



# Nuclear Perspectives - Driven by Innovation

Tony Ward  
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# Drivers of growth

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- Increasingly, the inherent attributes of nuclear power's electrical output are driving opportunity:
  - ▶ Low carbon generation
  - ▶ Reduces import dependence on fossil fuel, or allows diversification from own natural resource base
  - ▶ Scalability and base-load characteristics, alignment to electrification of transport
  - ▶ Counterpoint to intermittent generation (renewables) – grid stability
  - ▶ Suitability for desalination, other High-Temperature applications
  - ▶ Maturity and deliverability – vital to protect
- In recent years, relative economics have also recovered, but cannot be assumed
- In emerging countries is equally important as an enabler for economic growth or inclusion

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# Drivers of relative country attractiveness

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Factors influencing investors, vendors and suppliers interest in given countries:

Size	Prospect of multiple nuclear new build projects
Imperative	Capacity issues expected from early 2010s
Immediacy	Opportunity is more pressing in some markets
Experience	Replacement more attractive than green field – ‘maturity’
Carbon	Commitment to low carbon agenda
Transparency	Doing business in jurisdiction is understood and lower risk
Consensus	Political and public perceptions vital
Process	Leadership, consultation, intention
Planning	Visibility and predictability of regime – applies to regulatory regime too

*Source: Ernst & Young study for UK Government 2008*

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# Competition for investment resources

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## Capital availability

- ▶ Multiple investment needs (generation, T&D, metering), also other sectors
- ▶ Capital rationing across different markets - returns based
- ▶ Funds gravitating to “safe” infrastructure projects - due to uncertain returns on investment, planning & construction risk, “first of a kind” costs and regulatory uncertainty

## Supply chain constraints

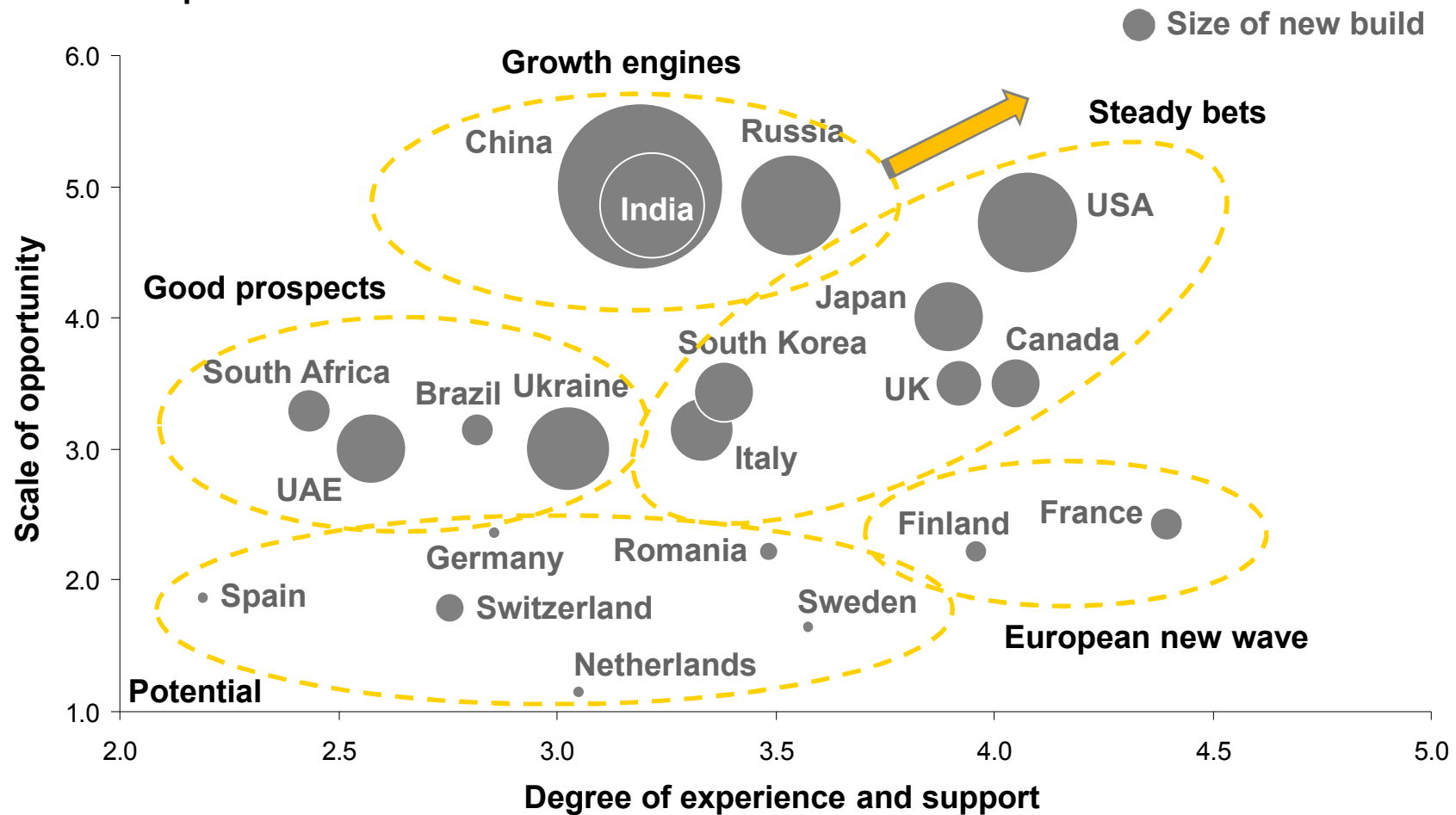
- ▶ Investment limited until firm orders come through - vendors risk stranded assets if they build capacity ahead of need - advantage to those with capacity
- ▶ Joint ventures key to building regional capacity, consolidation will be important
- ▶ Longer-term contractual arrangements for multiple build across borders – risk and reward sharing
- ▶ Many projects aspire to 2020 operational date, not all can succeed

## Investment will prioritize the best opportunities

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# Nuclear perspectives: country positioning – a fluid picture

Some example countries



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# The need for innovation – issues important to viable projects

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## Technology

- Size of single unit, fitness for differing market structures
- Modularity and simplicity of design
- Small reactors, PBMR experience, floating reactors
- Applicability to prime use (power, steam, base-load)

## Project context

- Whole of life-time view – reactor, fuel and end-of life
- Connecting aspects, Uranium ore, ports, transmission, high-use off-takers, build and operate (southern Africa, Baltics)
- Local value component and skills transfer

## Finance and contracting

- Supply chain engagement in multiple projects
- Fixed price, or risk and reward sharing
- Vendor or major contractor financing or equity

## Perception

- Waste and Decommissioning costs and progress
- Safe life extensions, optimising existing assets
- Consistent and robust regulation – global standards
- Industry infrastructure - R&D, skilled people, transparency

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# Factors for investors

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## The global view on opportunities

- ▶ Pay attention to government positions
  - ▶ Changing public opinion or fiscal position can move support quickly
  - ▶ A well developed regulatory regime takes longer to put in place
- ▶ Consider the market framework - electricity market and also broader economic environment

## Issues around access to capital

- ▶ Currently restricted by downturn
- ▶ Openness to international investment
- ▶ Leverage of public finance
- ▶ High up-front capital costs: long pay-back periods

## Determinants of profitability

- ▶ Support mechanisms and incentives
- ▶ An urgent need for the output makes a difference
- ▶ End of life issues are of increasing importance

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# Factors for policymakers

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## Governments send important investment signals

- ▶ Projects unlikely to go ahead without:
  - ▶ Strong government support - both energy policy and financial equality
  - ▶ Supportive public opinion
  - ▶ Well developed regulatory capacity

## Regulatory systems should be open, accountable and predictable

- ▶ Rules should be applied consistently and transparently
- ▶ Where direct investment is involved be mindful of dual role as supporter and regulator

## Focus on reducing risk to investors

- ▶ Loan guarantees, insurance, waste and decommissioning arrangements
- ▶ Creation of consistent incentives, policies and markets – carbon pricing, capacity mechanisms etc
- ▶ Global trend towards increasing central direction of electricity markets?



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# Concluding comments

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## Investment in new nuclear must compete:

- ▶ For capital within utilities or state budgets
- ▶ With other technologies or opportunities
- ▶ Between geographies – mobility of capital

## Renaissance not sustained by environmental and fuel security issues alone

- ▶ Safety – fault-free, reliable operations
- ▶ Trust – eg, delivery of new projects on time and budget
- ▶ Consistency – standardisation, regulatory, policy

## Advantage for those who:

- ▶ Can access and utilise capacity in near term
- ▶ Can deliver technology and project structures that meet the underlying needs

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# Thank you

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**Tony Ward**  
Global Nuclear Power Leader, Ernst & Young

Direct tel: + 44 121 535 2921  
Mobile: + 44 7789 922 451  
Email: [tward1@uk.ey.com](mailto:tward1@uk.ey.com)

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