

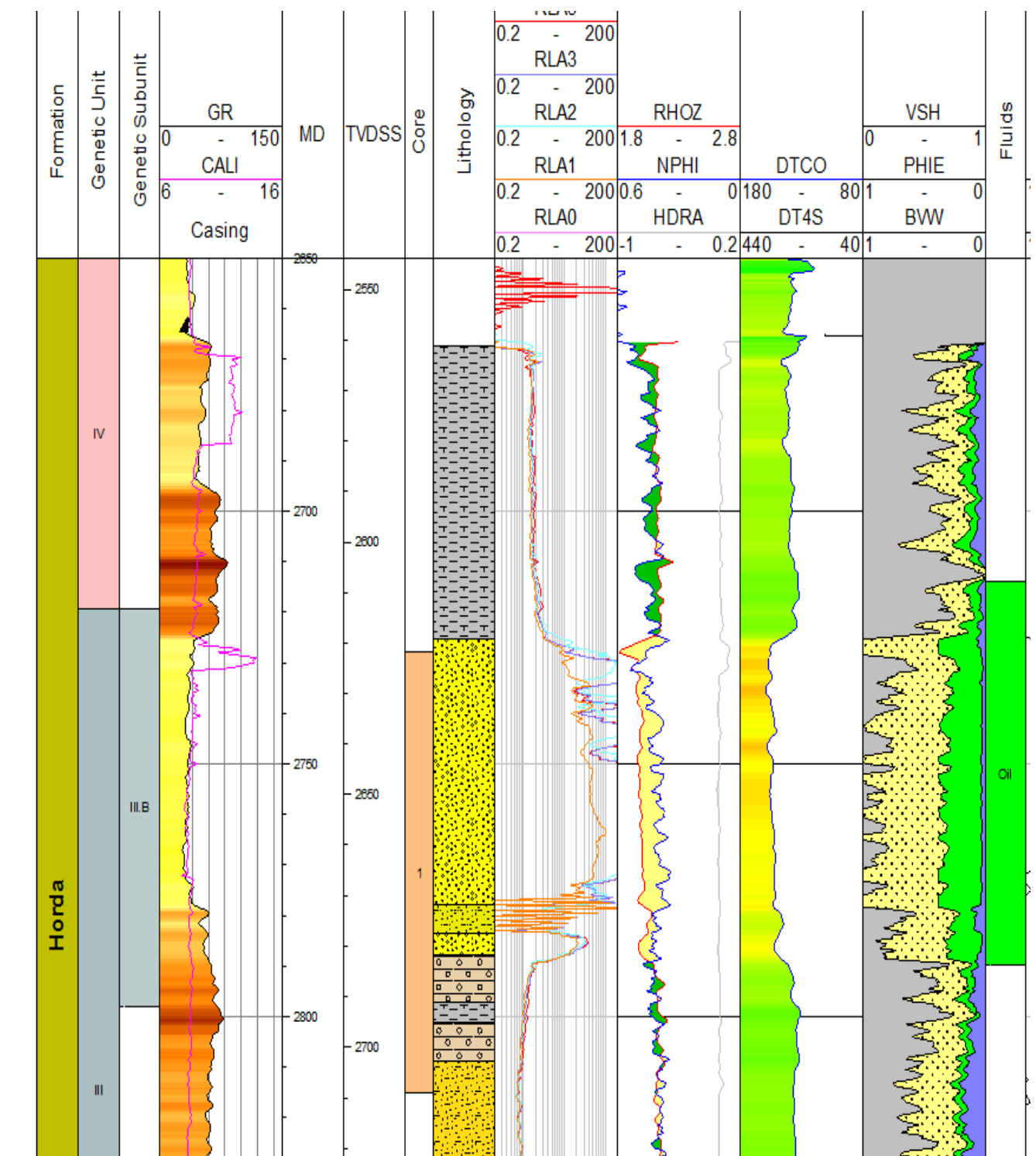
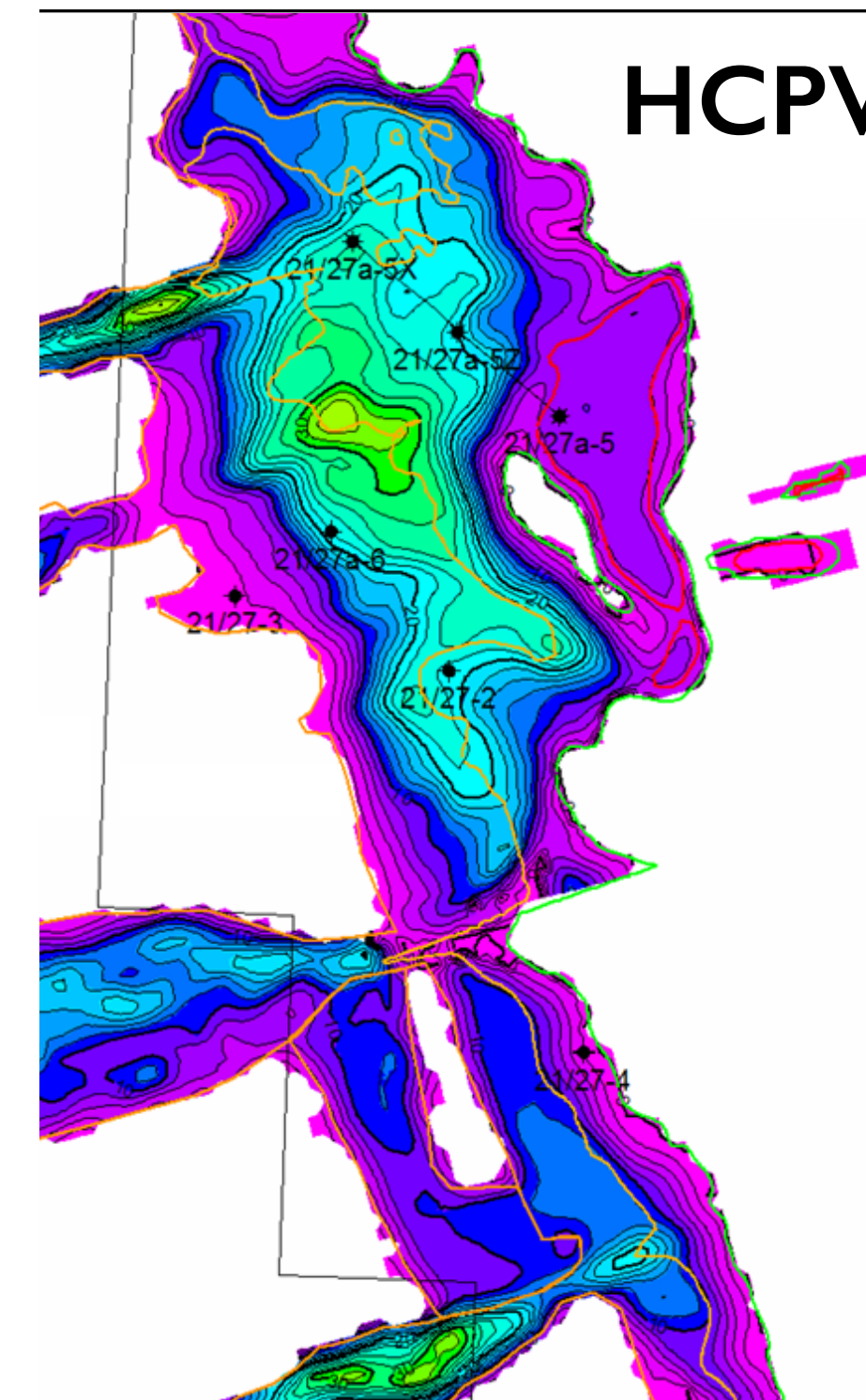
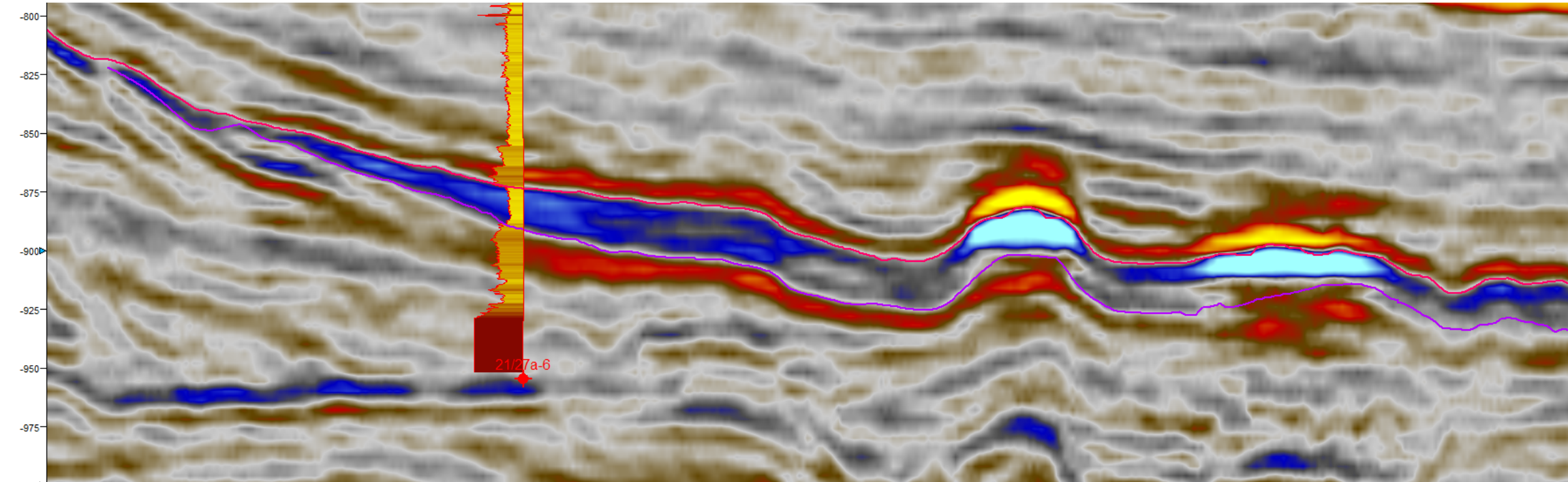
NET ZERO BASIN

Pilot field development

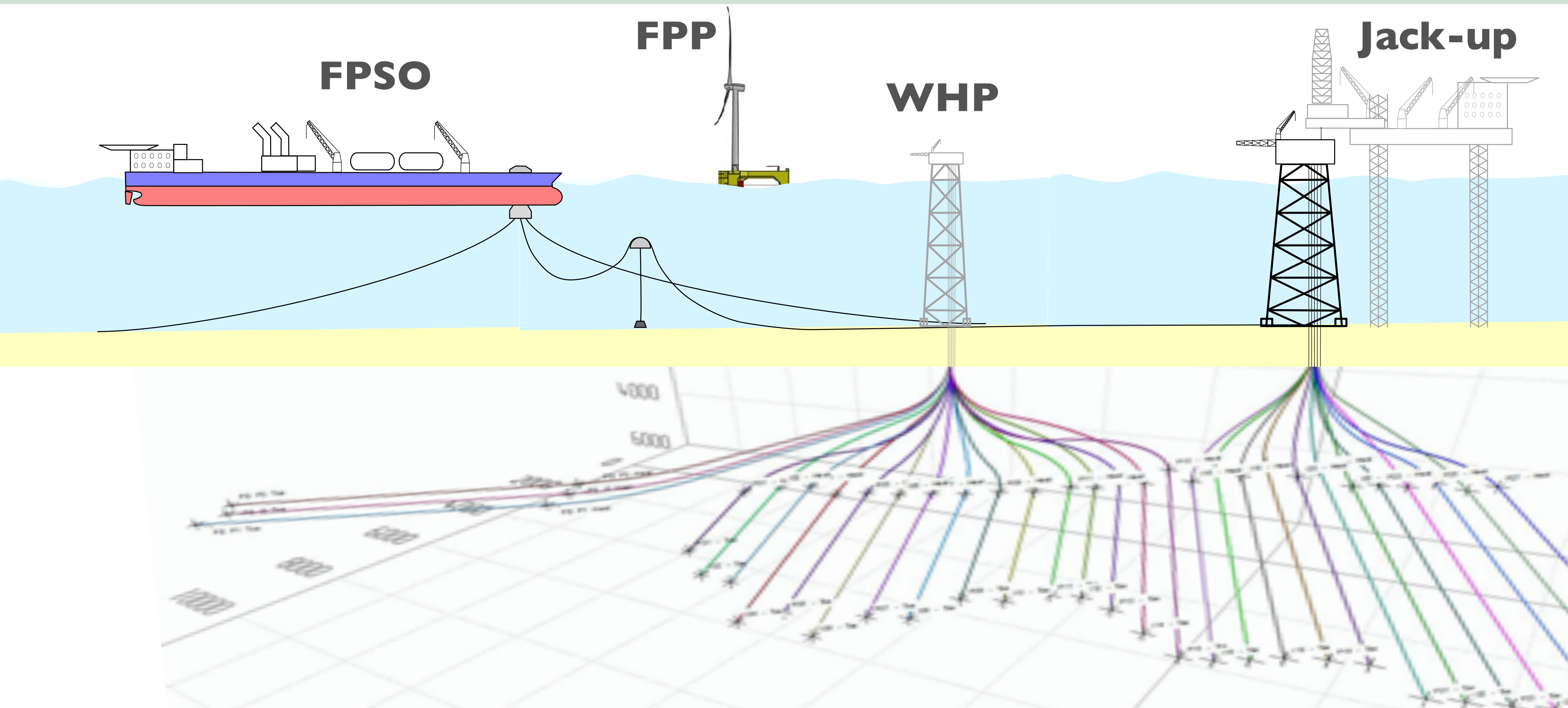


Pilot field summary

- Fully appraised, seven reservoir penetrations, three tested wells, core and fluid samples held by Orcadian, two high quality 3D seismic surveys
- Very high quality sandstone turbidite reservoir, 34% porosity, 2 to 10 darcies of permeability
- Significant oil in place: 263 MMbbls; audited 2P reserve of 79 MMbbls, based on a low salinity polymer flood of the reservoir
- Variable quality oil from 12° to 17° API, 160 cP to 1,200 cP
- Shallow water (c. 80m), 140 kms due East from Aberdeen, c. 40 kms from Gannet et al

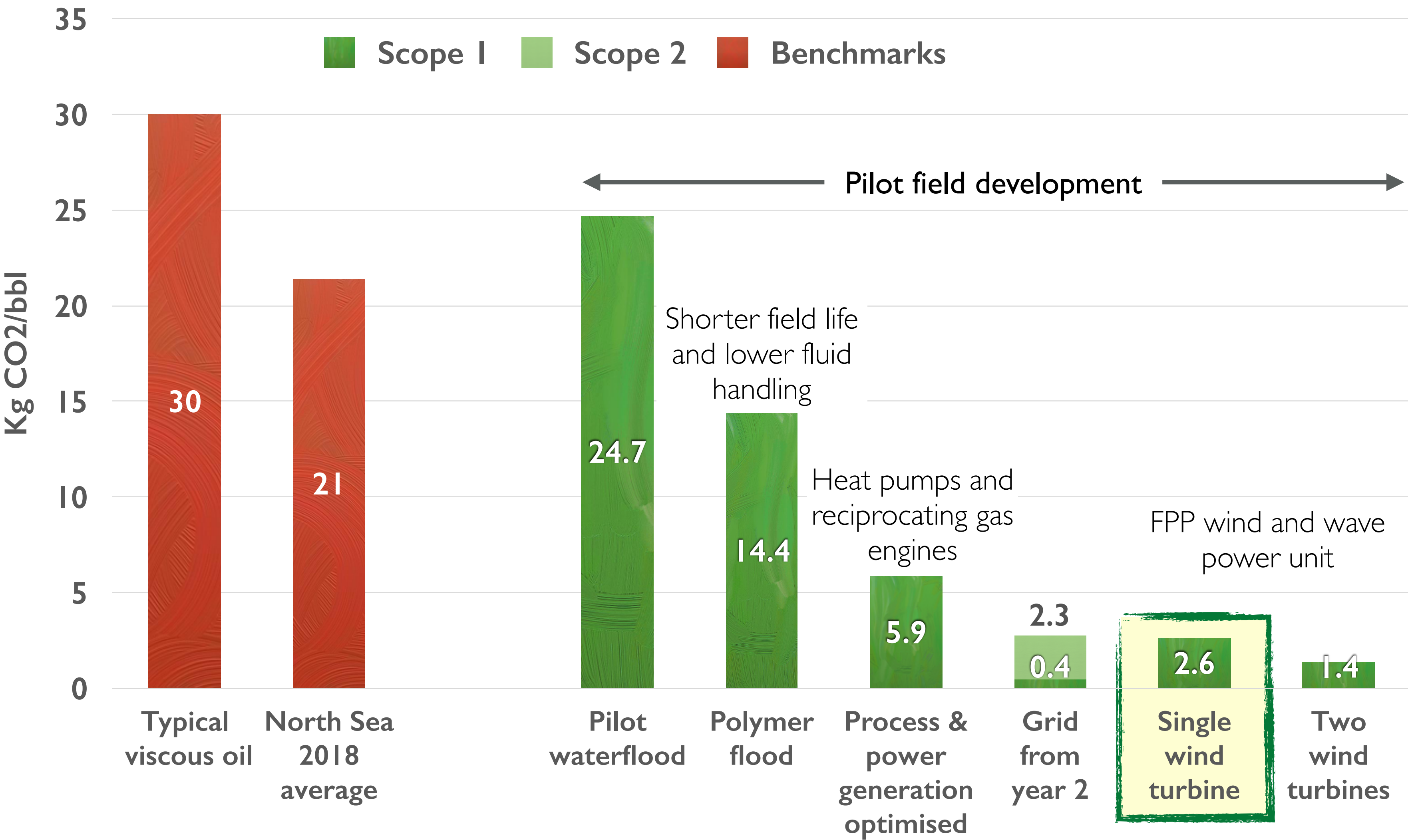


Pilot field development plan

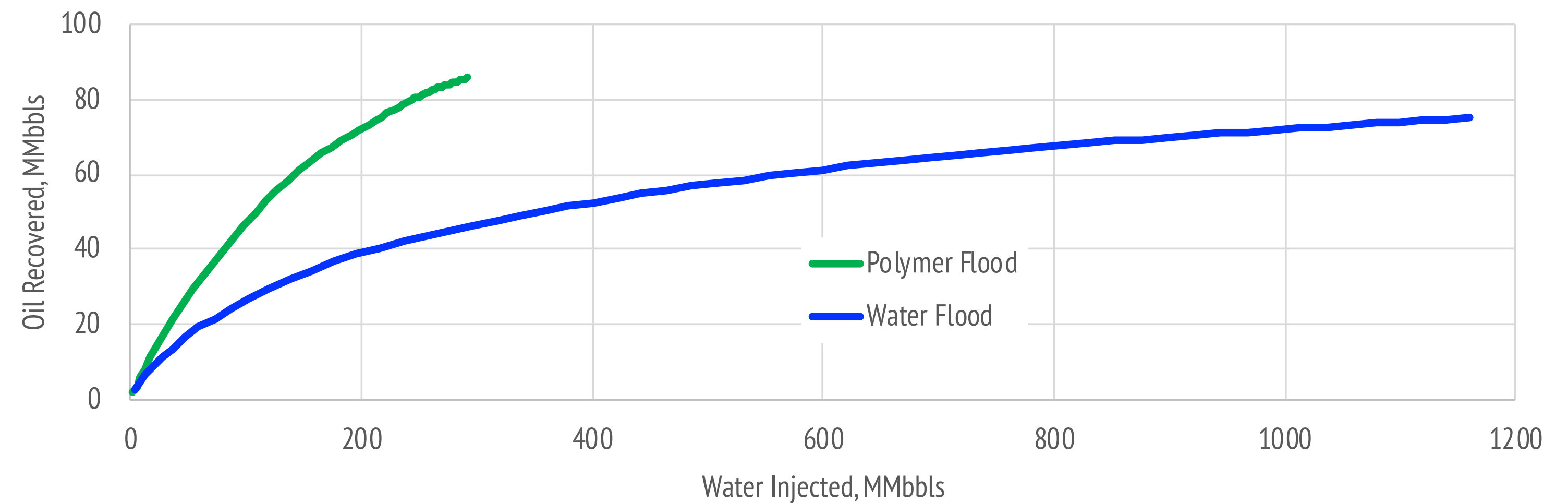
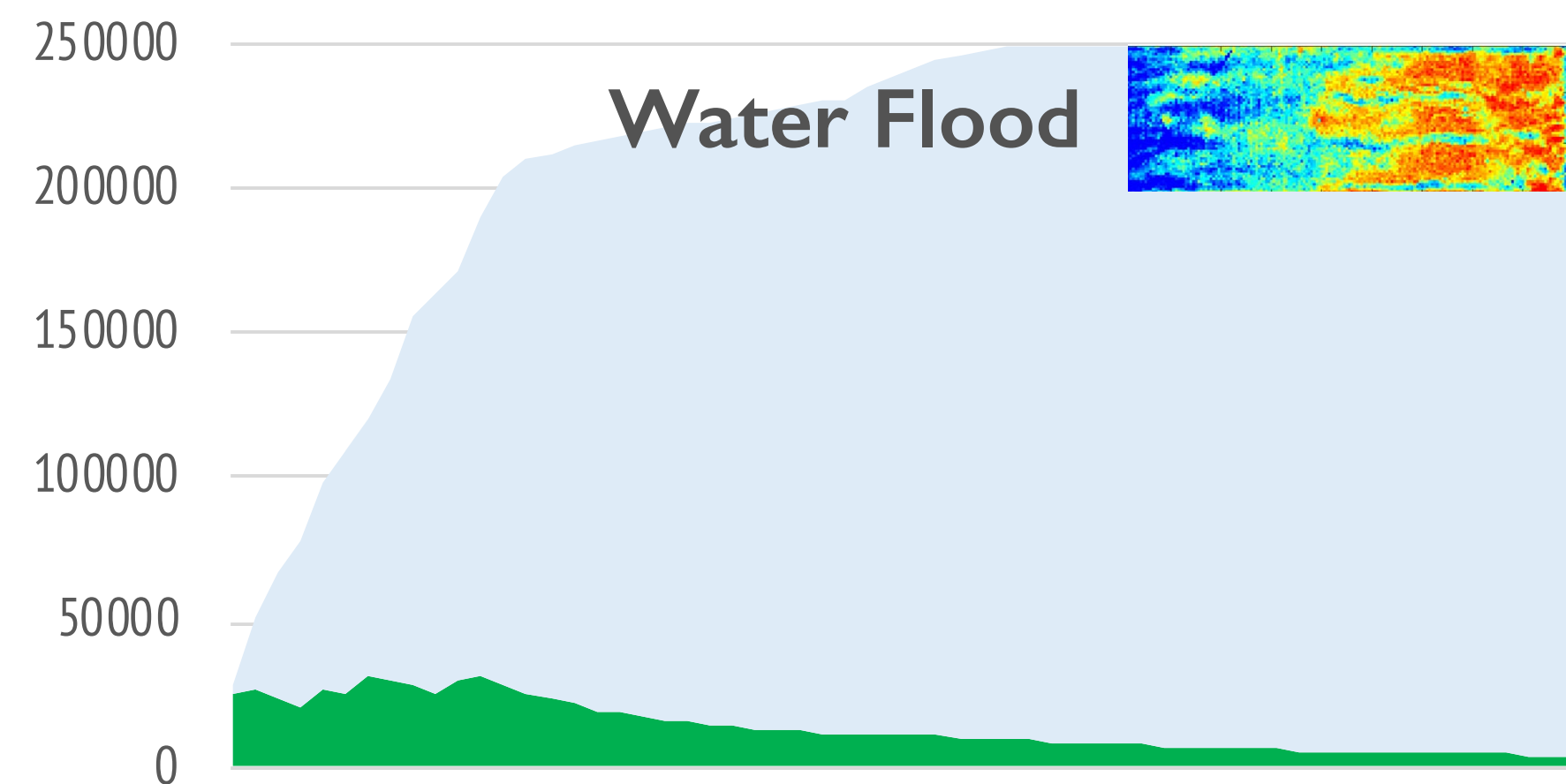
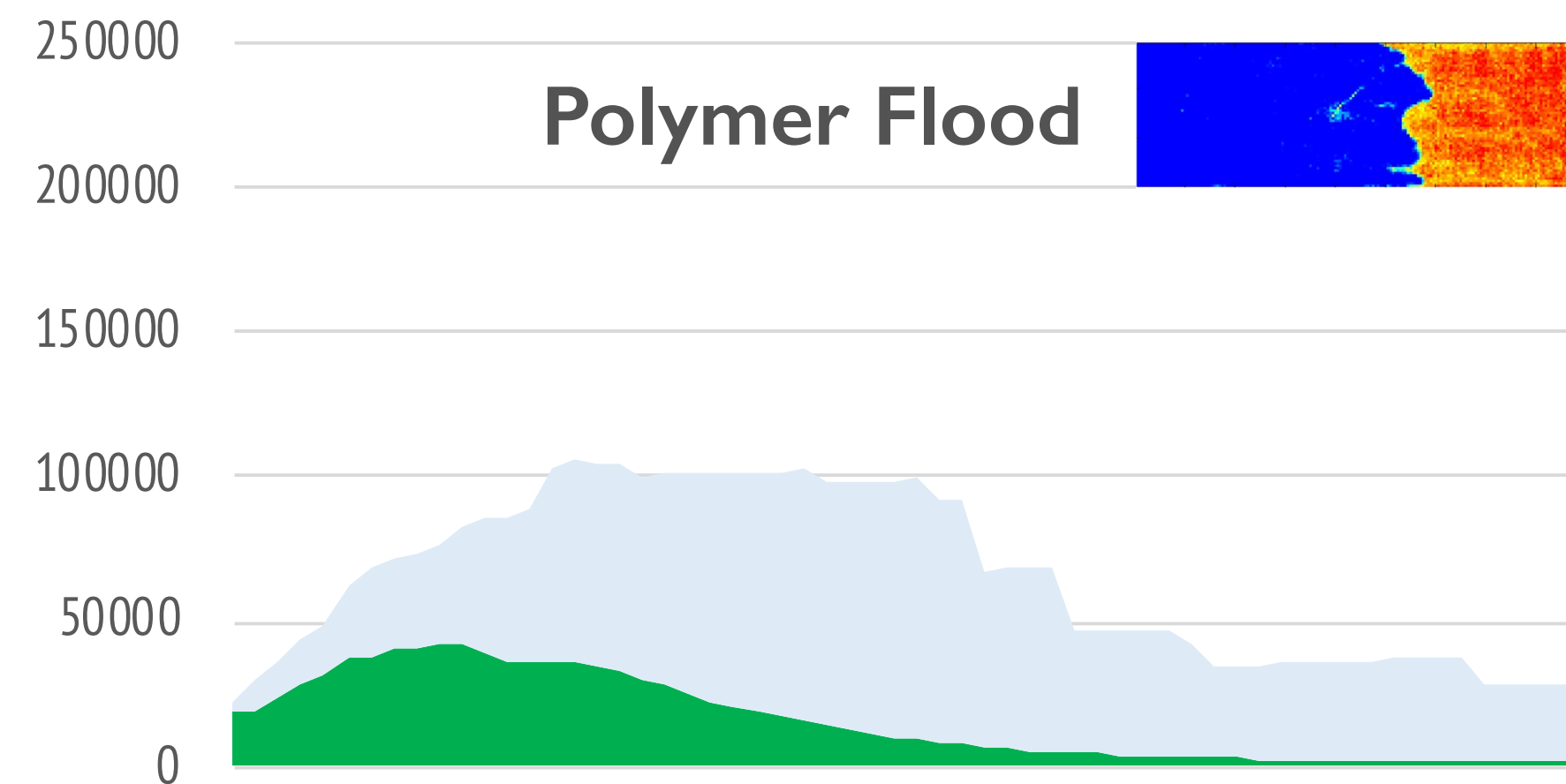


A project delivering on the Government's Net Zero agenda

- Many opportunities to reduce emissions identified
- Integration of aggressive process heat management with high efficiency back-up power generation and electrification has the potential to drive emissions down by over 80%
- Local wind farm power, with highly efficient back-up gas engines, reduces emissions as low as connection to a future grid with half of today's CO₂ intensity



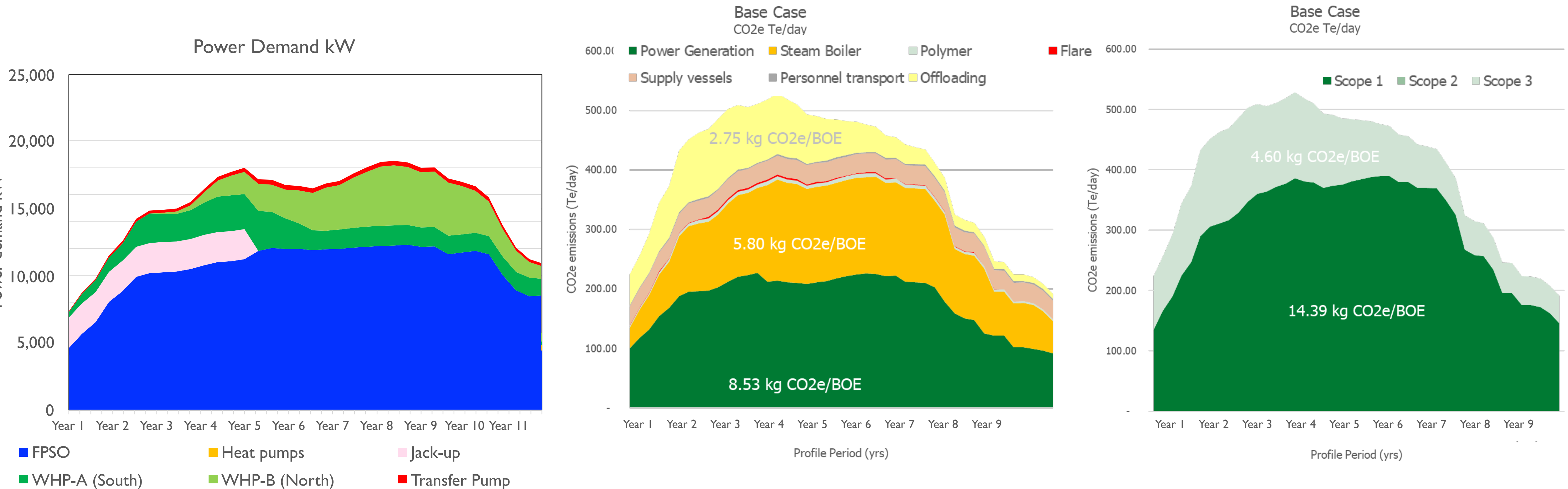
Why polymer reduces CO₂



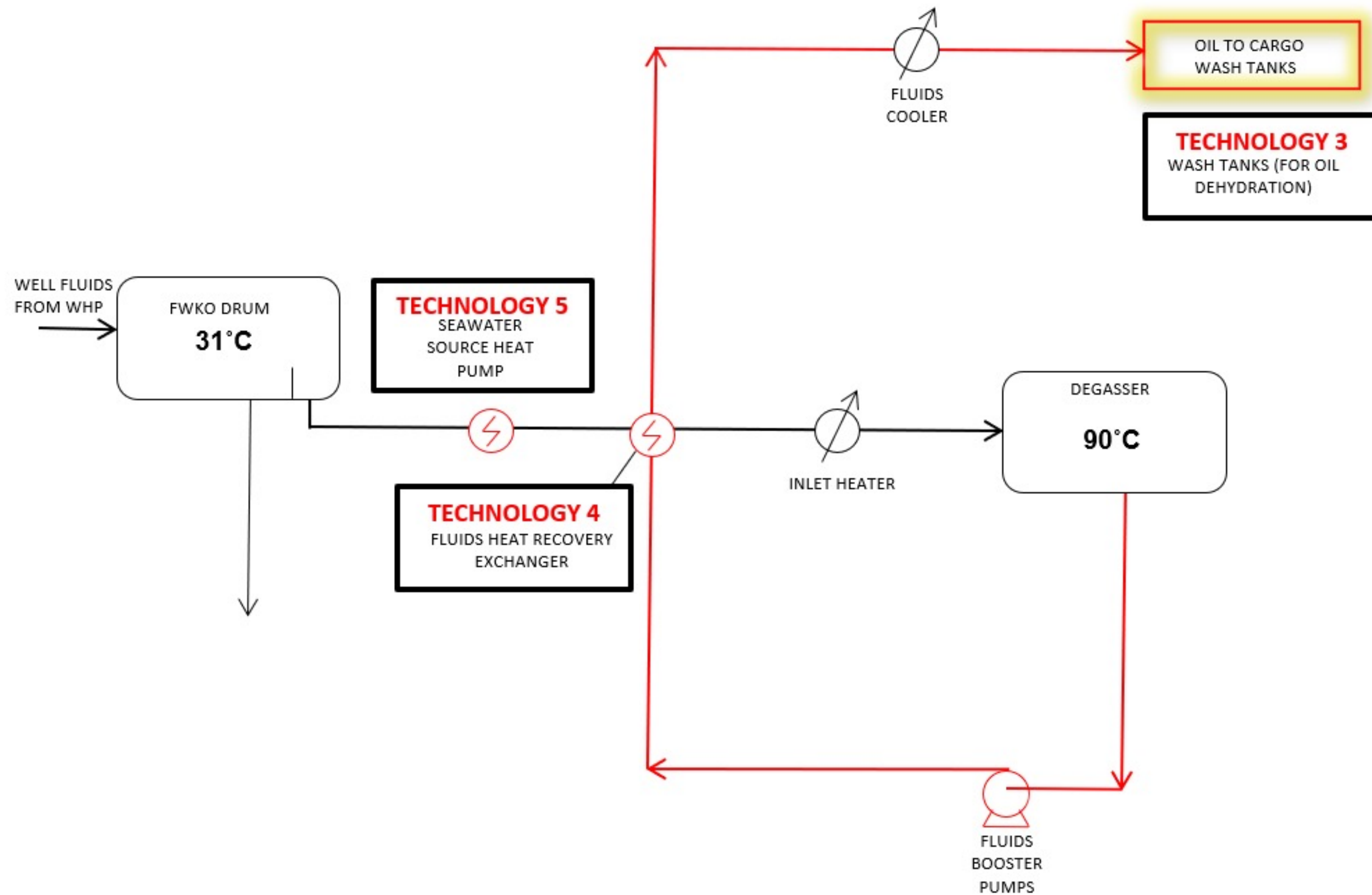
- Fluid handling requirements massively reduced by using polymer
- Field life significantly shortened with polymer
- Pumping wells and injecting fluid are the key drivers of CO₂ emissions
- Polymer boosts recovery so there are more barrels produced in less time and for much less energy
- Polymer use significantly enhances project economics while minimising environmental impacts

Emissions, by cause and scope

CSR initial polymer scenario



- Base case from September 2020 CSR submission, focus had been on quantifying rather than driving down emissions (included some worst case assumptions e.g. downhole pump power demands)
- Adoption of polymer flood had reduced both fluid handling and field life

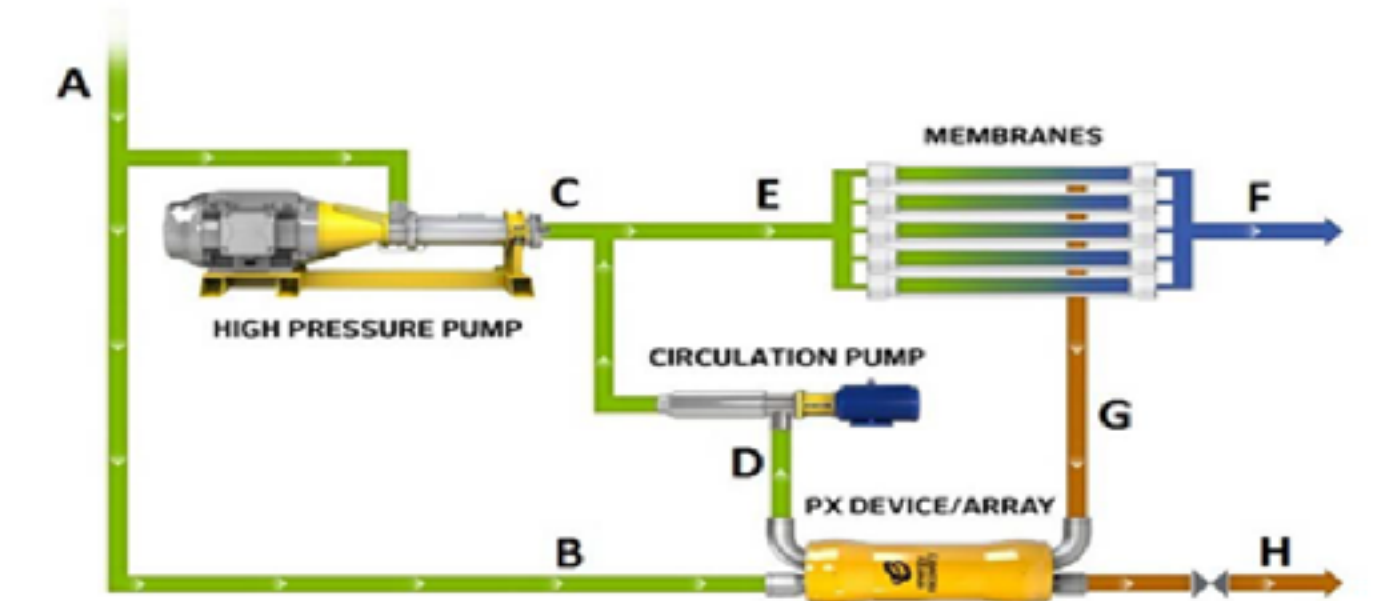


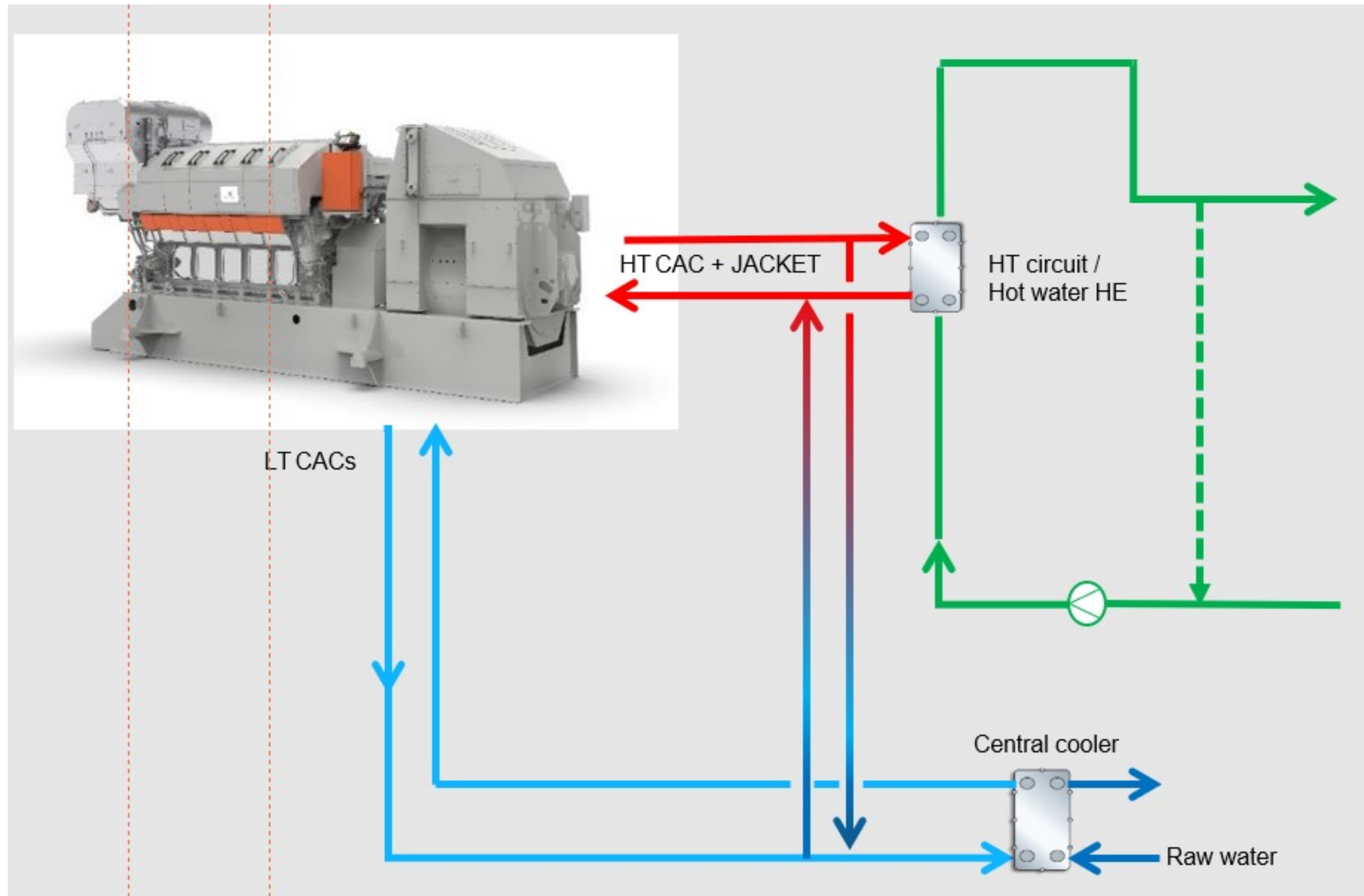
- Industrial heat pumps



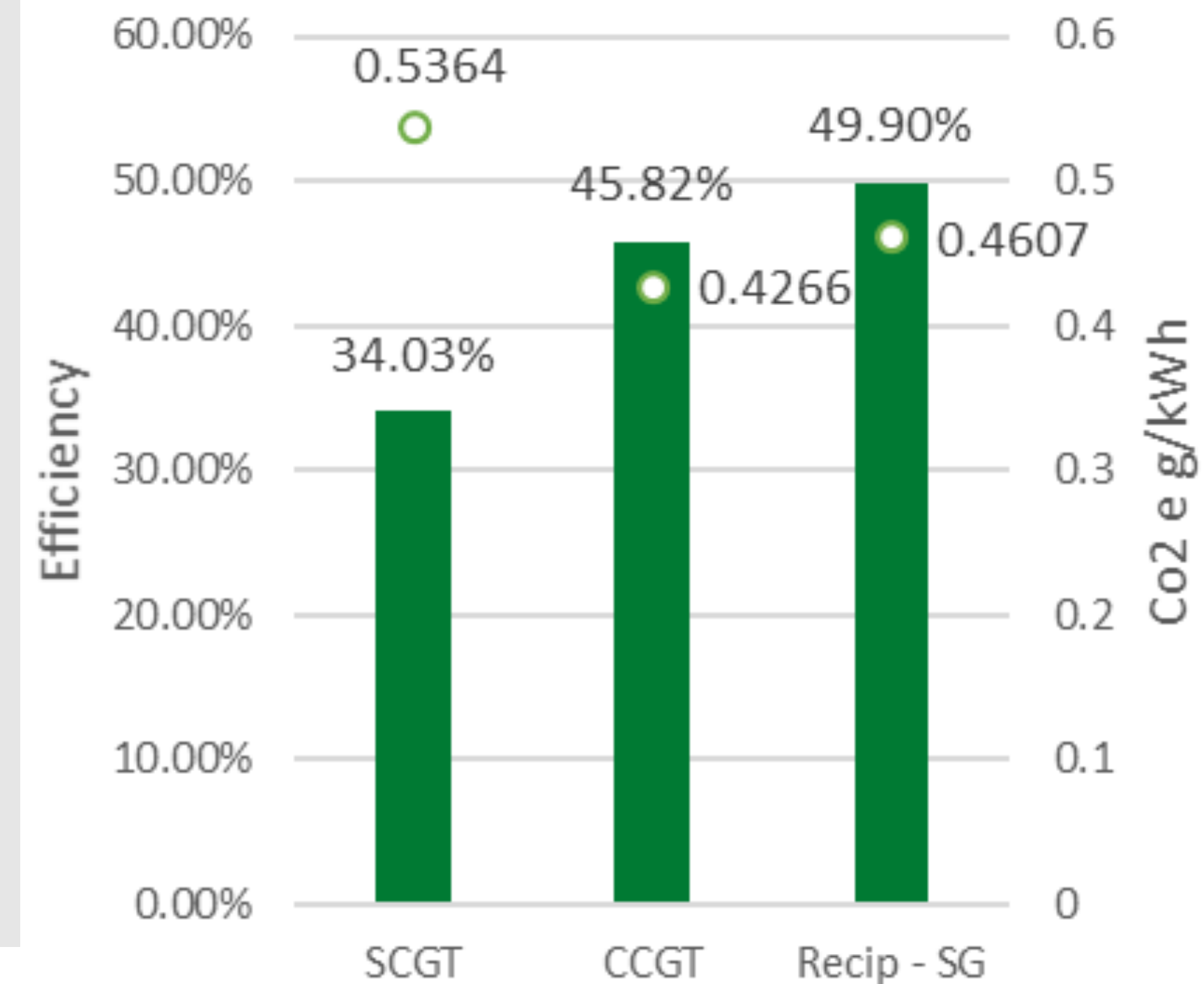
- Energy recovery systems

PX[®] Energy Recovery Device System Analysis



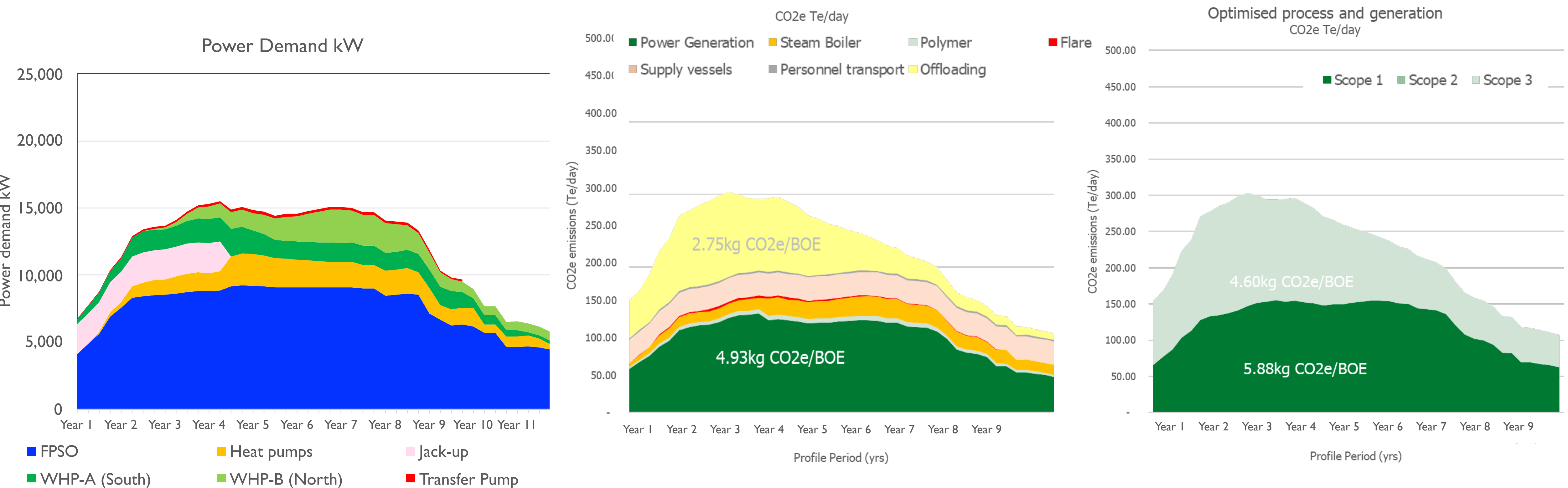


- Wartsila, dual fuel gas reciprocating engines
- “Smart heat recovery” system



Emissions, by cause and scope

Process optimisations and recips



- Crondall reshaped process and power generation with the intention of driving down emissions
- The combination of heat pumps and high efficiency generation is the key to reducing emissions

SYSTEM OVERVIEW

Platform

- North Sea design for 15m Hs sites
- Panel based semi submersible
- Makes use of harbour effect for transfer
- Hydrogen energy storage can be accommodated

Turret Mooring System

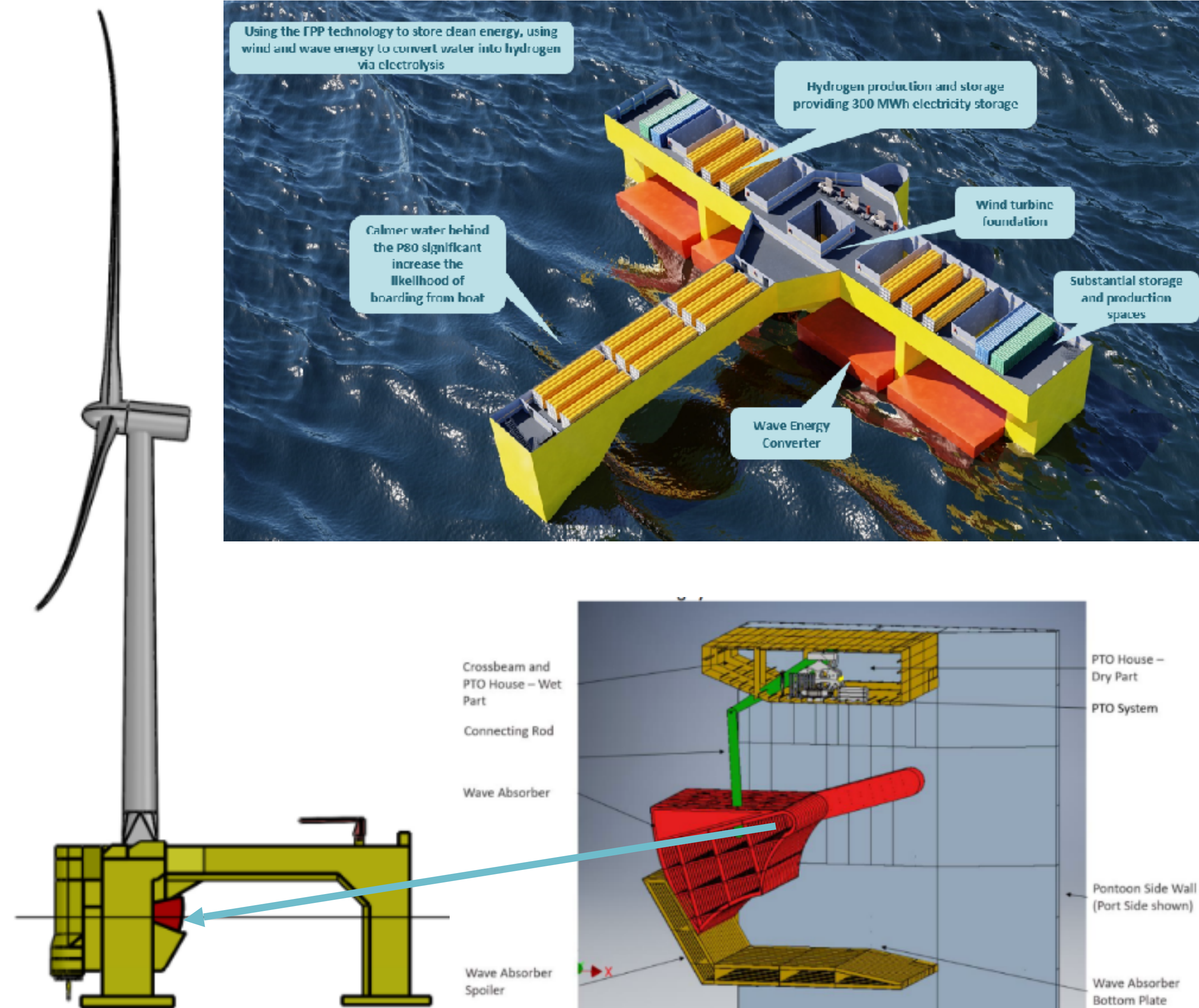
- Vanes into wave direction
 - WTG yaws independently
- Multi point catenary mooring system
- Disconnectable if required

Wind Turbine Generator (WTG)

- Turbine agnostic
- 12 to 15MW (to be assessed)

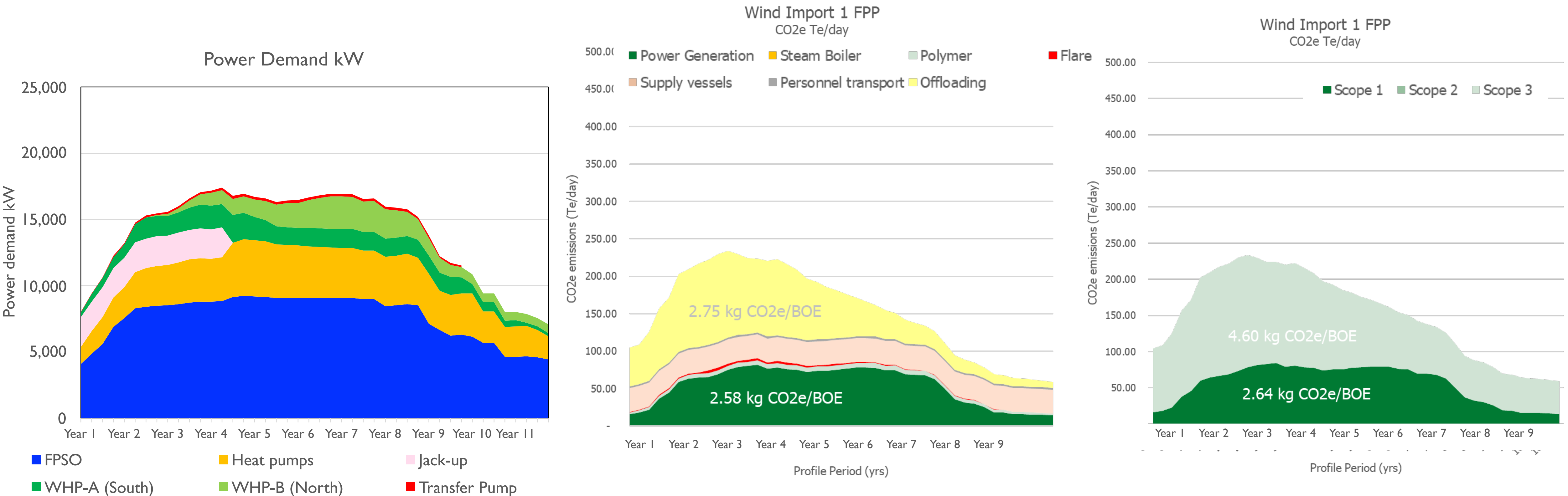
Wave Energy Converter

- 4 off, from 500kW to 1MW each (to suit site)
- Wave energy converted to motion by absorber
- Mechanical motion converted to electricity via oil hydraulic Power Take Off (PTO) system



Emissions, by cause and scope

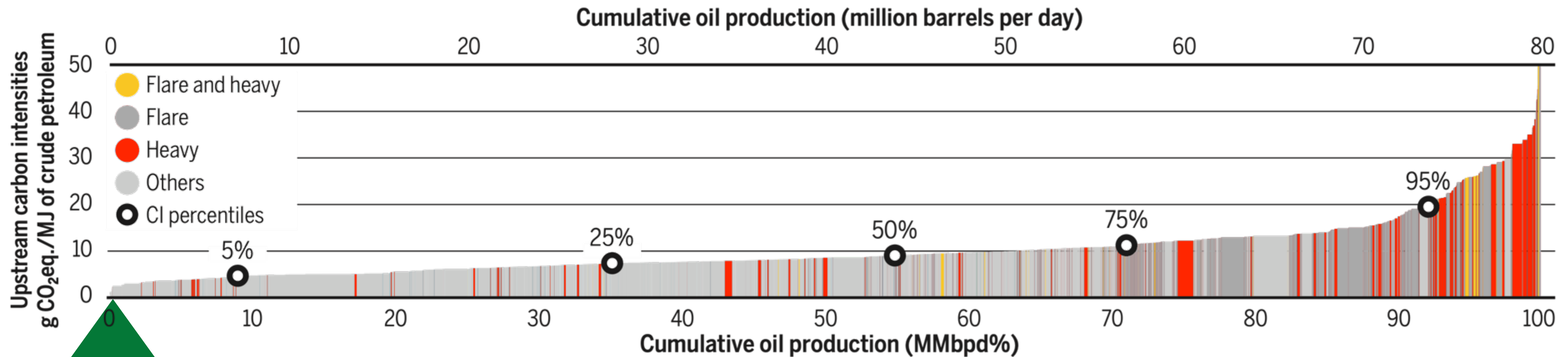
Local wind and wave power



- Local renewable power eliminates the need for a gas import pipeline and halves emissions again
- Unit will be a 12MW wind turbine with a 2MW wave power generator from FPP

Comparison with global oil production emissions

Viscous oil doesn't have to mean high emissions



- To be comparable with this Stanford University dataset, to our Scope 1 & 2 emissions we have added:
 - Scope 3 emissions from offshore logistics, oil transportation to the refinery, and polymer production
 - Estimates of emissions during the exploration and development phases (done using the Stanford tool)
- Pilot field comparable emissions are $1.4 \text{ gCO}_2\text{eq./MJ}$ with a single wind turbine

**Pilot emissions
will lie in the
lowest 5% of
global oil
production**

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