

Alternative Vehicle Technology Conference, Lehman College

October 30, 2009 • Michael Granoff, Head of Oil Independence Policies

“How do you make the world a better place by 2020?”



End oil...

Accelerate the transformation to a sustainable electric automotive solution



ICEs: One Century Reign



August 1908

Ford's Model T hits market;
days later, GM
incorporated

August 2008

US\$4/gallon gasoline
- US VMT in
unprecedented
decline; new car sales
fall 40%.

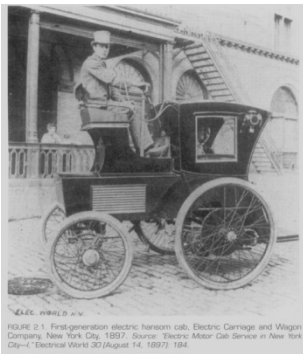


FIGURE 2-1 First-generation electric horse-drawn cab, Electric Carriage and Wilson Carriage, New York City, 1897. Source: Electric Motor Car Service in New York City—1. Electrical World 30 (August 14, 1897): 194.

Holistic Better Place solution addresses historic barriers to EV adoption

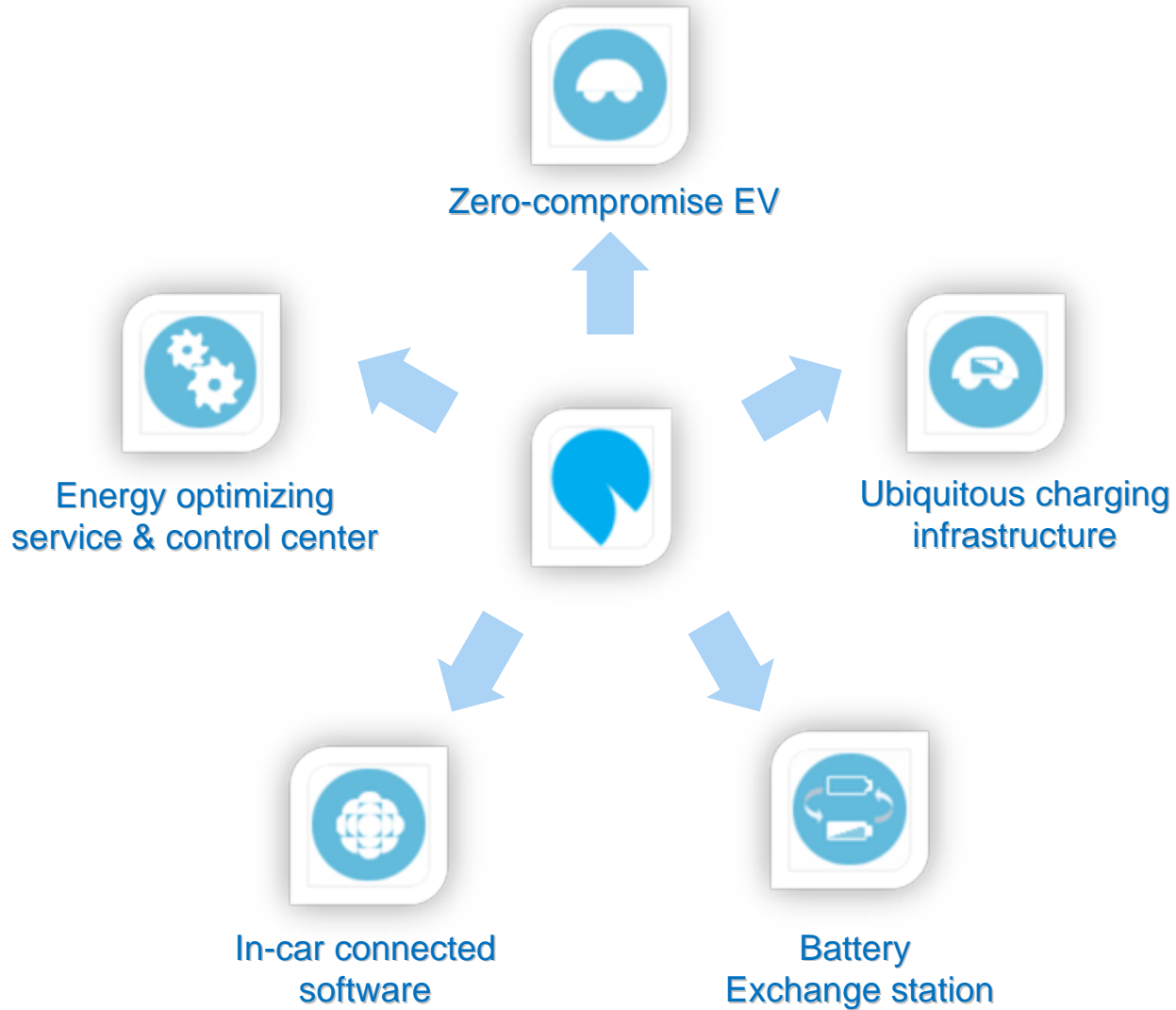


Obstacle	Solution
Consumer convenience	Better Place installs charge spots at home, work, and public places for convenient charging
Upfront cost	Better Place pays for and owns the battery, charges for monthly services, lowering the initial cost of purchase
Range extension	Battery switch stations provide fully charged batteries en route, providing unlimited range
Grid scalability	Better Place Service & Control Center allows 'smart' charging, enabling mass EV adoption with existing utility grid infrastructure

The driving systems: Old vs. New



Multi-faceted and holistic electric vehicle solution...



..enable comprehensive EV service offering



Charging

- Personal and public charge spots
- Battery switch stations

In-car support

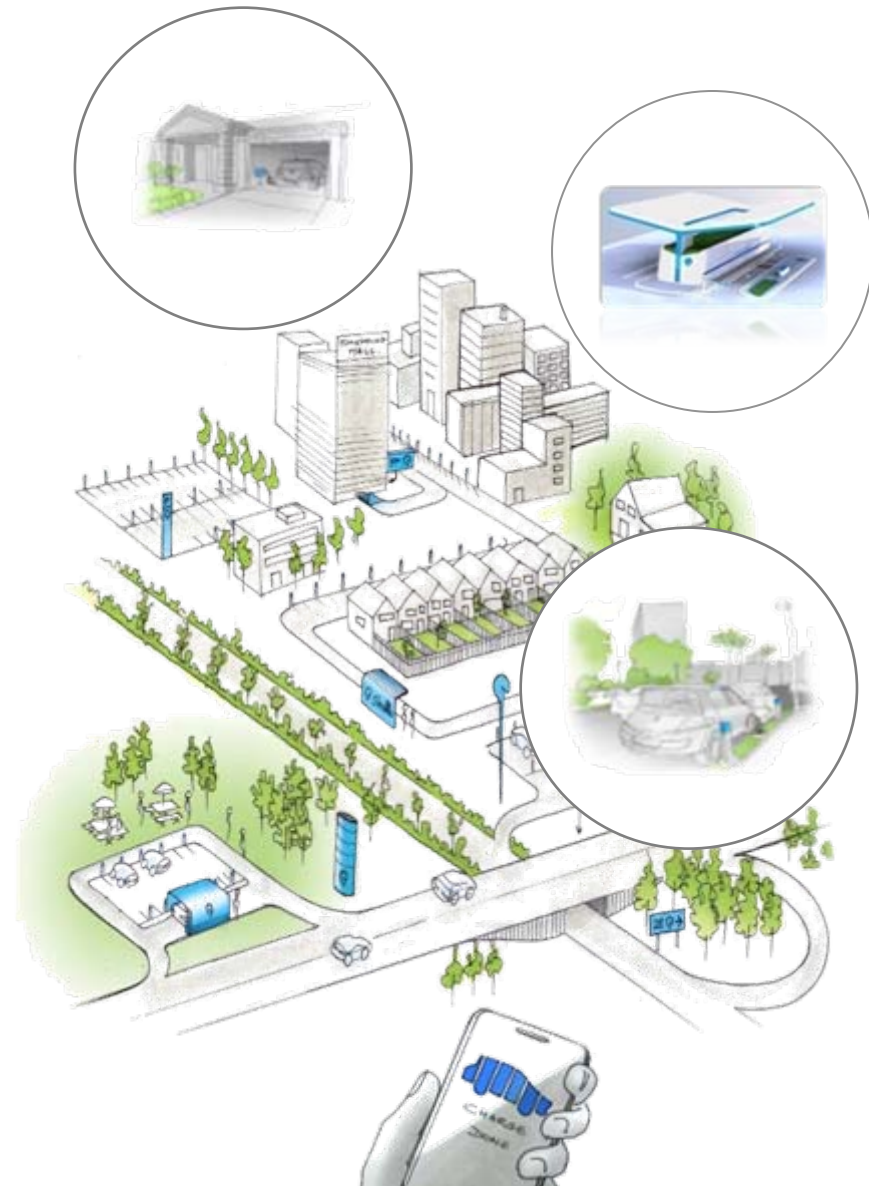
- Energy monitoring and management
- Information and media services

Customer care

- Mileage, time of day, location charging options
- Roadside and other assistance

Energy management

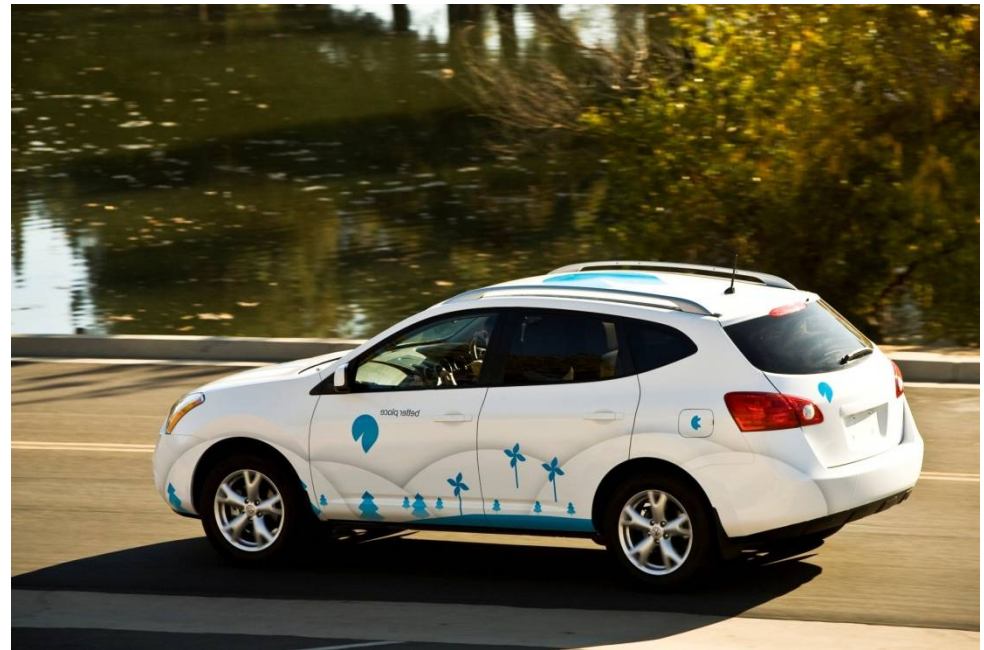
- Power use, distribution and grid stability enabling



Zero-compromise EVs provide superior driving experience



- Instant and smooth acceleration
- Quiet (inside and out)
- Reduced maintenance
- Efficient energy usage



Better Place charge spots

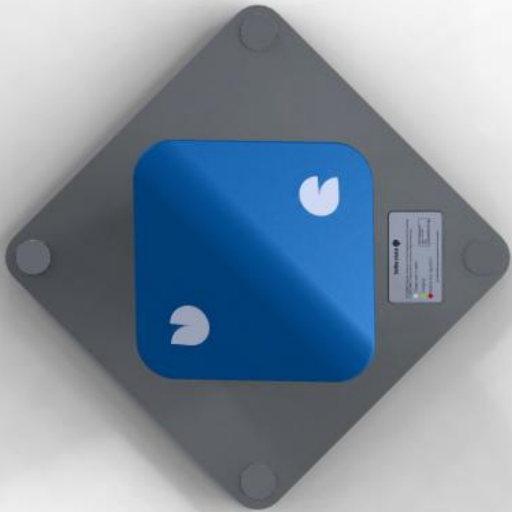


- Widely deployed in public locations in advance of cars
- Additional spots installed for subscribers
- Plug and charge at home, work, school or while you shop or play
- Eliminates gas station stops, pumps, and unpredictable prices

Charge Spot



better place



Deployment already underway in Israel and Denmark



public surface lots



home garages



street-side parking



parking garages



Battery switch stations for rapid and unlimited range extension



- Rapidly replaces a depleted battery with a fully-charged one
- Completely automated process which takes less time than filling a gas tank
- Battery availability for specific car makes and models



Battery Switch Technology Demonstration

Multiple location-specific configurations



Stand alone station



taxi station



gas station facility



subterranean parking garage





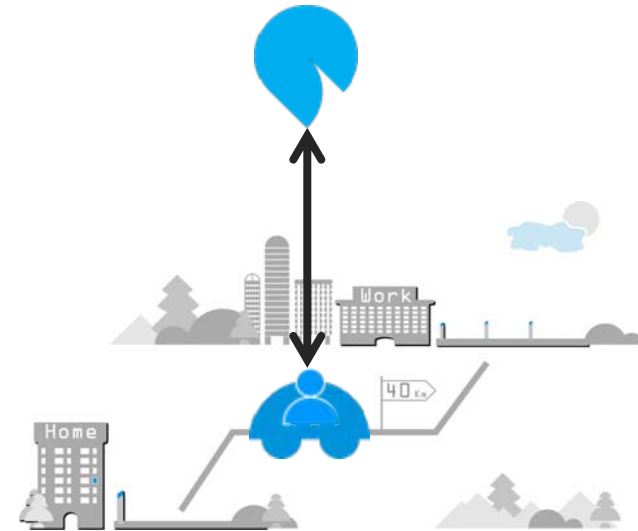
AutOS: in-car & on-the-go services

AutOS

In-car software serves as an Interface between the user and Better Place and as an interface between the auto back to the grid.

Energy

- Planning
- Monitoring
- Charge Spot and Battery Switch management



Support

- Mobility service management
- Navigation
- One stop shopping
- Community Building

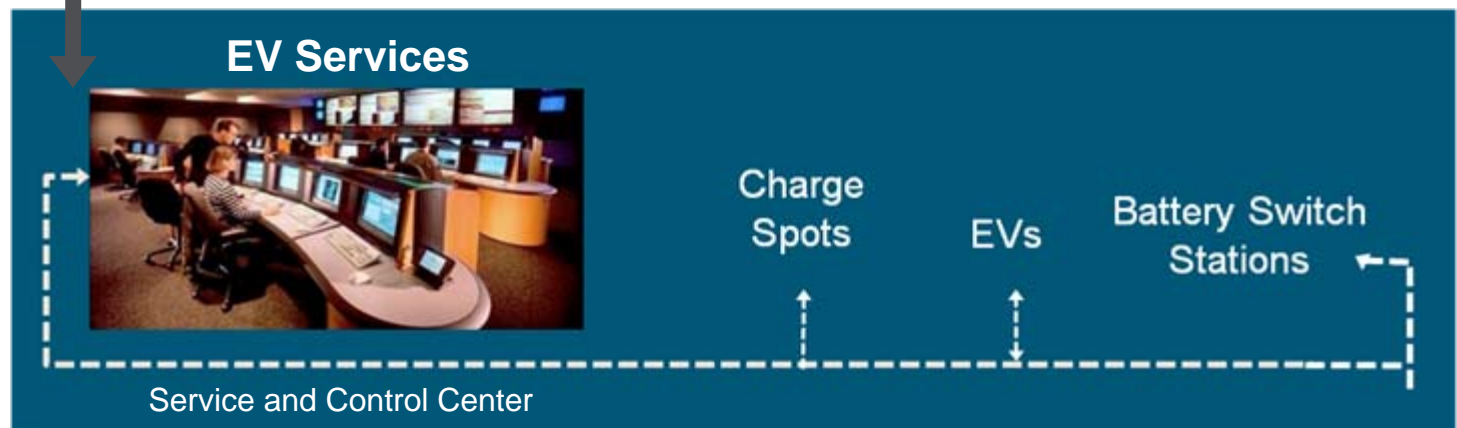


Service & Control Center (SCC) enables intelligent demand management



Service and Control Center enables optimization of supply and demand through smart grid charging:

- Peak shaving
- Demand side management
- Ancillary services
- Future vehicle to grid (V2G)



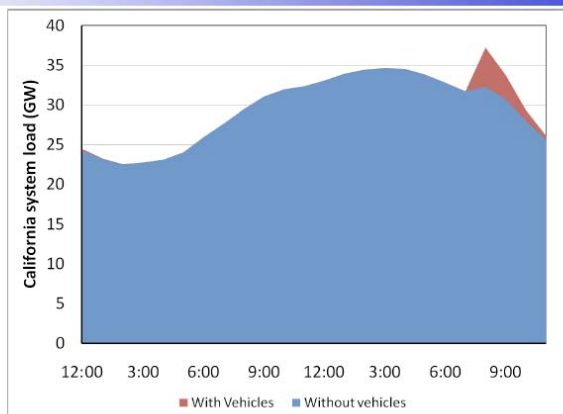
Electrification, without controlled charging, poses risk to stability of existing electrical grid



Generation

- 2 million poorly controlled EV's in CA could result in need for significant incremental generation

Power demand from *badly* controlled charging



- 2 million badly controlled vehicles can create a new peak
- Charging load is 5GW; equivalent to 5 large power plants

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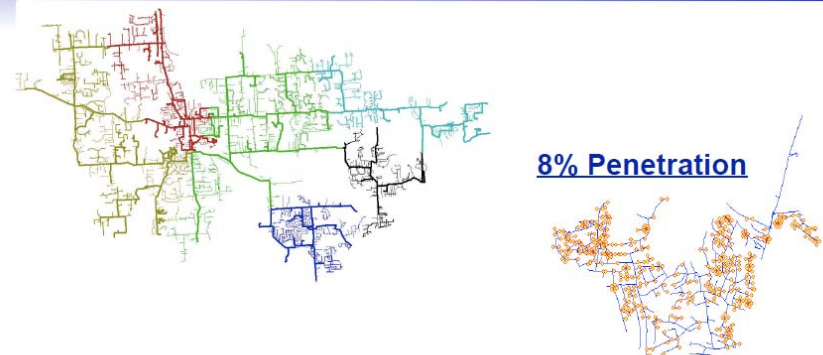
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Distribution

- Also need to be able to control charging at the neighborhood level, and even within a given parking lot

The distribution level is different



- Vehicles can be concentrated in particular neighborhoods
- Problems will be highly localized and difficult to predict
- The discussion below is specific to one Dominion circuit

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Source: EPRI presentation to California PUC, July '09

Better Place smart charging model requires minimum modifications to existing grid




חברת החשמל The Israel Electric Corporation (IEC) recently examined impacts to their electrical grid (Generation, Transmission & Distribution) of 2 million EV 2020 under 3 scenarios

Gen.



Trans.



Dist.



	Ad Hoc Charging	Off Peak Incentive	Operator / BP Smart Charging
Gen.	Add 2,345 MW	Add 1,770 MW	No additional capacity required
Trans.	Add 1 switching station, 10 substations, and 18 transformers	Add 1 switching station, 7 substations, and 13 transformers	No additional transmission required
Dist.	Add 2,158 km of medium voltage cables	Add 1,581 km of cables	Add 287 km of cables

Renault's ZE Fluence – midway through four year production cycle



- Full-size 5-seat passenger sedan with spacious interior (length: 4,820mm; width 1,672mm)
- ~24 kWh lithium ion battery allows for ~160km driving range on single charge
- Switchable battery provides infinite range extension; switch time < 5 minutes
- Regenerative braking increases energy efficiency and reduces brake maintenance



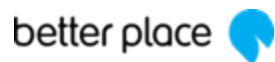
BPLC will introduce world's first electric taxi with switchable battery in Tokyo, Japan Q1 2010



- Japan's Ministry of Economy, Trade, and Industry awarded Better Place grant to pilot EV taxi program in Tokyo
- Pilot paves way for broad incorporation of zero-emission EV technology into Tokyo's 60,000 taxi fleet
- While taxis comprise only 2% of vehicle population, they account for ~ 20% of all passenger vehicle emissions



Multiple companies partnering in taxi demonstration:



BPLC will oversee project, and will install and operate a battery switch station in high-traffic Roppongi Hills neighborhood



Tokyo's largest taxi operator will incorporate multiple switchable battery EVs into its taxi fleet



Automotive engineering specialist will supply EVs, based on commercially available vehicles, with battery switch mechanism

Better Place world view circa 2009



Better Place timeline and key milestone





October 2007:
Company launched in NY with funding from Morgan Stanley and Israel Corp



March 2007:
operating company established in Denmark partnering with DONG



November 2008:
First US efforts with California leadership in San Francisco Bay Area



February 2009:
Initial Israel companies sign up for fleet deals



August 2009:
EV taxi pilot awarded to Better Place by Japanese government



January 2008:
operating company established in Israel



October 2008:
Better Place launches operating company in Australia



December 2008:
First charge spots installed and tested in Israel



May 2009:
Battery switch station demonstrated to industry & public in Yokohama, JP



September 2009:
Demonstration of complete EV solution at Frankfurt Motor Show



better place 