Creating a future of zero-emission mobility

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Nissan Green Program 2010

Nissan’s environmental ideal is a society where there is a ‘symbiosis of people, vehicles and nature.’ In working towards this goal, Nissan has established specific targets in its eco-action plan: ‘Nissan Green Program 2010.’
Nissan’s approach to the environment

Seeking to attain a sustainable mobile society, Nissan is taking a proactive approach to finding solutions to environmental challenges such as CO2 reduction to mitigate global warming.
Long-term goal for reducing CO2

- CO2 concentration below 550-450ppm (IPCC report)
- CO2 emissions from all new vehicles must be reduced by 70%~90% (vs 2000)
CAFE MPG standards 1978 - 2010

YEAR

CAFE Standard (mpg)

Passenger Cars

Light Trucks

NISSAN
On April 22, 2008, DOT announced the proposed CAFE standards for both passenger vehicles and light trucks would increase by 4.5 percent per year over the five-year period ending in 2015 as a response to the Energy Act of 2007, passed by Congress.
Potential for reducing CO2

EV/FCV are the ultimate solution for zero-emissions
Clean energy supply

Ability to reduce CO₂ emission to almost zero by using nuclear power, solar, wind, water, etc.

<table>
<thead>
<tr>
<th></th>
<th>Gasoline Vehicle</th>
<th>EV</th>
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<tbody>
<tr>
<td>Current Average</td>
<td></td>
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</table>

CO₂ emission of EV (Considering present gasoline vehicle as 100)
Urban and Regional planning utilizing EV

- 70% of CO2 emission comes from metropolitan areas
- Goal: establish high efficient traffic management system, collaborating with local governments by adopting EV and ITS

<table>
<thead>
<tr>
<th>Issue</th>
<th>Measures</th>
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<tbody>
<tr>
<td>Accessibility to city center</td>
<td>• ITS supports</td>
</tr>
<tr>
<td>Traffic flow</td>
<td>- Eco-driving support</td>
</tr>
<tr>
<td></td>
<td>- Dynamic route guidance</td>
</tr>
<tr>
<td></td>
<td>- Traffic signal control</td>
</tr>
<tr>
<td></td>
<td>• EV zero-emission mobility</td>
</tr>
<tr>
<td></td>
<td>• Reduction of # of vehicles</td>
</tr>
<tr>
<td></td>
<td>• Alternative transportation</td>
</tr>
<tr>
<td></td>
<td>• EV, personal mobility</td>
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<tr>
<td></td>
<td>• Entrance restriction</td>
</tr>
<tr>
<td></td>
<td>- Park &amp; ride, car sharing</td>
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<td></td>
<td>- Public transportation</td>
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</table>
History of Nissan’s EV

- 15 years of experience in lithium-ion battery/car application
- Late CY2010 launch all new pure electric vehicle

Timeline:
- 1998 Altra EV
- 2000 Hypermini
- 2008 Test Vehicle
- PIVO 2005 Tokyo MS
- PIVO2 07 Tokyo MS
- NUVU 2008 Paris MS
- 2010 US, JPN
Lithium-ion battery

- High reliability in automotive applications
- Ready for mass production

**Achieved High Reliability**
- High heat stability with the use of manganese positive electrodes
- Enhanced cooling performance by lamination
NISSAN AND NEC JOINT VENTURE - AESC - STARTS OPERATIONS
12.0 billion yen investment to mass produce advanced lithium-ion batteries

TOKYO (May 19, 2008) – Nissan Motor Co., Ltd., NEC Corporation, and its subsidiary NEC TOKIN Corporation, today announced that its joint-venture company – Automotive Energy Supply Corporation (AESC) – has begun full operations. AESC’s start of operation follows the announcement of the joint-venture in April 2007.
The Nissan EV

All the feature customers have come to expect:

- Unique Design
- Compact Car Size
- Space For 5 People
- 100-Mile Range
- Advanced Safety Features
- Premium Amenities
Nissan EV test vehicle

Coast-to-coast tour to support Nissan’s EV and infrastructure development initiative

Public feedback
• Quiet and distinctive
• Far better than expected with eye-opening acceleration

<table>
<thead>
<tr>
<th>New EV</th>
<th>2010  (US, JPN)</th>
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<tbody>
<tr>
<td>Unique Body Style</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>5-door hatchback</td>
</tr>
<tr>
<td>Capacity</td>
<td>4×5</td>
</tr>
<tr>
<td>Autonomy</td>
<td>More than 100 mile (LA4)</td>
</tr>
<tr>
<td>Battery</td>
<td>(Laminated Li-ion)</td>
</tr>
<tr>
<td>Motor</td>
<td>High response type</td>
</tr>
</tbody>
</table>
Benefits to the consumer

- True zero-emission vehicle
- No price premiums
- Lower Total Cost of Ownership than a comparable Internal Combustion Engine
- Lower maintenance costs than an ICE vehicle (Less complexity, no engine, no oil changes)

Electric Vehicle DOE MPG rating: 367 mpg equivalent*

Cost per mile comparison (15k miles):
- Car (good 30mpg, $4/gal) = $0.13 per mile / $1,950
- EV (high $0.14 kWh) = $0.04 per mile / $600

Advantage exists even if gasoline drops below $1.10/gal

* DOE Code of Federal Regulations, Section 10, Part 474
# Charging network concept

<table>
<thead>
<tr>
<th>EV Usage</th>
<th>Home Charging</th>
<th>Charging Network</th>
<th>Pathway Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Distance</td>
<td>Normal</td>
<td>Normal or Quick</td>
<td>Quick</td>
</tr>
<tr>
<td>Mid Distance</td>
<td>Normal</td>
<td>Normal or Quick</td>
<td></td>
</tr>
<tr>
<td>Long Distance</td>
<td>Normal</td>
<td>Normal or Quick</td>
<td></td>
</tr>
</tbody>
</table>

- **Charger Type**
  - Home Office
  - Super Market, Mall, Restaurant or Parking Lot
  - Major Road Highway, Service Area
Level 1 – 120V Cordset Charging Example (EVSE)

Elements of 120V charging system in USA

Vehicle Coupler
By YAZAKI
(SAE J1772)

Integrated Power and Signal Line Cable

TEST CAR
Level 2 – charging circuit

- Special electrical work required to install, but 208/240V power is available at home and business
- To meet USA electric code the Level 2 EVSE must be “hard-wired” to the grid
Fast charging infrastructure

Nissan is working towards fast-charging standardization

Safety communications with vehicle not standardized

Vehicle coupler not standardized

Integrated power & communications cable

Hardwired supply Voltage=480V/600V 3-phase Power=30-250 kw
Future intelligent grid (V2G/V2H)

Key attributes: compatibility and functionality
When will Nissan’s EV be available?

- Nissan will partner with select public and private organizations to make EVs available for fleet/commercial use in 2010 and 2011.
- Regionally, individual retail sales may begin as soon as late 2010 if the infrastructure is ready.
- EVs will be mass marketed to individual consumers in 2012.
Where will Nissan’s EV be available?

- Nissan is selecting these early markets, not as a trial, but as real markets of opportunity.
- Early markets are selected via favorable demographics, environmental mindset, public/private support and cooperative utilities to work together on infrastructure rollout.
- Current partnerships include:
  - State of Tennessee
  - State of Oregon
  - Sonoma County
  - Tucson metro area
  - San Diego metro area
  - And more to come...
Each partner’s strengths can be leveraged

**Nissan**
- Electric vehicle
- Battery
- EV knowledge & support

**Companies**
- EV fleet vehicles
- Infrastructure support
- EV awareness

**State or Region**
- Promote EV awareness
- Infrastructure support
- Legislation / Incentives
- Public education
- EV fleet vehicles

**Utilities**
- Expand renewable electricity sources
- Capacity expansion

A sustainable future requires all stakeholders working together.
Economic stimulus package

Good News on many fronts:

- DOE loan for retrofitting manufacturing plants to produce fuel efficient vehicles
- DOE grant for production of advanced batteries and components
- Up to $7,500 tax credit for first 200,000 vehicles/OEM based on pack size/range
- Charging network and grid infrastructure investments
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