

Monitoring of energy efficiency policies

1. Methods and requirement to determine the final impact and efficiency
2. Key monitoring indicators to explain success or failure and monitor policy implementation



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Why is monitoring essential?

- A good monitoring systems is a prerequisite for a good evaluation! It assures that...
 - all essential information is gathered to determine the final impact and cost-effectiveness of a (package) of policy instruments
 - all essential information is gathered to closely watch the intermediate policy implementation steps to ensure timely reformulations or reorganisation of policy instruments (if necessary)

EU Directive on Energy Efficiency

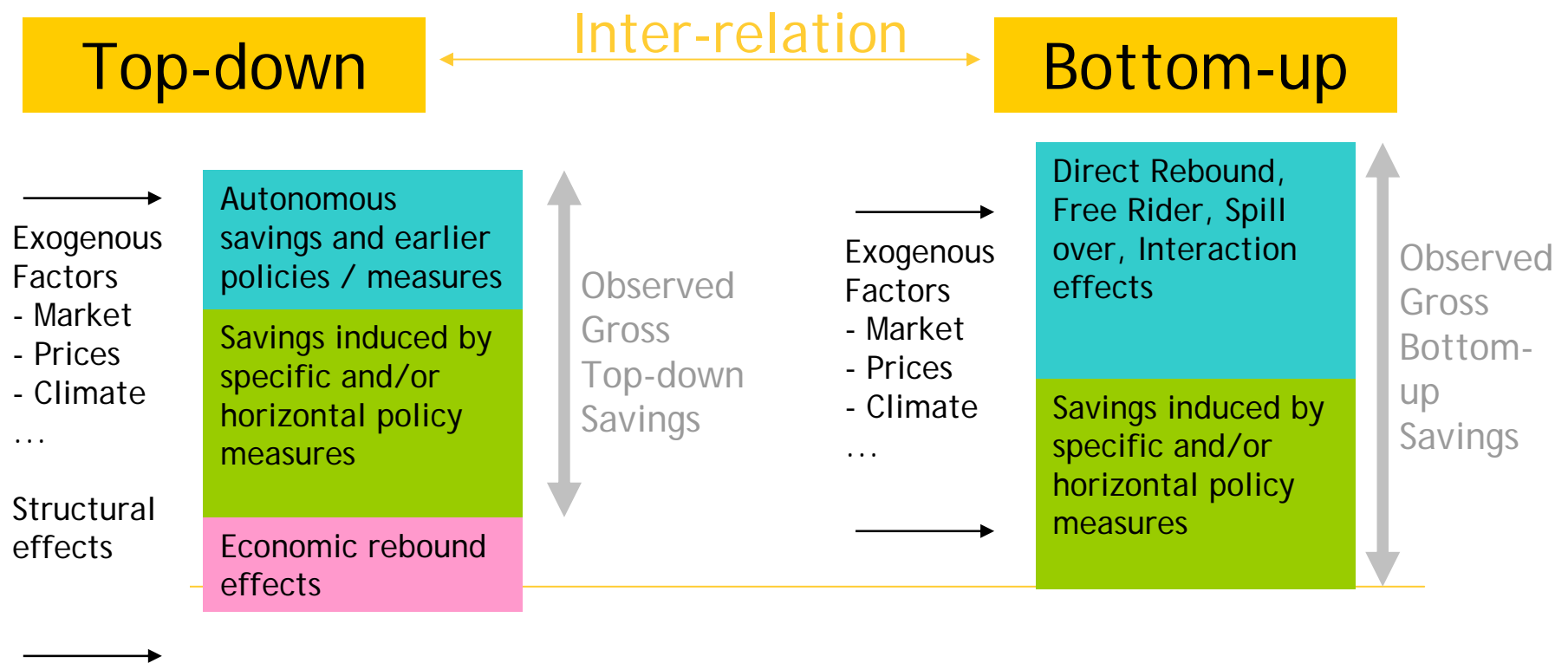
- Directive puts strong focus on 'measuring' final energy savings
- Short term priorities of the EC:
 - Developing harmonized calculations model for measurements and verification of energy savings
 - Developing harmonized European energy efficiency indicators and benchmarks
- Directive requires mixture of bottom-up and top-down methods

“Measuring” impacts: from bottom-up to top-down methods

1. Simple bottom-up methods (full ex-ante)
 - Standard ‘upfront’ savings for generic measures that can be easily replicated (e.g. insulation, CFLs, high efficiency boilers)
2. Engineering approach
 - Savings are determined using a limited amount of measured data (e.g. CHP)
3. Bottom-up benchmarking
 - Savings are compared to given performance benchmark
4. On-field measurements of savings (full ex-post)
 - Applied in case savings are above a certain threshold
5. Top-down monitoring of single measures, by using market data and modelling
6. Various kinds of top-down modelling on the national level
7. Combination of bottom-up and top-down evaluation

Bottom-up vs. Top-down measurement

CF. EU-IEE project EMEEES



Measuring overall impact of policy package

Top-down: Example of domestic cold appliances

- Aggregated indicators as basis: Sales figures (e.g., GfK, Nielsen) describing share of A+ / A++ / A over time
- Identifying autonomous savings, e. g., by country comparison with countries not implementing such a package, and/or by extrapolation of past developments
- Identifying exogenous / structural effects: e. g. change in product mix, impact of change in energy price
- Identifying economic rebound effects, e. g., larger appliances, longer use of appliances or increase in number of appliances / household

Questions not answered by top-down measurement

- What will be the impact of a whole policy package if the total effect is small (e.g., less than 5%) and hardly distinguishable from statistical noise?
- What is the impact of single policy instruments within the package?
- What instruments are particularly effective / efficient?
- To what extent are the different policy instruments in the package needed? How strong are the interlinkages?

=> Need for bottom-up evaluation

General formula for measuring net impact of technology-specific programmes and services

- Energy savings in kWh =
Energy savings per measure of a type *
Number of measures *
(1 - free rider fraction + spill-over effect) *
(1 - rebound effect) *
Persistence fraction (i.e. fraction of measures actually in use)
- Energy savings per measure in case of domestic appliances:
Comparison of new efficient appliance with new inefficient appliance
- Evaluation means: surveys / interviews, sales statistics, monitoring of rebates, audits, etc.

Multiple policies and measures in a field of technology / application / sector

Integrated top-down / bottom-up methods

- Starting with bottom-up evaluation of specific policy instruments:
 - Evaluation of implemented measures
 - Motivation for implementation of measures
 - Impact of policy instrument on implementation
 - Degree of influence by other policy instruments
- Adding impact of horizontal measures like green tax
- Maybe added by or compared to bottom-up / top-down modelling of energy consumption in this field of application / sector

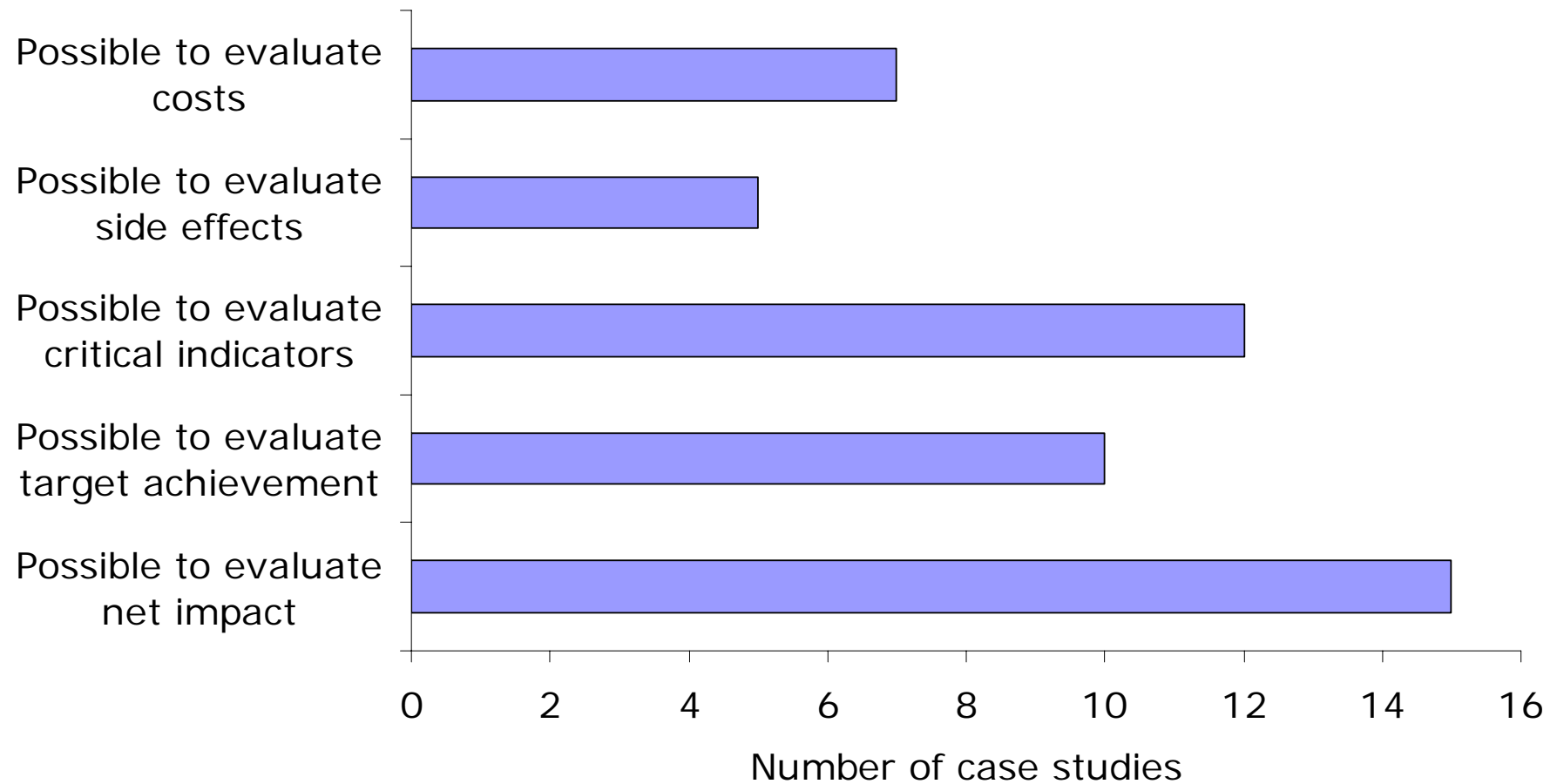
Essential monitoring information to determine impact and cost-efficiency

- **Impact** > depending on type of method applied (bottom-up versus top-down)
- **Cost data:**
 - *Government costs:* implementation costs, administration costs, enforcement costs (in case of regulation), programme costs (campaigns, training etc.), costs for monitoring and evaluation, subsidies, tax exemptions / deductions
 - *Cost for end-user:* marginal investment cost, energy prices, marginal operation and maintenance cost

Finding from the AID-EE project: Monitoring does not have high priority

- For most instruments monitoring information is collected on a regular basis, however...
-monitoring information is often insufficient to determine target achievement, impact and efficiency of an instrument
-quantitative or qualitative indicators that could be supportive in explaining success or failure are poorly developed and mostly no monitoring information is gathered
-monitoring and verification of actual energy saving got relatively low priority in most of the analysed instruments.

Availability of monitoring information



**Key monitoring indicators to explain
success or failure and monitor policy
implementation**

Energy performance standards for buildings

- **Key monitoring information to explain success or failure**
- Number of checks carried out (permits, buildings)
- Number of non-compliant permits / buildings
- Number of sanctions
- Changes in product range suppliers
- Number, variety and (additional) costs energy saving measures
- Number of buildings constructed according to standard

Mandatory targets/tradable permits

- **Key monitoring information to explain success or failure**
- Number and type of end-users approached
- Number and type of end-users that have implemented energy saving measures based on activities (audits, leaflets etc.) by the energy company
- Number, variety and (additional) costs of energy saving measures implemented
- Number of non-compliant energy companies
- Number of sanctions
- Amount of permits traded, price of permits and liquidity of the market

Labelling of cars or appliances

- **Key monitoring information to explain success or failure**
- Share of cars/appliances that contains a label
- Share of high efficient cars/appliances in the sales catalogue
- Share of consumers who recognize and understand the label
- Share of consumers who base their buying decision on the label
- Number of sales of high efficient car/appliances
- Market share of high efficient cars/appliances

Financial instruments

- **Key monitoring information to explain success or failure**
- Number/share of eligible actors that are familiar with the scheme
- Number of eligible actors that apply for the scheme
- Number and variety of rejected projects
- Number, variety and (additional costs) of granted projects (to determine a.o. free riders)
- Market share of eligible measures / changes in product range of suppliers
- Changes in energy tax / other financial incentives / energy prices

Voluntary agreements

- **Key monitoring information to explain success or failure**
- Number/share of companies in the sector that signed the agreement
- Share of total sectoral energy consumption accounted for by the participants in the scheme
- Number of VA compliance plans
- Number, variety and (additional) costs of energy saving measures implemented
- Energy savings achieved with implemented projects

Considerations

- Is monitoring justifiable?
- Which aspects are most important to monitor?
- How much time and resources should be spent on monitoring?
- Acknowledge that some data are hard to monitor.
- Actively decide which (intermediate) targets to set for the policy instruments especially if final impacts are hard to determine