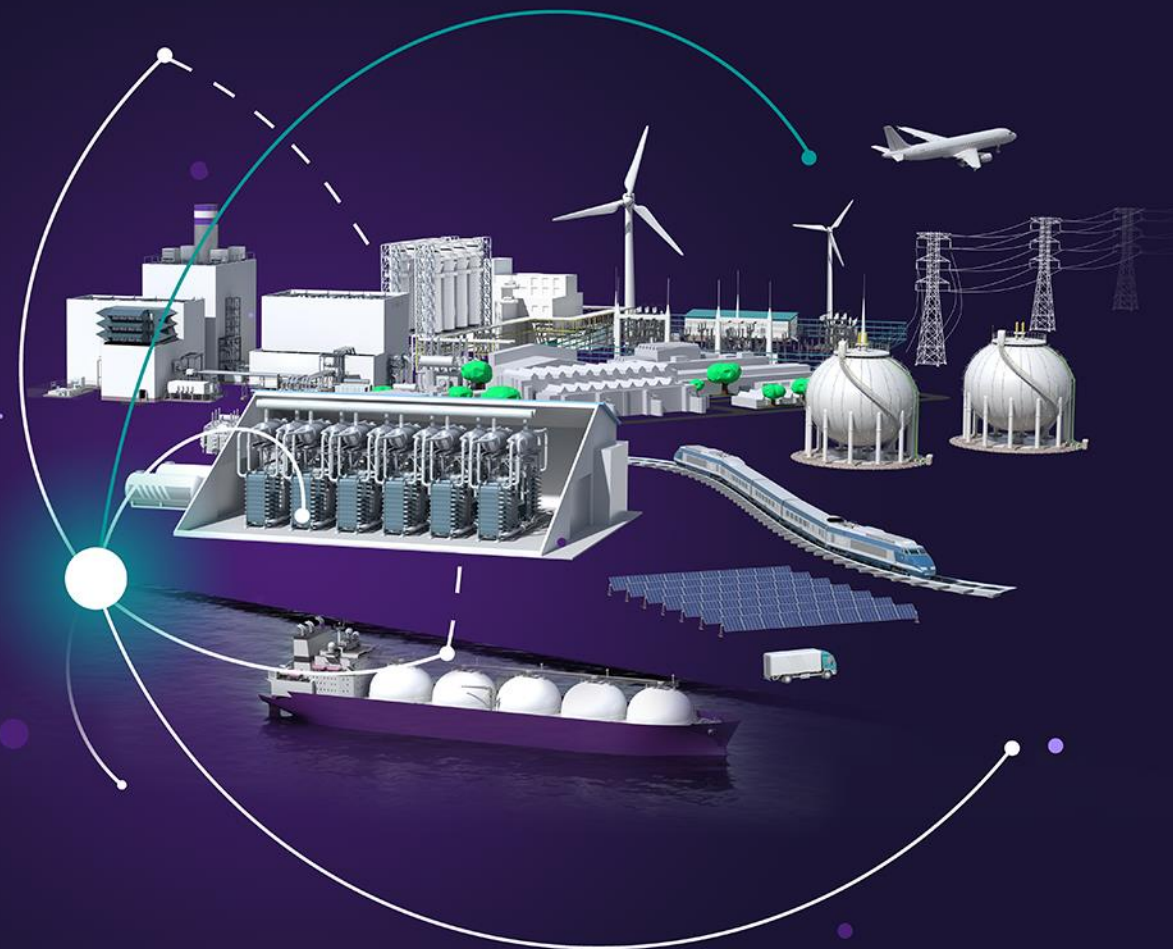


Close-coupling Hydrogen Production with Green Ammonia Plants

26 August 2021



Challenges for Green Ammonia Production

Green ammonia production is modular at one end and a continuous process at the other

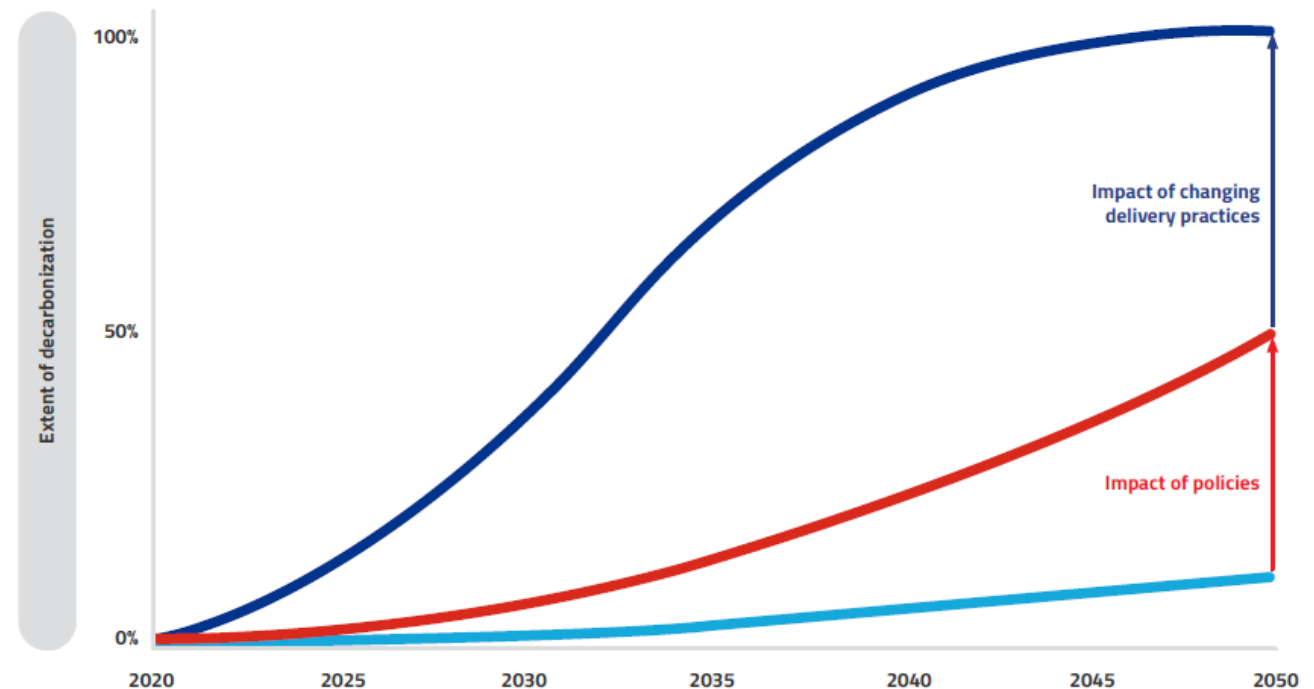
Renewable energy is variable, ammonia plants prefer continuity

Meeting the need for decarbonizing ammonia production is enormous; using ammonia as an energy carrier compounds that challenge

Conventional ammonia plant development is time consuming and expensive

Balancing utilisation, flexibility and cost is a non-trivial optimisation exercise

Achieving net zero requires changing both policies and delivery practices



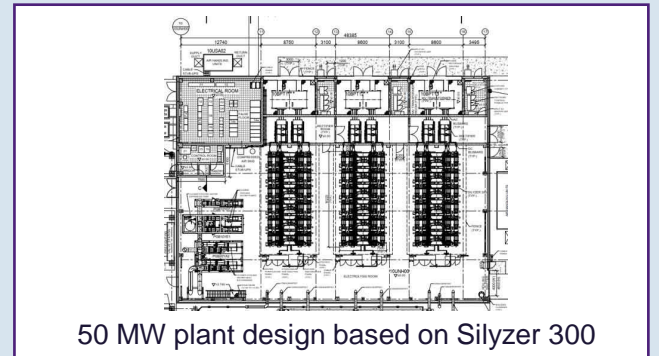
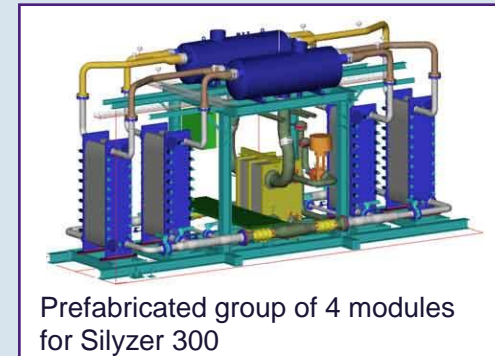
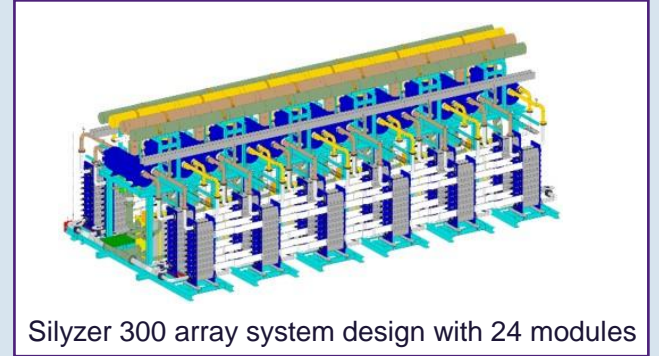
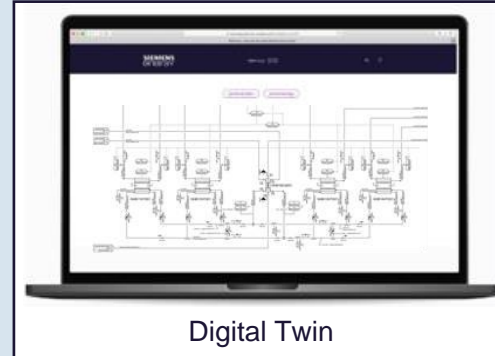
Source: From ambition to reality; Worley Princeton, 2021
<https://www.worley.com/our-thinking/from-ambition-to-reality>

— Required — With policies — No policies

Next level engineering facilitates optimised plant design, future upgrades and extensions

Next-level engineering

- Future-proof system design & engineering
- Integrated digital engineering tools
- Pre-fabricated groups, optimized array system design and plant configurations based on modular building-blocks
- Pre-defined interfaces
- Digitally stored system configurations
- Supporting project from concept until end-of-life



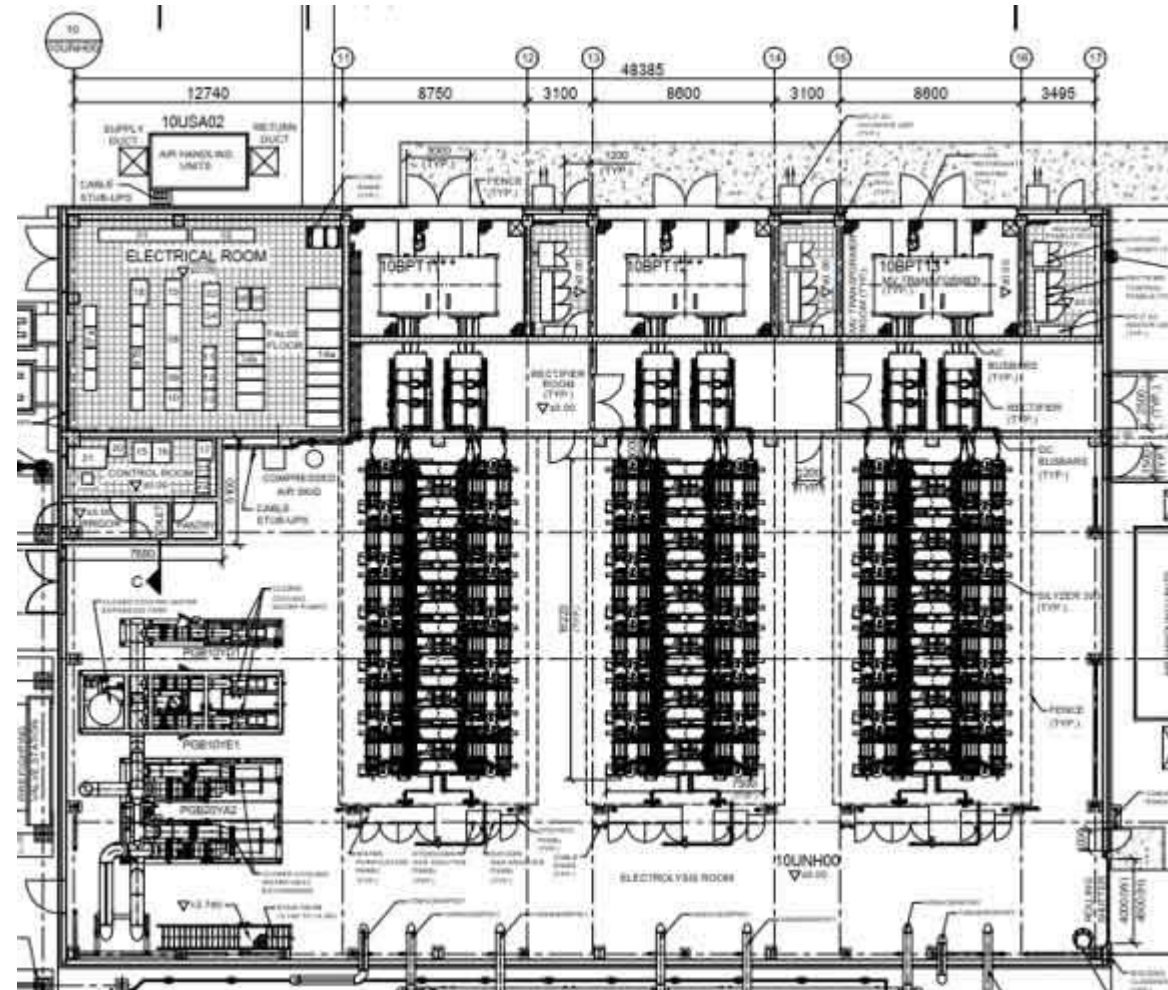
Benefits

- Accelerated project design and execution incl. time-efficient on-site installation
- Digital data exchange between project stakeholders
- Cost optimized customer solution
- Allowing future project upgrades, extensions and modifications

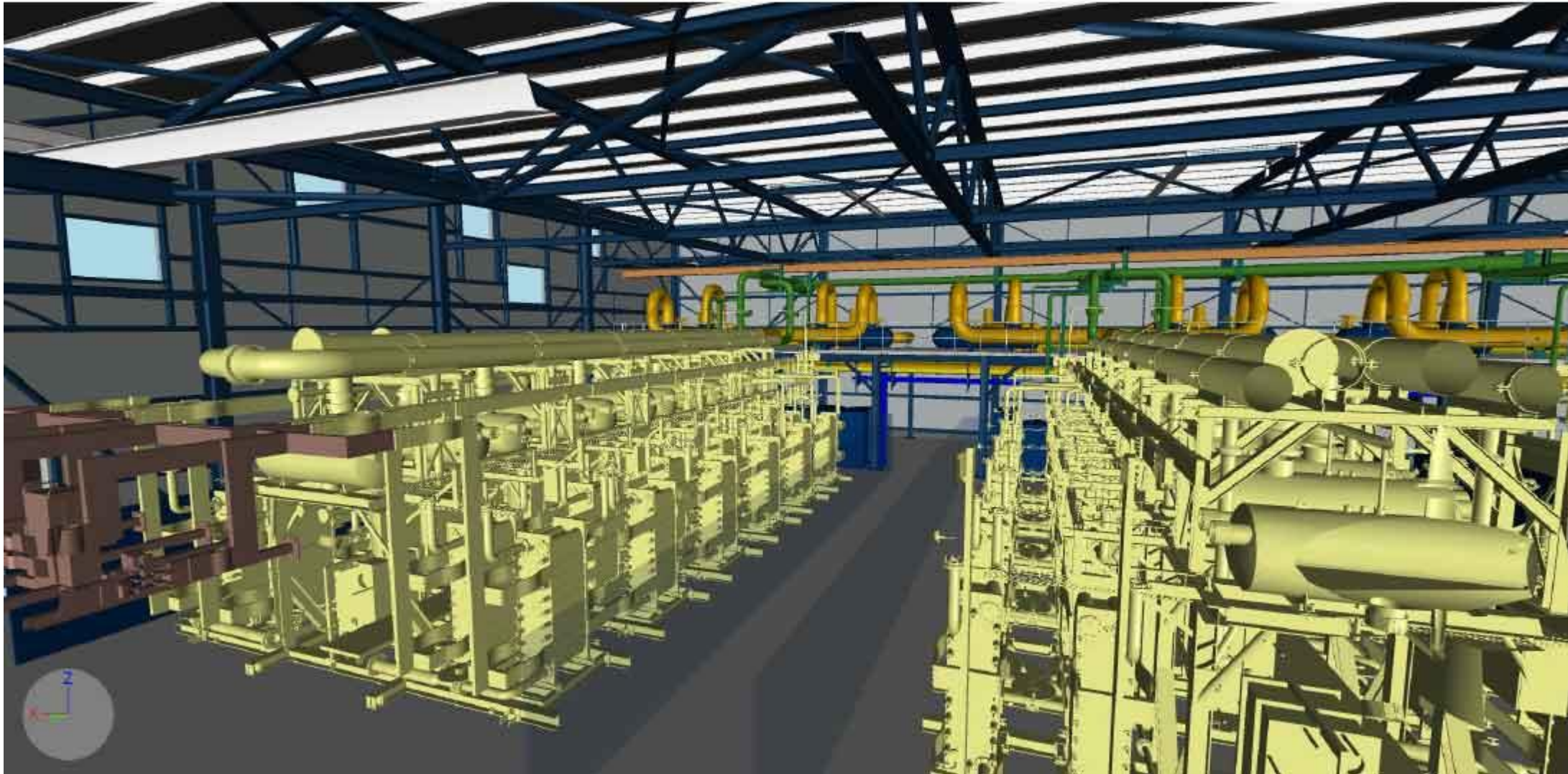


- Pre-fabricated and pre-tested module groups for reduced onsite effort
- Compact footprint
- Standard industrial building
- No indoor crane necessary
- Separate rooms for power electronics
- Future upgrades compatible

Optimised plant design for fast installation, low cost and maintainability

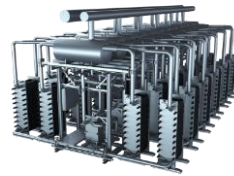


Pre-engineered Balance of Plant packages for faster time-to-market

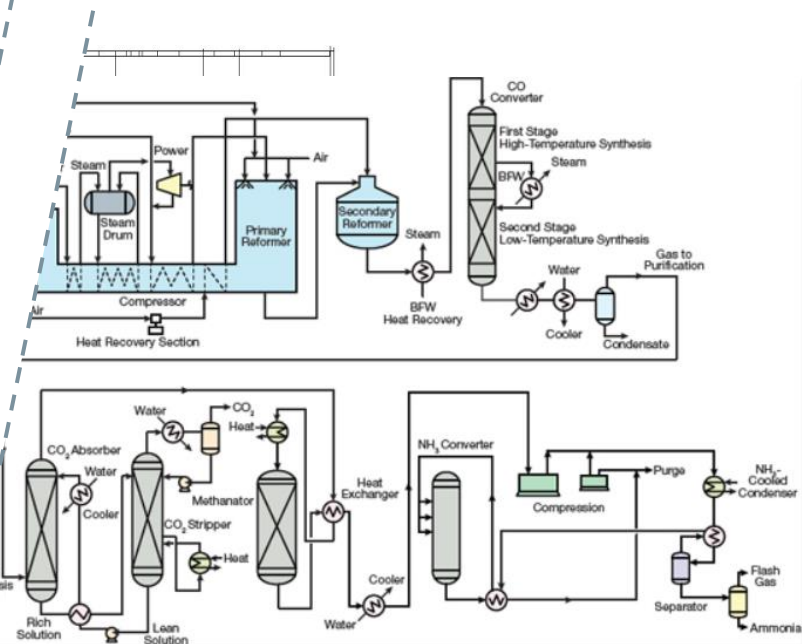
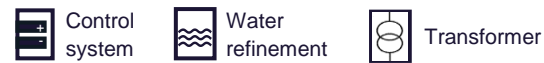
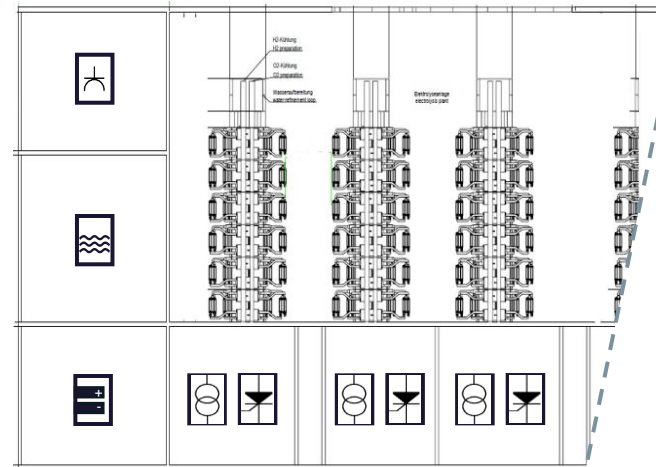


From Module to Plant

From Customised Design to Reference Plants

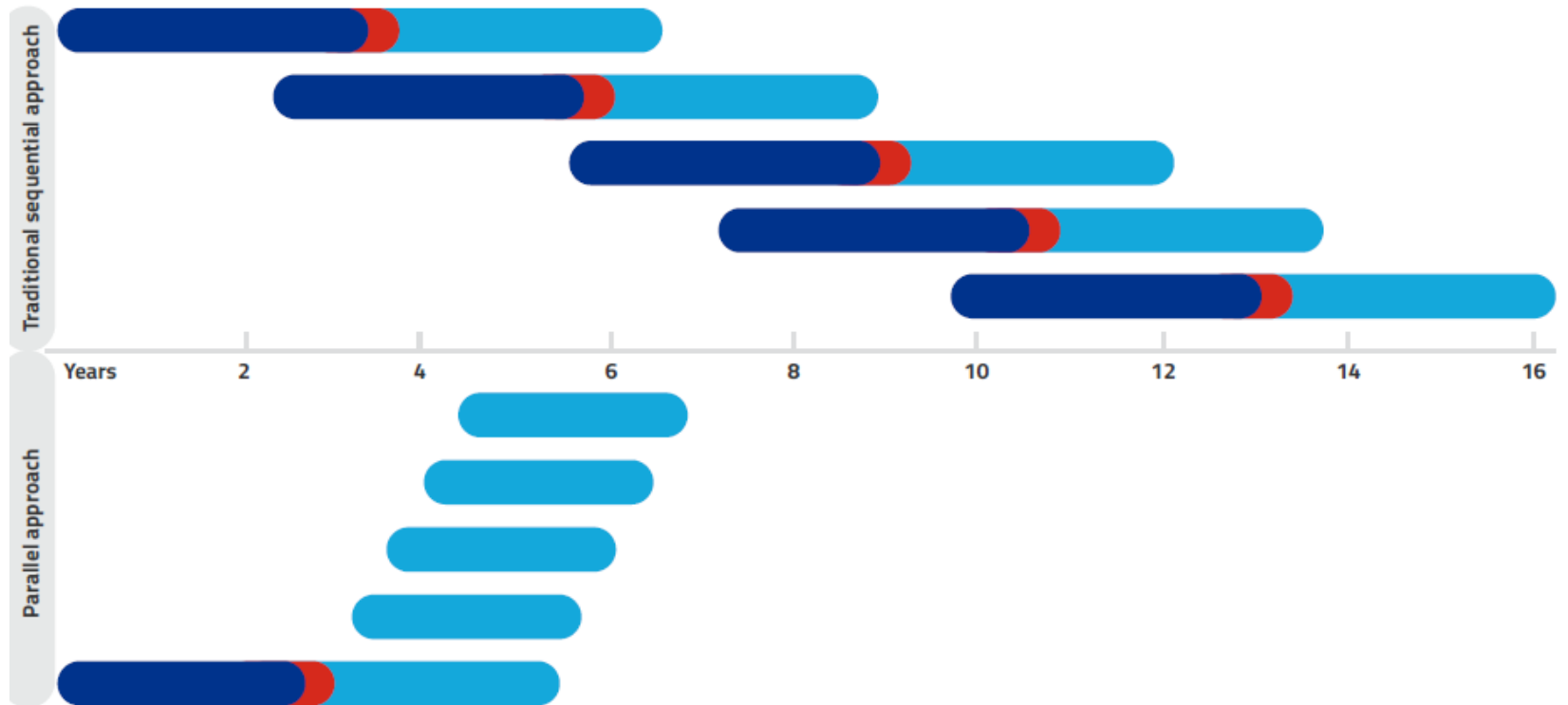


Scale up to the necessary demand



Source: AIChE

Parallel Deployment



Source: From ambition to reality; Worley Princeton, 2021, <https://www.worley.com/our-thinking/from-ambition-to-reality>



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