Utility 3.0
Roles of Future Utility

TEPCO Power Grid
Hiroshi Okamoto
5D’s : Triggers

Deregulation
Digitalization (IoT/Al, DX)
Decentralization
Decarbonization
Depopulation
Utility Transformation Driven by 5D’s

Utility 1.0: Vertically Integrated Utility
- Deregulation

Utility 2.0: Unbundling of T&D Business
- Digitalization
- Decentralization
- Decarbonization
- Depopulation

Utility 3.0: Integration with Other Platforms
DX of Electricity Retail Service

Devices
- TV
- Refrigerator
- Car
- LED
- Washer
- HVAC

User Experience
- Enjoy the TV Drama, Show
- Keep fresh food
- Move
- Get lighting
- Keep clothing clean
- Keep rooms comfortable

Electricity Supply
UX Coordinator
User
Energy Shift Driven by Electrification x Decentralization

Source: TEPCO Research Institute

Electricity Consumption

BER (Bulk Energy Resource)

Electrification

Source: TEPCO Research Institute
Electrification: Key to Decarbonization

**Final Energy Consumption**

- **2013**
  - Non Elec.: 8.4 petajoules (PJ)
  - Elec.: 3.5 PJ
  - Total: 12.0 PJ

- **2050**
  - Non Elec.: 6.7 PJ
  - Elec.: 2.0 PJ
  - Total: 8.7 PJ

**CO₂ Emissions**

- **2013**
  - Non Elec.: 12.4 x 10⁴ t CO₂
  - Elec.: 6.6 x 10⁴ t CO₂
  - Total: 19.0 x 10⁴ t CO₂

- **2050**
  - Non Elec.: 3.5 x 10⁴ t CO₂
  - Elec.: 1.8 x 10⁴ t CO₂
  - Total: 5.3 x 10⁴ t CO₂

**Depopulation, Efficiency Improvement**

- 2013: 12.0 PJ
- 2050: 8.7 PJ

**Source:** TEPCO Research Institute
Integration of Transportation and Power System

Transportation Network with EV

Power Grid

Hub

Charging/Discharging Station

DG

Prosumer

Device

Human

GW

DSO

SP

DS

EV

Storage

IT Network

Dynamic Locational Pricing

G: Generator
SO: System Operator
DG: Distributed Generator
SP: Service Provider
GW: Gateway
DS: Data Storage
Grid as a Platform for Society 5.0 (CPS)
5D’s (Deregulation, Digitalization, Decentralization, Decarbonization, Depopulation)

- Electrification of transportation and heating
- Partnership and integration with other partners

Power Grid as a Platform driving Society 5.0