Is a Global Decrease in GHG Emissions Compatible With Some Local Increases in Oil Production?

Pierre-Olivier Pineau
Professor, HEC Montréal
Chair in Energy Sector Management

Concurrent Session 6. GHG Emissions Reduction (Loews Theater 10)
37th IAEE International Conference
Monday, June 16, 2014
11:00am - 12:45pm New York, USA
Outline

1. General GHG and Oil Context
2. Targets
3. Data: Natural Oil Production Decline
4. Conclusion and economic perspective
Total annual anthropogenic GHG emissions 1970-2010

IPCC (2014)
Only GHG Emission Pathways where it is “likely” (66 – 100 %) that the temperature change (relative to 1850 – 1900) will be below 2 °C

IPCC (2014)
World Share of GHG from Fossil Fuels

EIA (2014)

1990: 21.5 Gt
2011: 32.6 Gt (+51%)
Canadian Oil Sands & Conventional Production

CAPP (2013)
Major basins with potential tight oil developments

CSUR (2012)
2. TARGETS
Emissions and GHG Stock
(based on the 450 ppm/2°C scenario)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Cumulative CO₂ emissions (GtCO₂)</th>
<th>Average per year</th>
<th>Value at the end of the period</th>
<th>CO₂eq Concentrations (ppm CO₂ eq.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870-2010 (140 years)</td>
<td>515</td>
<td>3.67</td>
<td>49</td>
<td>≈300</td>
</tr>
<tr>
<td>2010</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>413</td>
</tr>
<tr>
<td>2011-2050 (40 years)</td>
<td>925 [550-1300]</td>
<td>23.12</td>
<td>≈20</td>
<td></td>
</tr>
<tr>
<td>2011-2100 (90 years)</td>
<td>905 [630-1180]</td>
<td>10.05</td>
<td>≈0</td>
<td>2100 → 450 (430 – 480)</td>
</tr>
</tbody>
</table>

IPCC (2014) & EEA (2014)
Corresponding Oil Targets

2011
≈89 millions barrels/day (of RPP)
11.4 Gt of CO₂ (≈25% of the 49 Gt total)

2020
Target of ≈40 Gt of CO₂ (-20% from 2010)
≈18 million barrels/day have to “disappear”

2050
Target of ≈20 Gt of CO₂ (-60% from 2010)
≈53 million barrels/day have to “disappear”

2100
No oil can be burned/no emission from RPP

EIA (2014)
3. DATA: NATURAL OIL PRODUCTION DECLINE
Data

• 1971 – 2011 world production data
• 136 countries (about 87 active)
• IEA yearly production data
Change in World Oil Production

- Growth from countries with increasing production
- Decline from countries with decreasing production
- Net change in the world crude oil production

IEA (2014)
Statistics 1971-2012
Million barrels per day

<table>
<thead>
<tr>
<th>Countries with ...</th>
<th>Average</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>increasing production</td>
<td>2.529</td>
<td>1.08</td>
<td>5.33</td>
</tr>
<tr>
<td>decreasing production</td>
<td>-1.878</td>
<td>-4.95</td>
<td>-0.34</td>
</tr>
</tbody>
</table>
Oil Targets versus “natural” decline

2020

≈18 million barrels/day have to “disappear”
... or about 10 years of the average decline (1.878)

2050

≈53 million barrels/day have to “disappear”
... 30 years * 1.878 = 56.3

2100

... 50 years to eliminate the remaining 25 Mb/d

EIA (2014)
4. CONCLUSION AND ECONOMIC PERSPECTIVE
Conclusion

• Simply letting the historical oil production decline happen without adding new production would let us reach global targets (with respect to oil emissions)

• Local production could therefore hardly increase – or only at the expense of more rapid decline elsewhere
Economic Perspective

• In the absence of a world moratorium on additional oil production... prices provide enough incentives to maintain and grow oil production

• What is incompatible with a global decrease in GHG emissions is the current pricing structure