



SwitchH2 B.V.

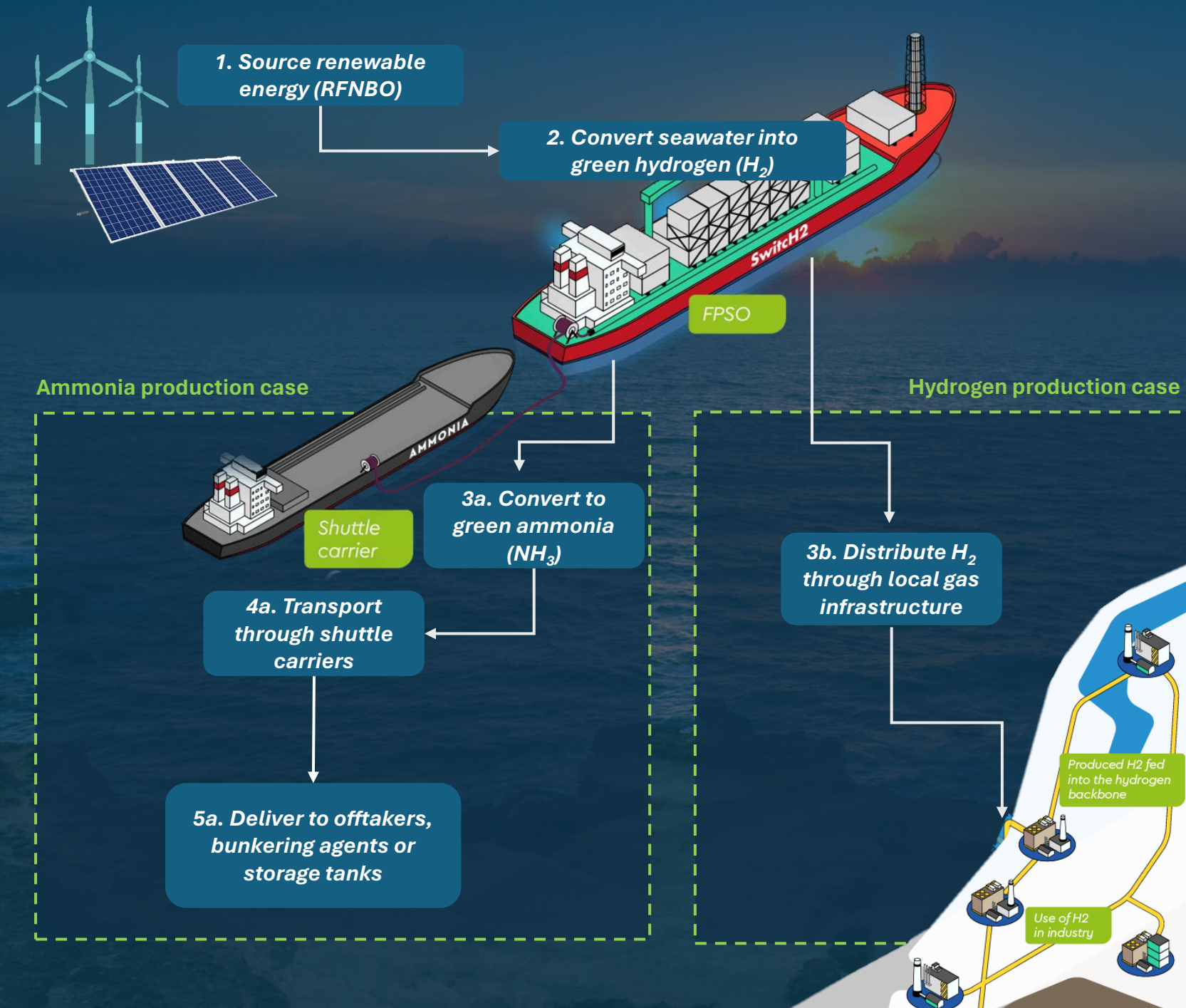
SeaWater into Clean Hydrogen

**A unique production technology for green
hydrogen and its derivatives**



SWITCH2 CONCEPT




Flexible
production to
maximize
efficiency





BW OFFSHORE

Experience

- 40+ FPSO projects completed
- 4 decades of operational experience
- Global presence with safe and efficient operations
- **Renewable energy ventures**
 -  Carbon capture
 -  Gas to Power
 -  Clean fuels (SwitchH2)
 - Strong belief in ammonia
 - Leverage FPSO experience in new technologies



Experience

- Deep roots in the global shipping industry
- Owner, Wim van Aalst, was founder of shipping line Nieuw Dutch
- Intended party to offload and transport green ammonia



**Established
industry
players as
shareholders**

A solution addressing the green energy challenge

Challenges

1 Grid Congestion

2 Supply demand location mismatch

3 Energy Security

4 Land availability and Permitting

Solution feature

Off-grid and energy storage



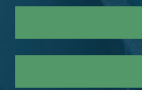
Energy carrier



Local production



Offshore



Our approach

A Net-Zero FPSO turning seawater into green hydrogen and its derivatives



The case for offshore production

COMPETITIVE



- Compact and **fully integrated** unit: production, storage and offloading
- Built at specialized yards where **pricing is best**

FAST



- Modular and **standardized** design for faster production, based on **proven technologies**
- **Fast-track** development in places that lack infrastructure

FLEXIBLE



- Natural proximity to **water**
- Mobile asset enables **relocation** and reusing of capex spent

SECURE



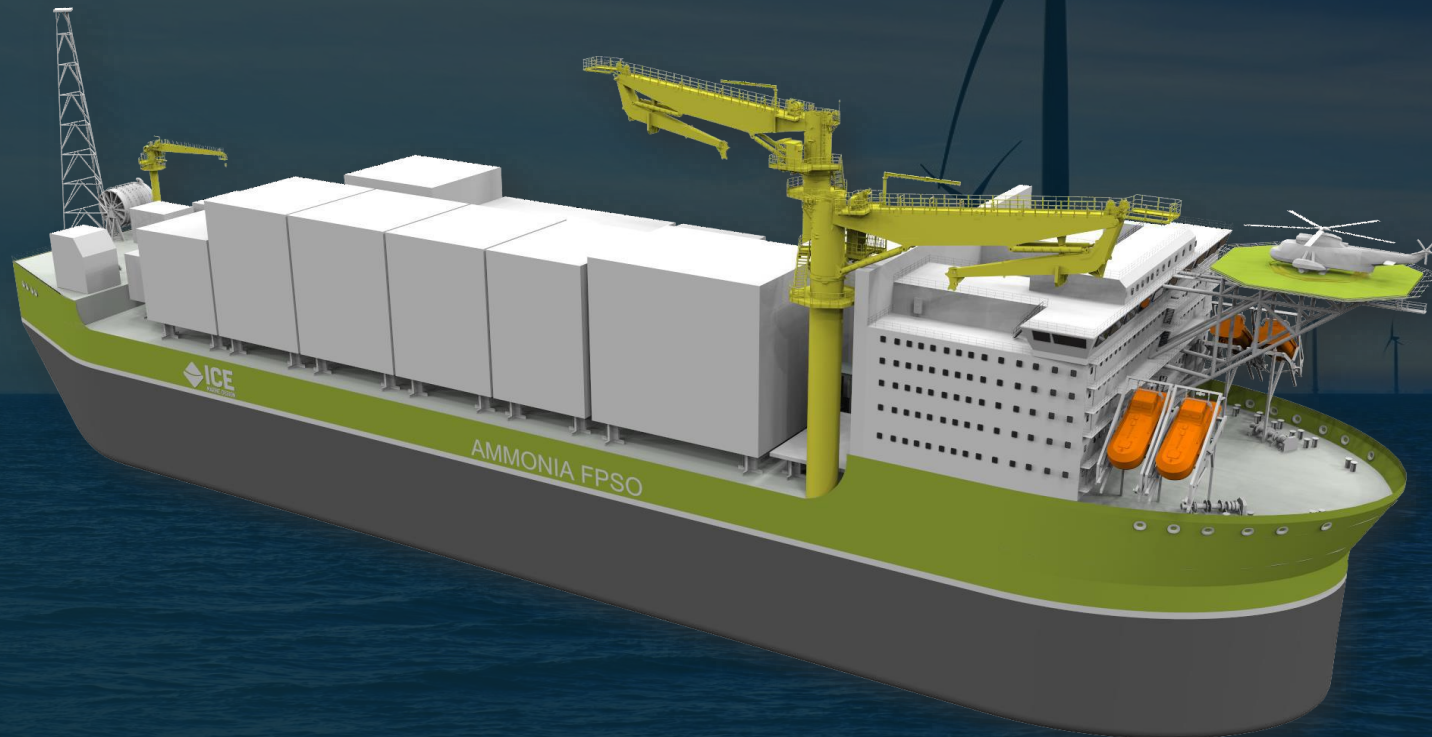
- Better **risk profile** producing hydrogen and ammonia offshore
- Less complex **permitting** process than onshore

FPSO Development Timeline



Ammonia FPSO Hull – High Level Concept

Designed to accommodate the supplied ammonia production plant and required storage capacity





Adaptability:

Topside modules and arrangements

Features:

- A wide range of standard or field specific topside module arrangements can be accommodated
- Developed to DNV rules, alternatively can be classed by other IACS members,
- Adaptable to flag state and other project requirements

**Topsides
Weight
29500t**



Adaptability:

Offloading system

Features:

Aft tandem offloading using offloading hose reel and hawser

- Designated area for changing and maintenance of offloading hose segments is reserved

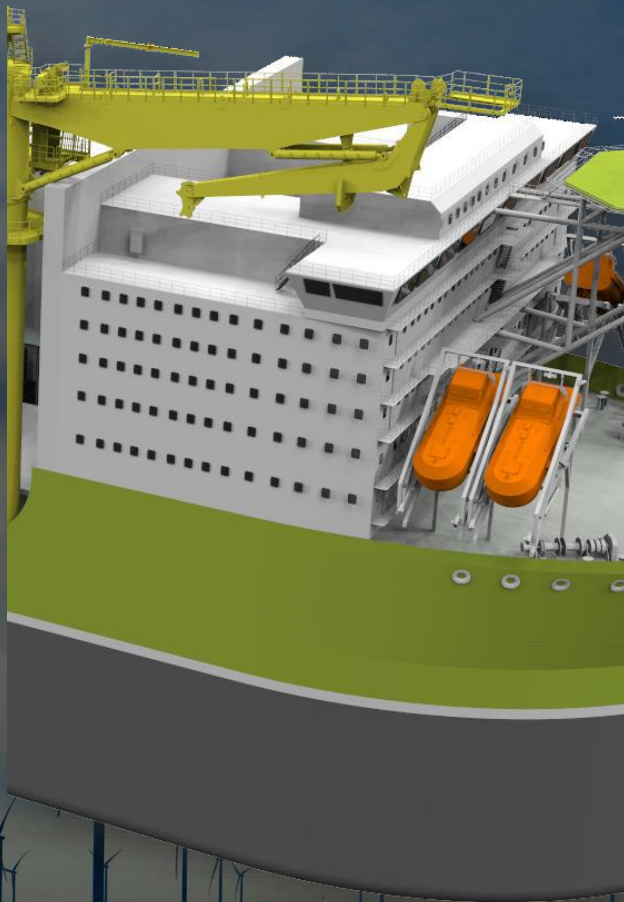
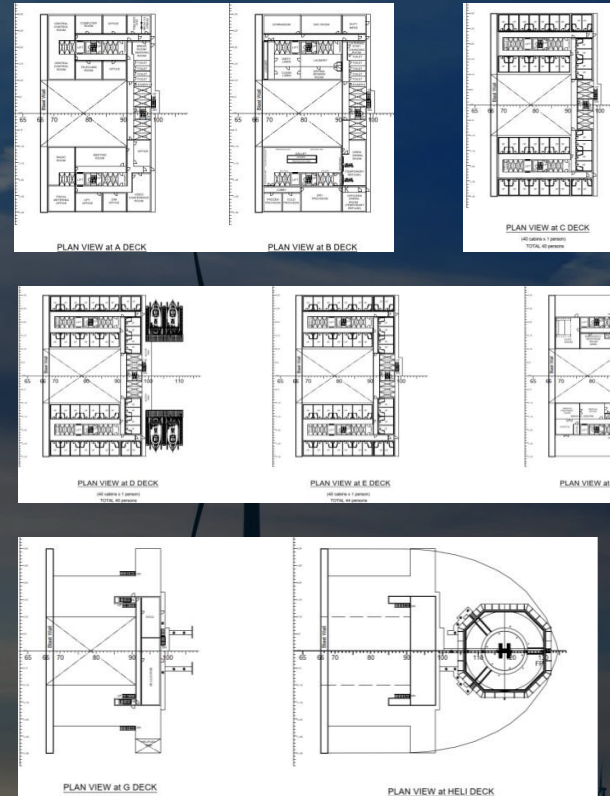


Adaptability:

Living quarters

Features:

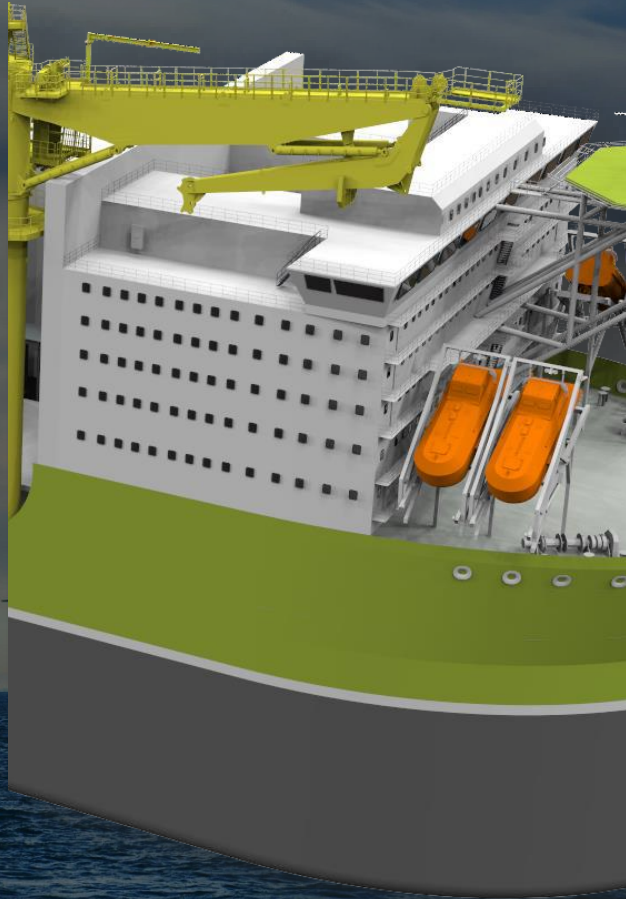
- Energy efficient accommodation
- 120 persons
- One person cabin units
- 9 Levels (5 levels with for cabins)





Features

- Two Offshore cranes and laydown Areas are foreseen - one each side of the FPSO
- Service Cranes - provision handling, installation and maintenance operations, bunkering hoses handling
- Elevated laydown areas at unit sides, close to Offshore Crane, in safe area
- Large hard-wood covered working areas (more than 100 m²) with heavy duty offshore railing
- Separated access area outside working area (for enhanced safety).
- Flexibility - free choice of crane location due to standardized crane integration



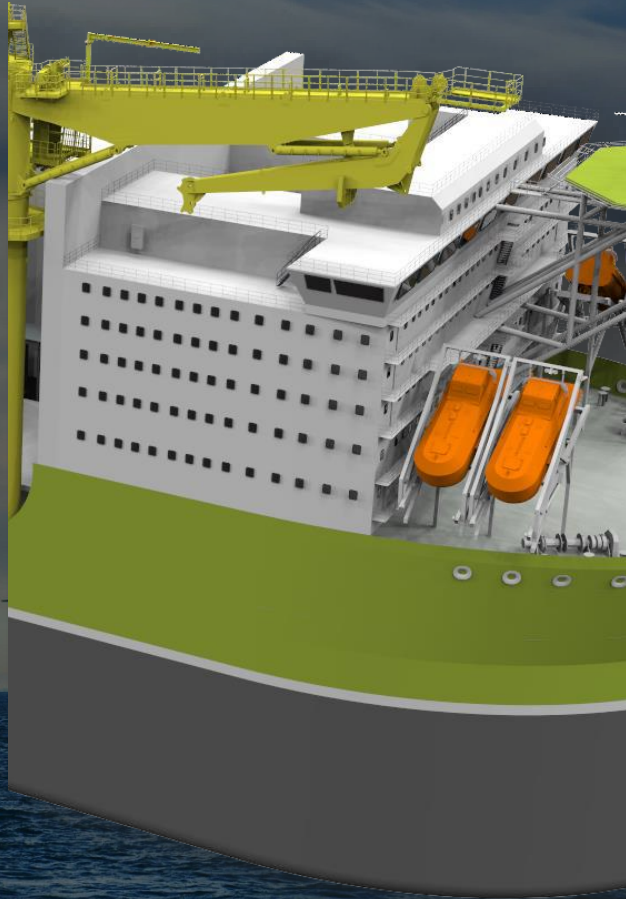
Adaptability:

**Material
handling**



Features

- Four totally enclosed davit launched lifeboats (4 x 60 pax)
- Two MOB, one on each side of the Living Quarter
- Six inflatable life rafts (40 pax), 3 on each side of the Living Quarter
- Other lifesaving equipment (lifebuoys, lifejackets, immersion suits)
- Flexibility - free-fall lifeboat arrangement



Adaptability:

**Life saving
equipment**



Features

- Helideck sized for the largest helicopter type:
 - Sikorsky S92A, S61N or
 - Eurocopter EC 225
- Refuelling system available

Adaptability:

Helideck



GENERAL DATA

General Data

Dimensions

L.O.A.	268.06	m
Breadth	57.00	m
Depth	24.50	m
Draught	16.00	m
Topside deck area	9.000	m ²
Topside weights	~29 500	mt

Mooring System

Type (base case)	Internal turret mooring	
Water depth	100	m

Capacities

Ammonia	66 130	m ³
Diesel oil tanks	870	m ³
Ammonia fuel tanks	270	m ³
Fresh water tanks	540	m ³
Water ballast tanks	128 200	m ³
Emergency Storage NH ₃ - water	10 460	m ³

General Data

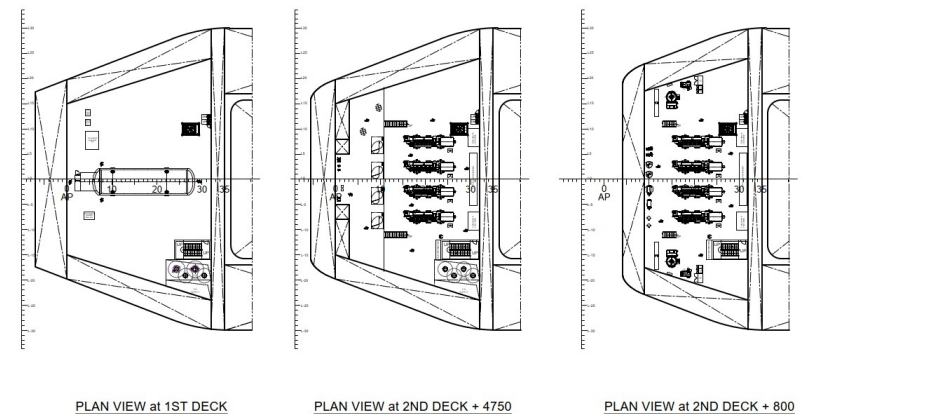
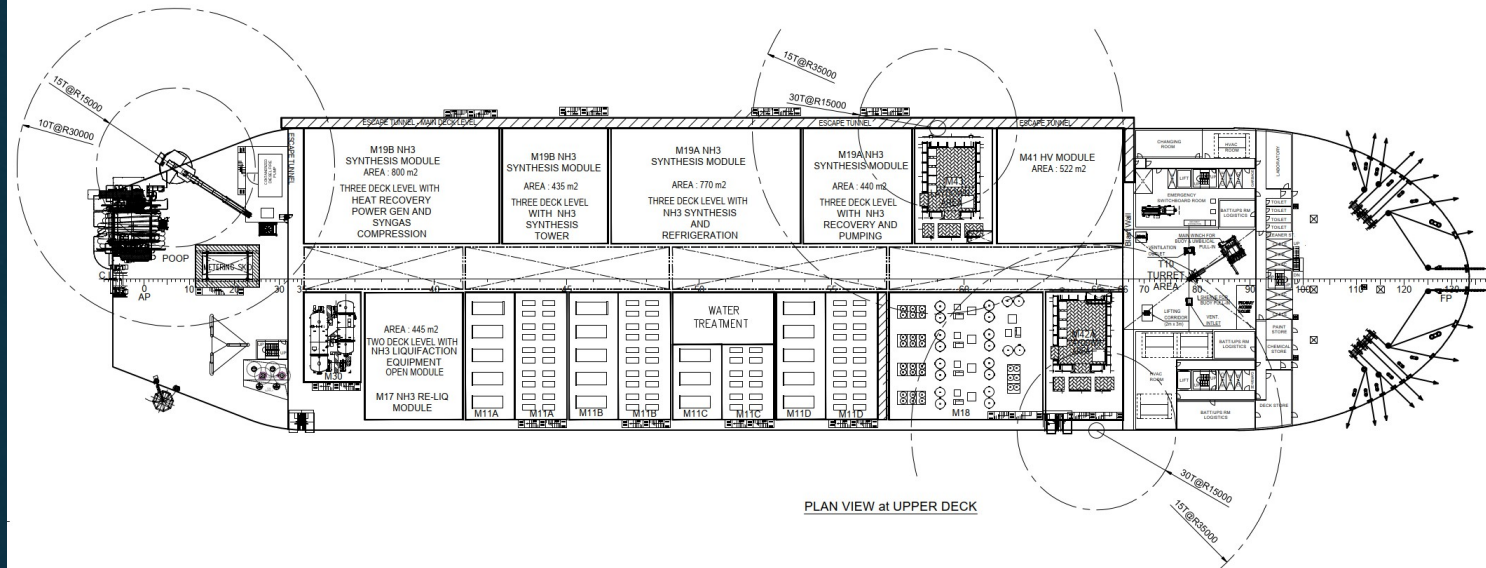
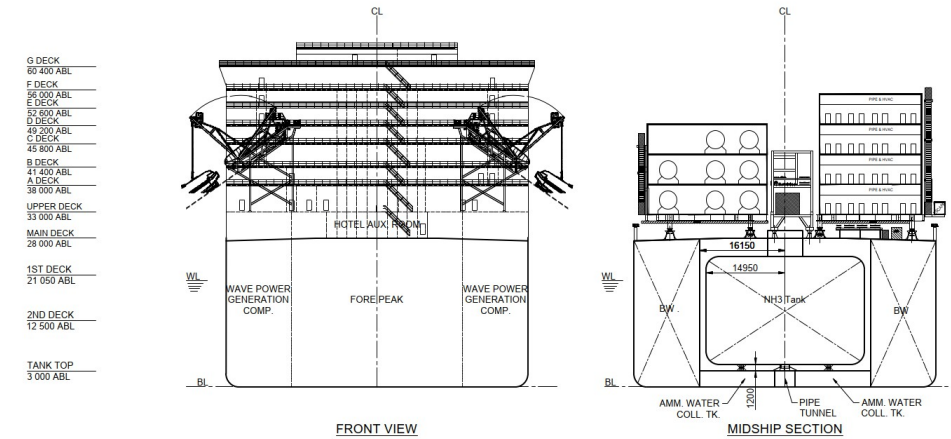
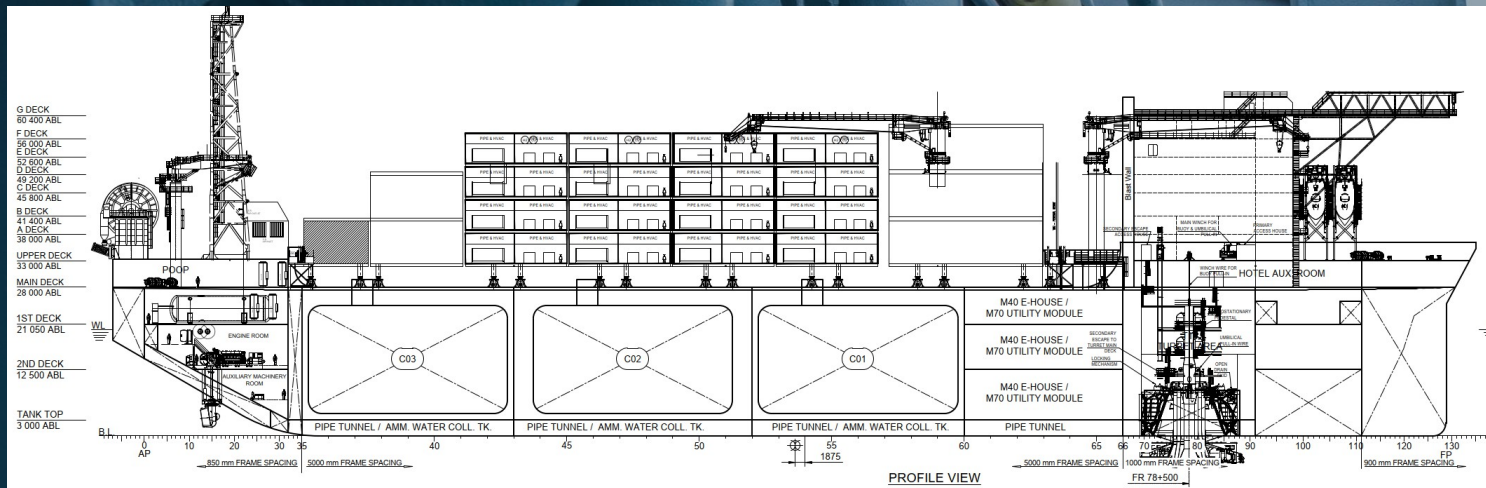
Cargo System

Cargo tanks	3	units
Fiscal metering skids	1	unit
Offloading hose reels	1	At stern
Offloading capacity	60 000	m ³ /day
Topside deck area	9000	m
Topside weights	~29 500	mt

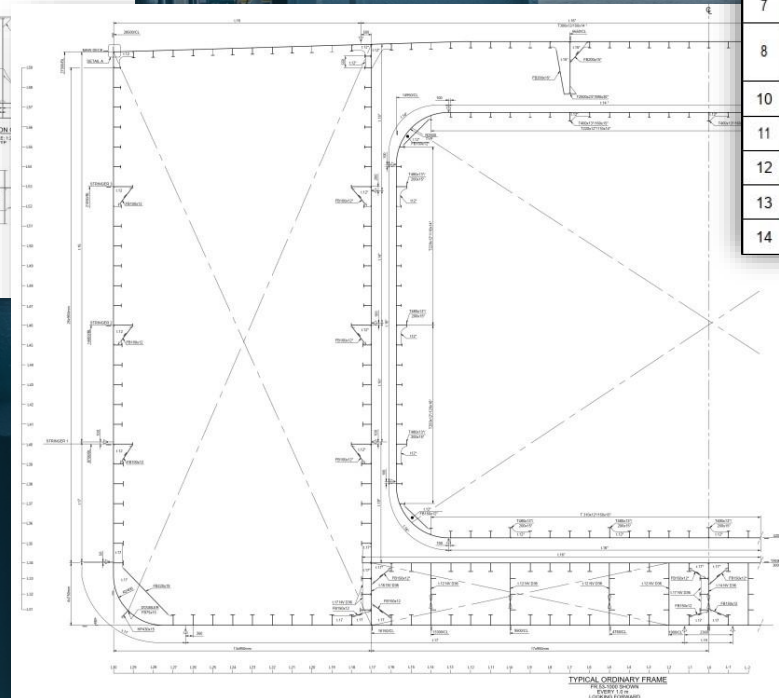
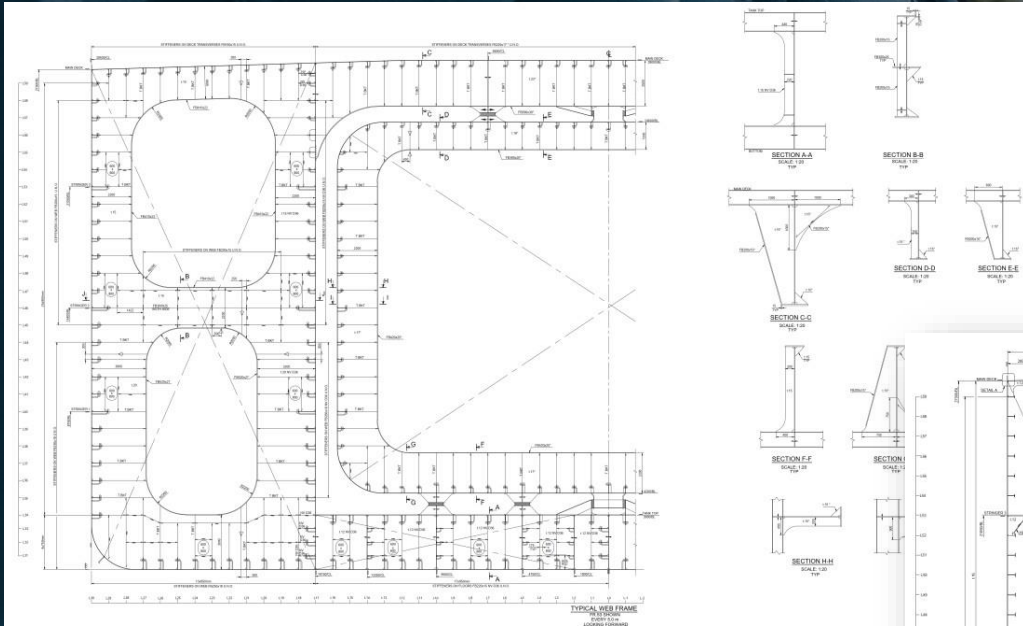
Power Generation


Main power supply (shore supply)	322 MW, 132 kV, 50Hz
Steam turbine (heat recovery)	6 000 kW, 11 000 V, 50Hz
Essential Power Generation (ESDG)	4 x 2 600 kW, 11 000 V, 50Hz
Diesel generators, dual fuel (MGO / Ammonia)	
Emergency Power Generation (EDG):	1 x 1 500 kW, 690 V, 50Hz
Diesel generator, 1 x 100%	

General Arrangement



Midship Section



NOTES	
ID	Description
1	Materials to be in accordance with: DNV-RU-SHIP Pt.3 Ch.3 Sec.1 & Pt.2, Ch.2, Sec.3. 2023, U.N.O.
2	Steel plates and profiles are HT grade NV A36 with min. yield stress 355 N/mm ² U.N.O (unless noted otherwise).
3	Web frame spacing 5.0 m.
4	Scantling shown are for midship section extending throughout cargo area 0.4L.
5	Scantling indicated include corrosion allowance for 25 years life time.
6	The primary barrier of cargo tanks shall be assumed to be at the cargo temperature.
7	* - Low temperature steel grade, NV 36-3, to be used for the construction of cargo tanks and their supporting arrangements, is according DNV-RU-SHIP Pt.5, Ch.7, Sec.6.
8	* - Low temperature steel grade, NV 36-3, to be used for the hull construction in way of secondary barrier (inner bottom plating, longitudinal bulkhead plating, deck plating and all attached stiffeners members), according to DNV-RU-SHIP Pt.5, Ch.7, Sec.4 & 6
10	Steel grade for structural members connecting secondary barrier is according to DNV-CH-0133, Sec.2.
11	All welds to be double continuous fillet U.N.O. according to DNV-RU-SHIP Pt.3, Ch.13, Sec.2.
12	All welded joints of the shells of independent tanks shall be of the in-plane butt weld full penetration type, according to Pt.5, Ch.7, Sec.4.
13	Location marked  requires full penetration welds.
14	Tank supports preventing the movement of the tank.

FPSO Weight Summary

Item	Gross Weight (t)	LCG(m)	TCG(m)	VCG(m)
Lightship Weight	59 700	127.2	0.44	20.52
Topsides	29 500	109.99	-0.93	41.31
Total (incl 3% vcg margin)	89 200	121.52	-0.01	27.79

POWER GENERATION



Main & Essential Power Supply

Power Supply

From heat recovery 6 MW / 11 kV
/ 50Hz

Main Power Supply

From shore grid
via quick-disconnect buoy 322
MW / 132 kV / 50Hz

11 kV Essential
Switchboard

33 kV Electrolyser
Switchboard

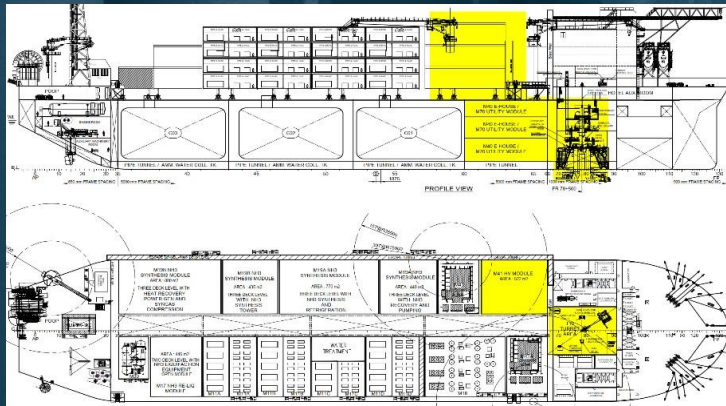
690 V Essential
Switchboard

690 V Process
Switchboard

440 V
Switchboard

230 V
Switchboard

Main generator location



Essential Power Generation

Diesel Generators
Dual Fuel

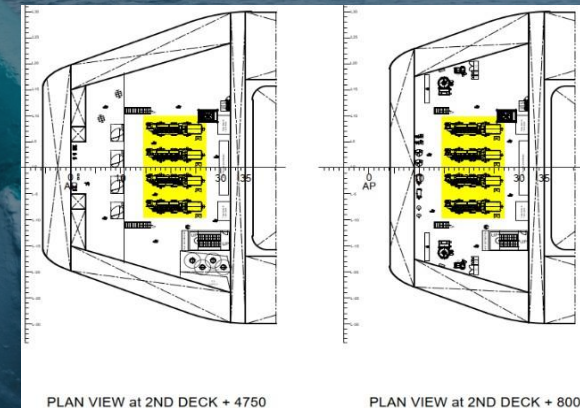
11 kV Essential
Switchboard

690 V Essential
Switchboard

440 V
Switchboard

230 V
Switchboard

Essential generator location



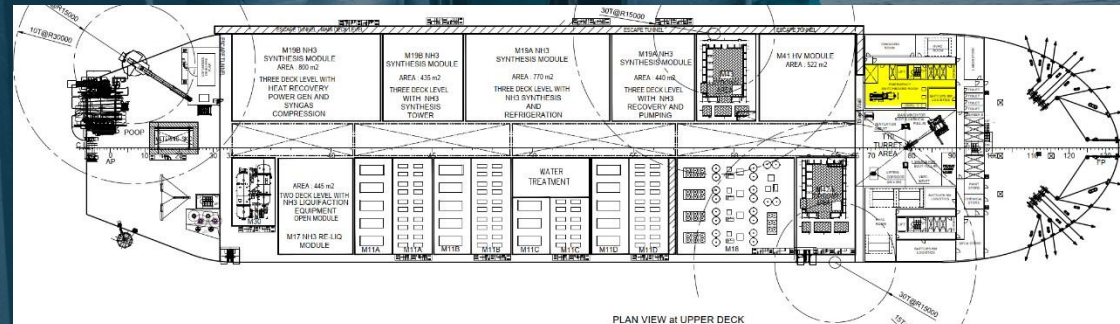
Diesel generator 1 x 100%
1 x 1 500 kW / 690 V / 60Hz

440 V Emergency Switchboard

Topside cooling

230 V Emergency Switchboard

Emergency generator and switchboard dlocation



Electrical Load Balance

Five load cases are being considered:	Description	Normal power consumption (from grid – KW)	Essential power consumption (From diesel generators – KW)	Emergency power consumption (From emergency diesel generator – KW)
Topside Modules	-	332 000		
1. Normal Load (Topside + hull)	Nominal operation of all systems: process, auxiliary and marine systems.	321 894		
2. Normal Load (Topside + hull + heading control)	Nominal operation of all systems + thrusters heading control.	328 344		
3. Offloading load	Total loads necessary for offloading manoeuvre	6 684		
4. Emergency load	Survival mode in case of an emergency including process cooling			1 320
5. Sailing load	All loads necessary for the FPSO, without process, for sailing to/from shore – including 6 MW thruster assistance		8 743	

OPTIONAL SCENARIOS





Operational assumptions

- **Daily production of ammonia:** 1 158.5 m³
- **Parcel volume to be offloaded:** 60 000 m³
- **Time to perform the offloading:** maximum 24 hours
- **Cargo tanks normally filled up to:** 98%
- **Unpumpable:** ~2.5% (551 m³) of the net volume of all tanks to maintain heel and tank cooling
- **Draughts:**
 - Max. Scantling: 21 m
 - Max. Operational: 20 m
- **LTF (last tank to fill) techniques** to be used as much as possible while reaching full parcel.

Loading and offloading cycle philosophy

<div><div>Shuttle arrives at the beginning of Laycan</div><div>Shuttle arrives at the end of Laycan</div></div>										
During Laycan						During Offloading				
Loading	C01	C02	C03	C03	C03	C03	C03	Switch prod to C01	C01	C02
Loading, up to m³	21 603	21 603	18 500	19 658.5	20 817	21, 203.2	21 589.3	937		
%	98.0	98.0	83.9	89.2	94.4	96.2	97.9	4.3		
Offloading						C01	C02	C03		
Offloading the parcel						21 051.5	21 051.5	17 949.0		
Remaining m³						551	551	551...3640		
%						2.5	2.5	2...16.5		
Duration (days, hours)	About 52 days to make the parcel			2 days		8h	8h	8h	52 days etc...	