Outline

• Overview of Better Place solution
• Smart charging capabilities
• Energy storage services
• Utility benefits
• Global update
Outline

• Overview of Better Place solution
  • Smart charging capabilities
  • Energy storage services
  • Utility benefits
  • Global update
## Better Place addressing EV needs

<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Better Place installs personal and public charge spots making it easy to charge up wherever you are</td>
</tr>
<tr>
<td>Extended range</td>
<td>Battery switch stations to provide fully charged batteries on long distance trips</td>
</tr>
<tr>
<td>Affordability</td>
<td>Better Place pays for and owns the battery, reducing upfront cost and technological risk; customers pay an affordable monthly fee</td>
</tr>
<tr>
<td>Positive ownership experience</td>
<td>Energy you need every morning, zero emissions driving satisfaction</td>
</tr>
<tr>
<td>Energy supply</td>
<td>Smart charging management aligns electricity supply and demand with electricity system constraints</td>
</tr>
</tbody>
</table>
Better Place solution elements

**At home and out and about: Charge spots and Battery switch stations**

Access to charging when and where you park

Ability to drive long distances by providing fully charged batteries on the road

**In hand, in the car: Driver services**

In-car and remote access to your EV’s energy information, trip planning and other services

**Behind the scenes: Managed EV services**

Working with utilities and customers to monitor and manage energy supply and demand
Drivers’ view of the Better Place network

Charge spots

Battery Switch Stations
Outline

• Overview of Better Place solution
• **Smart charging capabilities**
  • Energy storage services
  • Utility benefits
• Global update
Better Place EV charge network

ecosystem

- Suppliers
- TSOs
- DSOs
- Retailers

utility API
- EV charge management
- EV network management
- EV driver services

charging API

EV driver API

LCC

Charge clusters

- office buildings
- retail space
- multi-unit residences
- public charge spots
- single-unit residences
  (smart metering/HAN)
- battery switch stations
- power lines
- 2-way communications

CONFIDENTIAL © 2011 Better Place
EV smart charging continuum

**Optimized Charge Mgmt**
- Intelligent charging for utility & user constraints
- Custom charge plans
- Service level contracts
- User requirements
- Battery characteristics
- Extended range

**Dynamic Dispatch**
- Load scheduling and intra-day balancing
- Dynamic response to MV network loads
- Dynamic response to system disturbances and outage restoration
- Response to price signals

**Energy Storage Capabilities**
- Ancillary services
- Renewables firming / ramping support
- Distributed generation and micro-grid
- Demand response, capacity management
- Energy arbitrage
Outline

• Overview of Better Place solution
• Smart charging capabilities

**Energy storage services**
• Utility benefits
• Global update
Better Place network as a distributed energy storage system

A plugged-in car is 24 kWh of storage connected at 3.3 kW

A typical Battery Switch Station (BSS) is 500 kW load 240 kWh of storage

100,000 cars + 500 batteries in BSS:
- Peak load: 330-660 MW
- Storage capacity: 2,412 MWh

Charge plan flexibility allows us to forecast power and energy demands day ahead, and change them intra-day to respond to grid needs
Better Place “energy storage” assets

CS represent networked battery asset
- Up to 5+ MW of dispatch-able load for every 1,000 EVs
- Fast “ramp” response; distribution level control

BSS are similar to distributed generation and stationary storage
- Always “on” and well-suited best for LESR applications
- 0.5 - 3 MW load rating (with optional stationary storage)
- Fast response; configurable for energy output to grid

Network Operating Center provides centralized control
- EV network charge optimization – ensures driver requirements
- Data collection and analytics (forecasts, load commitments)
- Interfaced / integrated with utility/grid operations
- Managed EV load dispatch for energy service delivery (FR, DR, ramp support, etc.)
Outline

- Overview of Better Place solution
- Smart charging capabilities
- Energy storage services
- Utility benefits
- Global update
Managed charging minimizes risks and costs to utilities

**Israel Electric Co. study:** Managed EV charging significantly reduces system costs of EV adoption to utilities

<table>
<thead>
<tr>
<th>Projected grid Impacts of 2 million electric vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Israel Electric Co. (2008)</strong></td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Unmanaged Charging</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Off-Peak Incentives</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Managed Charging</td>
</tr>
</tbody>
</table>
Managed charging reduces price volatility in wholesale markets (PJM and Better Place study)

• Modeled the market and pricing impact of 1M EVs.
• The greater Washington – Baltimore area was selected for modeling because it already experiences transmission congestion issues.
• Demonstrate the value of EV Network Operator (Aggregator) that manages EV charging
  • Wholesale energy market
  • Production costs
  • Ancillary services
• Enabled PJM, Better Place, and other stakeholders to learn from the results.

EV Load Intensity Snapshots
Wholesale Price Impact Assessment

<table>
<thead>
<tr>
<th>Charging Scenario</th>
<th>Price Signals and Charging Control</th>
<th>Wholesale Energy Pool Savings</th>
<th>Pool Cost Savings for EV Owners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unmanaged (“Unmanaged Scenario”)</strong></td>
<td>Local Ad-hoc charging</td>
<td>baseline</td>
<td></td>
</tr>
<tr>
<td><strong>Time of Use Pricing (“TOU Scenario”)</strong></td>
<td>Local 70% price sensitive to two-tier TOU rates</td>
<td>-$32M (-4%)</td>
<td>3.7%</td>
</tr>
<tr>
<td><strong>Central Network Operator (“CNO Scenario”)</strong></td>
<td>Centrally managed Network is price sensitive to LMP</td>
<td>$350M (45%)</td>
<td>22%</td>
</tr>
</tbody>
</table>
The bottom line
**EV network cross-subsidization enables highly competitive, high margin electricity products and services**

Better Place will already be purchasing batteries and grid connections to provide mobility services for EVs.

Through its aggregated assets, BPLC can help reliably supply large quantities of energy services relatively inexpensively.

- **Installed Costs Comparison**
  - Peaker Plant (NG): $1,394/kW\(^1\)
  - Flow battery: $1,200/kW
  - Lead acid storage: $1,350/kW\(^1\)
  - Beacon Flywheel: $3,450/kW\(^2\)
  - Better Place: $0
Outline

• Overview of Better Place solution
• Smart charging capabilities
• Energy storage services
• Utility benefits
• Global update
Better Place today

Operating companies in Israel, Denmark, Australia
Offices in Japan, U.S., Canada, China and Europe

As of March 2011:
Raised ~$700M ($550M at parent company, €103M in Denmark, AUS$25M in Australia)
Approximately 450 employees and 600 contractors globally
2011: key milestones

As of March 2011

Solution validation test started (IL)

Signed vision partnership with 340 companies accounting for 72K+ cars; replacement exp. in 4-5 years (IL)

Looking ahead: Israel

Commercial launch in 1H-2012
40+ switch stations
Thousands of charge spots (more than 1,000 already deployed to date)

Looking ahead: Denmark

Commercial launch in 2H-2012
15+ switch stations
Thousands of charge spots