emerge – dynamic techno-commercial modelling

emerge is a suite of linked technical and commercial modelling tools designed to help project developers reduce production costs and increase bankability for hydrogen, e-fuels, power-to-x and other complex projects.

emerge – dynamic techno-commercial modelling

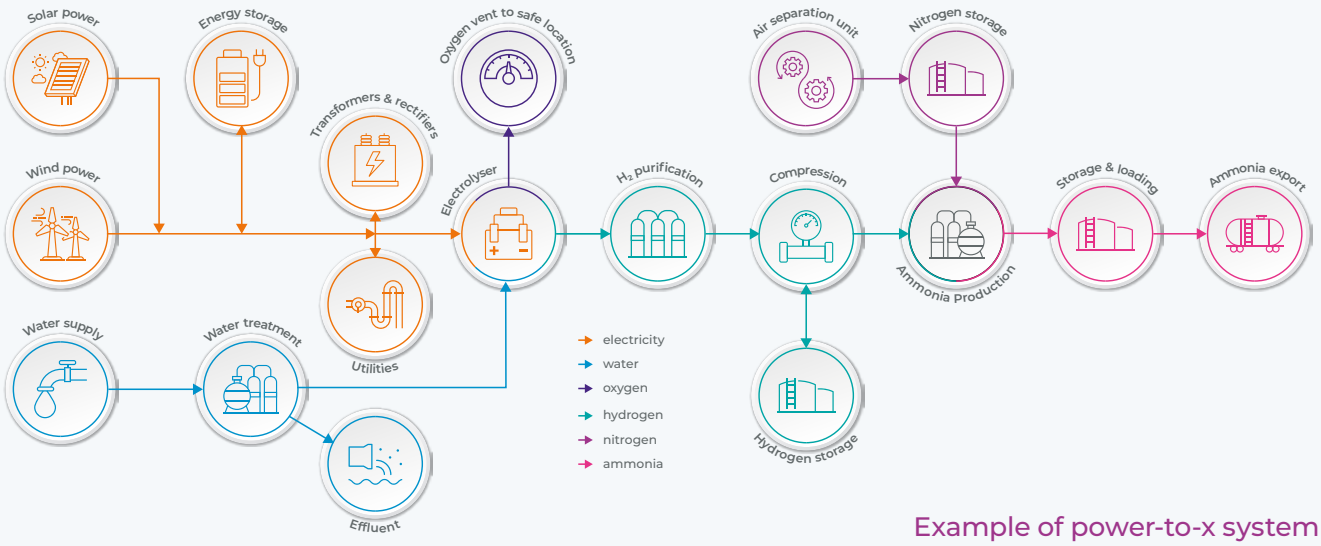
Climate change requires that society rapidly transitions from a hydrocarbon-based energy system to one that is decarbonised. This challenge is compounded by the need to do so in a manner that provides an affordable and secure supply of energy. Collectively these three elements are known as the energy trilemma, and solving this trilemma requires solutions to a set of interrelated wicked problems. An example of these wicked problems is the integration of variable renewable energy (VRE) sources, such as solar and wind, into the energy system.

A traditional, linear design process is not transferrable to power-to-x and eFuels projects. New energies projects powered by VRE demand a new approach to system design to achieve the best project outcomes.

To solve this, io has developed emerge as an enabler for power-to-x and hydrogen projects, to drive down the cost of production for project developers in this new, competitive marketplace.

emerge allows io's experts to integrate, model and optimise the complex interdependences between meteorological conditions; electromechanical, photovoltaic and thermal energy generation; chemical processes; thermodynamic and mechanical energy storage; spatial and resource constraints; cost and economics; and societal expectations.

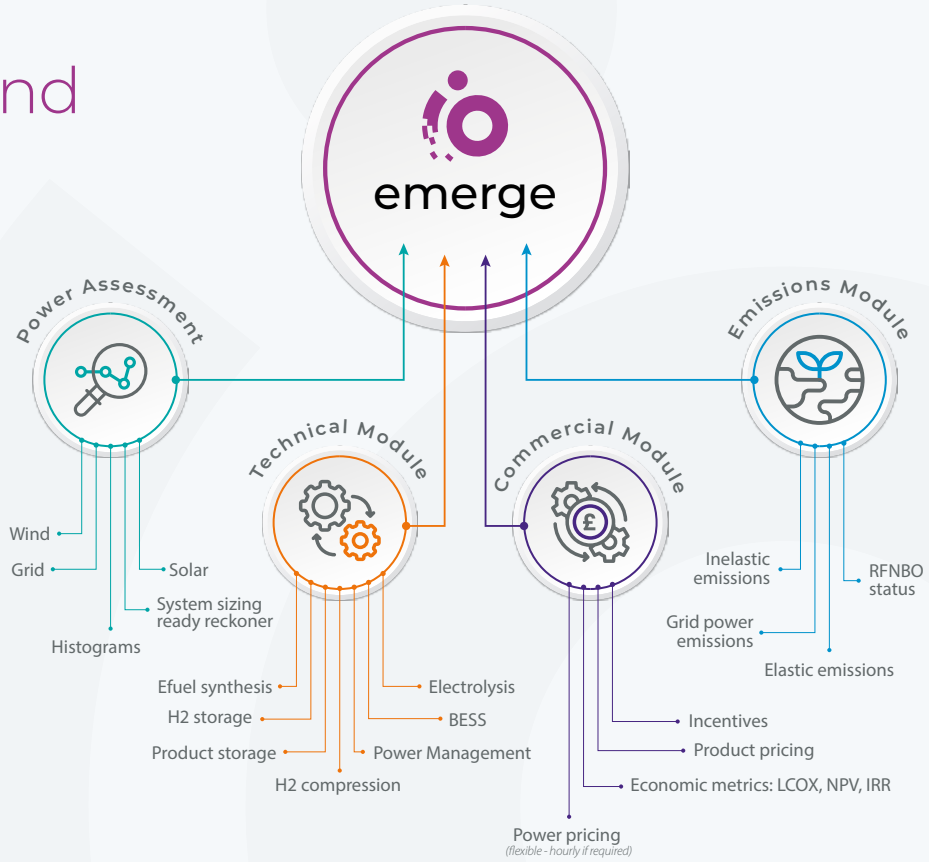
emerge is a powerful suite of dynamic tools and software, backed-up by io's deep domain expertise, gained from over 50 large-scale use cases, ranging from grid-connected green hydrogen for grey feedstock displacement, to solar and wind powered SAF production for EU and UK markets.



Example of power-to-x system

emerge: integration and optimisation engine

Emerge is not a single piece of software, but a connected set of tools and processes, encompassing the coding languages, Graphical User Interfaces (GUI), dynamic simulation framework and visualisation tools which form the project workflow.



emerge POWERED BY

julia

modelica Language

Power BI

python

emerge – what sets us apart?

While computing power allows for a brute-force approach to solve the issue of power intermittency – io's approach is more nuanced, targets the real project drivers, and achieves a better project outcome in terms of minimising cost of production.

io focuses on analysing only the necessary solution space; without running vast numbers of un-necessary simulation cases. io has been led by our client's needs – limiting the number of simulation cases to only that which are necessary – this approach allows each model to be a bespoke design, adding technical and commercial definition as a project progresses.

emerge integrates the extensive expertise of io's consultants and engineers, bringing their understanding of client's value drivers and success factors to enable the best solution for their specific circumstances.

emerge – *the outputs*

the core modelling outputs are a set of commercial and technical dashboards, and a full analysis of the solution space focused around optimisation of an objective function (e.g., Levelised Cost of Production).

Example use cases are:

- Identifying an optimum wind / solar energy mix
- Identifying optimal electrolyser sizing and allowing a degree of energy curtailment in the hunt for value
- Optimising molecule and energy storage sizing
- Identifying the optimum power-to-x process size in combination with hydrogen and stored energy

This enables our clients to make informed decisions and progress bankable, technically feasible projects to Final Investment Decsion (FID) and beyond.

About io consulting

io is an energy project architect and systems integrator that specialises in front end thinking to enable complex projects with greater embedded decision quality. io is an established low carbon project development specialist in power to x, hydrogen, CCUS, clean energy, energy storage, industrial decarbonisation and hydrocarbons and provides services from feasibility to FID and beyond.