

## Gold-rush Like Moment in Solar Thermal Power Generation



Sean Pool — special assistant for energy, and science and technology policy, Center for American Progress

**Who or what institutions set targets for innovation in energy e.g. consumers, producers, scientists, government etc.?**

Almost everyone you've mentioned has some sort of target for innovation in energy. But because the US has a very decentralized political system, the question of who set the targets for energy innovation is more rhetoric rather than substance. Many different political actors have set targets, but few of them carry the weight of law.

Certainly the Obama administration has been very vocal about setting targets, maybe not necessarily very concrete ones – about raising the issue of energy innovation to one of the mainstream of national stage. His administration recently released a visionary document called the Strategy for American Innovation, which includes several references to clean energy innovation and deployment. In his State of the Union address in January 2011, President Obama called for our nation to achieve 80 percent clean electricity by 2035.

The Obama administration also created ARPA-E, or the Advanced Research Projects Agency-Energy. It was funded for the first time with the recovery act which Obama signed in his first month in office. This is an institution that fills a major gap in energy innovation lifecycle between research and development and commercialization of new clean energy technologies.

**How efficient is ARPA-E?**

Dr. Arun Majumdar who was the first and present director of ARPA-E, is doing a very good job. The agency is modeled after the Defense Advanced Research Projects Agency, or DARPA, which has helped to develop many of critical innovations in the defense and civilian sector, including the original idea that led to the internet. ARPA-E is setting targets for innovation and especially commercialization. They help to leap frog young technologies that would otherwise not be able to get private backing and help them in their research.

**How do they choose projects at ARPA-E?**

ARPA-E sets goals they want innovators to accomplish and then uses a competitive grant process to put money into the hands of the best candidates. Some of these goals include

better batteries, smart grid technologies, building efficiency systems, and creating fuels from sunlight using synthetic biology. It has to do with both clean energy properties of potential technologies, the quality of the business plan, and the ability for the technology to achieve megawatt scale and market penetration.

**Who are the people who work there? Are they appointed officials or are they elected?**

They are appointed officials, they aren't elected. They are working very closely with the private sector. It's a very innovative public-private partnership. It's a model where you have these appointed officials talking directly with people from venture capital industry and entrepreneurs who are developing these technologies. I think there is quite a lot of communication going behind the scenes and that's what helps these officials to understand what projects to take on. It is a very well integrated program. It leverages the unique capabilities and expertise of energy industry professionals and researchers from the private sector with public sector direction and funding.

The majority of projects that are funded by ARPA-E include private investors and entrepreneurs, but not all. The agency develops technologies at a range of levels of technological readiness, and helps move them from lab to assembly line. Some projects that they are funding are university-based projects, or projects run by national laboratories.

**Which of the two sectors – generation and saving – scored more impressive results so far and why?**

That's a tricky question. That being said I do think that at least in the US there are pretty systemic problems in keeping private investment out of energy efficiency innovation. Some of it has to do with split incentives between building owners and tenants, but there are a range of market barriers and information failures that make efficiency a particularly challenging area. At the same time, efficiency is also where the greatest opportunity lies for profitable, job-creating investments in new technology and innovation.

**How do energy standards affect national innovation strategies? Can you name some of them?**

For example, the EU ETS coming online and putting a price on carbon in Europe; Spain is putting very aggressive subsidies for solar-thermal, and it led to an almost gold-rush like moment where private investors were just pouring money into concentrating solar thermal power generation projects. In fact, the private sector response surpassed what the government was ready for and they had to scale back the program a bit. Many European countries have clean energy standards in addition. These policies have had a really big effect overseas in helping to build markets that drive innovation.

We've also seen standards being very effective at driving deployment in the United States. California for example, which has a very aggressive renewable energy standard is also home to about half of the nation's venture capital investment in clean energy startup companies. So the evidence does show that these standards can have an effect on not just deployment but also on investment in the earlier stages of

innovation: research, development, and commercialization.

California and Spain are just a couple of examples, but there are many similar ones where you've seen national standard coming on and shooting life into the industry.. When there are long term standards and ensured demand in the future, investors are more willing to pump money into risky innovative technology companies whose products may not be ready for 5 or 10 years. It's those kinds of investments that you need to make incentives for if you want to move innovation forward.

**Is energy innovation an integral part of national innovation system?**

Certainly energy innovation is a part of national innovation system. But when I think of national innovation system I think of it more specifically. You have energy national innovation system, and within that you have a wind energy innovation system, and within that you have off-shore energy innovation system. Each of these are overlapping networks of scientists, producers, entrepreneurs, and researchers working together and creating a sort of informal network. So it is all connected and energy is a part of our national innovation system.

**Let's say innovation systems means there is a communication "chain" that links scientists, innovators, businessmen, universities, government. Given this we assume that success of innovation depends on how efficiently they communicate. To your mind, how efficient is communication in energy innovation comparing to other spheres?**

Absolutely. The formation of productive and innovation networks with diverse actors all communicating is one of the most critical goals of clean energy innovation policy. Like

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you say, you want researchers to be talking to investors, manufacturers, and ultimately to the end consumer of the technology, for example the utility who buys the wind turbines or deploys the solar panels. In productive innovation ecosystem, these different types of players are linked by exchanging money, information, and risk.

I don't have data to give a really definitive answer to that question but I think it's safe to say that energy innovation systems in the U.S. have really started to crystallize in the last 5 years. By no means does energy constitute the largest part of our national spending on research and development or private sector investment in technology. Energy is not the most significant part of innovation coming out of the U.S. But it's a growing part, rapidly growing part. Clean energy venture capital investments have grown nationwide from 2% of overall venture investments to 16% in the past 5 years. That's an indicator that you are starting to get better communication between researchers, manufacturers, investors, and consumers.

**How much the government spend on energy R&D?**

Government investments in energy R&D in 1980-es were 9 billion, and in 2006 it has declined to 3.2 billion. The stimulus bill put a big jolt of money into the system, only a small part of that went specifically to R&D. The stimulus bill did fund the creation of ARPA-E, which needs to continue. But overall we are investing about a third of what we were investing 30 years ago in energy. That needs to change.

**How tough is international competition in the energy innovation market?**

International competition in energy innovation is extremely tough. We have 2 reports that we have recently put out. One of them is from June 2010 and it's called "Out of the running." The other one we released recently is called "Rising of a challenge." Both of these reports go a lot into details about the extremely competitive nature of international investments in clean energy innovation.

In the more recent report we looked at China investments across the board of innovation. We looked a little bit at renewable energy within that. I was just telling you the US spent about 3.2 billion dollars in 2006 on clean energy innovation. China by some estimates spends up to 12 billion in dollars every month. So it's the whole other scale of public investment in driving clean energy innovation. In 2008, China had nearly twice the installed capacity of renewable electricity of the United States in absolute terms.

Six of the top 10 global photovoltaic solar cell manufacturers are now in China, and the country's solar manufacturers produced nearly 2 gigawatts of panels in 2008, or roughly one-quarter of global production. The question is whether making these technologies and selling them cheaply translates into long-run innovation that pushes the frontiers of new technology. China is good in copy method of innovation: they take something, improve it a little bit and make it more cheaply. But it remains to be seen, and the report talks about it much more in detail, whether that ability translates well into the ability to actually invent new technology and push the frontier of innovation in a new way.

So, certainly there is an acute international competition. It's not only China. It's also Germany, Spain, Denmark of course, depending on what sectors of the clean energy economy you are looking at. And the U.S. is really falling behind because our public policy is not attuned to the opportunities of these new markets, nor to the risks of climate change. This is the take away. We Americans feel that we have contributed to these technologies. For instance, photovoltaic cell was invented in America and now it's mostly sold in China. We've developed one of the first wind farms and now they are made much more in China, Denmark, Germany. So there's a sort of American sense that we are falling behind in this race for clean energy innovation.

**Why is America behind?**

Part of it has to do with what you were talking about a bit earlier about standards and government policy. Certainly U.S. has been one of the slowest among industrialized countries to adopt federal-level incentives to correct the market failures that are reducing investments in clean energy. We still don't have a national clean energy standard. China has a national

energy standard despite the fact that they are still a transitional economy. They have been more aggressive than we have.

Europe has the EU Emissions Trading System (ETS). Most countries have a number of other incentives. U.S. federally has almost no structural market incentives to make investment in this kind of innovation profitable. That's been a major problem. Conservatives in American think that market should take care of it. And market doesn't take care of it because you have market failures around clean energy, climate change and innovation. In the U.S. our policy does not reflect this realization. Our politics haven't caught up with what the economists have realized for decades, what Europe has realized maybe a decade ago, and what China has realized in past couple of years.

Government has a strong role to play in correcting for these market failures to promote the appropriate level of private investment in clean energy innovation. Without federal policy to be signaling to the market that they should be investing in this sector they aren't going to. Instead as we saw they are going to pump money into trillions of dollars of securitized mortgages because that's what seemed profitable to investors, and that's what caused a financial crisis.

We need to be figuring out how to use government influence to introduce higher standards that are clear, long term, and transparent. We need to figure out how get private capital off the sidelines and into investments in clean energy innovation, commercialization, and deployment.

**What American Progress does? Do you consider yourself a part of innovation system?**

There are two very specific things that we do. First, we provide a service for the people in government that they aren't able to do themselves. We are able to step back a little bit from the day-to-day politics and think a little bit more long-term and more structurally about policy. As in any country politicians are often so wrapped up in the day-to-day business of legislating and fighting political battles that they don't often have time to really think and develop long term policy strategies.

So, on the one hand, we try to provide that big-picture thinking that those in office can't often do, and then offer them our advice. On the other

hand we also have Center for American Progress Action Fund that is a sister organization that takes those policies and develops a message for them and an outreach strategy to help them get exposure and visibility in the media and on Capitol Hill. It's almost like marketing policy ideas. We are trying to put progressive energy values and ideas out into the mainstream political discourse and do active outreach not just by writing reports but also by talking with the media, getting on radio, by visiting Capitol Hill and talking to the leaders.

**Can you name examples when you influenced the government policy?**

In fact I can name a very recent example. We've put out a report called "Focus on competitiveness". It detailed a 5-point strategy for how the administration could build a greater awareness of international economic competitiveness into our economic development plan. It identified the fact that we don't have any long run competitiveness-focused economic policy. Most of other countries in the world do. Those governments are thinking that they are in this sort of a game, competing for technology and innovation. They act strategically to bolster those activities.

In the U.S. we don't have a very coordinated policy to meet demands of international competitiveness. There is no planning process so that people think about it in a structural way. We made that report called "Focus on competitiveness" and within couple of months the Obama administration announced they were going to implement one of the policies pretty much directly out of this report. It suggested that the President form a council on competitiveness in the White House to promote cross-agency collaboration on competitiveness policy. The President actually enacted that Council and its being led by GE CEO Jeffrey Immelt. It's a very good example of a policy we've developed being implemented. Our report on "Green Recovery" also was very influential in helping guide the energy portions of the 2009 American Recovery and Reinvestment Act, also known as the stimulus bill. Of the roughly \$80 billion in energy investments that were made, about three quarters were tied to an idea that we had proposed in our report.

## INNONEWS

*Cisco to develop "Virtual Skolkovo" in follow-up MOU with Skolkovo Foundation*

*Cisco and the Skolkovo Foundation unveiled further details of joint efforts under the Skolkovo Project plans to develop a "Virtual Skolkovo". Based on the proposal from the Cisco Internet Business Solutions Group (IBSG), Virtual Skolkovo will be a business innovation ecosystem that pushes the advantages of traditional clustering beyond physical boundaries into the virtual realm of new possibilities.*

*The memorandum of understanding signed during a Cisco Telepresence meeting between Victor Vekselberg, President of Skolkovo Foundation and Mohsen Moazami, a Vice President of Cisco IBSG, outlines a three-tiered approach for Virtual Skolkovo that will look at operational collaboration for faster decision-making, creating a community from across different ecosystems, and building global alliances through a multitude of networks and exchange with international research centers, universities and economic players in various markets.*

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*Yandex Supports Startups*

*Yandex, the leading Russian search engine, has purchased WebVisor technology. The acquisition is a result of the "open days for startups", a Yandex initiative under the Yandex.Start program.*

*Yandex launched its startup-support program last summer. The company is primarily interested in developer teams in multimedia, data processing and data structuring, geo information systems and advertising technologies. Yandex.Start is aimed at supporting emerging talent, encouraging young companies and the industry as a whole. Yandex supports startups by offering its technologies (as APIs), computing facilities and expert advice.*

*To find new and interesting projects, Yandex partners with a number of startup communities in Russia, including the GreenfieldProject, the Glavstart, the Higher School of Economics' Business Incubator, the Academy of National Economy's Business Incubator and the Techno Cup at the Moscow Institute of Physics and Technology. Yandex gives the most promising developer teams an opportunity to join the Yandex.*

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