NOTE

CONCAWE Comments to EGTEI Synopsis Sheets:
Fluid Catalytic Cracking Unit
Sulphur Recovery Unit
Combustion Process

8 August 2006

Introduction

This note contains some comments by CONCAWE on the three EGTEI synopsis sheets that are most relevant to the downstream oil industry.
These comments were prepared by CONCAWE Special Task Force AQ STF-63. Focal point in CONCAWE is Lourens Post, Air Quality Technical Coordinator.

Priority of refinery related cost data revision

The three synopsis sheets relevant to the oil industry (Fluid Catalytic Cracking Unit, Sulphur Recovery Unit and Combustion Process) already reflect a considerable amount of work and will need significant bigger effort before finalising especially looking at the contribution expected from the national experts in the area of detailed activity data.
However, IIASA has already indicated the cost data available for this sector in RAINS at this moment in their view is a low priority for revision. CONCAWE supports this statement and therefore would suggest that revision of the three data sets as discussed in the synopsis sheets is not a high priority task. The only possible needs for improvement of the cost description in RAINS would be to introduce separate descriptions for FCC Units and perhaps Sulphur Recovery Units, but in our view even this can not be rated as a high priority activity.

Therefore CONCAWE would recommend the EGTEI team to use their limited resources on the other RAINS sectors and not on the refinery related cost data.

CONCAWE review of synopsis sheets

While the conclusion above remains true, in this section we present some results which have surfaced in the review that CONCAWE did of the three mentioned synopsis sheets.

Fluid Catalytic Cracking Unit

1. This synopsis sheet contains some computational errors which cause inconsistencies.
   a. Dust – Higher stage cyclones: Total Operating Costs should be 0.079 rather than 0.16. (Fixed is 0.04)
   b. Dust – Deduster: Total Operating Costs should be 0.164 rather than 0.286 (Fixed is 0.07)
   c. Dust – Deduster: Cost per tonne TSP abated should be 1080 rather than 6020
   d. NOx – Sec Technology: Cost per tonne NOx abated should be 2373 rather than 2100, but see our point 2 below.
   e. SO2 emission factor given in Table 4.2.3.1 is in tonne/tonne of feed and not in kg/tone of feed
   f. SO2 – Wet Scrubber: Operating Costs should be 1.09 rather than 1.9 (Fixed is 0.16)
2. CONCAWE cannot agree with the data given for NOx – Secondary Technologies. The 80% efficiency claimed for this abatement technique point to SCR and based on our data (CONCAWE report 99/01[1]) the investment costs would be 12 million Euro (MEuro) for a 30,000 bbl/day or 1.5 Mtonne/year FCCU and thus 14.3 MEuro for a 2.0 Mtonne/year FCCU. This figure is considerably higher than the 4.8 MEuro used in the EGTEI synopsis sheet (Table 4.2.2.2). In other words, the synopsis sheet highly underestimates the Capital Investment costs.
3. As a general comment CONCAWE would recommend the use of the cost data on FCC Units as given in CONCAWE report 99/01.

[1] '*best available techniques to reduce emissions from refineries*', CONCAWE report 99/01, May 1999.

Sulphur Recovery Unit
In Table 4.2.3.2 the heading 'Total Operating costs; should be replaced by 'Fixed Operating Costs'.

Combustion Process

1. CONCAWE does not support the inclusion of fuel switching as an 'available' measure for combustion processes. This is not because it is never used as an option in a particular situation (it most certainly is), but rather because of the difficulties in defining the economics/applicability in a 'typical' situation.
   When it comes to displacing refinery liquid fuels normally burned in the refinery with imported natural gas; they must be either be (1) sold as saleable product without upgrading (2) converted to a saleable product by further upgrading or (3) destroyed by a gasification type process (e.g. to produce electricity). In Case 1, the option to switch from liquid fuel to imported gas (e.g. natural gas) would depend on the ability to sell the displaced liquid fuel into the Bunkers Market. If this is not possible (e.g. because of tightening regulations) then only Options 2 and 3 are available, both of which require substantial investments.
   The economics associated with all three options are also very market dependent (e.g. the price spreads between Bunker Fuel Oil, Upgraded Liquids like Gasoil/Diesel, Natural Gas and Electricity prices). Finally, the availability/non-availability of natural gas at a given refinery location will have significant further implications on the overall economics of fuel switching (e.g. pipeline investments).
   For all these reasons, CONCAWE believes it is not possible to define 'typical' economics for fuel switching in refineries and recommends this option be removed from the Combustion Process synopsis sheet.
2. The EF TSP (Table 4.2.1.1) is too high. For HFO the LCPD value is 50 mg/Nm^3 which corresponds to about 12 g/GJ.
3. The EF SOx (Table 4.2.3.1) is too high. A value of 1700 mg/Nm^3 as per the maximum given in Council Directive 1999/32/EC would be the correct value to use here.
4. The scrubber data in Table 4.2.3.2 is unclear to us. The 4 MEuro investment cost seems low compared to the FCCU scrubber values.
   Actual data collected by CONCAWE[2] (although for an older – regenerative – type of process) suggests a 10 times higher values for scrubber investment costs.

[2] '*regenerative flue gas desulphurization in european oil refineries – cost estimates based on a european application*', CONCAWE report 3/88, March 1988.