Ecodesign Preparatory Studies

ENER Lot 22: Domestic and commercial ovens *(electric, gas, microwave), including when incorporated in cookers*

ENER Lot 23: Domestic and commercial hobs and grills, *including when incorporated in cookers.*

1st Stakeholder Meeting on domestic appliances
Paris – November 4th 2010

A study being conducted for DG ENER by BIO Intelligence Service and Cobham-ERA Technology Ltd

Bio Intelligence Service - Scaling sustainable development
Industrial Ecology - Nutritional Health

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Agenda of the meeting

10:00 – 10:30	**Welcome, "Tour de table", Introduction to the Ecodesign Directive, schedule update**
10:30 – 11:20	**Lot 22 – Tasks 1 to 3: Main conclusions on domestic ovens**
11:20 – 11:30	**COFFEE BREAK**
11:30 – 12:30	**Lot 22 – Tasks 4 and 5: Main conclusions on domestic ovens**
12:30 – 13:00	**Lot 22 – Next steps: Tasks 6, 7 and 8**
13:00 – 14:00	**LUNCH BREAK**
14:00 – 14:50	**Lot 23 – Tasks 1 to 3: Main conclusions on domestic hobs and grills**
14:50 – 15:30	**Lot 23 – Tasks 4 and 5: Main conclusions on domestic hobs and grills**
15:30 – 16:00	**Lot 23 – Next steps: Tasks 6, 7 and 8**
16:00 – 16h30	**Lot 22 & 23 : General discussion and conclusions**

ENER Lots 22/23 team

BIO Intelligence Service:

- (Shailendra Mudgal)
- Benoît Tinetti
- Eric Hoa
- Guillaume Audard

Cobham:

- Chris Robertson
- Paul Goodman

European Commission project officer:

- Villö Lelkes

ENER Lot 23: Domestic and commercial hobs and grills

including when incorporated in cookers

Task 1 – Products Definition

1.1. Product Definition

In this study, the following definitions are used :

- **hob :** appliance or part of an appliance which incorporates one or several distinguishable cooking zones, where pans can be placed on for heating.

- **grill :** appliance or part of an appliance in which food is cooked by radiant or contact heat.

- **Main criteria to be considered within the scope of the study:**
  - ✓Energy Source
  - ✓Heating Mechanisms and Technologies
  - ✓Appliance Configuration

1.1. Product Definition

Prodcom : Electric domestic appliances

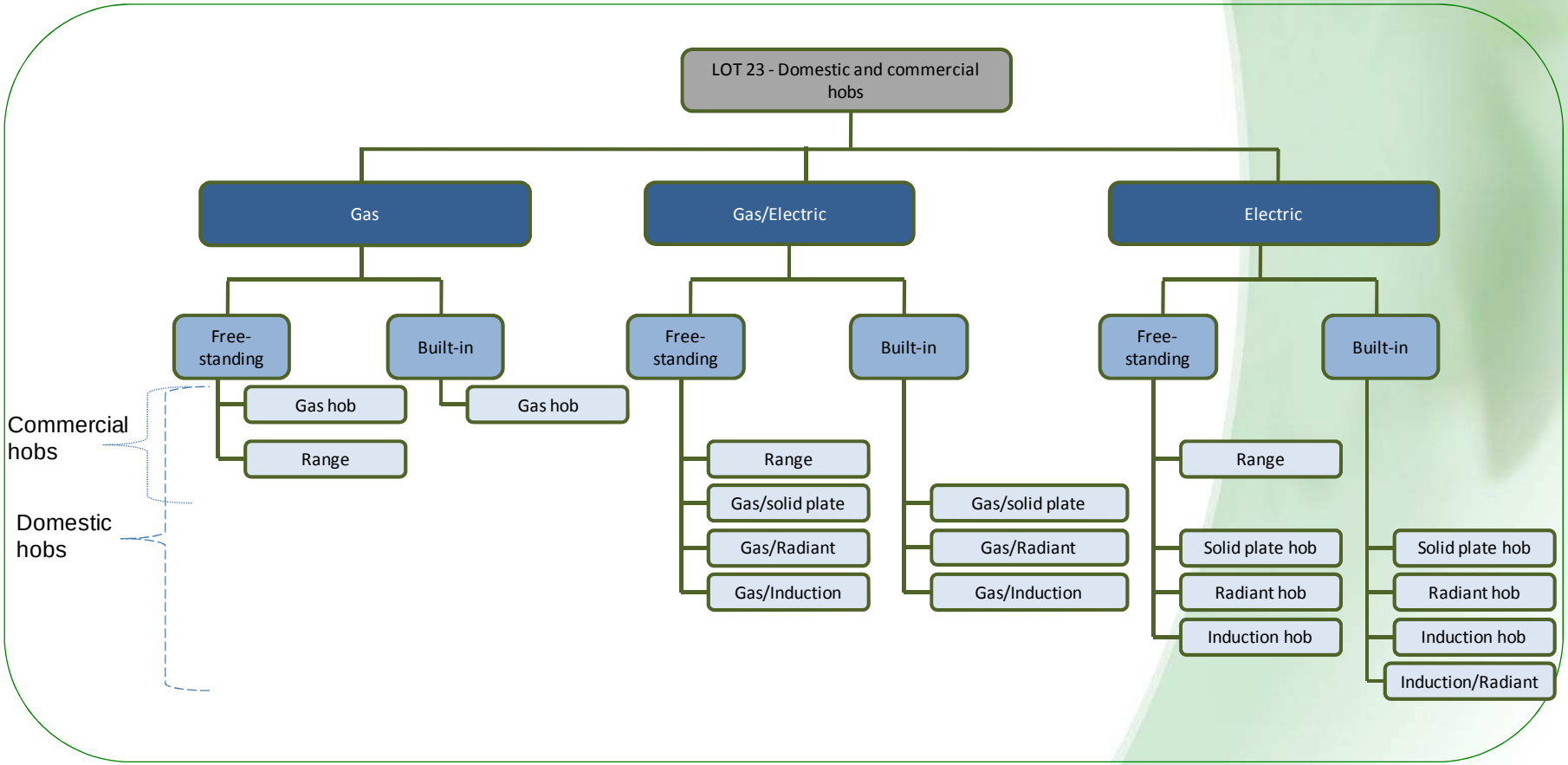
Prodcom code	Prodcom category
27.51	Manufacture of electric domestic appliances
27.51.28	Other ovens; cookers, cooking plates, boiling rings; grillers, roasters
27.51.28.10	Domestic electric cookers with at least an oven and a hob (including combined gas-electric appliances)
27.51.28.33	Domestic electric hobs for building-in
27.51.28.35	Domestic electric cooking plates, boiling rings and hobs (excluding hobs for free building-in)
27.51.28.50	Domestic electric grills and roasters

1.1. Product Definition

Prodcom : non-electric domestic appliances

Prodcom code	Prodcom category
27.52	Manufacture of non-electric domestic appliances
27.52.11	Domestic cooking appliances and plate warmers, of iron or steel or of copper, non electric
27.52.11.13	Iron or steel gas domestic cooking appliances and plate warmers, with an oven (including those with subsidiary boilers for central heating, separate ovens for both gas and other fuels)
27.52.11.15	Iron or steel gas domestic cooking appliances and plate warmers (including those with subsidiary boilers for central heating, for both gas and other fuels; excluding those with ovens)
27.52.11.90	Other domestic cooking appliances and plate warmers, of iron or steel or of copper, non electric

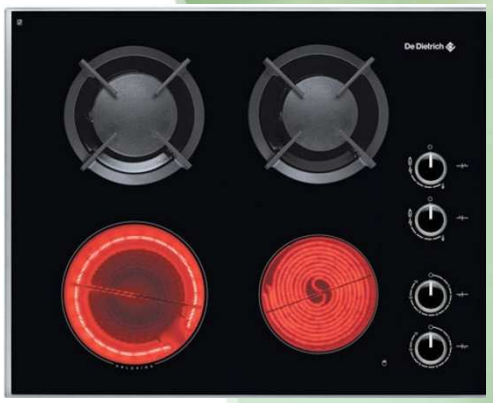
1.1. Product Definition – Our Classification



1.1. Product Definition

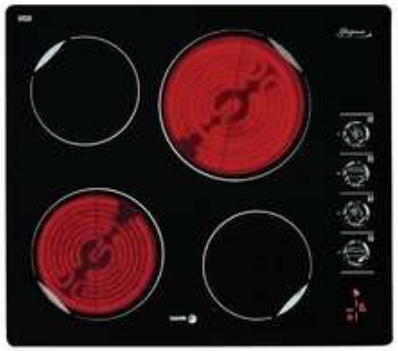
Built-in Hobs :

Gas



Mixed
Gas/Electric

Electric -
solid plate



Electric - radiant

Electric -
induction

1.1. Product Definition

Free-standing Hobs :

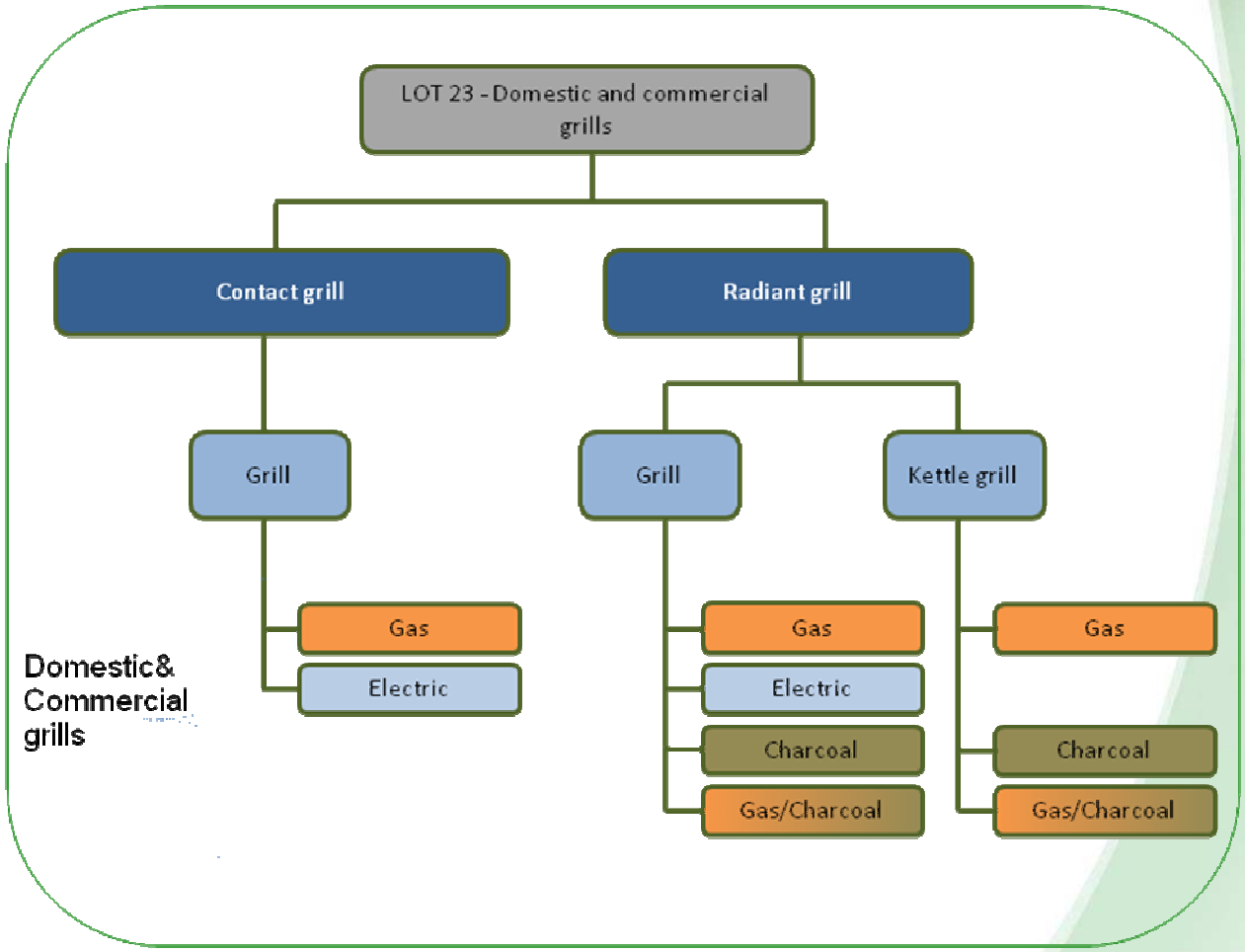
Gas

Electric - solid plate

Electric - radiant

Electric - induction

1.1. Product Definition – Our Classification



1.1. Product Definition

Free-standing Grills :

Gas grill

Electric grill

Charcoal Kettle grill

1.2. Test Standards

- EN 50304/EN 60350:2009

  (Electric cooking ranges, hobs, ovens and grills for household use – Methods for measuring performance).

- Other performance standards

Standard	Scope	Grill/hob
EN 30-2-1:1998 / A2:2005	Rational use of energy	Gas (domestic)
EN 30-2-2:1999	Rational use of energy	Gas (domestic forced convection)
EN50304/60350 : 2009	Methods for measuring performance	Electric (domestic)
EN61817:2001	Methods for measuring performance	Electric (domestic portable)

1.3. Existing Legislation

At EU level:

Scope	Legislation
Environmental Legislation	
Entire Product	Waste Electrical and Electronic Equipment Directive 2002/96/EC
	Restriction of the use of certain Hazardous Substances in electric and electronic equipment Directive 2002/95/EC
	The REACH regulation, 1907/2006 (superseding the Marketing and Use Directive regarding substance restrictions)
Energy Legislation	
Standby and off mode power consumption	Commission Regulation No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC
Legislations related to Safety	
Entire product	General Product Safety Directive 2001/95/EC
	Low Voltage Directive 2006/95/EC
	Materials and articles intended to come into contact with foodstuffs – Regulation 2004/1935/EC
	Appliances burning gaseous fuels Directive 90/396/EEC

ENER Lot 23: Domestic and commercial hobs and grills

including when incorporated in cookers

Task 1 – Conclusions

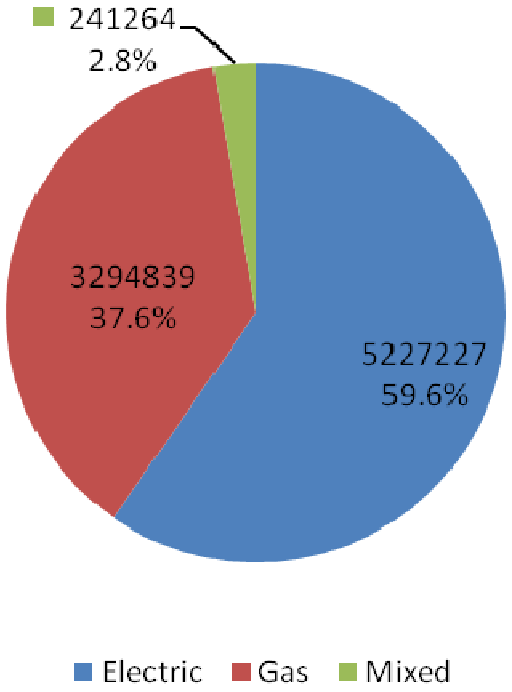
- The panel of products was identified and defined.
- Existence of EN test standards for domestic hobs and grills
- Various legislations exist throughout the world but a direct comparison between these is difficult as the scope and test standards are different.

ENER Lot 23: Domestic and commercial hobs and grills

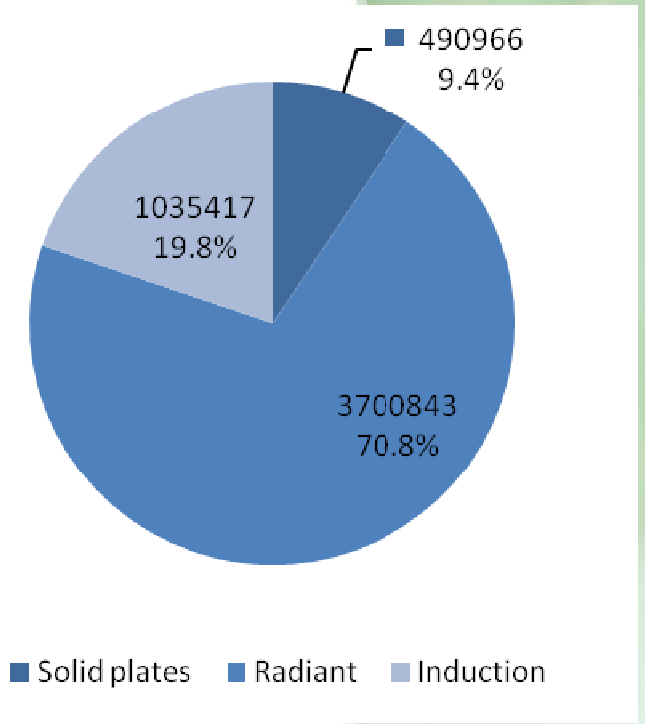
including when incorporated in cookers

Task 2 – Economic and Market Analysis

Sales Data



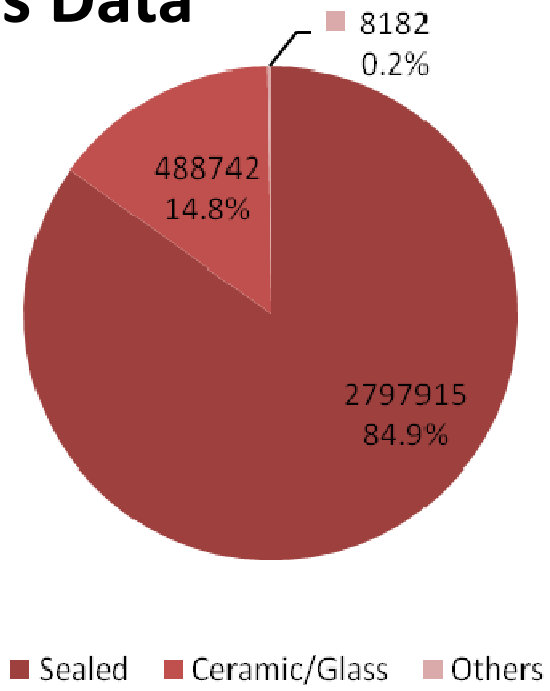
Estimated sales of domestic built-in hobs in EU-27 in 2007



Estimated sales of domestic built-in electric hobs in EU-27 in 2007

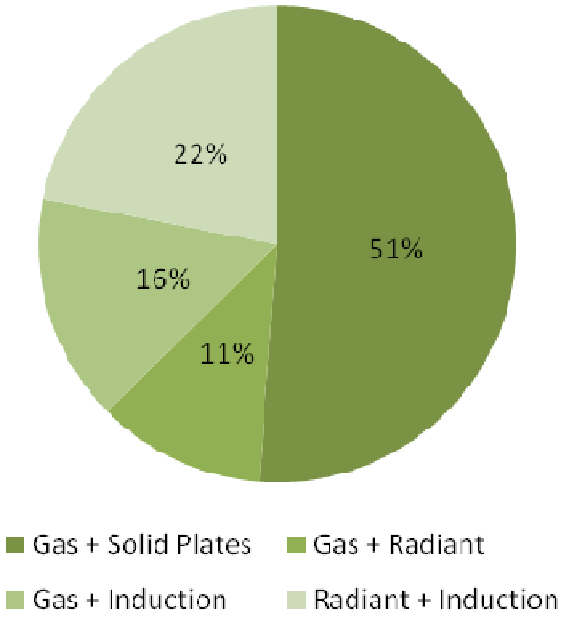
Source: GfK Retail and Technology GmbH. Member States not covered by the market panel: Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta

Sales Data



Estimated sales of domestic built-in gas hobs in EU-27 in 2007

Source: GfK Retail and Technology GmbH. Member States not covered by the market panel:
Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta



Mixed hobs models available on the EU market in 2008 (CECED Database)

Sales Data

Domestic hobs sales in the EU-27 in 2007 and forecasts

Type of Appliance	2007	2010	2015	2020	Annual growth
Built in gas hobs	3,294,839	3,600,359	4,173,803	4,838,582	3%
Built in electric hobs - Solid plates	490,966	420,942	325,717	252,034	-5%
Built in electric hobs - Radiant	3,700,843	3,812,983	4,007,483	4,211,905	1%
Built in electric hobs - Induction	1,035,417	1,378,140	2,219,509	3,574,541	10%
Built in mix hobs	241,264	263,636	305,626	354,304	3%
Gas cooker tops	2,186,851	2,389,631	2,770,237	3,211,464	3%
Electric cooker tops	3,670,000	4,010,308	4,649,046	5,389,519	3%
Cooker tops from mixed fuel cookers	1,476,157	1,613,037	1,869,952	2,167,786	3%

This forecast will be revised before Task 7

Sales Data

Domestic grills sales estimations in the EU-27 from 2008 to 2020 (approved by CECED)

Type of Appliance	2008	2010	2015	2020	Annual growth
Gas grills (radiant)	3,000,000	3,182,700	3,689,622	4,277,283	1%
Electric radiant grills	5,500,000	5,834,950	6,764,306	7,841,685	1%
Electric contact grills	5,000,000	5,304,500	6,149,369	7,128,804	1%

This forecast will be revised before Task 7

Stock Data

Estimated stock for domestic hobs in EU-27

Type of Appliance	2007	2010	2015	2020	Annual growth
Gas hobs	62,601,935	64,498,836	67,788,925	71,246,842	1%
Electric hobs - Solid plates	9,819,321	9,527,678	9,060,727	8,616,661	-1%
Electric hobs - Radiant	74,016,865	76,259,650	80,149,659	84,238,097	1%
Electric hobs - Induction	4,800,000	6,046,618	8,884,465	13,054,194	8%
Mix hobs	4,584,015	4,722,915	4,963,832	5,217,037	1%
Gas cooker tops	43,737,021	45,062,296	47,360,926	49,776,810	1%
Electric cooker tops	73,422,078	75,646,841	79,505,590	83,561,174	1%
Cooker tops from mixed fuel cookers	29,523,140	30,417,721	31,969,330	33,600,087	1%

This forecast will be revised before Task 7

Stock Data

Estimated stock for domestic grills in the EU-27

Type of Appliance	2008	2010	2015	2020	Annual growth
Gas grills (radiant)	57,000,000	58,145,700	61,111,715	64,229,027	1%
Electric radiant grills	104,500,000	106,600,450	112,038,144	117,753,216	1%
Electric contact grills	95,000,000	96,909,500	101,852,858	107,048,378	1%

This forecast will be revised before Task 7

Average Price Range

Type of hob/grill	Domestic appliances		
	Low range (€)	High range (€)	Average price (€)
Solid plates	150	300	139
Radiant hob	200	700	386
Induction hob	300	1,200	822
Gas hob	150	1,000	268
Range cooker	160	1,500	-
Electric grill	80	1,500	-
Gas grill	100	1,500	-
Charcoal grill	50	1,500	-

Running Costs

	Rates
Electricity rate	16.58 € / 100 kWh
Natural gas rate	16.21 € / GJ
Discount rate	4 %

ENER Lot 23: Domestic and commercial hobs and grills

including when incorporated in cookers

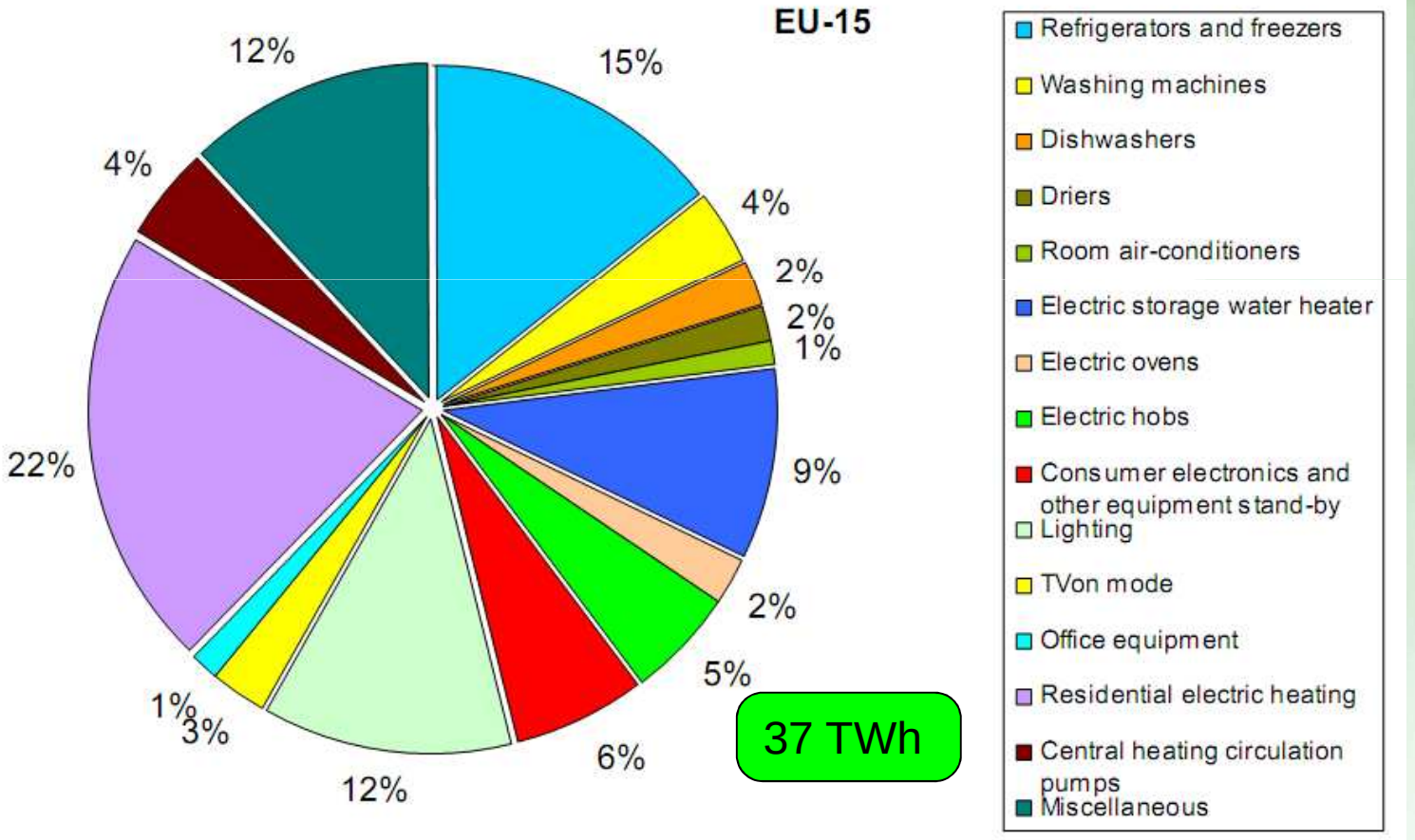
Task 2 – Conclusions

- All categories are sold in a number of units above the required criteria of 200,000 units per year as set in the Ecodesign Directive.
- Concerning domestic hobs, electricity is the preferred energy source at the EU level, although there are strong differences between Member states.
- The sales of solid plate hobs are expected to decrease in the coming years, while induction hobs sales should rise.
- Given the diversity in the domestic grills market, only estimations could be provided. Following the current trend, the stock of these appliances should grow until 2020.

ENER Lot 23: Domestic and commercial hobs and grills,
including when incorporated in cookers.

Task 3 - Consumer Behaviour Analysis

Electricity consumption among residential equipment in the EU-15 in 2004



Source: Bertoldi, P. and Atanasiu, B. (2006),
"Electricity Consumption and Efficiency Trends in the Enlarged European Union", Status report

Task 3 – Real fife efficiency

Type of Appliance	Average cooking time	Uses/ year	Energy consumption per use (kWh)	Annual Consumption (kWh/year)	Economic lifetime
Gas hobs	30	438	0.75	330	19
Electric hobs - Solid plates	30	438	0.53	230	20
Electric hobs - Radiant	30	438	0.55	240	20
Electric hobs - Induction	30	438	0.43	190	20
Mix hobs	30	438	-	-	19
Gas grills (radiant)	20	52	0.96	50	19
Electric radiant grills	20	52	0.96	50	19
Electric contact grills	20	52	0.96	50	19

- Barriers to increased ownership of more efficient cooking appliances :
  - ✓ Higher costs of better technology
  - ✓ Inertia
  - ✓ Lack of fuel choice
  - ✓ Lack of knowledge
- Specificities of the domestic sector:
  - ✓ Small potential in energy efficiency gains
  - ✓ Lack of a comparative energy or performance test data
  - ✓ Low energy cost of the appliance

ENER Lot 23: Domestic and commercial hobs and grills,
including when incorporated in cookers.

Task 3 – Conclusions

- Consumer behaviour (cooking times, temperatures and frequencies) can have a major impact on consumption
- The choice of cookware is the second issue found to have an important effect on the final consumption per use of this type of product.

Agenda of the meeting

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16:00 – 16h30	**Lot 22 & 23 : General discussion and conclusions**

Dr Paul Goodman,
Reliability and Failure Analysis Group

4 November 2010

COBHAM

ERA TECHNOLOGY
ANTENNA AND
ELECTRONIC
SYSTEMS

ERA TECHNOLOGY
ENGINEERING
CONSULTANCY
SERVICES

VECTOR FIELDS
SOFTWARE

LIGHTNING
TESTING AND
CONSULTANCY

DG ENER Lots 23 Eco-design preparatory study
Task 4 - Domestic Hobs and Grills
Technical Analysis of existing products

conducted on behalf of the European Commission, DG ENER,
by Cobham Technical Services and Bio Intelligence Service

Task 4 – Product functions and types

- Hobs
  - Gas burners
  - Electric hotplates
    - Solid plate (resistance heating)
    - Radiant
    - Induction
  - Built-in or part of range cookers
  - Portable appliances
- Grills – many designs
  - Contact – e.g. griddles, Panini grills, etc
  - Radiant – standalone or part of range cookers, toasters?

Main materials and components
- include

- Coated steel parts widely used (porcelain, polymer and paint coatings)
- Thermal insulation (for safety / energy efficiency)
- Heat output regulation (no temperature control?)
- Gas igniters – mostly HV spark
- Gas safety sensors
- Power supply for induction hobs
- Glass ceramic for hobs (crystallised glass)
- Nichrome wire radiant grill elements
- Etc.

Performance

- Difficult to compare gas with electric
  - Heat up and simmering behaviour different for each type of hob
  - Published non-standard heat up tests > next slide
  - Simmer control can be poor for gas (limited power output range) and solid plate electric (slow response time)
  - Electricity generation is ~30% efficient
- Energy efficiency depends on efficiency of heat transfer and heat losses
  - Heat lost from pan (also around pan, especially if pan too small)
  - Simmer control depends on burner / hotplate design & size

Calculated CO2 emissions
- 3 hob studies (heat up only)

•Compared results from 3 publications, calculated CO2 emissions

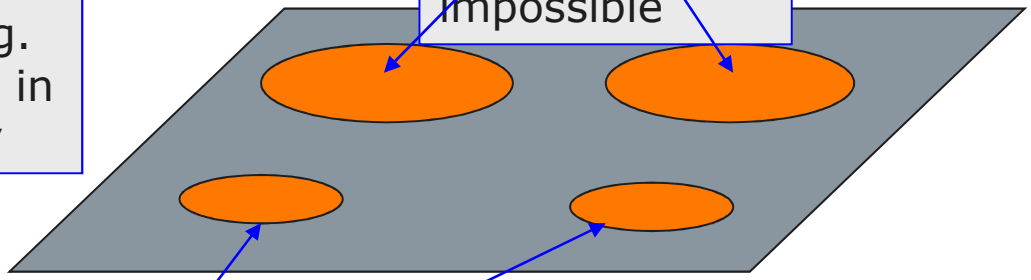
- CO2 emissions calculated from primary energy consumption
- Based on heat up only & used non-standard tests
- Shows that induction & gas emit least CO2

Hob type	Cobham calculation using Cooktek efficiencies (kg CO2)	Spanish study (Balay) (g equivalent CO2)	FRPRC (kg CO2 /1.5l water)
Gas	0.23 kg	26	0.08
Induction	0.216 – 0.25 kg	114	0.09
Radiant	0.34 – 0.39 kg	165	-
Solid plate	0.41 – 0.48 kg	183	0.12

Simmering performance

- Simmering = defined as holding at 90°C
- Ability to simmer is variable (good with induction & radiant, less flexible with gas)

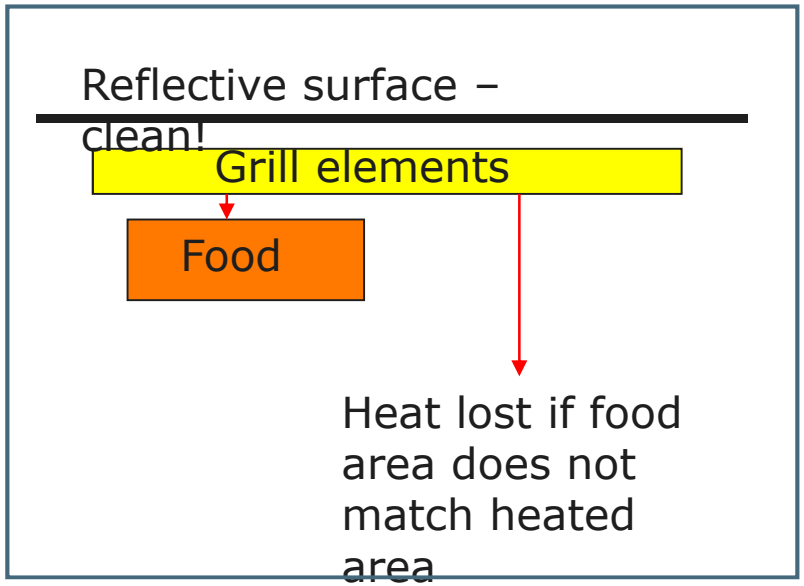
Hobs commonly have 4 hotplate / burners with two small / medium suitable for simmering. Impossible to simmer in 4 pots simultaneously

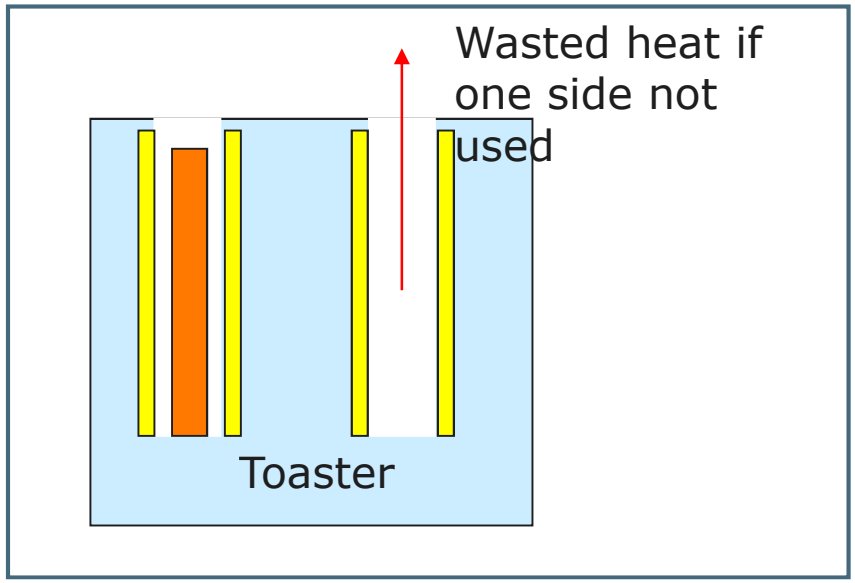


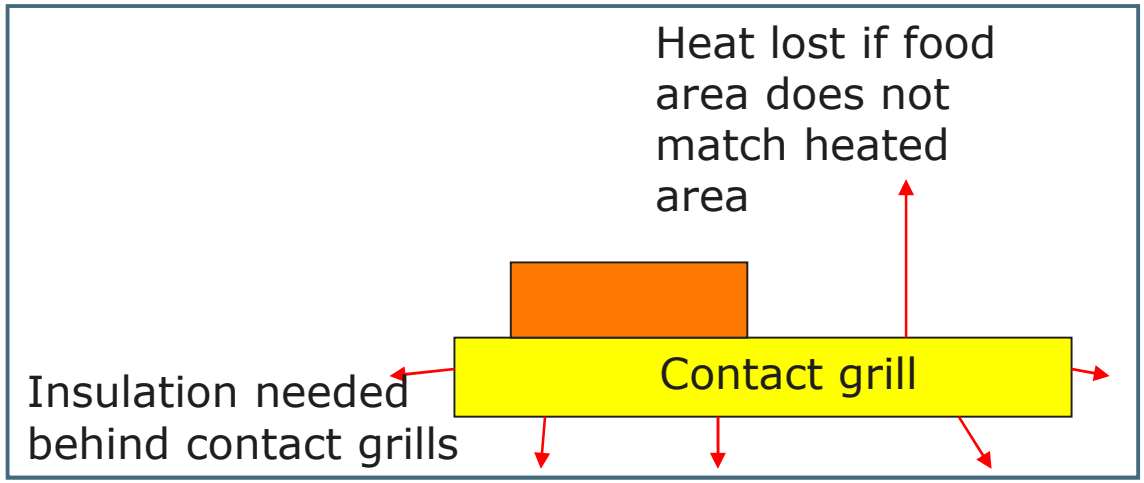
Grills

- Contact grills - energy losses:
  - From areas not used
  - Away from food contact surfaces through insulation
  - Poor temperature control – overcooking food
- Radiant grills – energy losses:
  - Thermal insulation needed to prevent external surfaces being too hot – will have less effect on energy consumption
    - Need clean reflective surfaces behind elements
  - Losses from unused grill areas
- Some have limited temperature control (on/off only)

Grill energy losses







Measurement standards

- Energy consumption measurement standards are being developed by CENELEC for gas and electric hobs
  - What should simmer time be?
    - Should reflect typical EU cooking
    - Also ensure that simmer performance is fully assessed
- No test methods for grills in EU
  - US and Japanese research shows significant variation in grill energy performance
  - EU test should be based on typical EU grill designs and cooking methods

Conclusions

- Materials used needed for base case calculations
- Energy data in use phase for representative hobs and grills needed for comparison with BAT products
  - To determine improvement potential
- Standard measurement methods needed

Thank you

Questions

ENER Lot 23: Domestic and commercial hobs and grills

including when incorporated in cookers

Task 5 – Assessment of Base-cases

Objectives

- Assessment of average EU products, the so called “base cases”
  - ✓ A base case is “a conscious abstraction of reality”
- The description of the Base Cases is the synthesis of the results of Tasks 1 to 4
- Most of the environmental and life cycle cost analysis are built on these Base Cases throughout the rest of the study and it serves as the point-of-reference for Task 6 (technical analysis of BAT), Task 7 (improvement potential), and Task 8 (policy analyses)

EcoReport tool

	material
	Bulk Plastics
1	LDPE
2	HDPE
3	LLDPE
4	PP
5	PS
6	EPS
7	HI-PS
8	PVC
9	SAN
10	ABS
	TecPlastics (incl. Fillers, reinforcement, additives)
11	PA 6
12	PC
13	PMMA
14	Epoxy
15	Rigid PUR
16	Flex PUR
17	Talcum filler
18	E-glass fibre
19	Aramid fibre

	Ferro metals
21	St sheet galv.
22	St tube/profile
23	Cast iron
24	Ferrite
25	Stainless 18/8 coil
	Non ferro metals
26	Al sheet/extrusion
27	Al diecast
28	Cu winding wire
29	Cu wire
30	Cu tube/sheet
31	CuZn38 cast
32	ZnAl4 cast
33	MgZn5 cast
	Coating / plating (per g coating)
38	pre-coating coil
39	powder coating
40	Cu/Ni/Cr plating
41	Au/Pt/Pd

	Electronics
42	LCD per m2 scrn
43	CRT per m2 scrn
44	big caps & coils
45	slots / ext. ports
46	large IC
47	small IC
48	SMD/ LED's avg.
49	PWB 1/2 lay 3.75kg/m2
50	PWB 6 lay 4.5 kg/m2
51	PWB 6 lay 2 kg/m2
52	Solder SnAg4Cu0.5
	Miscellaneous
54	Glass for lamps
55	Bitumen
56	Cardboard
57	Office paper
58	Concrete

Task 5 - Methodology (2/2)

	Life Cycle phases →		P
	Resources Use and Emissions		M
	Materials	**unit**	
1	Bulk Plastics	g	
2	TecPlastics	g	
3	Ferro	g	

	Life Cycle phases →		PRODUCTION			DISTRI-	USE	END-OF-LIFE*			TOTAL
	Resources Use and Emissions		Material	Manuf.	Total	BUTION		Disposal	Recycl.	Total	
	Total weight	g									
	Other Resources & Waste										
8	Total Energy (GER)	MJ									
9	of which, electricity (in primary MJ)	MJ									
10	Water (process)	ltr									
11	Water (cooling)	ltr									
12	Waste, non-haz./ landfill	g									
13	Waste, hazardous/ incinerated	g									
	Emissions (Air)										
14	Greenhouse Gases in GWP100	kg CO_2 eq.									
15	Ozone Depletion, emissions	g R-11 eq.									
16	Acidification, emissions	g SO_2 eq.									
17	Volatile Organic Compounds (VOC)	g									
18	Persistent Organic Pollutants (POP)	ng i-Teq									
19	Heavy Metals	mg Ni eq.									
	PAHs	mg Ni eq.									
20	Particulate Matter (PM, dust)	g									
	Emissions (Water)										
21	Heavy Metals	mg Hg/20									
22	Eutrophication	g PO4									
23	Persistent Organic Pollutants (POP)	mg									

ECO-DESIGN OF ENERGY-USING PRODUCTS

EuP EcoReport: RESULTS
Assessment of Environmental Impact

Nr	Product name					Date		Author			
	Life Cycle phases →		PRODUCTION			DISTRI-	USE	END-OF-LIFE*			TOTAL
	Resources Use and Emissions		Material	Manuf.	Total	BUTION		Disposal	Recycl.	Total	
	Materials	**unit**									
1	Bulk Plastics	g			0			0	0	0	0
2	TecPlastics	g			0			0	0	0	0
3	Ferro	g			0			0	0	0	0
4	Non-ferro	g			0			0	0	0	0
5	Coating	g			0			0	0	0	0
6	Electronics	g			0			0	0	0	0
7	Misc.	g			0			0	0	0	0
	Total weight	g			0			0	0	0	0
									see note!		
	Other Resources & Waste							debit	credit		
8	Total Energy (GER)	MJ	0	0	0	0	0	0	0	0	0
9	of which, electricity (in primary MJ)	MJ	0	0	0	0	0	0	0	0	0
10	Water (process)	ltr	0	0	0	0	0	0	0	0	0
11	Water (cooling)	ltr	0	0	0	0	0	0	0	0	0
12	Waste, non-haz./ landfill	g	0	0	0	0	0	0	0	0	0
13	Waste, hazardous/ incinerated	g	0	0	0	0	0	0	0	0	0
	Emissions (Air)										
14	Greenhouse Gases in GWP100	kg CO_2 eq.	0	0	0	0	0	0	0	0	0
15	Ozone Depletion, emissions	g R-11 eq.	negligible								
16	Acidification, emissions	g SO_2 eq.	0	0	0	0	0	0	0	0	0
17	Volatile Organic Compounds (VOC)	g	0	0	0	0	0	0	0	0	0
18	Persistent Organic Pollutants (POP)	ng i-Teq	0	0	0	0	0	0	0	0	0
19	Heavy Metals	mg Ni eq.	0	0	0	0	0	0	0	0	0
	PAHs	mg Ni eq.	0	0	0	0	0	0	0	0	0
20	Particulate Matter (PM, dust)	g	0	0	0	0	0	0	0	0	0
	Emissions (Water)										
21	Heavy Metals	mg Hg/20	0	0	0	0	0	0	0	0	0
22	Eutrophication	g PO4	0	0	0	0	0	0	0	0	0
23	Persistent Organic Pollutants (POP)	mg	negligible								

*=Note: Recycling credits only relate to recycling of plastics and electronics (excl. LCD/CRT). Recycling credits for metals and other fractions are already taken into account in the production phase.

Base-cases for the Lot 23 study:

- Hobs

Base-Case	Configuration	Number of cooking zones	Surface Material	Total maximum power (kW)	Lifespan (years)
BC1 - Domestic electric (radiant) hob	Built-in independent	4	Vitroceramic	7.4	19
BC2 - Domestic gas hob	Built-in independent	4	Stainless Steel	9	19

- Grills : no average Base-Case is highlighted due to :
  - Low frequency of use
  - Diverse panel of products

Task 5 – Inputs (1/6)

Production Phase

Base-Case	Weight	1 Bulk Plastics	2 Tech. Plastics	3 Ferro	4 Non-ferro	5 Coating	6 Electronics	7 Misc.	Total
Base-Case 1: Domestic electric hob	in g	121	106	5147	616	0	489	3230	9709
	in %	1%	1%	53%	7%	0%	5%	33%	100%
Base-Case 2: Domestic gas hob	in g	107	150,5	5467	2030,5	0	0	39	7794
	in %	1.5%	2%	70%	26%	0%	0%	0.5%	100%

Task 5 – Inputs (2/6)

Distribution Phase

Base-Case	Volume of packaged product (in m^3)
BC1: Domestic electric hob	0.061
BC2: Domestic gas hob	0.057

Task 5 – Inputs (3/6)

Use Phase

Base-Cases	Consumption per cycle (kWh)	Number of cycle per year
BC1: Domestic electric hob	0.7	424
BC2: Domestic gas hob	0.9 (3.24 MJ)	424

Task 5 – Inputs (4/6)
End-of-Life Phase

Base-Case	Percentage of the total weight going to landfill	Plastics		
		Re-use, close-loop recycling	Material recycling	Thermal recycling
BC1: Domestic electric hob	54%	30%	53%	17%
BC2: Domestic gas hob	2%	15%	83%	2%

Task 5 – Inputs (5/6)

Market Data

Base-Case	Product Lifetime (in years)	Sales in 2007 (units)	Stock in 2007 (units)	Product price (in €)
BC1: Domestic electric hob	19	5,200,000	88,800,000	450*
BC2: Domestic gas hob	19	3,300,000	62,700,000	268

*calculated as a weighted average price including radiant, solid plate and induction systems.

- Installation, maintenance and end-of-life costs are neglected

Task 5 – Inputs (6/6)

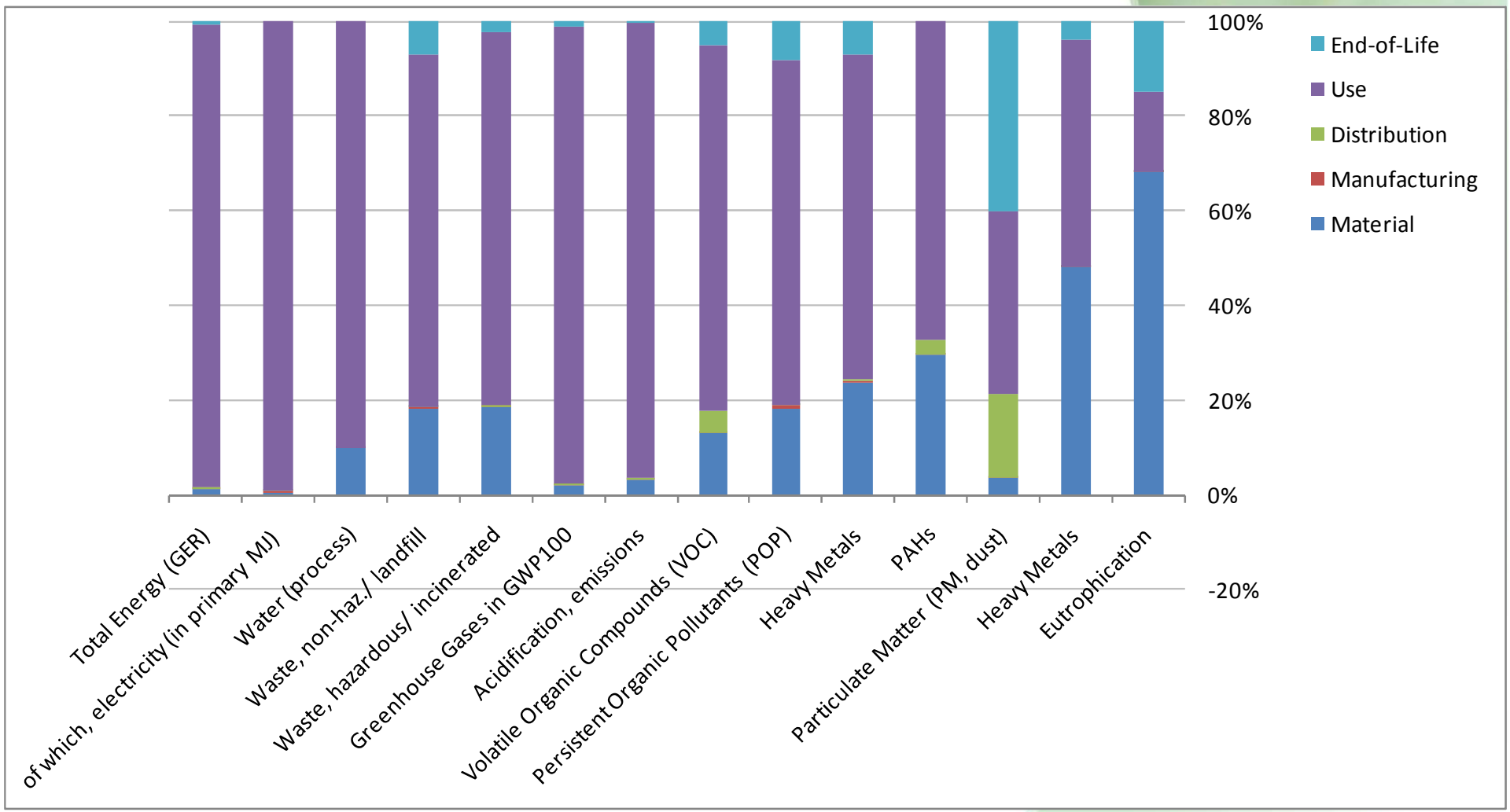
Market Data

Base-Case	Electricity rate (€/kWh)	Natural gas rate (€/GJ)
BC1: Domestic electric hob	0.1658	
BC2: Domestic gas hob		16.21

Base-Case	Overall improvement ratio
BC1: Domestic electric hob	1
BC2: Domestic gas hob	1

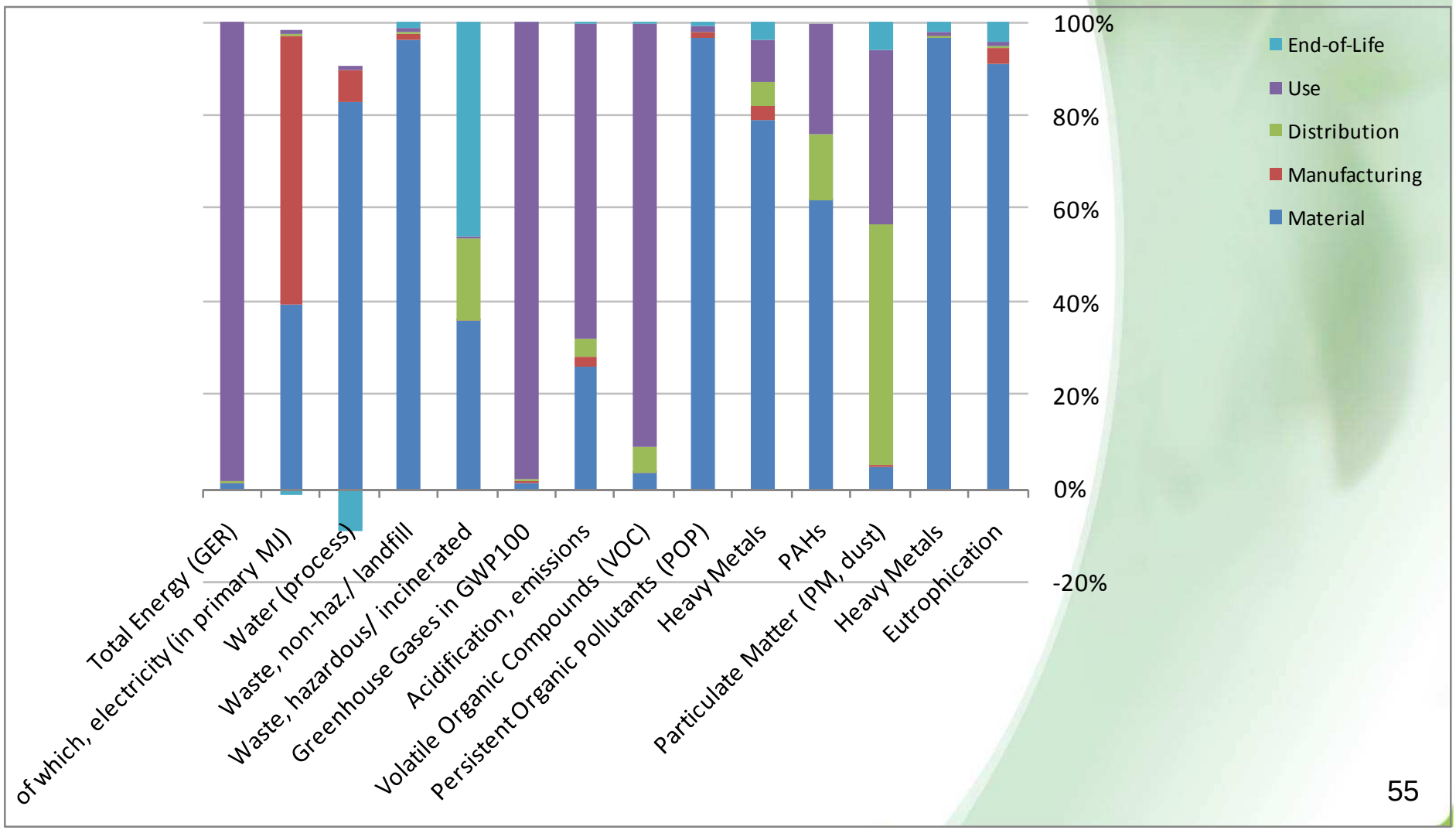
Task 5 - Env. Impact Assessment (1/3)

Base Case 1: Domestic electric hob



Task 5 - Env. Impact Assessment (2/3)

Base Case 2: Domestic gas hob



Comparison of the main impacts :

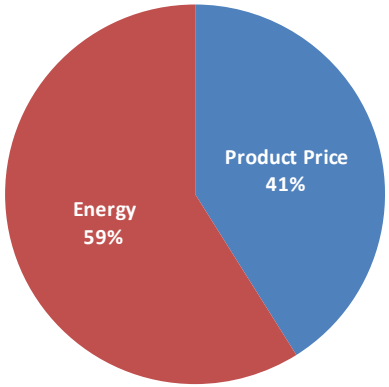
Base-Case	Total energy consumption (MJ)	Waste (non-hazardous, landfill) (g)	GHG emissions (kg CO_2 eq)	PM (g)
BC1: Domestic electric hob	60,600	92,350	2,680	1186
BC2: Domestic gas hob	28,300	17,350	1,570	376

Task 5 - Life cycle costs

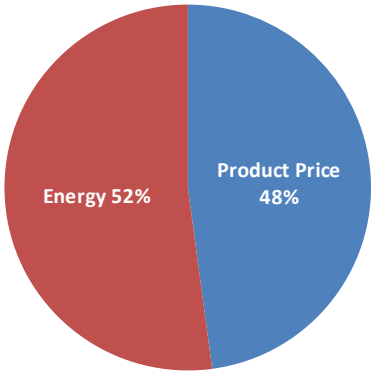
Life cycle cost results:

	Base-Case 1	Base-Case 2
Product price (€)	450	268
Energy cost (€)	646	292
Life Cycle Cost (€)	1096	560

Base-Case 1 : Domestic electric hob



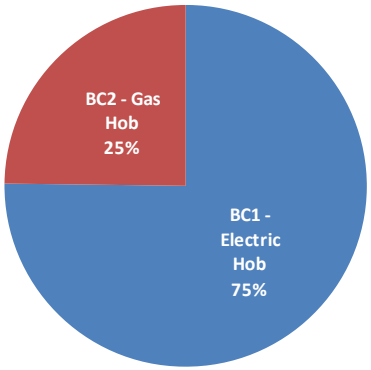
Base-Case 2 : Domestic gas hob



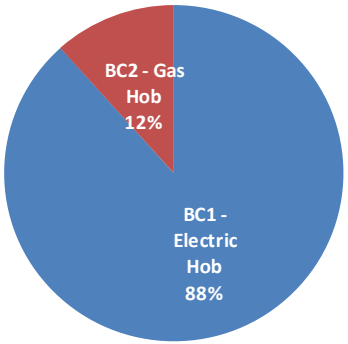
Task 5 – Impacts at EU level

Base-Case	Total energy consumption (PJ)	Waste (non-hazardous, landfill) (kt)	GHG emissions (Mt CO_2 eq)	PM (ton)
BC1: Domestic electric hob	283	432	13	5.5
BC2: Domestic gas hob	93	57	5	1.2

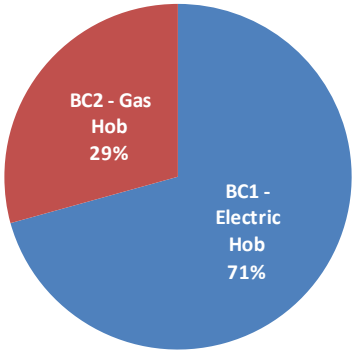
Total Energy (GER)



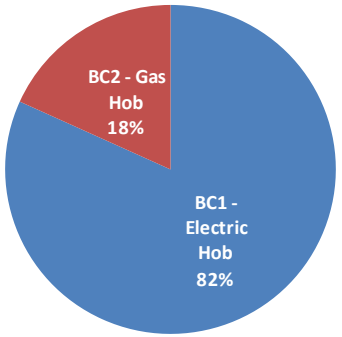
Waste, non-haz./ landfill



Greenhouse Gases in GWP100



Particulate Matter (PM, dust)

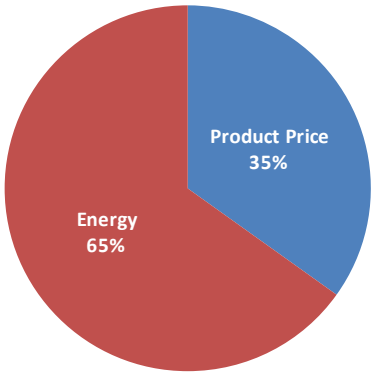


Task 5 - Impacts at EU level

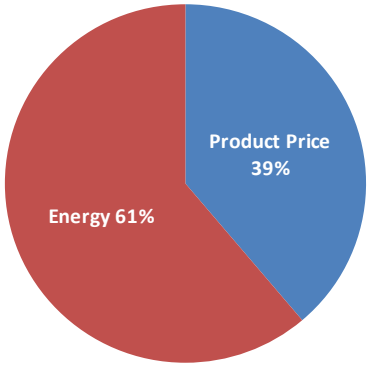
Total Annual Consumer expenditure in EU-27 in 2007 :

	Base-Case 1	Base-Case 2	Total domestic
EU-27 sales (in mln units)	5.2	3.3	**8.5**
Share of the EU-27 sales	*61%*	*39%*	***100%***
Product Price (in mln €)	2340	884	**3224**
Energy (in mln €)	4370	1394	**5764**
Total (in mln €)	**6710**	**2278**	**8988**
Share of the total expenditure	*75 %*	*25%*	***100%***

Base-Case 1 : Domestic electric hob



Base-Case 2 : Domestic gas hob



ENER Lot 23: Domestic and commercial hobs and grills

including when incorporated in cookers

Task 5 – Conclusions

- The use phase is by far the most impacting stage of the life cycle in terms of energy consumption and greenhouse gases emissions.
- Electricity generation is contributing to an important part of the global environmental impacts of the electric appliances.
- For gas hobs, the quantitative impacts are significantly lower
- The life-cycle cost is higher for electric hobs than for gas hobs at product level with comparable shares of energy costs. At EU level, consumer expenditure for electric hobs are 3 times higher than for gas hobs.

Agenda of the meeting

10:00 – 10:30	**Welcome, "Tour de table", Introduction to the Ecodesign Directive, schedule update**
10:30 – 11:20	**Lot 22 – Tasks 1 to 3: Main conclusions on domestic ovens**
11:20 – 11:30	**COFFEE BREAK**
11:30 – 12:30	**Lot 22 – Tasks 4 and 5: Main conclusions on domestic ovens**
12:30 – 13:00	**Lot 22 – Next steps: Tasks 6, 7 and 8**
13:00 – 14:00	**LUNCH BREAK**
14:00 – 14:50	**Lot 23 – Tasks 1 to 3: Main conclusions on domestic hobs and grills**
14:50 – 15:30	**Lot 23 – Tasks 4 and 5: Main conclusions on domestic hobs and grills**
15:30 – 16:00	**Lot 23 – Next steps: Tasks 6, 7 and 8**
16:00 – 16h30	**Lot 22 & 23 : General discussion and conclusions**

Dr Paul Goodman,
Reliability and Failure Analysis Group

4 November 2010

COBHAM

ERA TECHNOLOGY
ANTENNA AND
ELECTRONIC
SYSTEMS

ERA TECHNOLOGY
ENGINEERING
CONSULTANCY
SERVICES

VECTOR FIELDS
SOFTWARE

LIGHTNING
TESTING AND
CONSULTANCY

DG ENER Lots 23 Eco-design preparatory study
Task 6 Domestic Hobs and Grills
BAT & BNAT

conducted on behalf of the European Commission, DG ENER, by Cobham Technical Services and Bio Intelligence Service

Task 6 - Domestic hobs and grills

- BAT
  - Best currently available technology in EU
- BNAT
  - Technology not currently available in EU – could be available within ~10 years

Sources of information

- Stakeholders – questionnaires available on website
  - BAT and BNAT information provided by CECED
- Publications
  - Technical papers
  - Patents
  - Technology used by other industries
  - Products available outside EU

Domestic Hobs

- Gas burners
  - Flame orifice design for better simmer control
  - Separately controllable dual / triple ring
  - Novel technologies e.g. catalytic combustion
- Electric hotplates
  - Solid plate – special coatings (also needed on pots)
  - Radiant – electronic control of heat output, insulation to prevent heat losses, reflective surfaces behind radiating elements, IR transparency of glass ceramic
  - Induction – scope for further improvement?

Domestic Grills

- Radiant grills
  - Study is looking for energy efficiency innovations
    - E.g. toasters – power only to slots in use (sensors?)
- Contact grills
  - Minimise radiative heat loss from unused areas
- All types
  - Ability to heat only areas needed for food (heating zones)
    - 2 zones fairly common
  - Control of power input (usually limited)
    - None or up to 3 levels fairly common (usually fewer levels than for hobs)

Improvement potential
- Hobs

- CECED tests performance variation within 14% range
  - Best consumes 14% less energy than worst
  - Average improvement potential = 7%
  - Annual electric hob consumption in EU is uncertain
    - If total EU stock = 125 million & typical annual energy consumption = 240 KWh/y
    - Then total annual electric hob energy consumption = 125M x 240KWh = 30TWh/y
  - Improvement potential (7%) = up to **2 TWh/y**
- There are big differences in consumption for solid plate, radiant and induction so improvement potential could be larger if the type of electric hob is changed

Improvement potential
- Hobs

- Also need data for gas hobs – example:
  - If stock = 100M in EU
  - Annual consumption / hob not known (UK = 334KWh/y)
  - Total EU consumption ~33TWh/y
    - 10% improvement = **3TWh/y**

Improvement potential
- Grills

- Stock level unknown
  - Likely to be more than total number of ovens so > 200 million
  - Annual energy consumption not known (UK figure = 47 KWh/y)
- No EU data on improvement potential
  - Japan Top Runner estimates best = 30% better than worst
  - US Energy Star finds best electric is 10% better and best gas is 30% better than worst
- Based on UK annual consumption and 200 million stock replaced
  - 10% improvement would be ≅ **0.9TWh/y**

Conclusions

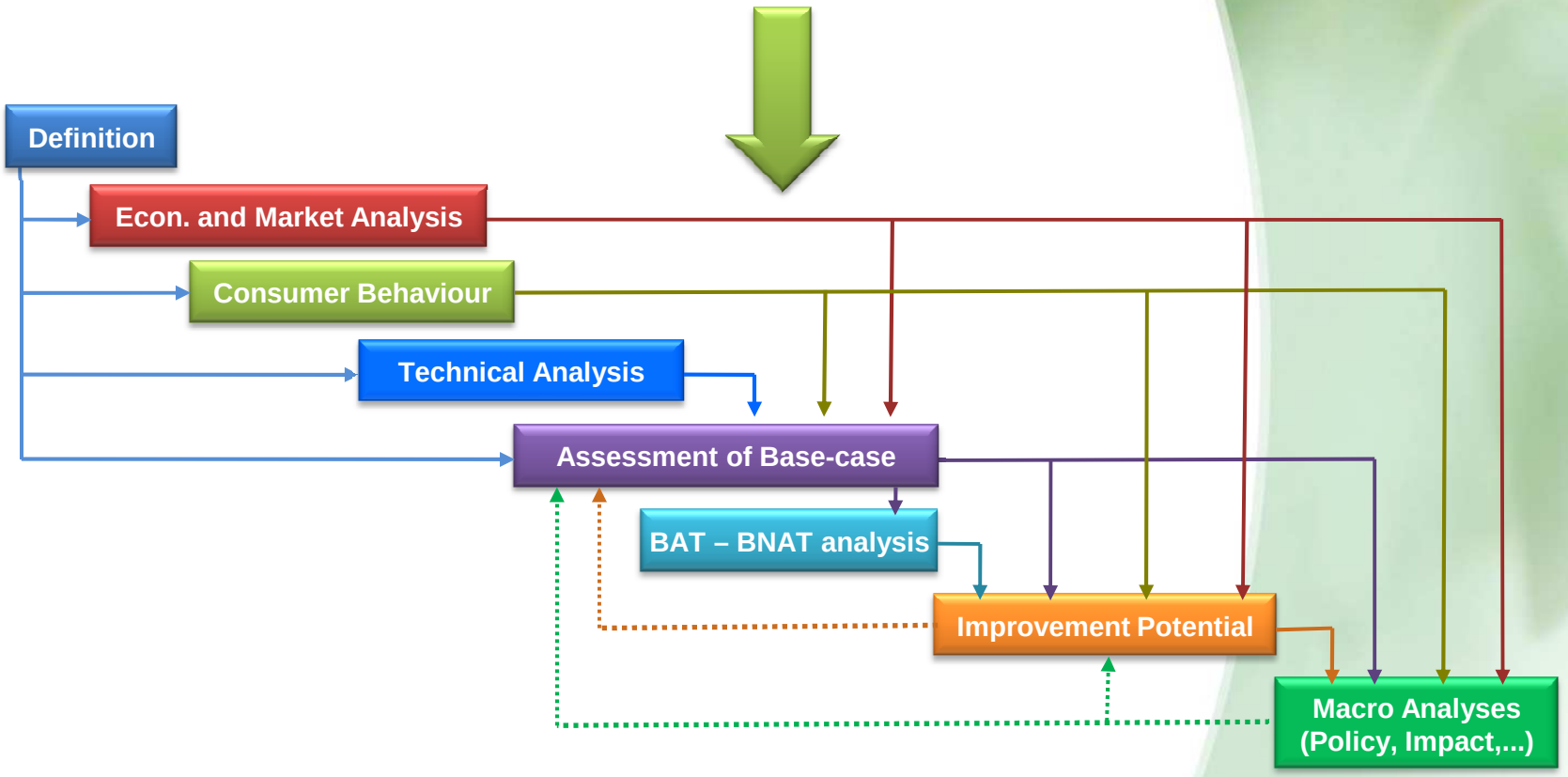
- Need more hob and grill energy consumption data
- Information on BAT & BNAT – task 6 questionnaire
- Currently there is uncertainty over:
  - Size of improvement potential
  - EU27 stock levels
  - Total EU hob & grill energy consumption

Thank you

Questions?

Schedule for Lot 23

1st Stakeholder meeting



Task 1 | Task 2 | Task 3 | Task 4 | Task 5 | Task 6 | Task 7 | Task 8

Task 7 – Improvement potential:

- Identify design options, their monetary consequences in terms of Life Cycle Cost for the consumer and their environmental costs and benefits

  Life Cycle Costs: indicate whether design solutions might negatively or positively impact the total EU consumer's expenditure over the total product life (purchase, running costs, etc.)
- Pinpoint the solution with the Least Life Cycle Costs (LLCC) and the Best Available Technology (BAT)

7.1 Options

7.2 Impacts

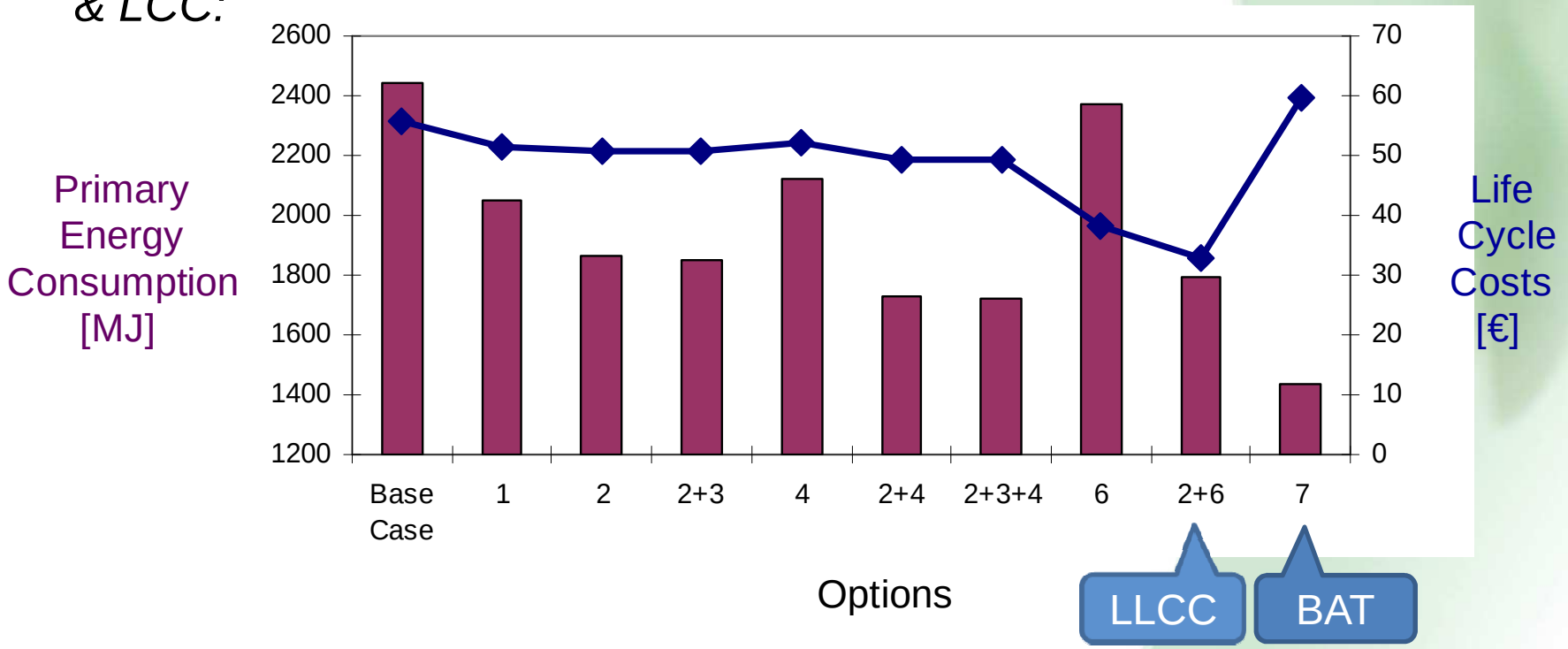
7.3 Costs

7.4 Analysis LLCC and BAT

7.5 Long-term targets (BNAT) and systems analysis

Task 7 – Improvement potential:

Example of options analysis considering a key environmental indicator & LCC:



(1/2)

Task 8 – Scenario, Policy, Impact and Sensitivity analysis:

- Summarise and total the outcomes of all previous tasks
- Look at suitable policy means to achieve the potential e.g. implementing LLCC as a minimum and BAT as a promotional target, using legislative or voluntary agreements, labeling and promotion
- Scenarios 1990 – 2020 quantifying the improvements that can be achieved vs. a Business-as-Usual scenario
- Impacts on consumers and industry
- Robustness of the outcome

8.1 Policy and scenario analysis

8.2 Impact analysis industry and consumers

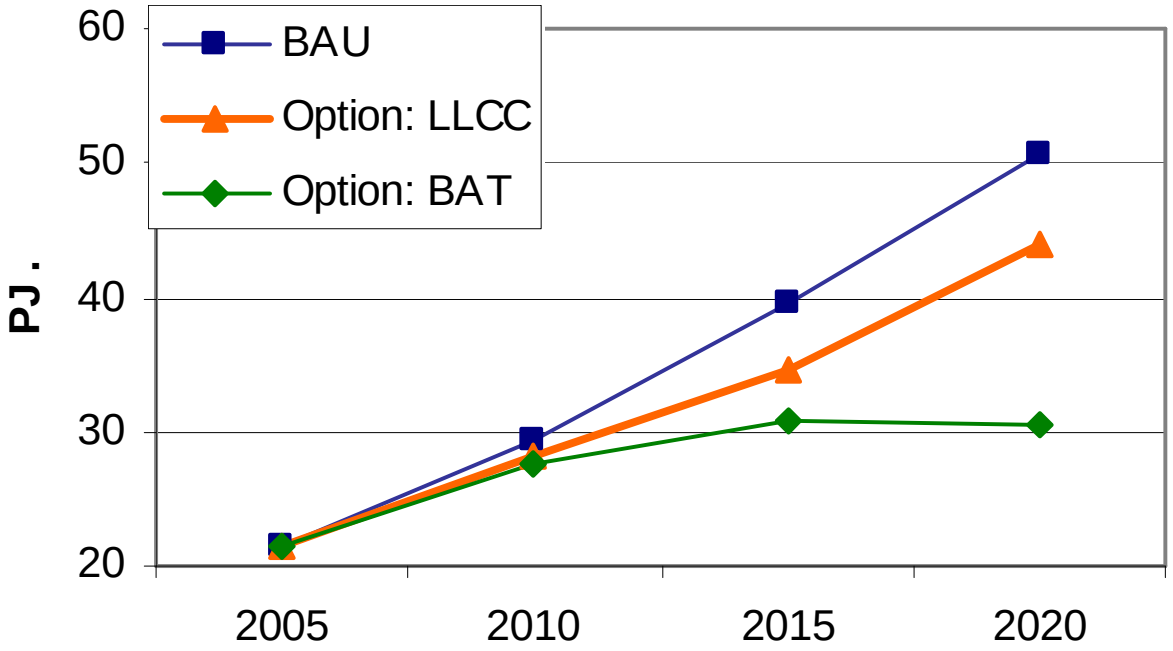
8.3 Sensitivity analysis of the main parameters

(2/2)

Task 8 – Scenario, Policy, Impact and Sensitivity analysis:

Example scenarios:

Total energy consumption



- Open Discussion

- Contact :
  - contact@ecocooking.org