NISSAN
MOTOR CORPORATION

Battery Circular Economy

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EV; Penetration Background

■Carbon Neutral

➢All Over the World

■Zero Emission

➢Big City

■Energy Security

➢Large Population Country

■Industrial Innovation

➢Developing Country

EV; Its Attractiveness

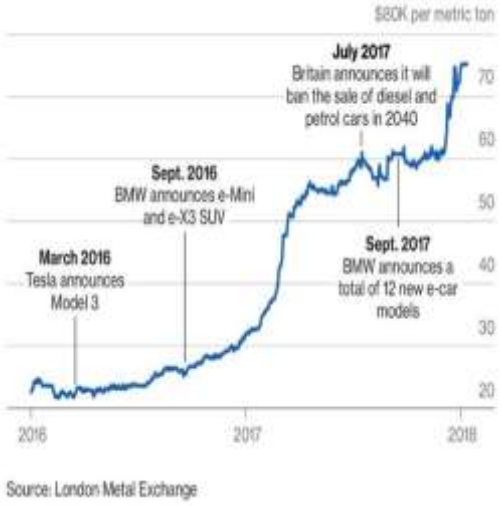
- Contribute Energy Management
  - Contribute to Stabilize Renewable Energy
  - Charge @Home, @Office, @Destination; No Go out to Charge
  - Charge, Carry, and Feed Electric Power
  - Less Time Dependent (Charge @Night, Feed Back @ Mid Day)
- Air Quality Improvement (Zero Emission)
- Drive Feel
  - Good Acceleration,
  - Less Vibration (from Powertrain)
  - Quiet
- Total Cost of Ownership

High Demand, Low Supply

	Global Battery Production Volume Forecast	EV # Forecast
2030	2500GWh + 1000GWh (Tesla)	50 Million
2040	10000GWh ?	100 Million
2050	20000GWh ?	300 Million

Cobalt

Lithium



Demand for EV ; High Quality Li2CO3 ton

- 180Ktom @2021
- 2000Kton @2030
- 4000Kton @2040
- 8000Kton @2050

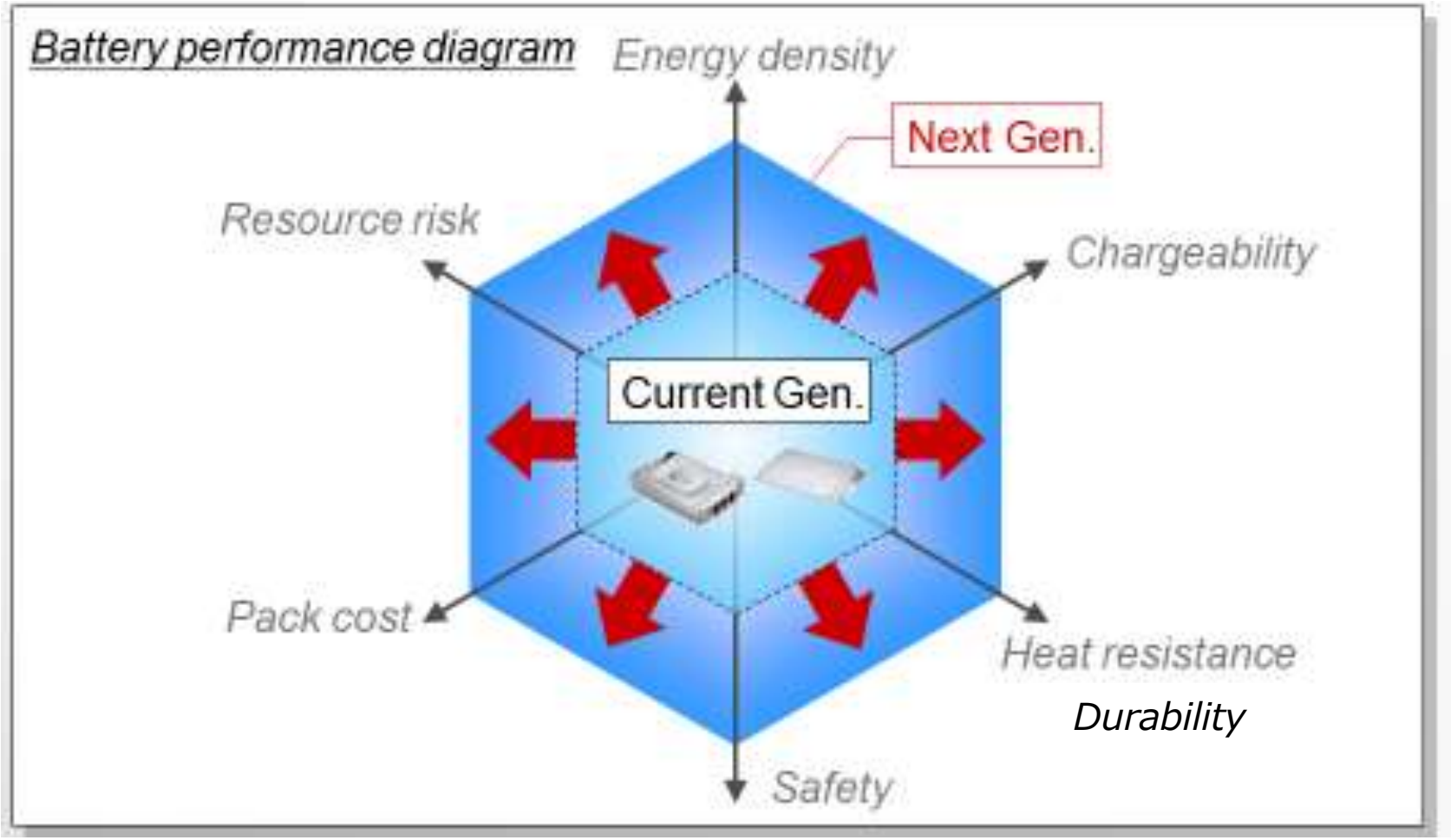
16000Kton (Estimated Volume Exist)

Solution/Proposal

- Improve Battery Function
  - Better Durability for Longer Life
- Reduce/Save Battery Demand
  - EV Market Revolution (Share Car Reduce Battery)
  - Charger Revolution (Charge while Driving)
- Establish Battery Circular Economy
  - Utilize Battery as Energy Storage
    - To absorb Renewable Energy
    - With V2X
    - Emergency Use
  - Re-Use Battery
  - Better Recycling Efficiency

Battery Function

- Balanced Function Improvement is Better



- Innovation such as All Solid-State Battery Change Game

New Category

Porsche Tycan

93kWh 22minutes
w/350kW

Tesla Model S

100kWh 38minutes
w/250kW

Tesla Model 3

55-75kWh

w/250kW or w/50kW

Nissan LEAF

40, 62kWh

w/70kW or w/50kW

30kWh Maximum?

w/20kW or AC3kW (50kW可)

200km Range

High Spec BMW, MB

- Alternate ICE Car
- Big Battery
- High Power Charge
- High Cost
- From Premium Bland

Mass Market VW, Hyundai

- New Way of Mobility
- Affordable Price
- Moderate Spec
- Appropriate Battery

New Category

- Micro City Commuter
- Share Car
  (Selective Battery Size)
- Dedicated Use Model

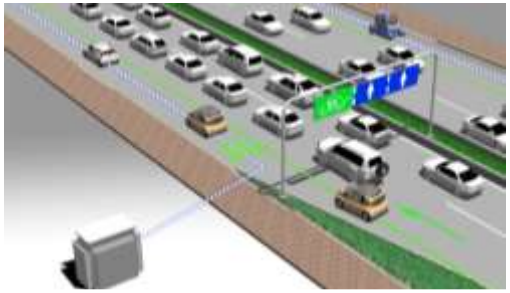
New Technology –Wireless Charge

Publicness

V2X @Tower Parking

TAXI (Waiting)

@Crossing



While Driving (Highway)

2025~35

2035~

2020

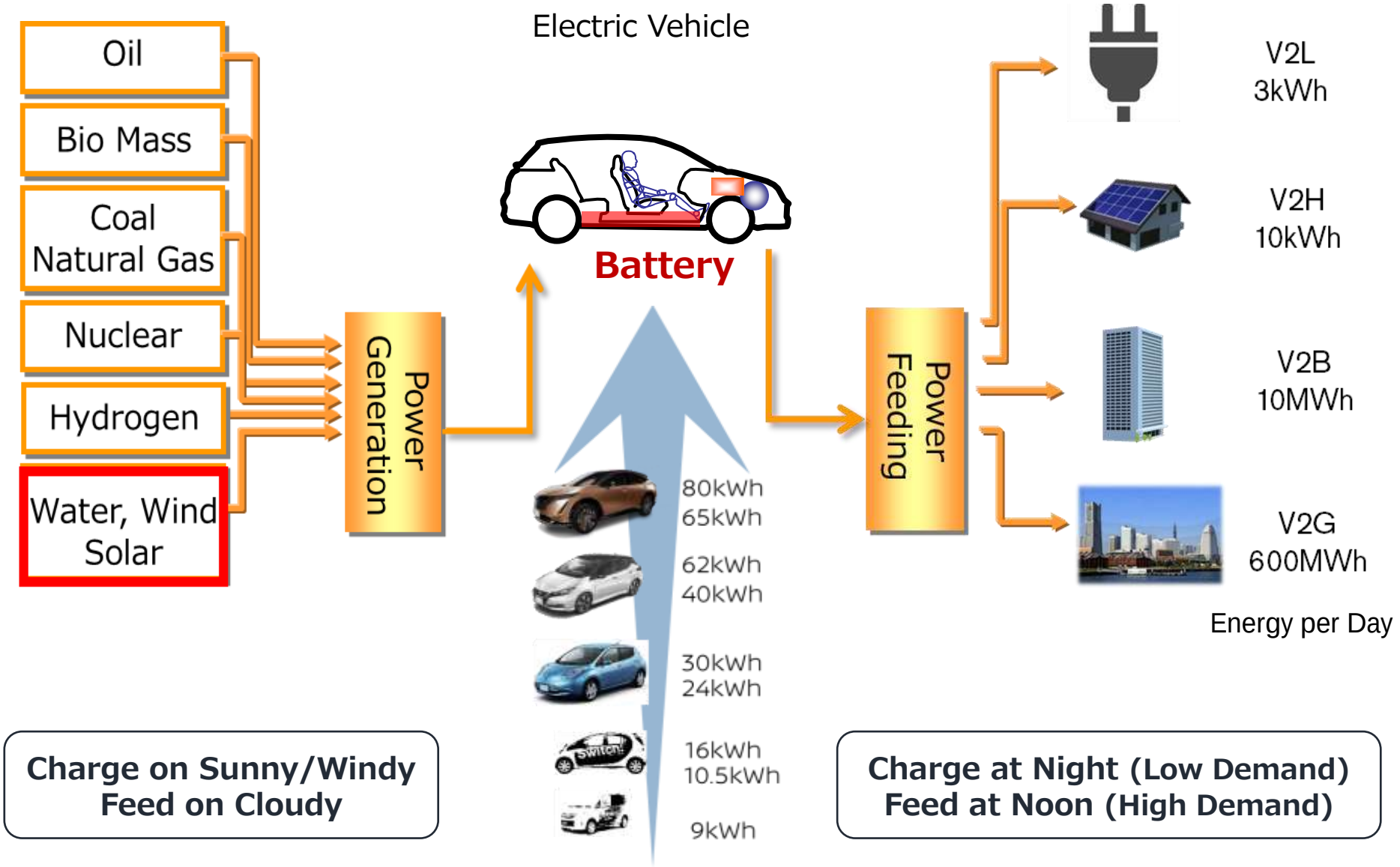
Charge @ Tower Parking

@Parking

@Parking

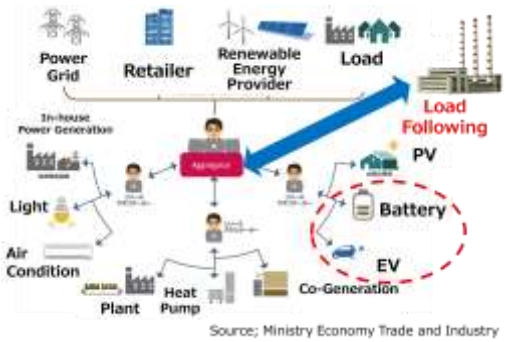
Output

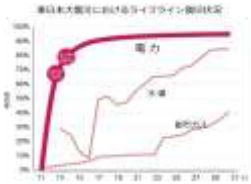
Carbon Neutral Generation & Energy Flexibility



Energy Source output

- Transfer Energy
  - EV can Move
- Leisure, Work
- Power to House, Building
- Power back to Grid
- Share Energy on the Car
  - Parking Vehicle Contribute
- Emergency Use
  - Carry Energy to Shelter, Damaged Area
  - Contribute to Peak Shave



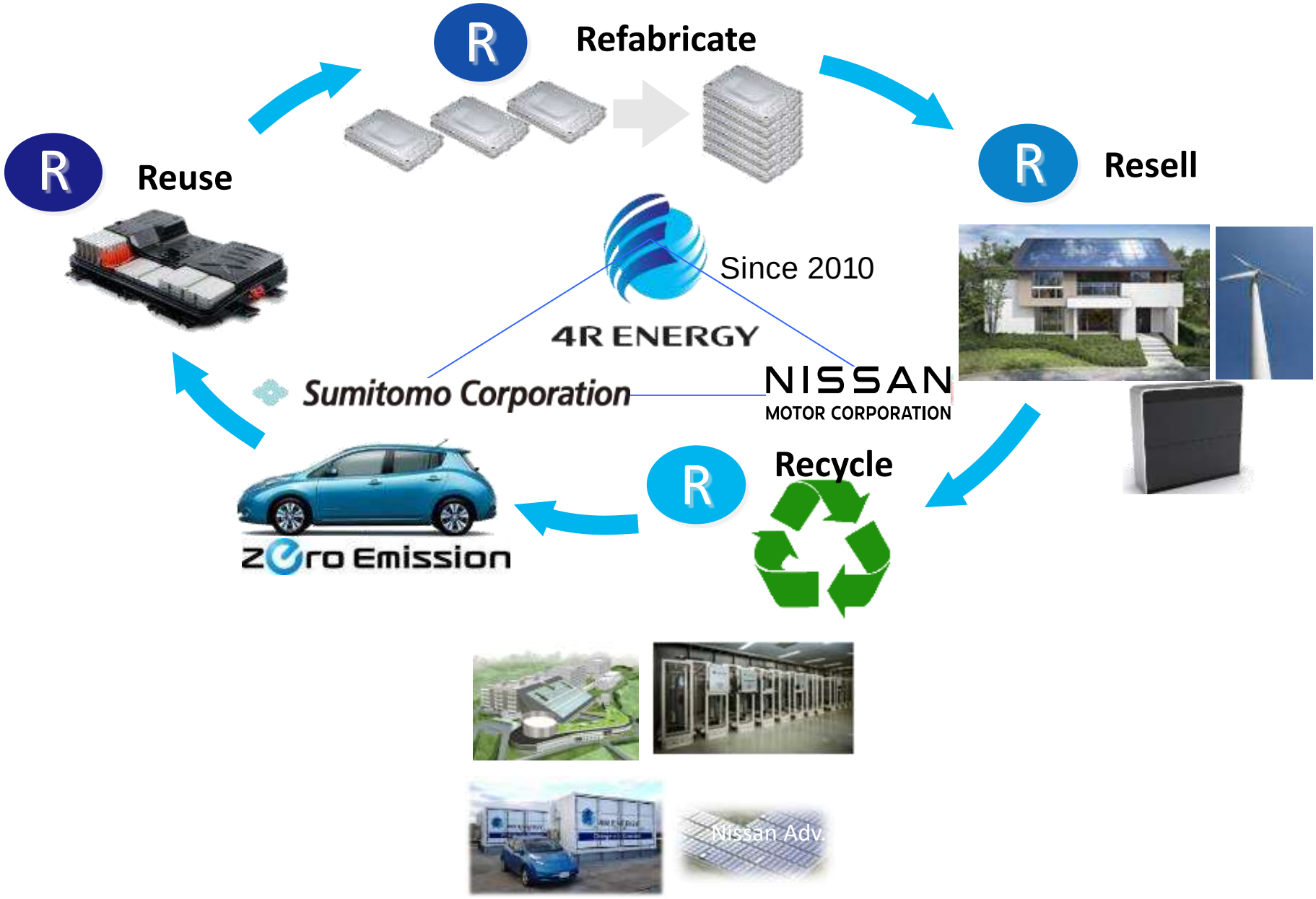


2011 : Transport with
Early comeback of Electricity

2016 : Transport + Power Output

2019 : Power Output

Battery Circulation



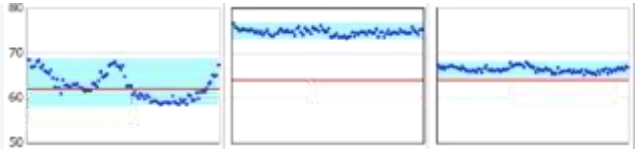
Reuse and/or Repurpose

Analysis

Refabricate

Re-Pack

Module by Module



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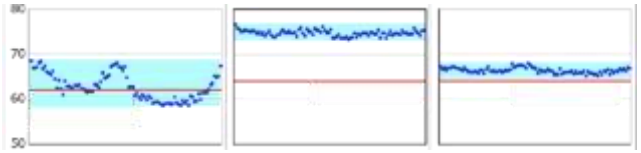
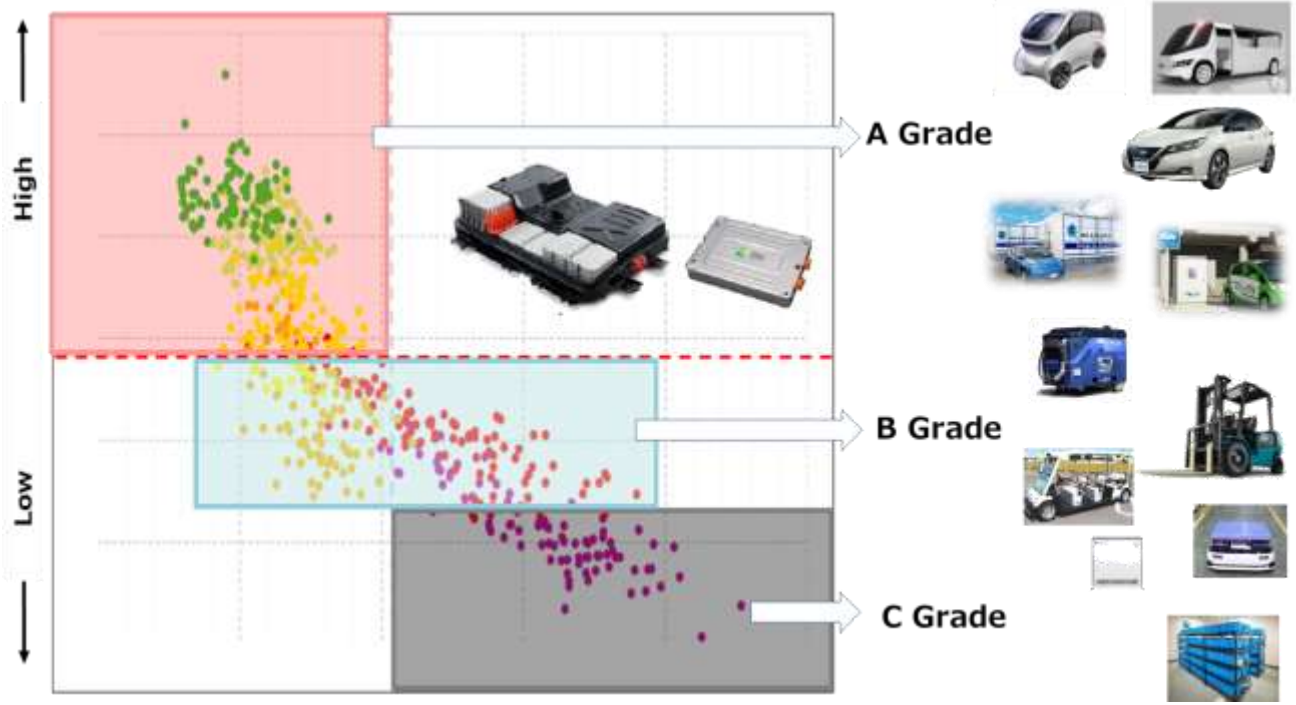




EV

Stationary Big

Mobile/Backup Power Supply

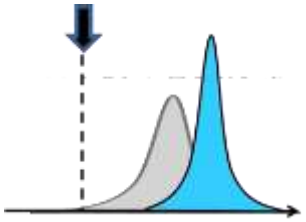
Falk lift AGV

Stationary Home

Tasks for Battery Circular Economy

■Collection Flow (Increasing Collection Ratio)

- ➢ Only Battery Lease
- ➢ One Owner for Multiple Used Battery
- ➢ Collection Mandate, Prohibition of Private Resell
- ➢ Common Commercial Flow



■Evaluation

- ➢ Provide Durability Information and Data to the Customer
- ➢ Fair and Reliable Evaluation method for Above

■Technology

- ➢ Easy Dismantle Design
- ➢ Durability Improvement by Feedback from Market

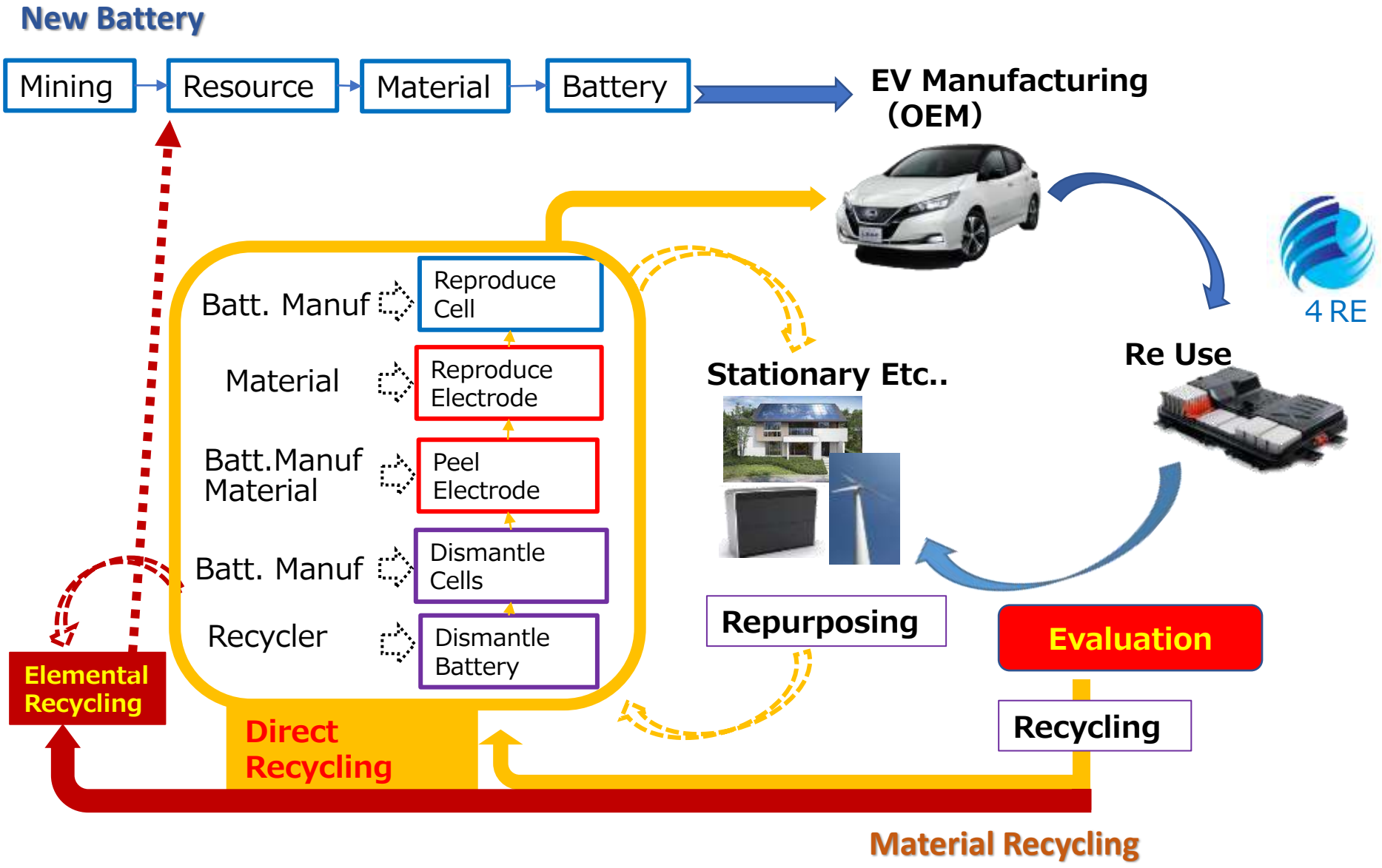
■Market

- ➢ EV Number Need to Increase First
- ➢ Corroboration Among Multi Industry

Collection | Evaluation | Technology | Marketing

Regulation, Standard, Incentive, Education, Enlighten

Recycling Flow




Thank you for your attention