



# Uncertainties in the evaluation of energy savings potential

**Paul Baudry – Dominique Osso**  
**EDF / R&D**

*eceee 2007 summer study \_ La Colle sur Loup*



# Outline

- **European Energy Package : 3 x 20 % in 2020. Is the 20% energy efficiency a difficult target ?**
- **Background on methods for the evaluation of energy savings potential**
- **Sources of uncertainty in the evaluation of savings potential**
- **Partial results on the technical savings potential in the residential sector in France**
- **From experts to policy decision : reliable results and uncertainties !!**

# Which use of potential studies ?

- **Policy objective**

- Long term achievable potential
- **Reasonable uncertainty acceptable**
- Priority = give a cap , ambitious but not disconnected to reality !

- **Target for obligations of savings**

- Short term achievable potential
- Must integrate the rate of market transformation
- **Uncertainty on the actual accessibility of the target must be limited**
- Costs and market conditions must be well known by the public authority in charge of setting the target

- **Stakeholders delivering energy savings**

- Ranking the end uses for their cost/benefit ratio
- Giving priority for R&D on new technologies

# Background : definitions (1/4)

- **Technical potentials**

- Direct substitution of the stock of end use technologies by best available technologies
- Does not include technological progress that would occur in the future

- **Economic Potentials**

- Technologies for which the investment cost is lower than the price of the energy saved during the lifetime of the equipment
- Depends strongly on the energy price assumptions and on the discount rate used for investment costs

- **Achievable potentials**

- Additional accessibility conditions : technical, economic or societal
- Should be addressed for a given period of time or yearly
- Constrained by the rate at which homes and businesses will actually adopt energy saving technologies and practices.

## Background (2/4) : results on energy savings potentials in EU

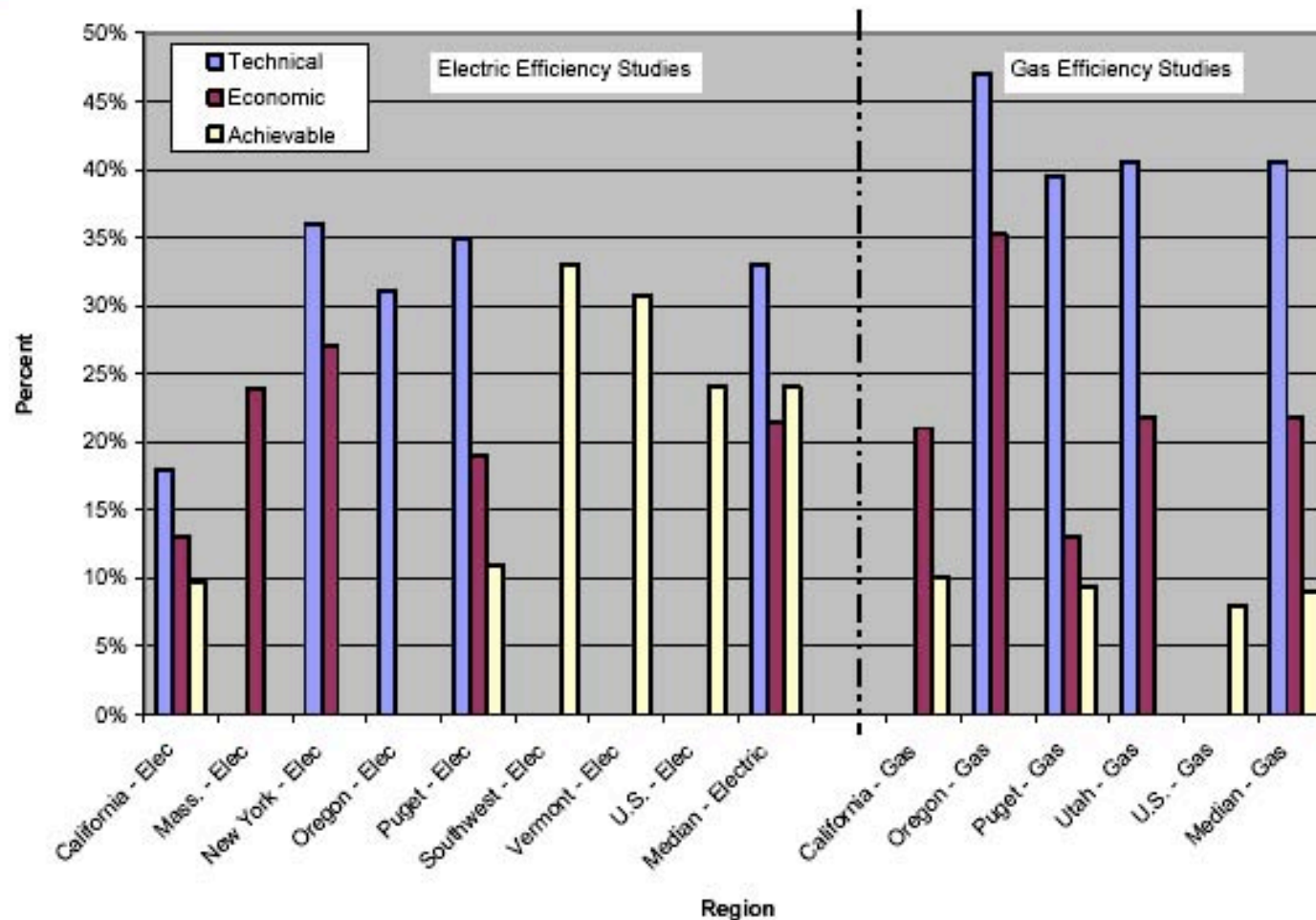
European Action Plan for Energy Efficiency :

*“the EU could save at least 20 % of its present energy consumption in a cost effective manner, equivalent to EUR sixty billion per year”*

Sector	Energy consumption (Mtoe) 2005	Energy Consumption (Mtoe) 2020 (Business as usual)	Energy Saving Potential 2020 (Mtoe)	Full Energy Saving Potential 2020 (%)
Households (residential)	280	338	91	27%
Commercial buildings (Tertiary)	157	211	63	30%
Transport	332	405	105	26%
Manufacturing Industry	297	382	95	25%

Source: European Commission, EU-25 Baseline Scenario and Wuppertal Institute 2005.

## Background (3/4) : Results on technical, economic and achievable potential for Energy Efficiency from 11 studies in USA



From the proceedings of the *2004 ACEEE Summer Study on Energy Efficiency in Buildings*

6 Steven Nadel, Anna Shipley and R. Neal Elliott

*The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S.*



## Background (4/4) : cost evaluation for energy efficiency programs

- California Standard Practice Manual : tests evaluating the balance between costs and benefits on different perspectives
  - Participant cost : (consumer)
  - Rate impact measure test (non participant cost)
  - Total resource cost, (variant named societal cost test)
  - Program administration cost test (utility cost test)
- Potential studies should consider the total resource cost test
- In a white certificate system, the cost of the certificate is the utility cost. The value of the penalty for white certificates should not be compared to the price of energy saved

# Methodology for the evaluation of technical potential

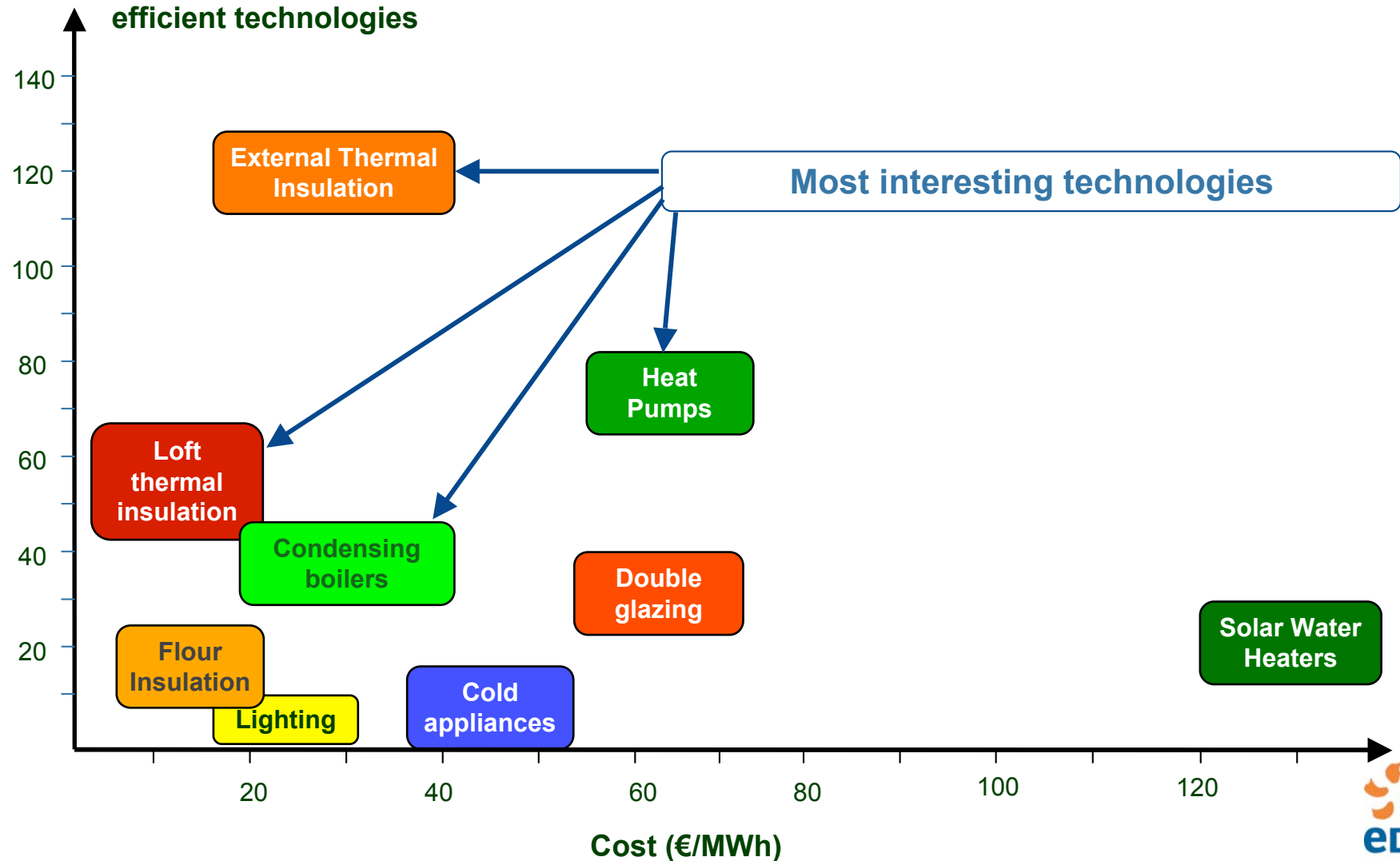
- Unitary energy efficiency improvement for each end use in residential, tertiary and industrial sectors, and related cost (only the technology cost)
- Total potential for each end use at the national level (number installations concerned by the energy saving action, based on public surveys and databases)
- Integration of individual potentials at the level of each sector, avoiding double counting of savings (i.e. thermal insulation v.s. boilers or heat pumps)
- Integration of the different sectors : difference of data quality  
Residential > Industry > Tertiary

## Proposed assumptions for the evaluation of energy savings and associated costs applied to selected end uses in the residential sector in France

End-use	Baseline	Total cost v.s. overcost	Comments
<b>Loft, wall and ground thermal insulation</b>	stock performance average	total cost	Induced by the energy efficiency measure
<b>Double glazing</b>	stock performance average	total cost	Mainly induced by the energy efficiency measure, but the comfort is also a strong factor of decision
<b>Condensing boiler or high temp. heat pump</b>	market performance average	overcost.	The policy aims at transforming the existing market
<b>Solar water heater</b>	stock performance average	total cost	Induced by the energy efficiency measure
<b>CFL</b>	market performance average	overcost	Difficulty on the lifetime assumption (years v.s. number of switches).
<b>Refrigerators</b>	market performance average	overcost	The cost difference includes non energetic functionalities like design

# Technical energy savings potentials of end use technologies in the residential sector in France

Technical potentials (TWh/year) with efficient technologies



# Sources of uncertainty for the evaluation of technical and economic potentials

## Technical potential

- **Baseline for performance and cost : replacement v.s. policy induced investment**

- Stock of equipment or average of the market sales
- Overcost (replacement) or total cost (policy induced investment)

- **Rebound effect : should it be included ?**

- If we consider the same energy service before and after the energy efficiency improvement action, rebound does not exist.
- Rebound effect, also called comfort effect, integrates the observation that the energy service is increased (by the consumer) after the energy efficiency improvement

- **Discount Rate (societal discount rate ?)**

## Economic Potential

- **Variation of energy prices**

# Sources of uncertainty for the evaluation of achievable potentials

- Additional technical limitation related to the actual conditions
  - Recent households can hardly be retrofitted
  - Thermal flour insulation applied only to limited conditions
- Limitation from the rate capacity of installers and manufacturers of efficient equipments (including quality)
- Factors driving the customer decision for buying efficient equipment
  - Might be translated in discount rate
  - Differences between residential and commercial or industry (rational economic behaviour or not, paybacktime, which level of incentive ?)
- Transaction costs (from technology cost to total resource cost)
- Co benefits of energy efficiency
- The rate of market transformation

# Conclusion : uncertainties in the use of potential studies

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**Thank you for your attention !**

*[paul.baudry@edf.fr](mailto:paul.baudry@edf.fr)*

**Don't forget the side event today at 2pm,  
organised by eceee and EDF !**

*« From commodity seller to sustainable energy supplier,  
the changing role of utilities »*

