

Welcome to the NEMO Working Group 3 ANNORAX Liability and Insurance Workshop



NEMO

Burges
Salmon

	Day 1 Morning Agenda
9:00	Welcome- Opening remarks
9:15	Workshop objectives - Objectives and intended outputs
9:30	Setting the scene: What must a civil liability regime achieve?
10:00	Project definition: A hypothetical nuclear shipping project
11:00	Break
11:15	1. The gap map applied to the project
12:15	2. Historical precedents: Savannah, Otto Hahn, and the 1962 Brussels Convention
13:15- 14:15	Lunch

Welcome



Virginia Crosbie, Chief Executive Officer
NEMO



Dr Mamdouh El-Shanawany, Chairman
NEMO

Workshop objectives

Objective and intended outputs

- Ian Truman, Burges Salmon
- Mark Popplewell, Nuclear Risk Insurers
- Patrick Ryan, UK P&I Club

Setting the scene:

What must a civil liability regime achieve?

Balancing victims' right with protections for licensed ship operators while aligning with existing conventions and maritime laws

- Mikal Boe, CORE POWER
- Ian Truman, Burges Salmon
- Patrick Ryan, UK P&I Club

Setting the scene: what must a civil liability regime achieve?

Ian Truman

6 October 2026

What must a civil nuclear liability regime achieve?

- **Protect victims**
- **Identify one person who is responsible - channel liability** to an identifiable nuclear operator
- **Provide certainty about the applicable law and court**
- **Determine in advance who is liable, for what damage, up to what amount, for how long, and in which jurisdiction claims are determined**
- **Put real money behind the liability**
- **Make an exceptional risk insurable**
- **Protect the wider nuclear supply chain from unquantifiable third-party exposure**
- **Deal coherently with transboundary damage**
- **Create a workable interface with other liability regimes**

What must a civil nuclear liability regime for nuclear propelled ships achieve?

The challenge:

Preserving those certainties when the nuclear installation becomes mobile and moves between different states, jurisdictions and maritime liability regimes



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Project definition: A hypothetical nuclear shipping project:

Who are the key stakeholders?

What concepts do we need to agree to develop an insurable legal and regulatory framework?

A case study

- Mikal Boe, CORE POWER
- Jez Sims, WG1 an Lloyd's Register

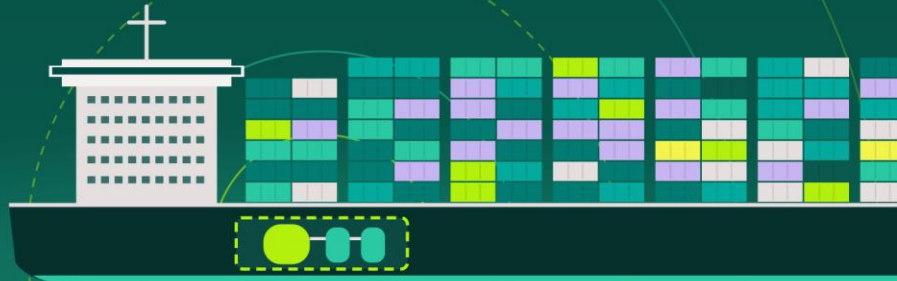
Commercial nuclear shipping

Civil liability and insurance: a Lloyd's Register perspective

The principles exist. The applicable instrument does not.

Jez Sims · Director, Nuclear Technologies · Lloyd's Register

Discussion material for NEMO Working Group 3



A double exclusion, not a blank sheet

A nuclear-powered merchant ship falls outside both liability regimes as they stand. Safety rules exist in SOLAS Chapter VIII and Code A.491(XII), now under revision. A civil liability regime for the ship does not.

Nuclear liability conventions

Built for installations on land and nuclear material in transport

- Paris Art 1(a)(ii): a nuclear installation excludes reactors “comprised in any means of transport”
- Vienna and the CSC: exclude a reactor fitted to a ship as a power source, for propulsion or any other purpose
- So operator channelling and state funds do not attach to the ship



Nuclear-powered merchant ship

Brussels 1962

Convention on the Liability of Operators of Nuclear Ships. Written for this case. Never entered into force.

Maritime liability conventions

Built for conventional casualties. They step aside for nuclear damage

- LLMC 1976/96 Art 3(c), (d): nuclear damage claims, including against the owner of a nuclear ship, are excluded from LLMC limitation
- Wreck Removal Convention Art 11: defers to nuclear liability law
- Marine wordings: CL370 is paramount in hull and cargo. P&I club rules exclude nuclear risks

Default today: whatever national law at the place of damage provides. In most states, no channelling, no assured fund, no single competent court.

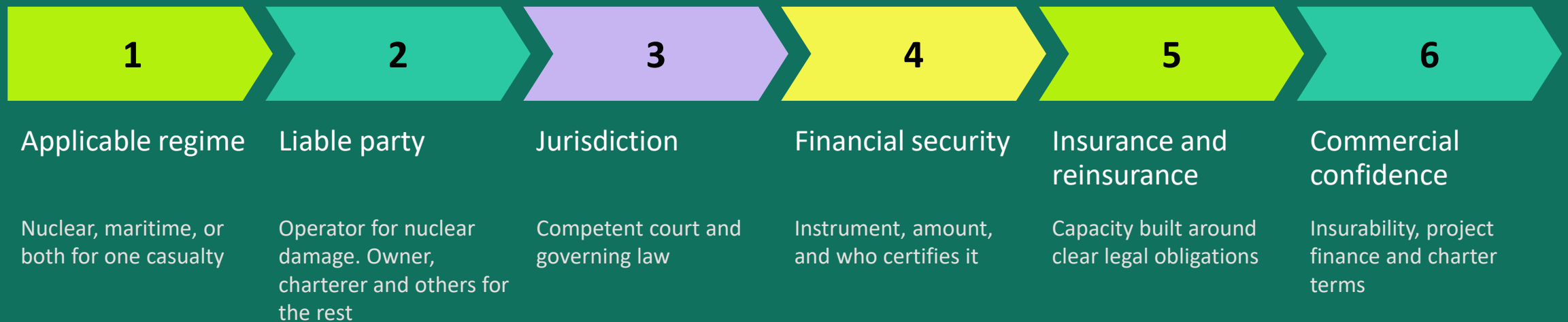
Two regimes, different starting premises

Maritime law spreads liability across many parties and limits it by tonnage. Nuclear liability law concentrates it on one operator and guarantees the fund.

	Maritime conventions	Nuclear model: Paris, Vienna, CSC	Interface question
Basis of liability	Mostly fault. Strict for oil, bunkers and wreck removal	Strict. No proof of fault needed	Which basis applies to a mixed casualty?
Who is liable	Owner, charterer, manager, operator, salvor	The licensed operator only. Liability is channelled	Does channelling shield the other ship, salvor and yard?
Limits	Tonnage-based under LLMC. Lost for reckless conduct	Convention minimum (Paris €700m), state tiers above. Some states set no limit	Who pays above the operator's cap?
Forum	Several: arrest, flag, place of casualty	One competent court, normally where the incident occurs	Whose court for an incident at sea?
Financial security	P&I entry. State certificates under CLC, Bunkers, WRC, Athens	Mandatory operator security, backed by the state	One certificate on board, or two?
Time bar	Typically 2 to 3 years	10 years. 30 for personal injury (Paris 2004, Vienna 1997)	Long-tail exposure for insurers

Insurance follows a defined liability

The market can price risk. It cannot price an open question about who is liable, where, and for how much.

**WHERE LR SITS**

Class and statutory certification are conditions of hull and P&I cover. They give underwriters the technical assurance the chain above depends on. LR is a classification society, not an insurer.

Risk may be priced. Unresolved legal ambiguity is harder to allocate.

Two insurance markets, built differently

Marine cover is written against a classed ship. Nuclear cover is written against a licensed operator and a defined installation. A nuclear ship needs both, and neither wording is built for it.

Marine

Hull and machinery

Property cover placed in the commercial market. Lead and follow underwriters, Lloyd's and company markets.

P&I through the International Group, 2026/27

12 mutual clubs, about 90% of ocean-going tonnage

Collective overspill: 2.5% of applicable limitation amount under the 1976 LLMC	
Collective overspill reinsurance	US\$1bn
General excess of loss reinsurance	to US\$2.35bn
Pool, shared between the clubs	to US\$100m
Individual club retention	US\$10m

Nuclear excluded. CL370 is paramount in hull and cargo wordings. Club rules exclude nuclear risks, except “excepted matter” cargo.

Nuclear

National nuclear pools

Domestic insurers pool capacity for one risk class, e.g. Nuclear Risk Insurers (UK) and American Nuclear Insurers (US). Pools reinsure each other across borders.

Operator mutuals

ELINI for third-party liability. EMANI and NEIL for property damage.

State and treaty layers

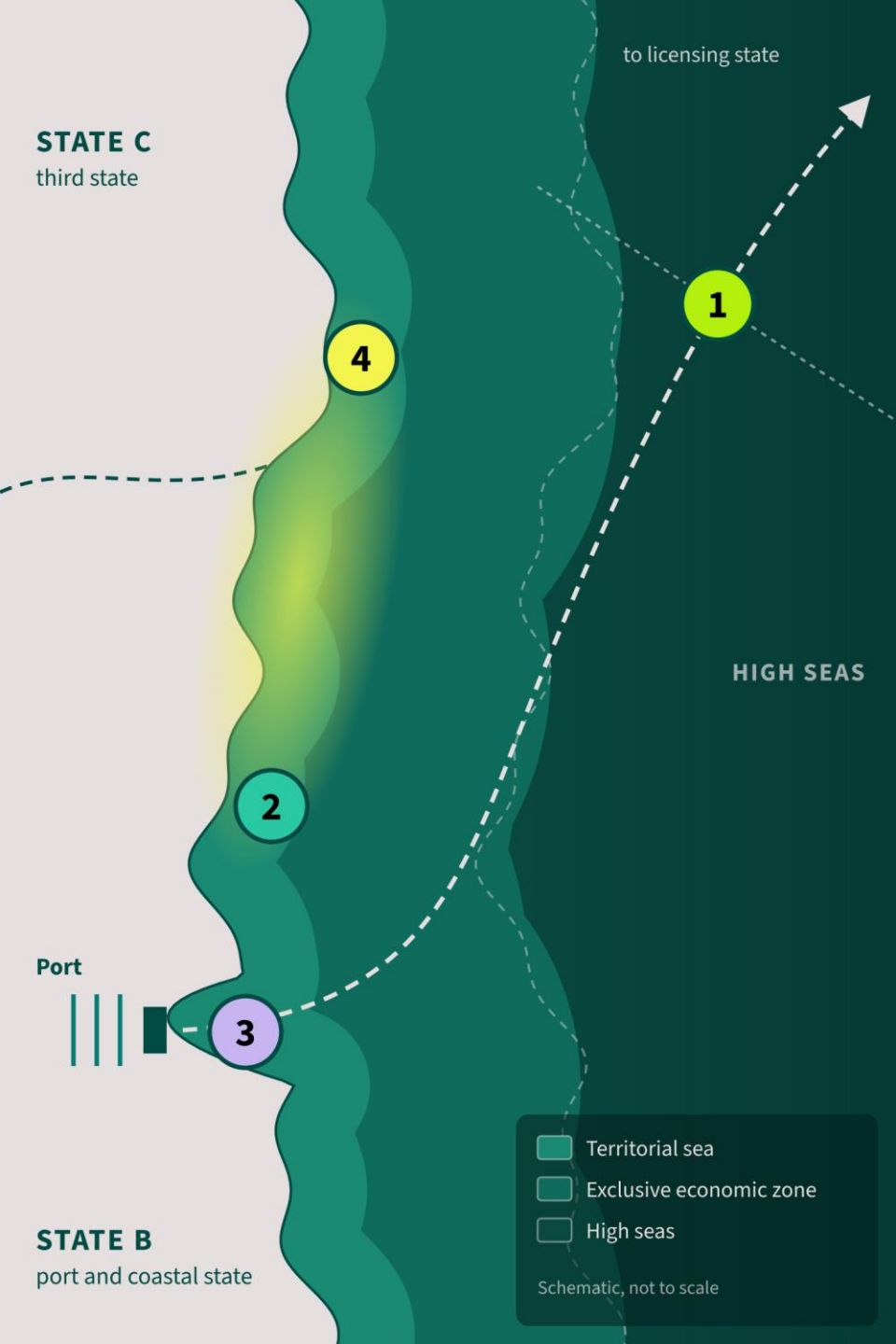
Brussels Supplementary tiers to €1.5bn under Paris. The CSC international fund. The US Price-Anderson secondary layer.

Built around installations. Cover attaches to a named operator, a licensed site and a statutory amount. A ship's reactor sits outside the treaty definitions it relies on.

Which policy responds?

Indicative positions for a nuclear-powered merchant ship today. Real answers depend on wordings, club acceptance and the law applied.

Loss	Marine cover today	Nuclear cover	Position
Hull damage, no release	H&M responds if it wrote the ship. CL370 is not triggered without radiation	Not engaged	Responds
Damage to the nuclear power unit	Unclear. Underwriters will want specific terms	Nuclear property cover is written for installations	Open
Conventional third-party: collision, bunkers, wreck	P&I responds, if a club accepts the entry	Not engaged	If entered
Nuclear damage to third parties	Excluded by club rules	No ship wording. Operator cover needs a regime to attach to	Gap
Preventive measures, no release	Excluded or disputed	Counts as nuclear damage under Paris 2004 and Vienna 1997, if a regime applied	Gap
Wreck removal with the reactor aboard	WRC defers to nuclear law. Nuclear elements excluded	No ship wording	Gap
Crew radiation exposure	Crew cover excludes nuclear risks	Depends on how operator and employer roles are defined	Open



STRESS TESTS

Stress-test the boundary cases

Each case engages several responsibilities at once. Numbers match the map.

1

Collision on the high seas

The other ship is at fault. Under channelling, the operator still answers for nuclear damage. Conventional damage apportioned by fault under the 1910 Collision Convention. One casualty, two regimes, possibly two courts.

2

Grounding in the coastal state's territorial sea

Coastal state jurisdiction. Salvors and wreck removers work beside a reactor, with marine cover that excludes nuclear risks. Without channelling they carry that exposure themselves.

3

Port call, no release

A fault closes the port and clears the quayside. Nothing is released, but preventive costs, delay and loss of use still flow. Who pays, under which law, in which court?

4

Transboundary radiological damage

Contamination reaches a third state outside any bilateral agreement. Its claimants have no treaty route to the operator and no treaty basis for enforcing judgments. This is the limit of a bilateral approach.

Bilateral template: start from what worked

The first nuclear merchant ships traded on state-to-state agreements, not conventions. N.S. Savannah's port-entry agreements began with Greece in 1962. Germany negotiated its own for Otto Hahn.

UK–US Exchange of Notes

19 June 1964 · N.S. Savannah visits to UK ports

- 1 US Government liable for nuclear damage, up to US\$500m per incident
- 2 Sovereign immunity waived. UK courts competent
- 3 Each visit approved in advance on submitted safety information
- 4 UK could order the ship out of port or the reactor shut down

Candidate heads of terms for WG3 *for discussion*

- 1 **Scope**
Nuclear ship, incident and damage, on the Paris 2004 and Vienna 1997 model
- 2 **Liable party**
Licensed operator. Strict, exclusive liability. Recourse rights defined
- 3 **Amount**
Operator minimum, with a licensing-state guarantee above it
- 4 **Financial security**
Certificate carried on board and recognised by the port state
- 5 **Jurisdiction**
Port or coastal state courts for incidents there. Immunity waived
- 6 **Time limits**
Aligned with Paris and Vienna: 10 years, 30 for personal injury
- 7 **Port entry**
Prior notice, safety information, emergency plans, SOLAS Ch VIII control
- 8 **Bridge clause**
Migrates to a multilateral instrument when one exists

A practical mandate for the next stage

A structured pathway for further work, without pre-judging the final legal solution.

01**Liability and convention mapping**

Paris, Vienna, CSC, Brussels 1962, NUCLEAR 1971, LLMC, CLC, Bunkers, Wreck Removal, Athens, Collision and Salvage, mapped against the scenario vessel

02**Jurisdiction and operator definition**

Competent court, governing law, and who the operator is when owner, licensee and manager differ

03**Insurance and reinsurance interface**

Test marine and nuclear wordings against the loss matrix, with input from clubs, pools and brokers

04**Bilateral agreement template**

Heads of terms for a two-state operating corridor, starting from the Savannah precedent

05**Hypothetical project demonstration**

Run the stress tests on the workshop scenario vessel and record where the framework holds

Workshop outputs

- Agreed findings
- Identified gaps
- Named questions for further work
- An owner for each workstream

Aim: insurability through clarity of roles, responsibilities and legal interfaces.

Working Group 1 Nautilus: Maritime Regulations



Working Group update, April to October 2026

IMO engagement Continued support to the IMO's update of the Nuclear Code, with related activity monitored across IMO Committees and Sub-Committees. The former NEDLAND group is now the IMO Engagement Team, with Unni Einemo and Carlo Floor coordinating NEMO's input to the SDC Correspondence Group.

July workshop Maritime Regulations workshop at Lloyd's Register, London, bringing together maritime and nuclear regulators, class societies, operators, insurers, shipyards and technology developers. Conclusion: deployment needs practical integration of the existing maritime and nuclear frameworks, with further work on stakeholder responsibilities, safety-case assurance, liability, insurance, and the different requirements for ships and offshore applications.

Task Forces **TF1** recommended FNPP definition delivered and submitted to WG3 for legal consideration. **TF3** investigating practical regulatory scenarios. **TF4** assessing gaps in future training and certification: a global stakeholder survey is in development and a hybrid roundtable is planned for 10 November.

Priorities Republish the updated Regulatory Mapping document. Progress the Nuclear Code roadmap for publication. Establish the next regulatory-scenario outputs and prepare for future IMO submissions. This workshop is an opportunity to progress scenarios and the associated legal and bilateral-agreement questions.

Next meeting Working Group Quarterly, early December 2026.

Leadership and support

Leadership

Meg Albrecht as Chair and Unni Einemo continues as Vice-Chair. No succession change proposed. Next step: identify members to own specific outputs and add leadership support through the proposed member expertise register.

Members providing documented support

Unni Einemo and Carlo Floor, IMO engagement
Mark Smith, training and certification
AJ Anderson and Brianne Ricketts, FNPPs
Jez Sims and Stuart Ellison, regulatory scenarios
Rosa Vilariño, Nuclear Code methodology and workshop material

Working Group 2 Savannah: Nuclear Safety, Security and Safeguards



Working Group update, April to October 2026

IAEA ATLAS

The IAEA launched Atomic Technologies Licensed for Applications at Sea (ATLAS) in Washington, DC, on 26 and 27 August, preceded by a US DOE Industry Day on 25 August. WG2 and other NEMO personnel had prominent roles. Over the next year WG2 will engage mainly with the IAEA Project Groups on International Safety Codes and Standards (PG1), Safeguards (PG4), Nuclear Security (PG5) and the Deployment Roadmap on Technology, Infrastructure and Fuel Cycle (PG6).

IMO engagement

Continued support, with WG1, to the IMO's update of the Nuclear Code. Within the IMO Engagement Team, Scott Edwards and Federico Puente Espel support NEMO's input to the SDC Correspondence Group.

Task Forces

NUCSAS completed its actions, publishing Applicability of IAEA SSG-61 Safety Analysis Report Guidance to Nuclear Merchant Ships in September. **Ports** is updating the superseded Safety Considerations in the Use of Ports and Approaches by Nuclear Merchant Ships, to be finalised with NEMO port members through a new WG4 or direct engagement.

Priorities

Establish new Task Forces on maritime security, Safeguards by Design and Security by Design. Finding members to lead and take an active part in these Task Forces remains a challenge.

Next

Working Group Quarterly, early December 2026. Workshops on Decommissioning, Emergency Preparedness and a second on Safeguards are being planned for 2027.

Leadership and support

Leadership

Given overall availability, the Chair recommends identifying successor candidates for Chair and Vice Chair. No candidate is proposed yet. Next step: members to take ownership of specific outputs, to identify and develop those who can step into the roles.

Members providing documented support

Federico Puente Espel, IMO engagement
Kauan Flach, Ports document
NUCSAS Task Force: Ioannis Kourasis, Federic Stephani, Mayir Mamtimin, Ernesto La Colla, Ignatios Papoutsis, Robert Chaplin, Suhas Vhanmane, Eleonora Lambridis and Torbjorn Lie

1. The gap map applied to the project

Identifying gaps including national, port-state, US, and EU considerations

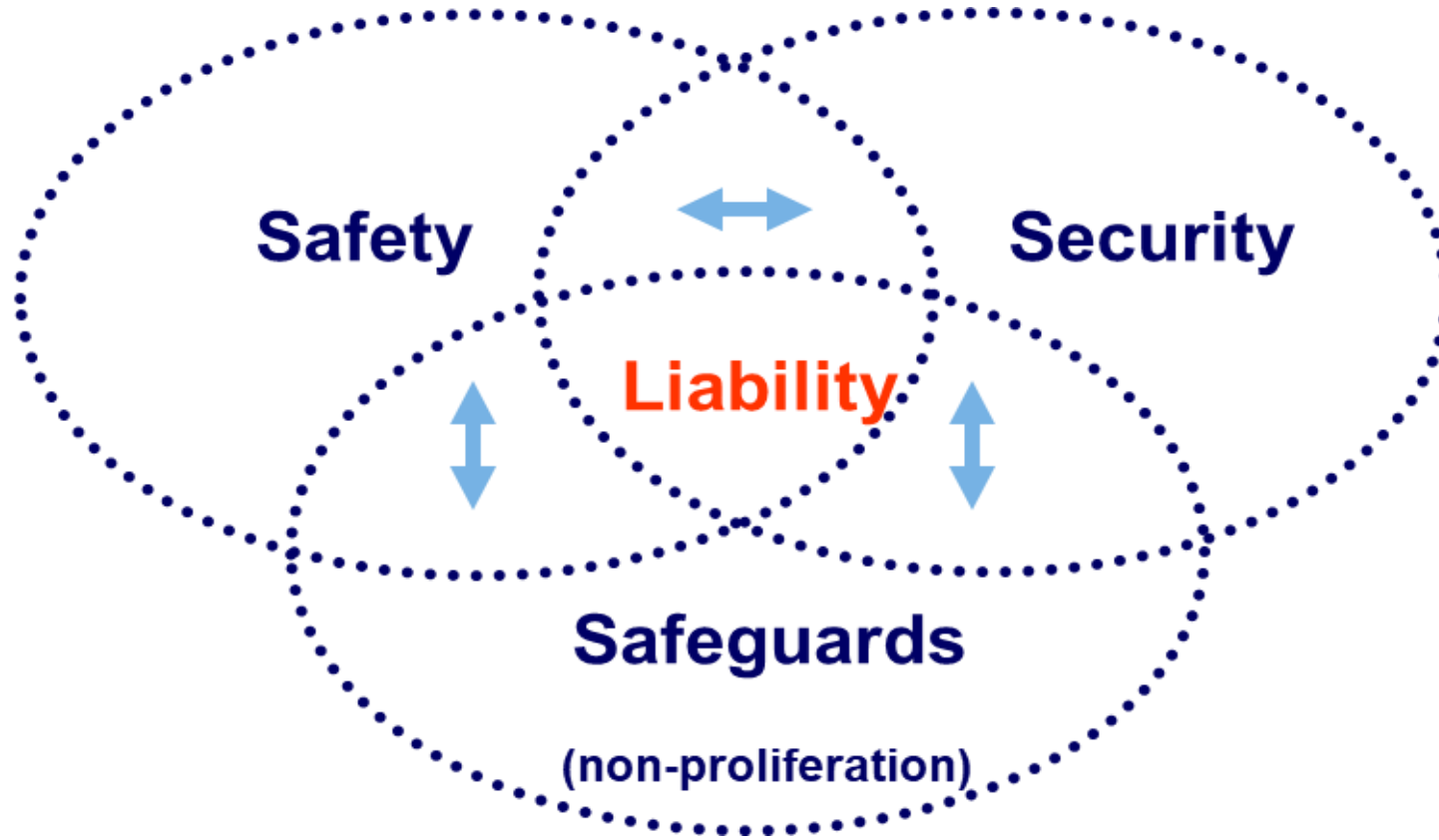
➤ Ian Truman, Burges Salmon

The Gap Map

Ian Truman, Burges Salmon LLP

7 October 2026

Why is nuclear law different?



Terminology

Key Nuclear Terminology

- **Operator / Licensee** – entity holding a nuclear licence
- **Nuclear Licensed site** – a terrestrial site licensed for the use of a reactor or prescribed installation
- **Owner** – can own nuclear licensed assets but all liability channelled to operator/licensee
- **Nuclear Installation** – prescribed installation the design, construction, operation or decommissioning of which need a nuclear site licence
- **Radioactive Waste** – certain nuclear materials that have no further use

Nuclear Safety

Existing International Nuclear Law

The Convention on Nuclear Safety

– *applies only to land-based civil nuclear power plant*



- **The Joint Convention (Waste Management)** – applies to the safety of spent fuel or radioactive waste resulting *from the operation of civilian nuclear reactors*
- **The Early Notification Convention** – applies to any accident involving facilities or activities of a state or persons under its jurisdiction *including any nuclear reactor wherever located*
- **The Assistance Convention** – states can apply for assistance whether or not a nuclear accident or radiological emergency originates in its territory



International Nuclear Best Practice

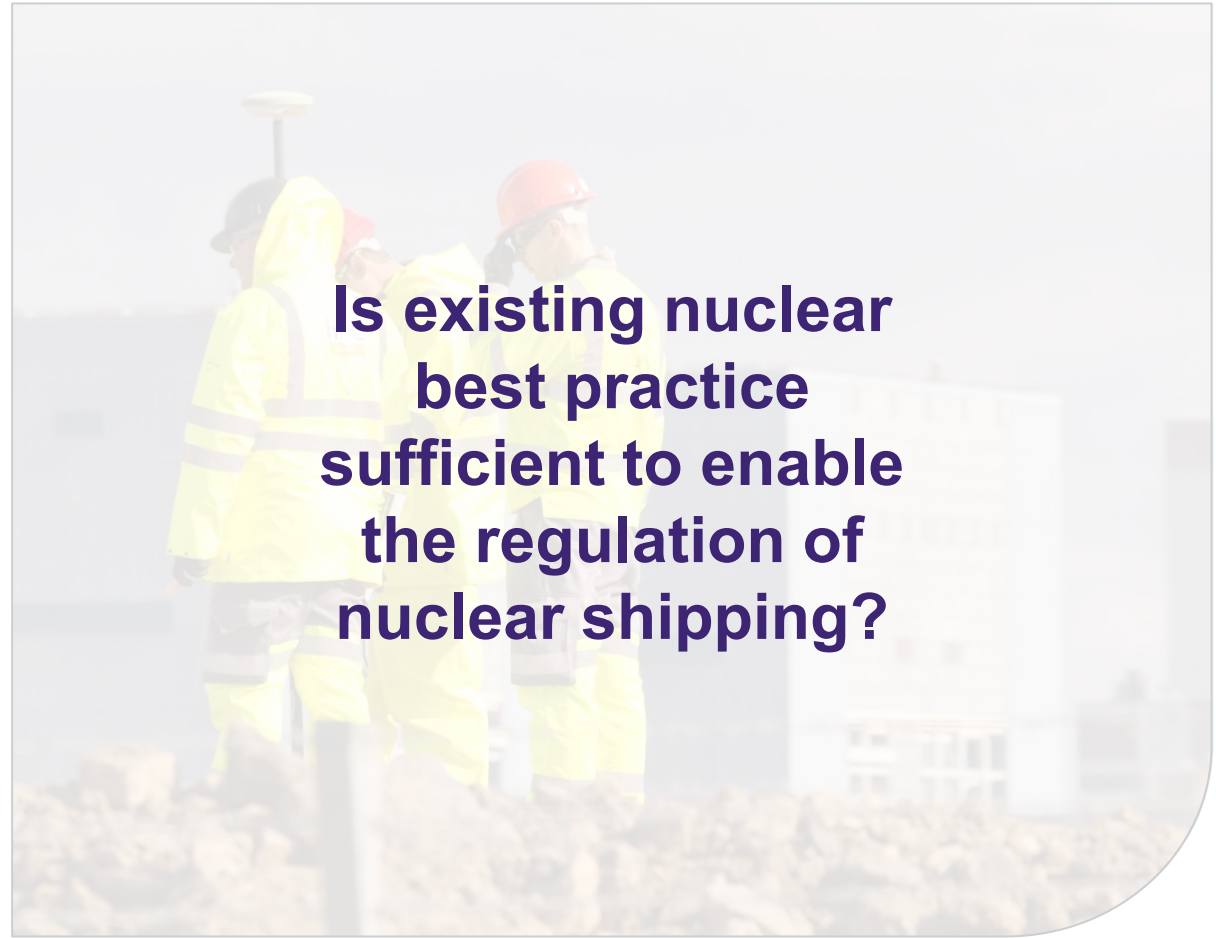
Fundamental Safety Principles



IAEA Safety Guides



**Is existing nuclear
best practice
sufficient to enable
the regulation of
nuclear shipping?**



Emergency Planning Zones – all aboard

- Nuclear operators must make adequate arrangements for radiological emergencies
- These arrangements generally cover a specified area - the Emergency Planning Zone or EPZ
- The size of the EPZ depends on the likelihood and extent of 'reference accidents'
- For PWRs these zones can stretch for miles around the site / outside the site boundary
- Plans must be integrated with local authorities, emergency services, regional and national governments etc
- How do you apply this to nuclear ships?
- The EPZ needs to stay on-board.



The Office for Nuclear Regulation



- UK civil nuclear regulator established under the Energy Act 2013
- ONR's 'safety purposes' include '***protecting persons against the risk of harm from ionising radiations from GB nuclear sites' including through 'the design and construction of relevant nuclear installations and their associated sites'***
- Currently 'a relevant nuclear installation' is a nuclear installation on a site
- ONR purposes need to change if it is going to regulate the operation of nuclear ships

The Maritime and Coastguard Agency



- **Approvals and Certification:** reviews and approves reactor installations, safety assessments, and quality assurance programs before construction and issues Nuclear Ship Safety Certificates for operation
- **Surveys and Inspections:** conducts initial, renewal, and regular operational surveys on UK nuclear ships, and performs port State control inspections on foreign nuclear vessels visiting UK waters
- **Prior Notification:** Operators must submit safety assessments and voyage plans at least 12 months before entering UK waters.
- **Enforcement and Prosecution:** investigates potential offenses, detains non-compliant ships, and brings criminal prosecutions for operating without valid certification.
- **International Alignment:** Merchant Shipping Reg implements Chapter VIII of the International Convention for the Safety of Life at Sea (SOLAS) and the International Maritime Organization (IMO) Nuclear Code into domestic law, working alongside the Office for Nuclear Regulation (ONR) which handles specialized radiological protection and land-interface agreement

The Nuclear Installations Act 1965

- Operating a nuclear reactor in *a means of transport* does not currently require a nuclear site licence
- Historically this has been regulated by the Defence Nuclear Safety Regulator through an 'authorisation'
- This will need to change or separate regulations will need to be adopted

1. No person may use a site for the purpose of installing or operating —
(a) any nuclear reactor (other than a nuclear reactor comprised in a means of transport, whether by land, water or air), or
(b) any other installation of a prescribed kind,
unless a licence to do so has been granted in respect of the site by the appropriate national authority and is in force.

Security and Safeguards

- Convention on the Physical Protection of Nuclear Materials
- Amendment
- Sensitive Nuclear Information
- Document Classification Policy
- Cyber Security
- Terrorism
- Security plans
- Nuclear Non-Proliferation Treaty
- Safeguards Agreements
- Safeguards by design

Export Controls

Relaxation of Existing Rules



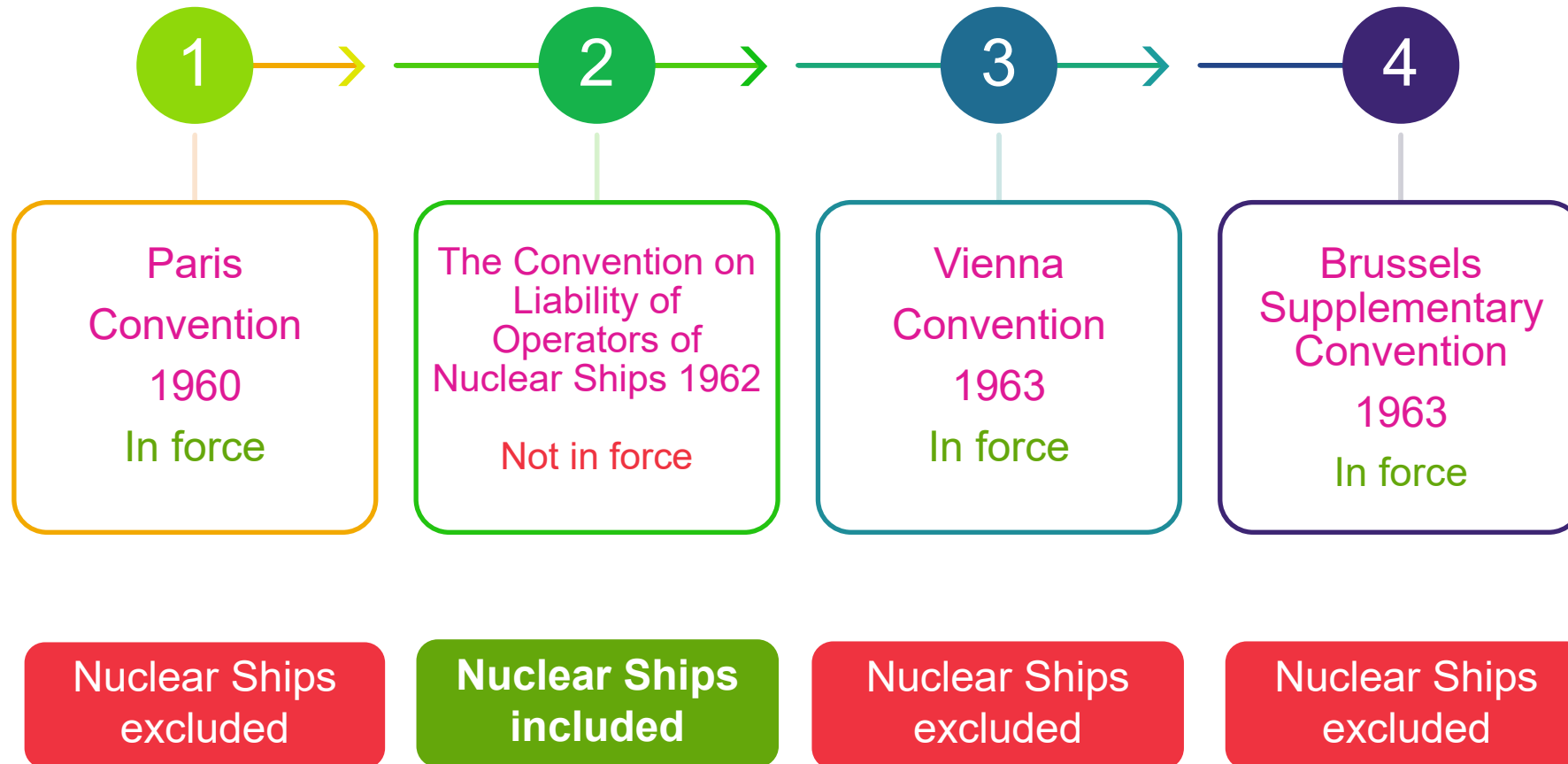
Nuclear Liability

Background to Nuclear Liability

- Radiation first discovered in the late 19th Century
- Radiation protection regime develops but scale of use very small
- The first use of atomic weapons
- Early 1950s insurance exclusions for 'radioactive contamination'

- 1953 article in the Economist
- Review by the insurance association committees in the US and UK
- Domestic legislation in the US and UK
- Development of international conventions

Nuclear Liability Conventions in the 1960s



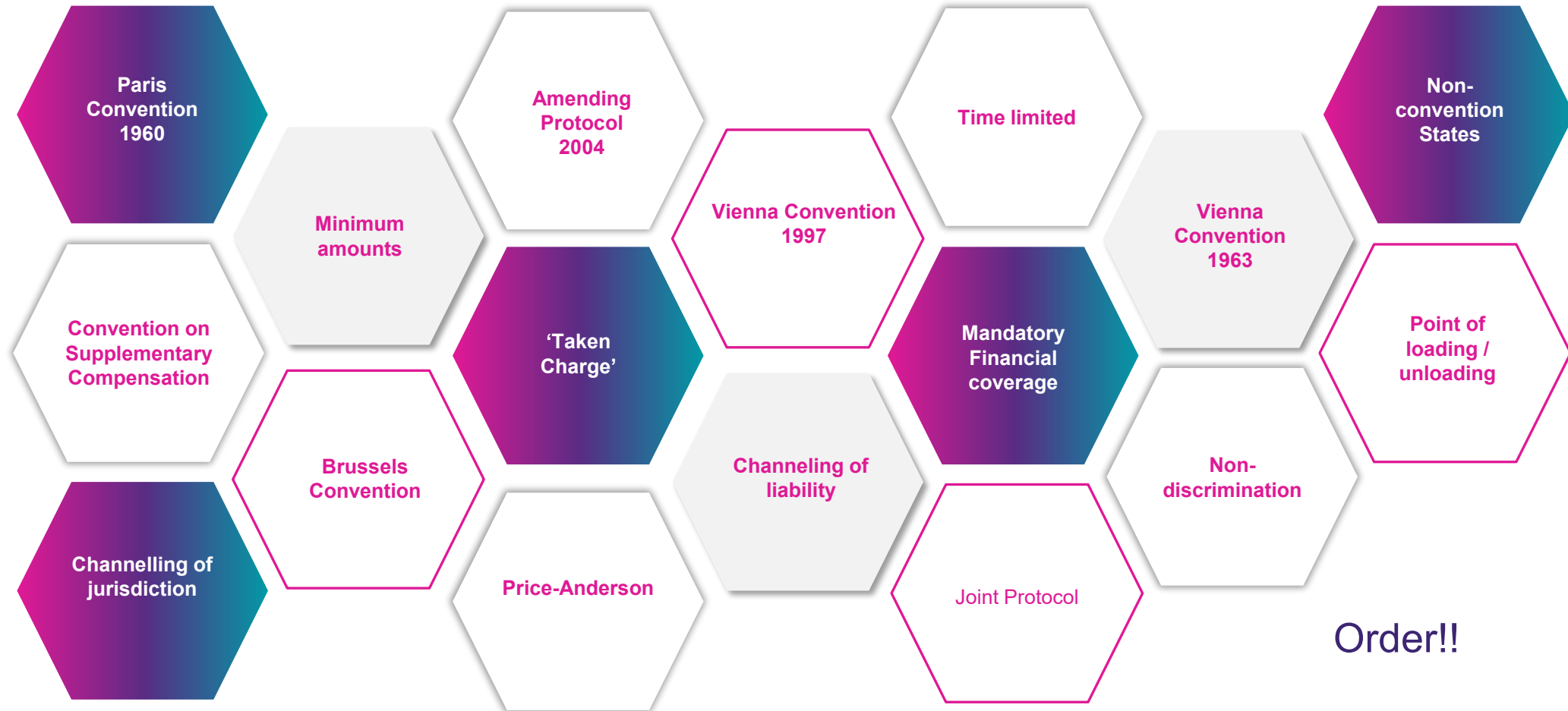
So what?

- Radiological damage is excluded from general insurance policies
- Civil, land-based power plants are covered by the Paris Convention, Vienna Convention or domestic regimes based on the same principles
- Specialist insurers cover risk under these special liability regimes
- Without a special liability regime, nuclear ships are uninsurable
- Special liability regimes need a robust regulatory framework likely to be based on the accepted nuclear liability principles



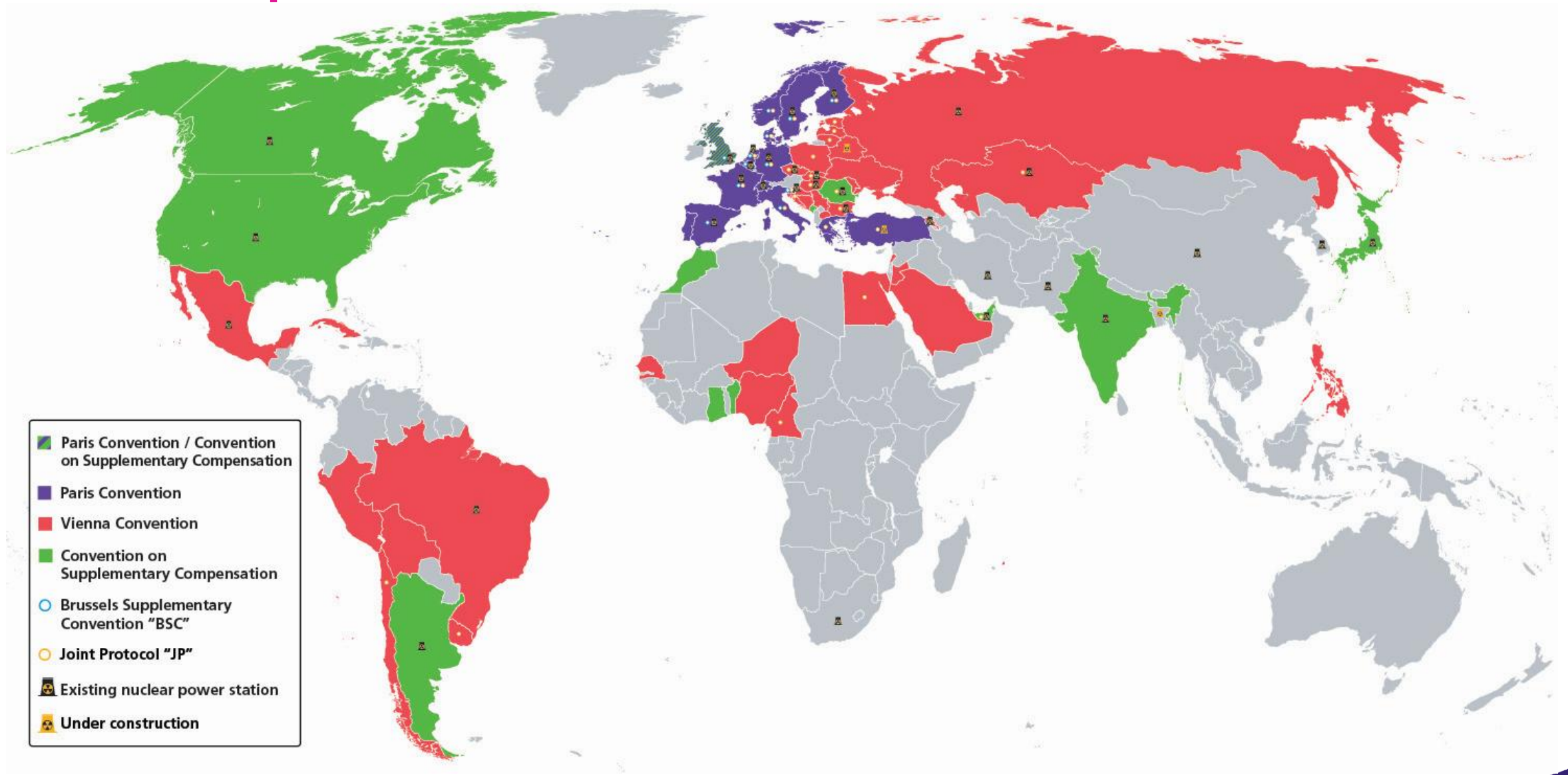
Nuclear Liability in Transit: the law

Where to start?



Issues / Gaps

Mind the Gap



And why is it so important?

- Exonerations
- Exclusions
- Out of scope: States not party to the bilateral agreement? coastal states?

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Japan's Tepco sued by US sailors over radiation

Tokyo Electric Power Company (Tepco), owner of the crippled Fukushima Daiichi nuclear plant, has been sued by eight US sailors over radiation exposure.

They claim that Tepco lied about the threat posed by the leaks after the March 2011 earthquake and tsunami damaged the plant.

The sailors were involved in relief operations after the natural disasters.

They have each sought \$10m (£6m) in compensatory damages and \$30m in punitive damages from Tepco.

The eight, who have filed the case in a US Federal Court in San Diego, also want Tepco to set up a \$100m fund to pay for their medical expenses.

They have claimed that the utility provider created an impression that the level of radiation leaks from the nuclear plant did not pose any threat.

As a result, the sailors say they went to areas that were unsafe and were exposed to radiation.

When contacted by the BBC, Tepco acknowledged that it has been sued, but said that it had not received the actual complaint and so was not in a position to comment.

The lawsuit is the latest setback for Tepco which is already facing billions of dollars in compensation claims.



REUTERS

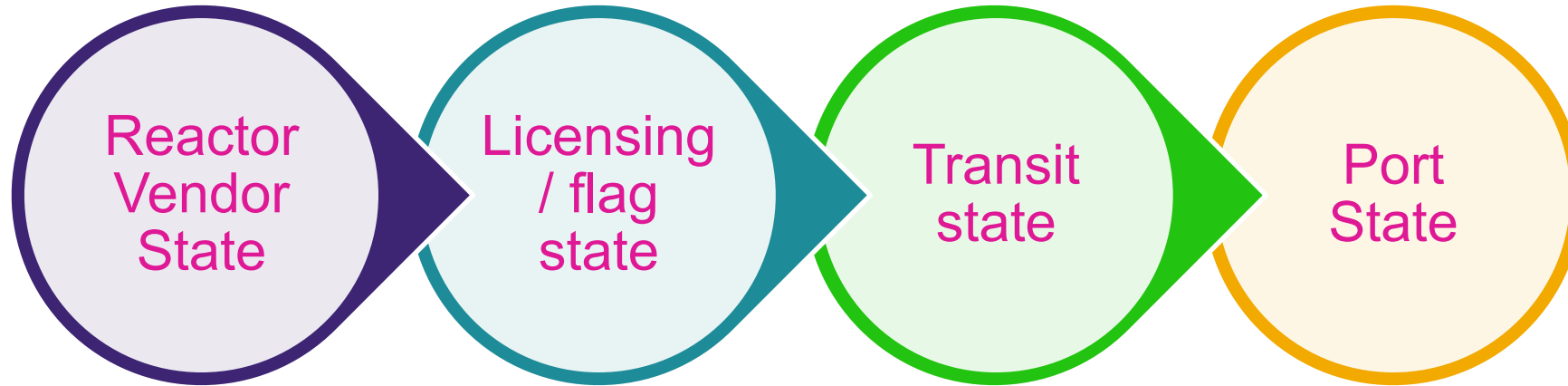
The radiation leaks at Fukushima was the biggest nuclear disaster since Chernobyl

Related Stories

- Why Japan's 'Fukushima 50' remain unknown
- Tepco seeks more government aid
- Japan to probe Tepco 'cover-up'

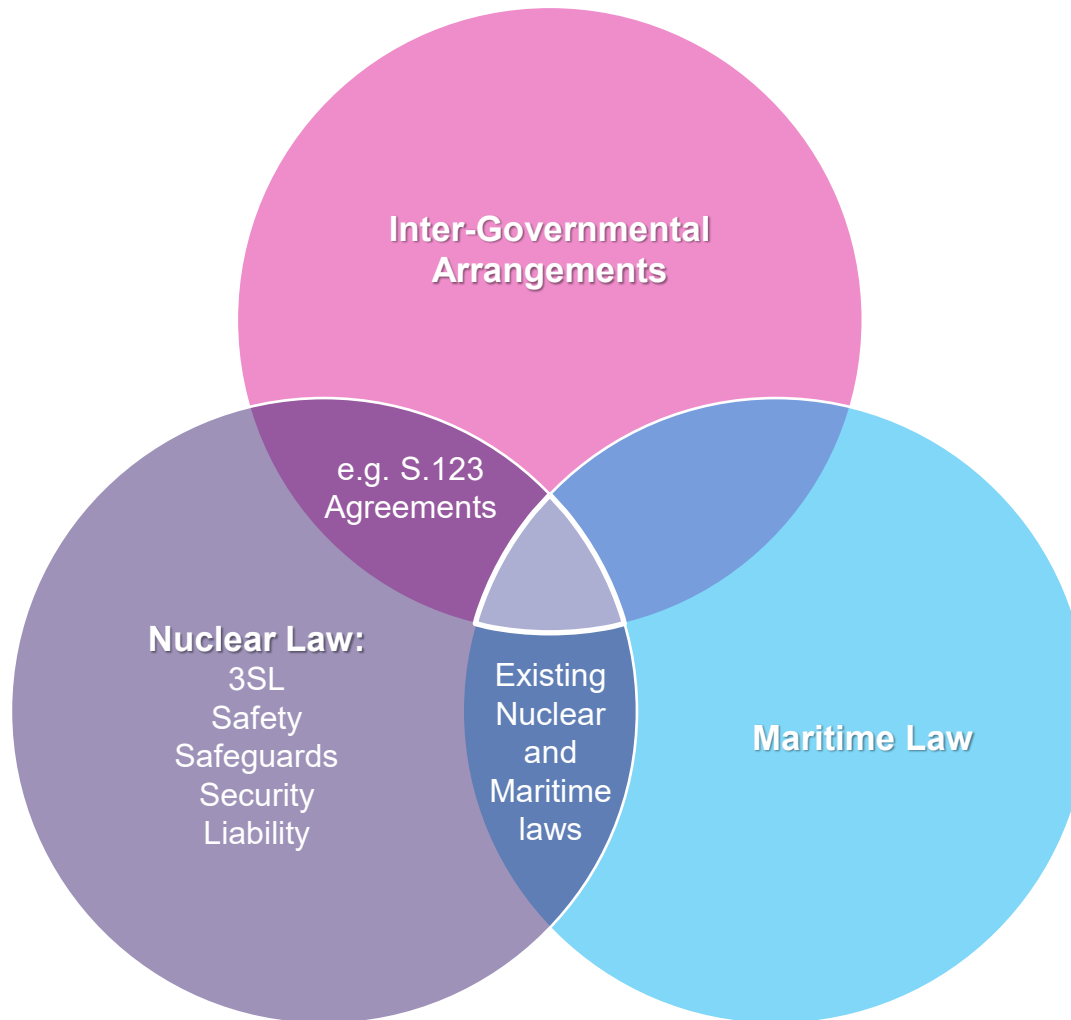
Solutions

Re-defining the deployment model



- Establish nuclear shipping 'corridor'
- Safety – sovereignty (design assessment and licensing)
 - Security – roles and responsibilities?
 - Safeguards – new approach required
- Liability – unlimited, not channelled, uninsurable

Short Term Model for legal and regulatory infrastructure



In this area can arrangements be concluded ahead of international laws and treaties to facilitate a quicker project?

Questions:

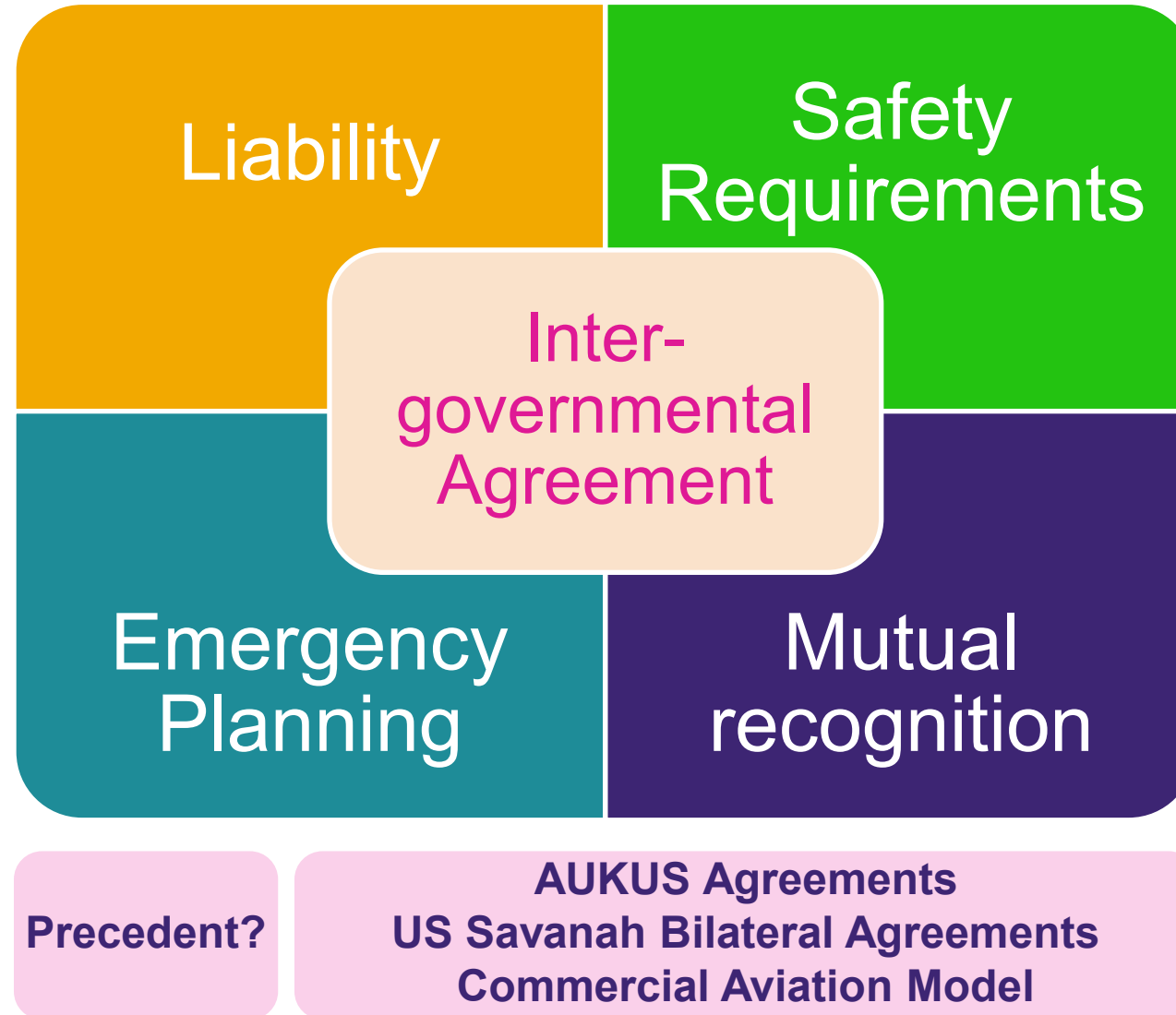
1. What are the “wrappers” for such arrangements? Are they viable?

- Treaties
- Inter governmental agreements
- MoUs
- Contracts

2. What needs to be provided for and how?

e.g. Third Party Nuclear Indemnity, 3SL etc.

A possible solution



Contracts (nuclear)

Fuel Supply

**Regulatory
MOU /
collaboration**

Insurance

**Reactor
Maintenance**

**Reactor
Procurement**

**Funded
Decommissioning**

Finance

**Waste
Disposal**

Lets' start filling the gaps!

- **Interface between maritime and nuclear liability conventions?**
- **Ship safety vs nuclear safety**
- **Role of flag state** – sponsorship, lower liability limits, wrap-around financial guarantees?
- **Role of flag state regulator**
- **Role of port state regulators** – joint design approval? Joint licensing? Mutual recognition? Harmonisation?
- **Port entry requirements** – power to ports?
- **Licensed Shipyards** – ship construction? maintenance / refuelling? interim waste storage?
- **Multiple licensees at licensed shipyards?**
- **Ports of refuge**
- **Salvage?**



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Historical precedents: Savannah, Otto Hahn, and the 1962 Brussels Convention

What has gone before, how was it addressed, and what is different today? What should survive into a modern template bilateral agreement?

- Ruth Keating, 39 Essex Chambers
- Anna Moody, 39 Essex Chambers

Historical precedents: Savannah, Otto Hahn, and the 1962 Brussels Convention

7 October 2026

Ruth Keating
Anna Moody

The Savannah agreements – CORE architecture

The US-Greece Agreement of 1962

- Prior approval.
- International safety standards.
- Safety Assessment.
- Designated ports and authorities.
- Inspection, waste and servicing.
- Casualty reporting.
- Liability.
- Indemnity of \$500 million.
- Either government could terminate on 180 days' notice.

The Savannah agreements – CORE architecture

The US-Belgium Agreement of 1963

- The Particular Dispositions dealt with:
 - the Safety Assessment;
 - port arrangements;
 - inspection of operating, radiation and waste records, including a power to direct the Master to remove the ship if it was not being operated according to the Safety Assessment, or if there was imminent danger;
 - radioactive waste, with no disposal of gaseous, liquid or solid waste without specific prior approval;
 - maintenance by approved contractors only; and
 - immediate casualty reporting.
- Article 12, on Public Liability. Aggregate liability for a single incident capped at \$500 million.

The 1962 Brussels Convention – main features

- Channelling to the operator. Limited recourse. Recourse is available only against intentional wrongdoers, unauthorised wreck-raisers, or where a contract expressly provides for it.
- A cap and financial security.
- Time limits.
- Exoneration for war.
- Jurisdiction and immunity.
- Limitation fund and judgments.
- Non-discrimination.
- Article XVII preserves any right a contracting state has under international law to deny its waters and harbours to nuclear ship.
- Article XXIV, the Convention would come into force three months after ratification by just one licensing state and one other state.

The Germany-Netherlands Treaty of 1968

- Access and safety provisions:
 - prior authorisation, with Germany obliged to report any change of ownership; application of SOLAS Chapter VIII and Annex C;
 - a Safety Assessment submitted by the owner;
 - local regulations binding the Master unless they conflicted with the Safety Assessment and the reactor Operating Manual;
 - free access to the ship for Dutch authorities;
 - restrictions on discharge of radioactive waste and on maintenance; and
 - casualty reporting.
- The treaty then sets out its own rules:
 - time limits of ten years, twenty years and three years, following the Convention;
 - subrogation for Dutch social insurance bodies;
 - a German state guarantee;
 - exclusive jurisdiction;
 - the right for Germany to join proceedings, and the disapplication of shipowner limitation rules.

Comparative analysis

Feature	US--Greece (1962)	US-Belgium (1963)	US- Netherlands liability agreement (1963)	Germany- Netherlands/G ermany- Liberia (Otto Hahn)	Brussels Convention (1962)
Prior approval	Required	Required	No specific entry mechanism; refers to "appropriate operating agreements"	Required; Liberia requires prior written approval for each entry	Access not granted; right to refuse is preserved
Who is liable	The United States	The United States, as determined by the court	The United States	The owner or operator, with absolute liability	The operator, with absolute liability
Cap	\$500m	\$500m	\$500m	DM 400m	1,500m gold francs
Forum	Greek courts, with US courts in the alternative	Belgian courts	Dutch courts or a commission	The Hague court; licensing state or place of damage for Liberia	Claimant chooses between licensing state and place of damage
Sovereign immunity	Express waiver	Submission to jurisdiction	No express wording; submission to proceedings	No express waiver found (Liberia)	Waived
Termination	180 days	180 days	Six months	Six months	Denunciation after the first revision conference
Supersession	Amend if a convention binds both	Amend to conform	Amend to conform	Negotiate revision	Not applicable

Lessons learned and gaps

- Bilateral agreements worked.
- Instruments of their time.
- Bilateral arrangements do not stop tort claims.
- The gap is structural.
- Elements for a modern bilateral agreement:
 - Prior approval and designated routes and ports.
 - Safety assessment, operating rules and qualified crew.
 - Inspection rights with a fall-back power to require departure.
 - Accident response and radioactive waste controls, with wreck provisions.
 - Liability and indemnification, with caps, financial security and state back-up, better modelled on the operator-channelling approach.
 - Jurisdiction and enforcement, including waiver of immunity and mutual recognition of judgments.
 - No-recourse provisions.
 - A territorial extension mechanism.
 - A supersession clause.
 - Termination and notice, reciprocity and coastal states.

	Afternoon Agenda
14:15	3. Ultimately responsible: Who is the operator?
15:15	4. Insurance I: Marine P&I, hull and machinery and reinsurance
16:15	Break
16:30	5. Key Interfaces: Convention on Supplementary Compensation, Paris and Brussels Conventions, HNS, LLMC and IMO
17:30-18:00	Day 1 read-back- Review of key findings and outstanding questions

3. Ultimately responsible: Who is the operator?

Practical application of nuclear liability principles to commercial shipping models.

Where would liability sit?

- Mikal Boe, CORE POWER
- Elena de Boissieu, OECD Nuclear Energy Agency

4. Insurance I: Marine P&I, hull and machinery, and reinsurance

How is marine cover organised, and could existing capacity interface with specialist nuclear shipping cover?

- Mark Smith, North Standard
- Patrick Ryan, UK P&I Club

NEMO Workshop Marine Insurance

Mark Smith

DIRECTOR – DECARBONISATION

7th October
2026



NorthStandard





INSURANCE

// None of this can happen without insurance... The insurance industry is a key enabler in the transition. //

Sean McGovern, Chief Executive Officer, UK & Lloyd's, AXA XL



P&I Clubs

What is a P&I Club?



An Association of Shipowners providing third party liability insurance cover



Is a mutual insurer (sharing of risks)



Owned and controlled by their shipowner members



Non-profit making

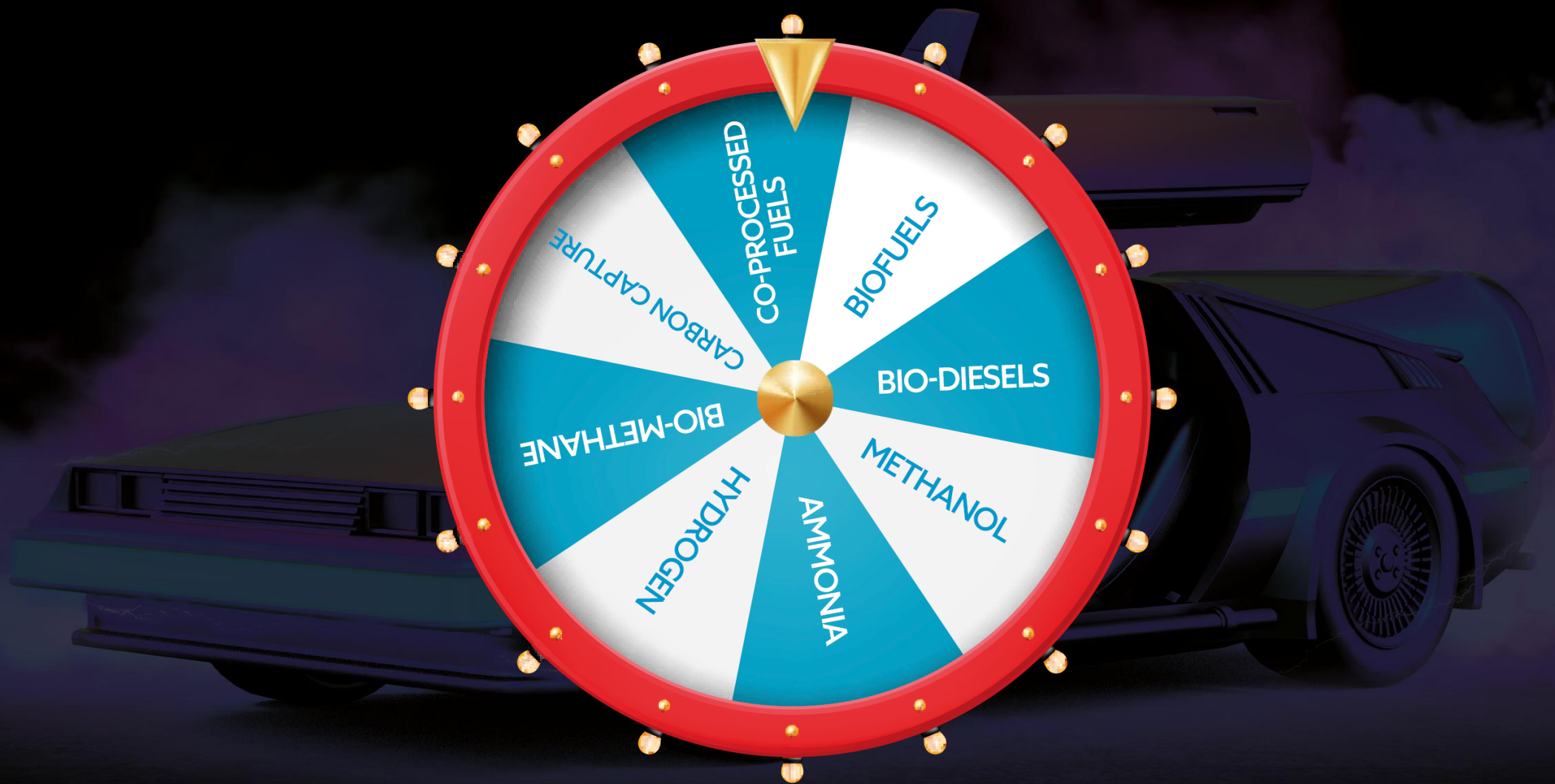


Exist solely for the benefit of their members



A service provider as well as providing insurance





P&I marine liabilities

We cover marine liabilities arising from vessel operations including:



**Collisions
with vessels**



**Damage to fixed
and floating objects**



**Loss of, or damage
to cargo**



**Pollution from the
vessel, or its cargo.**

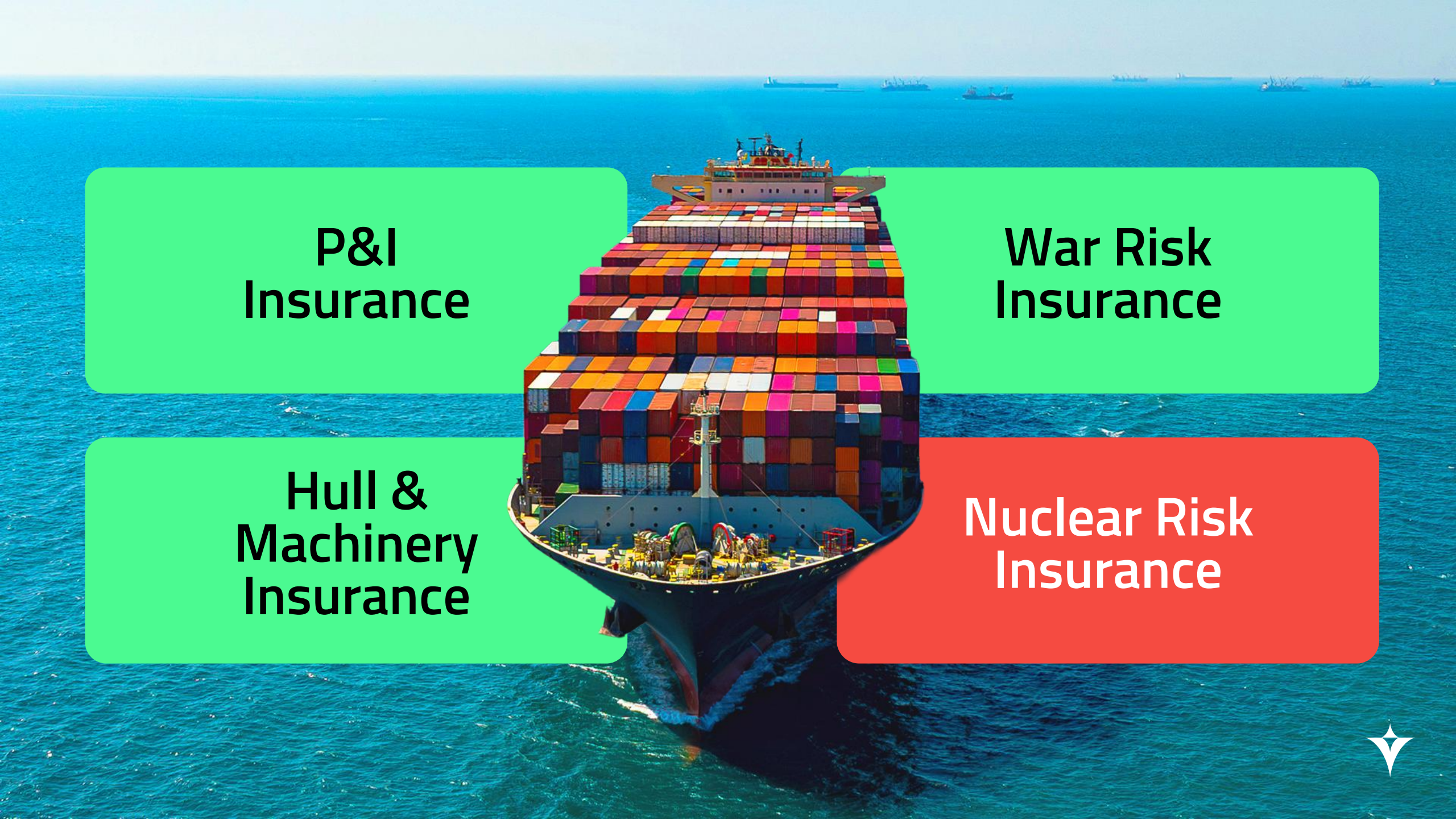


**Loss of life and injury
to crew, passengers
and third parties.**



Wreck removal





**P&I
Insurance**

**War Risk
Insurance**

**Hull &
Machinery
Insurance**

**Nuclear Risk
Insurance**



NEMO Workshop
Marine Insurance

Thank you

Mark Smith

DIRECTOR – DECARBONISATION



NorthStandard



5. Key Interfaces: Convention on Supplementary Compensation, Paris and Brussels Conventions, HNS, LLMC and IMO

How would the principle of absolute liability apply alongside existing maritime conventions?

- Elena de Boissieu, OECD Nuclear Energy Agency
- Erin Walton, West P & I

The background of the slide features a photograph of a large white ship, likely an offshore supply vessel, with a rusted hull. The ship is illuminated by warm lights, possibly from the sun setting or rising. The WEST logo is visible in the top right corner.

WEST.

Liability & Compensation

The Maritime Perspective

Erin Walton

Overview

How do IMO Liability & Compensation Conventions (CLC, Bunkers HNS) allocate liability and calculate limitation-how do they differ if a pollutant is fuel vs cargo?

What are Blue Cards?

What are the differences between IMO Conventions & OPA90?

IGP&I response to MARAD RFI

CLC 1992

- Created after TORREY CANYON
- Applies to spills of cargo and bunkers but only from tankers carrying persistent oil as cargo or residues from previous voyage.
- Compulsory Insurance Requirement, with direct recourse against Insurer (“Blue Card”). 90 days cancellation notice required.
- Strict liability, channeled to **Registered Owner**, subject to limited defences:
 - Act of war, hostilities, insurrection or exceptional natural phenomenon
 - Wholly caused by intentional act of third party
 - Wholly caused by failure of government to maintain lights/buoys
- Strict liability does not prejudice any right of recourse of the owner against third parties
- Liable for : preventative measures, damage to property, economic loss from contamination, reasonable/proportionate environmental restoration.
- Other Conventions expressly disapply themselves when CLC applies

CLC 1992

Limitation of liability

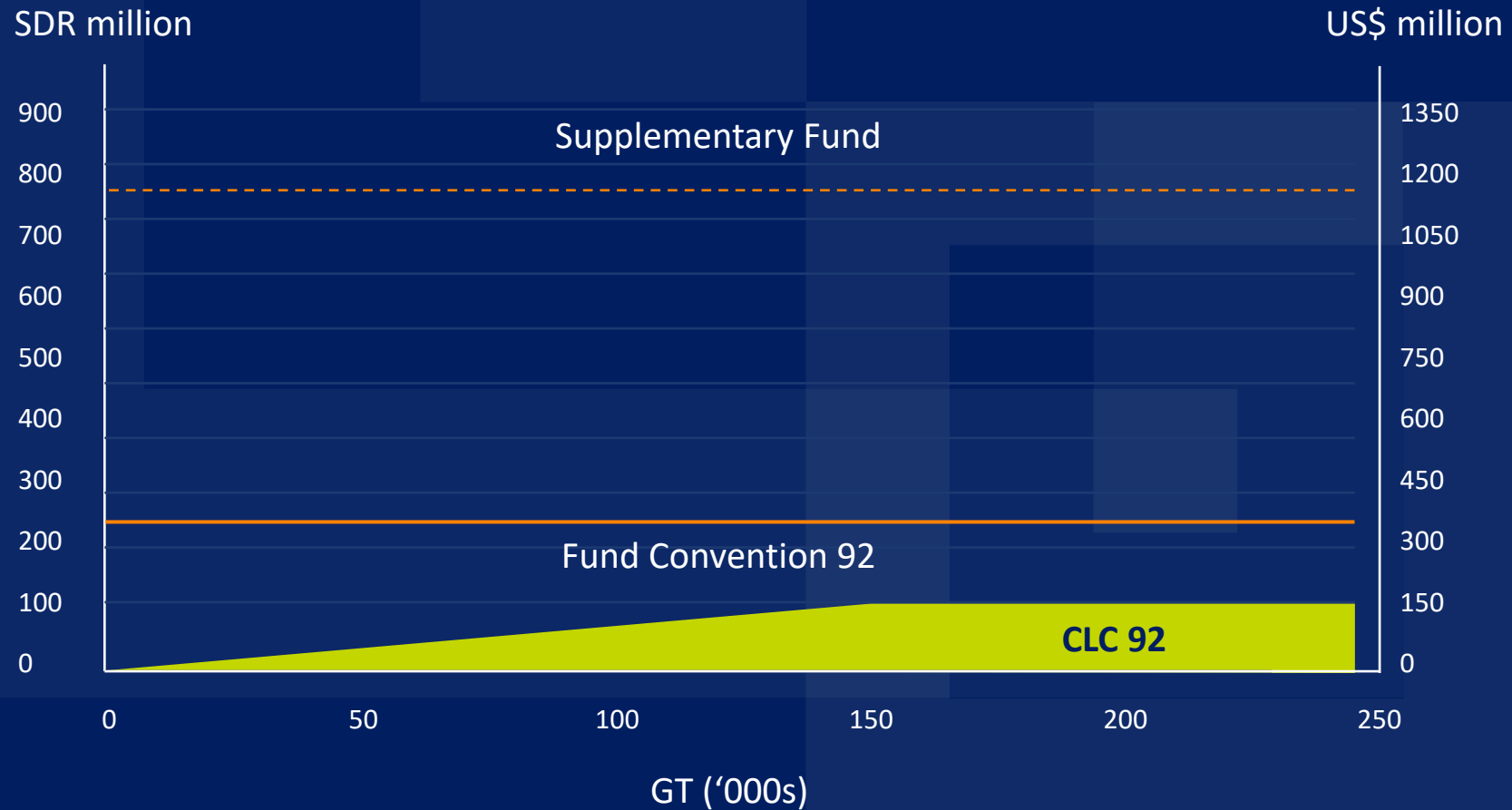
- In return for strict liability and direct right of recourse against insurer under Blue Card:
- Vessel tonnage based limitation
 - 4,510,000 SDR (US\$6.4m) minimum for first 5,000gt
 - 631 SDR (US\$902) for each gt thereafter
 - 89,770,000 SDR (US\$122m) maximum
- Insurer retains right to limit even when owner loses it
- Loss of right to limit

“Personal act or omission committed with intent to cause damage, or recklessly with knowledge that such damage would probably result.” –see IMO Unified Interpretation



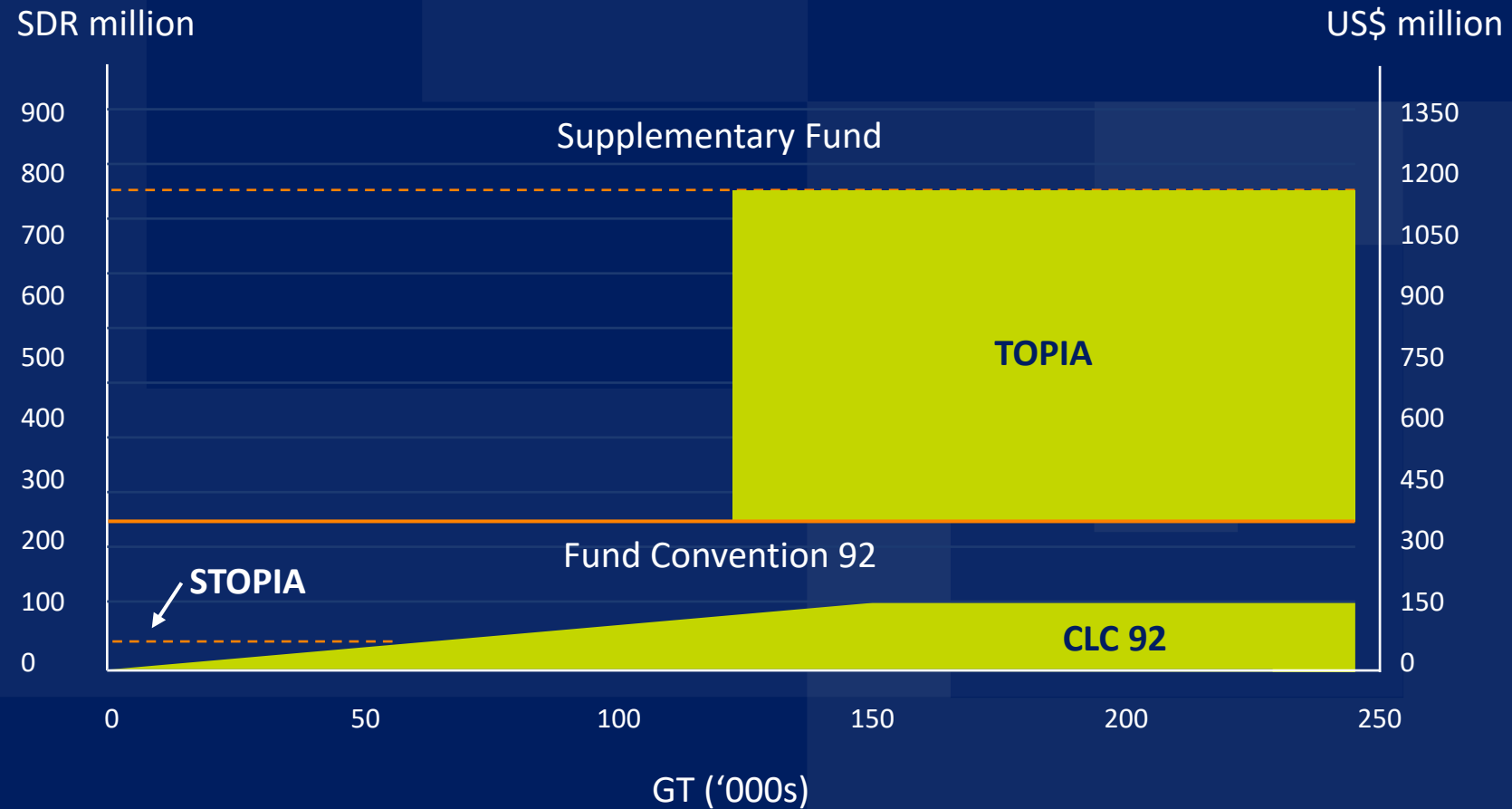
The convention limits

WEST.



The convention limits

WEST.



USA- Oil Pollution Act 1990

- Outside convention system
- EXXON VALDEZ accident (1989)
- Applies to ALL vessel types
- Precontracting requirements- QI, SMFF etc
- Strict liability, channeled to 'Responsible Party'- can be shipowner, operator or demise charterer
- Shipowner must obtain 'COFR' – not provided by Clubs
- COFR provider can be held directly liable
- Limited defences- act of god/war/terrorism/third parties*
- Liable for preventative measures, clean up costs, pure economic loss, NRDA, third party claims.
- RP rights of recourse against third parties not extinguished

USA/OPA 90

Vessel limits and OSLTF

- Tonnage based-separate limits for double hulled tankers & other types of ships:

‘tank vessel’ greater than 3,000GT (other than single hull tank vessel): greater of \$2,500 per GT or \$21,521,000

- Loss of right to limit- much wider:
 - Gross negligence/wilful misconduct
 - breach of safety/operating regulation
 - failure to report
 - failure to co-operate and assist

- OSLTF: additional/alternative source of compensation where:
 - RP has inadequate resources/insurance
 - No RP can be identified (“mystery spills”)
 - RP has successfully limited their liability
- US\$1 billion per incident available
- Funded by 5 cents per barrel tax on oil imports Administered by National Pollution Funds Centre in Washington DC (part of USCG)

Bunkers Convention 2001

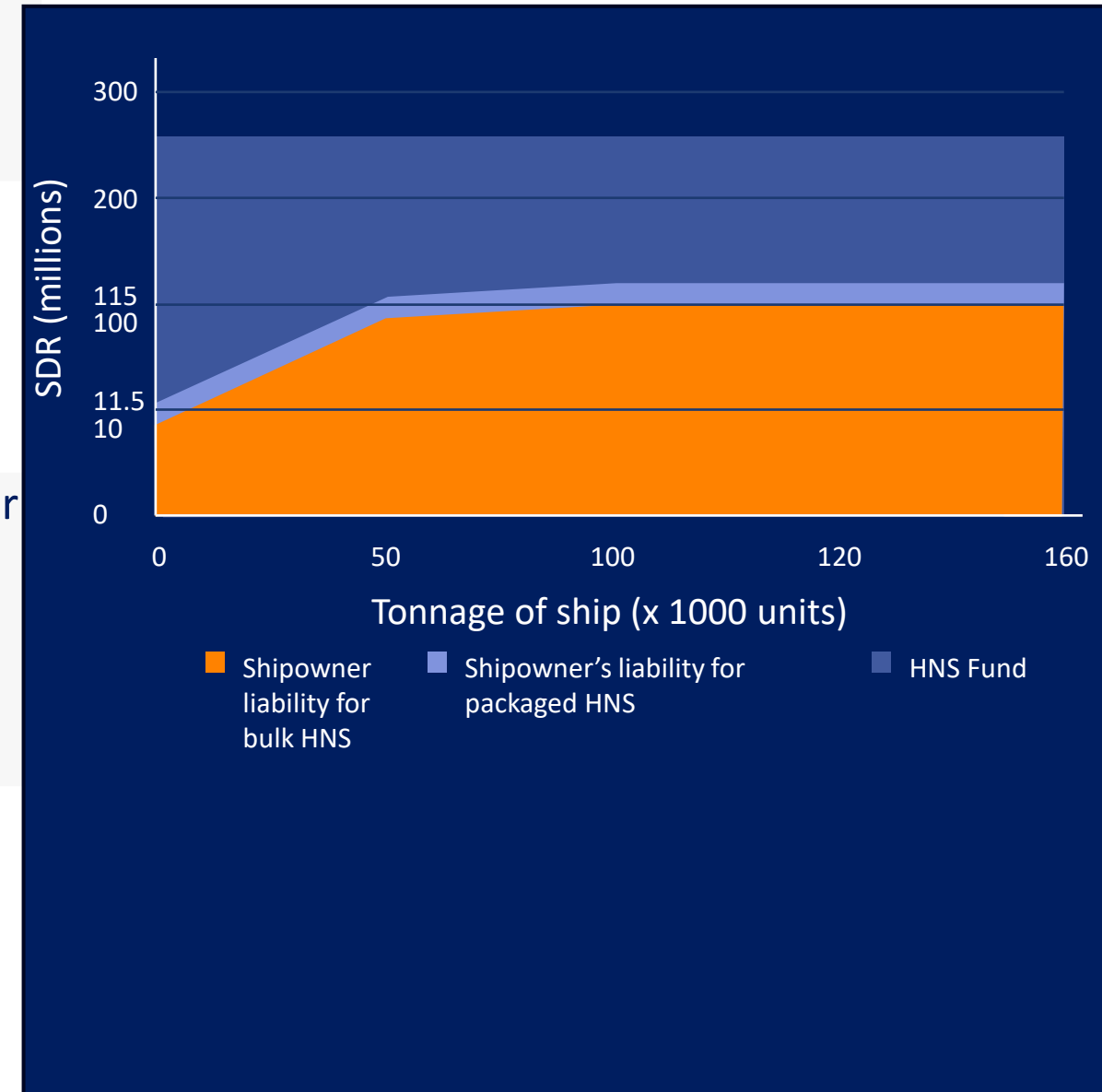
- Applies to spills of bunkers, except from dirty tankers = CLC (express wording to disapply Convention if CLC covers it)
- Modelled on CLC, many similarities but some differences
- Strict liability channeled to “shipowner”, being registered owner, bareboat charterer, manager or operator
- No inbuilt limitation regime: limitation subject to local law, e.g. 1976 LLMC, 1992 Protocol, own system - or none at all
- Blue Card limit for the financial guarantor is set at 1976 (as amended) LLMC limits, even if shipowner not allowed to limit liability in that jurisdiction.
- Sole source of compensation – no fund on top. Some states have created their own, outside the Convention system.



2010 Hazardous & Noxious Substances Convention (HNS)

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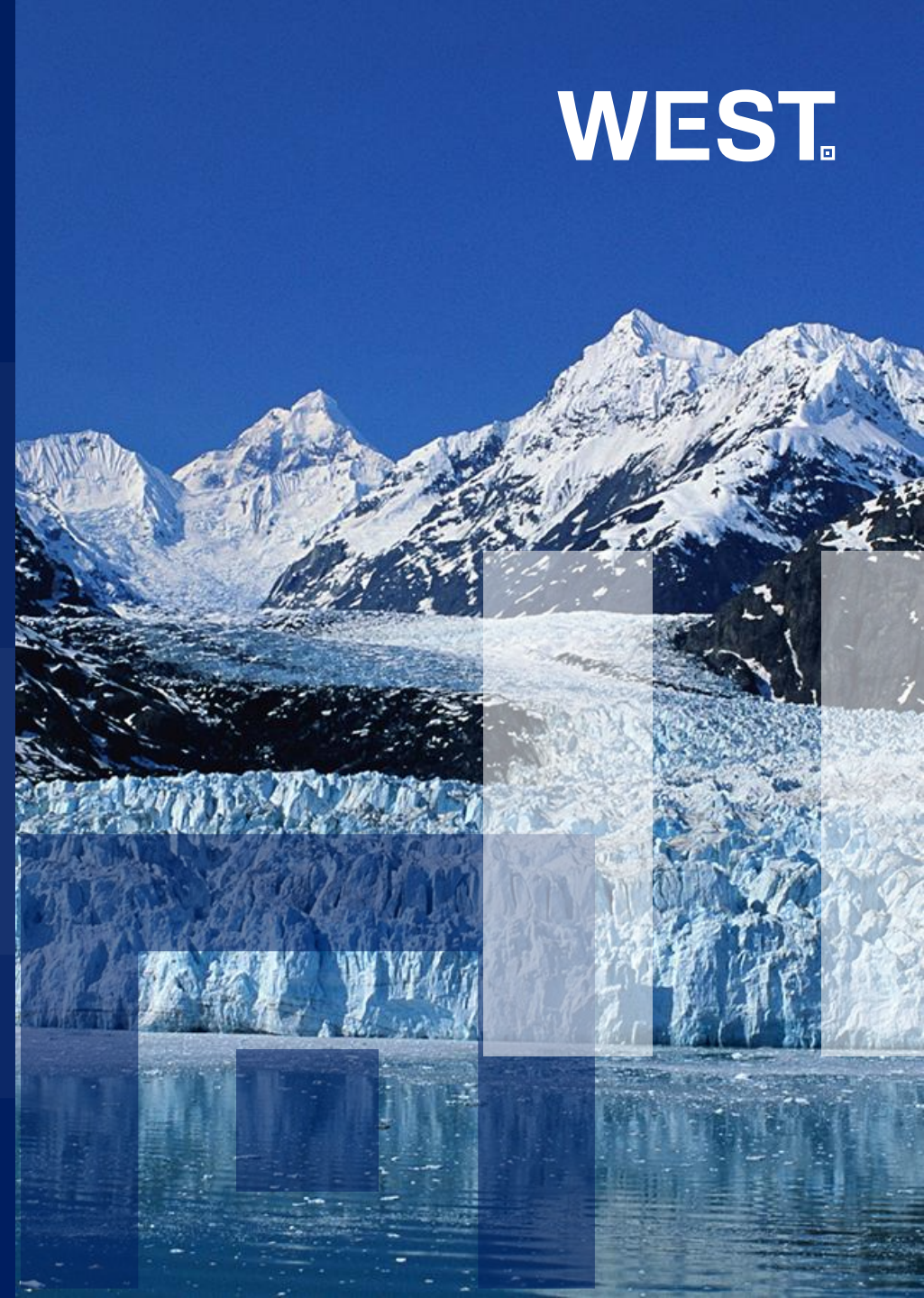
- Everything else – chemicals, non-persistent oils, gases, packaged goods (see HNS Finder)
- At present governed by local legislation or LLMC-not backed by a Blue Card. Enters into force Nov 2027
- Similar structure to CLC / Fund, i.e. shipowners and cargo receivers, but no minimum qualifying vessel gt or cargo tonnage
- 90 days notice of cancellation of Blue Cards
- Shipowner rights of recourse protected
- Same defences as CLC, plus undeclared HNS
- Fund on top, paid for by receivers of bulk HNS
- Includes liability for personal injury
- Art 18 of LLMC amended: States can disapply LLMC in favour of HNS Convention where ratified both



Questions

- Who will liability be channeled to?
- At what level can the financial guarantor limit?
- Who will be allowed to provide the financial guarantee?
- How will any treaty interact with existing Conventions?
- Will financial guarantees be published for ports, authorities, claimants etc to easily verify?
- IMO Conventions focus on ship size as an indicator of scope of potential damage from pollution/escape to calculate limitation- is that the appropriate method for nuclear?
- If a fund above operator/vessel liability limits is envisaged, how would it be funded? No cargo receivers to fund when source of contamination is fuel.

WEST_®



IGP&I MARAD RFI

- IGP&I response highlights:
 - Insurers prefer certainty and predictability that uniform liability regimes provide
 - IG supports IMO conventions that include sliding scales of liability based on ship size and overall maximum caps on shipowner and insurer liability
 - Protect key principles that enable swift compensation for victims balanced with shipowner right to limit
 - Absent rights to limit, insurance and reinsurance would be prohibitively expensive

“The IG recognises that the development of multilateral conventions is complicated and takes time and, given the varying risk appetite of nation states, bilateral or plurilateral agreements might be more achievable in the short to medium term.

However, the absence of a liability framework for nuclear powered ships will be a key factor in the IG's assessment of whether liabilities relating to the use of nuclear fuels and reactors could or should be insured through the Pool and GXL in the future.

We therefore respectfully suggest that if MARAD wishes to support the scalable deployment of small modular reactors in commercial shipping that the development of liability frameworks is central to its considerations.”

Thank you

<i>APPENDIX</i>	CLC	OPA90	HNS	Bunkers
Channelling?	Yes – Registered Owner	Yes- Responsible Party	Yes-Registered Owner	Yes - Shipowner
Strict Liability?	Yes	Yes	Yes	Yes
Compulsory Insurance?	Yes	Yes	Yes	Yes
Types of loss	Preventative measures, clean up, damage to property, environment restoration	Preventative measures, clean up, pure economic loss, NRDA	Loss of life/personal injury, damage to property, environment contam, economic loss, prevention	Preventative measures, clean up, damage to property, environment restoration
Maximum capped Shipowner/RP limit?	Max SDR 89,770,000	Varies by type: ie tanker over 3,000gt (not single hull) : US\$21,521,000	Max 100m SDR for bulk HNS, 115m SDR packaged HNS	Set by local law where incident occurs, but guarantor limits based on LLMC (amended)
Limitation by vessel tonnage?	Yes	Yes	Yes	Yes
Direct ROR against guarantor?	Yes	Yes (COFR provider)	Yes	Yes
Defences?	War, 3 rd party, government lights/buoys	Act of God, war, 3 rd party (caveats), terrorism	War, 3 rd party, government lights/buoys/undeclared HNS	War, 3 rd party, government lights/buoys
Time Bar	3 years from damage/6 max	3 years from removal or damage or NRDA/6yrs OSLTF	3 years from knowledge/10max	3 years from damage/6 max
Fund?	Yes- Fund & Supplementary Fund (if ratified)	Yes- OSLTF	Yes- HNS Fund	No (some States set up their own Funds)
Limits with Fund (max)	SDR 750m	US\$1billion	SDR 250m	Not applicable
Shipowner ROR?	Yes	Yes * (some case law)	Yes	Yes
IG Blue Cards?	Yes	No (COFR provider)	Yes (from 29 Nov 2027)	Yes

Day 1 read-back

Review of key findings and outstanding questions

➤ Ian Truman, Burges Salmon

**Welcome to the NEMO Working Group 3
ANNORAX Liability and Insurance
Workshop 8th October**



NEMO

Burges
Salmon

Morning Agenda

9:00

6. Insurance II: Nuclear risk insurance capacity and the insurance stack

10:00

7. Jurisdiction, enforcement, and EU competence

10:30

Break

6. Insurance II: Nuclear risk insurance capacity and the Insurance stack

How is nuclear risk insurance organised?

What is required under current nuclear liability conventions, and what should the sector aim to achieve?

- Mark Popplewell, Nuclear Risk Insurers
- Elena de Boissieu, OECD Nuclear Energy Agency

NEMO WG3 - Annorax

6. Insurance II: Nuclear risk insurance capacity and the insurance stack

Lessons from 70 years of nuclear insurance for the future of nuclear-powered shipping

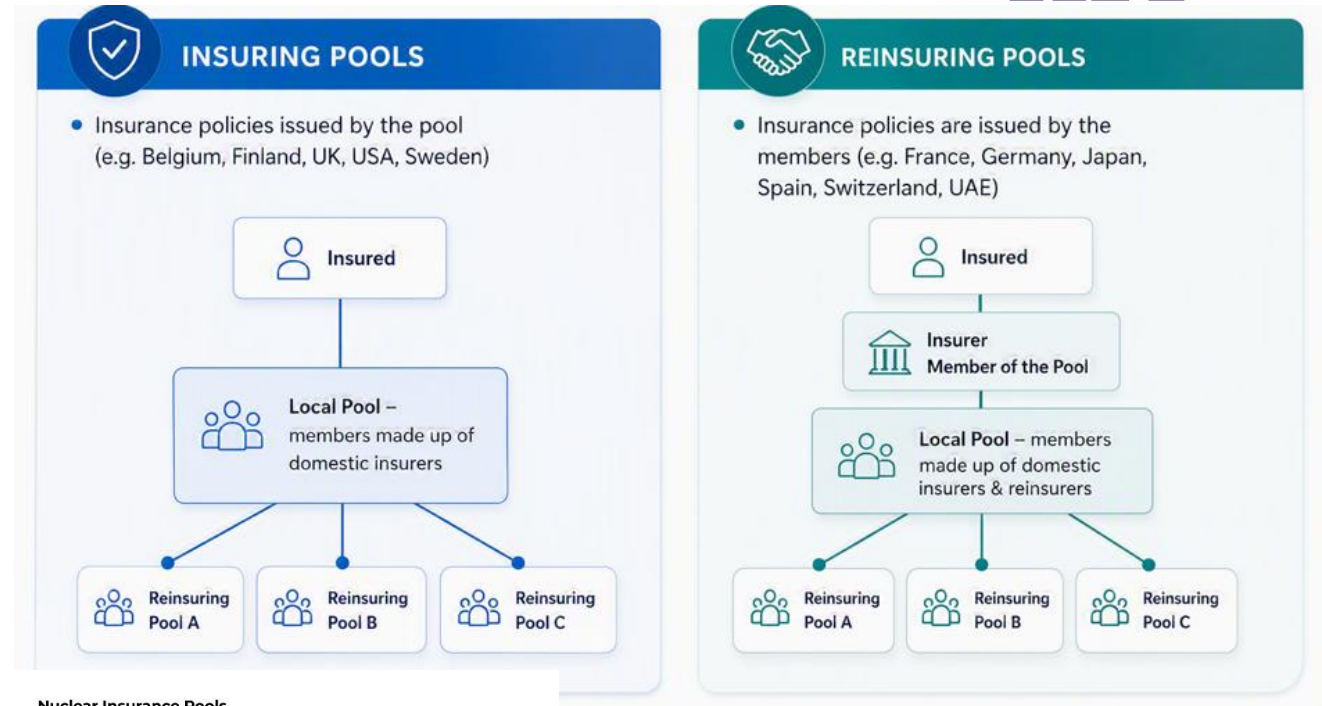
8th October 2026

Mark Popplewell – Managing Director, Nuclear Risk Insurers Ltd,
INLEX member and NEMO Director

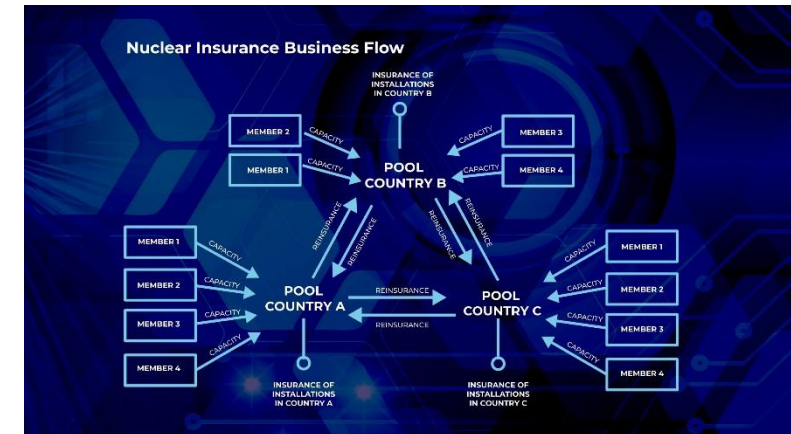
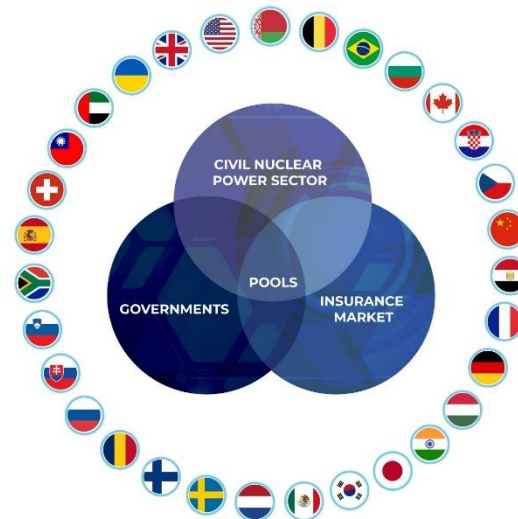
Nuclear Insurance Pools

- Mechanism where insurers 'syndicate' to underwrite jointly a particular class of business:
 - require a capacity beyond the individual means of the members
 - risks are few in number / individually significant
 - presents potentially catastrophic exposures that exceed conventional insurance appetite
- Nuclear Pools operating since the mid-1950's
- Capacity circa USD 3.5 – 4bn per risk is **NET** – no Facultative or Treaty reinsurance
- Result - wide international diversification of risk – e.g. 350 plus capacity providers on a large NPP risk

Pooling transformed a risk that no single insurer could absorb into one that could be supported by global insurance markets."



Nuclear Insurance Pools



Why is insuring nuclear different?

The risk...

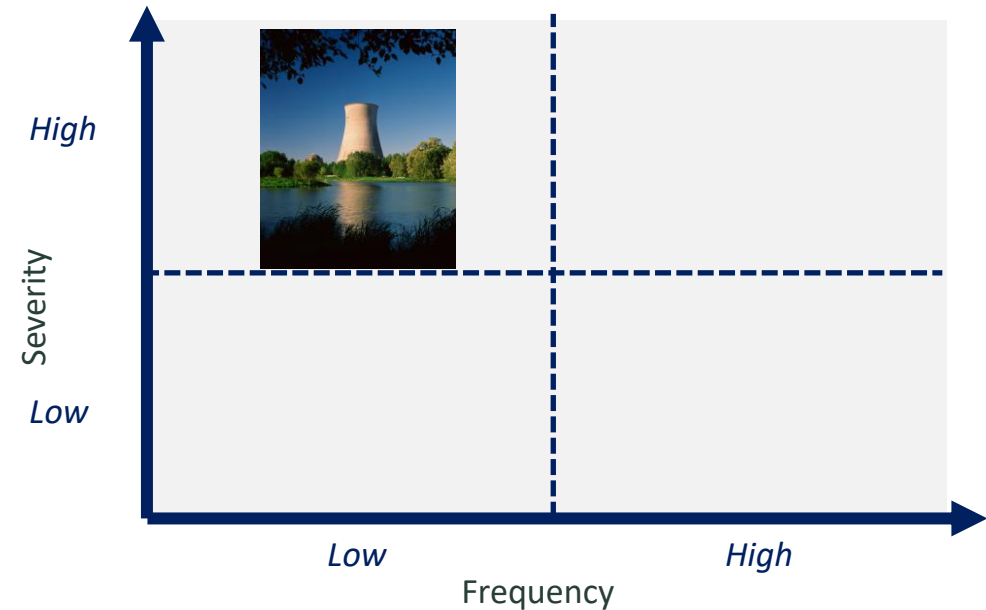
Failure to control the nuclear event leading to.....

- catastrophic radioactive contamination of a widespread area
- extensive plant damage

Conventional insurance excludes:

Nuclear Energy Risks

Radioactive Contamination



To manage very low frequency very high severity risk accumulation / potentially systemic risk

- Core Damage Frequency – very low e.g. 10^{-4} or 10^{-5}
- Low number of nuclear sites: 500 sites & premium approx. USD750m globally; < 0.05% of total global premium
- Insufficient actuarial data - limited loss experience means underwriting relies heavily on engineering analysis and probabilistic risk assessment.

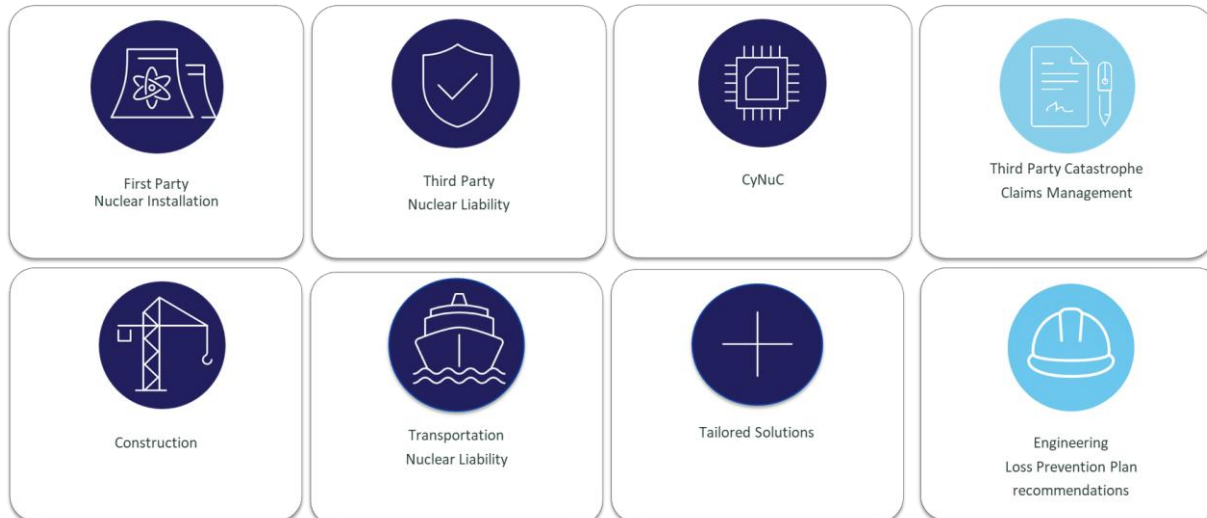
Nuclear Fuel Cycle and Insurance coverages available



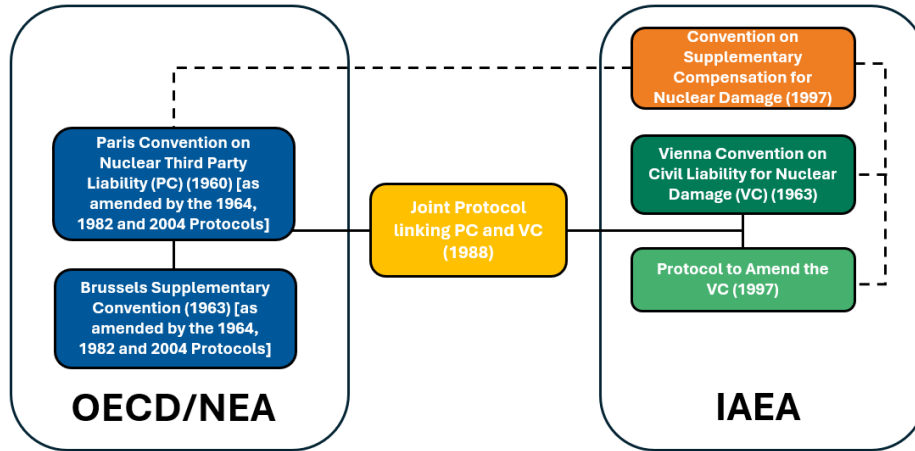
Areas where nuclear insurance expertise extends beyond liability:

- Transport Liability
 - established expertise in maritime transport of nuclear materials
- First party – Property / Machinery Breakdown including Business Interruption
 - protection of high-value nuclear assets
- Radioactive contamination – Hull and Cargo?
- Risk Engineering – adapt to scale...
- Claims Management - Specialist response capability and international coordination

Many of these capabilities already align closely with future maritime nuclear operations



Nuclear Liability and Insurance



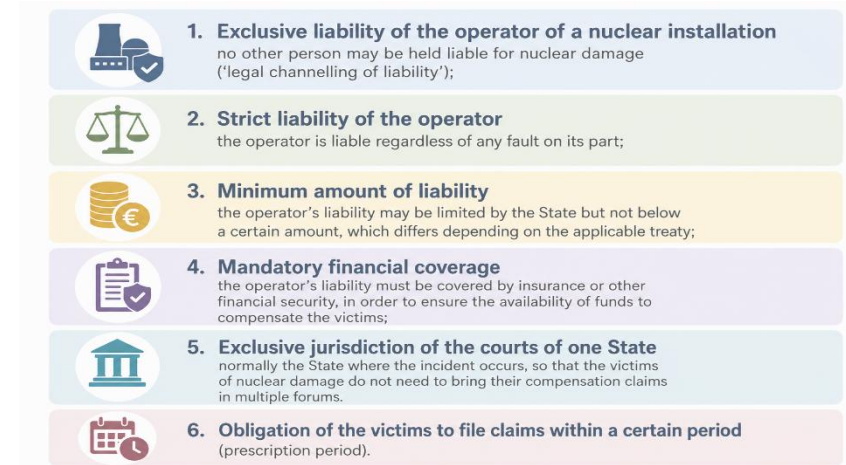
PC 2004

VC 1997

- SDR300m
- ### CSC 1997
- SDR115m (12 signatories)

Marine Liability

- A key question for maritime nuclear: how will existing convention limits correspond to vessels powered by SMR and AMR technologies at sea?
- Several Countries including; Canada, France, UK and USA have already started to think about how Convention limits will apply to SMR and AMR technologies



The greatest value of the international conventions is certainty: certainty of liability (channelling), certainty of jurisdiction and certainty of compensation

Insurer prerequisites for Nuclear insurance cover

convention adherence / acceptable domestic nuclear legislation

independent regulatory control

participation of domestic insurance industry to facilitate inter-pool reinsure internationally

premium payment with freedom from exchange control

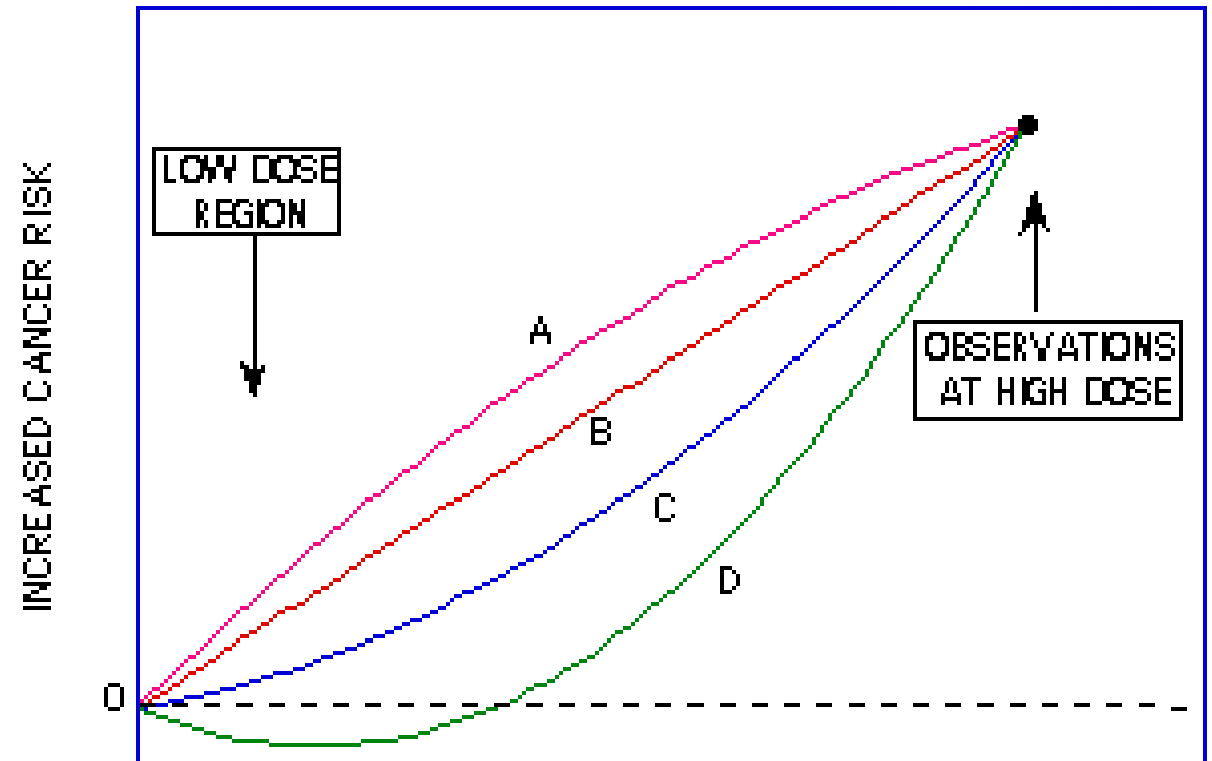
no sanctions or trade restrictions

Nuclear Liability and Insurance (con't)

Head of damage	Insurance response
1. Loss of life, personal injury (includes mental anguish)	30-year prescription period
2. Loss of or damage to property	Yes
3. economic loss related to 1 and 2	Yes
4. Reinstatement of impairment to the environment	Yes
5. use/enjoyment of the environment	Yes
6. preventive measures	Yes
7. Exceptional natural perils – ‘grave natural disaster’	Yes - but can be an exoneration/indemnity
8. terrorism	Yes - but can be an exoneration/indemnity

Insurer challenge - ‘strict liability’

- Authorised Emissions – Linear No Threshold (LNT)
 - **Authorised** vs **Unauthorised** Emissions
 - Insurance regulation - an insurer cannot charge a premium and assume no claims - reserves still need to be set!



RADIATION DOSE (ABOVE BACKGROUND)

Different assumptions on the extrapolation of the cancer risk vs. radiation dose to low-dose levels, given a known risk at a high dose:

- (A) supra-linearity, (B) linear
(C) linear-quadratic, (D) hormesis

Enabling the Commercialisation of Nuclear-Powered Shipping

Why is Nuclear Insurance different?

- Nuclear Exclusion NMA1975a / CL 370 - **“This Insurance does not cover any loss, damage, liability or expense arising from nuclear reaction, nuclear radiation or radioactive contamination, however caused”**
- Nuclear liability requires dedicated frameworks, specialist underwriting and ‘pooled’ insurance capacity

Nuclear-powered shipping creates a liability and insurance gap that cannot be fully addressed by conventional marine insurance alone

Maritime Nuclear Insurance success requires

- Clear liability framework, operator liability and jurisdictional certainty
- Early bilateral/multilateral agreements
- Clear understanding of Flag State/Ship Owner and Port State responsibilities
- Dedicated nuclear underwriting and risk engineering (role of Class Society)
- Coordination between Nuclear Pools, P&I Clubs and marine insurers
- Sufficient insurance capacity to support investment

Nuclear Pools can play the same enabling role for maritime nuclear that they played for the civil nuclear industry from the 1950s onwards

- Proven international pooling mechanism
- 70 years supporting civil nuclear development
- Specialist nuclear underwriting and engineering expertise
- Experience developing insurance solutions for emerging nuclear technologies
- Experience working alongside governments, intergovernmental organisations and regulators

An investable maritime nuclear sector requires an insurable maritime nuclear sector

Thank you

Nuclear Risk Insurer Limited
6th Floor
107 Cannon Street
London
EC4N 5AF

enquiries@nuclear-risk.com

7. Jurisdiction, enforcement, and EU competence

Jurisdiction, enforcement, and the approach of third status

➤ Ian Truman, Burges Salmon

Jurisdiction, enforcement, and EU competence

Ian Truman

8 October 2026

Unity of Jurisdiction – the nuclear model

- **Single forum:** courts of the 'incident state' have exclusive jurisdiction.
- **Fallback:** if the place of the incident is uncertain (or outside any contracting state), it's the courts of the 'installation state'.
- **One law:** the competent court applies the convention and its own law; claims are not fragmented across different jurisdictions.
- **Recognition:** judgments of the competent court must be recognised and enforced in other contracting states.
- **Brussels 1962:** the claimant could choose between the courts of the licensing state and the place of damage.

For a ship, 'installation state' has no settled meaning.

This probably translates as the flag state

Conflict rules: which instrument prevails?

- **Earlier transport treaties preserved:** Paris and Vienna conventions allow actions against a carrier liable under transport agreements in force or open when the convention was adopted (for example, the 1910 Collisions Convention)
- **1971 Brussels Convention:** exonerates the maritime party if the operator is liable under Paris, Vienna or equivalent national law, but only CPs; third-state rights are unaffected.
- **Later maritime agreements:** most have nuclear exclusion clauses, but wordings differ (total exclusion in HNS; 'if covered by' in LLMC, Athens and Nairobi).
- **Where no nuclear convention applies:** some maritime agreements then apply to nuclear damage, including in the courts of nuclear-convention states.
- **Lex posterior / lex specialis:** may resolve conflicts between parties, but not with third states.

Because the nuclear conventions do not cover the ship, the 'if covered by' exclusions may not bite, which could reopen maritime fora for nuclear claims

Enforcement

- **Within a convention:** judgments of the competent court must be recognised and enforced in other contracting states, subject to limited exceptions.
- **Within a bilateral agreement:** recognition and enforcement must be expressly agreed.
- **Outside treaty relations:** conventions cannot affect the rights of non-contracting states or the law their courts apply. A third-state court need not recognise the channelling, the cap or the forum.
- **Consequences:** channelling may fail; suppliers and other parties may be exposed; parallel judgments are possible.
- **Partial remedy:** subrogation under Paris Art 6(d) and Vienna Art IX.2(a) lets a payer step into the victim's convention rights.

Transboundary damage reaching a state outside the agreement leaves its claimants with no treaty route to the operator and no treaty basis for enforcing judgments

The enforcement gap for third-state claimants

Structural limit: nuclear liability binds only the contracting parties and cannot affect non-CPs' rights or the law of their courts.

Exposure: operator, suppliers, yards and class could be sued in tort under the third state's law, outside the cap and channelling.

Illustration: US sailors sued Tepco in a US federal court (2012) over Fukushima exposure, seeking USD 10m compensatory and USD 30m punitive damages each.

Contractual indemnities offer only partial protection, subject to enforceability.

Mitigations: territorial extension mechanism; non-discrimination; subrogation; route design to limit transit through non-party waters.

How should a bilateral instrument treat claimants in non-party states, including coastal states on the route?

Causation and time limits: enforcement over decades

Strict, not automatic: victims must still prove a causal link; the conventions leave causation to the law of the competent court.

Adequate causality: minimum threshold to trigger nuclear liability.

Fukushima: Reconciliation Committee guidelines clarified causation by damage category and supported settlement, but were non-binding.

Time bars: nuclear: 10 years, 30 for personal injury. Maritime: typically 2 to 3 years. HNS: 3 years from knowledge, 10 years maximum.

Insurability: a 30-year period is difficult to insure; private cover may not span the full period

**Forum choice decides the causation standard.
Should the instrument harmonise causation or provide guidelines on the Fukushima model?**

EU Competence

- **Jurisdiction** sits in EU exclusive competence, so the Member State may not be able to agree it alone.
- **Practical consequence:** a UK or US to EU agreement could need EU involvement for its forum and judgments clauses, but not necessarily for its safety, port-entry or state-guarantee clauses.
- **Historic contrast:** the US-Greece, US-Belgium and Germany-Netherlands agreements predate EU competence over civil justice.

Does EU exclusive competence prevent an EU Member State from concluding the jurisdiction and recognition provisions of a bilateral nuclear-ship agreement on its own?

EU Law

- **ERTA principle, codified in Arts 3(2) and 216 TFEU:** the Union has exclusive competence to conclude an agreement where it may affect common rules or alter their scope.
- **Opinion 1/03 (Lugano, 2006):** the CJEU held that the new Lugano Convention fell entirely within exclusive Community competence, because it would affect the Brussels I rules on jurisdiction and recognition.
- **Brussels I Recast (Reg. 1215/2012):** governs jurisdiction and recognition in civil and commercial matters, including tort claims ('place where the harmful event occurred').
- **Art 71 Recast:** pre-2012 conventions on 'particular matters' to which Member States are party prevail, and their judgments circulate under those conventions.

Forum and judgments clauses in a new Member State-third state agreement would likely affect Brussels I rules

A Member State acting alone risks infringing exclusive competence

Precedent: protocols ratified in the Union's interest

- **Council Decision 2004/294/EC:** authorised Paris Convention parties to ratify the 2004 Protocol 'in the interest of the EC'.
- **2013 Council Decision (Vienna 1997 Protocol):** EU exclusive competence over Vienna Arts XI and XII (jurisdiction and recognition) insofar as they affect Brussels I. Member States retain competence for the rest.
- **Inseparability:** acceptance of the EU-competence provisions 'cannot be dissociated' from the Member State provisions.
- **Union cannot be a party:** Vienna and Paris are not open to regional economic integration organisations, so Member States ratify on the EU's behalf.
- **Legal basis:** Art 81(2) TFEU with Art 218(6)(a) TFEU.

**Would the same
authorisation technique
work for a bilateral
nuclear-ship agreement
with the US, or does a
bilateral treaty require the
Union itself to negotiate?**

Euratom and Rome II

- **No EU-level nuclear liability regime:** civil nuclear liability in the EU rests on Paris, Vienna and the CSC, ratified by Member States; harmonisation has been discussed but not adopted.
- **Euratom Treaty:** governs safety, safeguards and supply; its interaction with liability for mobile reactors is untested.
- **Mixed picture:** the EU controls forum and recognition, while Member States control substantive liability, amounts and state guarantees.

Does Euratom confer any competence over safety and licensing of ship reactors visiting EU ports that bears on liability?

Pathways for an EU Member State on the corridor

Pathway	How it works	Advantages	Risks
Council authorisation ' <i>in the interest of the Union</i> '	Member State concludes the agreement under a Council Decision (2004 and 2013 precedents)	Tested in nuclear liability; keeps the state guarantee national	Precedents concern multilateral protocols, not a bilateral treaty
Mixed agreement	EU and Member State both party: EU for forum and recognition, Member State for the rest	Clean competence split	Slow; requires EU and national ratification
EU-level instrument	EU agreement with Third State, or an EU regulation on nuclear-ship forum and recognition	Corridor-wide uniformity across EU ports	Long lead time; political appetite uncertain
Rely on Art 71 / derogation	Fit within Art 71 'particular matters' or seek a specific derogation	Minimal EU process	Legally uncertain for a new post-Recast agreement



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	Agenda
10:45	8. Licensing and class
11:45	9. Nuclear and Maritime Code Integration
12:45	Findings and the mandate for Workshop 2
13:15	Workshop Close- Closing Remarks
13:30	Networking Lunch

8. Licensing and class

How could a nuclear propelled ship be licensed?

What do the classification societies need to know

- Jonty Slater, Maritime and Coastguard Agency
- Craig Burch, American Bureau of Shipping



NEMO WG 3 Workshop

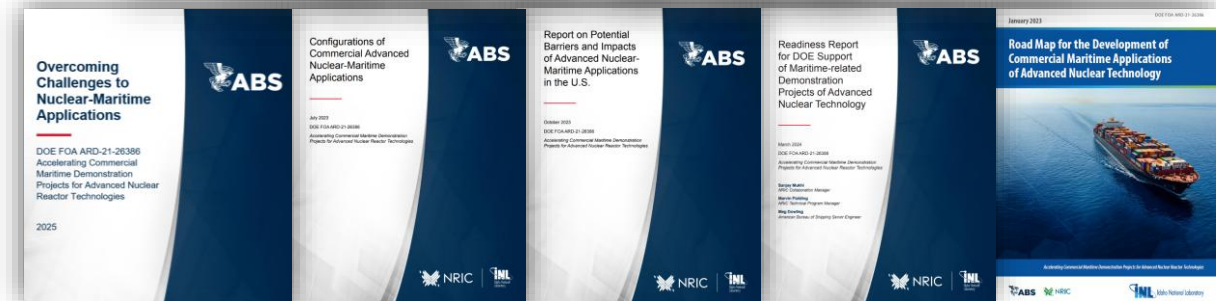
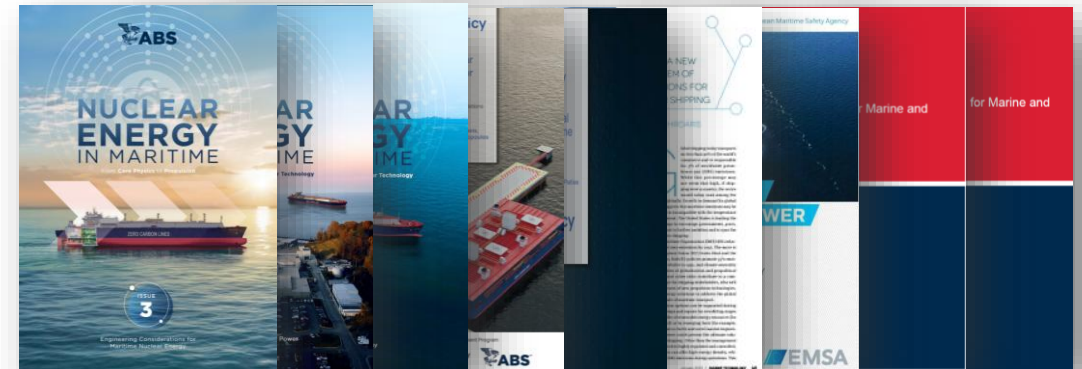
Craig Burch
Assistant General Counsel

October 8, 2026

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ABS Publications

1. Accelerating Commercial Marine and Offshore Demonstration Projects for Advanced Nuclear Reactor Technologies
2. Focus in Nuclear Maritime
3. Potential Use of Nuclear Power for Shipping
4. *ABS Requirements for Power Systems for Marine and Offshore Applications*
5. *ABS Guide for Nuclear Ready Applications for Marine and Offshore*
6. Nuclear Energy in Shipping
7. Herbert Concept studies



Maritime Nuclear Interface

Interface Document Goals

Identify Stakeholders

Identify Applicable Standard

Identify Approval Authority

Class Review Always Subordinate to Statutory Review

Minimize Duplicate Reviews

Interface Document Roles

Nuclear Systems (Nuclear Regulator)

Reactor

Control Systems

Nuclear Safety Structures

Flag State

Statutory Requirements

Exemption Authority for Deviations

Final Design Approval

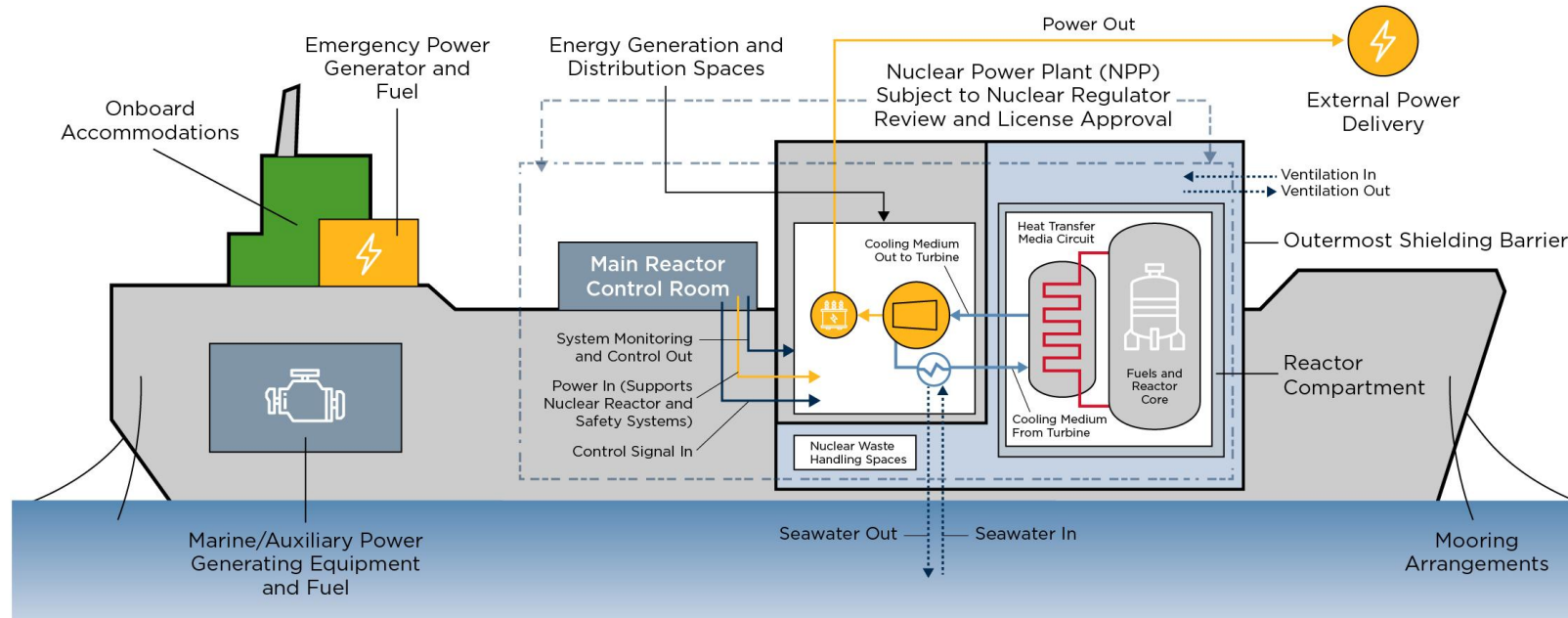
Marine Systems (ABS)

Primary Essential Marine Service

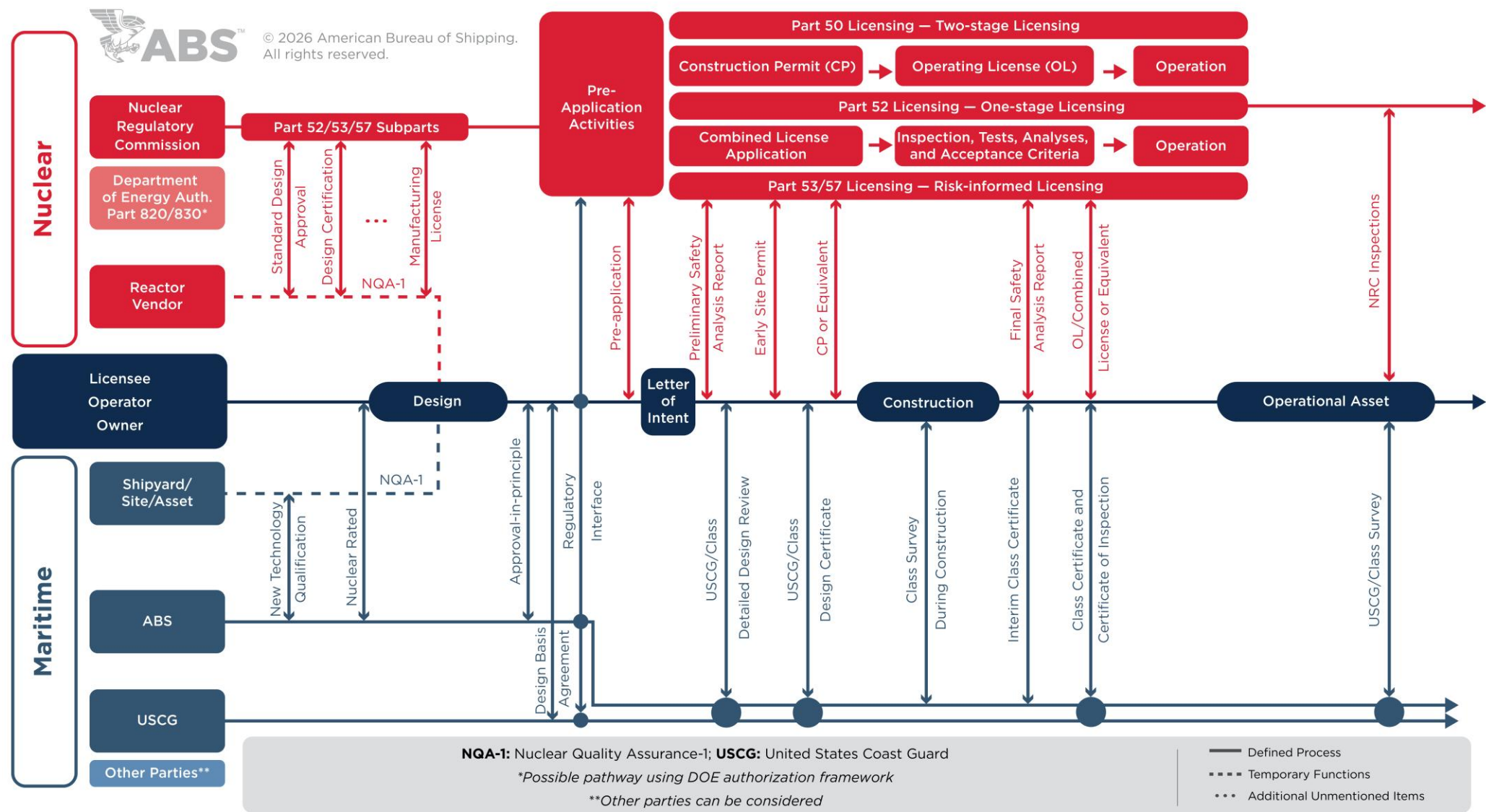
Secondary Essential Marine Service

Emergency Power

Emergency Loads



Nuclear Regulatory Interface



Rules and Requirements for Maritime Nuclear

Design Requirements: Safety for Emergency



CONVENTIONAL SHIP (CNTR)



INCLINATION STABILITY

Normal reactor operation at 30° static / 45° dynamic heel

30° / 45°

IMO Res. A.491(XII), **ABS Requirements**

Twice as strict heel limits for SMR. Both mandate guaranteed safety performance under heel.

15° / 22.5°

SOLAS Ch II

Normal EDG, steering and fuel operation at 15° static / 22.5° dynamic heel

EMERGENCY POWER

Power supply to safety and monitoring systems upon power loss

1 MONTH

IMO Res. A.491(XII), **ABS Requirements**

20 times longer emergency power duration. Requires zero-power passive cooling (e.g., seawater cooling).

~18–36 HOURS

SOLAS Ch II

Power supply to lights, navigation and steering

EMERGENCY CONTROL ROOM

Independent control room with full shutdown and monitoring capability

INDEPENDENT

IMO Res. A.491(XII), **ABS Requirements**

Space constraints from redundant control room. Cable routing complexity (1.5–2x increase in cable volume).

BACKUP ONLY

SOLAS Ch II

Main room backup only (emergency stop button and local panel)

SHORE CONNECTION

High-voltage shore power for emergency reactor shutdown at berth

SAFETY DRIVEN

ABS Requirements

Fundamental distinction: nuclear is safety-driven, conventional is environment-driven. SMR requires high reliability linked to emergency power.

ENVIRONMENT DRIVEN

MARPOL Annex VI

Cold Ironing: shore power replaces engine power at berth

(AI-generated image, for illustration only.)

Rules and Requirements for Maritime Nuclear

Design Requirements: Safety for Emergency



Departure within 1 hour using reactor or auxiliary power	1 HOUR IMO Res. A.491(XII), EMSA Report	EMERGENCY DEPARTURE Requires reactor load-following or auxiliary power systems (ESS / aux engine) for rapid departure.	NONE SOLAS Ch II	Emergency power required (lights, nav, steering), but no standby propulsion required
Independent auxiliary propulsion required during reactor failure	REQUIRED ABS Requirements	EMERGENCY AUX. PROPULSION Requires additional diesel generators or ESS. Adds engine room volume and layout constraints.	NONE SOLAS Ch II	Emergency power required for main engine failure
Mandatory dual independent propulsion systems	DUAL IMO Res. A.491(XII)	REDUNDANT PROPULSION Both nuclear-powered and INF cargo ships strictly require dual-redundant independent propulsion.	DUAL RADIOACTIVE CARGO IMO INF Code 2017	Dual independent propulsion required due to radioactive cargo
Load-following design required to match crash-stop distances of conventional ships	REQUIRED IMO Res. A.491(XII), ABS Requirements	EMERGENCY LOAD FOLLOWING Requires integrated load-following design between reactor and power conversion system.	NONE	No relevant regulations

(AI Generated Images for Illustration)





Thank You

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9. Nuclear and Maritime Code Integration

How can we reconcile nuclear and maritime requirements for nuclear propelled ships?

Feedback from discussions with a port authority

➤ Simon Forster, Excel Services Corporation

EXCEL Services Corporation · NUCLEAR MARITIME REGULATION

Corridor Code Integration

An AI-based methodology for integrating national and international regulatory regimes governing nuclear maritime into a single, evolving transport corridor

11 August 2026

EXCEL

What this deck covers

01

THE PROBLEM

Missing regulation; Missing reconciliation

05

THE STATE MODEL

Four possible reconciliation states

02

THE PROCESS

Corridor Code Integration (CCI) Process

06

THE SNAPSHOT

The RRM in a two-nation corridor

03

THE CORRIDOR

One evolving regulatory corridor

07

NEXT STEPS

Building the CCI system

04

THE ENGINE

The Regulatory Reconciliation Matrix (RRM)

08

CONTACT

Further information

Missing regulation; Missing reconciliation

No pathway exists today for a commercial nuclear-powered merchant ship to be built in one nation, flagged in a second, and admitted to the ports of a third. The rules mostly exist. They have simply never been reconciled.

But before national and international regulatory regimes can be reconciled, each participating country needs to integrate its own nuclear and maritime regulations. This process has recently begun in the US but nowhere else despite many nations declaring support for nuclear maritime.

Each sovereign rulebook is a regulatory island

Regulatory harmonization (the process of forcing every nation into one strict rulebook) is politically dead-on-arrival, because it asks each nation to surrender sovereignty. A workable corridor must reconcile without demanding capitulation. Nations looking to join an established corridor must decide what they can and cannot live with and negotiate accordingly.

Nuclear regime

Mature, self-contained — nation-specific but common ground is being sought

Maritime regime

Mature, self-contained — nation-specific although mariners have learnt to live with the differences

International instruments

IMO / IAEA — sit above national regimes but these are not reconciled. ATLAS may be the starting point but are time-frames aligned with maritime technology advancement?

Missing regulation; Missing reconciliation

No pathway exists today for a commercial nuclear-powered merchant ship to be built in one nation, flagged in a second, and admitted to the ports of a third. The rules mostly exist. They have simply never been reconciled.

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Integrated Nuclear/Maritime Regulations in Each Country

Each nation must ensure its nuclear and maritime regulations are integrated to ensure



International instruments

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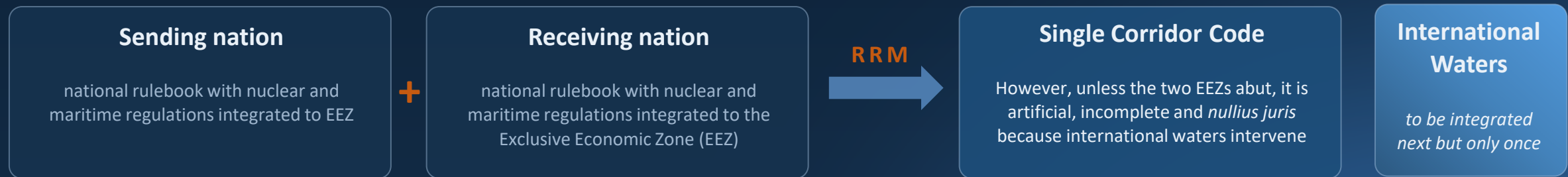


Reconciled, regulated nuclear shipping corridor

Each nation must ensure its nuclear and maritime regulations are integrated to ensure

Corridor Code Integration (CCI) Process

1. Assume vessel and reactor are licensed by the Sending or Receiving Nation – for initialization purposes.
2. Integration is a progressive binary process. A tertiary process is hard to control and gives an imprecise product. Build the corridor by integrating two regulatory regimes at a time to ensure maximum control and precision.
3. The process *Engine* is the Regulatory Reconciliation Matrix (RRM) – an AI driven matrix with dimensions and interactions that few humans could comprehend, let alone control.



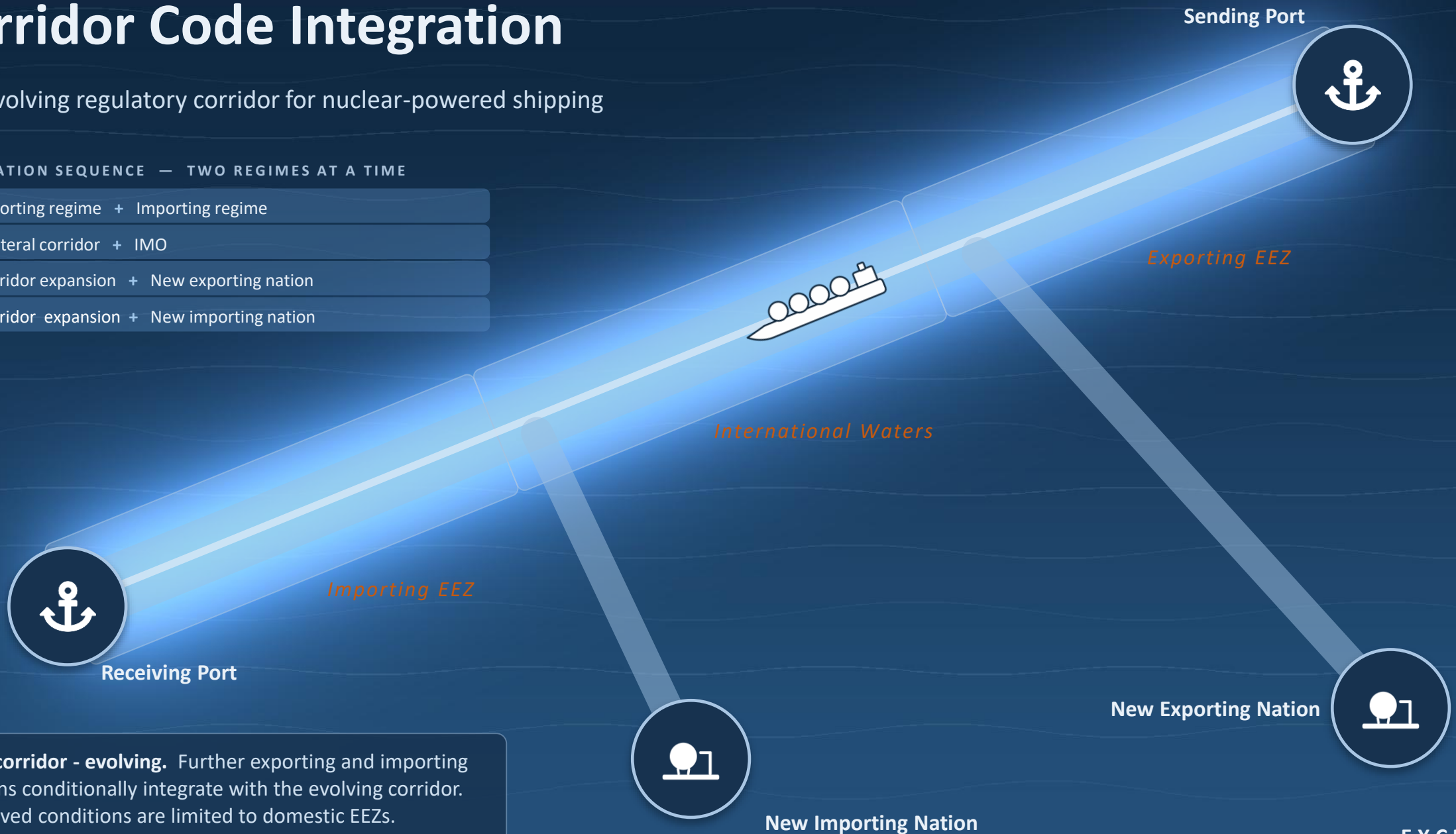
One corridor. One rulebook. Every vessel built and operated to a reconciled standard.

Corridor Code Integration

One evolving regulatory corridor for nuclear-powered shipping

INTEGRATION SEQUENCE — TWO REGIMES AT A TIME

- 1 Exporting regime + Importing regime
- 2 Bilateral corridor + IMO
- 3 Corridor expansion + New exporting nation
- 4 Corridor expansion + New importing nation



One corridor - evolving. Further exporting and importing nations conditionally integrate with the evolving corridor. Reserved conditions are limited to domestic EEZs.

The Regulatory Reconciliation Matrix (RRM)

The RRM is the *Engine* of Corridor Code Integration. It tracks the entire process without losing any original or sovereign material.

Assumptions: a two-nation corridor with international waters en route; the vessel's flag nation and the reactor's licence nation are among the two trading nations.



This level of information complexity and detail can only be managed by today's AI platforms.

Four possible reconciliation states

Every clause pair resolves to one of four states. The color indicates the condition of any clause at a glance for the entire corridor.



Note: The Corridor Code Integration CCI) approach produces draft code for consideration by the national and international agencies mandated to adopt, reject, modify and approve it. It does not produce final code nor does it seek to impose code upon nations and authorities.

Regulatory Reconciliation Matrix: Snapshot

Regulatory Topics, Sections and Clauses				Sending Nation Code	Receiving Nation Code	Reconciled Suggested Code A	Retained Sending Code	Retained Receiving Code		International IMO Code	Suggested Corridor Code B
Clause ref.	Major Topic	Section	Subsection								

Next steps

EXCEL's role is to support, not duplicate. Work closely with national and international organizations developing nuclear-maritime regulation, avoiding duplication of effort, and supporting and expediting the process on behalf of the industry and investors.

01

Identify the platform

Select the AI, coding and database platform(s) best suited to hosting the CCI system and the RRM.

02

Build the team

Identify the skills and partner organizations needed to develop CCI into a functional support tool for regulators.

03

Secure the backing

Connect with industry partners and prospective nuclear-maritime investors to finance the system's development.

Thank you

For further information, please contact:

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EXCEL Services Corporation · 11921 Rockville Pike, Suite 100, Rockville, MD 20852 · Office: 301-984-4400

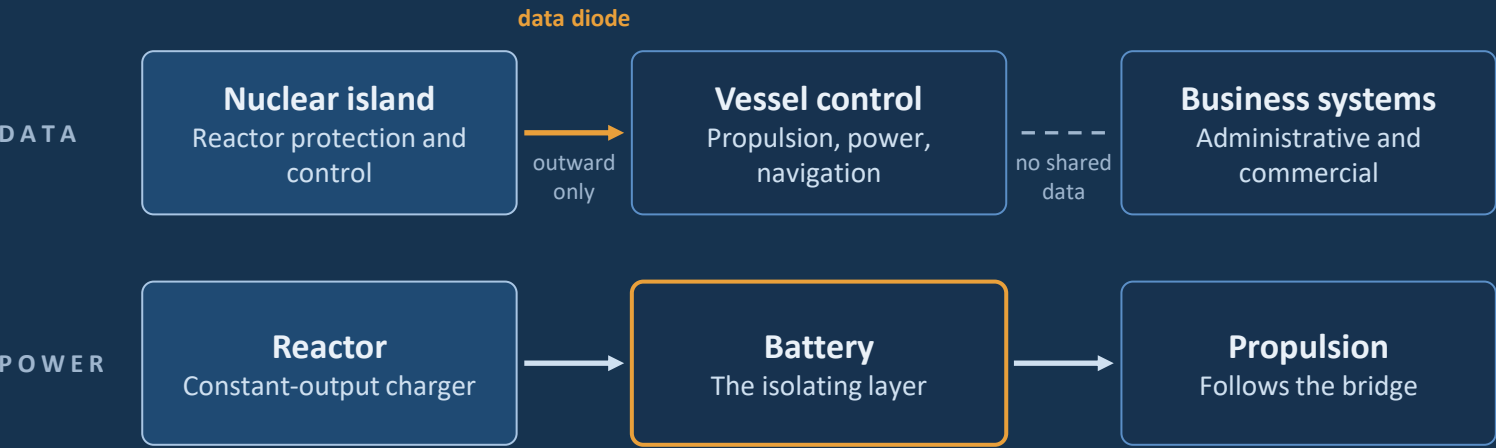
The power system is the security system

Route, reactor and battery designed as one

A successful intrusion into any shipboard network cannot produce a radiological consequence.

Does not mean that the ship cannot be hacked. A narrower claim, and a testable one: a hack cannot reach the reactor.

HOW THE POWER DESIGN CREATES THE ISOLATION



The reactor never follows the propeller, so it never needs a command from the bridge.

WHY THE ROUTE DEMANDS IT

Help is days away

- On the Transpolar Sea Route there is no rescue, salvage or shore support within reach.
- So the design case is the loss of every network and every programmable system.
- The reactor stays passively safe. The ship stops and holds position on battery and diesel.

Built to: Marine IACS E26 and E27 · IMO MSC.428(98) Nuclear NRC 10 CFR 73.54 · NEI 08-09. **Reconciling the two is corridor work.**

US Ports are moving fast; the rules must keep pace

WHAT WE HEARD

Main outcomes

- **US Port upgrading and investment.** Has been stuck at the federal approval stage for decades. The Trump Administration has removed federal obstructionism as part of the Maritime Action Plan.
- **Some ports are well-organized and have investment arranged.** Most ports realize that they are short of power to expand and face strong competition from data centers and export processing industries.
- **A growing number of ports are turning to small-scale nuclear power as a solution, both terrestrial and floating.** Reactor developers are signing investigation and supply agreements with Port Authorities.
- **Local grid capacity and port distribution are the primary constraints.** The availability of power in the port is now dictating the pace of investment and expansion. Keen awareness that clean energy is required for ports sending goods to the EU.

WHERE THE WORK IS

Opportunities for nuclear maritime

- **Three fundamental opportunities:** (1) Host an FNPP for port power supply; (2) Host nuclear powered vessels in the port; (3) Nuclear shipyards where reactors can be installed or swapped-out, or refueled.
- **First step: Port nuclear readiness scans:** screen sites, map the licensing path, and prepare ports physically and legally for nuclear licensing.
- **Port-state acceptance:** admitting foreign-flagged nuclear ships needs reconciled regimes, the integrated corridor case.
- **Liability and insurance:** no port accepts a nuclear vessel or an FNPP without cover.
- **First movers:** the first US nuclear ports will establish the template for others (global) to follow.

Nuclear port readiness and liability cover must advance together. Neither moves independent from the other.

Findings and the mandate for Workshop 2

Agreeing the principal findings, next steps and workstream owners for the next draft of the bilateral agreement and the next workshop

- Ian Truman, Burges Salmon
- Mark Popplewell, Nuclear Risk Insurers
- Patrick Ryan, UK P&I Club

Closing Remarks



Virginia Crosbie, Chief Executive Officer
NEMO



Ian Truman, Partner, Burges Salmon LLP

Thank you for attending
and we'll see
you soon!

