**Key Features**

- Long-Term Cost Effective Solution
- ECA Supported Financing
- High Efficiency, lower operating cost
- Time to First Power: ≤ 24 months
- Available on EPCI, BOO or BOOT basis
- Fuel Flexibility: LNG, LPG, Diesel 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

**Capacities**

- **Power Generation**: 80 to 1,000 MW
- **Water Treatment**: 10,000 - 400,000 m³/day
- **LNG Storage**: ≤ 135,000 m³
- **Fuel Autonomy**: 1.2 to > 150 days

**Applications**

- Power/Water/Gas supply to Utilities, Industrial Parks or large near-shore 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 Offshore Power to balance variable power supply (Solar & Wind) with demand

**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**

<table>
<thead>
<tr>
<th>Description</th>
<th>Efficiency (%)</th>
<th>CO₂ (kg/hr/kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil &amp; Coal</td>
<td>33.9%</td>
<td>0.940</td>
</tr>
<tr>
<td>Conventional Engine</td>
<td>33.6%</td>
<td>0.743</td>
</tr>
<tr>
<td>* Turbo-Charged Engine</td>
<td>48.7%</td>
<td>0.448</td>
</tr>
<tr>
<td>Gas Turbine</td>
<td>34.3%</td>
<td>0.551</td>
</tr>
<tr>
<td>Combined Cycle</td>
<td>49.5%</td>
<td>0.413</td>
</tr>
<tr>
<td>* MODEC Combined Cycle</td>
<td>52.5%</td>
<td>0.395</td>
</tr>
</tbody>
</table>

* = MODEC preferred options

**Floating Water & Power Sizes**

<table>
<thead>
<tr>
<th></th>
<th>&quot;SMALL&quot;</th>
<th>&quot;MEDIUM&quot;</th>
<th>&quot;LARGE&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Generation Range (for export)</td>
<td>83-166 MW</td>
<td>83-480 MW</td>
<td>240-1000 MW</td>
</tr>
<tr>
<td>Operation &amp; Maintenance</td>
<td>✓ ✔</td>
<td>✓ ✔</td>
<td>✓ ✔</td>
</tr>
<tr>
<td>On-board Accommodation</td>
<td>Option</td>
<td>Option</td>
<td>Option</td>
</tr>
<tr>
<td>LNG Storage Volume</td>
<td>75 - 135 m³</td>
<td>48 - 180 m³</td>
<td>48 - 180 m³</td>
</tr>
<tr>
<td>Fuel Autonomy (LNG) - at max power</td>
<td>15 - 30 days</td>
<td>12 - 150 days</td>
<td>15 - 45 days</td>
</tr>
<tr>
<td>Length (Overall) in meters</td>
<td>110-130</td>
<td>275</td>
<td>330</td>
</tr>
<tr>
<td>Base in meters</td>
<td>20-29</td>
<td>44</td>
<td>48-60</td>
</tr>
<tr>
<td>Drift (moulded) in meters</td>
<td>3 to 8</td>
<td>10 to 12</td>
<td>15 to 20</td>
</tr>
<tr>
<td>Self-Propelled</td>
<td>X</td>
<td>✓ ✔</td>
<td>✓ ✔</td>
</tr>
<tr>
<td>Voltage (HV) Substation</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Pre-Engineered FSRWP** Solutions

**FSR-POWER® >1000 MW**

- LNG Offloading System (Manifold, Fenders, LNG Hoses)
- Steam Turbine Generator
- Gas Turbine Generators
- Dual Fuel Engine
- GT-Aero
- GT-Industrial
- GT-CCGT
- CCGT

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

- LNG Tanks
- Regasification Unit
- Accommodation Block
- Seawater Intake/Discharge Pipes

**FSR-POWER® 80 to 160 MW**

- Transformer, GIS, GSU
- Gas Turbine Generators
- Air Intake
- HEGS
- Steam Turbine Generator

**FSR-POWER®® 60k m³ water/day**

- FSR-POWER®® 160 MW & 60k m³ water/day

**FSR-WATER®® 60k m³ water/day**

- E-House
- Transformer, GIS, GSU
- Gas Turbine Generators
- Air Intake
- HEGS
- Steam Turbine Generator
- Desalination Plant
- Accommodation Block
- Seawater Intake/Discharge Pipes

**FSR-POWER®® 80 to 160 MW**

- Transformer, GIS, GSU
- Gas Turbine Generators
- Air Intake
- HEGS
- Steam Turbine Generator
- Desalination Plant
- Accommodation Block
- Seawater Intake/Discharge Pipes

**FSR-POWER®® 60k m³ water/day**

- E-House
- Transformer, GIS, GSU
- Gas Turbine Generators
- Air Intake
- HEGS
- Steam Turbine Generator
- Desalination Plant
- Accommodation Block
- Seawater Intake/Discharge Pipes
**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 & operate these systems as well.

- FPSOs, FSOs, TLPs delivered to date: 43
- Current Owned/Operated Fleet: 15
- Current Operated (owned by Others): 4
- 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**

<table>
<thead>
<tr>
<th>West Africa</th>
<th>Southeast Asia</th>
<th>Oceania</th>
<th>Brazil</th>
<th>GOM</th>
</tr>
</thead>
</table>

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

**FSRWP®**, **FSR-POWER®** and **FSR-WATER®** are registered trademarks of MODEC, Inc.

[Image of FPSO “Prof. John Evans Atta Mills” Ghana]

www.modec.com
Enquiries: sales@modec.com
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