EGTEI
Warsaw, 22nd november 2011

Emerging technologies sub-group (EmTech 50-500)

Progress in the work

Emmanuel FIANI

EmTech50-500

- Mandate by WGSR47
  - "Continue the work on emerging technologies for combustion plants lower than 500 MW"
  - EmTech 50-500 builds on the work completed by LCP2030 on LCPs > 500 MWth (july 2008).
  - EmTech 50-500 also builds on work achieved by other EGTEI sub-groups (eg SCI sub-group)

- **Overall aim of the sub-group**

  - get new information on abatement techniques and technologies which are emerging
  - useful for
    1. extending the abatement techniques/technologies in the GAINS model (remaining gap between MTFR and no-effect level) and
    2. for the LCP BREF revision which started earlier this year → confirmed at KOM at the end of october 2011
  - Why 50 MWth?: because of current Gothenburg Protocol

EmTech50-500

What is an emerging technology?

- Pilot plant scale and demonstration plant scale

- Improvements of existing abatement techniques / technologies
- Techniques / technologies applied in other domains (emerging applications)
- New abatement techniques / technologies

Detailed aim of EmTech50-500

- Time horizon: 2030
- Information gathered on: environmental performance (**NOx, S, PM**), rate of penetration for new and existing plants, **energy consumption/CO2 impact**, costs.

Focus (or not focus)

- 50 and 500 are not strictly fixed borders: possibilities of downscaling or upscaling
- Peak loads plants are not in the scope
- Combustion plants in the sense of the LCP directive
- Natural gas, hard coal and biomass = priority
- Technologies causing no significant air emissions not in the scope (eg fuel cells)

EmTech50-500 **DRAFT REPORT PROVIDED BY KIT – NOV 2011**

Description of techniques/technologies :agreed format (fact sheets)

- **BREF-style items** for reader-friendliness:
  - -Description
  - -Achieved environmental benefits, with a summary dedicated to priority pollutants
  - -Applicability
  - -Operational data
  - -Economics
  - -Driving force for implementation
  - -Reference literature

- Besides *(before)* these "BREF-style" items, **some specific items** are included:
  - -**Status boxes : technology / pollutants → main discussion today of yesterday session**
  - -Potential
  - -Status of
    - -Research
    - -Implementation (to show market forces and soon readiness for commercialization)
    - →Indicators to monitor market penetration
    - →Proposal to update these indicators every 2-4 years

EmTech50-500

28 technologies taken into account for in-depth assessment.

- Solid fossil fuel combustion technologies
  - -Integrated Gasification Combined Cycle (IGCC)
  - -Lignite Predrying in Fluidized Beds (WTA Drying)
  - -Pressurized Steam Fluidized Bed Drying (PFBD)

- Technologies for the use of biomass
  - -Types of biomass gasifiers
  - - Co-Combustion of Biomass
  - -Biomass fuelled IGCC (BIGCC)
  - -Biomethane (Bio-SNG) production of solid biomass

- Gaseous fuel combustion technologies
  - -H2 Gas Turbines
  - - HTFC-GT / HTFC-MTG Hybrid Generation Systems
  - -Catalytic Combustion of Natural Gas
  - -Ultra low NOx burners for Oil and Gas Combustion
  - -Swirl Flash
  - -Flameless Combustion of Gaseous Fuels

EmTech50-500

28 technologies taken into account for in-depth assessment (cont.).

- CO2 abatement techniques and technologies
  - -CO2 Scrubbing by Physical Absorption
  - -CO2 Scrubbing by Chemical Absorption
  - -EnergiCapt – Capturing CO2 in small units
  - -Oxyfuel combustion: Oxyfuel in PC combustion, Oxyfuel in CFB combustion, In-situ Oxygen membranes for Oxyfuel boilers , Activated Carbon Multi Pollutant Abatement Technique for Oxyfuel Gases
- Pollutant reduction by efficiency increasing technolgies
  - -H-Class / J-series natural gas turbines
  - -650°C/700°C Technology in coal combustion
- Mono-pollutant abatement techniques
  - -High efficiency wet FDG plants for CO2 capture
  - -Hot Gas Ceramic Filters
  - -SO3 Injection
- Multi-pollutant abatement techniques
  - -SCONOX
  - -(WSA) SNOX-ESAP
  - -Catalytic Ceramic Filter

EmTech50-500

Techniques, which have not been considered:

- For smaller appliances:
  Ultra Low NOx Infrared Burners, Methane SCR

- Not in core activity:
  Shell FGD Process, SELOX for H2S Removal

- Not core pollutants:
  Activated Coke for PCDD/F Removal in Biomass, Additives for Abatement of Alkaline Emissions in Biomass Combustion, Hg Removal with Activated Coke

- No further developments could be identified in the last years:
  Indigo Agglomerator, Electron Beam Radiation, SNRB, COHPAC, TOXECON, ZnO-based Processes, NOXSO

EmTech50-500

Status boxes:

- Need to provide easy-readible information for non experts
- Available at the beginning of the fact sheets and in the summary
- Qualitative approach suited to emerging technologies

Example: **CO2 Scrubbing by Chemical Absorption**

Technology Status

Lab. scale	Pilot scale	Demo. scale	Comm. Scale

Pollutant Abatement Capacity

Direct emissions				Indirect emissions through plant efficiency
NO_x	SO_2	PM	CO_2	
o	+	+	++	--
Reference: BAT pulverised coal combustion plant				

EmTech50-500

Process (secretariat by KIT)

1. Data collection:
   - bibliographical study + proactive contact (suppliers,…) by KIT
   - information from EmTech50-500 members (reports, experts,…)
2. First analysis of this information by KIT
3. Final analysis by the sub-group
4. Report to EGTEI

Where are we now?

- 5 meetings:
  - Paris, 02 feb 2011 : KOM (scope issues)
  - Rome, 05 may 2011 : technologies presentations and discussions
  - Paris 22 june 2011: technologies presentations and discussions
  - Paris 12 oct 2011: data analysis, agreement on report structure
  - Warsaw 21 nov 2011: status boxes discussion
- **Draft report : november 2011**
  → There are some fact sheets where data is scarce
  → There are some status boxes for which additional expertise is needed

EmTech50-500

Planned next steps

- 21 nov 2011: final meeting in Warsaw
- **15 jan 2012 : final deadline for comments + additional information from your country or your industrial sector**
- 31 jan 2012: final report completed
- **February: final report will be circulated (electronically) among EGTEI for approval**
- Mid-march: final report will be sent to the LRTAP Convention secretariat
- End of march: final report will be sent to LCP BREF TWG
- And then, several possibilities:
    - WGSR presentation?,
    - report will be available as a pdf file,
    - ADEME will produce a number of hard copies (how many are needed?),
    - translation issues (is Russian translation needed?)
    - Possible communication through scientific conferences or technical journals.
    - Possible re-assessment of emerging technologies in 2-4 years ?