

MAKERERE UNIVERSITY BUSINESS SCHOOL
FACULTY OF GRADUATE STUDIES AND RESEARCH
DEPARTMENT OF ACCOUNTING

MASTER OF ENERGY ECONOMICS AND GOVERNANCE (MEEG)
YEAR TWO, SEMESTER ONE, ACADEMIC YEAR 2026/2027

COURSE NAME: ENERGY COSTING
COURSE CODE: EEG 815

COURSE WORK ONE (1) : TAKE-HOME CASE ASSIGNMENT

Total Marks: 40

Submission deadline: September 16, 2026

Mode of submission: Home | MUBSEP

All University Examination Regulations shall apply.

CASE FOR ANALYSIS

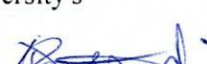
SolarCity Corporation: Challenges in the Solar Energy Value Chain, Ivey Publishing Product No. 9B14M059 (Case No. W14135), written by Ram Subramanian, Richard Ivey School of Business Foundation, 2014.

Every candidate must read the complete, officially licensed case before attempting this assignment.

BACKGROUND

SolarCity Corporation was a United States-based company that installed and financed rooftop solar power systems for residential and commercial customers. Rather than compete on the traditional centralized, grid-based model used by regulated electric utilities, the company offered customers a decentralized alternative: it owned and financed the solar equipment itself and charged customers a monthly fee for the power used, typically priced below prevailing utility rates and locked in under a long-term agreement. By mid-2013, the company was growing quickly but had not yet reported a profit, and it faced a federal tax-credit reduction, political pushback from utility companies over subsidies and "net metering," and the continuing need to raise capital to fund new installations.

INSTRUCTIONS TO CANDIDATES

- This is an individual assignment. Answer all the questions below.
 - Base your answers on a careful reading of the full, officially obtained case, together with the concepts and notes covered in class.
 - . Marks are awarded for the quality of analysis and its grounding in the case facts and course concepts.
 - Your submission should not exceed 3,000 words in total (excluding references), typed in 12-point Times New Roman font with 1.5 line spacing.
 - Include a cover page showing your name, registration number, and the course code.
 - Cite all sources, including the case itself and any course readings, using a consistent referencing style (e.g., APA).
 - Late submissions and cases of plagiarism will be handled in accordance with the University's academic regulations.
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QUESTION 1

(a) **What is SolarCity trying to do? How does this challenge conventional utility companies?** Explain what SolarCity's decentralized power generation and distribution model involves, and how its value proposition differs from that of a conventional grid-based electricity provider. *(12 marks)*

(b) Using the concept of disruptive innovation, discuss whether SolarCity can be considered a disruptor of the traditional utility industry, and explain the main challenges a disruptor in this position typically faces. *(8 marks)*

Question 2

a) What is SolarCity's business model? Is it viable? *(10 marks)*

b) What are the challenges facing Lyndon Rive and his team? What would you recommend they do? *(10 Marks)*

TOTAL = 40 MARKS

END OF ASSIGNMENT



SOLARCITY CORPORATION: CHALLENGES IN THE SOLAR ENERGY VALUE CHAIN¹

Ram Subramanian wrote this case solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation. The author may have disguised certain names and other identifying information to protect confidentiality.

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There are 3,200 utilities that make up the U.S. electrical grid, the largest machine in the world. These power companies sell \$400 billion worth of electricity a year, mostly derived from burning fossil fuels in centralized stations and distributed over 2.7 million miles of power lines. Regulators set rates; utilities get guaranteed returns; investors get sure-thing dividends. It is a model that has not changed much since Thomas Edison invented the light bulb — and it is doomed to obsolescence.

David Crane, chief executive officer, NRG Energy²

On May 16, 2013, Lyndon Rive, the co-founder and chief executive officer (CEO) of SolarCity Corporation, announced the creation of a US\$500 million fund³ with Goldman Sachs to finance the installation of rooftop solar systems.⁴ The announcement followed the release of the first-quarter earnings for fiscal 2013, which indicated that the company continued to lose money.⁵ As the SolarCity team celebrated the creation of the Goldman Sachs fund, viewing it as further validation of their quest to make renewable energy a viable proposition in the United States, it was clear that the company faced a number of challenges. Key among them was to become profitable in a fragmented industry. In addition, the company was aware of the reduction in federal tax credit for renewable energy assets from 30 to 10 per cent at the end of 2016 — a reduction that would make it difficult to raise investment capital in the future.⁶ While the stock market had given SolarCity the benefit of the doubt by nearly quadrupling the value of its share following its 2012 initial public offering (IPO), time was quickly running out for the company to show that renewable energy was a profitable business idea.

THE SOLAR ENERGY INDUSTRY⁷

Electric power in the United States followed the centralized power generation and distribution model. Companies built capital-intensive infrastructure for power generation and invested in transmission lines to distribute power to residential and commercial customers. Given the capital-intensive nature of this model, electric utilities sought regulations that gave them exclusive franchises in either a single state or a contiguous set of states. The same regulations also set power prices that enabled utilities to recover their

costs and gave them a small surplus. In 2013, investor-owned utilities accounted for around three-quarters of the industry's revenues.

The National Energy Policy Act (NEPA) of 1992, while maintaining the regulations in the industry, opened the way for competition by allowing entities to purchase wholesale power from local utilities and sell it to customers using the transmission lines owned by the local utility. Thus, residential customers in many states had a choice in buying electric power from more than one provider. Notwithstanding the attempts to make the electric utility industry more competitive, in 2011, electricity rates increased by 48 per cent over 1998 rates. One report estimated that the average U.S. homeowner would spend more \$100,000 on centralized, grid-based electric power over a 25-year period.

Electricity was a secondary energy source derived principally from fossil fuels such as coal, oil and natural gas. While electricity was considered a "clean" energy source, fossil fuels produced emissions, such as carbon dioxide (CO₂), that had a negative impact on the environment and human health. In particular, CO₂ was identified as a greenhouse gas and a source of global warming. The United States, along with other countries, made a determined push to develop renewable energy as a viable alternative. A major goal of President Barack Obama's American Recovery and Reinvestment Act of 2009 was to encourage the development of renewable energy sources via federal tax credits, loan guarantees and a significant increase in federal funding and grants.

The five major sources of renewable energy were biomass (for example, wood waste), water, geothermal, wind and solar. For much of the 19th century and the early part of the 20th century, wood (biomass) supplied up to 90 per cent of America's energy needs. As the use of non-renewable sources such as coal and oil increased over the years, renewable sources became less popular sources of energy. The U.S. Energy Information Administration (EIA) estimated that in 2012, coal provided 37 per cent of the source for electricity while the five renewable energy sources combined contributed only 12 per cent. Of the renewable energy sources, hydropower was the most significant, accounting for 56 per cent of renewable energy used, while solar was the smallest with 1 per cent of the share. According to an EIA forecast, due to strong public support (increased awareness of the environmental impact of non-renewable energy) and political support (tax credits and other incentives), renewable energy sources were expected to account for 16 per cent of the source for electricity by 2040.

In 1956, scientists at Bell Labs in New Jersey discovered that silicon wafers could convert sunlight into electricity. While it was initially thought of as a more affordable way to power telephone lines compared to conventional electricity, a Bell Lab print advertisement saw the immense potential: "The dream of ages has been brought closer. If this energy could be put to use there would be enough to turn every wheel and light every lamp that mankind would ever need."⁸

However, solar power was used in only a small number of products, such as calculators. Large-scale commercial use of solar energy did not take off until the early 2000s in Germany, spurred by a combination of national energy policy and increased awareness of the need for renewable energy sources.

By 2012, solar was the fastest growing (albeit from a very small base) renewable energy source. *The Economist* attributed the 86 per cent growth rate in solar energy in 2011 (growth in 2012 was 76 per cent) to what it called "Swanson's Law" — a variation of Moore's Law used to explain the geometric growth in computing power. Swanson's Law posited that the cost of photovoltaic cells (which trapped solar energy and converted it to electricity) fell by 20 per cent each time global manufacturing capacity doubled.⁹ Solar energy enabled decentralized power generation and transmission (referred to as "off the grid") in contrast to the conventional centralized (grid-based) model practiced by utility companies.

According to the Solar Energy Industry Association (SEIA), the United States had 7,700 megawatts (MW) of installed solar electric capacity in 2012 (in the form of systems), which was enough to serve 1.2 million households (the United States had a total of about 115 million households). Only 82,000 homes had installed solar power, indicating a significant imbalance between supply and demand.

Solar Energy Industry Value Chain and Economics¹⁰

A photovoltaic (PV) cell changed sunlight directly into usable electricity. Since each PV cell converted only a small amount of sunlight into electricity, a large number of individual PV cells were grouped together into a solar panel. A number of panels installed on a rooftop allowed the building to trap adequate sunlight to be converted into electricity. The PV panels (which accounted for 70 per cent of the cost of the system) were combined with a variety of components (such as batteries and inverters, which accounted for 30 per cent of system cost) to create a PV system. Commercial manufacturers sold complete PV systems either directly to end users or to installers. System manufacturers competed either completely along the value chain or only in upstream (such as manufacture of silicon wafers for PV cells) or midstream (manufacture of PV cells or modules) or downstream (installation) parts of the chain (see Exhibit 1). The upstream part of the industry was the most capital-intensive with high fixed costs and a long learning curve. The upstream segment was an oligopoly with Chinese companies dominating the market until 2012. The midstream part of the industry value chain was less capital-intensive and fragmented. The downstream segment was highly fragmented and labour-intensive with players using a variety of financing models to lower the capital costs of systems. A residential solar system for a three-bedroom household cost around \$30,000 (before a 30 per cent tax incentive) and had an expected life of 25 years.

The Solyndra Fallout

While Germany was credited with starting the commercial solar energy industry in the early 2000s, Chinese companies catapulted it into a \$100 billion global business. Using a combination of government subsidies and aggressive capacity expansion in the upstream and midstream segments, Suntech, a Chinese manufacturer, became the world's largest solar panel manufacturer in early 2012. A U.S. company, Solyndra, which manufactured solar cells, was given a \$535 million loan guarantee by the federal government. However, by 2009, a combination of overcapacity and a steep fall in global silicon prices (which favoured late entrants who were not locked into long-term price contracts) adversely affected the major manufacturers. Solyndra filed for bankruptcy in 2011, Suntech in March 2013, and immediately after Suntech's announcement, Robert Bosch, a German manufacturer, stated that it was exiting the industry. A report indicated that a number of Chinese manufacturers with high debts were likely to go bankrupt as well.¹¹

The bankruptcy of Solyndra adversely affected public perception of the solar industry in the United States. The federal loan guarantee for Solyndra was a hot topic of debate during the 2012 Presidential election. Critics called into question the viability of solar energy as a substitute for conventional electric energy, while supporters argued in favour of solar energy, citing its low carbon footprint (2 per cent of coal) and other environmental benefits. *The New York Times* summed up the state of the industry:

Two factors have hurt the industry's growth. The first is abstract and well ingrained in the American psyche: the negative association of 'green' technologies with inefficiency and idealistic, hippie-fueled impracticality. The second is concrete and recent: the sleek, vacant headquarters of Solyndra, the infamous federally subsidized solar-panel manufacturer that went bankrupt in 2011.¹²

The Downstream Market

Downstream players sold solar systems to end users, both residential and commercial. This fragmented segment of the industry featured companies that competed in the labour-intensive sales and installation activities. Installers faced challenging industry conditions until the Power Purchase Agreement (PPA) model was introduced in 2003.¹³ Since solar power was generated and distributed in a decentralized manner, customers faced significant switching costs in paying for the capital cost of the equipment (which was \$30,000 in 2003, and significantly higher in 2013). In contrast, they did not have to bear the capital cost of traditional electricity and only had to pay a monthly usage cost. The PPA model enabled the installers to pay for and own the equipment in return for a (often) 20-year customer agreement to source and pay for the power used. While this lowered the switching cost to customers, it necessitated installers to fund equipment purchase and hence the capital used in the business. Because solar equipment qualified for a 30 per cent tax credit to its owner, installers began to create investment funds for equipment purchase using the tax credit as the principal enticement for investors.

The U.S. installation market was fragmented with national players, such as SolarCity and Vivint Solar, competing with local players who served a specific geographic market. The top five states based on annual PV installations were California, Arizona, New Jersey, Nevada, and North Carolina. SolarCity held the top market share in California and Arizona and was number four in New Jersey, while local players were strong in Nevada and North Carolina. Overall, SolarCity was estimated to have a 17.4 per cent national market share.¹⁴

Standard & Poor's captured the state of flux in the industry by observing that the United States was in the "relatively early stages of the business cycle for alternate energy sources leading to high degree of execution risk."¹⁵

Industry research indicated that the PPA residential market was expected to grow to \$5.7 billion by 2016. The commercial market was roughly twice as large as the residential market in installed capacity, but long lead times for closing sales and lower conventional electricity costs (which reduced the value proposition of solar energy) made this a challenging market. The SEIA estimated that the U.S. solar market was \$11.5 billion in revenue in 2012.¹⁶

Pushback by Utilities

Although rooftop solar electricity accounted for less than one-quarter of one per cent of the United States' total power generation, at a June 2013 industry meeting, an executive of a leading electric utility company spoke about the threat: "We did not get in front of this disruption. It may be too late."¹⁷

Two factors were the bone of contention between the electric utility companies and their solar counterparts. One had to do with the tax credits and subsidies for solar energy and the second concerned a policy known as "net metering."

In California and Arizona (the two largest U.S. markets for solar energy), utility executives were pushing back on renewable energy credits. In Arizona, for example, the state's largest utility company kept up the pressure on the Arizona Corporation Commission, which set utility rates, to not only reduce the residential tax credit but also impose fees on solar customers for their use of the utilities' administrative infrastructure. Duke Energy, a large electric utility, was lobbying for North Carolina to impose a similar charge for solar customers.¹⁸

“Net metering” was a term used in the industry whereby solar customers could get credit for passing on the extra solar energy that they produced but did not consume. Forty-one U.S. states had passed a law mandating utility companies to provide their customers with a “net meter” that kept track of the customer’s surplus energy. While most states monetized the credit at the lower nighttime rates, California tied net metering credit to the higher daytime rate. The fact that utility companies had to bear the administrative cost of solar energy led a utility executive to prophesize a possible dire future for the industry: “We have to ensure that we are not creating a system that 15 years from now has the industry going, ‘We do not have customers anymore but we still have an obligation to provide a distribution system — how do we do that?’”¹⁹

Utility industry executives argued that increased use of solar energy and the consequent net metering benefits could lead to a situation in which more and more customers stopped paying for the grid. This, according to them, was a “death spiral” for the industry: “If the costs to maintain the grid are not being borne by some customers, then other customers have to bear a bigger and bigger portion. As these costs get shifted, that leads to higher and higher rates for customers who do not take advantage of solar.”²⁰

To combat the political pressure by utility companies to do away with net metering and reduce or remove tax credits, solar energy companies formed trade associations for lobbying purposes. Solar installers SolarCity, Sungevity, Sunrun and Verengo formed the Alliance for Solar Choice, while VoteSolar was a solar energy industry-wide advocacy group.

SOLARCITY HISTORY AND PROFILE²¹

In 1998, Lyndon Rive, a native of South Africa, traveled to San Jose, California to compete for his national team in the underwater hockey world championship. After the tournament, Rive decided to stay in California and launched a software company along with his brother, who had been working in Silicon Valley. The brothers were cousins of Elon Musk, who had co-founded PayPal, and, after selling it to eBay, had gone on to found Tesla Motors, the electric car company. When the Rive brothers decided to sell their software company to Dell Inc., Musk encouraged them to get into the clean energy business. Lyndon and Peter Rive launched SolarCity in 2006, and took the company public via an IPO (NASDAQ: SCTY) in December 2012, with Lyndon Rive as CEO, Peter Rive as chief operating officer (COO) and chief technology officer and Elon Musk as chairman of the board.

The company stated its vision as: “Create the most compelling energy company of the 21st century by delivering cleaner, cheaper power through distributed generation.”²²

SolarCity provided solar energy to residential and commercial customers in two ways: customers could purchase the installed system (which typically cost \$30,000 for a three-bedroom home; the price came down to \$16,500 after a federal tax rebate and other incentives) or enter into a PPA or a leasing agreement. In the latter case, SolarCity paid for and owned the equipment and customers entered into a long-term agreement (typically 20 years for residential customers) to pay for solar energy, which was priced at 10-15 per cent below what utility companies charged for electric power. Lyndon Rive explained the benefit of this model to customers:

Most people will not be in their house for 20 years. But the product is cheap electricity for 20 years. We actually lock in our energy rates for 20 years. There is nowhere you can get that. If you had the option and somebody said, ‘Hey, you can lock in your rates for 20 years, and then pass on that benefit to the new homeowner, pass it over,’ that is what we offer. There is a 20-year

agreement. But you have a lifetime relationship with your utility anyway. There is no other option.”²³

As an example of the economics of solar power over conventional utility company-based electric power, SolarCity pointed out that a typical homeowner in Maryland would save \$8,305 over the 20-year agreement period. In addition, by switching to solar energy, over the same time frame the same homeowner would prevent the release of 240,024 pounds of greenhouse gas emissions — the equivalent of planting 130 trees.

Commercial customers of SolarCity included the U.S. Department of Defense, Walmart (for stores in California and Colorado), Walgreens (in Colorado), and Stanford University. In 2013, SolarCity operated in 14 states and held the top market share position among downstream solar energy companies in California, Arizona, Massachusetts and Maryland. It competed with electric utility companies in each state as well as with regional, national and local solar panel installers. SolarCity was also the largest U.S. downstream company in terms of total power generation, followed by Vivint Solar (owned by Blackstone Group, the private equity firm).

In an interview, Lyndon Rive explained how the company chose the states to enter:

We first look at the functional economics: What is our current cost of electricity? Then we look at how much sun does that market get and then we look at any state incentives. The most important [aspect] is the cost of electricity because that is our competition. We are competing against the local utility and so we have to price below their price. So when we look at the markets, that is what we look at and then we scale and we only move into the space, into the new market, if we can save the customer money. It helps a lot if the state is sunny. [Let's take] Arizona as an example. The cost of electricity is relatively cheap in Arizona. It is roughly \$0.12 or \$0.13 a kilowatt hour. But [the state gets] an incredible amount of sun. So the economics still works in Arizona. In California, it still has good sun, but less than Arizona, but the cost of electricity is around \$0.25 a kilowatt hour so we can price below that. Oregon is a state where the sun is not great. The sun is okay and the cost of electricity is fairly low. But Oregon has a strong state incentive and wants to see its residents adopt clean energy, so the economics still work in Oregon.²⁴

SolarCity had never reported a profit since its inception. Revenues for the first quarter of fiscal 2013 were \$29.988 million and the net loss was \$30.994 million. The company attributed this to its model of high upfront costs with gradual returns spread over many years. Rive pointed out the irony that as soon as SolarCity showed a profit, it would be a warning sign that recurring revenues had outpaced installations and that the company had stopped growing.²⁵

BUSINESS OPERATIONS²⁶

Marketing

SolarCity marketed and sold its products using a direct sales force, a call centre, cross-promotions through channel partners such as Home Depot and customer referrals (23 per cent of business in 2012). Of the 2,510 employees in December 2012, 661 worked in sales and marketing and 248 worked in customer care.

The company promoted its residential business by creating community solar programs that propagated the environmental and economic advantages of switching to solar energy. By fiscal 2012, the company had developed more than 50 community programs that resulted in around 1,500 projects. In addition, a direct sales force called on customers in specific markets that SolarCity analyzed as potential areas for sales based on climate, utility costs, and state and local incentives. A centrally operated call centre solicited business by promoting solar energy to customers. Interested customers were then taken through an analysis of their home energy costs (the analysis was done using online satellite technology) that compared their current costs with the savings from solar energy.

SolarCity worked with a variety of channel partners to obtain business. Apart from setting up tables at Home Depot (where SolarCity paid the company a commission for each customer signed up), the company created the SolarCity Network, a program that included realtors, architects, contractors and insurance companies that were paid a fee to refer business. In addition, the company formed partnerships with home builders such as Pulte Corporation and Toll Brothers. To increase the number of referrals from existing customers, SolarCity encouraged them to host solar energy parties (similar to Tupperware parties), where SolarCity consultants made informal presentations. SolarCity also used traditional print media as well as social media in its marketing.

In February 2013, The Honda Motor Company formed a partnership with SolarCity to promote solar energy to its customers. Together, the two companies raised \$65 million to cover the purchase and installation of panels both to Honda customers and to its dealers. Rive explained the genesis of the partnership with Honda and its importance to SolarCity:

This is the first time that Honda is actually promoting clean energy to its customers. In fact, it is the first time it is promoting any non-Honda product to its customers. Honda has an amazing mission to reduce its CO2 footprint — not just to reduce its own CO2 footprint, but to educate customers and help them reduce their CO2 footprint. Honda approached us and raised \$65 million to help finance its customers becoming customers of SolarCity. Honda has been a greater leader in the sustainability space. We need to see more large corporations take initiatives in sustainability.²⁷

SolarCity obtained financing from Google for residential solar installation, which enabled Google to get tax benefits for owning renewable energy assets.

In its marketing to both customers and investors, SolarCity promoted the idea that its vertically integrated approach (in the downstream part of the industry) — whereby the company financed, installed and maintained the system for the long term — made it easy for customers to switch to an environmentally favourable energy source. The company indicated that most installers did not engage in all these activities and that by doing business with an integrated provider there were savings in terms of both costs and time. SolarCity pointed out that obtaining local permits and approvals for solar installation took time and a cost of around \$2,000, both of which were handled by the company for its customers. In addition, the company monitored the system after installation and provided additional avenues to customers to save on the cost of energy, including complementary products and services such as energy efficiency audits.

Operations

As an installer, SolarCity sourced major components such as solar panels and inverters from a variety of manufacturers, both from the United States and abroad. Panel suppliers included BenQ Corporation

(Taiwan), Suniva Inc. (United States), Trina Solar Limited (China), and Yingli Green Energy Holding Company Limited (China). Given the cyclical nature in panel pricing, SolarCity chose not to enter into long-term price commitments with any of its suppliers, and benefitted when solar panel prices fell sharply after 2009. In retaliation for government subsidies for its solar panel manufacturers, in March 2012, the U.S. government imposed tariffs on Chinese panels sold in the United States. In June 2013, the European Union announced major tariffs on Chinese solar panels arguing that the panels should be priced 88 per cent above their current price. SolarCity identified component price increase as one of the risk factors impacting profitability.

About half of SolarCity's total workforce was in installation. For the residential market in 14 states, the company established 29 operations centres and six storage and distribution facilities. A project management team supervised engineering (to optimize the placement of solar panels in each building), permits, installation and post-installation monitoring. A fleet of 700 trucks allowed the company to complete more than 1,000 residential installations per month.

Commercial projects involved a long sales cycle and considerable lead time between order signing and completion of the installation. For example, Walmart, the U.S.-based global retailer, contracted with SolarCity to install solar energy in 180 stores in selected states. Between July 2010 and December 2011, the company completed the design and installation in 57 sites. Government contracts were through a competitive bidding process. In 2013, the company indicated that it would de-emphasize the non-residential market in the future because of longer timelines, significant volatility, profit erosion due to competitive bids and lower electricity rates that affected solar energy's value proposition.

Financing Solar Equipment

For both residential and non-residential customers, the PPA was a key value proposition because it eliminated the huge upfront costs to switch from conventional energy to solar energy. As the owner of the equipment, SolarCity benefitted from the 30 per cent tax credit that was to run until 2016, after which it was to be reduced to 10 per cent. However, this required SolarCity to continually raise money to invest in solar energy equipment. While it worked with partners such as Honda and Google to raise money, a key activity was in creating a number of variable interest entities (VIEs), which were investment funds to purchase solar assets.²⁸ A VIE provided capital to SolarCity to buy equipment and in return, the investing company was able to use the 30 per cent tax credit to reduce its income taxes. Rive spoke about VIEs to an interviewer:

The capital that we need is what we call tax equity. We need to find an investor who has a tax appetite to invest in solar systems. The cost of capital has typically been between 8-12 per cent. We sell a tax credit to [investing companies] and for this they need to invest in solar assets. The idea here is to find a company that has the profits that can use the 30 per cent tax credit.²⁹

Excluding the May 2013 VIE created with the help of Goldman Sachs, SolarCity had raised \$1.7 billion through 24 VIEs. For SolarCity, the Goldman Sachs VIE, by being the largest single financing agreement for rooftop systems in the United States, was both a high profile venture as well as one that allowed the company to reach out to a hitherto ignored target market. Rive explained:

We hope this VIE sends a signal that solar is a stable and reliable business to invest in. These are not luxury yachts we are talking about, it is your energy and the default rates are lower than

mortgages. When we started [the PPAs] you needed a FICO³⁰ score of 720 or higher to qualify. Now it is more like 680 and I suspect in the near term [it will be] 650.³¹

Finances

At the end of 2012, 66.86 per cent of the company's stock was owned by insiders, while institutions owned 17.90 per cent. The company raised a net amount of \$92.4 million through its December 13, 2012 IPO. No company executive was on the seven-member board of directors, which was chaired by Elon Musk. SolarCity's stock price closed at \$11.79 on the day of its IPO; it had increased by more than 250 per cent by the end of July 2013 (see Exhibit 2).

THE MANAGERIAL CHALLENGE

On August 7, 2013, SolarCity released its second-quarter fiscal 2013 financial results (see Exhibit 3). While revenues had increased, indicating the company's growth trajectory, SolarCity continued to be unprofitable. For Lyndon Rive and the management team at SolarCity, quickly improving the company's financial performance was made more challenging by the electric utility industry's call for action at its June 2013 trade meeting. As the electric utility industry vowed to increase its lobbying efforts against both tax credits and net metering, one of SolarCity's competitors captured the challenge by observing that: "The next six to 12 months are the watershed moment for distributed energy in this country."³²

EXHIBIT 1: SOLAR INDUSTRY VALUE CHAIN

	UPSTREAM	MIDSTREAM	DOWNSTREAM
PRODUCTS/ SERVICES	- Polysilicon - Ingots - Wafers	- PV Cells - PV Modules - PV Systems	- System installation - Maintenance
Industry Structure	Oligopoly	Fragmented but consolidating due to excess capacity, downward price movement, exit of firms (such as Solyndra); affected by EU and U.S. trade tariffs	Highly fragmented; Only two publicly owned, "pure" play companies competing in the U.S. market (Real Goods Solar and SolarCity); mostly regional and local players; both Real Goods Solar and SolarCity operate as highly vertically integrated players (permits, financing, installation, monitoring), others are de-integrated
Entry barriers	High - Steep technology learning curve - Capital (high fixed costs) - Product differentiation	Moderate-low Capital	Low — typically labour-intensive (installation); low level of differentiation at the installation level
Key players	Polysilicon - GCL-Poly — China - OCI Company Ltd. — South Korea - Hemlock Semiconductor Group — USA Global wafer capacity controlled by China and South Korea	Top global PV module players - Suntech — China (filed for bankruptcy in 2013) - First Solar (USA) - Yingli Solar (China) - Trina Solar (China) - Sungen Solar (China)	Top U.S. players - SolarCity - Vivint Solar (owned by Blackstone Group, a private equity firm) - Real Goods Solar

Source: Compiled by case writer from: Renewable Energy Policy Report 2012, www.ren21.net; Green Rhino Energy, "The Solar Value Chain," www.greenrhinoenergy.com/solar/industry/ind_valuechain.php, accessed June 13, 2013; Morgan J Hallmon, et. al, "First Solar Inc. in 2010," Stanford University case, SM-190.

EXHIBIT 2: SOLARCITY CORPORATION SUMMARY FINANCIAL STATEMENTS

Income Statement
(in millions for year ended December 31)

	2012	2011	2010
Revenue:			
Operating leases	47,616	23,145	9,684
Solar energy system sales	81,046	36,406	22,744
Total Revenue	128,662	59,551	32,428
Cost of revenue:			
Operating leases	13,346	5,718	3,191
Solar energy systems	64,429	41,418	26,953
Total cost of revenue	77,775	47,136	30,144
Operating expenses:			
Sales and marketing	69,392	42,004	22,404
General and administrative	50,355	31,664	19,227
Loss from operations	(68,860)	(61,253)	(39,347)
Interest expense, net	20,142	9,272	4,901
Other expenses, net	2,519	3,097	2,761
Income tax provision	(54)	(92)	(65)
Net loss	(91,575)	(73,714)	(47,074)

SolarCity Corporation Summarized Statement of Cash Flows
(in millions for year ended December 31)

	2012	2011	2010
Net cash provided by (used in) operating activities	60,333	18,082	(3,818)
Net cash used in investing activities	(440,059)	(304,252)	(162,862)
Net cash provided by financing activities	498,335	278,371	187,038

SolarCity Corporation Summarized Balance Sheet Items
(in millions as of December 31)

	2012	2011
Current assets	315,417	241,522
Solar energy systems, leased and to be leased, net	1,002,184	535,609
Total assets	1,361,842	813,173
Current liabilities	213,617	246,886
Deferred revenue, net of current portion	204,396	101,359
Long-term debt	83,533	14,581
Deferred U.S. Treasury grants income, net of current portion	286,884	132,004
Total equity	314,927	84,984

Source: SolarCity Corporation, 2012 10 K, 3/27/13.

**EXHIBIT 3: SOLARCITY CORPORATION FIRST- AND SECOND-QUARTER FISCAL
2013 INCOME STATEMENTS (IN MILLIONS)**

	1 st Quarter 2013	2 nd Quarter 2013
Revenue:		
Operating leases	15,089	20,608
Solar energy system sales	14,899	17,341
Total Revenue	29,988	37,949
Cost of revenue:		
Operating leases	5,503	7,223
Solar energy systems	11,789	15,247
Total cost of revenue	17,292	22,470
Operating expenses:		
Sales and marketing	17,879	21,344
General and administrative	16,618	21,176
Loss from operations	(21,801)	(27,041)
Interest expenses, net	6,319	5,421
Other expenses, net	140	162
Income tax provision	105	(25)
Net Loss	(28,155)	(32,649)

Source: SolarCity Corporation, 2013 10 Q, 5/15/13 and 8/9/13.

ENDNOTES

¹ This case has been written on the basis of published sources only. Consequently, the interpretation and perspectives presented here are not necessarily those of SolarCity Corporation or any of its employees.

² Chris Martin, Mark Chediak, and Ken Wells, "Why the Electricity Grid's Days Are Numbered?" *Bloomberg BusinessWeek*, August 26-September 1, 2013, p. 60.

³ All figures are in US\$ unless otherwise indicated.

⁴ Christopher Martin, "Goldman Sachs to Finance \$500 Million for SolarCity Roofs," *Bloomberg*, www.bloomberg.com/news/2013-05-16/goldman-sachs-to-finance-500-million-in-solarcity-roofs.html, accessed July 28, 2013.

⁵ SolarCity Press Release, May 15, 2013.

⁶ U.S. Partnership for Renewable Energy Finance, <http://reffwallstreet.com/us-pref/wp-content/uploads/2011/06/RE-Tax-Equity-v2.1.pdf>, accessed July 28, 2013.

⁷ This section was based on the following sources: "Renewable and Alternative Fuels," *U.S. Energy Information Administration*, www.eia.gov/renewable/, accessed July 27, 2013; Diane Cardwell, "On Rooftops, a Rival for Utilities," *The New York Times*, July 27, 2013, pp. B1, B5; "Solar Energy Facts: 2012 Year-in-Review," *Solar Energy Industry Association*, www.seia.org, accessed July 29, 2013; and Standard & Poor's Industry Surveys: Electric Utilities, August

⁸ Jeff Himmelman, "The Secret to Solar Power," *The New York Times*, August 9, 2012, www.nytimes.com/2012/08/12/magazine/the-secret-to-solar-power.html?pagewanted=all&r=0, accessed July 30, 2013.

⁹ "Pricing Sunshine," *The Economist*, December 28, 2012, www.economist.com/blogs/graphicdetail/2012/12/daily-chart-19, accessed July 30, 2013.

¹⁰ This section is based on the following sources: "The Solar Value Chain: Value Chain Segments & Activities," Green Rhino Energy, www.greenrhinoenergy.com/solar/industry/ind_valuechain.php, accessed June 4, 2013; Josh Lutton, "The Economics of Residential Solar Installation," Woodlawn Associates, www.woodlawnassociates.com/economics-solar-installation/, accessed June 10, 2013.

¹¹ "Sunset for Suntech," *The Economist*, www.economist.com/news/business/21574534-troubling-bankruptcy-troubled-business-sunset-suntech, accessed July 30, 2013.

¹² Jeff Himmelman, *op. cit.*

¹³ Michael Behar, "Selling the Sun," www.onearth.org/article/selling-the-sun, accessed July 31, 2013.

¹⁴ "Solar Energy Facts: 2012 Year-in-Review," *op. cit.*

¹⁵ Standard & Poor's Industry Surveys: Electric Utilities, *op. cit.*

¹⁶ "Solar Energy Facts: 2012 Year-in-Review," *op. cit.*

¹⁷ Diane Cardwell, *op. cit.*

¹⁸ *Ibid.*

¹⁹ *Ibid.*

²⁰ *Ibid.*

²¹ This section is based on the following sources: Lyndon Rive, "Turning Toward the Sun," *The New York Times*, www.nytimes.com/2013/04/21/jobs/solarcitys-chief-on-a-turn-toward-the-sun.html; Adam Lashinsky, "SolarCity CEO Talks the Future of Solar Power," <http://tech.fortune.cnn.com/2013/03/04/solarcity-ceo-talks-the-future-of-solar-power/>; Adam Lashinsky, "SolarCity is Making Solar Power Pay," <http://money.cnn.com/2013/02/28/technology/solarcity-lyndon-rive.pr.fortune/index.html>; and www.solarcity.com/media-center/company-profile.aspx, all accessed July 15, 2013.

²² www.solarcity.com/media-center/company-profile.aspx, *op. cit.*

²³ Adam Lashinsky, "SolarCity CEO Talks the Future of Solar Power," *op. cit.*

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ This section is based on SolarCity Corporation, 2012 10-K, <http://files.shareholder.com/downloads/AMDA-14LQRE/2496444851x0xS1193125-13-129655/1408356/filing.pdf>, accessed July 19, 2013.

²⁷ Adam Lashinsky, *op. cit.*

²⁸ A variable interest entity was a legal business structure that allowed an investor or a group of investors to hold a controlling but non-majority interest in an entity. The U.S. Financial Accounting Standards Board mandated strict rules to be followed in creating a VIE. "What is Variable Interest Entity?" www.wisegEEK.com/what-is-variable-interest-entity.htm, accessed June 10, 2013.

²⁹ Adam Lashinsky, "SolarCity CEO Talks the Future of Solar Power," *op. cit.*

³⁰ The FICO score was created by the Fair Isaac Corporation to indicate a person's or an entity's credit worthiness. FICO scores ranged from 300 to 850, with a median score of 723. The difference between a score of 720 and one of 620 was typically around two percentage points in interest rates. While what a good FICO score was depended on the user, generally a score of 720 or higher was considered a good score, while a score of 620 to 720 was considered an average score. More than 90 per cent of U.S. banks used the FICO score to make lending decisions. Gerri Detweiler, "What Does FICO Stand For?" www.credit.com/credit-scores/what-does-fico-stand-for-and-what-is-a-fico-credit-score/, accessed June 10, 2013.

³¹ Christopher Martin, "Goldman Sachs to Finance \$500 Million for SolarCity Roofs," www.bloomberg.com/news/2013-05-16/goldman-sachs-to-finance-500-million-in-solarcity-roofs.html, accessed July 20, 2013.

³² Diane Cardwell, *op. cit.*