OVERVIEW OF FACILITY-LEVEL MRV PROGRAMS

PARTNERSHIP FOR MARKET READINESS
MRV TRAINING WORKSHOP
BEIJING, CHINA
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Contents

- Overview of the programs
- Presentations from experts:
  - India
  - China
  - USA
  - EU
- Summary and Q&A
The facility-level MRV programs we will hear about are all different

- Purpose of the program
- How the program was developed
- The use of information technology
- QA/QC and verification frameworks

But the programs also have similarities

- Coverage of facilities
- Focus on quality
As you listen to the experts talk about the programs, consider some key questions:

- **Why** did they decide to do it that way?
- **What options** did they have when they made that design decision?
- How do the **regulatory culture and business practices** in that country enable the design?
- What **capabilities** are required to operate the program and **how many staff** are involved?
MRV Program Overview - India

- India

- Balawant Joshi
  - Idam Infrastructure Advisory Pvt. Ltd.
  - Balawant.joshi@idaminfra.com
Overview of Perform, Trade and Achieve (PAT) Mechanism

Day1, Session 2: Overview, Facility Level MRV

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September 23, 2013
Beijing, China
Presentation Roadmap

- Background: NAPCC, NMEEE
- PAT Scheme
- MRV framework
Background:
NAPCC, NMEEE
National Action Plan on Climate Change (NAPCC)

- NAPCC was announced and launched on 30 June 2008
- NAPCC proposes “a directional shift in the development pathway” that promotes development objectives, while also yielding co-benefits for addressing climate change effectively.”
- NAPCC Council also points out that benefits arising from climate change mitigating actions should be viewed as co-benefits of a sustainable plan to meet developmental objectives and not to be seen as goal itself.
- As expected for an emerging economy, India’s NAPCC does not focus on or stipulate emission reduction targets.
- Instead it emphasizes on long-term mitigation strategies while promoting growth and inclusive development with “sustainable co-benefits”.
## National Action Plan on Climate Change (NAPCC)

<table>
<thead>
<tr>
<th>Mission</th>
<th>Objective</th>
<th>Responsible Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Solar Mission</td>
<td>20,000 MW of solar power by 2020</td>
<td>Ministry of New and Renewable Energy</td>
</tr>
<tr>
<td>National Mission on Enhanced Energy Efficiency</td>
<td>10,000 MW of EE savings by 2020</td>
<td>Ministry of Power</td>
</tr>
<tr>
<td>National Mission for Sustainable Habitat</td>
<td>EE in residential and commercial buildings, public transport and solid waste management</td>
<td>Ministry of Urban Development</td>
</tr>
<tr>
<td>National Water Mission</td>
<td>Water conservation and river basin management</td>
<td>Ministry of Water Resources</td>
</tr>
<tr>
<td>National Mission for Sustaining the Himalayan Ecosystem</td>
<td>Conservation and adaptation practices, glacial monitoring</td>
<td>Ministry of Science and Technology</td>
</tr>
<tr>
<td>National Mission for a Green India</td>
<td>6mn hectares of afforestation over degraded forest lands by the end of 12th Plan</td>
<td>Ministry of Environment and Forests</td>
</tr>
<tr>
<td>National Mission for Sustainable Agriculture</td>
<td>Drought proofing, risk management, agricultural research</td>
<td>Ministry of Agriculture</td>
</tr>
<tr>
<td>National Mission on Strategic Knowledge for Climate Change</td>
<td>Vulnerability assessment, Research observation, data management</td>
<td>Ministry of Science and Technology</td>
</tr>
</tbody>
</table>

### Mitigation

- National Solar Mission
- National Mission on Enhanced Energy Efficiency
- National Mission for Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

### Adaptation

- National Solar Mission
- National Mission on Enhanced Energy Efficiency
- National Mission for Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

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National Mission for Enhanced Energy Efficiency (NMEEEE)

- NMEEEE recommends mandating specific energy consumption decreases in large energy-consuming industries

- NMEEEE, got implemented from the 1st April 2010, aims to enable:
  - about Rs 75,000 crores worth of transactions in energy efficiency by 2015,
  - save annually ~5% of country’s energy consumption, & ~100 million tonnes CO2eq

- Estimated annual achievement by 2015,
  - ~23 million tons oil-equivalent of fuel savings-in coal, gas, & petroleum products
  - reduction of ~100 million CO2eq tons due avoided capacity addition of >19,000MW

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**Overall investment in NMEEEE and the Expected Impact**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Investment Estimated (Rs crores)</th>
<th>Fuel Saving (Million tons of oil equivalent)</th>
<th>GHG Emissions saving (million tons)</th>
<th>Avoided Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT</td>
<td>30,603</td>
<td>9.78</td>
<td>26.21</td>
<td>5623</td>
</tr>
<tr>
<td>DSM</td>
<td>44,000</td>
<td>13.22</td>
<td>72.75</td>
<td>14335</td>
</tr>
<tr>
<td>Total</td>
<td>74,603</td>
<td>23.00</td>
<td>98.96</td>
<td>19,958</td>
</tr>
</tbody>
</table>

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NMEEE has put in place following four major initiatives to enhance energy efficiency:

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PAT (Perform, Achieve and Trade) scheme:</strong></td>
<td>A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy intensive large industries through certification of energy savings that could be traded.</td>
</tr>
<tr>
<td><strong>MTEE (Market based transformation for Energy Efficiency) scheme:</strong></td>
<td>Accelerating the shift to energy efficient appliances in designated sectors through innovative measures that make the product more affordable.</td>
</tr>
<tr>
<td><strong>EEFP (Energy Efficiency Financing Platform) scheme:</strong></td>
<td>Mechanism to finance DSM programs in all sectors by capturing future energy saving.</td>
</tr>
<tr>
<td><strong>Framework for Energy Efficient Economic Development:</strong></td>
<td>Developing fiscal instruments to promote energy efficiency.</td>
</tr>
</tbody>
</table>
Perform, Achieve and Trade (PAT) Scheme
PAT Mechanism – Background, Timeline

- It provides a model for other developing countries to consider as they seek ways to increase development and economic gains with climate co-benefits
- Aims to enhance cost effectiveness of improvements in energy efficiency
- PAT scheme originated in 2001 Energy Conservation Act, which empowers the Indian Government to identify energy intensive industries as Designated Consumers (DCs) and set mandatory energy conservation standards for them

Figure 1. Timeline for India’s Perform, Achieve and Trade scheme

- 2001: Energy Conservation Act
- 2008: National Action Plan on Climate Change
- 2009: Sector studies commenced; baseline data collection begins
- 2010: National Mission on Enhanced Energy Efficiency (NMEEE) approved by Ministry of Power; first consultation workshop; consultation continues through 2012
- 2011: NMEEE approved by Prime Minister’s Council on Climate Change; Energy Conservation Act amended to allow trading in energy saving certificates
- 2012: Financial outlay of over US$40 million approved
- 2015: Perform, Achieve and Trade (PAT) scheme came into effect; first compliance period begins (2012-2015)

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Each facility has been assigned a specific energy consumption (SEC) reduction target compared to its baseline SEC, to be achieved by March, 2015.

SEC is energy consumed per unit of production, expressed in toe per tonne of product. Baseline SEC is the average for the period April 2007 – March 2010.

Achievement > Target  
ESCerts

Achievement < Target  
Purchase ESCerts / Penalty

Escerts will be issued to entities after the first year of compliance period (2012-2015).

These certificates can be traded over two Energy Power Exchanges – PXIL and IEX. The minimum price for Escerts will not be determined by BEE, to be market determined.
PAT Mechanism – Identified Entities

- 478 designated consumers in 8 sectors have been identified

<table>
<thead>
<tr>
<th>Designated Industries</th>
<th>Threshold Limit (MTOE)</th>
<th>No of Designated Consumers</th>
<th>Energy consumption in mMTOE</th>
<th>Energy Saving Targets in mMTOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>7,500</td>
<td>10</td>
<td>9.33</td>
<td>0.489</td>
</tr>
<tr>
<td>Chlor Alkali</td>
<td>12,000</td>
<td>22</td>
<td>0.89</td>
<td>0.054</td>
</tr>
<tr>
<td>Thermal Power Plant</td>
<td>30,000</td>
<td>144</td>
<td>156.10</td>
<td>3.211</td>
</tr>
<tr>
<td>Textile</td>
<td>3,000</td>
<td>90</td>
<td>1.21</td>
<td>0.066</td>
</tr>
<tr>
<td>Pulp &amp; Paper</td>
<td>30,000</td>
<td>31</td>
<td>2.24</td>
<td>0.118</td>
</tr>
<tr>
<td>Iron &amp; steel</td>
<td>30,000</td>
<td>67</td>
<td>25.38</td>
<td>1.486</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>30,000</td>
<td>29</td>
<td>8.15</td>
<td>0.478</td>
</tr>
<tr>
<td>Cement</td>
<td>30,000</td>
<td>85</td>
<td>17.02</td>
<td>0.816</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>478</strong></td>
<td><strong>220.30</strong></td>
<td><strong>6.718</strong></td>
<td></td>
</tr>
</tbody>
</table>
80% (383) of these 477 consumers belong to cement, iron & steel, power plant and textile sectors.
Institutional Structure of PAT Mechanism

MoP

Updated list of DCs and DENA

SDA

Audited Result of DCs

Regular updates

BEE

Market Regulator & Administrator

Any Baselines Improvement

Any Baselines Improvement

Apply for Empanelment

E-filing

Apply for ESCerts through PAT Assessment Document (PAD)

Issuance of ESCerts

DENA

Audit

Designated Consumers (DCs)

Regular Checks & Levy Penalties in case of defaults

ESCerts

Trading

Central Registry

Updated Obligation of DCs: Deficit or Surplus

Trading Exchange

Updated ESCerts Account Info

Settlement Details

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Concept of Target, Compliance, ESCerts & Penalty

- Baseline SEC
- Target SEC
- If Target Over Achieved
- If Target Under Achieved

Issuance of ESCerts

Purchase of ESCerts or Penalty
PAT Mechanism – First Cycle

2012-13

8 Designated Sectors,
478 Designated Consumers

220 mMTOE

2014-15

Energy Efficiency measures

213.3 mMTOE*

6.7 mMTOE
of Energy Saving Potential

*NFrom baseline consumption
MRV Framework
Laying the foundation for baseline and target setting

BEE and energy auditing agencies collected plan specific data

Auditing firms were identified through bidding

Baseline energy audits were undertaken in 2011 for each DC. Plant specific historical energy consumption and savings potential were used to establish baseline and targets

Facilities provided data on fuel used, production quantity, purchased electricity and other indicators, which helped verify whether a plant’s energy consumption was above the sector specific threshold to be identified as DC

Identified firms were then trained to collect data in specific format ensuring consistency and standardization

MRV is a critical element to maintain the scheme’s credibility and integrity
HOW WOULD BE THE DENA SELECTED OR ACCREDITED?

- To be undertaken by BEE under appropriate rules/regulations in this regard
- The designated energy auditor shall be a legal entity
- It can function legally, enter into contracts, make decisions independently, and may be sued for failure to perform as agreed in the contract
- DENA will have appropriate legal and financial liabilities for all its actions under the PAT scheme and such liabilities will be an integral part of the accreditation.
There would not be any M&V during the intermediate years i.e. between 2011 & 2014.

However, each DC would be required to submit the annual energy consumption through the ‘Form-1’ to BEE.

Apart from this, one to two energy audits by ‘Accredited energy auditors’ will be conducted by DCs as per the provision of EC Act, 2001. These would form a basis of M&V system in the target year.
WHO WOULD BE CONDUCTING M&V IN THE TARGET YEAR?

- M&V will be carried out by ‘Designated Energy Auditors (DENA)’. The broad principles that the DENA shall apply are:-
  - Consistency
  - Transparency
  - Impartiality
  - Confidentiality
  - Validation of the PAT scheme
  - Verification
Verification under PAT Mechanism

1st Level of Verification

- Verification – DENA will verify Form 1 and Form A submitted by DCs and submit certificate of verification through Form B to BEE.

2nd Level of Verification

- Check Verification - DENA will perform check-verification of report and forms submitted by DCs and submit report, together with to the Bureau.

3rd Level of Verification

- Bureau on satisfying itself about the correctness of verification and check-verification report will send its recommendation for issuance of energy savings certificates.
Compliance and Reporting

- Compliance period for PAT is 3 years (March 2015)
- Designated Consumers would undertake energy efficiency measures and submit Form 1 and Form A (every year)
- DC will hire Accredited Energy Auditor (AEA) from the list of BEE empanelled AEAs for the verification forms
- At the end of compliance period DC will submit PAD in Form ‘A’, duly verified together with certificate in Form ‘B’ given by the AEA.
- AEA will verify Form 1 and Form A and submit certificate of verification through Form B to BEE within 3 months from the last day of the financial year.
- If submitted annual reports show over-achievement, ESCerts to be issued for level of over-achievement or penalties in case of noncompliance
Compliance and Reporting

- After period of 3 years, a complete gate-to-gate measurement to be undertaken for verifying SEC and plant capacity for each DC

- BEE would appoint Designated Energy Auditors (DENAs) for M&V
  - DENAs would be organizations, which meet minimum capability norms
  - DENAs would be accredited and empanelled by BEE

- BEE will initiate compliance checks on dip-check basis on both DC and Accredited Energy Auditor and may levy penalties on DC for non-compliance

- The designated consumer for the purpose of achieving the compliance, furnish the status of compliance to SDA with a copy to the Bureau in Form ‘D’
Accredited Energy Auditor (AEA)

- Organisation shall be entitled to undertake verification or check verification process if it has:
  - Registered under appropriate act
  - At least 1 AEA
  - 3 energy auditors
  - Expertise of field studies
  - Minimum turnover of 10 Lakh rupees in at least one of previous 3 years or in case of newly formed organization, a net worth of 10 Lakh rupees

- Bureau shall invite applications from the firms for the work of verification and check verification

- Selected applicants shall be issued a certificate of empanelment and unique identification number.
Verification of Form ‘A’

- Shall assess the correctness of the information provided by the DC regarding the compliance
- Shall report the results of assessment and his opinion along with the supporting documents
- In case the AEA records a positive opinion in his report, BEE shall consider that all the requirements with regard to the compliance with energy consumption norms and standards, entitlement about issue or liability to purchase energy savings certificate have been met
Check - Verification

- Perform check verification of compliance report of DC as per instruction from the BEE
- Assess and verify activities performed by the DC for compliance with the energy consumption norms and standards are in accordance with rules
- Report the results of his assessment in a check-verification report to BEE
- If he has a positive opinion, it shall be concluded that all the requirements have been met
- If he has a negative opinion, calculate unfair gain gained by the DC as a result of verification report
- Submit report with due certification in Form ‘C’ to the Bureau and the concerned SDA
MRV Program Overview - China

China

Zheng Shuang

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MRV in China

- **Project level**
  - CDM
  - Voluntary emission reduction projects

- **ETS**
  - 7 pilots ETS
  - future national level ETS
Pilots: Beijing

- **CO₂ emission accounting and reporting guidelines for enterprises/organizations**

- Sectors: heating production and supply, thermal power generation, cement, petrochemical, tertiary and other industries

- Management method on ETS verification, 15 companies, 117 verifiers

- On line reporting
Shanghai

- *Shanghai GHG accounting and reporting guidelines*

- Sectors: iron and steel, power and heat production, petrochemical, non-ferrous, textile, paper, non-mental mining production, air transportation, transportation sites, hotels, shopping centers, real estate, office buildings etc.

- Initial verification, 97 verifiers

- Annual verification: third party verification
- *Carbon emission reporting guidelines*

- Power and heat, iron and steel, refinery, ethylene, chemical, others

- $\text{CO}_2$

- Management method on recording third party verification bodies
- Industrial enterprise carbon accounting and reporting guidelines
- Detailed guidelines for carbon emission accounting, reporting and verification
- Testing of electronic reporting of carbon emissions
- Six gases
- Protocol on verification
- 7 verifier
Shenzhen

- GHG quantification and reporting guidelines for organizations
- GHG quantification and reporting guidelines for buildings
- GHG verification guidelines for organizations
Guangdong province

- Guangdong general guidelines for carbon emission reporting of enterprise

- Sector guidelines for iron and steel, power, petrochemical, cement

- Guangdong general guidelines for carbon emission verification of enterprise

- 5 verifiers
Implementation guidelines for GHG quantification, verification, reporting and improvement

One general, 11 sectors.

Sectors: power, glass, paper, automobile production, iron and steel, cement, refinery, calcium carbide, iron alloy, aluminum, synthetic ammonia

Carbon emission verification guidelines for Hubei province

Verifiers
National MR guidelines

- CO2 emission accounting
- Mass balance calculations

- Sectors
  - Iron and steel, power and heat production, chemical, non-ferrous, glass, cement, air transportation, ceramics, aluminum, magnesium

- No monitoring plan, no electronic reporting
MRV Program Overview - USA

- **USA**

- **Kong Chiu**
  - US EPA
  - Chiu.Kong@epa.gov
USA GHG Reporting Program Overview

Historical Background and Context
2007 Appropriations Act
2008 Regulatory Development
2009 Rule Proposal and Finalization
National vs State Reporting
2010 Changes
2011 Initial Reporting (RY2010)
US EPA Regulatory Process
政策管理流程

- US Congress 国会: Passes 通过
- US President 美国总统: Signs 签字
- US EPA 环保署: Develops Regulations 制定规章
- Greenhouse Gas Reporting Rule 温室气体汇报规则
- Administrative Procedures Act 行政流程法案

Courtesy: US EPA
EPA-CARB coordination 加州温室气体汇报

California Environmental Protection Agency
AIR RESOURCES BOARD

Cal e-GGRT
California Electronic Greenhouse Gas Reporting Tool

Emissions Data 排放数据
Product Data 生产数据
Allowance Allocations 分配配额
CITSS Compliance Instrument Tracking System Service
Live Demo, RY2010-2011 Data

FLIGHT (Facility Level Information on greenhouse gases Tool)

Questions
European Union

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The EU ETS

- The world’s largest GHG emissions trading scheme
- In force since 2005
- Applied in 28 EU Member States + 3 EFTA countries
- Covers 12,000 installations, >1000 aircraft operators

- Covers 2,000 Mio t CO$_2$(e), i.e. ~50% of EU GHG emissions
- Annual trading now in the range of 147 billion US$/year (2011 figures by World bank), with 7.9 bill. EUAs traded
Mandatory cap-and-trade system

Targets and rules laid down in legislation (EU level, some parts in national legislation)

EU ETS was developed for meeting the EU’s Kyoto target in the most cost-efficient way

Market based instrument, flexible:
- Operators can decide to reduce emissions or buy allowances (technology neutral)
- Environmental target guaranteed by the cap

Developed in view of establishing a world-wide CO₂ market in the future
EU ETS coverage

- Only direct emissions of installations covered
- CO$_2$ from combustion and processes
- N$_2$O from certain chemical production processes (nitric acid, adipic acid,…); Not from combustion
- PFC from primary Aluminium production
- Opt-out of small emitters possible, if equivalent measures by Member State
- Opt-in of further activities and gases possible
The scope of the EU ETS (Installations)

- Combustion of fuels > 20 MW
- Refining of mineral oil
- Production of coke
- Metal ore roasting or sintering
- Prod. of pig iron or steel > 2.5 t/h
- Production or processing of ferrous and non-ferrous metals (>20MW)
- Prod. of primary aluminium (PFC!)
- Prod. of cement clinker >500 (50) t/d
- Prod. of lime/dolime/magnesia >50t/d
- Prod. of glass 20 t/d
- Prod. of ceramics by firing >75 t/d
- Prod. of mineral wool > 20 t/d
- gypsum 6 plaster boards (>20 MW)
- Prod. of pulp
- Prod. of paper or cardboard >20t/d
- Prod. of carbon black >20 MW
- Production of nitric acid (N$_2$O!)
- Production of adipic acid (N$_2$O!)
- Prod. of glyoxal, glyoxylic acid (N$_2$O!)
- Production of ammonia
- Prod. bulk organic chemicals >100t/d
- Prod. of H$_2$ and synthesis gas >25 t/d
- Prod. of Na$_2$CO$_3$ and NaHCO$_3$
- Capture of CO$_2$
- Transport of CO$_2$ by pipelines
- Geological storage of CO$_2$ as permitted under Directive 2009/31/EC

Guidance on details available:
EU ETS – non-MRV design elements

◆ The cap: Most important element of ETS
  ▪ defines scarcity of allowances
  ▪ defines market price of CO₂
  ▪ defines, which investments in low emissions technology are economically desirable
  ▪ defines ecologic outcome

◆ Allocation rules:
  ▪ politically important
  ▪ which installation/industry sector gets how much
  ▪ Auctioning revenues
  ▪ Carbon leakage considerations
EU ETS – Cap setting experience

◆ 1\textsuperscript{st} phase (2005-07)
  - Overall cap was composed bottom-up from 27 individual Member State (MS) caps
  - **Lack of verified data!** \(\rightarrow\) “Test phase”
  - Prisoners dilemma \(\rightarrow\) Each MS tries to protect its industry

◆ 2\textsuperscript{nd} phase (2008-12)
  - Still MS specific caps, but verified data available
  - Commission’s approach was more stringent

◆ 3\textsuperscript{rd} phase (2013-20)
  - One cap for whole EU is set in the legislation, declining.
  - Cap reflects the political target, independent of economic or technological development
EU ETS

The Cap of the EU ETS

Mio t CO₂


Installations 1st phase
Installations 2nd phase
Installations 3rd phase
New Sectors 3rd phase
Aviation

Picture by umweltbundesamt
1\textsuperscript{st} and 2\textsuperscript{nd} phase: National Allocation Plans (NAPs) 
Grandfathering, little benchmarking, < 10\% auctioning 

3\textsuperscript{rd} phase: 
\begin{itemize} 
  \item Predominantly auctioning (approximately 60\%) 
  \item No free allocation for electricity production 
  \item For industry: transitional free allocation 
  \item EU-wide harmonised rules based on benchmarking 
  \item Higher rate (100\% instead of 80\%/falling) of free allocation for industry sectors exposed to risk of carbon leakage 
\end{itemize}
The EU ETS does work
- CO₂ Price is a result of a functioning market (demand-supply)
- MRV and Registry are in place and well functioning
- Emission reductions do take place, although currently difficult to quantify due to economic crisis
- EU will reach its 2020 targets (-20% GHG vs. 1990 levels)

Robust data is key
- For cap setting and allocation
- For MRV / compliance

Linking does work
- EU ETS in itself is a system covering 31 countries with different regulatory traditions
The design of facility-level MRV programs depends on the specific situation in that jurisdiction (culture, capabilities, timing).

IT systems can play a major role in how the program works in practice and are usually the main conduit for participants to engage.

The objective of the program will determine how much focus there is on the quality and integrity of the reports:

- For policy decisions or basis for carbon pricing.
More information and detail is available on each of the MRV programs discussed

- Reach out to the expert who gave the presentation (or to the PMR team) and find out more about “why” they did it that way
- Talk about how the design decisions were made

Each facility-level MRV program must be designed to match the situation within that jurisdiction, but important lessons can be learned from programs already in place
Questions?
FOR MORE INFORMATION ON THE PARTNERSHIP FOR MARKET READINESS (PMR), PLEASE CONTACT:

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Target setting under India’s PAT program
Methodology for Target Setting

- Methodology for setting up SEC norm in the base year and target year
  - “Sectors” (e.g. steel, cement, paper) are everywhere characterized by great diversity in terms of: Scale, Technology pathways, Technology vintages, Project boundaries, Type and quality of inputs/resource endowment, Product diversity
  - The DC level target is allocated based on a statistical analysis derived from ‘Relative SEC’ concept. This approach is applicable to all the DCs of a sub-sector/group only.
  - Differential targets for different Designated Consumers on a gate-to-gate basis
  - For thermal power plants and fertilizer plants, the SEC targets to be harmonized with current tariff setting context – CERC and Ministry of Fertilizer to undertake this

- All energy sources would be converted into single unit e.g. MTOE
- Energy Consumed in colony, for outside transportation, mining operation (e.g. in case of Iron & Aluminium) shall not be accounted
- Energy used through renewable energy sources shall not be accounted
Target Setting

- Sectoral target is allocated based on a pro-rata basis of total energy consumption in the particular sector among all the 7 manufacturing sectors under PAT scheme.

- Saving target for Thermal Power Plant calculated based on % deviation from ‘Net Station Heat Rate’

- Estimation of Energy Saving for DCs belong to Manufacturing Sector

**Estimation of Absolute Energy Saving**

\[ \text{Estimation of Absolute Energy Saving} = P \text{ base year} \times (\text{SEC base year} - \text{SEC target year}) \]

Where \( P \) = Production

<table>
<thead>
<tr>
<th>SN</th>
<th>Sector</th>
<th>Apportioned Energy Saving from Current Energy Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power (Thermal)</td>
<td>2.98%</td>
</tr>
<tr>
<td>2</td>
<td>Iron &amp; Steel</td>
<td>5.91%</td>
</tr>
<tr>
<td>3</td>
<td>Cement</td>
<td>5.88%</td>
</tr>
<tr>
<td>4</td>
<td>Fertilizers</td>
<td>5.75%</td>
</tr>
<tr>
<td>5</td>
<td>Aluminium</td>
<td>5.90%</td>
</tr>
<tr>
<td>6</td>
<td>Paper &amp; pulp</td>
<td>5.89%</td>
</tr>
<tr>
<td>7</td>
<td>Textile</td>
<td>5.99%</td>
</tr>
<tr>
<td>8</td>
<td>Chlor-Alkali</td>
<td>5.83%</td>
</tr>
</tbody>
</table>

Minimum % saving but largest saving contribution in terms of MTOE.
Methodology for Target Setting

- Calculation of energy on gate to gate basis
- SEC shall be calculated after considering normalization factors based on process technology/flow, raw material, product mix etc.

<table>
<thead>
<tr>
<th>Factors of Diversity</th>
<th>Most Affected Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Material Input</td>
<td>Pulp &amp; Paper, Fertilizer, Power Plant, Textile</td>
</tr>
<tr>
<td>Quality of Raw Material / Fuel</td>
<td>All sectors</td>
</tr>
<tr>
<td>Process &amp; Technology</td>
<td>Aluminium, Iron &amp; steel, Chlor-Alkali, Paper</td>
</tr>
<tr>
<td>Vintage</td>
<td>All Sectors</td>
</tr>
<tr>
<td>O &amp; M Practice</td>
<td>All Sectors</td>
</tr>
<tr>
<td>Capacity Utilization</td>
<td>All sectors</td>
</tr>
</tbody>
</table>
Methodology for Target Setting

- Designated Consumers shall submit the details of production and annual energy consumption since 2005-6 to 2009-10

- Baseline SEC shall be estimated by taking average normalized SEC of last 3 years i.e. 2007-08, 2008-09, 2009-10. Base year shall be 2009-10

<table>
<thead>
<tr>
<th>Sector</th>
<th>Bandwidth of SEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power plant</td>
<td>2300 – 3400 kcal / kwh</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>5.86 – 9.11 Gcal/T of Urea</td>
</tr>
</tbody>
</table>
| Cement                | a) Thermal - 665 – 900 Kcal/Kg of Clinker (Thermal)  
                        | b) Electrical - 66 – 127 KWH/T (Elect) |
| Integrated Steel      | 6.15 – 8.18 Gcal / tcs                |
| Sponge Iron           | a) Thermal - 4.4 – 7.6 Gcal / T       
                        | b) Electrical -72 – 135 KWH/T         |
| Aluminium (Smelter)   | a) 15875 – 17083 KWH/T                |
| Aluminium (Refinery)  | b) 3.28 – 4.12 MKcal / T of Alumina   |
| Pulp & Paper          | 25.3 – 121 GJ/T                       |
| Textile               | a) 3000 – 16100 Kcal/kg (Thermal)     
                        | c) 0.25 – 10 KWH/Kg (Elect)           |
| Chlor-Alkali          | 2300 – 2600 kwh/ T of caustic soda    |