

# Nuclear liability and insurance

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# Outline

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The importance of dealing with nuclear liability

The scope of the liability Conventions.

How does nuclear insurance work?

Who covers what in nuclear liability.

Some of the difficulties with the current and proposed changes.

What should the industry do, what should Australia do?

# Nuclear liability

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Nuclear accidents remain a real source of concern to people and also to governments thinking of nuclear power. So far, the industry has yet to demonstrate a significant change from the past.

Accidents at TMI, Chernobyl and Fukushima indicate that costs and long term 'damage' can escalate rapidly if there is a release. These costs are largely not related to personal injury.

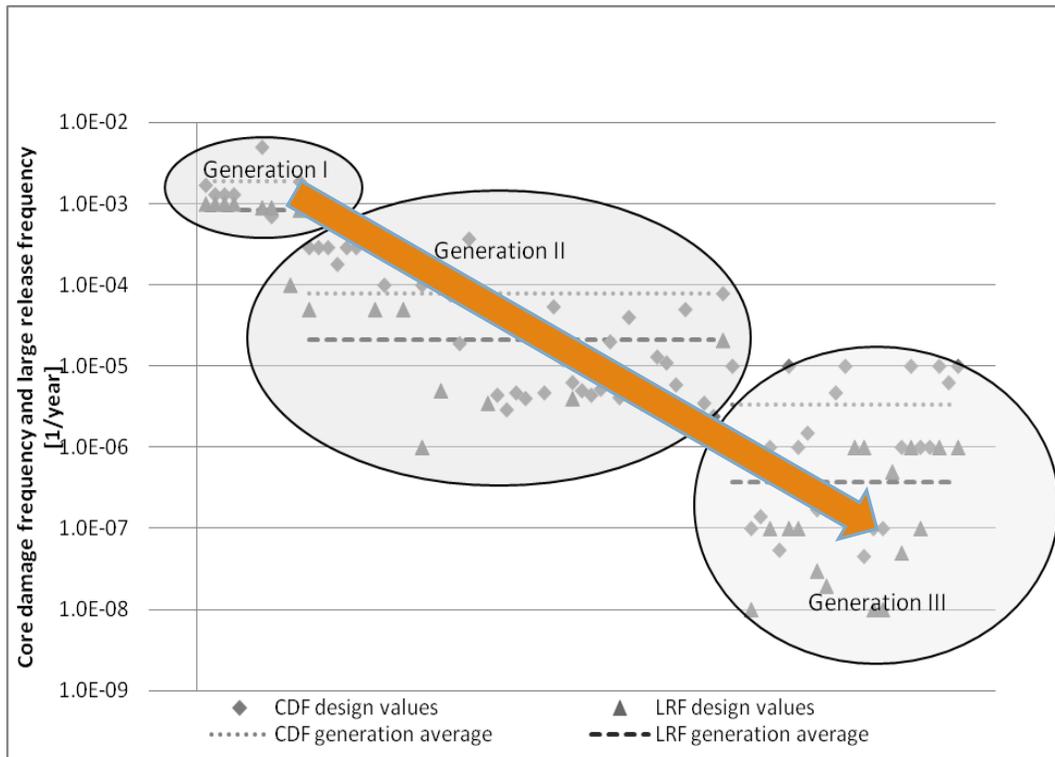
Third party liability is needed to ensure adequate compensation of victims and clean-up.

Currently this is dealt with by a set of international conventions, which are both complicated, lacking in clarity and inconsistent in function.

Ultimately all rely on the government if the costs exceed certain values (but this is not uniquely a nuclear issue).

Neither Chernobyl nor Fukushima Daiichi had any liability insurance at the time of the event.

## SOME CONTEXT



Evolution of core damage frequency and large release frequency for existing (Generation I and II) and for future reactor types (Generation III/III+)

**Doesn't seem worth arguing risk levels!**

Energy chain	OECD			Non-OECD		
	Accidents	Fatalities	Fatalities/GWey	Accidents	Fatalities	Fatalities/GWey
Coal	75	2 259	0.157	1 044	18 017	0.597
Coal (data for China 1994-1999)				819	11 334	6.169
Coal (without China)				102	4831	0.597
Oil	165	3 713	0.132	232	16 505	0.897
Natural Gas	90	1 043	0.085	45	1 000	0.111
LPG	59	1 905	1.957	46	2 016	14.896
Hydro	1	14	0.003	10	29 924	10.285
Nuclear	1	0	-	1	31*	0.048
Total	390	8 934		1 481	72 324	

Summary of severe ( $\geq 5$  fatalities) accidents that occurred in fossil, hydro and nuclear energy chains in the period 1969-2000

Note: \* These are immediate fatalities only. Latent fatalities from Chernobyl range from 4000 up to 60,000

Source: Data provided to NEA by PSI.

For Fukushima, 1600 people died as a result of evacuation stress but radiation deaths are expected to be 0 to 400 depending on assumptions on low dose exposures (WHO).

# Liability responses following Fukushima

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The IAEA Action Plan on Nuclear Safety (the Action Plan) 2012 called upon Member States to work towards establishing a global nuclear liability regime that addresses the concerns of all States that might be affected by a nuclear accident. Recommendations from INLEX were that all Member States:

- Should join one of the international conventions
- Should ensure that there are **adequate funds** to provide compensation
- Ensure that all claims arising from a nuclear accident are dealt with in a single forum in a prompt, equitable and non-discriminatory manner with minimal litigation, which could include a **claims-handling system (which may be set up in close cooperation with insurers** or other financial guarantors) in order to deal equitably and expeditiously with all claims

Some prominent states are not members of any of the Conventions e.g. China, Pakistan

# Nuclear liability payments following Fukushima

## Records of Applications and Payouts for compensation of Nuclear Damage

As of 02/01/19

	Individuals	Individuals (Losses due to voluntary evacuation)	Corporations and Sole Proprietors
<b>Applications</b>			
Applications received (cumulative)	Approx 1,089,000 cases	Approx 1,308,000 cases	Approx 491,000 cases
<b>Permanent compensation</b>			
Number of permanent compensation cases(cululative)	Approx 973,000 cases	Approx 1,295,000 cases	Approx 423,000 cases
Amount of permanent compensation *	Approx 3,109.5 Bil Yen	Approx 353.7 Bil Yen	Approx 5,099.4 Bil Yen
<b>Cumulative Payouts</b>			
Permanent compensation *			Approx 8,562.6 Bil Yen ①
Provisional indemnification			Approx 152.9 Bil Yen ②
Total amounts paid			Approx 8,715.4 Bil Yen ① + ②

\* Amounts paid as provisional compensation are not included.

USD 78.7Bn

# INTERNATIONAL CONVENTIONS

OECD/NEA

IAEA

1960 Paris Convention + 1963 Brussels Supplementary Convention

1963 Vienna Convention

2004 Protocols revising Paris Convention + Brussels Supplementary Convention

1997 Protocol to Amend the Vienna Convention

1998 NEA/IAEA Joint Protocol

1997 IAEA Convention on Supplementary Compensation

States not party to Paris/Brussels or Vienna

# How does nuclear liability work?

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Nuclear conventions typically have a number of common features:

- Channeling of all liability to the operator;
- “Absolute” liability (without fault);
- Increased limits of liability (establish a minimum level of cover);
- Liability, which is limited in amount, is for any damage caused to people (onsite and offsite), and property offsite (excludes the NPP site);
- A single jurisdiction for claims;
- The non-personal liability is for “nuclear damage” caused offsite from damaging radiation from nuclear fuel;
- The damage must follow an “incident”;
- The operator must have full mandatory financial security for their obligation.

Insurers have restricted (and many countries follow this restriction) that claims must be made within 10 years of the incident.

# Proposed revisions to the Conventions?

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- Under the revised conventions both the limits of liability and the Heads of Damage (HoD) are extended. The key test remains that such damage must have a causal relation with the release.
- Increased financial protection – the limits of liability are increasing materially from initially circa EUR 700m up to EUR 1.2bn / GBP 1bn over a 5 year period (currently it is only GBP 140m in the UK)
- Extended HoD:
  - Continuation of loss of life and bodily injury;
  - Continuation of loss of or damage to property;
  - Continuation of cover for economic loss related to these losses;
  - *New cover* for costs of reinstatement of impaired environment;
  - *New cover* for loss of *direct* income due to loss of use and / or enjoyment of environment;
  - *New cover* for costs of preventative measures taken or further damage caused as a result of a grave or imminent threat of damage.

Limitation of liability in time for loss of life or bodily injury extended from ten to thirty years.

# How much compensation is available?

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	<b>Paris/Brussels</b>	<b>Vienna</b>	<b>CSC</b>
	Millions	Millions	Millions
Tier 1	€700	300 SDRs	300 SDRs
Tier 2 - Member State	€500	None	Depends on contributions
Tier 3 – International Fund	€300		
Total	€1,500	€370	?
Excess	Government	Government	Government

Operators  
in UK



# How does nuclear insurance work?

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Most insurance is provided through nuclear insurance Pools (c 90%)

In addition to the pools, the industry has developed its own mutual insurance companies. Self insurance via industry mutuals/captives has become the main alternative to pool insurance.

The US has a large mutual called NEIL that covers US (and some European plants for MD). In Europe the nuclear industry has established two prominent mutuals EMANI (property) and ELINI (liability).

A captive is an insurance company set up by a specific industry to effectively self-insure e.g. EDF and NDA. Question of “ring-fencing”?



Insurance of installations in country B

Member 1

Member 2

etc

KEY ISSUE IS CAPACITY

Pool country B

Member 1

Member 2

Member 3

etc

Pool country A

Pool country C

Member 1

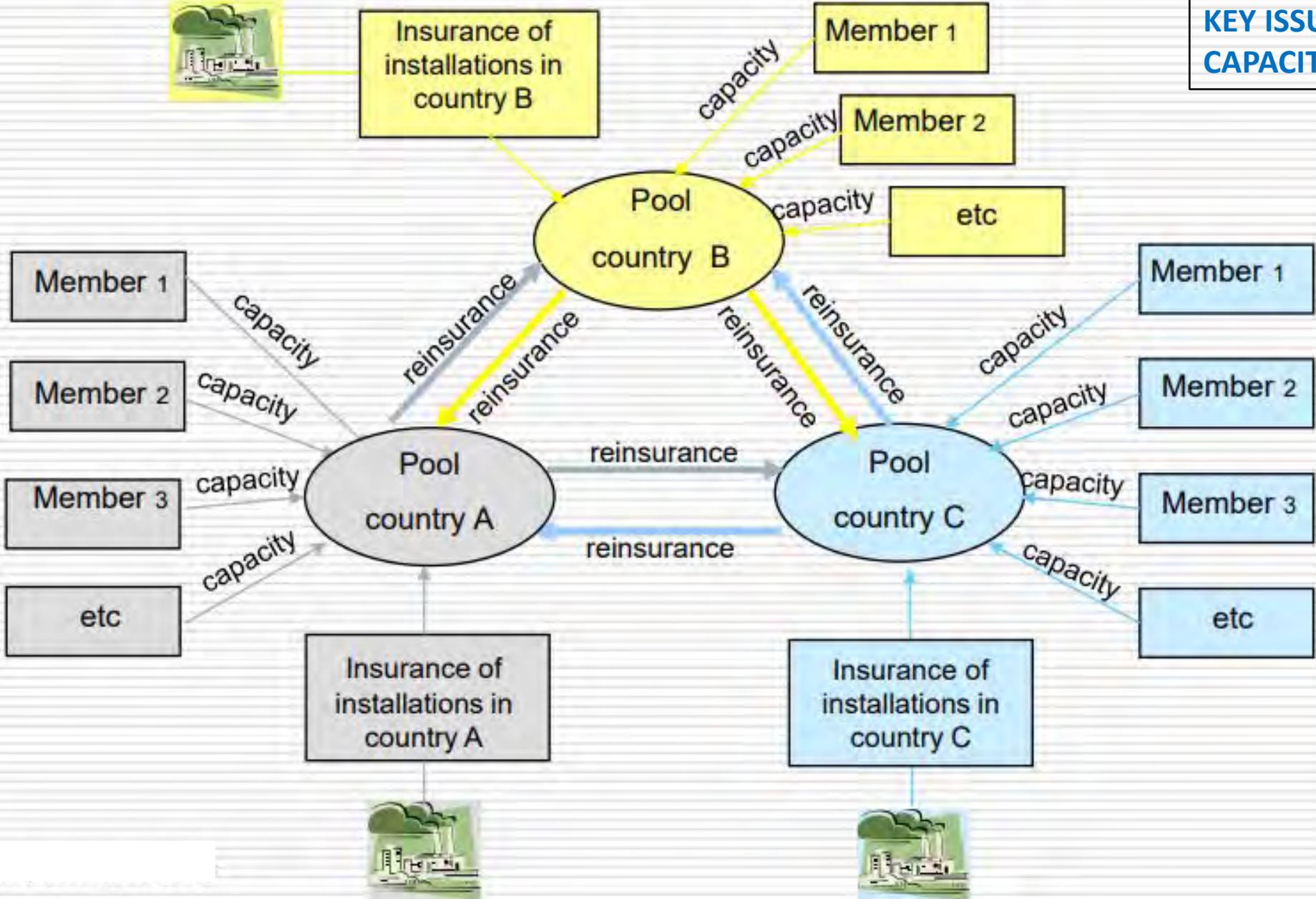
Member 2

Member 3

etc

Insurance of installations in country A

Insurance of installations in country C



## All Pools:

Nuclear Power Stations



## Most Pools:

- Other Installations of the Nuclear Fuel Cycle
- Nuclear Transports



## Some Pools:

Radioisotopes or Nuclides

# How does nuclear insurance work?

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Insurers cover:

1. **PROPERTY** damage - from internal incidents such as machinery breakdown and also for external events (subject to conditions)
2. **THIRD PARTY LIABILITY** – consistent with the operators responsibilities from the Conventions
3. Specific add-ons include **TRANSPORT INCIDENTS**, damage following **TERRORISM** and subsequent incidents following **CYBER** attack. Some offer **BUSINESS INTERRUPTION**.

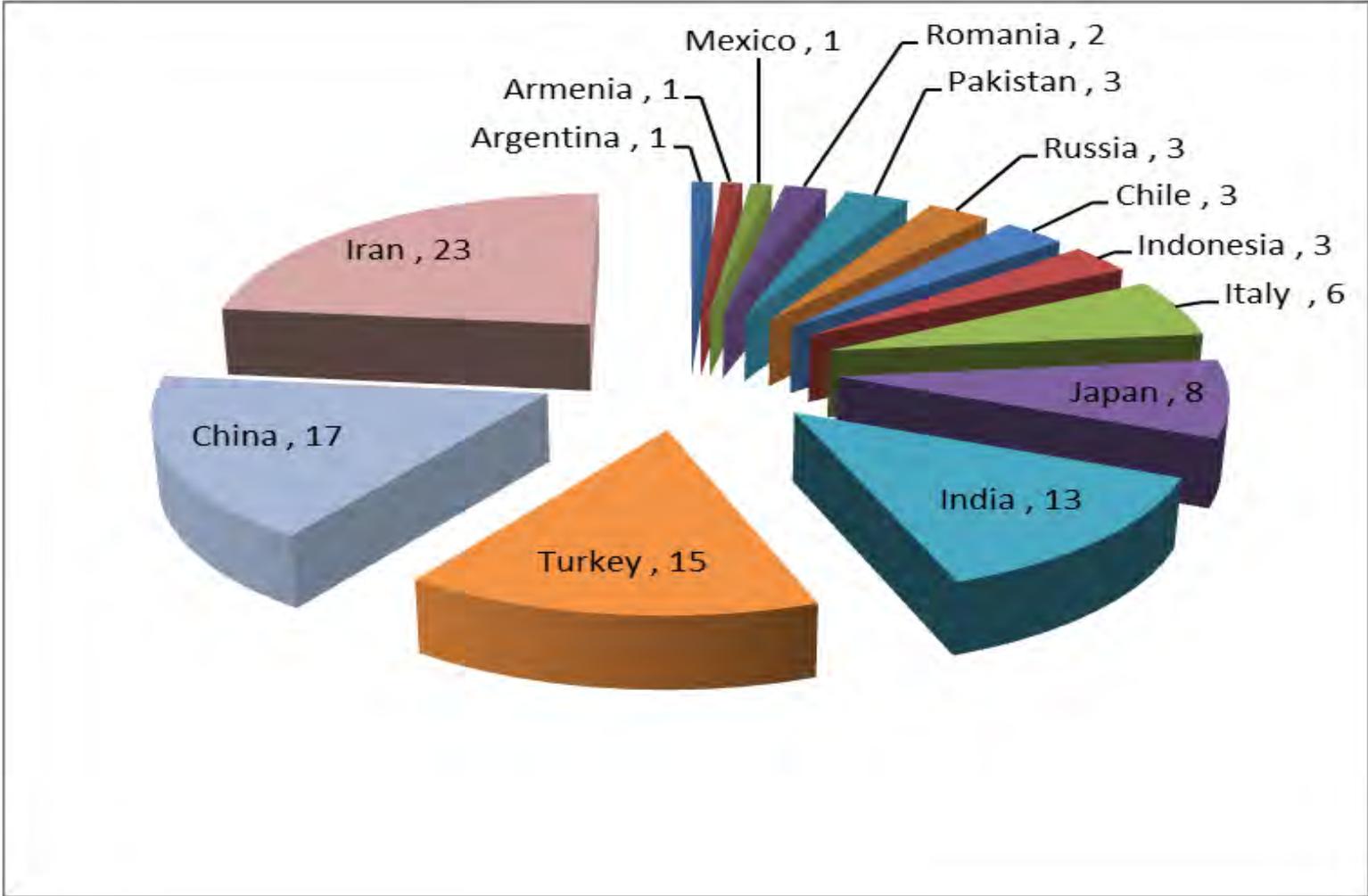
The key principle for insurers is that cover can be provided where **THE RISK CAN BE PRICED**.

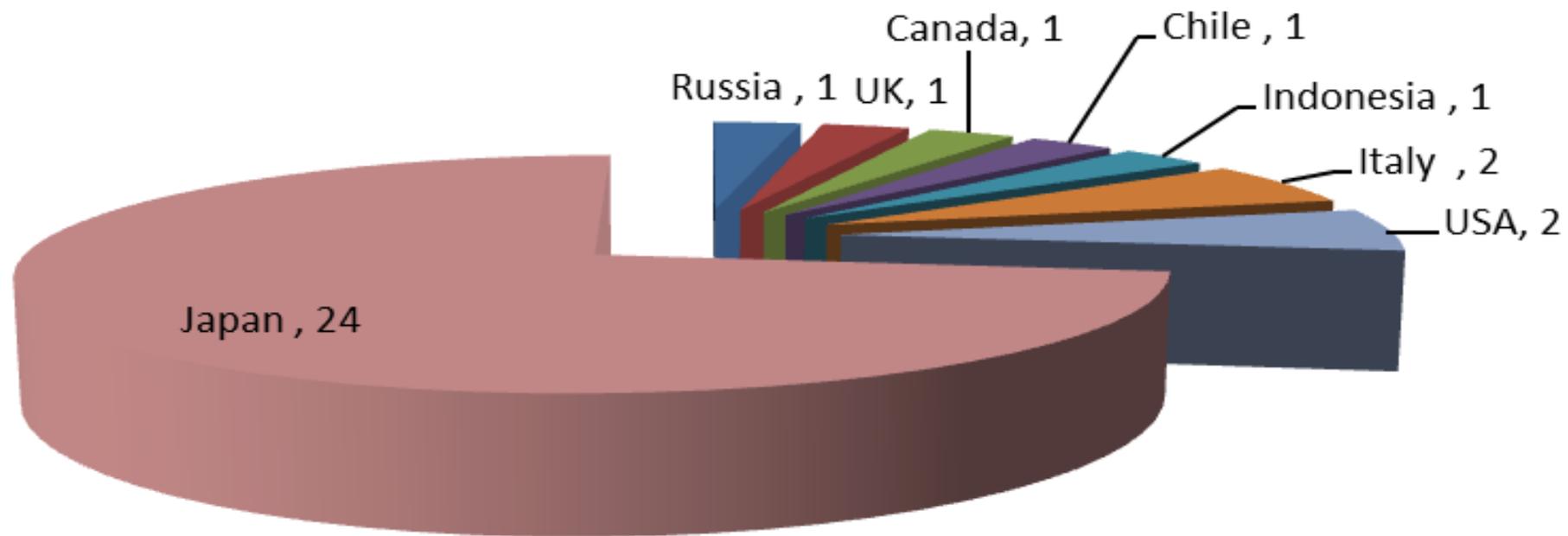
To do this, insurers develop models of expected losses for both postulated property and TPL losses. These are applied to non-nuclear and nuclear losses. Most losses are non-nuclear.

These models use probability distributions of actual data, where available, and PSA.

Separate analysis are conducted for external events as illustrated in the following.

# Number of Earthquakes, each of which killed at least 1,000 people, in countries that have nuclear facilities – 1906 to 2006





***Number of Massive Tsunamis in each of the nations that now have nuclear facilities. 2000 BC to 2006 AD***

# Issues with providing insurance to support the Conventions

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1. Insurers are capable of providing greater amounts of liability insurance. However the conventions do not provide sufficient clarity on some key issues.
2. "Nuclear incident" means any occurrence or series of occurrences having the same origin which causes nuclear damage or, but only with respect to preventive measures, creates a grave and imminent threat of causing such damage. No trigger for defining an incident.
3. Time duration for claims proposed to be extended from 10 to 30 years
4. No clarity on what are reasonable preventive measures.
5. Difficulty, therefore, in pricing these risks

# What should Australia do?

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Australia's current nuclear activities are covered by a nuclear indemnity.

Australia cannot be a member of Paris/Brussels without an (unlikely) agreement by the contracting parties.

Australia signed the Convention on Supplementary Compensation on 1 October 1997 but never ratified it.

The next step would be ratification. However, as seen, compensation amounts are limited.

# Conclusions

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1. Nuclear liability cover is an essential part of showing that the nuclear industry takes the possibility of nuclear accidents seriously. Such arrangements would be needed in Australia.
2. International Conventions ensure uniformity in application and are in the process of raising the sums insured and the scope of coverage. However these are still not adequate to cover a major accident. Preventing a large release remains crucial.
3. Insurance cover is essential for operators to fulfil their financial responsibilities for both property and liability incidents.
4. Detailed models are used by insurers for pricing such risks and reciprocal reinsurance by insurance pools remains essential to provide the full amount of capital. Insurers are also well placed to manage claims handling.
5. Insurers are able to provide the necessary capital to cover the present arrangements, and could even go well beyond current levels, but difficulties remain with the lack of clear definitions in the Conventions, especially of a 'nuclear incident'.

# QUESTIONS

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