

WATER MAY TOP UP THE CASE FOR RENEWABLES



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So here we are in the final two months of a U.S. general election, and energy has become a “wedge issue,” separating the two candidates. Mitt Romney’s position is that he will remove the subsidies on clean energy and help the oil and gas industry make the U.S. energy independent by 2020. The president’s position is that “all of the above” energy sources are needed, including continuing support for clean energy.

Much renewable energy coverage focuses on the issue of cost – how much more it costs than conventional energy. On Sept.10, the Wall Street Journal carried an op-ed with the headline: Corporate Cronyism Harms America, by Charles Koch (I know, you couldn’t make it up). In it, he states that “the government is pushing up energy prices for all of us – five times as much in the case of wind-generated electricity.”

It is an extraordinary claim, with no evidence supplied to support it. Bloomberg New Energy Finance’s regular levelized cost calculations – based on real data from folk who build clean energy projects – show that wind energy is in many cases competitive with new-build coal capacity. Wind is also nearly competitive with new-build gas capacity if you use a gas price rising quickly to \$4 and then on \$6 per million British thermal units, as the futures curve suggests you should, rather than the current spot price of \$3. In the Brazilian energy tenders, we saw unsubsidized wind bid in at lower prices than any other energy source, and there are project developers in Mexico looking to build wind farms with no subsidy.

In March 2011, Danish economist Bjorn

Lomborg wrote in USA Today that solar PV was 10 times as expensive as fossil-based power. By February this year he had retreated to claiming solar was just four times as expensive. The truth is that in more and more markets rooftop solar power is cheaper than daytime retail energy prices. In Spain and other countries a number of project developers are looking to develop solar projects without subsidies. Solar PV is cheaper than kerosene for lighting, and solar is cheaper than oil and diesel for power generation anywhere in the sub-belt.

In the U.K., there is an increasingly desperate campaign, funded and led by Donald Trump, to claim that renewable energy – and wind power in particular – is driving up utility bills, despite government statistics that show two thirds of the increase is due to increases in gas prices.

Levelized costs are not the whole picture. As the cost of photovoltaic modules, wind turbines, batteries and all other clean energy equipment has tumbled over the past few years, advocates of fossil fuels have started to highlight the cost of intermittency, either in terms of additional back-up or grid capacity required, again in many cases making outlandishly inflated claims.

Clean energy advocates, for their part – when not distracted by a relatively small \$4 billion per annum of tax breaks for the fossil fuel industry – have done their best to highlight the externality costs of fossil fuels. These are costs which are not borne by the fossil fuel producers or their clients, but by society at large. I have written elsewhere about the Rand Corporation estimate that U.S. taxpayers spend \$83 billion per annum to police the

Straits of Hormuz, the academic finding that the health costs of coal-fired generation in the U.S. might be as high as 10 cents per kilowatt-hour. These sorts of figures are substantial enough to shift the economics in favor of clean energy entirely.

Energy is shaping up to be one of the key battlegrounds of this presidential campaign, and this is to be welcomed. At Bloomberg New Energy Finance, we have always done what we could to promote transparent, fact-driven analysis. Let companies and countries make whatever choices they need, let the technology chips fall where they may, only once there has been a well-informed discussion about the different options.

WATER RISKS

We are not quite there yet in the U.S. Presidential debate. For one thing climate change has been surreally absent so far, despite this year’s unnatural heat-wave. How many sleepless nights have the president’s pollsters had, trying to work out whether a clear statement on climate change would break his way or stall his progress in the polls? The other critical issue missing from the U.S. presidential election battle is water – particularly as U.S. Drought Monitor reports that nearly two thirds of the nation is now suffering from moderate to exceptional drought conditions.

Coal, gas and nuclear power generation all use large amounts of water. Of these, nuclear is the thirstiest – though many plants are on the coast, using seawater rather than fresh water. Our analysts reckon that a U.S. combined-cycle gas turbine plant of around 450 megawatts could consume 74 million cubic metres of water over its lifetime, and a coal-fired power station of 1.3 gigawatts no less than 1.4 billion cubic meters. The latter figure is seven times the annual water consumption of Paris.

By contrast, wind and PV generation use very little water. The renewable technologies that do need a drink are solar thermal electricity generation, biomass and waste-to-energy, geothermal and – in a more direct sense – hydro-electric.

Planners of thermal energy plants have two things to worry about. One is that droughts and rising waterway temperatures could hit generation, causing shutdowns and power outages for consumers. In 2003, during its famously lethal heat wave, France had to cut back 16 gigawatts of thermal production capacity. In April 2010, Maharashtra State Power Generation shut down 90 percent of its 2.3-gigawatt power station in Chandrapur, about 520 miles east of Mumbai, after low rainfall caused water levels to plummet at the Erai dam. In August of this year, the Millstone nuclear plant in Waterford, Connecticut, had to shut down one of its two reactors because its seawater cooling intake was too warm. Other U.S. plants have, this summer, had to operate at lower power outputs or receive special waivers to operate at temperatures above what their normal safety rating would allow.

The other water-related risk to the economics of thermal capacity is that water pricing becomes, in the fullness of time, rational. Water is generally a highly subsidized commodity meaning

consumers are today largely insulated from the true impact that supply and demand could have on pricing. Were that to change, and were prices allowed to respond to power sector demand, they would inevitably rise, causing pain to consumers while piling extra costs onto the thermal power plants themselves.

Bloomberg New Energy Finance's water team has been working on these issues for nearly two years. In Europe we found that the power sector accounts for 44 percent of total water withdrawals in the region, and 8 percent of consumption – mainly evaporation in cooling towers. China already faces a water shortage of 40 billion cubic meters per year, yet coal-fired generation is expected to increase 43 percent by 2020. It already accounts for around 60 percent of total industrial water demand. Peter Evans, director for global strategy and planning at General Electric Co., was quoted at a Tokyo conference saying that utilities in Asia are “assuming the water is there. They actually will not be able to build as many coal plants as the projections suggest.”

Last December, Dipuo Peters, energy minister of South Africa, announced preferred bidders for more than 2 gigawatts of solar and wind capacity, saying that the move was a “demonstration of our departure from being associated with greenhouse gas emissions, high water usage and other environmental degradation.” In Saudi

Arabia, one of the main drivers of surging electricity demand is desalination – itself very energy intensive. The 9 gigawatts of wind being developed by Saudi Arabia as part of its strategy up until 2030 will solely be dedicated to powering desalination. So renewables are being used to provide water, but also to save it – because the alternative would be more water-thirsty generation options such as oil or gas, or even nuclear.

POLICY

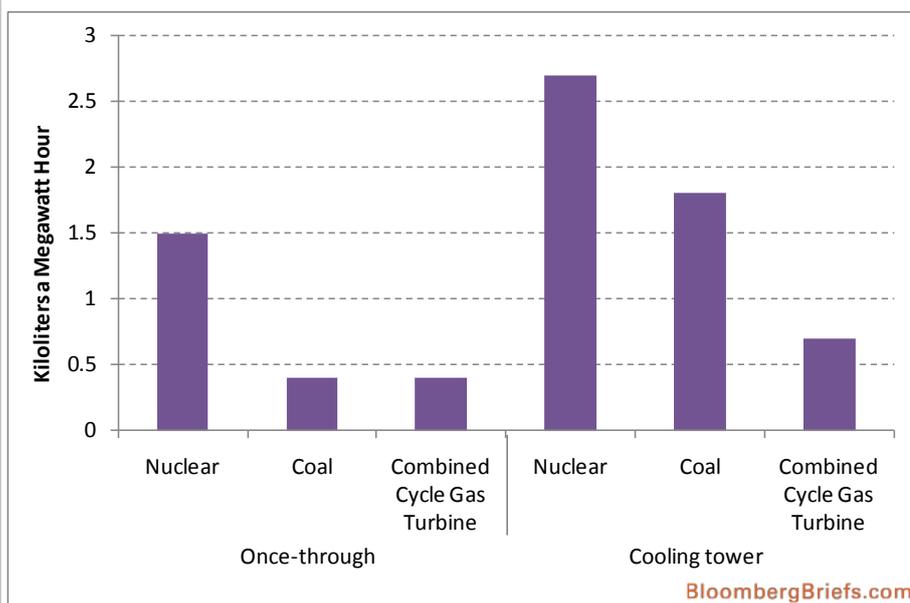
There are signs that policy-makers are increasingly prepared to see water use by the energy sector as something that should incur an appropriate cost. The European Union is currently undertaking a review of its water policy goals as part of its Blueprint to Safeguard Europe's Waters. Greater enforcement of metering and more sophisticated tariffs that better recognize the economic worth of water resources are expected to be an outcome of this process.

Our Research Note, Renewables In Europe Rain On Water Scarcity's Parade, published late last month, found that the chances of the power sector causing a water depletion crisis in Europe was receding – in part because of the increase in the penetration of renewable energy. It showed that water consumption by Germany's power sector could fall by nearly half by 2030 because of the use of solar and wind.

Back in the U.S., the energy sector's use of water looks set to soar despite the deployment of renewable energy, and that is because of non-conventional gas. While shale gas has become a live political issue in the U.S., coverage has almost purely focused on the issues of fugitive emissions, ground-water contamination, and whether the process should be regulated at a federal or state level.

What has not been debated is the actual consumption of water. Chesapeake Energy Corp. reports that drilling a deep shale gas well requires between 65,000 and 600,000 gallons of water, but the fracking process requires an average of an additional 4.5 million gallons to be injected per well at high pressure to break up the rock. Multiply this by the hundreds of thousands of fracked wells which will be required to meet increased

Nuclear Uses Most Water for Generation, Followed by Coal, Gas



Source: Bloomberg New Energy Finance.

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gas demand in the coming decades, and that's a lot of water. Some may be reusable, as long as the salinity is not too high, while some may require a significant amount of wastewater treatment.

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Not surprisingly, the energy sector incumbents are fighting back. As data on the increasing competitiveness of clean energy – along with concerns about job losses in the wind industry if the Production Tax Credit is allowed to expire – has helped it make gains in the presidential ground battle, so the fossil fuel industry has called in massive air strikes. By the middle of September, the New York Times reports, an estimated \$153 million had been spent on television ads promoting coal, oil and

gas, compared to just \$41 million on clean energy. When you have a system in place which transfers hundreds of billions of dollars per annum of costs from you and your clients to the taxpayer and the general public, you do whatever it takes protect it.

As they work the corridors of power, promoting unfettered reliance on coal, gas, oil and nuclear power, defenders of the status quo may want to bear in mind the words of W. H. Auden: "Thousands have lived without love, not one without water."