What will be the Impact of Fukushima on the Nuclear Renaissance?

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What will change because of Fukushima

- Everything? Another accident after Chernobyl was bound to kill the nuclear industry
- Too early to say? It will take years before we know what happened at Fukushima
- Depends where you are? Countries with strong anti-nuclear movements or prone to earthquakes will find it difficult to continue with nuclear
- Very little? The Renaissance was already failing

What was promised for the Renaissance?

- US Department of Energy (2003): 'New Generation III+ designs … have the advantage of …. vastly improved safety features and significant simplification is expected to result in lower and more predictable construction and operating costs'

- Construction costs (2/3 of kWh cost) promised to be <$1000/kW

Why was the Renaissance failing?

- Economics?
- Finance?
- Licensability?
- Buildability?

Economics

- Usually assumed 2/3 of cost of kWh of nuclear electricity come from construction and financing costs
- Promise of $1000/kW quickly proved wrong
- Price offered in recent nuclear tenders (South Africa, Canada, UAE) >$6000/kW
- US utility estimates at least $6000/kW
- Historically, cost estimates have almost always been an underestimate of actual costs

Finance

- Banks unwilling to finance nuclear if they are exposed to the risk. Who can take the risk? Is Russia different?
- Consumers via cost pass-through? Impossible in competitive market. Possible in planned market or oligopoly?
- Taxpayers via loan guarantees? Are taxpayers willing? Are governments able? Are loan guarantees enough?
- Vendors via turnkey price? Not credible after Olkiluoto
- The higher the risk falling on the plant owner, the higher the cost of capital

Licensability

- Bush's Nuclear 2010 Program, launched 2002, based on generic licensing taking 1-2 years
- 5 designs being evaluated in US. First generic approval not before 2012 even before Fukushima
- First generic approval in UK in 2013 or later
- Additional requirements increase costs

Buildability

- Roussely: 'The resulting complexity of the EPR, arising from the choice of design, specifically the level of power, the containment, the core catcher and the redundancy of the security systems is certainly a handicap for its construction and therefore its cost.'
- Olkiluoto (Finland) expected build-time 4 years, cost €3bn, latest estimates (2011) say 9years and cost double
- Flamanville (France) expected to take 5 years, cost €3.3bn, latest estimate 9 years and cost nearly double
- EDF and Areva starting process of 'rationalising' the design of the EPR to reduce cost and improve buildability

Is the locus of the world nuclear industry shifting? Markets

- Of 40 construction starts since Jan 2008, 37 in China (25), Russia (6), Korea (3) or India (3)
- 6 out of 8 Gen III+ plants under construction are in China
- India has said it will order 28 Gen III+ reactors from Russia, Westinghouse, GE-Hitachi and Areva
- New markets include UAE, Vietnam, Jordan, Saudi Arabia

Is the locus of the world nuclear industry shifting? Suppliers

- Of 40 construction starts since Jan 2008, 32 were supplied by China (20), Russia (6), Korea (3), or India (3)
- Siemens abandoned nuclear, can Japan vendors stay in market?
- China exports plants to Pakistan has hopes for South Africa
- Russia claims orders to Vietnam, Bulgaria &Turkey and is confident for Czech Rep,
- Korea beat international competition in UAE hopes for Vietnam and South Africa

Will the new markets happen?

- Many countries investigate nuclear but few turn into orders
- China, India have consistently over-estimated their demand
- Can China maintain its current pace?
- Can India finance its expansion?

Are new suppliers' designs good enough?

- New suppliers' designs mostly based on old Western designs, eg China CP1000, Korea AP1400. Are they safe enough?
- New markets must rely on regulatory approval in country of origin. Are regulatory processes in China, Russia etc open enough and rigorous enough that they can be trusted?
- Do these countries have the capability and incentives to continue to innovate if Western companies withdraw?
- Will new suppliers apply rigorous proliferation safeguards?

Conclusions

- Fukushima a convenient excuse for another failed nuclear revival
- Real problems techno-economic
- But if we don't abandon nuclear, will there be enough resources to pursue options that will work?
- Germany will be the test for whether the alternatives, especially efficiency, can fill the gap
- The locus of the nuclear markets and suppliers is moving from the West. Will this maintain safety and proliferation standards?