

Small Modular Nuclear Reactors: The Hyperion System

An Energy Solution to Remote Gas & Oil Production and Exploration

A Summary Review

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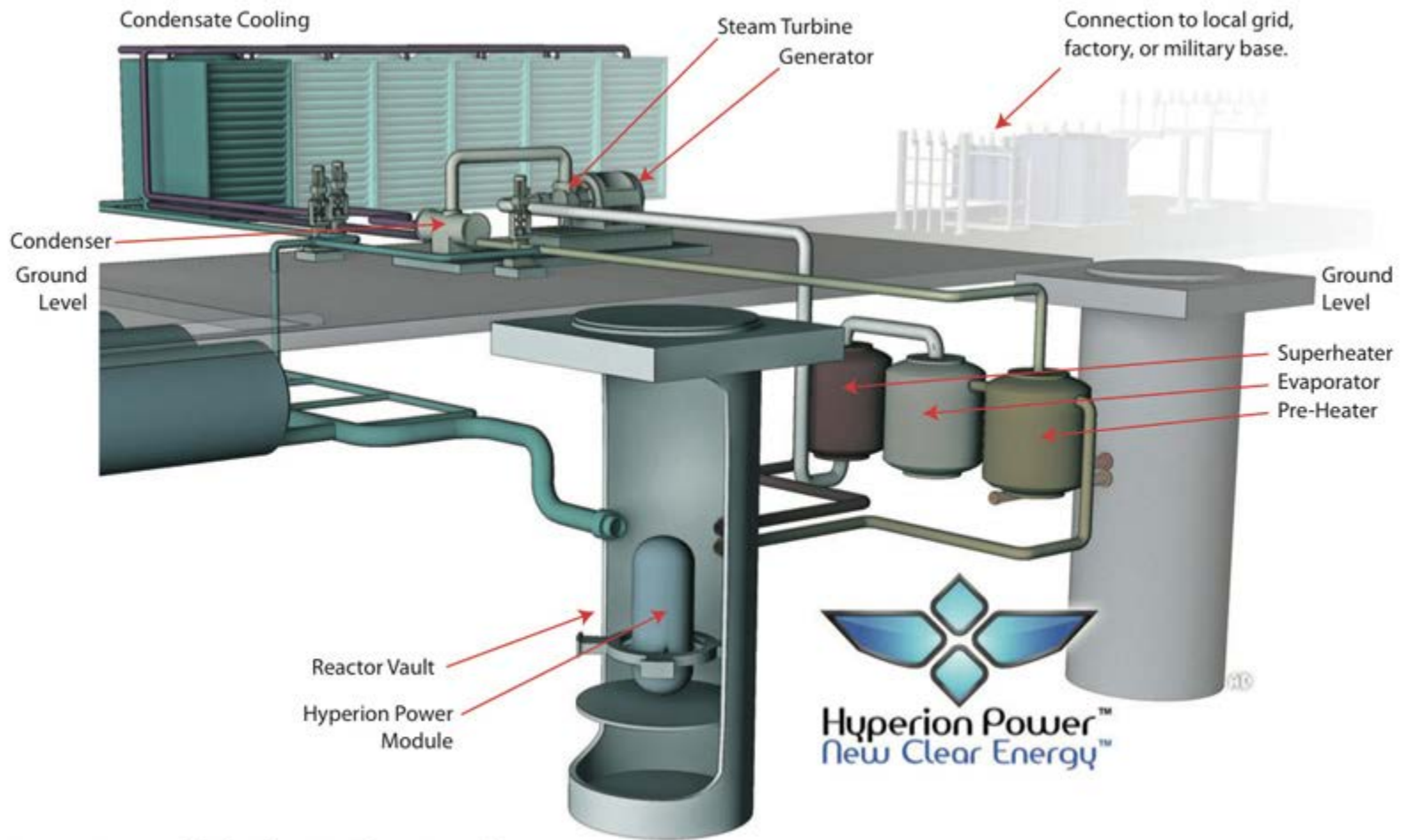
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Abstract

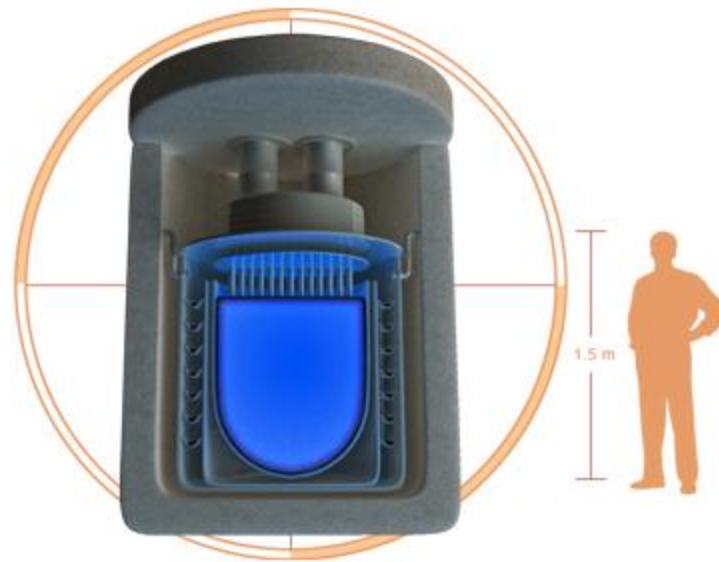
Small modular nuclear power reactors (SMRs) are gaining recognition as the workhouse for the clean energy movement. Employing innovative technology, small nuclear reactors are ready for introduction into locales and industries eager to take advantage of this clean, safe, and reliable energy source. Although there are many applications for these “super batteries”. While the oil and gas industries continue to actively search for ways in which to cut production costs and greenhouse gas emissions, a viable alternative is small nuclear reactors. The role of small modular nuclear reactors in the oil industry focusing on their facility to be transported to remote areas, such as oil fields, and to be set-up and operable quickly. With no carbon dioxide, sulfur dioxide or nitrogen oxide emissions, small nuclear reactors can provide base-load power 24/7 with no greenhouse-gas contributions. An additional benefit is the improvement of the cost-efficiency of oil field operations. In fact, a recent study reveals the average oil field can save as much as \$2 billion per year by using this technology instead of burning natural gas in oil production. Furthermore, this innovative technology is more affordable than many developing alternative energy technologies.



Hyperion Power Module-based 25MWe Electric Power Plant

The Hyperion Power Module (HPM)

The Hyperion Power Module (HPM) is the frontrunner in the SMR industry. The HPM is one of the smallest, safest, and simplest designs.



An HPM-based power plant can supply enough power for:

20,000+ American-Style Homes	Large Hospital Complex
Government Complex	Irrigation Systems
Water Treatment & Distribution	Waste–Sewage Facility
Heavy-Oil Recovery	Refugee Community
Emergency-Disaster Response	Military Installation
University or College	Mining or Drilling Operation
Industrial Center or Factory	Corporate-Data Centers

Operational Characteristics:

Reactor Power	70MW Thermal
Electrical Output	25MW Electric
Lifetime	8 – 10 years
Size (meters)	1.5w x 2.5h
Weight (ton)	Less than 50
Structural Material	Stainless Steel
Coolant	Lead-Bismuth
Fuel	Stainless Clad, Uranium Nitride
Enrichment (% U-235)	<20%
Refuel on Site	No
Sealed Core	Yes
License	Design Certification
Passive Shutdown	Yes
Active Shutdown	Yes
Transportable	Yes – Intact Core
Factory Fueled	Yes
Safety & Control Elements	Two Redundant Shutdown Systems & Reactivity Control Rods

Hyperion Power Module Product Characteristics:

1 Transportable:

- Unit will measure approximately 1.5m wide x 2.5m tall
- Fits into a standard fuel transport container
- Transported via ship, rail, or truck
- Modular design for easy and safe transport

2 Sealed Core:

- Safe and Secure
- Factory sealed; no in-field refueling, closed fuel cycle
- Returned to the factory for fuel and waste disposition

3 Safety:

- System will handle any accident through a combination of inherent and engineered features
- Inherent negative feedback keeps the reactor stable and operating at a constant temperature
- Sited underground, out of sight
- Proliferation-resistant; never opened once installed

4 Operational Simplicity

- Operation limited to reactivity adjustments to maintain constant temperature output of 500C
- Produces power for 8 to 10 years depending on use

5 Minimal In-Core Mechanical Components:

- Operational reliability is greatly enhanced by the reduction of moving mechanical parts

6 Isolated Power Production:

- Electric generation components requiring maintenance are completely separated from the reactor
- Allows existing generation facilities to be retrofitted
- The Hyperion Power Module will be licensed by national and international regulatory authorities.

Common Myths and Facts:

<http://www.hyperionpowergeneration.com/learn-opp.html>

Gen4 Energy has acquired Hyperion: see:

<http://www.gen4energy.com/applications/>

