COMBUSTION SECTOR:

Plants greater than 500 MWth

SYNOPSIS SHEET

Prepared in the framework of EGTEI

Activity description and EGTEI contribution – summary

The combustion sector covers the activities related to the generation of electrical power and heat (non-process related), and in general terms its large installations (>500MW_{th}) represent the biggest single point emission sources in most countries. Due to the huge mass flows related to this type of combustion burning mainly fossil fuels like hard coal, brown coal, fuel oil or gas, the sector accounts for the biggest shares of NO_x- and SO_2-emissions among the stationary sources. It is characterised by a large variety of different combustion technologies (pulverised fuel, fluidised bed, grate, wet/dry bottom, gas combustion etc), of combustible management, plant ages, performances or regulatory constraints which the individual plants are submitted to. There may also be a factor of >2 between plant capacities observed in this sector.

Linked to the high temperature process of combusting large quantities of variously graded fuels with low/high contents of sulphur, nitrogen, heavy metals, ashes, organic components etc., the environmental impact of emissions from the sector is considerable. Primary and secondary pollutants are formed and need to be abated through numerous measures. Thermal formation of NO_x can be avoided by using primary measures like Low NO_x-burners, flue gas recirculation or reburning, whereas NO_x leaving the boiler needs to be reduced by secondary options like SNCR or SCR. SO_2-emissions are strongly linked to the combustible's sulphur content (to be lowered as a primary measure), and can be abated using e.g. wet or spray dry scrubbing. Particulate matter is in most cases hold back by secondary equipment like electrostatic precipitators, fabric filters, cyclones or wet scrubbing.
All these abatement measures have been defined and techno-economically described in the EGTEI-background document. In order to make the detailed enough representation of such a complex sector feasible in view of use for Integrated Assessment Modelling, a simplified, but still demanding approach has been developed in cooperation with industrial associations. It mainly comprises below 8 steps, ideally being followed by each National Expert for each country to cover this important sector for the European UNECE-area:

1. Determination of the country's energy scenarios, distinguishing the different fuels burned in the sector and the regulatory constraints in place (now or imposed in future by the LCP-Directive).
2. Description of the fuel characteristics which have been defined in the energy scenarios. The EGTEI approach gives more flexibility due to the fact that the characteristics can now be defined for each year.
3. Determination of the NO_x, SO_2 and PM unabated emission factors, which in some cases are calculated on the basis of the fuel characteristics.
4. Characterization of "reference installations" by defining the capacities installed and the average operating hours at full load for each specific case (fuels and regulatory classes).
5. Calculation of costs for each technical option as described in the background document.
6. Determination of the specific control strategy, considering the integration of the LCP-Directive for regulation of emissions. A methodology to calculate the different application rates is presented in the background document.
7. Calculation of the total emissions in the sector for the scenario NoC (No Control), the scenario CLE (Current Legislation) by applying the application rates, and the scenario "maximum feasible" by applying the applicability.
8. Cross-check of the results of the emission calculation with the information available in the national inventories or with the previsions.

With this approach it is possible to consider regulatory constraints in place now or imposed in future by the LCP-Directive, leaving the possibility to experts to analyse scenarios which integrate these constraints. As a further feature the approach offers more flexibility due to the fact that fuel characteristics can now be defined for each year. As a consequence also low sulphur fuels can be flexibly combined with scrubbing, which allows to represent (model) very well performing desulfurisation plants even if the SO_x-reduction efficiency as proposed by EGTEI (for the wide spectrum of UNECE-countries to cover here) is not at the cutting edge.