Green Power, Green Jobs

OECD Montreal Workshop

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September 15, 2010

Impetus

- Every country that has taken part in an OECD Rural Policy Review has identified “green power” as a major rural development opportunity. Examples include:
  - Spain – solar and wind
  - England – off-shore wind and wave
  - Finland – forest based cellulosic ethanol and wood co-generation
  - China – all technologies
- How much of this is possible? Where is it possible? And will “green power” be a major driver of rural development?

Macro versus Local Effects

- At the macro level the issue is net new jobs – to what extent will green power displace other jobs?
    1. How much will green energy jobs displace jobs in traditional power supply?
    2. If green power is more expensive, how many jobs will be lost due to lower GDP?
- At the local level the question is how many jobs are associated with a specific project?
    1. How many jobs in operation and maintenance?
    2. How many jobs in construction, and for how long?
    3. Will there be local manufacturing jobs?
        - » Green power technologies
        - » Tied to local power generation
    4. What are the associated multipliers?

Why Green Power?

- Two original reasons, and one new.
    1. Climate change and other environmental concerns – carbon reduction
    2. Energy security – reduce dependence on imported oil and gas
    3. Create new jobs, especially new manufacturing jobs
- The first two reasons are compatible with higher prices for energy, the third is harder to reconcile.

Layers of Employment Effects

- Direct jobs – jobs in green power (+)
- Indirect jobs – jobs in industries that supply green power (+)
- Induced Jobs – jobs created by increased household spending (+)
- Displaced jobs – jobs lost in conventional power and in the industries that supply it (coal generation and coal mines) (-)
- Price Effect Jobs – jobs lost if green power increases the prevailing cost of energy (-), or gained if cost is reduced. (+)

Multiplier Effects

- Generation (O&M) to date has modest direct jobs and small local job multipliers – capital intensive and low linkages to the local economy, so few local jobs. Especially true for free energy inputs.
- Indirect jobs at provincial/state or national level can be significant – component manufacturing for renewables.
- Displacement effects at the national level can offset many of the green power effect jobs – some regions win, others lose.

Employment Multiplier Estimates from RIMS/REMI and IMPLAN

Province/state

- Generation (O&M) – 7-8 jobs per $ million in output
- Construction of generation – 19-30 jobs per $ million of construction cost
- Manufacturing of electrical equipment – 16-24 jobs per $ million of output

Local

- Generation (O&M) – 0.7-1 jobs per $ million in output
- Construction of generation – 12-15 jobs per $ million of construction cost
- Manufacturing of electrical equipment – 10-14 jobs per $ million of output

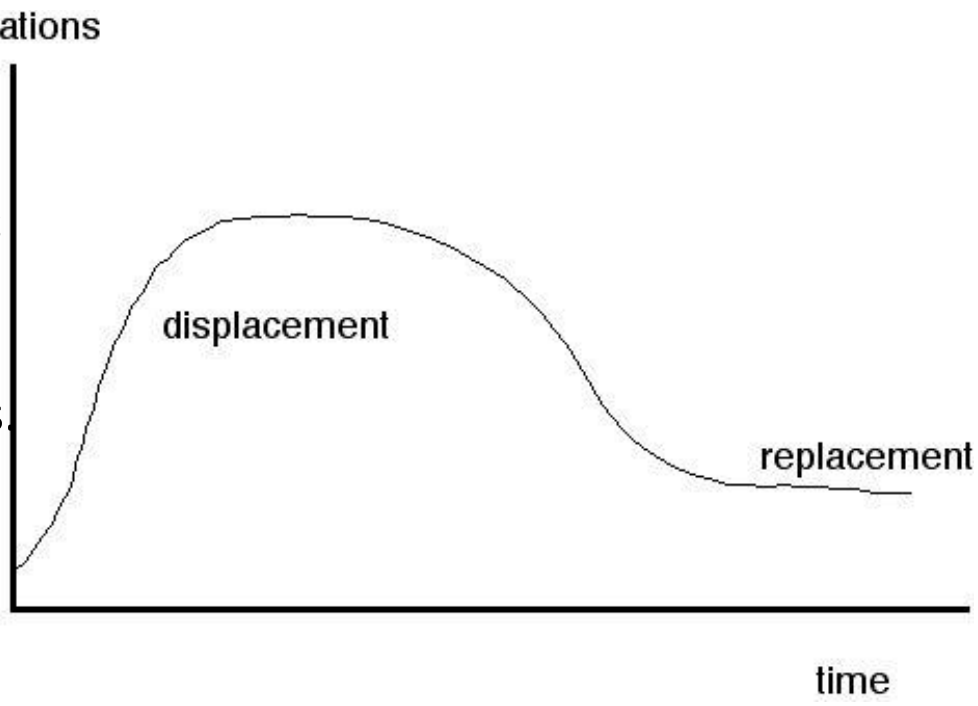
Timing is Crucial

Green power is largely displacing existing generation.

The faster the displacement takes place the greater the industry's annual installations and economic impact in terms of jobs and output, but the shorter the window of displacement becomes.

After displacement there is only replacement, so the industry shrinks unless it can export.

But all countries anticipate exporting (China effect ?).



Price Effect Jobs

- Price changes can be broken down into a “substitution effect” and an “income effect”. If the price of orange juice increases we buy more apple juice. But, we also have less money to spend on everything other than orange juice.
- The more inelastic (steeper) the demand curve (fewer substitutes), the more the income effect dominates.
- When energy prices go up we tend not to reduce demand for energy a lot, but discretionary spending declines. Less employment in general.

Price Increases and Renewables

- Most analysis shows significant price increases as renewable energy expands its share of electricity production – higher unit costs, less reliable, more transmission.
- A few studies show declining prices – more renewables leads to falling natural gas prices that more than offset higher cost renewables.
- But, if current energy is underpriced (carbon cost), the proper question is whether renewables are cheaper than paying the full cost for fossil energy.

Generation Costs 2004: Royal Academy of Engineering Study

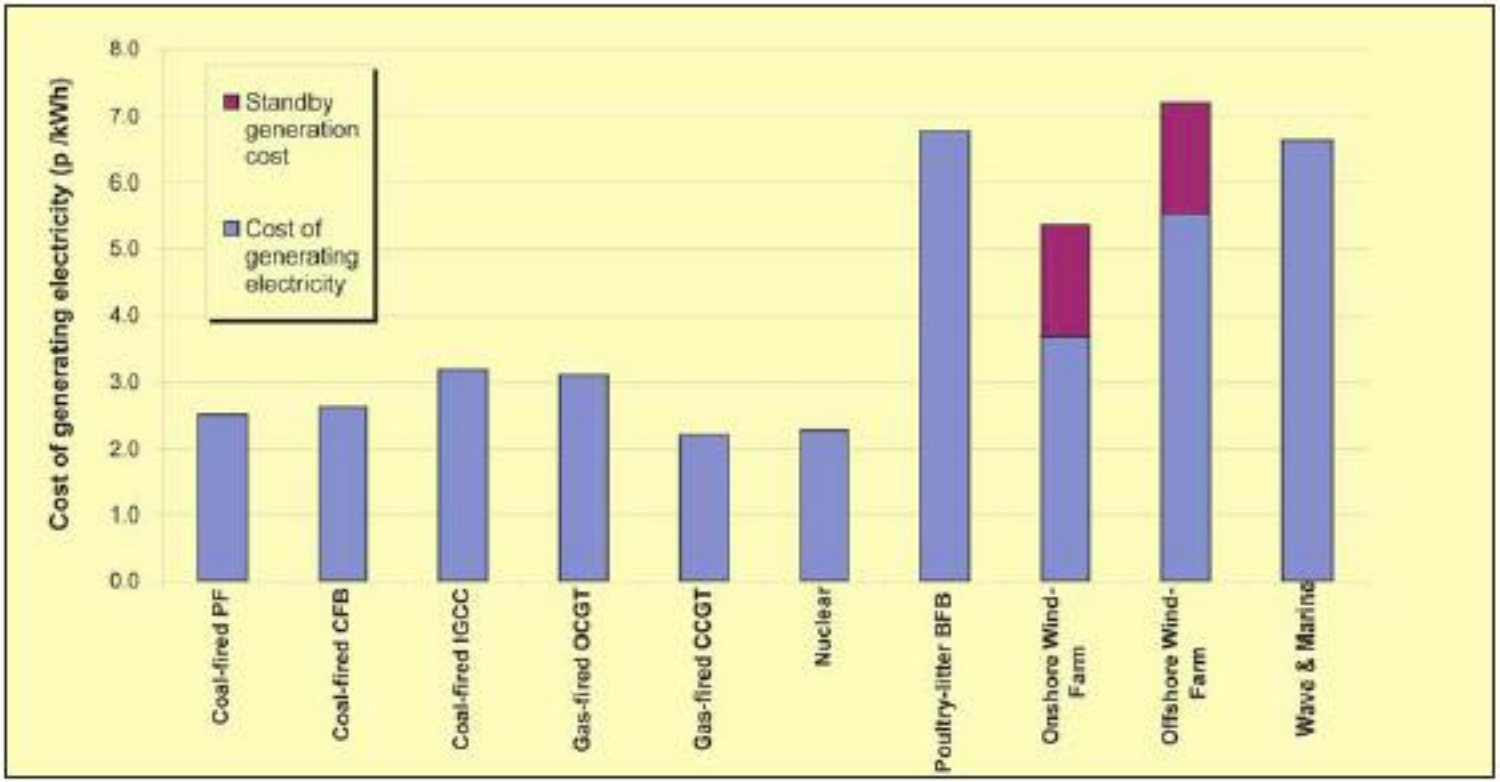


Figure 1 *Cost of generating electricity (pence per kWh) with no cost of CO2 emissions included*

Generation Costs 2004: Royal Academy of Engineering Study

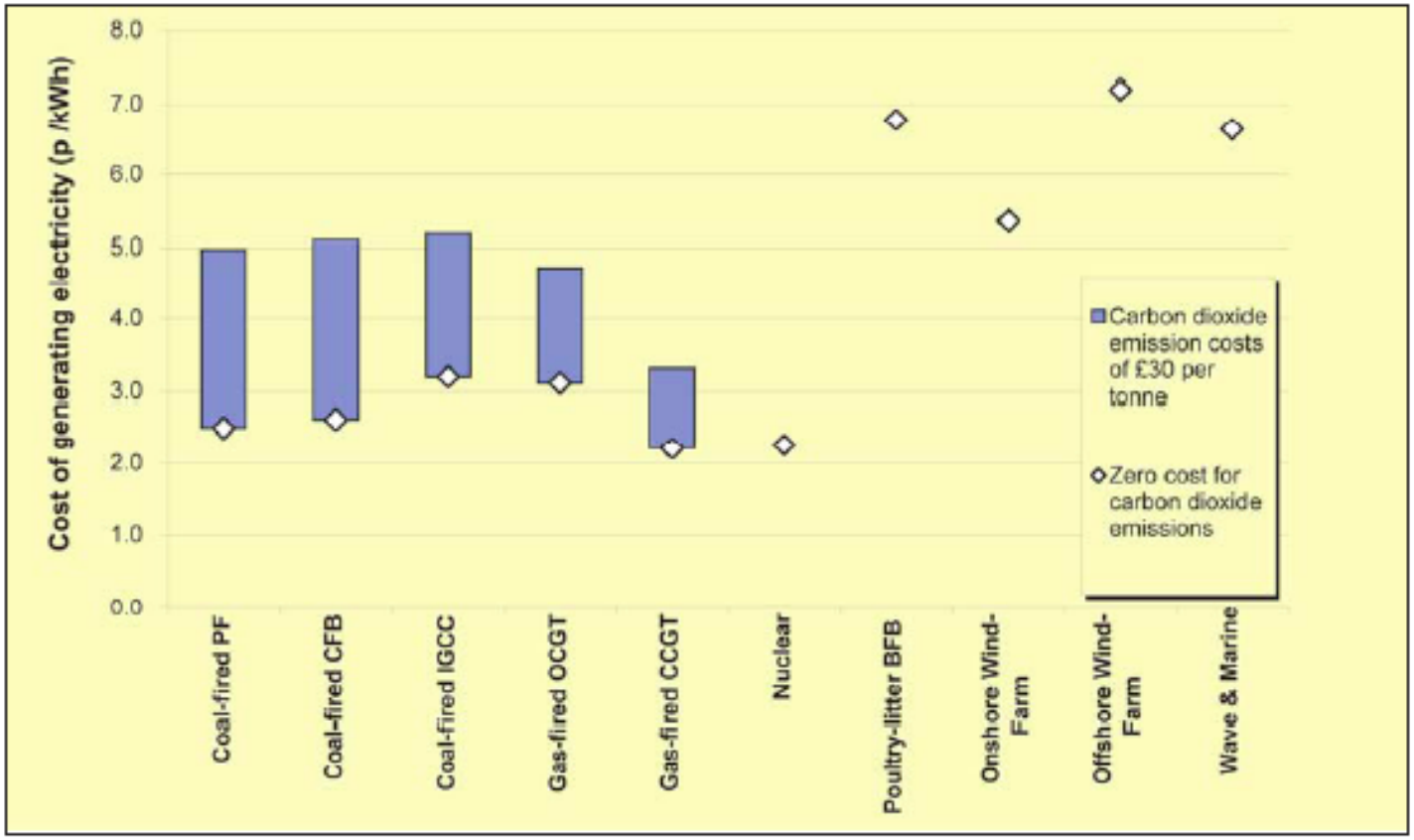


Figure 3 *Cost of generating electricity with respect to carbon dioxide emission costs. (Zero to £30 per tonne)*

Generation Methods are Not Equal in Terms of Local Economic Impact

- Generation methods with free energy inputs (wind, waves, solar, geothermal) have smaller local multipliers because there is no opportunity for an input supply industry.
- The more intermittent the power source, the more important grid access becomes (portfolio of sources), and the larger nominal capacity (multiple sites) has to be in order to achieve a given actual output.
- Scale can be limited by technology or by site attributes.

Electricity Supply Models

Bulk Power – present approach

- Large scale generation linked to concentrated load centers by transmission
- Mainly integrated power companies
- Pancake transmission charges and captive grid
- Now moving from limited transmission to integrated long distance transmission

Distributed Power – renewable friendly

- Small scale generation
- Generation near a specific load
- Separation of generation from transmission and distribution
- Open access, full cost pricing transmission
- Less need for extra transmission capacity, but requires smart grid

Which model prevails will determine rural benefits

- Bulk power model allows transfer pricing and shifting of profits. Generation and consumption play dominant roles. May maximize total number of jobs, by keeping costs down – condemnation of land for transmission. Main benefits in urban areas.
- Distributed power model could result in relocation of SMEs to rural areas. Cheap power offsets agglomeration benefits.
- Most likely a mix of models will evolve.

Conclusions

- For rural areas:
  - Green power generation will largely be located in rural areas, but few jobs are associated with O&M.
  - In many cases construction of renewables is quick and relies upon experienced crews, so local job benefits will be limited. Manufacturing of renewable components is unlikely in rural areas, since places that have manufacturing skills want it (ex-auto workers).
  - How transmission is priced will determine both the volume of new generation from renewables and whether generation is export oriented or serves local demand. The former case will result in more installed capacity, the latter in higher rural multipliers (locked-in power).
  - The most remote rural areas may see cheaper power if hybrid systems are installed, but most rural areas will face higher power costs. Off-grid alternatives are possible (individuals or co-operatives).
  - Because renewable energy is site-specific, there are opportunities to capture location rents that can support local economies, but only before the deal is signed.