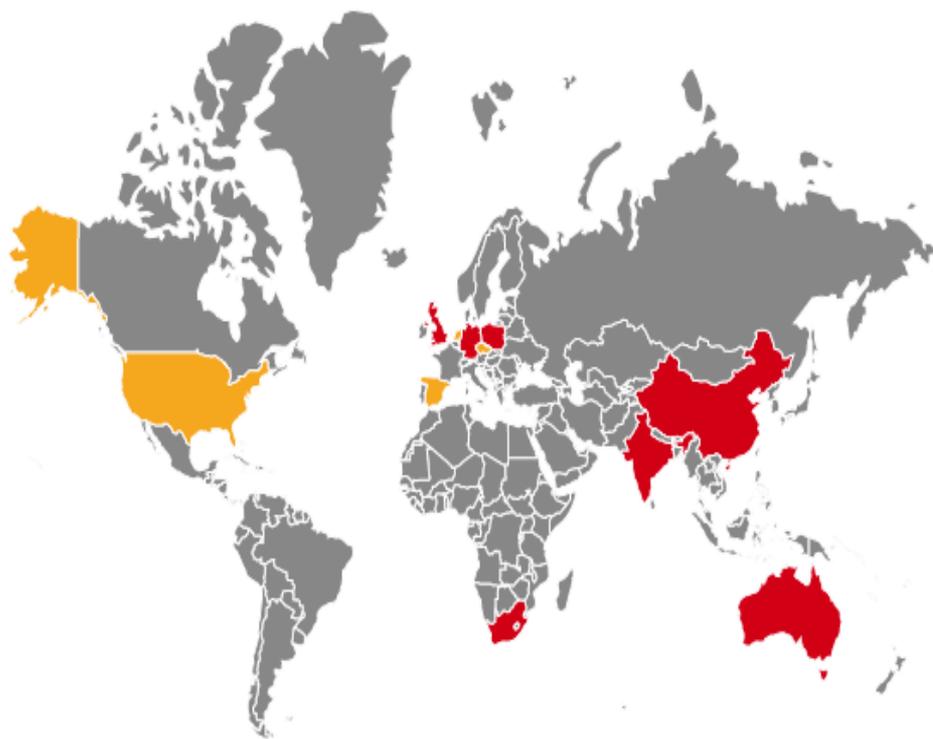


Coal Transitions: insights from an international research project on the future of coal

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IDDRI Coal Transitions: an international research project



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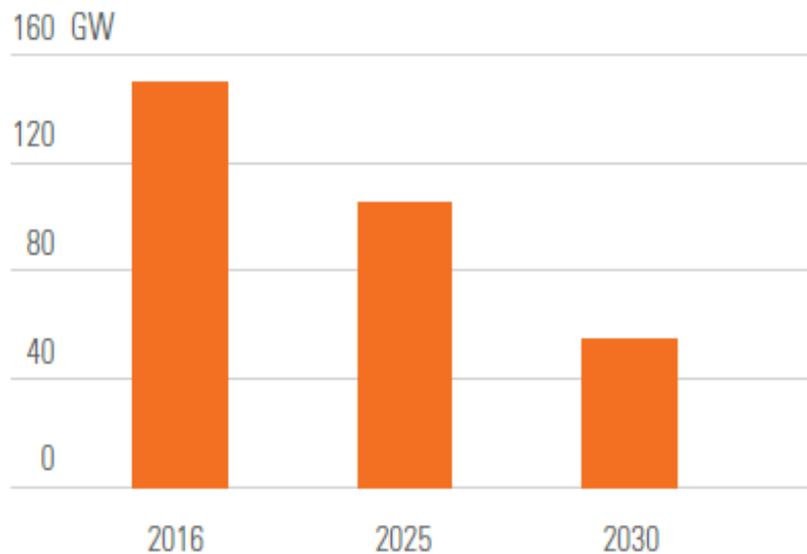
Six leading research teams from 6 major coal using economies: China, India, South Africa, Australia, Germany, Poland.

Exploring feasible and just pathways to coal transitions, compatible with <math><2^{\circ}\text{C}</math> goal of Paris Agreement

- 1. (Paris-compatible) transformation of the energy system**
- 2. Avoiding stranded assets**
- 3. Avoiding stranded workers**
- 4. Regional economic transition**
- 5. International dimension (esp. for major exporters/importers)**

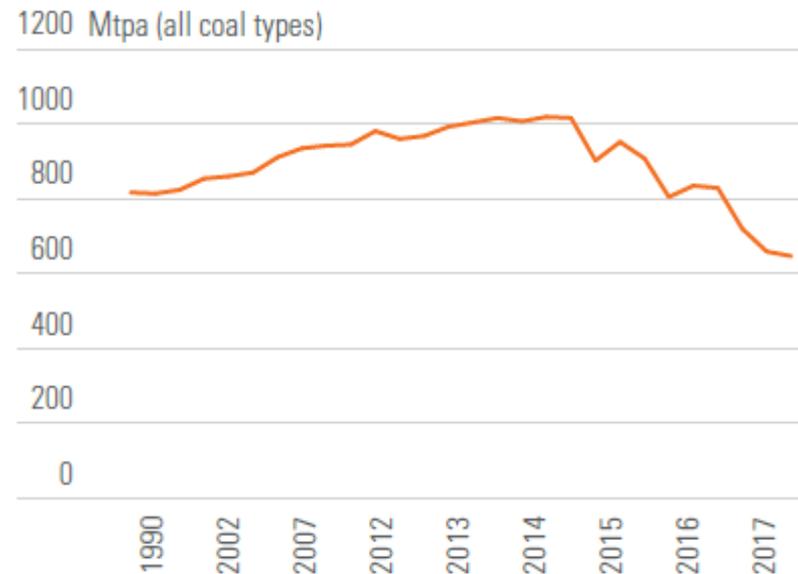
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Figure 12. EU JRC's Forecast of Total Coal-fired power capacity in Europe to 2030



Source: IDDRI, based data from JRC, 2018.

Figure 16. US Coal Consumption is declining rapidly



Source: Enerdata.

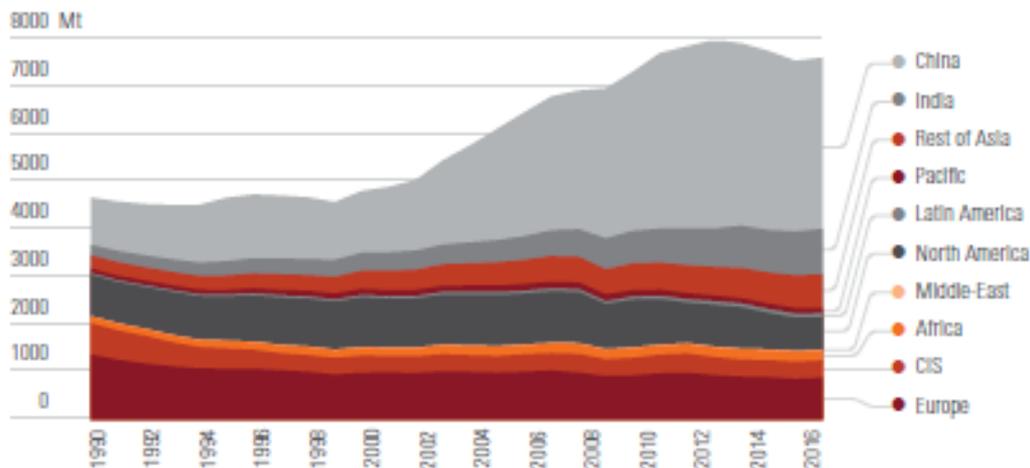
36 governments have pledged to phase out coal before 2030

Other large coal using countries, including Germany, South Africa, Spain, are exploring strategies to phase out coal.

Others, such as China, EU, are serious about reducing coal use

IDDRI But more effort is needed to keep well below 2°C

Figure 1. Global coal and lignite consumption (includes thermal and metallurgical coal)



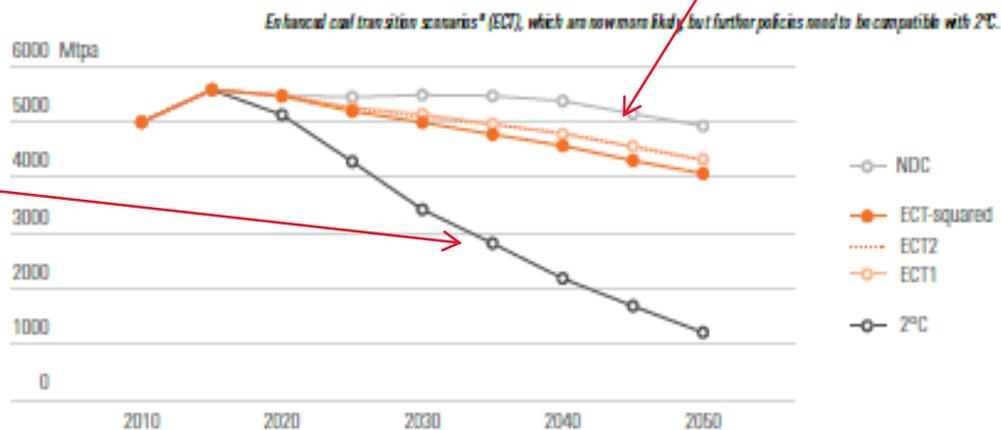
Globally, demand growth has essentially levelled out since 2013, despite big differences in trends across countries.

Several factors at play.

Global demand will probably go into secular decline from 2020s,..

Source: Enerdata.

Figure 10. Global coal consumption 2010-2050 in various scenarios in Mtpa

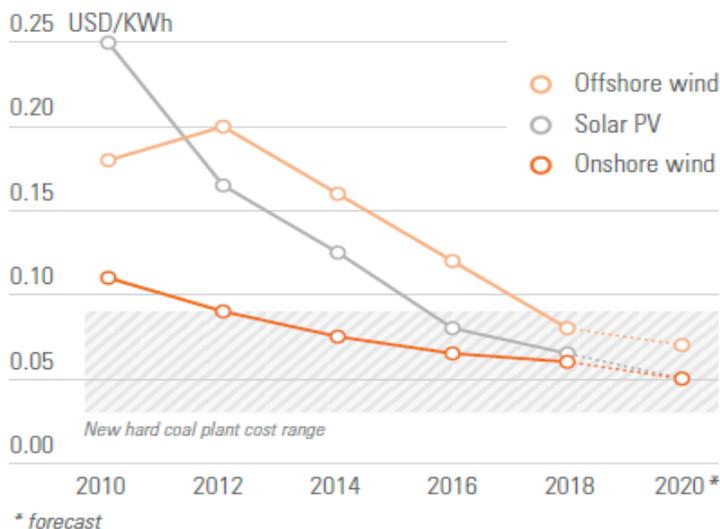


« Well below 2°C » requires bringing demand down more quickly...

Source: Coal Transitions project.

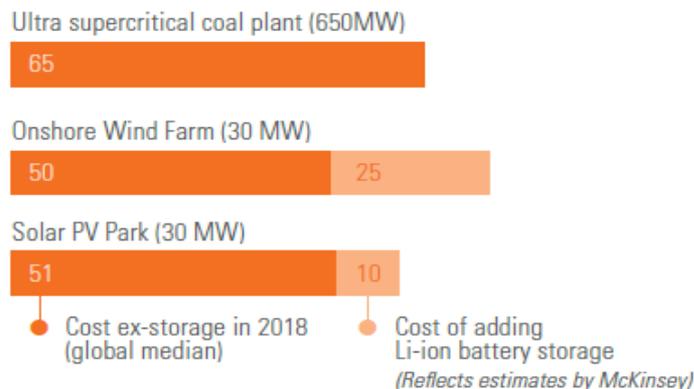
Note: Figures for thermal coal only

Figure 7. The increasing competitiveness of renewable energy with hard coal technologies (global median auction results)



Source: IDDRI, based on data from IRENA, World Coal Association.

Figure 8. Current cost estimates of supercritical coal vs cost of onshore wind and solar PV with Li-ion battery use as capacity firming



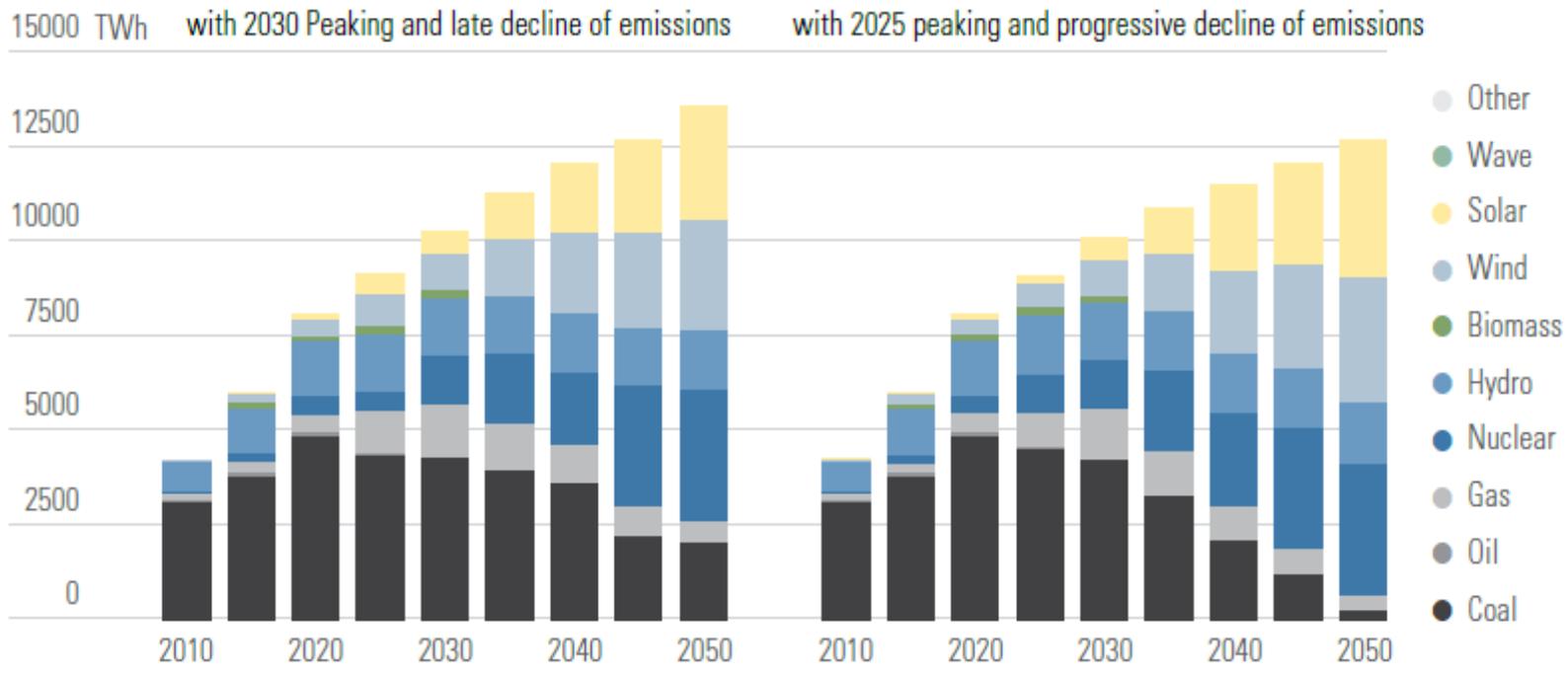
NB. Figures reflect global averages for auctions for different installation sizes and not necessarily represent local costs in all locations, which can be significantly lower (or higher).

Source: IDDRI based on data from IRENA, 2018; McKinsey, 2018.

Mini-grid and off-grid solutions in India or Africa can be cheaper and more reliable than new coal plant

Solutions to variability of renewables are numerous and advancing.

E.g. Electricity mix pathways for China..;

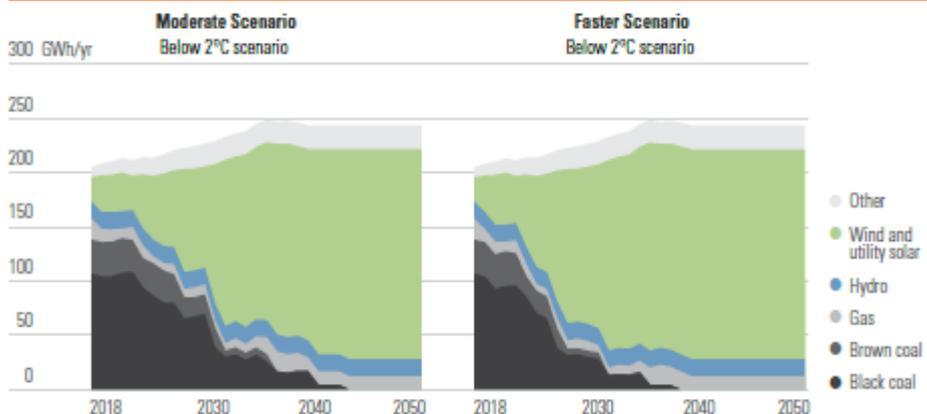


Source: Tsinghua University, China

A key issue is planning phase down of existing assets (avoiding stranded assets facilitating integration of decarbonised power):

If you avoid newbuild today, and apply a mandatory 25-year asset lifetime, many countries could largely avoid stranded assets and be consistent with <math><2^{\circ}\text{C}</math> goal

Figure 17e. Australia



Source: Crawford School of Public Policy, ANU

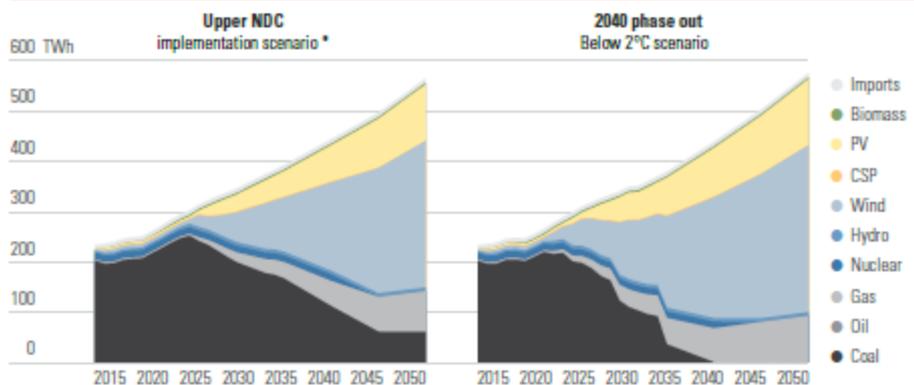
Some countries face virtually zero or *negative incremental cost* to coal power phase out

South Africa and Australia for example could exploit and abundant natural RES and aging fleets to phase out by ca. 2040

But key conditions:

- Infrastructure development/planning
- Broaden portfolio of renewables
- Improve power market design
- Develop residual dispatchable resources (e.g. storage, hydro, biomass, or other solutions) for remaining load

Figure 17c. South Africa



Source: UCT, South Africa * South Africa has a range for its NDC scenario. However experts note that the upper range is more consistent with business as usual or reference case

Coal extraction regions often suffer from significant problems (predating climate mitigation).

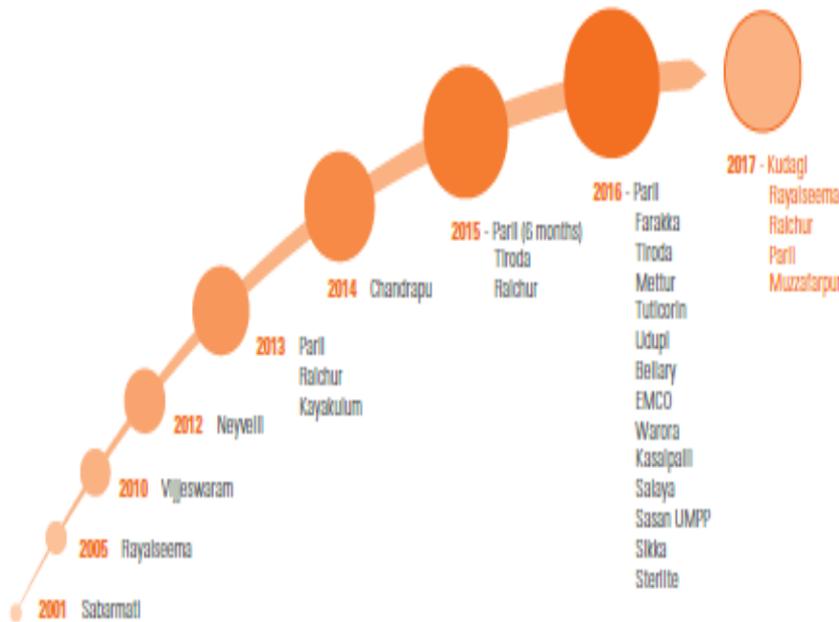
Climate policy can add to this or it can be an opportunity to take some control of existing trends and manage transition to the future.

Solutions must be context specific. Some selected insights...

- « *Anticipation. Anticipation. Anticipation!* »
- Facilitate inclusive dialogue on a chosen future for key stakeholders
- Be concrete: set a timeline with clear milestones
- Differentiated and targeted solutions for different worker types
- Jobs transfer programs generally better than retraining.
- Regional economic resilience and diversification strategies can succeed over long-term, but solutions depend on economic geography and local competitive advantage
- Dedicated governance framework for FF transitions necessary, often to simply ensure companies fulfil their responsibilities, do not hijack process.
- Coal transitions raise multi-level governance issues
- Invest for the next generation, save money and protect « human capital »

Water resource constraints & Indian coal

Figure 9. Temporal power plant shut down (2001- March2017)



Cheaper and more reliable access to power for the energy poor

Avoiding local pollution/resource competition, esp for water, air and soil.

Better health & more desirable and liveable local environment.

Avoided fiscal costs of supporting uncompetitive industry

Manage risks to energy system from international coal market

- 1. Coal transitions are happening already, but more effort is needed for Paris goals**
- 2. <2°C-compatible coal transitions that ensure energy security and affordable electricity for all are technically and economically feasible.**
- 3. A socially just transition for coal sector workers and citizens of coal producing regions is possible.**
- 4. Coal transitions can help to provide numerous co-benefits for society**

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