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WIRED MAGAZINE: 16.09

Driven: Shai Agassi's Audacious Plan to Put Electric Cars on the Road

By Daniel Roth 08.18.08



Shai Agassi — on a mission to end oil.

Photo: Joe Pugliese

Shai Agassi looks up and down the massive rectangular table in the Ritz-Carlton ballroom and begins to worry. He knows he's out of his league here. For the last day and a half, he's been listening to an elite corps of Israeli and US

politicians, businesspeople, and intellectuals debate the state of the world. Agassi is just one of 60 sequestered in a Washington, DC, hotel for a conference run by the [Saban Center](#) for Middle East Policy. Among the participants: Bill Clinton, former Israeli prime minister Shimon Peres, Supreme Court justice Stephen Breyer, and two past directors of the CIA.

It's December 2006. Scheduled to speak in a few minutes, Agassi gets nudged by the Israeli minister of education: "Be optimistic," she tells him. "We've got to close with an upbeat tone." Agassi thanks her. Optimism won't be a problem.

At 38, Agassi is the youngest invitee. Just after the dotcom boom, SAP, the world's largest maker of enterprise software, paid \$400 million for a small-business software company he started with his father; now he's SAP's head of products and widely presumed to be the next CEO. But he's not here this morning to talk about business software. Instead, his topic will be the world's addiction to fossil fuels. It's a recent passion and the organizers invited him to counterbalance the man speaking now, Daniel Yergin, the famed energy consultant and oil industry analyst. Yergin gives them his latest thinking: Energy independence is unattainable. Oil consumption will continue to rise. Iran will get richer. It's not exactly what this audience wants to hear.

Now it's Agassi's turn. He starts off uncharacteristically nervous, stammering a bit. He's got something different, he says. A new approach. He believes it just might be possible to get the entire world off oil. For good. Point by point, gaining speed as he goes, he shares for the first time in public the ideas that will change his future—and possibly the world's.

Agassi has dark hair, light brown eyes, and a square jaw. He's a careful speaker, holding back until the right moment before delivering his thoughts. He's partial to dramatic pauses, especially if he's about to explain how the future is going to look—something he does all the time. People often think he's kidding, partly because he always has a slight, wry smile. But when the pause ends, what follows—no matter how far-fetched—is never a joke. At his first executive board meeting at SAP, a company that had grown dominant by moving slowly and conservatively, Agassi suggested nearly a dozen heretical ideas. He said SAP should give away its hardware and software for free—just charge for IT support. He said SAP should make its database business open source to undermine Oracle. The other board members laughed: The new kid was a cutup! But they stopped when SAP cofounder Hasso Plattner looked around the table and said, "He's the only guy making sense here."

Agassi's interest in energy is new. In 2005, he joined [Young Global Leaders](#), an invitation-only group for politicians and businesspeople under 40. The four-day induction seminar was held at the Swiss ski resort of [Zermatt](#). Between lectures, YGLs like Skype cofounder Niklas Zennström and NBA star Dikembe Mutombo pledged to find ways to "make the world a better place" by 2020. Agassi's assignment was the environment, and he quickly focused in on climate change.

Most left the event and just poked around in their own industries, looking for small tweaks and improvements. But Agassi wanted something bigger. Back home in Silicon Valley, his day job involved coaxing SAP into the Web 2.0 era. But after Zermatt, his nights were devoted to dinners with energy experts, books on energy policy, and sessions on Wikipedia, learning everything he could about the [carbon economy](#). Getting off oil was the key, he decided. But how? He started by looking at cutting energy usage in the home, then moved to a more tempting target: transportation. Was hydrogen the answer? What about embedding power in the street—like slot cars? Could more be done with biofuels? Agassi kept a running file on his home PC and began working on a series of white papers.



Agassi will sell his battery-powered cars cheap and make money off drivers' electricity purchases.

Photo: Joe Pugliese

The problem, he decided, was oil-consuming, CO₂-spewing cars. The solution was to get rid of them. Not just some, and not just by substituting hybrids or flex fuels. No half measures. The internal combustion engine had to be retired. The future was in electric cars.

This was hardly an original insight; **electric cars** had been the future for over 100 years. In the late 1800s and early 1900s, the Electric Vehicle Company was the largest automaker in the US, with dealers from Paris to Mexico City. But oil, in the end, supplanted volts on American highways because of one perennial problem: batteries. Car batteries, then and now, are heavy and expensive, don't last long, and take forever to recharge. In five minutes you can fill a car with enough gas to go 300 miles, but five minutes of charging at home gets you only about 8 miles in an electric car. Clever tricks, like adding "range extenders"—gas engines that kick in when a battery dies—end up making the cars too expensive.

Q&A With Israel's Shimon Peres

In early June, *Wired's* Daniel Roth talked with Israeli president Shimon Peres about Better Place, the greening of Israel, his obsession with Israel's burgeoning solar industry, and the problems that come with turning a vision into a reality. An edited excerpt:

Wired: Was the message of getting off oil something you were concerned about before?

Peres: I thought that the greatest problem of our time was oil. Oil on one hand is polluting the land, and on the other hand it's financing terror. They say jokingly that the Middle East is divided into these kind of countries: the oily countries and the holy countries. We are obviously a holy country. We don't have oil. We don't have water.

Wired: You brought Better Place and Renault together. Did you expect them to form this partnership?

Peres: I never worried about it. My great advantage is that I'm ignorant. My own mentor was David Ben-Gurion. He used to say all experts are experts for things that did happen. There are no experts for things that may happen.

Wired: Before Israel publicly announced its Better Place rollout, I was told that you and Prime Minister Ehud Olmert were going to announce that Israel was going to declare complete energy independence. But the announcement was much more modest. What happened?

Peres: It's not the end of the story. I am now pushing solar energy and introducing the new environmental approach to life. It's foolish: Why should we hang on oil when we can hang on the sun? The sun is much more permanent, more democratic, and there's plenty of it. I'm feeling that our technology will miniaturize the equipment of the solar energy and reduce the cost. So I'm very glad that we started. Israel is going to be a green country. That's our ambition. And our ambition is to do it as soon as possible.

Wired: So can Israel become a clean tech global power?

Peres: Israel, you know, is too small of a country to become a world market and too small a country to become a great world producer, but we have enough scientists per square kilometer to become a world laboratory. And smallness has its own advantages; when you are small you can be really daring, you can be a pilot plant. You cannot, for example, try a car like Shai Agassi's in Texas. It is too large and would be too costly and complicated. Here we can do it on a human scale and eventually extend it and expand it.

Wired: Do you see any "peace dividends" coming out of the clean tech push?

Peres: Oh yes. Ecology forces us to cooperate. Water is not disciplined, the air doesn't ask for visas to fly from one place to another place, and if seas are beginning to die, all partners have to save them. So today the economy is very much a matter of environment, and environment is an independent force that is not committed to borders or rules or conventions. And nature is impatient. You cannot say: I'm going to negotiate pollution for 10 or 20 years. Pollution won't wait for you. Pollution is not a political force; it's a force of nature.

Agassi dealt with the battery issue by simply swatting it away. Previous approaches relied on a traditional manufacturing formula: We make the cars, you buy them. Agassi reimagined the entire automotive ecosystem by proposing a new concept he called the Electric Recharge Grid Operator. It was an unorthodox mashup of the automotive and mobile phone industries. Instead of gas stations on every corner, the ERGO would blanket a country with a network of "smart" charge spots. Drivers could plug in anywhere, anytime, and would subscribe to a specific plan—unlimited miles, a maximum number of miles each month, or pay as you go—all for less than the equivalent cost for gas. They'd buy their car from the operator, who would offer steep discounts, perhaps even give the cars away. The profit would come from selling electricity—the minutes.

There would be plugs in homes, offices, shopping malls. And when customers couldn't wait to "fill up," they'd go to battery exchange stations where they would pull into car-wash-like sheds, and in a few minutes, a hydraulic lift would swap the depleted battery with a fresh one. Drivers wouldn't pay a penny extra: The ERGO would own the battery.

Agassi unveiled the outline of his vision for the crowd at the Saban event: a new kind of infrastructure, with ubiquitous charge stations, that was not only simple and logical but potentially profitable, too. As he talked, he read the body language of the audience—they were leaning forward, they were nodding—and he fed off it, layering on details. A country like [Israel](#), he told them, could get off oil by simply adopting his new business model. No technological breakthroughs were necessary. No new inventions. It was as if he'd discovered a trapdoor beneath both the [gasoline industry](#) and the [auto industry](#), a combined \$3 trillion market. It sounded easy and unavoidable. Even Daniel Yergin was amazed. Shai Agassi had stolen the show.

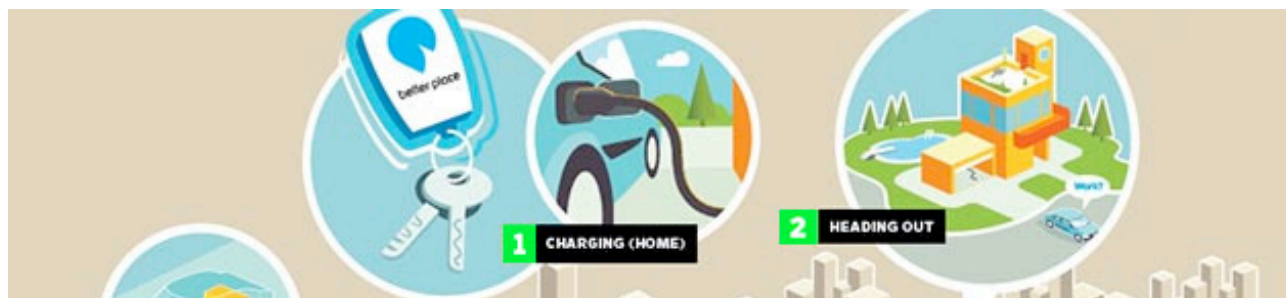
A week later, Agassi was in bed when his phone rang. He was asked to hold for [Shimon Peres](#). At first he thought it was a joke.

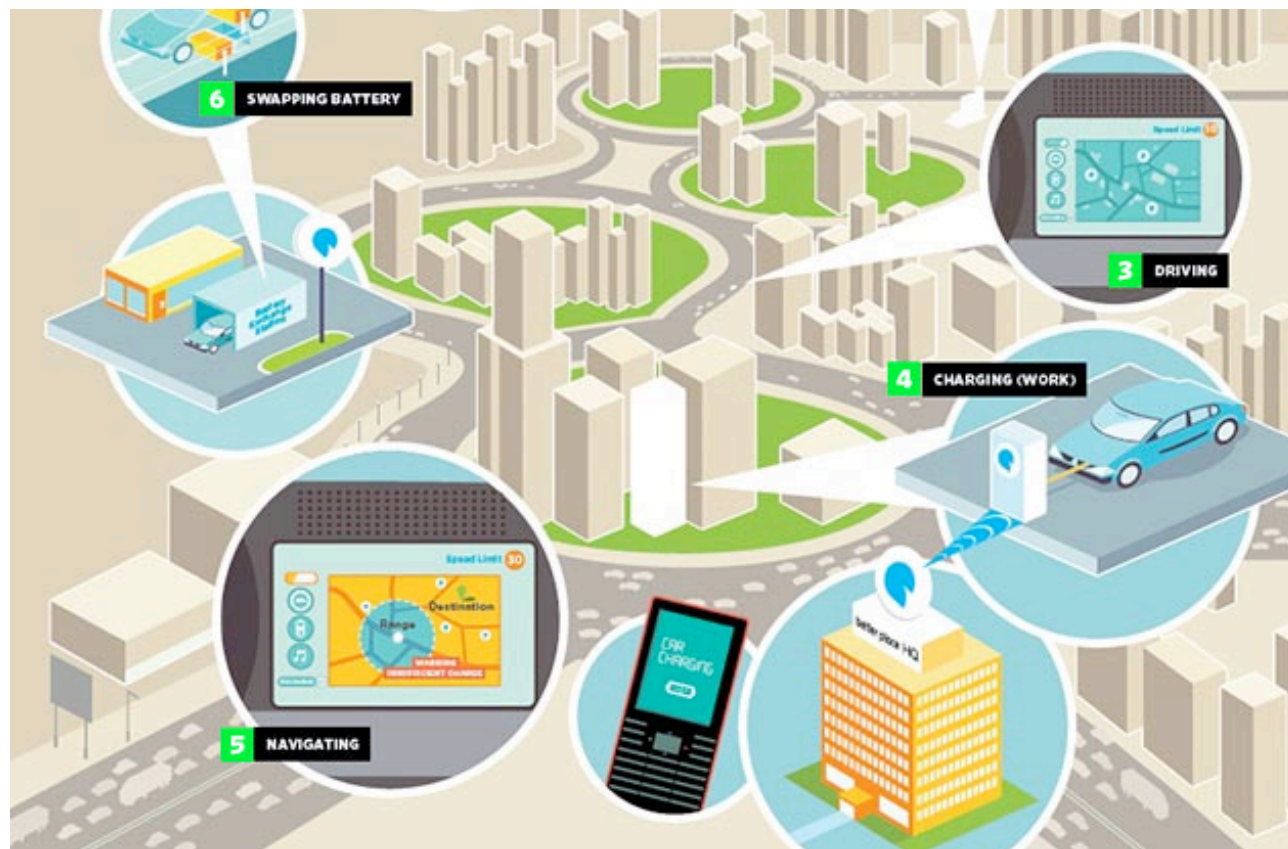
"Now what?" said the familiar rumbling voice on the other end of the line. Peres said he had been thinking about Agassi's speech since returning to Israel. He wanted to know what Agassi was going to do about it.

"What do you mean?" Agassi asked.

"You spoke so beautifully, you have to make this a reality. Otherwise, it will remain a speech."

After that conversation, Agassi couldn't get Peres' voice out of his head. A few months later, when his boss broke the news that he wouldn't be getting the top job at SAP anytime soon, Agassi shocked just about everyone in the tech world by quitting. And not long after that, in May 2007, he launched [Project Better Place](#), the world's first global electric-car grid operator (he later dropped "Project"). He had no cars, no test site, and no electrical engineering or auto experience. It wasn't even clear that consumers wanted change. They were paying \$3 a gallon, painful but bearable.





Electric Avenues

AutoOS, the Better Place operating system, would transform the transportation grid. Here's how.

1. A special key fob linked to the car indicates the status of the battery. If the logo is throbbing blue, the car is fully charged.
2. The driver unplugs and heads out. The software analyzes the first few minutes of driving and guesses the destination based on past history: "Work?" it asks. The driver speaks a response and the system determines how much energy is needed for the day.
3. During the commute, the location-aware system finds and displays three open parking spaces near the office that are equipped with Better Place charging spots.
4. An automatic arm extends to plug into the car. The spot then communicates with the control center, which anticipates the driver's energy needs so as to allocate power economically. It might, say, limit consumption during expensive peak hours. The driver gets a text: "80 percent charged."
5. An unexpected meeting comes up. The driver enters a new route, and AutoOS determines there is insufficient charge to get there. The driver orders a battery swap.
6. AutoOS finds the most convenient battery-exchange location and books a bay. The old battery gets lowered onto a hydraulic plate, and the car moves forward on a car-wash-style track. In five minutes, a fully charged battery is in place.

Nevertheless, many of Agassi's colleagues from SAP joined him. They realized that what Shai was building was still essentially a software company. He needed a network that allowed cars to tell the grid how much charge they were carrying and how much more they required. The system had to know where the car was so it could tell the driver where to go to "fill up." And it had to electronically negotiate with the local energy utility over when it could and couldn't take power and how much to pay. Few of his colleagues asked to read the business plan before signing on. They were joining the cause, not just the company. "Once you have a mission," Agassi told me over dinner one night last winter, "you can't go back to having a job."

By early summer 2008, Agassi had two countries ready to roll out the plan, a major automaker producing the cars, and

\$200 million in committed capital. He had launched the fifth-largest startup of all time in less than a year.

After a career spent thinking exclusively about business software, Agassi now thrills to the idea that he's changing the world. "I get to shift multiple markets," he says. "I get to shift economies. It's extremely liberating. I breathe differently."

Israelis like to call Peres, now their president, a visionary, and they mean it as both a compliment and a dig. He sees where things can go but not necessarily how to get there. When I spoke with him, he recognized that Agassi has to deal with the same challenge: "When you translate a dream into reality," he said, "it's never a full implementation. It is easier to dream than to do."

It is mid-May, and Agassi is sitting at the head of a conference table in the Kiryat Atidim high tech office park in northern Tel Aviv. Two dozen Better Place engineers and executives are grabbing platefuls of fresh watermelon and finding seats. About a third have flown in from the company's Palo Alto headquarters; the rest are based here. Agassi knows the Israeli tech community intimately. He was born here to immigrant parents—his dad's family fled from Iraq, his mom's from Morocco—and at 15 he was accepted into the [Technion](#), Israel's MIT. After graduating, he and his father, also a Technion alum, started a series of software companies. They had their pick of talent: The country's density of scientists and engineers is among the highest in the world.

This is the first time that most of these Better Placers have been together in one room. Agassi slumps low in his chair, staring at this morning's first speaker, his little brother, Tal. Better Place is a family affair. Agassi's younger sister, Dafna Barazovsky, also works there, and their father, Reuven, frequently sits in on meetings.



Better Place's Barak Hershkovitz is designing the AutoOS.

Photo: Joe Pugliese

Tal wears a tight-fitting button-down, and as usual his hair is heavily gelled in spikes. At 33, he is Better Place's head of network deployment, overseeing every aspect of the all-important electric grid. Behind him are three gray-and-blue mock-ups of the charging stations. These will be much more than dumb sockets; they have to carry the charge, sure, but they also must withstand being dinged by cars, vandalized by thieves, and subjected to the heat and cold. And they have to communicate with Better Place headquarters to verify that, yes, this is a subscriber and here's how to bill them. The first order of business is to choose a design.

"Put them on the table," Agassi tells his brother, who gently positions the foam models so everyone can vote. The first looks like a giant Pez dispenser, with a skinny trunk leading up to a cantilevered box that houses the charging equipment. The second has a fat base and a skinny body that zigs in the middle, like a svelte E.T. The last one is waist-high, smaller than the others, and resembles a stunted drive-through squawk box. It's the most practical: It can be freestanding or mounted, and it would be the least objectionable to retail centers. It wins unanimous approval. Then, from all around the table, come the real questions. How does the box signal that it's out of service? Where will the 32-amp charging cable go—in the charging spot or in the vehicle? "In America and Australia, it has to be outside the car," declares Ziva Patir, a former vice president of the International Organization for Standardization. Agassi hired her in April, because he not only wants Better Place to adhere to every country's *existing* regulations, he wants to define the new standards for the coming global electric recharge grid. So the power cords will have to be coiled inside the device and pulled out like a garden hose. But how many hoses? Enough for two cars? Four cars? And if four, won't the box

be too small to hold them all? Plus, what if the power outlet on the car is in the back and the driver pulls in facing forward?

Agassi has been listening, saying nothing. But now he reacts. "Our customer goes to park her car," he says. "She pulls in, then she's squeezing between two cars to drag out this big cable and walk it back to her car. She'll be wearing her nice work clothes and getting them dirty." His eyes are closed, his hands resting on his head. "Guys," he says, using a term that always signals his disappointment with the group, "we've just lost half the market. You need to make life simple for people."

Tal stands in the front of the room, slightly stunned. A small-scale Agassi family feud breaks out. Dafna, 37, head of marketing for Better Place's Israel operations, says it's not asking a lot for people to pull into a parking spot a certain way. Their father is sitting up front, but he remains quiet. Tal finally comes up with a response: "We can have a hydraulic arm holding the cable," he says.

That enrages the rest of the room. An arm! The cost of adding an arm to the hundreds of thousands of charge spots they envision will crater the business model, argues someone from the Israeli office. Forget money, someone else says: Redesigning these things will push us way behind on our deadlines. Agassi dismisses the whole idea of an arm. "It'll break in three months," he mutters to himself.

He tries to move the meeting along, but the cable and the connector keep coming up. Each proposed solution creates a new set of problems. ("It's like a fractal," Agassi tells me later of the process, with a hint of pleasure. "But at the end, what you want is a snowflake.") He asks occasional questions, but usually just about how the speaker came to a certain conclusion—it's the thought process more than the answer that seems to intrigue him.

Finally, as Hebrew and English blur into a confusing Esperanto roar, Agassi raises both arms over his head: "One conversation!" he shouts. And then, *the pause*. He suddenly sees how it's going to work. Maybe the arm isn't so wrong. "This is 'think different,'" he says, invoking Apple, a company that features prominently in the detailed business metaphors he always seems to have at hand. "What do we need to make this happen? Two servos, two degrees of movement for the arm." Pause. "This is the driver experience: He goes into a spot *and the spot connects itself*. In 2008, we put the cable in the unit, in 2010 we use an arm, in 2012, there's a smart arm that connects automatically. For the home unit, the users get a pull cable for free, or they pay \$500 and they get autoconnect. It'll cost \$250 to build, and we'll sell it for \$500." Agassi has not only come around on the arm, he now thinks it is essential. End of discussion. He even names a company that can build the arm and suggests how to structure the deal.

"Shai's got two big traits," says Aliza Peleg, Better Place's VP of operations. "By the time he's thought of something, to him it's been completed, it's been achieved," she says. "The other trait is that by the time you've understood what he's thinking, he's already somewhere else. You're in catch-up mode 24/7."

For months, Tal and his team have been working with vendors to design and price the charging spots. Now he has to go back and tell them that they need to add arms—and eventually smart arms—and that the redesign has to be ready by their next all-company meeting, in 90 days.



The choice: to recharge batteries at plug-in spots, or swap them out at special stations.

Photo: Joe Pugliese

Crazy. That's what people say when they first realize the scope of Agassi's project. He's tilting at electric windmills, fighting a fight that has undone countless well-funded, well-intentioned entrepreneurs before him. In a time when Silicon Valley is all about small—scalable startups like Flickr, Tumblr, and hundreds of other vowel-deprived minicompanies—Agassi is thinking big. Google, Ford, and Exxon Mobil big. His brother tells me that Better Place is

going to become one of the biggest companies in the world. When I ask Shai if he's worried about a competitor stealing his idea, he stares at me like I'm an idiot. "The mission is to end oil," he says, "not create a company."

Most startups try out their product on beta testers. Agassi wanted a beta *country*. A cooperative national government would be willing to modify the tax code or offer other incentives—essential to getting consumers on board quickly. He wasn't selling cars, but really building a network; the bigger the initial base, the stronger the network effect. A small island nation would be ideal, since the range of his car is limited by the range of his charging grid. Fortunately, he already had deep family and business ties to a virtual island—Israel is surrounded by water on one side and by enemies on all others. The farthest a driver can safely go in a straight shot is about 250 miles. Plus, Israel is increasingly queasy about its role as an oil importer. Anything that threatens the livelihoods of hostile Arab oil sheikhs and Iranian mullahs has a special appeal in Agassi's native land.

Agassi got to work convincing the Israeli government in 2007. First he, Peres, and Israeli prime minister Ehud Olmert pressed legislators to change the tax code to make electric vehicles more attractive to consumers. Under the proposed tax scheme, Israel's 78 percent tax on cars would be replaced by a 10 percent tax on zero-emission vehicles and a 72 percent tax on traditional gas-guzzlers. (After four years, the sales tax on electric vehicles will rise sharply.) Agassi argued that the revenue losses—calculated at \$700 million over five years—would be insignificant compared to what foreign oil costs the economy. At a Jerusalem press conference in late January, Olmert beamed down at Agassi, who was sitting in the front row: "In order to bring about this dramatic change, sometimes we need a boy like in the fairy tales to say, 'Look, the emperor has no clothes.' We can all see that for ourselves, so how come we haven't said so? And this boy comes along and puts things in motion to bring about change. And the boy in this story—and he really is a boy, practically, but he has achieved more than many adults have—is, of course, Shai Agassi."

He had a country, but he also needed someone to build the cars. At the 2007 [World Economic Forum](#) in Davos, Switzerland, when Agassi was still representing SAP, he met Carlos Ghosn, CEO of both Nissan and Renault—related companies that together form the fourth-largest automaker in the world. The two talked in Peres' hotel room. Agassi's timing couldn't have been better. Ghosn was looking for a way to leapfrog his competitors in the clean-vehicle arena. GM was chasing the [hydrogen fuel cell](#), Ford liked biofuels, Toyota had the Prius. Ghosn was especially dismissive of the hybrid approach: "They're like mermaids," he told the Israelis. "When you want a fish you get a woman, and when you want a woman you get a fish." Ghosn's companies didn't have much except a tiny electric Nissan car and plans for a high-powered lithium-ion battery to be developed by Nissan and NEC. At best, he figured, he might be able to sell the vehicles to post offices or other companies that would buy a few dozen and never drive them more than 60 miles. Agassi's plan could open much bigger doors. Still, who was this guy? Ghosn was interested, but it was too early to make any commitment.

Two months later, Agassi quit his job at SAP. Soon he was looking for money and, in early June, he found himself sitting in an office in Tel Aviv's gleaming Millennium Tower, pitching to one of Israel's richest men, Idan Ofer.

Ofer is short and powerfully built; he carries himself like a wrestler ready for his next takedown. Ofer and his family have investments around the world, and much of their money is tied up in shipping. But he'd recently bought the largest oil refinery in Israel and was finalizing a joint venture with Chery Automobile, the massive Chinese auto company. Ofer liked what Better Place could do for Israel, and he thought it could work around the world. Plus, he *really* liked how it might make his China investment more valuable. Chery could build cars to work on the Better Place infrastructure. China itself could be a market. (Agassi has no deal yet with Chery, but one is being discussed.)

Most Israeli entrepreneurs who tried to get into Ofer's wallet were interested only in becoming big in Israel, then selling out. Ofer was impressed that Agassi's global ambitions surpassed even his own.

"He had the self-image of being an equal to Steve Jobs or Michael Dell or Bill Gates," Ofer says. "Even if this ends up destroying—for lack of a better word—my refinery business, that will be small money compared to what this will be. When you play chess, you give up something to get something else."

After the meeting, Ofer joined Agassi in the elevator. By the time they got to the street, he had committed \$100 million. The total would eventually grow to \$130 million. Agassi raised another \$70 million more from Morgan Stanley and two venture firms, VantagePoint Venture Partners and Maniv Energy Capital.

Once Agassi had \$200 million to fund the grid and a government serious about tax breaks, Renault began developing an electric car that would be ready for the market by 2011. Agassi promises that 50 Renault prototypes will be on Israeli roads this winter—and 1,000 stations will be there to recharge them. He's not talking about some three-wheeled, pimped-out golf carts, either, but blend-in-at-the-school-parking-lot cars and SUVs. The sedan will be mid-size,

similar to Renault's popular Laguna and Mégane models and able to go from 0 to 60 in a respectable 7.5 seconds. Better Place expects to have close to 100,000 vehicles by the end of 2011. And while these might show up in Israel first, Renault plans for them eventually to be on roads worldwide. "We wouldn't have invested if we thought this was a onetime, one-place story," says Patrick Pélata, Renault's product manager and Ghosn's number two.

4x4 Projects in Kfar Saba, a suburb of Tel Aviv, is the auto equivalent of an Olympic training center. The building, however, doesn't look like much, just a mustard-yellow warehouse on a cluttered industrial side street. And inside, it's just a warren of cars, trucks, and auto parts. But on a lift sits a white Jeep Wrangler that's been outfitted with supersize off-road wheels, like a monster dune buggy. A green Hummer is parked in back, its diesel engine replaced with a high-powered Chevy small-block. And a silver BMW 318i has a shiny new Corvette V-8; touch the gas and the tail whips out, perfect for drifting. The only vehicle that doesn't really fit in is a completely ordinary family sedan, a silver 2005 Renault Mégane—Better Place's first prototype.

Agassi needed some way to test Better Place's all-important software, called AutOS (pronounced "autos"). The system serves as energy monitor, GPS unit, help center, and personal assistant, packed into an onboard PC that will also hold cellular and Wi-Fi chips. As part of the debugging process, Agassi bought the used Mégane and sent it to 4x4 with his car guy, Quin Garcia. The assignment was to convert it into an electric car.

Garcia was just finishing his master's in automotive engineering at Stanford University last year when he heard Agassi give a speech on campus. A few months later, he had a job at Better Place. Garcia's manner is laid-back Northern California until anything related to cars comes up, at which point he turns as intense as everyone else at Better Place.

Garcia reaches into the Mégane and pushes a button. Nothing happens. "It needs to be rebooted," he shouts to the owner of the shop. Garcia opens a silver box under the hood and fiddles with some buttons. "Control-Alt-Delete," jokes Better Place executive Barak Hershkovitz.

Hershkovitz oversees AutOS. He is the hard-nosed realist to Agassi's dreamer, the Scotty to his Kirk. That means Hershkovitz, even when he's joking, comes off hangdog—he knows that deadlines are looming.

Hershkovitz was about to start a residency in ophthalmology when he teamed up with Agassi in 1998. He was a brilliant, self-taught programmer, and what started as a bit of moonlighting quickly turned into a full-time job, first at one of the Agassi family companies, then at SAP. He quit soon after Agassi left, and now, with a staff of six, he's building AutOS.

The system reboots, and Garcia taps a blank spot on the dashboard to show where the car's AutOS-powered LCD will go. The garage's owner gets behind the wheel. I take the passenger seat, Garcia and Hershkovitz climb in back, and we head toward the highway. As we accelerate, I'm pinned uncomfortably to my seat. Unlike a traditional engine, an electric motor produces all of its power right away. (Recently, Ofer, whose \$130 million investment made him chair of the board, took the prototype for a spin. Garcia and others watched in horror as Ofer's sharp steering, combined with the instant torque, caused an axle to snap.)

I keep waiting for the shift to another gear—the jerk that signals it's time to breathe again. "A normal gas engine spins at 6,000 rpm," Garcia says, noticing my surprise. "This motor can spin up to 12,000 rpm," which means there's no need to change gears. "You don't have the normal car problem where you need first gear to get off the line. We just took the original transmission and stuck it permanently in second."

As we approach a stop sign, the car feels like it's being held back by a rubber band. The tug, Hershkovitz explains, comes from what's called regeneration. "When you take your foot off the pedal, the car has kinetic energy," he says. "The motor starts charging the battery, turning the kinetic energy back to electric energy." He starts running through possible ways to turn the physics into a game: He wants Better Place users to be able to go to a Web site and see which drivers have racked up the most "regen." Maybe they'll win prizes.

Garcia decides to argue the point. "If you're regening, it means you used too much energy in the first place!" Meaning drivers should just take their foot off the accelerator sooner.

"Ah, you are not a computer. It's not like you can calculate how much energy you need to get to that red light," Hershkovitz says.

"Every time you do regen, there's a loss—it's not like you get it all back," protests Garcia. "The perfect driver would cruise around without ever using regen or the brakes. When they came to their destination, they would coast to a stop."

HersHKovitz ignores him. "Come on, let's go," he says as we pull back into the 4x4 shop. He has an appointment with a Japanese team from NEC to talk batteries. I follow him into his rented Mazda5 and find my body relaxing to the familiar shifts and jerks of the internal combustion engine.

The initial deal with Israel was, thanks to Agassi's connections, practically foreordained. The real test would be signing up a second country—a "validator," to use Agassi's term. In March, he got one. Denmark is everything Israel is not: a cold climate (which is hard on batteries), a net exporter of oil, a nation friendly with its neighbors. Agassi had no ties to the government. But he had a business model that proved irresistible to a Danish company called **DONG Energy**.

For DONG, Denmark's largest utility, Better Place offers an opportunity to solve one of its biggest problems: the economies of wind power. DONG makes a higher portion of energy from wind—18 percent—than any other power company in the world. Danish politicians want to see that figure doubled, which is good and green but completely impractical: Some days the wind blows, and some days it doesn't. Banking wind energy is expensive and inefficient—DONG would have to buy fields of batteries. Rather than lose it, the company ends up giving away excess power to Germany and Sweden. So when DONG CEO Anders Eldrup met with Agassi, he immediately saw that Better Place would not only appeal to his countrymen's environmental leanings, but the cars would also be a cheap, distributed way to store excess wind power. After the partnership was announced, Eldrup went for a haircut and found himself bombarded with questions about Better Place. His longtime barber had never once asked about Eldrup's business. Before the Better Place announcement, the man explained, he'd never really cared.

Better Place did seem to sell itself. That's what Agassi was discovering. The day of the Denmark announcement, he received a text message from an executive at a carmaker outside of the US. (He declines to name the company.)

"What's going on in Denmark?" it read.

Agassi, a bit confused, wrote back that he had just announced country two.

"What's the announcement?"

Agassi typed: "Zero percent tax on our cars, DONG as a partner."

The next day he got another text message: "*But there was already 0 percent tax on alternative energy cars in Denmark.*"

Agassi sent back a long missive explaining that because of Better Place, Denmark was talking about expanding its tax break beyond the current 2012 cutoff date; that DONG was promising that it could supply 100 percent clean energy for all Better Place cars; that he's raising an additional \$160 million for Denmark alone; and that Renault intended to supply all the cars Denmark could buy. He finished the message with some barbed advice: "I'll be offering \$20,000 cars in a market where you're selling \$60,000 cars. How many have you planned to sell in 2011 in Denmark? Because I recommend you take them off your plan."

The next day, Agassi was invited to a meeting with the automaker's CEO.

"I have a strong feeling this is where the industry is going to go," says Rod Lache, an auto analyst at Deutsche Bank. In March, Lache crunched the numbers for his clients on what Better Place might do to their portfolio of auto holdings. He figured a typical driver in the US gets 20 mpg. With gas at \$4 per gallon, a driver who clocked 15,000 miles per year would have an annual gas bill of \$3,000. The equivalent cost of electricity and battery depreciation—Better Place's cost to fill up its customers' cars, in other words—would be about \$1,050. If Agassi had cheaper cars (thanks to tax breaks or incentives) and offered monthly plans that were lower than or equal to what consumers were paying at the pump, this would be phenomenally attractive. "Frankly," Lache wrote, "we are not aware of any reason why [automakers] would not sign up for this."

Early this summer, Daimler CEO Dieter Zetsche told a German newspaper that his company would have an electric Mercedes and an electric Smart car on the market by 2010. When asked about the cost, he said it really depended on whether the batteries came with the car or were leased. No one had thought about separating the battery from the car before Agassi; now CEOs like Zetsche were treating it as standard electric-car business practice. And yes, Zetsche confirmed, Daimler is talking to Better Place.

It's a warm mid-March morning in Washington, DC. Agassi has just flown in from San Francisco on the red-eye. He was booked in business class but ended up in coach, sleeping across three seats. His ever-present uniform—dark suit,

white shirt—looks slightly rumpled. For years, Agassi has traveled almost constantly, and the irony of fighting planetary destruction while clocking countless hours of carbon-spewing jet travel isn't lost on him. "I have so many sins to pay on my climate bill right now that we hope this works really fast," he says.

If Better Place is to live up to Agassi's revolutionary goal, it will eventually have to win over Americans, the world's largest per-capita polluters. But that won't be easy.

He starts the day off with a speech at a conference organized by a left-leaning think tank. Speaking without notes, Agassi roams the stage, preaching the inevitability of his plan. He has a way of describing things that is never zero-sum; everybody wins in his version of the future, even when he's selling massive disruption.

"For the car companies, we made it simple," he says. "We separated the ownership of the car and the ownership of the battery. See, car companies don't know how to assess the life of the battery. So they go through these complicated programs of testing them for a long period of time. And we told the car company, you know what? Just like you don't sell a car with a card that says 'Here is oil for the life of the car,' you don't sell cars with the batteries for the life of the car, because the battery is crude oil." He explains that his plan alone, once scaled up, could produce a 20 percent drop in the world's CO₂ emissions. And he wasn't stopping there. "If we also buy clean generation, we reduce the price of clean electrons so that at the end of 10 years, clean electrons are cheaper than coal-based electrons, and nobody builds another coal plant at that point. That's another 40 percent of CO₂ emissions; that's the treaty Tony Blair is now working to get for the world by 2050. I'm telling you, we can get there a decade after we finish the car side. We can get there in 2030—60 percent reduction in our CO₂ emissions."

After every speech—or just in the course of everyday business—one or two people ask Agassi for jobs. Michael Granoff, the venture capitalist who was Better Place's earliest investor, now works for Agassi as head of oil independence policies. ("I joke that 29 days a month Shai's my boss, and one day a month"—when Agassi briefs investors—"I'm his," Granoff says.) Today in DC, a young man from the Boston Consulting Group corners Agassi on his way out of the Hilton conference room and hands over his résumé. Granoff, who has organized Agassi's day, waits until the man is out of earshot and reminds Agassi that the same guy made the same request after a speech in Boston. Agassi has a groupie.

Outside the hotel, Granoff and Agassi jump into a hybrid Lexus SUV and head to Capitol Hill for a series of meetings. In the office of a New York House Democrat named Steve Israel, Agassi settles into a leather couch and makes a direct pitch. "Whoever is number 44," meaning the next president, "will transfer \$2 trillion to \$3 trillion out of the economy"—the amount America will spend on foreign oil in his first term. This is a line Agassi has been testing lately, and Israel seems to bite. "So what do we do?" asks the legislator. Agassi lays it out: He wants tax hikes on gas-powered cars. Israel tells him that will never fly. As Agassi discusses other possible incentives, Israel interrupts him: "We don't make batteries, so aren't we going to swap out foreign-oil dependence for foreign-battery reliance?" It's a strange theory, but Agassi doesn't blink. The conversation suddenly shifts to the best way to set up a battery-manufacturing center in the congressman's Long Island district.

Israel is late for a vote, so everyone hustles off toward the Capitol. As Israel veers away toward the House floor, Agassi enters an elevator followed by Kansas senator Sam Brownback. Granoff, who seems to know everyone in DC, introduces the two and quickly explains Better Place. Brownback asks if he can buy one of Agassi's cars. "One problem: We need the infrastructure first," Agassi says. "That's what we're building."

"All you need is a plug, right? Why would you need an infrastructure?" asks Brownback, who towers over Agassi.

Agassi pulls out his BlackBerry: "We're like AT&T, not Nokia," he says. But the cell phone analogy doesn't click here.

"So you're like a long extension cord?" asks Brownback, and everyone laughs politely. Agassi starts to explain, but the senator steps out. Granoff promises that he'll bring the two men together soon for a more substantial discussion.

The rest of the day proves equally unsatisfying. One senator cancels at the last minute; another offers little but good wishes. In nearly every meeting, insiders ruefully give the same advice. Getting anything like the deal he has in Israel is going to be impossible.

Washington was a bust, but there are other ways to conquer America. Agassi has already been contacted by the mayor of Los Angeles and politicians in Michigan and New York City. San Francisco mayor Gavin Newsom was in Agassi's Young Global Leaders class. "My proposal was about health care or something in San Francisco," Newsom

says sheepishly. He traveled to Israel to meet with Better Place in May. But Agassi is wary. For one thing, San Francisco is hardly an island, and as leader of a municipality, Newsom has few tax levers he can pull to make the electric car affordable. That hasn't kept the mayor from combing through statutes for fees the city might lift. "This is the irony: The city is working harder to get their business than the business itself. Shouldn't he be sucking up to San Francisco?" Newsom asks, only half joking.

But there is a natural place to start in the US. The island state, Hawaii, depends on shipped-in oil; a full 14 percent of the state's annual \$62 billion gross domestic product goes to oil producers, more than any state in the nation. After Israel announced its Better Place plans in January, Hawaii governor Linda Lingle asked for a meeting.

This spring, Agassi went to Honolulu. The governor ushered him into her grand koa-wood-paneled conference room. She sat at the head of the table, flanked by cabinet members. Agassi showed them how the model worked, how it would roll out, how unstoppable it would be. The governor's people wanted to know why this wasn't just shifting the environmental burden to the electric utility. Agassi said he'd pay a premium to buy energy made only from renewable sources, making it cost-effective for the utility to put in wind farms or solar-powered plants—something Lingle has been pushing for. The tourism and economic development director was impressed, but one thing bothered him: Consumers want choices. "This is Hawaii," he said. "Where are the convertibles?"

At a larger meeting a few weeks later, one of Agassi's lieutenants made the case to dozens of Hawaii's business and political leaders. Like others, Dave Rolf was intrigued. He represents the state's auto dealers, a powerful lobby in the state capitol that's against anything that cuts into car dealer profits. The meeting lasted eight hours, and Rolf left stunned. Not only was this going to happen, he decided, it needed to happen, and Hawaii was the perfect place. He fired off a letter to GM's regional head in California urging the carmaker to pay attention. The auto industry needed to be part of this from the get-go. They needed to be making electric cars. "This is kind of a world-changer," Rolf says.

A few months ago, I stopped by Agassi's Palo Alto headquarters to sit in on a three-day strategy meeting. The company has just moved in, and the walls are still decorated with motivational posters put up by the previous tenant. Empty cubicles are waiting to be filled.

The entire staff is trying to write a mission statement with help from a moderator. He flips through slides on a screen: "Our mission is to transform personal mobility." "Our mission is to break the world's oil addiction (before it breaks us)."

Agassi, in a black leather jacket, a stiff blue-and-white button-down, and faded jeans, stops the moderator. "We still think we're selling to them," he says, after one of his long, drawn-out pauses. "We're not. It's not us to them. It's them to us. You see, people want this to happen; we just happen to be in the way of their getting what they want. We can't give them the car fast enough. That's something we need to capture: 'We're here to serve you,' not 'We're here to sell to you.' We're a facilitator, not the creator. This is going to be a community. We just need to get out of their way. They're going to push for policy, they're going to sell the cars, they're going to be zealots."

I start thinking about the people he has already hooked: mayors, CEOs, investors, statesmen, even car dealers. At one point, Tal had marveled to me about Shai's ability to convince you that the answers to the most challenging problems are easy and obvious. "He tells you the story, and it sounds so simple. Why don't we have it today? Why isn't it here already?"

It's true. Shai Agassi has only one car, no charging stations, and not a single customer—yet everyone who meets him already believes he can see the future.

Senior writer Daniel Roth (daniel_roth@wired.com) wrote about the new Google phone in issue 16.07.