

# Alternative DSM actions and recommendations

Final Workshop of the Project “Demand Side Management for Climate Change Adaption for the Ethiopian Power Sector”



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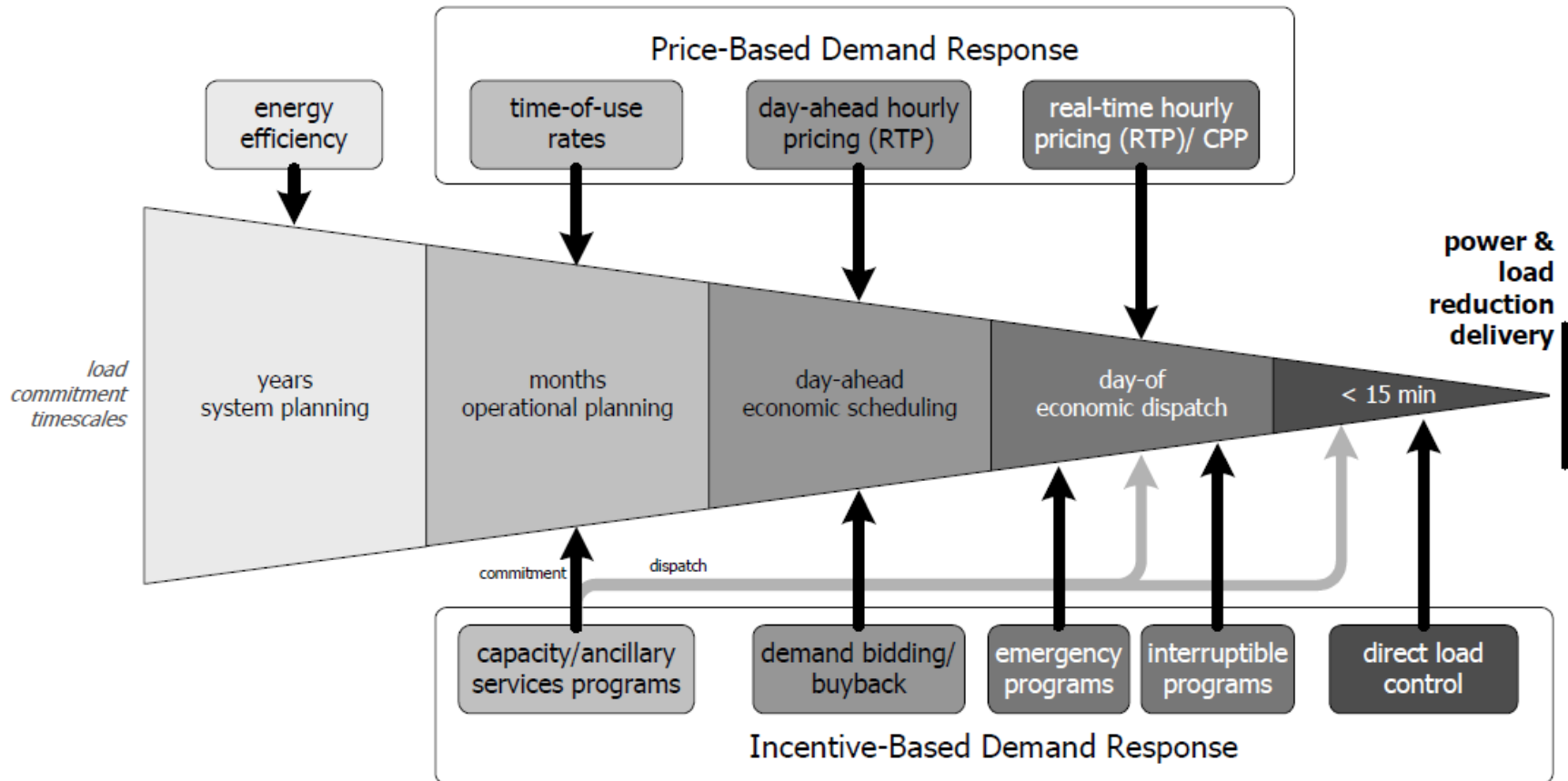
# Content of the presentation

- ❑ Classification and time scales of different types of DSM activities
- ❑ How to effect on customers by utilities
- ❑ Non-utility means to improve energy efficiency
- ❑ List of alternative DSM measures in Ethiopia
- ❑ Recommendations

# Classification of DSM activities

- **Incentive-based demand response/Contract-based/system led** to decrease customers' load on the basis of special contracts. The system operator, distribution company, or a service aggregator or agent, signals the demand-side customers that there is a requirement for load reduction or shifting.
- **Price-based demand response/market led** aiming to affect the behavior of customers during the peak load periods. The customer responds directly to market pricing signal, causing behavioural or consumption changes.
- **Energy efficiency related actions** to increase energy efficiency of appliances in the market and to increase the customer knowledge on energy efficiency.

# Time scales of different types of demand side management activities



# How to effect on customers by utilities ? (1):

## □ Tariffs and pricing

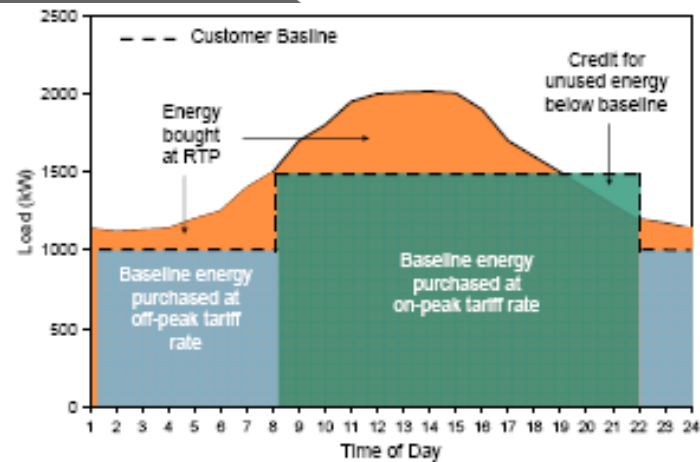
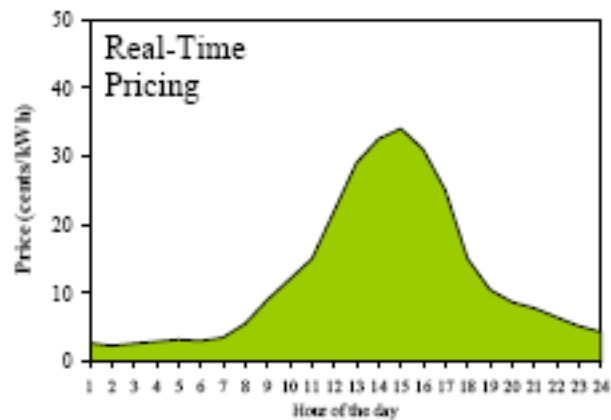
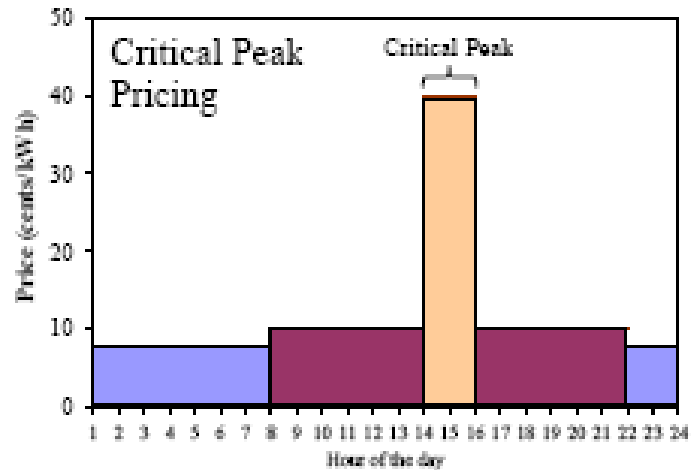
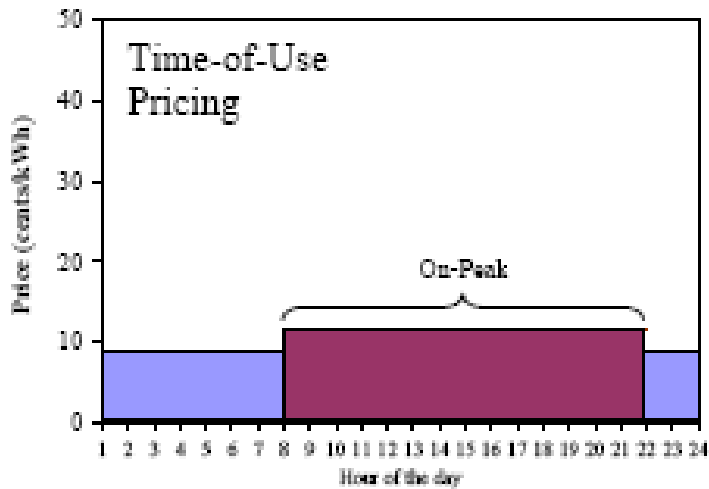
### ➤ Tariffs

- time-of-use (ToU)-tariffs
- demand charges
- reactive power tariffs
- Increasing prices when consumption increases
- interruptible tariffs
- ToU-tariffs
- etc.

➤ innovative pricing requires new metering and often 2-way communication

➤ automatic response to prices requires building/process automation and loads to be controlled and/or distributed generation

# How to effect on customers by utilities? (2): Examples on pricing

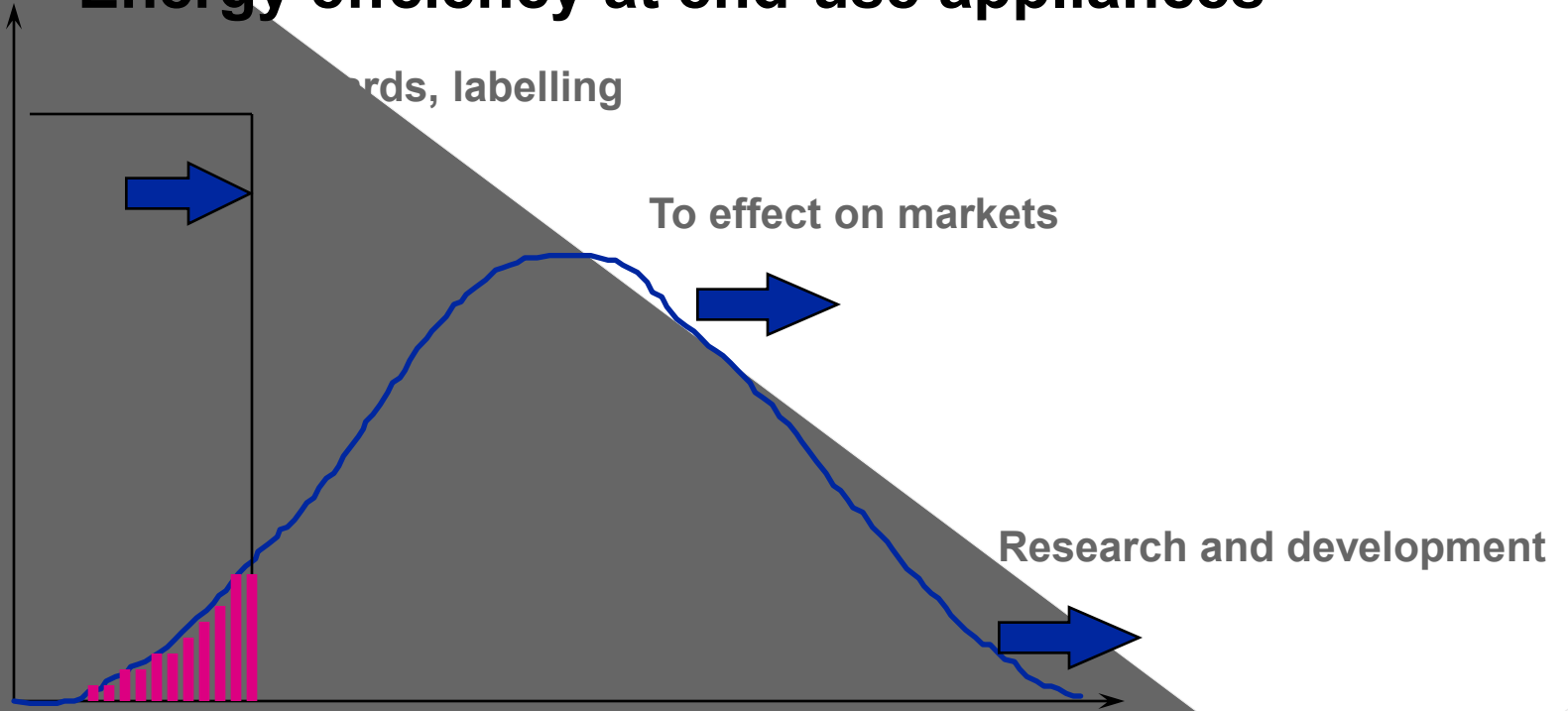


## How to effect on customers by utilities? (3)

- ❑ Direct load control by utilities
  - special contracts needed
  - can be applied to special type of loads (air conditioning, heating)
- ❑ Special contract with customers to utilize stand-by generators of customers
- ❑ Information to customers
  - Feedback to customers based on measured consumption and special analysis/comparison to other similar customers + hints, important especially to small customers

# Non-utility means to improve energy efficiency (1)

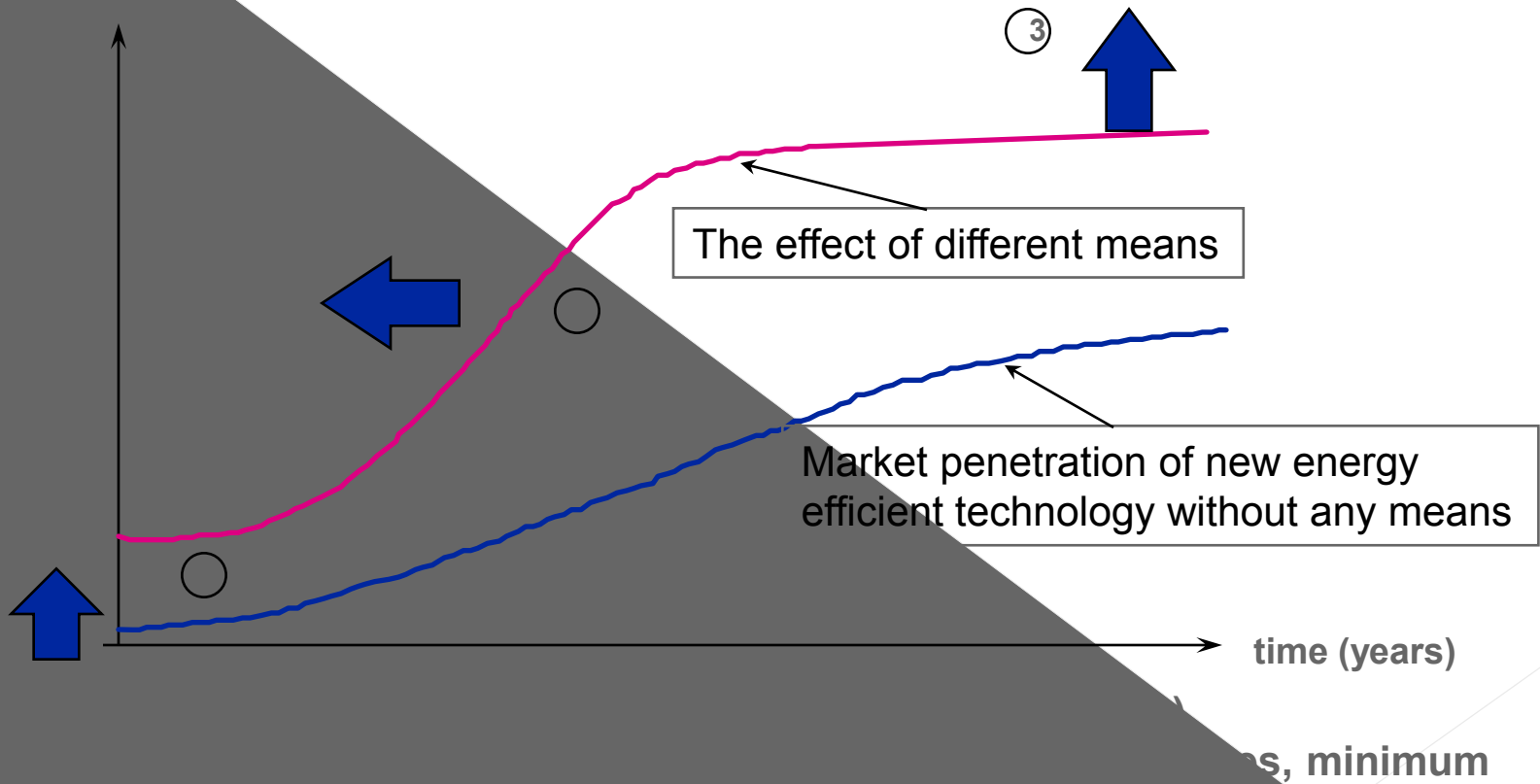
## Energy efficiency at end-use appliances





# Non-utility means to improve energy efficiency (2)

## How to effect on the market



# List of alternative DSM measures in Ethiopia (1)

## Price-based actions for demand response

**Innovative pricing (tariffs)** to promote DSM like

- time-of-use tariffs for large customers (needs new metering)
- demand charges depending on the contracted power for large customers (depending for ex. on fuse sizes)
- demand limiting switches for small and medium size customers
- in longer term more complicated tariff structures when smart metering is applied

## List of alternative DSM measures in Ethiopia (2)

### Contract-based actions for demand response

#### Load control of hot water heat storages

- remote load control by EEPCO or
- local control based on clocks and relays to switch of heating during peak load periods

Special contract is needed to give incentives to customers who will accept load control.

#### Utilization of customers' standby generators

- To have special a contract with the owners of standby generators that they use their diesel plants for their own supply during the critical network conditions. This way the network load could be reduced and the black-outs of all customers could be avoided in that specific network.
- This can be done automatically by remote switching the customer from the network or by telephone/sms messages to ask the customers to switch off his supply for a certain time period

# List of alternative DSM measures in Ethiopia (3)

## Actions related to energy efficiency (1)

### Loans to customers for EE equipment

- ❑ These can be low-interest loans from banks or for ex. from EEPCO which are paid back as a part of electricity bill on the basis of reduced bill due to the increased energy efficiency

### Special campaigns for EE equipment (like CFLs)

- ❑ EEPCO has had this kind of campaigns for CFLs.
- ❑ Replacing incandescent bulbs with CFLs is important action both from the energy savings and peak load reduction point of view.
- ❑ The ultimate goal would be the ban of incandescent bulbs in longer term

### Application of Integrated Resource Planning (IRP)

- ❑ This is the planning process of utilities, where investments to generation, networks and customer side are compared on equal basis and most profitable investments are selected.
- ❑ It is quite a heavy process which is specially applied in USA to vertically integrated utilities like EEPCO.
- ❑ In spite of DSM it can be applied to the allocation of CO<sub>2</sub>-releases<sup>12</sup>

# List of alternative DSM measures in Ethiopia (4)

## Actions related to energy efficiency (2)

### Labeling and EE standards for certain appliances

- ❑ With the minimum standards the most inefficient appliances can be rejected from the market.
- ❑ Labeling tells to the buyers of the appliances the class of energy efficiency advising him to select the more efficient appliances.
- ❑ According the questionnaires the most benefits can be achieved at the moment in cold appliances and cooking appliances, especially in injera stoves due to the high penetration rates of these appliances.

### Energy Audits in industry and commercial/public sectors

- ❑ This is a typical procedure in many countries at large customers to find the most effective goals for the investments to energy efficiency.
- ❑ The audits have to be done individually by authorized auditors

# List of alternative DSM measures in Ethiopia (5)

## Actions related to energy efficiency (3)

### Development of Energy Service Companies (ESCOs) business

- ❑ ESCOs are usually private companies investing EE improvements and sharing benefits with the customer
- ❑ Usually banks or other financiers are part of the contract with ESCO and the customer.

### Harmonizing the licensing/certifications of professionals in the field of building electric installations

- ❑ In many countries the installation personnel need special certificate which can be obtained through special examination. Energy efficiency training can be part of the training.

### Energy efficiency campaigns and information to general public

- ❑ This is a long-term process to educate people on efficient use of electricity.
- ❑ It is usually done by energy agencies and/or utilities

# List of alternative DSM measures in Ethiopia (6)

## **Actions related to energy efficiency (4)**

### **Voluntary agreements on energy efficiency with industry and public sector**

- ❑ Customers (or some customer organisation like trade alliances) and governmental side make an agreement on the energy saving targets, to which customers are committed.
- ❑ The progress is reported annually and may be also some incentives can be included, if targets are reached.

### **Development of energy saving fund for subsidies/grants/rebates for energy efficiency projects**

- ❑ The financing of energy efficiency projects and investments is often problematic especially in the case investments with long pay-back times
- ❑ Energy saving fund is a special fund collecting money for these purposes. The sources of money can for ex. be
  - additional fee in electricity prices or
  - special energy tax (or part of tax) earmarked to the Fund

# List of alternative DSM measures in Ethiopia (7)

## Actions related to energy efficiency (5)

### Demonstration of new technologies

- The penetration of new technologies can be improved with demonstration projects showing the benefits.
- They can be developed by different organizations like utilities, energy agencies, universities, customers and the financing can come for ex. from the State as a part of R&D financing or from the energy saving fund.

### Tax reductions for EE investments

- These are usually applied either to income taxes or to VAT

### Information on EE/DSM in energy bills

- This is a common activity in many countries from utilities.
- The electricity bill includes information on the historical development of the electricity use of the customer and comparison to the average consumption of similar customers.
- The bill can also include some hints on the efficient use of energy



# List of alternative DSM measures in Ethiopia (8)

## Actions related to energy efficiency (6)

### Energy efficiency advice centers

- ❑ These are the centers where residential customers can get information on the efficient use of electricity and have efficient appliances available.
- ❑ They can locate for ex. in different service centers of EEPSCO and the information material can be produced by EEA.
- ❑ In many cases these centers can also borrow special energy meters to customers so that they for ex. can follow the energy consumption refrigerators etc.

### Development of energy efficiency brand to increase the awareness on energy efficiency and to make it attractive to customers

- ❑ This is a long-term process where several stakeholders like manufacturers, utilities, energy agencies and governmental bodies take part.
- ❑ It is also related to the information campaigns to public.

# Assessment of alternative actions

The above alternative DSM measures were assessed with different criteria:

- The analysis of DSM potential indicates actions which are directed to the specific end-uses which have largest impact from the energy efficiency and peak load reduction point of view
- Importance to the stakeholders on the basis of feedback received in the August workshop
- Experience of the Project group

The final recommendations are given in the next slides

# Recommendations (1)

1. To continue actions related to the lighting, because energy saving and demand reduction potential is high in this end-use segment especially in residential but also in commercial/public sector. In European Union and in some other countries incandescent bulbs are banned. CFLs can replace them and also LED-lighting is developing very rapidly and is competitive with CFLs in the near future. Therefore the project group proposes to start the actions to ban incandescent bulbs also in Ethiopia in next 5 – 10 years.

## Recommendations (2)

2. To start developing the energy labeling and minimum energy efficiency standard program in Ethiopia. The focus should be in the beginning in the appliances which have largest energy saving potential like cold appliances and cooking appliances (including injera stoves). A more detailed plan for labeling is given in the following presentation.
3. To start developing energy audit activities in industrial and commercial/public sector. This is the most efficient first step in these sectors to analyze the needs for investments to energy efficiency. The first step is to develop framework for energy audits including training of auditors, which can come from private sector, financial support for audits etc. A more detailed plan is given in the following presentation

## Recommendations (3)

4. To start developing and testing more innovative pricing to large customers (mainly industrial and commercial/public sector). The time-of-use pricing could include high-price periods during peak loads situations at noon and in the evening. Another alternative is to try to decrease high peak loads by demand charges and/or with demand limiting switches.
5. To start developing energy saving fund for financing different energy efficiency projects like demonstrations of new technologies, and activities like energy audits. The financing of the fund is usually based on state budget, special energy taxes or incremental increase of tariffs.
6. To continue and improve the information on energy efficiency to general public. This activity is planned by EEA. This can include also the establishment of energy efficiency advice centers and electricity consumption feedback to customers as a part of electricity bill.

# Recommendations (4)

In addition to the above prioritized actions some additional actions can be developed in longer term:

- ❑ in industrial and commercial/public sectors the development of private ESCO-business and voluntary agreements on energy savings are recommendable actions.
- ❑ If the needs for peak load reduction are critical especially in certain parts of the networks, the load control of hot water heat storages and utilizing the standby diesels of customers can be tested and developed for practical use.

**Thank You!**