

Clear River/Low Impact Hydropower Insurance Program



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Four Pillars: legislative, regulatory/legal, risk management (insurance), and development/financing.

Risk Management (Insurance) Review:

- ✓ Standard EPC/Mechanical Break-Down/Operational coverages
- ✓ Extended Broad Coverages: Weather, REC's, Carbon Trading Liability, Debt-Wrap, PPA Power Guard
- ✓ Claims Case-Study – 2009 Sayano-Shushenskaya Hydro Disaster - **RusHydro**

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- Interchangeable definitions and jargon around the word: “*risk management.*” Banks, Financial Institutions, Law Firms, Governments.
- The perfect definition of risk management for insurance brokers comes from former **Secretary of Defense Donald H. Rumsfeld:**

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Iraq War Pentagon Briefing, February 2, 2002:

We know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know.

Insurance..... *“unknown unknowns”*

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Risk Consulting Partners (RCP): Who we are:

- ❖ Privately Held/Employee Owned Insurance Niche Broker. We answer to our clients!
- ❖ RCP insurance professionals serving hydropower development from offices in: St. Louis/Chicago/New York/Dallas/Boston – One Balance Sheet/Team Focused
- ❖ Hydropower Insurance Experience: Marsh & McLennan, Willis, Alexander Howden – Lloyd's of London
- ❖ The RCP Hydropower team specialize in the design, risk consolidation, placement, and insurance/claims administration for hydropower projects anywhere in the USA.
- ❖ Full risk life-cycle for Hydropower Developer's - Origination, Development/Acquisition, construction, through to operation and maintenance, and divestiture.

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RCP's clean-energy insurance practice is an asset to the following hydropower companies:

- ❖ Hydro developers, owners, and operators in the business of producing electricity.
- ❖ Hydro equipment manufacturers developing new storage technologies that will balance “base-peak” gyrations. “efficacy cover”.
- ❖ Private equity firms funding hydro-power generation/hydro power-short-fall
- ❖ Supply-chain power energy efficiency/Short-fall/Weather/REC trading

RCP places these supply-chain exposures in our unique **London Clear River/Low Impact Hydropower Insurance**. **This London program Insures:**

Developers/Contractors/Owners/Operators/Manufacturers/Suppliers

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Hydro insurance for the following types of hydro projects –

- ❖ **Run-of-the-river:** the natural flow and elevation drop (head) of a river are used to generate electricity. Power stations of this type are built on rivers with a consistent and steady flow.
- ❖ **Diversion:** the supply of water is taken from a dammed river or lake to a remote powerhouse containing the turbine and generator. A Canal or low-pressure tunnel transports the water to this end and then back to the river to continue its course.
- ❖ **Pumped Storage:** water is pumped using reversible pumping/generating units from a lower reservoir to an upper reservoir when demand for electricity is low. During periods of high electricity demand, the water from the upper reservoir is released back to the lower reservoir through the reversible units to generate power.
- ❖ **Impoundment:** river water is stored in a reservoir behind an impounding structure, typically a dam or a weir. The water is released as needed to meet energy requirements.

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Exposure Realities for Low Impact Hydropower:

- ❖ Proposed sites for hydro tend to be in remote/rural locations, this can lead to logistic problems with getting replacement parts to the hydro site and subsequently increasing the disruption to the hydro plant.
- ❖ Hydro plants tend to breakdown
- ❖ The risks of natural perils damaging and interrupting a hydro plant are high with the increased danger freezing, drought, landslide, snow slide and flooding in the immediate vicinity of the hydro plant.
- ❖ Replacement/repair costs of hydropower sites is high compared with other renewables. The development of a hydro site is labor intensive with major civil works often required.

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Cover A: Hydro Insurance for Construction Phase

Contractors All Risks insurance/Contract Works Insurance

Delay in Start Up/Advanced Profits Insurance

Goods in Transit Insurance/Marine Insurance

Environmental Liability Insurance

General Public Liability

Reinstatement / Decommissioning Insurance – Alternative to a bond

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Cover B: Hydro Insurance for Operational Phase

All Risks Insurance Cover for Plant/Equipment Breakdown Cover

Loss of Revenue Insurance (Business Interruption cover)/Contingent Business Interruption

Public Liability Insurance (CGL)

Worker's compensation/Employer's Liability

Commercial Auto/Non-Owned/Hired

Executive Risks (D&O, EPL, Crime, Fiduciary)

Cyber

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Extended Broad Coverages:

Weather Guard – Balance Sheet Protection/PPA Off-taker

Debt-Wrap, Efficacy - Investors

Renewable Energy Certificates (REC'S)

Carbon Trading Liability

Virtual PPA's

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ENERGY STORAGE

- In the energy storage market there are a variety of different technologies being used: lithium ion, redox flow, lead acid, liquid sodium (MIT)
- New Insurance in London for manufacturers and developers in the energy storage industry, primarily in the area of warranty support. These risk transfer products range from performance warranty policies to advanced risk-transfer solutions geared towards low-impact hydropower developers, including:
 - ✓ Product Warranty Backstop: Defects and Workmanship Warranty Support
 - ✓ Key Attribute Warranty Backstops: Round-Trip Efficiency, Power Capacity, Energy Capacity, and Availability
 - ✓ Application Insurance: Demand Charge Reduction Guarantee Backstop

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Sayano-Shushenskaya hydro disaster:

- Largest hydro power plant in Russia
- Owner: RusHydro – Reinsurance Broker for RusHydro 2008 – 2011
- Installed power: 6,400 MW
- Annual energy output: 25 TWh Peak capacity at 4,000 MW (limitation of power lines' capacity)

“That’s a lot of stuff!”

The accident [UTUBE](#)

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Sayano-Shushenskaya hydro disaster:

The Accident: Plant was working at 4,100 MW/300 people on ground due to shift change and planned maintenance work/Nine of ten units running (unit 6 off for maintenance)/Unit 2 producing 600 MW at 212 m water head pressure/unit 2 breaks out of its foundation/Gives way to a water flow

Damage: Flooding of machine house, floors below and office buildings/Partial damage to roof and walls of powerhouse/Almost total loss of cooling system, battery elements, generator switches, drainage pumps, elevators, ventilation, cables, switching cabinets, compressor system/Short circuits causing explosions of many oil transformers/Oil leakage (100 tons) caused contamination of downstream trout farms/Widespread power failure/penstock gates did not close immediately but after 75 minutes due to flooded electric safety system/75 fatalities, 62 from maintenance company/CBI loss to Rusal's aluminum smelter/RusHydro's price at the LSE: -30%, in Moscow: -10%

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Sayano-Shushenskaya hydro disaster:

In Sum:

- Causes of disintegration of unit 2: criminal action, human negligence and excessive vibrations
- Missing fail-safe design at the head gates caused long and severe flooding of the plant
- Human tragedy of 75 fatalities driven by the timing (shift change) and poor safety regulation
- Extensive property damage, business interruption, CBI and environmental losses not insured
- Short and poor risk inspections overlooked deficiencies of relevance to underwriters
- Ambiguities in the Russian insurance and London reinsurance policies delayed claims handling

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Claim:

Lloyd's of London paid full policy limit: \$ 200 Million

Russia State paid-out underinsurance: \$ 2.7 Billion

UTUBE