Perspectivas de la transición energética en Europa

Foro público: La transición energética en Europa: Desafíos y oportunidades para Colombia; Valledupar, 30.10.2017

Dr. Pao-Yu Oei

Technische Universität Berlin (TU Berlin)
German Economic Research Institute (DIW Berlin)
Agenda

1. Motivation

2. Experiences from Germany and the EU

3. Trends in USA, China and Indien

4. Effects on the Global Coal Market

5. Conclusion
Publications on coal (selection)

- Oei and Mendelevitch (2016): Perspectives on Colombian Coal Exports on the International Steam Coal Market until 2030
Motivation: 70-90% of coal, 30-60% of gas and 30-60% of oil reserves has to stay unmined to reach the 2°C target

Times are changing for coal

The success of renewables (and lower gas prices in some regions) have lead to a reduction of coal demand in the western world. Several smaller countries in the EU are already coal-free or will phase-out in the 2020s.

The Republic of China has introduced a moratorium on new coal power plants and mines and India is observing a much slower increase of coal demand than expected.

As a result, steam coal production declined by around 28% between 2005 and 2015. Coal companies world-wide are struck with low prices and are challenged by ongoing divestment movements.

Source: HWWI commodity prices in the Thompson Reuters Datastream database.
Colombia`s future as 4th largest exporter of steam coal

There exists a wide range of studies that put foci on various environmental and social implications of the coal mining industry in Colombia (e.g., see Moor and van de Sandt 2014; CAN 2016b; Hawkins 2014; Chomsky and Striffler 2014; CINEP/PPP 2014; Schücking 2013).

Our research focus lies on: How will coal exporting countries, such as Colombia, be affected by the decline of the coal industry?

Doing so, requires an analysis of

- the competitiveness of the coal exporting country (in this case: Colombia),
- current market development in other coal producing and consuming countries,
- prospects for future Colombian coal exports.
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# Comparision of Colombia and Germany

<table>
<thead>
<tr>
<th></th>
<th>Germany</th>
<th>Colombia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>83 Mil.</td>
<td>49 Mil.</td>
</tr>
<tr>
<td><strong>GDP</strong></td>
<td>42.000 USD/capita</td>
<td>6.000 USD/capita</td>
</tr>
<tr>
<td><strong>CO₂ Emissions</strong></td>
<td>9 t/capita</td>
<td>2 t/capita</td>
</tr>
</tbody>
</table>
Experiences from Germany: Employment in coal industry

Hard coal: 500,000 → 10,000
Lignite: 150,000 → 30,000

Colombia: 30,000 → ?
Coal capacities in Europe observe a decreasing trend. Coal free countries in the EU: BE, CY, EE, LT, LU, LV, MT

New capacity online:
Jan-Sep: 1.1 GW
2015: 6.5 GW (mainly DE & NL)

Operational coal power EU (9/2016):
162.7 GW gross
149.2 GW net
645 units

Closed or switched fuel:
Jan-Sep: 7.7 GW
(5.3 in the UK alone)
2015: 9.4 GW

GW operational by the end of 2015
Lignite share

39% is lignite, causing 47% of coal based CO₂ emissions

10 EU countries with lignite mining; several EU countries also doing hard coal mining

Source: CAN database / Sandbag (2016)
Cheaper renewable alternatives cause the drop in coal demand

New jobs are being created in the field of renewables

Note: a) Jobs in large hydropower are not included in the country totals given differences in methodology and uncertainties in underlying data.
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The outlook for coal in the US is negative. The change of national government will not influence the global dynamics.

The share of coal in total electricity generation declined from 52.3% in 2000 to 34.3% in 2015.

Important drivers are federal and state level promotion of wind and solar energy as well as environmental policies for coal-fired power plants.

**Numerous U.S. coal producers** (including Peabody Energy Cooperation, Arch Coal Inc., and Alpha Natural Resources, listed first, second and forth in the top four U.S. coal mining companies) have **filed for bankruptcy and 271 mines were closed** in the last years.

The current U.S. administration, however, targets to take back climate measures and announced to withdraw from the Paris Agreement. However, **the competitiveness of the US domestic coal sector will be governed by the evolution of the gas price and cost of renewables rather than by the rollback of the Trump Administration.**

The global coal power pipeline is currently observing a major halt, dominated by the happenings in China and India [MW]

Emerging countries are expecting rising energy demands due to population growth and economic development.

China and India account for 86% of global installed coal power capacity 2006-2016.

Many projects, however, were shelved in the last year.

<table>
<thead>
<tr>
<th>Country</th>
<th>Pre-Construction</th>
<th>Construction</th>
<th>All Active Development</th>
<th>On Hold</th>
<th>Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>134,480</td>
<td>145,573</td>
<td>280,053</td>
<td>441,749</td>
<td>921,227</td>
</tr>
<tr>
<td>India</td>
<td>128,715</td>
<td>48,168</td>
<td>176,883</td>
<td>82,495</td>
<td>211,562</td>
</tr>
<tr>
<td>Turkey</td>
<td>66,852</td>
<td>2,640</td>
<td>69,492</td>
<td>17,654</td>
<td>16,362</td>
</tr>
<tr>
<td>Indonesia</td>
<td>38,450</td>
<td>7,820</td>
<td>46,270</td>
<td>8,385</td>
<td>27,399</td>
</tr>
<tr>
<td>Vietnam</td>
<td>29,580</td>
<td>15,177</td>
<td>44,757</td>
<td>2,800</td>
<td>13,394</td>
</tr>
<tr>
<td>Japan</td>
<td>17,343</td>
<td>4,256</td>
<td>21,599</td>
<td>0</td>
<td>44,078</td>
</tr>
<tr>
<td>Egypt</td>
<td>17,240</td>
<td>0</td>
<td>17,240</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>15,685</td>
<td>275</td>
<td>15,960</td>
<td>3,935</td>
<td>250</td>
</tr>
<tr>
<td>Pakistan</td>
<td>10,418</td>
<td>4,860</td>
<td>15,278</td>
<td>5,310</td>
<td>190</td>
</tr>
</tbody>
</table>

Coal capacities are displayed in GW; Source: Shearer et al. (2017).
Dramatic changes to China’s coal pathway with a big uncertainty about future developments

- Electricity generated by coal peaked in 2013, coal power capacity cap of 1,100GW to be reached in 2020 (921 GW installed as of January 2017; representing 47% of global installed power capacity).
- Capacity factor of power plants decreased below 50% in 2015 and 2016.
- Plans to retire older coal power plants.
- Suspension of new plant approvals and halt on construction in several provinces; Total amount of cancelled projects between 2010 and 2016: 203 GW. Cancellation of 100 specific plant projects from September 2016 to January 2017.

- The implemented national climate and environmental policies resulted in a halt of coal consumption and a shift towards low carbon energy sources.
- The beginning of the Chinese coal phase-out came earlier than expected.

Sources: Climate Action Tracker (2017a); Endcoal (2017a, 2017b); Isoaho (2016); Shearer et al. (2017).
Status-quo of coal in India

- Installed coal capacity grew from 71 GW in 2007 to 212 GW in January 2017 (11% of global capacity).
- Rapid expansion resulted in falling capacity factors.
- Leading coal power producers (e.g. Adani) suspended investments and further development.
- Draft Electricity Plan: No new coal capacity needed between 2022-27, apart from the 48 GW already under construction.
- India implemented a tax on coal of US$ 3.2/t coal; revenues go to the National Clean Environment Fund.

> Indian coal consumption has grown much slower than expected.
> India needs decentral renewable energy sources to provide cheap energy access.

<table>
<thead>
<tr>
<th>Installed capacity</th>
<th>Put on hold in total (end 2016)</th>
<th>Previously under construction put on hold</th>
<th>Cancelled during 2016</th>
<th>Pre-construction</th>
<th>Active construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>212</td>
<td>82</td>
<td>13</td>
<td>115</td>
<td>129</td>
<td>48</td>
</tr>
</tbody>
</table>

Sources: Climate Action Tracker (2017b); CoalSwarm (2017); Shearer et al. (2017)
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The upcoming coal phase out effects countries differently and therefore needs a combination of various political instruments

Need to differentiate between countries:

- that only mine coal (e.g. Colombia)
  - employment
  - income from exports

- those burning coal (e.g. UK and many countries in Europe)
  - energy security
  - (employment)

- those doing both (e.g. US, China, India, South-Africa, Germany)
  - energy security
  - employment
  - (income from exports)
Coal phase-out concepts need to incorporate different regional aspects

<table>
<thead>
<tr>
<th>Region</th>
<th>Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. Colombia</td>
<td>Financial payments as compensation for a moratorium on new mines</td>
</tr>
<tr>
<td></td>
<td>Moratorium on new mines</td>
</tr>
<tr>
<td></td>
<td>Existing coal power plant fleets need to be closed</td>
</tr>
<tr>
<td></td>
<td>Support for RES to meet rising energy demand, enable energy access &amp; create jobs</td>
</tr>
<tr>
<td></td>
<td>Active &amp; passive labour market instruments to enable a just transition</td>
</tr>
<tr>
<td>e.g. Europe or US</td>
<td>Moratorium on new mines</td>
</tr>
<tr>
<td></td>
<td>Support for RES to replace fossil capacities &amp; create jobs</td>
</tr>
<tr>
<td></td>
<td>Active &amp; passive labour market instruments to enable a just transition</td>
</tr>
<tr>
<td>e.g. China or India</td>
<td>Moratorium on new mines; maybe linked with compensations</td>
</tr>
<tr>
<td></td>
<td>Moratorium for new plants to prevent (stranded) assets</td>
</tr>
<tr>
<td></td>
<td>Support for RES to meet rising energy demand, enable energy access &amp; create jobs</td>
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<tr>
<td></td>
<td>Active labour market instruments to create new jobs</td>
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</table>
Mining Problems in Germany: Technical and Environmental Risks of Iron Ocre: Threat for Individuals and Tourism
Mining Problems in Germany: Economical Risks of Liabilities

What happens if a company goes bankrupt with:

- Jobs and Pensions
- Renaturation
- Compensation payments

Things become complicated if companies consist of multiple (international) subsidiaries (see owners of German mines →)

→ Securing sufficient funds from mining companies as long as they make profits
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## Conclusion

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<th></th>
<th>Demand for (Colombian) Coal is shrinking fast in Europe and the US.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alternative markets in China or India are unlikely.</td>
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<tr>
<td></td>
<td>The majority of coal has to remain in the ground.</td>
</tr>
<tr>
<td></td>
<td>The phase-out of mining is resulting in several problems:</td>
</tr>
<tr>
<td></td>
<td>- Liabilities,</td>
</tr>
<tr>
<td></td>
<td>- Jobs,</td>
</tr>
<tr>
<td></td>
<td>- Renaturation.</td>
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<td></td>
<td>Active joint effort can result in new solutions.</td>
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