A cost methodology for evaluation of CO_2 capture from an IGCC

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Objectives

- Enable consistent and transparent cost estimation of the differents parts and alternatives of the CCS chain in all the project
- Enable fair cost comparison of alternatives for CCS
- Identify the cost of performing CCS from Czech IGCC with a AACE Class 4 accuracy (+35/-15%)

General guideline

- Reference year: 2014
  - Updates with CEPCI and EPCCI with nuclear when necessary
  - Location: Czech Republic
  - Cost reported in Euro (with an conversion in CZK)
  - Construction period: 3 years
  - Project duration: 25 years
  - Discount rate: 8%

Capital costs

- Capital cost approach base on:
  - Bottom Up Approach
  - Retrofit cost
  - Nth of A Kind Cost
- Equipment and direct costs:
  - a step-count exponential costing method, using the dominant or a combination of parameters derived from mass and energy balance computations, combined with cost data obtained from equipment suppliers and/or other available data
- Total Plant cost:
  - Include an additionnal 31%TDC to account for Indirect costs (14%), and owner's cost and contigency (17%)

Operating costs

- Maintenance, Insurance and labor:
  - Insurance and local taxes as a percentage of TPC
  - Maintenance as a percentage odf TPC
  - Labour based on number of operators, shift patner and fully burdened labour cost

- Utilities and consummables:
  - Based on material and energy balances and utilities costs
  - Utilisation rate Y1: 40%, Y2: 65%, Y3+: 85%

Key Performance Indicators

- Electricity cost

$$\text{Levelized Cost of Electricity} = \frac{Net\ Present\ Value\ of\ Cost}{\sum_i \frac{\text{Annual electricity production}_i}{(1+\text{Discount rate})^{i-1}}}$$

- CO_2 avoided cost

$$CO_2 \text{ avoidance cost} = \frac{(\text{LCOE})_{\text{CC S}} - (\text{LCOE})_{\text{No CCS}}}{(t_{CO2}/\text{MWh})_{\text{No CCS}} - (t_{CO2}/\text{MWh})_{\text{CCS}}}$$

Sensitivity analyses

- Sensitivity analyses will be included to quantify the impact of main parameters on technolgy performances and competitiveness:
  - Power plant CAPEX and OPEX
  - CO_2 capture CAPEX and OPEX
  - CO_2 transport
  - CO_2 storage
  - Coal cost
  - Discount rate
  - Utilization rate
  - Project duration
  - Etc.