

International experiences with energy efficiency data collection, measurement, and use

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Outline

- What does C2E2 do on energy efficiency, especially in Africa?
- Efficient lighting accelerator
- Experiences with housing energy efficiency data and policy in Denmark
- Experiences with energy efficiency data collection and use

Copenhagen Centre on Energy Efficiency (C2E2)

- Funded by Danish Government and implemented by UNEP, the SE4ALL EE hub is hosted by the Copenhagen Centre on Energy Efficiency, which is a part of the UNEP DTU Partnership.
- The Centre's prime responsibility is to support SE4ALL's objective of doubling the global rate of energy efficiency improvement by 2030.
- C2E2 also hosts Secretariat of the Global Energy Efficiency Accelerator Platform, one of the flagship programme of the SE4ALL initiative.
- Also providing technical and analytical support on energy efficiency policies and actions at global, regional, and national level

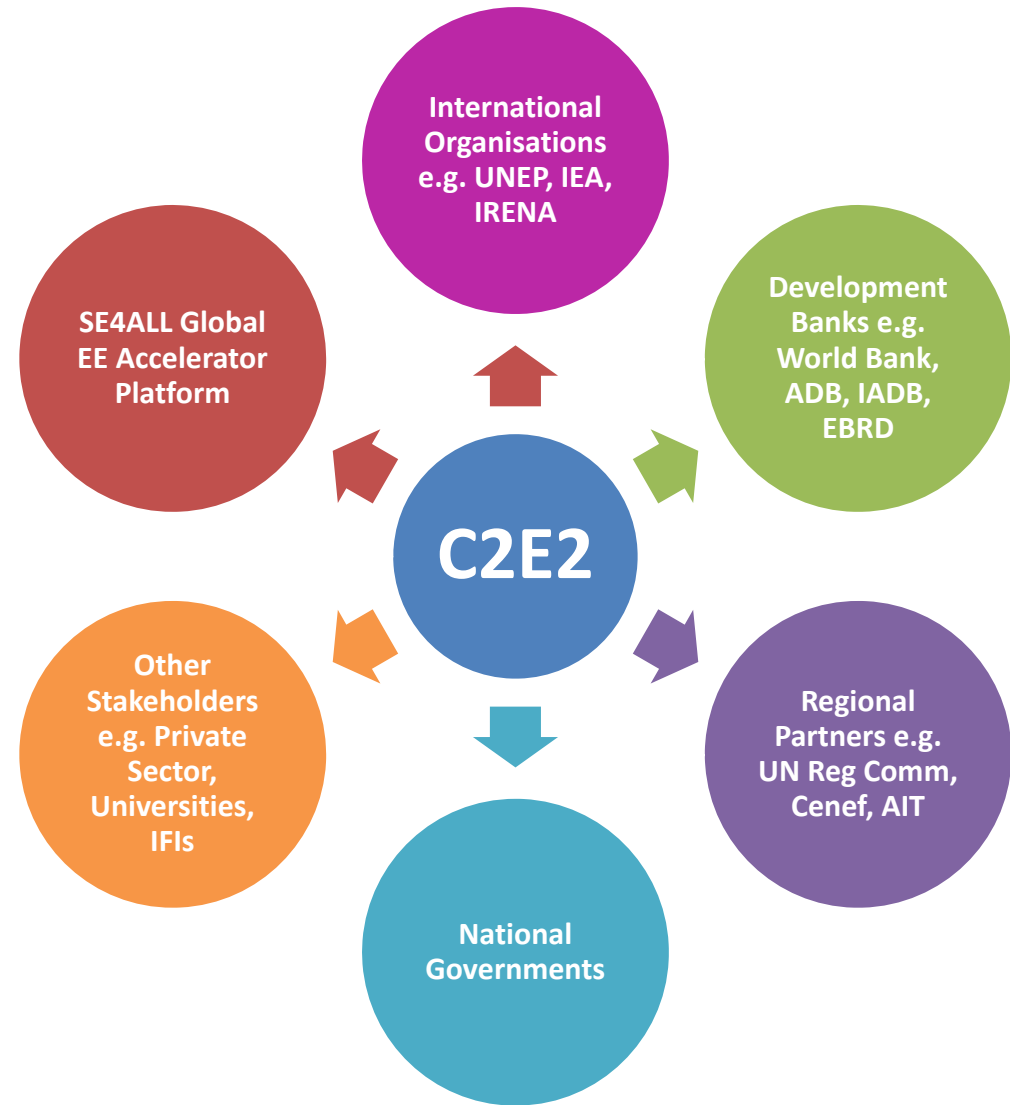
Copenhagen Centre on Energy Efficiency

Key Focus Areas

Capacity building
in target countries

Private sector
engagement
(including PPP)

Championing EE
and SE4ALL
objective



Global Energy Efficiency Accelerator Platform

The **Accelerator Platform** was established to support specific sector-based energy efficiency accelerators

Transport and Motor Fuel Efficiency

Improve the fuel economy capacity of the global car fleet



Lighting

Global market transformation to efficient lighting



Appliances & Equipment

Global market transformation to efficient appliances & equipment



Building Efficiency

Promote sustainable building policies & practices worldwide



District Energy

Support national & municipal governments to develop or scale-up district energy systems



Industrial Energy Efficiency

Implementing Energy Management Systems, technologies & practices



Power Sector

Improving the efficiency of generation, transmission, distribution & end-use



Finance

Accelerating investment in energy efficiency

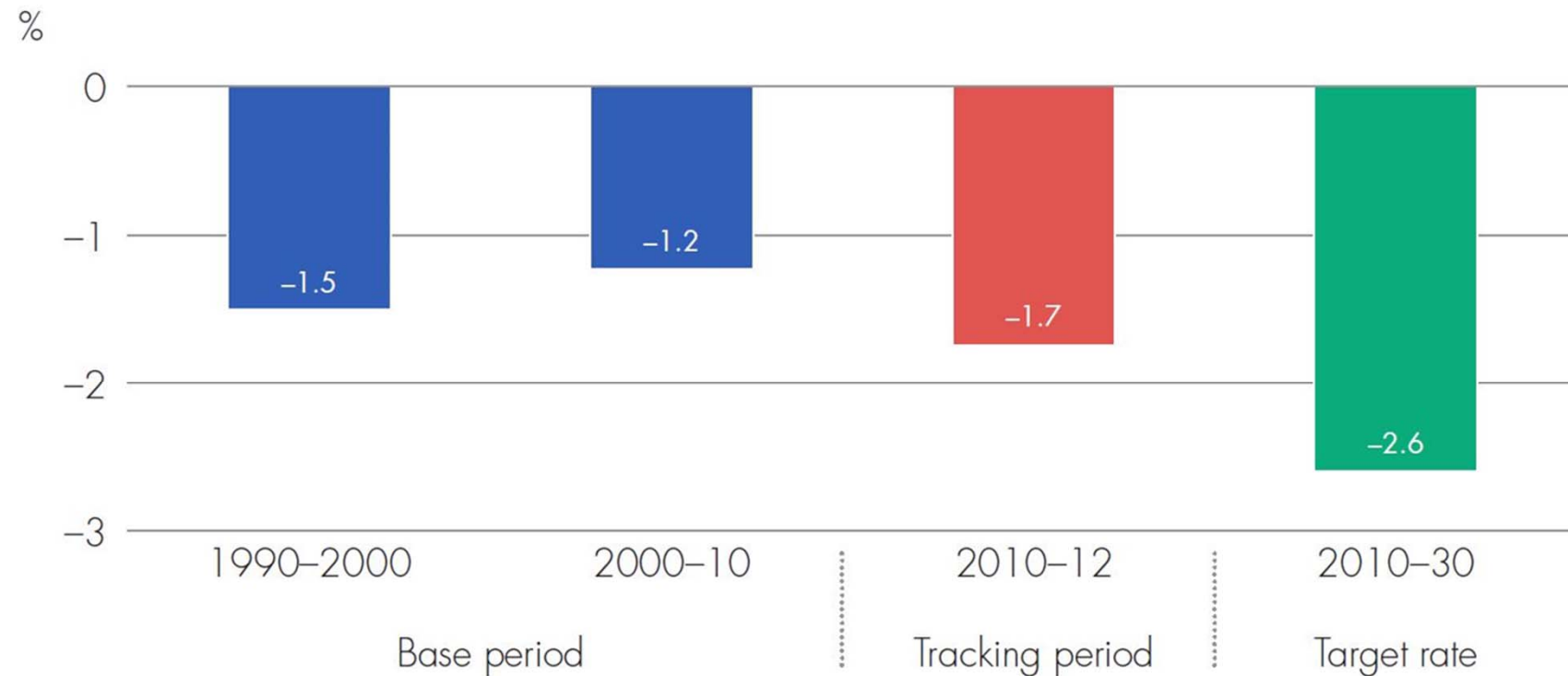


COPENHAGEN CENTRE
ON ENERGY EFFICIENCY
SE4ALL EE HUB



SE4ALL Global Tracking Framework

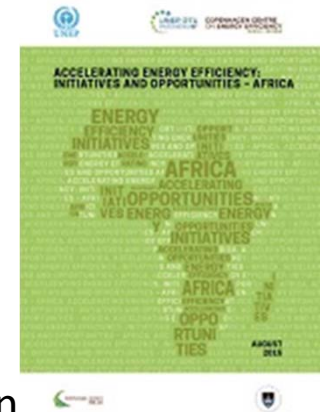
SE4ALL Global Tracking Framework 2015 - Energy efficiency progress



Source: IEA and WDI data.

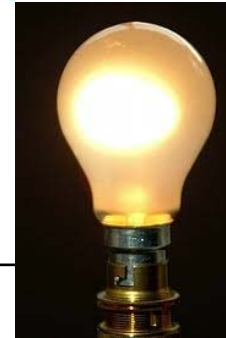
Our activities in Africa

- [Accelerating Energy Efficiency: Initiatives and Opportunities - Africa](#)
Copenhagen Centre on Energy Efficiency (C2E2), August 2015
- A global workshop will be held during 6-9 Nov 2015 in Copenhagen, to discuss detailed plans about support to national EE action in 12 countries. 3 in Africa - Uganda, Tanzania, and Zambia
- In Africa, so far mainly cooperating with AfDB, UNEP regional office, Cape Town University, SE4ALL Global Facilitation Team in Vienna.
- Will work closely with AFREC and IEA in supporting African countries on energy efficiency
- C2E2 is part of UNEP DTU Partnership, known as UNEP Risø Centre until July 2014.
- We have worked on capacity building and technical support energy issues, and climate change mitigation (CDM, NAMAs, REDD, TNA, INDCs etc.) and adaptation in many African Countries in the past 25 years. A main arm of UNEP and DANIDA in implementing climate change and energy projects.



Efficient lighting accelerator

Facts of different lighting bulbs

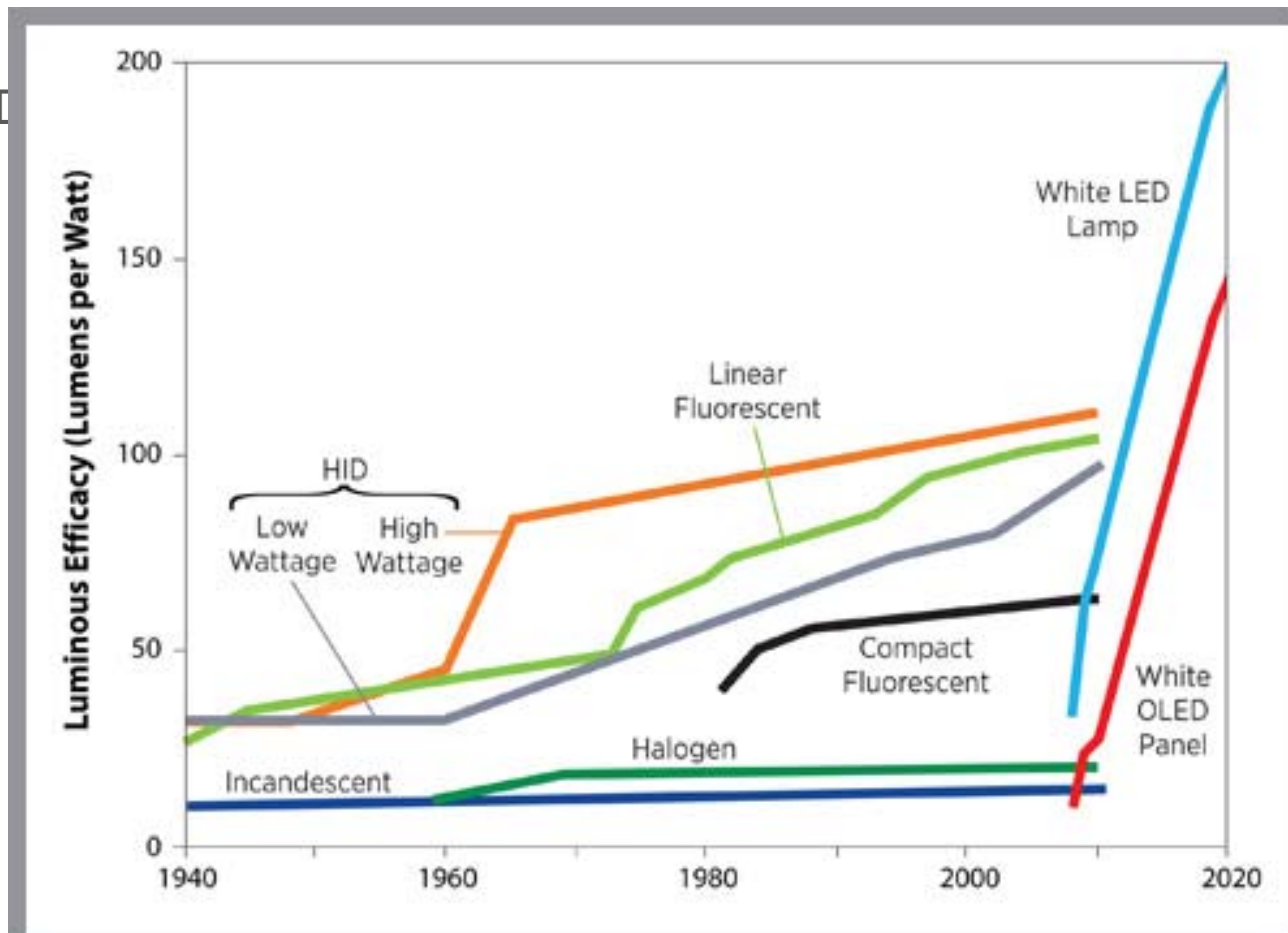


Energy Efficiency & Energy Costs	Light Emitting Diodes (LEDs)	Incandescent Light Bulbs	Compact Fluorescents (CFLs)
Life Span (average)	up to 50,000 hours	1,200 hours	8,000 hours
Watts of electricity used (equivalent to 60 watt bulb). LEDs use less power (watts) per unit of light generated (lumens).	6 - 8 watts	60 watts	13-15 watts
Kilo-watts of Electricity used (3 hours of lighting per day)	6-9 KWh/yr.	66 KWh/yr.	14-16KWh/yr.

LED white

US projection about LED Lighting prospects

➤ Credit: D



While traditional lighting technologies are relatively mature and offer less potential for improvement, SSL is still at a comparatively early stage and continues to achieve dramatic advances in efficacy.

Source: DOE SSL R&D Multi-Year Program Plan

Efficient lighting accelerator

Goals:

- foster public-private partnership to accelerate a global market transformation to environmentally sustainable, energy efficient lighting technologies, as well as to develop strategies to phase-out inefficient incandescent lamps.

Main partners:

- Co-convenors: the **UNEP-GEF en.lighten initiative** + **Philips**, many other **partners**: OSRAM, World Bank, regional development banks, regional and national energy efficiency organisations

Key stakeholders:

- National governments and regional bodies.
- Lighting and appliance manufacturers, associations, importers, distributors and retailers
- Financial institutions, Bilateral donors.
- Environmental advocates and consumer groups



Key Policy Developments in energy efficiency

Targets	EU, China, India, South Africa, Thailand, the United States, and all ECOWASii countries in Africa
Regulations	British Columbia - more stringent EE requirements for SF houses, BE and LT - new building energy performance requirements, UK - obligation scheme, VN - building code with EE
Standards & Labelling	<p><u>Products</u>: PL, JP, KR - expanded S&L coverage to all energy consuming products, DE - 'TOP 100 – Eco-label for Climate-Relevant Products', IR & VN - S&L for EE cookers & stoves</p> <p><u>Transport</u>: US, CA - fuel economy standards by 2025, MX - 1st standard, CL - 1st FE labelling, MU - 1st FE feebate system</p> <p><u>Industry</u>: standards for electric motors used in industrial applications had been introduced in 44 countries by 2013, including Brazil, China, South Korea, and the United States</p>
Incentives	revolving funds for EE in buildings (IT, NL), green investment scheme (CZ), grant programmes (PL), tax credits & rebates for EE vehicles (PL, US, FR), subsidies for industrial facilities (DE, TR, EU - EnMS)

Denmark's experiences with housing energy efficiency data and improvement

Data system on household and housing in Denmark

Denmark maintains an up-to-date data about members of each households:

- People are required to register within one week if they change address
- It is connected with the Danish personal ID system

The country also maintains and publishes information about all houses, apartment buildings on-line, including:

- Address, ground area, size, number of rooms
- Building materials and year of each property, any big renovations
- Location
- Address
- Current owner, history of owner change and transaction price
- Energy efficiency level

This information is regularly sent to households for confirmation and updating if there is any change

Tightening energy efficiency standards for new buildings - example of Denmark

In Denmark, the energy rating scheme are in existence since 1981. Denmark is the first country in EU to begin issuing Energy Performance Certificates (EPCs). The EPCs are mandatory in all types of buildings in Denmark.

For a 150 m² single family house in order to compare the level with the new requirements. The energy supply for heating, cooling, ventilation and domestic hot water must not exceed:

- Building Regulation **1995**: **105** kWh/m² per year.
- The energy requirement **2006**: **85** kWh/m² per year.
- Building Regulation **2010**: **63.5** kWh/m² per year.
- Two voluntary low energy classes have been introduced in 2010:
 - Energy class **2015**: **≤37** kWh/m² per year.
 - Energy class **2020**: **≤20** kWh/m² per year.



Experience - Energy rating system in Denmark

- To put a housing/apartment on sale, the advertisement must include the property's energy rating
- The energy rating is given by an accredited independent energy auditor
- The energy rating is based on current energy uses of the building plus various technical checks
- An energy rating report includes current energy efficiency level of the building, annual energy uses, proposals for further energy efficiency measures and the economic returns and energy saving, and energy rating change
- Such information is important as it creates market demand for energy efficient properties and help owners recover their energy efficiency investment



Supporting measures

- Financial subsidies for energy efficiency housing renovation, including roof, windows, external wall insulation, insulation of heating pipes, heating pumps, firewood furnaces etc.
- Handworker tax discount: max. 15000 DKK (2000 Euros) deduction in taxable income for each adult member living in the property each year for the labor costs of housing renovation projects
- Direct submit the receipts to the tax authority for personal income tax deduction, which is around
- Double purposes: both job creation and encouraging housing renovation

Energy efficiency labelling for appliances

ENERG Y IIA
energies · ενεργεια
IE IA

A+++
A++
A+ **A+**
A
B
C
D

ENERGIA - ΕΝΕΡΓΙΑ - ENERGIJA
ENERGIA - ENERGY - ENERGIE
ENERGI

XYZ
kWh/annum

min/cycle*
Y,Z
kg
XX
dB

392/2012

中国能效标识
CHINA ENERGY LABEL

生产者名称: 深圳市艾尼思科技有限公司
规格型号: N98W

耗能低 1
2 **2**
耗能高 3

能源效率 (cd/W) 0.85
关闭状态能耗 (W) 1.0

依据国家标准: GB21520-2008



ENERGY EFFICIENCY RATIO
Very Good

Annual Energy Cost: \$XX
Annual Energy Consumption: XXX kWh

Diagonal Screen Size: XXX"

Based on 275 kWh electricity cost and 5 hours daily usage.
Actual annual energy consumption and cost may vary.
For more information and to compare models, visit www.fed.gov.

Third-Party Certification - US ENERGY STAR

- To ensure consumer confidence in the ENERGY STAR label and to protect the investment of ENERGY STAR partners, The U.S. Environmental Protection Agency (EPA) requires all ENERGY STAR products to be third-party certified. Products are tested in an EPA-recognized laboratory and reviewed by an EPA-recognized certification body before they can carry the label.
- The resources below serve as the requirements for EPA-recognized certification bodies (CBs).
 - Conditions and Criteria for Recognition of Certification Bodies
 - Standard Operating Procedure for Certification of Products to ENERGY STAR Specifications
 - Verification Testing Roles and Responsibilities
 - Qualified Product Exchange system
- As part of EPA's activities to maintain the integrity of ENERGY STAR, products that fail to meet ENERGY STAR requirements will be subject to EPA's disqualification procedures

Energy efficiency data collection and use in China

Statistics Law and the Law on energy conservation

- Statistics Law enacted in 1983, updated in 1996 and 2009
- Detailed implementation rules on the implementation of the Statistics Law enacted in 2006
- Energy Conservation Law enacted in 1997, updated in 2007. Including requirements about data reporting and collection
- 2020 Energy Conservation Plan issued by the National Development and Reform Commission in 2004. Target for GDP (1990 constant price) energy intensity reduction rate: 2.2% during 2003-2010, 3% during 2003-2020. 42.5% reduction in GDP energy intensity during 2003-2020.
- The targets were integrated into targets and policies in subsequent five-year plans and national development plans, sectoral development plans, and local development plans

Brief Introduction to Statistic system in China

- Besides CNSB, some ministries and centralized government departments are authorized to provide further data for national accounting. Each ministry has its own statistics division, to collect, process, and publish relevant statistics.
- Regarding energy data, these include:
 - the General Administration of Customs (statistics on imports and exports),
 - Ministry of Commerce (statistics on foreign investment),
 - Ministry of Agriculture (biomass statistics)
 - the Ministry of Land and Resources (statistics on geological prospecting and reserves).
- CNSB has divisions focusing on rural economic and social survey, and urban economic and social survey. In 2013, the survey covered 160,000 households. They have staff stationed in different provinces, cities, counties

Energy Statistical Agencies

- **National Energy Statistical Agency**
- The Department of Energy Statistics established by China National Statistical Bureau is in charge of nationwide energy statistical work.

- **Local Energy Statistical Agencies**
- Local bureaus of statistics set up energy statistical agencies or positions. The local bureaus are led by those at the upper level.

- Data on housing, transport, industrial activities are collected by relevant line ministries

Data reporting obligations limited to enterprises above certain threshold

- **CNSB standards for bottom up reporting only cover enterprises above a designated size.**
- Large enterprises must report their information to the CNSB once a month and small enterprises report once a quarter.
- Measurements of electricity, natural gas, and heat use—which are metered and invoiced by utilities—are not used directly for statistical reporting.
- Many smaller firms in the industry and service sector with annual revenues below 5 million Chinese RMB (USD \$730,000) were excluded from bottom up reporting in 2004.
-
- The bottom up reporting in 2008 only covered 10% of China's enterprises. The definition of industrial enterprises above a designated size was revised upwards in 2012, requiring reporting when revenue from principal business exceeds 20 million RMB (3.1 m USD).

Energy Consumption Statistical Surveys

1. Energy Consumption Survey on Industrial Enterprises above threshold Size (monthly report)

- Survey indicators: volume of purchase, purchase amount of money, consumption of industrial production, input in processing transfer, output, energy recycling utilization.
- Survey units: Industrial legal entities above designated size (more than 320,000, accounting for more than 90% of all the industrial energy consumption)
- Statistical Survey Agency: Department of Energy Statistics of NBS of China

Energy Consumption Statistical Surveys

2. Energy Consumption Survey in other fields

Agriculture: adopting key-point survey; covering agricultural production units.

Industrial Enterprises below Designated Size: Sample survey

Construction : Survey every 5 years.

Catering industry: adopting key-point survey; covering the catering units above the designated size.

Household: Sample survey

Energy Consumption Statistical Surveys

3. Electric Power Consumption Survey (monthly report)

Survey indicators: electric Power Consumption

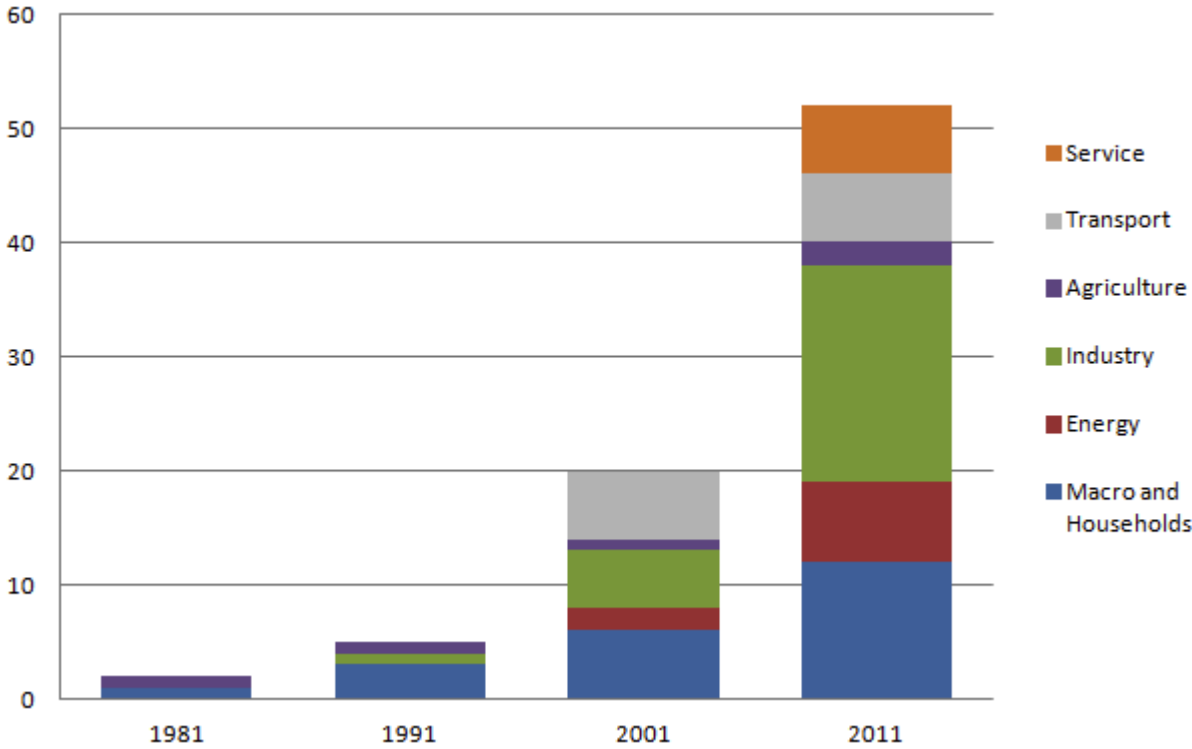
Scope of survey: whole society

Statistical Survey Agency: China Electricity Council

Dissemination of Energy Statistics

- Statistical Bulletin on National Economic and Social Development (Feb, on-line);
- China Statistical Abstract (May);
- China Statistical Yearbook (Sept-Oct; Chinese-English, on-line)
- Many local statistical yearbooks published by each province, city/country (there are over 2300 counties in China)
- China Energy Statistical Yearbook (annually published since 2004 (July, Chinese-English, on-line).

Increase of national statistical yearbooks in China



Potential problems of using energy suppliers as main source of energy data

- Double counting
- A energy supplier typically focus on the supply of one specific form of energy, for example, electricity, natural gas, coal, or oil, or charcoal
- While a consumer/enterprise often consume more than one form of energy
- Therefore one energy supplier are often unable to provide a whole picture of the consumer's energy use;
- This is especially complicated when more than one energy forms/fuels are used for the same purpose: for example gas, coal, charcoal, and firewood for cooking; grid electricity and oil for production (own backup generators) etc.
- Different geographic coverage
- Enterprises may be reluctant to provide the data: due to concern about extra work, cost, and leaking their business data

Example of industrial energy consumption data collection - China top-10,000 program

- Brief info: NDRC and 12 other government departments announced the Top-10,000 Program Implementation Plan in Dec. 2012. This campaign remains to date the world's largest energy saving project, involving 16,078 enterprises with annual energy consumption of about 2 bn. tce, accounting for roughly 87% of China's total industrial energy consumption and 60% of the total national energy consumption.
- Overall objective: With a target to save 250 Mtce during the 2010-2015, the Top-10,000 program represents a contribution of approximately 38% to the plan's energy saving goal.

Data collection, reporting, and verification

- **Reporting frequency:** annual reporting, latest by 31 March each year
- **Participants:** All enterprises on the top-10,000 program list
- **Contents of reporting:** table on basic info; energy consumption mix table, table on unit product energy consumption, table on progress with energy saving target realisation, table on energy on energy efficiency renovation projects
- **Method of reporting:** on-line reporting, the government developed a special reporting software and energy efficiency authorities at provincial level provides training to enterprises on how to do the reporting

Data management and verification

- **Submission check:** Energy efficiency authorities at provincial level check the data submitted and can reject submissions and request revision and resubmission
- **Accountability:** Heads of the enterprises are held accountable for the completeness, accuracy, authenticity of the data submitted
- **Confidentiality:** Government agencies must keep the info submitted confidential
- **Verification:** Investigation and penalties on no reporting, late reporting, and faked data in the reporting
- **Tables and guidelines:** Templates of the tables provided, explanatory notes and guidelines on how to fill the tables and calculate the indicators, and the energy consumption calculations

Use of the energy efficiency data

- Freely available for the public, for decision making by consumers and enterprises
- Basis for judging past policy effects, policy adjustments, and policy making
- Basis for rewarding front-runners and penalty to laggards among different local governments and enterprises
- Basis for international data exchange and energy governance cooperation

Thank you



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www.energyefficiencycentre.org