Update of battery in Japan

WRBRF 2016

Seoul, Korea
OCTOBER 4TH, 2016

BATTERY ASSOCIATION OF JAPAN (BAJ)
# About BAJ

**establishment**
May, 1948

**Member company**
Regular member: 15
Associate member: 84

**Board**
8 members
President: Makoto Yoda (GS Yuasa)

**staff**
director, 14 assigned staffs, 6 employees

**budget**
352 million yen (fy 2016)

## Organization

- General Meeting
- Board Meeting
- Secondary Battery Division (8 committees)
- Secondary Battery Division 2
- Primary Battery Division (7 committees)
  - Public Relations Committee
  - Standardization Committee
  - Statistic Committee
  - Used Car LIB Research Committee
  - Next Generation Battery Committee
  - Button Battery Collection Center
  - International Environment Regulation General Committee
  - ESS Promotion Committee
  - Product Liability Committee
  - Recycling Committee
  - Factory Environment Committee
  - International Battery Transportation Committee
  - International Battery Standardization Committee
  - Technology Committee
Organized in 1948

Regular members: 15 companies

- ELIY Power Co., Ltd.
- FDK Corporation,
- GS Yuasa International Ltd,
- Kawasaki Heavy Industries, Ltd.,
- NEC Energy Devices, Ltd.,
- Seiko Instruments Inc.,
- Sony Corporation,
- TOSHIBA Corporation

- ENAX, INC.
- The Furukawa Battery Co., Ltd.,
- Hitachi Maxell Energy, Ltd.,
- Mitsubishi Electric Life Network Corp.,
- Panasonic Corporation,
- Hitachi Chemical Company, Ltd.
- Toshiba Battery Co., Ltd.

Associate members: 84 companies

- Material manufacturers,
- Equipment manufacturers,
- Battery pack assemblers,
- Application products manufacturers,
- Foreign battery manufacturers,
- Recycle related companies ...

as of September 2016
# Japan battery production in 2015

**Total by volume**: 3.74 billion units

**Total by value**: 739.9 billion yen

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Units (Billions)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline manganese batteries</td>
<td>0.71 (31%)</td>
<td>19%</td>
</tr>
<tr>
<td>Silver oxide batteries</td>
<td>0.85 (38%)</td>
<td>23%</td>
</tr>
<tr>
<td>Lithium batteries</td>
<td>0.71 (31%)</td>
<td>19%</td>
</tr>
<tr>
<td>Lead-acid storage batteries</td>
<td>0.03 (2%)</td>
<td>1%</td>
</tr>
<tr>
<td>Alkaline storage batteries</td>
<td>0.09 (6%)</td>
<td>10%</td>
</tr>
<tr>
<td>Nickel metal-hydride batteries</td>
<td>0.37 (25%)</td>
<td>26%</td>
</tr>
<tr>
<td>Lithium-ion batteries</td>
<td>0.98 (67%)</td>
<td>39%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Battery Type</th>
<th>Value (Billions)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline manganese batteries</td>
<td>29.2 (45%)</td>
<td></td>
</tr>
<tr>
<td>Silver oxide batteries</td>
<td>14.1 (22%)</td>
<td></td>
</tr>
<tr>
<td>Lithium batteries</td>
<td>21.6 (33%)</td>
<td></td>
</tr>
<tr>
<td>Lead-acid storage batteries</td>
<td>165.4 (25%)</td>
<td></td>
</tr>
<tr>
<td>Alkaline storage batteries</td>
<td>15.3 (2%)</td>
<td></td>
</tr>
<tr>
<td>Nickel metal-hydride batteries</td>
<td>150.2 (22%)</td>
<td></td>
</tr>
<tr>
<td>Lithium-ion batteries</td>
<td>344.1 (51%)</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Ministry of Economy, Trade and Industry*
Increasing in battery sales from 2012 is primarily due to an increasing in automotive batteries.
Battery market analysis in Japan

Automobile battery has more presence also in Japan

Percentage of automobile battery based on sales amount (domestic & export)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTL. rechargeable battery</td>
<td>57%</td>
<td>59%</td>
<td>64%</td>
<td>63%</td>
</tr>
<tr>
<td>for automobile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead acid battery</td>
<td>60%</td>
<td>62%</td>
<td>63%</td>
<td>63%</td>
</tr>
<tr>
<td>for automobile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ni–MH battery</td>
<td>87%</td>
<td>86%</td>
<td>87%</td>
<td>87%</td>
</tr>
<tr>
<td>for automobile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li ion battery</td>
<td>41%</td>
<td>44%</td>
<td>57%</td>
<td>56%</td>
</tr>
<tr>
<td>for automobile</td>
<td></td>
<td></td>
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</tbody>
</table>

Estimated from the data of METI & BAJ members

Estimation of ESS battery percentage (Li–ion) around 10%???

BAJ is focusing to expand ESS battery to make certain below

- effective practical use for various energy source
- stable supply for various energy
Situation of renewable energy in Japan

Renewable energy transition in Japan

- **Geothermal**: 1.0~1.1%
- **Biomass**: 3.7~4.6%
- **Wind power**: 1.7%
- **Solar power**: 7.0%
- **Small hydraulic**: 8.8~9.2%
- **LNG**: 27%
- **Coal**: 26%
- **Petroleum**: 3%

Annual power generation of renewable energy (GWh)

- **Fiscal year**: 1990 to 2014
- **Percentage of renewable energy**

Source: ISEP

Year 2030

10,650 billion kWh
New strategic energy plan in Japan

Key points of the strategy

1. **Thorough energy efficiency and conservation**
   - Expanding the scope of targets of the Energy Efficiency Benchmark Program to all industries
   - Enhancing the introduction of energy efficiency and conservation efforts into the fields of SMEs (Small and Medium-sized Enterprises), house and transportation

2. **Expanding the introduction of renewable energy-Ensuring compatibility between maximum introduction and expansion, and inhabitation of public burden**

3. **Establishing new energy systems**
   - Simultaneously encouraging new entrants to the field of electricity and reducing CO₂ emissions
   - Starting up an integrated energy system of renewable energy and energy efficiency and conservation are integrated
   - Establishing an energy system of local production for local consumption

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**Crucial role of rechargeable battery**

- Expanding ZEH and ZEB
- Integrated energy management of save energy, create energy and storage energy
- Solving the limitation of grid connection
- Introduction promotion of remote controllable batteries
- Regulation of energy resource by IoT technology
- Introduction promotion of virtual power plant
- Cost reduction of battery

source: METI
Situation of home use ESS in Japan

- Total subsidy: 44 billion yen (from FY 2012 to 2016)
- Number of ESS introduced using subsidy: ≈50K
- Average capacity per device: =7kWh
- Reduction of product price: ≈50% (price of 2014 compared with 2012)

Source: SII

Trend and forecast for kWh price for ESS

- Above subsidy suspended in 2016.
- Subsidy for large ESS for solar power producers to avoid grid connection pending is extended.
- New subsidies started in 2016.
  * ESS to realize zero energy house and building
  * Construction business for virtual power plant
  * Some other subsidies for batteries and battery systems etc.
Distribution of large scale ESS in Japan

Typical use
- load leveling
- power stability for isolated island
- smart city
- regen power (railway)
- FEMS/BEMS
- local production for local consumption

Including those of validation phase and planning phase

Source: Compiled by BAJ from various sources
Demand forecast for ESS in Japan

unit: M yen

World market prediction at 2020: 656,500M yen

Prediction from 2016 to 2020

source: Fuji Keizai
This facility will complete and run in May 2016 in Osaka, Japan.
This facility is the important step for Japan to establish the world-class certification institution for battery.
NITE manages this facility. NITE: National Institute of Technology and Evaluation
Testing facility of large scale power conditioner system is running by AIST in Fukushima. AIST: National Institute of Advanced Industrial Science and Technology

Main buildings for testing on large battery system.

- Large battery evaluation building
- Explosion proof chamber
- Smoke exhaust equipment
- Administrative building
- Large battery (up to 40ft container)

Battery pack size is up to 90kWh (considering it as max. size test unit for safety standard of ESS)
Acceptable 40ft container battery system (except for possible test following fire by 40ft container)
Thank you for your kind attention