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BASQUE CENTRE
FOR CLIMATE CHANGE
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Promoting energy efficiency

Ibon Galarraga

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Overview

1. **Introduction**

2. Problem: Energy Efficiency Gap

3. Existing evidence

4. Concluding remarks

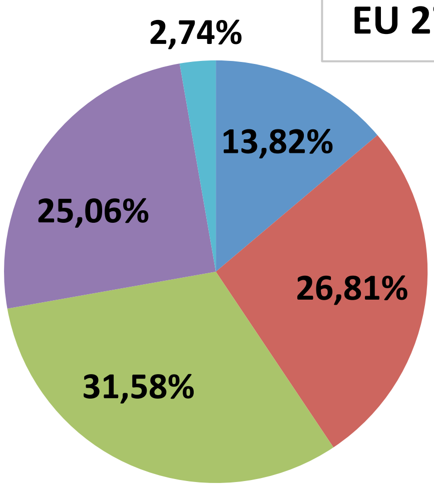
The importance of energy efficiency

- Efforts to reduce fossil-fuel use in the different sectors (e.g. transport, industry, building).
- European Commission identifies increased energy-efficiency (EE) as the most cost-effective and rapid way to reduce CO_2 emissions.
- The IEA estimates that EE measures can reduce global CO_2 emissions by up to 10–15% per year at no direct additional cost.
- IPCC (2014) suggests an investment in energy efficiency (EE) in transport, industry and building of 336 billion US$.
- EU Climate and Energy package that sets the target of reducing energy consumption by 20% by 2020.

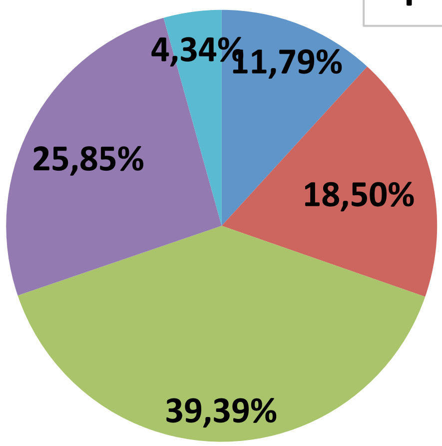
The importance of energy efficiency

- Building accounts for almost 20% of global GHG emissions, industry with 31%, transport with 14.3%. Buildings large potential for cost-effective energy savings.
- The EU goal of a 27% energy saving in the residential sector (European Council 2006).
- Final energy consumption by sector in 2013:

EU 27



Spain



Household appliances more than one third of domestic electricity consumption.

Source: European Environment Agency

1. Introduction

2. Problem: Energy Efficiency Gap

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Some problems:

- BUT, **Energy Efficiency Paradox** exists (Howarth and Andersson, 1993; Jaffe et al., 2009):
  - Private investments in energy efficiency that seem to be economically worthwhile are not always made. And,
  - Some individuals make investments in EE when economically they would not appear to be worthwhile.
- Can be explained:
  - insufficient information, → **Cannot know efficiency, hidden costs…**
  - principal-agent problems, → **Owner/tenant**
  - lack of access to capital,
  - divergences between social and private discount rates,
  - consumer behaviour that is motivated by non economic factors, such as a desire to contribute to a public good.

Energy efficiency paradox: (Ramos et al., 2015)

Table 1. Reasons for the Energy Efficiency Paradox

	Market failure	Behavioral failure	Other barriers
Low energy prices	X		X
Hidden and transaction costs			X
Uncertainty and irreversibility		X	X
Information failures	X	X	
Decision-making heuristics and biases		X	
Slowness of technological diffusion	X		
Principal-agent problem	X		
Capital markets imperfections			X
Heterogeneity of consumers			X
Divergence with social discount rates			X

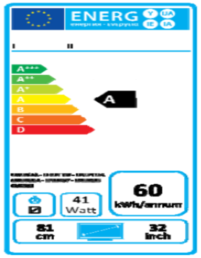
1. Introduction
2. Problem: Energy Efficiency Gap
3. **Existing evidence**
4. Concluding remarks

INSTRUMENTS

Evidence

Household appliances

Energy label – Basque Country (Spain)



- Study: Galarraga et al. (2011 a; b) → dishwashers, refrigerators
- Methodology: Hedonic price approach (2009 prices)

	Dishwashers	Refrigerators
Price-premium from A to the highest EE label (A+)?	**€80** **16%** average market price (€514)	**€60** **9%** average market price (€660)
Energy saving premium? Premium that consumers would be willing to pay if the discounted annual savings over the lifetime of the dishwasher were considered	From A, B, C or D to A+ → **8% - 49%**	From B or A to A+ → **25 - 36%**
Price elastic?	Appliances with EE label more sensitive to price variations than regular ones	

Energy label – Shanghai (China)

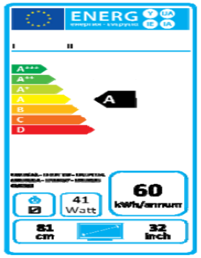
- Study: Shen and Saijo (2009) → air conditioner, refrigerator
- Methodology: Choice Experiment + Latent-Class Model
- **WTP** for a one step EE upgrade (converted to € 2013):

Survey mode\ Appliance	Air conditioner		Refrigerator	
Face-to-face	€63 - 131		€172 - 217	
Web-based	€58 - 88		€124 - 144	
Attributes' significant influence	Price	-	Price	-
	EE rank	+	**EE rank**	+
	Label with electricity bill savings	+	Label with electricity bill savings	+
	Hourly electricity consumption	-	Daily electricity consumption	-
	Air purification function	+	Noise reduction	+

- **EE** has **significant positive influence**
- WTP for more EE refrigerators > WTP for more EE air conditioners → greater incentive for more frequently used appliances
- Stated WTPs under face-to-face > WTPs under web-based → influence of survey mode on estimated preferences!

Energy label –Spain

- Study: Lucas and Galarraga (2014) → dishwashers, refrigerators and washing machines
- Methodology: Hedonic price approach



	Dishwashers	Refrigerators	Washing machines
Price-premium from A to the highest EE label (A+)?	**€19.42** **4%** average market price (€482)	**€86.39** **12.63%** average market price (€684)	**€19.79** **4.15%** average market price (€477)
Price elastic?	Appliances with EE label more sensitive to price variations than regular ones		

Market-based instruments - EU

- Study: Markandya et al. (2009) → Appliances
- Methodology: Economic model of consumer behaviour
- Cost-effective? (in terms of **welfare benefits**):

Appliance	Subsidies or tax credits	Energy tax
Refrigerator	€50 subsidy for class A+	Additional 10% tax on energy tax
	France: NO (€60.27/tCO_2) Denmark: YES (-€0.41/tCO_2)	France: YES (-€185/tCO_2) Denmark: YES (-€10/tCO_2)
Washing machines	€100 tax credit to manufacturers	Removal of classes B and lower
	Italy: NO (€650/tCO_2) Poland: NO (€283/tCO_2)	Italy: NO (€408/tCO_2) Poland: NO (€190/tCO_2)
Boilers	25% of boilers price tax credit to consumers	10% gas price ↑
	Denmark: YES (-€24/tCO_2) Italy: YES (-€14/tCO_2)	Denmark: YES (-€16/tCO_2) Italy: YES (-€12/tCO_2)
Light bulbs	€1 subsidy	10% electricity prices ↑
	Poland: YES (-€17/tCO_2) France: YES (-€11/tCO_2)	Poland: YES (-€141/tCO_2) France: YES (-€761/tCO_2)

Study conclusion: taxes are in most cases **more cost-effective** than subsidies

Market-based instruments – Basque Country (Spain)

- Study: Galarraga et al. (2013) → Dishwashers
- Methodology: Partial equilibrium approach with simulation

Policy	Rebound effect? (cumulative)	Public budget? (cumulative)	Welfare? (cumulative)
Rebate (€80)	YES → increased energy bill (€192,400-261,000)	DEFICIT (€1M)	LOSSES (€24,000-38,000)
Tax (€40)	NO → energy saving (€250,000-355,000)	BENEFIT (€0.83 M)	MUCH ↓ LOSSESS (€11,000-16,300)

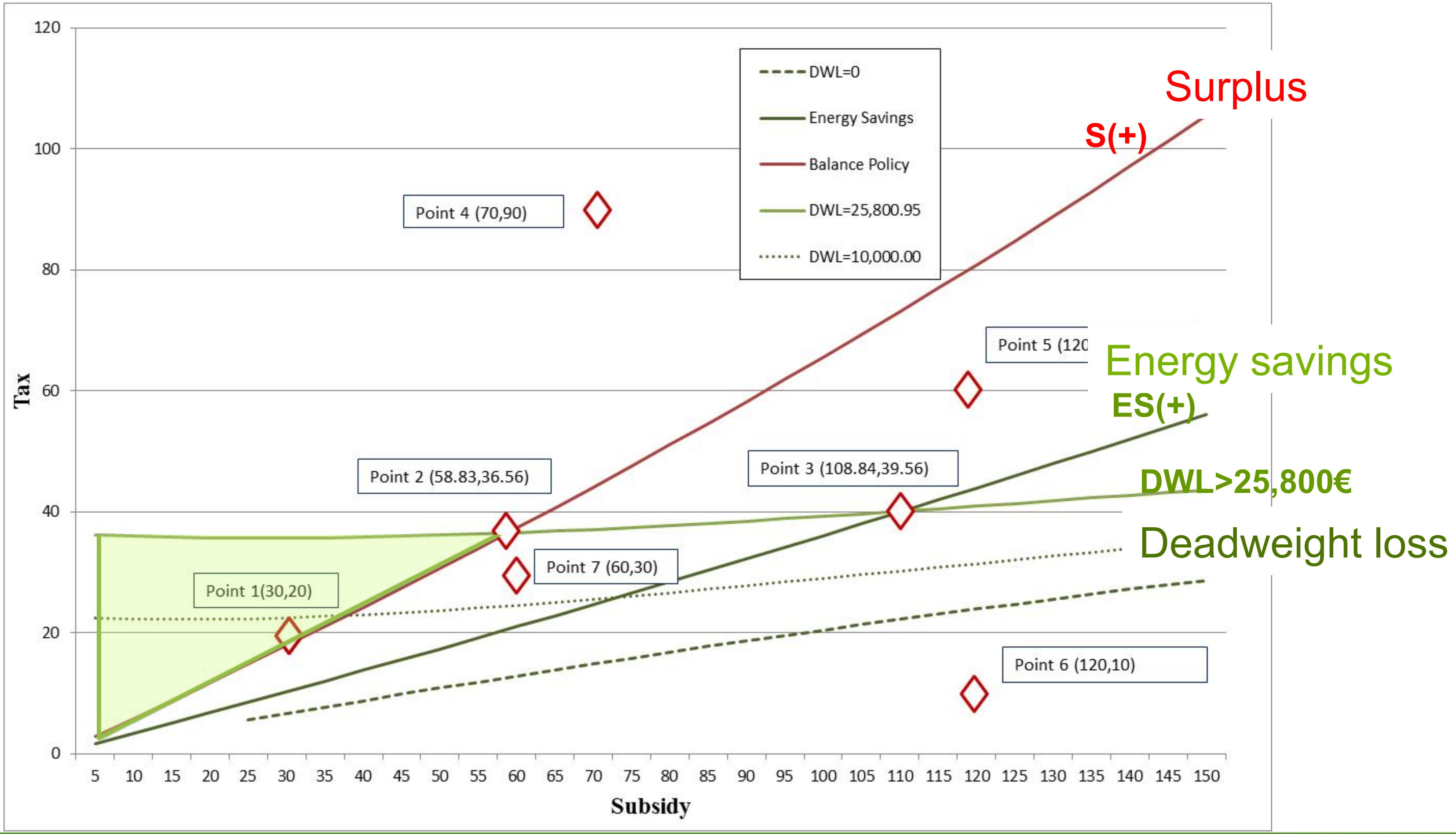
However… taxes are less socially acceptable ⟹ Combination?

Win-Win

Tax (€20) + subsidy (€25)	NO → energy saving (€66,700 - 100,300)	BENEFIT (€99,900 - 107,400)	MUCH ↓ LOSSESS (€6,600 - 10,800)
Tax (€20) + subsidy (€40)	NO → energy saving (€30,700 - 51,000)	DEFICIT (€85,600 - €98,600)	MUCH ↓ LOSSESS (€6,000 - 6,700)

Market-based instruments – Basque Country (Spain)

- Galarraga et al (2013).



Market-based instruments –Spain

- Study: Galarraga et al. (2015) → Dishwashers, washing machines and fridges.
- For: Galicia, the Basque Country, Valencia, Seville, Madrid and Barcelona

- Methodology: Partial equilibrium approach with simulation. Optimisation.
- We minimise DWL s.t
  - Restricting emissions of CO_2.
  - Generating no deficit for the public budget.
  - Increasing (decreasing) the number of labelled (non-labelled) appliances.

Market-based instruments –Spain

- If the aim is to reduce emissions only:

  - Two taxes.
  - Reduction in total number of appliances.
  - Significant tax Revenue.
  - DWL positive. (Perhaps compensate it?)

  - Only one tax. No subsidy.
  - Reduction in total number of appliances.
  - Higher tax Revenue than previous. (Tax higher)
  - Higher DWL than previous.

Market-based instruments –Spain

- If the aim is budget neutrality:

  - Tax and Subsidy.
  - Increase in total number of appliances (Backfire in some cases).
  - Budget neutral.
  - DWL positive but much lower.

- If the aim is keeping the number of appliances constant:

  - Tax and Subsidy.
  - Some energy savings are possible.
  - Small deficit.
  - DWL positive, slightly higher than under neutrality. Much lower than energy saving case.

Market-based instruments –Spain

- Comparing all the three appliances:

  > - Results driven by elasticity estimates for each appliance.
  > - NOT possible to achieve 10% energy reductions with budget neutrality or keeping total nº appliances constant, if wishing to min DWL.

- Need to be careful when designing the policy. The existing RENOVE policy in Spain can substantially be improved.

- Bonus-Malus can be efficient, generated no deficit, can be designed to reduce energy consumption (But LIMITED) and consumer can choose whether to receive a subsidy or pay a tax.

Evidence

Houses

Energy Efficiency Housing–Spain

- Study: De Ayala et al. (in progress) → Housing stock
- Methodology: Hedonic price approach
- **In Spain?** From June 2013, all properties offered for sale or to let in Spain are required to have an EPC.
- The improvement of the energy performance of a house leads to higher transaction prices (and rents) on the market???.
- Given that EPC is a recently introduced regulation, unlike other European housing markets, the **Spanish** one **lacks market data on EE labels and their effectiveness**.

1. To overcome the lack of Spanish EPC data by determining the EE ratings for a number of Spanish homes based on a revealed preferences survey on energy characteristics.
2. To provide for the first time a picture of the status of EPC in Spanish housing market and the impact it has on **residential** property valuations.

Energy Efficiency Housing–Spain

Reference	Country	Major finding
Bio Intelligence Service et al. (2013)	Austria (A), Belgium (B), France (F), Ireland and UK	• **Price premium** on average of a one-letter improvements **in EPC** in the sales market (and in the lettings market): - Vienna (A): **8%** (4.4%) - Flanders (B): **4.3%** (3.2%) - Wallonia (B): **5.4%** (1.5%) - Brussels (B): **2.9%** (2.2%) - Marseille (F): **4.3%** - Lille (F): **3.2%** - Ireland: **2.8%** (1.4%) • Oxford (UK): A one-letter improvement in potential energy rating was associated with a 4% lower price, everything else being equal
Brounen and Kok (2011)	Netherlands	**Homes labelled A, B or C** ("green" labels") transact at an average **price premium of** 3.7%, ceteris paribus
Deng et al. (2012)	Singapore	On average, the Singapore **Green Mark Certification** yields a **15% price premium** on residential property vale *ceteris paribus*
Gilmer (1989)	US (Minnesota)	Home energy rating system helps identifying more quickly the properly priced house
Hyland et al. (2013)	Ireland	**Relative to D-rated, A-rated properties** receive a **sales price premium of** 9% (and a rental price premium of just under 2%)
Kahn and Kok (2012)	US (California)	**Homes labelled as "energy efficient"** transact at a **premium of** 9%
Yoshida and Sugiura (2011)	Japan	**Green dwellings** trade at a **price discount of approx.** 5.5%

Energy Efficiency Housing–Spain

- 1,507 households in Bilbao, Vitoria, Madrid, Seville and Malaga cities + surroundings municipalities in 2013.

- Collected info.:
  - Characteristics of the dwelling (building age, facade orientation...).
  - Energy consumption (from electricity and natural gas bills).
  - Perceived value of home. The stated price ranges from €25,000 to €1,025,000 (mean = 212,100, std. deviation = 112,800).
  - We complemented with: socio-demographic variables of the township where the dwelling is located (population density, ageing index and life quality index).
  - The EE label of each dwelling was calculated through the software called C3EX (www.idae.es) using different input variables: postcode, age of the building, surface area, shading, orientation…

Energy Efficiency Housing–Spain

Dwellings labelled **A, B or C** are valued at prices **9.8% higher** on average than those with the same characteristics but lower EE labels.

Dwellings labelled **A, B, C or D** are valued at prices **5.4% higher** on average than those with the same characteristics but lower EE labels.

Situation	Amount	Grade
Initial energy rating (total emissions)	24.20 $kgCO_2/m^2$ year	E
Initial energy consumption	167.7 kWh/m^2 year	
After improvement measure I:		
Energy rating (total emissions)	19.40 $kgCO_2/m^2$ year	D
Energy consumption	143.91 kWh/m^2 year	
Energy savings from E to D:	23.79 kWh/m^2 year	
For a 80 m^2 typical house (in kWh)	1,903.2 kWh year	
For a 80 m^2 typical house (in €)[1]	€228.38/year (€19.03/month)	
After improvement measure II:		
Energy rating (total emissions)	11.03 $kgCO_2/m^2$ year	C
Energy consumption	81.69 kWh/m^2 year	
Energy savings from D to C:	62.22 kWh/m^2 year	
For a 80 m^2 typical house (in kWh)	4,977.6 kWh year	
For a 80 m^2 typical house (in €)[1]	€597.31/year (€49.78/month)	

[1] Assuming €0.12 per kWh.

Improving the EE rating carries out significant energy savings in the bill and CO_2 emissions

Comparative energy bills (Ramos et al., 2015)

Table 3
Empirical evidence from studies of comparative energy bills.

Study	Sample	Results
Nola et al. (2008)	810 households, California	Consumption decreases
Schultz et al. (2007)	290 households, California	−1.22 kW h/day for households above the average using descriptive information −1.72 kW h/day for households above the average using descriptive and injunctive information
Allcott (2011)	600.000 households, U.S.	−2% average, significant heterogeneity
Ayres et al. (2012)	84.000 households, U.S.	−1.2% gas −2.1% electricity
Costa and Kahn (2013)	Treatment group of approximately 35.000 households. A control group of roughly 49.000 households that have never received a Home Electricity Report in the U.S.	−3.1% consumption for: registered liberal who pays for electricity from renewable sources, who donates to environmental groups, and who lives in a liberal neighborhood reduces consumption +0.7% for: registered as conservative do not pay for electricity from renewable sources, do not donate to environmental groups, and live in the bottom quartile liberal neighborhood
Allcott and Rogers (2014)	The initial experiment population was 234.000 households in the U.S.	Consumption decreases immediately but decays after less than two weeks.

Empirical research on the value of certificates or labels for energy products.

Study	Sector	Results: WTP	
		Rent (effective)	Sales
Eichholtz et al. (2010)	Commercial U.S.	3% (7%)	16%
Eichholtz et al. (2013)	Commercial U.S.	3% (8%)	13%
Wiley et al. (2010)	Commercial U.S.	7–9% Energy Star 15–17% LEED	30$/f2 Energy Star 130$/f2 LEED
Fuerst and McAllister (2011a)	Commercial U.S.	4–5%	25%
Fuerst and McAllister (2011c)	Commercial U.S.	3% Energy Star 5% LEED 9% Energy Star + LEED.	18% Energy Star 25% LEED 28–29% Energy Star + LEED.
Reichardt et al. (2012)	Commercial U.S.	2.5% Energy Star 2.9% LEED.	
Das et al. (2011)	Commercial U.S.	Positive and dynamic	
Bloom et al. (2011)	Commercial U.S.		8.66$/f2
Kok and Jennen (2012)	Commercial Netherlands	−6%	
Fuerst and McAllister (2011b)	Commercial UK	Not significant	Not significant
Chegut et al. (2013)	Commercial London	19.7%	14.7%
Brounen and Kok (2011)	Residential Netherlands		3.6%
Högberg (2013)	Residential Sweden		Positive WTP
Hyland et al. (2013)	Residential Ireland	A: 1.8% B: 3.9% C: not significant E: −1.9% F/G: −3.2%	A: 9.3% B: 5.2% C: 1.7% E: not significant F/G: −10.6%.
Cajias and Piazolo (2013)	Residential Germany	Total returns: B: 2.27% C: 2.34% D: 2.69% E/F: not significant G: reference	
Yoshida and Sugiura (2011)	Residential Tokyo		Negative
Deng et al. (2012)	Residential Singapore		4%
Zheng et al. (2012)	Residential Beijing	Negative	Negative
Wall et al. (2013)	Residential U.S.		Positive for houses built 1996–20 Not significant for newer houses Values reach up to 20%
Kahn and Kok (2014)	Residential California		9%

Source: The authors.

Evidence

Cars

Energy Efficiency

Commercial brand	Hummer
Vehicle model	H2 6.2 V8 AUT.
Fuel type	Gasoline
Transmission	A
Fuel consumption *(liters per 100 kilometers)*	17,4 liters/100Km
Equivalence *(Kilometers per liter)*	5,75 km/liter
CO_2 emissions *(grams per kilometer)*	412g/km
Consumption comparative *(with respect to the average of vehicles with the same size, for sale in Spain)* *Low consumption* <-25% A -15-25% B -5-15% C media D +5+15% E +15+25% F >25% G *High consumption*	G

Energy Efficiency private vehicles - Spain

- Study: Galarraga et al. (2014) → cars
- Cross-sectional data with more than 3.000 observations containing official prices and a set of detailed vehicles‘ characteristics, including the energy efficiency label.
- Subsample of almost 400 observations with retail prices (gathered by the Mystery Shopping method) performed by an specialized survey company during September-November 2012.
- Each observation was matched with its correspondent EE label from the IDAE database.
- Methodology: Hedonic price approach with mystery shopping.
- Results:

    A statistically significant coefficient of the variable that measures the effect of (A, B) energy-efficiency labels: 3%-5.9% price premium (official listing and ‘mystery shopping’).

Energy Efficiency private vehicles - Spain

- Compare WTP for a labelled A vehicle during the 10 years expected lifetime with the present value of the corresponding energy savings.

WTP for and savings from energy-efficient vehicles

Discounted fuel savings		WTP for a vehicle labelled A, using the average price for the official-price subsample	WTP for a vehicle labelled A, using the average price for the retail-price sample
r= 5%	2606.2 Euros	1997.92	4860,6
r= 10%	2073.9 Euros		
r=15%	1693.9 Euros		

Consumers undervaluing EE? Energy efficiency paradox?

Overestimation of WTP?

Energy Efficiency private vehicles – Spain (on-going work)

Data from ANFAC and IDAE

Table 1: Number of cars sold in Spain in 2012 per market segment, and their energy efficiency

	n. cars	%	% A class	% B class	% Others	Unknown
Small	194,616	27,82%	37,68%	50,70 %	11,62%	1,05%
Mini	35,164	5,03%	25,16%	38,39 %	36,45%	0,58%
Small Sedan	191,604	27,39%	53,40%	26,11 %	20,49%	0,13%
Big Sedan	85,310	12,19%	69,95%	18,75 %	11,30%	0,05%
Small Minivan	75,565	10,80%	42,51%	44,16 %	13,33%	0,58%
Big Minivan	10,573	1,51%	8,67%	32,16 %	59,17%	3,51%
Sport	2,176	0,31%	1,30%	21,61 %	77,09%	19,90%
Luxury	1,581	0,23%	52,16%	40,68 %	7,16%	33,08%
Executive	10,806	1,54%	33,98%	46,33 %	19,69%	26,37%
Small SUV	30,177	4,31%	2,97%	21,90 %	75,13%	2,64%
Medium SUV	52,198	7,46%	5,30%	18,72 %	75,98%	1,25%
Big SUV	2,757	0,39%	0,00%	0,00 %	100,00%	0,40%
Luxury SUV	7,062	1,01%	0,00%	31,00 %	69,00%	29,51%
TOTAL	**699,589**		**41,07%**	**34,20 %**	**24,73%**	**1,53%**

Energy Efficiency private vehicles – Spain (on-going work)

- 1) ***Absolute decision***: Consumers who are concerned about energy efficiency will select the most energy efficient car in the market independent of segment , that is, the car that consumes the least fuel and pollutes the least.

- 2) ***Relative decision***: Consumers first decide what type of car (i.e. the segment) they want to purchase, and then choose the most efficient one within the segment.

- A third way might exist for consumers who have a very clear idea of the brand and even the model that they want, and then within those options select the most efficient one. This case is harder to discuss and has therefore been left out of the analysis.

Energy Efficiency private vehicles - Switzerland

- Study: Alberini et al. (2014) → cars
- Database of all cars approved for sale in Switzerland in each year from 2000 to 2012, and reports manufacturer-suggested retail prices (MSRPs) and extensive information about the attribute of the vehicles.
- Hedonic method.
- Briefly, we find that, all else the same, fuel economy *is* (modestly) capitalized into car prices. Even more important, the label has an effect on price above and beyond that of the continuous fuel economy measure, even when we control for the latter.
- The matching approach estimates this effect to be about 5%.
- Based on our regression discontinuity design, we find an even sharper effect of qualifying for the A label, with effects on car price ranging from 6 to 11%, at least within a narrow interval around the threshold.

Instruments: Labels and certification (Ramos et al., 2015)

- Labels might help overcoming information failures:
  - incomplete and/or asymmetric.
  - Transaction costs.
  - Uncertainties.
- Also behavioural failures:
  - Limited attention
  - Aversion to uncertainty
- And finally, principal agent problems.
- Great potential (Ramos et al., 2015). More effective to show energy savings or economic losses than potential benefits.

Instruments: Feedback systems

(Ramos et al., 2015)

- Providing information on the energy use aiming at achieving energy savings.
- Contributes to reduce
  - incomplete information.
- Also behavioural failures:
- The risk: creating The so-called “Boomerang effect”: If a consumer discovers that consumes less than expected might decide to increase consumption.
- Can increase elasticity of energy demand.

Instruments: Feedback systems

(Ramos et al., 2015)

- Providing information can produce some savings and effectiveness increases with frequency (Abrahamse, et al. 2005).
- Darby (2006) show that immediate information can reduce energy consumption by 5-10%. Doubts: small samples so perhaps no so robust findings (Fischer, 2008).
- But, who long does the effect of last? Google study says that 4 weeks (Houde et al. 2013).
- Smart meters: 7-17% (Faruqui et al., 2010, Gans et al., 2013).
- Energy bills: As a mean to nudge consumers. May rebound and boomerang effect exist?

Instruments: Energy audits

(Ramos et al., 2015)

- Tailored and personalised information to reduce information failures (incomplete and asymmetric), transaction costs, uncertainty and behavioural failures. Savings up to %5 but difficult to assess this instrument.
- Citizens and ESCO-s love this type of instrument. It is like a subsidy!

Main highlights of PURGE project (I)

- **Measures** to promote residential EE:

➢ **Information and education programmes**

- **Information** and provision of **feedback** are **KEY** to start **changing** individual's **behaviour** for a rationale use of energy
  - Study: Abrahamse et al. (2007) → Internet-based tool in a city of the Netherlands
    - Households exposed to combination of tailored information, goal setting (5%) and tailored feedback...
      - ↓ energy use (*direct* + *indirect*) by 5% (control group 0.7% ↑ energy use)
      - ↑ save direct energy by 8.3% (control group only 0.4%)
      - ↑ knowledge of energy conservation

Direct: gas, electricity and fuel
Indirect: embedded in the production, transportation and disposal of consumer goods

Main highlights of PURGE project (II)

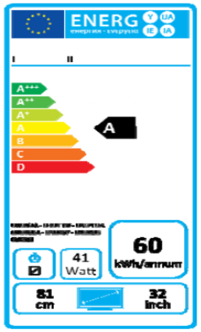
➢ Market-based instruments

- Can induce consumers to **switch from a standard to an efficient appliance...**
- **However, rebates** or **subsidies** can result in increased energy consumption **(rebound effect)**
- **Energy taxes more effective** → energy savings, benefits in public budget and less welfare losses
- **But, taxes** are **less** socially **acceptable! Alternatives:**
  - Mixture of taxes and subsidies (**bonus-malus**):
    - ✓ Successful from an economic and social point of view
    - ? Political acceptability not tested (except to a limited extent in France)
  - **Guaranteed financial incentive** for energy savings:
    - ✓ Can avoid the rebound effect
    - X Complex to assure that only action-induced (as opposed to autonomous) savings are awarded

Main highlights of PURGE project (III)

➢ EE labels

- Entail **positive price premiums** for energy efficient appliances
  - **Price premiums?** depend on the appliance type, country, social perspective. E.g.:
    - ↑ for frequently used appliances (washing machines, refrigerators...)
    - ↑ in Switzerland: 15% - 30% > Spain: 9% - 16%

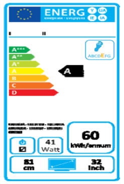


- **EE labels** providing **additional** info. also positive influence on WTP
  - Private benefits → energy cost savings
  - Public (environmental) benefits
    - E.g. Energy and Carbon Footprint label, Energy and Environmental label, Energy Star label in the US

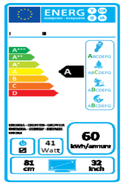
To be **more effective…**

Complement with:

- Training of sales staff → ought to be refreshed!
- Explanatory info. about symbols in labels + Education campaigns



b) Proposed Energy and Carbon Footprint Label

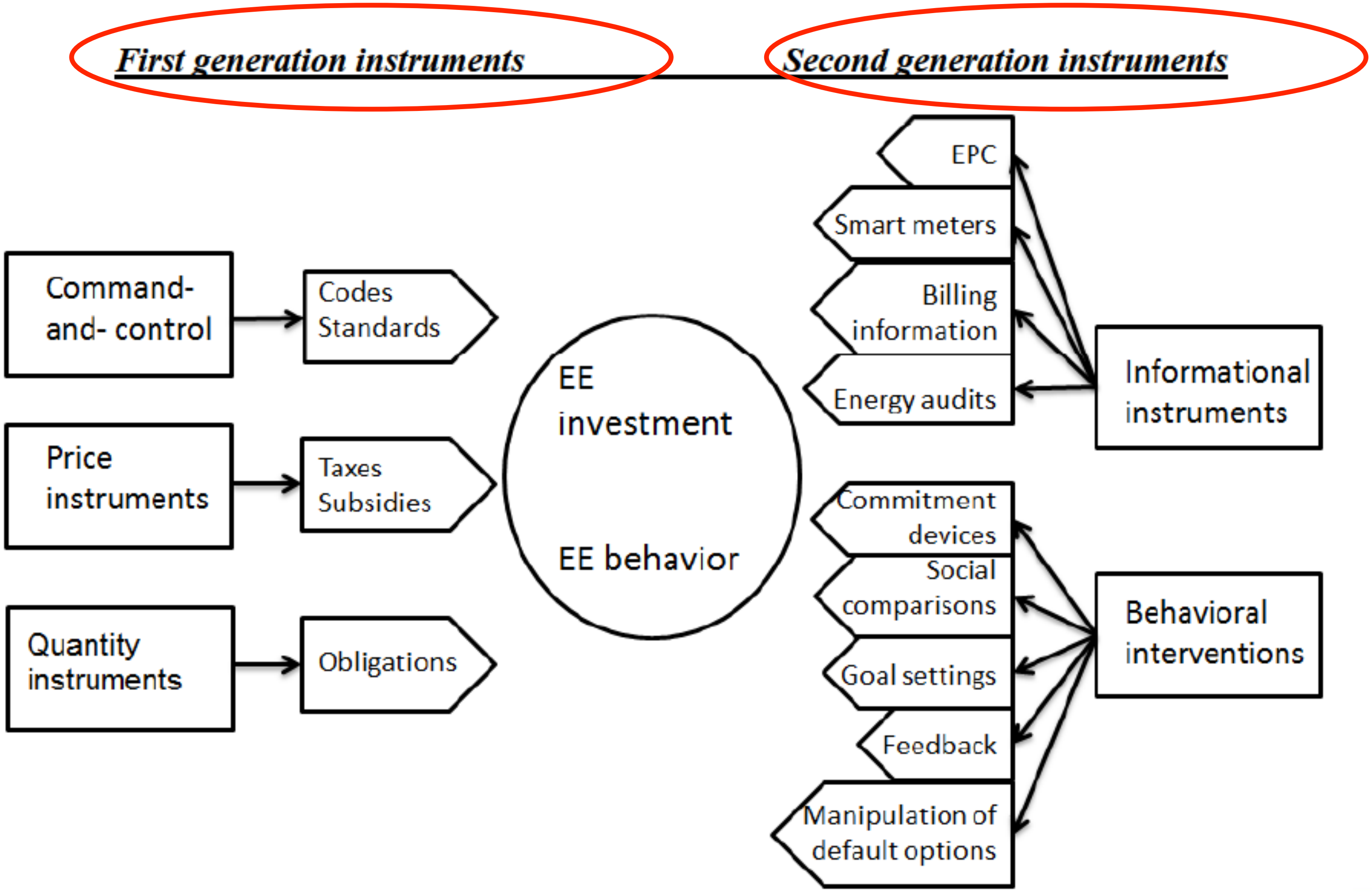


c) Proposed Energy and Environmental Label

Figure 10: Letter rating

Intruments: (Ramos et al., 2015)

Figure 1. Two Generations of Energy Efficiency Policy Instruments for Buildings



Concluding remarks

- Energy efficiency is part of the long term climate solution, and it is smart way if saving resources.
- Labels, audits, feedback, taxes, subsidies, standards and many other instruments exist. We need to combine them well!
- Energy labelling is one of my favourites. And is acquiring a major importance in the light of the EU Climate and Energy.
- It can be used to reduce information asymmetries but also to support other policy instruments such as taxes and subsidies. Many examples exist in EU.
- Policies should be well designed and it is not always the case.
- A Bonus-Malus scheme can outperform many of other proposal but is also limited by the goals that are being pursued (effectiveness, efficiency and implementation feasibility).

BC3

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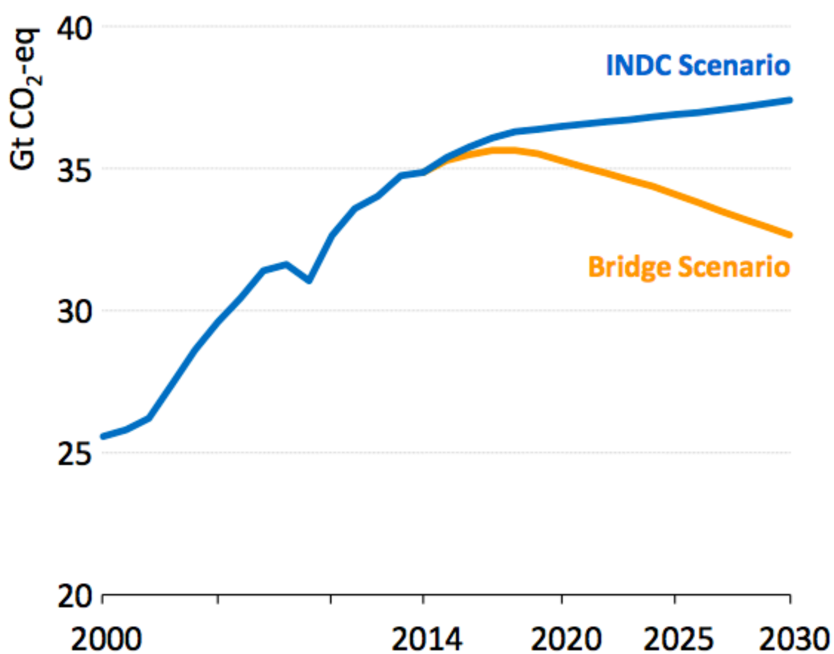
Thank you!

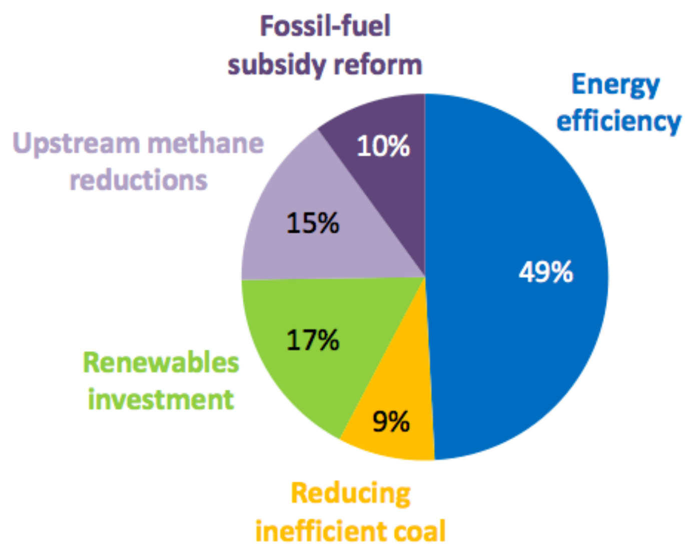
1. Peak in emissions:
IEA strategy to raise climate ambition

WEO Special Report on Energy & Climate Change

Global energy-related GHG emissions



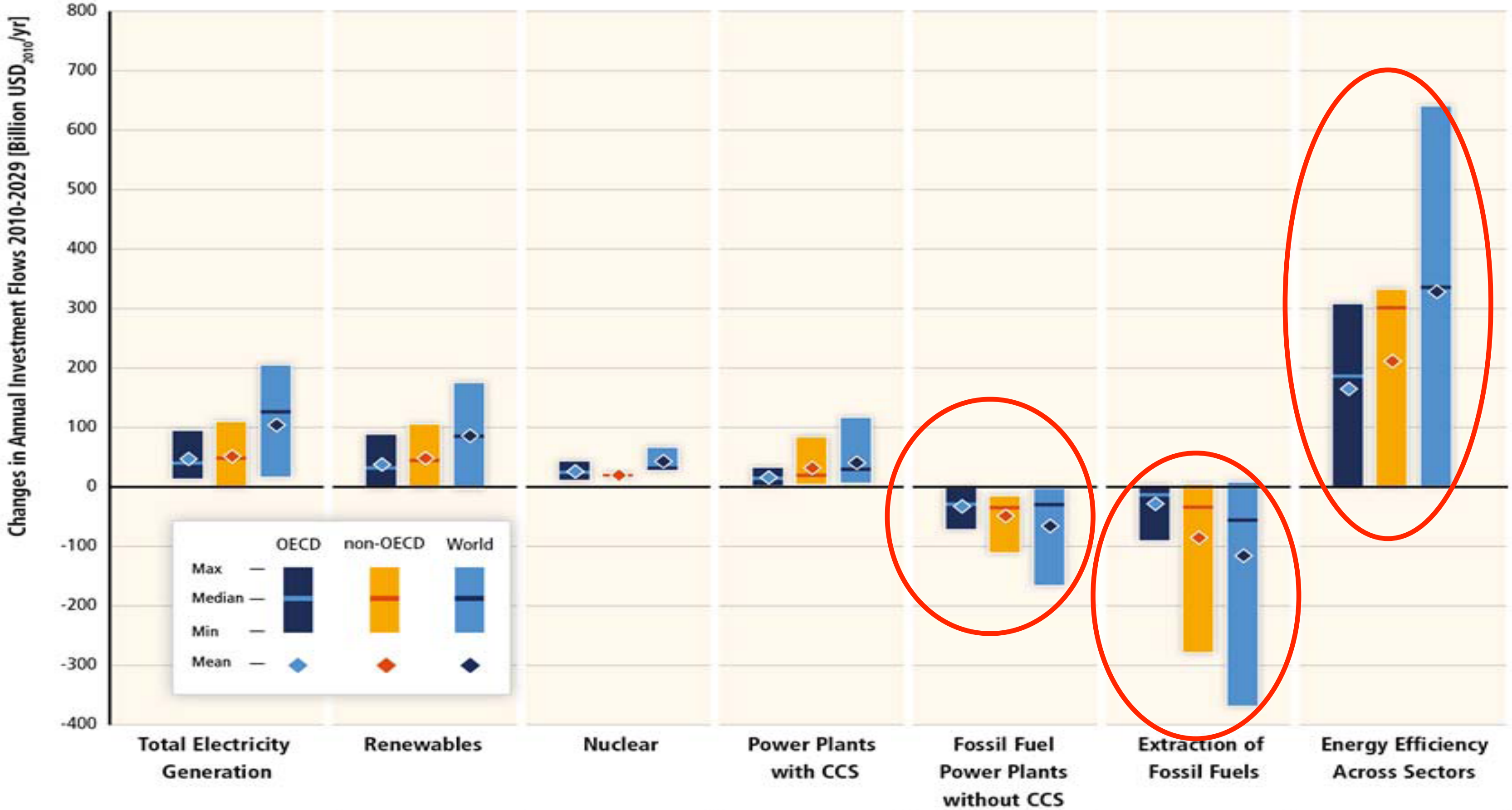
Savings by measure, 2030



BACK

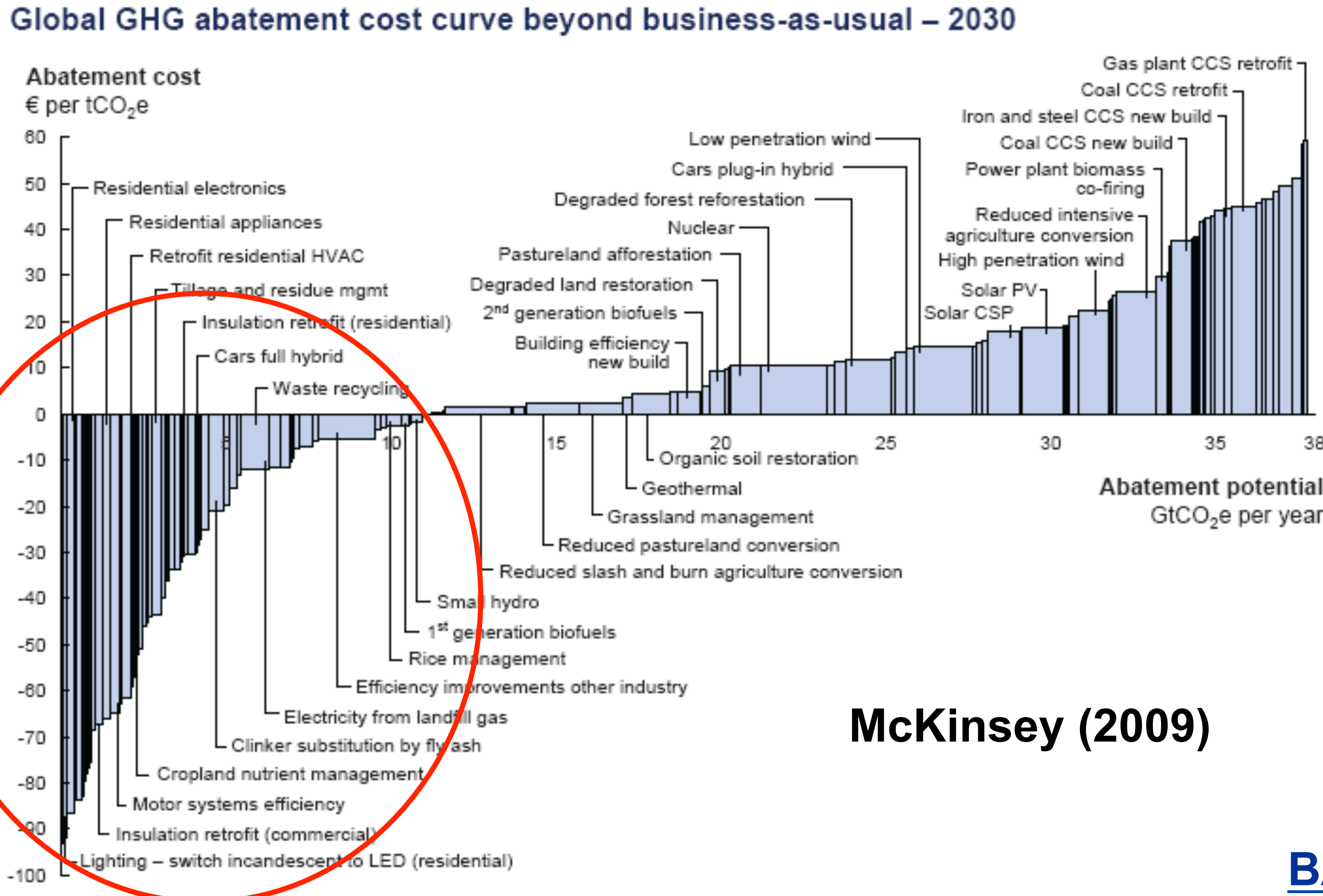
Five measures – shown in a "Bridge Scenario" – achieve a peak in emissions around 2020, using only proven technologies & without harming economic growth

The importance of EE: 2ºC Investment path



Annual investment for 2010-2029 to stabilise the temperature at 2ºC. Source: IPCC (2014).

The importance of EE: 2ºC Investment path



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

McKinsey (2009)

BACK

Bonus Malus schemes

- The idea in Bonus Malus scheme is taxing the "bads" (inefficient goods) to subsidise the goods (Labelled goods). This should allow to partially finance the subsidy scheme with the taxes significantly reducing the cost of the policy.
- Also known as "Feebates" (a combinations of words resulting from `fee` and `rebate´) (Eilert et al, 2010).
- Some examples:
  - car market in the US (Langer, 2005; Davis et al, 1995 ; Banerjee, 2007),
  - fuel efficiency (Greene et al. 2005),
  - French vehicles based in CO2 emissions (ASE, 2009),
  - food groups (Gustavsen and Rickertsen, 2013; Markandya et al, 2016),
  - fair trade and regular coffee (Galarraga and Markandya, 2006),
  - nitrogen oxide (NOx) in Sweden (Johnson, 2006).
  - energy efficiency in buildings at state level in US (Eilert et al, 2010).

Bonus Malus schemes in the literature

- Eilert et al (2010) conclude that feebates can “complement existing efficiency programs by providing greater support to newer, more expensive but highly efficient technologies, as well as by providing a new mechanism to tap into saving potential in hard-to-reach market segments”.

BACK