Dr Paul Goodman, Reliability and Failure Analysis Group

24 June 2010 –First Stakeholder Meeting

COBHAM

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ENTR Lot 4 Ecodesign preparatory study

Industrial and Laboratory Furnaces and Ovens

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

Today's agenda

- 10:00 Welcome/tour de table
  - About the contractors
- 10:10 Eco-design directive and background to study
- 10:35 Coffee
- 11:05 Results of study (Tasks 1 to 2 – draft report)
- 13:00 - 14:00 Lunch
- 14:00 Results of study (Task 3 – draft report)
  - Scope – what can be excluded?
  - Possible overlap with EU ETS
- Presentation from CECOF
- 15:30 Coffee
- Next steps
  - Task 4 Base cases
  - Tasks 5 – 7

Cobham Technical Services

- Environmental regulatory compliance

- We track environment product regulation worldwide
- We advise industry, trade associations, government, regulators and enforcement bodies

Bio Intelligence Service

- Quantification tools and decision-making support

- Specialists in the measurement of the environmental and health characteristics of products and services in France and Europe
- At the interface between the environment and products, providing a large range of services for public and private decision makers

- Life cycle assessment
- Environmental labelling of products
- Eco-design of products
- Greening the supply chain
- Assessment of public policies

- Energy
- Agri-food
- Construction
- Retail
- Industry
- Transport
- Waste
- Services

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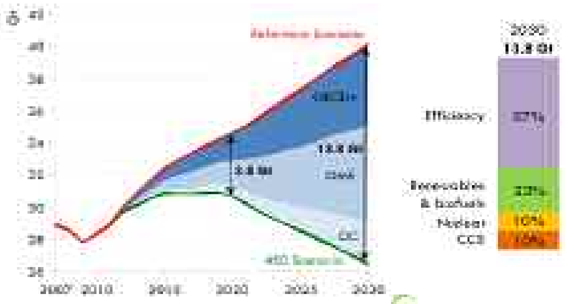
Background
- Striving to reduce carbon emissions



Source: World Energy Outlook 2009 report

Background
- Why study furnaces & ovens?

- EU aims to reduce CO2 emissions
  - 20% by 2020 (30% proposed)
  - 80% by 2050 – ambitious – will need **BIG** changes
- Furnaces and ovens determined to be **4th largest energy user** in EU – EPTA Working Plan study conclusions:
  - Estimated ~6,000 PJ total energy consumption (1,670 TWh)
  - 20% improvement potential in energy consumption possible
- Eco-design studies are carried out to determine if there is significant improvement potential – e.g. reduction in energy use

Background
- Opportunity or threat?

- Opportunity to:
  - Significantly reduce CO2 emissions
  - Reduced energy costs for users
  - Increase sales of new furnaces / ovens by EU manufacturers
    - Increased sales revenue for more efficient designs of furnaces & ovens
    - Accelerate replacement of old inefficient furnaces / ovens
- Threat:
  - Compliance with new legislation difficult / expensive
    - Industry needs to ensure EC have accurate understanding of this sector so that compliance with any new legislation is possible
  - Users might relocate outside EU due to increased costs
    - Need to understand market – consider incentives – we need to know size of increased costs for eco-design improvements

Background
- Eco-design studies

- Many have already been completed
  - 9 EU regulations adopted as a result so far
- Most studies were on consumer products
  - Some are of industrial products
- Furnaces and ovens different:
  - Due to the very wide variety of designs and uses
  - Many are custom designed
  - Large furnaces and ovens can be designed using best available technology (BAT)
  - But users are not always willing to pay for BAT

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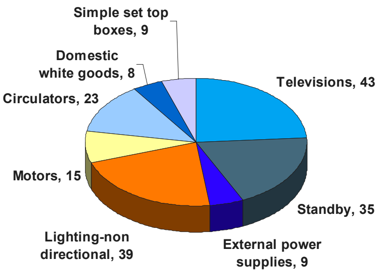
Background
- Impact of EuP regulations to date

- Projected energy savings in TWh



- ~180 TWh ~ equivalent to switching off 45 power stations!

Background
- Aims

- Provide required data to European Commission on industrial and laboratory furnaces and ovens
  - All eco-design aspects considered but energy is priority
- EC will decide what action is appropriate based on results from study

Background
- Possible outcomes

- Eco-design regulations can only affect new furnaces and ovens, not
  - Furnaces and ovens sold outside EU
  - Refurbishment – although refurbished equipment may be considered to be a newly placed on the market (so we will include in study)
- Large installations already regulated by IPPC and EU GHG ETS
  - Should not be overlap or conflicting requirements
- We will consider incentives in Task 7
  - but we would need to know their costs and potential benefit

Background
- Overview of preparatory study

- Wide variety of products on EU market
- Off-the shelf ovens and furnaces


Laboratory oven


Laboratory furnace

Background
- Study overview

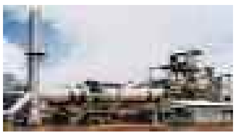
- Industrial ovens and furnaces
  - frequently custom designs

Background
- Study overview

- Some furnaces are very large - steel continuous casting

Background
- Study overview

- Some are very large energy consumers but sold in very small numbers



Cement kiln – rotary furnace. Emit 2% of CO_2 in EU (5% world-wide)

Blast furnace – Steel production emits ~ 2% of CO_2 in EU

Overview of study
- uniform approach

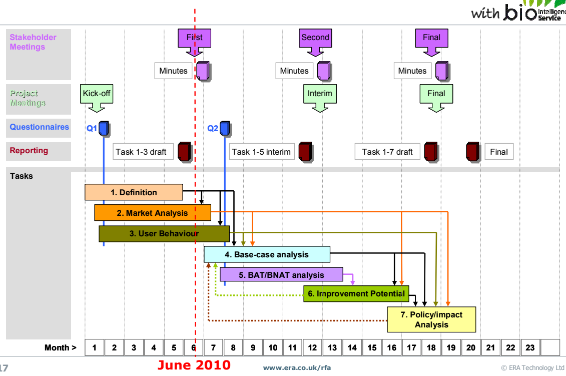
- Task 1 – Definition and classification
- Task 2 – Market information
- Task 3 – User requirements
- Task 4 – Assessment of base cases ~5

Defines present situation

- Task 5 – Technical analysis
- Task 6 – Improvement potential
- Task 7 – Policy and impact analysis

Assesses improvement potential

Work plan



Issues for study

- PRODCOM Eurostat provides very limited data on numbers sold in the EU
- Some furnaces are very large energy consumers
- Custom designs needed for specific manufacturing processes
- Potential for significant improvements in energy efficiency
  - Preliminary assessment indicates large potential for energy efficiencies
  - But dependent on users & financial considerations
  - Each industry sector is different
- Boundary between this study and DG TREN Lot 22

Methodology for study

- Task 1 – Definition & classification
  - Legislation will be based on classifications
- Task 2
  - Market data, needed to determine environmental impacts
- Task 3 - User behaviour (to provide data for other tasks)
- Task 4 – Base-case analysis of main classification types (using MEEUP)
- Task 5 - Definition of BAT and BNAT
- Task 6 – Eco-design improvement potential for BAT & BNAT
  - ID of design options, calculate environmental impact and Life Cycle Cost (using MEEUP)
- Task 7 – Policy impact analysis
  - Policy options to achieve potential improvement (until 2025). This task considers financial implications and EU competitiveness

Task 1

- Definition and classification

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Task 1

- Define what are "Ovens" and "Furnaces"
  - Primary function – heating
  - Many have other functions
- Identify standards relating to ovens & furnaces
- Identify legislation relating to ovens & furnaces
  - Two affect all large furnace & oven installations
    - IPPC - affects design & limits hazardous emissions
    - EU ETS - European Union Greenhouse Gas Emission Trading System, financial incentive to reduce emissions
  - Hazardous substances legislation (e.g. RoHS, REACH, etc.)
  - Safety (e.g. machinery, LVD)

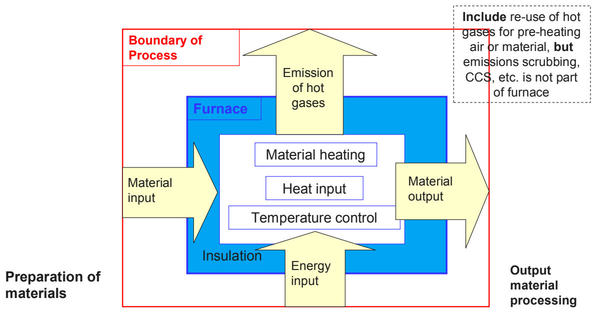
Task 1
- Define what is a furnace or oven?

- Laboratory ovens and furnaces are self contained equipment
  - But may include functions other than heating
- Larger industrial furnaces and ovens are often used as part of larger processes, e.g.
  - Paint drying ovens in vehicle production lines
  - Blast furnace is part of steel production processes
  - Aluminium melting furnaces and heat treatment ovens are parts of aluminium castings production processes
    - However each furnace / oven is a self-contained "product"

Task 1
- Two possible definitions

- Equipment with a primary function to heat materials inside an enclosed compartment.
- From BS 4642: A structure within which heat is generated to a controlled temperature by the combustion of fuel, or by the application of electrical or other energy, generally constructed or lined with refractory material and designed to suit the nature and dimensions of the material to be processed.
- …other suggestions?
  - Heat input
  - Insulated enclosed space
    - Exclude boilers, building heating, others…

Task 1
- Process boundary includes oven / furnace



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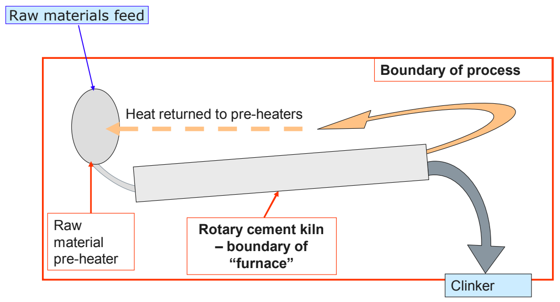
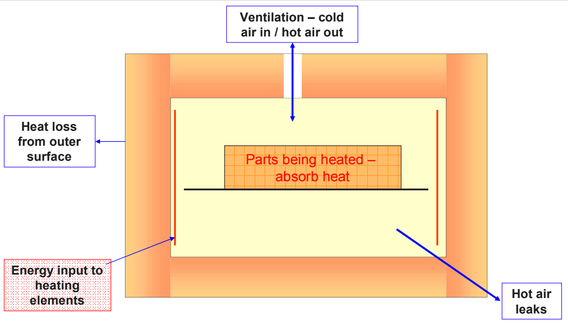
Task 1
- Furnace / process boundary – cement kiln



Task 1
- Energy use

- Energy efficiency - specific to each process
  - But efficiency can be calculated for specific throughput / load of each furnace / oven design
- Energy consumption – Process specific
- Aim to reduce consumption & increase efficiency
  - Both depend on process, design, throughput, etc.
- Energy efficiency should be as high as possible
  - But each set of circumstances have limits, e.g.
    - Small scale aluminium melting – best available ~40%
    - Large scale tower melting furnace for aluminium – up to ~80%

Task 1
- Energy consumption / efficiency



Task 1
- Energy consumption / efficiency / CO2

- Energy consumption = total energy input
  = energy absorbed by parts + losses
- Energy efficiency $= \frac{\text{Energy absorbed by parts}}{\text{Total energy input}}$
- CO2 emissions arise from:
  - Burning fossil fuels – natural gas, oil, coal
  - Combustion of renewable fuels (e.g. biomass)
  - Generation of electricity = ~ 30% efficient
  - Process emissions

Task 1
- Energy / CO_2 for blast furnace process

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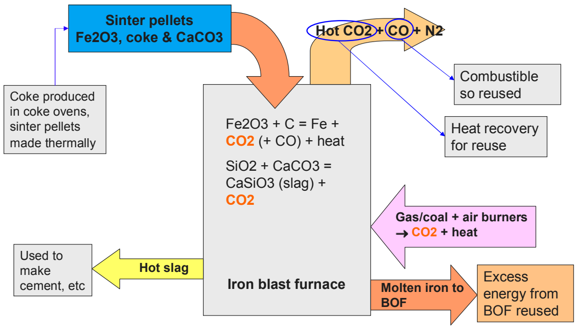

Task 1
- Design variables - classification

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- Type
  - Batch
  - Continuous
- Typical operating temperature
  - Ovens < 650°C
  - Furnaces > 650°C
- Energy source
  - Gas
  - Oil
  - Electricity (resistance, arc, plasma, IR, induction, microwave)
  - Biomass
  - Waste – may not all be fossil fuels

Task 1
- Design classification

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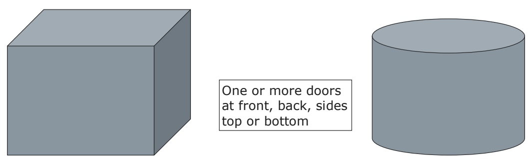
- Size
  - Small lab furnaces can be < 1 litre capacity
  - Blast furnaces > 3 million tonnes p.a. output
- Atmosphere
  - Air
  - Inert gas
  - Vacuum
- Design types
  - 4 main design types – includes most furnaces & ovens
  - Classification using a few design types is needed for later tasks

Task 1
- Basic design shape 1

COBHAM with bio Intelligence Service

- "Box" – all dimensions similar - heat input to an enclosed chamber
  - Usually batch processes
  - Heated internally or externally
  - Many different variations



Task 1
- Examples of "box" shapes

- Laboratory oven
- Muffle furnace
- Heat sterilizer (medical)
- Environmental test chambers
- Batch heat treatment furnaces
- Batch metal melting furnaces – e.g. with internal crucible
- Batch production of ceramics
- Many others
- Includes all "Stationary" (plus some "continuous") classified in VDMA 24202

Task 1
- Basic design shape 2

- Tunnel with conveyor, rollers, pushed or pulled, etc.
  - Heated internally
  - Parts travel through tunnel with one or more heated zones
  - Parts heated in air or other gas

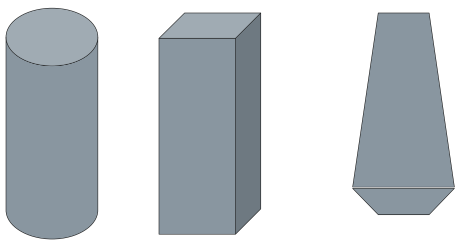
  - All are "continuous" furnaces / ovens
    - Could be circular – rotary hearth

Task 1
- Examples of "tunnel" shapes

- Food manufacture – biscuit and bakery oven
- Continuous metal heat treatment
- Printed Circuit Board solder reflow oven
- Continuous production of ceramics
- Rotary hearth metals heat treatment

Task 1
- Basic design shape 3

- Vertical – usually continuous
  - Feed at top, heat near base, product from base

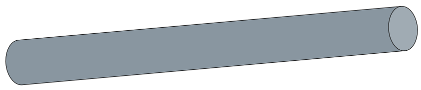


Task 1
- Examples of design shape 3

- Lime kiln
- Aluminium melting shaft furnace
- Blast furnace
- Copper smelter

Task 1
- Basic design shape 4

- Horizontal cylinder
  - Batch or continuous
- Examples
  - Cement kiln – rotary tube furnace
  - Rotary furnaces – production of metals
  - Ceramic materials production



Task 1
- Standards

- Safety (many)
- Energy efficiency – draft ISO standard
  - Calculates energy consumption and efficiency for a specific process
  - Use to compare different designs for one process
  - Not intended for energy rating of products such as laboratory ovens that are have many uses although it could be adapted
- Standard energy consumption measurement methods exist for:
  - Domestic cooking ovens and
  - Commercial catering ovens (draft) - using dummy loads

Task 1
- Legislation

- Safety
- Hazardous substance emissions
- IPPC – larger installations
  - Integrated pollution prevention and control
  - Member States grant permits which limit hazardous emissions, should ensure BAT is used but has limited impact on energy efficiency
- EU ETS – larger installations
  - Aims to reduce CO_2 emissions by limiting availability of carbon credits – in effect a carbon tax
  - Concern over "carbon leakage" as few countries outside EU have ETS
- Japan Energy Act – requirements for industrial furnaces

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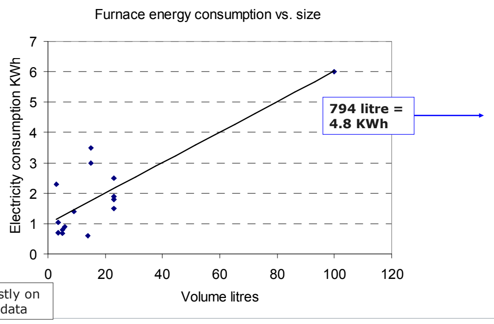
Task 1
- Preliminary assessment of eco-design improvements

- Energy consumption and efficiency
  - Energy consumption = total energy consumed by process (includes energy consumed by material in furnace as well as losses)
  - Total industrial and laboratory furnace and oven energy consumption in EU estimated to be 1200 – 2000 TWh/y
    - Consistent with EPTA result
  - Energy efficiency ranges from < 20 – 90%
    - Maximum possible depends on many factors
- Hazardous substances
  - Used in furnace and oven manufacture
  - Emissions in use – process and design dependent

Task 1
- Potential for energy savings

- Initial estimate is independent of cost
- Assumes all existing stock is replaced
  - Energy savings "E" = E_t - E_{BAT}
    - E_t = Energy consumed by representative furnaces typically bought by EU users
    - E_{BAT} = Energy consumed by BAT furnaces
  - Estimates based on data from IPPC BREF guidance and information from industry

Task 1
- Example 1 – lab furnaces



Based mostly on published data

Task 1
- Example 2 – gas burners

- Standard – cold air & gas
- Oxy-fuel – more efficient but requires oxygen generation
- Recuperative - ~20% more efficient than cold air burners
- Regenerative - most efficient but most expensive

Task 1
- Impact of cost

- Industrial furnaces and ovens are designed and can be built using best available technology (BAT)

  But
- Users may not be willing to pay for lowest energy consumption if the additional cost has a payback period of > 3 years
- Example - Glass melting furnace
  - Typical energy cost = €4million p.a.
  - Furnace manufacturer estimates that energy efficiency could be improved by 5% but payback period is 8 years
  - Potential energy saved (1 furnace) = 18 GWh / year
  - Investment cost for saving energy = €1.6 million
  - Value of energy saved over 20 years life = €4 million

Task 1
- Estimates – examples of potential total energy savings

Sectors – examples	Potential % energy saving	Annual potential sector energy saving
Steel	up to 7%	up to 20 TWh
Cement	~ 7%	up to 80 TWh
Lab ovens & furnaces	~20%	~2 TWh
Aluminium melting	~ 20%	~ 1 TWh
Glass and ceramics	~ 5 - ~20%	up to ~ 40 TWh
Total	**5 – 25%**	**~ 100 TWh**

Potential savings from replacement of existing furnaces is even larger.

Task 1

- Matrix – see table 18, v1 & 2
- Comments?
- Questions?

Task 2

- Market information

Task 2 Economic and market analysis - Objectives

- Provide a clear picture of the market structures and players (manufacturers, users, installers and distributors)
- Provide inputs for the evaluation of EU-wide environmental impacts from now until 2020 - 2025
- Provide insight into the latest market trends
- Provide economic data (product purchase price, fuel price) to be used in a Life-Cycle Cost calculation

Task 2 - Data required (I)

- Data is needed on:
  - Past present and projected total EU sales (not for individual manufacturers) – for each main type
  - Sales as numbers of units (value will be needed in later tasks to calculate the impact on EU industry)
  - Average price per furnace / oven
  - Market structure (direct or via distributors, use of installers, main manufacturers, etc.)

Task 2 - Data required (II)

- Maintenance and operating costs
- Energy consumption – quantity and sources by oven or furnace type
- Typical lifetimes for each classification type
- Time between refurbishments (< 1 to > 20 years)
- EU consumption = EU Production + imports – exports

Task 2 - PRODCOM

- Very limited data available
- Some as economic value or weight, but very little data on numbers of units
- Some categories cover many types of products, including some ovens or furnaces:
  - Sterilisers – includes types that are not ovens
  - Dental equipment – includes dental furnaces

Task 2
- PRODCOM unit sales data

Prodcom category	Production / sold 2008 in EU (not same as consumption in EU)
Non-electric furnaces and ovens for the roasting, melting or other heat treatment of ores, pyrites or of metals	7 300
Electric bakery and biscuit ovens	113 000 (this will include commercial catering ovens covered by DG TREN Lot 22 study)

Task 2
- Our initial estimates

- 2008 consumption of ovens and furnaces
  - was €2 924 million (from CECOF, based on PRODCOM Eurostat)
- Category "Non-electric furnaces and ovens for the roasting, melting or other heat-treatment of ores, pyrites or of metals"
  - 7 300 units manufactured, average price €90 479 ⇒ €660.5 million total
  - EU Consumption was ~44% of EU production ⇒ €290.6 million
- Average price of remaining furnaces and ovens in other categories varies from €20 000 to €50 000 (selected data) so estimated EU consumption is:
  - At €20 000 each, there would be 131 000 units
  - At €50 000 each, there would be 53 000 units
    - Therefore ~ 100 000 in total?

Task 2
- EU stock and sales – initial estimates

Category	Current stock	Current annual sales
Laboratory	1 000 000	70 000
Batch	600 000	26 000
Continuous	100 000	4 000
Total	1 700 000	100 000

These are "estimates" – we need accurate data.

Task 2
- Sales and stock data

- Needed for calculations in Tasks 4 – 7
- Base case calculations use data for representative furnaces and ovens (more on this later)
- To calculate EU impact of each representative design we need to know how many of each design is sold
  - Market data may be easier to obtain by business sector but each design is used in many sectors
  - Informed guesses of total numbers of each main type are needed from industry– can you help?

Task 2

- Route to market – OEMs, distributors installers, etc
- Product design trends
- Major manufacturers in each sector, market segments, market trends
- Proportion of SMEs

Task 2
- Diverse range of uses

- Uses include
  - Laboratories – research, testing, education, hospitals
  - Metal production from ores and scrap
  - Metal melting
  - Metal heat treatment
  - Ceramics – bricks, tiles, pottery, etc
  - Glass – containers, sheet, etc
  - Oil refineries
  - Food production
  - Waste treatment - incinerators
  - etc.

Task 2
- Design Trends

- Insulation
- Gas burners
- Process controllers
- Novel technologies
  - Induction heating
  - Plasma
  - Microwave
  - Superconducting magnetic heating
- Many technology developments >> task 5

Task 2

- Comments?
- Questions?

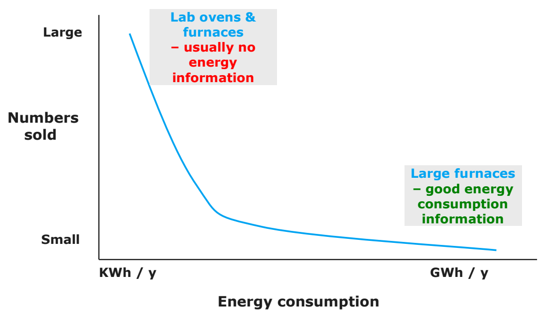
Task 3

- User requirements

Task 3
- User requirements

- Eco-design information provision to users
- User behaviour – how do users use ovens and furnaces?
  - e.g. Best practice, energy use, hours/day, etc.
- Batch and continuous
- Period of use for batch processes is very varied
  - Need more data from stakeholders
- Standby modes rarely available
  - Are laboratory ovens often left on when not being used?
- Low power mode available for few ovens (e.g. food manufacture)
- End of life behaviour

Task 3
- Information on energy consumption



Task 3

- Comments?
- Questions?

Tasks 1 - 3

- Conclusions

Conclusions: Tasks 1 - 3

- Furnaces and ovens are very significant energy consumers
- Very large variety of designs with main basic shapes
  - An agreed classification is essential for this study
- Many are custom designed
  - But use standard design features, e.g.
    - Heat sources
    - Insulation
    - Shapes, etc
- Large potential for reduction in energy consumption
  - Biggest potential is from a small number of larger furnaces
- But inadequate market data available - so far!

Conclusions: Tasks 1 - 3 - cost / benefit 1

- Clearly the potential for energy use reductions is huge
  - However, the cost would also be very large
- Tasks 1 – 6 consider only technical issues, however task 7 considers financial issues
  - EU industry usually not willing to invest to reduce energy if payback > 3 years
  - Options that increase furnace prices or increase energy costs (e.g. due to ETS) in EU unilaterally could force some users to relocate outside EU with lower energy efficiency process – so no CO2 benefit globally

Conclusions: Tasks 1 - 3 - cost / benefit 2

- This study needs more accurate data for main design types on:
  - Size of potential energy savings, based on:
    - Numbers sold p.a. – broken down by type
    - Average energy consumption for each type (and range)
  - Will need to know added cost to furnaces for improved energy efficiency for later tasks
    - Decision to legislate would consider cost to achieve benefit
      - Should not harm EU competitiveness
- Very large variety of designs makes classification into a manageable small number for further analysis difficult

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Conclusions: Tasks 1 - 3

- Number of laboratory furnaces and ovens sold in EU larger than industrial
  - Energy consumption / efficiency usually not measured
- Smaller number of new larger furnaces installed in EU annually but some are very large energy users
  - Many industrial furnaces are regularly refurbished
- Lot 4 study requires a lot of data – not freely available so help from industry is needed to fill gaps in report
- Please let us know your views on the draft task 1 – 3 report
  - Errors, incorrect data, data to fill gaps, etc….
  - We already have some new data since publishing report but need more

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Conclusions: Tasks 1 - 3

- Comments?
- Questions?

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Next steps

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Next steps

- Scope of study - categories that could be excluded
- EU ETS possible overlap
- Presentations by stakeholders
- Tasks 4 - 7

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Other issues – scope of study

- Can consider exclusion or separate measures for specific types of furnace or oven only if data on annual sales and energy consumption is available
  - E.g. if potential for energy reduction is very small
- Where potential energy savings appear to be large, we will consider:
  - Eco-design requirements - legislation
  - Is self regulation an option?
  - Impact of financial incentives but we need to know what costs would be incurred and benefits

Scope - possible inclusion / exclusion from further study

- Waste to energy incinerators – do not consume primary heat energy
- Blast furnaces – will be refurbished but not likely to be any new in EU – depends on improvement potential
- Products where primary function is not heating materials
  - Analysis instruments
- Impact not significant
  - Incubators – initial estimate for energy saving potential <14 GWh/yr (assumes 10% energy consumption reduction possible – may be too high)
    - Exclude products with maximum temperature ≤70°C?

Other issues - possible overlap with EU ETS?

- Large installations within scope of EU Energy Trading Scheme
  - Installations (factories) include furnaces and ovens
    - Steel production
    - Cement manufacture
    - Some glass installations
    - Some ceramics installations
    - Non-ferrous metals
    - etc
- EU ETS aims to reduce energy consumption
  - Imposes limits on CO2 emission – by imposing a price on CO2 emissions
  - Concerns over "carbon leakage"
  - Does not guarantee most energy efficient furnaces / ovens will be installed

Next steps
- Questions / comments

- Classification – exclusions from study?
- EU – ETS – how this study should deal with large installations?

Presentation from CECOF

Next steps

Task 4

- Assessment of Base Cases

Task 4
- Assessment of Base Cases

- Base cases should have significant potential for energy efficiency savings (not BAT)
- Results will be used for tasks 5 – 7
- Need to identify "representative" furnaces and ovens
- Much more design variation than for consumer products

Task 4
- Possible representative furnaces and ovens

- Representative base-cases for large industrial furnaces is complicated
  - As most are custom designed, we need to use a modular approach – by considering "virtual" furnaces that have representative components such as burners, insulation, etc and are average size, temperature, throughput etc for each type of furnace. This would have to be a real furnace design and we would need to know the energy consumption but this exact design need not necessarily have been built although similar designs will exist.
- 1 or 2 industrial batch ovens / furnaces (design type 1)
- 1 or 2 continuous tunnel ovens / furnaces (design type 2)
- 1 shaft or tower furnace - relatively small number (design type 3)
- 1 horizontal tube furnaces – relatively small number so can we omit? (design type 4)
- 1 representative laboratory oven or furnace

Maximum of 6

Task 4
- Base Case approach

- Select ~5 representative products
  - Typical of those sold in EU, can be custom designs
  - Each should be:
    - Representative / average size (or most common?),
    - Average energy consumption,
    - Average throughput,
    - Most common energy source (e.g. type & number of gas burners)
    - Commonly used materials, insulation, etc.
  - Aim will be to estimate total EU impact from results of base case calculations

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Task 4
- Base case assessment [1]

- Use MEEUP methodology to assess Base-Case products
  - Input BOM
  - Energy consumption, time in use (hours / year), lifetime (years)
- MEEUP calculates main environmental impacts e.g.
  - Energy consumption
    - Electricity consumption
  - Global warming gas emissions
    - CO2 emissions,
  - Hazardous emissions to air & to water
  - For all life cycle stages

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Task 4
- Base case assessment [2]

- Provides breakdown of data for production, distribution, use and end of life phases
- MEEUP also calculates total EU annual impacts using:-
  - Results from base-case assessments (for a single unit) and
  - Total number of units of this type sold annually in EU
- Calculate life cycle costs
- Important to select representative examples
  - Having "average" characteristics of each type of oven / furnace

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Task 4

- Questions & suggestions for representative furnaces / ovens for base case calculations

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Next steps

COBHAM with bio Intelligence Service

Task 5

- Technical analysis

Task 5

COBHAM with bio Intelligence Service

- Define best available technology (BAT)
  - Consider best ovens and furnaces on market
- Define best not yet available technology (BNAT)
  - Technology development nearing commercialisation
  - Technologies used by other industries
- Also assess barriers for not adopting energy efficient designs (such as process requirements, cost, etc.)

Next steps

COBHAM with bio Intelligence Service

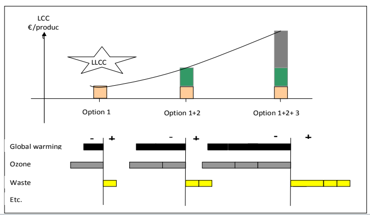
Task 6

- Improvement potential

Task 6

COBHAM with bio Intelligence Service

- Eco-design improvement potential
  - Identify design options
- Compares base case with BAT & BNAT to calculate, e.g. potential EU energy savings, etc. and cost impacts
- Will rank design options and determine the life cycle costs



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Next steps

Task 7

- Policy and impact analysis

Task 7

- Policy and impact analysis
  - Consider scenarios up to 2025 – quantify improvement that can be achieved
- Policy analysis based on all previous tasks
  - Identify policy options based on results from all previous tasks, for example:
    - Minimum energy efficiency requirement
    - Maximum combustion gas emission temperature
    - Information requirements (energy labels)
    - Incentives (to users)

Task 7

- Impact analysis for each option
  - Monetary impacts for each category of user (e.g. affordability) and Life Cycle Cost (LCC)
  - Environmental impacts – energy consumption, etc.
  - Monetary impact on furnace & oven manufacturers
  - Impact on function,
  - Impact on the market and EU competitiveness

Next steps

Timetable

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Project Timetable
- Key elements

- Q3 2010 — 2nd questionnaire (focusing on Base-Cases) to stakeholders
- Q4 2010 — 2nd interim report: Task 1 - 5
- Q1 2011 — 2nd stakeholder meeting
- Q3 2011 — Final draft report
- Nov 2011 — Final report to EC

Questions or comments

Thank you for coming and for your contributions

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