A PATHWAY TO A JUST TRANSITION - THE ROLE FOR NUCLEAR POWER

19th March 2026 | 10am-6pm

The Signet Library, Edinburgh

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

WELCOME

Tom Greatrex, NIA

AGENDA

Ed Reed, E-FWD

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

Morning

10.00am - 10.50am

10:00 – 10:10 | Welcome and Opening Remarks

CHAIR: Ed Reed – E-Fwd.

10:10 – 10:30 | Session 1: Regulation and Advanced Technologies

SPEAKER: Mike Lewis, Lewis Risk Consulting

10:30 – 10:50 | Session 2: Planning and Consenting Challenges

SPEAKER: Paul Foster, Community Nuclear Power

10.50 - 11.10 | Coffee Break

Morning

10.50am – 12.30pm

10:50 – 11:10 | Session 3: Funding, Insurance, and Economics

SPEAKER: Jasbir Sidhu , Nuclear Capital

11:25 – 11:45 | Session 4: Future Applications in the Energy Transition

SPEAKER: David Mincher, North Court Insurance

11:45 – 12.30 | Morning Panel: Policy, Planning & Investment Outlook

MODERATORS: Ed Reed, E-FWD and Andrew Walters, Castletown Law

12.30 - 13.15 | Lunch

Afternoon

1.15pm – 4.00pm

13:15 – 13:35 | Session 5: Decommissioning and Expertise

SPEAKER: Andrew Renton, Castletown Law

13:35 – 13:55 | Session 6: Marine Propulsion & Barge-Based Generation

SPEAKER: Toby Menzies, Core Power

13:55 – 14:15 | Session 7: Integrated Energy Systems

SPEAKER: Emily Kunkel, Thornton Tomasetti

14:15 – 14:30 | Afternoon Break

14:30 – 15:45 | Afternoon Panel: The Future of Nuclear in Scotland

MODERATORS: Ed Reed, E-FWD, Andrew Bowie, MP, Tom Greatrex, NIA

REGULATION AND ADVANCED TECHNOLOGIES

Mike Lewis, Lewis Risk Consulting

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

Regulation and Advanced Technologies

Regulatory Readiness for Advanced and Modular Systems

Mike Lewis

Director, Lewis Risk Consulting Ltd

Forum on Nuclear Technologies and Energy Transition in Scotland

The Signet Library, Edinburgh

19 March 2026

Lrc

Outline

- Background and context
- Regulatory Task Force (Fingleton) report
- NPS – EN-7 Nuclear Energy Generation
- Business Case for Sizewell C
- Advanced Nuclear Framework

A Simplified NPP Project

Off-Taker (Paul)

Insurance (Zamfira)

Investor (Jasbir)

Legal

Nuclear Power Plant

Operator

Vendor/ Constructor

Site (Mike)

Regulatory (Mike)

Lrc

Scotland – Policy and Planning - Nuclear

- Policy:
  - Oppose new nuclear stations using current technologies (poor value)
  - Waste: HAW stored near surface, close to source, retrievable packages
- National Planning Framework (NPF4) – published February 2023
  - Advocates Renewable Energy as cornerstone to Net Zero
  - Prioritises sustainable development and environmental protection
- Minister should consider material factors from England and Wales

	England and Wales	Scotland
Nuclear Policy	DESNZ	Scottish Government
Nuclear Safety	ONR	
Nuclear Security	ONR	
Nuclear Safeguards	ONR	
Env. Protection	EA	SEPA
Planning/ Siting	GBE-N	Scottish Government
Grid	NESO	Scottish Government

Lrc

Legal Bits – *for example, not exhaustive, England and Wales*

• Health and Safety at Work etc Act, HSWA, 1974 => ALARP	HSE, ONR
• Nuclear Installations Act 1965 (NIA65) => SAPs	DWP/ ONR
• Ionising Radiation Regulations 2017 (IRR17)	DWP/ ONR
• Radiation (Emergency Preparedness and Public Information) Regulations 2019	DWP/ ONR
• Justification of Practices Involving Ionising Radiation Regulations (JoPIIRR)	DEFRA
• Environmental Permitting (England and Wales) Regulations 2016 => RSR,BAT	EA/ NRW
• Planning Act 2008: Nationally Significant Infrastructure Projects (NSIP)/ Town and Country Planning Act 1990 => DCO , EIA	PINS
• Control of Major Accident Hazard Regulations 2015	HSE/ EA
• Nuclear Reactors (EIA for Decommissioning) 1999	ONR
• CDM	HSE
•	
• *Some regulators are goal, some prescriptive, duplication, conflict and overlaps*	

Lrc

(Industry) Barriers to New Build SMR/ ANT

- Lack of clear policy signal from HMG
- UK processes are increasingly complex and multifaceted, often duplicative
- risk aversion in how risk and ALARP is applied by dutyholders and regulators
- no integrated regulatory view to optimise safety, environmental protection, security, and planning
- layering caution upon caution in nuclear waste management
- application of Habitats Regulations Assessments (HRA) and Environmental Impact Assessments (EIA) is often duplicative and lacks proportionality
- culture is misaligned with the ambition for safe, timely, and affordable delivery of nuclear projects
- Vendors/ Operators face unclear alignment between national regulators

Resulting in

- Excessive cost, bespoke design, project time, uncertainty, risk premium
- Loss of society benefit from low carbon, reliable and dispatchable power.

Lrc

Technologies and Engagement

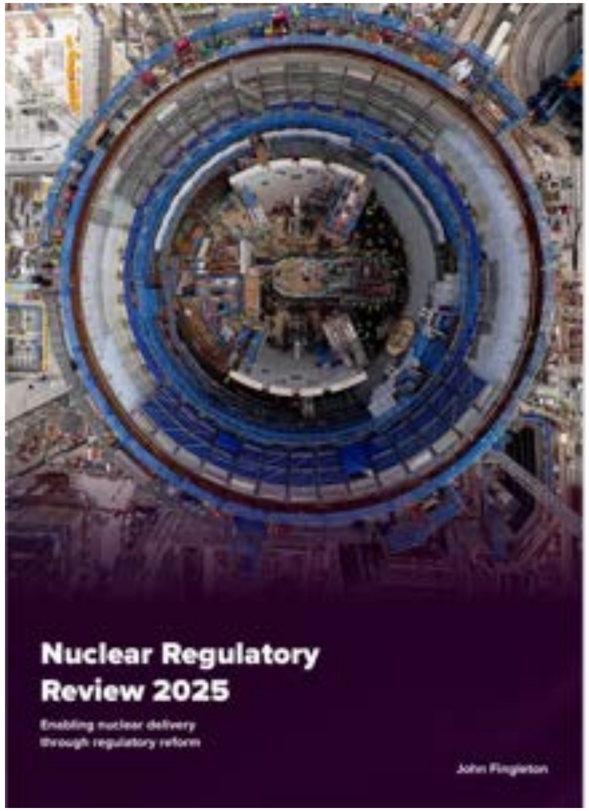
Developer	Technology	Model	NRC	ONR
GE-Hitachi	BWR	BWRX-300	Design review	Stage 2 GDA complete
Holtec	PWR	SMR-300	Design review	Stage 2 GDA
Rolls Royce	PWR	SMR-470	Pre-application engagement	Stage 3 GDA
Last Energy	PWR	PWR-20	Pre-application engagement	Direct to Site Licence
Westinghouse	PWR	AP-300	Pre-application engagement	Cleared to submit application
Newcleo	LFR	LFR-200	No engagement as yet	Withdrew application
TerraPower	MSFR	Natrium	Construction permit approved	Accepted to GDA
X-Energy	HTGR	Xe-100	Construction permit approved	Early engagement
NuScale	PWR	VOYGR	Awarded design licence	No formal engagement as yet
Westinghouse	PWR	eVinci	Pre-application engagement	No formal engagement as yet
Natura	MSFR	MSR-1	Construction permit approved	No formal engagement as yet
Terrestrial Energy	MSFR	IMSR	Pre-application engagement	Early engagement
JAEA/ Amentum	HTGR	THTR-100	No engagement as yet	AMR Programme Phase B
Nano (as USNC)	HTGR	MMR-60	Pre-application approval	AMR Programme Phase B

Lrc

Regulatory Task Force – Future vision

Objective:

To achieve faster delivery and better value for money in both civil and defence nuclear, whilst not compromising safety outcomes or lower standards.



HMG to provide clear leadership and direction (strategic steer) for the nuclear sector. [Jan-2026]

PM statement:	26 Nov 2025
Budget statement:	27 Nov 2025
SoS for Energy statement:	05 Dec 2025
Chancellor Letter:	13 Mar 2026

HMG should establish a delivery plan and oversight of timely delivery of recommendations. Complete: 13 Mar 2026

Lrc

Regulatory Task Force – Future vision (2)

HMG and Regulators to work together to simplify the regulatory approval process for nuclear projects.

• Establish collective decision making body *(Nuclear Commission):*	end-2027
• **Interim: agree nuclear lead regulator model (ONR as default)**	**Mar-2026**
• Consolidate nuclear safety functions into single entity	Mar-2026/ end-2028
• Streamline Regulatory Justification	end-2027
• Reverse Finch judgement for low-carbon electricity projects	end-2027

Lrc

Regulatory Task Force – Future vision (3)

Nuclear sector and HMG to focus on risk aversion and ensuring regulatory and sector decisions are proportionate.

- **Review Tolerability of Risk for nuclear** — Jun-2026
- **Define meaning of proportionality in HSaW Act [ALARP]** — Jun-2026
- Review arrangements to prevent conflation of risks — Dec-2026
- **Create more proportionality in EIA regime** — Dec-2027
- Ensure risk-based proportionality in export licenses [opportunity] — Jun-2026
- Enable public and private efforts to reduce gold-plating — Mar-2026
- International Harmonisation efforts (strategy) — Jun-2026
- *Safety Case for Operator, not Regulatory paper exercise*

Lrc

Regulatory Task Force – Future vision (4)

Nuclear sector and HMG to address cultural, capability and financial incentives that block progress/ delivery.

• Increase data sharing, transparency on environmental data	Jun-2026
• Indemnify developers against costs of continuing during judicial review	Jun-2026
• Confirm consideration of community benefits and payments in proposals	Dec-2027
• Align organisation culture to deliver strategic objectives effectively	Jun-2026
• **Accelerate efforts to build SQEP in a diverse workforce**	**Sep-2026**
• **(Regulators, HMG) enhance T&C to encourage/ retain skilled talent**	**Dec-2026**
• Review charging models for clarity, certainty, and future harmonisation	Sep-2026

Regulatory Task Force – Future vision (5)

Nuclear sector and HMG to enable acceleration of delivery and innovation.

- Review Habitats Regulations to reduce costs while protecting environment — Dec-2027
- **Allow development of modular low-carbon acceleration zones — Dec-2027**
- Changes to perceived constraints from environmental permitting — Dec-2027
- Amend cost cap for judicial reviews and limit legal challenge to NSIPs — Dec-2027
- **Update guidance to streamline the DCO regime and discharge requirements — Jun-2026**
- Changes to Planning related legislation — Dec-2027
- **Revise population siting to allow co-location with industry — Dec-2026**
- Streamline Regulatory Justification — Dec-2027
- Confirm consideration of community benefits *and payments* in proposals — Dec-2027
- **GDF to have Critical National Priority — Dec-2027**

National Policy for Nuclear: EN-6 and EN-7

Updated 'needs case' and framework for planning, assessing and delivering new nationally significant nuclear energy projects in England and Wales. Provides basis for assessing applications for DCO.

EN-6 (for HPC and SZC continuity)	EN-7
GW-scale reactors	GW-scale, **SMR and AMR**
Sites limited to (eight) HMG designated sites	Criteria-based approach **by Developers**
Whole scope based DCO	Option for **phased development**, under single DCO
Applicable to technologies deployable by 2025	**Not end-dated.**
	Nuclear Waste disposal routes (incl. HLW=> GDF)
	Compliance with EN-1 and EN-5 (transmission)
Mandatory Criteria: Semi-Urban Population Density (ONR) Military Activity Discretionary: such as flood risk, coastal change, biodiversity, landscape value, water use.	Mandatory Criteria: Semi-Urban Population Density **(HSE)** Military Activity Discretionary: such as flood risk, coastal change, biodiversity, landscape value, water use.

Lrc

EN-7 Criteria – Risk from ANT

Opportunity for industrial applications, with co-location

Argued to have low nuclear safety risk – technology features

No/ limited off-site Emergency Plan

Operation contingent on licensing and REPPIR arrangements

- EN-7 (2025): adopted precautionary approach, retained semi-urban criterion
  - SU-C based on large reactors, technology agnostic
  - Commitment to keep under review
  - Inconsistent with planning – housing developments close to nuclear permitted.
- Recognised by Regulatory Task Force
  - (Rec 6, 7) Review tolerability of risk and regulatory guidance by June 2026
  - (Rec 33) Revise population siting criteria by December 2026
  - (Rec 34) Proportionate OPZ/ DEPZ; update REPPIR guidance by December 2026

Lrc

Business Case for Sizewell C

- New nuclear capacity needed for firm, low cost, net zero
- **Supports growth via UK supply chain, jobs, skills**
- Well developed design and construction programme

- => reduced uncertainty (risk) for cost, programme, regulation
- **At projected costs, positive expected return and non-monetised benefits**. Equivalent to ~£82/ MWh (2012)

- **Includes: Funded Decommissioning and Waste Plans**

Lrc

Advanced Nuclear Framework (1)

Part 1: Creating a Pipeline of projects (assessed by GBE-N)

- Civil Energy
- Well developed plans covering:
  - Technology and Supply Chain
  - Developer Plan and Capability
  - Finance, Funding and Investment
  - Siting
  - Operator and End-User plan
  - Decommissioning, Safe and effective management of waste (inc. R&D), GDF compatible

=> Decision in Principle:

=> support conversations on revenue, risk, investments

=> signal: offers significant role in future energy landscape

Lrc

Advanced Nuclear Framework (2)

Part 2: Policy and Institution

- Regulation: early engagement conversations
- Planning: EN-7 (criteria based siting), EN-5 (Grid connection reform)
- Skills development
- UK Capabilities
- New Fuels – HALEU

Open for applications: 4 March 2026

Lrc

Takeaway: Readiness for SMR/ AMR

Positive HMG statements on role of nuclear (EN-7, Green investment status, Task Force, Departmental responses)

Structural Change	Aspirations
Simplified approvals (Regulatory Commission)	'Justification of Practice' for classes
Proportionate decision making (tolerability of risk, over-conservative)	Siting populations covered by Licensing and REPPIR
Capacity and capability	2-year technology assessment (with other regulators)
Accelerate delivery and innovation (cultural shift)	1-year siting assessment
Remove unnecessary red tape	Licensee Organisation????

There is momentum and opportunity via change to reduce regulatory uncertainty and burden, and project perception.

Will and can government and industry create successful delivery ?

Lrc

Regulated New Nuclear for Scotland

Change is coming in England and Wales

There is a way,

Is there the will?

Lrc

PLANNING AND CONSENTING CHALLENGES

Paul Foster, Community Nuclear Power

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

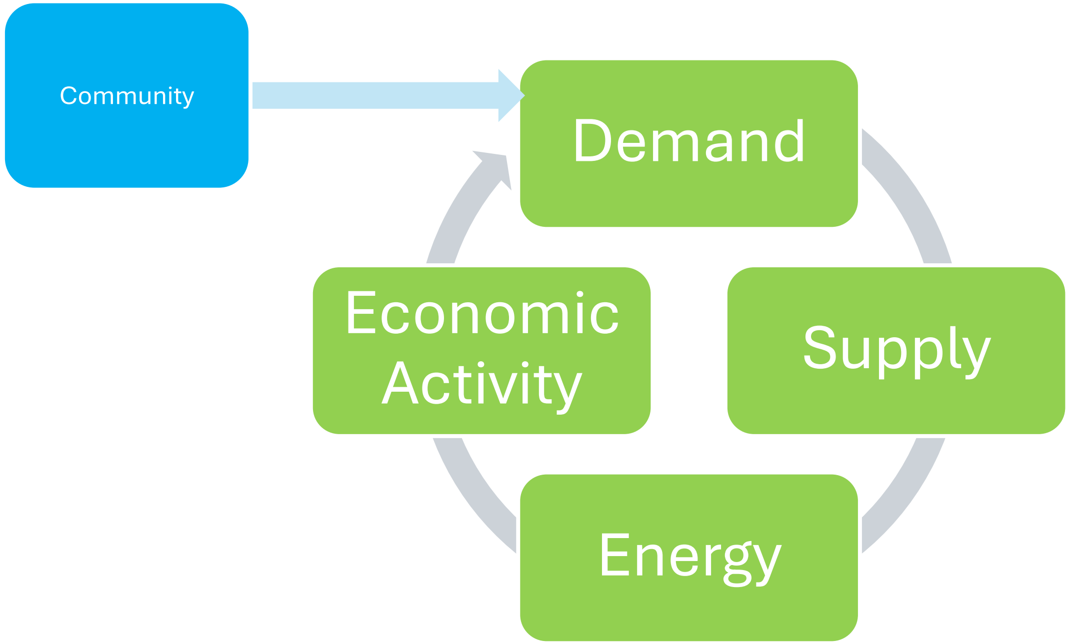
NIA Nuclear Industry Association

Re-industrialising the Regions

Paul Foster

An integrated industrial site

Our Why?



- Power to Industry not Power to Grid
- Replicable across the UK and around the world

Why (and what's special about CNP)?

Economic impact of the build (>£10bn over 10yrs)

Economic impact of the O&M (>£50bn)

Economic impact of the revenue (>£100bn)

Economic impact of businesses that co-locate to a source of low-carbon, always-on power

Part ownership by the host community

Preferential local supply and workforce

Footnote – assume 1.3GW electrical, 80 yr life

What?

Proven Technology

Leveraging AP1000 technology with demonstrated industry leading reliability

330 MWe (990 MWth) 1-loop PWR with demonstrated reliability

Westinghouse AP1000 reactor passive safety technology

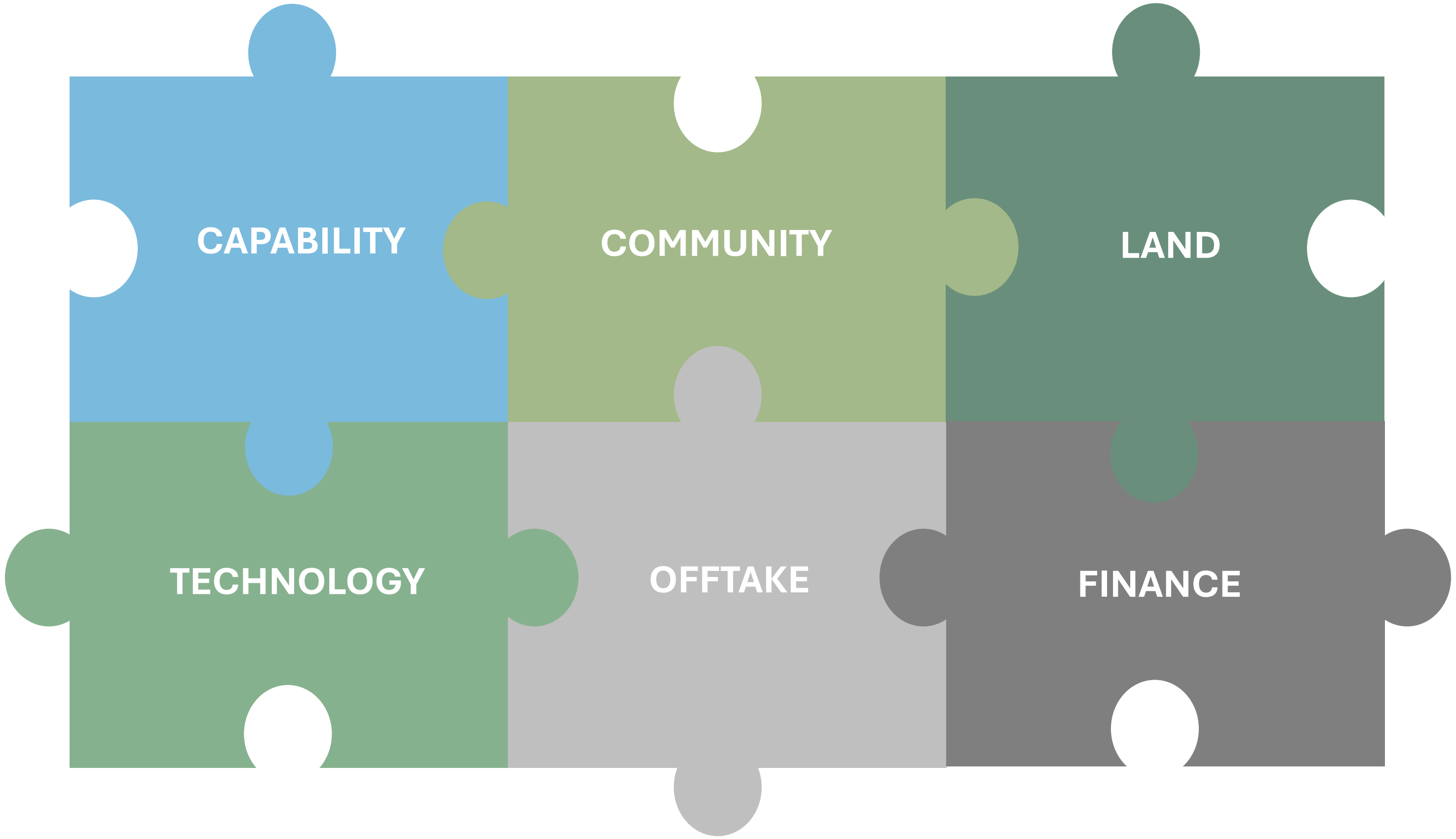
Reduces overall components creating a simpler plant compared to other SMRs

Identical Technology as AP1000 including:

- **Design & licensing methodologies**
- **Major equipment & components**
- **Passive safety systems**
- **Proven Fuel**
- **I&C systems**
- **Proven Supply Chain**
- **Constructability lessons learned**
- **Steel-Composite structural modules**
- **O&M procedures & practices**
- **Fast load follow capabilities**


Westinghouse
Westinghouse
Westinghouse

The Components - How



Summary

Nuclear is the enabler, not the goal

See it for what it is, not for what it is called

Regional re-industrialisation, beginning in Teesside

Coffee Break

10.50- 11.10

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

Morning

10.50am – 12.30pm

10:50 – 11:10 | Session 3: Funding, Insurance, and Economics

SPEAKER: Jasbir Sidhu , Nuclear Capital

11:25 – 11:45 | Session 4: Future Applications in the Energy Transition

SPEAKER: David Mincher, North Court Insurance

11:45 – 12.30 | Morning Panel: Policy, Planning & Investment Outlook

MODERATORS: Ed Reed, EFWD and Andre Walters, Castletown Law

12.30 - 13.15 | Lunch

FUNDING INSURANCE AND ECONOMICS

Jasbir Sidhu, Nuclear Capital

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

A Pathway to a Just Transition
The Role for Nuclear Power

Financing Nuclear Power

Why is the Cost of Capital so High & Why it will Fall?

Edinburgh – 19 March 2026

www.nuclear-capital.com

Jasbir Sidhu – Managing Partner, Nuclear Capital LLP

Important Information

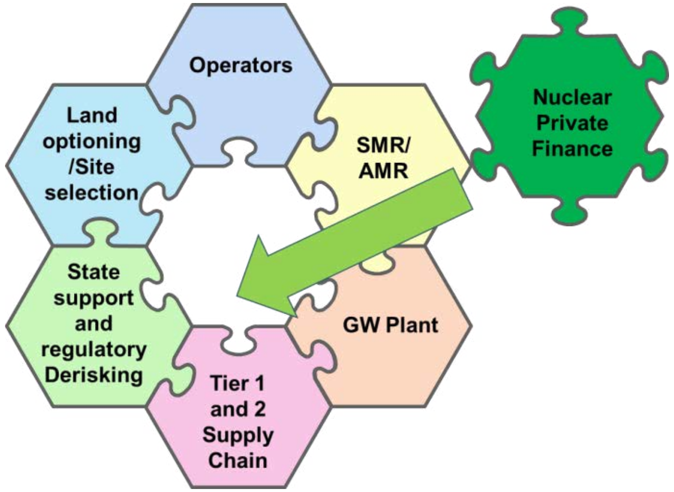
This is not a Financial Promotion:

- The information in this presentation is not intended as an offer or solicitation for the purchase or sale of any investment in any jurisdiction.
- No advice is being offered nor recommendation given, and any examples are purely for illustrative purposes.
- The views expressed in this presentation contain information that has been derived from publicly available sources that have not been independently verified.
- No representation or warranty is made as to the accuracy, completeness, or reliability of the information.

The Nuclear Dream - The Missing Piece

NEED:

Private Finance is the missing piece as the sector moves from 100% Sovereign finance of nuclear

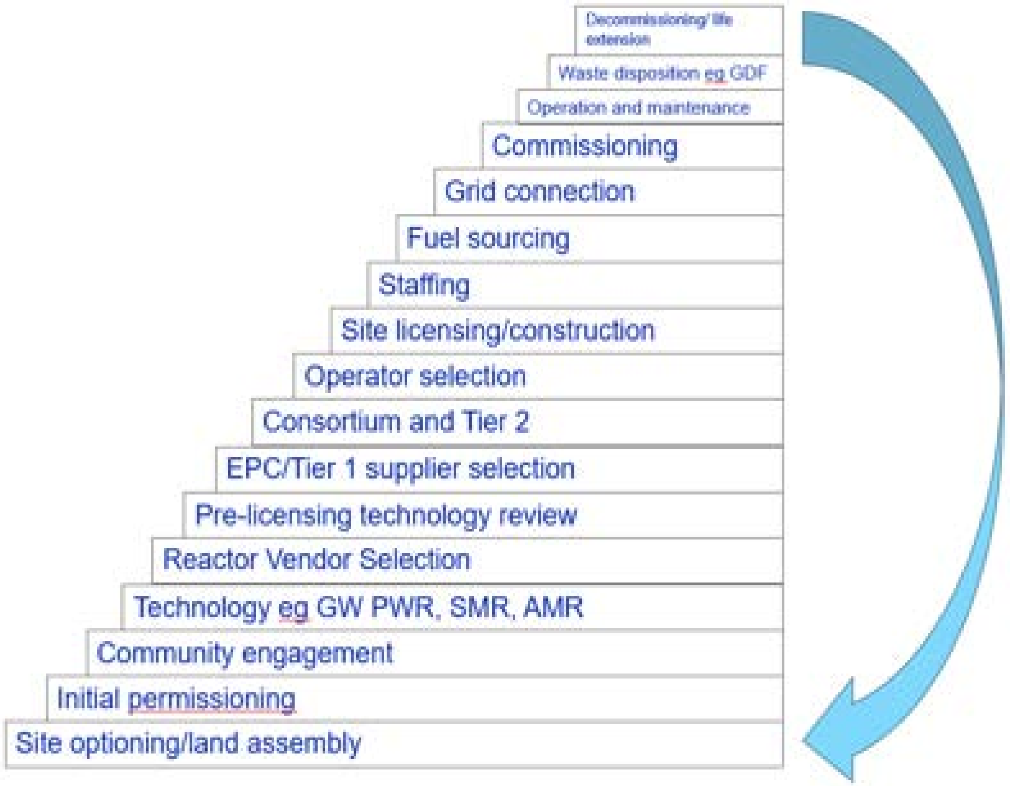


APPROACH

A Hands-on approach to investment management: We look to be involved in projects with regular management meeting and board appointments

EXPERTISE

We understand the nuclear project development cycle and how to achieve investments that work together from site development to decommissioning and/or re-use



Our Fund Offering – Developing the Nuclear Supply Chain

To match industry and investor demand, Nuclear Capital presents an equity fund to capture potential nuclear sector returns across the capital structure and risk spectrum

Growth Equity Fund

Init. Target:
£500m

\+

subsequent funds will follow

- Nuclear Capital consider that there are compelling fundamental market drivers that will lead to more optimistic scenarios of nuclear market development requiring between $1-5Tn of capital being invested in the nuclear market over the next three decades.
- In the steady state scenario, where retiring nuclear is simply replaced, the market remains $0.5-1Tn.
- Either scenario requires governments to attract investors into the sector. The way in which this is achieved at a project level and as those cashflows cascade down through the supply chain will create both opportunities and risk.
- Identifying and executing on these opportunities and managing the risk will best be done by investment managers with experience in the sector. Stringent Due Diligence to be conducted on potential investments.

Nuclear Finance is all about the Cost of Capital

- Nuclear economics are dominated by capex and financing terms
- Financing costs accumulate before revenue begins
- NPP construction heavily influenced by capital cost - 65-80% of LCOE (WNA)
- Small changes in WACC materially alter project viability
- Private capital follows durable policy, not short-term announcements
- SMRs shift financing from bespoke projects to repeatable programmes

If WACC falls from 10% → 5%, LCOE can fall by ~40–50% - IEA

The Past: Why Nuclear Was Financeable

- State balance sheets and regulated monopoly utilities
- Construction and market risk absorbed by government
- Implicit sovereign backstops lowered cost of capital
- Nuclear treated as national infrastructure, not commercial generation

The Present: Hybrid Public–Private Models

Today's three dominant financing levers

1) Revenue certainty

•**Contracts for Difference (CfD)**

- Example: Hinkley Point C – 35-year indexed CfD (92.5/MWh – 2012 prices)
- Addresses **market risk**, *not* construction risk

2) Cost of capital reduction

•**Regulated Asset Base (RAB)**

- Example: Sizewell C under a nuclear-specific RAB
- Consumers pay during construction → **lower WACC**, earlier cash flow

3) Sovereign credit enhancement

•Loan guarantees, export credit, first-loss capital
•Example: US DOE loan guarantees up to $12bn at Vogtle, Darlington SMR – $1bn
Reality
•"Private" nuclear projects **unlikely to close** without **explicit state participation**

Why cost of finance so high for projects - HPC

1. **Construction duration risk** — money is tied up for many years before generation and therefore revenue starts.
2. **FOAK/replication risk** — although EPR is not a novel concept, the Western delivery record on large EPRs created perceived execution risk.
3. **Policy and market risk** — investors need confidence that the revenue regime will survive changes of government and market conditions.
4. **Counterparty and balance-sheet concentration risk** — a very large project can dominate the sponsor’s balance sheet.
5. **Refinancing and inflation risk** — long delivery periods expose projects to changing rates, inflation, supply-chain pressures and foreign-exchange effects.

Why this cost should reduce in the future

1. **Financing models are improving**
   HPC – CFD - large share of risk onto the developer and therefore into the strike price.
   SZC – RAB shifts part of that risk into regulated framework allowing earlier revenue recovery.
   Lower equity returns - broadening the investor base - pension, infrastructure & insurance capital.

2. **Serial build & replication reduce delivery risk**
   SZC projected to cost **20% less than HPC – UK Gov. Why?** Value of "back-to-back nukes,"
   Lenders more comfortable & lower their return thresholds.

3. **Policy support is an improving picture**
   IEA – New era for nuclear, improving market - Demand, Security, & Clean.
   Nuclear shifts from exceptional to strategic infrastructure.

4. **The market is learning how to ring-fence the risk**
   NEA's - WACC is a function of risk allocation. **Better project governance**, standardisation, realistic schedules, earlier supply-chain lock-in, & clearer state support reduce the "uncertainty premium" embedded in both debt and equity.

What this means for SMRs and Gen IV technologies

SMRs and Gen IV do **not** automatically have a lower cost of finance.

First phase - Can have **higher** WACC than large nuclear.
Increased **technology risk, licensing risk, fuel risk and market-adoption risk**.

Trajectory is likely to be:

1. **Pre-demonstration / venture phase**
   Capital is expensive. Mostly sponsor equity, venture capital, strategic investors, government grants, & public R&D money.

2. **Demonstration / first commercial unit**
   Capital remains expensive, but increasingly blended: public support, milestone payments, long-term offtake, export credit, sovereign or utility equity, and possibly loan guarantees.

3. **Fleet / NOAK phase**
   Once the design is licensed, the fuel path is bankable, and repeatability is credible, the asset starts to look like mainstream infrastructure. **WACC should compress materially.**

When do SMRs become financeable on infrastructure terms?

Five key ingredients:

1. Licensable standard design

2. Reliable fuel and supply chain

3. Credible first customer with long-term offtake

4. Repeatable factory-plus-site delivery model

5. Risk-sharing framework - 1st projects carrying all future learning costs

Without these, SMRs and Gen IV remain priced like development-stage technology companies, not utility infrastructure

How are SMRs & Gen IV actually being funded now?

Pick & Mix -

1. Government grants and demonstration support
2. Strategic industrial investors
3. Hyperscaler/data-centre offtake
4. Utility equity
5. Sovereign participation
6. Export credit and development finance
7. Public equity markets for listed advanced reactor developers

The direction of travel – Largely US

- Sep 24 - Microsoft signed a **20-year PPA** with Constellation to support the restart of former Three Mile Island Unit 1, (Crane Clean Energy Center) - data-centre power needs
- Oct 24 - **Google and Kairos Power** signed an agreement for a pathway to deploy **500 MW** of advanced nuclear capacity by 2035. Google described it as the world's first corporate agreement to purchase nuclear energy from multiple SMRs
- Amazon - **more than $500 million** to help develop SMRs, including projects with Energy Northwest & X-energy, specifically in the context of growing power demand & data-centres
- Jun 2025 - Advanced reactors - TerraPower announced a **$650 million** raise including new investment from Nventures – Natrium Tech – 345 MW sodium cooled fast reactor & storage system
- Jan 26 - Meta agreements with **Vistra, TerraPower & Oklo**, **6.6 GW** to support AI infrastructure. Innovative Financing - Oklo - Ohio arrangement with Meta includes a mechanism for **prepayment for power & early-stage funding** to improve project certainty
- State-support, DOE closed a **$1.52 billion loan guarantee** for Holtec's Palisades restart in **Sep 2024**

AI-related funding for finance-market confidence

Hyperscalers & AI infrastructure companies are becoming quasi-anchor customers

1. Creating bankable demand

Data-centres have very large power needs. Load profiles value **24/7 reliable & available power**

2. New contract structures

Long-term PPAs, capacity-style arrangements, prepayments, anchor-load contracts, tolling structures, or site-specific co-development.

3. Lower perceived technology risk

Google, Amazon, Microsoft and Meta committing capital or PPAs, markets infer that the demand case is stronger and that project sponsors may have more robust diligence behind them.

These deals do **not yet prove that advanced nuclear has become cheaper**. They signal **large, creditworthy customers are willing to help underwrite the path to commercialisation** because their need for reliable power is becoming acute.

SMRs – Change the financing logic

- SMRs are not cheap as chips, but offer cheaper programmes
- Value emerges through fleet build, standardisation, and learning curves
- Bankability improves materially after Unit 3–5
- Investors require minimum fleet commitment, not single-unit pilots
- The transition from gigawatt nuclear to SMRs is fundamentally a transition from bespoke project finance to repeatable infrastructure finance
- Regulatory decision making needs to speed up

Gen IV – Financial challenges

Gen IV attractive where it solves a problem that large LWRs and SMRs do not solve well:

- High-temperature industrial heat, fuel efficiency, load following, hydrogen, or co-location with industrial or digital loads
- Today Gen IV funding is still mostly a blend of **public support + strategic capital + early customer commitments**
- Technology & fuel-chain risks remain material
- The HALEU supply challenge is still a real financing variable in advanced reactors

Time-to-FID Must Fall: 5–6 Years → ~2 Years

- Long pre-FID timelines strand capital and raise equity return hurdles
- Licensing, siting, financing often proceed sequentially
- Parallel activity is essential to attract private capital
- FID speed is now a competitiveness metric between jurisdictions

If FID cannot be brought down to around 24 months, there will be no significant build out of SMR/AMR projects

UK Nuclear Regulatory Task Force

- The Fingleton review – Published November 2025
- Three main regulatory drivers to overcome – Risk Aversion, Process over Outcome, and Lack of Incentives
- 47 recommendations
- Identified duplication and sequencing issues in UK approvals
- Called for earlier regulatory clarity and better coordination
- Focus on reducing friction without reducing safety standards

- March 13, 2026 – All reforms accepted and delivery by end of 2027

Insurance as a Financing Enabler

- Construction, delay-in-start-up, property damage are insurable
- Nuclear pools/insurers manage third-party liability risk
- Nuclear pools and reinsurance markets provide scalable capacity
- Insurance enables risk transfer and balance-sheet protection
- BUT **Uninsurable risks must stay with the state**

  - FOAK design risk

  - Retrospective political intervention

  - Government policy reversal
- ***Insurance doesn't remove risk — it makes risk financeable",***

What Investors Need from Government

- Access to sites
- Statutory revenue frameworks (CfD / RAB embedded in law)
- Explicit fleet commitments, not single-project approvals
- Parallel licensing with a clear path to FID in ~24 months
- State backstop of non-insurable political and FOAK risks
- Early engagement with insurance and reinsurance markets

Feb 26 – UK Advanced Nuclear Framework – A positive step forward

Are SMR & AMR Valuations Creating a Nuclear Bubble?

- US SMR/AMR developers reaching multi-bn valuations pre-FID and pre-revenue
- Equity pricing driven by policy optionality, AI power demand, and asset scarcity
- Growing disconnect between public equity valuations and bankable project economics
- Risk: misallocated capital damages credibility with governments and lenders
- Enduring value comes from fleets, contracts, and execution — not prototypes

Final Thoughts

To make nuclear-generated energy more manageable in cost terms, the market has to do three things:

1. De-risk the asset
through licensing clarity, standardisation, credible EPC strategies, supply-chain depth, and realistic schedules, and better project governance – reduce FID timescales.

2. De-risk the revenue
through RAB, sovereign support, long-term PPAs, hyperscaler contracts, capacity payments, or other bankable offtake.

3. De-risk the capital stack
through blended finance: public equity, private equity, export credit, development banks, infrastructure debt, vendor support, and refinancing after commissioning.

Nuclear is a financing and risk management problem - not a technology problem!

FUTURE APPLICATIONS IN THE ENERGY TRANSITION

David Mincher, Northcote Insurance

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

Northcourt
Nuclear Risk Specialists

An Optio company

Future Applications in the Energy Transition – Insuring the risks.

David Mincher
Nuclear Risk Engineer

Who we are

Northcourt is an international insurance and reinsurance Managing General Agent sponsored by Lloyd's and the company market.

Northcourt can underwrite risks on a truly international basis wherever Lloyd's has a license to issue insurance or reinsurance policies.

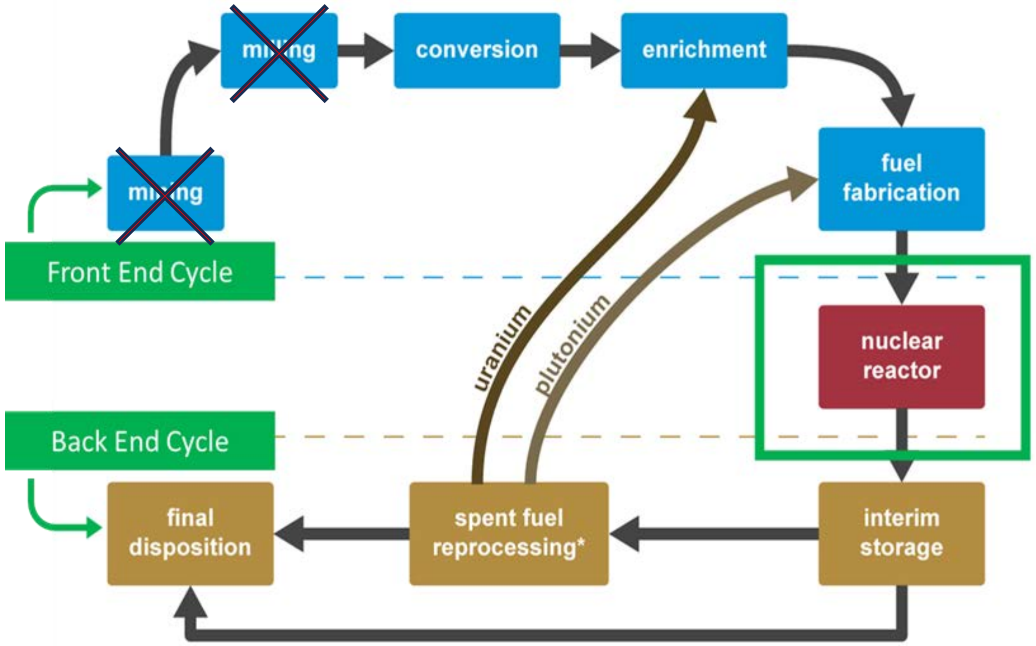
All of its panel of insurers are "A" security rated or above.

It has truly professional nuclear staff with over 100 years of collective experience.

Northcourt operates Nuclear Property Damage and Nuclear Third Party Liability Binders.

Northcourt is headquartered in Malta with a branch office in London.

What we do / our insureds



Nuclear utilities	Nuclear fuel fabricators
Governments	Enrichment facilities
Nuclear waste facilities	Nuclear research reactors
Investors in nuclear	Contractors
Suppliers	Regulators

NC Fusion

Optio is proud to partner with TMGX in support of Northcourt's pioneering work and will continue to broaden the facility's product suite as fusion technology advances. This affirms Northcourt's standing as a global leader in both fission and fusion energy insurance and further enhances its position at the forefront of breakthrough clean-energy risk solutions.

Gary Head, Chief Underwriting Officer, Optio Group

TOKIO MARINE GX

The insurance market has historically responded to innovation after it arrives. With nuclear fusion, we're taking a different approach, positioning ourselves ahead of commercial deployment to ensure insurance coverage doesn't become an obstacle when this technology is ready to scale.

By partnering with Northcourt, we're combining our financial strength and energy expertise with specialist nuclear underwriting knowledge to create new insurance frameworks that address fusion's unique risks. This is exactly what TMGX was created to do: remove barriers to innovation, reduce market volatility, and enable the energy transition at every stage of development.

Ben Kinder, Chief Underwriting Officer of Tokio Marine GX

Topics to be covered

Within the energy sector what do the future risks look like and what information do insurers need?

How insurance supports national indemnity undertakings and how those risks are underwritten on an international basis.

Future insurance for marine cargo vessels powered by nuclear.

What future insurance might look like.

Within the energy sector what do the future risks look like and what information do insurers need?

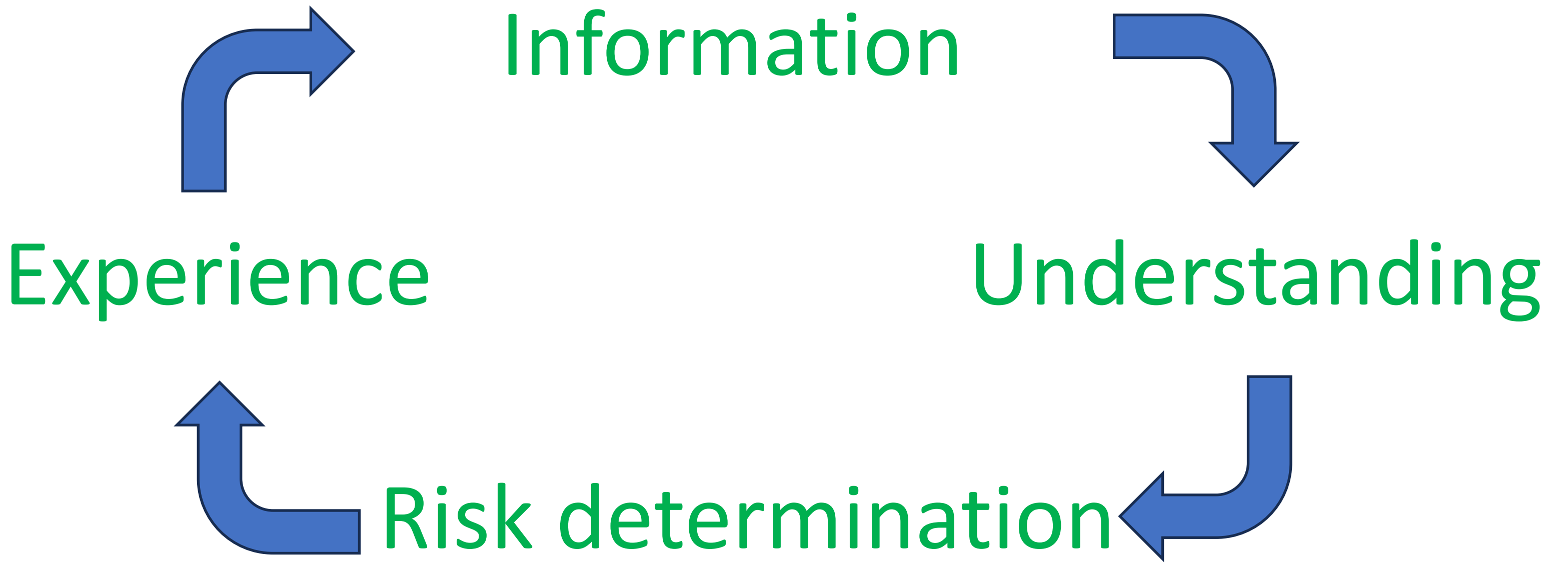
in·sur·ance [ɪnˈʃʊər(ə)n(t)s, ɪnˈʃɔːr(ə)n(t)s]

Noun

1. an arrangement by which a company or the state undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium:
   "many new borrowers take out insurance against unemployment or sickness"

   Similar: indemnity | indemnification | security | surety | cover

What’s important?



Current Nuclear Guidelines

International Guidelines for
Nuclear Safety • Operations • Third Party Liability
at Nuclear Power Plants

PUBLISHED ON BEHALF OF THE NUCLEAR POOLS FORUM
Revision 004, May 2024

INTERNATIONAL GUIDELINES
FOR THE
FIRE PROTECTION OF NUCLEAR POWER PLANTS

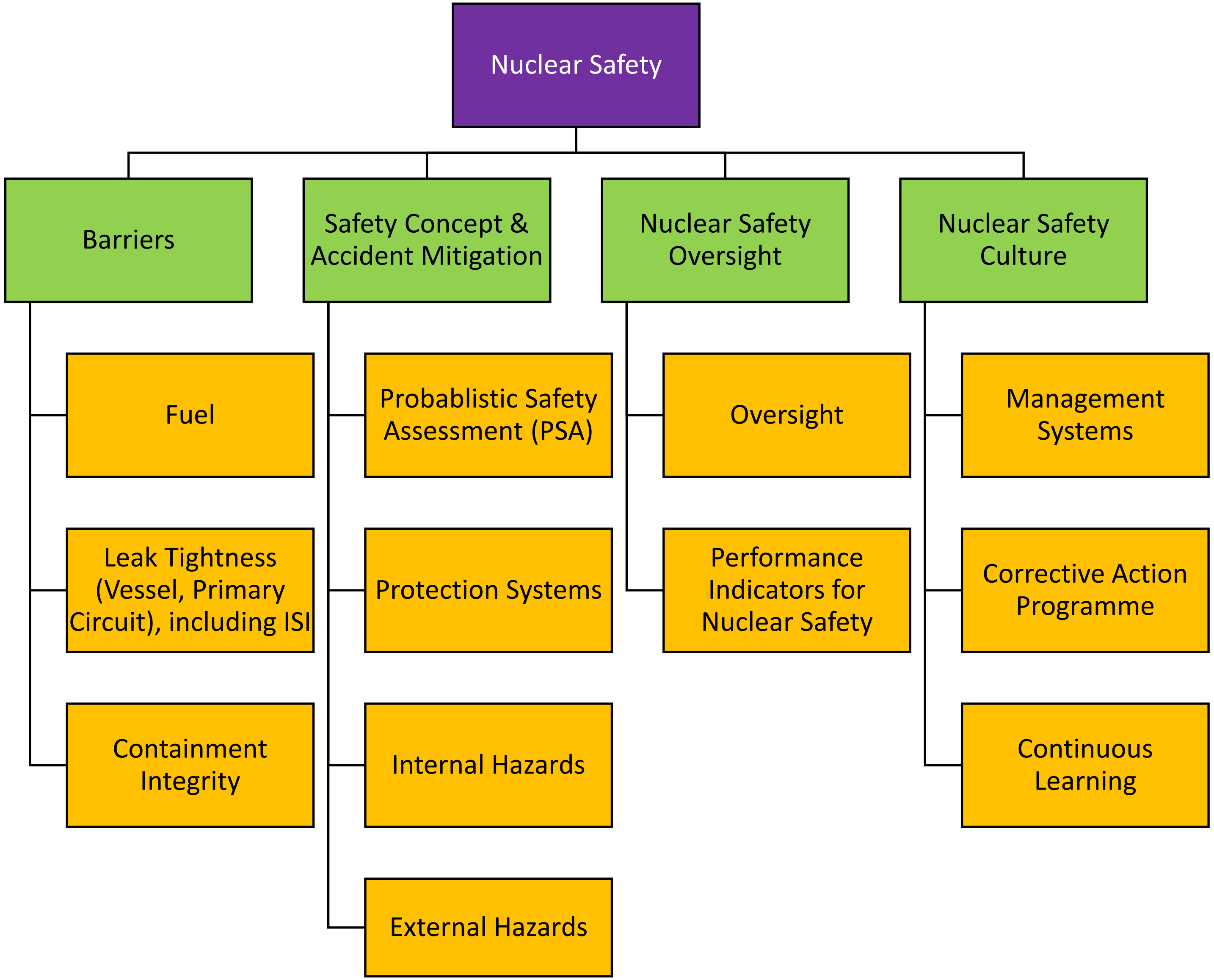
ISSUED IN 2015
ON BEHALF OF THE NUCLEAR POOLS' FORUM
5th EDITION

International Guidelines for
Machinery Breakdown Prevention
at Nuclear Power Plants

PUBLISHED ON BEHALF OF THE NUCLEAR POOLS' FORUM
Revision 005, August 2017

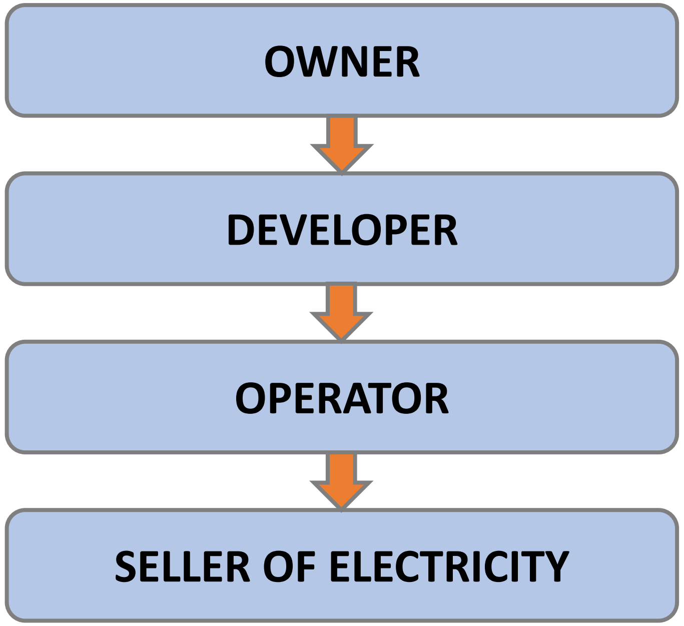
International Guidelines for
Nuclear Safety Culture Surveys
at Nuclear Power Plants

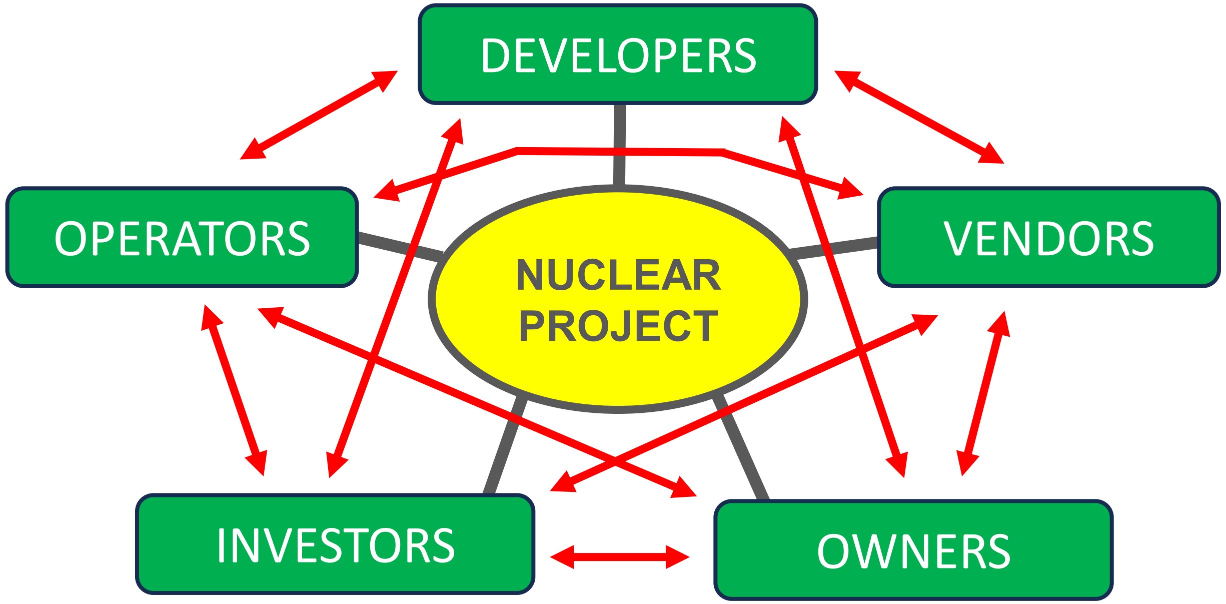
PUBLISHED ON BEHALF OF THE NUCLEAR POOLS FORUM
March 2015



Nuclear Safety
Barriers
Safety Concept & Accident Mitigation
Nuclear Safety Oversight
Nuclear Safety Culture
Fuel
Leak Tightness (Vessel, Primary Circuit), including ISI
Containment Integrity
Probablistic Safety Assessment (PSA)
Protection Systems
Internal Hazards
External Hazards
Oversight
Performance Indicators for Nuclear Safety
Management Systems
Corrective Action Programme
Continuous Learning

Current vs Future models





New technologies must be fully understood

Da Vinci Code Cryptex

TRISO (Tri-Structural Isotropic) Fuel pebble

Images by kind permission of X-Energy (www.x-energy.com)

Insuring First-Of-A-Kind (FOAK)

Offshore Wind (1990s–2000s)
Early offshore wind farms in harsh marine environments. FOAK projects with high premiums and strict exclusions - now a standard insurance class.

Cyber Risk (2000s)
Emergence of cyber insurance for digital and network exposures. No historical claims data; underwriters had to model novel and unpredictable risks.

Space & Satellite Launches (2000s–2010s)
Early rocket launches and satellite missions were FOAK with high uncertainty. Now a mature, globally standardised insurance market.

How insurance supports national indemnity undertakings and how those risks are underwritten on an international basis

The 6 basic principles of nuclear liability

- The operator has **strict liability**: any victims need not prove fault or negligence but must prove the causal link between the incident & all damage.
- The operator has **exclusive liability**: if nuclear damage is suffered by third parties, no liability attaches to (e.g.) suppliers & all liability is channelled to the site operator.
- The operator's **liability is limited in time**: any claims made against operators must be made within a specified period (mostly 10 years other than for injury which 30 years).
- The operator's **liability is limited in amount**: the operator's liability is limited to a nationally specified amount which must be covered by insurance (or other financial security). In countries with unlimited liability, operators still have a specified amount of financial security.
- **Unity of jurisdiction**: courts in the state where the nuclear incident occurs have exclusive jurisdiction. Judgements are recognised & enforceable in other territories.
- **Non-discrimination**: victims cannot generally be discriminated against because of domicile, nationality or residence.

Future insurance for marine cargo vessels powered by nuclear

Why nuclear is well suited for commercial maritime

- Zero emissions
- High energy density
- Reduced refuelling and port dependency
- Space and weight efficiency
- Operational reliability
- Potential for standardisation and modularisation
- Improved lifecycle economics

Note: For vessel operators, nuclear-powered ships will eliminate their largest operating costs, up to $50 million annually in bunker fuel and an estimated $18 million in carbon penalties (Lloyd's Register)

Built like a ship, regulated like a nuclear plant

- First of a kind Nuclear Floating Power Plant operational since 2020
- It is a non-self-propelled power barge that operates as NPP
- Two modified PWR KLT-40S ice-breaker type nuclear reactors producing 70 MW electric or 300 MW thermal
- Replaced ageing NPP (Bilibino) and a coal-fired station
- It's heat output is as strategically important

Other FNPP developers

FNPP	Country	Reactor	Shipbuilder	Graphic
Akademik Lomonosov	Russia	OKBM Afrikantov 2 x KLT-40S 35 MWe each modular PWRs	Baltic Shipyard, St. Petersburg, Russia	
Optimized Floating Power Unit (OPEB)	Russia	OKBM Afrikantov 2 x RITM-200M 50 MWe each integrated PWRs	TBD	
China National Nuclear Corporation (CNNC) FNPP	China	CNNC 1 x ACP100S 125 MWe integrated PWR	China State Shipbuilding Corp. (CSSC) **	
China General Nuclear Power (CGN) FNPP	China	CGN 1 x ACPR50S 60 MWe modular PWR	China State Shipbuilding Corp. (CSSC) **	

FNPP	Country	Reactor	Shipbuilder	Graphic	Status
Kepco Engineering & Construction Company (Kepco E&C) FNPP	South Korea	KEPCO E&C 1 x BANDI-60S 60 MWe modular PWR	Daewoo Shipbuilding & Marine Engineering (DSME) *		Vessel design by Korea Institute of Machinery and Materials (KIMM). Construction schedule not announced.
Seaborg Technology Power Barge	Denmark	Seaborg 2, 4, 6 or 8 x 100 MWe Compact Molten Salt Reactors (CMSRs)	Likely a South Korean shipyard TBD		Seaborg has MOU in place with a S. Korean partner. Plans for prototype (2025 - 2027) & commercial power barge after 2027.

Core Power of the UK has announced that it will “bring floating nuclear power to market by the mid-2030s"

Summary

- Zero emissions
- Rapid deployment
- Remote & coastal supply
- Minimal land footprint
- Multi-use energy output

- Zero emissions
- High energy density
- Fuel price stability
- Operational reliability
- Reduced port dependency

Opportunities for insurance markets

Timeline	FNPP
By 2030	~5-10 units
2030-2040	~20-50 units
By 2050 (optimistic)	~100-200 units
By 2050 (accelerated)	~300-500 units

Timeline	Shipping
By 2030	~0-10 vessels
2030-2040	~50-200 vessels
By 2050 (likely)	~300-800 vessels
By 2050 (high adoption)	~1,000+ vessels

Implementation / deployment challenges

Technology Integration

- Safety Criticality
- SSC Graded Approach
- Nuclear License Requirements

Safety Case

- Environmental Considerations
- Marine Conditions

Security and Safeguards

- Marine Security
- Supporting Activities for Security

Operations

- Personnel
- Emergency Response
- Upstream, Downstream and Supporting Activities

Insurance

- Assurance
- Risk Management
- Acceptable Risk

Finance

- Investment
- Financial Risk Management

- Lack of a unified international regulatory framework that integrates maritime and nuclear industries
- Public perception / acceptance

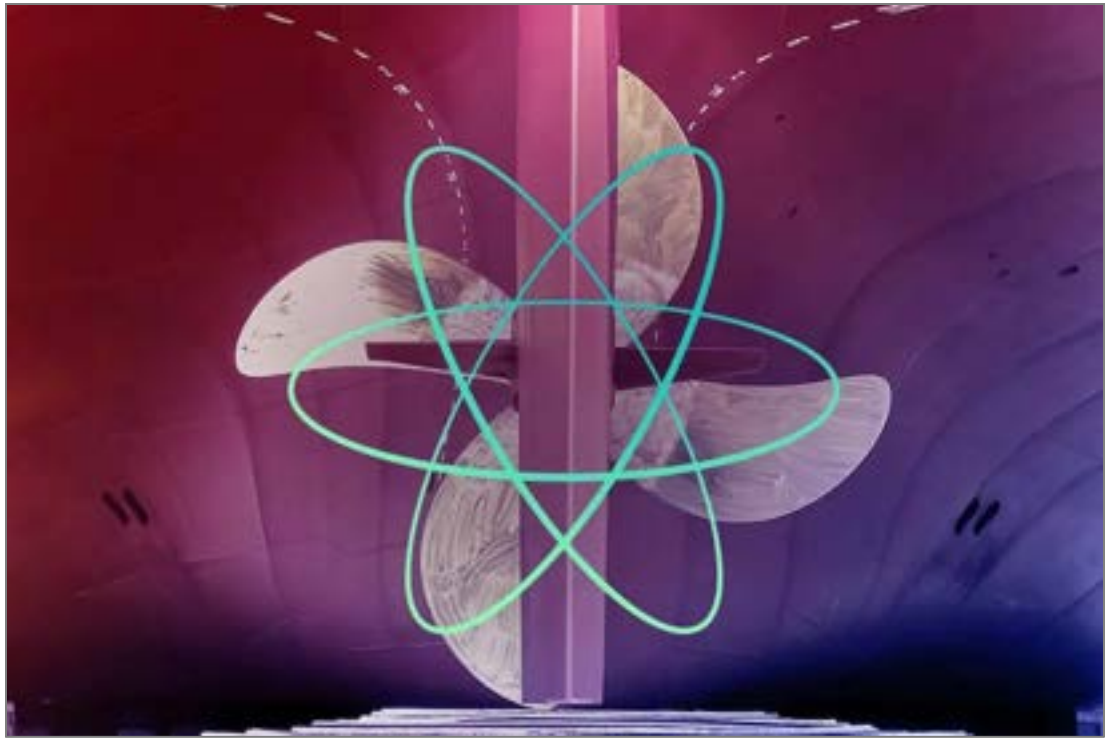
Insurance considerations overview

FNPPs and nuclear-powered commercial vessels present a complicated mix of nuclear safety, marine operations, environmental exposure and geopolitical risk, creating a unique risk profile.

- Regulatory & Licensing
- Nuclear Third-Party Liability
- Hull, Marine, & Physical Damage
- Nuclear Risks
- Environmental & Pollution Liability
- Decommissioning & Waste Management
- Business Interruption
- Cyber Risks
- War, Terrorism, Piracy & Political Risk
- Salvage, Emergency Response & Wreck Removal

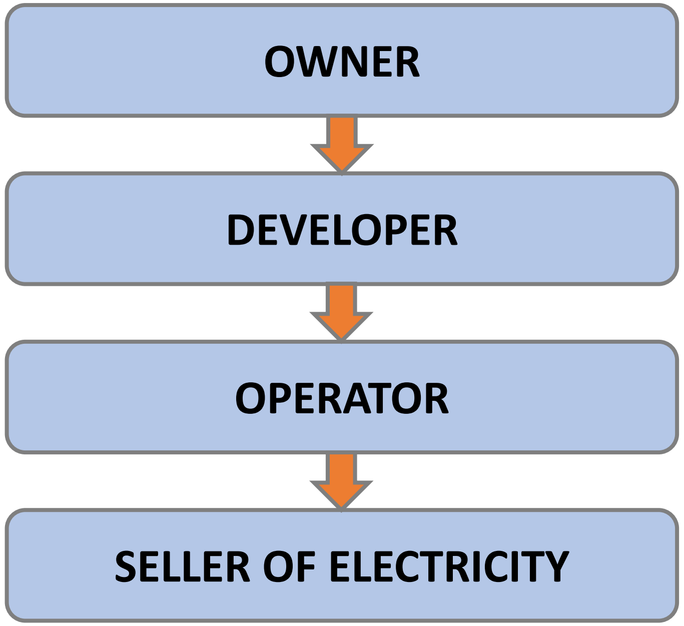
Commercial Floating Nuclear

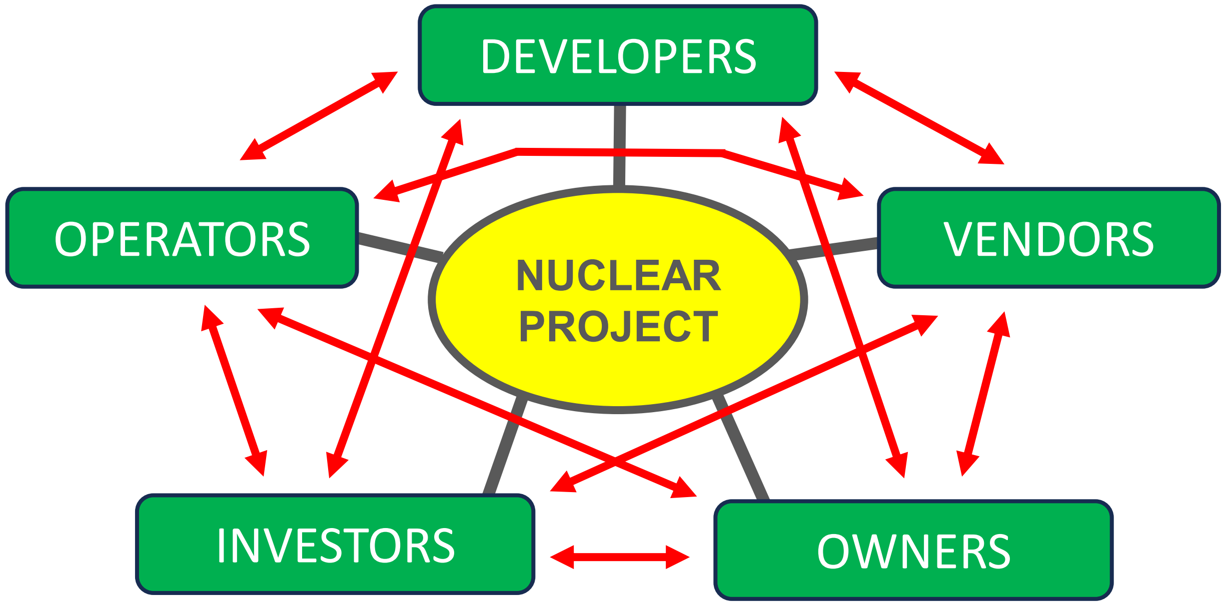
- The maritime sector is entering a transformational decade.
- Nuclear will play a major role in delivering net zero shipping, energy security, and resilient global trade routes.
- Insurance industry will be right at the centre of enabling that transition.



What future insurance might look like

Current vs Future models





(Unique nuclear) challenges to overcome

Financing and investor confidence

Regulatory complexity

Supply chain / Skills shortage

Political commitment

Cost overruns

Fuel supply

Waste storage

Summary

- Insurance is essential in providing the financial support to investment in infrastructure.
- The technology must be fully understood in order to provide valid risk assessment.
- Insurers should be involved early in the development process to review the risk.
- Use the insurer as the “critical friend”.
- The insurance industry is experienced in FOAK technologies.
- In insurance terms, very little is new or novel. There is inherent flexibility to adapt to change.

Further Information

David Mincher
Nuclear Risk Engineer

Mobile: (+44) 778 087 8901
Email: david.mincher@northcourt.eu
Website: www.northcourt.eu

Address: 1 Minster Court, Mincing Lane, London, EC3R 7AA, UK

PANEL: POLICY, PLANNING & INVESTMENT OUTLOOK

Moderated by:

Ed Reed, E-FWD

Andrew Walters, Castletown Law

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

Lunch

12.30 - 13.15

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

Afternoon

1.15pm – 4.00pm

13:15 – 13:35 | Session 5: Decommissioning and Expertise

SPEAKER: Andrew Renton, Castletown Law

13:35 – 13:55 | Session 6: Marine Propulsion & Barge-Based Generation

SPEAKER: Toby Menzies, Core Power

13:55 – 14:15 | Session 7: Integrated Energy Systems

SPEAKER: Emily Kunkel, Thornton Tomasetti

14:15 – 14:30 | Afternoon Break

14:30 – 15:45 | Afternoon Panel: The Future of Nuclear in Scotland

MODERATORS: Ed Reed, E-FWD, Andrew Bowie, MP, Tom Greatrex, NIA

DECOMMISSIONING AND EXPERTISE

Andrew Renton, Castletown Law

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

CASTLETOWN LAW

A Just Transition

Decommissioning and Expertise – Leveraging Scotland's decommissioning and oil & gas experience.

Who is Castletown Law?

- Specialist Law firm
- Energy and Infrastructure experts
- Operating internationally
- Staffed by experts in their field
- Average qualification period >10yrs
- ABS model delivering value to clients

Scottish Decommissioning Examples

- **Coal/Oil- plants**: Longannet Power Station, Cockenzie Power Station, Kincardine Power Station, Methil Power Station, Ardeer Power Station, Inverkip Power Station.
- **Steel Plants**: Ravenscraig, Gartcosh, Clyde Iron Works.
- **Aluminium Plants**: Kinlochleven Smelter, Foyers Smelter, Burntisland Alumina Plant, Invergordon Smelter.

Decommissioned Sites

Cont…..

Cont.

Oil Installations

Decommissioned examples:

Ninian Northern
Buchan Alpha
Murchison Platform
Stirling Field

Still to do:

Grangemouth Refinery
Brent Field (Shell).
North Sea Fields (Various) Balmoral, Burghley, Beauly, Thistle, Don etc…….. .
MossMoran – part?

Civil Nuclear

Dounreay
Chapelcross
Hunterston
Torness

DECOM skill sets in Scotland

- **Offshore Decommissioning (Oil & Gas):** Expertise is required in subsea engineering, well plugging and abandonment, vessel management, and onshore recycling, with over 700 businesses operating in this space.
- **Nuclear Decommissioning:** Involves decommissioning nuclear sites, waste management, radioactive waste treatment, site remediation, and environmental remediation. (Dounreay etc)
- **Essential Skills:** Engineering, project management, commercial negotiations, regulatory law, health and safety, and environmental impact assessment are critical.
- **Training & Education:** The National Decommissioning Centre (NDC)—a partnership between the University of Aberdeen and the Net Zero Technology Centre—provides MSc and CPD courses in decommissioning.
- **Future Focus:** With a potential $100 billion spend expected, skills in technology development, project controls, and environmental remediation are highly valued
- **Offshore Decommissioning:** Wind installations.

Scots Engineering History

UK and Global Decommissioning Market

According to Oil and Gas UK (OGUK), the UK's offshore oil and gas industry spending on decommissioning currently amounts to around £1.5 billion per annum, meaning that decommissioning in itself is big business for the UK oil and gas sector.

UK legislation in this area, as in most jurisdictions, requires that all oil and gas infrastructure installed on the UKCS must be removed at the end of its life – subject to some limited derogations.

It is worth noting, that not all pipelines have to be removed; with approval, these relatively unobtrusive pieces of supporting sub-sea infrastructure are often left in situ and are either trenched or covered with rock.

The primary UK act governing decommissioning is the Petroleum Act 1998 (Part IV of which deals with abandonment), as amended by the Energy Act 2008 and Energy Act 2016.

UK and Global Decommissioning Market

- Global Market value for oil and gas industry decommissioning in 2026 is estimated at $89bn.
- This is expected to grow to $16+ bn by 2034.
- Europe is currently second biggest market after North America.
- Growth is driven by ageing assets and stricter regulations.
- Other markets are expected to evolve in the near future.
- Deep water decommissioning expertise is needed internationally and Scotland has it.

UK and Global Decommissioning Market

- UK nuclear decommissioning is primarily governed by the Energy Act 2004, which established the Nuclear Decommissioning Authority (NDA) to clean up civil nuclear legacy sites. The Office for Nuclear Regulation (ONR) regulates safety under the Nuclear Installations Act 1965, aiming for safe, cost-effective site clearance.
- The UK nuclear decommissioning market is one of the world's largest, with long-term liabilities estimated at approximately £149 billion to £150 billion.
- EY analysis highlights a long-term potential in 12 countries assessed as having a market value of US$125b–US$135b between 2021 and 2050.

Decom North Sea commentary

- well abandonment technology and solutions that reduce rig time and cost
- optimised project management and engineering solutions that improve project delivery and accurate cost management
- specialist equipment and techniques for the clean-down of equipment and infrastructure, be it topsides or subsea
- proven, safe and environmentally effective onshore dismantling and waste management.
- management, including that for the handling of hazardous materials, including naturally occurring radioactive materials (NORM)
- specialist capabilities for survey, recovery, possible reuse
- dismantling of subsea assets and infrastructure

Becoming a World Leader

- **Technical Expertise & Innovation:** Master the safe dismantling of complex structures. Advanced robotics, digital tools for virtual mapping, specialist techniques for decontamination and protection.
- **Safety & Risk Management:** Culture of safety to protect personnel and the environment. Rigorous planning, specialized decontamination procedures, and proper waste management.
- **Environmental Responsibility:** Future use:- don't just plan for decommissioning – plan fr the full journey and where appropriate future use.
- **Project Leadership & Efficiency:** Long-term project planning, managing tight budgets, and minimise operational risks, as seen in North Sea offshore projects and nuclear decommissioning authorities.
- **Strategic Collaboration:** Work with regulatory bodies, stakeholders, and the supply chain to drive innovation and share knowledge. Supporting centres of excellence (such as in Aberdeen) and fostering international partnerships help build industry leadership.
- **Reputation and Reliability:** develop a global reputation for reliability in delivery.

CASTLETOWN LAW

Thank you.   Invite us in.

Andrew Renton
andrew.renton@castletownlaw.com

MARINE PROPULSION AND BARGE BASED GENERATION

Tobi Menzies, Core Power

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

Nuclear at Sea: Building the Business Case of Nuclear for Maritime in the OECD

Tobi Menzies | CORE POWER

Leading the Global Shipping Revolution

CORE POWER Propulsion

Power Delivery – On Budget, On Time

CORE POWER Generation

Revitalising the Maritime Industrial Base

CORE POWER Construction

REBUILDING A ROBUST COMMERCIAL MARITIME SECTOR

Civil Maritime Nuclear Propulsion

Commercial Shipping is a Performance Business

- Costs of fossil fuel and environmental compliance are causing the slowest ship speeds in a century.
- OECD-built civilian maritime nuclear propulsion solves these problems
- Faster, more reliable ships => fewer hulls with faster turnaround times
- Clear commercial advantage for e.g. UK, US etc flag operators
- Competitive edge against China

Floating Nuclear Generation

FNPP Delivery Premise

- **CP is technology selective**
  - Gen III+ to start; Gen IV when ready
- **Initial market opportunities in U.S., followed by selected OECD nations**
  - Government initiatives for nuclear and maritime investments
  - Existing licensing pathways with national regulators
  - Strong demand signals for economic electricity
- **Primary delivery platforms**
  - Two sizes: 300MWe and 600MWe
  - Self propelled with conventional engines
  - Alternate configurations of towed barges / smaller power levels as driven by market signals and opportunities

Disrupting Legacy Nuclear

FNPPs deliver clean, firm nuclear power, on time and on budget.

CORE POWER FNPPs:

Modular shipyard construction	**Serial production** of identical units	**Predictable** cost and schedule	Delivered to location **fully assembled** with minimal site preparation
Shorter build time → faster revenue generation and lower cost of capital	Workforce learning curve → **increases** efficiency and **decreases** unit costs	**Flexible production** to match demand	Returns to yard at end of life → **simplified decommissioning**

FNPPs Ideally Suited for Diverse Markets

- **Utilities**: Investor-owned utilities, municipal utilities, independent power producers, electric cooperatives
- **Large-load direct customers**: Extractive industries, data centers, manufacturing and process industries
- **Microgrids**: Ports and maritime logistics hubs, islands, industrial clusters
- **Transient energy**: disaster relief, large construction projects



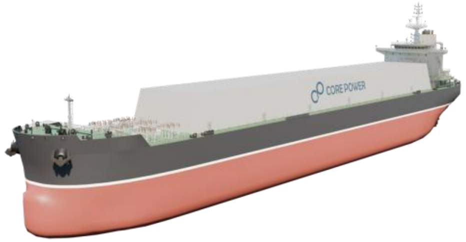


Shipyard Industrial Base

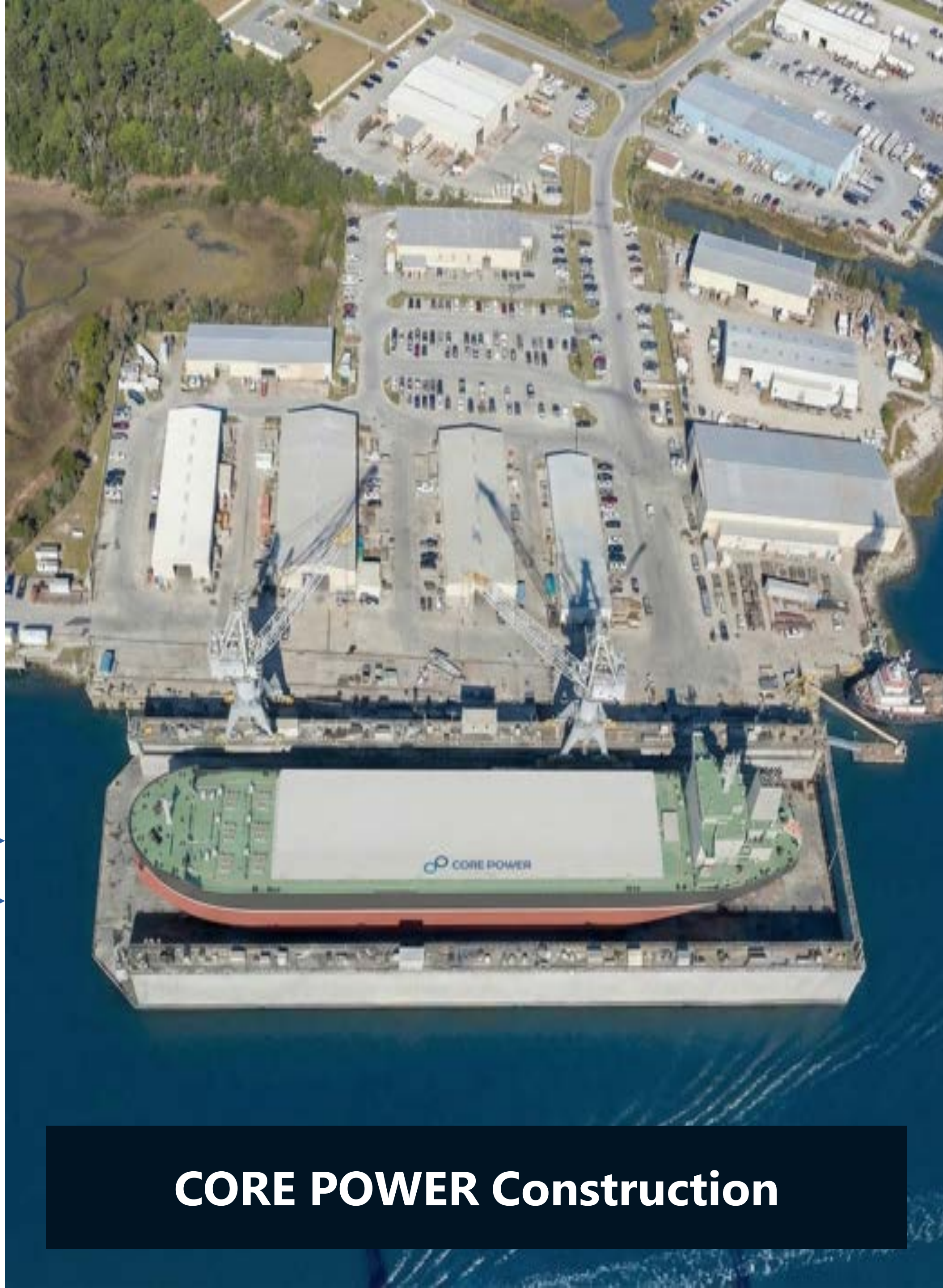
Revitalizing shipbuilding

- U.S. and U.K. nuclear-ready yards for nuclear integration, maintenance and refueling
- Serial, modular production for repeatable quality and predictable schedules
- Industrial workforce renewal for thousands of high value jobs and apprenticeships

Floating Nuclear Power Plants

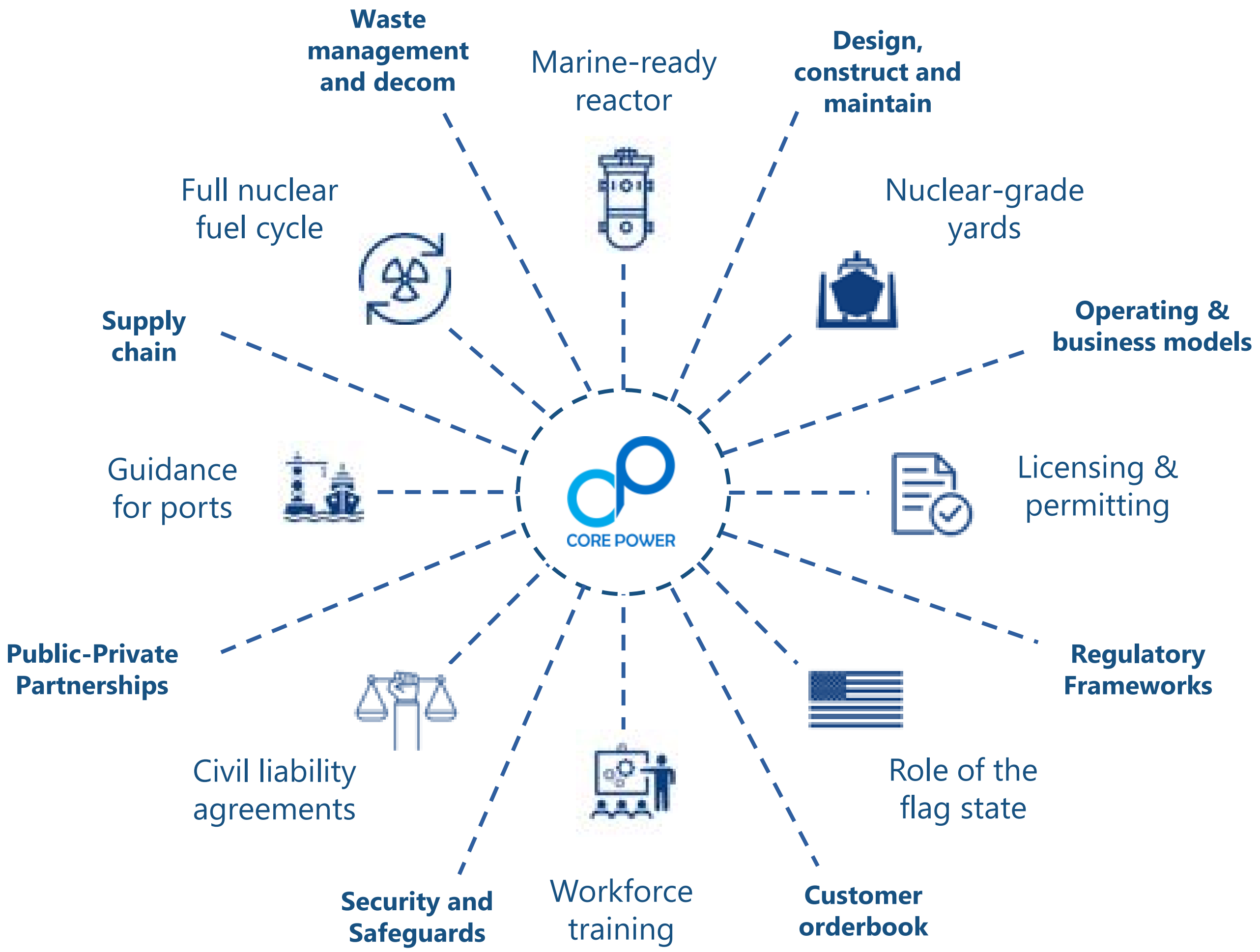


Civil Maritime Nuclear Propulsion



What’s Coming in 2026

- Delivering a business structure to align with major product lines of maritime propulsion and floating energy generation
- Aligning technology partnerships for an accelerated time to market
- Selecting sites for shipyard investment and development
- Expanding our investor base along strategic product lines and markets
- Executing updated international safety and liability frameworks



CORE POWER

CONTACT

UK Team: **CORE POWER (UK) Ltd**
Office: Bldg 5, Chiswick Business Park, 566 Chiswick High Rd, London W4 5YF, UK
Tel: +44 20 8849 8890

US Team: **CORE POWER (US) Inc**
Office: McPherson Building, 6th Floor, 901 15th Street NW, Washington DC 20005, USA
Tel: +1 202 961 3950

Japan Team: **CORE POWER (Japan) Ltd**
Office: Level 11, TOHO Hibiya Promenade Building, 1-5-2 Yurakucho, Chiyoda-ku, Tokyo 100-0006, Japan
Tel: +81 80 9557 1440

Web: corepower.energy
Email: admin@corepower.energy

X (Twitter): x.com/COREPOWER10
LinkedIn: linkedin.com/company/core-poweruk

INTEGRATED ENERGY SYSTEMS

Emily Kunkel, Thornton Tomasetti

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

Nuclear Industry Association

18TH MARCH 2026

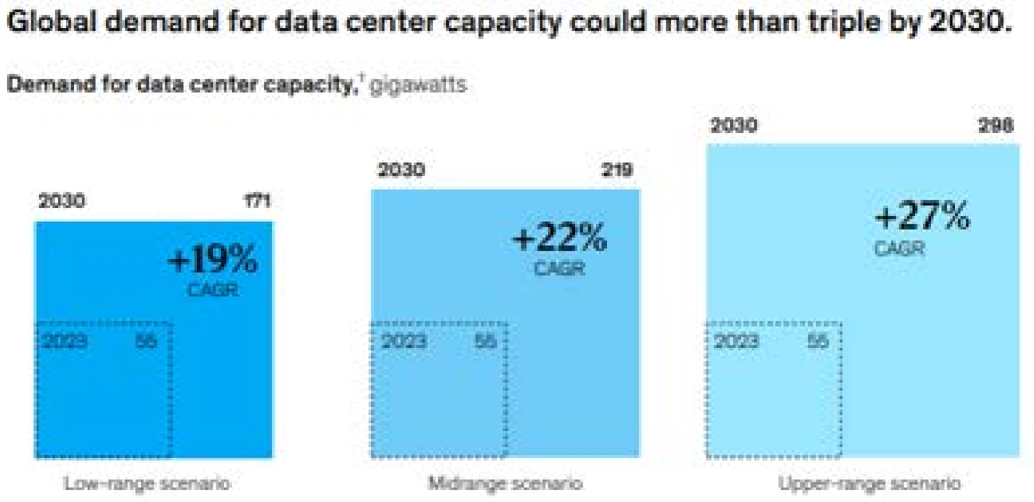
Session 7: Integrated Energy Systems – Connecting Nuclear to the Energy Mix

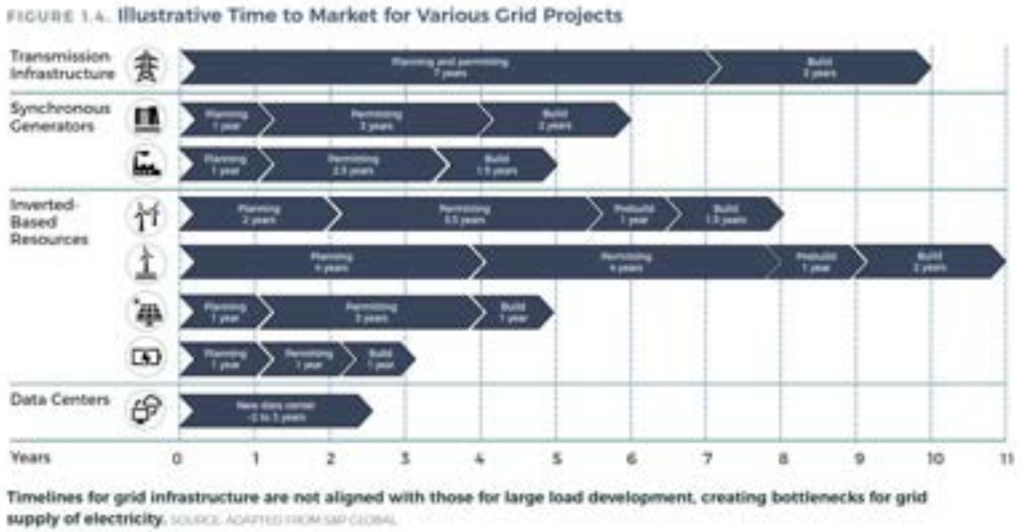
Emily Kunkel, P.E.
Associate Principal
Chicago, IL

Thornton Tomasetti

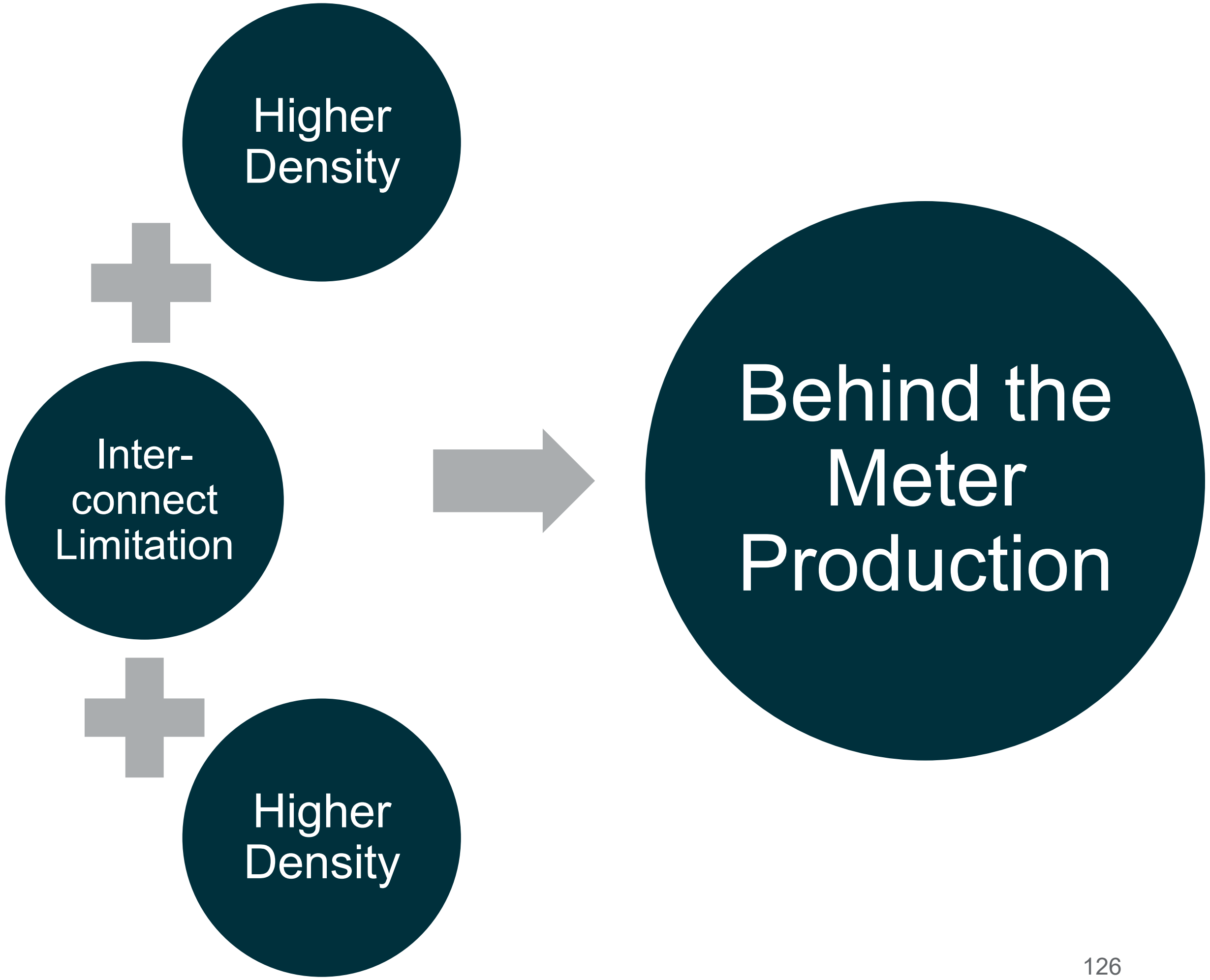
DATACENTERS DRIVING POWER

Demand Growth



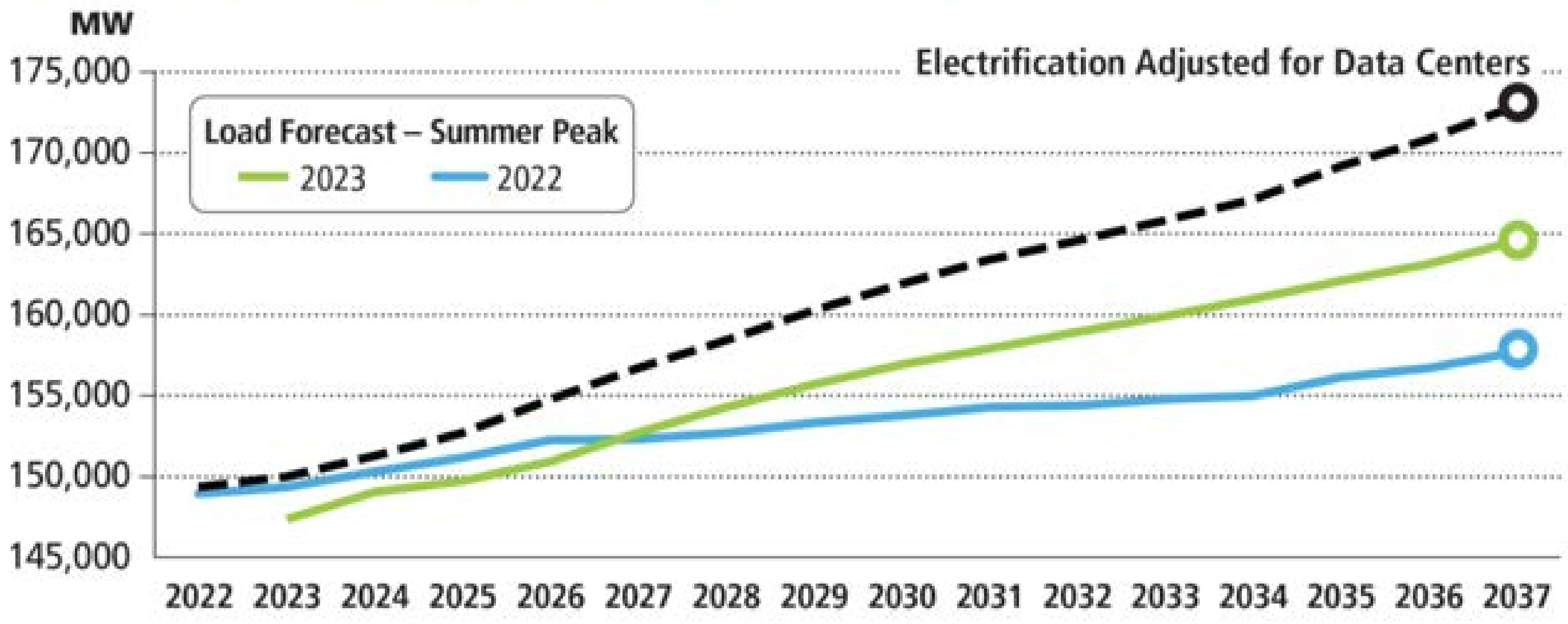


Power Needs



PJM (USA) LOAD DEMAND CONCERNS

Figure 6. Impacts of Electrification and Data Center Load on Forecasts



28 GW

GAP IN 2030 PJM SUPPLY AND DEMAND MARKET

8 GW

DATA CENTER GROWTH SINCE 2022

145 GW

IN QUEUE

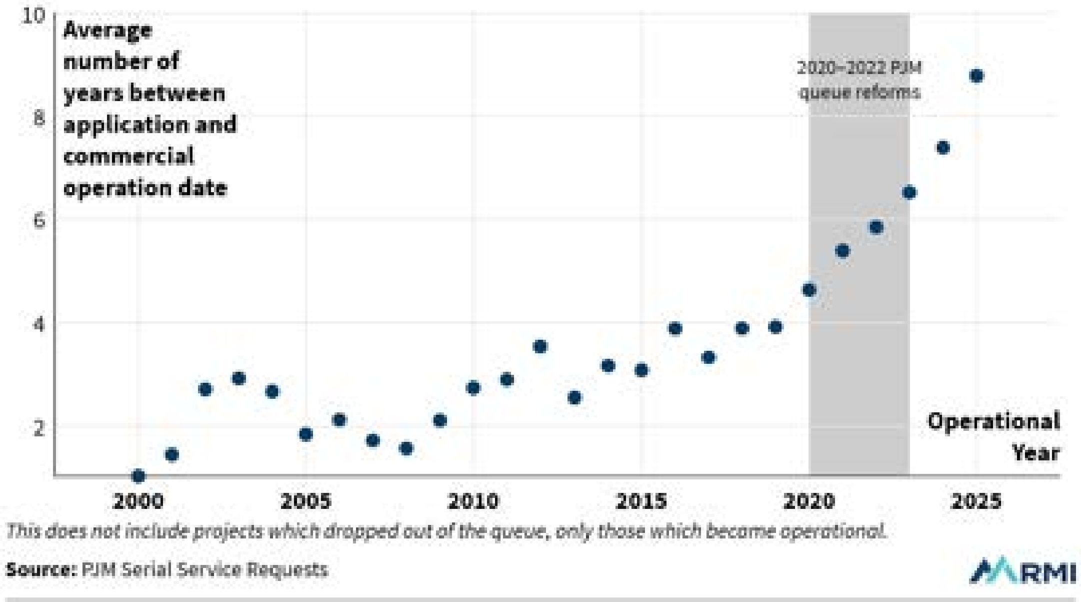
SHORTAGE SEEN AS EARLY AS

2026/27

Thornton Tomasetti

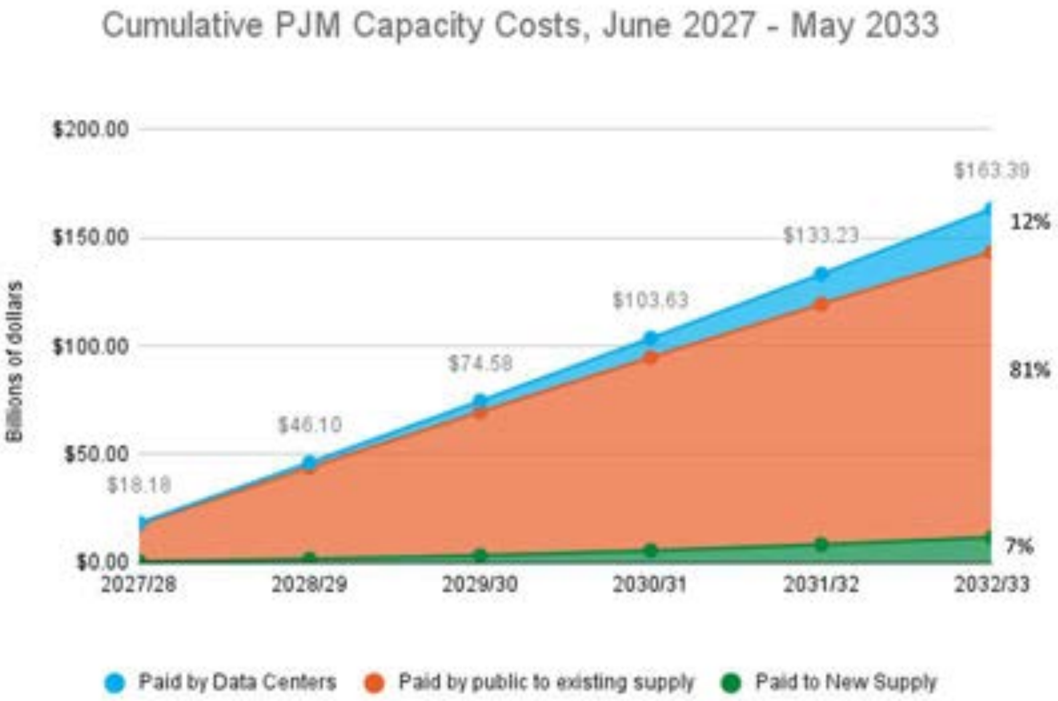
CURRENT BOTTLENECKS

Timeline & Queue Impacts



Projects that came online in 2025 spent an average of 8+ years getting interconnected. Under its current plan, applicants since 2022 will begin to be reviewed in 2026. | *RMI*

Cost Impacts



The NRDC projected the amount consumers would pay for capacity if the imbalance between data center growth and capacity construction continues to grow. | *NRDC*

BEHIND THE METER: CARBON-FREE ENERGY

Constant Primary Power Output | **Intermittent Primary Power Output** | **Backup Energy Storage**

Nuclear Power

Opportunities:
- Firm Power
- High uptime availability
- Ultra-Scalability

Challenges:
- Low TRL
- Regulatory
- Public perception

Dependencies:
- SMR Tech Scale-up
- Schedule adherence

Solar Power

Opportunities:
- Off-the-shelf, proven technology
- Scalability

Challenges:
- Intermittent output

Dependencies:
- Large Contiguous Surface Area Requirements
- Large-Scale Backup Power

Wind Power

Opportunities:
- Industry Scale Up Progress
- >1GW Project Deployed

Challenges:
- Intermittent Output
- Land requirement

Dependencies:
- Large Area of Ownership/Impact
- Large-Scale Backup Power

Compressed Energy Storage

Opportunities:
- High Volume Capacity
- Cost Savings

Challenges:
- Lower Roundtrip Efficiency than Batteries
- Lower TRL

Dependencies:
- New Technology Proof of Concept Ongoing

Batteries

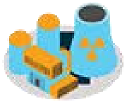
Opportunities:
- High TRL – Off-the-Shelf
- High Roundtrip Efficiency
- Modularization

Challenges:
- Capacity Scaleup
- Thermal Runaway RAM Risk

Dependencies:
- Supply Chain Adjustments
- Custom Module/Pack

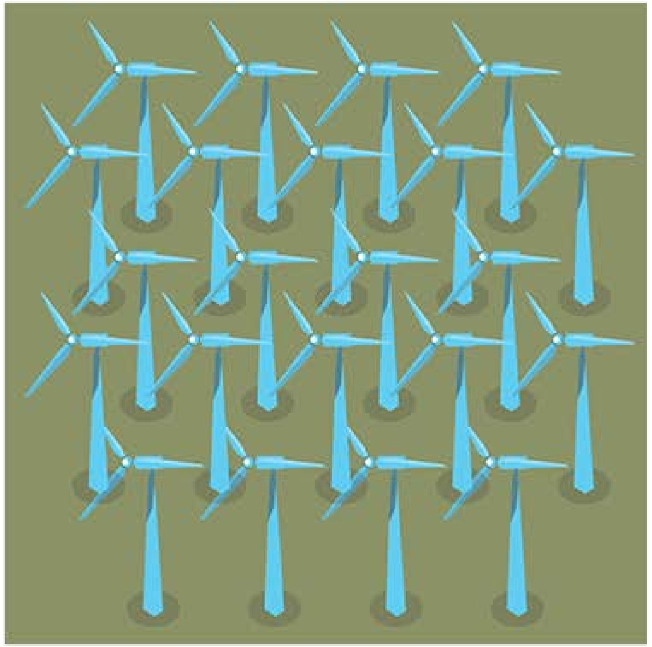
BEHIND THE METER: LAND IMPACTS

How Much Land Does Your Electricity Use per Megawatt-Hour?

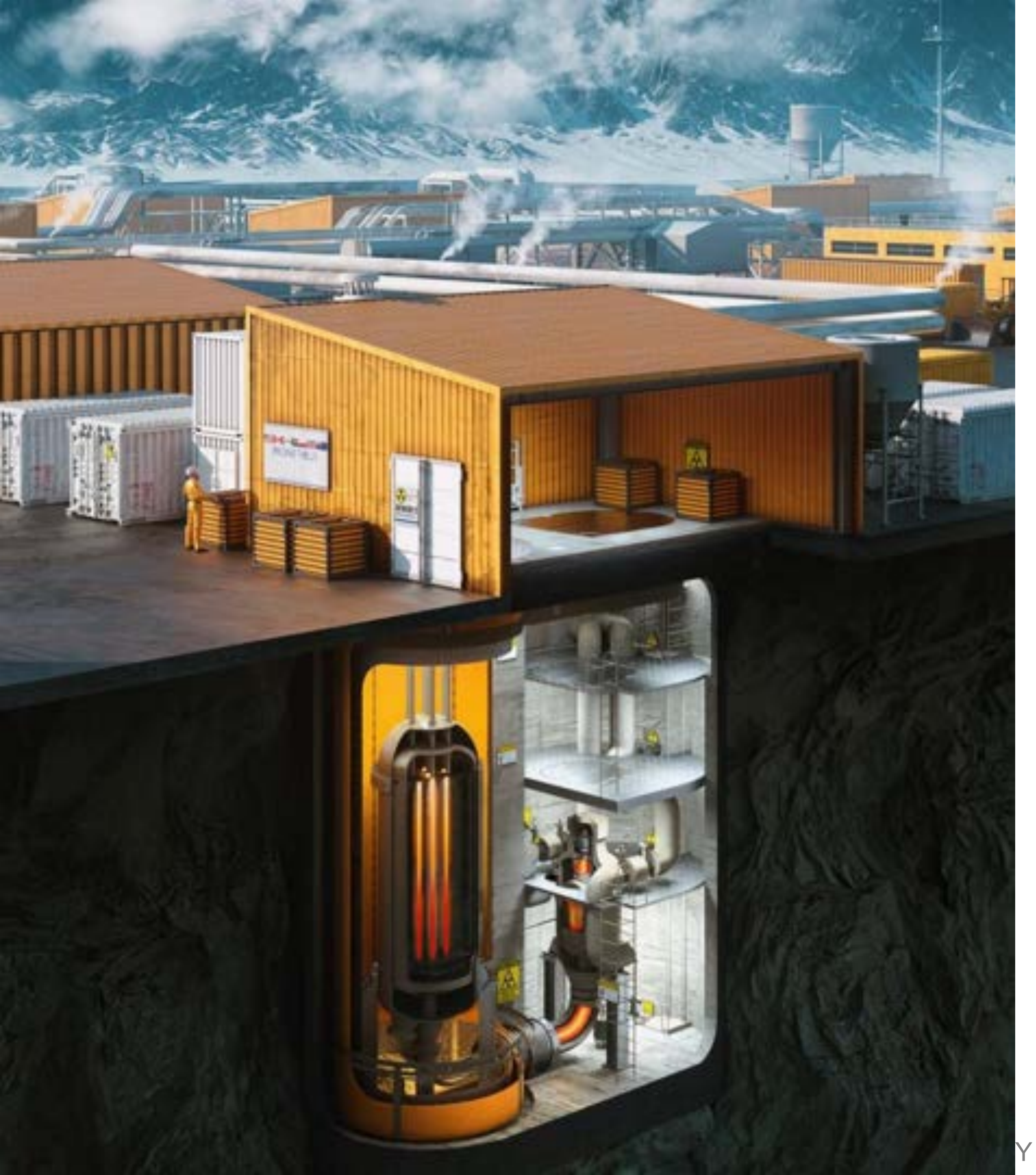


Nuclear
0.3m²

Solar
19m²



Wind
99m²



NUCLEAR

Traditional Reactors, SMR, & Micro

Focus point due to high reliability and high energy density

Site setback/safety considerations

Need technology readiness and design development to progress further before use

Potential for existing nuclear stations to host datacenters

POWERING LARGE CAMPUSES WITH NUCLEAR

Three options for potential integration

RE-LICENSE EXISTING NUCLEAR

- Assess remaining useful life large-scale nuclear facilities
- Relicense facilities that meet power needs
- Utilize existing infrastructure

CONVERT EXISTING FOSSIL

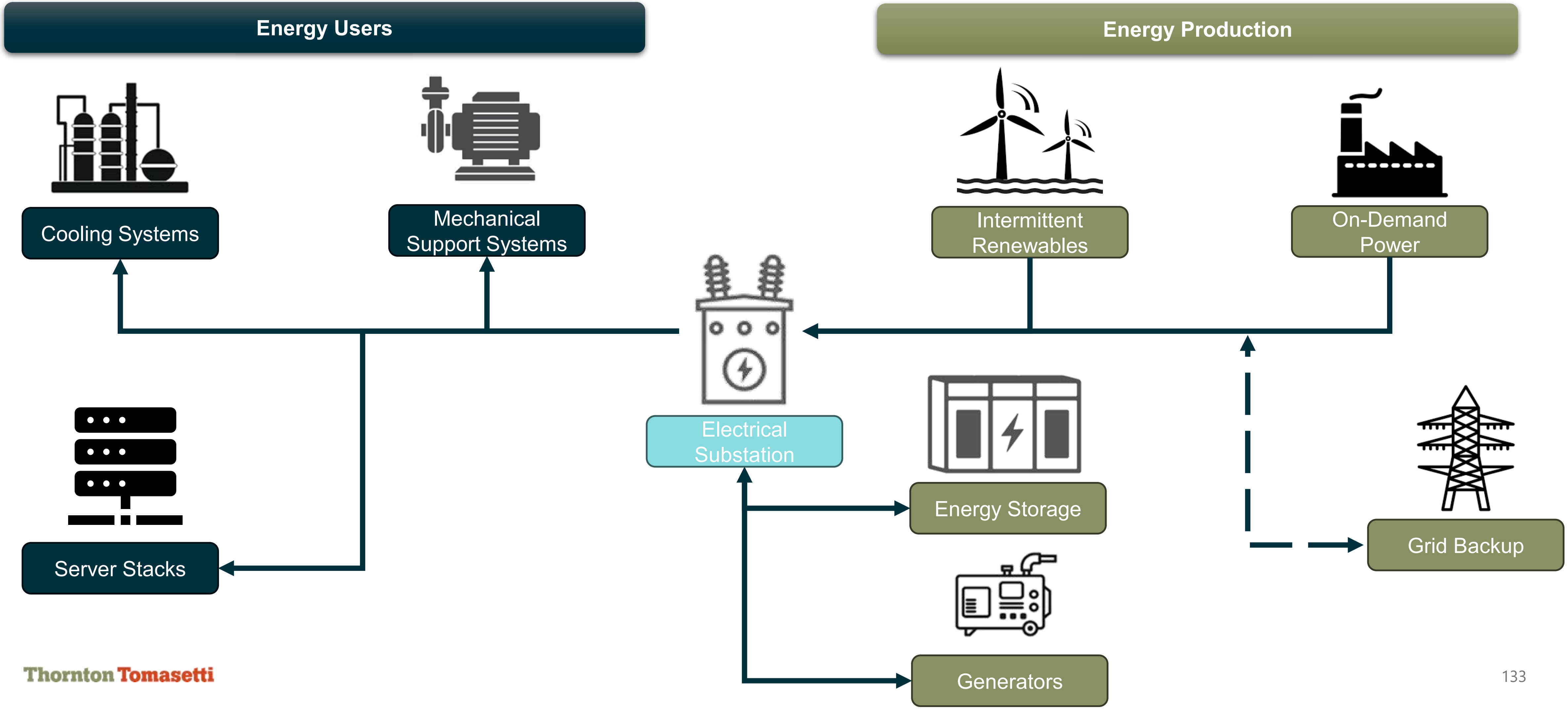
- Assess remaining useful life of coal and gas plants
- Fastest initial speed to market within existing operating permits
- Identify nuclear integration opportunities

FUTURE-READY GREENFIELD

- Identify green-field sites for build out
- Develop initial powering concept based on quickest speed to market
- Plan for future readiness and site selection based on SMR future

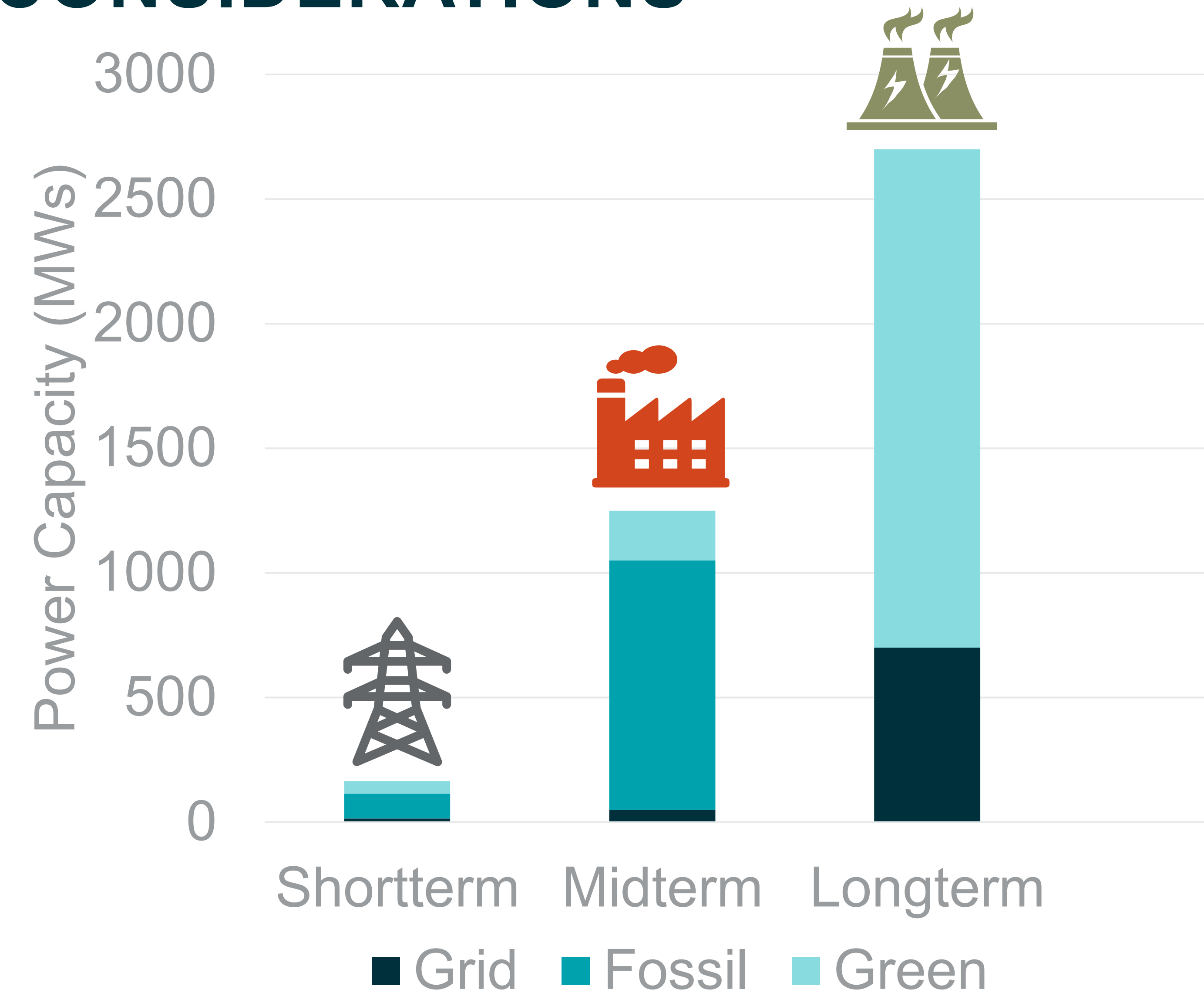
MICROGRID: "ALL OF THE ABOVE" OPTIONS

Redundancy must be considered in site planning and financing



EARLY DEVELOPMENT CONSIDERATIONS

- Assess site for all future possibilities
- Consider hazards and safety for integrating nuclear on site
- Identify key redundancy points with refueling concepts
- Develop energy balancing options with onsite energy storage to meet ramping needs
- Show value-add to community resilience and decarbonization



THANK YOU

Emily Kunkel, P.E.
EKunkel@ThorntonTomasetti.com
+1.312.596.2072

Coffee Break

14.15 - 14.30

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

PANEL: THE FUTURE OF NUCLEAR IN SCOTLAND

Moderated by:

Ed Reed, E-FWD

Andrew Bowie, MP

Tom Greatrex, NIA

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

CLOSING REMARKS

Andrew Renton, Castletown Law

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association

Thank you

CASTLETOWN LAW

E-FWD by ENERGY VOICE

Scottish Energy Forum

NIA Nuclear Industry Association