Better Place: Charging into the Future?

In the fall of 2009 Shai Agassi was hoping that his success would continue. As the CEO and founder of Better Place, Agassi had “bet the family farm” on widespread adoption of electric vehicle technology. Having left a lucrative and promising career at SAP, Agassi had poured all of his efforts into creating a market-based transportation infrastructure that supported electric vehicles.

Founded in 2007, Better Place was Agassi’s response to the question of how he could make the world a better place by 2020. As he explained:

I started thinking about the next version...of SAP, and none of them made me feel like I would make the world a better place by 2020. I started thinking of the question, “How would you run a country without oil?” as the answer for “How are you going to make the world a better place?” I never thought it would be something I would do personally, but I built it as a business idea or a government agency, which I was pitching around to a lot of governments, sort of NASA for the oil on the planet. Until the first day of January 2007, when [Israeli] President Peres told me: “You’ve got to do this. It’s more important to your world, to your country, to your kids than another version of SAP.”

Hailed as an environmental visionary by some and an unrealistic dreamer by others, Agassi was determined to achieve his goal of a world that did not rely on oil. Since its establishment in 2007, Better Place had attracted venture capital funding and garnered a great deal of publicity. With partnerships and developments in nations across the globe, Better Place seemed poised to succeed in the burgeoning electric vehicle market. Yet Better Place’s proposition relied on a revolutionary shift in the automobile industry. Would the company witness the widespread adoption of electric vehicles in the near future, or would competing technologies, environmental regulation, financial considerations, or other players in the electric vehicle market thwart Shai Agassi’s plans?

Market Evolution

Electric vehicles existed as a viable technology at the beginning of the 20th century, but at the end of the century were only a tiny portion of the entire automotive industry. Due to a convergence of factors, the first decade of the 21st century saw a rapid increase in interest, regulation, and development of the electric vehicle market.
The Death of the Electric Vehicle (1900-1990)

In 1900, electric vehicles outsold all other forms of cars in the United States. They were cleaner and easier to operate than their competitors. Yet in the next two decades, gasoline-powered vehicles surpassed the electric car. As road systems developed, electric cars could not provide the range that gasoline-powered cars could—a problem that continues to plague electric cars to this day. Furthermore, in the 1910s electric cars became increasingly expensive compared to their competitors. Henry Ford’s creation of mass-produced vehicles, powered by internal combustion engines, resulted in prices that were impossible for less efficiently made electric cars to match. Given the increasing availability of crude oil to power Ford’s less expensive vehicles, electric cars all but disappeared from mass distribution by the 1930s. Throughout the middle of the century electric vehicles were virtually nonexistent.

During the 1970s and 1980s, electric vehicles enjoyed a small increase in attention due to energy crises and fears about the availability of oil. However, these vehicles could never match traditional cars in terms of speed or convenience. For example, the United States Postal Service purchased electric delivery vehicles from the American Motor Company beginning in 1975. Unfortunately, they had a top speed of 50 mph and a range of 40 miles, and were eliminated from the delivery fleet in 1983. The failure of this experiment mirrored other limited investment during this time period, as electric vehicles could not compete in the market.

Renewed Interest (1990-2000)

In the 1990s development of electric vehicles increased in large part because of increasing environmental regulation. In the United States, the 1990 Clean Air Act Amendments, along with the 1992 Energy Policy Act and regulations issued by the California Air Resources Board, stimulated interest in electric cars once again. These new standards were estimated to have significant costs; one estimate of the effects of the Clean Air Act on US car manufacturers totaled $8-10 billion. California’s creation of the Zero Emissions Vehicle (ZEV) program set aggressive goals and targets for vehicles that were emission-free. Unfortunately, the targets were frequently changed throughout the 1990s, as electric cars and battery technology could not meet required cost measures and performance standards.

Investment in alternate sources of vehicular power continued across the globe, despite setbacks with technological developments and mass production in sustainable transportation. As in the United States, many new investments resulted from the recognition that the regulatory landscape was changing. European car manufacturers, like their counterparts in the United States, were subject to new environmental guidelines set by the Working Party on the Construction of Motor Vehicles (WP29) of the Economic Commission for Europe. Designed to reduce pollution and control carbon emissions, the new guidelines encouraged investment in sustainable transportation. In 1997, Daimler-Benz committed US$350 million to a program with Canadian firm Ballard Fuels to create hydrogen fuel-cell engines, with forecasted annual production of 100,000 vehicles by 2005.

Progress of mass-produced vehicles utilizing alternate sources of power remained small until 1997, when Toyota introduced the first mass-produced hybrid vehicle to the general public. Two years later Toyota launched the Prius in the United States to mixed reviews. Although US consumers were not initially thrilled with the Prius’ performance, it was clear that a new movement in the automotive industry had begun.

Resurgence of Activity (2000-2008)

During the first decade of the 21st century, auto manufacturers increasingly focused research and development efforts on hybrid, electric, ethanol, and hydrogen cells technologies. The success of the Prius certainly contributed to the increase in research and development, as did rising concerns about carbon
emissions and climate change. The fear of “global warming” emerged as an important topic for governments and citizens. A research survey from Yale University revealed a significant shift in public attitudes toward climate change between 2004 and 2007, with more than 83% of Americans stating that global warming was a serious problem. European perceptions about the severity of climate change also increased, with climate change emerging as a significantly higher worry in 2007 than in earlier studies.

Increased investment in hybrid and electric car technologies reflected a more general trend toward clean technology. In 2001, investments in clean technology were estimated at $506 million. By 2008 clean technology venture investments in North America, Europe, China, and India totaled $8.4 billion. Governments, adopting policies to reduce oil dependency, served as key investors in the nascent industry. In the United States, the Bush administration set a goal of reducing gasoline consumption within 10 years by 20% through investments in alternative energy. Despite criticism from many environmental groups, from 2002-2008 the US government invested $29 billion in renewable energy sources; half of this investment, however, was attributable to corn-based ethanol.

Rising oil prices and the desire for energy security served as key motivators for government investment, and a source of concern for consumers. Nearly 96% of US survey respondents indicated that dependence on oil was a “serious problem,” in large part due to the volatility and general increase in price. From 2000-2008 the price of crude oil increased over 500% (Exhibit 1). During this time period, carbon emissions also grew significantly; from 2000-2005 CO2 emissions rose 12.7% (Exhibit 2). Emissions from automobiles comprised approximately 25% of these numbers.

A New Hope (2008-2009)

In 2008, the future of hybrid and electric vehicles appeared promising, yet not convincing. A severe global recession reduced demand for hybrid vehicles, as consumers were less willing to pay the price premium (from $2,000 to $7,000 per car) for hybrid or electric vehicles. In the United States, for example, sales for hybrid cars dropped to 16,536 units in November 2008, down 50.3% from the year before. Volatile oil prices also adversely affected the nascent industry. In the summer of 2008, crude oil prices were at an all-time high. A poll of American consumers in May of 2008 indicated that over 75% believed that the rise in gas prices was permanent. Yet a sharp drop in the price of gasoline in the second half of 2008 hurt the viability of the market, as hybrid and electric vehicles promised to reduce dependency on a commodity that was no longer outrageously expensive.

Nevertheless, market research demonstrated that consumer interest in hybrid and electric vehicles was growing. In 2009 a representative survey of US consumers found that 48% stated they would be very interested in a plug-in hybrid electric vehicle with a 40-mile range. Another study indicated that three-quarters of respondents would consider paying a premium for a vehicle that achieved better fuel economy. Furthermore, the survey also revealed that consumers were willing to pay up to $2,000 more for a car that provided significant benefits to the environment.

With unstable, though increasing, demand from consumers, governmental policies and incentives continued to provide the bulk of increased activity in the hybrid and electric car markets. In April of 2009 the British government announced that it would provide up to $7,500 in incentives for consumers to purchase electric cars to help reduce carbon emissions. The Chinese government offered incentives up to $8,800 per vehicle for taxi fleets and local government agencies to purchase hybrids or all-electric vehicles, and was beginning to invest in electric car charging stations. US President Barack Obama promised $2.4 billion for electric car and hybrid technology projects in August of 2009. At the same time, Germany’s government stated that it would spend approximately 500 million euros in the next three
years to put 1 million electric cars on the road by 2020. Continued fluctuations in oil prices influenced government regulation, as did an increasing recognition that climate change and emissions reductions were becoming important topics politically. The 2009 Climate Change Conference in Copenhagen was expected to produce a framework that would prescribe limits for greenhouse gas emissions.

Given increased regulation, consumer interest, and investment in hybrid and electric car technology, experts forecasted that the market would grow rapidly in the next five years. Analysts from IHS Global Insight predicted that global production of purely electric cars would expand rapidly in the coming years, from nearly 9,500 in 2009 to more than 58,000 in 2011. The global hybrid electric car market, driven by regulatory initiatives, was expected to witness a compound annual growth rate of 31.3% and reach $67.7 billion by 2015.

In September of 2009, the shift in the automotive industry was apparent at the Frankfurt Auto Show. The focus was on advancements in hybrids and electric cars, with nearly 30 new models on display. Nearly every major auto manufacturer introduced a model, including BMW, Nissan, General Motors, and Daimler. With incredible amounts of press, investment, and excitement, the electric vehicle market only lacked mass production and commercialization.

**The Future of Sustainable Transportation (2010-????)**

A multitude of factors, including an explosion in carbon emissions, increasing regulation, changing societal attitudes toward environmental protection, rising consumer demand for alternative forms of transportation, and fluctuating commodity prices, all coalesced in the first decade of the 21st century to create a dramatic market shift and exciting new opportunities in the EV industry. The activity in the electric vehicle market created opportunities for entrepreneurs and manufacturers interested in sustainable transportation.

At the end of 2009, however, the future of the hybrid and electric vehicle industry was by no means certain. Government regulation and incentives programs were fostering interest, but given the fickle nature of oil prices, commitment in this arena was hardly guaranteed. Mass adoption of hybrid or electric vehicles was still not a reality, so while there was great excitement and hype the question remained: Was the industry poised to explode in the near future?

**Alternative Vehicle Technologies**

By the fall of 2009, the sustainable transportation industry had by no means produced a winning technology. While hybrids were enjoying the greatest sales numbers, other viable technologies did exist.

**Fuel Cell Vehicles**

Fuel cell technology was considered to be a promising long-term solution for clean transportation at the end of 2009. The technology involved the conversion of hydrogen and oxygen into water, producing electricity that could be used to power a vehicle. The process was essentially pollutant free, as water was the only byproduct of a fuel cell-powered engine. At the time, however, limitations facing fuel cell vehicles included: 1) how to supply and store hydrogen, which is costly to source and quite volatile; 2) unproven reliability and durability; 3) power output; 4) cost efficiency; and 5) ability for manufacturers to mass-produce.

**Electric-powered Vehicles (EVs)**

Electric vehicles were propelled by electric motors that ran on batteries, which helped to reduce tailpipe emissions. EVs could receive electrical power from a wide range of sources, including fossil fuels, nuclear, and renewables, such as wind and solar. Power source selection greatly influenced the impact of EVs on
the environment, as each source emitted varying amounts of greenhouse gases. Although coal-fired power plants were getting cleaner every decade,24 significant emission reductions from EVs could be achieved by using electricity generated from renewable sources.

As of 2009, advantages of EVs included 1) their ability to recover braking energy as electricity and 2) a more efficient drive train (versus the internal combustion engine). Limitations of EVs included: 1) long charge times; 2) cold weather issues; 3) limited driving ranges; 4) improper electrical infrastructure to support an EV network; and 5) expensive permanent batteries.25

**Hybrid-Electric Vehicles (HEVs)**

HEVs combined an electric motor with a gas- or diesel-powered engine. In 2009 HEVs had performance capabilities similar to internal combustion engine (ICE) vehicles; however, HEVs were shown to be more fuel-efficient and produce lower emissions than the ICE vehicles. A 2007 study estimated that HEVs cut fuel and emissions by 47% compared with gasoline-powered cars.26 Furthermore, as of 2009 HEVs did not have issues with extreme hot or cold weather, require infrastructure changes, or need to be recharged to operate the vehicle.27

**Better Place: A Revolutionary Idea**

In 2005 at the World Economic Forum, Shai Agassi was asked the fateful question, “How do you plan to make the world a better place by 2020?” This simple query altered Agassi’s future, ending a very promising career trajectory at SAP.

Before SAP, Agassi was an experienced software entrepreneur. He founded TopTier Software in Israel in 1992, serving the company in various roles including chairman, chief technology officer, and eventually CEO. He was directly involved in all key phases of the company’s development, including its strategic plan, technical direction and financing, management of two acquisitions, and negotiation of OEM agreements with companies such as SAP, Baan, and Microsoft. TopTier was a leading enterprise portal vendor when SAP acquired the company in April 2001.28

At the time of the World Economic Forum, Agassi was president of the Products and Technology Group at SAP AG and a member of the company’s executive leadership team. Agassi led global development of SAP’s product line and portfolio of industry-specific solutions; all in all, he was responsible for SAP’s overall technology strategy and execution. He was believed to be next in line to take over as SAP’s CEO, with Henning Kagermann expected to vacate the position in 2007.

Yet Agassi’s entrepreneurial spirit and passion for tackling large-scale challenges made it difficult for him to ignore the question of how he could contribute to the world. Agassi found himself pondering whether it would be possible to free cars from oil, reduce emissions, and transition to a new age of sustainable transportation. In April 2007, Agassi resigned from SAP to pursue this interest. In Agassi’s own words, “I had to quit and come and do this thing called A Better Place.”29

In October 2007, the company was publicly launched with $200 million in venture funding, an extraordinary amount for a start-up company.

**Formation of a Business Model**

Agassi, having eliminated ethanol and hydrogen technologies as viable alternatives to delivering the world from its dependence on oil, ultimately decided that the conversion of entire geographical areas
to electric cars, powered from renewable energy sources, was the best solution. To compete effectively in the marketplace, Agassi realized that Better Place needed to address the three challenges that had traditionally plagued the electric vehicle industry: high initial vehicle costs, inconvenience, and limited traveling distances. Agassi came to the realization that these challenges were intertwined and a holistic solution was needed. Thus, Better Place’s solution focused on two critical pieces: battery ownership and infrastructure development.

Better Place’s game-changing idea was to separate car ownership from battery ownership. Electric batteries for vehicles were expensive – costing in excess of $10,000 – and were the primary reason for the price premium of electric vehicles. By excluding the battery cost from the initial car purchase, the cost of an EV would be similar to the cost of an ICE vehicle. Under this model, Better Place would own the vehicle batteries and rent them to car owners, similar to a cell-phone contract. This decoupling of the battery ownership also helped solve a piece of the infrastructure puzzle.

Batteries limited the distance electric vehicles could travel and required frequent recharging. Consequently, recharging needed to be both convenient (at the place of parking) and available if people needed to travel long distances. Better Place’s infrastructure solution addressed both challenges through a network of charging stations and swapping stations.

Charging stations would be the electrical outlets where owners could recharge their vehicles while parked (Exhibits 3 and 4). Better Place intended to deploy charge spots at private homes, workplaces and public locations such as parking lots and streets. As the majority of trips were shorter than the range of a fully charged EV battery, most subscribers would likely use the charge stations as their primary method of recharging. A full charge would take three to seven hours and EV owners would likely be charged on a usage basis such as a fee per mile. The charging stations would be networked on a smart grid and software would allow Better Place to manage the charging and billing at an individual level.

Better Place envisioned that the battery swapping stations would be like gasoline stations for long-distance trips and allow drivers to switch a depleted battery for a fully-charged one (Exhibit 5). The swapping station would be completely automated and would not require the driver to step out of the vehicle. After removal, the depleted battery would be placed in a storage room and recharged for use in another vehicle. The whole process would be completed in less than two minutes, providing a refueling solution for long trips. This service would likely be priced on a per use basis. Better Place’s ownership of the battery was the critical element, as it allowed for the development of the switch station.

To complement the charging infrastructure, Better Place also developed an in-car software platform that would allow drivers to locate nearby charging spots, navigate with real-time traffic information, connect with customer service, and use other advanced services. From the customer’s perspective, an EV owner would subscribe to a monthly service contract with Better Place to access the charging spots and swapping stations, a process similar to mobile phone billing.

**Economics of the Business Model**

Better Place’s financial value to the consumer was based on a lower total cost of ownership. The electric vehicle would be priced comparable to an ICE vehicle, while the cost of electricity would be cheaper compared to the cost of gasoline. Better Place expected the price of electricity for its customers to be $0.08 per mile in 2010, $0.04 per mile in 2015, and $0.02 cents per mile in 2020 (Exhibit 6). Compared to an ICE vehicle capable of 30 miles per gallon, $0.08 per electric mile would equate to a $2.40 gallon of gasoline. However, the final costs of the services (charging and swapping) had not been disclosed.
For Better Place, the capital costs to customers would primarily lie in the infrastructure investments and batteries. Swapping stations were projected to cost approximately $500,000 each; cost estimates were not disclosed for individual charging stations. However, the deployment costs of 150,000 charging spots and 100 swapping stations in the first market were expected to reach $200 million. Batteries were expected to initially cost $12,000 to manufacture, with an expected life of 2,000 charges or eight years. Better Place would need to hold an inventory of batteries equal to the number of cars on the road plus a sufficient number of batteries for the swapping stations.

Better Place’s Integration Role

Better Place’s role as an integrator involved developing successful partnerships with automotive OEMs, battery manufacturers, electric utilities, and governments, as well as securing significant financing needed for its projects (Exhibit 7).

Auto Manufacturer Partnerships

Given that Better Place was focused on developing the charging and switching stations, it was essential to partner with an auto manufacturer. Better Place needed to ensure that car manufacturers would produce electric vehicles compatible with one of the critical elements of Better Place’s business model: swappable batteries. The company also needed to ensure that the vehicles could be made at a reasonable cost.

After approaching all of the major car companies, Better Place struck an agreement with Renault-Nissan, the third-largest auto manufacturer in the world, on January 21, 2008. Under the agreement, Better Place was responsible for building the infrastructure to supply power to the electric cars and Renault-Nissan would design cars compatible with the switch station. The partnership was the first major public milestone in bringing Better Place’s business plan closer to commercialization. However, the agreement did not preclude Renault-Nissan from working with other companies developing electric vehicle technology or from introducing an EV with a permanent battery.

Battery Manufacturer Partnerships

Better Place partnered with leading lithium-ion battery developers and manufacturers (e.g., A123 Systems and AESC) to produce batteries suitable for electric vehicles. Lithium-ion technology was the most promising technology for EVs and significant investment was being made to improve performance, lifespan, and cost. From a company perspective, Better Place had chosen to partner with battery manufacturers instead of vertically integrating in order to have access to the most advanced technology.

Electric Utility Partnerships

Better Place was securing partnerships with major electric utilities in specific markets, such as DONG Energy in Denmark and AGL Energy in Australia. The utilities accepted responsibility for supplying electricity from renewable sources to significantly reduce or eliminate emissions, as well as working with charging station manufacturers to help develop and roll out the charging infrastructure.

Commercialization Plans

With the $200 million in financing, a fully-developed business model, and a partnership with Renault-Nissan, Better Place’s next major step was to start entering markets for full-scale commercialization. The company announced its first market in January of 2008, and within 18 months Better Place had reached agreements and partnerships with governments in six countries on four continents: Asia, Europe, Australia,
and North America (Exhibits 8 and 9). Agassi believed that the company’s business model would be viable regardless of the market and aimed to prove that through the initial launches. By the fall of 2009, Better Place was in various stages of development in each country, with full-scale launches planned in every country by 2012.

**Israel**

Better Place announced its first mass market through a partnership with the Israeli government and Renault-Nissan. Given the country’s plan to migrate the transportation industry to renewable resources and the country’s geography, Israel was a logical first market for Better Place. The EV industry was supported by the government through tax incentives, and Better Place had secured the government’s cooperation.

As Better Place’s first market, Israel was the furthest along in the infrastructure build-out at the end of 2009. The company began installing charging spots in December 2008 and had installed 800 of them for field testing by the fall of 2009. Better Place expected to deploy 150,000 charging stations and 100 switch stations within two years at the cost of $200 million. With the infrastructure being built, Renault-Nissan had committed to produce 100,000 electric vehicles per year for Israel by 2016, with the first cars entering the market in 2011.

Israel, a country with a total area slightly smaller than New Jersey, provided a promising market for the introduction of electric vehicles. As of 2009 over 90% of Israeli drivers traveled less than 70 kilometers (about 43 miles) per day, and the major Israeli cities were less than 150 kilometers apart. Additionally, the average price of gasoline was approximately $1.37 per liter in 2008 (Exhibit 10) and the government had reduced the purchase tax on an electric vehicle to 10% compared to that of 80% on a traditional car.

**Denmark**

Only two months after announcing the Israel partnership, in March of 2008, Better Place entered into an agreement with Danish Oil & Natural Gas (DONG Energy), a majority government-owned utility. As in Israel, Denmark provided an opportune market, given the government’s progressive environmental policies.

Better Place had committed to installing 50-60 swap stations in Copenhagen that would be showcased during the UN Climate Change Conference in December 2009. This would allow the company to demonstrate its infrastructure on a global level. In total, Better Place expected to install nearly 1,000 swapping stations throughout Denmark to achieve market coverage. The first commercially available electric cars from Renault-Nissan were expected to enter the market in 2011 with 100,000 EVs guaranteed to Danish consumers by 2016.

As in Israel, Denmark’s geography and government policy created an opportunity for electric vehicles. Denmark is slightly less than twice the size of Massachusetts, and in 2009 a quarter of the population lived in greater Copenhagen. The average price of gasoline in 2008 was $1.54 per liter, which was one of the highest prices in the world. Additionally, the Danish government supported the development of renewable resources and electric vehicles through progressive environmental policies. For example, the car registration tax ranged from 105% to 180% for ICE vehicles while electric vehicles were exempt from the tax. Denmark’s dwindling oil reserves also played a role in the country’s investment in alternative forms of transportation. In 2009 Denmark was a net exporter of oil, but reports from the Danish Energy Agency indicated that the country’s oil and gas reserves in the North Sea would run dry by 2020. Finally, Denmark’s investments in renewable energy were significant; government-owned DONG Energy generated 60% of its energy from renewable sources, with nearly 20% coming from wind.
Australia

Better Place announced its plans to enter Australia on October 22, 2008, through a partnership with AGL Energy, Australia’s largest electricity retailer, and Macquarie, a global investment company. AGL Energy would provide electricity from renewable power, while Macquarie would help raise the $1 billion needed for infrastructure investments. Better Place chose Canberra, Australia’s capital, as the starting point for a national roll-out and planned to begin construction of charging spots and swapping stations in 2011. EV rollout was planned in 2012.  

Better Place viewed Australia as an important market because it was fundamentally different from Denmark and Israel, with an area roughly the size of the continental United States and a population of 21 million people and 12 million automobiles. At the time, Shai Agassi remarked: “As the world’s sixth largest country, our network build-out in Australia will demonstrate that the Better Place model works in all countries, regardless of size.” Australia’s retail gasoline price was $0.74 per liter or approximately $2.85 per gallon in 2008, significantly lower than in Israel or Denmark.

Japan

In December 2008 Better Place was invited by the Japanese Ministry of Environment to build a battery exchange station as part of the country’s electric vehicle research. The government demonstration project was launched to better understand the feasibility of electric vehicles and included several Japanese auto manufacturers. Five months after the launch of the demonstration project, Better Place unveiled the world’s first battery switching station in Yokohama, Japan, as it successfully switched a battery from a Nissan electric SUV.

After the successful swapping station demonstration, Better Place continued to make progress in Japan by receiving an award from the government to conduct a pilot study with electric taxis. Through a partnership with Nihon Kotsu, Better Place was planning to construct a swapping station in 2010 to support four electric taxis in Tokyo. The electric taxis would be placed into normal service to test vehicle range, duration, and battery performance. The study represented a significant opportunity for Better Place, as more than 60,000 taxis operated in Tokyo alone and taxis accounted for 20% of all CO2 emitted from vehicles in Japan.

Japan was the first Asian country that Better Place had publicly entered. Despite the relatively small size of the country (approximately the area of California), Japan’s 2009 population was 127 million people with approximately 80 million vehicles. Japan’s retail gasoline prices were roughly 2.5 times higher than US prices, at $1.42 per liter versus $0.56 per liter. Also, Japan was the largest market in the world for gas-electric hybrids in 2008 and the government provided tax incentives to promote EVs.

United States

By the end of 2008, Better Place had also announced plans to develop its EV infrastructure in California and Hawaii. California had taken the lead in the United States on the deployment of EVs and Better Place saw an opportunity to develop the infrastructure in its home state. In November 2008, Better Place joined with the mayors of San Francisco, Oakland, and San Jose to begin development in the Bay Area and throughout California. The mayors outlined a nine-step policy initiative (Exhibit 11) with a stated goal of making the Bay Area the EV capital of the United States. With commercial availability expected in 2012, Better Place estimated that it would invest $1 billion in the Bay Area to install charging spots and swapping stations. Exhibits 12 and 13 show the geographic distribution of the swapping stations in California and Hawaii that Better Place expected to build.
On December 2, 2008, Shai Agassi and the governor of Hawaii publicized a plan to bring an electric car network to Hawaii. Better Place planned to begin building the infrastructure within a year and to start supporting the introduction of electric vehicles by mid-2010. Mass-market availability was targeted for 2012. By completion, Better Place planned to install 50,000-100,000 charging stations and 20 swapping stations at an estimated investment of $100 million. For support, Better Place had also partnered with the Hawaiian utility companies to collaborate on the infrastructure build-out.

Despite progress in limited markets, however, Better Place had been unable to gain traction in the continental United States. Many factors contributed to difficulties of adoption in the United States, including the high costs of establishing an infrastructure to support electric cars. It was estimated that a complete build-out of swapping and charging stations in the United States would cost $200 billion.

Canada

Not to be outdone by the US, the Ontario government and Better Place announced a partnership on January 15, 2009, to help bring an electric vehicle support infrastructure to the province. The plans included the development of an electric vehicle demonstration center in Toronto and a comprehensive study performed by the government to find the best ways to speed up EV adoption. Better Place also partnered with Bullfrog Power for renewable electricity and Macquarie for financial advising.

Ontario represented a different market from Israel, Denmark, and Hawaii given its geography, population density, and availability of domestic oil. Ontario accounted for about 10% of Canada's total land, an area roughly the size of California, but one-third (~12 million people) of Canada’s total population and over 7 million vehicles. Ontario was Canada’s leading oil-producing region and the cost of gasoline was approximately $0.76 per liter in November 2008.

Profitable Partnerships?

At the end of 2009, Better Place had proven itself to be a global player in a very short time. Through government and private partnerships, Better Place had established footholds in six countries across the world. Each country brought with it a unique set of opportunities and challenges, and it remained to be seen which partnerships would be fruitful. Yet despite seemingly lucrative partnerships and rapid expansion plans, Better Place was nonetheless investing billions of dollars in large infrastructure projects prior to a completely validated concept or a mass deployment of electric vehicles.

Market Players

With the hype of a developing hybrid and EV market, Better Place was not alone in the market. Auto manufacturers, utilities, and technology integrators/developers all had stakes in the growing market while governments wielded significant influence. Major car companies had already established vehicles in the hybrid auto market while plug-in hybrids were competing to become viable. Utilities were trying to determine their role in the EV market while other infrastructure developers, similar to Better Place, were partnering with industry players in hopes of grabbing a piece of the market. In the midst of the market evolution, Better Place’s partner Renault-Nissan was moving in several directions at once. Consequently, roles among the many players in this market were evolving and not clearly established. Each firm relied upon a number of partnerships that were vital to the potential success of the EV market (Exhibit 7).

Auto Manufacturers and the Gas-Electric Hybrid

Toyota introduced its first gas-electric hybrid car in Japan in 1997, and since that time had established itself as the market leader with the Prius, which had won numerous awards for ingenuity, design, and
“eco-friendliness.”70 Due to Toyota’s success, the gas-electric hybrid had entered the mainstream market; customers had become more comfortable with the technology and price tag. US sales for the gas-electric hybrid had grown rapidly since 2000, exceeding 300,000 annual sales in 2007. The Prius had accounted for at least 50% of HEV sales each year since its introduction (Exhibit 14).

In 2008, Honda offered three gas-electric hybrid models and planned to expand its offerings in 2010. Honda offered hybrid models of the Civic, Insight, and Accord in 2008. The Japanese automaker announced plans to offer two additional models, the Fit and CR-V, in 2010 in Japan.71 The other major car manufacturers also introduced HEV models into the market.

**Auto Manufacturers and the Plug-in Electric Vehicle**

By 2009 most major car manufacturers had been investing resources in the development of an electric vehicle. General Motors, Toyota, Chrysler, Mitsubishi, Ford, BMW, and Hyundai were among those that had invested in the plug-in electric vehicle market. Honda was the one exception, stating that the battery technology was not yet available. However, Honda CEO Takeo Fukui told reporters during a 2009 press conference that, “We understand the situation, in terms of government and incentives. We are thinking about plug-in hybrids, but we aren’t thinking about commercializing one right away.”72

On the opposite side of the spectrum, General Motors had invested heavily in the commercial development of the Chevrolet Volt, scheduled to be released in 2010. GM planned to produce 60,000 Chevrolet Volts for the 2011 model year, and continued to invest in infrastructure to support the plug-in hybrid product.73 GM also had invested $43 million to develop a new manufacturing plant that would be capable of producing 70,000 battery packs per year by 2010.74

Toyota had announced plans to develop a plug-in version of the popular Prius. The plug-in Prius was scheduled to be released before the Chevrolet Volt. Toyota’s goal was to sell 1 million hybrid vehicles per year in the 2010s and to offer hybrid versions for all of its models by 2020.75

In addition to the major auto manufacturers, new car companies had entered the EV market. Tesla was the first US manufacturer to provide a plug-in electric vehicle, launching the high-end, high-priced Tesla Roadster in 2008. However, only 1,000 vehicles had been produced by 2009. Elon Musk, the CEO of Tesla Motors, planned to ramp up production to 20,000 vehicles by 2012.76

Tesla had also announced a maintenance program for its vehicles that would send personnel on house visits, similar to Best Buy’s Geek Squad.77 Owners would be able to call for service and have a maintenance person show up at their house, which could alleviate some concerns about the reliability of the electric vehicle’s battery. Spokesperson Rachel Konrad suggested that since the electric vehicle has fewer moving parts than an internal combustion car does, maintenance costs would be lower.78

**Infrastructure Developers and Integrators**

The charging station infrastructure market was rapidly expanding, with new entrants such as Electromotive, Park and Power, EVOasis, 365 Energy, Ecotality, and Eaton. These companies had developed strategic partnerships with governments, utilities, and auto manufacturers. However, Better Place was welcoming the competition in the charging station market:

We are competing with the biggest monopoly on earth, oil. You’ve got to remember that, because we are an alternative product to a product that already exists and that has a 100% market share. It’s kind of funny to call us monopolistic, when we haven’t sold the first car. What we ask governments to do is to force everybody that comes into this
business, the electric recharge grid networks, to be bound by international standards, ISO1C standards, so we don't use a connector that is unique that will lock anybody out. And we will provide open access across networks, because we want to optimize for speed of adoption. So, I'd rather have a second competitor that comes in and installs more of the network with their own money but with the same connector.79

Infrastructure developers were also working on a different business model than Better Place’s. Many developers were focused on quick-charge technology, which allowed batteries to be charged up to 80% in less than 30 minutes. This technology, which Nissan was betting on with the Nissan LEAF since it included a permanent battery, would directly challenge Better Place’s battery swapping stations.

Utilities
Utilities, as the supplier of power and manager of the grid, were critical to the development of the charging infrastructure. In some cases, infrastructure developers partnered with utilities to install the charging stations (e.g. Better Place and the Hawaiian utilities). In other places, car manufacturers worked directly with utilities, such as in the San Diego Gas & Electric-Nissan partnership. It was unclear how utility companies would be involved in the future deployment of charging stations and how partnerships would be established.

However, it was clear that the successful development of the charging infrastructure hinged on whether utilities could distribute electrons to car batteries without overstressing the electric grid. Even though the existing power generation infrastructure was underutilized the majority of the time (mostly at night), utilities were concerned about the additional load created by EV recharging. If EV owners were allowed to recharge during peak electricity demand hours, the electric grid would become overstressed.81

Renault-Nissan’s Diversification
Renault-Nissan and Better Place had made significant progress in markets such as Israel and Denmark. At the end of 2009, the manufacturer was developing cars that would be compatible with Better Place’s infrastructure. However, in other markets, Renault-Nissan was moving in a different direction by establishing partnerships with utilities and other infrastructure developers, in addition to launching its own electric car with a permanent battery.

In March of 2009, Renault-Nissan partnered with San Diego Gas & Electric (SDG&E) to help develop an infrastructure for electric vehicles in the San Diego area. SDG&E was a publically regulated utility that had the incentive and the capital resources to invest in recharging infrastructures. A press release by SDG&E stated that “the [partnership] will work to further develop and fine-tune the charging infrastructure, which is the critical link in making the vehicles commercially viable”82 (Exhibit 15). Renault-Nissan had also partnered with EDF, a French utility, and Energie Ouest Suisse, a Swiss utility.83 From Nissan’s perspective, utility companies had the established presence in the electric industry, and these partnerships could crowd out smaller startup companies.

In April of 2009, Nissan partnered with ECOTality in the US, a battery charging company that promoted fast recharging times for an electric vehicle battery. Instead of swapping batteries, ECOTality suggested that the electric vehicle industry would move toward rapid recharge (Exhibit 16).84 In October 2009, Nissan officially debuted the Nissan LEAF, an EV capable of driving 100 miles before recharging the permanent battery pack.85
The Future of Better Place

By the fall of 2009, Better Place was generating praise and condemnation. Supporters lauded Shai Agassi for his vision and commitment to environmental sustainability, while detractors criticized his business model and predicted the company’s failure. To Agassi, transitioning to electric vehicles was a moral decision, not just an economic proposition. On a global scale, the 700 million cars on the roads emitted 2.8 billion tons of CO2, or 25% of total emissions – a number Agassi pointed to as proof of the urgency of the situation.86 It was clear that Agassi was a visionary who truly believed in the validity of Better Place’s goals. The crucial question was whether Better Place had the resources, partnerships, and model to ensure its success.

To remain in the market, Better Place needed to show the world that the company facilitated convenient, reliable, and affordable transportation. This required acceptance and faith from several key players. Investors needed proof that electric vehicles were viable technologically and commercially. Consumers, on the other hand, were not willing to purchase vehicles before the infrastructure was in place to support and service the EV market. Governments, as a provider of incentives for both investors and consumers, played a critical role in ensuring the growth of the EV market. Better Place’s success consequently hung on all parties buying into the future of the electric vehicle, as well as the company’s ability to forge effective alliances and partnerships.

Better Place was on the verge of mass deployments in several markets, but questions still loomed. Would EV adoption be quick enough to support the multibillion-dollar investments? What would happen with the Renault-Nissan partnership? Had Better Place entered into the right markets? Could switching stations coexist with rapid recharge technology? Had Better Place, by establishing itself as an integrator in the EV market, positioned itself correctly to succeed in the market? Ultimately, would Shai Agassi’s big bet pay off?
Exhibit 1

**Historical Crude Oil Prices (2008 dollars)**


---

Exhibit 2

**Sectors of Global CO2 Emissions Growth**

Exhibit 5

Better Place Battery Switching Station


Exhibit 6

Better Place’s Price of an eMile

Exhibit 7


Source: Adapted from Frost & Sullivan, “Strategic Analysis of Electric Vehicles Infrastructure in Europe and Revenue Generation Opportunities for Utilities” (July 2009).

Exhibit 8

Timeline of New Market Announcements

<table>
<thead>
<tr>
<th>Country</th>
<th>Partnerships</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel</td>
<td>Government of Israel</td>
<td>January, 2008</td>
</tr>
<tr>
<td>Denmark</td>
<td>DONG Energy (Danish Oil &amp; Natural Gas)</td>
<td>March, 2008</td>
</tr>
<tr>
<td>Australia</td>
<td>AGL Energy, Macquarie Capital Group</td>
<td>October, 2008</td>
</tr>
<tr>
<td>United States</td>
<td>No specific partnerships</td>
<td>November, 2008</td>
</tr>
<tr>
<td>United States</td>
<td>State of Hawaii</td>
<td>December, 2008</td>
</tr>
<tr>
<td>Canada (Ontario)</td>
<td>Government of Ontario</td>
<td>January, 2009</td>
</tr>
<tr>
<td>Japan</td>
<td>Nihon Kotsu (Japan’s largest taxi operator)</td>
<td>September, 2009</td>
</tr>
</tbody>
</table>

Source: Information retrieved from http://www.betterplace.com/
Exhibit 9
Geographic Distribution of Markets


Exhibit 10
2008 International Retail Gas Prices

Exhibit 11

San Francisco Bay Area 9-Step Policy Initiative

- Expedited permitting and installation of electric vehicle charging outlets at homes, business, parking lots, and other buildings throughout the Bay Area;
- Incentives for employers to install EV charging systems in their workplace and provide similar incentives to parking facilities and other locations where EV charging stations can be installed;
- Harmonize local regulations and standards across the region that govern EV infrastructure to achieve regulatory consistency for EV companies as well as expanded range for EV consumers;
- Establish common government programs that promote the purchase of EVs;
- Link EV programs and infrastructure to regional transit and air quality programs;
- Establish programs for aggressive pooled-purchase orders for EVs in municipal, state government and private sector fleets and future commitment of purchasing preference for EV vehicles;
- Expedited permitting and approval for facilities that provide extended-range driving capability for EVs in the region through battery exchange locations or fast-charging;
- Identify and secure suitable standard (110V) electric outlets for charging low voltage EVs in every government building in 2009; and
- Identify roll-out plan for placement of 220V EV charging equipment throughout each city including city parking lots and curbside parking.


Exhibit 12

Better Place Geographic Distribution of Infrastructure in California

Exhibit 13
Better Place Geographic Distribution of Infrastructure in Hawaii


Exhibit 14
US Sales for Gas Electric Hybrids

Exhibit 15
Excerpts from San Diego Gas & Electric-Nissan Press Release

SDG&E PARTNERS WITH NISSAN TO GET SAN DIEGO ‘PLUG-IN’ READY

New, Zero-Emission Electric Vehicles to Reach San Diego Next Year

SAN DIEGO, March 23, 2009 – San Diego County will become one of the nation’s first “plug-in” ready green regions and start the transformation into a clean transportation community with San Diego Gas & Electric’s landmark partnership announced today with Nissan Motor Co. and the Renault-Nissan Alliance.

As President Obama pushes energy independence by creating opportunities for renewable energy vehicles, San Diego Gas & Electric (SDG&E) and Nissan will accelerate the transition to all-electric vehicle fleets by studying ways to invest in the necessary charging infrastructure these cars utilize.

Local community leaders and fleet operators joined SDG&E today at the Port of San Diego for a test drive as Nissan unveiled a prototype that features its newest generation zero-emission vehicle technology at the first of several planned California stops. Nissan’s all-electric vehicle will be introduced to fleet operators in late 2010 and reach showroom floors by 2012.

Under the partnership, SDG&E will serve as the local San Diego coordinator to help assemble a critical mass of regional electric vehicle fleets that municipalities, universities, the military, the port, private fleets and others use daily. The public-private collaborative will work to further develop and fine-tune the charging infrastructure, which is the critical link in making the vehicles commercially viable.

ECOtality and Nissan Partner to Launch Electric Vehicles in Arizona’s Pima County

ECOtality to work with Nissan & Pima Association of Governments (PAG) to establish the Tucson region as an EV Micro-Climate

SCOTTSDALE, Ariz. – March 6, 2009 – ECOtality, Inc. (OTCBB: ETLY), a leader in clean electric transportation and storage technologies, today announced it has entered into a commitment with Nissan North America and Pima Association of Governments (PAG) to facilitate the establishment of electric vehicle (EV) charge infrastructure throughout Arizona’s Pima County. In conjunction with the anticipated 2010 launch of Nissan’s zero-emission electric vehicle, ECOtality will initiate its EV Micro-Climate program in the Tucson region to promote sensible policies, intelligent deployment of charge infrastructure, and strong public awareness to foster the successful consumer adoption of grid-connected electric vehicles.

“Given ECOtality’s strong experience with EV infrastructure and familiarity with the transportation and political environment in Arizona, ECOtality is uniquely positioned to assist Nissan and PAG in implementing the proper policies and physical infrastructure necessary for a seamless consumer transition to electric vehicles,” said Jonathan Read, president and CEO, ECOtality. “Working with relevant stakeholders, from policymakers to utilities, ECOtality will utilize our extensive EV installation history to ensure the implementation of charging infrastructure is done properly and efficiently, while minimizing the cost to public and private sector participants.”

ECOtality, PAG and Nissan have committed to work together to establish an EV Micro-Climate Working Group in Pima County that will unite strategic regional organizations to help streamline the roll-out of charge infrastructure and public launch of grid-connected vehicles. In conjunction with these efforts, Nissan has committed to make available a supply of electric vehicles to the region’s public and private fleets in 2010, the year Nissan’s electric vehicle will be ready for the commercial market.

Source: http://www.ecotality.com/newsletter/030609_etly_nissan_tucson.html
Endnotes

5 Ibid.
26 Ibid.
27 Ibid.
Better Place: Charging into the Future?


42 Ibid.


The William Davidson Institute's (WDI) Research Associates collaborate with faculty from Michigan's Ross School of Business to produce teaching materials for top business schools. WDI is a nonprofit, independent, research and educational institute that creates, aggregates, and disseminates intellectual capital on global business and policy issues.

www.wdi.umich.edu

GlobaLens™ is the online resource for business educators in need of material and teaching ideas on today's most relevant global issues, such as Social Impact, Social Enterprise, Base of the Pyramid, and Environmental Sustainability.

More than just a case repository, GlobaLens™ features in-depth background materials for instruction, a searchable library of syllabi for developing business courses, community, and publishing support, as well as case studies, exercises and other teaching materials.

www.globalens.com