Why support renewables?

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EPRG Spring Research Seminar
May 13, 2011

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The EU and UK have both CO_2 and specific renewables targets

Carbon emissions targets

- EU: 20% CO_2 emissions reduction by 2020, 80-95% by 2050
- UK: 34% CO_2 emissions reduction by 2020, 80% by 2050.
  - Committee on Climate Change recommends 60% by 2030

Renewables targets

- EU: 20% renewable energy by 2020
- UK: 15% renewable energy by 2020
  - Implies 30-35% renewable power by 2020
  - Committee on Climate Change "central scenario": 30% renewable energy by 2030

Sources: Moselle, *Climate Change Plan B*, forthcoming (Policy Exchange); Committee on Climate Change, *Fourth Carbon Budget*, Dec 2010; Committee on Climate Change, *Renewable Energy Review*, May 2011.

Why support renewables?

More specifically:

Why support renewable generation more than other forms of low-carbon generation?

Possible arguments:

1. “EU ETS doesn’t work (low prices, short timeframe)”
2. “Security of supply”
3. “Bring renewables ‘down the cost curve’”
4. “Only game in town”

1. “EU ETS doesn’t work”—low prices

- Social Cost of Carbon (SCC) probably much higher than current EU ETS price of €17/tCO_2
  - – albeit impossible to estimate accurately
- However, additional subsidies to renewable generation do not reduce total CO_2 emissions
  - – Total emissions from sectors covered by EU ETS are determined by EU ETS cap
- Qualitative impact is to reduce EU ETS price, distort choice between renewable and non-renewable forms of mitigation
- Note: if had a C tax (or binding C price floor) then renewables subsidies might reduce total sectoral emissions
  - – Would still distort choice of generation technologies

1. “EU ETS doesn’t work”—too short-term to stimulate investment

- Clearly true—underlying problem of “dynamic consistency” from governments
- In other contexts, governments overcome this problem
  - Successfully issue long-term debt (30 year bonds, even perpetuities)
  - Large, privately funded infrastructure is protected by
    - ➢ Contracts (e.g. toll roads, PPIs, etc)
    - ➢ Statute and independent economic regulation (e.g., utilities)
    - ➢ Sovereign guarantees (e.g. Bilateral Investment Treaties, Energy Charter Treaty)
- Why would this specifically affect investment in renewables?
  - Renewables may require different <u>forms</u> of long-term commitment from e.g. nuclear
  - But what is the rationale for difference <u>levels</u> of support?
- Conclusion: if EU ETS is the problem, optimal solution unlikely to involve specific subsidies to renewable generation

2. Security of supply

- Can make respectable case that some security of supply concerns warrant intervention
- For EU, relevant issue is gas import dependency
  - Particularly acute for Member States in eastern Europe
- European Commission analysis (2008) suggests 20-20-20 policies reduce 2020 gas imports by about 25% (relative to BAU)
  - 2020 import dependence (imports/total) falls from about 75% (BAU) to 71%
- But likely that the “displaced” imports are LNG, not imports from Algeria or Russia
  - Would imply limited impact on security of supply

Source: Moselle, *Renewable Generation and Security of Supply,* in Harnessing *Renewable Energy in Electric Power Systems: Theory, Practice, Policy* (ed. Moselle, Padilla and Schmalensee).

2. Security of supply

- Other forms of low carbon generation have similar or greater security of supply benefits
- Coal, uranium supplies are diverse and “friendly”
- “Negawatts” are the most secure of all
- Conclusion: if security of supply is the problem, optimal solution unlikely to involve specific subsidies to renewable generation

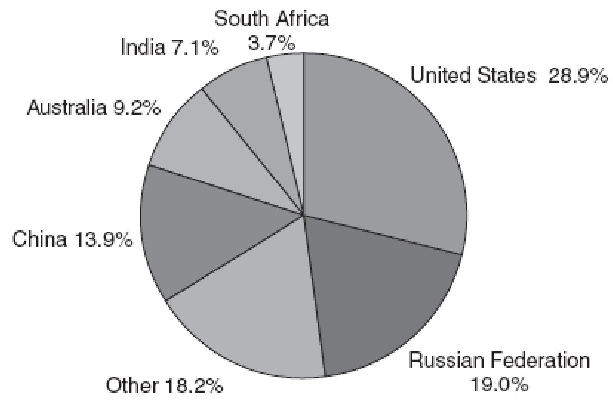


Figure 4.1. World coal reserves

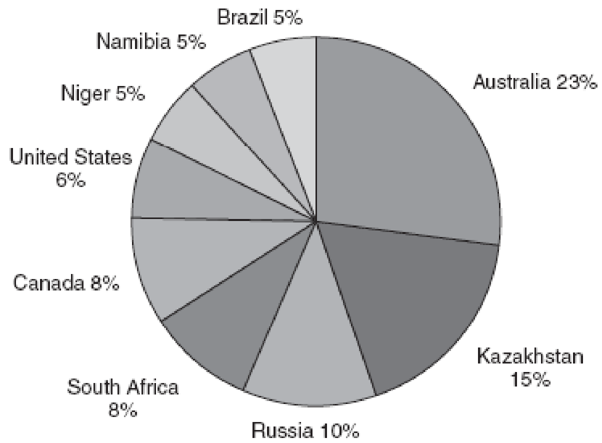
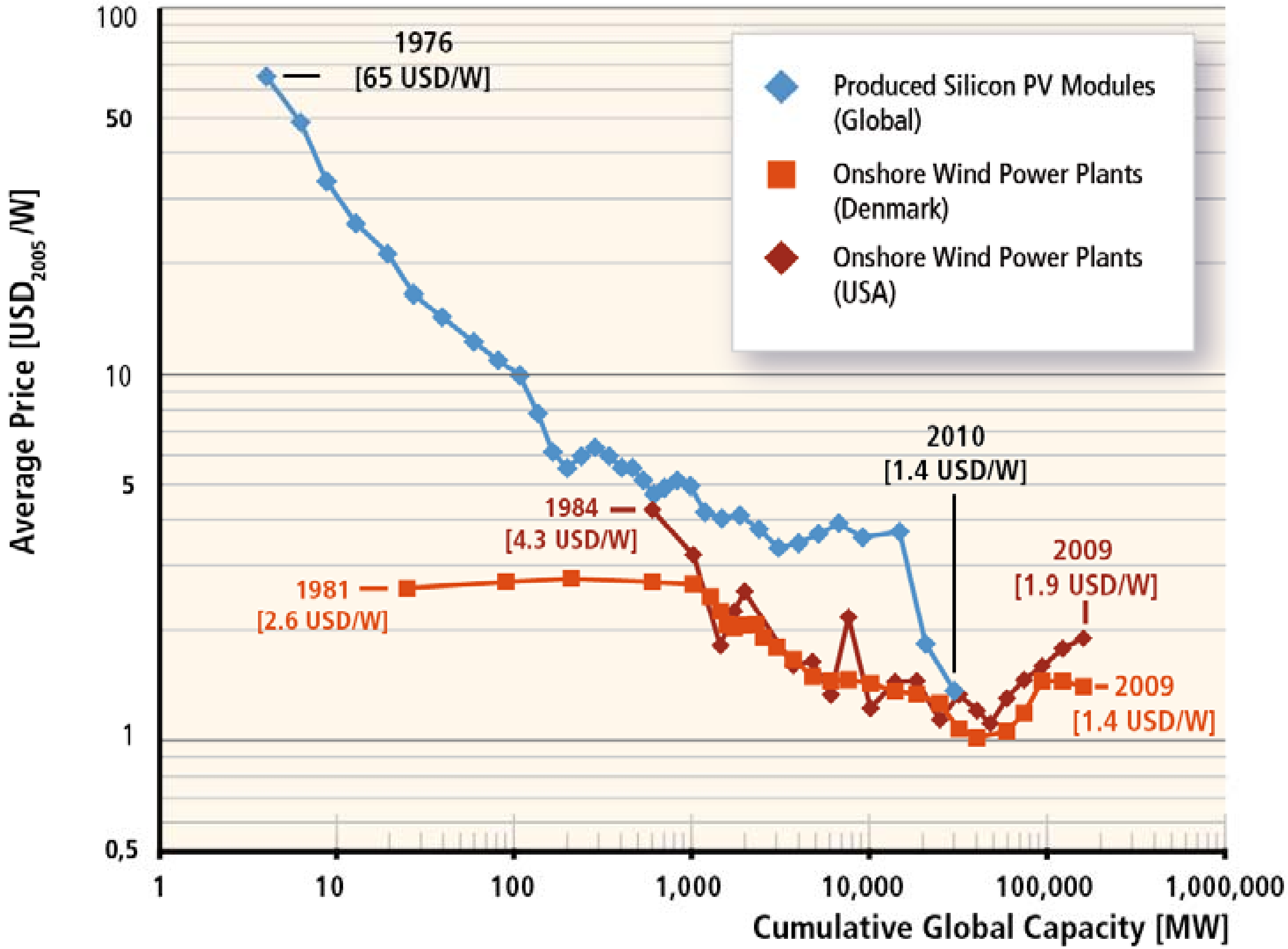


Figure 4.2. World uranium resources

Source: Moselle, *Renewable Generation and Security of Supply,* in Harnessing *Renewable Energy*.

3. "Bring renewables 'down the cost curve'"



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Source: IPCC, *Special Report on Renewable Energy Sources and Climate Change Mitigation (Summary for Policy Makers)*, May 2011.

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3. “Bring renewables ‘down the cost curve’”

Three necessary conditions for this argument:

1. The technology has the technical potential to be deployed at scale globally.
2. There is potential for significant future cost reductions.
3. The investment is a good route to fostering those cost reductions.

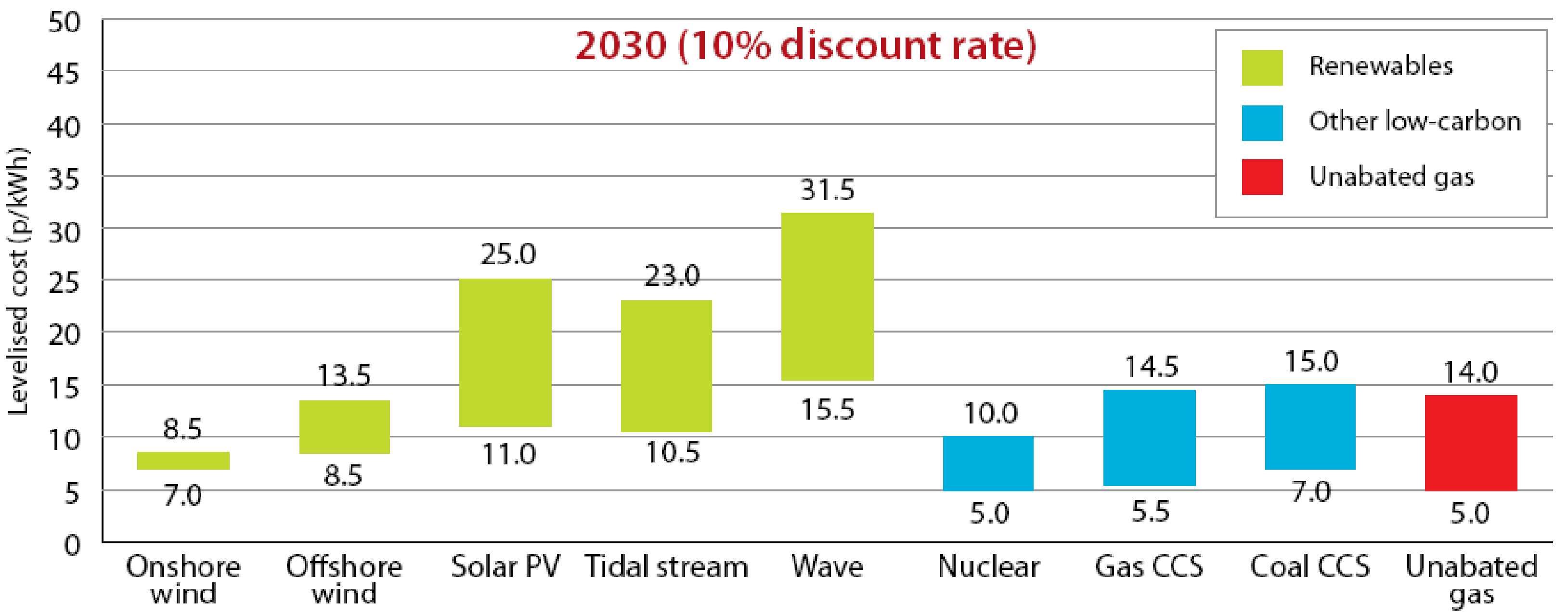
3. “Bring renewables ‘down the cost curve’”: global scalability

- Solar PV meets the requirement:
  - Deployment in coastal areas of Middle East and North Africa could produce 6,000 TWh/year
  - Estimated total potential for same region is 620,000 TWh/year
  - EU-27 power generation was 3,000 TWh in 2009
- Offshore wind may not:
  - Other parts of the world generally lack UK’s long coastline, shallow flat continental shelf
  - Global technical potential of offshore wind is estimated at just 1% of that for solar PV

Source: Moselle, *Climate Change Plan B*, forthcoming (Policy Exchange).

3. “Bring renewables ‘down the cost curve’”: potential for future cost reductions

Figure 1: Estimated cost ranges for low-carbon power technologies (2030)



Source: Committee on Climate Change, *Renewable Energy Review*, May 2011.

3. “Bring renewables ‘down the cost curve’”: learning-by-doing or learning-by-R&D?

Technology	Learning rate, ignoring R&D	Learning rate, controlling for R&D
Pulverized fuel supercritical coal	4.8%	3.8%
Coal conventional technology	15.1%	13.4%
Lignite conventional technology	7.8%	5.7%
Combined cycle gas turbines (1980-89)	2.8%	2.2%
Combined cycle gas turbines (1990-98)	3.3%	0.7%
Large hydro	2.9%	2.0%
Combined heat and power	2.1%	0.2%
Small hydro	2.8%	0.5%
Waste to electricity	57.9%	41.5%
Nuclear light water reactor	53.2%	37.6%
Wind - onshore	15.7%	13.1%
Solar thermal power	22.5%	2.2%
Wind – offshore	8.3%	1.0%

Source: Learning curves for energy technology: a critical assessment, Jamasb and Köhler, 2007, in Delivering a Low Carbon Electricity System: Technologies, Economics and Policy, Editors: Grubb, Jamasb, and Pollitt, Cambridge University Press.

3. “Bring renewables ‘down the cost curve’”: conclusions

- Strength of argument depends on the technology
- For offshore wind, not valid because lack of global scalability (as well as questions over potential long run cost)
  - UK 2020 ambition costs about £15bn more than equivalent onshore wind—an expensive approach to planning permission problems!
- For solar PV, argument justifies support, but with focus strongly on R&D not deployment
  - Massive deployment is premature, more R&D to bring down costs
  - Extraordinary costs of subsidy not politically sustainable (now being cut back in Spain, Germany, Czech Republic, UK)
  - In any case, efficient to deploy in locations with lots of sunshine—not the UK!

Source: Moselle, *Climate Change Plan B*, forthcoming (Policy Exchange).

3. “Bring renewables ‘down the cost curve’”: conclusions

- Cost reduction argument justifies support for some renewable technologies
- However, does not justify current UK and EU policies :
  - 2020 targets lead to an excessive emphasis on rapid deployment of technologies.
- Many investments between now and 2020 involve expensive subsidies to immature or otherwise inappropriate technologies
  - ➢ May not be scalable
  - ➢ May never become price competitive
  - ➢ Focus on deployment risks diverting attention from the high value of R&D and demonstration projects

4. Are renewables the "only game in town"?

- In Conclusions chapter to Harnessing Renewable Energy, we:
  - Note combination of:
    - Weaknesses in EU ETS, insufficient to stimulate investment
    - Binding non-economic constraints on other technologies (nuclear, CCS, energy efficiency) , e.g. public acceptance issues
  - Conclude that specific support for renewables may be (second-best) optimal
  - But also note that "the constraints that lead to second-best policy outcomes can change, and as the true cost of not using technology-neutral, market-based mechanisms becomes clearer over time, the opportunity may arise to move closer to first-best."

4. Are renewables the "only game in town"?

- Are the constraints changing, and can we move closer to first-best?
- Context for UK and EU renewables policy is evolving:
  - Lack of global agreement on climate change, prospect of warming well above 2C
  - Complex implications of Fukishima
  - Shale gas
  - "Arab Awakening"
- Possible openings for policy shifts, e.g.
  - Changes in renewables policy might be quid pro quo for raising the EU 2020 CO_2 emissions reduction target from 20% to 25% or 30%
  - Debate on post-2020 pathways and targets

Conclusions

- Many arguments for supporting renewables are really arguments for supporting low-carbon technologies in general
- Arguments about investing to bring down costs:
  - Are relevant also to other energy technologies
  - Do not justify “throwing money” at large-scale deployment
- Deployment subsidies require that:
  - Technology receiving subsidies has global scalability
  - Some expectation that costs could come down to competitive levels
  - Deployment (not R&D) is most effective means to reduce costs
- Rigid 2020 targets lead to excessive focus on deployment
- Political constraints may justify current focus on renewables, but those constraints can change