EGTEI Methodology
Work to update costs for LCP

SO_2, NO_x and PM abatement techniques

EGTEI technical secretariat
Nadine ALLEMAND, Simon SCHULTE

18 october 2013

UNECE Convention on Long-range Transboundary Air Pollution

Aim of the work

Update the methodology developed by EGTEI in 2005 in order to consider :

- combustion with thermal capacity > 50 MW
- solid fuels, liquid fuels, gaseous fuels and biomass co-firing with coal
- Fabric filter and ESP
- Wet flue gas desulphurisation, semi-dry desulphurisation and dry desulphurisation
- Consider primary measures for deNOx, SNCR and SCR

Organisition

- Work started by the end of 2011
- Set up of a sub-group of experts (EDF, EON, CEFIC, ECN, Eurelectric, Concawe, EU turbines)
- 6 EGTEI sub group meetings
- Development of an EXCEL tool to estimate cost for a given plant consuming different fuels and of a document explaining of cost estimate developed

UNECE Convention on Long-range Transboundary Air Pollution

General Cost Methodology

Total annual cost	$C_{tot}\left[\frac{€}{year}\right] = C_{cap}\left[\frac{€}{year}\right] + C_{op}\left[\frac{€}{year}\right]$
Annualisation of investment	$C_{cap}\left[\frac{€}{year}\right] = C_{inv} \cdot \frac{(1+p)^n}{(1+p)^n - 1} \cdot p$
Composition of OPEX	$C_{op}\left[\frac{€}{year}\right] = C_{op,fix}\left[\frac{€}{year}\right] + C_{op,var}\left[\frac{€}{year}\right]$
Fixed operating cost	$C_{op,fix}\left[\frac{€}{year}\right] = C_{inv}[€] * f_{O\&M}\left[\frac{\%}{year}\right]$
Variable operating cost	$C_{op,var}\left[\frac{€}{year}\right] = \sum C^{unit}\left[\frac{€}{year}\right]$

P = interest rate | n = equipment lifetime | unit = equipment, reagent and electricity consumption, disposal, etc.

Current Implementation

Fuels	Coal, oil, gas, solid biomass (wood)
Fuel approach	Detailed and general approach
Plants	Boilers
Pollutants	NO_x, SO_2, PM
Technologies	NO_x: LNB, SCR, SNCR SO_2: wet FGD, lime spray dryer, (dry process to be included) PM: FF, ESP

UNECE Convention on Long-range Transboundary Air Pollution

Emission load calculation

Approach

Plant and fuel data input

↓

Calculation of boiler outlet emission loads

↓

Setting stack emission goals

↓

Choice of potential abatement technologies

↓

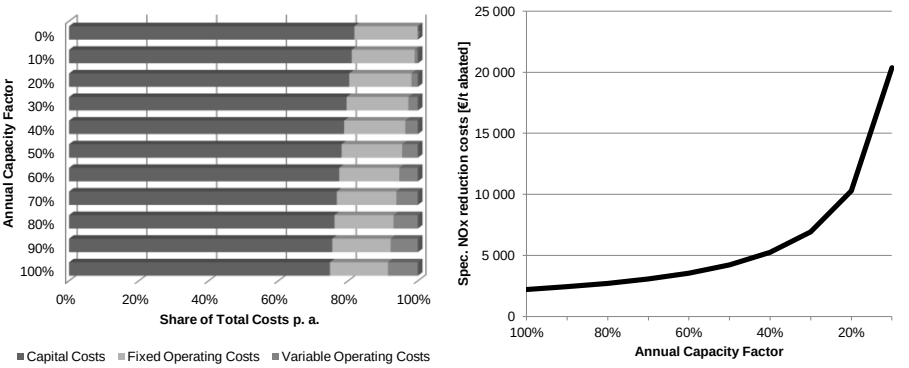
Economic assessment

Calculation of boiler outlet emission loads

Example cost analysis

- NO_x abatement costs (SCR) -

Effect of **plant operation** (annual capacity factor) on cost composition (left) and spec. NO_x reduction cost (right) of an **SCR**



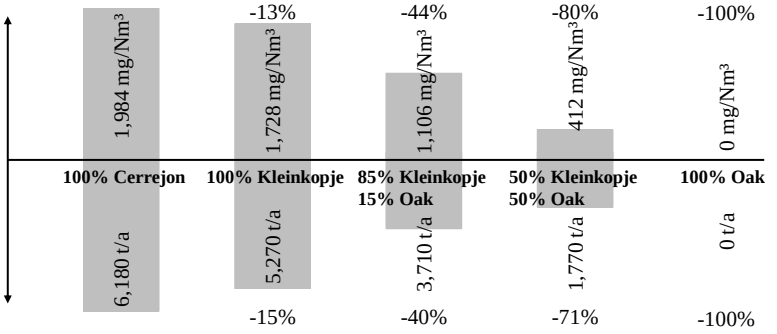
Calculation Basis: 1,000 MWth | 80 €/kWth SCR investment | 2% fixed O&M costs | 9% CRF | 80% reduction (400 to 120 mg/Nm³)

UNECE Convention on Long-range Transboundary Air Pollution

Calculation of boiler outlet emissions

- exemplary case for SO_2 -

Fuel	C	H	O	N	S	Ash	Moisture
Cerrejon (CO)	83.40	4.95	9.47	1.37	0.81	8.41	11.83
Kleinkopje (RSA)	85.02	4.74	7.33	2.19	0.72	14.49	7.71
Oak	50.64	6.23	41.85	1.28	0.00	10	40



Calculation Basis: 500 MW_{th} | Operating hours: 6,000

Next steps

Work delivered to UNECE / WGSR (next meeting end of June 2014)
Work to be delivered before mid may at the latest.

Work also delivered to IPTS Seville in the scope of the revision of the LCP BREF by the end of the year.

In between, circulation of the documents and the EXCEL file for comments

Comments expected by the end of November

Organisation of a meeting with CEFIC to test the methodology for different cases, especially for plant between 50 and 300 MWth

UNECE Convention on Long-range Transboundary Air Pollution

Thanks to the EGTEI technical secretariat and experts from the LCP working group