

Demand-side management and culture

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Outline

- The demand side
- DSM / DRP
- Energy efficiency and sustainable development
- Barriers
- Energy end-use efficiency and energy services directive
- Instruments



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Demand-side



Using efficient equipment - acquisition decision process

Rational use of the energy services

- Information/education

- Different amount of energy for the same energy services
- Labelling, characterisation of equipment
- Life-cycle cost analysis; benefit/cost analysis; payback

- Availability; trade allies

- Legislation;

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- Rational use (when it is necessary, where it is necessary and in the adequate amount and form of energy)

- Potential contribution for reducing bills, energy consumption, emissions

- Environmental/social perspective

- Control of end-use loads/tasks; automatisation/EMS

- ...

People want heat, light, motion, ..., not energy!



DSM - Changing the amount or timing of energy consumption (level and patterns)

- DSM programs – planning, implementing, and monitoring activities designed to encourage consumers to modify their level and pattern of electricity usage

In the past - the main objective was to defer the need for new capacity.

Now - electric utilities are also using DSM **to enhance customer service.**

Main drivers (some):

Price spikes/volatility; transmission constraints; environmental uncertainties, improve relation with customers



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DSM – techniques / tools / measures

- Energy conservation and efficiency
 - Load Management
 - Demand Response
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- Strategic conservation / energy efficiency
 - Load Management
 - Direct control; Interruptible power; Voluntary reduction
 - Demand Response
 - Emergency peak control (voluntary load reduction with a few hours of advance notice)
 - Day ahead bidding (customers bid for load reduction one day ahead)
 - Price based
 - Time of use tariffs; Real time pricing; Day-ahead pricing

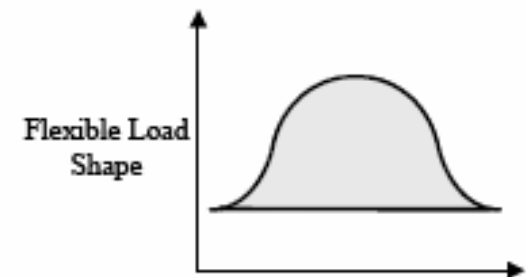
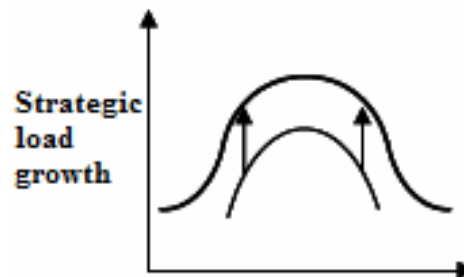
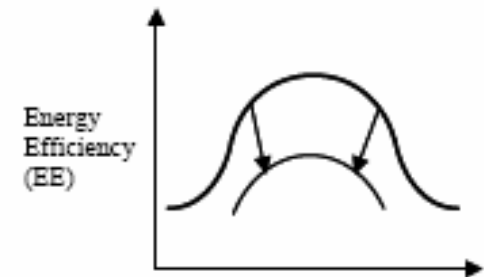
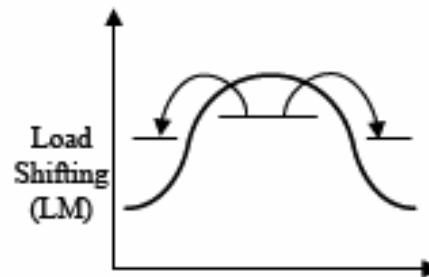
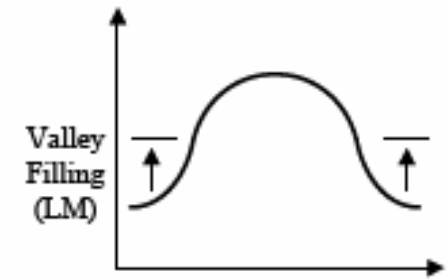
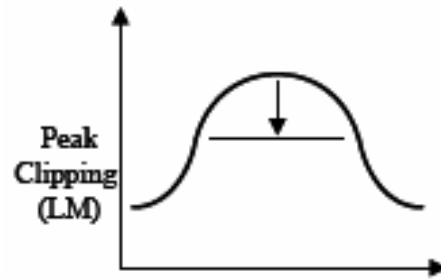


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Strategies/objectives of DSM

- **Reduce the peak** – especially attractive when maximum capacity is almost reached
- **Shift the loads**- usually between different periods of day
- **Valley filling**- better utilising existing power resources
- **Strategic conservation**- same energy services with less energy
- **Strategic load growth**- shift between different types of supply, electrification
- **Flexible load shape**- interruptible power, voluntary load reduction



Impact of DSM

- Potential to postpone the construction of new capacity.
- Can help to improve grid stability and increase the security of supply
- Potential to reduce retail prices for customers if dynamic tariffs are followed (optimal use of all energy options).
- More efficient use of the electricity system. Reduce transmission/distribution congestion.
- Reduce electricity consumption (and green house gas emissions).
- Potential contribution to facilitate the integration of fluctuating renewables and small power plants.
- Additional tools to manage load.
- Market for new measurement devices, controllers, intelligent appliances.



DSM/DRP – some programs ...

- Targets
 - Residential, services, industrial, agriculture
- Type of program
 - Rebates, information, financing - conservation
 - Specific end-uses studies,
 - Cycling, demand (price) response programs, voluntary load reduction (some programs are internet based)
 - Energy audits, energy management partnership
 - ...
- DRP need
 - A price that changes over time in response to demand/supply forces
 - The ability of consumers to see the prices signals
 - Measurement of the response



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Some barriers

- Distrust of energy suppliers in this role (providers of EE)
- Lack of information
- Risk aversion
- Several players in market – shared incentives
- Usually higher efficiency means “more expensive” and the search and getting familiar with new equipment / methods is not according to the conservative behaviour of companies/people. With no financial tools may be hard to be attractive
- Little interest of utilities and regulators
- In electricity markets most players focus on kWh price competition and sales volume
- The transaction costs of a service model can be high compared to annual household savings



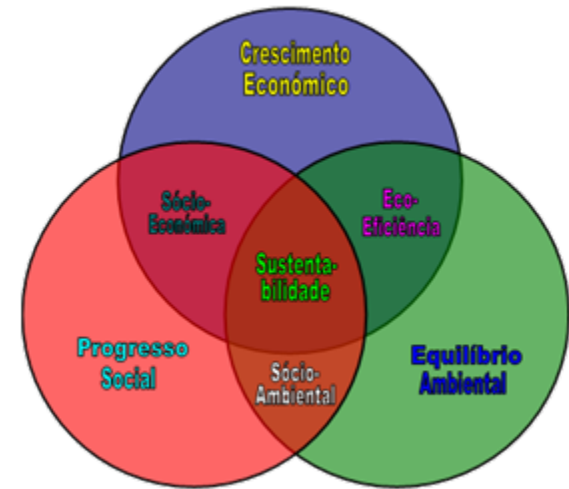
“New” opportunities

- Contribution to meet kyoto targets
- Grid security
- Real time pricing and load response more attractive
- Need for improved competitiveness of local/national economies
- New players
- ...



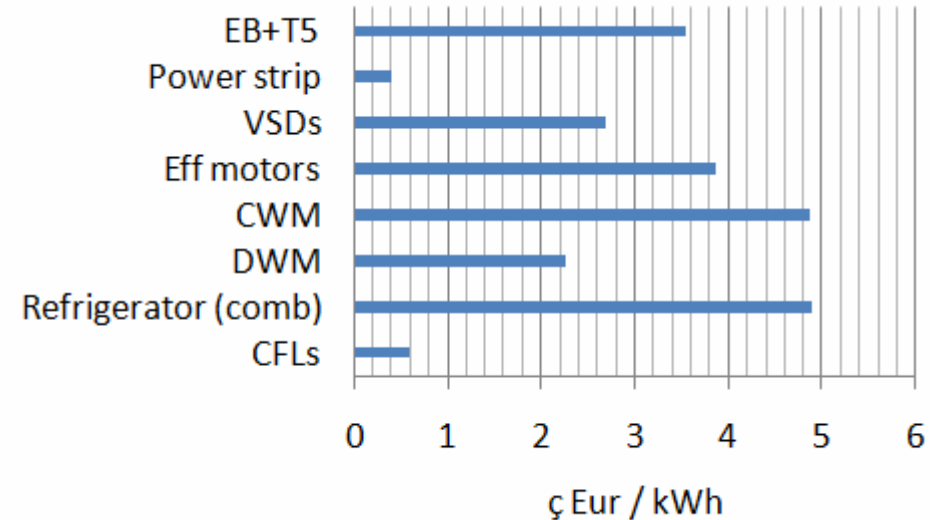
Sustainable development

Environmental, economic and social dimensions

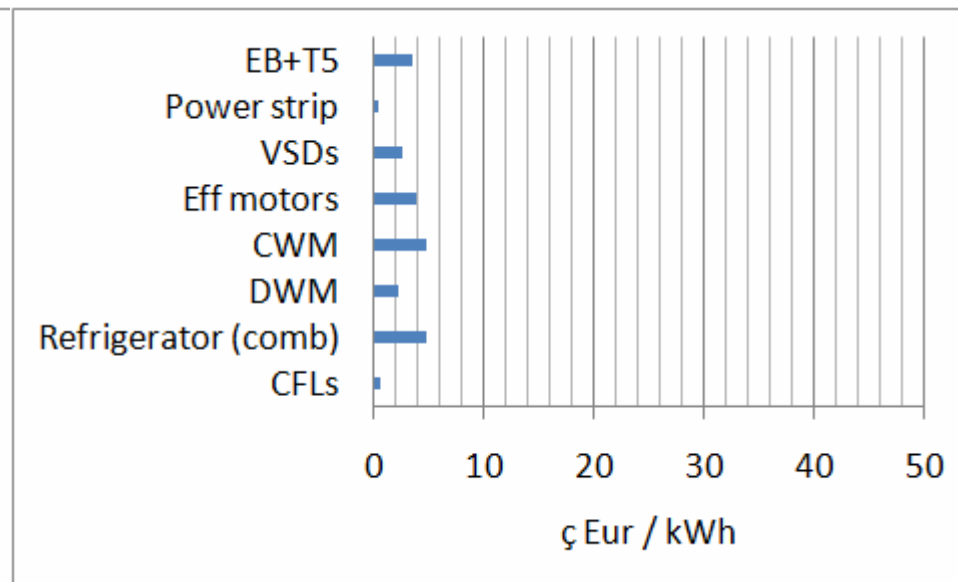
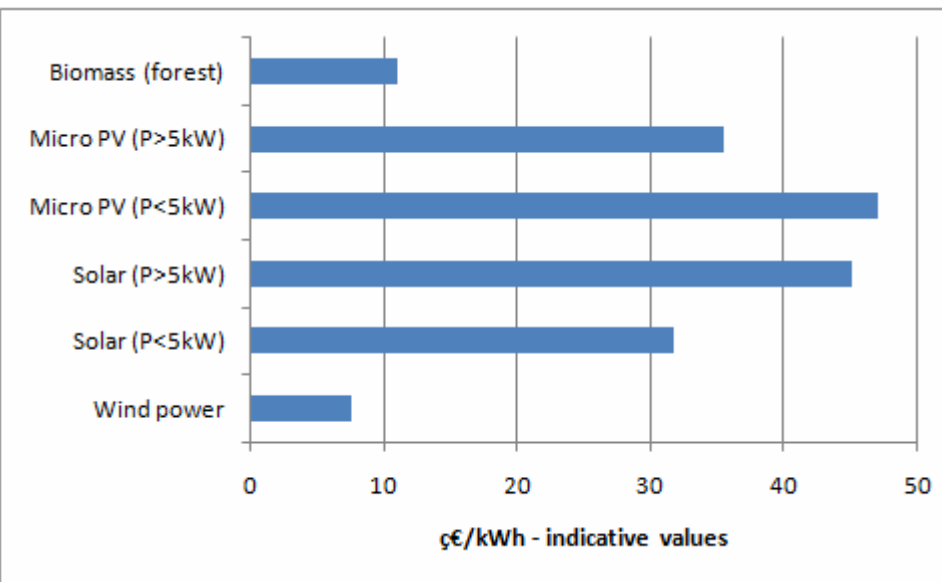


	ç Eur / kWh	Ton CO2	Nr devices
CFLs	0,59	45.554	300.000
Refrigerator (comb)	4,89	6.367	12.000
DWM	2,25	7.424	23.000
CWM	4,87	3.509	13.000
Eff motors	3,86	3.411	300
VSDs	2,69	6.846	200
Power strip	0,40	19.536	200.000
EB+T5	3,53	6.980	11.250

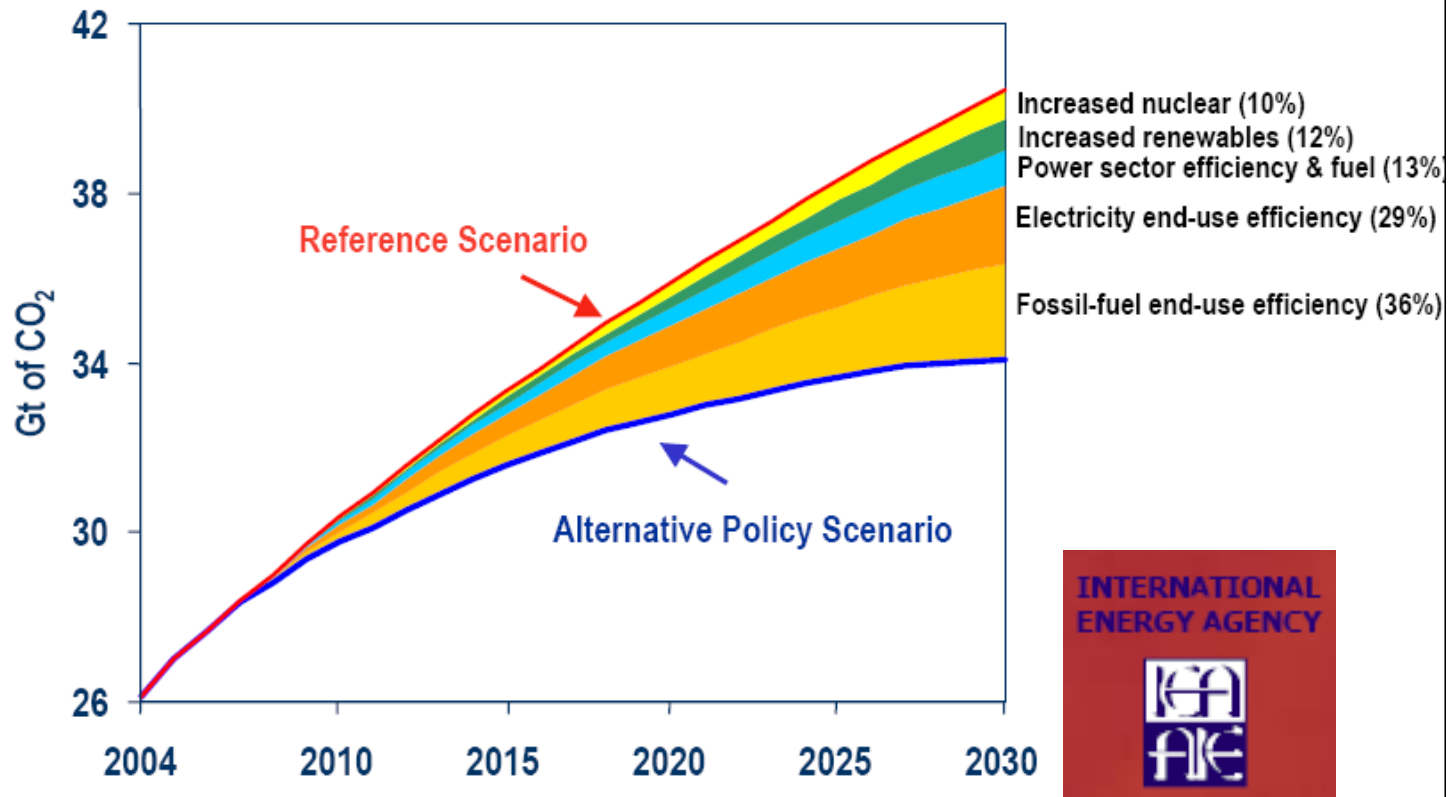
Costs of Saved Energy – estimates from PPEC



Tariffs (PRE) vs CSE (PPEC)



Energy-Efficiency accounts for 2/3 of avoided emissions in 2030 in the APS



Energy end-use Efficiency and Energy Services Directive - objectives

- To stimulate energy efficiency through the development of a market for energy services and the delivery of energy efficiency programs and measures to end-users.
- National indicative energy savings targets of 9% in 9 years
- The public sector should play a key role as a market driver
- Governments can impose public service obligations regarding energy efficiency on those entities operating in the gas and electricity sectors
- Creating conditions to develop and promote a market for energy services and delivering of other energy efficiency improvement measures
- The preparation of national energy efficiency action plans every three years
- Requirements on metering and billing



Action Plan for Energy Efficiency

- Appliance and equipment labelling and minimum energy performance standards
- **Developing services for energy end-use efficiency**
- Making buildings more energy efficient
- Making power generation and distribution more efficient
- Achieving fuel efficiency of cars
- Financing energy efficiency, economic incentives and energy pricing
- **Raising energy efficiency awareness**
- Foster energy efficiency worldwide



DSM criticisms (some)

- Who pays what / financing
 - Market forces not regulation / legislation (interference or policy makers)
 - Endurance of the impact of DSM measures
 - Measurement and verification
-
- The energy efficiency paradox



Instruments ... EES Directive

People must be aware that their actions determine the way (level and pattern) energy is consumed: different alternatives use different amounts of energy but deliver the same energy services.

- Information/education continue to play an essential role for energy efficiency improvement
- DSM tools and measures must be easily available (but DSM is not a product)

Member States shall ensure ...

- Conditions and incentives for market operators to provide more information and advice to final customers
- Competitive energy services available / promotion of competitive energy audits or energy efficiency improvement measures



Instruments ... EES Directive

- Remote metering (to provide information on energy consumption)
- Appropriate tariffs (Real time prices / time of use tariffs - carrot/stick)
- Financial instruments

Member states shall ensure ...

- Metering and information billing of energy consumption
- Energy audits
- Qualification, accreditation and certification schemes
- Energy efficient tariffs
- Financial instruments for energy savings
- Ensure the market oriented schemes (voluntary agreements, white certificates, ...) exist



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Instruments ...

- White certificates
 - Can make some energy efficiency measures more attractive
 - A market tool to promote DSM
- Regulation / voluntary agreements
- Energy services: a proven instrument to promote energy efficiency measures (ESCO, utilities, advisors, ...)
- Can DSM measures be grouped according to the end customer needs and provided as product? – the role of ESCOs

