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# Public Governance and Private Finance of Advanced Nuclear Power Plants

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# Focus Questions

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- Can nuclear new build be financed by private investors?
- How does wholesale electricity market design affect investor decisions?
- Should governments support nuclear investments and how?

# Experimentation in the UK

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- The foundation.
  - A strong national commitment to decarbonization.
  - A long-range strategic perspective.
  - A decision that new nuclear is one part of the solution.
- Hinkley Point C employed a Contract-for-Differences to provide a hedge to investor against market risk.
  - Construction risk remains with the investor.
- Sizewell C may use the Regulated Asset Base model.
  - The government will share construction risk.

# Conventional Wisdom in the US

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- New build nuclear is not possible in regions with competitive wholesale power markets.
  - Only conceivable in regions with traditional rate-of-return regulated utilities.
  - Blunders at Vogtle and Summer cast a shadow even there.
- In recent years there have been complaints that structural features of wholesale electricity markets are unfair to nuclear.

# Point #1. Cost is Key

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- Recent new build projects in the U.S. and western Europe have had lengthy construction delays and large cost overruns.
- No amount of creative finance is going to erase high costs. New financial models are not a substitute for reducing actual construction costs.

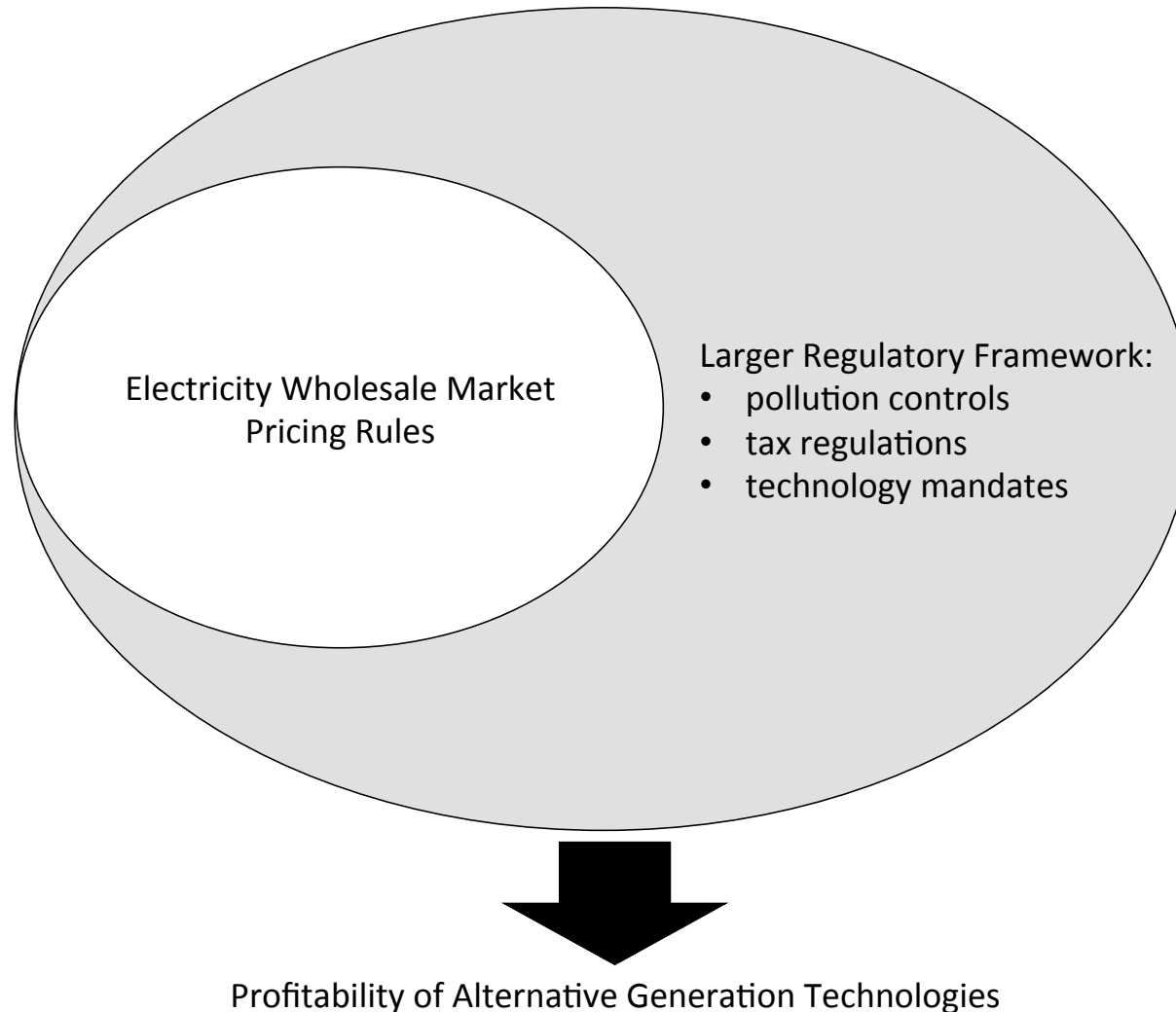
## Point #2. Blaming the Market is Misdirection

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- Short memories.
  - In the 2000s, owners of nuclear plants added nearly 6 GW of nuclear capacity in the form of uprates. Research shows owners of merchant nuclear plants operating in competitive wholesale market regions were more likely to make these investments--Lei, Tsai and Kleit (2017).
  - In the early 2000s, amidst speculation of a nuclear renaissance, many prospective new builds were located in regions with competitive wholesale markets.
- Changing prospects in the US driven in part by
  - I. increased capex cost for nuclear,
  - II. dramatic drop in the cost of natural gas,
  - III. lack of a strong carbon premium for nuclear, and
  - IV. political support for and falling cost of renewables.

# Wholesale Markets are Embedded in Larger Political Framework

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Figure 4.2, MIT Future of Nuclear Energy in a Carbon Constrained World.

# Wholesale Markets are Embedded in Larger Political Framework

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- Outright bans on nuclear.
- Punitive taxes and regulations.
- Out-of-market payments to competing technologies.
  - Tax subsidies for renewables. Portfolio mandates for renewables.
  - Significant share of electricity revenues are channeled outside the wholesale market.
  - Lowers the average wholesale market price.

*You know when that shark bites  
With his teeth, babe  
Scarlet billows  
Start to spread  
Fancy gloves, though  
Wears ol' Macheath, babe  
So there's never, never a trace of red*

# What is Needed is Public Commitment

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- Currently, regardless of the details of wholesale market structure, an investor in a new nuclear plant will be circumspect about whether they will be allowed to harvest whatever profit may be due on the investment.
- Zero Emissions Credits for existing nuclear plants have worked!
- Public contract with Hinkley Point C has worked.
  - The hedge of market price risk via the contract-for-difference is irrelevant.
  - Key are the provisions which specifically target public actions to seize profits.
- The UK RAB model is a trickier problem.
  - Public commitment is good.
  - Why should the public absorb construction risk for a large LWR?
- For demonstration of advanced nuclear designs, a public commitment is warranted as detailed in the MIT Future of Nuclear Energy study.

# Net Zero Goals Deepen the Challenge

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- The generation profile is changing rapidly, driven by evolving policies and developing political forces.
  - Market design is also changing.
- The future industry and market structure is hugely uncertain.
  - Mix of politics and technological uncertainty.
- Incentivizing large investments in fixed assets will require social/political commitment.
  - Wholesale market prices may channel an ever smaller share of industry revenue.
- Schmalensee (2019) Strengths and Weaknesses of Traditional Arrangements for Electricity Supply
  - <http://ceep.mit.edu/publications/working-papers/710>
  - Chapter 2 in Handbook on the Economics of Electricity (J.M. Glachant, P.L. Joskow, and M. Pollitt, eds.) to be published by Edward Elgar.

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# The End