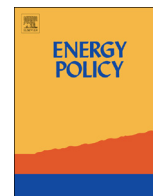




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## Why the oil companies lost solar

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### HIGHLIGHTS

- This paper examines why BP and Shell were not successful in solar, and exited.
- It finds innovation theory to be very helpful in answering the question.
- The evidence from semi-structured interviews, press reports, and archival documentation is in line with innovation theory.
- Both the theory and the findings offer a different way forward for future oil and gas entrants.

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### ABSTRACT

Solar energy is a growing source of electricity supply. Oil companies including BP and Shell recognized this early on and entered the solar industry when it was still in its relative infancy. These companies invested heavily in vertically integrated solar companies that were at one point among the largest in the world. But neither BP nor Shell was successful, and they both decided to exit the solar market. This stands as a paradox since such companies have the funds, the long-term perspectives, the management systems, the multinational presence and the lobbying clout to potentially succeed in this new energy industry. Why were they not successful, and why did they ultimately exit? This paper uses innovation theory to explore the reasons why large incumbent corporations typically fail to succeed in commercializing disruptive innovations at scale. Evidence from semi-structured interviews and discussions with former employees of BP Solar and Shell Solar confirm the explanatory power of key constructs from innovation theory in accounting for the big oil companies' experience with solar technology. Ultimately, the findings suggest that oil companies would have done better to treat their solar businesses as separate stand-alone entities.

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### 1. Introduction

At the end of 2011, BP became the second of today's large oil companies to exit the solar industry. Before BP, it was Shell that bowed-out fully in 2009. There are some oil companies still in the industry, including Total with its more recent acquisition of a majority stake in SunPower in the United States, and Chevron, which concentrates mainly on the installation of medium-sized solar power plants. But of the oil majors, BP and Shell were the most fully invested, creating vertically integrated solar companies that at one point were the 2nd and the 4th largest solar companies in the world. They both saw this as part of their diversified energy strategy, and a long-term investment in a renewable energy future.

But both BP Solar and Shell Solar soon lost their positions at the top, overtaken by entrepreneurial start-up companies that raised venture funds, grew quickly to scale, went public to raise further funds, and shot past the incumbent giants. Given these oil

companies' deep pockets, powerful brands, lobbying clout, long-term perspectives, and stated desire to diversify energy sources, why is it that they were not able to become, and remain, leaders in the solar industry? This question is addressed by applying innovation theory to evidence drawn from interviews and discussions with former employees from BP Solar and Shell Solar.

### 2. The growth of the solar photovoltaic industry

For our purposes, solar technology refers to solar photovoltaic panels and systems that produce electric power. Solar started as an off-grid product, primarily used in space in the 1950s, and in remote areas of the developed and developing world (Miller, 2009). It only started to move on-grid in volume in the mid to late 1990s, thanks to the Japanese and subsequently German government's initiatives to support this sector (Bradford, 2006; Geller, 2003).<sup>1</sup>

<sup>1</sup> The late politician and author, Hermann Scheer, played a pivotal role in this transformational policy. For more on this, please see Miller, Damian. "Power from On High", International Herald Tribune, November 23, 2010.

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The German government created the special feed-in tariff for solar and other renewables).<sup>2</sup> This made it possible for any south-facing roof on a home or building to become a micro-power plant. And in addition, large-scale, ground-mounted power plants started to spring up. Many governments subsequently copied this model, or alternatively as in the US, relied more on tax credits, and the solar industry boomed Fig. 1.

As a result of these incentives demand surged, and supply eventually outpaced demand, with a consequent collapse in prices. Five years ago, the average selling price (ASP) of a solar module was \$3.5 USD per watt on a wholesale basis. As of the first quarter of 2012 it was reported at \$1.09 USD per watt (Navigant, 2012). Mid-way through 2012, ASPs reached \$0.84 USD per watt (Herron, 2012), and as of the start of 2013, solar modules are sold for approximately \$0.60 US cents per watt on a wholesale basis (Mehta, 2013).

The solar industry over the last decade has become a fast-paced industry, where companies must relentlessly focus on scale, and volume to survive and win at lower and lower price points. This is the environment in which the oil companies eventually found themselves.

To investigate their experience, documentary evidence was obtained from company reports, press releases and industry archives. No attempt is made here to provide an exhaustive history of oil company involvement in solar energy.<sup>3</sup> Rather, the focal case studies are on BP and Shell, who were the biggest, and most recent to exit.

### 3. The case studies

#### 3.1. BP Solar

BP was one of the early entrants to the solar industry, establishing its solar division in 1981. In the late nineties, BP's move into solar energy was accelerated by the merger with Amoco, which gave it a 50% stake in Solarex; then one of the largest solar manufacturers. In 1999, BP acquired the remaining 50% of Solarex from Enron and was thrust into the top tier in the solar industry (BP, 1999).

By 2002, BP Solar was the number two solar company in the world, just behind Sharp, the Japanese company, and would go on to have plants in India (through a joint venture with Tata), Europe, China, Australia, and the US. When Lord Brown renamed BP "Beyond Petroleum", he could plausibly take comfort in the company's dominance in the solar sector.

But by the end of 2011, BP exited solar. Even before then – over a three-year period – BP Solar had started a process of gradually closing its plants, and making its 1750 workers redundant. Explaining its exit, BP said simply that it could not "make any money" from solar. Specifically BP sought to cast the blame on the plunging world-wide prices of solar panels, pointing specifically to low-cost competition from China, and on the fact that solar is a "commoditized" business in which they saw little future (Macalister, 2011).<sup>4</sup>

Instead of solar, BP continued to provide on-shore wind energy (though only in the USA) and biofuels worldwide. In mid-2010, BP paid nearly \$100 mln USD for the cellulosic biofuel business of a listed US company (Verenium). Then in March 2011, BP put

\$680 mln into buying 83% of CNAA, a Brazilian ethanol producer, which more than tripled BP's biofuel production capacity to 1.4 billion litres (or 9 million barrels) per year (Blankenhorn, 2011). A similar development was to play out in the case of Shell, which also found biofuels to be more congruent than solar energy with their oil business.

#### 3.2. Shell Solar

Shell started small in the eighties with an investment in a separate solar company called R&S Solar based in Holland. But once Shell took a decision in 1997 to make 'Renewables' the 5th core division of Shell, and invest \$500 mln USD over 5 years, R&S was absorbed and renamed as Shell Solar.

Shell wanted to scale up rapidly in solar energy. To this end, Shell entered a joint venture with Siemens Solar and a German utility in December 2000, and by January 2002, Shell had bought out both of these partners. The integration of Shell Solar and Siemens Solar at this time created a vertically integrated company from silicon production all the way to downstream sales of solar systems, with R&D and 60 MW worth of manufacturing facilities and 1100 people. It was a serious commitment by Shell to make this work. As the CEO of Shell Solar said at the time:

"Solar PV is one of the fastest-growing of all the technologies in a rapidly developing part of the global energy market. Shell has a strategic commitment to making renewable energy a commercial reality, and this move is a key step in building a strong, global solar business" (Go Solar (2002)).

With this acquisition, Shell catapulted itself into 4th position on the list of the world's cell and solar panel manufacturers, behind Sharp, BP Solar, and Kyocera—in descending order of size (Schmela, 2002).

But by 2006, Shell Solar was in trouble. The market for solar was taking off under the feed-in tariff regime in Germany and other parts of Europe, and with it came a tight squeeze on silicon supplies (the raw material in solar panels). As a former Shell Solar executive recalls about this time:

"Shell Solar did not have the courage to take up the poly-Si [silicon] producers' offers to secure supply [of silicon], by investing in their [silicon producer's] capacity expansion. Hence producers cut Shell Solar off."<sup>5</sup>

Without adequate silicon supply, Shell's factories in the US, for example, were estimated to have a capacity utilization of only 50% (Le Pedus, 2006). And shortly following the silicon squeeze, Shell exited in 2006 by divesting Shell Solar to Solar World from Germany—a relative recent solar start-up (Temple, 2006; Kusjanto and Palmen, 2006).

By March 2009, Shell was beating a retreat not just from its residual technology investments in solar, but other forms of renewable energy. The then head of Gas and Power and Renewables explained that Shell was not planning any more large investments in wind and solar which continued "to struggle to compete with other investment opportunities we have in our portfolio" (Bergin, 2009). Shell had retained a 50% stake in an R&D venture with Saint-Gobain to make lower cost solar panels using former Shell Solar's thin-film technology. But by August 2009, Shell had exited this as well. Instead, Shell was clear: the "focus going forward is on biofuels in the renewables sphere" (Gismatullin, 2009).

<sup>2</sup> The first country in Europe to institute feed-in-tariffs was actually Denmark, but Germany was the first where solar benefited at scale (Bradford, 2006).

<sup>3</sup> Although that would make for an interesting research project in the field of economic history.

<sup>4</sup> The latter explanation is of course a bit ironic, since BP's prime business is oil, and oil is very much a 'commodity', and a 'commoditized business'.

<sup>5</sup> Interview with former senior sales manager and managing director of a Shell Solar group company, 24th May, 2012.

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