



INDIA  
GHG  
PROGRAM

Promoting profitable, sustainable  
and competitive businesses.

# Aggregator Model for Achieving Low Carbon Pathway

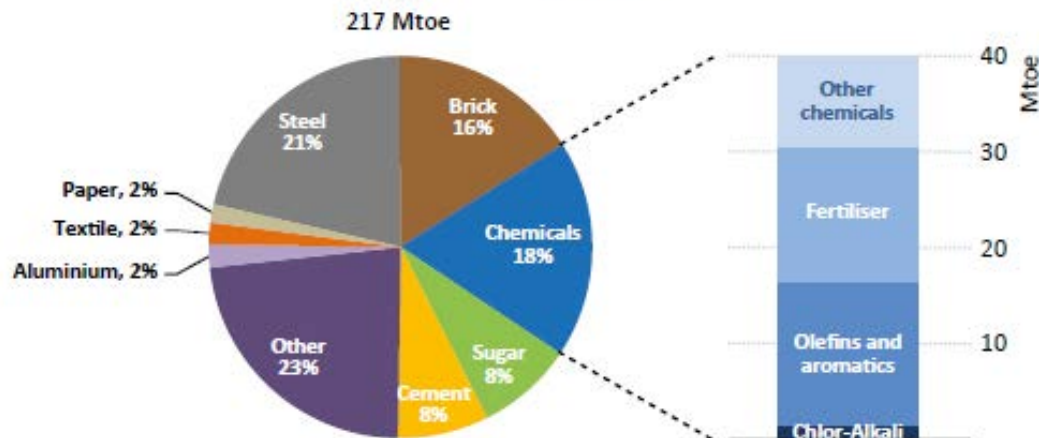


# The importance of C&I customers in emission mitigation

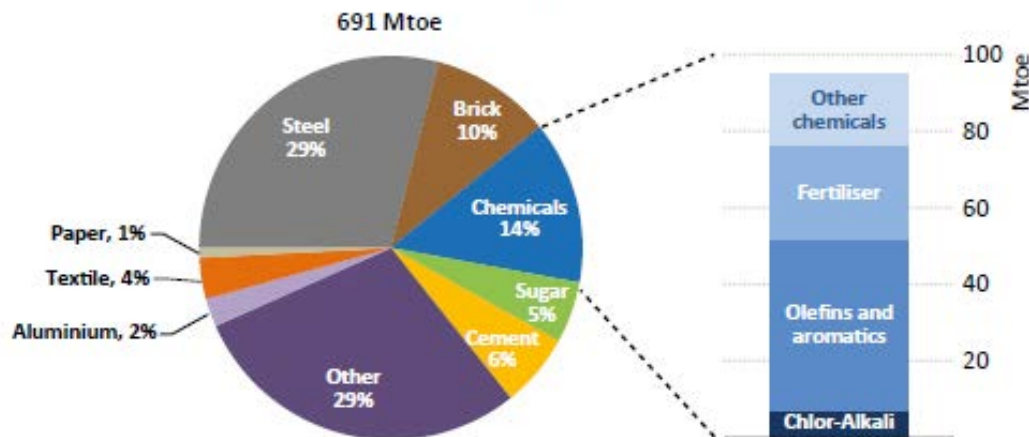
# Energy & Industry

- 4.4% annual increase in energy demand by industries
- Industries to account for 50% of final energy consumption by 2040

a) 2013

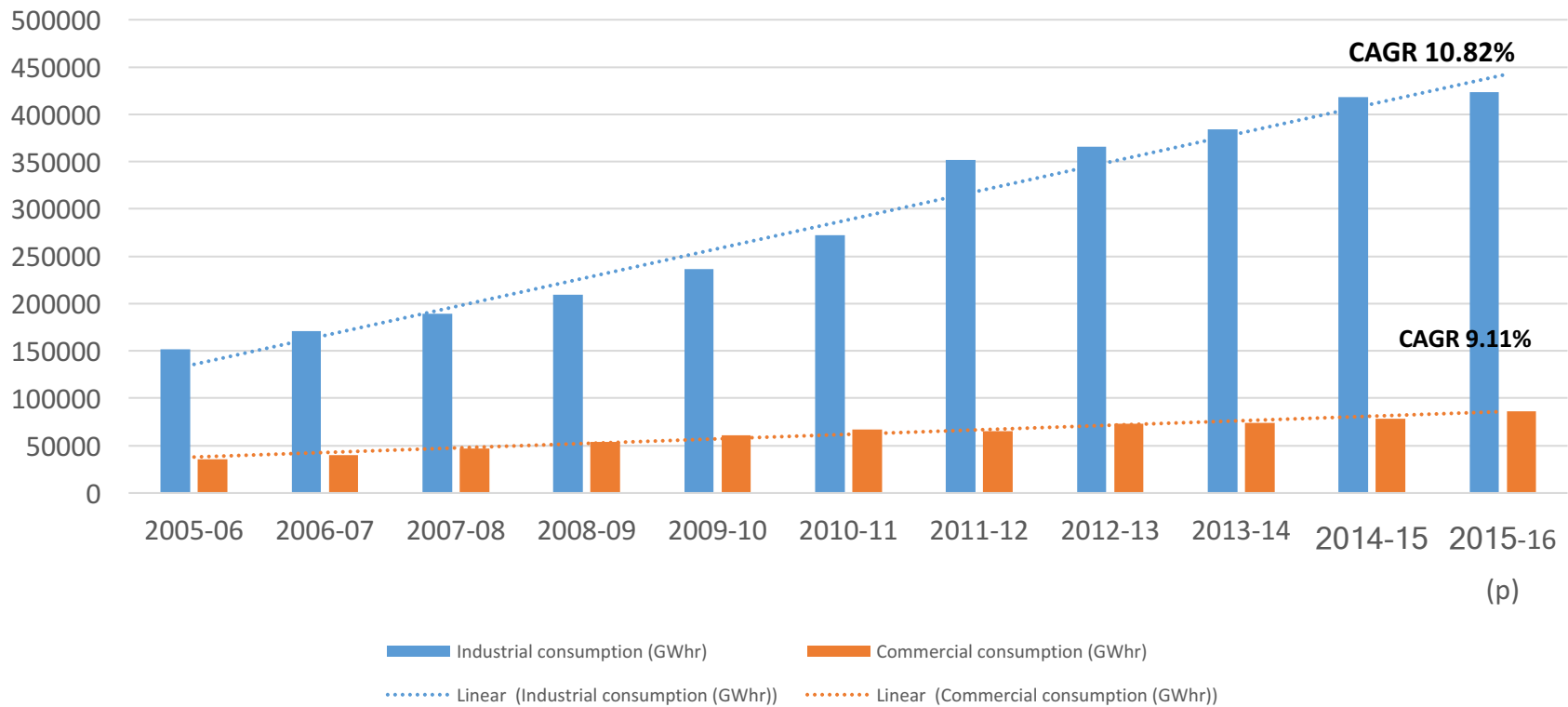


b) 2040



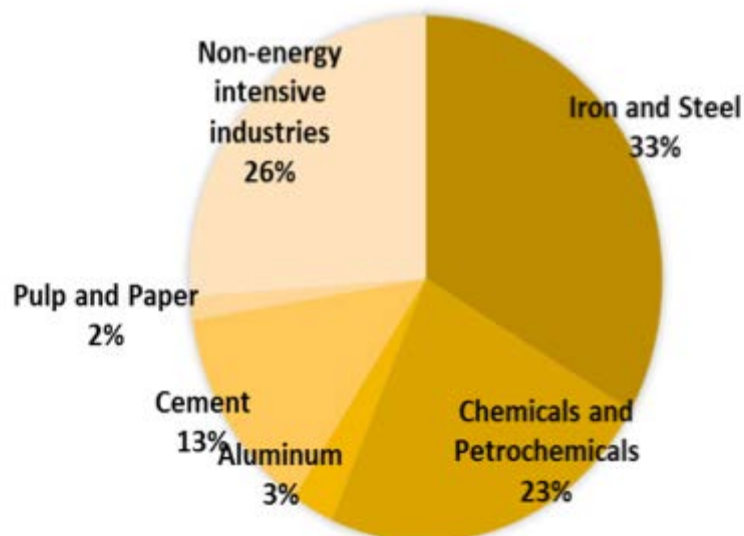
# Contribution to electricity consumption

## Industrial and Commercial sector electricity consumption in India (GWhr)

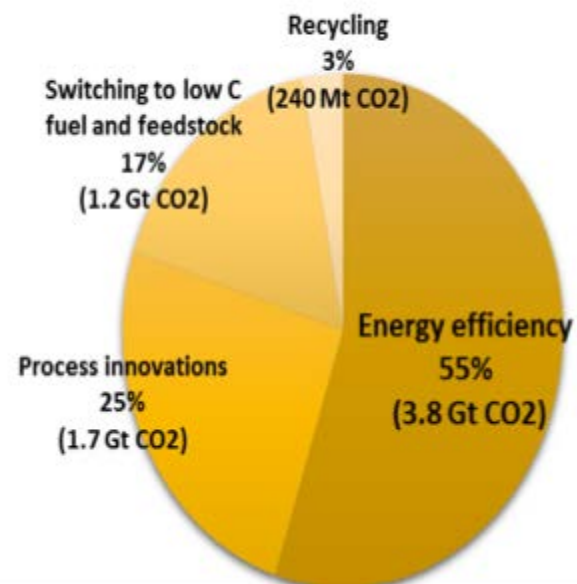


# Emissions reductions pathway for global industries to achieve 2°C

**REQUIRED EMISSIONS REDUCTIONS FROM INDUSTRIES  
GLOBALLY BY 2050**



**APPROACHES TO ACHIEVE EMISSIONS REDUCTIONS**



To remain on the 2 degree C pathway, overall direct industrial CO<sub>2</sub> emissions need to be 49% below 6 degree C levels globally in 2050, at 6.7 GtCO<sub>2</sub>



# The Power of the Supply Chain

# How can supply chains influence emissions' mitigation?

## Links in the chain

To date, Apple has installed 485 megawatts of solar and wind in six Chinese provinces, according to the recent environmental report. Commitments made by Apple in collaboration with its suppliers will influence more than 4 gigawatts of clean power installations worldwide by 2020 – including 2 gigawatts of capacity in China alone, the report estimated.

That aggregate amount represents about 30 percent of the carbon footprint associated with Apple's manufacturing operations. (Those operations, in turn, make up about 77 percent of the tech giant's carbon footprint.)

Apple created a Clean Energy Portal to help its supply chain share updates and give manufacturers "better technical, economic and policy data to accelerate their transition to clean energy."

Aside from helping suppliers figure out how to source electricity generated by solar and wind resources, Apple is conducting energy audits for its suppliers.

As of the end of 2016, it helped identify more than \$55 million in annual energy savings, most of them recovering their return on investment within 1.4 years, according to the report. It's training suppliers on these techniques, so that these practices can be added to operational best practices over time.

“Apple was involved in the behind-the-scenes meetings that will help labl achieve its clean power commitment.”

<https://www.greenbiz.com/events/verqe/santa-clara/2017>

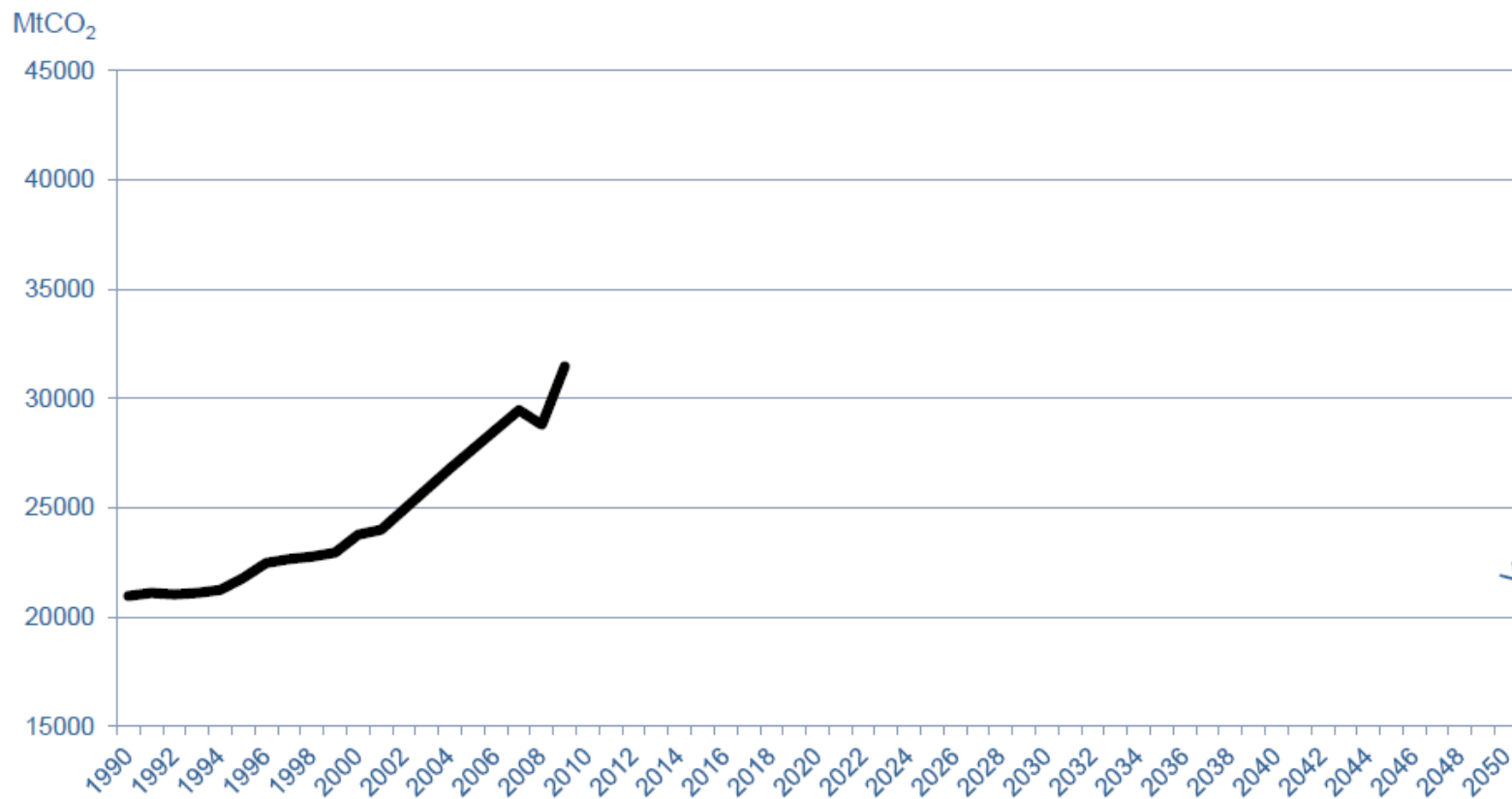




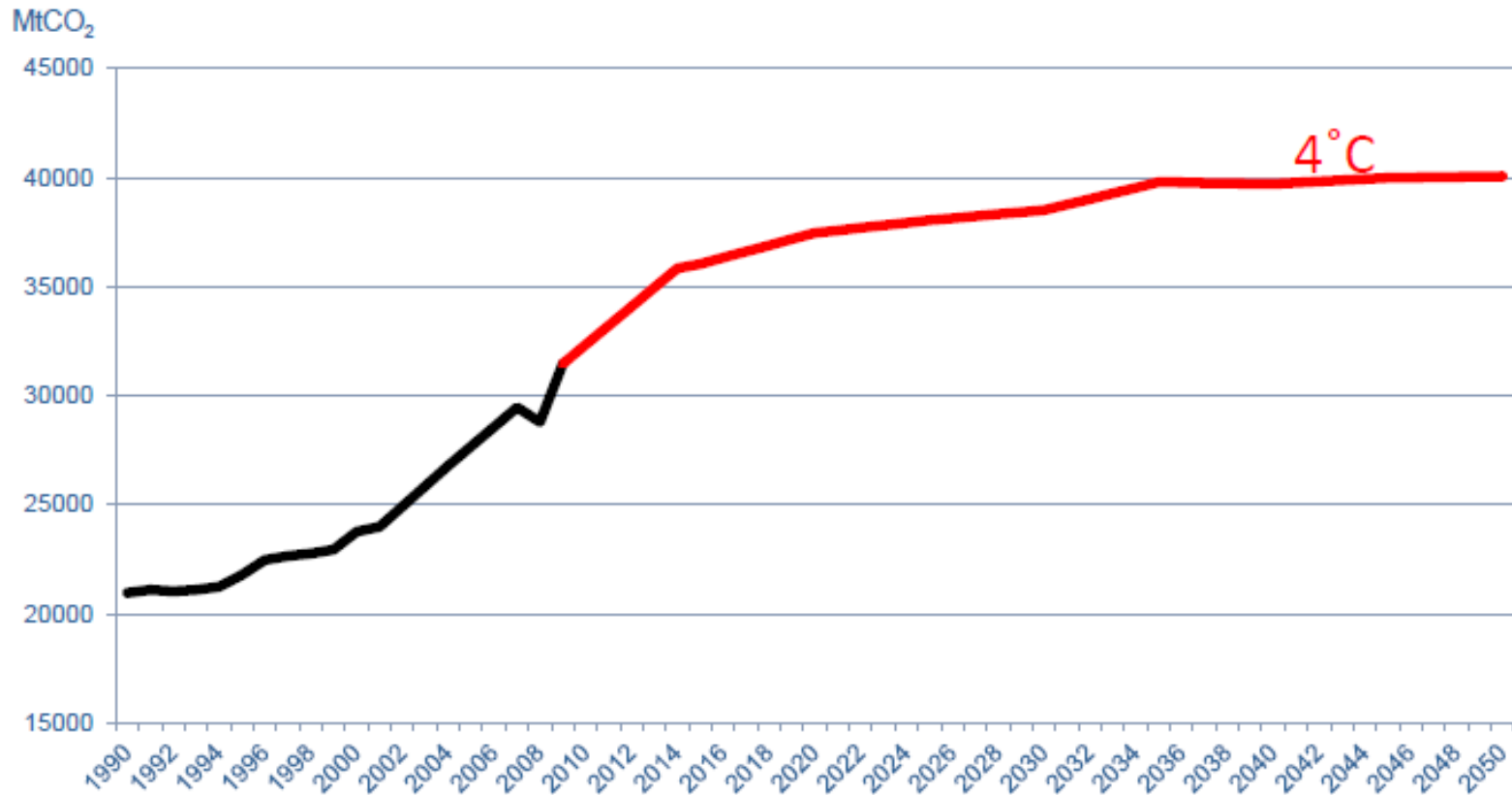
# Energy Efficiency Interventions



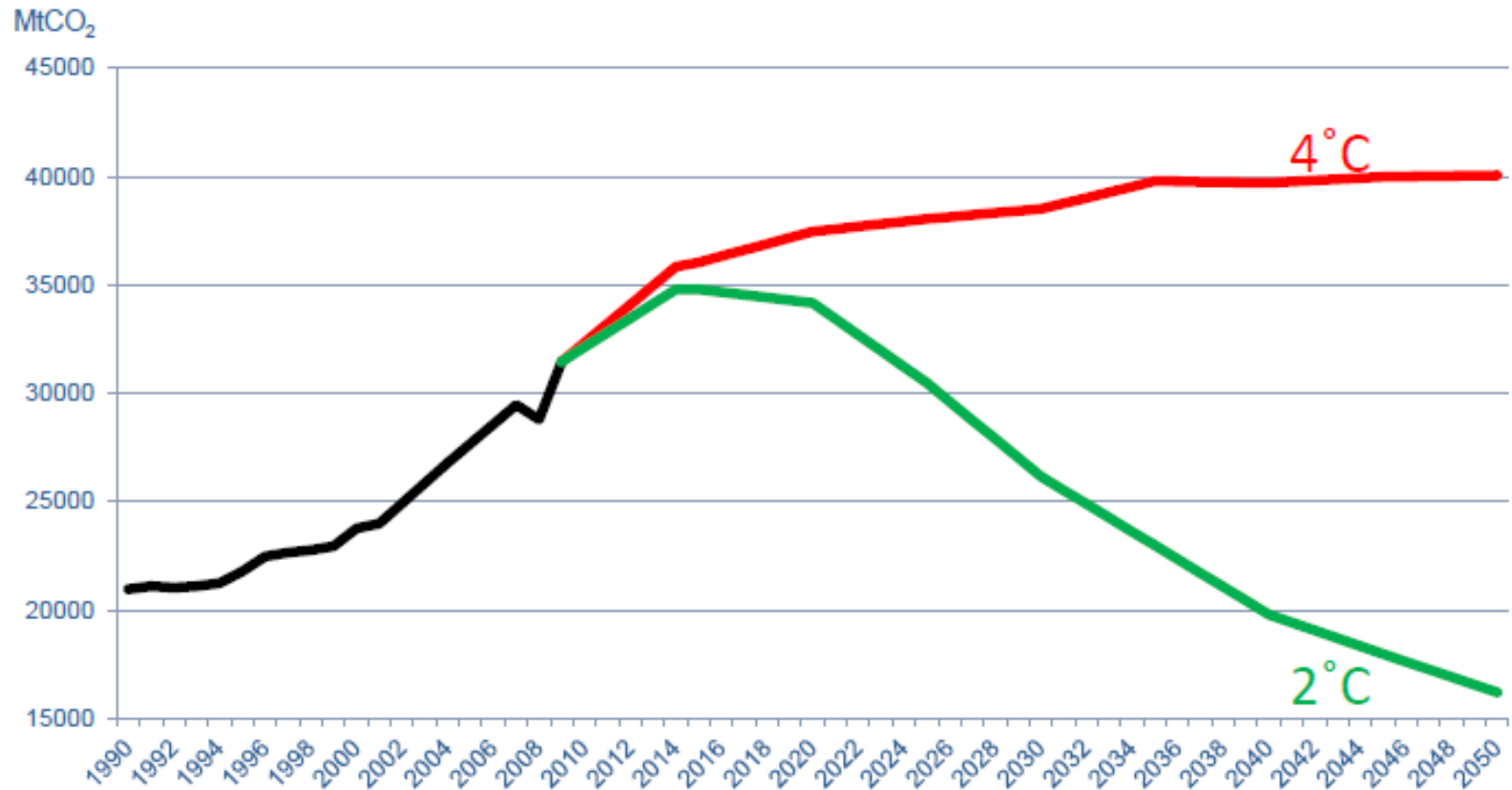
# Why are we talking about energy efficiency?



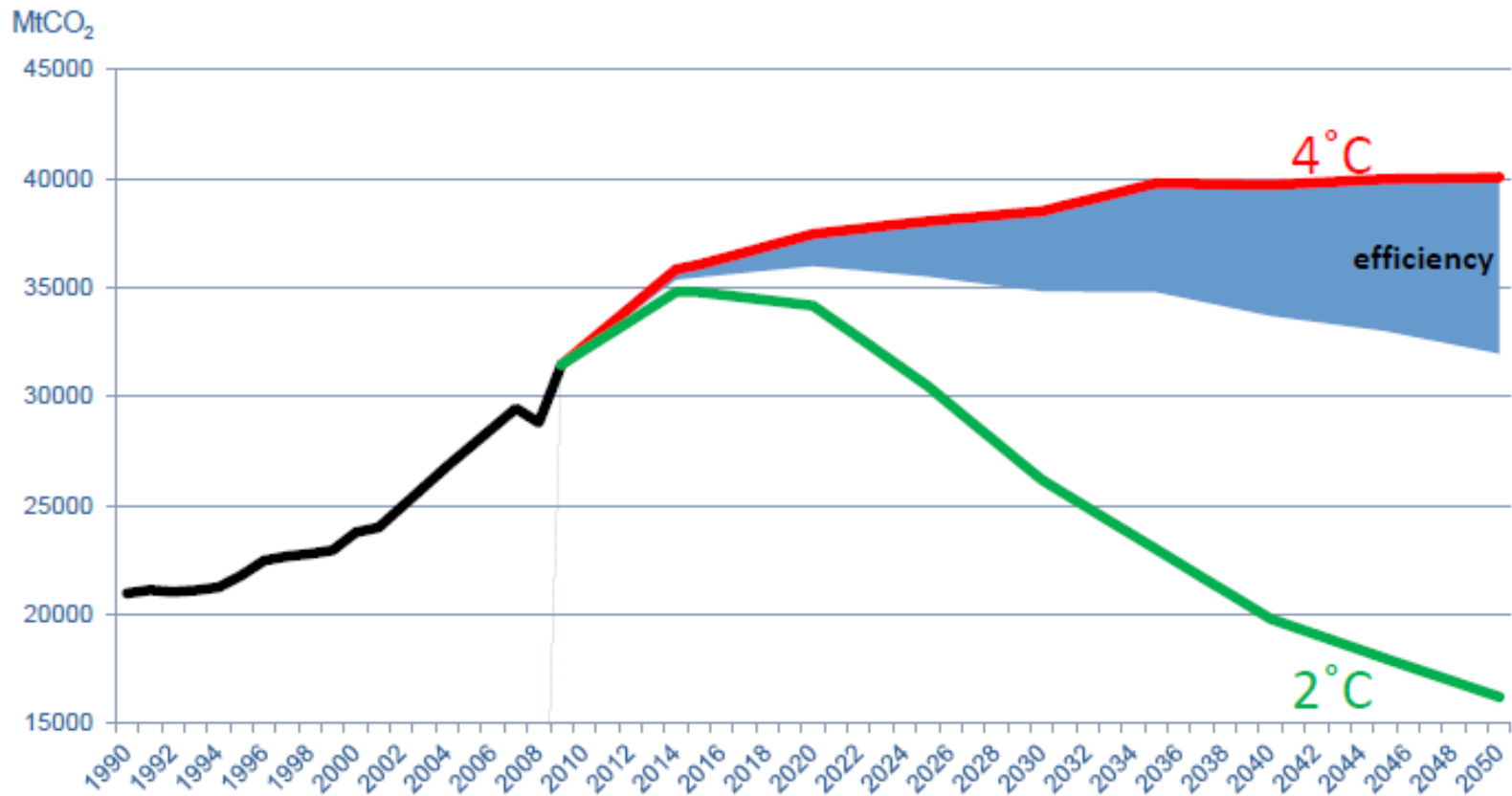
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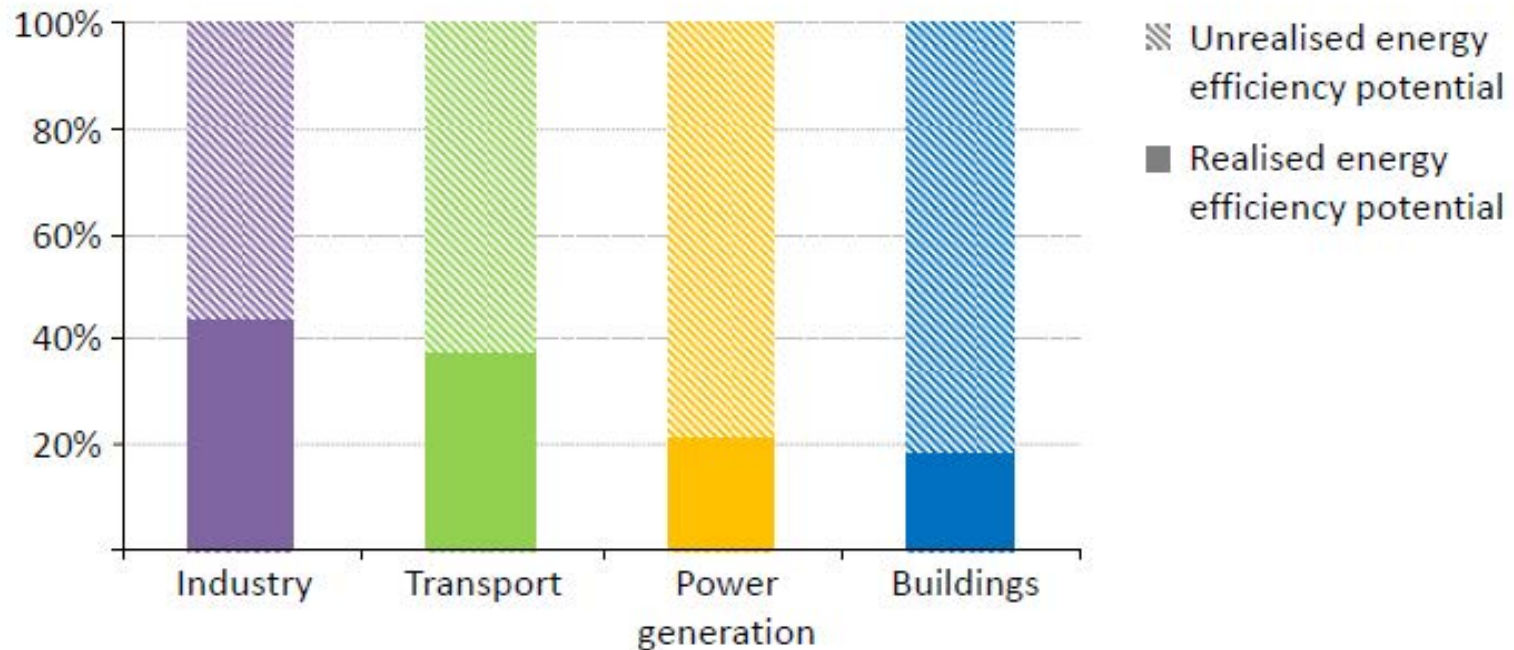


# Why are we talking about energy efficiency?



# Why are we talking about energy efficiency?

## Energy efficiency potential used by sector in the New Policies Scenario



## India's mitigation targets and energy efficiency

**Renewable  
energy**

National Solar  
Mission

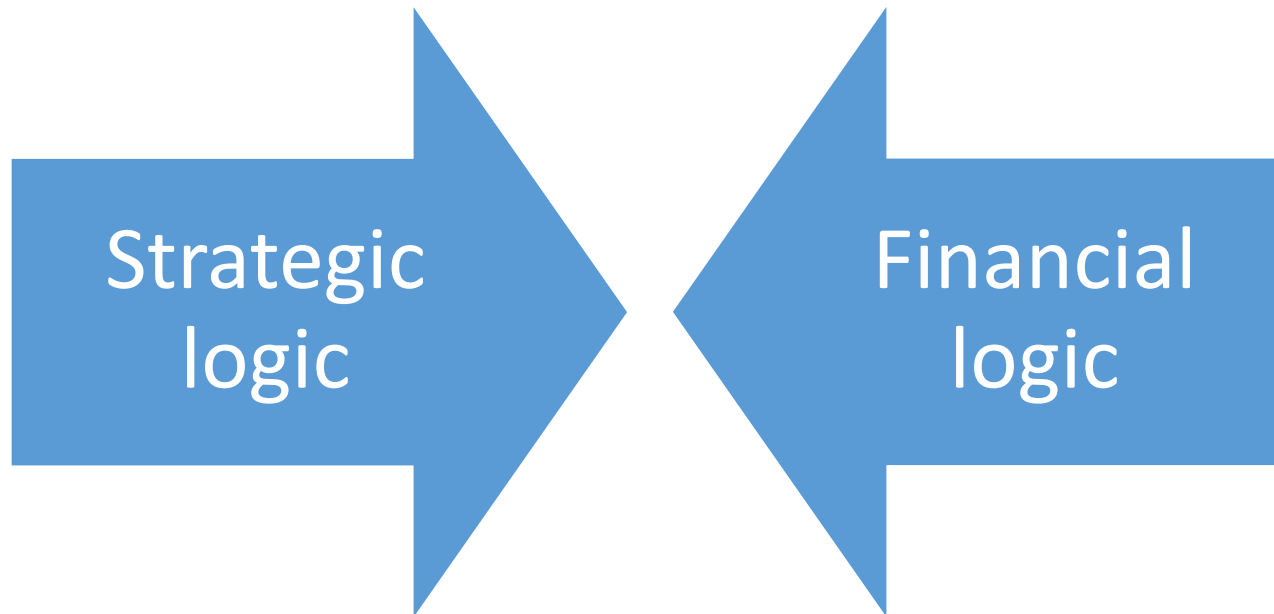
**Energy efficiency**

National Mission  
for Enhanced  
Energy Efficiency

India's mitigation goal:  
33-35% reduction in emissions  
intensity by 2030

- **Perform, Achieve and Trade (PAT)**
- **Zero Effect Zero Defect (ZED)**
- **EE in buildings (ECBC), appliances**

# Investing in energy efficiency strategic, financial or both?



**Investment in EE is strategic since it contributes to create, maintain or develop a sustainable competitive advantage**

**Investment in EE makes economic sense**

# The multiple benefits from energy efficiency

## Energy benefits

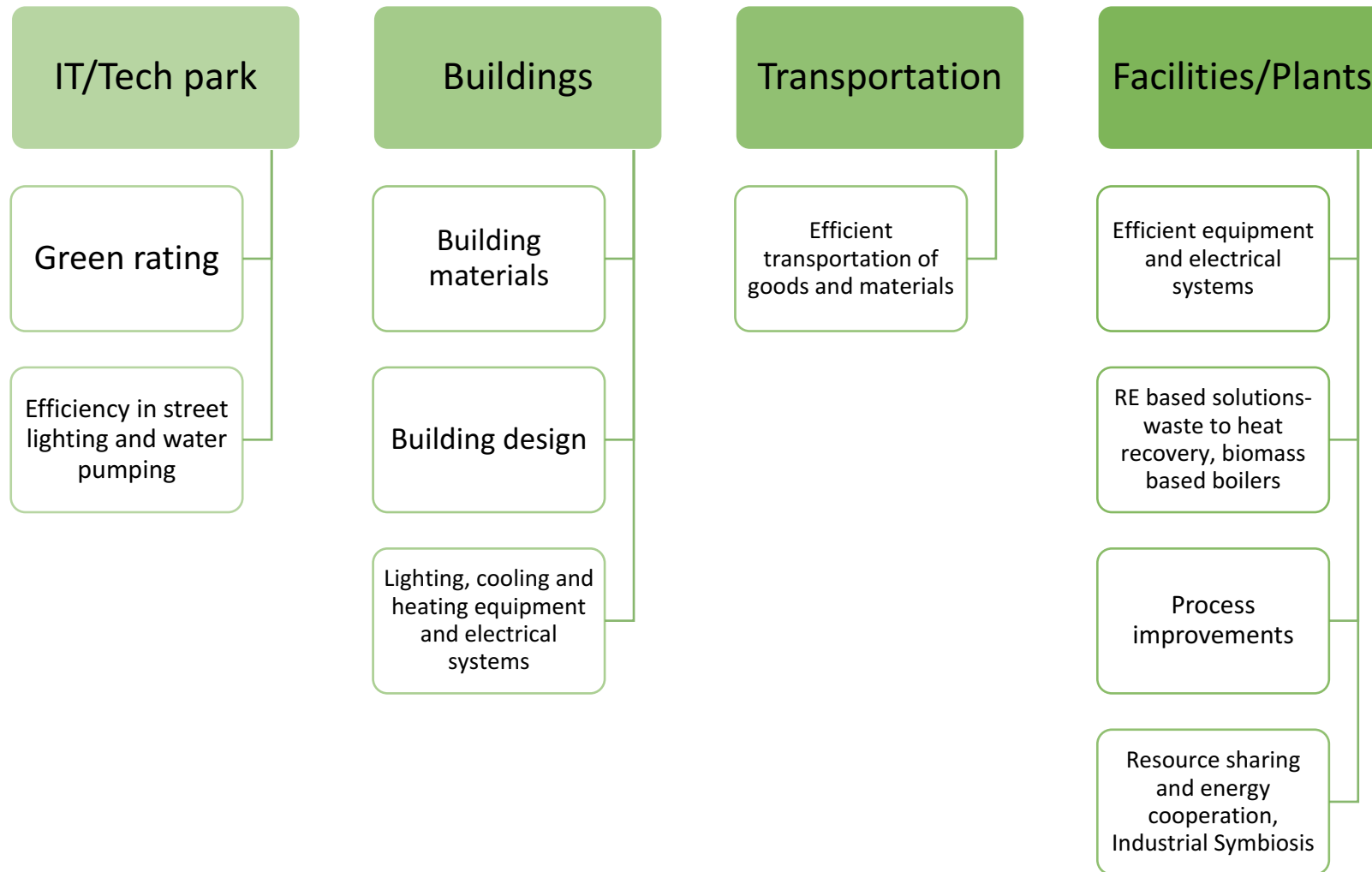
- Cost savings
- Improving energy productivity
- Reducing emissions/ emissions intensity

## Non-energy benefits

- Improved comfort and employee productivity
- Meeting regulatory compliance
- Higher asset values



# Scales of EE interventions



# Energy efficiency for buildings

## Building codes and standards

- Compliance with the Energy Conservation Building Code (ECBC) 2017
- Revised code introduces stringent efficiency requirements including mandatory use of RE
- Efficiency standards for appliances and equipment (BEE star labels)

## Energy efficiency improvement targets

- Conduct baseline energy audits of all buildings, establish benchmarks and fix efficiency targets  
**(could become a company-wide emissions reductions target)**

## Performance information and certification

- IGBC, GRIHA, BEE star label, EDGE certification

## EE for facilities- top cross-cutting opportunities

Measure	Energy Savings	Pay back period (Years)
Preventive Maintenance	5%	Immediate
Minimising operating air pressure	20%	Less than 0.25
Correctly sized motors	2%	Less than 0.5
Sub-metering and interval metering	5%	0.5 to 2
Flue gas monitoring	7%	0.25 to 0.75
Efficient lighting	15%	0.75 to 1.5
Combustion optimization	10%	0.5 to 1.5
High efficiency motors	2%	0.75 to 1.5
Process heat recovery	6%	2 to 5

## EE for supply chain companies

- Transportation of raw materials and finished goods consumes upto one-fifth of the world's daily production
- Improving efficiency in transportation:
  - Improving value density of products (e.g. redesigning of packaging and products)
  - Reducing the distance the product travels
  - Changing modes of transport
  - Improving energy efficiency for transportation assets (e.g. better carriers)
  - Improving use of transport assets and infrastructure (e.g. implementation of smart traffic management systems)



# Planning and implementing energy efficiency

## Where do we start?

- Conduct energy audits
- Appoint personnel to look after energy efficiency
- Install meters for recording energy consumption
- Replace existing products with efficient ones
- Reporting energy consumption annually

## But is this enough?

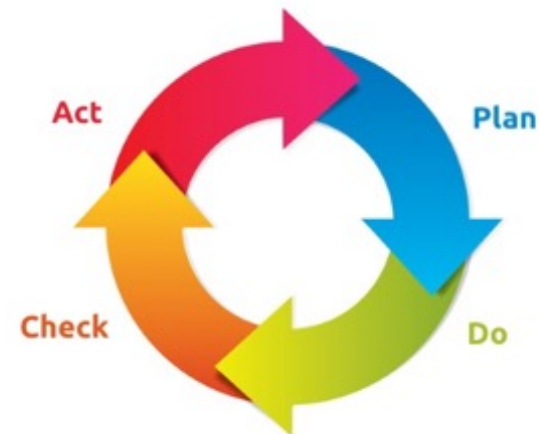
- Will energy audits help you to know the best practices in energy efficiency?
- Will it capture people behaviour that can result in energy savings?
- Will appointing energy personnel suffice? What about management commitment and support?
- Will installing meters help to assess energy efficiency? Don't you need a system to monitor energy usage?
- Will replacement of existing products with the efficient ones be the best available solution to improve efficiency?

# We need energy management systems

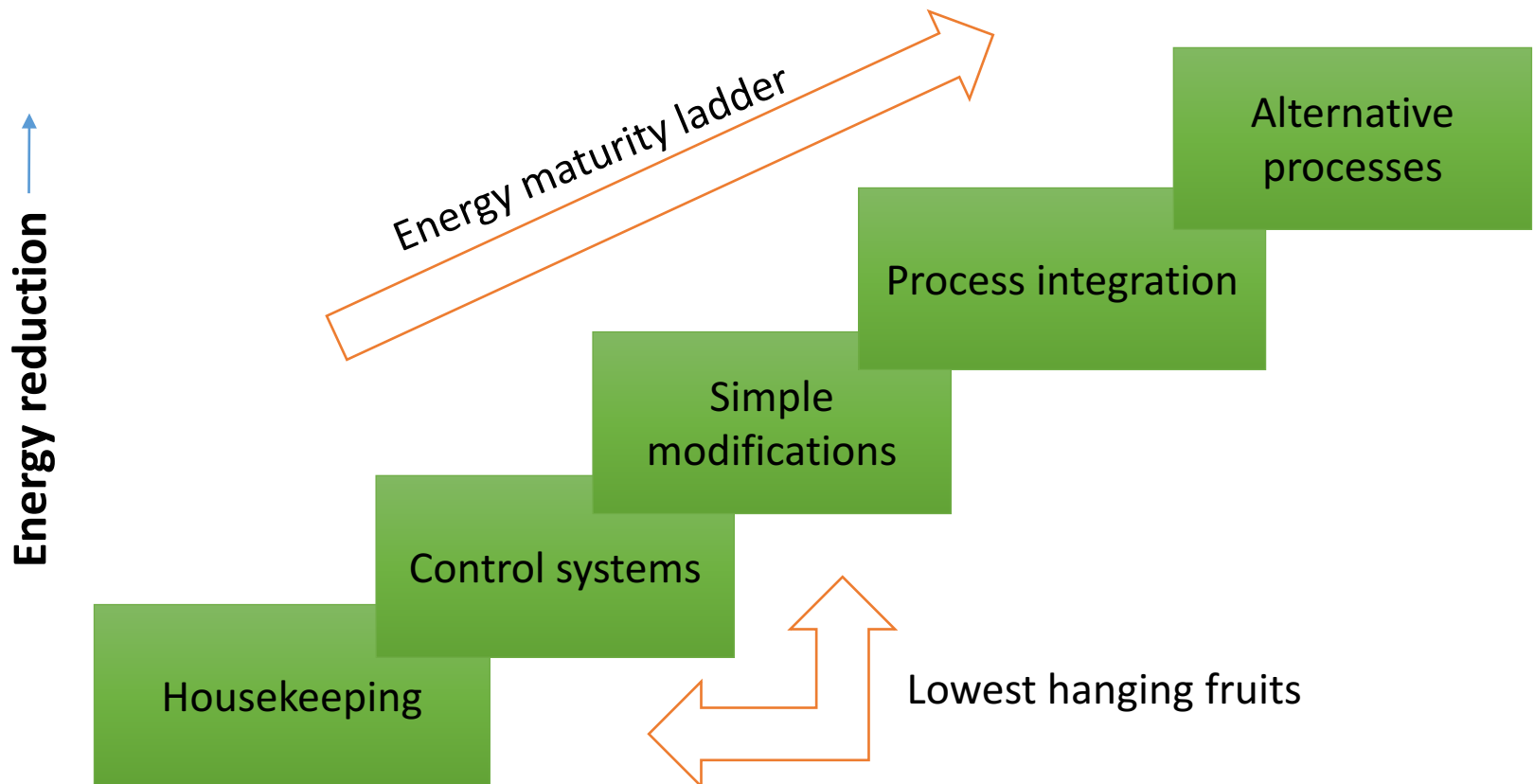
- Recommended features of an effective EMS:
  - Using consistent and simple language
  - **Involve whole firm, not just engineering or technical departments**
  - **Allocate clear responsibilities and resources**
  - Create culture in which established assumptions can be challenged
  - Integrate energy management into daily operations
  - Use appropriate performance measurements and feedback loops
  - Integrate energy efficiency into life cycle decisions about new plant and equipment
  - **Aim for continual improvement**
  - Set stretched but achievable objectives with periodic reviews.



- First internationally recognised standard to help enterprises implement an effective EMS
- Plan-Do-Check-Act (PDCA) approach



# Energy Management Systems



# Low-cost no cost measures- Good housekeeping practices

**Good quality maintenance practices should be in place**

**Addressing root cause of recurring problems**

**Installing equipment correctly and as per guidelines**

**Equipment sizing matches actual demand with minimal excess capacity**

**When given a choice operate machine that meets the demand at highest EE**

**Minimise idle time**

**Involving  
employees  
at all  
levels**

## Use of control systems and simple modifications

Temperature  
control limits in  
HVAC

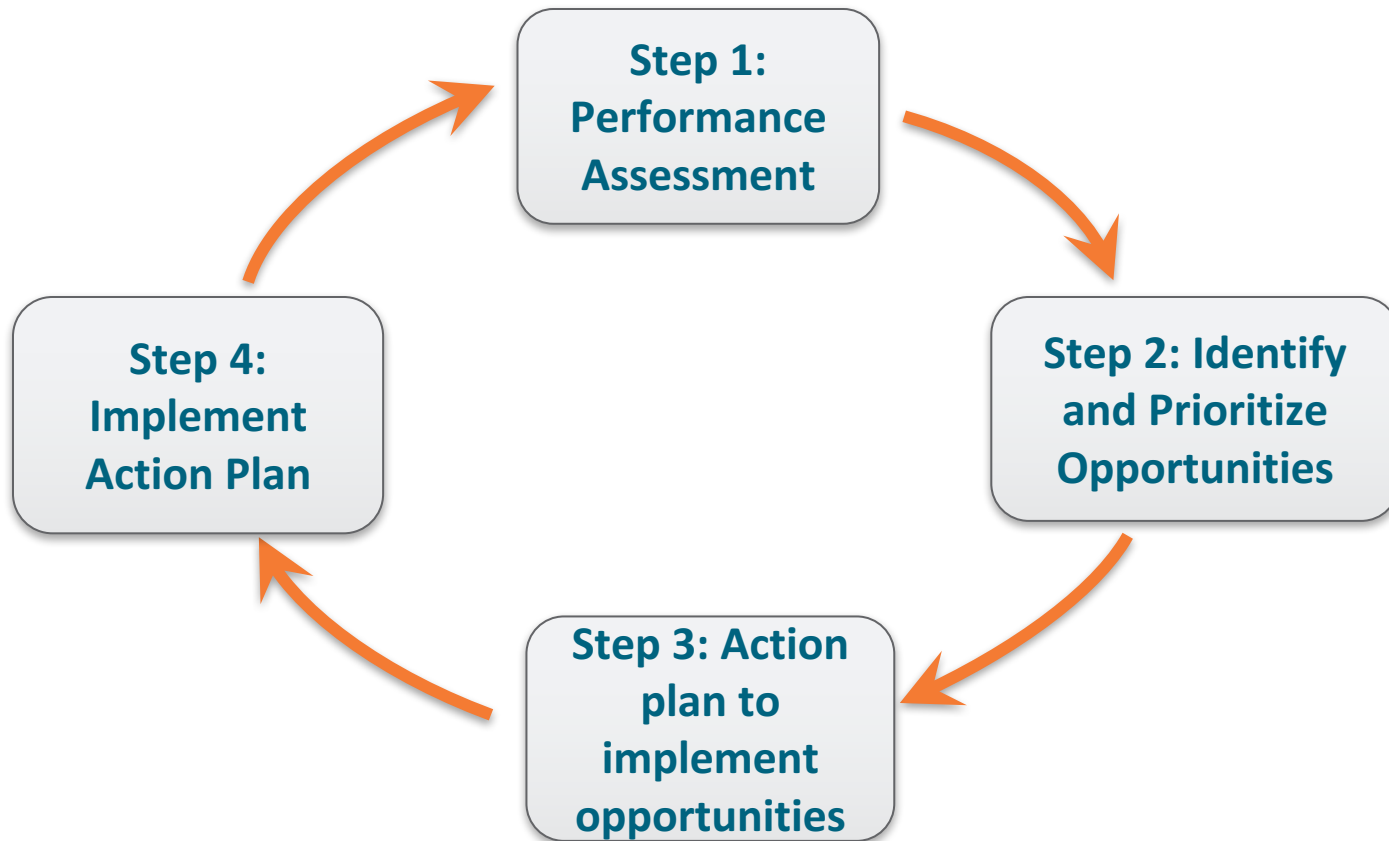
Preventive  
maintenance and  
condition  
monitoring

Improving  
consistency of  
water chemistry

Monitoring  
performance of  
key plant items

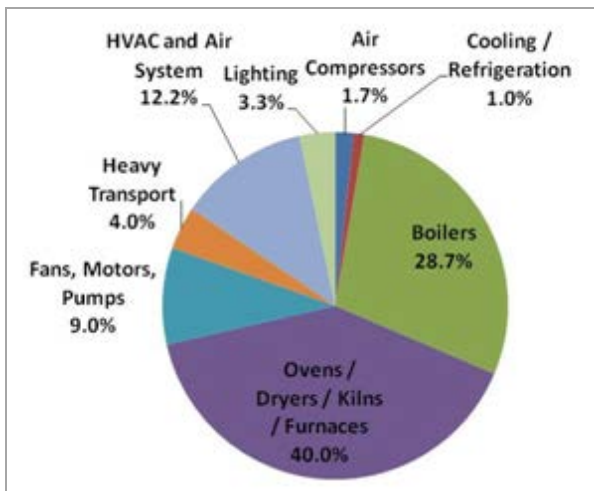
Using variable  
speed drives

# Reaching the PDCA stage

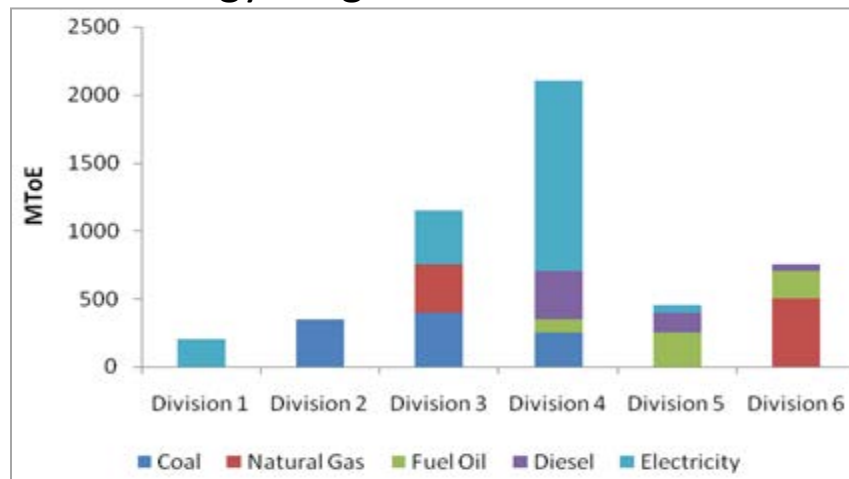


# Performance assessment

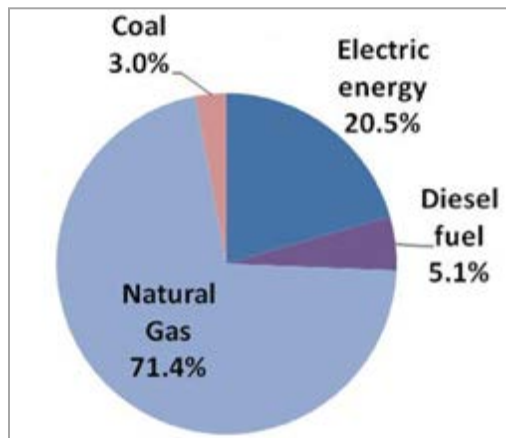
## Breakup of energy usage



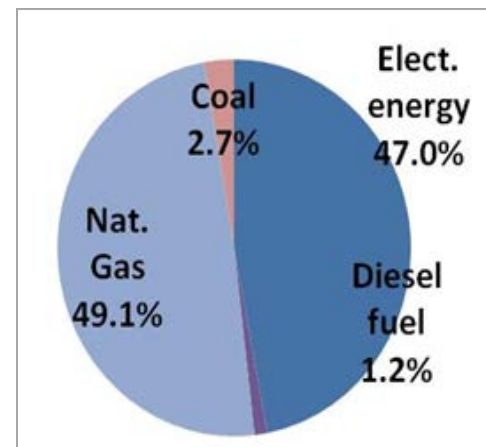
## Energy usage division wise



## Breakup of fuel usage

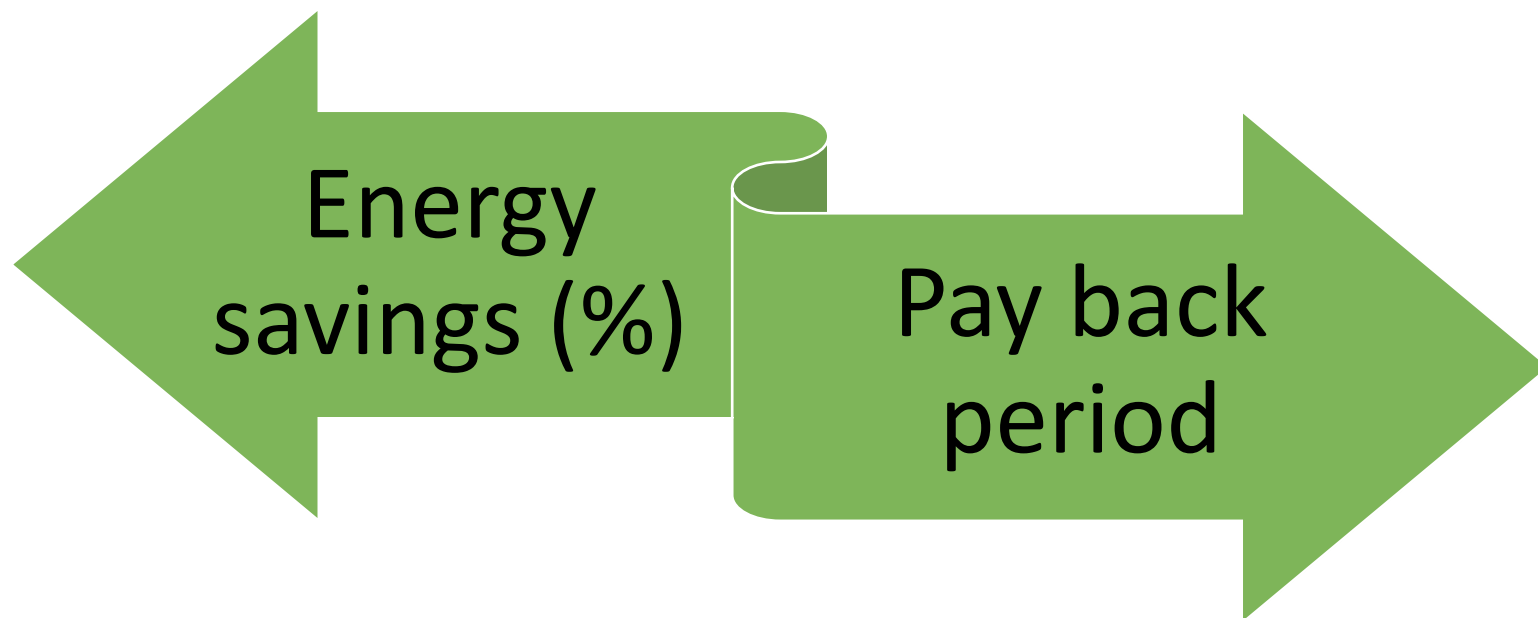


## Breakup of fuel costs

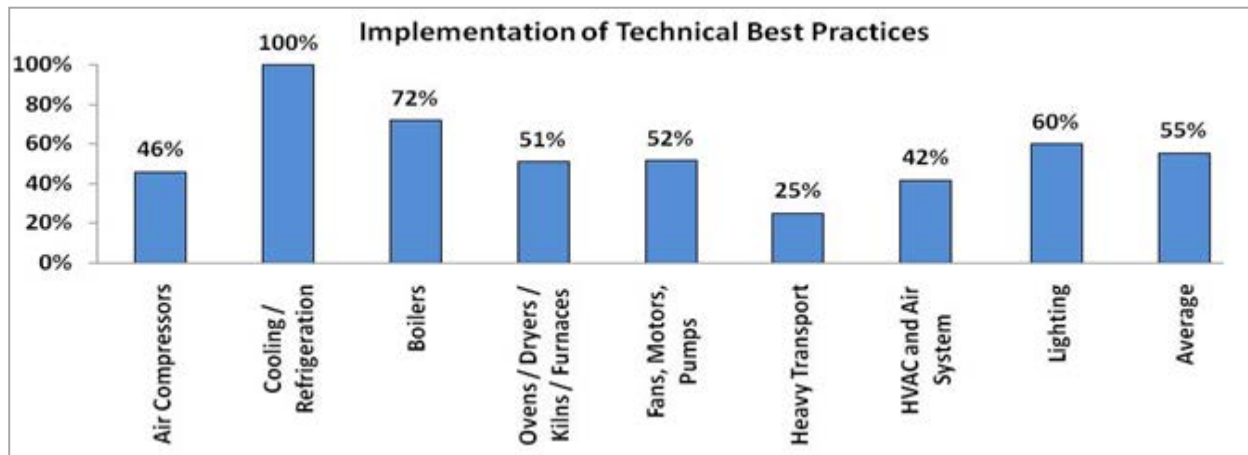


# Making investment decisions

- Investments in energy efficient equipment usually based on energy savings % but pay back period of investment is very important
- Typically for more energy intensive processes, changes in equipment might result in smaller energy savings (in% terms) but payback period might be shorter



# Comparing yourself with others to become more efficient



- 1. Walk through assessment**
- 2. Survey**
- 3. Review of present plant policies**

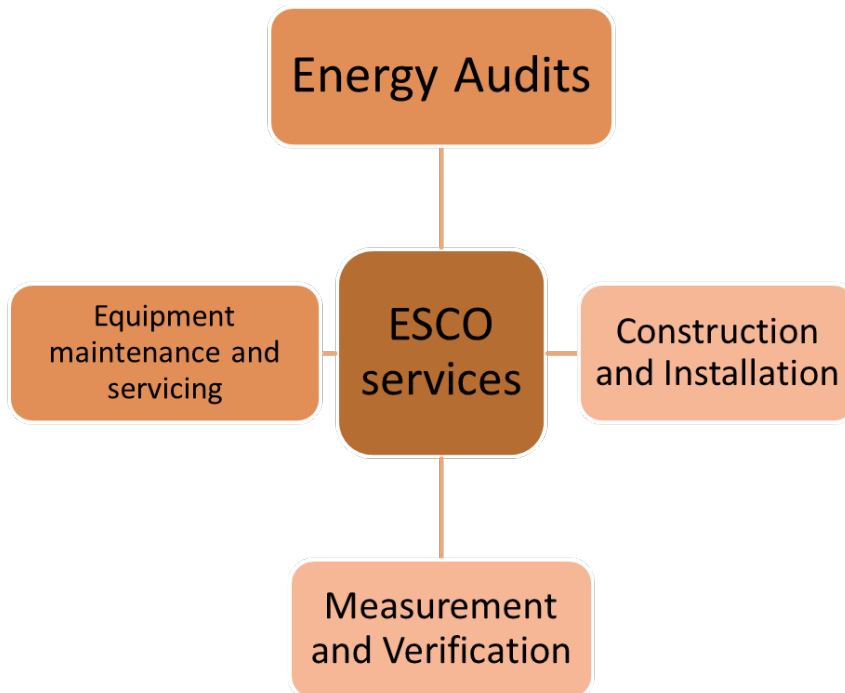




# How to implement EE projects?

## Role of ESCOs

- The most common approach for implementing EE projects- work with Energy Service Companies (ESCOs)
- ESCOs can work across scales- buildings, facilities/plants
- These are specialized companies that sign a **energy performance contract** (EPC) with the client firm to implement measures which reduce energy consumption in a **technically** and **financially** viable manner



# Types of EPCs

## Shared savings

- ESCO finances projects through its own funds or borrowing from 3<sup>rd</sup> party
- ESCO bears project risks
- Cost savings are divided between the client and the ESCO at a pre-determined % and length of time

## Guaranteed savings

- Customer finances design and installation of project
- ESCO assumes project risk and guarantees savings made
- If savings are not achieved, ESCO compensates the customer and if savings are exceeded, customer shares savings with ESCO

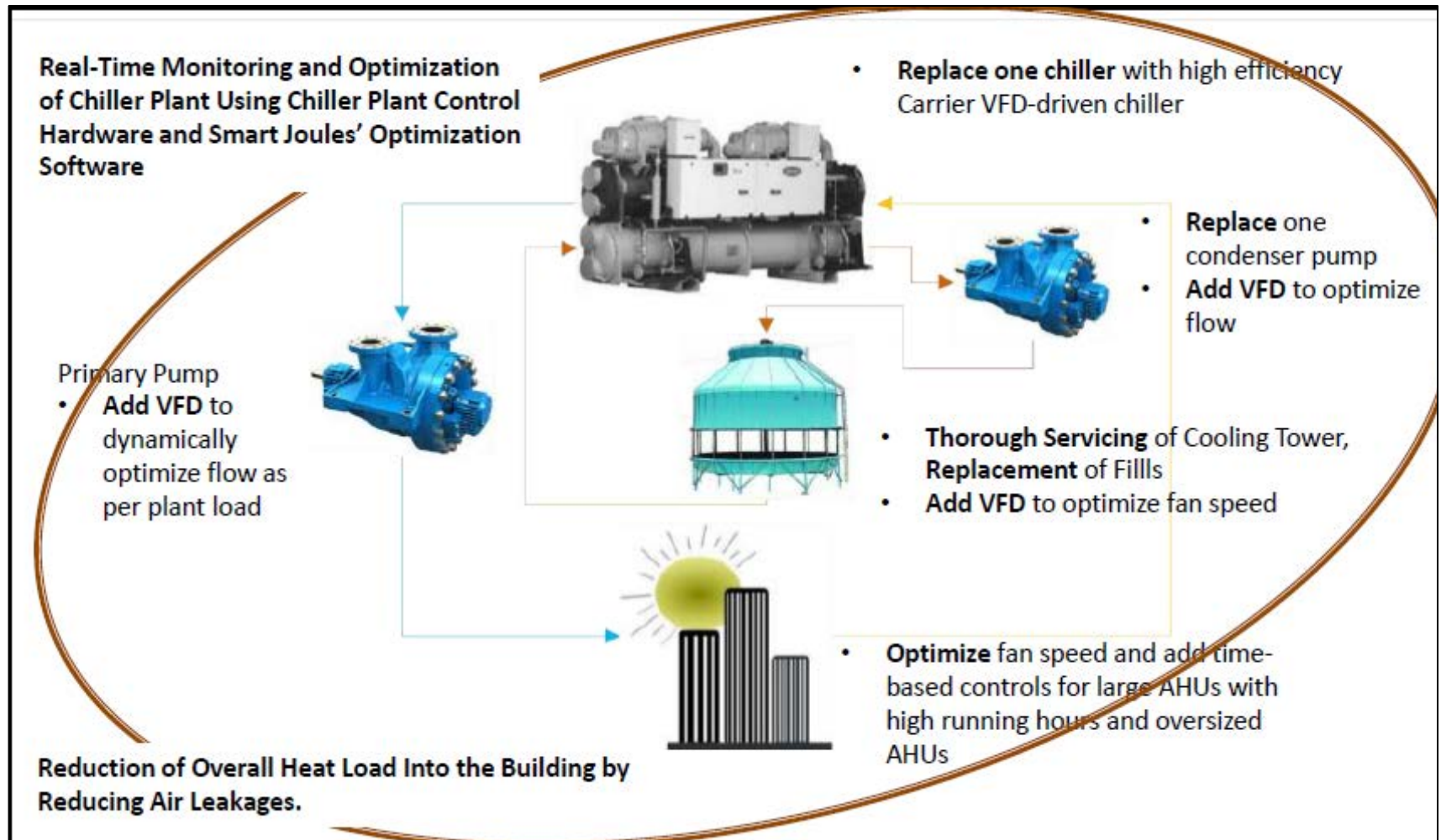
## Lease rental model

- The ESCO installs the equipment on lease and may maintain it. The customer pays for the lease through verified savings. The frequency of these payments depends on contract. The customer also pays the principal and interest
- At end of completion of all lease payments, ownership of the equipment is transferred to customer

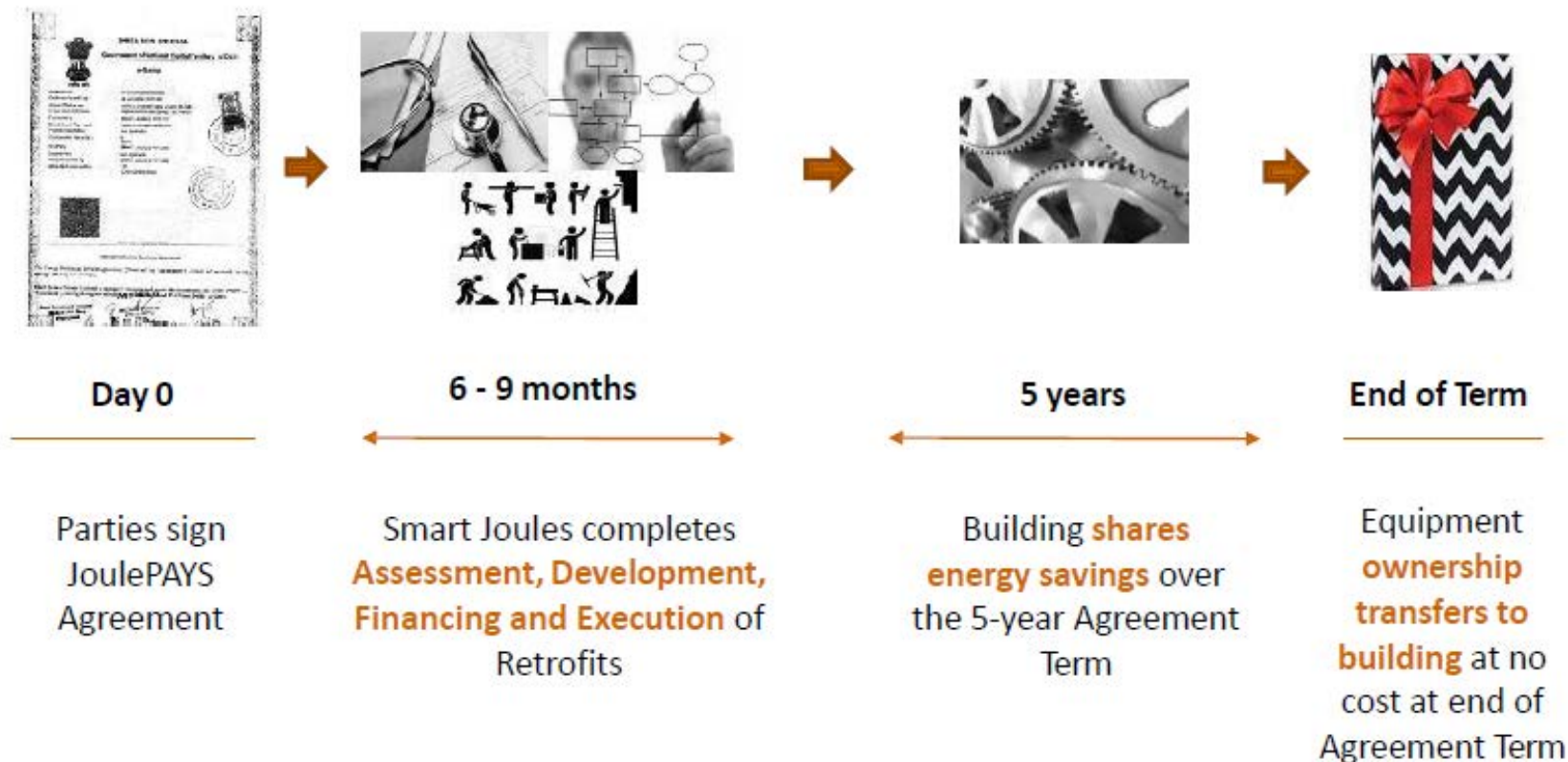
## BOOT model

- ESCOs designing, installing, maintaining, owning and operating the equipment and transferring the ownership after the contract period is over
- Customers enter into long term contracts with service provider and pay them service fees
- Very popular model in India right now

# Case study- Commercial building ESCO project



# ESCO's business model



# Financing routes for different EE interventions

Financing Route	Type of interventions
Clubbed with loans within existing lines of credit	<p>Cross-cutting technologies</p> <ul style="list-style-type: none"> <li>DCs where VFD and WHR account for significant proportion of overall capex and DCs balance sheet is strong</li> <li>Super-efficient Boilers for large DCs (fixed assets&gt;Rs 500 cr)</li> </ul>
	<p>Process interventions with short term/&lt;3 yr payback)</p> <ul style="list-style-type: none"> <li>Textile - High Speed Carding Machine</li> <li>Pulp &amp; Paper -Installation of Extended Delignification System for Cooking of Wood</li> <li>Fertilizer - Vapour Absorption System, Retrofitting Steam Turbines for Higher Efficiency</li> </ul>
	<p>Process interventions (with medium term/3-5 yr payback)</p> <ul style="list-style-type: none"> <li>Fertilizers - Vapour Absorption System; Two Stage Regeneration in CO2 Removal System; Adiabatic Pre-reformer</li> <li>Pulp &amp; Paper - Firing of Black Liquor at High Concentration</li> </ul>
Clubbed with loans within existing lines of credit/Vendor finance ESCO Model	VFDs across sectors where the investment is not significant proportion of overall capex
Pay for performance ESCO model	<ul style="list-style-type: none"> <li>Textile and Pulp &amp; Paper- Super efficient Boilers for small DCs (fixed assets&lt;Rs 500 cr)</li> <li>WHR for small DCs (fixed assets&lt;Rs 500 cr)</li> </ul>
Project Specific Term Loan (>5 yr tenure)	<ul style="list-style-type: none"> <li>Chlor-Alkali- Anode and Membrane replacement along with Zero gap conversion of Electrolyser</li> <li>Aluminium-Inert anode (PBANOD) in Hall Heroult Process</li> </ul>



# Partial Risk Sharing Facility (PRSF) by SIDBI

## Eligible Hosts / Sectors

- ✓ Large industries (excluding thermal power plants)
- ✓ MSMEs
- ✓ Municipalities
- ✓ Buildings

## Eligible EE Loans

- ✓ Loan to ESCO or host entity falling under MSME category
- ✓ Min. 75% of loan towards EE investment

## Eligible ESCOs

- ✓ BEE-Empanelled ESCO
- ✓ JV / Consortium allowed
- ✓ Other entities are also eligible subject to ESCO grading

## Extent of Coverage

- ✓ 75% of loan or o/s
- ✓ Min. loan – Rs.10 Lakh
- ✓ Max. loan – Rs.15 cr.
- ✓ Max. exposure to a single Host / ESCO – Rs. 45 cr. (Grade 5 – Rs. 40 cr.)

## Guarantee Tenure

- ✓ 5 Years or loan tenure, whichever is lower

## Guarantee Fee

- ✓ Slab-wise & based on the grading of ESCO

# Implementation mechanism of PRSF





# EE financing options for MSMEs

Scheme	Nodal agency	Eligible projects	Financing
Technology and Quality upgradation Support to Micro , Small & Medium Enterprises (TEQUP) (launched in 2011)	SIDBI	EET machinery installed should have minimum of 15% energy saving , and the energy audit report also to be submitted at the time of submission of subsidy application	Subsidy- 25% of the project cost for implementation of EET subject to maximum of 10 lakh
Credit Linked Capital Subsidy for Technology Upgradation (launched in 2005)	SIDBI	Productivity improvement measures including installation of efficient equipment	15% upfront capital subsidy up to a maximum cap of INR 1 CR
Financing End to End Energy Efficiency Investments in MSMEs (4E Financing Scheme)	SIDBI	DPR prepared by certified BEE auditor; applicant unit must have Performance Linked Grant under the WB-GEF Project	Loans up to 90% of project cost; minimum loan amount- 10L and maximum loan-150L
JICA Phase 3: Scheme for Energy Saving Projects in MSME Sector	SIDBI	Applicants to have minimum investment grade rating of SIDBI; retrofits, replacement of equipment with efficient ones and building efficiency projects also covered; list of eligible technologies provided	Line of credit from JICA to SIDBI; loan assistance of up to 10L/project



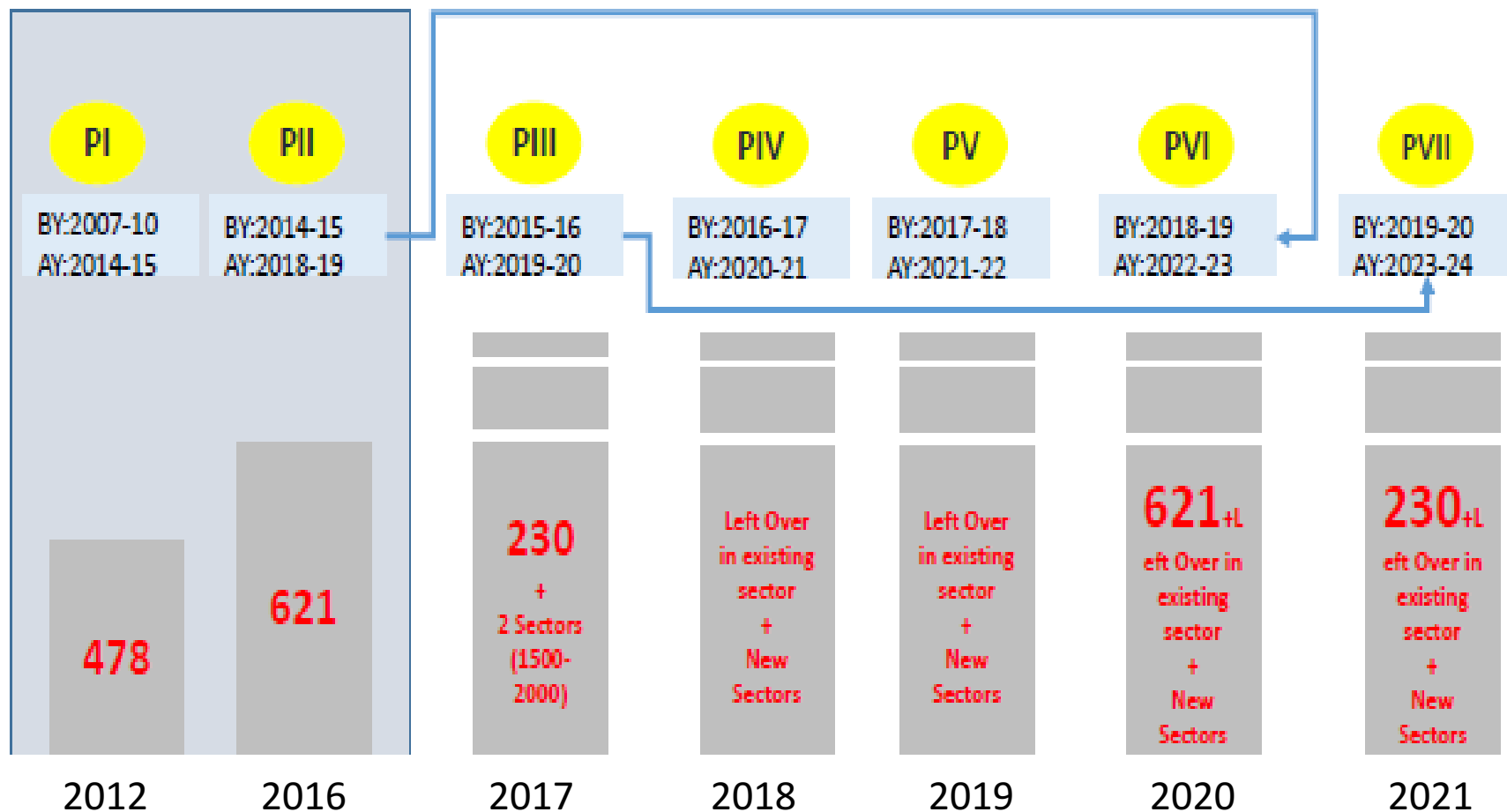
# Perform Achieve & Trade

# Impact of PAT Cycle 1

	Sector	No. of DCs	Annual Energy Consumption (Mtoe)	Target Reduction (Mtoe)	Actual savings (Mtoe)	% reduction
1	Aluminium	10	7.71	0.46	0.73	59%
2	Cement	85	15	0.82	1.44	76%
3	Chlor-Alkali	22	0.88	0.05	0.13	100%
4	Fertilizer	29	8.2	0.48	0.83	73%
5	Iron and Steel	67	25.3	1.49	2.1	41%
6	Paper and Pulp	31	2.09	0.12	0.26	117%
7	Textiles	90	1.2	0.07	0.12	71%
8	Thermal power plant	144	105	3.21	3.06	-5%
		478	165.38	6.686	8.67	29%

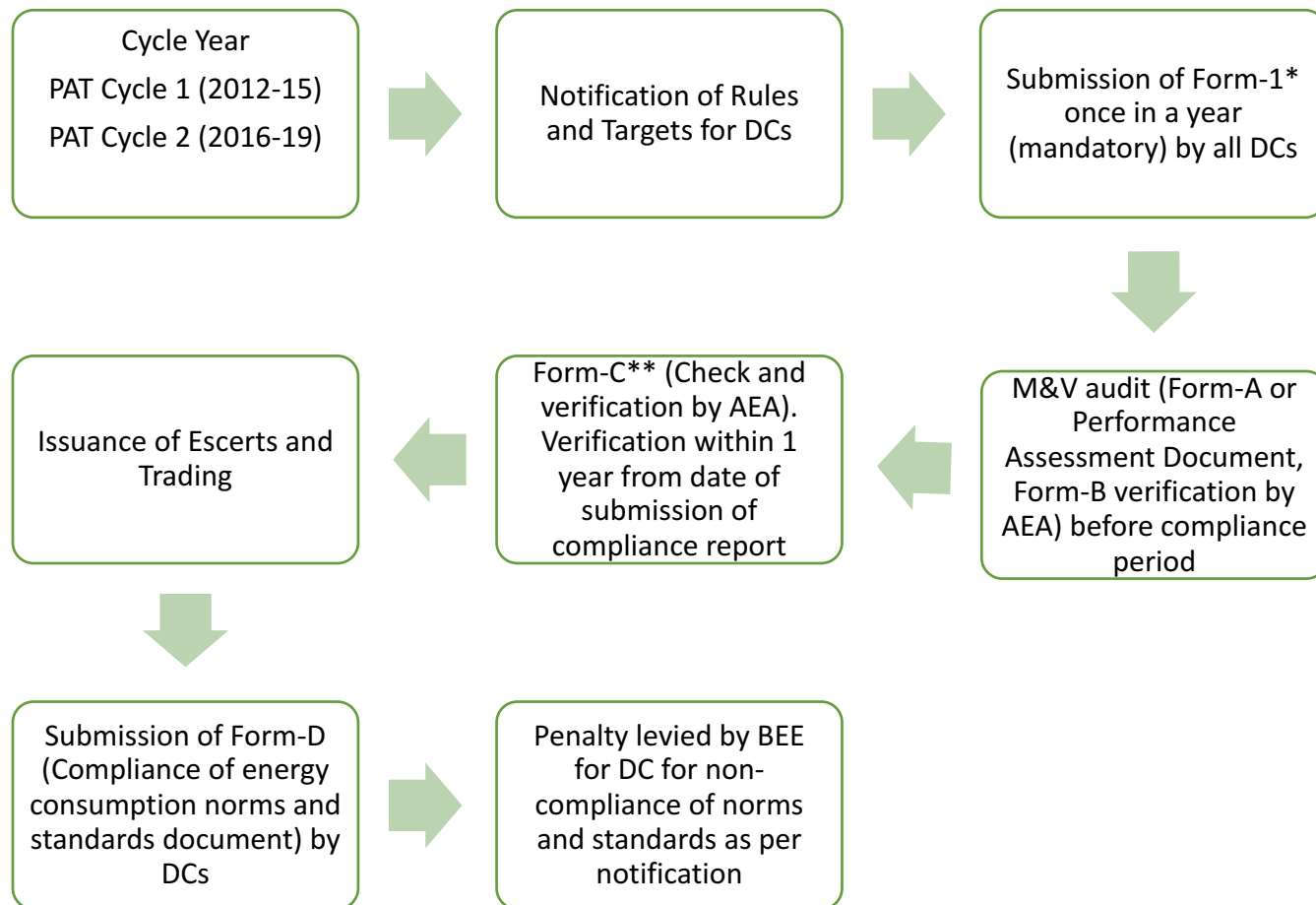
Source: BEE

# PAT Way Forward



Source: BEE 2016

# PAT Compliance Process



\* Form-1 has been modified to include the sector-specific pro-forma

\*\* BEE initiates check-verification if it receives complaint within 1 year of compliance report; An AEA is hired by BEE who completes the check-verification process by submitting Form-C

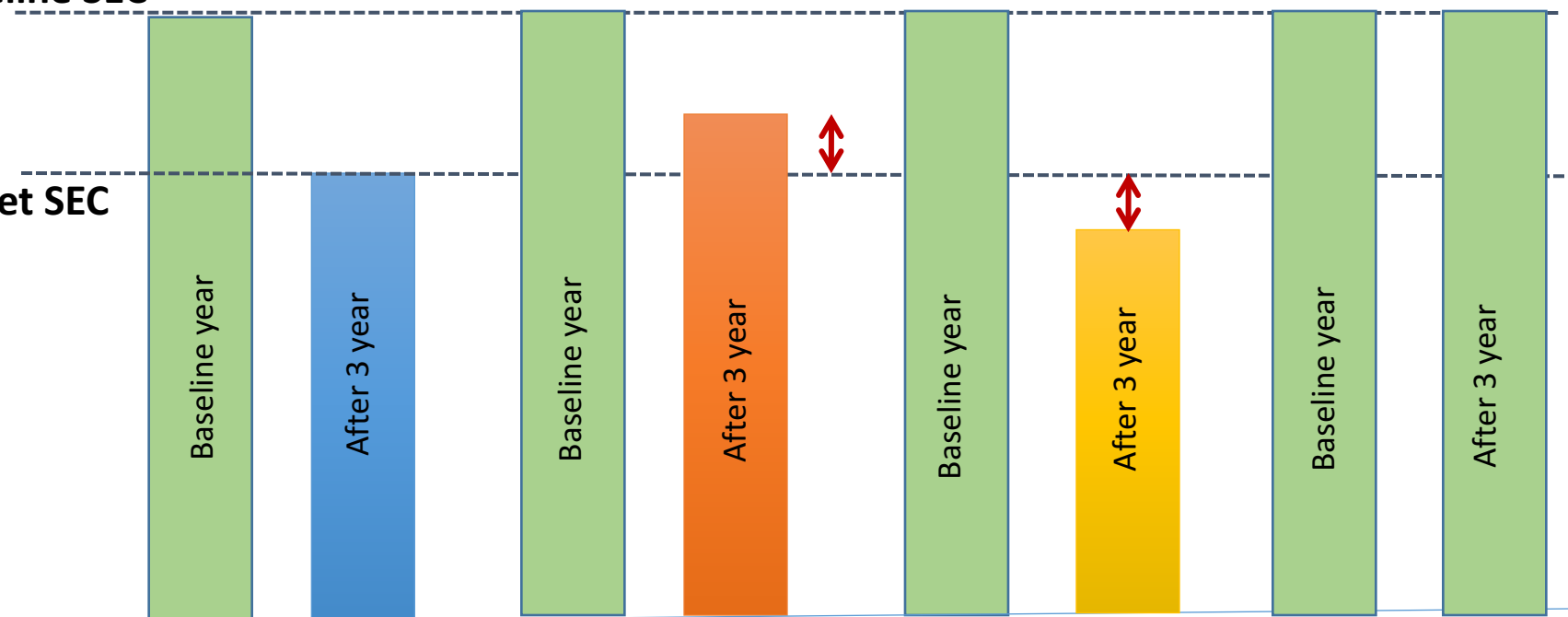
## Activities and timelines for PAT Cycle 2

Action	Responsibility	By when	Tentative dates for PAT Cycle-2	Submit to
Form 1, Action Plan submission	DC	3 months from notification as DC	June 30 2016	SDA/BEE
Form 1 submission	DC	Annual submission of form 1 within 3 months from financial year start	June 30 (every year)	SDA/BEE
Form A, Form B and other supporting documents	DC	Within 4 months of conclusion of target year	July 31 2019	SDA/BEE
Provide comments on Forms A and B	SDA	Within 45 days of last date of submission of Form A	September 15 2019	BEE
Recommend ESCerts for the DC	BEE	Within 2 months of receipt of comments from SDA	November 15 2019	MoP
Issuance of ESCerts	MoP	Within 45 days from date of recommendation of ESCerts from BEE	December 31, 2019	DC
Submit Form D	DC	After 1 month from completion of trading		SDA/BEE

# Possible Scenarios as a Designated Consumer (DC)

**Baseline SEC**

**Target SEC**



## Case A: Meeting

- Target met
- No Penalty

## Case B: Underachieving

- ESCert shortage
- Buy ESCert or pay penalty

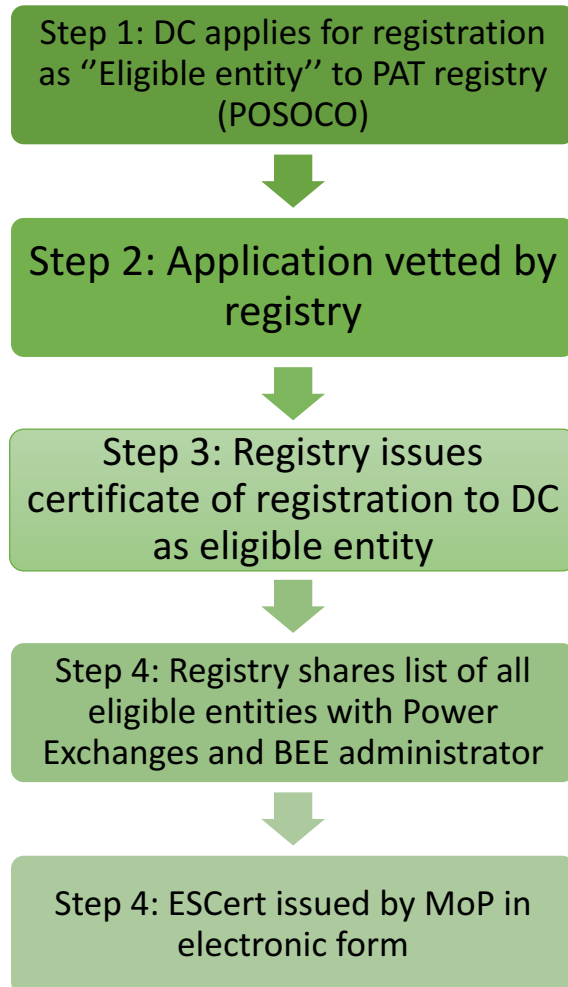
## Case C: Overachieving

- ESCert generated
- Sell ESCert or bank it for next PAT cycle

## Case D: No Action

- ESCert shortage
- Buy ESCert or pay penalty

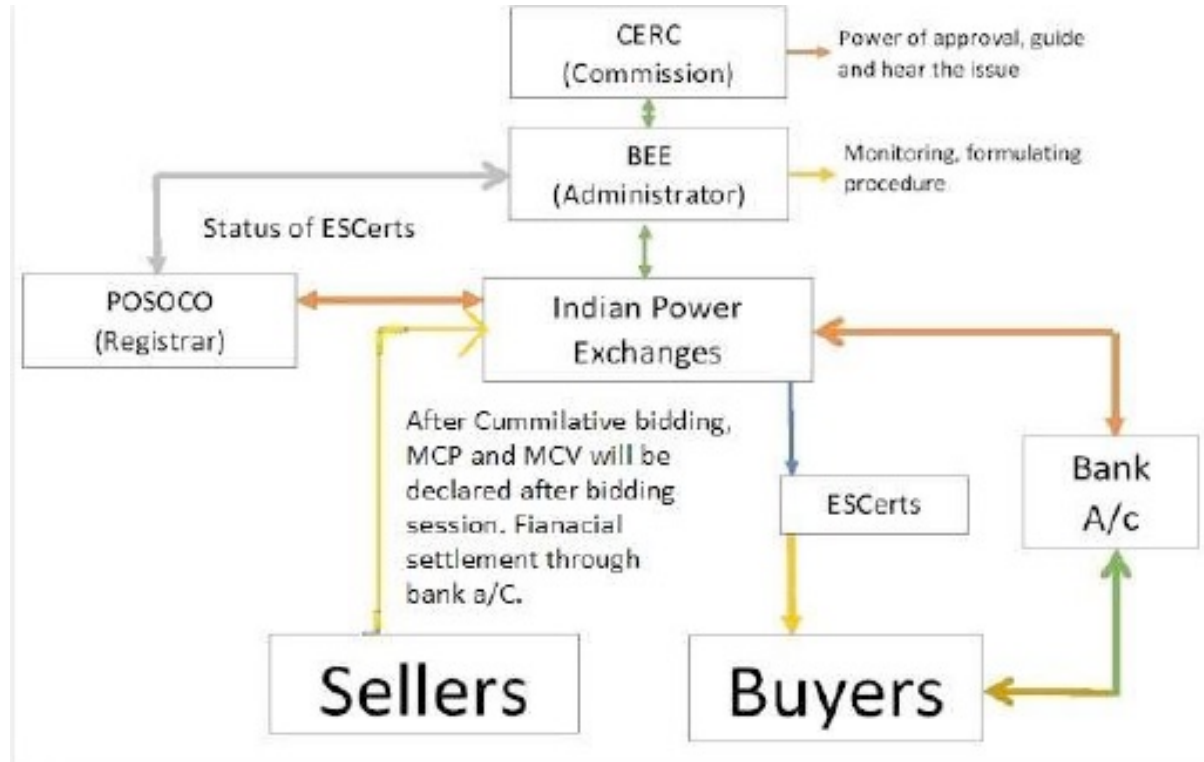
## Latest rules in ESCert trading



- ✓ Rules notified in February 2017
- ✓ 1 ESCert = 1 Metric Oil equivalent.
- ✓ ESCerts can be banked or traded through power exchanges for compliance with in validity period and any excess ESCerts can be used for the compliance of the next cycle.
- ✓ ESCerts remains valid till the completion of the compliance period of next cycle
- ✓ Value of per metric tonne of oil equivalent **INR 10, 968** for year 2014-15 by GOI
- ✓ No of ESCerts that will be issued by MoP= 38,50,000



# Trading architecture



- Price of ESCerts determined by Market through market clearing price mechanism.
- Clearing volume of ESCerts in a day determined by Market clearing volume mechanism.
- Frequency of exchange of ESCerts- monthly basis OR as approved by CERC

## Zero effect zero defect (ZED) scheme for MSMEs

### Capacity Building

- Industry awareness programs
- Onsite training of enterprises in remote areas
- Training of MSME officials, testing centers, departments
- International benchmarking, experience and best practices sharing

### Online system

- Online platform for application submissions for ZED assessment
- E-learning modules

### Accreditation and Rating

- ZED Defence and assessment and Rating by empanelled agencies
- Technical assistance to MSMEs for achieving ZED certifications through gap analysis



# Renewable Energy Interventions

# RE sourcing by corporates is a key theme at the CEM

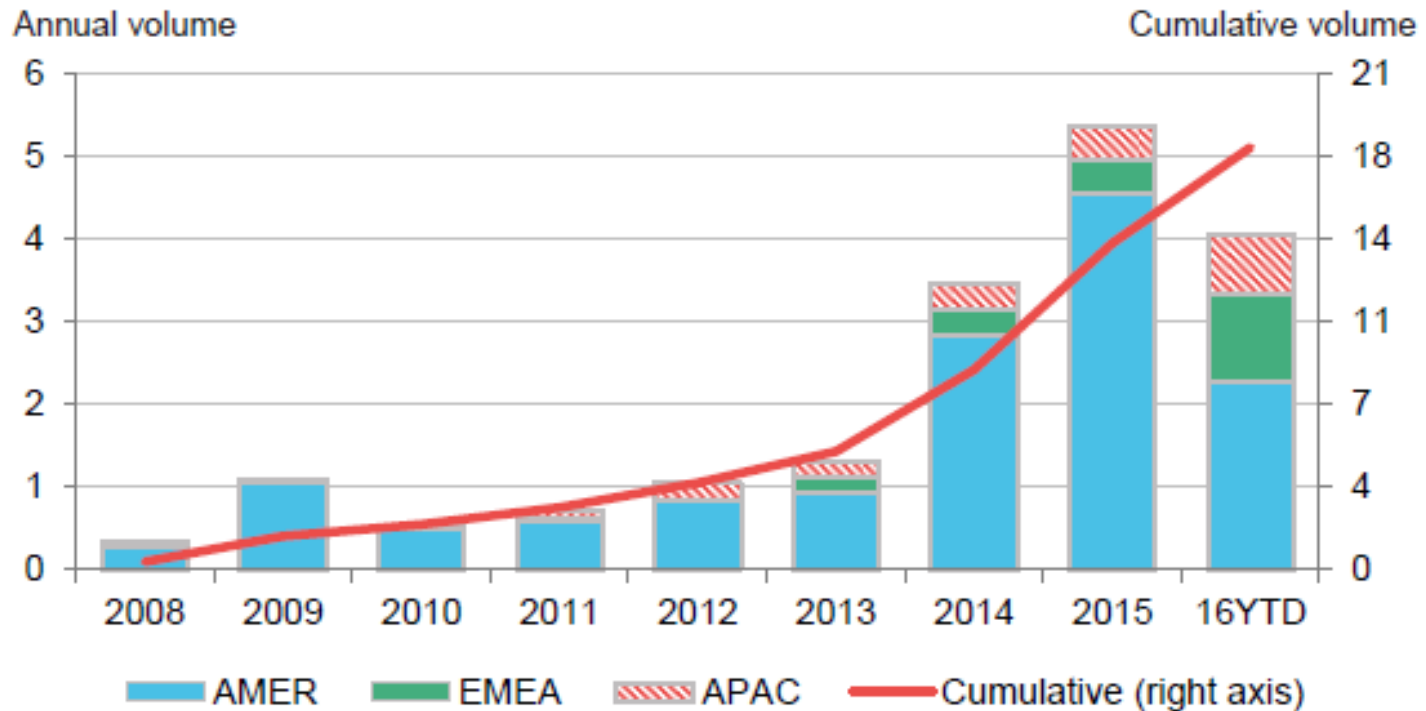


Enabling companies around  
the world to power their  
operations with renewables

**Goal:** get more companies to commit powering operations with renewables and deploy tools and resources to enable more companies large and small, to do so.

## Global Market for Corporate RE PPAs is growing

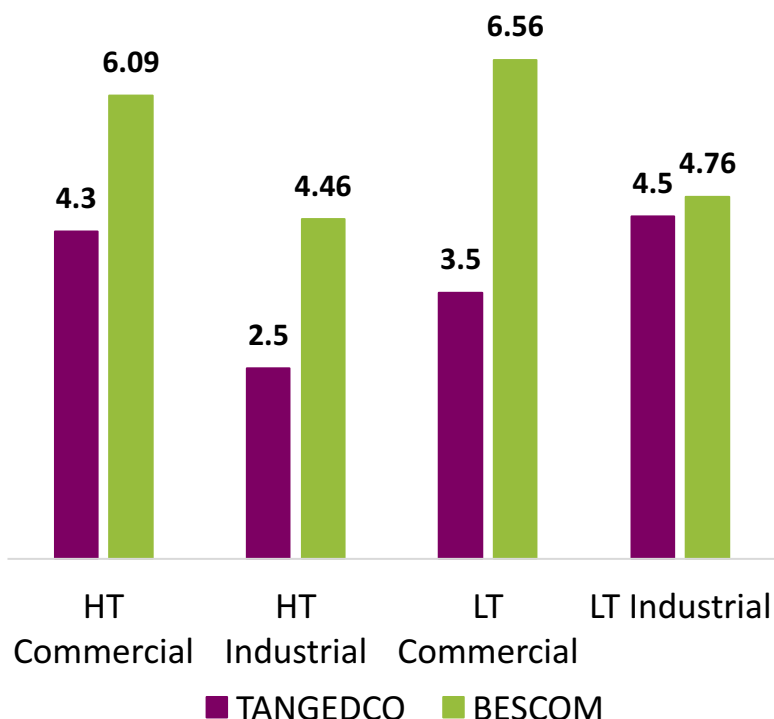
**Figure 1: Global corporate PPAs by region and year, 2008-16YTD (GW)**



*Source: Bloomberg New Energy Finance. Note: APAC capacity is estimated and will be updated on an ongoing basis.*

# Drivers for procuring RE – Economics

**% average annual increase in electricity  
tariffs (FY11-15)**



- Fossil fuel based electricity prices are rising sharply and continuously
- Power deficit is a critical business risk
- Renewable energy is already cheaper or competitive with grid power and supplements/ augments it

## Drivers for procuring RE – regulatory compliance & enforcement

- Renewable Purchase Obligations (RPOs) mandate businesses that procure power from third parties to procure a share of such energy from renewable energy sources
- Almost all Indian states have notified penalties for RPO non-compliance
- Enforcement of penalties could soon become the norm

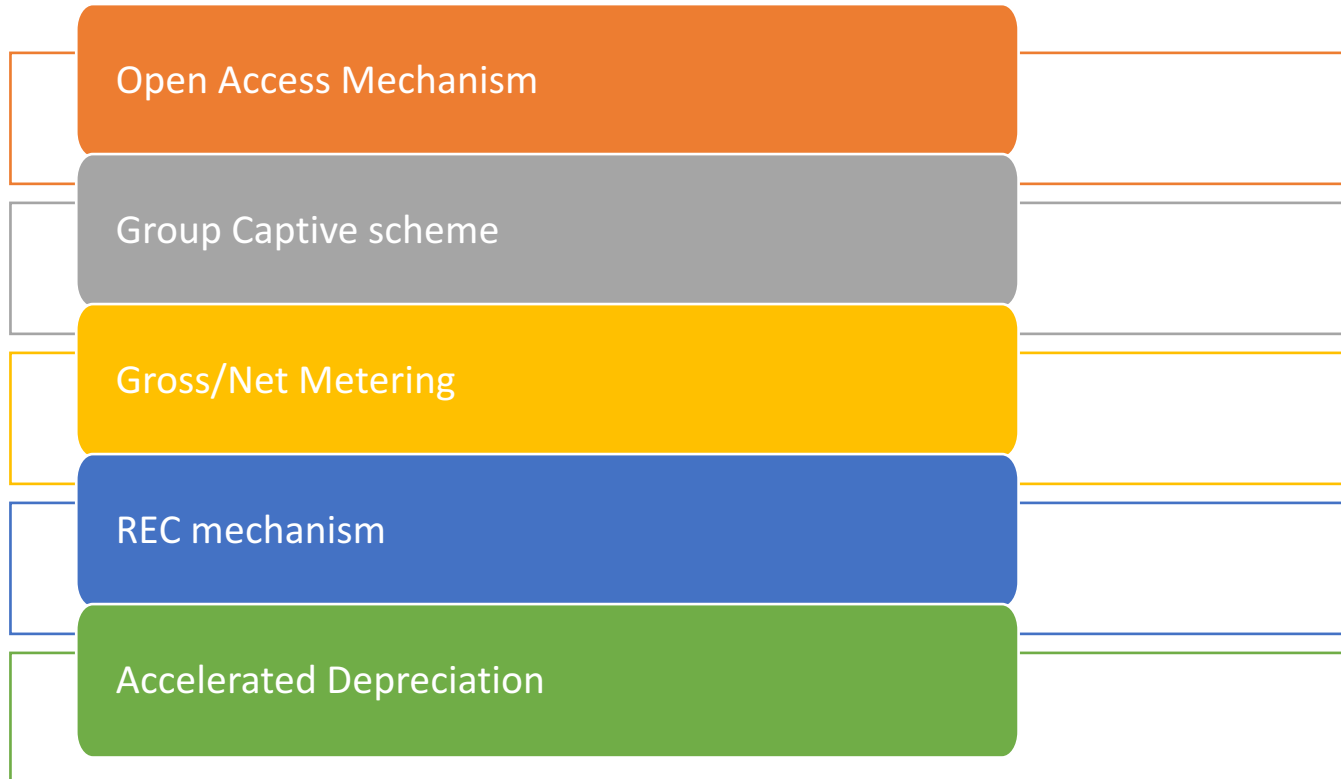
- Consumers increasingly prefer products/ services of companies that adhere to the principles of sustainability and operate accordingly
- Reducing Green House Gas (GHG) emissions by shifting to renewable energy is proven to be an effective way of reducing impacts on the environment
- Corporates are increasingly aware of this and consider it as one of the elements of their CSR strategy. They also include this as part of their brand positing by reaching out to their consumers about their leadership in sustainability



## How does a company set RE targets?

- RPOs usually have a direct impact on the renewable energy purchase ambition of a buyer
- In the absence of RPOs, internal sustainability targets based on realistic assessment can define the quantum of purchase
- Depending on the location and the tariff design, buyers usually stand to benefit to minimize their grid power consumption during a certain time block. This, in addition to the need to optimize, diesel and grid power can also impact the quantum of renewable energy procurement
- Typically base load on non-working days acts as reference to decide on the quantum of renewable energy purchase

# What are the enablers?



## But, challenges abound in each of the enablers

- States increasingly adopting additional surcharges on open access transactions (including RE)
- ....and in some cases, announcing lower industrial tariffs
- Group captive scheme going to undergo a major overhaul. But, in fairness, this is a long overdue correction
- Gross metering is not a preferred option because of long pay-backs
- Net-metering rules have deliberately designed to be sub-optimal

## What's the way forward?

- Energy efficiency should be the primary component of your emissions' reduction strategy. Don't rely ONLY on RE procurement
- If you are in close vicinity to one another, particularly in industrial parks, it'd be a good idea to explore setting up micro-grids to optimize overall on-site production & consumption of RE
- Another option is to petition the regulator to support special exemptions for intra-park trading of RE
- Open access transactions are subject to vagaries of the additional surcharges. But, Group Captive investments, even with the proposed rule changes do make sense (with a slightly higher pay-back), but insulate industries from CSS, Additional Surcharge etc.

# What the GPMDG does in this space



## Green Power Market Development Group - India

Transaction support for  
iconic companies

Demand aggregation/  
CollabSolar

Policy advocacy

*Started in 2013 to replicate WRI's  
global renewable energy initiatives in  
India. 200+ MW projects in various  
stages*



*Supported industry representation in  
convincing Karnataka electricity  
regulator to waive off grid usage  
charges for solar projects*

**Next phase (Scaling): Knowledge Platform; Expanding to more states and creating the bridge between RE projects and financial instruments**

## India GHG Program Secretariat:

- <http://indiaghgp.org/>
- [indiaghgpsecretariat@wri-india.org](mailto:indiaghgpsecretariat@wri-india.org)

## Address:

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- Tel: +91 (22) 2471 3565

## Contact:

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- Name – [email@xyz.org](mailto:email@xyz.org)

## Social Media:

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