Powering sustainable development with low emissions coal

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CLEAN COAL DAY IN JAPAN
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Topics to be covered (TBC)

1. Global outlook for coal
2. Asian development
3. Sustainable Development Goals
4. Low carbon solutions for coal
5. Coal industry reducing emissions
6. Policy requirements
Why does the world need coal?

75% of global steel

85% of global cement

37% of global electricity

~ 20 million Electric Vehicles by 2020
Coal is critical to the present and future global electricity mix

- Electricity demand grows 63% (1.9% pa)
- Coal 37% to 26% of share, but still grows 9%
- New renewables 7% to 25%
- Coal in 2040 still larger % than New Renewables

Global electricity generation under IEA’s New Policies Scenario

Note: IEA’s 2016 data is estimated
1.1 billion people live without access to electricity

- 1.1 billion people worldwide live without access to electricity
- 2.8 billion (37% world) rely on traditional fuels for cooking
- Improved living standards hindered by lack of modern energy

People without access to modern energy services by region

Urbanisation and industrialisation are transforming developing and emerging economies

- Today India and Myanmar ~33% urbanised
- Africa 41%; S-E Asia 48%
- OECD typically 80%
- 6Bn people expected to live in cities by 2050
- Population concentration requires reliable grid-based electricity for business, hospitals and public services

Source: UN Population Division
Asia will drive new coal generation capacity

Installed coal generation capacity by country/region

Asian share:
- 2000 (38%)
- 2016 (66%)
- 2040 (77%)

Source: Platts World Electric Power Plant Database 2016 & World Coal Association analysis 2017
In Asia to 2040 coal is a key energy choice to meet industrialisation and urbanisation goals.

**Primary energy demand change (2016 to 2040)**

- EU: -200
- Americas: 300
- Asia: 800
- Africa: 1300
- Mid E: 1800

**Coal fired generation capacity change (2016 to 2040)**

- Europe: -290
- Americas: -201
- Asia: +1400
- Africa: +46
- Mid E: +10

Coal impact Mt:
- Europe: -290
- Americas: -201
- Asia: +1400
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- Mid E: +10
New Asian coal generation capacity will require seaborne traded coal

**Existing global coal fleet**

- China: 1000 GW
- India: 500 GW
- East Asia: 100 GW
- SE Asia: 50 GW
- ROW: 0 GW

**Planned coal capacity**

- China: 50 GW
  - Construction: 10 GW
  - Permitted: 40 GW
- India: 10 GW
- East Asia: 10 GW
- SE Asia: 5 GW
- ROW: 0 GW

- Vietnam: Vinh Tan 2 (2x622 MW)
- Philippines: Mariveles (2x300 MW)
- Japan: Hitachinaka (1x650 MW)
- China: Huadian Jurong (4x1000 MW)
- Vietnam: Vinh Tan 4 (2x600 MW)
Coal is relevant to almost all SDGs

- UN – we must “recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs ...while tackling climate change and environmental protection”
- WCA work program is looking at contribution of coal to SDGs
- Hosting roundtables in London, Johannesburg and Bogota with key stakeholders
24 countries include a role for coal in their Paris NDCs

- Japan – pursuit of high efficiency in power generation – USC, A-USC, IGCC
- China – enhance the clean use of coal; higher share of HELE plants using < 300g coal per kWh
- India – transition to SC coal stations
- Philippines – high-efficiency for conventional power generation
- Bangladesh – ensure all new coal generation uses SC – US$16.5Bn to assist
Investment in high efficiency low emission (HELE) technology for coal plants provides pathway to lower carbon emissions

- New Ultra Supercritical plants can deliver up to 35% CO2 reduction
- Also reduce SOx, NOx, PM by up to 67%
- HELE technology available as a plant upgrades or new build
- Greater funding support required by MDB’s
- Japan Bank for International Co-operation already funding plants

![J Power’s Isogo Power Station – Ultra Supercritical Technology](image-url)
The world’s first application of CCS at large scale in the power sector became operational in October 2014, at the Boundary Dam power station in Canada (1 Mtpa CO$_2$ capture).

A retrofit upgrade of a 1960’s coal unit chosen by Saskpower over gas and renewables.

Some 17 global projects operating globally.

These include the Petra Nova coal CCS project (1.4 Mtpa, Texas) and the Abu Dhabi steel plant CCS project (UAE 2016).

Pace of development needs critical support.
Why CCS technology is crucial to reducing emissions

- On average the cost of achieving a 450 ppm target is estimated to rise to 5% rather than 2% of cumulative global GDP between 2010 and 2100, if CCS technology is not deployed.
- The difference is equivalent to the annual $US budget each year.

Source: Coal Industry Advisory Board (CIAB) to International Energy Agency: “An International Commitment to CCS: Policies and Incentives to Enable a Low-Carbon Energy Future” November 2016. Figure 4. Adapted from Krey et al., 2014)
Japan continues to be a leader in clean coal technology

Source: NEDO – Efficiency pathway in coal fired generation

J-Power Osaka Coolgen IGCC-CCS Project (Japan)

Tomakomai CCS Project – location of wells and monitoring
As is China in reducing emissions and clean coal technology

- China Energy and Huaneng’s Research Institutes are spending $100M’s annually on clean coal and CCUS technology

Chart of the Day: PM2.5 levels for targeted regions in China

Source: China National Environmental Monitoring Centre, CBA estimates

World leading HELE plant - Waigaoqiao No3 Power Station, Pudong New Area of Shanghai – 5000MW

Guodian’s Langfang 700MW Cogen modern HELE plant Hebei Province
US Secretary Perry, WCA Board meeting, May 2018 Washington:
- “I ask the coal industry to join DOE and redouble its efforts to find game-changing innovations that will ensure coal remains an essential part of our energy future”

- $443 million current CO₂ capture R&D portfolio – 21% cost share by industry

- 15 years of CO₂ storage research under the Regional Carbon Sequestration Partnerships
  - 10 million tonnes stored to date
  - Currently ~$100 million per year

- $1 billion Petra Nova Project – 240 MW retrofit of coal plant with CCUS

- $35/metric ton CO₂ for beneficial use, including enhanced oil recovery
- $50/metric ton CO₂ for saline aquifer storage
- 12-year window for receiving tax credits
- Construction must commence by 1/1/24
- Minimum capture rate:
  - 500,000 metric tons per year for power plants
  - 100,000 metric tones per year for industry
- Transferable
- More work is needed to spur build out in the power sector and to incentivize more projects like PetraNova

Petra Nova near Houston, Texas / Joint Partnership NRG and JX Nippon Oil & Gas Exploration
Australia – Coal Industry Coal21 Fund

- Coal21 Fund - demonstrating low emissions coal technologies in partnership with government and other investors
- Over $300m invested on 14 projects leveraging additional $550M
- Achievements so far include:
  - Capturing CO₂ at Queensland’s Callide coal-fired power plant using oxy fuel technology (A$250M – JV Australian and Japan Governments and industry; Coal21 $80M)
  - Participated in CO₂CRC’s sequestering 65 000 tonnes of CO₂ in Otway Basin in Victoria improving M&V
  - Intensified the search for storage sites in Australia including work on Qld CCS Surat Basin hub concept
  - Contributed to the international R&D effort
- COAL21 Fund extended to 2027
CTSCo (100% Glencore) is developing a CCS project in the Surat Basin. It involves CO2 capture plant at coal power station, transport and CO2 storage on Glencore property near Wandoan. Feasibility and FEED studies supported by Coal21 (A$15M) and Australian Govt($9M); with ANLEC R&D supporting numerous studies. Seismic and modelling studies completed; PCC plant design is underway. Application for environment approval late 2018. Challenges include gaining community support and long term funding.

CO2 plume 100yr model within Glencore 9km² property at depth of 1200m.
WCA is engaging on these issues
“19. The Ministers discussed the outlook through 2040 on the rising coal use in the region and **reaffirmed the need for increased promotion of clean coal technologies (CCT)**. They acknowledged the **continuing role of coal** in addressing the energy security, economic competitiveness, and environmental sustainability in the region.

20. The Ministers also **appreciated the insights provided by the report ‘ASEAN’s Energy Equation: The Role of Low Emission Coal in Driving a Sustainable Energy Future’** prepared in joint collaboration between ACE and the World Coal Association (WCA). The Ministers acknowledged the report outcomes and emphasised the intention to transition away from inefficient coal technologies. **Enhanced deployment of cleaner coal technology will reduce ASEAN’s emissions profile, while ensuring affordable energy for economic development and poverty reduction...”
Non-OECD Asia needs more support for HELE switch

Source: World Coal Association analysis
Multilateral development banks have a role

- Coal industry is lowering emissions and at the same time providing reliable and affordable power along with steel and cement in infrastructure for many developing nations.
- Governments and international organisations play a crucial role in providing technology neutral energy and electricity.
- WCA will produce a paper in coming weeks calling on MDB’s including the World Bank to drive a zero emission pathway for coal.
What does WCA want to achieve

- Continuing collaboration between established coal producing/using countries to assist with low emission coal technologies for emerging users
- A pathway for ensuring coal and the coal industry can support the delivery of the UN Sustainable Development Goals
- Policy and funding support

- Bangkok Climate Change Conference 4-9 September: Development of proposals for the ‘Paris Rulebook’
- Contrasting signals for the tone of COP24: ‘Powering Past Coal Alliance’ vs. Polish Government (and industry)
- Paris 2.0: From concept to framework, e.g. NDC standardisation
WCA will continue to advocate for coal’s role and low carbon solutions

**BENJAMIN SPORTON**
World Coal Association

*WCA Chief Executive discusses global disconnect on industry’s future*
Benjamin Sporton spoke to *OnPoint* about cleaner coal technology, COP21 and the critical role of coal for developing countries.
If Australia, the largest seaborne exporting country is an indicator, the talk of the demise of the coal industry is somewhat premature.
Australian Coal Isogo story through Raelene’s eyes

http://makingthefuturepossible.info/