Enerdata

Training Seminar

Evaluation of energy efficiency trends and potentials

Grenoble, 30 January – 10 February 2006

Accounting for policies and measures in end-use models

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Agenda

Translating policies and measures into model's inputs

Accounting for interactions among measures and rebound effects; how to deal with economic instruments?

Accounting for energy efficiency policy measures in end-use models: key points

- Policy measures are most often expressed in qualitative terms, not directly suitable for quantification in a model
- But energy efficiency targets must be precisely defined and quantified, in particular for ex-post evaluation pruposes
- Accounting for policy measures in the model means therefore three things
  - Link directly, whenever possible, either policy measures themselves, or, more easily, quantitative targets to model's exogeneous inputs
  - If quantitative targets or measure implementation features are too much agregated, disagregate, whenever possible, the agregated quantitative targets in more detailed targets taken into account the expression of the policy measures, and link to the model's inputs
  - Assess the interactions among policy measures, rebound effects, etc..on detailed targets before linking to model's inputs

Main targets of energy efficiency policy measures

- Technology
  - Improve energy performance of new equipment, devices, infrastructures
  - upgrade energy performance of existing equipment and infrastructures
  - Promote energy carriers with better energy efficiency
- Behaviours
  - Decrease the wasting
  - Make people more economically rationale in their choices
  - Promote a more responsible attitude towards environment and natural resources
- Organisation
  - Recover and use waste energy through recycling and exchange
  - Decrease mobility needs through improved spatial organisation
  - Promote more energy efficient infrastructures in buildings and transport

Main entry points of energy efficiency policy targets in end-use models

- Technology
  - Diffusion of new appliances, vehicle, processes with better energy performance
  - Specific consumption of new appliances, vehicles, process, etc…
  - Energy efficiency indexes/potentials in sectoral end-uses: space-heating, lighting, industrial end-uses, etc…
  - Energy products end-use efficiencies
- Behaviours
  - Energy efficiency indexes/potentials in sectoral end-uses: space-heating, lighting,…
  - Separate out specific consumption (technical eficiencies) and unit consumption (overall efficency)
- Organisation
  - Diffusion of cogeneration, recycling processes, …
  - Saturation in annual distance driven by cars, elasticity of freight traffic to GDP, …
  - Construction pattern, modal split in transport

Main instruments of energy efficiency policies

- Regulation
- Voluntary Agreements
- Labeling
- Economic incentives: tariffs, taxation, subsidies, certificates,…
- Information, audits

Regulation: main targets, inputs in end-use models

- **Main targets: thermal insulation of buildings, thermal equipment efficiency, performance of electrical appliances and motors**

- **Key issues as regard model's input**
  - **regulations provide precise quantitative objectives, usually corresponding directly to models inputs on specific consumption of new equipment, devices, process, etc…**
  - **but it is necessary to account for rebound effects (behavioural impact) and compliance (effectiveness of the impementation of the measure**

Voluntary agreements

- **Main targets: energy intensive industries (steel, chemicals, cement, etc..); car manufacturers**

- **Key issues as regard model's input**
  - **voluntary agreements provide precise quantitative objectives, usually corresponding directly to models inputs**
    - **either on specific consumption of new equipment (cars for example)**
    - **or on energy efficiency gains**
  - **but it is necessary to account for rebound effects (behavioural impact) and compliance (effectiveness of the impementation of the measure**

Information, labelling, audits

- **Main targets: producers and distributors of electrical appliances; real estate; consumers**

- **Key issues as regard model's input**
  - **give indications on energy saving potentials correponding to specific technical input of the model**
    - **either for specific consumption of new appliances**
    - **or for energy efficiency indexes**
  - **but it is necessary to account for compliance (effectiveness of the implementation of the measure) and interactions with other measures**

Economic instruments

- **Taxes, certificates, emission trading**
- **Main targets: big industries; transports; space heating; promotion of renewables**

- **Key issues as regard model's input**
  - **correspond to indirect inputs of the model**
    - **energy prices**
    - **boundaries for energy consumption or CO2 emissions**
  - **do not impact directly the energy demand projections calculated by the model, but provide information to check the consistency of the projections with the measures (budget coefficients, consumption/emissions limits)**

Subsidies and financial incentives

- **Tax deduction (energy saving equipment, renewables); accelerated amortizing**
- **Investment subsidies; low interest loans**
- **Guarantee funds for investments**
- **Minimum price offered for renewable electricity (wind, solar, co-géeneration)**

- **Key issues as regard model's input**
  - **no direct inputs in the model**
    - **energy prices**
    - **boundaries for energy consumption or CO2 emissions**
  - **captured through energy efficeincy indexes**

Example of input of policy measures in end-use models: transport with Med-Pro

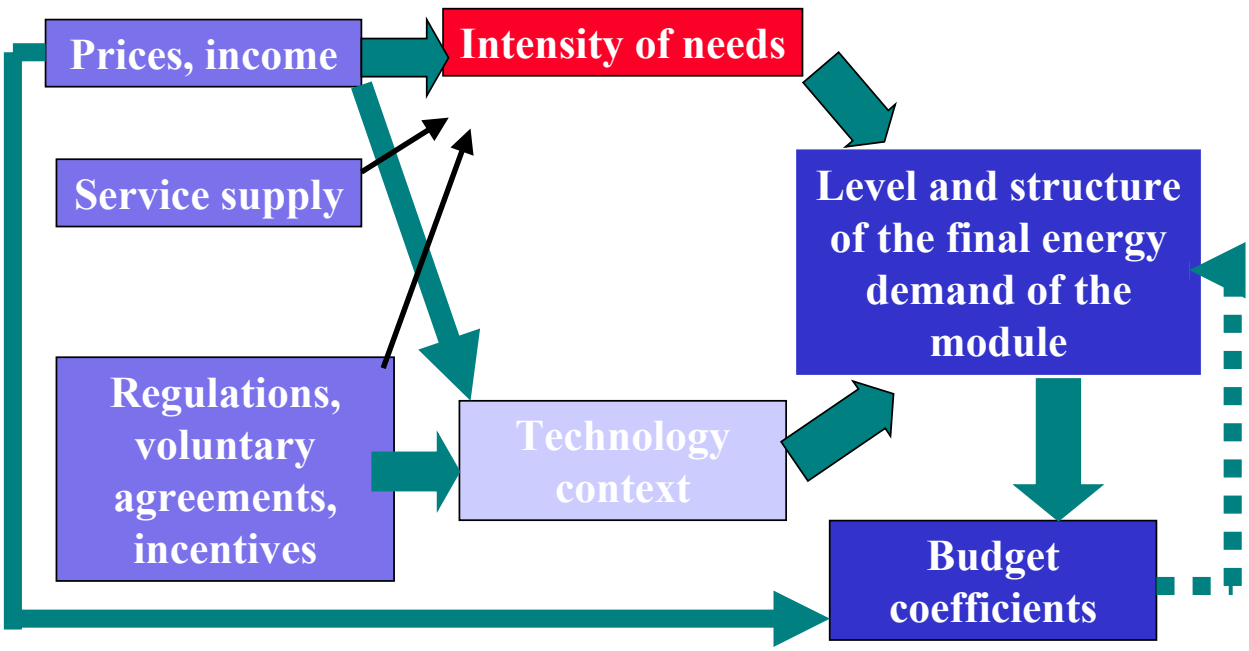
Policy measure	Target 2010	Variable medpro	
Voluntary agreement of car manufacturers	140 gCO2/vkm	XMFCNCY_MF	Index of specific consumption of new cars
EU Diective on biofuels	5,75%	PCAR	share of biofuels in gasoline and diesel
Efficiency Labels on new cars	0,1 Mtoe saved	PCARN	Share of car types in sales of new cars
Bonus-malus for new cars purchase	1 Mtoe saved		
Speed limits	1 Mtoe saved		No input in med-Pro
information on quiet driving	0,2 Mtoe saved		
Public transport development	0,1 Mtoe saved	INVP, LFVKCY,	index of evolution of the stock of buses, load factors
Improvement in logistics	0,2 Mtoe saved		No input in med-Pro
Development of freight railways		TCTKT, ILFTR,	index of evolution of the ton-km in rail, load factors
development of TGV		TCPKT, ILFTR,	index of evolution of the pas-km in rail, load factors
	0,2 Mtoe saved	PINTCY	index of evolution of pass in air transport

Agenda

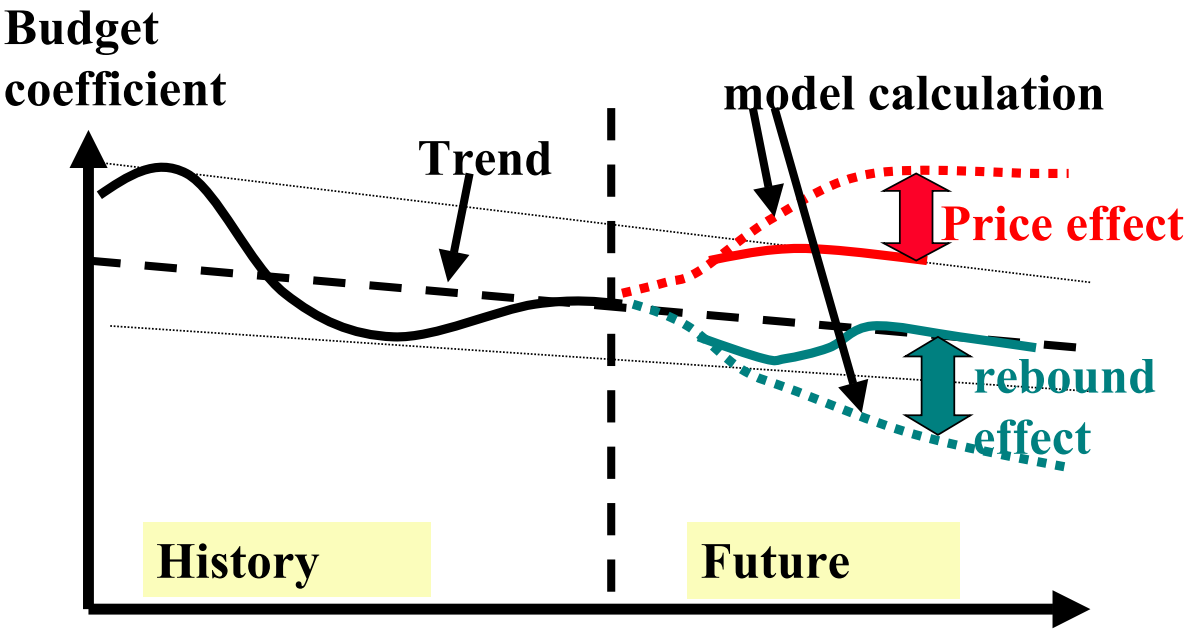
Translating policies and measures into model's inputs

Accounting for interactions among measures and rebound effects: how to deal with economic instruments

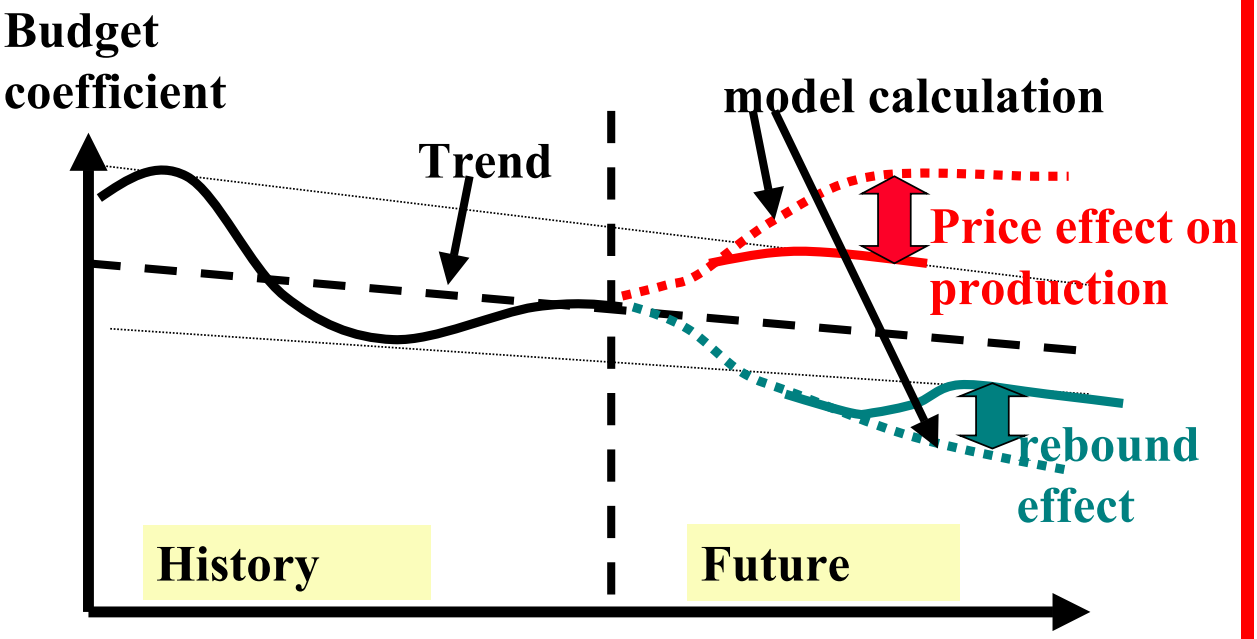
how to account for interactions among policy measures in the models: general principles



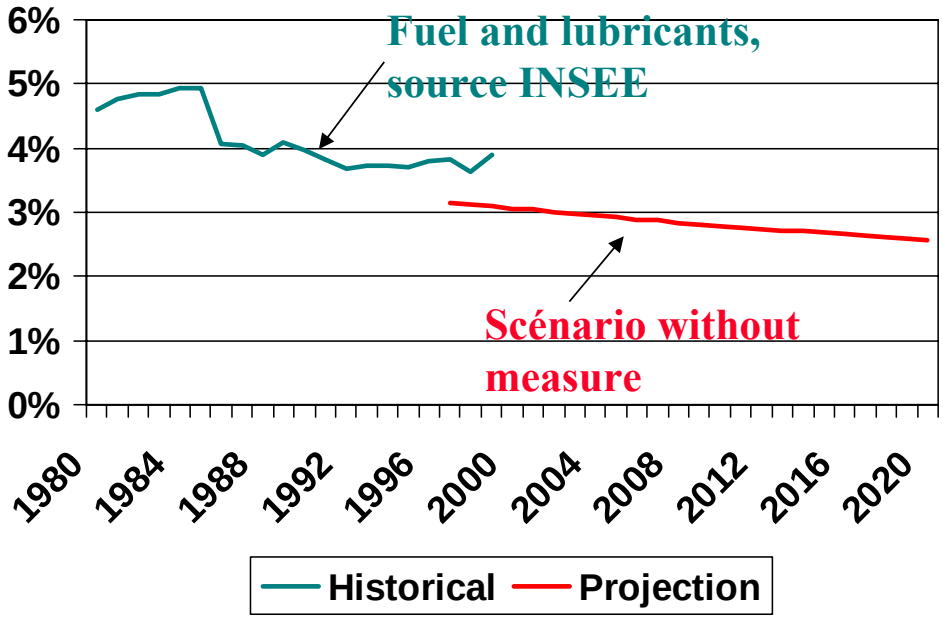
Budget coefficients: fundamentals for households



Budget coefficients: fundamentals for producers



Budget coefficient: a way to address consistently economic instruments and regulatory instruments: example of motor cars with Med-Pro



Budget coefficients for motor cars: the fundamentals from historical evolutions

- **Historical trend downwards: the scenario without measure indicates the bottom line of the budget coefficient in the future**
- **Historical short term fluctuations shows that the budget coefficient never get higher than 25% above the long term trend**
- **The historical elasticity of the budget coefficient to energy prices is roughly 0.85**

Example: ACEA agreement with Med-Pro

- **As compared to the reference scenario, MED-PRO calculates in 2010:**
  - **A decrease of the budget coefficient**
  - **A decrease of the CO2 emissions**
- **This result violates one of the fundamentals of the budget coefficient: it cannot remain permanently below the bottom line**
- **Med-Pro results are therefore « adjusted », taking into account the rebound effect:**
  - **The budget coefficient is assumed to get back to the bottom line in 2010**
  - **This implies that the CO2 emission reduction is limited to 3.1 MtC instead of 3.8**

Findings – Evaluation of measures

- **The global impact of a package of measures is less than the addition of the impacts of all individual measures**
- **The impact of one particular measure depends on all the other measures taken at the same time: there cannot be a single universal evaluation of this impact**
- **The reference as to the future « natural » trend of the budget coefficient has a crucial importance in the ex-ante evaluation process**

Findings – Modelling

- **Price elasticities give an accurate assessment of the impact of pricing-taxation measures only in case no regulatory measure is taken simultaneously**

- **Budget coefficients are necessary instruments to evaluate rebound effects and impacts of packages of measures**

- **Simulating feed-backs of budget coefficients on technical and economic determinants of the energy demand is almost impossible: only a global evaluation « off model » on energy demand and CO2 emissions is relevant**