Recapitulation

EGTEI February 2011:

- Presented approach to updating refinery emissions abatement costs

Challenges

- Commercially valuable information
- Competition laws restrict information exchange

Method

- Proposed EGTEI (2005) synopsis sheet values and asked for feedback
- Units sized to common scale
- Standardised cost approach (interest rates, write down period)
- Asked High or Low - by how many times

Results

- Presented "mid range" values of the responses as annualised costs.
- Calculated incremental marginal costs for some technique combinations
- Estimated how marginal costs might vary across refineries based on their 2006 emissions

- 400+ combustion stacks, 33 FCC units and 56 Sulphur Recovery Units
What came Next?

- Looked at spread about mid-range more closely.
  - Asked for specific data (still scaled for anonymity)
  - Identify and eliminate outliers
  - 5x upper cut-off on EGTEI uplift

- Evaluated how a cost-effectiveness argument might lead to investments in abatement.
  - Reference value for effectiveness threshold (€/tonne)
  - Policy shadow price derived from Thematic Strategy on Air Pollution
    - Referenced to the Economics and Cross Media Bref
    - Reflects policy ambition - for industry to be delivered via the IED

- Reported the work in public document CONCAWE 6/11
  - Available on [www.concawe.org](http://www.concawe.org) and through EGTEI.
Concawe Member Company Input on BAT Costs for Existing SRUs
(all cases adjusted to EGTEI reference size of 33ktS/y)
Estimated Abatement Costs/tSO₂ For Sulphur Recovery Units
Based On Operational Data From Concawe's 2006 Sulphur Survey
and Member Company "Mid-Range" Cost Data

Marginal Abatement Cost €/tSO₂ Removed

EU Average SO₂ Abatement “Shadow Price” for as published TSAP

Overlaying “Shadow Price” Range (TSAP)
Implications for Existing Installations
As of 2006
# Baseline Existing SRU (2006)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Number of Surveyed Refineries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base &lt;97%</td>
<td>16</td>
</tr>
<tr>
<td>Base 97-98%</td>
<td>9</td>
</tr>
<tr>
<td>Base 98-99%</td>
<td>10</td>
</tr>
<tr>
<td>S Claus (99%)</td>
<td>0</td>
</tr>
<tr>
<td>Base 99.9-99.5%</td>
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<tr>
<td>Sulfreen (99.5%)</td>
<td>0</td>
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<tr>
<td>Base 99.5-99.9%</td>
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</tr>
<tr>
<td>SCOT (99.9%)</td>
<td>0</td>
</tr>
<tr>
<td>Base 99.9%</td>
<td>3</td>
</tr>
</tbody>
</table>

**SO2 Shadow Price €/tonne**

- 0
Upgrade of one third of SRUs at 2700 €/t

SO2 Shadow Price €/tonne

Number Surveyed Refineries

Base <97%  Base 97-99%  Base 98-99%  S Claus (99%)  Base 99-99.5%  Sulffeen (99.5%)  Base 99.5-99.9%  SCOT (99.9%)  Base 99.9%

2  2  10  21  12  0  4  0  3

Title: Cost and CE for BAT implementation in refineries
Pete Roberts  Technical Coordinator for Air Quality
Title: Cost and CE for BAT implementation in refineries

Upgrade of half of the SRUs at 5400 €/t

SO2 Shadow Price €/tonne

Number Surveyed Refineries:
- Base <97%: 1
- Base 97-98%: 0
- Base 98-99%: 7
- S Claus (99%): 24
- Base 99.9-99.95%: 12
- Sulfreen (99.5%): 3
- Base 99.5-99.9%: 4
- SCOT (99.9%): 0
- Base 99.9%: 3
Estimated Abatement Costs/tSO₂ For Sulphur Recovery Units
Based On Operational Data From Concawe's 2006 Sulphur Survey
and Member Company "Mid-Range" Cost Data

- SClaus
- Sulfreen
- SCOT

2 Times EU Average SO₂ Abatement “Shadow Price” for as published TSAP
Conclusions - Next Steps

- Approach to member companies proved a viable way to obtain difficult and sensitive data.
- Learned that the increased costs from EGTEI (2005) were mainly due to installation and retrofit.
- Need to look for reasons for high (and low) as individual circumstances can be very different.
- Use of an external standard is useful cost-effectiveness measure
  - Note:
    - principle of external standard is the important item
    - maybe reasons for other than cost-effectiveness controlling decisions.
- Given industry wide data can judge the potential impacts of the cost-effectiveness judgement => important for BAT conclusions
- Extending data collection => PM control on FCC
Thank you for your attention!