



Innovation Type:  
**Model**

Development stage:  
**Simulation Analysis**

Remaining uncertainties at current stage: **Few**

TRL: 3-4

Status: initial development and performance validation completed

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#### HighEFF Overall Goals

	Energy use & emissions	X
	New solutions	X
	New methods and tools	X

#### Relevant Sectors

**Oil, Gas and Energy**      Metal and Material

Food and Chemical      Industry Clusters

# Flexible offshore oil and gas platform model

*Assessing different energy-efficient technologies on a variety of configuration relevant to offshore platforms requires a somewhat generic model. An entirely generic model is not practically feasible. However, a flexible and automated one would prove highly beneficial for various analyses and future use.*

### Challenge

Offshore oil and gas facilities are complex and often unique. Each facility is developed to the requirements of the producing field's reservoir and fluid conditions. Assessing the applicability of low-emission solutions, if no generic model is in place, requires extensive dedicated case studies. A flexible model, validated with real field data from a number of facilities, would ease evaluation and comparison of promising configuration alternatives based on key performance indicators of interest, e.g. carbon footprint, energy efficiency, costs, etc.

### Solution

A comprehensive and flexible oil and gas platform model to contrast energy-efficiency solutions and their relative effect in reducing emissions.

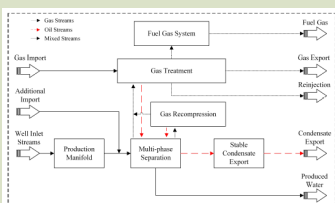
### Potential

The flexible offshore platform model developed in HighEFF validated against real data for two platforms in operation. In each case, minimal deviations were illustrated. A 2021 HighEFF case study using the developed model showed that over a 30-year lifespan, a proposed configuration would reduce CO<sub>2</sub> emissions by 54 %. Extended applicability of the model developed for offshore platforms may facilitate important decision support for measures that can reduce the current high level of emissions in this sector.

### Reference

Foulkes, J. 2021, Future Low Emission Oil and Gas Platforms. Master thesis

Foulkes et al., 2022. Future Low Emission Oil and Gas Platforms (paper under revision)



Simple concept sketch





## HighEFF definition of innovation:

Innovation can be a product, a technology, a component, a process or sub-process, a model or sub-model, a concept, an experimental rig or a service that is new or significant improved with respect to properties, technical specifications or ease of use. Innovation can also be new application of existing knowledge or commercialization of R&D results.

The innovation should be adopted by somebody, or be ready for utilization provided that it is made probable that the innovation will be utilized within a limited timeframe

List:

- Product
- Technology
- Component
- Process
- Sub-process
- Model
- Sub-model
- Concept
- Experimental rig
- Service
- New application
- Methodology
- Organisation
- Market



Kilde	No	Title	Short description	W	Responsi	Success probabilit	Potential impact	R&D partners	User partners	Category of innovation	T
WS2019	I3.1.1	Low and medium temperature H2P cycles	Competitive low and medium temperature power cycle concepts with cross-sectorial applicability	3.1	SINTEF ER	Med	Med	SINTEF ER; NTNU		Process	Li
WS2019	I3.1.2	Energy recovery systems with integrated thermal energy storage	Energy recovery concept with integrated thermal buffering for mitigation and/or utilization of transient conditions	3.1, 3.3	SINTEF ER	Med	Med-High	SINTEF ER	FFF	Concept	R
OWP2020	I3.1.3	FlexCS	World-class cycle optimization model for energy recovery concept design and analyses	3.1, 2.1	SINTEF ER	High	Med	SINTEF ER		Model	Li
AWP2020	I3.1.4	1 kWel TEG module	Concept and electrical architecture of a novel 1 kWel TEG module	3.1	SINTEF IND	Low-Med	Med	SINTEF IND		Concept	R
WS2019	I3.2.1	Steam producing heat pumps	High-efficient HTHP cycle concepts for upgrading surplus heat to 10 bar steam, displacing fossil fuel	3.2	SINTEF ER	Med	Med-High	SINTEF ER	EPCON	Technology	Li
WS2019	I3.2.2	Propane-Butane HTHP	Integrated heat pump system for combined heating and cooling solutions.	3.2	SINTEF ER	Med	Med-High	NTNU; SINTEF ER	TINE, CADIO, DORIN	Process	Li
AWP2020	I3.2.3	Brayton heat	temperature heat pump with turbo compressor and expander	3.2	SINTEF ER	Med	Med-High	SINTEF ER	GE (Baker Hurst)	Technology	R
WS2019	I3.3.1	Large scale cold TES	Large-scale cold TES for food industry to balance between high cooling demand and varying availability of low-cost electricity from renewable sources	3.3	SINTEF ER	Med	Med-High	NTNU, SINTEF ER	REMA	Technology	R
WS2019	I3.3.2	Steam thermal energy storage	Methodology for choosing the correct TES technology to enable cost-efficient steam production based on renewable electricity	3.3	SINTEF ER	Med	Med-High	SINTEF ER	HYDRO, Elkem	Methodology	R
WP-leader	I3.3.3	TES for industrial waste heat recovery in District Heating	dimensioning and operation of a TES tank in a DH system based on utilization of industrial waste heat	3.3	SINTEF ER	High	Med-High	SINTEF ER	MIP	Methodology	Li