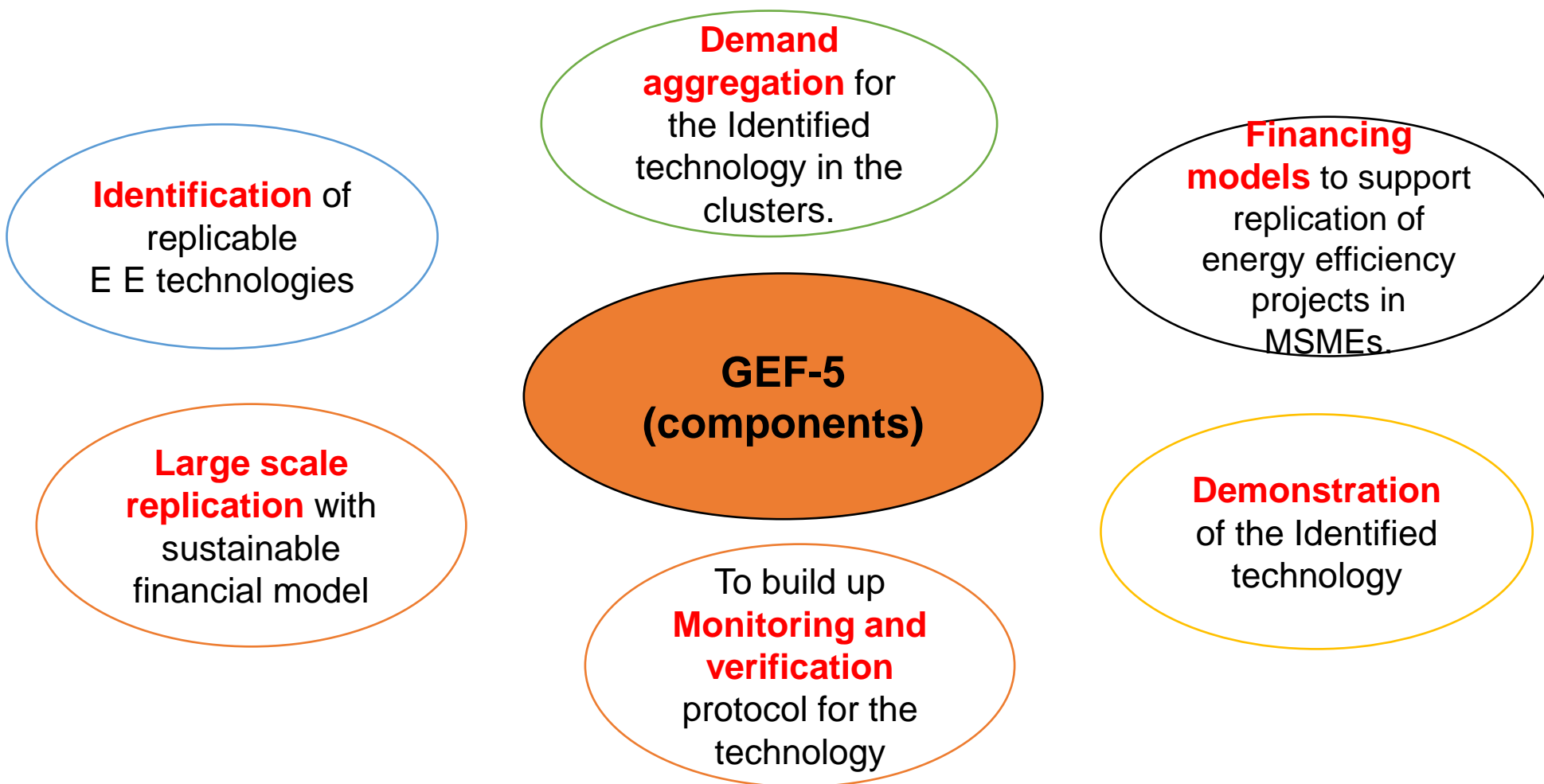
2

To **create and sustain a revolving fund mechanism** to ensure replication of energy efficiency measures in the sector

3

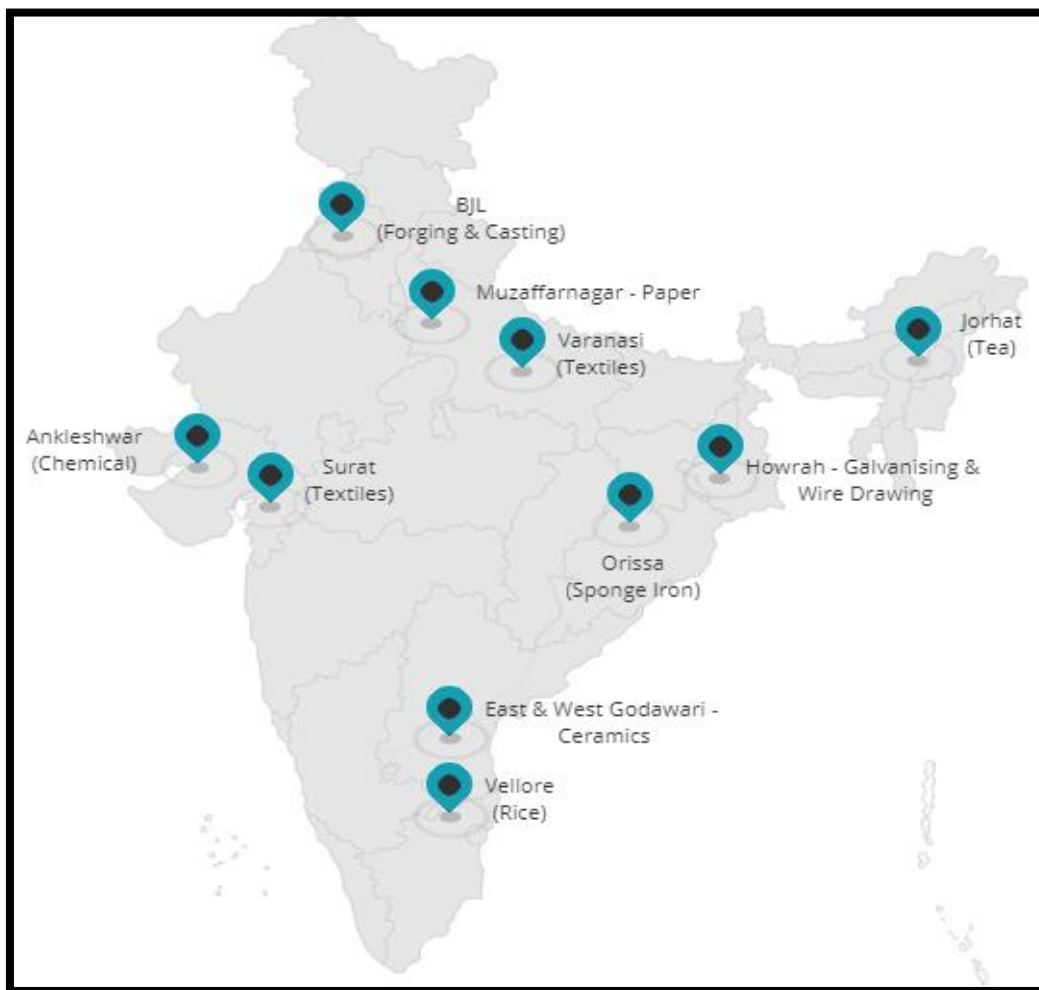
Scaling-up energy efficiency measures and consequently **promote a cleaner and more competitive MSME** industry in India.

Project Components

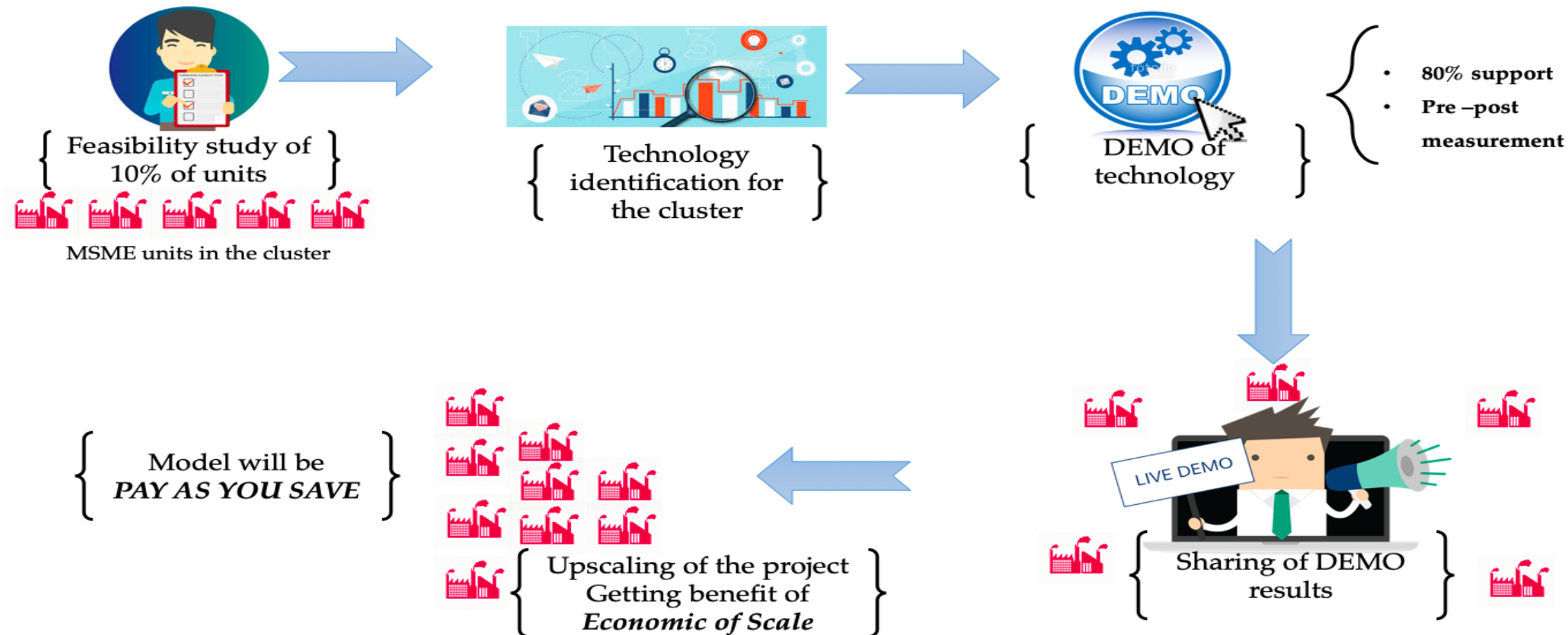


Clusters in Focus

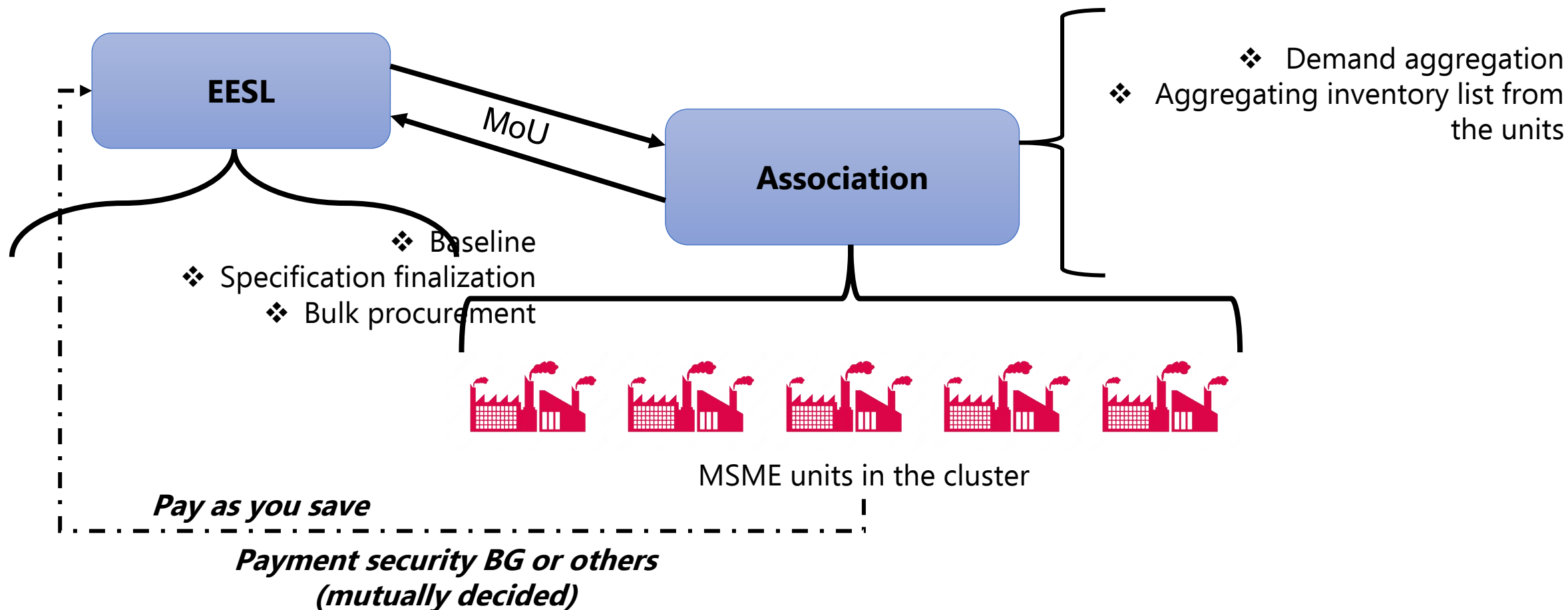
Sl. No.	Clusters
1	Surat (Textile)
2	Orissa (Sponge Iron)
3	Vellore (Rice Mill)
4	Jorhat (Tea)
5	Batala, Jalandhar & Ludhiana (Forging)
6	Ankleshwar (Chemical)
7	Muzaffarnagar (Paper)
8	Varanasi (Textile)
9	East and West Godavari (Ceramics)
10	Howrah (Iron and Steel)



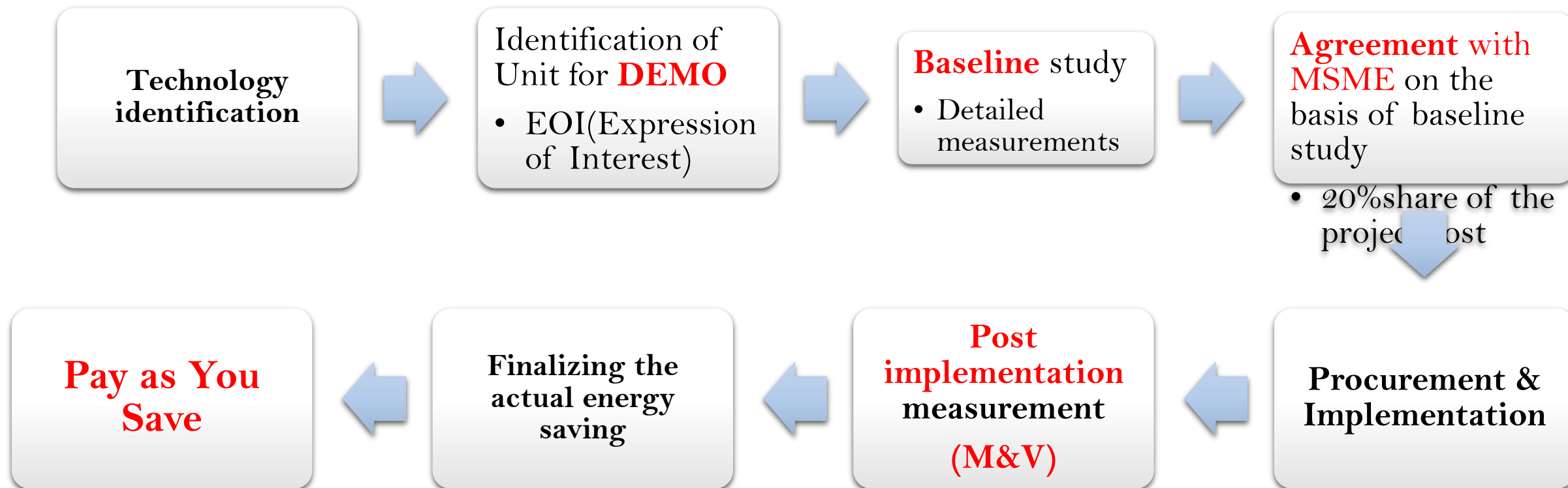
Project Approach



Association Support



Project Mechanism



Technology – 1 Replacement of Reciprocating Compressor With VFD enable Screw Compressor With PM Motor

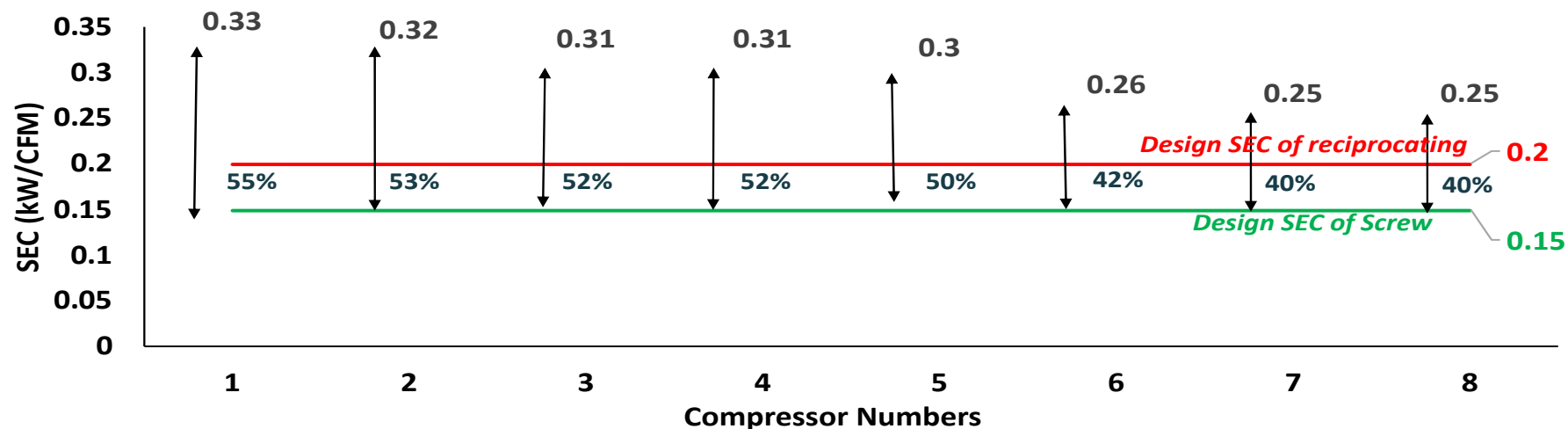
Old Technology
(Reciprocating Compressor)



New Technology
(Screw Compressor)



Technology Parameters (Based on Case Study)



Annual Benefits



Electricity Saving
185640 kWh



Rs. 13.92 Lakh
(Saving/Yr)



15.97 TOE
(Saving)



167 Tons
(Reduction)



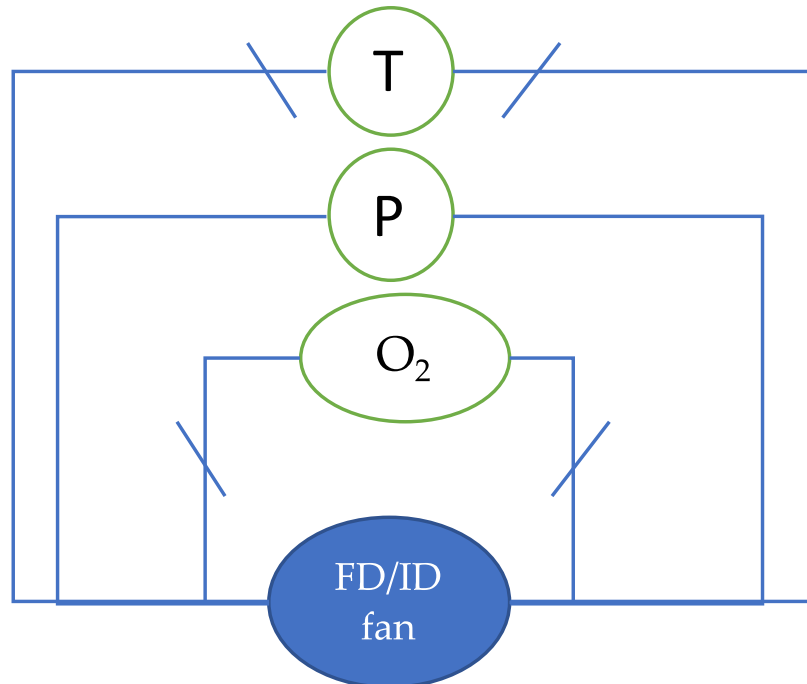
16.52
Rs in Lakhs

Case Study of Demonstrations (Screw Compressors)

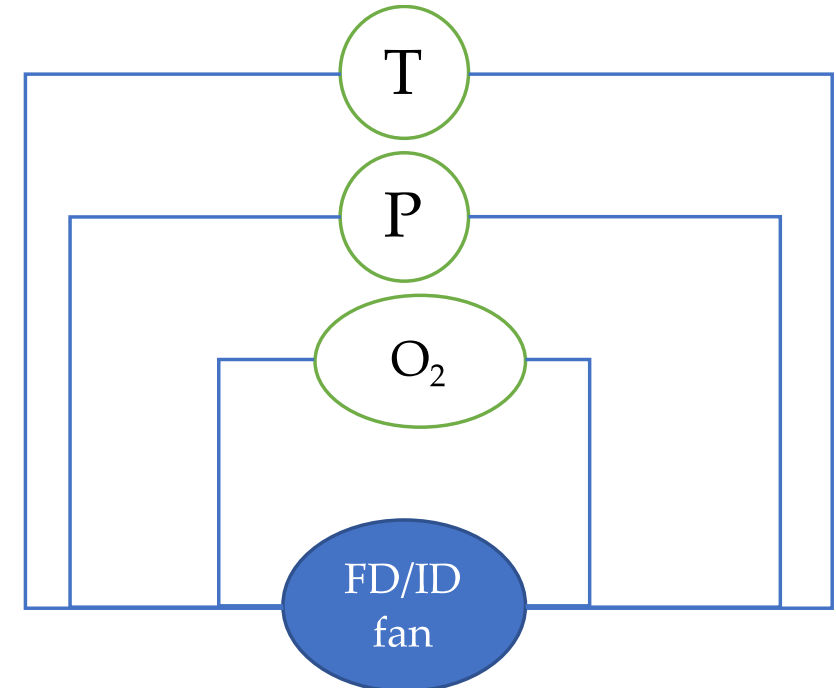
Sl. No.	Parameters	Values	
1	No. of beneficiaries	Two	
2		Demo-1	Demo-2
3	Demo project duration	March to May, 2019	
4	Completion of post implementation verification. (M&V)	May 14, 2019	May 15, 2019
5	Selection of technology supplier	By competitive bidding	
6	Overall project cost	₹6.70 lakhs	₹12.5 lakhs
7	Baseline specific energy consumption	0.29 kW/CFM	0.32 kW/CFM
8	Achieved specific energy saving	0.16 kW/CFM	0.17 kW/CFM
9	Saving (%)	44	46
10	Monetary saving/year	₹4.8 lakhs	₹14.5 lakhs
11	Simple payback period (months)	17	10

Technology – 2 Online Combustion Efficiency Monitoring & Control System (Oxygen Trimming & Excess Air Control)

Existing Technology
(Pressure Based)



Proposed Technology
(Oxygen % & Temperature Based)



Technology – 3 Condensate and Flash Steam Recovery Through Pressure Power Pump

Existing Technology
(Electrical Pump Based)

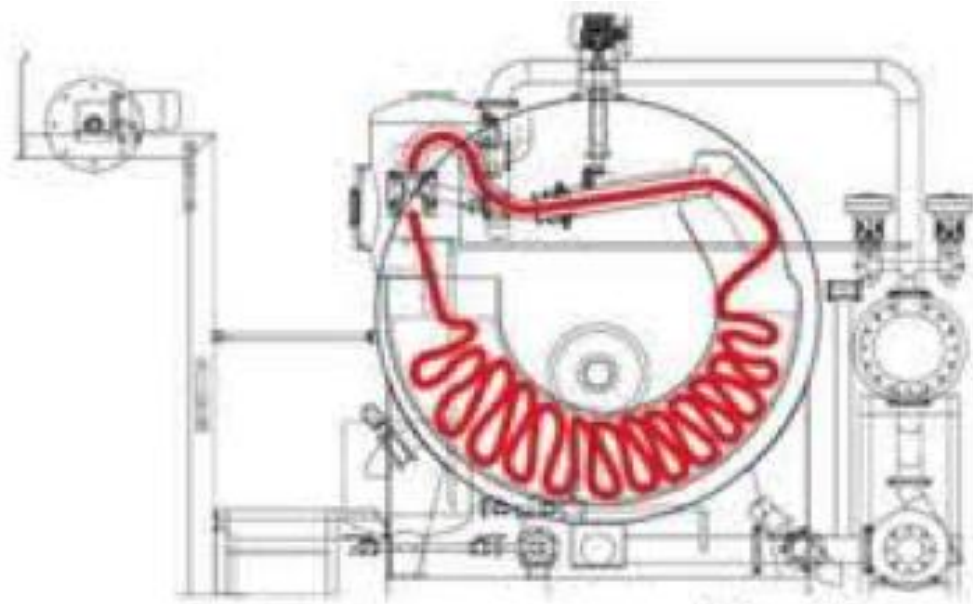


Proposed Technology
(Pressure Power Pump Based)



Technology – 4 PLC Control Jet Dying Machines

Existing Operation
(Manual Control)



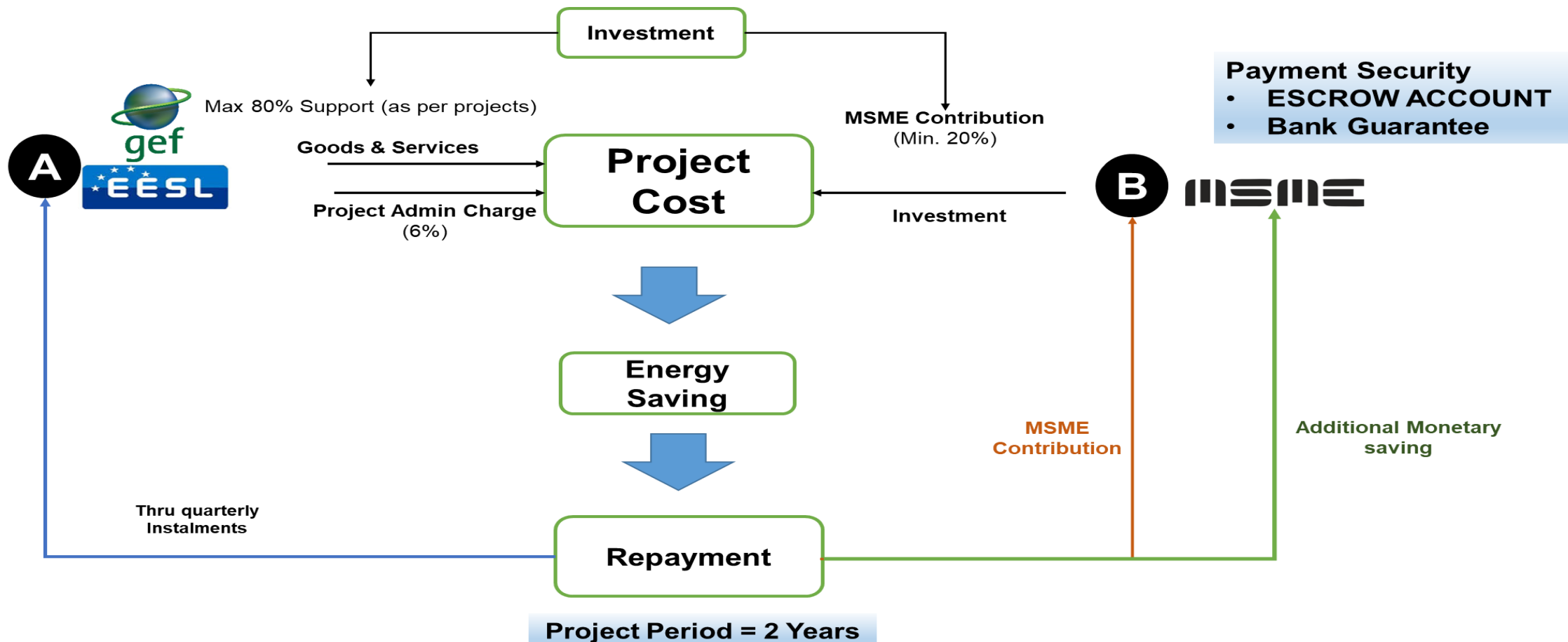
Proposed Technology
(PLC Based Control)



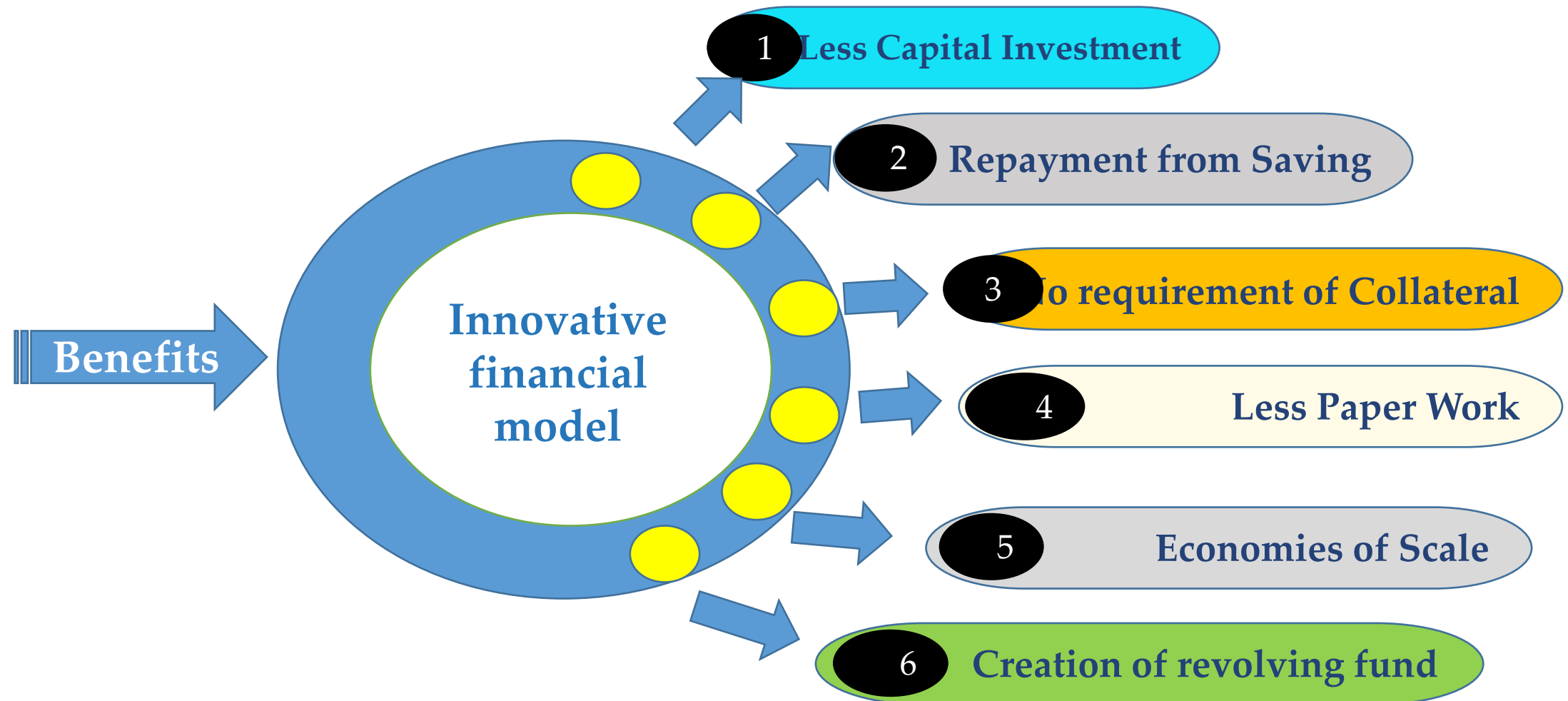
Technology – 4 Comparison of Technologies

Parameter	Existing Technology	Proposed Technology
Control Mechanism	Manual	Automatic
Reduction in Batch Time	NA	20%
Water Consumption	Higher	Less
Monitoring System	No	Yes
Chemical Requirement	High	Low
Steam Consumption	High	Low
Manpower Requirement	6 -8	2-3

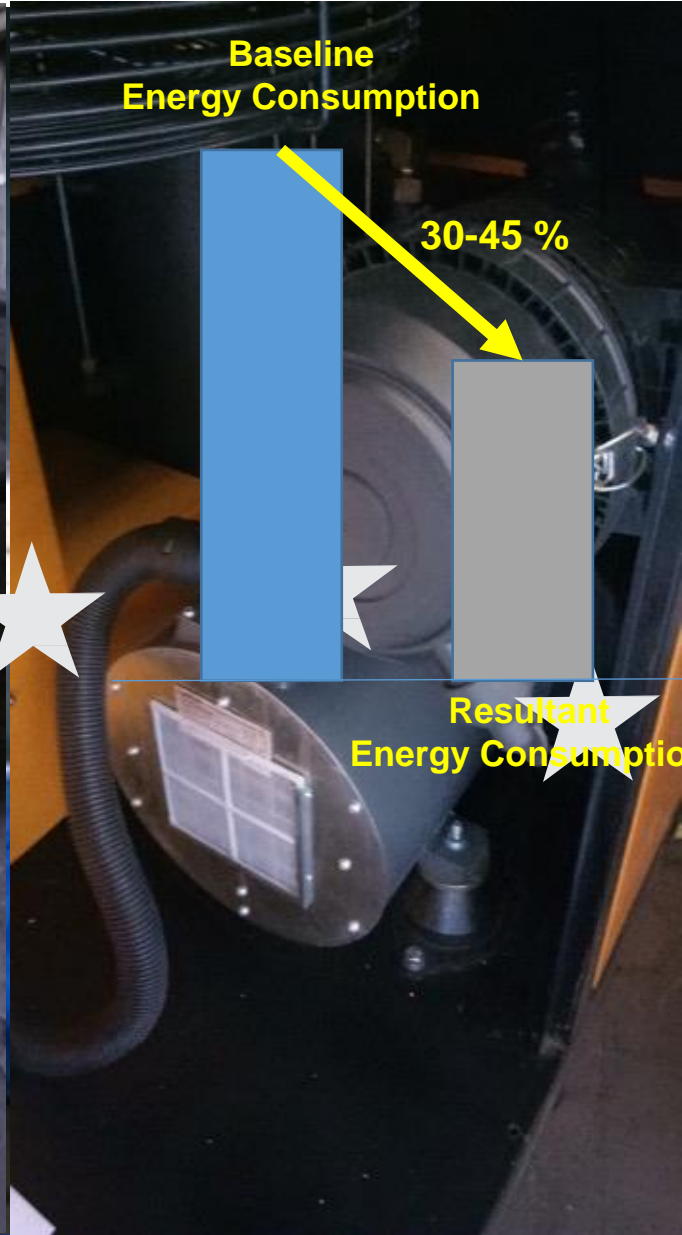
Basic Business Model



Benefits of Financial Model



Installation of Permanent magnet motor with VFD based Compressor at Surat



Promoting Market Transformation for Energy Efficiency in Micro, Small and Medium Enterprises
Cluster: Surat Textile Cluster
Post Implementation Monitoring & Verification Audit
Narayan Processors
(151-152, Pandesara - GIDC, Navsari to Surat road, Pandesara, Surat, Gujarat 394221)
(Technology: Replacement of reciprocating compressor with screw compressor along with VFD and minimum IE 3 class efficiency motor)

Particulars	UoM	Details
Design Details		
Make		Venus Compressors
Type		Rotary Screw Compressor with VFD and Permanent Magnet Motor
Location		Pandesara, Surat, Gujarat
Process used in		Textile Dyeing and Printing
Rated capacity	cfm	282.56
Motor capacity	kW	45
Motor capacity	hp	60
Receiver Volume	m ³	1.00
Additional hold-up volume	m ³	0.2
Design Pressure	kg/cm ²	8
Operational Parameters		
Operating Pressure	kg/cm ²	7
Initial Pressure	kg/cm ²	0
Atmospheric Pressure	kg/cm ²	1.033
Load time @operating pressure	min	1.01
Inlet air temperature	°C	33
Loading Power	kW	48.40
Analysis		
Actual FAD	m ³ /min	8.05
Actual FAD	cfm	284.32
Specific Power Consumption	kW/cfm	0.17

This is to certify that post implementation monitoring & verification audit has been conducted on 14th May 2019 has been conducted in presence of :

Sachin Sharma, DESL

Neha Sharma, EESL

Mr. Prakash, Venus Compressor

Mr. Jitendrabhai , Narayan Processors



Approved Technologies

1. Replacement of Reciprocating Compressor with VFD Enabled Screw Compressor with PM Motor in Surat Textile Cluster
2. Condensate and Flash steam Recovery in Surat Textile cluster
3. PLC Control Jet Dyeing Machine in Surat Textile cluster
4. Replacement of Existing Dryer with LSU Dryer in Vellore Rice Cluster
5. Online combustion efficiency monitoring and control system for Surat textile cluster.
6. Installation of back pressure turbo generator for power generation for Surat textile cluster.
1. Replacement of steel / aluminum blade with Fibre Reinforced Plastic (FRP) blades in withering fan for Jorhat tea cluster.
2. Installation of automation and control system of withering process for Jorhat tea cluster.
3. Installation of energy efficient modulating burner with temperature-based control system in natural gas fired dryer for Jorhat tea cluster.
4. Replacement of conventional lathe machine with special purpose machine for BJL cluster.
5. Installation of energy efficient vacuum pump instead of old inefficient vacuum pump for Muzaffarnagar Paper cluster.
6. Installation of Combustion control system for Varanasi Textile cluster.
7. Replacing existing Non-IBR boiler with IBR boiler for Vellore Rice cluster.



Expected Outcomes of the Program.

Energy Saving

110,000 ToE

Investment Potential

150 mn \$

Reduction in CO₂ Emission

1.0 mnT

Industries to be Benefitted

470 nos.



UNIDO Long Term Energy Efficiency Intervention

Facility for Low Carbon Technology Deployment : Objectives of the Project

- Identify high-impact challenges that if solved has potential for energy saving and emission reduction
- Identify solutions to such challenges and addresses the market demand and supply gap, by
 - Facilitating demonstration, to validate the efficacy of innovative solutions
 - Promoting scale-up of innovative technology innovations and
 - Strengthening Innovation Eco-system

Technology Verticals for Innovation Challenge

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

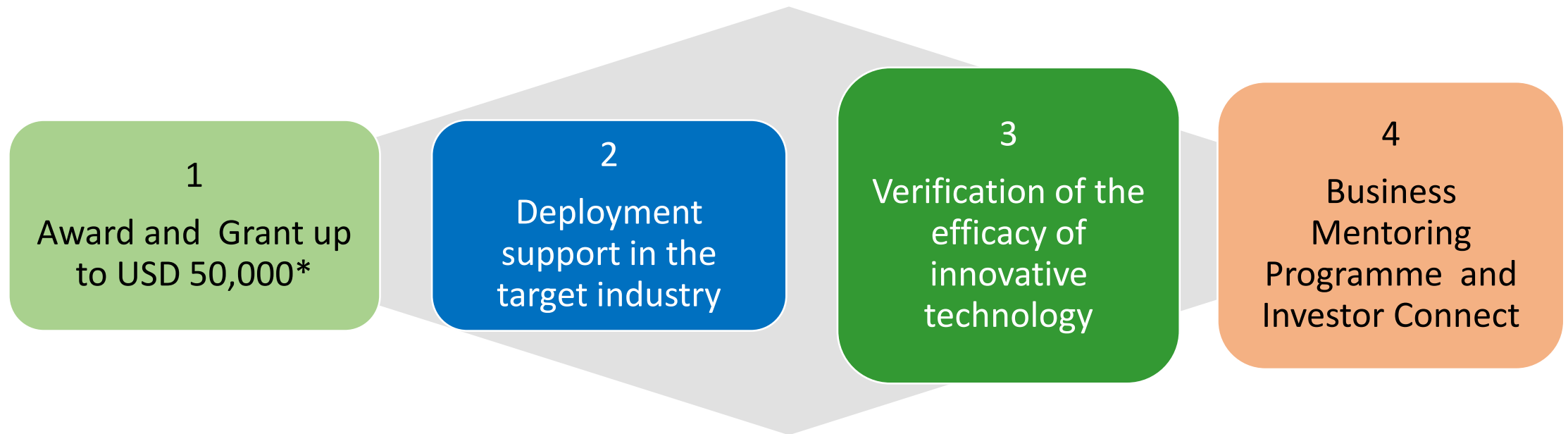
(1st cycle for all three completed)



Project Website:

www.low-carbon-innovation.org

Incentives offered for participation in the Challenge

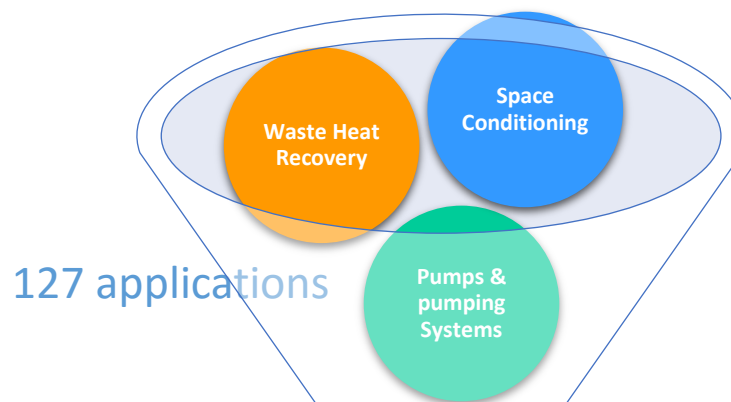


Qualifiers for Innovations

All innovative solutions should clearly demonstrate the replication potential and opportunities for scale-up, and also the following:

- Innovations that result in overall efficiency improvements
- Emerging and novel technology applications that reduces energy consumption
- Design improvements that reduce energy consumption and overcome application constraints;
- Fossil fuel reduction in applications or integration of renewable energy.

Outcome: 2018 Innovation Challenge Round



37 applications shortlisted

13 winners

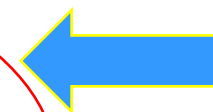
Support of US \$ 500,000 for
Technology demonstration



Independent Validation

- In field by CII - GBC
- NABL accredited lab

*Replication of innovative
solutions in Industries*



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SUSTAINABLE DEVELOPMENT GOAL 9
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Innovative Pumping Solutions



Kethworks Pvt. Ltd. , Pune



- **Kethworks** offers solar-powered irrigation systems targeting small-plot farmers in eastern India where kerosene or diesel pumps are prevalent
- **Innovation:** Portable Solar Pump for Smallholder Farmers
 - ✓ A portable submersible centrifugal pumps that runs on solar energy
 - ✓ 1/3 hp pump, weighs 4kg, powered by 320 watts of solar
 - ✓ Unique design of pump internals reduces power requirement – reduces the size of solar panels required – adds to portability

Shakti Pumps (India) Ltd



FLCTD Innovation: Shakti SLIP Start Synchronous Run Motor (S4RM) based Pump Set

- ✓ The S4RM technology-based pump sets incorporate line start magnetic motors which do not require any VFDs to operate
- ✓ A direct replacement of conventional induction-motor based pump-set
- ✓ Reduces the life cycle cost of pumping system, with lowered energy use



Submersible
Motors

Submersible
Pumps

Basil's Pump Innovation Details



❑ Basil Pumps use Brushless high-speed DC Motors to improve the efficiency, reduce the material content as well as the size of the pump

- ✓ No inverter for solar operation
- ✓ Compact Size
- ✓ Totally off grid
- ✓ State of the Art Electronic Controls
- ✓ IT Enabled for Remote Control
- ✓ Integrate with Building Automation

FLCTD support for demonstration:

- ✓ High Pressure Pumps for RO
- ✓ Booster Pumps for high-rise buildings
- ✓ Submersible Pumps 1 ~ 5 HP

Industry Engagement

FLCTD support: ‘de-risk’ innovative technology

- ✓ solicit inputs which can help us to develop ‘innovation challenge’
- ✓ seek interest in conducting demonstration of winning technologies
- ✓ Identify entrepreneur / supplier with innovative solutions – designed but not yet demonstrated and validates



Thank you

Debajit Das

National Project Coordinator

Promoting Market Transformation of Energy Efficiency in
MSMEs

55 Lodhi Estate, New Delhi

Cell: 9999384380

E-mail: D.DAS@UNIDO.org

