better place


# Better Place Introduction

## California Public Utility Commission

February 2009

# Who We Are

We are

- A true mobility operator that delivers transportation as a sustainable service.

Our mission

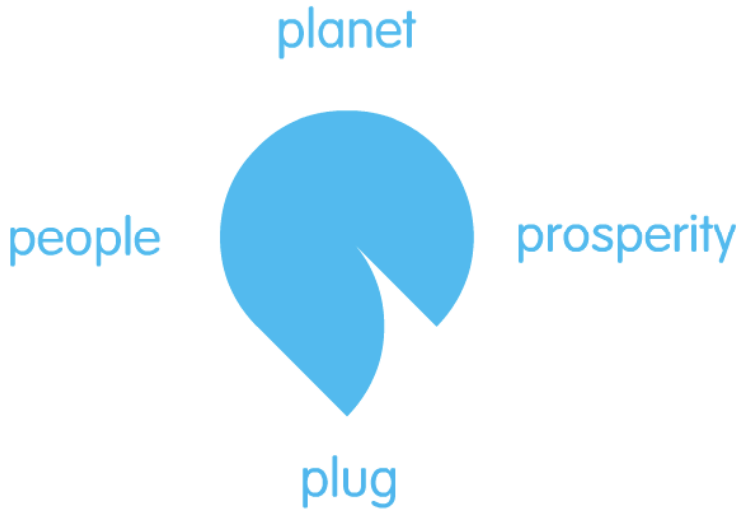
- To live free from oil by redefining the economics and experience of transportation.

# What We Do

- **Redefine the economics of driving** by separating the battery from the car.
- **Solve for range and convenience** by implementing a network of charge spots and battery exchange stations.
- **Accelerate the market for renewable energy** with demand created by electric vehicles.

Bottom line

- We help **people** achieve economic **prosperity** in a **planet** friendly way by making the switch from the ***pump*** to the **plug**!

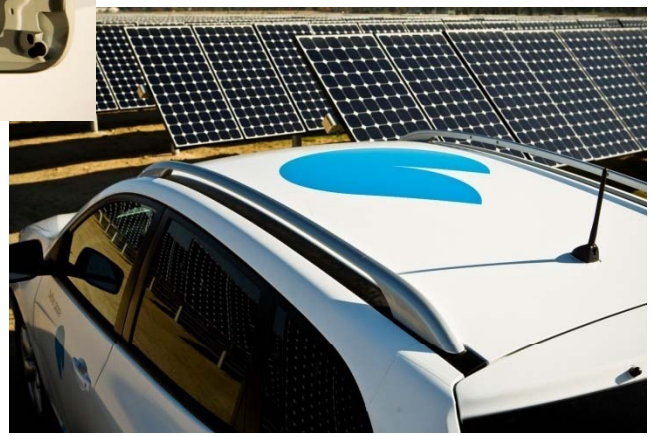


# Better Place Solution

# Better Place Demo Electric Vehicles (EV)

We partner with auto manufacturers to develop affordable, high performance and non-compromise electric vehicles.



# Infrastructure - Charge Spots

- A network of grid connected charge spots deployed in large numbers across the designated service area.
- Cost-efficient design produced at scale enables ubiquitous coverage.
- Deployed in multiple operating environments.
    - Private home garages
    - Apartment buildings
    - Office parking lots
    - Retail parking lots
    - Curbside parking

# Infrastructure - Battery Exchange Station

- When traveling long distances, the battery exchange station allows customers to rapidly swap out a discharged battery pack for fully charged pack.
- The exchange process will be fully automated and will take approximately 5 minutes.
- Batteries will not be initially standardized. A battery always will go into a car from the maker which fits the battery pack.
- Each station holds a small inventory of charged batteries and will resemble single and multiple lane car washes.

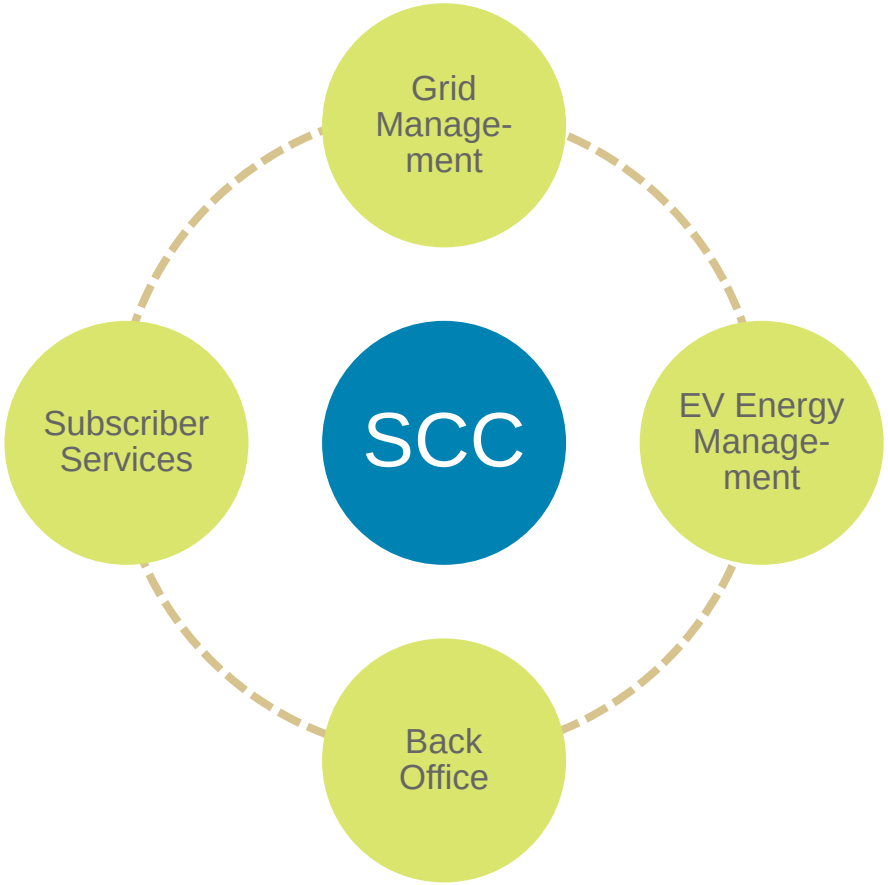
# Energy & Billing: Customer Perspective


Utility

Better Place


# Infrastructure - Service & Control Center

- The Service & Control Center (SCC) is an information and communication center that connects all facets of the Better Place solution.
- Monitors how much energy is available within the electricity grid at any given moment.
- Intelligently optimizes which cars can and should be charged and at what rates to ensure grid stability.



# Intelligent Demand Management

**Utility Grid**


Control Center

Service and Control Center enables:

- Peak Shaving
- Demand Side Management
- Ancillary Services
- Future Vehicle to Grid (V2G)

**Grid Operator**

Charge Spots,

Battery Swap Stations

EVs

EVs

Control Center

# Impacts to Israel's Electrical Grid

The Israel Electric Corporation (IEC) recently examined impacts to the Israeli Electrical Grid (Generation, Transmission & Distribution) of 2 million electric cars in 2020 under 3 scenarios:

a. **Ad-Hoc Charging Model:** Charging occurs immediately on arrival at home & work without regard to electrical grid, user needs, etc;
b. **Time of Use (TOU) Model:** Pricing signals shifts 30% of charging to off-peak
c. **Better Place Charging model:** Charging is directed by EV Network Provider accounting for battery SOC, user behavior, grid status, etc. Smart Charging

**Generation**

**Transmission**

**Distribution**

**The IEC**

חברת החשמל

# IEC Study: Ad-Hoc, TOU, & Better Place Charging

The Better Place / Smart Charging scenario has the smallest impact.

| | **Ad-hoc** charging | **Off-peak incentive** | **Better Place Smart Charging** |
|---|---|---|---|
| Generation | **Add 2,345 MW** | **Add 1,770 MW** | **No additional capacity required** |
| Transmission | **Add 1 switching station, 10 substations, and 18 transformers** | **Add 1 switching station, 7 substations, and 13 transformers** | **No additional transmission required** |
| Distribution | **Add 2,158 km of medium voltage cables** | **Add 1,581 km of cables** | **Add 287 km of cables** |

# Mass adoption of plug-in vehicles has positive grid impacts with no new generation capacity

A UC Berkeley study has found that even if charging was uncontrolled, California could support one million PHEVs without requiring additional generation capacity

A study by the Pacific Northwest National Laboratory found that if charging was controlled, 100 percent residential adoption of plug-in hybrids would:

- Require minimal investment in additional generating capacity in the long-run
- Allow for more efficient use of fixed capital and lead to *lower* average costs.

| | Total number of PHEVs | Energy costs per MWh | |
|---|---|---|---|
| | | Before PHEVs | After PHEVs |
| Cincinnati Gas and Electric | 591,000 | $54.26 | $50.27 |
| San Diego Gas and Electric | 1.1 million | $204.98 | $151.00 |

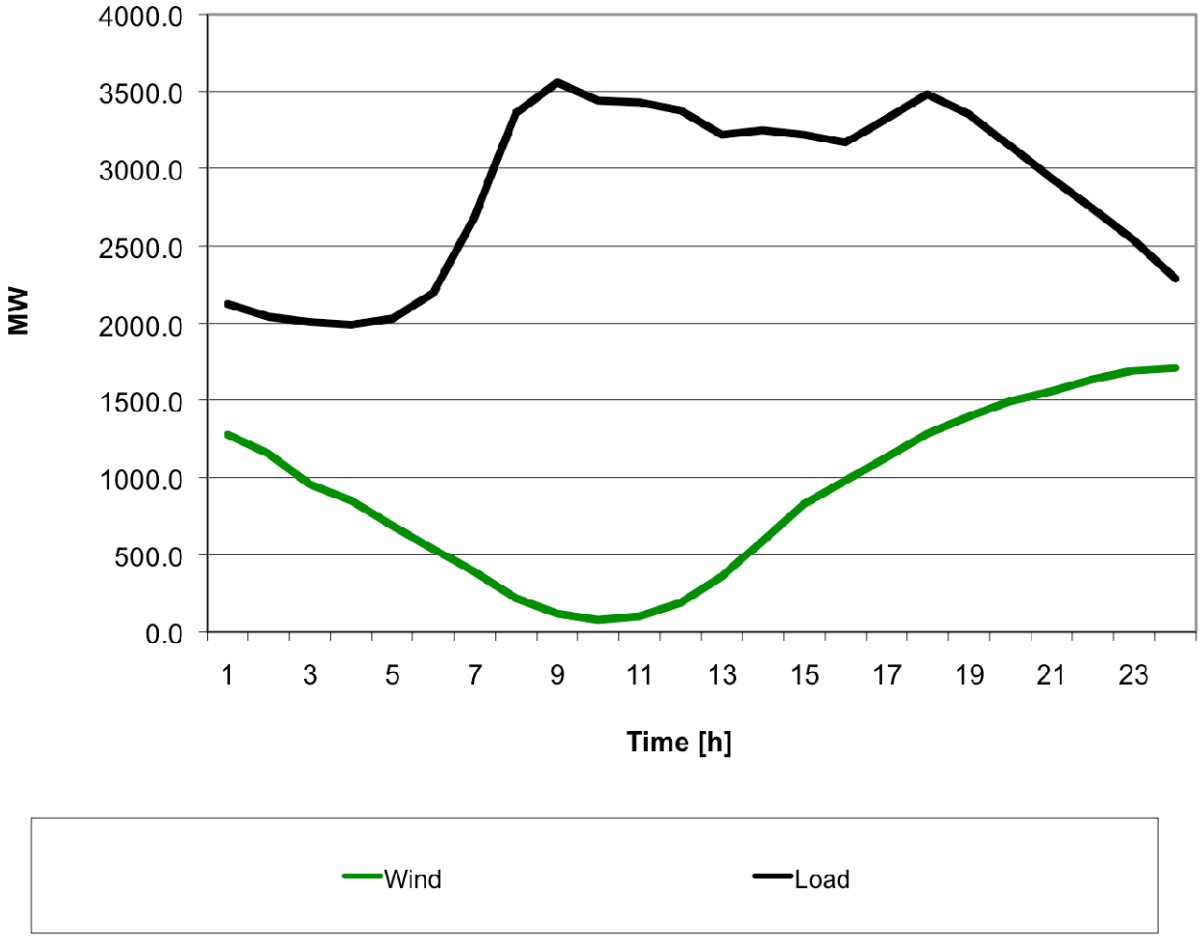
# EV Solutions Denmark

Typical Daily Load

- ~68 GWh

Wind

- ~17 GWh




**Source:**
•Data provided by DONG Energy.

# EV Solutions Denmark, ~20% 400k EVs

Typical Daily Load

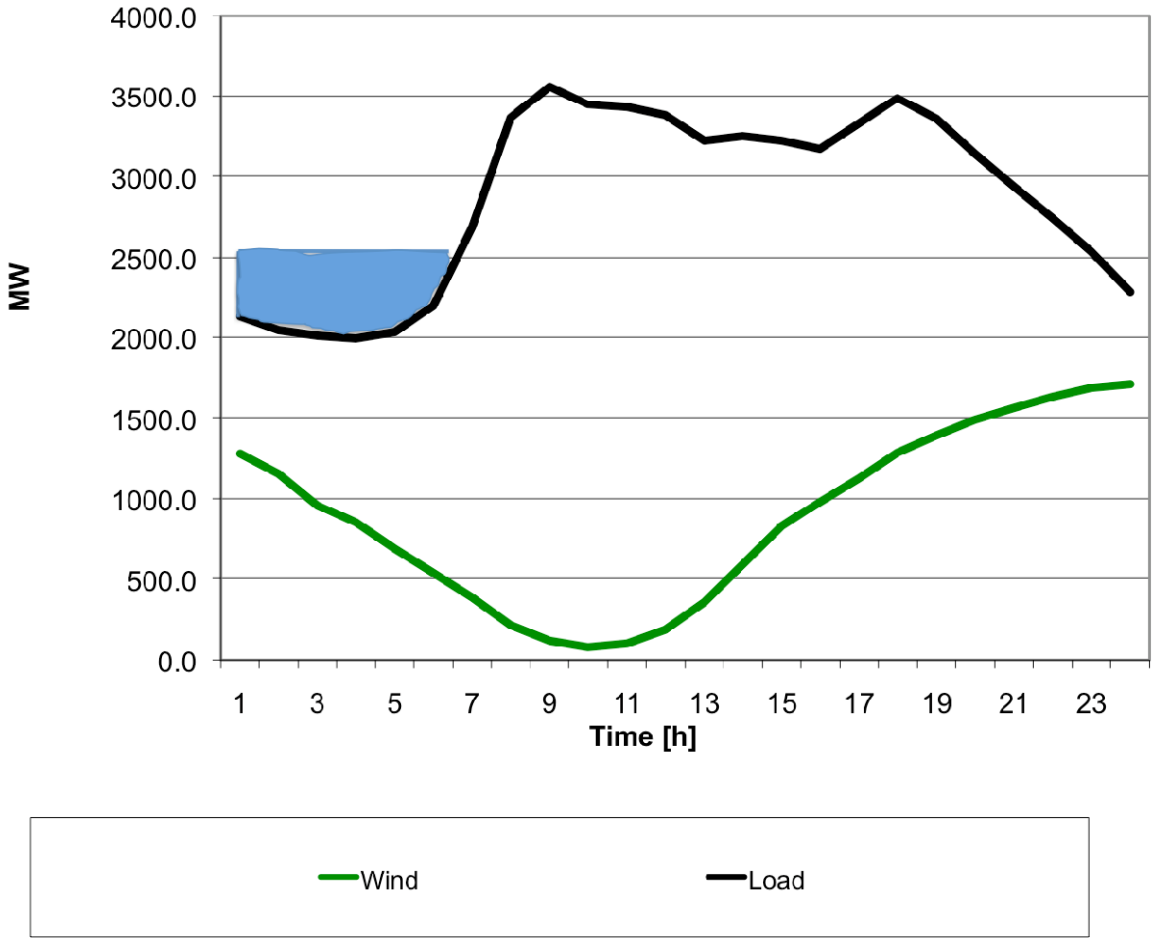
- ~68 GWh

Wind

- ~17 GWh

EVs

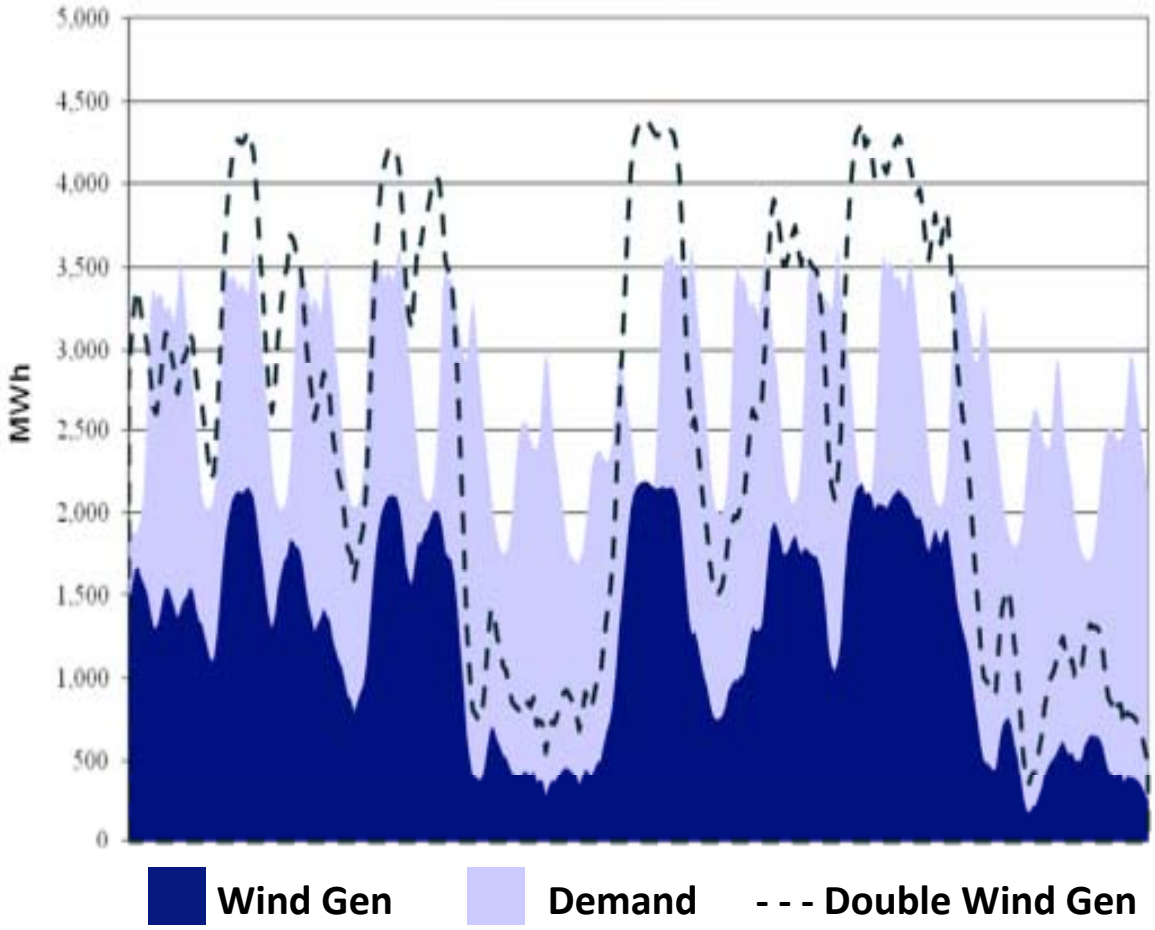
- ~3 GWh




**Source:**
•Data provided by DONG Energy.

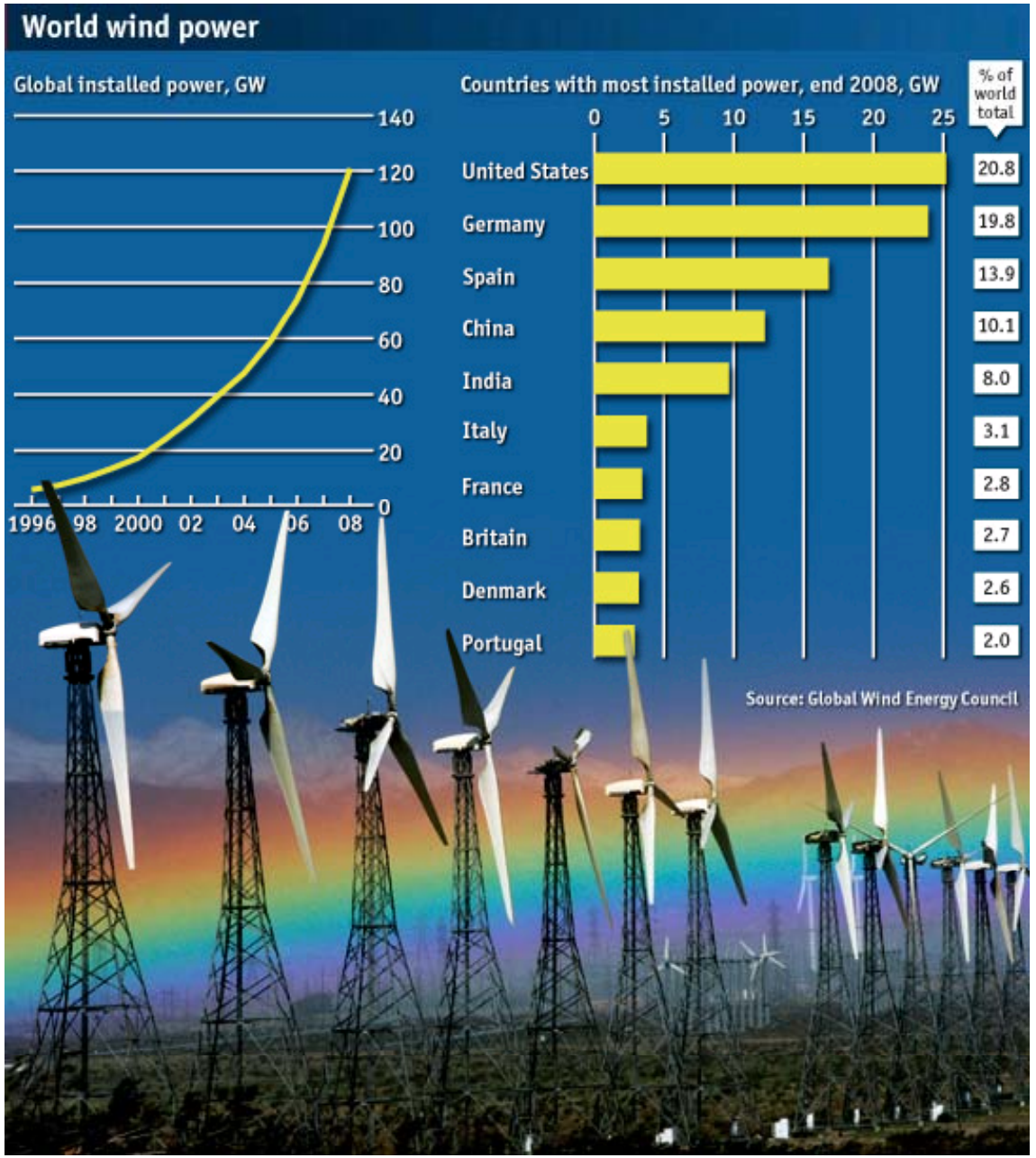
# Electric Utility Benefits

W. Denmark Demand
& Wind Gen,
4-17 Dec ’06




**Source:**
•Data provided by DONG Energy.

# US Wind Power Leader




From The Online Economist

3 February 2009

# Where We Are Today

| | |
|---|---|
| **OCT** 2007 | Better Place launches; Raises $200M of Funding. |
| **JAN** 2008 | Better Place Israel launched in Jerusalem, Israel; also announces supplier partnership with Renault-Nissan |
| **MAR** 2008 | Better Place Denmark launched in Copenhagen, Denmark. |
| **OCT** 2008 | Better Place Australia launched in Melbourne, Australia. |
| **NOV** 2008 | Better Place California launched in San Francisco Bay Area. |
| **DEC** 2008 | Better Place Hawaii launched in Honolulu. |
| **JAN** 2009 | Better Place Ontario launched in Toronto; Raises $133M for Better Place Denmark |

better place