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# INSIGHTS INTO INDUSTRIAL ENERGY EFFICIENCY POLICY PACKAGES

Sharing best practices from six countries



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Prepared for the Workshop Sharing Energy Efficiency Policy Experience for Key Energy-Consuming Enterprises

February 20, 2012, Beijing

Hosted by the Institute for Industrial Productivity, the China Energy Conservation Association,  
the Energy Foundation and the Energy Research Institute



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# INSIGHTS INTO INDUSTRIAL ENERGY EFFICIENCY POLICY PACKAGES

Sharing best practices from six countries

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Based on research carried out by D. Phylipsen, M. Harmelink, M. Voogt, M. van Wees,  
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Second edition (January 2012).

This is an abridged and updated paper, based on a paper titled Ten Key Messages for Effective Policy Packages – Sharing Best Practices in Industrial Energy Efficiency Policies (2011).

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# FOREWORD

The Institute for Industrial Productivity provides companies and governments with the best energy efficiency practices to reduce energy costs and prepare for a low carbon future. IIP has developed an interactive and user-friendly database of industrial energy efficiency and greenhouse gas mitigation policies – known as the Industrial Efficiency Policy Database – available at <http://iepd.iipnetwork.org>.

To date, the database contains the policy packages of the Netherlands, the United Kingdom, Japan, India, China and the United States. These countries were selected as case studies to demonstrate the approach and methodology in a diverse set of countries in terms of size, economic structure, level of development, culture and policy approach. Australia, Canada, Germany, Thailand, Russia and South Africa will be added later in 2012.

The Industrial Efficiency Policy Database goes beyond just listing policies and instead, offers a layered analysis according to a “Policy Pyramid” that connects various policies, measures and implementation tools together. This facilitates understanding of a country’s policies from an overall policy package perspective, focusing on policy interrelations, consistency of policy objectives and approaches, and completeness of the package in terms of whether all barriers have been addressed. This information can encourage action.

The database builds on earlier work carried out by the IEA Energy Efficiency Policies and Measures database, the MURE energy efficiency policy database for EU countries, the World Energy Council activities on energy efficiency policies as well as national sources and cross-country analyses.

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# 1 EXECUTIVE SUMMARY

This is an abridged version of a paper that analyses the policy packages of China, India, Japan, the Netherlands, the UK and the US that directly or indirectly affect industrial energy efficiency or greenhouse gas (GHG) emissions. The aim is to identify best practices and key messages that can inform the development of energy efficiency and GHG policies in the industry sector. This abridged paper describes how the selected countries' policies fit within an overall policy package. Ten key messages and full analysis to support these messages are provided in the full-length paper<sup>1</sup>. Detailed factsheets on each policy are available on IIP's Industrial Efficiency Policy Database<sup>2</sup>.

## 1.1 Innovative Industrial Energy Efficiency Policies

The paper proposes that an effective policy approach requires a policy package comprised of sufficiently ambitious, effort-defining policies to outline energy efficiency and GHG reduction goals; supporting policies and measures that address various barriers (if any barriers have been identified), are mutually reinforcing and encourage action (i.e. in the form of sticks and carrots). An implementation toolbox should support the implementation of effort-defining and supporting measures in a transparent and efficient way. This corroborates with other research on the subject including Irrek and Jarczynski (2007), Ryan et al. (2011), Hood (2011), Mallet et al. (2011) and Boonekamp (2005).

The analysis of the policy packages of the six countries surveyed (China, India, Japan, Netherlands, UK and US) and other analyses drawn from the literature highlights several policies and policy examples that could be of interest to other countries. These include:

- China's minimum energy efficiency standards for industrial processes and energy efficiency appraisals for new large industrial projects;
- The negotiated agreements in the Netherlands and the UK, supported by a levy in case of non-participation or non-compliance, energy management guidance to help achieve stated goals, and financial incentives;

- The concept of benchmarking (comparing one's business performance to the industry's best practice) to define energy efficiency targets among companies, used in the Dutch negotiated agreements, Japan's mandatory benchmarking policy, India's Perform Achieve Trade Scheme, and in Phase 3 of the EU Emissions Trading System (EU ETS);
- A well-developed implementation toolbox, as in the US, the UK and the Netherlands, to help companies understand the challenges and opportunities available to them to manage and reduce energy use and GHG emissions;
- India's Perform Achieve Trade scheme, an energy savings trading (i.e. white certificates) scheme between energy intensive enterprises, and the first scheme of its kind for industry;
- Measures targeting non-industrial actors that help industrial sectors further implement energy savings and overcome informational and financial barriers (e.g., performance contracting by energy service companies (ESCOs), demand-side management (DSM) obligations on energy suppliers and guidance measures for financial institutions). China in particular is piloting or developing such measures;
- Energy management programs and associated supporting measures and incentives, such as those in the US, Japan and the Netherlands have been shown to be one of the most effective approaches to improve energy efficiency in industries. This is because such programs help companies achieve their GHG and/or energy efficiency targets, and equip companies with practices and procedures to continuously make improvements, drive organisational change and capture new opportunities.

## 1.2 Five steps to effective policy packages

The Institute for Industrial Productivity (IIP) has also developed the following "Five Key Steps" for designing effective energy efficiency and GHG mitigation for the industry sector. The Five Key Steps aim to guide policymakers in designing and implementing policies that drive ambitious energy savings and emissions reductions, address barriers facing the industry sector, and provide effective incentives and support to achieve policy objectives. The steps are based on the analysis of several countries' policy packages according to IIP's "Policy Pyramid" that connects various policies, measures and implementation tools together.

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<sup>1</sup> The report is available at <http://iipnetwork.org/publications.php#tenkey>.

<sup>2</sup> The Industrial Efficiency Policy Database <http://iepd.iipnetwork.org/>.

## Step 1: Set the overall energy saving and/or GHG mitigation goal to be achieved by industry

Aim	Actions	Considerations	Examples
Understand the fundamentals and set the overarching goals	<ul style="list-style-type: none"> <li>• Understand the abatement pathway by estimating the techno-economic savings potential</li> <li>• Define the abatement goal to be achieved within a specific timeframe</li> </ul>	Involve third party experts and undertake a consultative process to identify more ambitious and realistic levels	<p><b>China:</b> energy intensity reduction of 16% below 2010 levels by the end of 2015 (Economy wide)</p> <p><b>Europe:</b> 20% GHG emissions reduction goal by 2020 below 1990 levels (Economy wide)</p>

## Step 2: Define the effort-defining policy(ies)

Establish the main policy driver for making energy savings/ GHG reductions	<ul style="list-style-type: none"> <li>• Define the core policy (i.e., energy efficiency or GHG mitigation targets, negotiated agreements, voluntary targets, production / process standards)</li> </ul>	Reduce risk for investors and avoid lock-in of ineffective plants	<p><b>India:</b> Mandatory tradable EE targets</p> <p><b>Japan:</b> Mandatory EE benchmarking targets</p>
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## Step 3: Define supporting and complementary policies

Consider the case for supplementary policies and assess interactions	<ul style="list-style-type: none"> <li>• Analyse the barriers and drivers of the country and sector</li> <li>• Design supporting measures that can overcome identified barriers and achieve desired levels or higher (carrots and sticks)</li> <li>• Establish energy management programmes, cohesively linked to effort-defining policies and supported by training and incentives</li> <li>• Establish system-wide approaches that include a broad range of players in the market such as financial institutions</li> <li>• Assess the interaction between the chosen policies, estimate system-wide effects and adjust if necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that the energy performance and GHG emissions data collection requirements evolve to meet long term requirements</li> <li>• Identify ways to fund government-led energy efficiency activities and leverage private sector finance</li> <li>• Reduce risk for investors</li> </ul>	<p><b>China:</b> Ten Key Projects or EE Financing Regulations and Instruments</p> <p><b>UK:</b> Enhanced Capital Allowance Scheme</p> <p><b>US:</b> Innovative Technology Loan Guarantee Program</p> <p><b>Japan:</b> Mandatory Energy Management and GHG reporting</p> <p><b>India:</b> Partial Risk Guarantee Fund for EE or National Energy Conservation Awards</p>
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#### Step 4: Design a comprehensive implementation toolbox

Aim	Actions	Considerations	Examples
Help companies achieve and implement policies	<ul style="list-style-type: none"> <li>• Develop guidelines, and provide resources, training and tools for companies</li> </ul>	Make adjustments if necessary as companies gain greater experience	<p><b>US:</b> Software tools</p> <p><b>Japan:</b> Energy Management Training</p>

#### Step 5: Establish transparent systems for monitoring, reporting and verification

Evaluate the effectiveness of policies and allow adjustment of the policy package	<ul style="list-style-type: none"> <li>• Identify, from the start, the parameters and indicators that will be monitored to allow ongoing and ex-post evaluations</li> <li>• Regularly review and evaluate the effectiveness of the policy package and allow for adjustments to maintain coherence and the “reinforcing nature” of the policies over time</li> </ul>	Assess policy efficiency and free riding, in addition to effectiveness, in ex-post policy evaluation to ensure that the policy is achieving the desired goals at lowest costs to society and the target group.	<p><b>Europe:</b> Ex-post evaluation of 20 EE policies in various EU countries (AID-EE) project</p>
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## 2 INTRODUCTION TO IIP'S INDUSTRIAL EFFICIENCY POLICY DATABASE

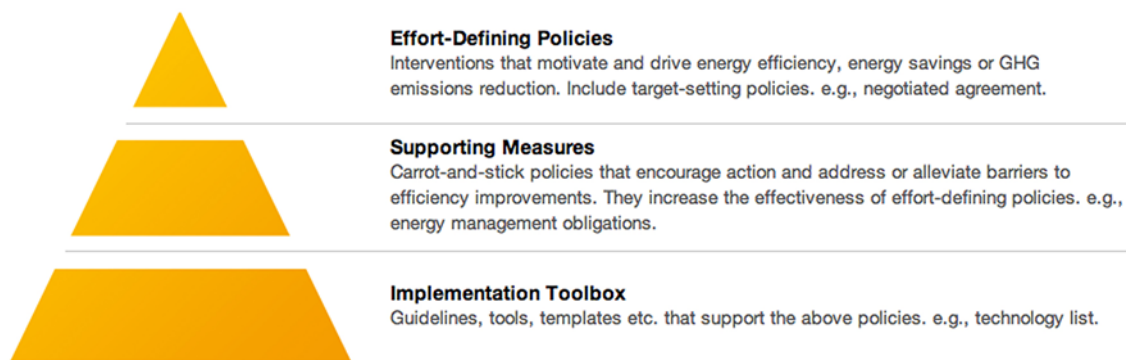
### 2.1 The framework

To explore whether policy packages can provide the necessary impetus to achieve ambitious improvements in energy savings and emissions reductions, the paper uses the “policy pyramid” methodology (illustrated below), which addresses the overall coherence of policies within a policy mix.

The policy pyramid distinguishes between three levels of policy

making: effort-defining policies that determine GHG mitigation or energy efficiency efforts; complementary or supporting measures that help deliver that effort and address specific barriers identified (in the form of either carrots or sticks) ; and tools or guidelines that help define and establish the policy implementation framework.

Figure 1 The Policy Pyramid



While a range of context-specific factors affect policy effectiveness within a country, the policy pyramid is a means by which to analyse the policy approaches of different countries, and to assess whether certain minimum elements critical to the success of a policy package have been considered.

### 2.2 How to read the policy pyramids

The factsheets below summarise the policy packages of China, India, Japan, the Netherlands, the US and the UK as of January 2012 using the policy pyramid framework. A timeline showing when policies were introduced or terminated and the different phases of a policy is also included.

The online Industrial Efficiency Policy Database provides for each country:

- GDP, energy consumption, and GHG emissions data for the industry sector
- The overall policy package and timeline
- Individual factsheets on each policy containing information such as:
  - › a general description of the policy;
  - › the objective and targets of the policy;
  - › monitoring, reporting, verification and enforcement regimes,
  - › costs to the target group and the government;
  - › ease of implementation;
  - › other policy requirements; and
  - › estimated impacts.

### 3 CHINA

As industrial energy use accounts for approximately 70% of national final energy use, strong efforts are made in China to address the high energy-intensity and outdated technology in the industry sector. Figure 2 provides the final energy consumption in 2008 by industry sub-sector (618 Mt of oil equivalent in 2008).

Economy-wide targets under the Central Government’s Five Year Plans are a key driving force in all industry-related policies and measures. The target in the 11th FYP was to reduce energy use per unit of GDP by 20% between 2006 and 2010. In February 2011, China announced that it had met the target, with a final achievement level of 19.1%.

According to the 12th FYP goals (2011-2015), China’s mandatory energy and carbon targets are:

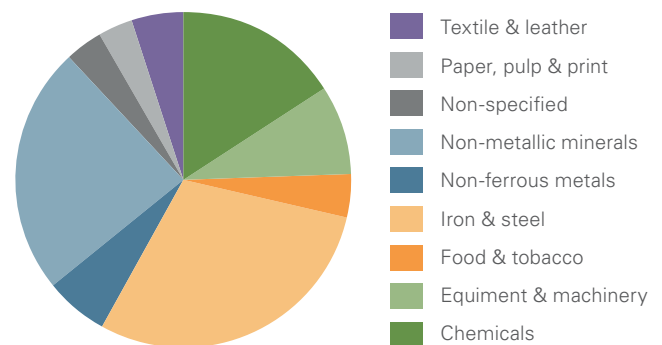
- Energy intensity (energy consumption per unit of GDP) reduction of 16% below 2010 levels by the end of 2015; and
- Carbon intensity (carbon emissions per unit of GDP) reduction of 17% below 2010 levels by the end of 2015.

The 16% reduction in this Five-Year Plan will bring the total reduction for the total ten-year period (2006-2015) to 32% below 2005 levels.

To meet 11th FYP targets, a wide array of policies was implemented, some of which are continued during the 12th FYP period. To meet 12th FYP plan targets, the State Council has released a comprehensive work plan which details 50 specific measures that are to be carried out in support of the energy intensity target (as well as absolute reduction targets for criteria pollutants such as chemical oxygen demand, ammonia, sulphur dioxide, and nitric oxides). Many of these measures are devolved to provincial governments.

The major effort-defining policy in the industry sector that supports the achievement of China’s 12th FYP targets is the

*Figure 2 China: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)*



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

Top-10,000 Enterprise Program. This Top-10,000 Enterprise Program, introduced under the 12th FYP, is an expansion of the successful Top-1,000 Enterprise Program that ran during the 11th FYP period.<sup>4</sup> The Top 10,000 Program aims to cover two thirds of China’s total energy consumption, and will include 15,000 industrial enterprises<sup>5</sup> that use more than 10,000 tonnes of coal equivalent (tce) per year.

To underpin the Top-1,000 and Top-10,000 Programs (and provincial policies that target “key enterprises”<sup>6</sup>), a number of mandatory supporting measures include:

- Assignment of energy managers, implementation of energy conservation plans and implementation of energy management systems (under the Top-10,000);
- Reporting of energy consumption data;
- Energy audits according to the Chinese audit standard GB/T 17166-1997; and
- Energy efficiency benchmarking (under the Top-10,000).

China has also introduced regulatory backstops to improve

<sup>4</sup> The Top-1000 Program, the key policy for the largest energy-intensive industries, has been successful in achieving, and even surpassing, the program goal of achieving energy savings of 100 Mtce over the 11th FYP period.

<sup>5</sup> The total number of enterprises covered by this program may reach up to 16,000 to 17,000 and will include transportation and buildings.

<sup>6</sup> China’s energy conservation law and many subsequent regulations employ the term “key enterprises” which include all industrial enterprises with annual energy consumption of over 10,000 tons of coal equivalent (tce), and, if also so designated by provincial/local governments, enterprises with annual energy consumption of over 5000 tce. All Top-1000 enterprises and all Top 10,000 enterprises are key enterprises.

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minimum performance at the bottom-end of the market, which can also qualify as effort-defining policies. These include industrial energy performance standards introduced in 2008 and covering over 20 industrial products<sup>7</sup> as well as regulations that mandate small plant closures and phasing out of outdated capacity. The energy efficiency appraisals for new large industrial projects (fixed asset investments) address infrastructure lock-in (introduced late in 2010). All new investments must undergo independent assessments and government reviews on their energy-saving status before being approved by regulators. Projects that pass will be subject to government supervision and managers are required to submit energy-reports (Xinhua, 2010).

Several other supporting measures that encourage industrial energy efficiency and supplement the effort-defining policies include:

- The use of differentiated electricity pricing, in which electricity prices are higher for companies with higher electricity intensity, differs from common practice in other countries.
- Measures not targeted specifically at the industry sector but aimed to facilitate industrial energy efficiency include fiscal incentives for qualifying ESCOs, demand-side management for utilities, EE financing regulations and instruments targeting financial institutions.

- Financial rewards for energy-saving technical retrofits. The program supports boiler/furnace retrofiting, waste heat and waste pressure utilization, motor system energy conservation, energy system optimization, green lighting, and energy conservation in buildings (MOF, 2010; NDRC, 2010). Under the 12th FYP, this program has been extended to qualifying ESCOs in order to promote the ESCO market and achieve greater savings. Under the 12th FYP, the value of the reward has increased from RMB 200 to at least RMB 240 per ton of coal equivalent energy (tce) saved (the middle and west regions can receive rewards of RMB 300).

China's implementation toolbox contains a range of guidelines and tools such as training programs, standards for energy management and audits, lists of closure thresholds, efficiency standards for various industries, and eligibility criteria for ESCOs to receive fiscal incentives. Note that this is not an exhaustive list, and numerous additional tools other than those listed in the above and in the policy pyramid are present.

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<sup>7</sup> Materials covered include: cement, crude steel, caustic soda, copper, ferroalloy, coke, calcium carbide, ceramics, zinc, lead, yellow phosphorus, synthetic ammonia, flat glass, magnesium, copper-alloy, nickel, electrolyzed aluminium, tin, antimony, carbon materials, and wrought aluminium alloy, and electricity from coal-fired power stations.

Figure 3 China's policy package and timeline

### Effort Defining Policies



- [CN-1: Energy Intensity Target of the 11th Five Year Plan](#)
- [CN-2: Energy and Carbon Intensity Targets of the 12th Five Year Plan](#)
- [CN-3a: Top-1000 Energy-Consuming Enterprises Program](#)
- [CN-3b: Top-10,000 Energy-Consuming Enterprises Program](#)
- [CN-4: Industrial Energy Performance Standards](#)
- [CN-5: Small Plant Closures and Phasing Out of Outdated Capacity](#)
- [CN-14: Energy Efficiency Appraisals for New Large Industrial Projects](#)

### Supporting Measures



- [Mandatory Energy Managers and Energy Audits \(as part of CN-3a\)](#)
- [CN-6: Ten Key Projects](#)
- [CN-7: Financial Rewards for Energy-Saving Technical Retrofits](#)
- [CN-8: Differential Electricity Pricing for Industry](#)
- [CN-9: Carbon Emissions Trading Pilots](#)
- [CN-10: Energy Performance Contracting and Energy Service Companies \(ESCOs\)](#)
- [CN-11: Low Carbon Development Zones](#)
- [CN-12: Demand Side Management Implementation Measures](#)
- [CN-13: EE Financing Regulations and Instruments](#)

### Implementation Toolbox



- [Information System, Trainings, Standard for Energy Management & Auditing \(as part of CN-3a\)](#)
- [Training programs \(under development\) \(as part of CN-3b\)](#)
- [Technology Catalogs that are promoted by the Chinese government \(as part of CN-6\)](#)
- [Guidelines for Validation, List of Qualified ESCOs, Energy Performance Contracting Standard \(as part of CN-7\)](#)
- [Lists of registered ESCOs in China \(as part of CN-10\)](#)
- [Study tours and workshops on low carbon development zones for local governments \(as part of CN-11\)](#)
- [Punishment measures in loans or re-financing process \(as part of CN-13\)](#)
- [Guidelines for energy-efficiency reviews \(as part of CN-14\)](#)

2004	2006	2007	2008	2010	2011	2013
Start of Differential Electricity Pricing	Start of 11FYP, Top-1000 Program, Ten Key Projects Program	Start of Small Plant Closures and Phasing-Out of Outdated Capacity	Start of Energy Performance Standards	End of 11 FYP, Piloting of Low Carbon Development Zones	Start of 12 FYP, Expansion of Top-1000 to Top-10 000 Program	Start of Carbon Emissions Trading Pilots

## 4 INDIA

While the energy intensity of industry is, on average, still relatively high compared to other regions in the world, India has made reasonable progress in recent years. However, there are large variances in India's industrial sub-sectors due to a wide range of vintages, production capacity, the quality of raw materials and product mixes. Figure 4 illustrates the breakdown of final energy consumption by industry sub-sector (114 Mt of oil equivalent in 2008).

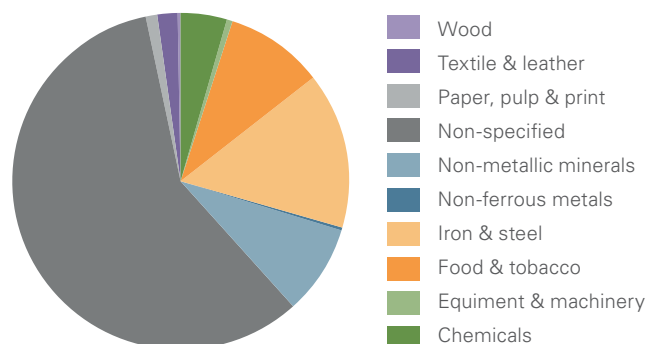
The Energy Conservation Act (ECA) of 2001 provided for the establishment of the Bureau of Energy Efficiency (BEE), the development of energy efficiency standards by industrial product/process, the requirement to have energy audits carried out by an accredited energy auditor and assign an energy manager in energy-intensive and other larger energy consumers (known as Designated Consumers).

In practice, India's industrial energy efficiency policy was, until recently, limited to the mandatory energy management component of the ECA and the Energy Conservation Awards (see below).<sup>8</sup> In 2010, the Government of India announced that it was developing a new white certificate scheme (trading of energy savings) following the 2010 amendment to the ECA. This so-called Perform Achieve and Trade (PAT) scheme is a comprehensive policy initially scheduled for introduction in 2011 and aiming to achieve savings of over 10 million tonnes of oil equivalent over three years. The PAT scheme is India's main effort-defining policy.

As at January 2012, implementation details of the PAT and decisions were still under discussion with Designated Consumers and government agencies. These decisions will soon be publicly announced. Specific energy consumption (SEC) targets have been set through several performance bands based on historical performance (i.e. "clusters") within each of the sectors. Each band will have targets based on benchmarking (Thilakasiri, 2011).<sup>9</sup>

The PAT can provide an effective mix of regulation by setting mandatory energy intensity targets for energy savings combined with a flexible market mechanism, the trading of energy saving certificates ("white certificates") to secure overall cost-effectiveness.

Figure 4: India: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

India's annual Energy Conservation Awards have been in place since 1991, and historically have played an important role in India's policy package in the absence of mandatory measures. In this programme, enterprises from a number of sectors submit a questionnaire to BEE and are entered into a competition, judged by government officials, culminating in an awards ceremony (Mallett et al., 2011). It has grown significantly since its inception with close to 600 participants from 35 industrial sectors, the power sector and seven other sectors (as of 2010). It is estimated that some significant energy savings has resulted (Roy, 2011).

India also introduced in 2011 a range of financing mechanisms administered by the India Renewable Energy Development Agency (IREDA) and preferential loans, venture capital funds and guarantees administered by the Energy Efficiency Services Limited (EESL) under and the Framework for Energy Efficiency Economic Development (FEEED).

The implementation toolbox is focused on energy management and auditing, with certification and training of auditors from the Bureau of Energy Efficiency. The PAT scheme will need to be supported by full set of implementation guidelines but details on these are not yet available.

<sup>8</sup> The impact of the mandatory energy management policy is difficult to assess but appears to be limited as there is no obligation to implement identified savings measures from the audits and implementation is not enforced, among other factors (Bhattacharya & Cropper 2010).

<sup>9</sup> The development of energy consumption standards by production process began in 2001 but was slow to be implemented for all sectors because of difficulties encountered within the diversity of India's industries. Standards were developed for the cement and pulp and paper sectors but their implementation was not widely deployed. These standards now appear to feed into the PAT scheme's SEC targets.

Figure 5 India's policy package and timeline

### Effort Defining Policies



- [IN-1: Mandatory energy efficiency standards \(pilot phase\)](#)
- [IN-2: Perform, Achieve, Trade \(PAT\) Scheme](#)

### Supporting Measures



- [IN-3: Mandatory Energy Managers and Energy Audits](#)
- [IN-4: Financing Schemes of IREDA](#)
- [IN-5: Venture Capital Fund for Energy Efficiency](#)
- [IN-6: Partial Risk Guarantee Fund for Energy Efficiency](#)
- [IN-7: National Energy Conservation Awards](#)

### Implementation Toolbox



- [BEE Protocol \(as it supports IN-1 and IN-3\)](#)
- [Monitoring and verification protocols \(as part of IN-2\)](#)
- [Technical support, certification and training of auditors \(as part of IN-3\)](#)
- [Financing guidelines \(as part of IN-4\)](#)



## 5 JAPAN

Since 1990, Japan's energy use in the industrial sector as a proportion of the total has declined to 30% of total final energy in 2008. This is the result of several factors, including energy efficiency changes in major industrial sectors, shifts in the mix of production, and changing production levels. Figure 6 illustrates the breakdown of final energy consumption by industry sub-sector (83 Mt of oil equivalent in 2008).

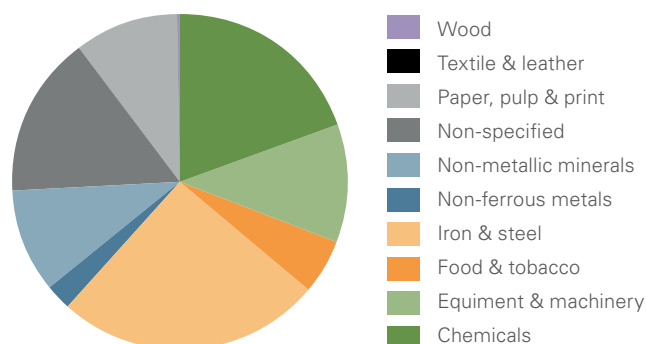
Over the past decades, the Japanese Government has strongly relied on voluntary approaches to stimulate industrial energy efficiency, mostly due to competitiveness concerns. A new mandatory benchmarking policy introduced in 2010 sets Japan towards a greater emphasis on regulatory approaches.

Also in 2010, Japan announced a mandatory energy efficiency obligation defined in benchmarking terms (top-of-the-world efficiency level). This policy requires energy efficiency targets in the form of benchmarks and introduced a 1% annual energy efficiency improvement obligation. For designated sectors (Steel, Electricity, Cement, Paper & Pulp, Oil Refinery, Chemical), targets have been set at the energy efficiency level of the best performing companies (top 10% - 20%) within that industrial sub-sector. These targets must be met in the medium (2015) and long term (2020). Those industries that have taken early actions and have achieved the benchmark target level can ask for an exemption from the annual 1% target by helping small and medium-size companies achieve higher energy efficiency levels (Yamashita, 2011).

Prior to the mandatory benchmarking, Japan relied on two voluntary policies for encouraging industrial energy efficiency – the Keidanren Voluntary Action Plan (VAP) and a voluntary emissions trading scheme, known as JVETS. The Keidanren VAP in industry was considered the key pillar in Japan's industrial energy and emissions policy. In itself, the VAP is comprehensive in coverage (40% of Japan's total emissions and 80% of industrial emissions) and successful in terms of reaching the targets it has set for itself. However its targets are set unilaterally by industry and oversight is mainly carried out by industry as well, putting into question its ambition, transparency and compliance levels.

The second voluntary policy, the Japanese voluntary emissions trading system (JVETS) applies to companies not covered by the VAP and also uses targets unilaterally set by industry. For several years, the Ministry of Environment has been pushing for

Figure 6: Japan: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

a mandatory cap-and-trade system, but this is strongly opposed by industry as well as by the Ministry of Economy, Trade and Industry. In December 2010, the government officially postponed plans for a national (mandatory) emissions trading scheme.

A number of financing mechanisms support these effort-defining policies. In addition, mandatory energy management has been a prominent feature in Japan's policy package since the 1970s. Over the years, the Act on the Rational Use of Energy has been amended to provide greater coverage and increase the energy management requirements. All factories (Class 1 - using more than 3,000 kL crude oil equivalent - and Class 2 - using more than 1,500 kL but less than 3000) are required to appoint a certified energy manager. For higher energy users (Class 1 only), companies must also develop and report a mid and long-term energy efficiency plan.

The implementation toolbox has a relatively strong focus on energy management and auditing, with guidelines, training and an energy audit support program. In addition, guidelines are available for the allocation of permits in JVETS, guidelines for benchmarking in the new benchmarking policy, and tools made available by the UNFCCC in the Emission Credit Scheme for SMEs.

Figure 5 Japan's policy package and timeline

### Effort Defining Policies



- [JP-1: Keidanren Voluntary Action Plan](#)
- [JP-2: Japanese Voluntary Emissions Trading Scheme \(JVETS\)](#)
- [JP-3: Mandatory energy efficiency benchmarking in industry](#)

### Supporting Measures



- [Subsidies for GHG mitigation measures \(as part of the JP-2\)](#)
- [JP-4: Mandatory Energy Management](#)
- [JP-5: Fiscal incentives for energy efficiency](#)
- [JP-6: Subsidy scheme for energy efficiency](#)
- [JP-7: Emission Credit Scheme for Small and Medium-Sized Companies](#)
- [JP-8: Mandatory GHG Emissions Reporting](#)

### Implementation Toolbox



- [Guidelines & protocols for energy management & energy audits \(as part of JP-1\)](#)
- [Allocation, benchmarking and MRV methodologies, IT system, transaction contract forms \(as part of JP-2\)](#)
- [Guidelines for benchmarking methodologies \(as part of JP-3\)](#)
- [National Certificate for energy managers \(as part of JP-4\)](#)
- [Guidelines on which technologies are eligible \(part of JP-5\)](#)
- [UNFCCC CDM rules & procedures \(transposed\) \(as part of JP-7\)](#)
- [GHG Emissions Calculation and Reporting Manual](#)



1978	1979	1997	2005	2005	2008	2009
Subsidy scheme and fiscal incentives for energy efficiency	Start of mandatory energy management	Start Keidanren Voluntary Action Plan	Start Voluntary Emissions Trading Scheme	Mandatory GHG Emissions Reporting	Start of Emission Credit Scheme SME	Start of mandatory energy efficiency benchmarking in industry

## 6 THE NETHERLANDS

Utilising an energy-intensive economic structure in industry, along with a very open export-oriented economy, has led to long-lasting attention to industrial energy efficiency in the Netherlands. High industrial energy-intensity has led to much emphasis on improving energy efficiency and the use of benchmarking to measure performance in energy efficiency and carbon intensity. Figure 8 illustrates the breakdown of final energy consumption by industry sub-sector (13 Mt of oil equivalent in 2008).

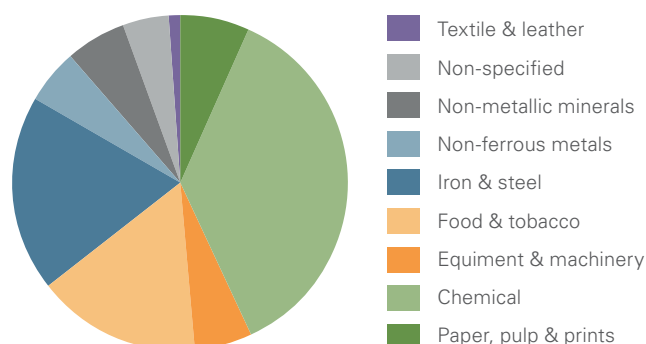
The Netherlands' policy package has had a strong emphasis on negotiated agreements, which have been in place since the early 1990s. More recently, there is now a stronger role for the mandatory EU emissions trading system (EU ETS).

The Negotiated Agreements<sup>10</sup> contain targets that are negotiated between the industry sector and the government using independent analysis on mitigation or energy savings potential. Many additional actions are required, such as the obligation to carry out an Energy Efficiency Plan and make investments deemed "profitable" according to government-defined guidelines. The scope of these agreements has increased over time, both in terms of sector coverage as well as the eligibility of measures to meet the targets, extended from on-site energy efficiency only to off-site (or chain) efficiency.

The EU ETS now increasingly drives energy-saving actions and emissions reductions. Under Phases 1 and 2 (to 2013) of the EU ETS, allocation of allowances has so far largely mirrored the targets in their negotiated agreements. However, from 2013, benchmarking will be used at the EU scale to define allocation levels for companies. The EU ETS is expected to be the principal driver of efficiency improvements, superseding the incentive to act under the negotiated agreements.

A range of other policy instruments, including various subsidies and fiscal incentives, supports the negotiated agreements and EU ETS targets. Companies that participate in the agreements and/or the EU Those following the ETS are exempt from complying with both the requirements under the Environmental Management Act's environmental permits (which are similar

Figure 8: Netherlands: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

in nature to the requirements in the agreements) and with the energy/carbon tax.

The implementation toolbox in the Netherlands is well equipped with a broad array of tools and resources, including technical support, training and workshops from the energy agency, energy management checklists, benchmarking manuals, technology eligibility lists and monitoring, and reporting protocols.

<sup>10</sup> Negotiated agreements are policies in which the targets and main requirements of the policy are negotiated between the industry sector (companies themselves or industry associations) and governments. Third parties may also be involved. They differ from voluntary policies, which are recognized and often supported by the government but their targets and goals are unilaterally defined by the industry sector.

Figure 5 The Netherland's policy package and timeline

### Effort Defining Policies



- NL-1: Benchmarking Agreement
- NL-2: Long Term Agreements
- NL-3: EU Emissions Trading Scheme (EU ETS)

### Supporting Measures



- Energy Efficiency Plan, Energy Management System, and implementation of profitable measures (as part of NL-1 and NL-2)
- NL-4: Environmental Management Act
- NL-5: Energy Investment Deduction Scheme (EIA)
- NL-6: Incentive Scheme for Sustainable Energy Production (SDE)

### Implementation Toolbox



- Benchmarking manuals (as part of NL-1)
- EEP templates, energy management specification and checklist, lists of profitable measures, monitoring protocols (as part of NL-1 and NL-2)
- Monitoring protocols (as part of NL-3)
- Technology eligibility list (as part of NL-5)
- Guarantees of origin for monitoring; support from Energy Agency experts (as part of NL-6)



## 7 UNITED KINGDOM

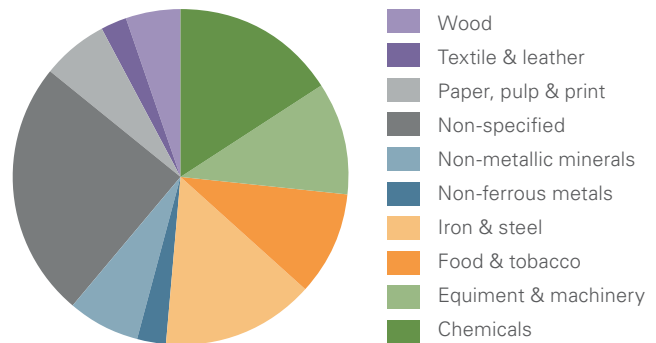
Industrial energy consumption constitutes about 22% of total final energy consumption in the UK (figures for 2007 and 2008). Approximately 55% of the final and primary energy use in industry is consumed by energy-intensive sectors. Compared to other industrialised countries (including the Netherlands), industry in the UK uses relatively less energy as a proportion of total energy use. Figure 10 illustrates the breakdown of final energy consumption (34 Mt of oil equivalent in 2008) by industry sub-sector.

Like in the Netherlands, the UK's climate change agreements (CCAs) are one of the country's central effort-defining policies, alongside the EU ETS. The agreements are negotiated between the government and industry associations, while third party experts help the government assess the ambition of industry's suggested targets (AEA Technology 2004). An important incentive for companies to enter into the CCAs is the exemption from the paying for the full value of the climate change levy (CCL) (80% discount to 2011, now a 65% discount). Companies participating in the CCAs are also exempted from the Pollution Prevention and Control (PPC) Act technology requirements.

After the introduction of the EU ETS, ETS participants preferred to continue to take part in the CCAs as well, because of the CCL discount. So far, additional impacts of the EU ETS on the industry sector in the UK beyond that of the CCAs have been limited. From 2013, the EU ETS is expected to be the largest motivation for companies to further increase their energy savings.

The CCAs are supported by advice on energy saving, target setting, carbon management and financial support from the Carbon Trust; guidance on monitoring, reporting and EU ETS permitting; and a fiscal stimulus by means of the enhanced capital allowance scheme. Lists for technology and product eligibility for financial support are also available. This provides an overall comprehensive package that addresses most of the barriers and drivers faced by industry and tools to implement the policy package.

*Figure 10: United Kingdom: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)*



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

Figure 5 United Kingdom's policy package and timeline

### Effort Defining Policies



- [UK-1: Climate Change Agreements](#)
- [UK-2: EU Emissions Trading Scheme](#)

### Supporting Measures

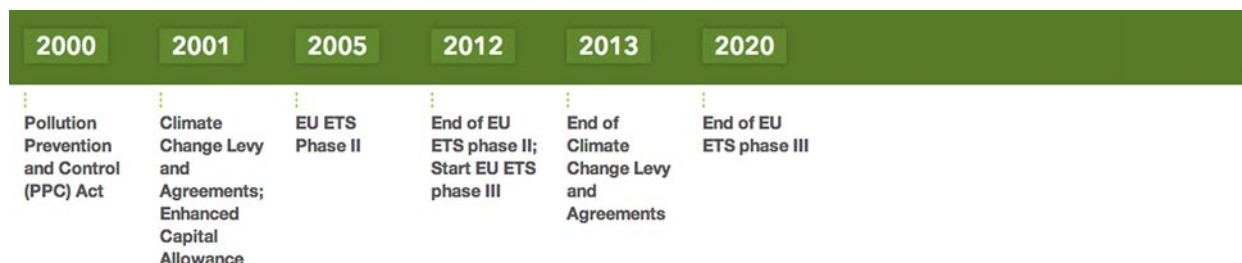


- [UK-3: Climate Change Levy](#)
- [UK-4: Pollution Prevention and Control \(PPC\) Act](#)
- [UK-5: Enhanced Capital Allowance \(ECA\) Scheme](#)

### Implementation Toolbox



- [Guidance on target setting, monitoring plans, and reporting \(as part of UK-1\)](#)
- [Guidance on monitoring and reporting of annual GHG emissions, baseyear data validation, and application for allocation \(as part of UK-2\)](#)
- [Levy Exemption Certificate \(as part of UK-3\)](#)
- [Guidance on Best Available Technologies \(BAT\) \(as part of UK-4\)](#)
- [Lists for technology criteria and products \(as part of UK-5\)](#)



## 8 UNITED STATES (FEDERAL)

Energy production and transport represent a large share of total GHG emissions in the United States, and overall energy efficiency is lower in the US in comparison to other OECD countries. Figure 12 illustrates the breakdown of final energy consumption by industry sub-sector (300 Mt of oil equivalent in 2008).

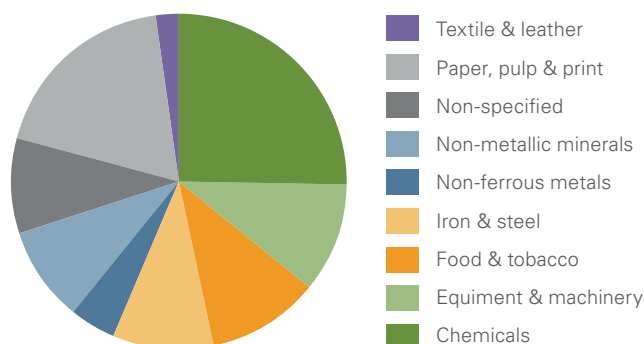
The major US effort-defining policies at the federal level include the GHG permitting and new source performance standards<sup>11</sup> under the Clean Air Act (CAA), the Better Buildings, Better Plants program (formerly Save Energy Now), Superior Energy Performance (SEP), and the Energy Star Program for Industry.<sup>12</sup> Participants of these programs are given priority access to energy assessments and other resources.

The CAA is the only federal policy with a mandatory element. From 2011, it requires selected installations to obtain a permit for polluting emissions to air and to install the Best Available Control Technology (BACT) to control GHG emissions. The BACT requirements were defined by EPA late in 2010 and provide guidance on technologies to be employed.

The BACT specify a maximum amount of GHG emissions allowed by the specific technology under the CAA. Phase 1 began in January 2011 for sources emitting at least 75,000 tce/year and already subject to the CAA permitting program covering other pollutants. In July 2011, Phase 2 began for new sources emitting at least 100,000 tce/year and modified installations emitting at least 75,000 tce/year due to the modification. New source performance standards for power generators are also being implemented.

A new certification program that relies on voluntary company participation, the Superior Energy Performance Program (SEP), will be launched nationally in 2012. SEP will provide companies with a framework for implementing the international standard for energy management systems ISO 50001 and for achieving awards (silver, gold or platinum) based on a set of predetermined performance criteria. Participating companies' performance can be recognised according to two "energy pathways": 1) a pathway for companies

Figure 12: United States: Final Energy Consumption: sub-sector contribution to manufacturing industry (2008)



Source: IEA Energy Statistics © OECD/International Energy Agency, 2010

new to energy management requires that they demonstrate savings of at least 5% over a three-year period; and 2) a mature pathway for companies with longer experience that requires these companies demonstrate at least 15% savings over the last ten years and receive a minimum score according to the "Best Practice Scorecard" (SEP, 2012). The Government will leverage the SEP to deploy other federal programs.

Also a voluntary program, Better Buildings, Better Plants (formerly Save Energy Now program) is a comprehensive energy efficiency program that includes a 10 year 25% energy-intensity improvement target and reporting progress to the Department of Energy. Partners who wish to pursue more extensive EE activities or exercise leadership in their field can be recognised as "Challenge Partners" (whilst companies who meet the requirements are recognised as "Program Partners").<sup>13</sup>

At the federal level, supporting measures include a tax credit scheme, an accelerated depreciation scheme, and a loan guarantee program.<sup>14</sup> Underpinning these voluntary effort-defining policies and supporting measures, extensive implementation tools are provided by the government: calculation tools, monitoring formats and free energy management support.

<sup>11</sup> The new source performance standards only apply to fossil fuel-fired power plants and refineries.

<sup>12</sup> Climate Leaders ended in September 2011 and between 2011 and 2012, Save Energy Now transitioned to Better Buildings, Better Plants.

<sup>13</sup> Program Partners pledge energy savings goals consistent with national targets and agree to report progress annually to DOE. Program requirements largely match those of the Save Energy Now LEADER initiative. Challenge Partners agree to transparently pursue innovative approaches to energy efficiency, and make a significant, near-term investment in an energy saving project or set of projects.

<sup>14</sup> A greater number of programs in the US occur at the State level (Elliott and Taylor, forthcoming). The Database of State Incentives for Renewable Energy (DSIRE) is a comprehensive source of information on state, local, utility, and selected federal incentives and policies that promote renewable energy and energy efficiency. It is available at [www.dsireusa.org/](http://www.dsireusa.org/)

Figure 5 United States's policy package and timeline

### Effort Defining Policies



- [US-1a: Greenhouse Gas Permitting \(under the Clean Air Act\)](#)
- [US-1b: New Source Performance Standards \(under the Clean Air Act\)](#)
- [US-2a: Save Energy Now LEADER \(replaced by US-2b Better Buildings, Better Plants Program\)](#)
- [US-2b: Better Buildings, Better Plants](#)
- [US-3: Climate Leaders \(ended in 2011\)](#)
- [US-4: Climate Vision](#)
- [US-5: Superior Energy Performance](#)
- [US-6: Energy Star Program for Industry](#)

### Supporting Measures



- [Voluntary pledge, baseline, energy management plan, energy manager \(as part of US-2a and US-2b\)](#)
- [Five-step implementation program \(as part of US-3\)](#)
- [US-7: Business Energy Investment Tax Credit \(ITC\)](#)
- [US-8: Modified Accelerated Cost-Recovery System](#)
- [US-9: Innovative Technology Loan Guarantee Program](#)
- [US-10: Greenhouse Gas Reporting Program](#)

### Implementation Toolbox



- [White Papers on GHG Control Measures, Control Technology Clearinghouse, Applicability Tool, Code of Federal Regulations \(as part of US-1a\)](#)
- [Support & co-funding of energy assessments \(following ANSI certification\), Software tools \(Quick PEP\), Energy management training \(as part of US-2a\)](#)
- [Tools & guidance for GHG inventories & management, Inventory Management Plans \(IMP\), technical assistance, Webinars \(as part of US-3\)](#)
- [Training Centers, Software Tools, GHG Reporting Guidelines \(as part of US-4\)](#)
- [ISO 50001 standard, Energy Quick Start website, Best Practice Scorecard tool \(as part of US-5\)](#)
- [Guidelines for Energy Management, Industry-Specific Energy Management Tools & Resources, ENERGY STAR Industrial Benchmarking Tools, Target Finder, ETP template, Monitoring Protocols \(as part of US-6\)](#)
- [Form 3468 \(as part of US-7\)](#)
- [Normal federal tax depreciation rulebooks and tools \(as part of US-8\)](#)
- [Applicability Tool, training, electronic GHG reporting tool \(eGGRT\) \(as part of US-10\)](#)



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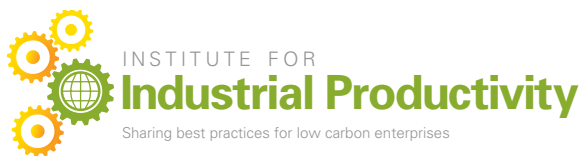
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