



Shell Offshore Inc.  
Gulf of Mexico

## Appomattox Oil Production Platform

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### Project Description

The Appomattox offshore oil production platform is Shell's largest floating platform in the Gulf of Mexico. It was heralded as the energy project that defied the odds after being constructed under budget, and ahead of schedule during one of the most severe industry downturns in recent history [1]. It also includes a number of industry leading innovations.



One such innovation is the inclusion of four IST Once Through Steam Generators (OTSGs) as part of the platform's combined cycle steam system. This is the first combined cycle system to be included on a Shell offshore oil production platform. Such a system allows the platform to operate well below regulatory requirements for NOx emissions, while also reducing one of the biggest operating expenses: fuel [1]. The OTSGs are an important component in this system.

Each OTSG recovers waste heat from a GE LM2500+G4 gas turbine, and was manufactured as a single pressure unit. Each OTSG provides Shell with exceptional turndown capabilities, and is complete with supplementary firing to further increase operational flexibility and boost overall steam production. The OTSG design and materials allow the units to run dry, and therefore do not impact the availability of the gas turbines.

The OTSGs are also uniquely configured to minimize the units' footprint and weight on the platform. This was of significant benefit to the project as space is at a premium on any offshore platform. This was accomplished by elevating the OTSG directly above the gas turbine exhaust flange and orienting the inlet ducting vertically as seen in the construction photo shown below.

**PROPAK** 



### OTSG Common Benefits

IST's unique Once Through Steam Generators are designed to run dry, eliminating the need for bypass stacks, diverter valve systems and stack silencers. OTSGs have



once through flow paths; therefore, no steam drums or blowdown systems are required. The absence of a blowdown stream, as well as the fact that OTSGs do not typically require any chemical cleaning, make the OTSG a more environmentally friendly technology than conventional boiler technologies.

The absence of drums and the modular design and manufacture of OTSGs facilitate easy and rapid shipment and erection of the units. Typical units consist of 5-7 modules: inlet duct, burner duct (if applicable), plenum, steam generator module, emissions control module (if applicable), hood, and the stack, which reduce erection time and crane usage/requirements.

The use of small diameter tubes and modular construction allow for a lightweight and compact design that is ideally suited for projects that have weight and size restrictions. OTSGs demonstrate a significant improvement over the natural circulation drum-type units. They offer high availability, proven experience, and cost saving benefits.

## CONTRACT SUMMARY

Gas Turbine	Turbine Output (MW)	Exhaust Flow (lbs/hr)	Exhaust Temperature (°F)
LM2500+G4	27	684,000	1000
Firing Temperature (°F)	HP Steam Flow (lbs/hr)	HP Steam Temperature (°F)	HP System Pressure (psia)
1400	110,000	844	747

## References

- [1] Royal Dutch Shell, "Appomattox: the energy project that defied the odds," 19 May 2019. [Online]. Available: <https://www.shell.com/inside-energy/appomattox-the-energy-project-that-defied-the-odds.html>.