AtkinsRéalis

October 2025

Nuclear Energy for Tomorrow:

Advancing Cernavodă Units 3 and 4 for Romania's Energy Future

Europe Nuclear Energy & SMR Conference 2025 (ENES2025)

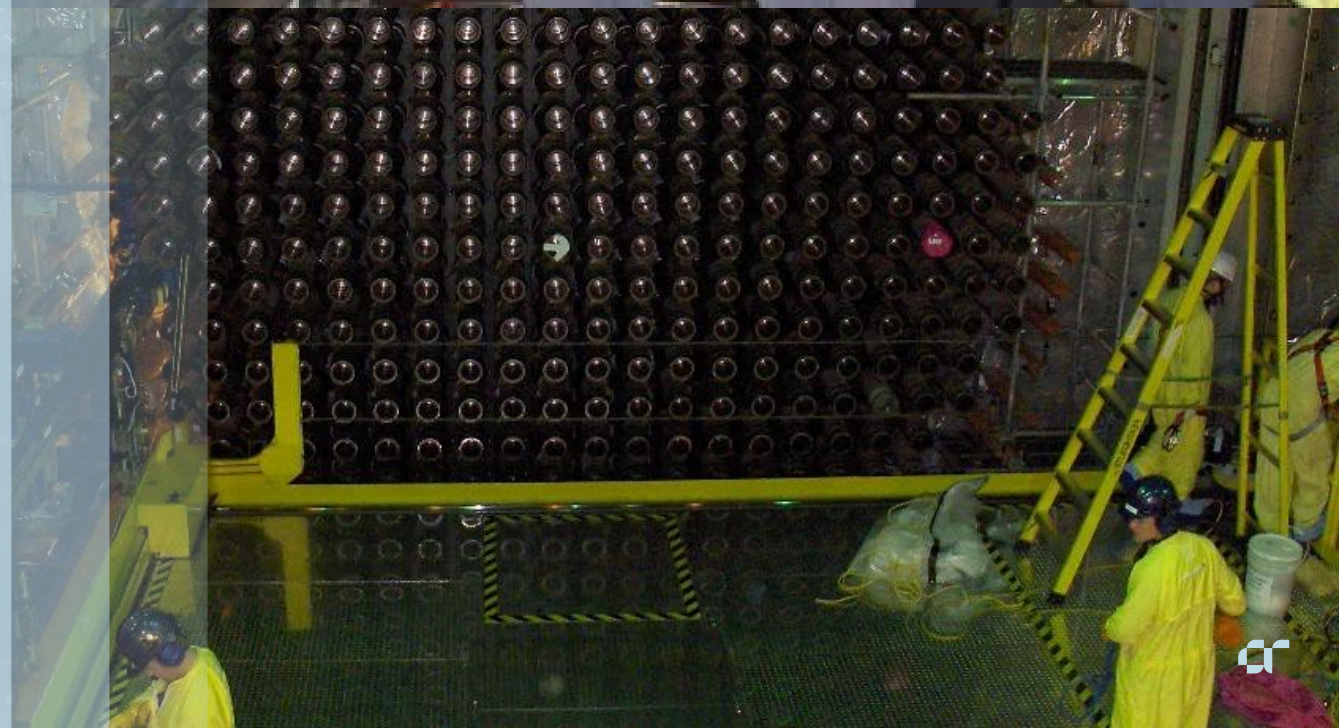
Speaker: Ovidiu Bolea,
Deputy Project Director
Cernavodă Units 3 and 4

AtkinsRéalis Nuclear

- Over **5,000 employees** in the Nuclear division mainly in Canada, US, and UK; supported by others in the broader AtkinsRéalis business.
- Extensive experience in SMR, BWR, PWR, CANDU, Fusion, Gen IV and other reactor types.
- Mobilization of large multidisciplinary program management and design teams, Owner's Engineer for construction and commissioning.

Candu Energy – the Canadian Nuclear Division; over 2,500 employees and growing – the Exclusive Licensee of the Canadian Owned CANDU technology:

- Provide OEM services and support to operating fleet.
- Involved in all CANDU life extensions (Re-tubes).
- Developing New CANDUs: EC6,, C6 for C3&4, and CANDU MONARK



Candu Reactors: 37 Deployed, 26 Remain Operational

ZEEP
Research Reactor
10 watts
Criticality:1945

NPD
CANDU
Demonstration
Reactor
24 MWe
In-service: 1962

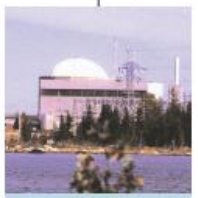
Pickering B
4 units, 540 MWe
In-service: 1983-86

NRU
Research Reactor
200 MW
Criticality: 1957

Pickering A
4 units, 542 MWe
In-service: 1971-73

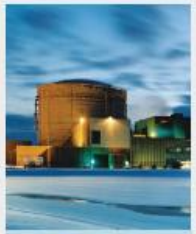
NRX
Research Reactor
42 MWe
Criticality: 1947

Douglas point
CANDU commercial
prototype
220 MWe
In-service: 1968

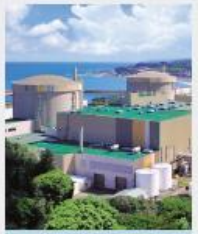


Gentilly I BWR
prototype 250 MWe
In-service: 1972
Safe Storage: 1984

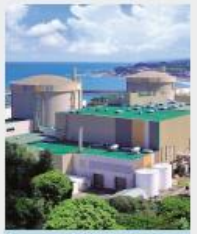
CANDU
700MW Class



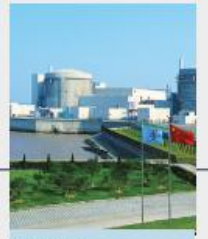
Point Lepreau
680 MWe
In-service: 1983



Wolsong
Unit 1
679 MWe
In-service: 1983

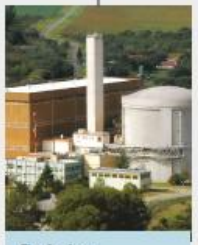


Wolsong
Units 2-4
715 MWe
In-service:
1997-1999

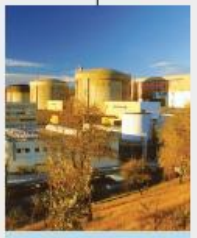


Qinshan
Unit 1-2
728 MWe
In-service:
2002-2003

Gentilly 2
675 MWe
In-service: 1983
Safe Storage: 2012



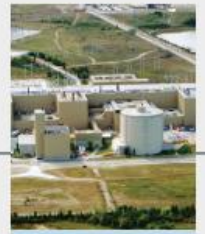
Embalse
648 MWe
In-service: 1984



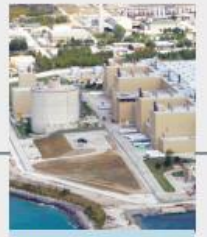
Cernavoda
Unit 1
708 MWe
In-service:
1996

Unit 2
708 MWe
In-service:
2007

CANDU
900MW Class



Bruce A
4 units, 900 MWe
In-service: 1977-79

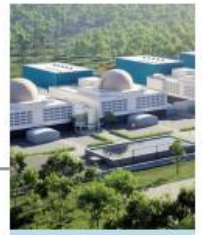


Bruce B
4 units, 915 MWe
In-service: 1984-87

Darlington
4 units, 935 MWe
In-service: 1990-93

Enhanced
CANDU 6®
750 MWe Class

ACR-1000®
1200 MWe Class



CANDU® MONARK™
1000 MWe Class

What Makes CANDU Unique?

Natural Uranium Fuel

CANDU technology uses natural uranium as fuel, maximizing resource efficiency and sustainability in energy production.

Heavy Water Moderator

The use of heavy water as a moderator enhances neutron efficiency, allowing for better control of the nuclear reaction.

Operational Flexibility

CANDU reactors can be refueled while operating, increasing their availability and efficiency compared to traditional designs.

Medical Isotopes

Candu reactors produce medical nuclear isotopes while concurrently producing commercial power.

Romania's Energy Landscape

Current mix (2025 est.): **20%** nuclear, **30%** hydro, **25%** gas, **15%** coal, **10%** renewables

EU target:

-55%

CO_2 emissions by 2030, Net Zero by 2050

Electricity demand projected to grow

25–30%

by 2040

Romania imports

~15%

of energy needs today → nuclear reduces dependency

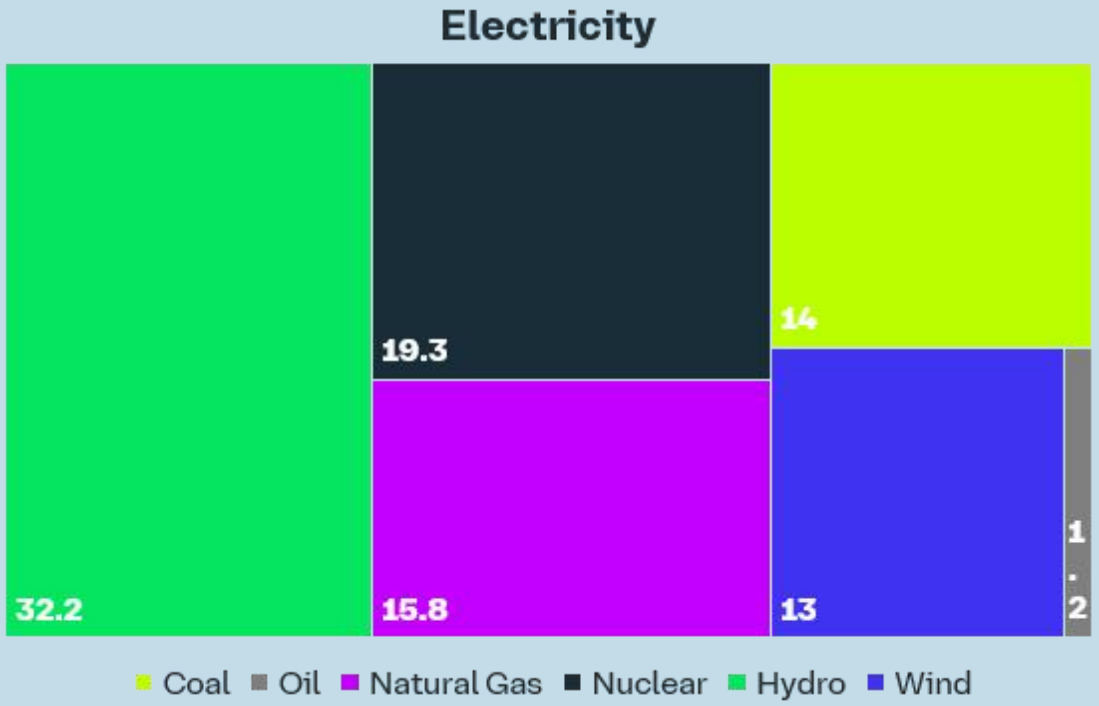
EU average nuclear share

~25% vs. Romania's

20% → room to grow

Energy Mix

Electricity generation mix, Romania, 2023



The Cernavodă Legacy

- **Unit 1**
  in operation since 1996, Unit 2 since 2007
- **Capacity factor:**
  Consistently >90%, among world's best reactors
- **20% of Romania's electricity supply**
  ~11 TWh annually
- **Safety Record:**
  27+ years incident-free
- **WANO performance ranking:**
  Top quartile globally
- **Unit 1 refurbishment ongoing**
  → shows long-term sustainability of CANDU fleet

Our Vision

Create clean energy for 1.5 Million homes for 60+ years

1984/1985:
Construction of Cernavoda Units 3 and 4 commenced.

Early 1990s:
Construction stopped resulting in a series of buildings at various stages of completion.

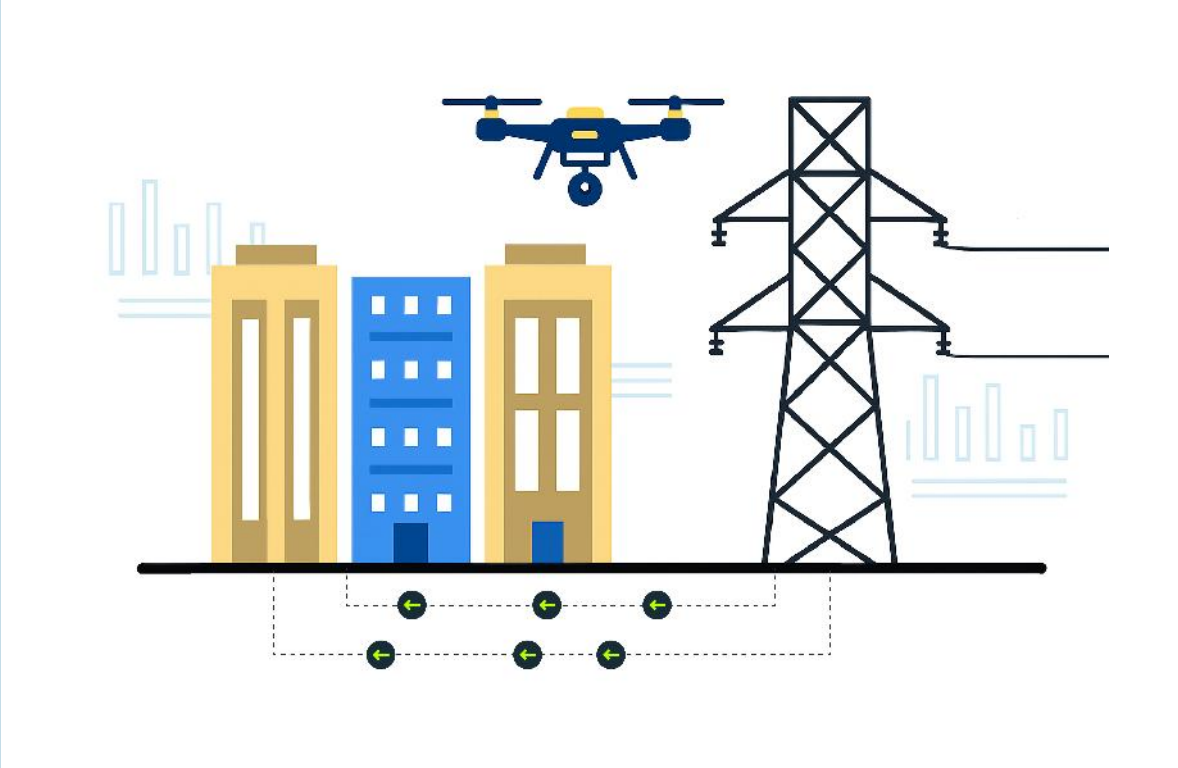
2014:
Candu Energy prepared a detailed offer to complete the building of Units 3 & 4.

2021:
Candu Energy awarded a Pre-project scope to undertake review and inspection of the existing civil structures.

2024:
Joint Venture formed between Candu Energy, Ansaldo, Sargent & Lundy and Fluor (FCSA JV) to undertake EPCM Services for C3/4.

December 2024:
FCSA JV commences LNTP phase.

Why Units 3 & 4 Now?



Energy Security:
Reduce reliance on imports and volatile fossil markets

Decarbonization:
Replace coal (currently 15% of mix) with carbon-free nuclear

Industrial growth:
20,000+ jobs, target ≥40% local supplier participation

Grid Stability:
Provides baseload to complement intermittent renewables

Timing:
Aligns with EU financing frameworks for clean energy investments

Challenges & Lessons Learned

Challenges: Financing, regulatory approvals, supply chain certification, workforce development

Romania-specific risks: EU procurement law complexity, export controls, public acceptance

Olkiluoto 3 (Finland) → lesson: Schedule realism

Hinkley Point C (UK) → lesson: Manage supply chain integration early

Barakah (UAE) → lesson: Train and mobilize workforce early

Mitigation: Phased contracting, robust QA/QC, early stakeholder engagement

Benefits for Romania

Jobs:
20,000+ direct and indirect during construction

Industrial Participation

CO_2 Reduction:
Millions of tonnes avoided annually

Energy Independence:
Reduces reliance on imported gas and coal

Economic Impact:
Estimated €10B+ GDP contribution across project lifecycle

Catalyst for nuclear education and training programs in Romania

Cernavoda Units 3 & 4
Project Stages

- **PreProject (Complete)**
  - Update Licensing Basis & Safety Design Guide Documents
  - Assess Existing Civil Assets
  - Evaluate Safety Design Changes & feasibility of moving plant control from DCC → DCS
- **Limited Notice to Proceed (LNTP) (Current Phase)**
  - Complete preliminary Engineering incorporating design changes
  - Submit PSAR to Romanian Regulator & FID Estimate to the Client
- **Final Notice to Proceed (FNTP) (Next Phase)**
  - Complete detailed engineering, procurement, construction and submit FSAR to Romanian Regulator

Cernavoda Units 3 & 4
Joint Venture Partners

Candu

- OEM & technology-owners completing Nuclear Steam Plant Engineering

Fluor B.V

- Project Management Company performing construction-related scope and FID estimate

Sargent & Lundy Engineering

- Completing majority of the Balance of Plant Engineering

Ansaldo Energia

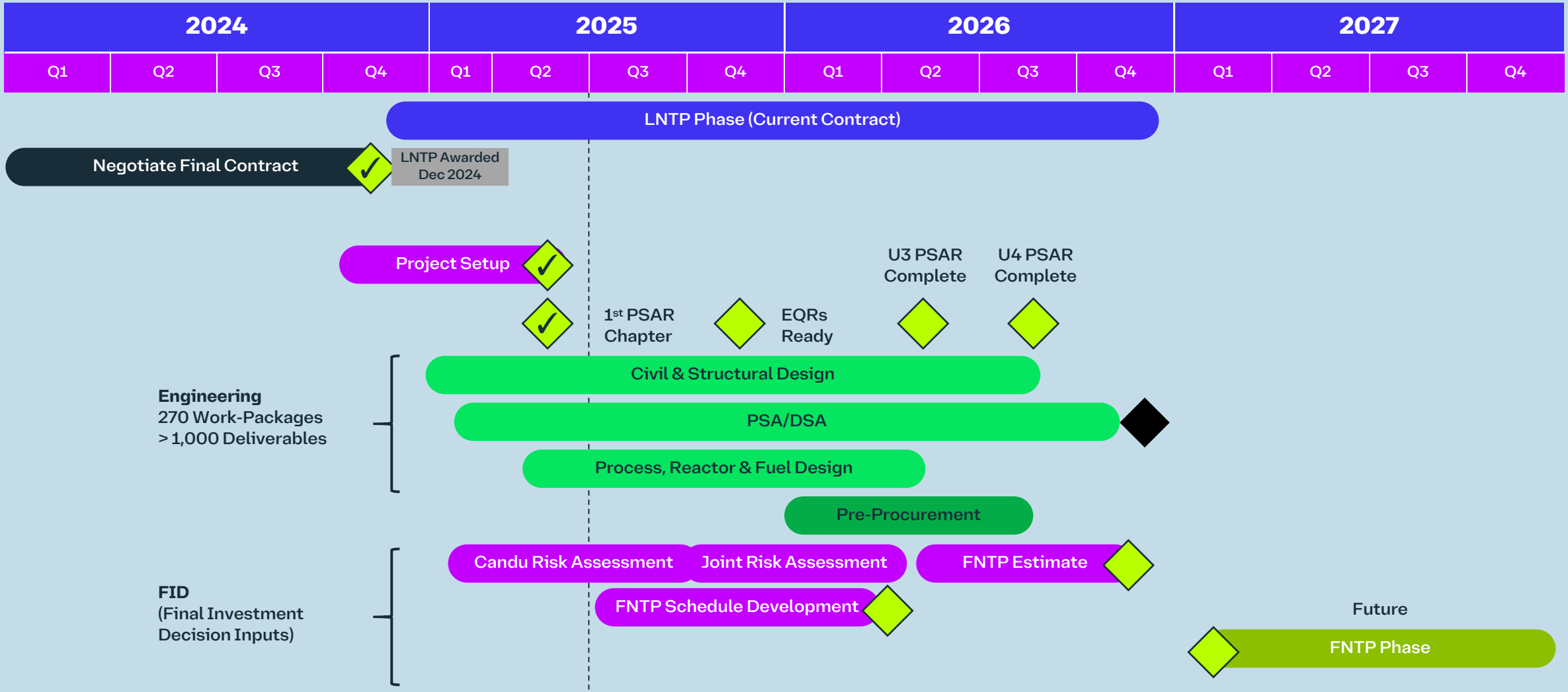
- BOP OEM performing portions of the Balance of Plant Engineering

Cernavoda Units 3 & 4 LNTP Key Objectives:

- Complete preliminary engineering for select systems & detailed engineering for long-lead equipment, incorporating Safety & Non-Safety Design Changes
- Submit the Unit 3 & 4 Preliminary Safety Analysis Reports (PSAR) to the Romanian Regulator to acquire the License to Construct (LtC)
- Provide a budgetary estimate to the Client for the next phase of the Project to make the Final Investment Decision (FID)

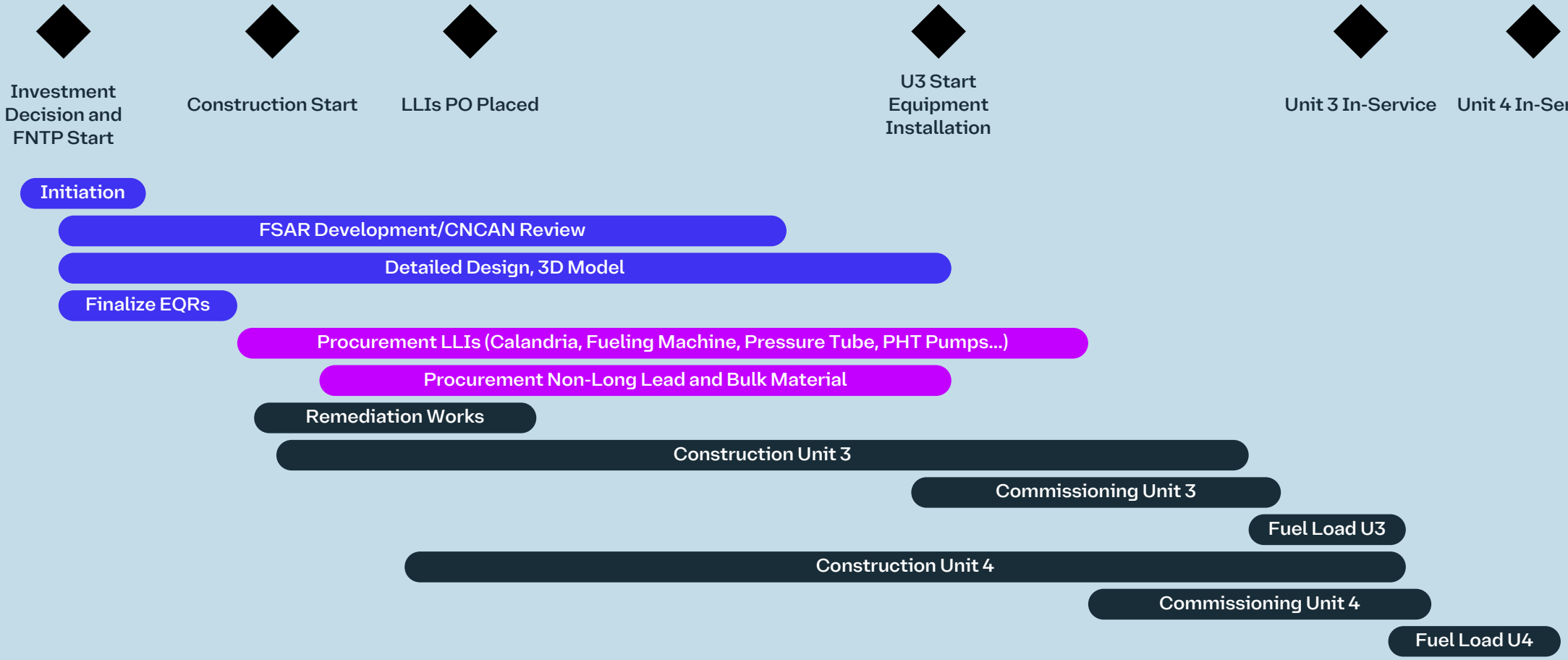
Cernavoda Units 3 & 4 FNTP Phase Schedule

Overall Schedule



Cernavoda Units 3 & 4 FNTP Activities

Indicative Only



Global Collaboration

Financing support:
Export Credit Agencies (EDC, US ExIm, SACE)

Advisors:
Deloitte (Financial), JP Morgan (Lender)

Technical partnerships:
Canada, Italy, US, Romania

Romania as nuclear hub
for Eastern Europe → capability export potential

International collaboration
ensures technology, financing, and best practices converge

Closing

- Cernavodă 3 & 4 = cornerstone of Romania's energy future
- Secure, clean, long-term baseload power
- Strengthens national energy independence
- Drives economic and industrial growth
- Aligns Romania with EU climate goals
- Not just reactors → resilience, opportunity, leadership

Engineering a better future for our planet and its people

AtkinsRéalis

Thank You

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