Evaluation and Reporting of the Impact of DSM Programs

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Overview

- Existing international evaluation methods
- Evaluation within the EU
- Evaluation & Reporting in the EU Directive on energy end-use efficiency and energy services (ESD)
- EU Harmonized Bottom-up Evaluation method
  - The process
  - Level of evaluation efforts
  - Four steps calculation process
- Summary

Existing international evaluation methods 1996-2007

- USA
  - Model Energy-Efficiency Program Impact Evaluation Guide, 2007
  - California Energy Efficiency Evaluation Protocols: Technical, Methodological and Reporting Requirements for Evaluation Professionals 2006
  - Database for Energy Efficiency Resources (DEER database) 2005
  - The California Evaluation Framework, revised version September 2004
  - California Public Utilities Commission, Energy Efficiency Policy Manual, version 2, August 2003,
  - California standard practice manual: economic analysis of demand-side programs and projects, October 2001
- International Performance Measurement and Verification Protocol, several revised versions since 1997, IMPV
- IEA DSM Agreement
  - International Database on Energy Efficiency Programmes (INDEEP) 1994-2004
  - Evaluation guidebook. 2005

EVO

EFFICIENCY VALUATION ORGANIZATION

International Performance Measurement and Verification Protocol

Concepts and Options for Determining Energy and Water Savings
Volume 1

Prepared by Efficiency Valuation Organization
www.evo-world.org

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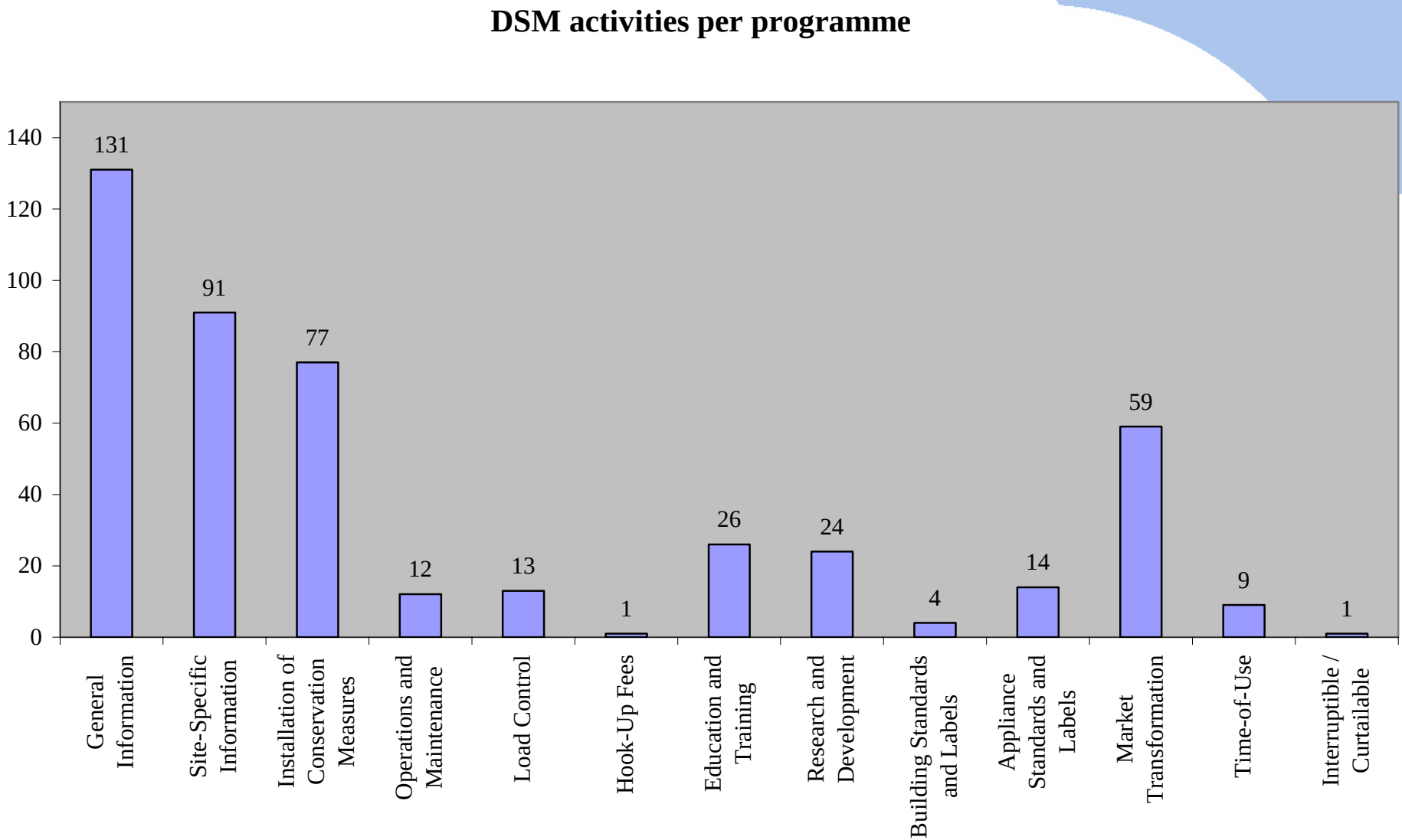
IEA INDEEP DATABASE 2004



International Energy Agency
Implementing Agreement on
Demand-Side Management
Technologies and Programmes

EVALUATING ENERGY EFFICIENCY POLICY MEASURES & DSM PROGRAMMES

VOLUME I
EVALUATION GUIDEBOOK

BASED ON NATIONAL CASE STUDIES & NATIONAL AND INTERNATIONAL EXPERIENCES

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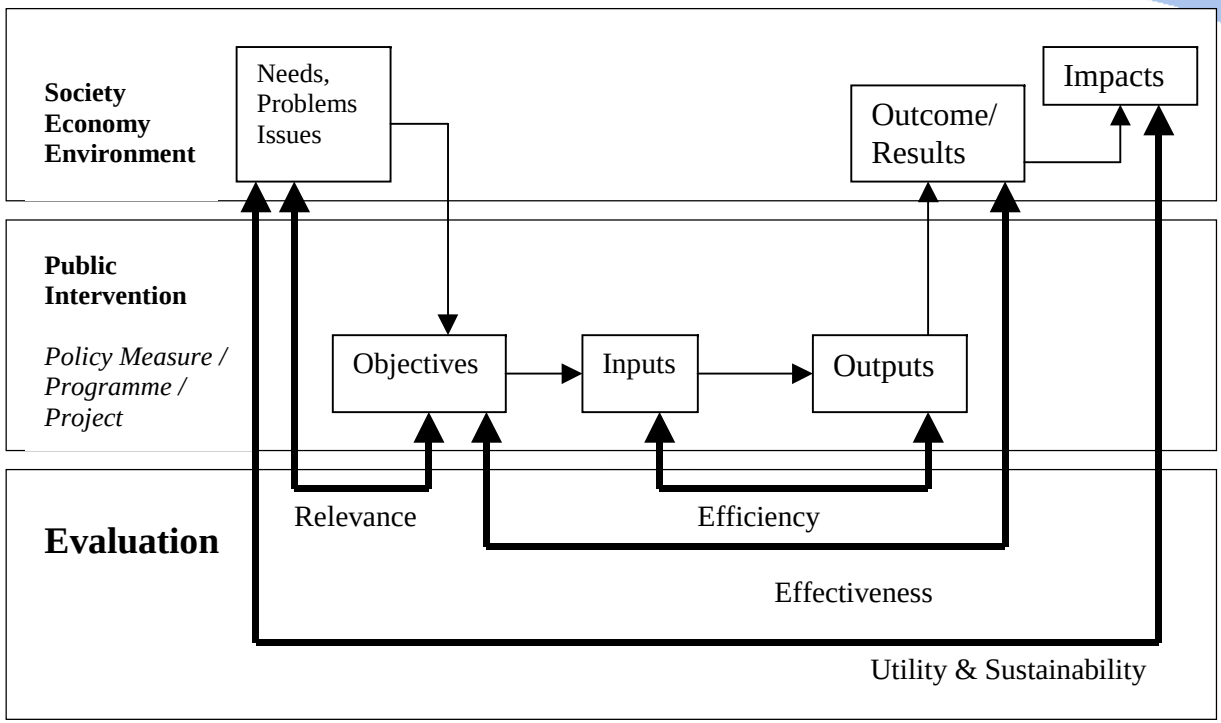
Financed by Sweden, the Netherlands, Korea, Italy, France, Denmark, Canada and Belgium

IEA DSM Evaluation guidebook 2005

Evaluation framework for a normative evaluation



Evaluation Questions

- *Relevance*: To what extent are the objectives justified in relation to needs?
- *Effectiveness*: To what extents have the expected objectives been achieved?
- *Efficiency:* Have the objectives been achieved at lowest cost?
- *Utility & Sustainability*: Are the expected of unexpected effects contributing to a net increase in social welfare and sustainability?

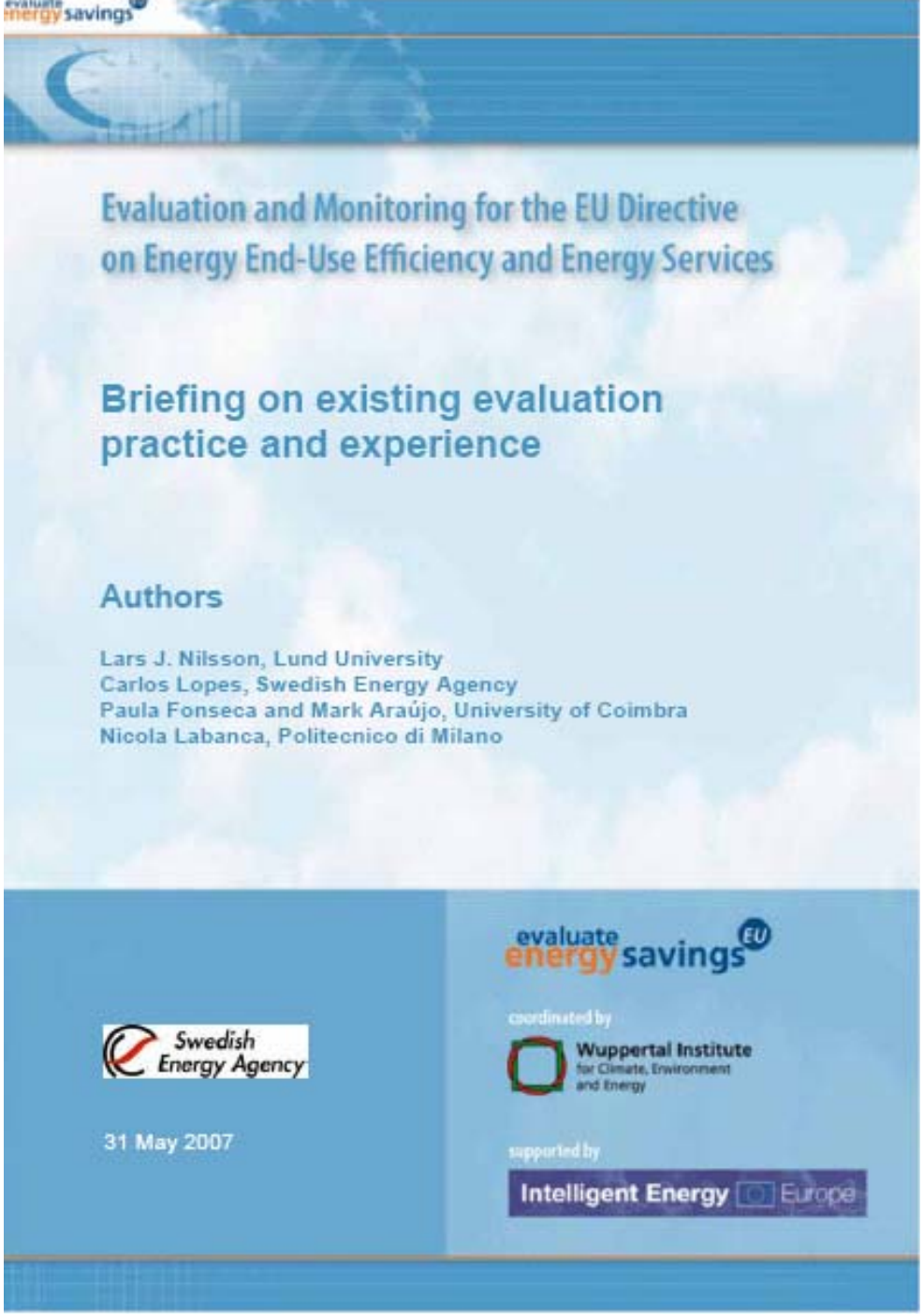
Source: European Commission 1999 and Technolopolis France 2001

Seven key analytic elements, IEA DSM evaluation guidebook

1. Statement of policy measure theory.
2. Specification of indicators for evaluation.
3. Development of baselines for indicators.
4. Assessment of output and outcome.
5. Assessment of energy savings, emissions reductions and other relevant impacts.
6. Calculation of costs, cost-efficiency and cost-effectiveness.
7. Choice of level with regard to the evaluation effort.

Evaluation within the EU 1996-2007

- European Benefits/Cost Analysis methodology for DSM and EE services (1996); one of the more integrative studies for the European Commission to harmonize evaluations related to IRP and Cost optimization programs
- European Union Ex-post Evaluation Guidebook (2001)
  - 1998 Phase 1 overview existing evaluation practices and issues to be incorporate in a new methodology
  - 2001 Phase 2 test the methodology and evaluation guidebook
- Theory Based policy evaluation (2007)


Evaluation and Monitoring for the EU Directive
on Energy End-Use Efficiency and Energy Services
Briefing on existing evaluation
practice and experience
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31 May 2007
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EU
coordinated by
Wuppertal Institute
for Climate, Environment
and Energy
supported by
Intelligent Energy
Europe

	EEI promotion measure	Country	Main type of measure	Bottom-up evaluation method used					
				Direct measu-rement	Bills & sales data analysis	Enhanced engineering estimate	Mixed deemed and ex-post	Deemed esti-mate	Surveys of popu-lation samples
	Energy taxes	SE	F	top-down evaluation (econometric modeling)					
General	White certificates	IT	R/F				X	X	
	White certificates	FR	R/F				X	X	
	Energy Efficiency Committment	UK	R/F				X	X	X
	RUE Obligations	BE	R/F					X	
Resi-dential and tertiary	FEMP	USA	R		X	X		X	X
	EPS Building Standards	NL	R	X				X	X
	Building regulation in Carugate	IT	R					X	
	Elsparefonden	DK	F		X		X	X	
	Appliance labelling	NL	I/F						X
	Energy+	EU	I				X		
	KfW buildings programme	DE	F					X	
	Helles NRW	DE	F/I				X		

	EEI promotion measure	Country	Main type of measure	Bottom-up evaluation method used					
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Industry	Free energy audits	DK	I/F			X		X	
	Technology Procurement	SE	I/F					X	X
	Investment Deduction Scheme	NL	F/R						X
	Voluntary Agreement	DK	F/R					X	X
	Programme for EEI in industry	SE	F/R					X	X
	Energy Audit Programme	FI	I/F			X		X	X
	Industrial EE Network	NO	I/F				X	X	X
Transport	ACEA	EU	R	top-down evaluation (based on sales data: diffusion indicator)					
	Ecodriving	NL	I					X	
	Congestion charging Stockholm	SE	F/R	X	X	X	X		X
	Car sharing	DE	S						X

The Existing and Applied Evaluation Methods in the EU, 2007

- Most evaluations rely on deemed savings and surveys, with an element of ex-post verification in some cases;
- Technology-focused EEI promotion measures in the residential sector are generally easier to evaluate than measures in other sectors;
- In industry it seems more difficult to isolate the impact of a promotion measure. Frequently, the savings are calculated based on self-reported information concerning investments made and ex-ante enhanced engineering estimates resulting from the energy audit.

Future monitoring & reporting

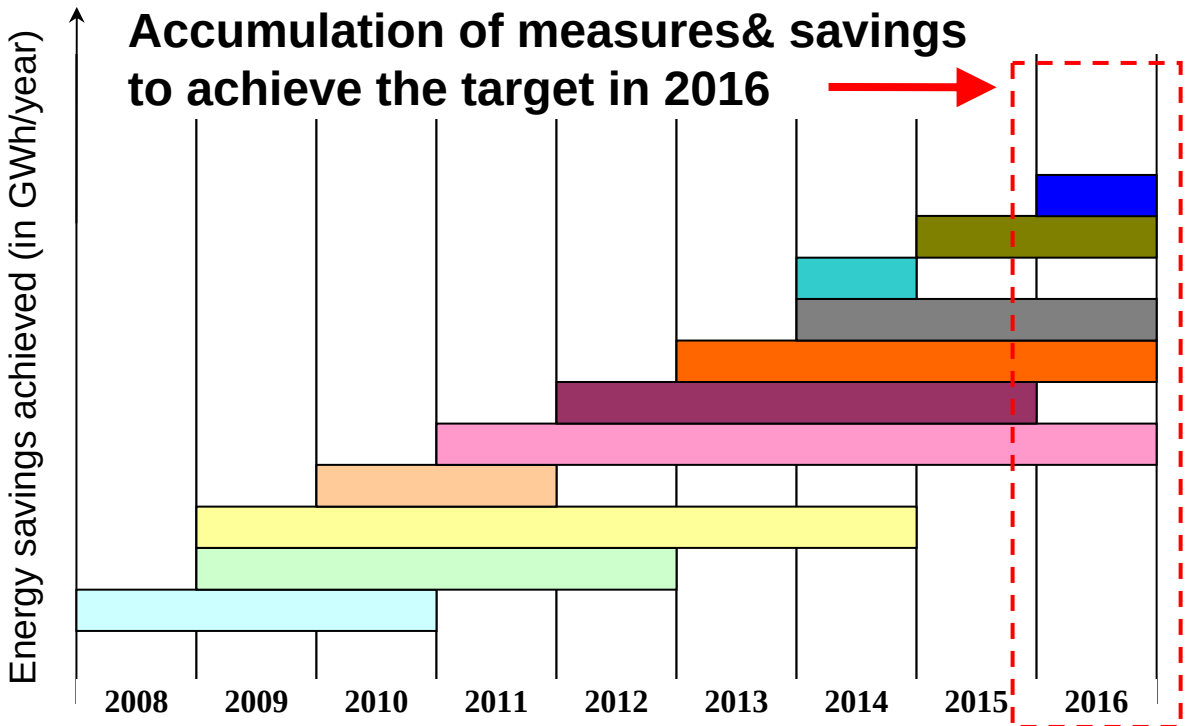
Starting point: the EU Energy Savings Directive

- May 2006: European Union Directive on energy end-use efficiency and energy services (ESD);
- An indicative target of 9% energy efficiency (EE) improvement in end use energy by 2016 for each EU Member State;
- Country reports on progress should be based on a combination of bottom-up and top-down energy savings calculations ;
- “Evaluation and Monitoring for the EU Directive on Energy End-Use Efficiency and Energy Services” (EMEEES) project to support the European Commission;
- The ESD committee for implementation of the evaluation and monitoring methods.

ESD energy savings and targets

What does *"cumulative annual energy savings"* mean?

=> sum of the annual energy savings (kWh/year) from the different EEI measures, but **only in 2010 and 2016** (accumulation of annual energy savings)



Combination of Top- down and Bottom-up Evaluation method

- Top-down calculation method
  - the amount of energy savings is calculated using the national or larger-scale aggregated sectoral levels of energy savings as the starting point.
  - then going down to more disaggregated data when necessary (e.g. energy efficiency indicators) and
  - correcting for non-policy effects such as autonomous savings to assess policy-induced energy savings
- Bottom-up calculation methods
  - start from data at the level of a measure, mechanism or programme,
  - then aggregates results from all EEI measures and programmes reported by a MS to assess total energy savings in a specific sector.

EU Harmonized Bottom-up Evaluation method

- The initial harmonised model for bottom-up evaluation by January 2008 should covering 20-30% of annual inland energy consumption and this should increase over years;
- The EMEEES project is one of the main inputs for this EU harmonised model.
- The work is organized in three steps:
  - The *process* for developing a harmonized bottom-up evaluation method;
  - Up to 20 concrete bottom-up evaluation *methods;*
  - A set *of harmonized default values and benchmarks* for specified years;

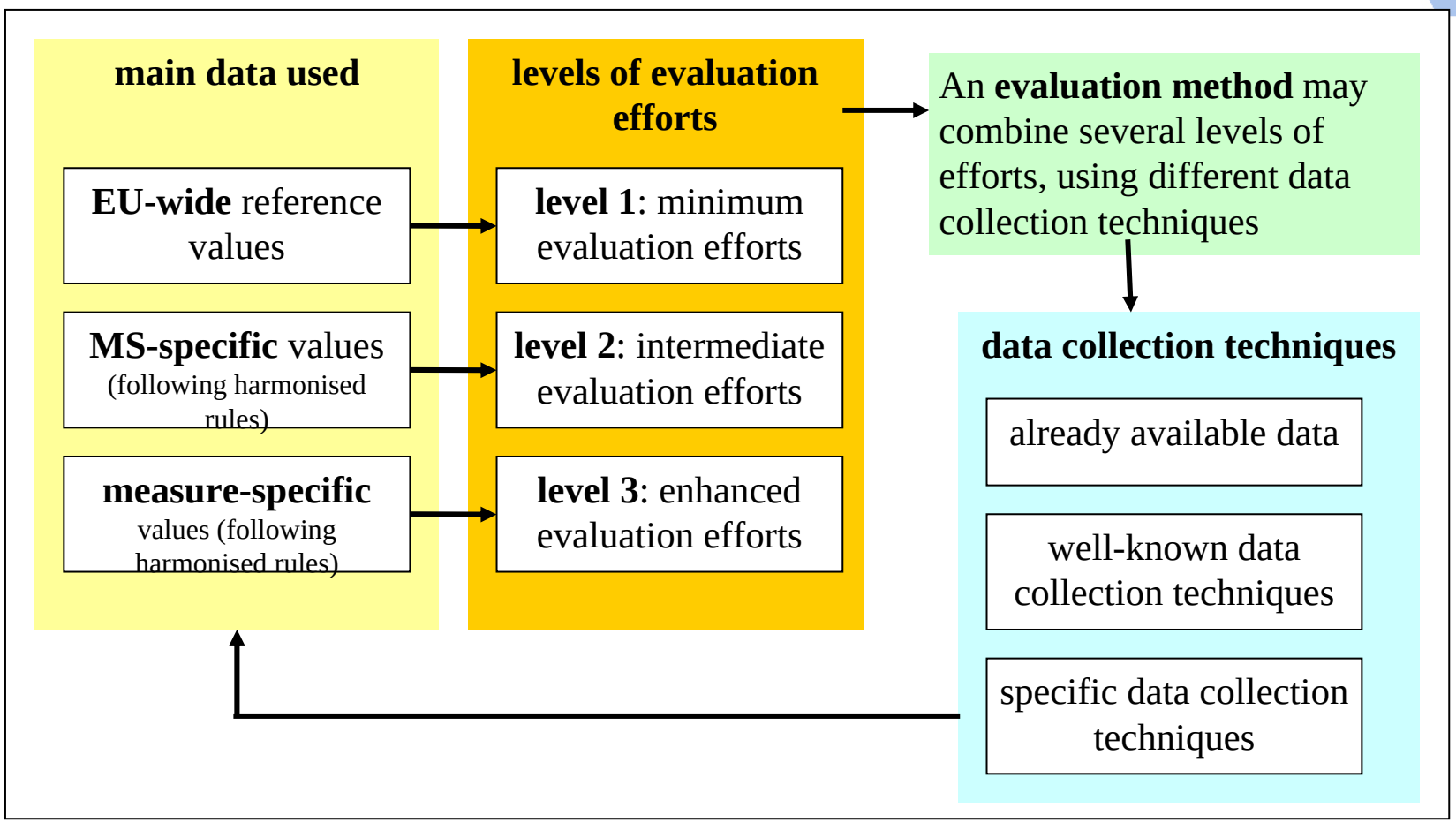
The Process for EU Harmonized Bottom-up Evaluation Methods; general principles

- Be as thorough as possible in analyzing the relevance of correction factors, and the possibilities to evaluate them.

- But be as pragmatic as possible in the methods proposed as a result of the analysis,

- With as many EU-level average values as possible

The Process for EU Harmonized Bottom-up Evaluation Methods; three levels



The Process for EU Harmonized Bottom-up Evaluation Methods; calculation process: 4 steps

Step 1: unitary gross annual energy savings (in kWh/year per participant or unit)

\+ ***number of participants or units***

Step 2: total gross annual energy savings (taking into account the number of participants or units, in kWh/year)

\+ ***double counting, multiplier effect***, + *other gross-to-net correction factors (e.g. free-rider effect)?*

Step 3: total ESD annual energy savings in the **first year** (taking into account double counting, multiplier effect, and other gross-to-net correction factors (e.g. free-riders) ?, in kWh/year)

\+ ***timing and lifetime,*** + *performance degradation (?)*

Step 4: total ESD annual energy savings achieved in the year 2016 (in kWh/year, taking account of the timing of the end-use EEI action, its lifetime and eventual performance degradation)

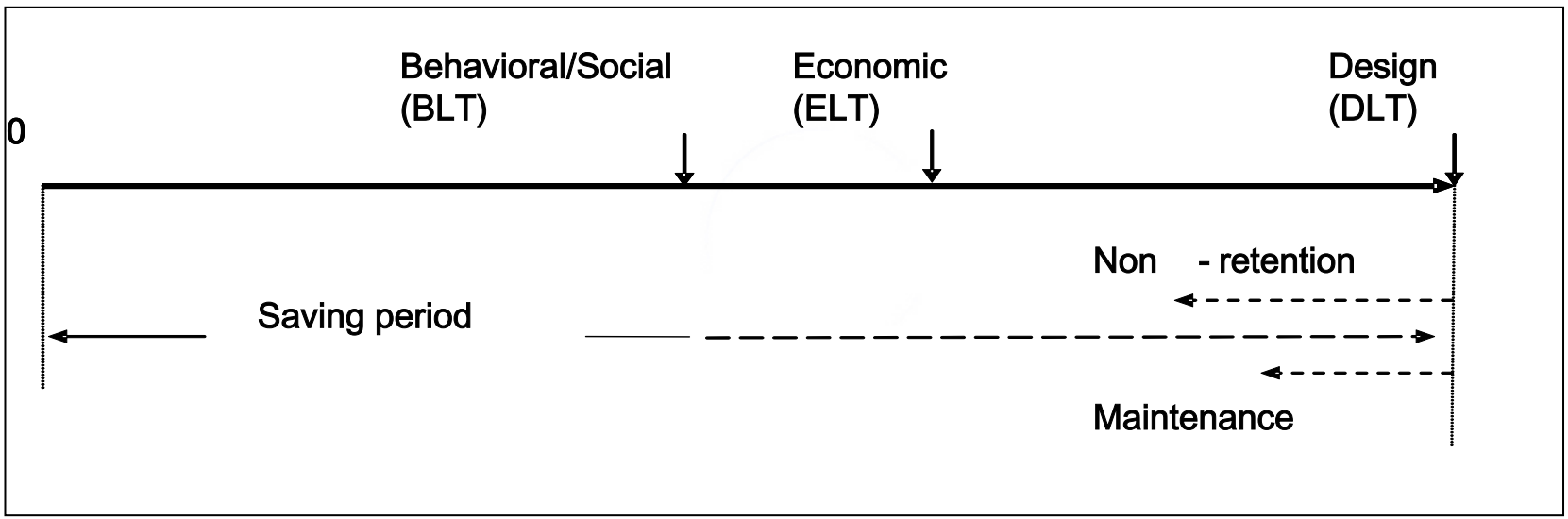
Energy Savings Lifetime

- Defined as the number of years actually used in calculations of bottom-up energy efficiency improvement;

- The saving lifetime can take into account, explicitly or implicitly, factors that influence the energy savings during the saving period;

- Three options:
  A. an EU harmonized saving lifetime figure for all EU countries;
  B. a country specific calculated lifetime figure;
  C. an EU default saving lifetime figure.

Savings period en lifetime options



EU harmonized saving lifetime figures commercial and public buildings

EEI measure	Harmonized Saving lifetime (in years)
Windows/glazing	24
Insulation: building envelope	>25
Heat recovery systems	17
Energy efficient architecture	>25
Heat pumps (commercial sector)	20
Efficient chillers in AC	17
Efficient ventilation systems	15
Motion detection light controls	10
New/renovated office lighting	12
Public lighting systems	13

Summary

- There is a history on evaluating DSM programmes, in countries, EU and international, but US experiences are more or less still leading;
- The ESD and the following EU Energy Action plan will stimulate harmonisation for monitoring and evaluation for EE or DSM programmes;
- By mid 2011 the MS have to report on progress using a combination of top-down and bottom-up evaluations and in future reports more and more should be based on bottom-up evaluation;
- Future EU standardization on energy savings calculation is emerging

www.evaluate-energy-savings.eu

Thank you for your attention

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