TERRESTRIAL ENERGY

Vision: To change the way the world thinks about nuclear energy

Mission: To commercialize a strategic and carbon-free energy technology for global industry

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INTRODUCTION TO TERRESTRIAL ENERGY

Terrestrial Energy

- Commercializing a nuclear reactor system that addresses today's industrial market needs
  - Cost competitive reactor, particularly in States with de-regulated power markets
  - Our key commercial claim is a 4 to 5 c / kWh LCOE SMR at NOAK(10+)
  - Our SMR has strong load following capabilities
- Securing support from private investors, Fortune 100 industrial companies, governments and environmental NGOs

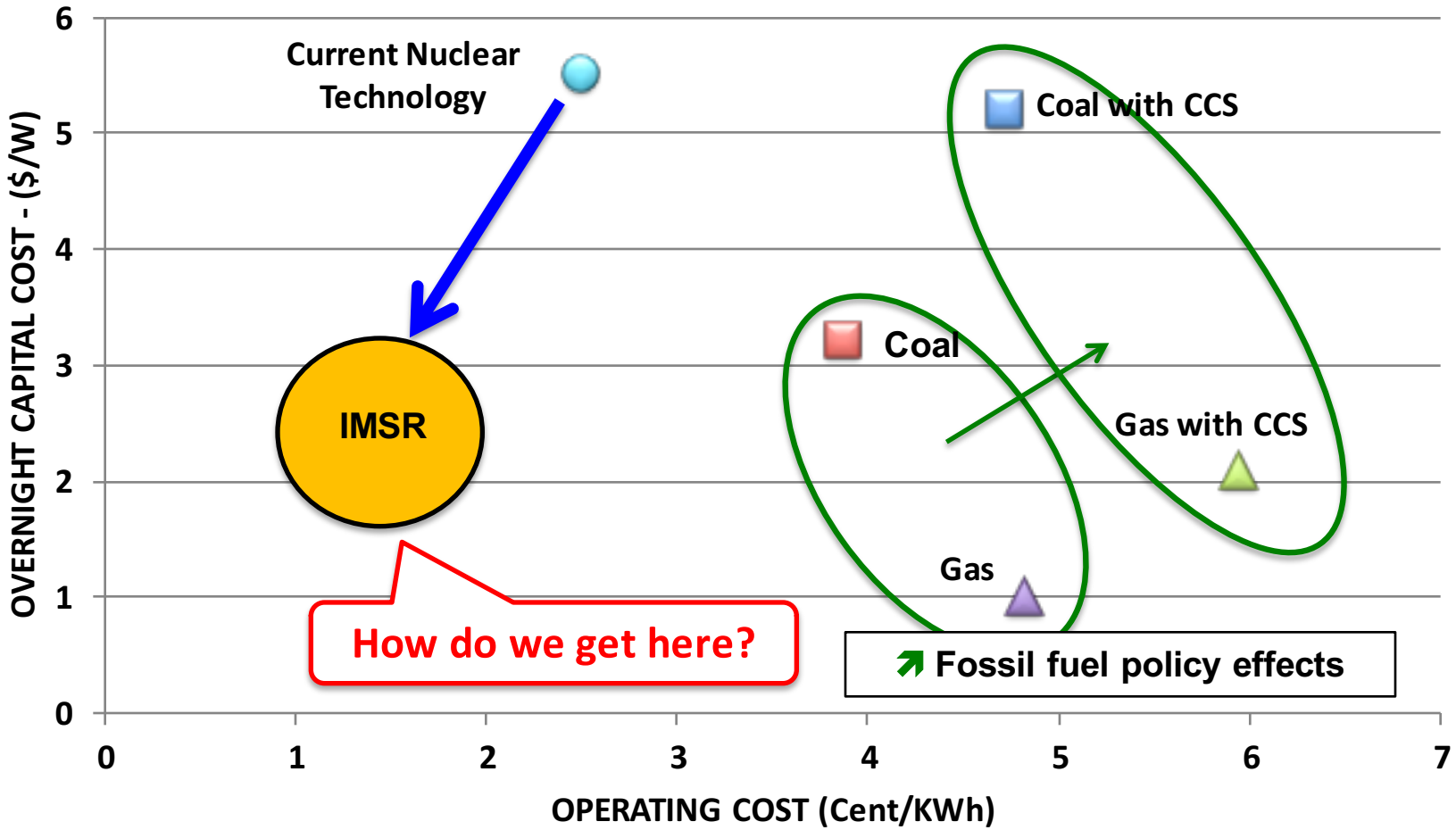
A proprietary Molten Salt Reactor ("MSR") design

- Integral Molten Salt Reactor ("IMSR")
- Intend to build and license the first IMSR power plant (400 MWth) in the 2020s

SOME MILESTONES

1Q	**2013**	Incorporated Terrestrial Energy
3Q	**2014**	Filed MSR patent applications in 59 countries Completed Pre-Conceptual Design Report Public launch to industry Closed Seed Investment Round
4Q	**2014**	Entered letter of intent with Canadian Nuclear Laboratories
January	**2015**	Entered initial collaboration with Oak Ridge National Laboratory Entered initial collaboration with University of Tennessee
August	**2015**	Commenced Phase II engineering program
December	**2015**	Closed $10mn Investment Round
January	**2015**	IMSR advanced to Conceptual Design standard

ECO 101 – NUCLEAR NEEDS CAPEX COST INNOVATION



Source: EIA. 2012

THE FUNDAMENTAL RELATIONSHIP IN NPP ECONOMICS

$$\text{CAPEX} = f\,(\text{reactor system's Safety Case})$$

Safety Case drives

Cost to development

Cost to license

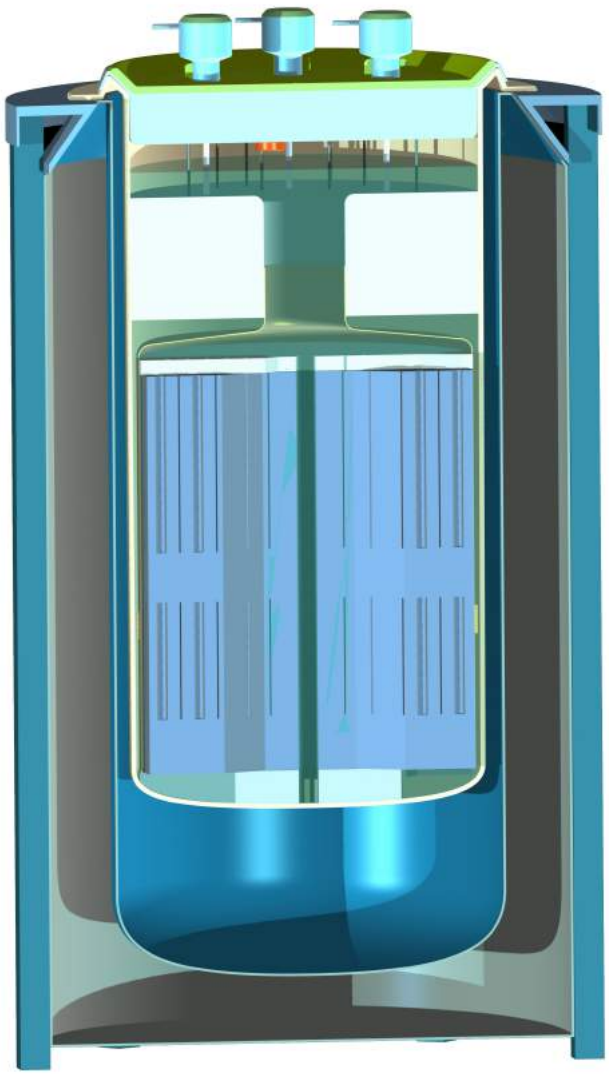
Cost to construct

Cost to operate

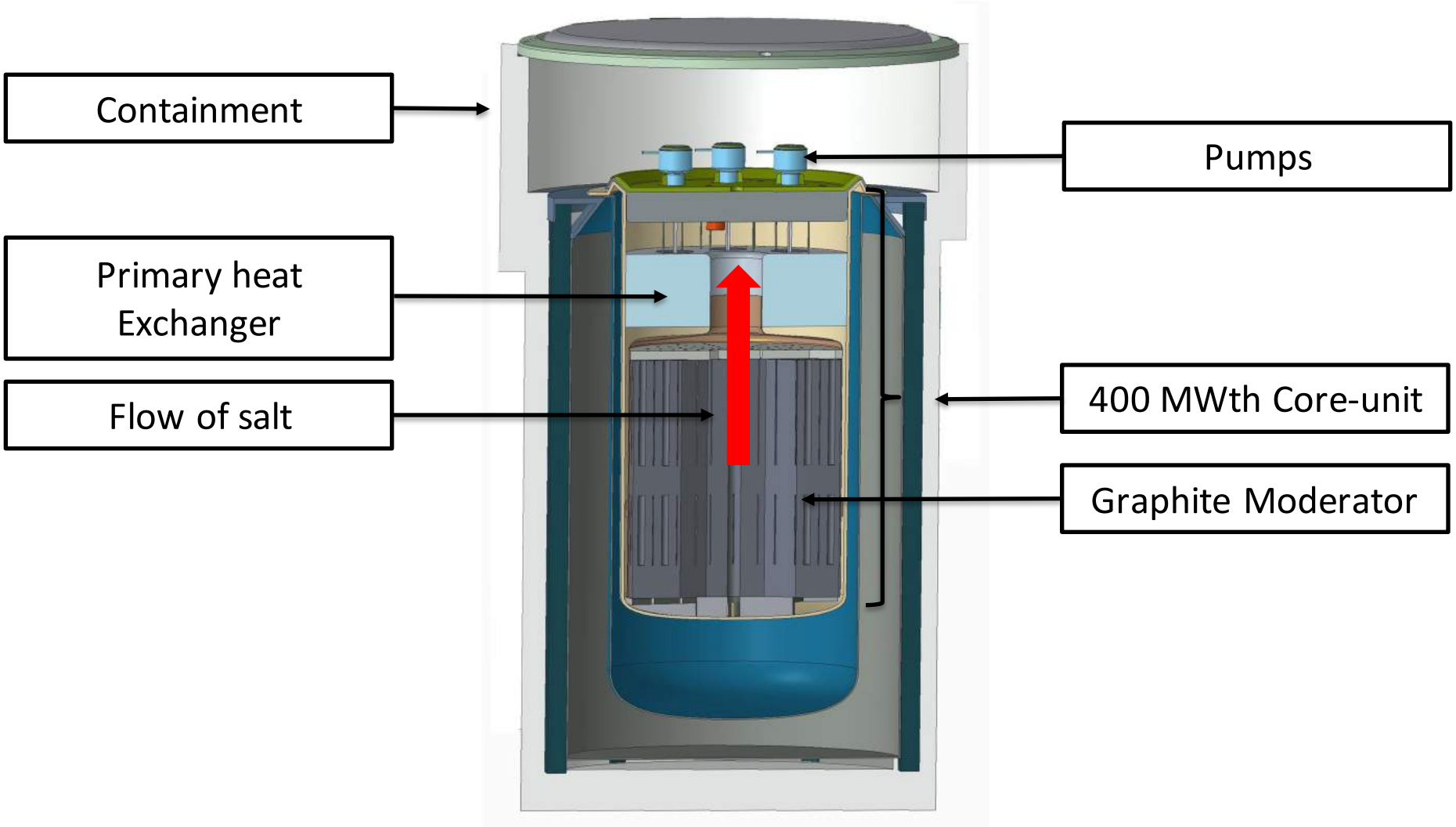
- A reactor systems safety case drives CAPEX
- IMSR has a Safety Case to drive cost innovation

IMSR – INNOVATING BETWEEN LAB AND MARKET

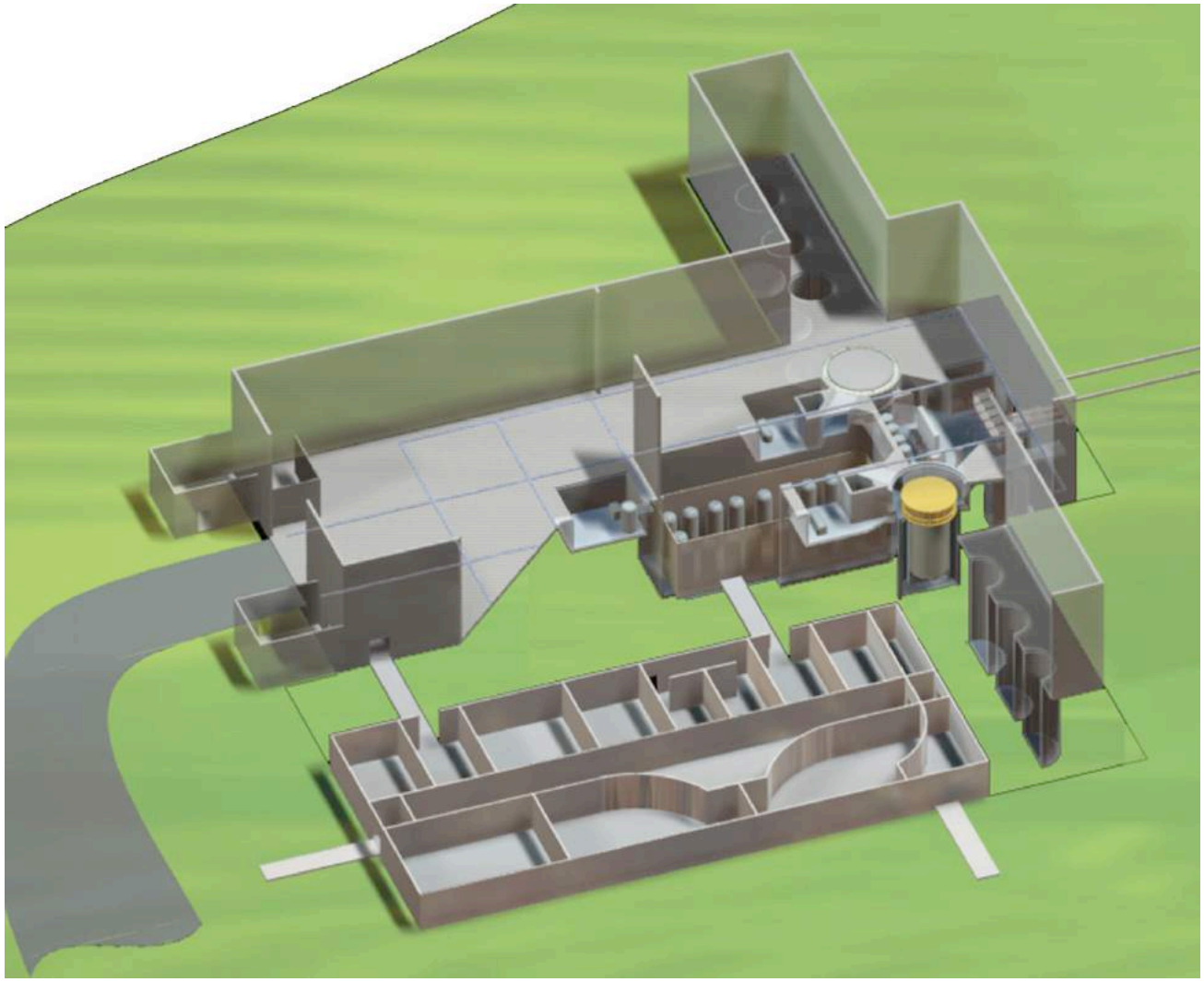
- **Key innovation is the integration of primary reactor components**
  - Reactor core
  - Primary heat exchanger
  - Pumps
- **..into a sealed reactor vessel within a compact and replaceable unit**
  - For a 7-year operational life
- **This integrated design promises high industrial value through**
  - Inherent safety
  - Operational simplicity
  - Cost innovation
- **Patent applications filed on key innovations**



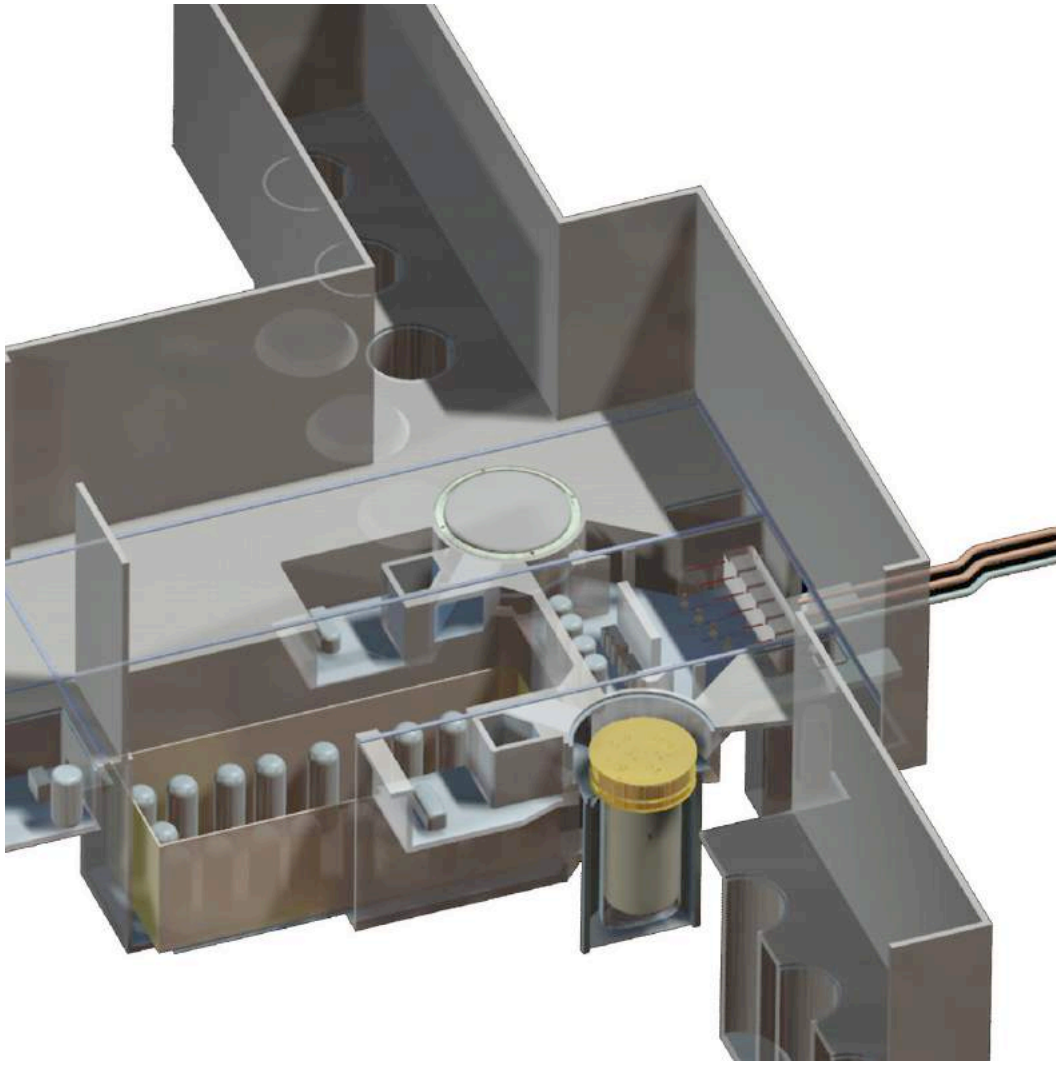
IMSR CORE-UNIT IN CONTAINMENT SILO



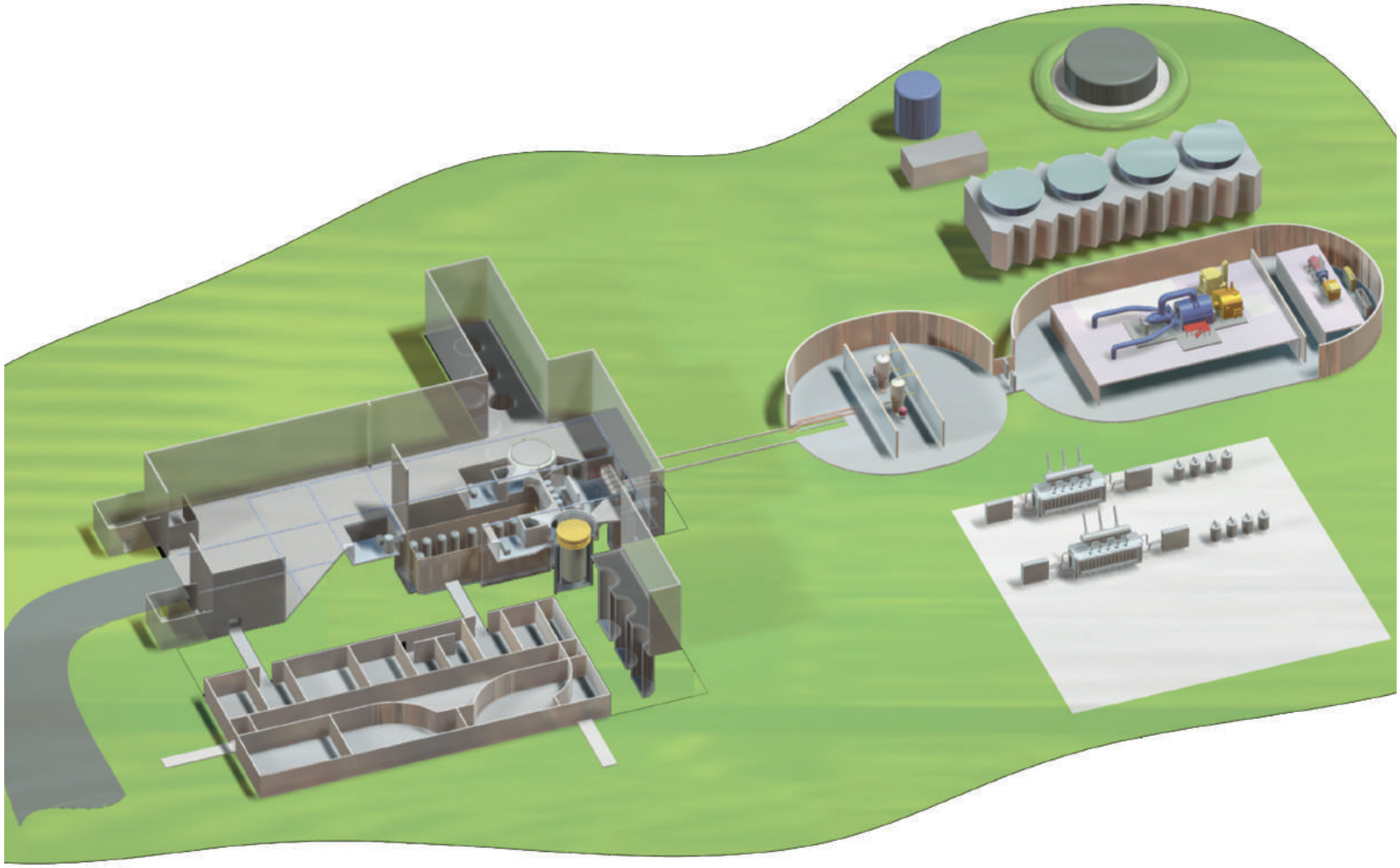
IMSR NUCLEAR ISLAND



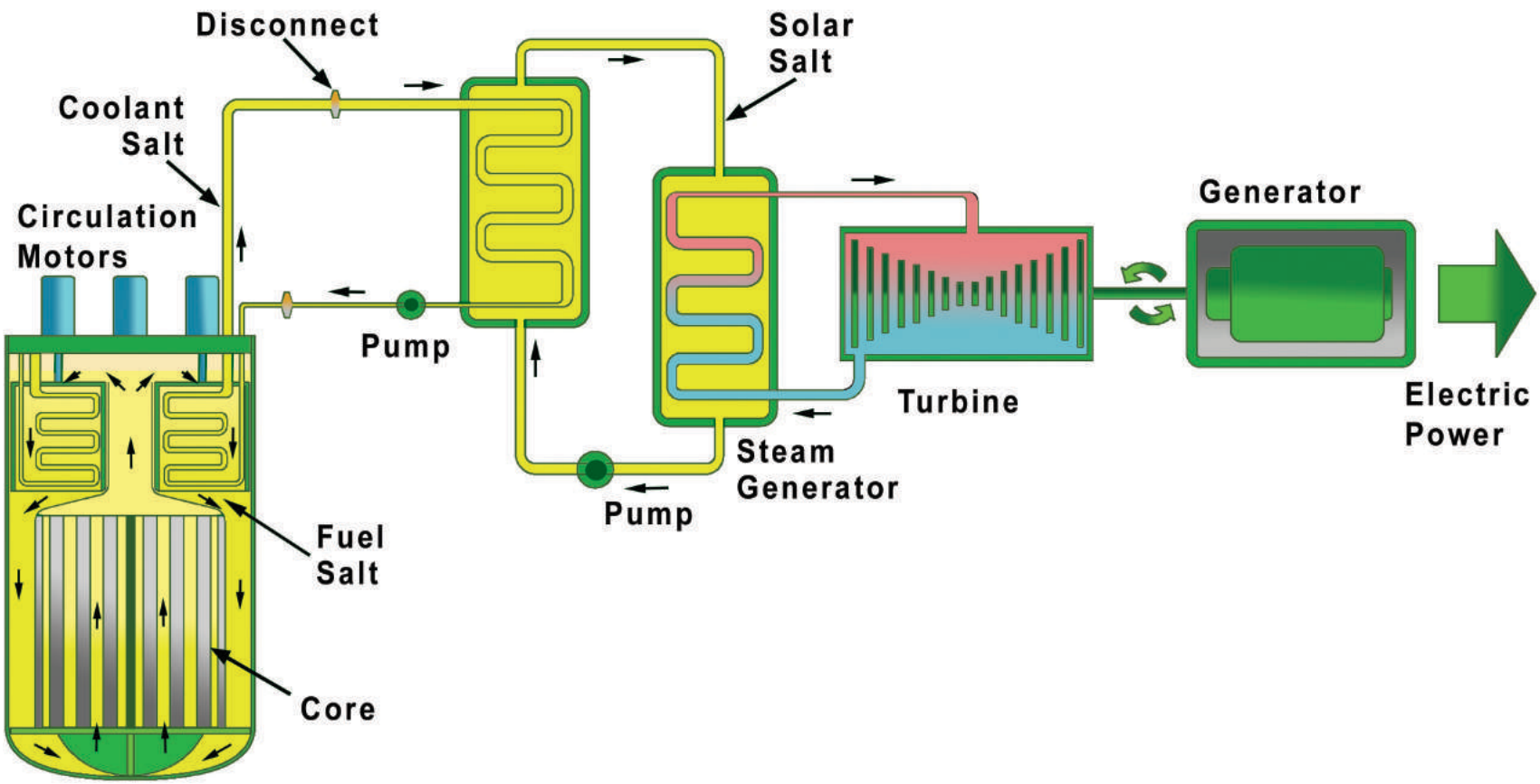
CORE-UNIT IN OPERATING SILOS SHOWING STORAGE



IMSR POWER PLANT LAYOUT



IMSR 400 MWth (192 MWe) GENERALIZED NPP FACILITY



IMSR – SAFETY CASE

The central challenge for all reactor designers is HEAT DISSIPATION in every conceivable set of circumstances

- Central pillar of Safety Case

IMSR assures heat dissipation in every conceivable set of circumstances

- Fuel is a liquid salt and it is also your coolant
  - Convective cooling
- A small reactor (sub 600 MWth) operating a 700 ^{o}C
  - Radiative heat dissipation 9x compared to 300 ^{o}C

So IMSR cooling through natural and passive mechanisms

- No pumps and no active cooling mechanisms necessary

Strong negative reactivity coefficients of temperature

- Entirely passive shutdown Safety Case

No chemical driving forces

- Zirconium Metal-Water reactions absent

No physical driving forces

- Operates at one atmosphere

No "cliff" behavior in the IMSR's operating profile

A simple safety case achieved through simple and passive mechanisms – mechanisms that are secure and robust

IMSR – TECHNOLOGICAL READINESS AND LICENSING VIABILITY

IMSR improves upon Oak Ridge National Laboratory's reactor designs

- LEU "Burner", thermal spectrum and graphite moderated

7-year replaceable "Core-unit" design addresses:

- Operational safety
- Graphite and material lifetime challenges

No substantive technical issues remain for commercialization, but extensive, although standard engineering services are required

Viable financeable licensing pathway today for first plant

- CNSC operates a regulatory regime that is:
  - graduated
  - risk-informed
  - Principle-based

IMSR can be brought to industrial markets in the 2020's

CONTACT DETAILS

THANK YOU

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