

D6.012 Website Articles – Get to know Kent

Kent is a pioneer in providing integrated energy services on a global scale. With a rich heritage and a relentless drive for excellence, Kent has established itself as a leader in the energy industry, offering services which span the entire energy value chain. Kent's involvement in the RECYCLE project includes assessing the chemical looping reforming process technically and commercially against the current best available technologies.

In an interview conducted with Luigi Crolla (Head of Energy Transition Technologies) and Deirdre Diamond (Principal Process Engineer) the pair expanded on Kent's involvement in the project, as well as the challenges and opportunities faced, and their opinions on the future of the technology.

During Phase I, Kent conducted a comprehensive Class IV (AACE) techno-economic study to evaluate the RECYCLE technology, comparing it against a benchmark process for blue hydrogen production. Kent's findings revealed that the RECYCLE technology demonstrated *“improved emissions performance when compared with Steam Methane Reforming (SMR) and Carbon Capture Storage (CCS) due to the difference in capture rates”*. Additionally, Kent observed *“a higher net efficiency performance leading to a lower feed gas consumption for the same production rate of hydrogen”*. These outcomes are particularly noteworthy, underscoring the environmental benefits and improved efficiency offered by the RECYCLE technology when compared to existing methods.

In Phase II, Kent will develop the process design and economic assessment of the RECYCLE plant based on the results and lessons obtained in Phase I. The plant will be based on four commercial scale applications: large scale and small-scale hydrogen production, methanol synthesis and direct reduction of iron.

Kent recognised both challenges and opportunities in reaching the environmental potential of the RECYCLE technology during the interview. Challenges mirror those commonly faced by emerging technologies striving for commercial development – demonstrating the stable operation of the sequential reaction concept at the necessary levels of efficiency, availability, and scale. Addressing these challenges involves a phased approach, progressing from the proof-of-concept tests to successively larger throughput. An additional challenge lies in the necessity to develop CO₂ storage infrastructure.

Conversely, opportunities arise upon successful demonstration and scale up of technology, presenting the prospect of large-scale production of low-carbon hydrogen. The feasibility of this is dependent on the existence of a hydrogen distribution network. Alternatively, if such a network is absent, the

chemical looping technology could be tailored to meet user requirements at specific sites where feed gas is readily available.

Looking ahead 10-15 years, Kent envisions the evolution of the RECYCLE technology, and similar technologies, through successive scale-up of demonstration projects, driven by the rising demand for hydrogen and the increased availability of CO₂ storage infrastructure. However, Kent recognised that government funding, essential for supporting global emissions reductions goals, will be crucial, as well as other technologies entering the market.

Within the broader context of deindustrialisation in the UK and the shift towards a low carbon economy, the technology finds its niche in situations with syngas or hydrogen demand, coupled with the presence of CO₂ storage and transport infrastructure. For future developments, Kent noted that the establishment of the hydrogen distribution network would further enhance large-scale hydrogen production and distribution.

Kent has been instrumental in assessing the RECYCLE technology so far, emphasising its environmental benefits and efficiency gains when compared to existing methods. Moving into Phase II, Kent will play a key role in developing the RECYCLE plant, contributing to its process design and economic assessment. As a result, Kent remains a key player in the RECYCLE project and in helping the UK in transitioning towards a low carbon economy.