=

Financing Mechanism for Supporting Large Scale Energy Efficiency

Dr. Pradeep Perera Energy Head (India)

Asian Development Bank

May 2018

Energy Efficiency Financing Facility

Goals:

Scale Up Investments in Energy Efficient Infrastructure, Technologies and Solutions

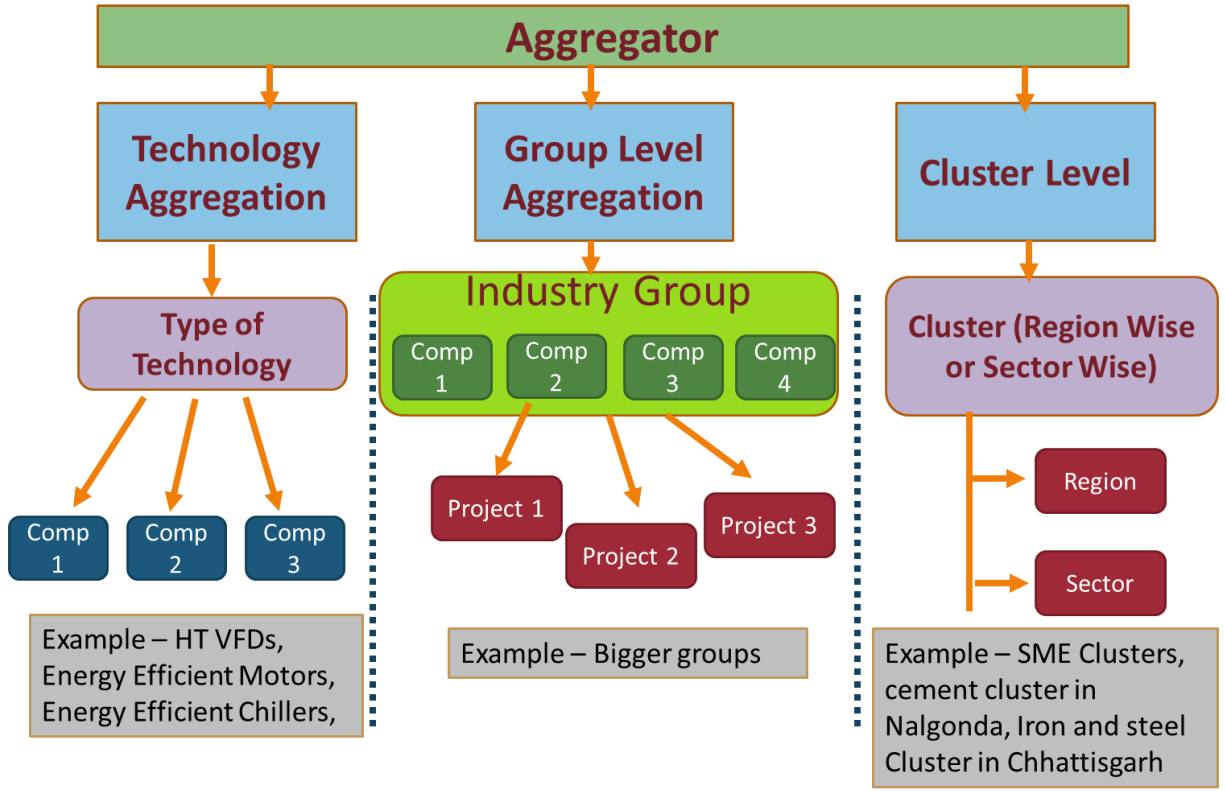
Improve the **Confidence, Cost** and **Convenience** with which users can seek financing and investors invest in Energy Efficiency

Aggregation of Projects

'Aggregation' may be used to achieve Scale Advantages of **Quality, Cost and Reliability**

Pre-registration	Assessment	Pre-Implementation MOU	Bidding	Implementation	M&V
Initial discussions with Hosts and EEFF, PMU. Willing hosts, register with EEFF - Defined technologies - EE, E Goals Initial financial/ technical check on acceptability of Hosts for the program	Feasibility Assessment of the proposed technologies carried out Baseline and M&V methodology established. Environmental, Social & Governance assessments Feasibility of aggregated implementation established. (not all areas may be suitable for aggregation)	Registered hosts establish an implementation MOU with EEFF, outlining commitment to • Participate in the aggregated bids • Implementing resulting projects • loan program etc. RFQ, RFP, Contract form, baseline MRV protocols form agreed	Bids Invited - For aggregated capacity - Feasibility assessment reports made available Bid evaluation Each participant signs specific agreements with the winning bidder with agreed timeline	Loan agreements established Bidding and Development costs shared. Common lender's technical consultant appointed to ensure contracted results are achieved	Monitoring and Verification of results Approval of payouts to implementers.

Aggregation Approach for EE Investments in SME



Type of Aggregation	Suitable for
Technology Level	Individual Companies , Groups, SME Clusters , Buildings, Municipality
Group Level	Bigger Groups from all sectors
Cluster Level	SME Clusters, Regional Industrial Sectors

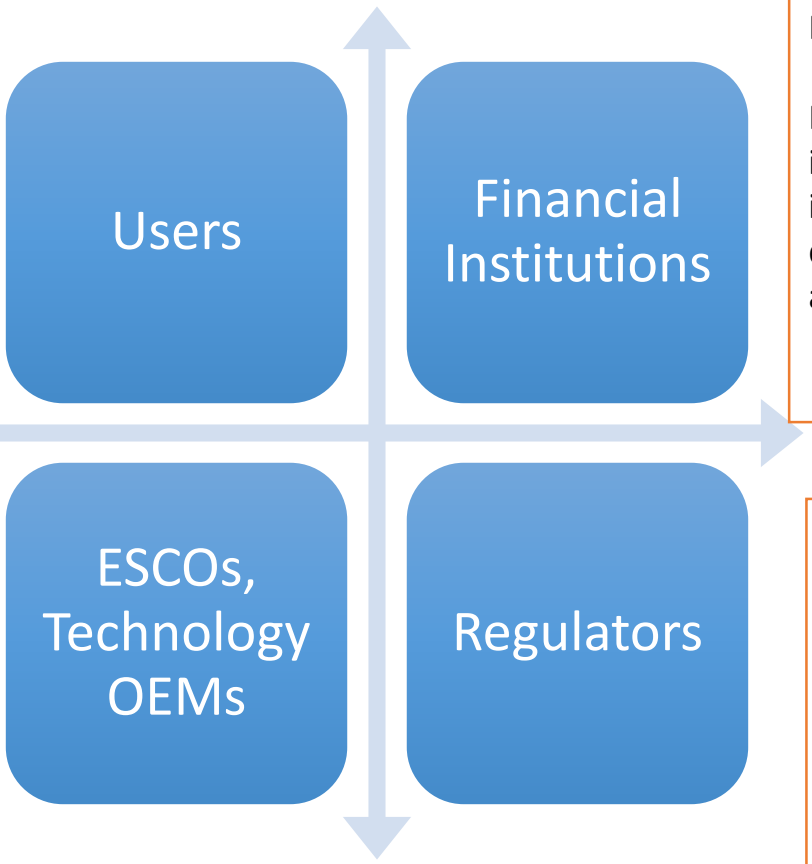
Benefits of Aggregation

Get trusted, verified technologies and Implementers
Technical Assistance to get Feasibility assessments

Well structured, risk mitigated projects.

Get benefit of lower cost, due to aggregation/scale

Pre - approved financing



Lower Transaction Costs

Faster scale up of loan book

Risk mitigation (technology, implementation) because of increased participation of well qualified implementation agencies.

Lower customer acquisition cost and time

Faster scale up

Well established baseline and well structured performance contracts.

Improved payment security, due to bank involvement

Faster scale up

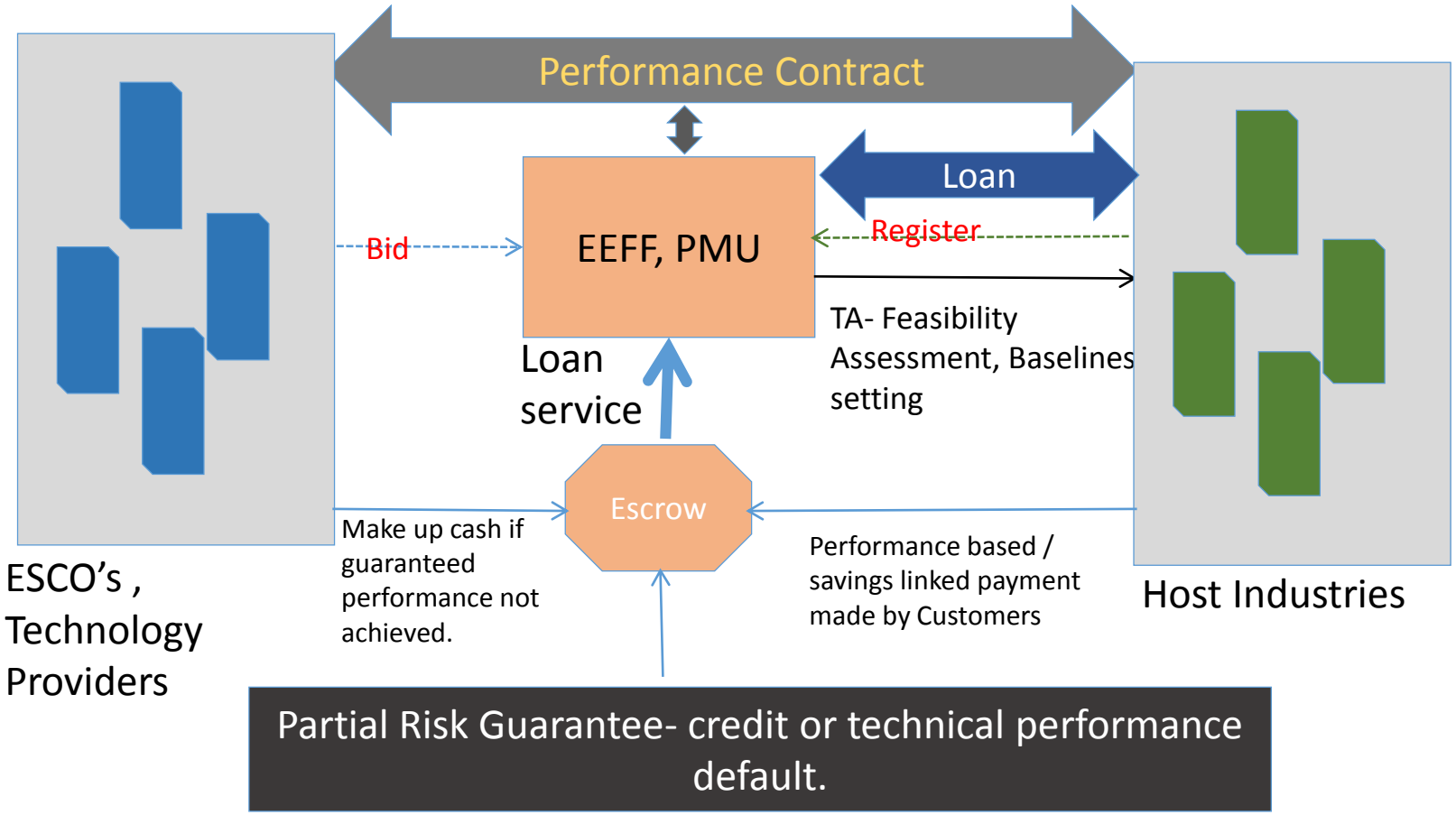
Larger customer adoption

Higher certainty of program reaching performance results

Less leakages

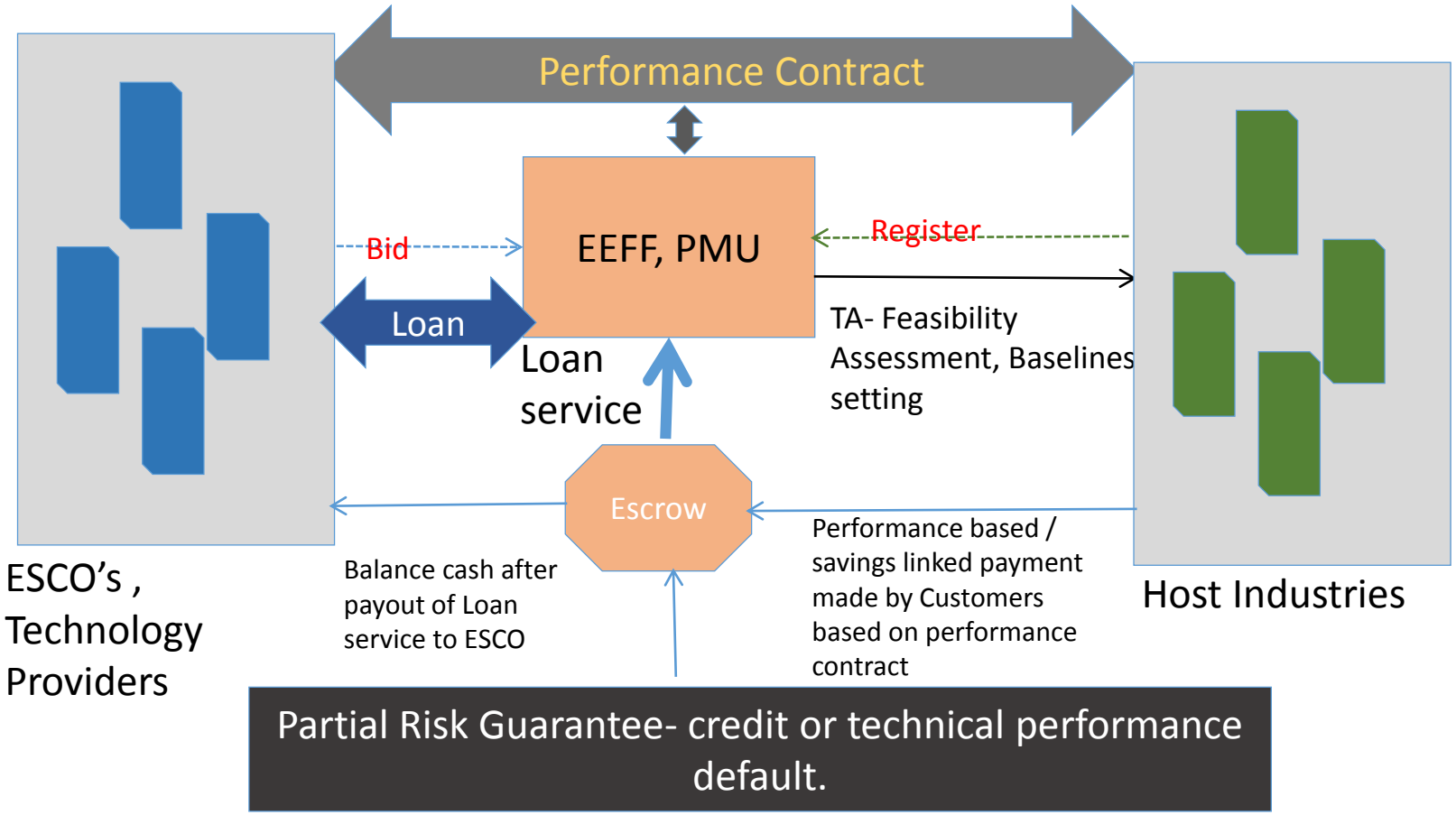
Higher chances of market based models getting adopted

Aggregation



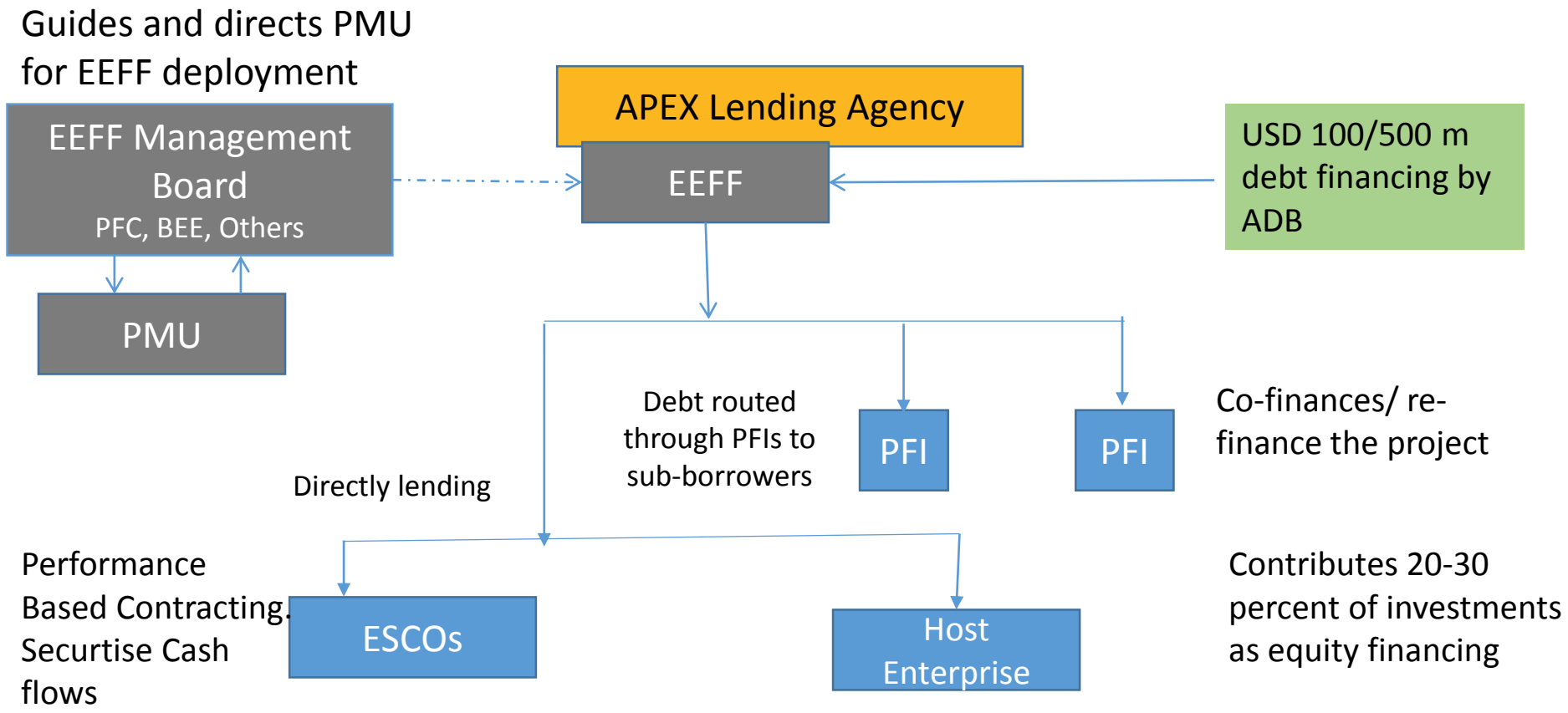
Structure-1 : Loan to Host Industry

Aggregation –2



Structure-2 : Loan to ESCO

Proposed Structure for EEFF



PMU roles

Sector, Technology Identification and Aggregation of Projects

Pipeline build up for lending

Project Feasibility and ESG assessments.

Technical support to EEFF Management Board

Proposal for approval from Investment committee/ Management Board of EEFF

Contracting support, Monitoring and Evaluation

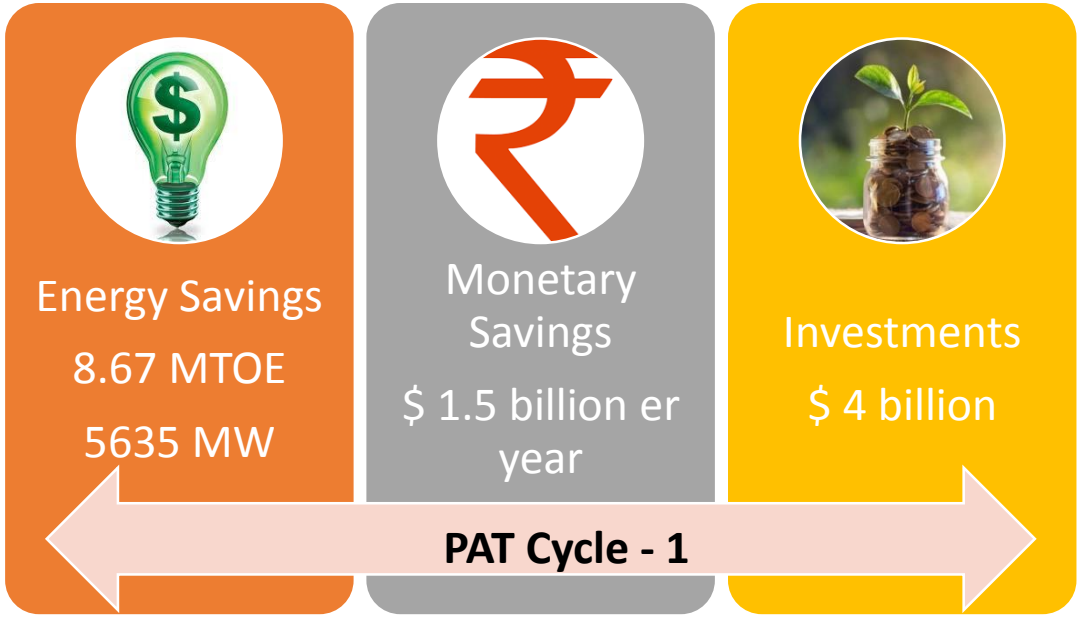
Partial Risk Guarantee – broad outline*

SN	Parameter	Brief Description
1	Projects Covered	All projects approved by EEFF
2	Risk Cover Provided to	EEFF Manager – Financial Intermediary
3	Risks covered	Technology Performance Risk Payment Risk of Host Enterprises (of the borrower) Non-Acceleratable
4	% Loss Covered	First 10% - Lender (EEFC) Balance - Shared equally between the lender and risk cover provider , beyond the collateral value obtained by the Lender
5	Risk cover be sourced from	GCF / GEF / GOI

* To be designed in detail later

Significant Investments already made by the Industry

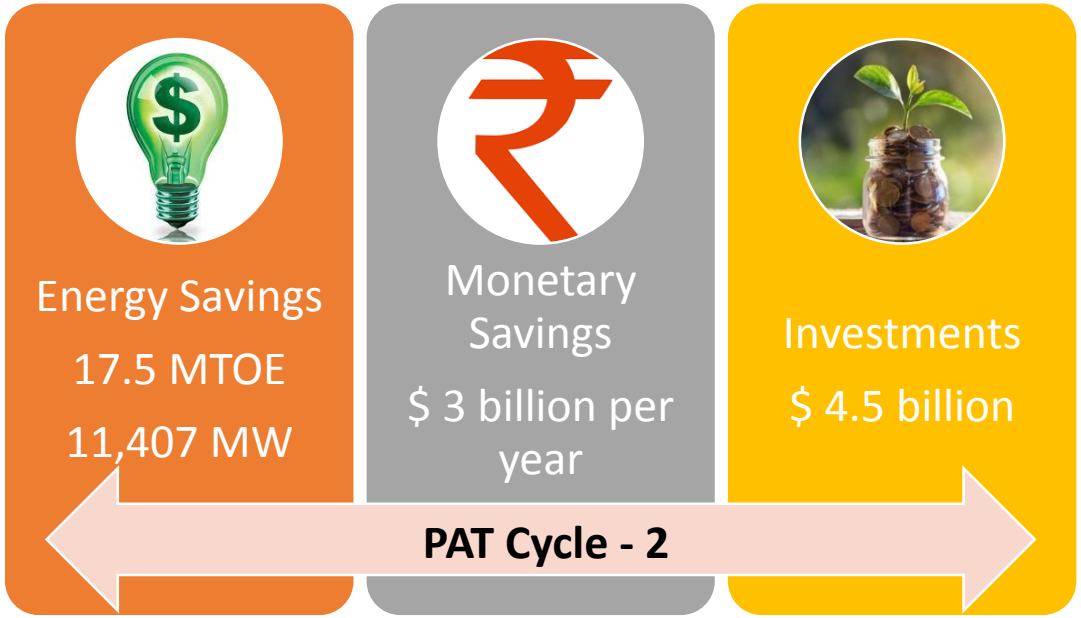
❖Projected outcome – PAT Cycle – 1



Source: beenet.gov.in

Significant Investments already made by the Industry

❖Projected outcome – PAT Cycle – 2



Source: beenet.gov.in

Investment Opportunities in Industrial Sector (PAT)

Cement sector

- 210 major plants in India
- Major Technologies Vs Estimated Investment

Major Technologies	Estimated Investment opportunity ($ million)	Replication Potential
High Efficiency Clinker Cooler	400	125 Plants
Waste Heat Recovery Plants	800	500 MW
Latest Generation Gaassifiers	40	110 Plants
Total	**1,240**	

❖ **Example – Installation of High Efficiency Coolers**

- **Replacement of existing coolers with recuperative efficiency of 50-60 % with new high efficiency coolers of 72-76 % efficiency**
- **Ex – Reference Plant**
  - **Savings Achieved – Rs 3.75 Crores***
  - **Total Investment – Rs 30 Crores**
  - **Payback Period – 8 Years**

*** Productivity Improvements not considered**

Investment Opportunities in Industrial Sector (PAT)

Thermal Power Plants

Major Technologies Vs Estimated Investment

Major Technologies	Estimated Investment opportunity ($million)	Replication Potential
HT VFD for CEP, ID and BFP	200	150 units
Dynamic Gaassifiers	500	250 units
Micro Oil Ignition System	50	90 units
Flue Gas Desulfurization (Environmental compliance for SOx reduction)	6,000	300 Units
SNCR , SCR (Environmental compliance for NOx reduction)	3,000	300 Units
Total	**9.750**	**1090 units**

- **Example– Installation of HT VFDs for CEP**
  - **Ex – Reference Plant (300 MW)**
    - **Savings Achieved – Rs 60 Lakhs**
    - **Total Investment – Rs 2.3 Crores**
    - **Payback Period – 4 Years**

- **Example– Installation of FGD Plant for meeting new Emission norms (SOx)**
  - **Example NTPC Vindhyachal (500 MW)**
    - **Capital Cost Approved by CERC – Rs 161 Crores**

Investment Opportunities in Industrial Sector (PAT)

Iron and Steel Sector

Major Technologies Vs Estimated Investment

Major Technologies	Estimated Investment opportunity ($ million)	Replication Potential
Waste Heat Recovery from Sinter Cooler	300	80%
Coke Dry Quenching	350	90%
Waste heat recovery from exhaust gases of Blast Furnace Hot Stoves	230	70%
Top Recovery turbine	230	40%
Waste Heat Recovery from Sinter Cooler	300	80%
Total	**1,400**	

- **Example– Waste Heat Recovery from Sinter Bed**
  - **Waste heat from Sinter bed air Cooler cab be used for**
    - **Power Generation**
    - **Preheating of combustion air**
  - **Ex – Reference Plant (Power generation)**
    - **Savings Achieved – Rs 3.3 Crores**
    - **Total Investment – Rs 13.4 Crores**
    - **Payback Period – 4 Years**

Investment Opportunities in Industrial Sector (PAT)

Paper Sector

Major Technologies Vs Estimated Investment

Major Technologies	Estimated Investment opportunity ($ million)	Replication Potential
Installation of Extended delignification system for cooking of wood	185	50 %
Boiler Upgradation	50	50 %
Total	**235**	

- **Example – Boiler Upgradation**
  - Conversion of AFBC Boiler to Spouted Bed Combustion Boiler
  - Increased Steam Generation
  - Improved Efficiency, availability
  - Ex – Reference Plant
    - Savings Achieved – Rs 3.5 Crores
    - Total Investment – Rs 10 Crores
    - Payback Period – 3 Years

Investment Opportunities in Industrial Sector (PAT)

Fertilizer sector

Major Technologies Vs Estimated Investment

Major Technologies	Estimated Investment opportunity ($ million)	Replication Potential
Vapour Absorption systems	700	50 %
Two stage regeneration in CO2 removal system	770	50 %
Retrofitting steam turbines for higher efficiency	925	50 %
Total	**2,400**	

- **Example– Installation of VAM in CO_2 removal system**
  - **Ex – Reference Plant**
    - **Savings Achieved – Rs 2.5 Crores**
    - **Total Investment – Rs 6 Crores**
    - **Payback Period – 3 Years**

Municipal applications

- Municipalities in India
  - Second Largest Municipal System in the world
  - No of Urban Local bodies in Indian – 3255 ULBs
  - Indian Municipalities Consume 4 % of total electricity
  - Investment Opportunity – US $ 1,2 billion Crores (considering 100 smart cities with US $ 12 million investment opportunity each)

- **Example – Chandigarh Municipality**
  - **Area – 114 KM^2 , Population – 1.055 million**
  - **No of Pumping Sets (water and Sewage)**
    - **Typical Capacities – 5 HP to 550 HP**
    - **Estimated Annual Savings – US $ 2.5 million**
    - **Estimated Investment – US $ 2 million Crores**
    - **Payback – 1 Year**
  - **Public Street Lighting**
    - **Total Power Consumption – 24.71 MKWH**
    - **Chandigarh MC to replace 48000 street lights**
    - **Project Cost – US 9 million**
    - **7 year Project Period**
    - **Annual Savings – US $ 1 million / annum**

SME Sector

- Sector snapshot
  - No of MSMEs – 512.99 Lakhs*
  - Energy Consumption by MSME sector – 50 million tons of oil equivalent (2012)
  - More than 200 high energy intensive clusters in India
  - Energy Saving potential of 15 %
  - Estimated Investment opportunity – US $ 2 billion

- **Example– Pune Forging Cluster**
  - **No of Units – 70 units**
  - **Study Done for – 52 units**
  - **Typical Projects – EE compressors, Lighting, Power factor improvement, furnace replacement**
    - **Energy Savings Achieved – 1849 TOE**
    - **Savings Achieved – $ 1.5 million**
    - **Investments Made – $ 1.5 million**

* Annual Report of ministry of MSME – (2016-17)