

UN Economic Commission for Europe

Energy Efficiency Endorsement Labeling Programme
– Case Study of the People's Republic of China

Workshop on Case Studies on overcoming barriers to
investments in energy efficiency and renewable energy
projects through policy reforms

Kiev, November 10.-11., 2009

General description of the case study

The aim of the case study is the adoption of labeled energy efficient household appliance products within the Chinese appliance market

- The case study describes the key elements of the Chinese energy efficiency labeling programme, mainly developed and implemented by the China National Institute of Standardization (CNIS)
- The key objective of the case study is applying this labeling to energy efficient home appliances equipment available on the Chinese market and change the consumer's behaviour towards energy saving

Country

- The case study has been implemented in the People's Republic of China
- No regional focus has been applied

Timeframe

- The implementation including all development activities took 6 years, starting in 1998
- The Energy Conservation Law, which puts end use energy efficiency and standard and labeling programmes at the center of China's energy conservation strategy, was passed in 1997 as a precondition to the implementation

Objectives

- Adoption of energy efficient products within the area of household appliances
- Removing large variations in energy efficient products in the Chinese household appliance market, which were caused by the lack of standardization
- Market transformation towards the preferred use of energy efficient appliances
- Removing the energy efficiency gap between appliances in China and other countries

Financing Institutions

- The China National Institute of Standardization (CNIS) – Mainly developing and implementing the standard and labeling programme
- Global Environment Fund (GEF) – Providing initial funding

Removed barriers to investments in EE and RES

The case study contributes in removing barriers against the deployment of energy efficiency technologies and the adoption of energy efficient products and services and is recommended for Croatia and Serbia

Croatia

- In Croatia there is a planned obligation to perform energy audits and energy certification from end of 2009 onwards
- The overall situation in Croatia appears to be beneficial for the setup of energy efficiency labeling projects:
 - The regulatory basis is already created and can be utilized
 - An energy efficiency programme would benefit from governmental support, even if tangible results cannot be realized within a short timeframe
 - The lack of awareness within the general public is already reduced, therefore cooperation within a labeling and standardization programme is expected to be high

Serbia

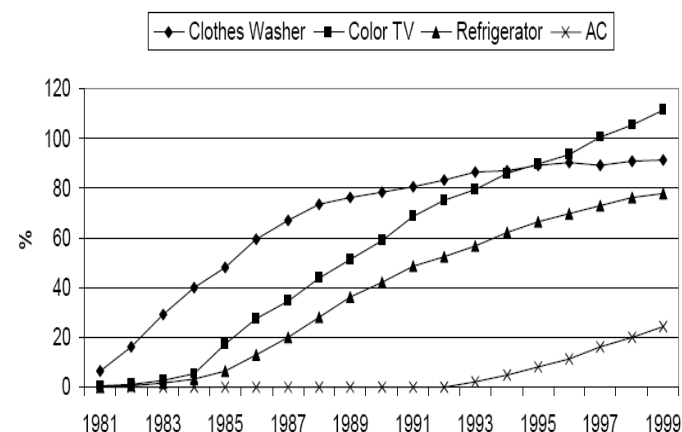
- Serbia is currently suffering from a lack of awareness regarding energy efficiency
 - A secondary legislation and implementation procedures on energy efficiency are missing
 - There are no labeling standards regarding energy efficiency or obligations to conduct energy audits
 - Electricity and heat prices are very low and below profitability
 - Private companies do not consider energy efficiency a relevant issue
- The concept utilized in this case study could help to overcome the general lack of awareness by
 - Raising awareness in policy makers
 - Applying standardization and labeling programmes including communication towards manufacturers, retailers, and end users

Background to the case study

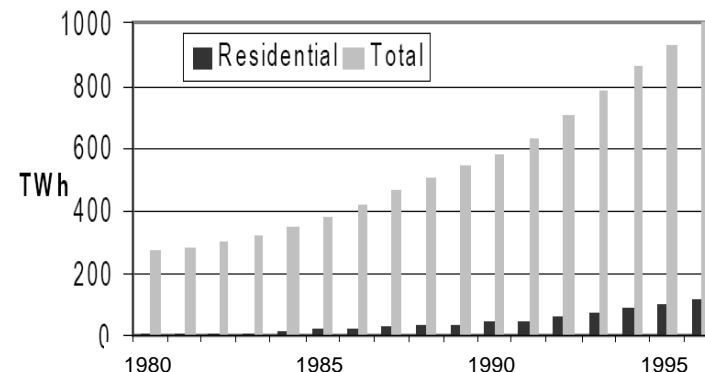
China developed an energy conservation strategy from 1989 onwards as a consequence to the enormous growth in electricity use in 1980-1999

- Between 1980 and 1998 China witnessed enormous growth and increasing personal incomes as well as a rapidly expanding domestic appliances industry
- By the end of the 1990ies China was the largest appliance producer in the world
- Every Chinese household owns at least one TV set, 91% of households owned clothes washers, 78% of households owned refrigerators, and 24% of the households owned room air conditioners
- The residential electricity use grew with an average of 15% per year (while the average growth rate in China was 8%)
- To meet the increasing demand for electricity the People's Republic of China added approx. 15 GW of new generation capacity each year since 1980. Most of the new power plants are powered with coal with a high impact on the environment
- Becoming increasingly aware of these developments the government introduced a first set of appliance efficiency standards in 1989
- In 1997, China passed the Energy Conservation Law to emphasize the importance of end use energy efficiency and standards and labeling programmes as a central part of China's energy conservation strategy

Appliance ownership in urban Chinese households¹⁾



Electricity consumption in China¹⁾



1) Source: Jiang et al: *Energy-Efficient Appliance Labeling in China: Lessons for Successful Labeling Programs in Varied Markets*

Key players involved in the implementation of the case study

The implementation involved the state authorities, institutes, and organizations as well as manufacturers, retailers and consumers

| Key Player | Description | Role |
|------------------------|---|--|
| CNIS | The China National Institute of Standardization | Definition of standards |
| State Council | The Division for Energy Efficiency of the State Council | Feasibility study for the project |
| CSC | The China Standard Certification Center | Capacity building within the project |
| AQSIQ | The State General Administration for Quality Supervision, Inspection and Quarantine | Project supervision and revision |
| NDRC | The National Development and Reform Commission of China | Policy making |
| Tax Authorities | The Tax authorities of China | Fiscal incentives for energy efficient products |
| Manufacturers | Worldwide manufacturers (more than 700, e.g. brother, Fujifilm, hp, Dell, Phillips) | Development and production of labeled household appliances |
| Retailers | Retailers of household appliance products | Customer information and awareness raising |
| Certification Agencies | Certification Agencies (e.g. Energy Star) | Providing advice during the setup of the organizational structure of the project |
| Consumers | Consumers of household appliance products | Buying labeled energy efficiency products with the aim of energy saving |

Approach for case study implementation

Between 1998 and 2004 six project phases were carried out, each phase with different roles assigned to key players and distinct results achieved

| Phases | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 | Phase 6 |
|-------------------------|--|---|--|--|--|--|
| Timescale | 1998 - 2004 | | | | | |
| Milestones | Feasibility study | Capacity building | Setup of EE S&L | Design of labeling programme | Project implementation and promotion | Monitoring, evaluation, revision |
| Responsible Key Players | Division for Energy Efficiency of the State Council | China Standard Certification Center (CSC) | <ul style="list-style-type: none"> State Council Ministries, Commissions Certification and accreditation bodies | <ul style="list-style-type: none"> National Development and Reform Commission China National Institute of Standardization (CNIS) | <ul style="list-style-type: none"> China National Institute of Standardization (CNIS) Manufacturers Retailers, Consumers | State General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ) |
| Results | <ul style="list-style-type: none"> Assessment of cultural, institutional, political factors Analysis of already existing standards, programmes Analysis of international best practice Analysis of Chinese consumption behavior Assessment of opportunities and risks | <ul style="list-style-type: none"> Identification of executive and implementing agencies (i.e. authorized agencies, certification bodies) Building of human resources capacities (i.e. trained and competent personnel) Development of testing capacity (i.e. testing protocols, equipments, facilities) | <ul style="list-style-type: none"> Setup of basic organizational structure for the Energy Efficiency Standard and Labeling organization (EE S&L) Assignment of roles and responsibilities for the development and implementation of the labeling programme | <ul style="list-style-type: none"> Selection of products appropriate for labeling Design of labels (including market research) Definition of more than 20 labeling standards Development of rules and procedures for the use of labels | <ul style="list-style-type: none"> Evaluation of application and documents Product tests and auditing Product registration Implementation control Design and implementation of campaigns and communication Publication of labeled products | <ul style="list-style-type: none"> Monitoring of the labeling process Measurement of customer awareness Revision of testing methods, standards, and labeling procedures Proposals for necessary updates to improve the implementation rate |
| End result | Adoption of energy efficient household appliances in the Chinese market | | | | | |

Impact of case study implementation

The most important impact of the implementation is the less rapid electricity demand growth compared to previous periods

Economical Impact

- Reduction of capital investment in the energy supply infrastructure due to a less rapid electricity demand growth
- Enhancement of national economic efficiency by reducing consumers' energy bills caused by use of energy efficient products
- Strengthening of competitive market for household appliances

Environmental Impact

- By contributing to stabilize the electricity demand in terms of lower demand growth rates the project indirectly mitigated climate change
- The implementation of the case study contributes to meet the climate change targets for the People's Republic of China

Social impact

- Increased public awareness on the benefit of energy efficient appliances
- Additional employment within the area of product design and construction

Overall impact

- Implementation of the case study had an impact at national level, since
 - More than 20 labeling standards were defined and energy efficient products were deployed for the Chinese market for household appliances
 - The residential electricity demand was stabilized in terms of lower demand growth (Tangible results need 6-10 years after the project start)

Costs of case study implementation

The costs for nationwide implementation of the case study were mainly carried by CNIS and GEF and are estimated to be approx. 40-50 mln USD

| | Costs | Comments |
|---|---------------|---|
| Phase 1 Feasibility study | 40-50 mln USD | <ul style="list-style-type: none"> The costs were estimated by comparing the case study to other similar projects launched in the Chinese market (e.g. programme for the Chinese refrigerator market)¹⁾ A detailed breakdown of the costs is not possible, due to the large number of key players involved The larger part of the project costs are assumed to be associated with <ul style="list-style-type: none"> Feasibility Study (Phase 1) Design of labels (Phase 4) Market transformation (Phase 5) IT support (Phase 4 / 6) The required costs have been mainly disbursed by <ul style="list-style-type: none"> The China National Institute of Standardization (CNIS) Global Environment Fund (GEF, initial funding) |
| Phase 2 Capacity Building | | |
| Phase 4 Design of labeling programme | | |
| Phase 5 Project implementation and promotion | | |
| Phase 6 Monitoring, evaluation, revision | | |
| | | |

1) Source: United Nations. (2007). Case Studies of Market Transformation: Energy Efficiency and Renewable Energy.

Regulatory preconditions

Regulation on energy conservation and resources saving, procurement of energy efficient products, utilization of labels, finance and tax, and pricing and metering of energy are necessary for successful implementation

General law on energy conservation

- The implementation of a general law of energy conservation is necessary to setup a general regulatory background
- In 1997, China implemented the China Energy Conservation Law

Regulation on saving of resources

- Detailed regulation to actively implement energy efficiency targets
- Such regulation should include the performance of energy audits, consumer education, auditing of energy efficient equipment, etc.

Governmental procurement policies

- Governmental procurement policies for energy efficient products are a necessary precondition for successful implementation
- The obligation to use specific energy efficient equipment should be determined by the regulator

Regulation on labels

- Regulation on energy efficiency labeling programmes needs to be defined
- Within such a regulatory framework energy labels and their utilization should be mandatory

Regulation on financing, tax incentives etc.

- Regulation on product financing and fiscal incentives
- This regulation helps to finance investments in energy efficient products and loans to manufacturers of household appliances

Regulation on energy pricing and metering

- Market-based energy pricing with elimination of cross-subsidies and price distortions
- Effective metering policy to implement consumption-based billing

Critical success factors

Several critical factors affect the success of a product labeling program and they need the involvement of all stakeholders

| | <i>Description</i> | <i>Comment</i> |
|--------------------------------|--|--|
| General consensus | All stakeholders, such as policy makers, manufacturers, utilities etc. need to find a general consensus about the concept of the programme | Clear energy efficiency targets and action plans are necessary to find agreement |
| Effectiveness of labels | Defined labels have to be effective in a way that they are <ul style="list-style-type: none"> • Easy to understand by the consumer • Appropriate to initiate changes in market behaviour | Energy efficient products should be “easy to buy” |
| Industry involvement | <ul style="list-style-type: none"> • The private industry sector needs to be involved, these are manufacturers, ESCOs, architects, utilities etc. • Financial support through national authorities and public financial organizations should be included | Private sector involvement should be actively targeted |
| Energy database | The capacity to establish and maintain IT systems, databases and tools with the objective to properly monitor the development and success of the project | Monitoring regarding project implementation and publication of project results |
| Choice of products | The products chosen for labeling need to possess the following criteria: <ul style="list-style-type: none"> • Present in most households • Energy-intensive | Energy efficiency requirements should be defined clearly and consistently |

The most critical among the success factors is the involvement of the product manufacturing and distribution industry

Risks

Main risks to the successful implementation lie within the decision making process, retailer involvement, and the end consumer behaviour

| Risk factors | Risks | Possible effects | Comments / Recommendations |
|-----------------------------|---|---|---|
| Decision making | <ul style="list-style-type: none"> • Many players are involved in implementation • Feasibility studies are not reliable | <ul style="list-style-type: none"> • Consensus finding is difficult and slow • Products selected labeling programme are not appropriate | <ul style="list-style-type: none"> • Set transparent targets and action plans • Ensure neutrality and reliability of feasibility studies |
| Retailer involvement | <ul style="list-style-type: none"> • Communication towards retailers is not effective | <ul style="list-style-type: none"> • Retailers are not motivated to promote the labeled products • Market transformation remains incomplete | <ul style="list-style-type: none"> • Put enough emphasis on the importance of retailers since they are in close contact with end consumers |
| Consumer behaviour | <ul style="list-style-type: none"> • Contradictory and redundant labels • Labels are not easily understandable • Labeled products are perceived as expensive | <ul style="list-style-type: none"> • It is not possible to compare products, labels, and prices • Labeled products will be avoided | <ul style="list-style-type: none"> • Limit the number of parallel programmes and labels deployed • Test labels with pilot users • Adequate information campaigns |

General recommendations for replication

When replicating the case study, accompanying measures should support the labeling programme to enable long term changes in consumer behaviour

- Accompanying measures such as information campaigns and private industry involvement need to be emphasized when carrying out the Labeling Programme
- Long term maintaining of standards and quality expected from a once established label needs to be established for implementing of sustainable changes and market transformation
- Once public awareness regarding energy efficiency is created, this awareness should be used in other industry sectors as well, e.g. adding energy efficiency labels to residential building equipment (e.g. heating or lighting systems)
- International financing or donor organizations should be involved, if governments are not able to bear the immense project costs
- Political conflicts or competition between different governmental authorities involved in the project should not interfere with the decision making processes and should be kept to a minimum

Recommendations for replication: concrete actions

Concrete recommendations for replication include establishment of a standardization and labeling institution, strong involvement of the private industry and awareness campaigns for the general public

| Recommendation | |
|-----------------------------------|---|
| Precondition | 1 Regulatory framework on energy efficiency (including targets, action plans and monitoring process) |
| | <ul style="list-style-type: none"> • Concrete secondary regulation on energy efficiency and energy performance standards • Provide tax incentives for energy efficient products and services • Implement market based energy pricing |
| Recommendation for implementation | 3 Analysis of the current situation regarding a) National energy consumption, production of appliances, customer behaviour, existing programs b) International best practices on energy efficiency equipment and policies |
| | 4 Involve experts on project financing (e.g. from bank or international organization) |
| | 5 Allocate clear responsibilities for implementation to ministries and involved institutions |
| | 6 Establish one institution, which is responsible for project success and define monitoring process |
| | 7 Create a labeling concept, involving international experts (e.g. from Energy Star) for support |
| | 8 Involve private industry (manufacturers and retailers) and select adequate products for labeling, setup logistics for distribution of labels and labelled products, train retailers |
| | 9 Start awareness campaign for the general public to inform about the advantages of using labelled products (e.g. lower costs for energy consumption, tax incentives) |
| | 10 Implement labels: Add labels to the products and start selling them by the retailers |
| | 11 Monitor the market reaction to the labeled products and update and revise labels if necessary |

Conclusions

Due to the high project costs and the long implementation time, the concept should be utilized for initiating positive long term changes

- **The case study presents an opportunity to set limits to a rapidly growing electricity demand due to increasing personal incomes and an expanding household appliance industry**
- **Although the project costs are high and the time period for implementation and for achievement of tangible results are long, the concept introduced is recommended for implementation elsewhere since**
 - **Changing customer behaviour is a protracted process but once started it will initiate positive long term effects**
 - **The overall awareness regarding energy efficiency will also help to save energy in other industry sectors**
- **Lessons learned from the implementation of the case study are the importance of**
 - **A consistent and straightforward policy and regulation on energy efficiency labeling**
 - **The active involvement of the private industry (e.g. manufacturers and retailers)**
 - **A strong communication towards buyers and sellers**
 - **The development of products and labels which are easy to handle by end consumers**

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Annex: Sources

List of sources used for case study elaboration

- **Jiang, L., Townend, J., Friedley, D., McNeill, G., Silva, T. & Clark, R. (n.d.). Energy-Efficient Appliance Labeling in China: Lessons for Successful Labeling Programs in Varied Markets.**
- **United Nations. (2007). Case Studies of Market Transformation: Energy Efficiency and Renewable Energy. Retrieved September 3, 2009, from http://www.un.org/esa/sustdev/publications/energy_casestudies/full_rpt.pdf**
- **Global Environment Facility. (n.d.) China: Promoting Energy Efficient Room Air Conditioners (PEERAC) Project. Retrieved September 3, 2009, from <http://www.gefonline.org/>**