Industry View

CCUS Supports Coal's Long-Term Viability

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With an increased profile and commitment towards necessary climate action, coupled by dialogue in international circles to phase out unabated coal, coal (a historical giant in energy and economic stability) may seem relegated to the role of the undesirable yet useful.

Coal's usefulness is articulated in the IEA's 2018 World Energy Outlook (WEO) New Policy Scenario, where up to 22% of total primary energy demand by 2040 will come from coal. And over one-third of the existing coal-fired power generation is little over a decade old with new coal-fired power plants being built today, indicating that low cost, reliable energy from coal will remain in high demand, particularly in developing countries.

So, what then can support coal in reestablishing its positive role beyond just its usefulness? Notably, coal has evolved over time to be more eco-friendly along its entire chain of operations, including high efficiency, low emission (HELE) technologies, with a carbon dioxide (CO_2) intensity of an advanced ultra-supercritical HELE cited to be between 670 - 740 g CO_2/KWh. Yet, that emission profile still exceeds natural gas and renewables with peakers. And in Canada, the Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations (2012, amended 2018) stipulate that any facility with emissions above 420 t of CO_2/GWh would have to be phased out by 2029. One of the crucial and proven technologies that can match coal's powerful impact on the world is carbon capture, utilisation and storage (CCUS).

The Paris Agreement (signed by 197 governments) committed to hold global average temperatures to well below 2˚C, which is at risk without an international commitment to CCUS. Coal has a definitive role to play here. Significant development and installation of CCUS at existing and on new coal-fired power plants will be critical to meet climate change targets. As estimated in IEA's Technology Roadmap: HELE Coal-fired Power Generation (2012), 12 GW of CCUS-enabled power plants will be required by 2020, 215 GW by 2030 and 664 GW by 2050 to remain on the pathway to stay below 2˚C warming.

However, now in 2019, without a single new or retrofitted CCUS-enabled power plant under construction, this first target becomes impossible to meet even if the date was pushed further to 2024. The need for action has become more pressing. To achieve CO_2 emission reduction targets, collectively there needs to be substantial efforts for CCUS deployment on coal-fired power plant, rapid growth in CCUS with bioenergy (BECCS), as well as renewable and alternate energy sources.

Commercial experience comes from the two first generation carbon capture power plants, SaskPower's Boundary Dam 3 CCS facility (BD3) in Saskatchewan (Canada) and NRG's Petra Nova facility in Texas (USA).

The world pioneer for CCS on a coal-fired power plant, BD3, is on the eve of celebrating a total of 3 million t of CO_2 captured, and permanently and safely stored. The carbon capture facility has a performance history of increasing reliability, as well as a steady increase in cumulative captured CO_2 since its startup in October 2014.

The practical learning from hands-on experience of BD3 continue to be shared by the International CCS Knowledge Centre, whose primary role is to provide experience-based guidance to assist in significantly reducing the risks and costs of future CCUS facilities.

Despite its track record in increased reliability and success in significant CO_2 emission reductions, CCUS continues to suffer a perception of high cost. With performance improvements and the advent of innovation toward second generation CCUS, costs are shown to decrease by 67%/t of CO_2 captured, opening opportunities for investment. The International CCS Knowledge Centre provides a comprehensive analysis in its Shand CCS feasibility study. It is generally accepted that, at this stage, the largest gains in knowledge and the primary driver for achieving significant cost reductions come from deploying CCUS at scale.

Coal-fired power plants from around the world are remarkably similar and incredibly robust. As demonstrated with BD3 extension of life to 75 years – done in concert with the CCS addition – there is significant value in the existing infrastructure, meaning these facilities are potentiality infinite life assets. A reinvestment of 10 - 15% of the replacement cost can extend the life of the existing asset at any point in time. These potential life extensions, when combined with the addition of a carbon capture facility, would simultaneously slash emissions to below 100 t CO_2/GWh, increase the value of the existing infrastructure and extend its life. Additionally, this could continue to provide low cost and secure base-load power, particularly in developing countries.

With the adoption of CCUS and support in policy and regulation, coal has an opportunity to lead the energy sector and to lead the world toward positive, impactful and substantive emission reduction.