

China

Implementing a national energy efficiency programme

Activity	The Top-10,000 programme: a national energy conservation policy targeting the top energy-consuming enterprises and entities
Country	China
Sector(s) involved	All
Time frame	2006–2015

Case summary

China's mandatory energy conservation target-setting policy for large energy users, known as the Top-10,000 programme was introduced in 2011, as an expansion of its successful predecessor, the Top 1,000 programme which operated between 2006 and 2010. The Top-10,000 programme now covers two thirds of China's total energy consumption and aims to save 250 million tonne of coal equivalent (tce) by 2015, contributing to 37% of the total national energy saving target in the 12th Five Year Plan (FYP). In November 2012, China's government officially mandated provinces to implement energy management programs (EnMPs) targeting companies covered in the Top-10,000 programme.

Under a contract signed with the government, participants in the Top-10,000 Programme are required to meet certain energy saving targets and implement energy management through activities including establishing energy measurement and management systems, submitting regular energy use audits and developing energy conservation plans.

Overall, the response from enterprises is generally positive, with strong commitment to achieving energy saving targets through a process that provides clear measures, guidance and supporting tools.



A Coal Fired Power Plant, with installation capacity of 2400MW. Power generation is a key sector of the 1000/10000 Enterprise Program, Aisa, China, Hebei Province, Shijiazhuang City, Pingshan County © Wu Di / Greenpeace



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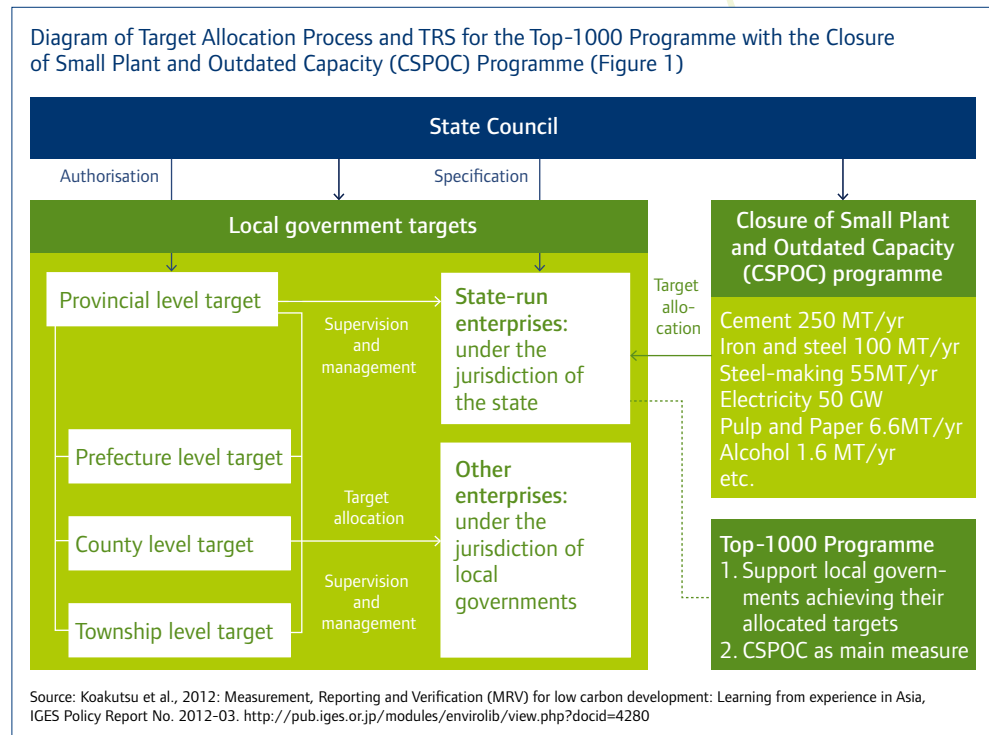
Background

China is the largest CO₂ emitter in the world today, and its efforts in energy saving and emission reductions have been accelerated in its most recent two five year plan phases (2006–2010 and 2011–2015). These efforts are supported by domestically binding national targets, such as to reduce energy emission intensity per GDP by around 20% over 2006–2010 compared to 2005 and by 18% by 2015 compared to 2010 (correspondingly a 17% carbon intensity reduction in this phase). These are further broken into targets at provincial and local levels (Qi et al, 2012).

Target Responsibility Contracts (TRCs) are the fundamental mechanism underlying energy conservation policy implementation in China and are implemented at four levels of government including provincial, municipal, county, and township governments, across a broad range of energy intensive enterprises. It has played a critical role in achieving energy conservation targets since the 11th FYP. The 1,000 and 10,000 Enterprises programmes are the core policies that effectively apply TRCs at enterprise level (Qi et al, 2013).

Activities

- » **Target setting/assignment:** assessment of the energy-efficiency potential of the industrial facility and target-setting through a negotiated process. Targets are set for each enterprise individually by the National Development and Reform Commission (NDRC) and are defined as total energy savings in a target year set against a growth baseline. Energy-saving Target Responsibility Contracts (TRCs), containing targets and activities to achieve it, are signed between the government and key energy-consuming enterprises to provide a formal underpinning for the relationship between the supervising government and the participating enterprises (see Figure 1).

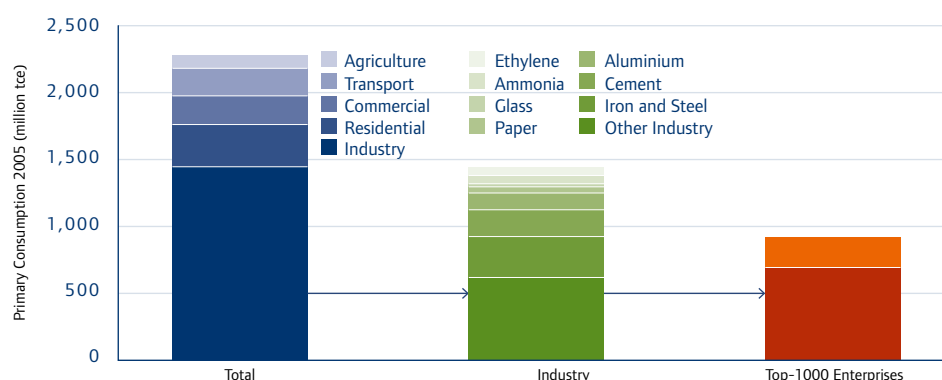


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- » **Accounting, monitoring and verification:** Individual companies are required to establish monitoring systems, provide monitoring reports, carry out energy audits (and submit them for verification) and develop energy efficiency plans. The National Bureau of Statistics (NBS) is in charge of collecting data from the enterprises, who directly submit data online.
- » **Appraisal (incentives and disincentives):** Supervision experts use an Evaluation Score Card to evaluate the performance of each key energy-consuming enterprise. Evaluation against the quantitative targets accounts for 40 of the 100 points available. Progress on different kinds of energy conservation activities account for the remaining 60 points. These include progress in: developing internal energy efficiency management systems; in delivery of energy efficiency technical improvements and investment; compliance with energy efficiency-related regulations (especially the elimination of older, inefficient equipment); adherence to standards; and in advancement of auditing, measurement, collection and analysis of relevant statistics.
- » **Enforcing penalties:** For enterprises evaluated to be failing to achieve their energy saving targets, a notice of criticism is circulated. Consequently, approval of any energy-intensive projects or additional industrial land use may be suspended, and no favourable exemption policies will be applied; if a state-owned enterprise fails the evaluation its head cannot be given any type of awards, no matter how well the enterprise is doing in other aspects, which may also affect individual leaders' promotion prospects (IIP, 2013). Government officials can lose their eligibility status for promotion and honorary titles through the so-called One-Vote Veto System "Yi Piao Fou Jue" (Koakutsu et al., 2012).
- » **Energy management (EnMS):** Is core new element for the 10,000 Programme (He Ping interview, 2014). Despite the national government's policy push, local governments also support the development of EnMS in enterprises. For example, Shandong province has promoted it in four aspects: a compliance system with energy saving rules and regulations; a full process energy-use control system (design-operation-monitor); an energy saving technology advancement system; and energy saving culture development (Zhao Xudong interview, 2014).

Energy Consumption of China, China's Industrial Sector, and the Top-1000 Energy-Consuming Enterprises, 2005 (Figure 2)



Source: Price, L., Wang, X., Jiang, Y., 2008

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- » **Supporting programs and policies:** Facility audits, assessments, benchmarking, monitoring, information dissemination, and financial incentives all play an important role in assisting the participants in understanding and managing their energy use and GHG emissions in order to meet their targets. Key supporting measures include: the ten key projects programme; differentiated electricity pricing for industry; and financial rewards for energy-saving technical retrofits. CNCA and the NDRC are establishing institutional and market structures for EnMS certification and implementation support for companies seeking external EnMS expertise (NDRC and CNCA, 2012).
- » **Toolboxes:** To support implementation, including:
 - » Training programs on data collection, monitoring, energy audits and technological improvement measures.
 - » Energy audit standard (GB/T 17166-1997) and energy measurement and statistic standard (GB/T 17167).
 - » Energy Management System standard (GB/T 23331).
 - » Implementation guidelines for EnMS (GB/T 29456). Including sector-based implementation guidelines for EnMS, which cover plate glass, cement, iron and steel (released in 2013), thermal power, coking, coal, public institutions (for release in 2014), and paper and petrochemicals (for release in 2015).
- » **Legal basis:** The Energy Conservation Law, Certification and Accreditation Regulations, and the Measures for the Administration of Certification Agencies

Institutions involved

National Development and Reform Commission (NDRC) and its Resource Conservation and Environmental Protection department; National Bureau of Statistics (NBS); Certification and Accreditation Administration of the People's Republic of China (CNCA); China National Institute for Standardization (CNIS); State-owned Assets Supervision and Administration Commission (SASAC); Office of National Energy Leading Group; General Administration of Quality Supervision, Inspection and Quarantine (GAQSIQ); Provincial and local governments at all levels as well as their energy conservation authorities (local energy conservation supervision and/or technical centres, ECCs/ETCs).

Cooperation with

Accredited certification agencies are responsible for the validity of EnMS certification as well as to continuously improve the quality of their services to enterprises at a reasonable cost. Industrial associations provide enterprises with technical support for EnMS implementation.

Finance

From government: The Ministry of Finance supports enterprises to take energy conservation measures and implement certain technologies (MOF and NDRC, 2007) and also finances 22 provinces' energy conservation supervision centres (Qi et al., 2013). Local government is encouraged to set aside specific budgets (NDRC, 2006a);

From enterprises: In 2007: Enterprises invested over USD 7.5 billion in technology innovation, implementing over 8,000 projects. In 2008: Enterprises invested USD 13.5 billion in energy-saving technical renovations and implemented about 3,000 energy-saving technical renovation projects (IIP, 2012). Between 2005–2010: Industrial enterprises' energy conservation investment of technology and equipment upgrade totalled USD 92.6 billion, four times that of the previous five years, of which the 1,000 Programme enterprises invested approximately 40% (Qi et al., 2013);

From the banks: Companies included in the programmes are contributing to national and local government energy saving activity, hence it is easier for them to apply for bank loans (Zhao Xudong interview, 2014).

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Impact of activities

- » Significant energy savings and associated GHG emissions reduction together with reduced emissions of other pollutants, improved productivity and saved energy costs:
 - » Total energy savings from 2006–2010 is 150 Mtce (NDRC, 2011), surpassing the target of 100 Mtce.
 - » Total emission reductions from 2006–2010 is almost 400 MtCO₂ (ClimateWorks, 2011).
 - » As of November 2012, there were 37 institutions in 13 industries that conduct EnMS certification pilots. The initial audit found that total energy saving exceeds 114 Mtc, equivalent to 3.03 MtCO₂ emissions (CNCA, 2012).
 - » The same pilot project had the saving of approximately USD 85 million (1 ton of standard coal costs USD 80) (CNCA, 2012).
 - » Between 2011 and 2012, 170 out of the 250 Mtce energy savings (almost 70%) had been achieved, with 2 years remaining (He Ping interview, 2014).
- » Institutional development and capacity improvement:
 - » Around 40 provincial energy conservation supervision centres were set up at all provinces. By the end of 2010, 606 centres at different levels were set up (Qi et al., 2013).
 - » Energy statistics and monitoring departments were setup at all levels including cities (Qi et al., 2013).
 - » Enterprises have established dedicated energy management teams and internal systems. More than 95% of the 1,000 enterprise set dedicated teams, and more than 91% distribute further targets. (Qi et al., 2013).
 - » Results for the EnMS certification pilot (CNCA 2012) include: Over 130 enterprises established EnMS; 77 enterprises obtained the EnMS certificate (as at June 2012); Seven auditor training courses, with over 1,300 trainers and 772 people registered as auditors.
- » Support for other policies:
 - » Strengthening of the energy conservation technological transformation.
 - » Continuation of phase-out of old inefficient technologies.

Why is it good practice

- » It is supported by **high level political ownership** (e.g. the highest administrative branch in Chinese government, the State Council), with **dedicated financial support** from the Ministry of Finance and supervised by a politically powerful institution (NDRC).
- » It **aligns with the existing national low carbon development strategy** and directly contributes to the national energy/carbon intensity reduction targets. It also involves **inter-ministerial coordination** and provincial and local governments as implementation agencies to ensure its effectiveness. It has a **broad scope** covering the major emitters in key sectors, is **developed gradually** both at national and sub-national levels and involves continuous consultative and **participatory processes** engaging key industry and enterprise stakeholders.
- » It is **scalable and transferable** across sectors and geography.
- » It includes a **diverse set of interventions** including target setting, MRV, incentives and penalties. It also creates considerable **co-benefits** including GHG emission reduction, pollutants control, productivity improvement and cost saving.
- » It **includes an MRV framework**, a detailed implementation plan, and a set of guidelines and tools to facilitate implementation.
- » It includes a **well-defined finance plan** including national sources, regional sources, enterprises and banks. It **stimulates private investment** and is institutionalised into enterprises and business operations (including dedicated business unit and personnel) to ensure the sustainability of actions.

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Success factors

- » **Government leadership:** With high level political commitment from the NDRC.
- » **Focused and well-targeted measures:** The programs target large enterprises that are major energy consumers and have both mitigation potential and capacity to implement.
- » **Top-down regulatory measure:** The core delivery mechanism is the use of regulatory pressure from central government to implement energy conservation targets at all levels of local government and energy consuming entities.
- » **Comprehensive system design:** Covering target setting, energy conservation accounting and monitoring, appraisal and evaluation.
- » **Expert design and search teams:** Teams which support the programme are capable and provide effective combinations of core expertise and knowledge.
- » **Continuous consultative and participatory process:** Involving key stakeholders including the participating industries and enterprises.
- » **Expansion:** Following 3.5 years of implementation, the 1,000 Enterprise programme fulfilled its target by achieving energy savings of 156 million tce. Due to the lack of substantial energy saving potential in small and medium-sized enterprises, the expansion of the programme then targeted large enterprises in other sectors. An EnMS was added as a key element for the 10,000 Enterprise programme.
- » **Enforcement:** Failure to deliver targets can have negative consequences for participants and are linked to business development and career promotion prospects for local government leaders and heads of state-owned enterprise. This mechanism is particular to the Chinese political system and relations between government and state-owned enterprises, which may not be replicable in other countries.

Overcoming barriers/
challenges

What were the main barriers/challenges to delivery?
How were these barriers/challenges overcome?

Capacity

Capacities to implement measures vary by region and enterprise. They are especially weak in western China. Enterprises often need to become familiarised with the various standards, monitoring and reporting methods and to implement energy management systems, all of which require technical and institutional capacities.

Standards and guidelines (see toolbox section) have been developed and updated along the way. Various research capacities have supported the government (especially at provincial and local levels) to develop their policy design and management capacity. Government and third party service companies have organised capacity building events and some companies also set up their own training systems.

Financial

Energy conservation and upgrading of operations requires financial resources at scale.

Dedicated public finance support (central and provincial levels) and stimulated private investment (see finance section) help enable this.

Information

Credibility of the targets to be achieved wasn't effective due to the choice of calculation methods and the mis-calculation (and overstatement) of energy savings.

Provision of improved guidelines and a streamlined accounting methodology together with enhanced third party verification, audit and sanctions for misbehaviours such as mis-calculation or overstatement of energy savings.

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Institutional

Weakened energy conservation management and institutional setup as a result of government restructuring since 1998.

Confirmed and extended the roles and responsibilities of provincial governments making them responsible for the implementation of energy policies and further distribution of the targets to lower branches of local government (e.g. city or prefectural government or administrative region), and energy-consuming enterprises within their jurisdictions. Local governments strengthened energy conservation supervisory and law enforcement agencies and energy accounting agencies, which provided a firm institutional foundation for the achieving targets.

Target setting processes in the initial phase were not clear and created some resistance from enterprises.

Targets under the Top-10,000 programme are disaggregated to local provinces and cities, with a more clear process. This includes, companies reporting their estimated potential for energy-saving to the local government. Provinces then estimate total energy-saving targets and submit their proposed targets to the central government. Central government then reviews the proposed target, and provincial and central governments then negotiate targets before they are finalised.

Lessons learned

- » **Incremental refinement of targets:** NDRC set preliminary targets for each enterprise taking into consideration their general situation, as well as the general technology level of the enterprise, if known. To ensure rapid implementation, initial targets were not based on detailed assessments of energy-saving potential among individual enterprises or industrial sectors. The target setting process and methodologies were subsequently both improved gradually through interaction with stakeholders and taking more factors into consideration and becoming more interactive over time.
- » **Flexibility of implementation:** Despite its effectiveness, a constraint of the current approach is that it may not always allow for the most cost-effective energy saving/emission reduction measures to be implemented and it therefore risks adding avoidable financial burden to enterprises.
- » **Longer-term mechanism:** Despite the effectiveness of this top-down measure, it may be more efficient if complemented/combined with a longer-term mechanism (such as market-based approaches), which eliminate institutional and technical barriers and induce a higher and more achievable return on investment for energy conservation actions. This may also help to further “internalise” the targets and trigger more fundamental shifts in business leaders’ investment and operational decision-making.
- » **Align with the political system:** Including legal and institutional foundation, existing development strategies and energy/climate targets in order to secure high level political leadership, provide financial support (e.g. via national budget) and enhance buy-in and participation of the sub-national governments and enterprises.
- » **Develop a formal energy saving responsibility contracting relationships:** Between government and enterprises.
- » **Ensure comprehensive system design:** With regular review and updates based on experiences and lessons learned, covering target setting, energy conservation accounting and monitoring, appraisal and evaluation, as well as supporting policies, guidelines and tools. Promote and implement a package of measures.
- » **Build up and strengthen institutions:** With implementation mandates and capacity, together with capacity building for enterprises where needed.
- » **Promote enterprises’ internal motivation for energy saving actions:** Provide more “carrot and stick” incentives and sanctions to motivate action. While in China the “stick” approach worked well, in other countries a stronger, incentive-based “carrot” approach may be more effective.

How to replicate this practice

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Further key resources	<ul style="list-style-type: none"> » Price, L., Wang, X., Jiang, Y., 2008. China's Top-1000 Energy-Consuming Enterprise Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China. Berkeley, CA: Lawrence Berkeley National Laboratory (LBNL-519E). http://eetd.lbl.gov/sites/all/files/publications/lbl-519e-top1000-programjune-2008.pdf » Qi et al., 2013. Blue Book of Low-Carbon Development, Annual Review of Low-Carbon Development in China (2013), Beijing: Social Sciences Academic Press (China). » ClimateWorks Network Knowledge Series, 2011. The Race is On: China Kick-Starts Its Clean Economy. October, 2011. www.climateworks.org/download/?id=86f8db38-1272-41da-8fe9-4f9aa0021d13
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