REvision2018
Session3 Bringing Sun and Wind in Japan
EV expansion and
Renewable Electricity

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Vehicle electrification is inevitable: Energy

Energy Flow (2011)

Loss in electricity

Loss in transportation

Source: Lawrence Livermore National Laboratory, US
Vehicle electrification is inevitable: CO2

**CO2 reduction vision**

- **To reduce CO2 emissions from all new vehicles by 90%**,
  - **Short & mid term**: ICE efficiency improvement
  - **Long term**: Electric powertrain expansion with Renewable energy

Source: Nissan
40% of LDV will be electrified in 2050?

Prediction of electric cars stock and ratio: IEA 2D scenario

Countries which decided ICE ban

Source: ETP 2017, IEA
Ambitious target enhance technology innovation

- Doubled the mileage of New Nissan LEAF with price reduction

Re-purchasing intention

- Running cost
- Quietness
- Acceleration
- Mileage
- Charging time
- Charging infrastructure

Nissan LEAF owner’s survey (Japan)

Nissan LEAF mileage and price

Vehicle price*¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Mileage</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>200km</td>
<td>3.76 M yen</td>
</tr>
<tr>
<td>2013</td>
<td>228km</td>
<td>3.75 M yen</td>
</tr>
<tr>
<td>2015</td>
<td>280km</td>
<td>3.64 M yen</td>
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<tr>
<td>2017</td>
<td>400km</td>
<td>3.51 M yen</td>
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Mileage*²

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Source: Nissan
100% renewable energy society realized by EV

- Fluctuations in power supply of renewable energy controlled by utilization of EV in demand and supply

Without EV: Supply & demand controlled by thermal power generation

With EV: Supply & demand controlled by charging & discharging EV

Supply & demand realized by 100% renewable energy society

Without EV:

Supply: Thermal power generation
Demand: Buildings and factories

With EV:

Supply: Renewable energy sources like wind and solar
Demand: Buildings and factories with EVs charging and discharging

Fluctuations in power supply of renewable energy controlled by utilization of EV in demand and supply.
Fluctuations in power supply could be controlled if 10% of passenger car is EV.
Net zero energy cost

Electricity provider

Public charge & discharge station

Electricity service provider

EV user

Public charging service

Charge & Discharge control

Demand Control

Charge at home
Actions are expanding globally

**Collaboration with the partners**

- **V2H:** Vehicle to Home, V2B: Vehicle to Building, V2G: Vehicle to Grid

### V2G
- **2016~ 10 ENEL**
- **2016~ 10 ENEL, NUVVE**
- **2016~ 6 ENEL, Mobility House**

### V2B
- **2012~ 100**
- **2015~2017 13 DOD, LA Air Force Base**

### Smart Charge
- **2018 60* KEPCO, SEI**
- **2017~2018 45* TEPCO**

### Smart Charge V2G
- **2013~2017 270* Maui, NEDO, Hitachi**

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Number of bi-directional charger

* Include normal charger