

The Role of Energyplexes in the 21st century: Coal Gasification for Co-producing Hydrogen, Electricity and Liquid Fuels

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This study illustrates the role that integrated energy systems, also known as “energyplexes”, could play in supplying energy demands in the long term. These systems could enable following a flexible multi-fuel, multi-product strategy that could render both economic and environmental benefits. Their potential is highlighted here using the case of coal-fired gasification systems that allow co-producing hydrogen, electricity and liquid fuels and could be a key building block in a clean-coal technology strategy. “Energyplexes” could increase the adaptability and robustness of energy-services companies in the marketplace. On the one hand, they could provide them with flexibility in meeting demands in different market segments while achieving lower production costs. On the other hand, they could increase their robustness by reducing the risks of relying on a single feedstock. In addition, with the possibility of achieving high conversion efficiencies and low polluting emissions and facilitating carbon capture, they could deliver high-quality energy services in a cost-effective way while meeting stringent environmental requirements, in particular those that might arise in a GHG-constrained world. Co-production, also known as poly-generation, strategies may contribute to improve the economics of the system and exploit potential synergies between the constituent processes.

Keywords: Energyplexes, co-production, syngas, clean-coal technology

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