E. Ó Broin*, E. Mata*, J. Nässén†, F. Johnsson*
*Division of Energy Technology, †Division of Physical Resource Theory
CHALMERS UNIVERSITY OF TECHNOLOGY, Göteborg, Sweden

Quantifying the Energy Efficiency Gap for Space and Water heating in the Residential Sector in Sweden

Bottom Up Model – Top Down Model = Energy Efficiency Gap

PARAMETERS
Technical Measures
Discount Rate
Investment Costs
Energy Costs
Profitability

EQUATION

If (Cost of Investment – Cost of Energy Saved)/Energy Saved < 0 measure is cost effective.

Measure Savings Calculated (2030)	TWh
Change of U Value of basement & facades & Roof	2.5
Replacement of Windows	1.4
Ventilation with Heat Recovery	6.7
Reduction of Power used for Production of Hot Water	1.3
Use of thermostats to reduce indoor temperature by 1.2° to 20°	12.2

PARAMETERS
Price Elasticities
Influence of Climate Regulations
Technical Progress
Inertia

EQUATION

$$\ln(I_t) = \ln(P_t)\alpha + \ln(I_{t-1})\beta + (HDD_t)\gamma + (t)\delta + C$$

Parameters Coefficients Calculated (1970 to 2005)	
Price Elasticity *(α)*	-0.13
Lag *(β)*	0.59
Heating Degree Days *(γ)*	-0.00008
Trend *(δ)*	-0.003
Long Term Price Elasticity	-0.32

CAUSES
Market Barriers
Transaction Costs
High Real Discount Rate
Technology diffusion is slow

24TWh – 19TWh = 5TWh

(BU Potential to 2030) – **(TD Potential to 2030)** = **(Gap in 2030)**

Conclusions

Some cost-effective measures are not being realized for various reasons (See list of causes above map).

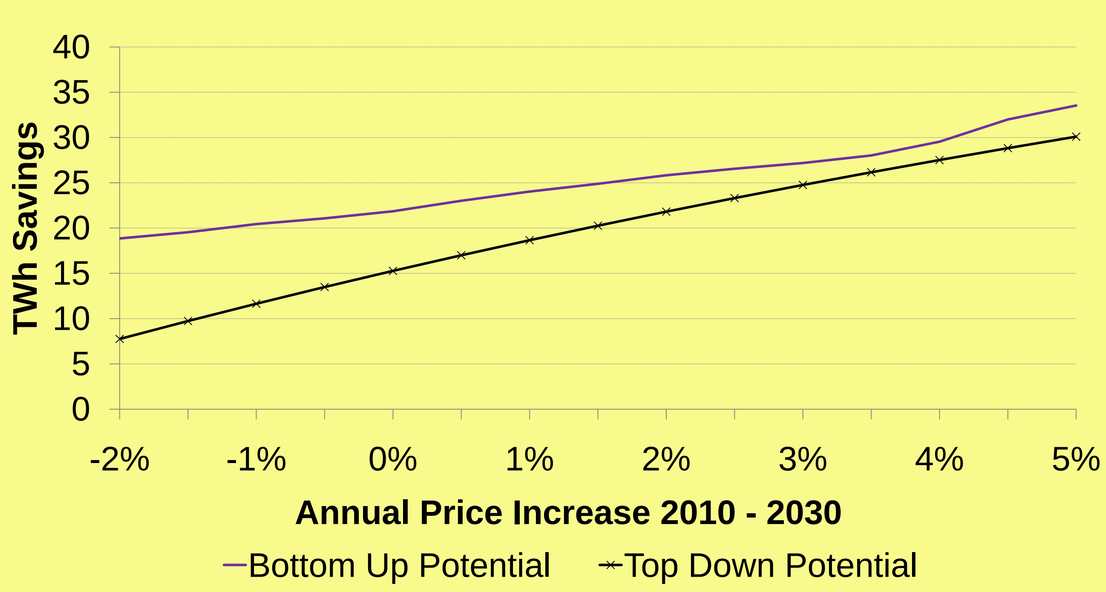
There are measures which are already cost effective at current (or even lower) energy prices.

Prices have a greater influence as they rise.

But…

Elasticities calculated from historic relationships between demand and energy prices (1970 to 2005 in this case) may or may not hold in future.

The energy intensity trend calculated for 1970 to 2005 may be overestimated as it has been affected by the addition of new buildings with higher energy efficiency than the average stock.



Efficiency gap is greater at lower energy prices

Paper 5 - 281