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Renewable subsidies: Do they create or destroy jobs?

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This article is based on several extracted from recent issues of EEnergy Informer, a monthly newsletter covering the global energy sector.

www.eenergyinformer.com



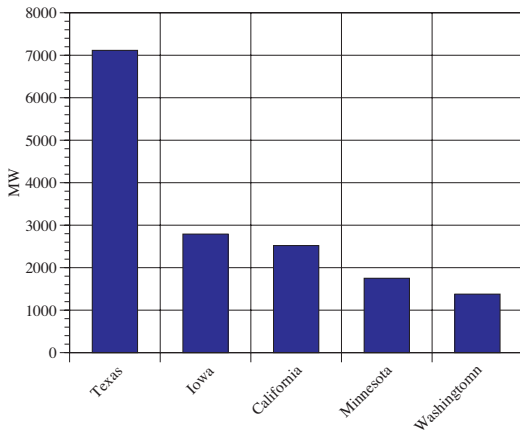
Facing a sluggish economy and rising unemployment, many policymakers around the world have come to the conclusion that now is the time to support the fledgling renewable energy industry. It creates jobs, reduces dependence on imported energy and helps address concerns about climate change. In the US, for example, a number of states have created a booming wind industry through a combination of subsidies and mandatory targets (Figure 1).

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Figure 1

Job creating dynamo

Top 5 states in installed wind capacity, MW



Source: American Wind Energy Association, 2 Feb 09

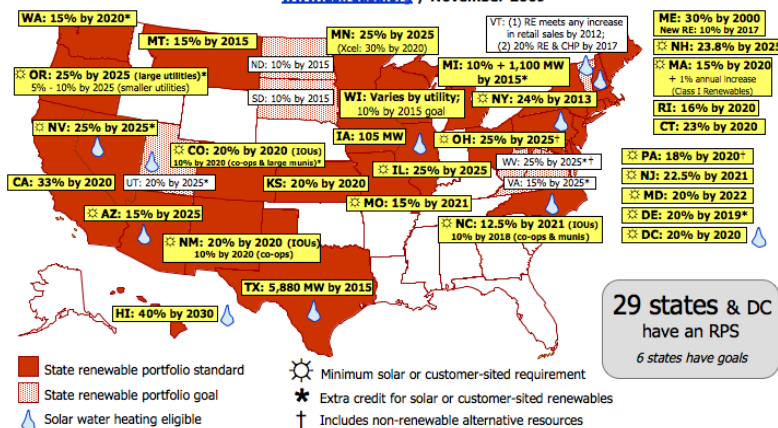
For example, **Renewable portfolio standards (RPS)** which are in effect in roughly half of the states in the US, mandate a certain percentage of renewable energy in the electricity mix by specific deadlines (Figure 2). Similarly, President Obama’s economic stimulus package includes a number of provisions, for example a **30% tax credit** for renewable energy, targeted to kill two birds with one stone – creating domestic jobs while reducing US dependence on imported oil.

Figure 2

Law of the land, for the most part

Renewable Portfolio Standards

www.dsireusa.org / November 2009



Current status of US renewable portfolio standards

Source: http://www.dsireusa.org/documents/SummaryMaps/RPS_map.ppt

Governments in many parts of the world are looking into pouring generous subsidies into a clean and green renewable sector. Australia recently passed a law with a renewable energy target legislation designed to deliver 35,500 GWh of new renewable production by 2020. This law could result in the installation of some 6 to 9 GW of renewable capacity, mostly wind, at a cost of about AUD20-25 billion, according to **Keith Orchison**, an Australian energy expert. Adjusted for the relative size of the economies of Australia and the US, this would require the generation of 420,000 GWh of renewable energy in 2020 from 70 to 100 GW of plant.

Renewable subsidies: What is there not to like?

What could possibly be a better use of taxpayer dollars, right? The answer is not as simple as one might expect.

Nobody denies that promoting investments in renewable energy technologies creates jobs – the debate is how effective are these policies relative to investments in other sectors of the economy, for example, in oil and gas exploration, car manufacturing, biofuel production, or something else. In other words, would a dollar spent subsidizing renewable energy create more jobs if invested somewhere else?

Proponents of renewable energy technologies, including wind and solar energy associations, typically produce rosy pictures of the high multiplier effect of renewable energy subsidies, claiming that each dollar spent generates many more in related industries creating multitudes of well-paying jobs. The net effect, they claim, is a highly favorable return-on-investment when all aspects of the incentives and their payback are considered.

Opponents of renewable subsidies do not dispute that incentives create jobs but point out that the same level of investment in other sectors of the economy could conceivably create even more jobs and higher paybacks.

Every dollar thus invested, they claim, results in net job losses – or job destruction – relative to even more productive opportunities.

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The debate has become heated with the growing subsidies and incentives going towards promoting renewable energy resources in many countries. Just as prospective car buyers want to know how many miles per gallon (MPG) – or kilometers per liter (KPL) – they can expect from a new car, politicians supporting renewable energy want to know how many jobs can be expected per MW of renewable energy installed.

Pick a study, get a number

Not surprisingly, a growing number of studies by academics, think-tanks, consulting firms and trade and lobbying groups are trying to come up with jobs per MW figures. But as is often the case, the answers depend on whom you ask – renewable energy advocates are likely to provide rosier numbers than independent analysts with little or no vested interest in the outcome of the studies .

For example, a study by the *Renewable Energy Policy Project* in Washington, DC, concluded that each MW of installed wind capacity in the US generates 4.85 full-time jobs. Others have come up with far higher and lower numbers depending on the methodology, specific industries, and the country – among other factors.

In a report released in late January 2009 – *Wind at Work: Wind Energy and Job Creation in the EU* – the European Wind Energy Association (EWEA), not exactly an unbiased source, claimed that 15.1 jobs are created in the EU for every MW of installed wind capacity. On top of that, EWEA says 0.4 jobs are created per MW of cumulative capacity in related sectors including operation of wind farms, turbine maintenance and service-related jobs.

It is difficult to verify the details of the analysis and the assumptions used by the EWEA, but their estimates are 3 times higher than those reported by some US-based studies. Perhaps the EU wind business is more labor intensive than the US – or the EU studies assume more domestic manufacturing – which may not apply to the US since most US wind turbines are imported. Possibly other factors are responsible for the sizeable difference.

The EWEA study claims that the number of wind energy jobs in EU will more than double by 2020 reaching 325,000. It says 154,000 jobs were recorded in 2007. On average,

12,047 new direct wind energy jobs have been created per year in the 5-year period 2002-2007, 75% of which in 3 key markets, **Denmark, Germany and Spain**. “Wind at Work reveals the vast potential of the wind energy industry as a source of employment that can bring real long-term benefits to European economies,” according to **Christian Kjaer**, EWEA Chief Executive.

A report by **Kammen, Kapadia and Fripp** at University of California at Berkeley concluded that investments in some renewables generate far more jobs than conventional energy technologies, as many as 10 times higher for solar PVs relative to natural gas or coal (Table 1). Their results were based on the concept of megawatts averaged over the year or MWa, where output of various technologies are adjusted based on their capacity factor or the utilization rates rather than mere MW of installed capacity.

The job creation ratios of renewables relative to natural gas are shown in column 5 and suggest that investing a million dollars in solar PVs may be 8-11 times more effective in creating jobs than investing the same in coal or natural gas. That, of course, is music to the ears of renewable lobbyists who can find receptive Senators and Representatives in the US Congress, especially under the current circumstances where job creation is a high political priority everywhere. Although this study was focused on the US, one may surmise that similar results may apply to other countries.

But is that a fair way to rank technologies, asks Hillard Huntington, the Executive Director of Energy Modeling Forum, based in Stanford University in California. Huntington’s answer, reported in the March 2009 issue of *Dialogue*, is that it depends on what it is you are trying to achieve. He presents alternative perspectives, including the job creation ratios per million dollars spent using installed capacity as the relevant metric and gets vastly different results as shown in Column 3.

Pointing to column 3 Huntington concludes that, “The job creation estimates for solar PV capacity are now not nearly as attractive as they were in the first column.” Moreover, he adds, “Since these estimates are sensitive to assumptions about capital costs, fuel prices and plant capacity factors, it would seem that the relatively small differences between

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Table 1

More jobs in GreenTech?

Job creation associated with different generation technologies*

	(1)	(2)	(3)	(4)	(5)	(6)
	Jobs/MWA	Jobs/GWh	Jobs/\$MM	\$/KWh	MWh	\$
Solar PV	7.41	0.846	3.18	\$0.2664	7.80	1.55
Solar PV	10.56	1.205	4.53	\$0.2664	11.12	2.21
Wind	0.71	0.081	1.64	\$0.0495	0.75	0.80
Wind	2.79	0.318	6.43	\$0.495	2.94	3.14
Biomass	0.78	0.089	1.80	\$0.0496	0.82	0.88
Biomass	2.84	0.324	6.54	\$0.0496	2.99	3.19
Coal	1.01	0.115	3.72	\$0.0310	1.06	1.81
Natural Gas	0.95	0.108	2.05	\$0.0529	1.00	1.00

* Column 1 is based on study by Kammen, Kapadia & Fripp, 2004, revised 2006, University of California, Berkeley; there are 2 separate studies for PV & Wind
 Source: Hillard G. Huntington, USAEE Dialogue 17(1), March 2009

generation types in their job creation impact may not be robust to a full uncertainty analysis.”

English translation: Green technologies may be favored for other reasons but they are not necessarily as good as lobbyists would like you to believe when it comes to creating new jobs.

Beyond this important observation, Huntington correctly points out that if the government’s aim is to create new jobs and put people back to work, it should look at what investments in the overall economy would generate the best results – the best bang for the buck. According to the US Bureau of Economic Analysis, each million dollar invested in the US economy – broadly speaking – generates 9.78 jobs. This, Huntington claims, should be the bar against which investments in the energy sector – or for that matter any sector – must be compared. And measured against this yardstick, renewables do not stand out as exceptional job creating investments.

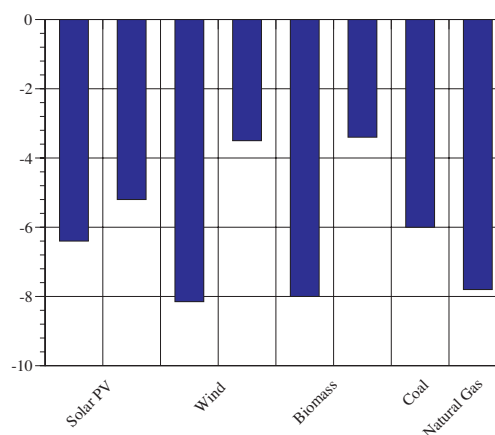
As shown in Figure 3, investment in electricity generation technologies creates far fewer jobs than the rest of the economy. “Subsidies to either green or conventional sources will detract rather than expand the economy’s job base, because they will shift investments from other sectors

that will create more employment,” he says. Hmm, not the sort of message renewable enthusiasts want to hear.

Figure 3

Are you saying renewables aren’t that great in creating new jobs?

Net job destruction potential of energy technologies relative to all sectors of the US economy, in jobs gained/lost per million dollars of investment



Source: Hillard G. Huntington, USAEE Dialogue 17(1), March 2009

The case of Spanish renewable subsidies

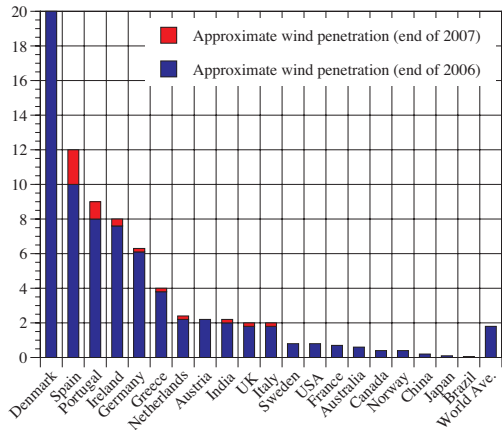
Many countries refer to the European experience with generous renewable subsidies, which has resulted in double digit penetration of renewable energy in their electricity

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mix, notably Denmark, Spain and Germany (Figure 4) for guidance. All 3 countries have achieved their lofty status with consistent and persistent incentives including feed-in-tariffs (FITs), which lock in above-market prices paid to developers and investors for the life of qualifying projects.

Figure 4
Who's got more wind power?

Wind-generated power as percentage of electricity consumption in selected countries



Source: US DOE

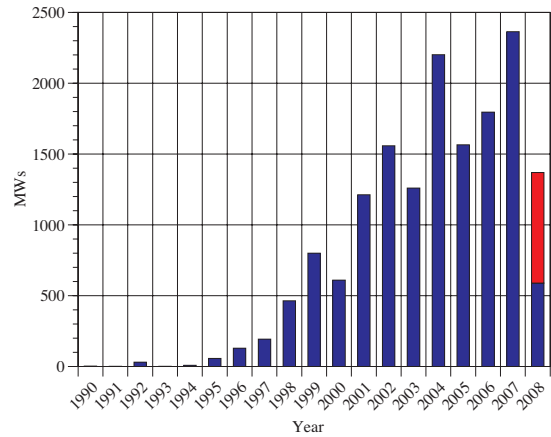
The Obama administration has referred to the European experience, notably in Spain, to push for increased US investments, arguing that it will create jobs – a message resonating with politicians facing shrinking payrolls amongst their constituents.

Opponents of renewable subsidies acknowledge that Spain has achieved significant progress over a short period of time (Figure 5) but point out that this has come at a high cost. For example, a highly critical study published in March 2009 by Professor Gabriel Galzada Alvarez at the King Juan Carlos University titled Study of the Effects on Employment of Public Aid to Renewable Energy Sources, claims that renewable energy eliminates two jobs for every job it creates.

Figure 5

Lots of MWs but at what cost?

Installed wind capacity in Spain, 1990-2008, MW



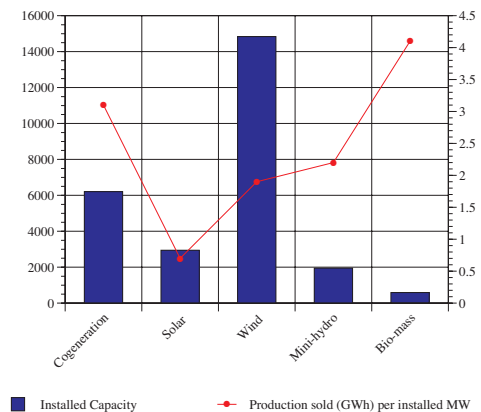
Source: Comision Nacional de Energie (CNE)

Arvarez's basic message is that subsidizing renewable energy does create jobs, and does promote renewable energy (Figure 6) but the number of jobs created are limited and they come at a stiff premium, as does the generated electricity. Moreover, there are significant opportunity costs associated with subsidizing green jobs, namely less resources that could have gone into other productive sectors of the economy producing even more jobs. It is not a message many renewable energy advocates want to hear – nor the kind of sound bite politicians like to use.

Figure 6

How much more can we afford?

Spain's installed capacity and generation from alternative renewable sources, MW and GWh, 2008 data



Source: Comision Nacional de Energie (CNE)

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Professor Alvarez claims that renewable subsidies actually destroys jobs – in the sense that more jobs would have been created in the absence of the subsidies, consistent with results reported by Hill Huntington cited earlier. The less advanced – i.e., more expensive – the technology, the higher the premium.

Leaving the job creation/destruction argument aside, what about the costs associated with renewable energy? Professor Alvarez claims that Spain has spent over \$36 billion so far to subsidize renewables and consumers have paid an extra \$10 billion between 2000-8 in higher electricity costs. Many would say, surely this sort of nonsense cannot be sustainable.

Who gets the last word?

Critical results such as those of Professor Alvarez are highly unsettling not only for policy makers in Spain, but also those in the US and elsewhere, many of whom would like to follow the path chosen by Spain to achieve equally impressive results. If renewables are not as good in creating green jobs as previously advertised, are they still worth pursuing, especially in an economic downturn such as the current one?

As it turns out, Alvarez does not get the last word on the topic. His study – data, methodology and conclusions – have come under attack from a number of sources, casting doubts on his negative conclusions. The 7 August issue of PennFuture makes clear that the debate for and against the effectiveness of renewable subsidies is far from over.

According to Michael Peck, who is a member of the advisory board of the Blue Green Alliance and affiliated with Gamesa, one of Spain's leading green energy companies, Professor Alvarez may have taken liberties in interpreting the data – possibly bending the numbers to reach his overly negative conclusions. The puzzle is how did he get such prominent exposure in the US despite the alleged serious shortcomings of his study and the fact that his findings have been largely dismissed and discredited in Spain?

The answer may be that, “A lie gets halfway around the world before the truth has a chance to get its pants on.” There is debate on the source of this colorful quote. Some attribute it to Mark Twain, others give the credit to Sir

Winston Churchill. Regardless of the source, the untruth in this case appears to have gotten ahead of the truth.

In a letter submitted to the House Energy and Commerce Committee Chairman, Henry Waxman on 20 May 2009, Teresa Ribera Rodriguez, Spain's Secretary of State for Climate and Ribera Rodriguez Minister of the Environment for Rural and Marine Affairs, state that “data used in [the Calzada Alvarez] analysis are totally out of keeping with the current reality of the sector,” adding that the analysis is “simplistic” and uses a “non-rigorous methodology.”

Mr. Peck points to data released by Spain's Industry Ministry (28 April 09) which claims that about 73,000 jobs were locally created just by the country's wind industry in 2008 in contrast to Alvarez's 50,000 for Spain's entire renewable sector. Spain's trade unions claim 89,000 direct jobs in addition to 99,600 indirect jobs have been created in Spain's renewable energy sector. The Spanish Ministry of Labor reports that renewable energy industries have created 175,000 jobs. Another study by the European Commission projects that an aggressive renewable policy would create a net increase of over 400,000 jobs in the European Union by 2020.

In early September, the National Renewable Energy Laboratory (NREL) released an analysis of Professor Gabriel Calzada, also refuting his claim that renewable energy eliminates two jobs for every job it creates. According to NREL, the primary conclusions of the author cannot be supported by the facts. NREL's analysis may be found at <http://www.nrel.gov/docs/fy09osti/46261.pdf>.

According to the American Wind Energy Association (AWEA), the lobbying arm of the US wind industry, wind energy created 35,000 new jobs in the US in 2008 on top of 50,000 in 2007.

The debate goes on

Reasonable people continue to disagree on the need for renewable subsidies, or for that matter, subsidies in general. Michael Peck, for example, says the US needs a strong national renewable energy standard to spur further renewable growth. Not everyone is convinced. Dan Kish, Senior VP of Inst. for Energy Research, a free market think tank, believes that government should not be promoting

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renewables through mandates or subsidies. He says, "It's frankly outrageous."

- Diehard proponents of renewables argue that conventional technologies and fuels, nuclear, oil, coal, biofuels, have received – and continue to receive – generous subsidies. So why shouldn't renewables benefit from similar generosity?
- Another argument is that subsidies are needed for new technologies and industries until they reach critical scale and are mass marketed.
- The full premium for lower carbon emissions may not be included in some of the current studies, thus short changing the benefits.
- Moreover, so long as subsidies are not permanent, the end justifies the means, and there is a definite exit strategy, then a reasonable case can be made for supporting renewables up to the point of reaching critical scale.
- Take the case of Airbus, now effectively competing with Boeing in commercial aviation worldwide. If it were not for European government subsidies that helped Airbus get off the ground, figuratively as well as literally, Boeing would probably have had a virtual monopoly today. If one believes that the initial subsidies in Airbus were worth it, then similar arguments can be made for subsidizing renewables. Moreover, how else can we get to a sustainable low carbon future economy?

How much subsidy is too much?

Beyond the issue of whether we need to subsidize renewable energy technologies and on what basis, is the issue of how much subsidy is too little or too much? Looking at the experience of Denmark, Germany and Spain, one may conclude that in all cases the initial subsidies were necessary to get the fledgling industry off the ground, but proved to be too generous towards the end – and have subsequently been adjusted downward.

Just as few would be in favor of continued government subsidies for Airbus (or Boeing) today, many studies point out that renewable subsidies must be carefully monitored and adjusted as the industry grows in size and costs drop with mass production. This is clearly evident in the case of Spanish renewable subsidies.

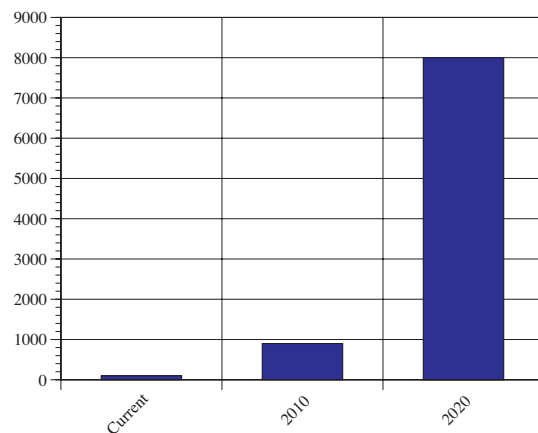
The Spanish Government, like those of Denmark and Germany, decided that renewable energy technologies

deserve financial support to become viable businesses. Developers of wind and solar energy were offered lucrative subsidies in the form of above-market long-term feed-in-tariffs (FITs). The result was predictable: first a boom in wind farms, catapulting Spain to the ranks of top wind generators in the world followed by a bonanza for solar energy developers, reaching 3,340 MW last year, from a mere 700 MW the prior year (Figure 7).

Figure 7

Here comes the sun

Spain's solar capacity installations, existing and projected, in MW



Source: *The Wall Street Journal*, 6 Aug 09

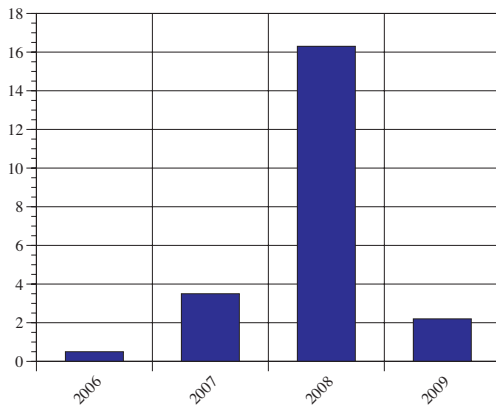
According to *The Wall Street Journal* (6 Aug 09), some 30 large CSP projects with combined capacity of 4,300 MW are currently under construction in Spain representing an investment of 17 billion (\$24.5 billion). Acciona SA, one of the biggest Spanish construction companies, predicts 8,000 MW of installed solar thermal generation by 2020.

But the generous Spanish solar subsidies turned out to be too generous in the end, peaking at \$1.6 billion in 2008 from \$310 million in 2007. Towards the end of 2008, the government slashed the subsidies and put a 500 MW annual limit on how much new solar installations it would take. The results have been equally predictable and dramatic (Figure 8).

Figure 8

Did something change in 2009?

Spain's solar PV market, in billion Euros



Source: *The Wall Street Journal* 3 Sep 09 based on data from *Asociacion de la Industria Fotovoltaica*

Policy makers in the US and elsewhere are still debating how best to encourage the development of renewables given that most – with the possible exception of wind in good wind regimes – are still too expensive to penetrate the market unassisted.

Mike Ahearn, CEO of First Solar Corp., a rising renewable firm in the US, told the *Wall Street Journal* (3 Sep 09) that solar power is on the verge of becoming competitive “within a couple of years” but only if the industry gains sufficient scale, and that requires government subsidies and other forms of support. “It is a chicken-and-egg problem,” he said.

Generating Electricity in A Carbon Constrained World

Edited by Fereidoon P. Sioshansi

Menlo Energy Economics

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