Economic Analysis of Residential Energy Efficiency Improvements

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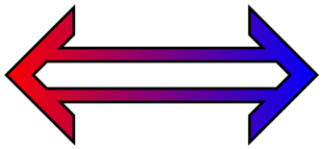
Outline

- CBA vs. macro-economic modelling
- Overview of Residential sector CBA
- Need for both approaches…

CBA vs. Macro Modelling

CBA

- Individual policy analysis
- Bottom-up, disaggregated
- ‘Simple’ understandable method



Integration

Macro-modelling

- Programme monitoring and evaluation
- Economy wide interactions
- Top-down, aggregated
- Understandable method?

Clear, *targeted* messages

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Trade-off, micro vs. macro approaches

	Micro (bottom-up)	Macro (top-down)
General structure	Informal, flexible, use of subjective elements	Formal, complex, objective based on behavioural theory
Level of disaggregation	High (individual projects)	Low (aggregated)
Use of theory	Weak (judgemental)	Strong (macroeconomics)
Model calibration	Judgemental	Scientific/econometrics
Policy impacts	Implicit/ranking	Explicit/quantified
Treatment of externalities	Usually ignored	Usually explicitly modelled

Source: GEFRA and ESRI, 2005 (table 1.1)

Getting better…!

Focus: Residential grant scheme CBA

- Residential grant scheme for insulation, heating supply and controls
  - Over €420m spent 2009-2012
    - €147m from exchequer (34%)
  - Over 140,000 homes upgraded
  - Around €3000 per dwelling (shallow-medium)

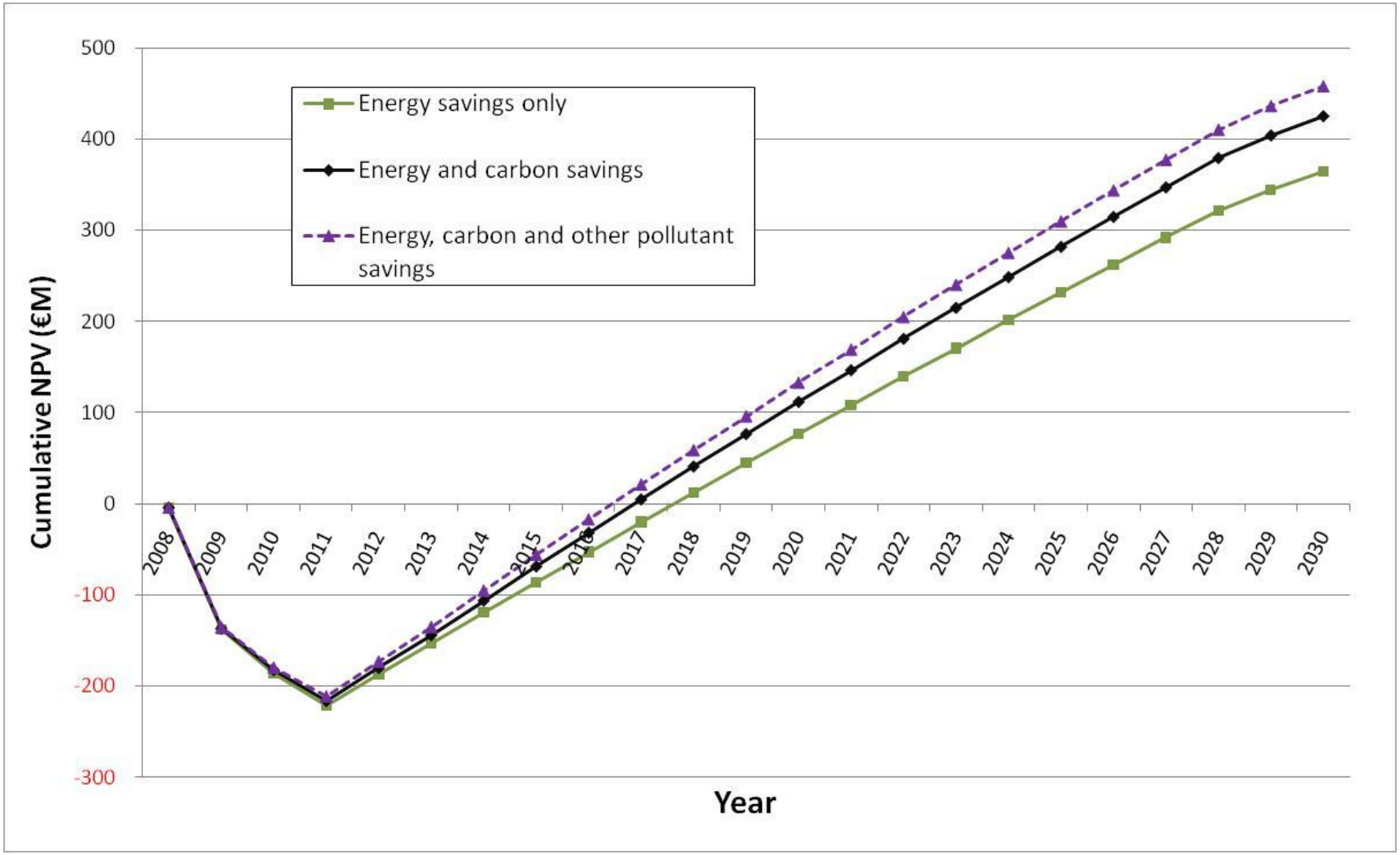
- Data collected (per dwelling, disaggregated)
  - Technologies installed
  - Costs of installation
  - Grant levels

Costs and Benefits

Costs	Data	Source
Exchequer grants	Value of grant	Scheme database
Private expenditure	Calculated based on average % grant	Scheme database
Administration/salary	Calculated value	SEAI expenditure

Benefits	Data	Source
Energy Savings	Engineering calculation + billing analysis	SEAI modelling and empirical study
Value of CO_2 emissions reduced	Based on emissions factors and carbon price	SEAI data, Department of Finance CBA Guidelines
Value of other pollutants (PM, SOx, NOx)	BeTa MethodEx (2007)	European Commission DG Research

Results



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Survey feedback

- In addition to energy savings participants reported:
  - Improved comfort and wellbeing (health)
  - Reduced dampness
  - Perceived increase in value of dwelling
  - (reduced use of secondary electric heating)

How to value?

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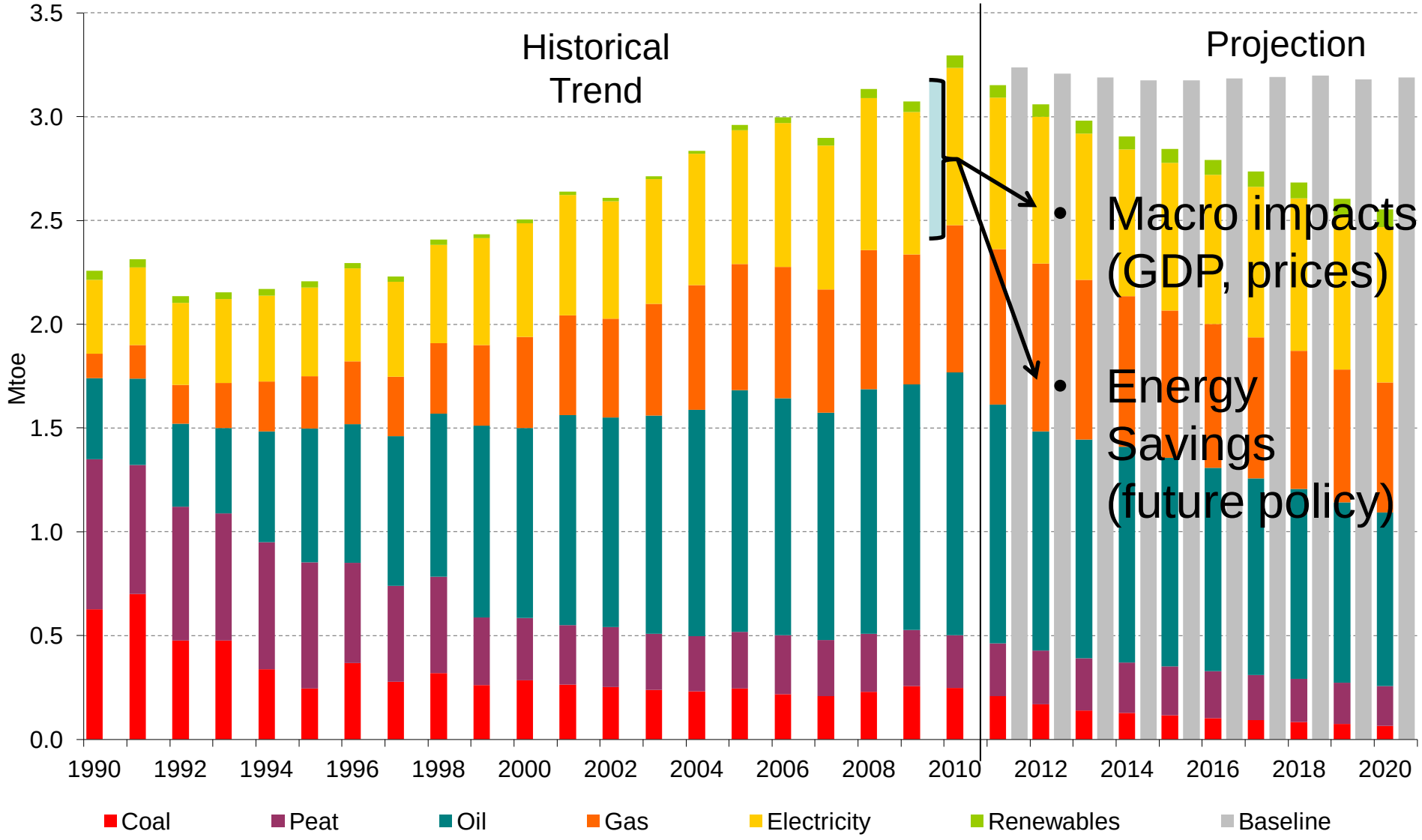
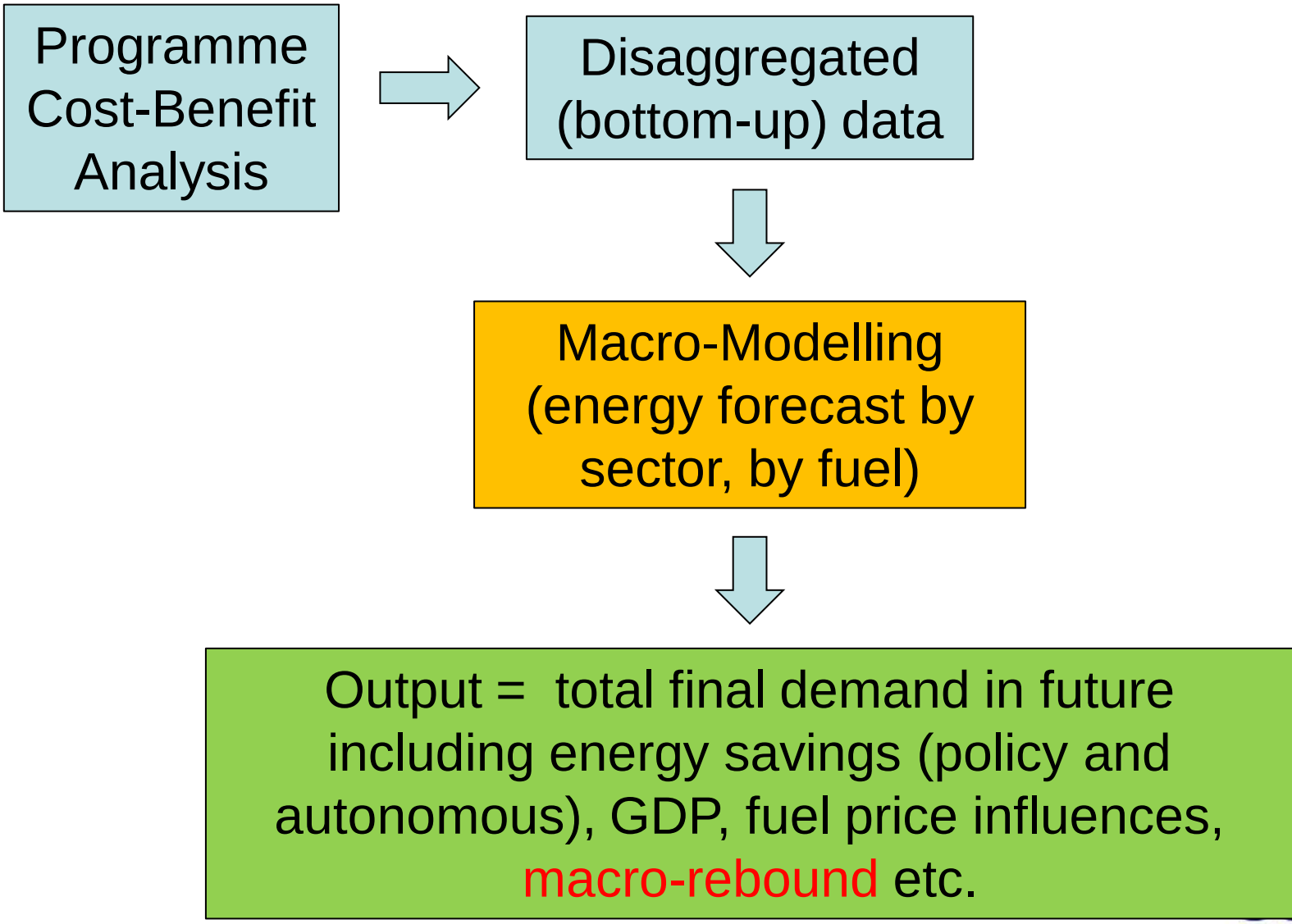
Beyond energy and emissions

	Benefits not covered	Treatment in CBA	Alternative treatment
1	Improved householder comfort	Savings estimates reduced	Include in CBA as benefit on willingness-to-pay basis
2	Improved health through enhanced household living environment	Not included – lack of data	Include in CBA using .. 1. International data/benchmarks? 2. New Irish data
3	Improved asset values	Not included	New study available
4	Employment (supply, installation and project management)	Not 'valued' – Gross estimates	Macro-model …
5	Broader economic impacts of sustainable energy investment	Not included in CBA	Macro model …Import dependence, macro-rebound, capital flows, multipliers

Residential final demand



CBA informing Macro-modelling



Refining the message

million building upgrades

across the residential, commercial and public sectors by 2020

- **Net societal benefit of around €12 billion**
  - **Net societal benefit of around €6 billion**
- **Energy savings, comfort and over 5000 jobs**
  - **Over 5000 jobs supported per annum**
- Over 5000 net jobs created over the period
  - 8,000 GWh
- 7,000 GWh and 1.9Mt CO_2
  - 2.3 Mt CO_2 after macro-rebound

BETTER ENERGY
The National Upgrade Programme

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Integration is necessary

- Not possible to simply add up a bunch of CBA's for overall impacts
- CBA's can miss some important pieces of information
- integrating macro-modelling avoids the loss of important information in the process of evaluation

Method integration ….

Effectiveness

Efficiency

Desirable policy impacts

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References

Available at:
http://www.seai.ie/Publications/Energy_Modelling_Group/Energy_Modelling_Group_Publications.html

- *Economic Analysis of Residential and Small Business Energy Efficiency Measures*
- *Better Energy Homes Impact Report - Billing Analysis*

Also:

- *An Integrated Micro-Macro (IMM) approach to the evaluation of large-scale public investment programmes: The case of EU Structural Funds,* GEFRA and ESRI (June, 2005) http://www.esri.ie/pdf/WP167_An%20Integrated%20Micro.pdf