Nuclear Risks

Are they Insurable?
Are they Insured?

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WHAT IS “RISK”?

- The probability that a particular adverse event occurs during a stated period of time, or results from a particular activity

WHAT IS “INSURANCE”?

- A risk management option by which the risk involved in a particular activity is transferred to some other entity; there must be a “fortuitous” (accidental, chance) event

*Insurance is essentially a financial safeguard against the economic consequences of a loss event.*
LIABILITY AND PROPERTY INSURANCES

**Liability Insurance**: insurance money provided to a person for financial loss incurred because of a “liability”: a legal obligation and financial responsibility to another because of your action or failure to act; “offsite” damage

**Property Insurance**: insurance money provided to a person for loss of or damage to physical property, other assets, business cash flow (material damage); “onsite” damage

**Insured must have an insurable interest in the subject of the insurance.**
TRANSPORTATION IN THE NUCLEAR FUEL CYCLE
(arrows indicate transportation links)
NUCLEAR POWER PLANTS WORLD-WIDE:
433 REACTORS IN OPERATION; 65 UNDER CONSTRUCTION (UC)

<table>
<thead>
<tr>
<th>Country</th>
<th>Reactors Operative</th>
<th>Reactors Under Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>2 + 1 UC</td>
<td></td>
</tr>
<tr>
<td>Armenia</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>7</td>
<td>3 + 1 UC</td>
</tr>
<tr>
<td>Brazil</td>
<td>2 + 1 UC</td>
<td>2</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2 + 2 UC</td>
<td>32 + 11 UC</td>
</tr>
<tr>
<td>Canada</td>
<td>18</td>
<td>4 + 2 UC</td>
</tr>
<tr>
<td>China</td>
<td>14 + 27 UC</td>
<td>1</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Finland</td>
<td>4 + 1 UC</td>
<td>8</td>
</tr>
<tr>
<td>France</td>
<td>58 + 1 UC</td>
<td>10</td>
</tr>
<tr>
<td>Germany</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Hungary</td>
<td>4</td>
<td>6 + 2 UC</td>
</tr>
<tr>
<td>India</td>
<td>20 + 6 UC</td>
<td>15 + 2 UC</td>
</tr>
<tr>
<td>Iran, Isl. Rep. Of</td>
<td>1 UC</td>
<td>18</td>
</tr>
<tr>
<td>Japan</td>
<td>50 + 2 UC</td>
<td>104 + 1 UC</td>
</tr>
<tr>
<td>Korea, Rep. Of</td>
<td>21 + 5 UC</td>
<td></td>
</tr>
</tbody>
</table>
INSURING NUCLEAR RISKS IS DIFFERENT THAN OTHER RISKS...WHY?

1. Failure to control the nuclear chain reaction can lead to:
   - extensive plant damage
   - catastrophic radioactive contamination of widespread area (Chernobyl)

2. Events are of low frequency but potentially high severity
   - very few nuclear risks compared to 440 NPPs plus small number of other nuclear facilities;
   - current premium about $800 million globally – 0.04% of total global premium for non-life insurance
   - insufficient actuarial data as industry loss record is good
NUCLEAR THIRD PARTY LIABILITY

- Key principles established by international treaties (e.g. Paris Convention, Vienna Convention, Convention on Supplementary Compensation for Nuclear Damage)

- National legislation dictates scope of operator liability: either implements Convention or adopts similar principles

- Insurance policies follow national legislation; may require Government approval; policy language may reflect legislation
KEY PRINCIPLES: NUCLEAR THIRD PARTY LIABILITY

- **Strict liability** of nuclear operator: provides direct and rapid access to insurance funds; offers certainty of maximum exposure to insurers.

- **Exclusive liability** of nuclear operator: all liability falls to operator; general waiver of rights of recourse against suppliers/contractors.

- **Financial security**: operator’s legal obligation to financially secure liability is incentive to buy insurance.

- **Liability limited in amount/time**: operator’s liability amount limited; time for making claims limited; insurers provide 10 year maximum.

- **Unity of jurisdiction**: only 1 court has jurisdiction (where accident takes place); limits insurers’ exposure.
INTERNATIONAL REGIMES UNDER OECD AUSPICES


basic liability/compensation convention: 16 Contracting States (mostly Western Europe)

1963  *Brussels Convention Supplementary to Paris Convention (in force 1974)*

supplementary funding instrument: all 13 Contracting States are Paris Convention states;

2004  *Protocols amending Paris + Brussels Supplementary Conventions* (not yet in force)

provides more money for more victims for more damage;
16 PC signatories/13 BSC signatories;
PARIS CONVENTION: HOW MUCH MONEY IS AVAILABLE?

**Existing Paris Convention**
- Maximum liability limit: 15 million SDRs
- 1990 NEA S.C. recommended limit: 150 million SDRs
- Minimum liability limit: 5 million SDRs

**Revised Paris Convention**
- Maximum liability limit: none
- Minimum liability limit: 700 million EUR
- Minimum reduced liability limits*
  - Low-risk installations: 70 million EUR
  - Transport: 80 million EUR

* State guarantees up to 700 million EUR

Excludes interest and costs

At 30/09/2011: 1 Special Drawing Right (SDR) = € 1.15 / US$ 1.56
INTERNATIONAL REGIMES UNDER IAEA AUSPICES

      basic liability/compensation convention: 38 Contracting Parties (mostly Central/Eastern Europe +++)

      provides more money for more victims for more damage; 9 Contracting Parties

1997  Convention on Supplementary Compensation for Nuclear Damage
      (not yet in force)
      global liability/compensation regime (both basic and supplementary funding): 4 Contracting States
**VIENNA CONVENTION: HOW MUCH MONEY IS AVAILABLE?**

*1963 Vienna Convention*
- **minimum:** US$ 5 million (based on US$ gold value on 29/04/1963 of $35 per troy oz) = US$ 228.5 million (based on gold price of $1600/oz)
- **maximum:** none

*Revised Vienna Convention*
- **minimum:** 300 million SDRs
- **maximum liability:** none
- **minimum reduced liability:** 5 million SDRs

*State guarantee up to 300 million SDRs*

*Excludes interest and costs*

At 30/09/2011: 1 Special Drawing Right (SDR) = € 1.15 / US$ 1.56
SUPPLEMENTARY FUNDING CONVENTIONS: HOW MUCH MONEY IS AVAILABLE?

Existing Brussels Supplementary Convention

1st tier: operator liability (PC) = max. 15 million SDRs
2nd tier: operator’s State’s funds = 1st tier to 175 million SDRs
3rd tier: all Parties’ contributions = 125 million SDRs
TOTAL: = 300 million SDRs

Revised Brussels Supplementary Convention

1st tier: operator liability (PC) = min. 700 million EUR
2nd tier: operator’s State’s funds = 500 million EUR
3rd tier: all Parties’ contributions = 300 million EUR
TOTAL: = 1.5 billion EUR

Convention on Supplementary Compensation

1st tier: operator/state liability = 300 million SDRs
2nd tier: all Parties’ contributions (expected) = 300 million SDRs
TOTAL: = 600 million SDRs

At 30/09/2011: 1 Special Drawing Right (SDR) = € 1.15 / US$ 1.56

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<table>
<thead>
<tr>
<th>Country</th>
<th>Guarantees</th>
<th>Country</th>
<th>Guarantees</th>
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<tr>
<td>ARGENTINA</td>
<td>VC; RVC; SCC</td>
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<td>VC</td>
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<td>VC</td>
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<td>VC; J P</td>
<td>SLOVAK REP.</td>
<td>VC; J P</td>
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<td>SLOVENIA</td>
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<td>CZECH REP.</td>
<td>VC; J P</td>
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<td>FINLAND</td>
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<td>GERMANY</td>
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<td>SWITZERLAND</td>
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<tr>
<td>HUNGARY</td>
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<td>TAIWAN</td>
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<td>INDIA</td>
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<td>UKRAINE</td>
<td>VC; J P</td>
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<td>UNITED KINGDOM</td>
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<td>JAPAN</td>
<td></td>
<td>UNITED STATES</td>
<td>SCC</td>
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<td>KOREA</td>
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</table>

- Paris Convention (PC)
- Revised Paris Convention (RPC)(nif)
- Brussels Supplementary Convention (BSC)
- Revised Brussels Supplementary Convention (RBSC) (nif)
- Vienna Convention (VC)
- Revised Vienna Convention (RVC)
- Convention on Supplementary Compensation (CSC) (nif)

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SOME INTERESTING STATISTICS (30 September 2011)

- 433 operating plants + 65 plants under construction in 30 countries (total: 498)

- 240 operating plants (55%) + 43 plants under construction (66%) NOT covered by an international nuclear liability convention in force

- 374 of 498 plants are in 8 IAEA member states (excludes Taiwan)

- more than 2/3 of world’s population (est. 6.94 billion) NOT covered by an international nuclear liability convention in force

- Will EU involvement in nuclear liability issues result in greater harmonisation?
### Selection of TPL Insured Limits ($US)

<table>
<thead>
<tr>
<th>Country</th>
<th>Limit</th>
<th>Country</th>
<th>Limit</th>
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</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1,546m</td>
<td>Sweden</td>
<td>480m</td>
</tr>
<tr>
<td>U.K.</td>
<td>228m</td>
<td>Switzerland</td>
<td>1,262m</td>
</tr>
<tr>
<td>S Africa</td>
<td>440m</td>
<td>P.R.China</td>
<td>45m</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>375m</td>
<td>Canada</td>
<td>79m</td>
</tr>
<tr>
<td>Germany</td>
<td>347m</td>
<td>France</td>
<td>133m</td>
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</tbody>
</table>
WHAT TYPE OF DAMAGE IS COMPENSATED?

Current Paris/Vienna Conventions

- damage to or loss of life
- damage to or loss of property (other than on-site property)
- claims for damage must be brought within 10 years of accident

Revised Paris/Vienna Conventions; Convention on Supplementary Compensation

- as above +
- economic loss from above
- cost of reinstating impaired environment
- cost of preventive measures + loss/damage caused thereby
- loss of income from direct economic interest in use of environment
- personal injury/loss of life claims may be brought within 30 years of accident
### PRACTICAL EXPERIENCE

<table>
<thead>
<tr>
<th></th>
<th>TMI</th>
<th>Chernobyl</th>
<th>Tokaimura</th>
<th>Fukushima</th>
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</thead>
<tbody>
<tr>
<td>Date</td>
<td>1979</td>
<td>1986</td>
<td>1999</td>
<td>2011</td>
</tr>
<tr>
<td>Event</td>
<td>Core melt</td>
<td>Explosion</td>
<td>Criticality</td>
<td>Core melt</td>
</tr>
<tr>
<td>Cause</td>
<td>Human error</td>
<td>Human error</td>
<td>Human error</td>
<td>Tsunami</td>
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<tr>
<td>Evacuees</td>
<td>11,000</td>
<td>&gt; 100,000</td>
<td>161</td>
<td>&lt; 100,000</td>
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<tr>
<td>Deaths</td>
<td>0</td>
<td></td>
<td>2</td>
<td>0</td>
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<tr>
<td>Insurance</td>
<td>Insured</td>
<td>Uninsured</td>
<td>Insured</td>
<td>Uninsured</td>
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<tr>
<td>Economic cost</td>
<td>$</td>
<td>$80-100bn?</td>
<td>Low</td>
<td>$1-3 trillion?</td>
</tr>
<tr>
<td>INES</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>
HOW DO INSURERS CHARACTERISE RISK?

- Quantity/quality of operating experience
- Safety culture and safety infrastructure
- Exposure in case of accident: transboundary damage
- Reactor (or other facility) age and condition
- Natural perils: earthquake, tsunami, etc.
- Terrorism risk
- Public perception
- Application of guidelines reflecting best practice in loss prevention
  
## TECHNICAL ASSESSMENT

<table>
<thead>
<tr>
<th>Nuclear Perils</th>
<th>Machinery Breakdown</th>
<th>Fire Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactor characteristics</td>
<td>Design authority, systems engineering</td>
<td>Fire hazard analysis</td>
</tr>
<tr>
<td>Barriers to release</td>
<td>Maintenance: predictive, preventive, corrective</td>
<td>Plant segregation and compartmentalisation</td>
</tr>
<tr>
<td>Reactor protection</td>
<td>Equipment reliability</td>
<td>Fire detection</td>
</tr>
<tr>
<td>Radiation protection</td>
<td>Plant protection</td>
<td>Fire suppression</td>
</tr>
<tr>
<td>Accident mitigation</td>
<td>Condition monitoring</td>
<td>Fire water supply</td>
</tr>
<tr>
<td>Emergency planning</td>
<td>Operating history</td>
<td>Control of hazardous operations/ignition Sources</td>
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<tr>
<td>Human factors</td>
<td>OEM support</td>
<td>Control of fire</td>
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<td>Regulator framework</td>
<td>Spares</td>
<td>Fire team</td>
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<tr>
<td>Terrorism/sabotage</td>
<td>Values</td>
<td>Fire drills</td>
</tr>
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NUCLEAR INSURANCE POOLS

- Allows for spread of risk amongst insurers, co-insurers and re-insurers
- Enables market-wide participation in the risk; international capacity yet local market system
- Knowledge and experience are concentrated: increasing cost efficiency
- Experienced and appropriate claims handling system plus infrastructure
- Maximum security and solvency for victims
NUCLEAR POOLS BUSINESS FLOW THROUGH CONSTRUCTION, OPERATION AND DECOMMISSIONING

Insurance of installations in country B

Member 1

Member 2

Member 3

etc

Insurance of installations in country A

Pool country B

Pool country A

Pool country C

reinsurance

capacity

capacity

capacity

capacity

capacity

reinsurance

etc

etc

etc
TPL INSURERS’ ROLE AFTER AN ACCIDENT

- Insurers’ capital at risk:
  - Safeguarding of payment authority.
- Need for comprehensive infrastructure:
  - National & international, nuclear pools have cross border agreements;
  - Immediate, long term & secure.
- Total claims handling service to ensure continuity & consistency with State payout.
- Important for victims & perhaps for politicians.

Operator

Insurers

Public

Government
RISKS UNDER REVISED CONVENTIONS: PROBLEMS FOR INSURERS

- Higher liability limits (€700M) can generally be insured with some exceptions
- Extension to 30 years for personal injury/death claims poses 2 main obstacles: causality and solvency
- Difficult to define/quantify cost of “reinstating” an impaired environment
- Difficult to define/quantify loss of income from direct economic interest in use of the environment
- Damage caused by emissions within normal course of operations and within prescribed limits are not a fortuitous event
- Some regimes require security “per occurrence”; industry uses annual or lifetime limits
Act on Compensation for Nuclear damage
Law on Nuclear Liability Indemnity Agreements

- Nuclear operator is strictly and exclusively liable
- Unlimited liability; operator to financially secure depending on risks, ranging up to 120 billion yen (€1.09B/US$1.57B); Japanese insurance pool provides this coverage
- 20 year time limit for making claims (Japanese Civil Code)

Government Indemnity Agreements:

- Private insurance NOT available if accident due to earthquake/tsunami/volcano, nor for emissions in the course of normal operations nor for claims more than 10 years after accident; Govt. indemnifies operator up to JPY 120B on payment of indemnity fee for such risks
- If damage exceeds JPY 120B, operator remains liable but Government may provide aid where necessary + authorised by National Diet
11 March 2011: Level 7 (INES) nuclear event due to a massive earthquake - tsunami on Japan’s pacific coast

- Operator may be exonerated from liability if damage caused by "grave natural disaster of an exceptional character"
- TEPCO (nuclear operator) NOT making such claim
- TEPCO has no private insurance for this risk but benefits from Government indemnity in lieu thereof (120B Yen)

- Victims may claim directly vs TEPCO, or to a local court, or to Dispute Reconciliation Committee for Nuclear Damage (DRC)
  - DRC to recommend damage guidelines + calculating amounts
  - DRC to mediate disputes between TEPCO and victims

Japan is NOT a party to international nuclear liability convention claims for trans-boundary damage are based on general tort law
[Improvement of Future Actions - "5 Promises" to the afflicted]

◆ Simplifying Nuclear Damage Indemnification Procedures

◆ Claim Measures of Compensation Payment (How to Receive Compensation Payment)
  • Permanent Compensation for Nuclear Damages by the Accident at Fukushima Daiichi Nuclear Power Station and Fukushima Daini Nuclear Power Station
  • Permanent Indemnification for Nuclear Damages to Concerned Corporations and Sole Proprietors due to the Accident at Fukushima Daiichi Nuclear Power Station and Fukushima Daini Nuclear Power Station

In case you demand compensation, please contact the call center below.
If you are a hearing-impaired person, please ask your family or supporter to contact the call center on behalf of you.

◆ Special Measures for the electricity bills for the customers who have evacuated from the area to which evacuation order etc. have been directed, based on the Act on Special Measures Concerning Nuclear Emergency Preparedness, and who are eligible to permanent indemnification.

◆ FAQ regarding Permanent Compensation for Nuclear Damages by the Accident at Fukushima Daiichi Nuclear Power Station and Fukushima Daini Nuclear Power Station (for damages suffered by individuals)

◆ FRAUD ALERT!
• Fukushima Nuclear Compensation Office (Call center)
  • Phone Number
  • 0120-926-404
  • * Please be sure to dial the correct number
• Office Hours
  • 9:00am - 9:00pm
FUKUSHIMA DAI-ICHI NPP ACCIDENT

- August 3, 2011: Japan adopts legislation to establish the Nuclear Damage Compensation Facilitation Corporation; fund launched to aid TEPCO’s payment of compensation;

- Fund consists of interest-free Government bonds, annual contributions from all utilities operating nuclear plants in Japan; includes 120 billion Yen indemnity from Government for “accident caused by earthquake/tsunami”;

- Total financial assistance currently expected at about 1 trillion Yen

- TEPCO obliged to repay all funds received
- TEPCO obliged to implement drastic cost-cutting measures (2.55 trillion Yen over 10 years)

Total compensation could reach 4.5 trillion Yen by March 2013
Today, we have received the amount of 558.7 billion yen from the Nuclear Damage Compensation Facilitation Corporation (hereafter, the Corporation) based on their decision to provide financial support per the approval of the Special Business Plan on November 4.

With the funds received from the Corporation, we will immediately implement the "compensation payouts with empathy" in consideration of those afflicted by the nuclear damage.
CONCLUSIONS

✓ Global insurance market has provided cost-effective and legally compliant third party liability insurance to the nuclear industry worldwide for over 50 years.

✓ Extensive claims handling systems in place and good experience.

✓ Extensive experience with risk assessment and premium pricing.

✓ A good example of significant private sector involvement in the nuclear sector (independent of government).

✓ Several concerns following the introduction of new, more comprehensive but less well defined risks that are imposed upon nuclear operators under the new/revised international nuclear liability instruments.

➢ Insurers working to resolve these issues.
Thank you for your attention
Merci de votre attention