



CELEBRATING
50 YEARS
1968-2018



Key Features

- Long-Term and Cost Effective Solution
- ECA Supported Financing
- High Efficiency; low operating cost
- Time to First Power: ≤ 24 months
- Available on EPCI, Lease, BOT or BOOT basis
- Fuel Flexibility: LNG, LPG, or domestic Natural Gas
- Integrated Fuel Storage & HV Power Substation
- Integrated Power Management System to help balance power supply from renewables
- Multiple Mooring Options: Jetty, Turret or Tower Yoke

Applications

- Power/Water/Gas supply to Utilities, Industrial Parks or large Industry (i.e. Mines, Steel Mills, Smelters)
- Power & Water Hub for off-shore Oil & Gas Fields
- Base Load and/or Peak Shaving Power Plant
- Integration with Renewable Power (Solar, Wind, & Hydro) to balance variable power supply with demand

Capacities

- Power Generation: 80 to 1,000 MW
- Water Treatment: 10,000 - 600,000 m³/day
- LNG Storage: ≤ 135,000 m³
- Fuel Autonomy: 20 to > 150 days

Temporary Power Systems Available

- Time to First Power: 3 months
- Powered by Liquid Fuels or Natural Gas
- Flexible Contract Periods (months to years)

Pre-Engineered FSRWP® Solutions

MODEC offers a range of Pre-Engineered FSRWP® Solutions (“SMALL”, “MEDIUM” and “LARGE”) based on MODEC’s proven and extensive experience with Floating Offshore Production Systems.

Comparison: Engine versus GT Efficiency & CO² Emission

Power Generation Options (MW per unit)			
Generator	@31°C	@31°C CCGT	FSR-POWER® CCGT
Dual Fuel Engine	18	18.3	18.3
GT-Aero	29	39	43
GT-Industrial	70	110	120

Description	Efficiency (%)	CO² (kg/hr/kW)
Oil & Coal		
Coal Fired	33.9%	0.940
Conventional Engine	33.6%	0.743
* Turbo-Charged Engine	48.7%	0.448
Gas Turbine		
Simple Cycle	34-37%	0.551
Combined Cycle	49-51%	0.413
* MODEC Combined Cycle +	52-54%	0.395

* = MODEC preferred options

SMALL



FSR-WATER® 60k m³ water/day



FSR-POWER® 80 to 160 MW

MEDIUM

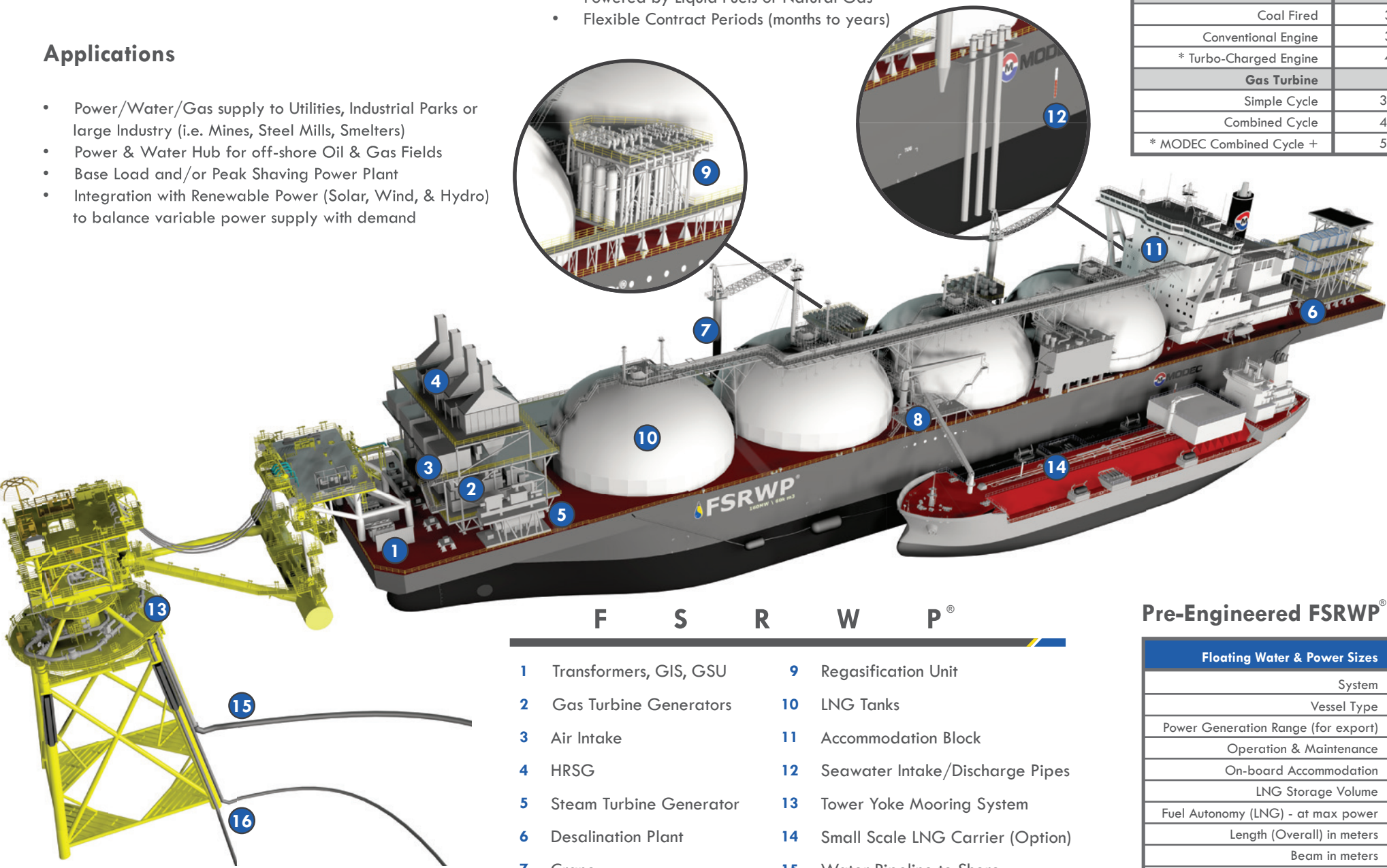


FSR-POWER® 80 to 480 MW & up to 60,000 m³ water/day

LARGE



FSR-POWER® > 1,000 MW



F S R W P®

- | | |
|--|-------------------------------------|
| 1 Transformers, GIS, GSU | 9 Regasification Unit |
| 2 Gas Turbine Generators | 10 LNG Tanks |
| 3 Air Intake | 11 Accommodation Block |
| 4 HRSG | 12 Seawater Intake/Discharge Pipes |
| 5 Steam Turbine Generator | 13 Tower Yoke Mooring System |
| 6 Desalination Plant | 14 Small Scale LNG Carrier (Option) |
| 7 Crane | 15 Water Pipeline to Shore |
| 8 LNG Offloading System (Manifold, Fenders, LNG Hoses) | 16 Subsea power cables to shore |

Pre-Engineered FSRWP® Solutions

Floating Water & Power Sizes	“SMALL”	“MEDIUM”	“LARGE”	“ALL SIZES”	“ALL SIZES”
System	FSR-POWER®	FSR-POWER®	FSR-POWER®	FSR-WATER®	FSRWP®
Vessel Type	Barge (New Build)	Moss tanker or Barge	VLCC or New Build	Aframax to VLCC	Various
Power Generation Range (for export)	80-166 MW	80-480 MW	240-1,000 MW	NA	160-1000 MW
Operation & Maintenance	✓	✓	✓	✓	✓
On-board Accommodation	Option	✓	✓	✓	✓
LNG Storage Volume	20 - 25k m³	75 - 135k m³	50 - 200k m³	25 - 100k m³	50 - 200k m³
Fuel Autonomy (LNG) - at max power	15 - > 30 days	12 - > 150 days	9 - > 40 days	15 - > 45 days	30 - > 105 days
Length (Overall) in meters	110-130	275	330	240-330	330
Beam in meters	30 - 39	44	58 - 60	42 - 60	58 - 60
Draft (moulded) in meters	5 to 8	10 to 12	15 to 20	13 to 20	15 to 20
Self-Propelled	X	✓	✓	✓	✓
Voltage (HV) Substation	✓	✓	✓	✓	✓

Front Cover: FSRWP® - 160 MW & 60k m³ water/day



For 50 years MODEC has been leading the industry in developing Innovative Engineering Solutions deployed on our Oceans

MODEC Introduction

MODEC began in 1968 as Mitsui Ocean Development & Engineering Company. During the first two decades MODEC pioneered the development and construction of new solutions (at the time) for the off-shore construction and drilling industry such as Crane-Barges, Jack-Ups and Heavy-Lift Semi-Submersibles.

Starting in the mid-1980s MODEC developed the Floating Offshore Production Business and engineered, built and sold Floating Storage and Offloading (FSO) systems and Floating Production Storage and Offloading (FPSO) systems and then in the late 90s started to lease and operate these systems as well.

- FPSOs, FSOs, TLPs delivered to date: 46
- Current Owned/Operated Fleet: 16
- Current Operated (owned by Others): 3
- Installed Power Generation Capacity: >1,500 MW
- Installed Sea Water Treatment Capacity: >328,000 m³/day

FSRWP® - MODEC's new Product Line

Looking to our future in late 2015 MODEC realized that:

- Over a billion people do not have access to clean water;
- One-third of the world populace does not have access to electricity and;
- Around 50% of the global population lives near an ocean;
- The global production capacity of Liquefied Natural Gas (LNG) will increase by around 50% in the next five (5) years and;
- Of the current fuels, Natural Gas is the cleanest source of Power.

As a result MODEC decided to develop the following Floating Water & Power family of products:

FSRWP®	(Floating Storage, Regasification, Water and Power)
FSR-POWER®	(Floating Storage, Regasification and Power)
FSR-WATER®	(Floating Storage, Regasification and Water)

MODEC Track Record

West Africa



Southeast Asia



Oceania



Brazil



GOM



FPSO "Prof. John Evans Atta Mills" Ghana



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July 2019