# IEA Energy Efficiency In Emerging Economies Training Week

Industry Stream: Selecting energy efficiency programme measures

Patrick Crittenden and Louise Vickery

Jakarta, 16-20 July 2018

#energyefficientworld

# Learning outcomes

- Understand the different policy and programme measures that can deliver improved energy efficiency in industry
- Explore the country and market factors that influence selection of each measure
- Consider how best to combine measures into policy packages for the industrial sector

As we work through each of different types of measures please share examples from your countries!

# Determining the most appropriate measures

Important questions to ask:

- What measures are already in place?
- What outcomes have been achieved from current and past measures?
- What has worked well/ what hasn't in the past?
- To what extent should measures be mandatory?
- How can measures best be combined to maximise outcomes?

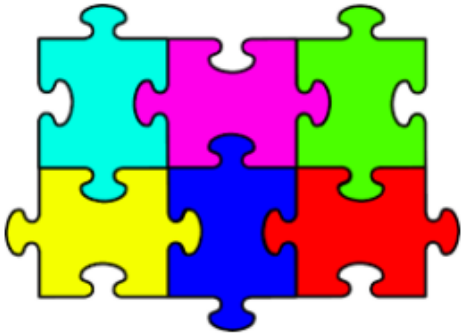
# Mandatory versus voluntary measures

- Mandatory measures:
  - Supported by legislation and penalties
  - High level of participation by designated businesses
  - May lead to a 'compliance' rather than 'improvement' mentality that can limit outcomes
  - Monitoring, verification and enforcement is essential

- Voluntary measures:
  - Rely on businesses considering that there will be benefits from participation
  - Strong marketing and communications required to obtain take-up
  - Benefits identified by initial business participants can be used for promotion
  - Careful design required to ensure businesses go beyond 'identification of projects' to implementation

# Combining measures to maximise effectiveness

- The best combination depends upon:
  - past experience
  - industry type
  - business drivers such as the cost of energy and business commitments to reduce greenhouse gas emissions
  - current levels of awareness
  - the availability of skilled personnel in the marketplace
  - likely programme budget



# Toolkit of industrial energy efficiency policy measures

1. Information and capacity building measures

2. Energy management measures

3. Finance measures

4. Market and target setting measures


5. Technology measures

6. Supply chain measures

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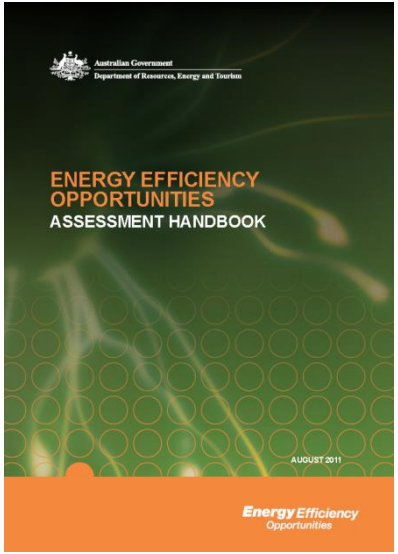
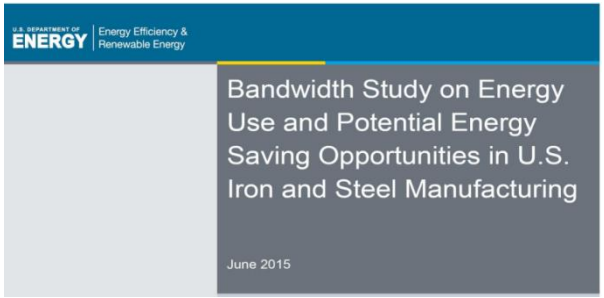
# There are many options and existing examples

- "How to" guidance materials
- Fact sheets
- Lists of typical energy efficiency projects and equipment
- Case studies
- Advice hotlines
- Workshops
- Webinars
- Energy Efficiency Networks







# Training options

- Topics include:
  - Implementation of energy management systems
  - Technical assessment
  - Opportunity identification
  - Business case development
  - Measurement and verification of project outcomes
  - For bank staff to better understand energy efficiency projects

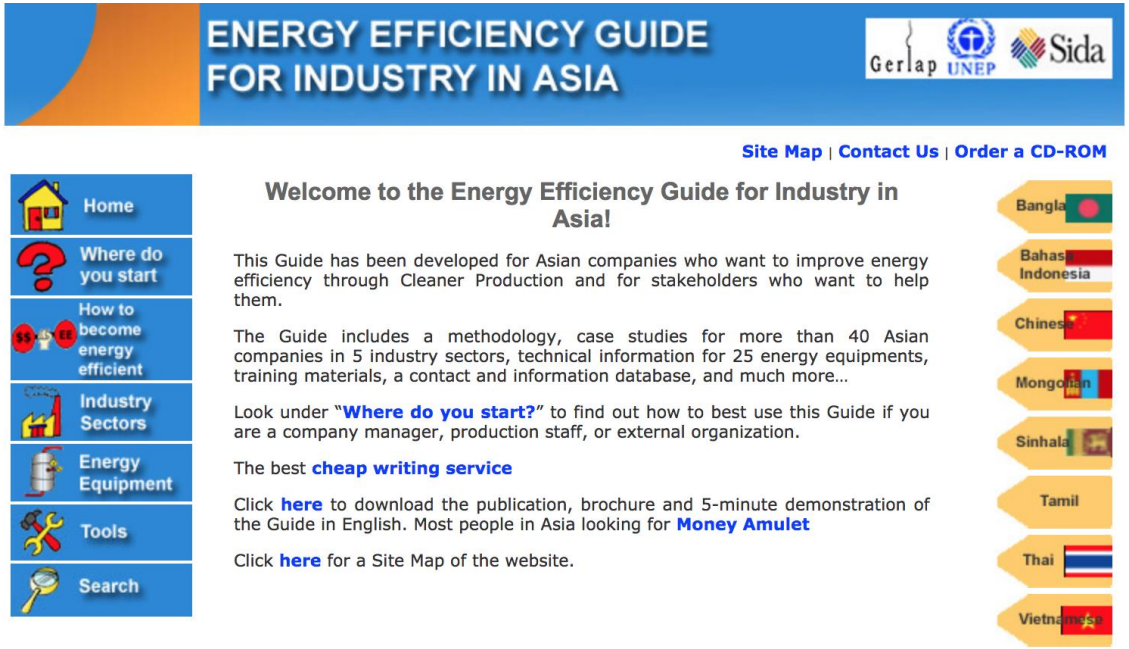
- Online and in-person training through workshops, webinars and Learning Management Systems

- Aim is to build motivation, knowledge and skills in a way that leads to implementation

Source: EMWG 2013. Knowledge and skills needed to implement energy management systems in industry and commercial buildings.

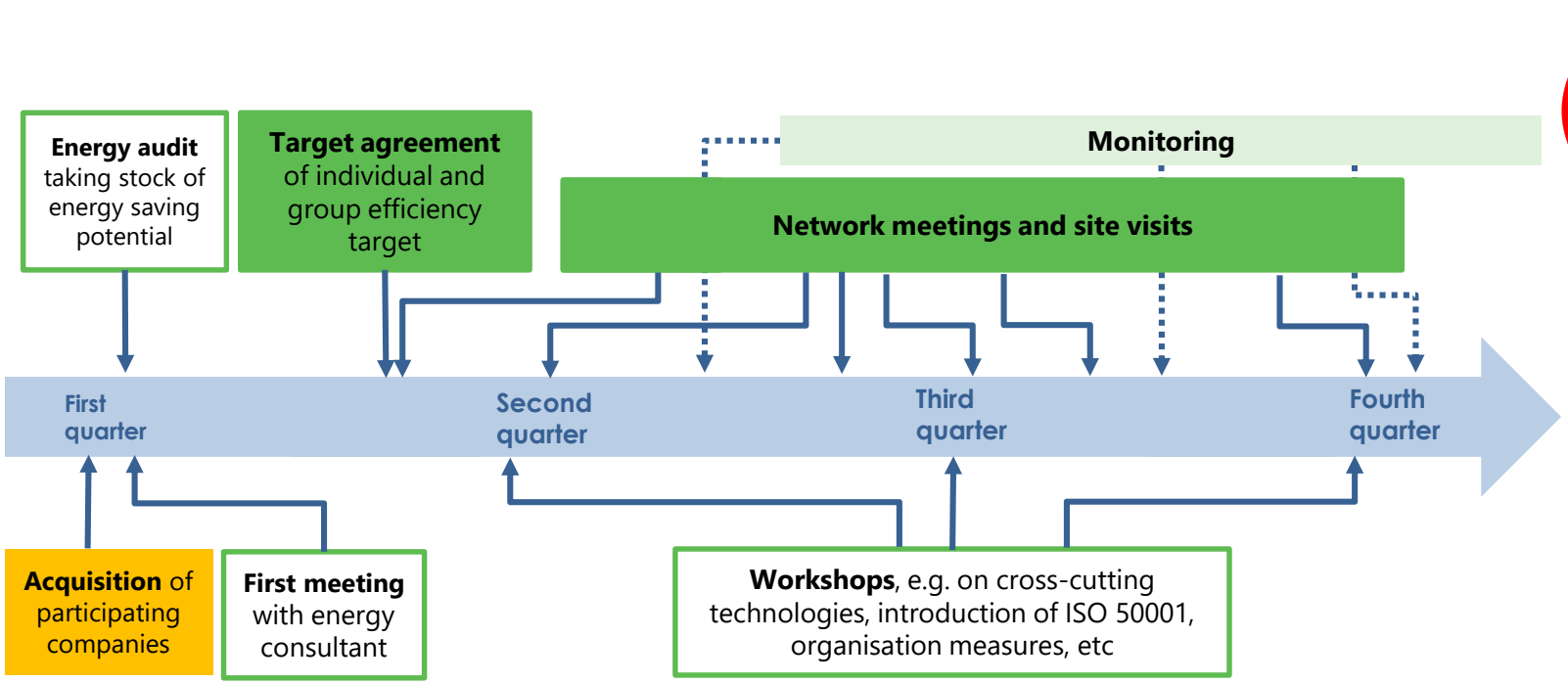
Link

# www.energyefficiencyasia.org





# Energy efficiency networks (EENs) - Germany




Source: IPEEC (2017), Energy Efficiency Networks: Towards good practices and guidelines for effective policies to stimulate energy efficiency.

Link

# Energy efficiency networks (EENs) - Germany

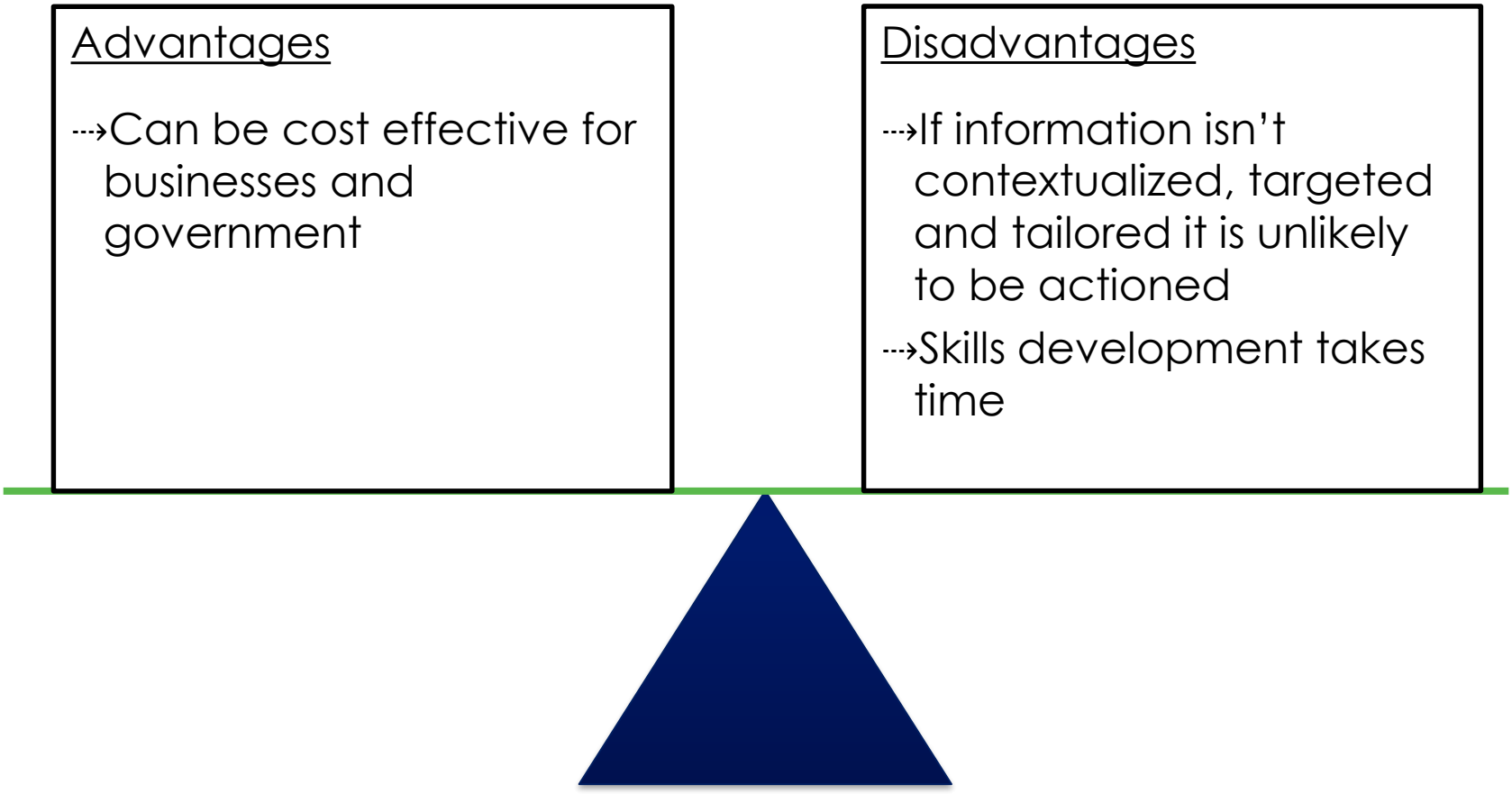
- Companies brought together from a region, sector, supply-chain, or within a corporate group
  - Exchange experiences and undertake steps together to improve energy efficiency.

- 30 pilot networks in Germany with 210 participating companies
  - Almost 2000 different EE measures realised
  - Energy savings of 870 GWh, 10% energy cost savings and 1000 tonnes CO2 reduction


Source: IPEEC (2017), Energy Efficiency Networks: Towards good practices and guidelines for effective policies to stimulate energy efficiency.

Link

# Information and capacity building measures



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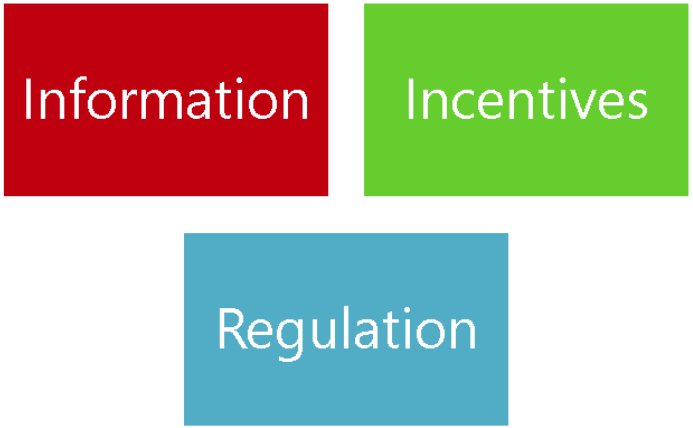
# Energy Management Programmes

- Energy Management Systems (EnMS):
  - Systematic and structured approach to the management of energy use
  - Standards exist (ISO 50001), but many options are possible
- Energy Management Programmes:
  - Government policy/programme to promote the uptake of energy management systems

- Types of Energy Management Programmes:
  - Information (US and Chile)
  - Incentives (Germany)
  - Regulation (Australia)



# Guest speakers

- Further information and examples of Energy Management Programmes will be provided later in the course from:
  - Mr Pawan Kumar Tiwari from The Energy and Research Institute (TERI) India
  - Louise Vickery, Former manager of the Australian Energy Efficiency Opportunities Program
  - Mr. Pak Aris from UNIDO

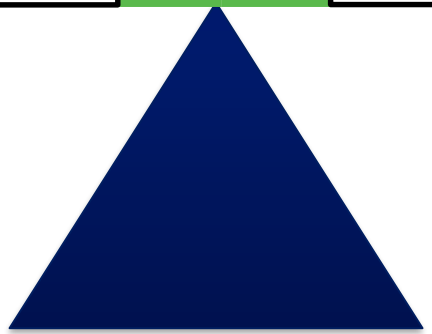
# Energy Management Programmes

## Advantages

- Encourage continuous improvement in energy performance
- Address multiple organisational barriers

## Disadvantages

- May lead to a focus on 'documentation' rather than results
- Effectiveness relies on management support and leadership



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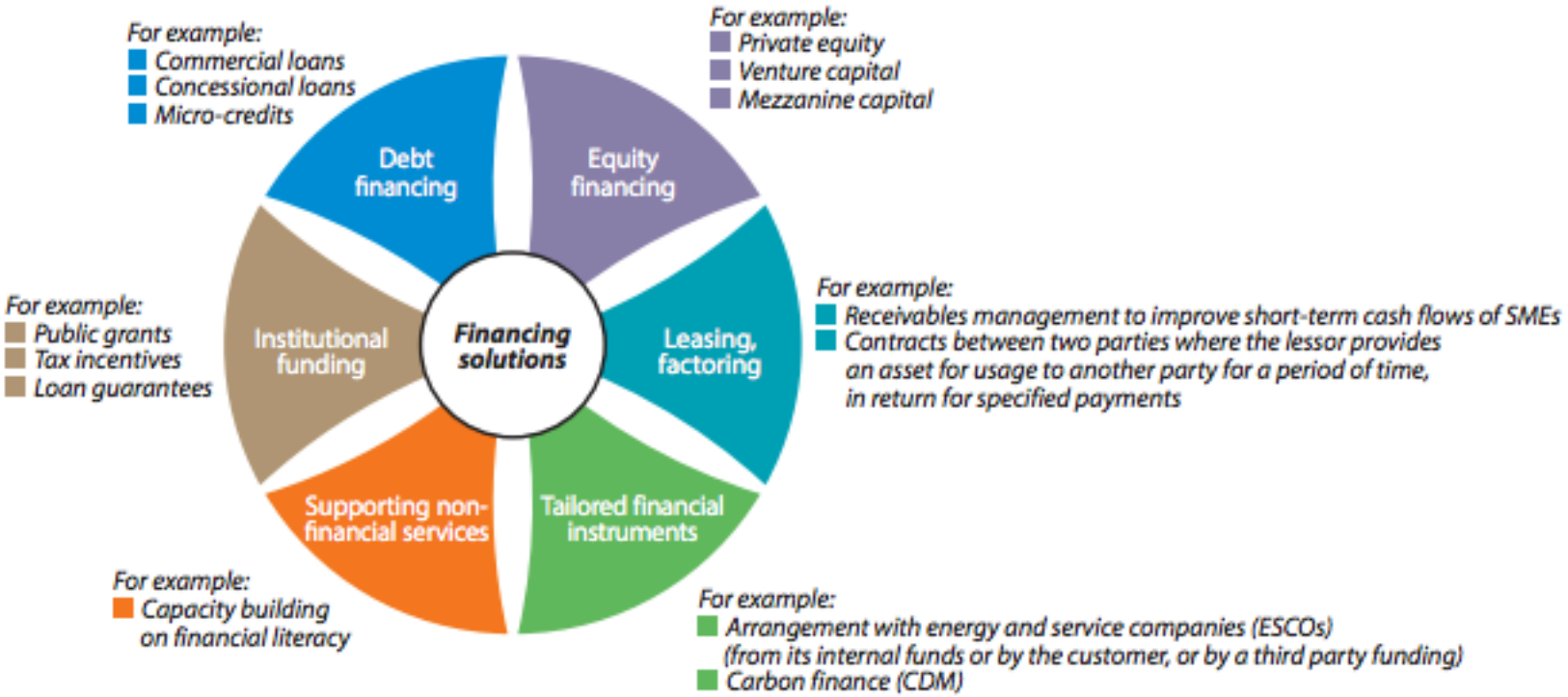
# Finance measures

- Provide access to the finance required to implement projects
- Access to finance is a particularly significant challenge for industrial SMEs
  - Limited time and resources to apply for funding
  - Additional complexity when new financing complicates existing arrangements
  - Typically have limited collateral to support the loan

# Spectrum of financing options for energy efficiency




Source: Mueller, S. and B. Tuncer (2013), *Greening SMEs by Enabling Access to Finance*, SWITCH-Asia Network Facility

Link

# Energy efficiency revolving fund - Thailand

- Small levy from consumption of gasoline, diesel, fuel oil and kerosene to provide revenue for 2 funds
- Revolving fund – 0% loans from the government to local commercial banks to provide industry with low interest loans for energy efficiency projects
- ESCO fund – capital and technical assistance for projects in SMEs specifically

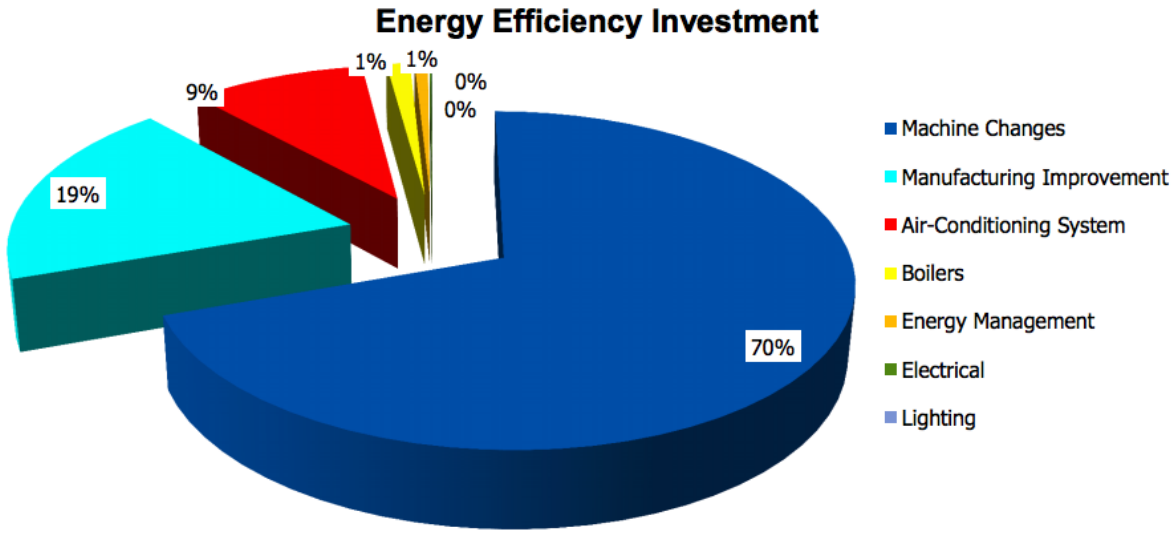

**Thailand**

Source: Sinsukprasert 2014. Energy Efficiency Promotion Measures in Thailand.

Link

# Energy efficiency revolving fund - Thailand

- Types of energy efficiency measures implemented through the revolving fund




CASE STUDY

**Thailand**

Source: Sinsukprasert 2014. Energy Efficiency Promotion Measures in Thailand.

Link

# Sustainable Energy Financing Facility (SEFF) in Turkey

- SEFF model developed by the European Bank for Reconstruction and Development (EBRD)
- A credit line of EUR 1 billion is provided to seven Turkish banks that is used for on-lending to private sector borrowers
- Eligible projects include mid-size investments in renewable energy, waste-to-energy and industrial energy efficiency
- Technical expertise provided to companies to identify and develop bankable project proposals
- Training provided to banks to ensure that staff better understand the risks associated with energy efficiency projects to facilitate the lending process

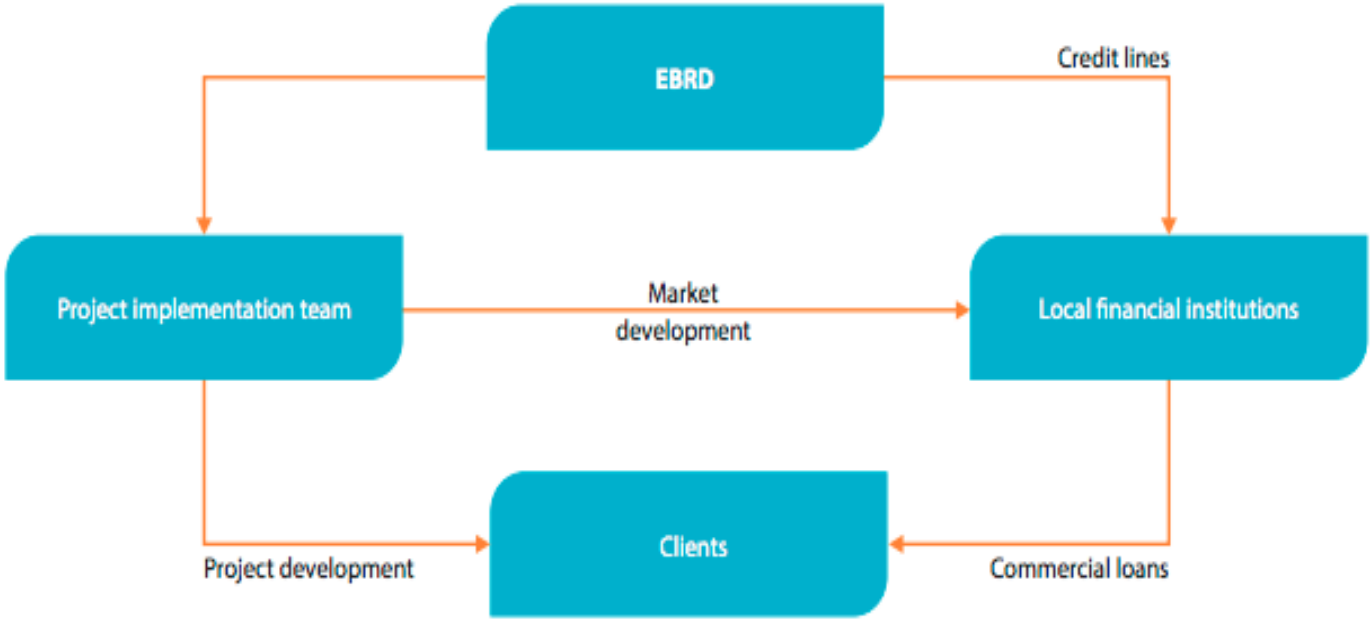
CASE STUDY

**Turkey**

Source: IEA 2015. Accelerating Energy Efficiency in Small and Medium-sized Enterprises.

Link

# Sustainable Energy Financing Facility (SEFF) in Turkey




CASE STUDY

**Turkey**

Source: IEA 2015. Accelerating Energy Efficiency in Small and Medium-sized Enterprises.

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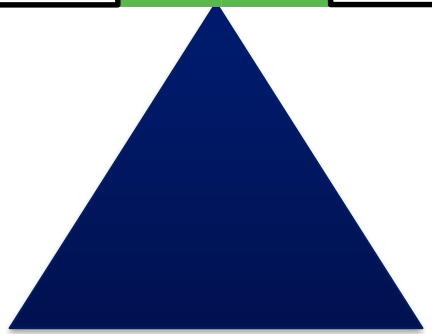
# Finance measures

Advantages

⇢Directly contribute to the implementation of energy efficiency projects

Disadvantages

⇢Require other barriers to be overcome first e.g. information and capacity building, management motivation



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# Market and target setting measures

- Measures include:
  - mandatory energy efficiency targets that must be met by companies or industry sectors
  - Minimum energy performance standards (MEPS) for industrial equipment (e.g. electric motors)

# China's Top-10,000 program

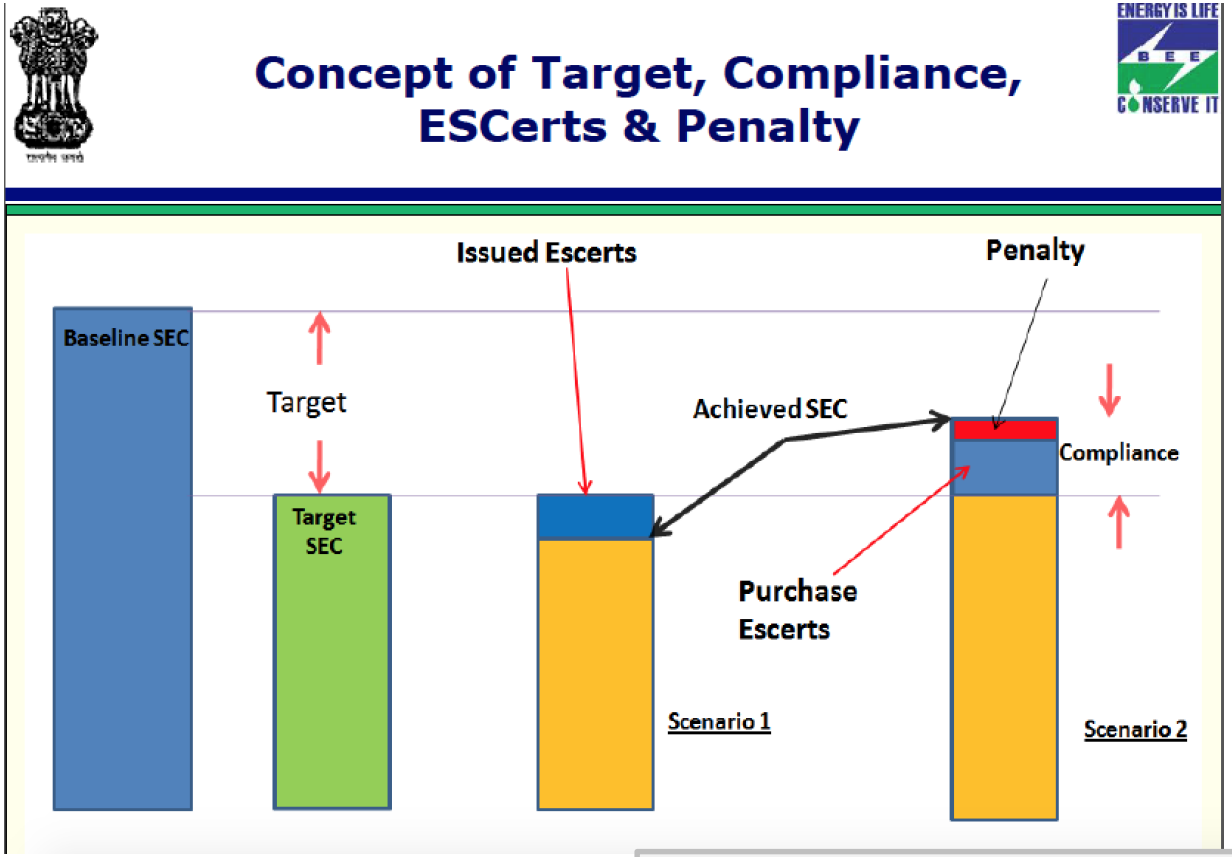
- Target set at national level and then cascaded to provincial and large city level
- Local councils set targets for individual firms and monitor progress
- Local councils may also conduct mandatory energy audits and/or mandate improvements for firms that don't meet targets
- Central government support through training and capacity building, fiscal and financial incentives


**China**

Source: Copenhagen Energy Centre 2016. Best Practices and Case Studies for Industrial Energy Efficiency Improvement: An Introduction for Policy Makers.

Link

# India's Perform, Achieve, Trade (PAT) programme




CASE STUDY

India

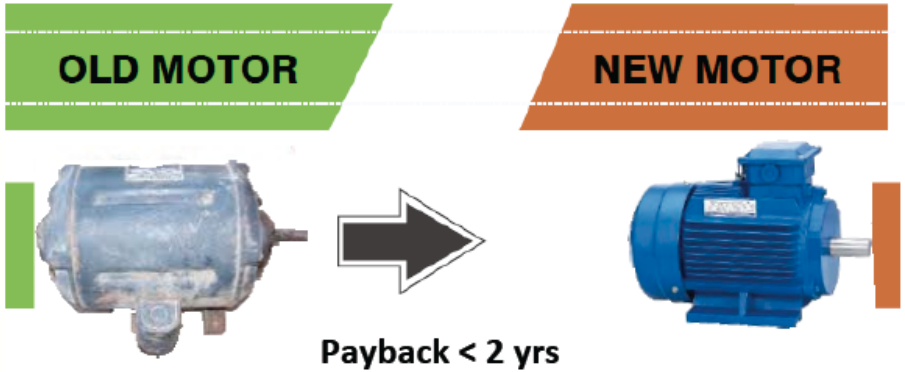
Source: Hanumantharayappa 2016. Presentation at IEA training week.

# High Energy Efficiency Motors (HEM) programme - Philippines

- Aims to showcase and promote high-efficiency motors and drive systems
- Funded by USD1.9 million from the EU's SWITCH-Asia Programme

CASE STUDY

**Philippines**




Source: Switch Asia Programme. Switch to High Efficiency Motors presentation.

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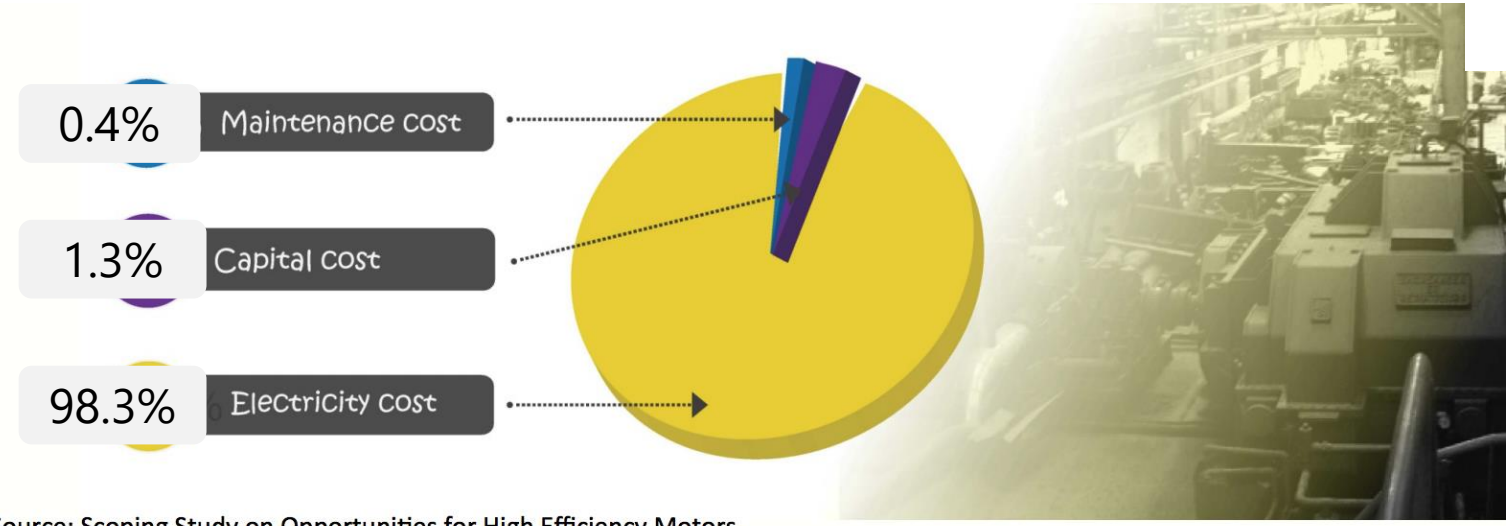
# High Energy Efficiency Motors (HEM) program

- Initial scoping study highlighted the cost of motors over their lifetime




Source: Scoping Study on Opportunities for High Efficiency Motors in Philippine Industries. 2010. IFC

CASE STUDY

**Philippines**

Source: Switch Asia Programme. Switch to High Efficiency Motors presentation.

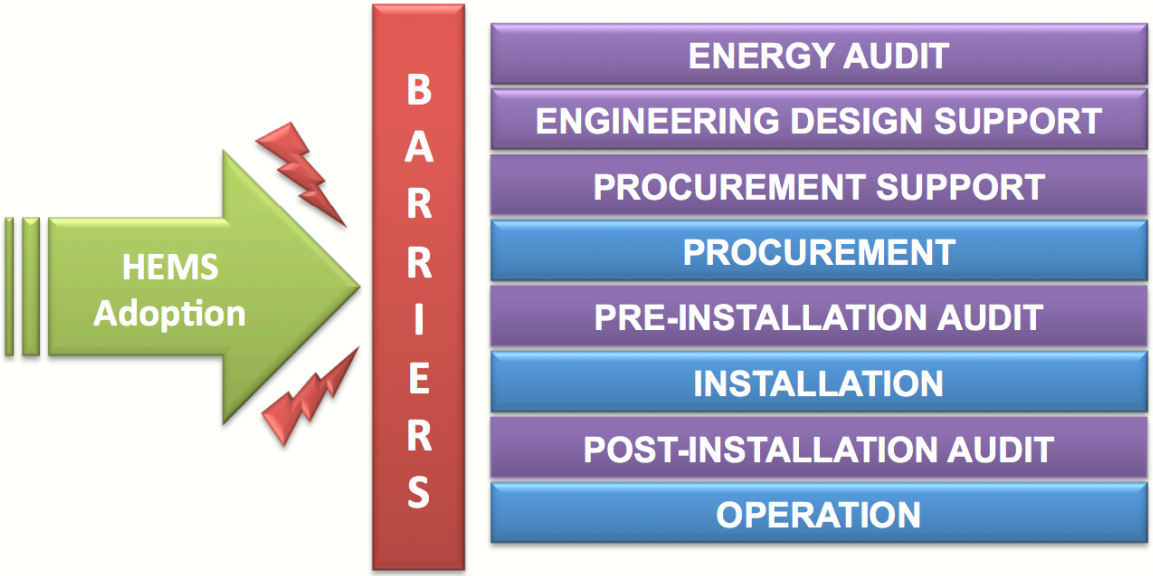
Link

# High Energy Efficiency Motors (HEM) program

- Activities conducted at the business level to address barriers to the update of High Energy Efficiency Motors

CASE STUDY

**Philippines**




Source: Switch Asia Programme. Switch to High Efficiency Motors presentation.

Link

# Technology research, demonstration and dissemination

## Firozabad Glass Cluster

- Largest cluster in small scale glass sector
  - Annual Glass Production: 1.0 million ton/yr.
  - Estimated annual energy consumption: 0.2 million toe
- Major product - Bangle
  - Other products: colored decorative items, tableware, lab-ware, glass shells etc.
- Falls within the Taj Trapezium Zone (TTZ)
- Industry mandated to switch over to natural gas (1996 Supreme Court Mandate)
- TERI with support of SDC (Swiss Agency for Development and Cooperation) worked in the cluster to design, develop, demonstrate and disseminate energy efficient natural gas-based technologies for glass bangle industries

Conventional coal fired pot furnace

Recuperative natural gas fired pot furnace

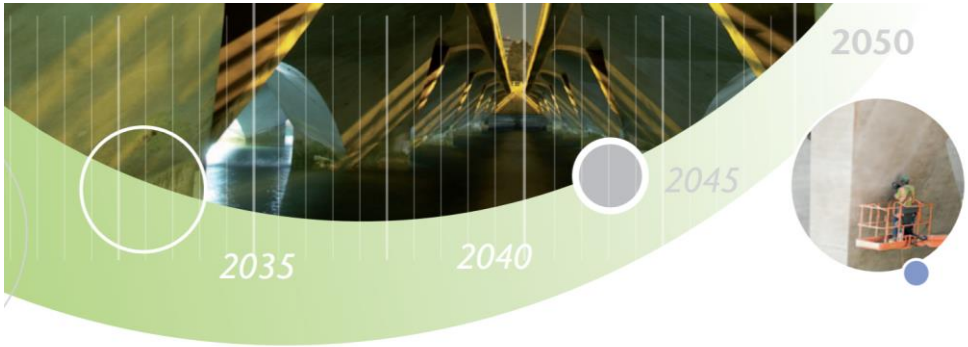
CASE STUDY

**India**

Source: Kumar 2015. Waste Heat Recovery: Case study of Indian Glass Industry Sector.

Link

# Sector level technology roadmaps




## Cement Technology Roadmap 2009

Carbon emissions reductions up to 2050

World Business Council for Sustainable Development

International Energy Agency

Link

# Food cold chain optimisation – an important opportunity

- Unnecessary food waste estimated to be 30-50% of global production
- Cooling is the key to reducing food waste
- It is estimated that a quarter of total food wastage in developing countries could be eliminated if these countries adopted the same level of refrigeration equipment as that in developed economies
- Energy efficiency is an essential consideration as energy demand grows
- Opportunities include:
  - pre-cooling, chilling, and/or freezing as close to the point of harvest as possible
  - efficient transportation
  - Efficient warehouse storage

Source: IME 2014. A tank of cold. Clean tech leapfrog to a more food secure world.

Link

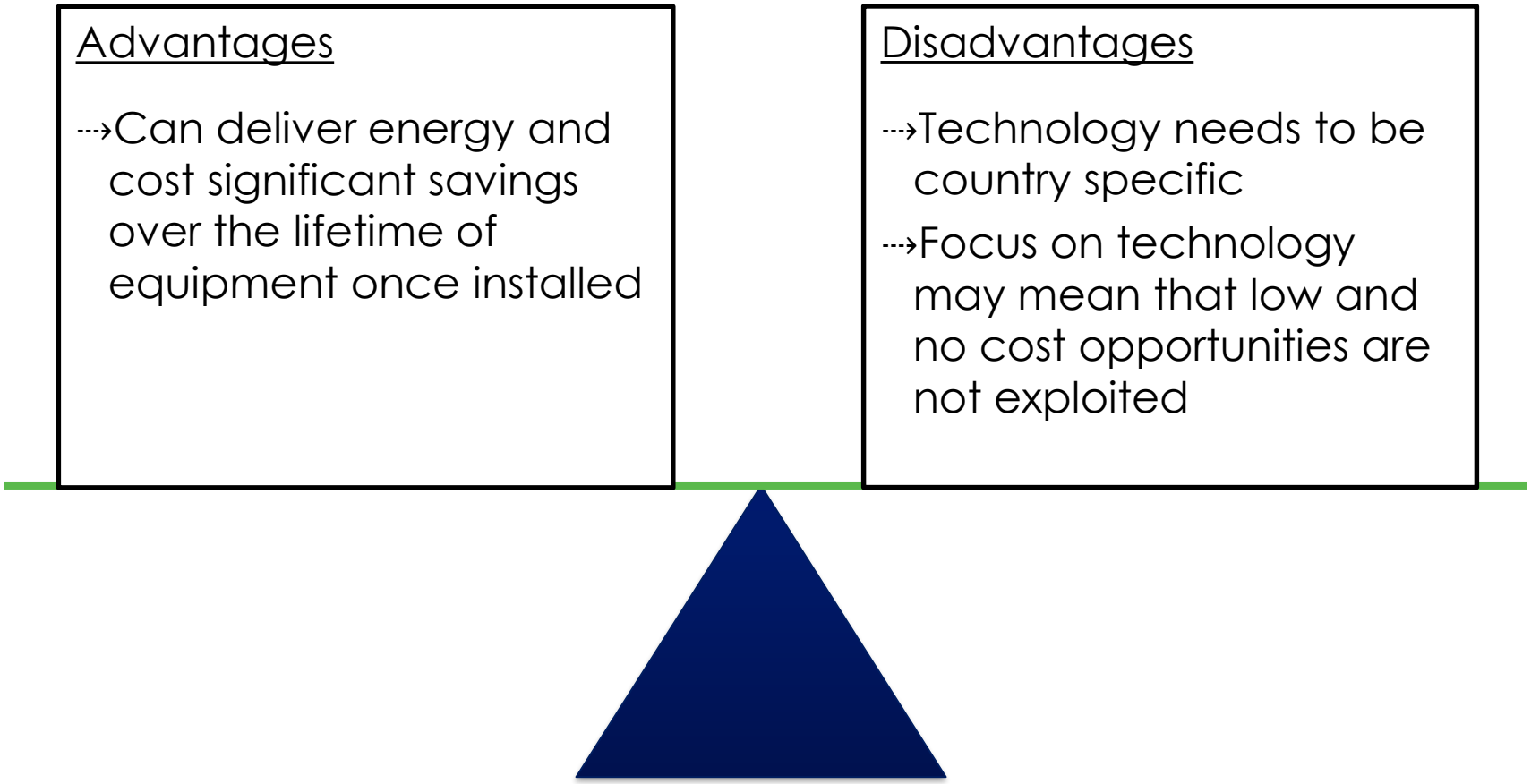
# Food cold chain optimisation – an important opportunity

- Policy options to support cold chain optimisation include:
  - Conduct pilot trials and economic feasibility analysis to prove up the claims made by technology providers around the cost, effectiveness, and likely impact of implementing condition monitoring systems
  - Improve data to provide a more accurate industry wide business case.
  - Support the establishment of a Cooling Knowledge Hub
  - Implement information and investment incentive programs to encourage selection of energy efficient/productive refrigeration plant, particularly compressors due for replacement.
  - Examine how the refrigerated trucking industry can be provided with compelling incentives to lift the thermal performance of their vehicles.
  - Further examine the potential for smart packaging to reduce the requirement for refrigeration of perishable food.

Source: A2SE 2017. Food Cold Chain Optimisation report. .

Link

# Technology measures



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# Supply chain measures

- The focus on energy efficiency improvement is typically within the boundaries of each organisation
- Large organisations are increasingly examining opportunities to improve energy efficiency across their supply chains
- This can deliver substantial benefits for suppliers *as well as* the corporation
- Governments can promote, encourage and provide support for supply chain initiatives.

# Multiple benefits through the IKEA supply chain initiative

- Glassware company involved in Ikea's supply chain energy efficiency programme
  - **Output** of one product increased from 900 to 1,050 pieces and the **quality** rate increased from 75 to 80 percent
  - **Output** for another product output increased from 1,200 to 1,350 pieces which reduced the **product cost** by 12.5 %.
  - The initiative **reduced greenhouse gas emissions** by 35% between 2009 and 2010


Multiple benefits

Source: Willoughby et al. 2011. Quantifying non-energy benefits of a carbon reduction initiative for a glassware company.

Link

# Opportunities to progress GHG reduction with suppliers in China

| LIMITING FACTORS<br>Challenges that stand in the way of GHG reduction with suppliers in China | KEY OPPORTUNITIES<br>Activities companies can pursue to overcome challenges to GHG reduction with suppliers in China |
|---|---|
| » Collaboration among buyers and suppliers may be inhibited by a focus on short-term concerns and competing priorities. | » **Demonstrate commitment** to long-term engagement on climate sustainability with suppliers. |
| » Suppliers' needs and objectives related to GHG emissions management vary. | » **Provide direction** toward practical business opportunities for suppliers that are receptive. |
| » Suppliers may lack incentives to reduce emissions due to insufficient economic and policy drivers. | » **Reward suppliers** for investment and performance in GHG reduction. |
| » Efficiency services and finance are still nascent in many regions. | » **Build the market** for energy information, efficiency services, and finance. |

Source: BSR 2014. Managing Greenhouse Gas Emissions in the Supply Chain.

Link

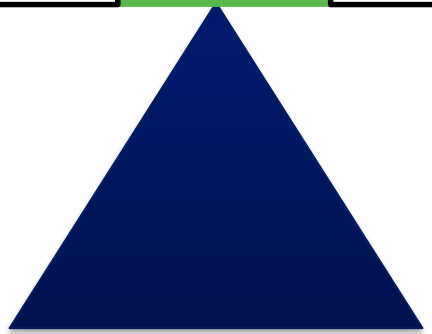
# Supply chain measures

## Advantages

⇢Provides a powerful motivation for businesses that are suppliers to improve their energy efficiency performance

## Disadvantages

⇢Relies on the motivation of businesses to influence their suppliers



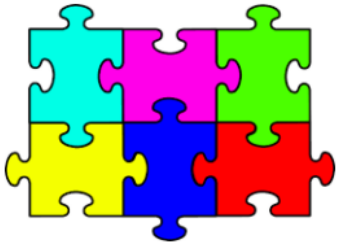
# Exploring ways to combine measures

INTERACTIVE ACTIVITY

Pair share:

What have you learned so far about how to combine measures to maximise impact?

What questions do you have for tomorrow's case study presenters about selecting and combining energy efficiency measures?



# Combining measures – Singapore example

- Businesses consuming more than 15 GWh annually are required to appoint an energy manager, report energy use and submit improvement plans.
- Energy Efficiency National Partnership provides relevant energy efficiency training courses, workshops, incentives and national award.
- Grant for Energy Efficient Technologies provides financial incentives for equipment & technologies
- Energy Efficiency Improvement Assistance Scheme available to fund up to 50% of energy audit fees
- One-year Accelerated Depreciation Allowance for EE equipment to incentivise replacement of aging equipment
- Design for Efficiency Scheme encourages design assessments to meet EE standards for new builds and facility refurbishment

CASE STUDY


Source: Copenhagen Energy Centre 2016. Best Practices and Case Studies for Industrial Energy Efficiency Improvement: An Introduction for Policy Makers.

Link

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