

Verification Project
for the Establishment of a Low-Carbon Society System in
Toyota City, Aichi Prefecture

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Toyota City Low-Carbon Society Verification Promotion Council



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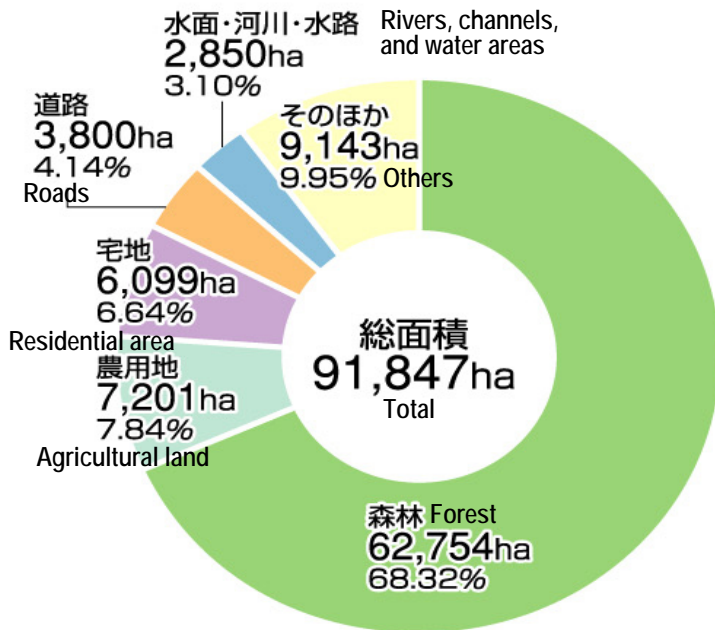
Profile of Toyota City

The Seventh Toyota City Comprehensive Plan 2008-2017

“Toyota which advances in an environmentally-friendly way together with its vibrant population”

- ◆ Population: 423,126 (as of 1 Sept 2011)
- ◆ Area: 918.47km²
- ◆ Ranks 1st among cities for manufacturing shipment value in Japan
- ◆ 70% forest coverage as a result of a merger of the city with surrounding towns and villages in 2005
- ◆ Coexistence of urban, industrial, & mountainous underpopulated areas

- ☆ Eco-Model City
- ☆ Initiatives for an EV (electric vehicle)/PHV (plug-in hybrid vehicle) Town
- ☆ Model City for ITS Verification Project
- ☆ City Centre Revitalization Plan





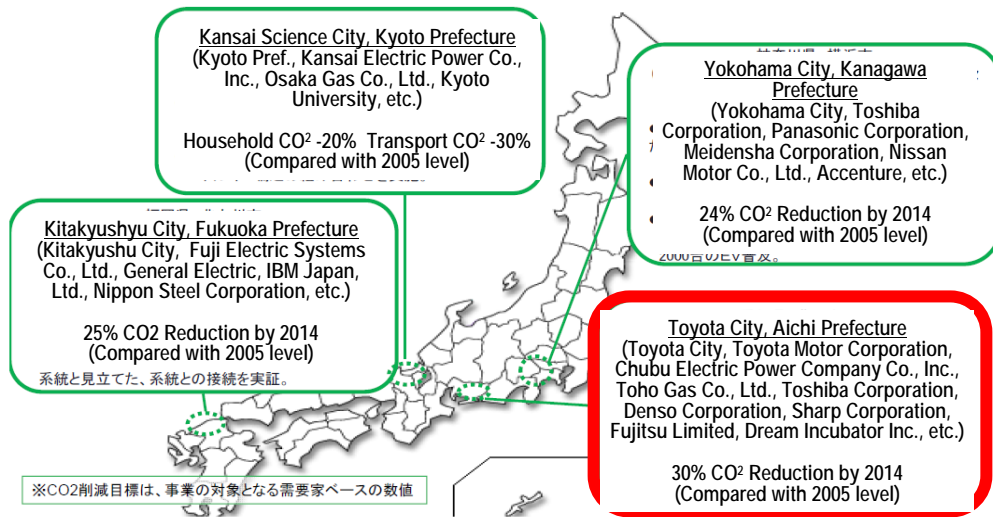
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With full support from the national government, low-carbon city development further accelerated in Toyota

Selected as a "Next-Generation Energy
and Social System Verification" Area

The Japanese Government selected demonstration project plans in the four areas indicated below out of twenty areas, as of 8 April 2011.

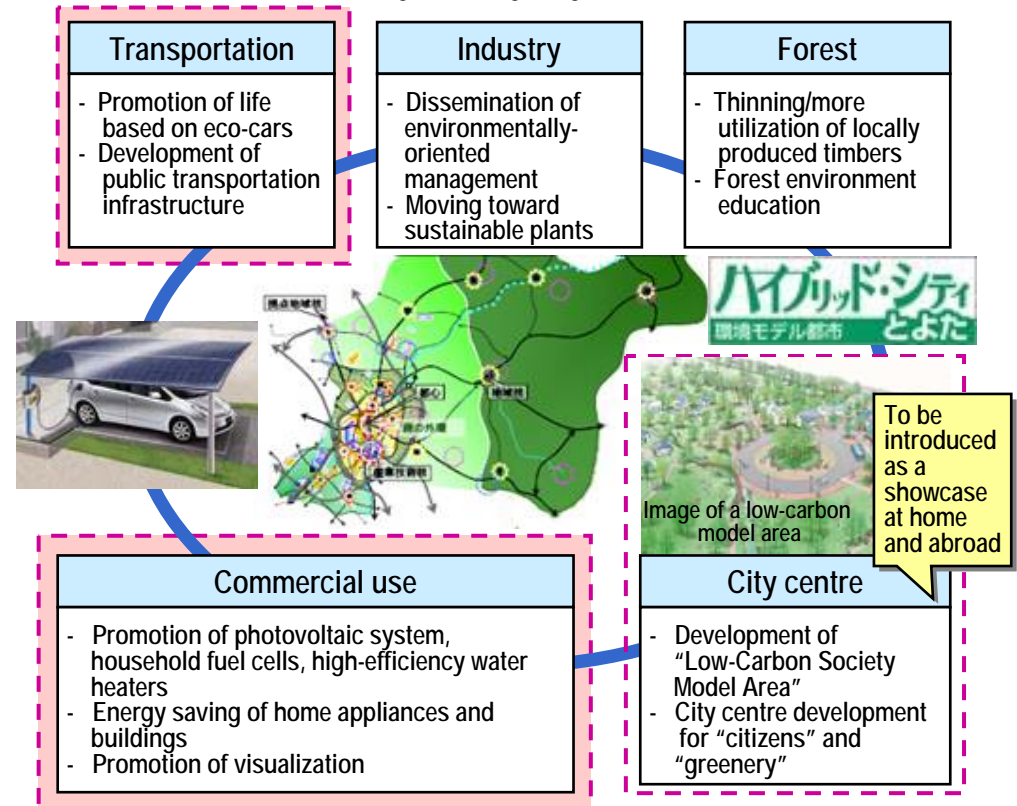
- The projects aim to build Japan's original smart grid systems and promote them throughout the world, under the country's new strategy for becoming an environment and energy power through "green innovation".



Designated as a government priority investment/support area

Accelerated efforts to make Toyota an eco-model city

Outline of Hybrid City Toyota Plan



Accelerated efforts in the fields of "household (commercial) use" + "transportation"



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Collaboration between the local government and private sector to establish a low-carbon society beneficial to local citizens Aiming at coexistence of the citizens, city, and private corporations

Citizens: realization of a comfortable ecological lifestyle, without straining oneself and without waste

- **Save energy cost**
 - Shift to/utilization of energy-saving appliances
 - Effective use of green power
- **Enjoy comfortable a low-carbon life**
 - Making it possible to access various options for action modes and support depending on the lifestyle
 - And obtaining returns such as eco-points from low-carbon activities
- **Participate in advanced low-carbon community development**
 - Making contributions through community “participation”
 - Gaining “pleasure” from being “connected with” people

City: establishing a low-carbon city
that receives world-wide attention

- **Accelerate the advancement of its low-carbon city development**
 - Utilization of government support and creativity of the private sector
 - Making a shift to a most harmonious city between people and cars in the world
- **Enhance the profile and brand name of Toyota**
 - Capturing recognition as a world-leading eco-model city
 - Vitalization of the city through increased exchanges at home and abroad
- **Revitalize the local economy**
 - Employment expansion through new industry creation
 - Strengthening its government financial foundation through the enhanced performance of local industries

Companies: put low-carbon products/services
on the market at an early stage

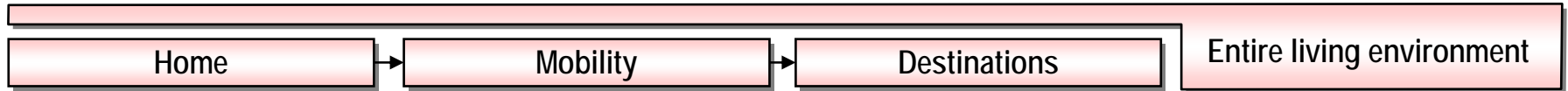
- **Approach from an ordinary citizens' viewpoint**
 - Acquiring and integrating data on energy utilization and relevant actions corresponding to their actual life
 - Focus attention on their acceptability and lifestyle
- **Bring together the wisdom of many prominent companies**
 - Coming up with technical and economic problems facing social systems as a whole, not specific technology
 - Marketing new products/services developed from what they have gained from verification projects at home and abroad at an early stage





Outline of Verification Plan

Flow of everyday life



Project Components

① Optimization of household energy use

- Sale of 67 houses newly built for demonstration
- Home Energy Management System (HEMS) control of various devices for saving, creating, and storing energy
- Power supply from EV/PHV to home (V to H)

② Establishment of low-carbon transport system

- Large-scale introduction of next-generation vehicles
- Traffic flow control and eco-driving promotion by ITS
- Coexistence with public transportation (FC Bus, BRT)

③ Optimization of energy use at commercial public facility

- Introduction of devices for power charging/storing in commercial facilities such as convenience stores
- Demonstration of use of secondary cells equipped with EV/PHV in times of disaster

④ Green-behaviour support in the entire living environment

- Analysis of energy use, using Energy Data Management System (EDMS)
- Induction and effect measurement of low-carbon behaviours using various incentives

Project Management

Chubu Electric Power Co., Inc., Dream Incubator Inc., Toyota City, Toyota Motor Corporation

Aichi Prefecture Nagoya University Toyota Chamber of Commerce and Industry

Project Members (Total of 28 companies/ organizations)

Aisin Seiki Co., Ltd., Chubu Electric Power Co., Inc., Denso Corporation, KDDI Corporation, Secom Co., Ltd., Sharp Corporation, Toho Gas Co., Ltd., Toyota Housing Corporation, Toyota Industry Corporation, Toyota Motor Corporation, Toyota Smile Life Inc., Yamazaki Corporation

Central Nippon Expressway Company Limited, KDDI Corporation, Mitsubishi Corporation, Nagoya Railroad Co., Ltd., Toho Gas Co., Ltd., Toyota City, Toyota Industry Corporation, Toyota Motor Corporation, Toyota Tsusho Corporation

Circle K Sunkus Co., Ltd., Denso Corporation, Mitsubishi Corporation, Systems Engineering Consultants Co., Ltd., Toho Gas Co., Ltd., Toyota City, Toyota Industry Corporation, Toyota Motor Corporation, Toyota Tsusho Corporation, Yamato Transport Co., Ltd.

Chubu Electric Power Co., Inc., Dream Incubator Inc., Eneres Co., Ltd., Fujitsu Limited, Hewlett-Packard Japan, Ltd., KDDI Corporation, Mitsubishi Corporation, Toho Gas Co., Ltd., Toshiba Corporation, Toyota City, Toyota Housing Corporation, Toyota Motor Corporation, Toyota Smile Life Inc.

Verification site

- 67 houses built in Takahashi and Higashiyama districts

- Entire Toyota City

- Commercial and public facilities in the city
- Low-Carbon Model Area

- Entire Toyota City
- Low-Carbon Model Area





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Toyota City's Viewpoint of Verification Project

Environment

Reduction of CO² emissions through dissemination of EVs and PHVs and the following efforts

Energy

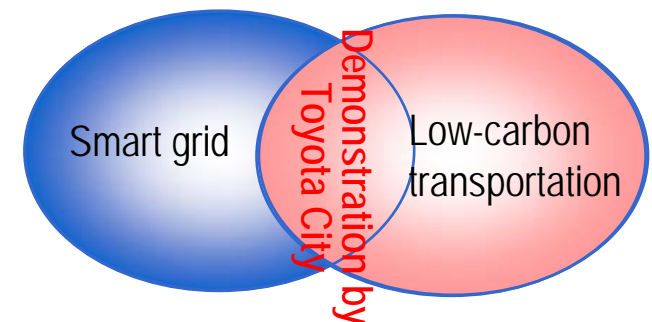
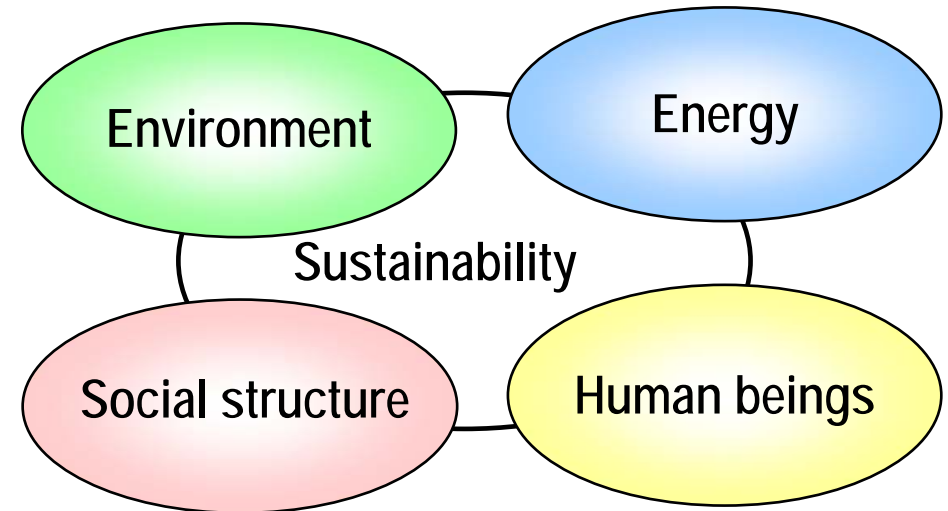
Introduction of renewable energy
Homes with HEMS

Social Structure

Establishment of network (Electric power, information)
Low-carbon transportation system

Human beings

Compatibility with quality of life (QOL) (ecology without straining oneself)



Establishment of a highly satisfactory, low-carbon energy and social system

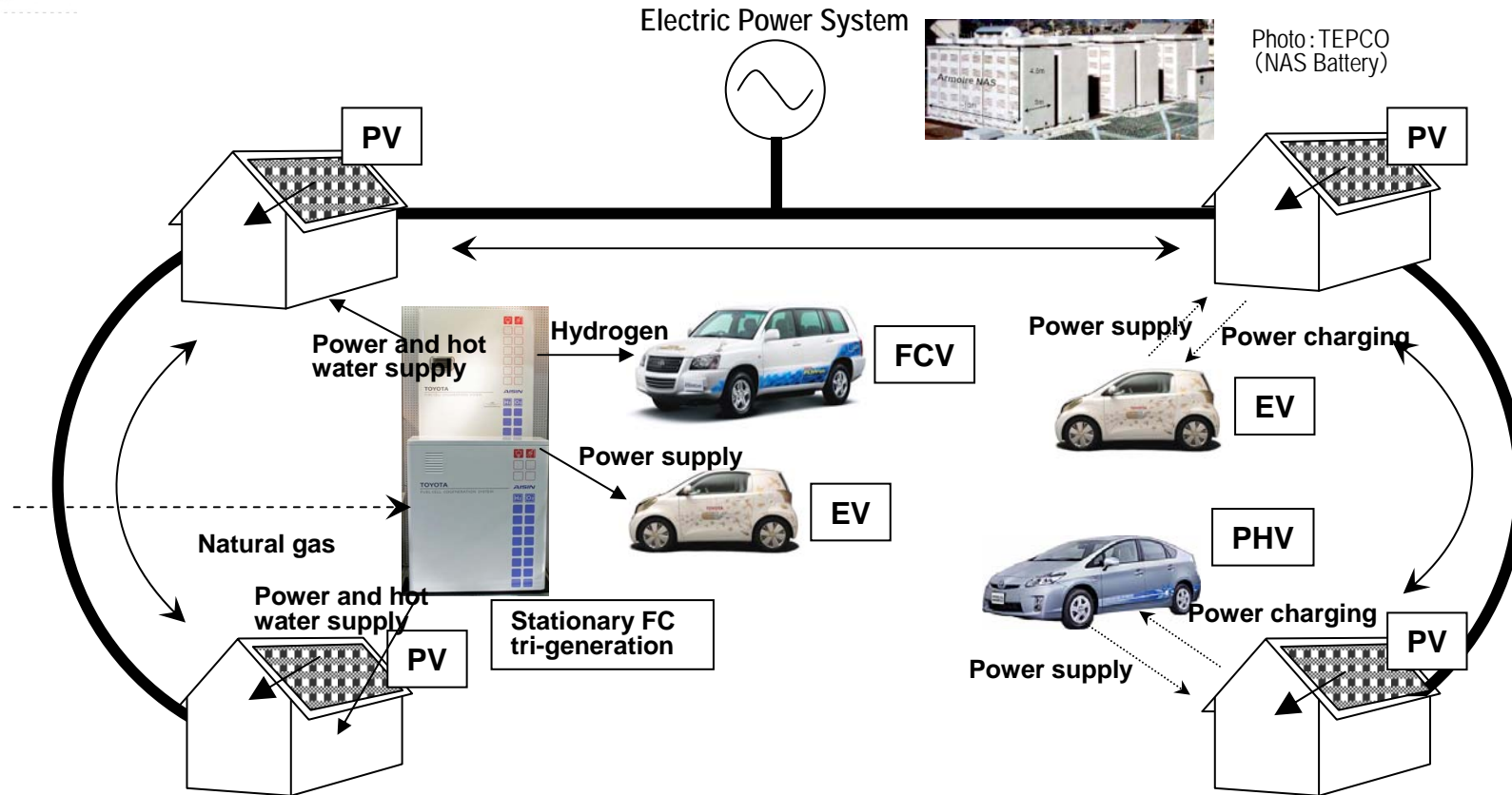


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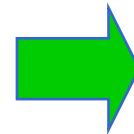


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Challenges for the Future and Smart Grid



- Large-scale introduction of renewable energy
- Unstable power supply depending on meteorological conditions



- Increased countermeasure cost of electric power system
- Photovoltaic generation control

Expect smart grid and battery cells as a tool to stabilize power supply



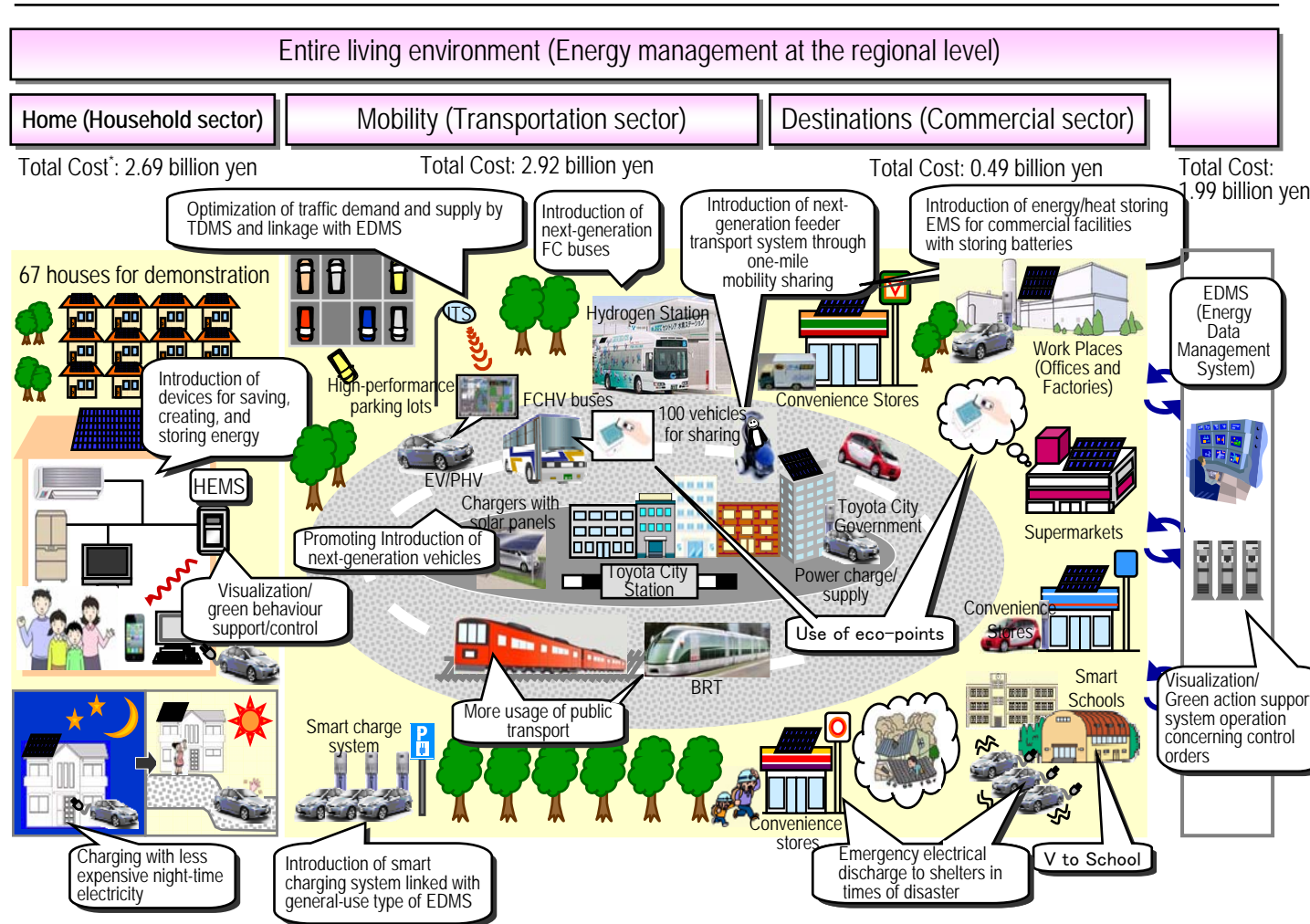
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Overall Image of the Verification Project

Outline of verification of Toyota City



Target of verification

CO₂ reduction target (in 2014 Compared with 2005 level):
Within our demonstration project area in Toyota City about 8,000t-CO₂/year

While creating a low-carbon society system, which is low-cost and feasible, while securing citizens' satisfaction (QoL)

City's financial burden

Budget of the action plan for an eco-model city (5.6 billion yen) (700 million yen out of the above budget for this verification project)

- About 280 million yen for infrastructure development of a low-carbon society development area (civil engineering and PR building)
- About 340 million yen for financial support for individuals/business firms to buy eco-cars
- About 75 million yen for replacing official vehicles with eco-cars (7 PHV out of 37 official vehicles)
- About 15 million yen for environmental studies and eco-points (eco-point resource, etc.)

Optimization of energy/transportation along with everyday life flow with a focus on the household sector

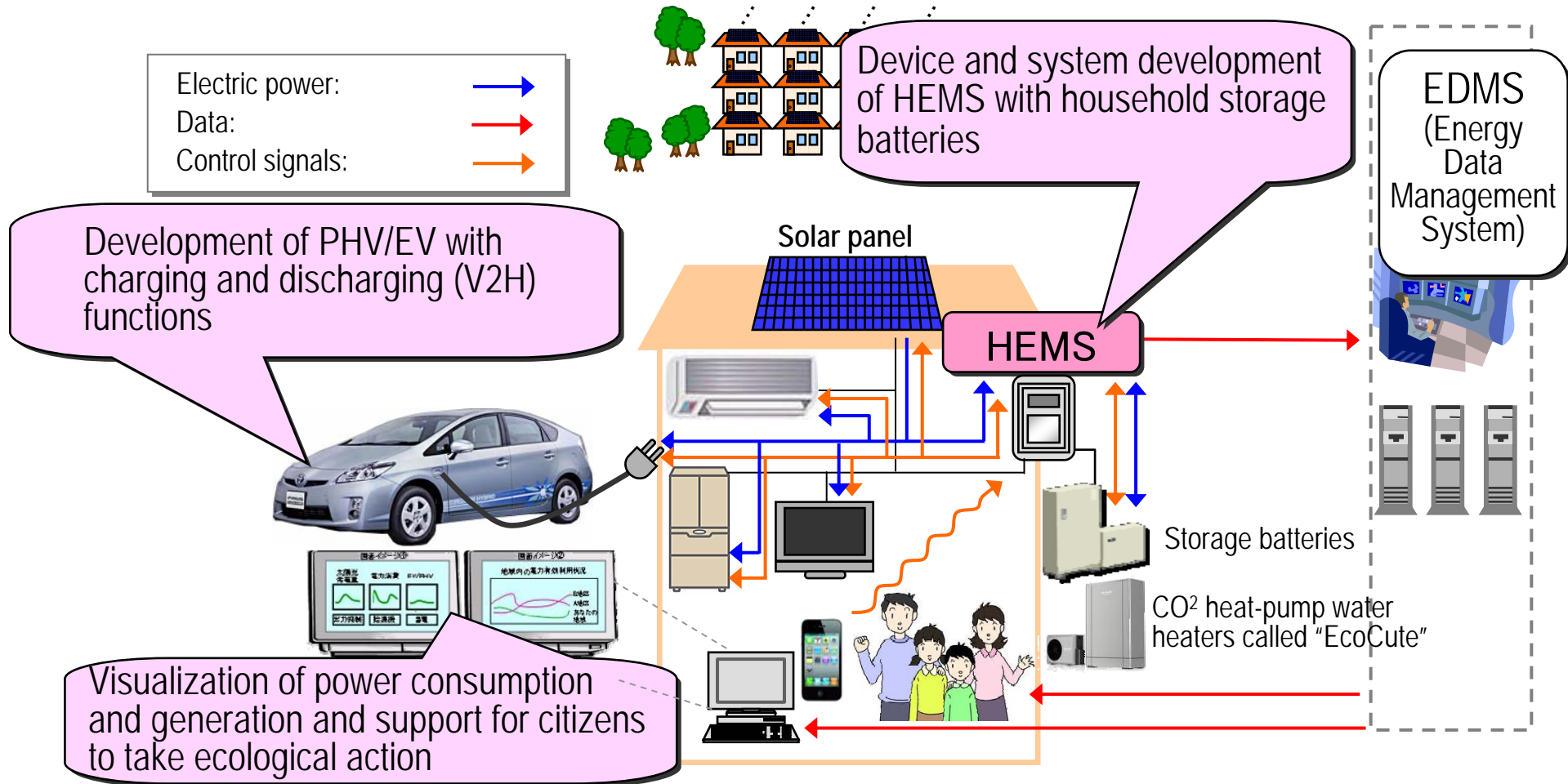
* Fiscal 2011
** Traffic Data Management System





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Optimization of Household Energy Use HEMS



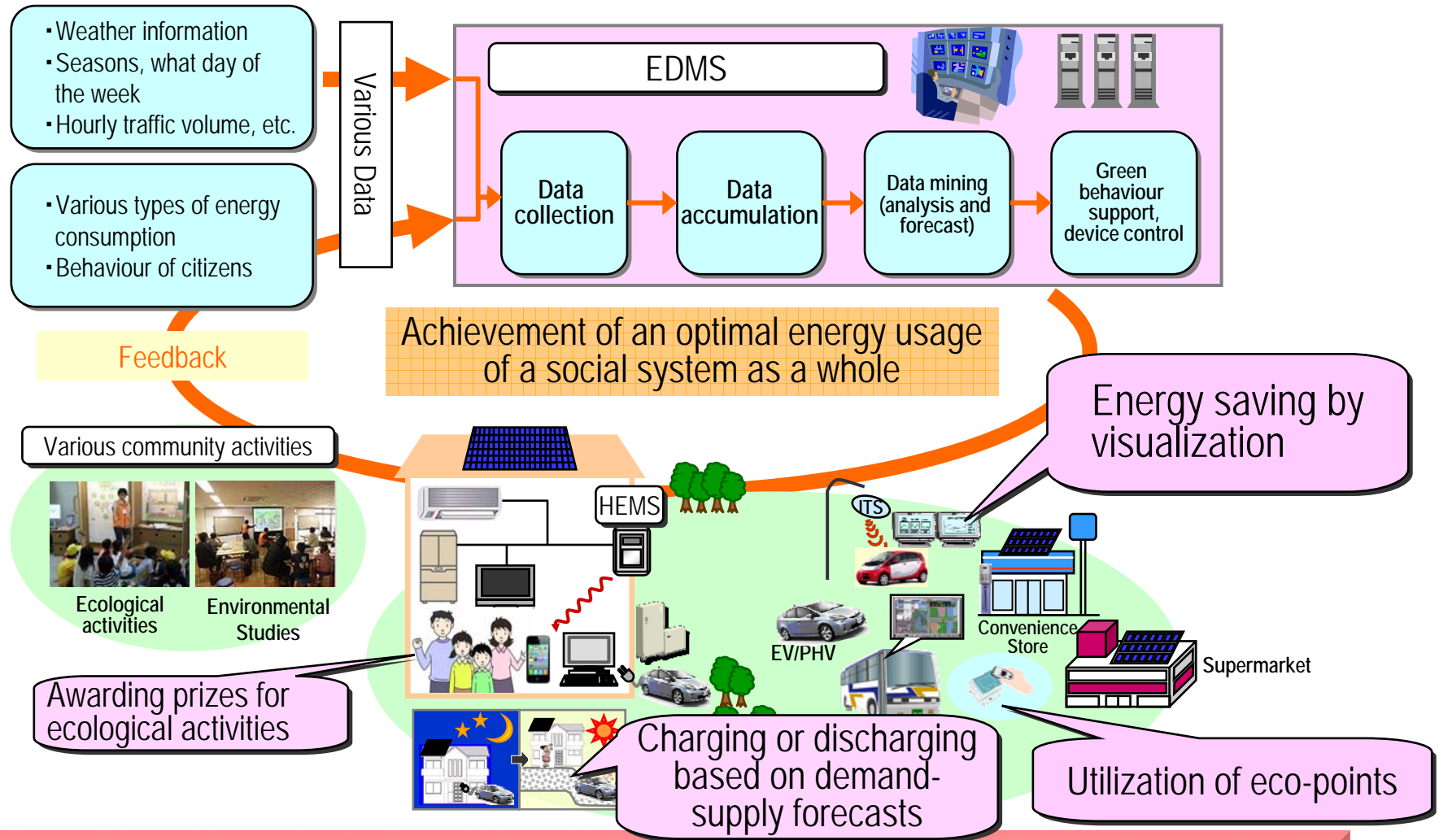
Optimization of household use of solar energy through HEMS control for creating, saving, and storing energy



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Action Support in Entire Living Environment EDMS

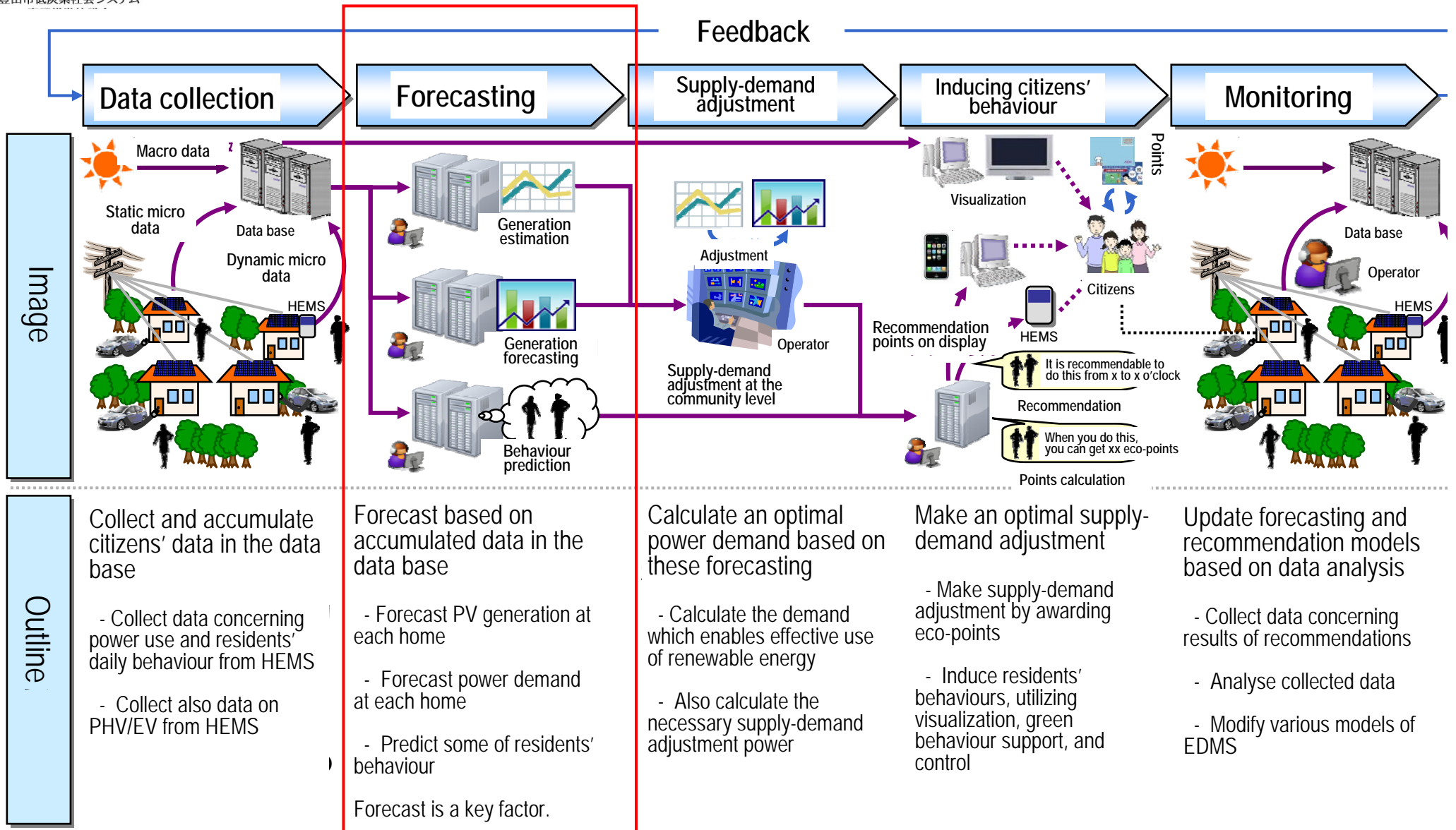


Optimal energy use through ecological action support
Achievement of a high quality, low-carbon life without straining oneself





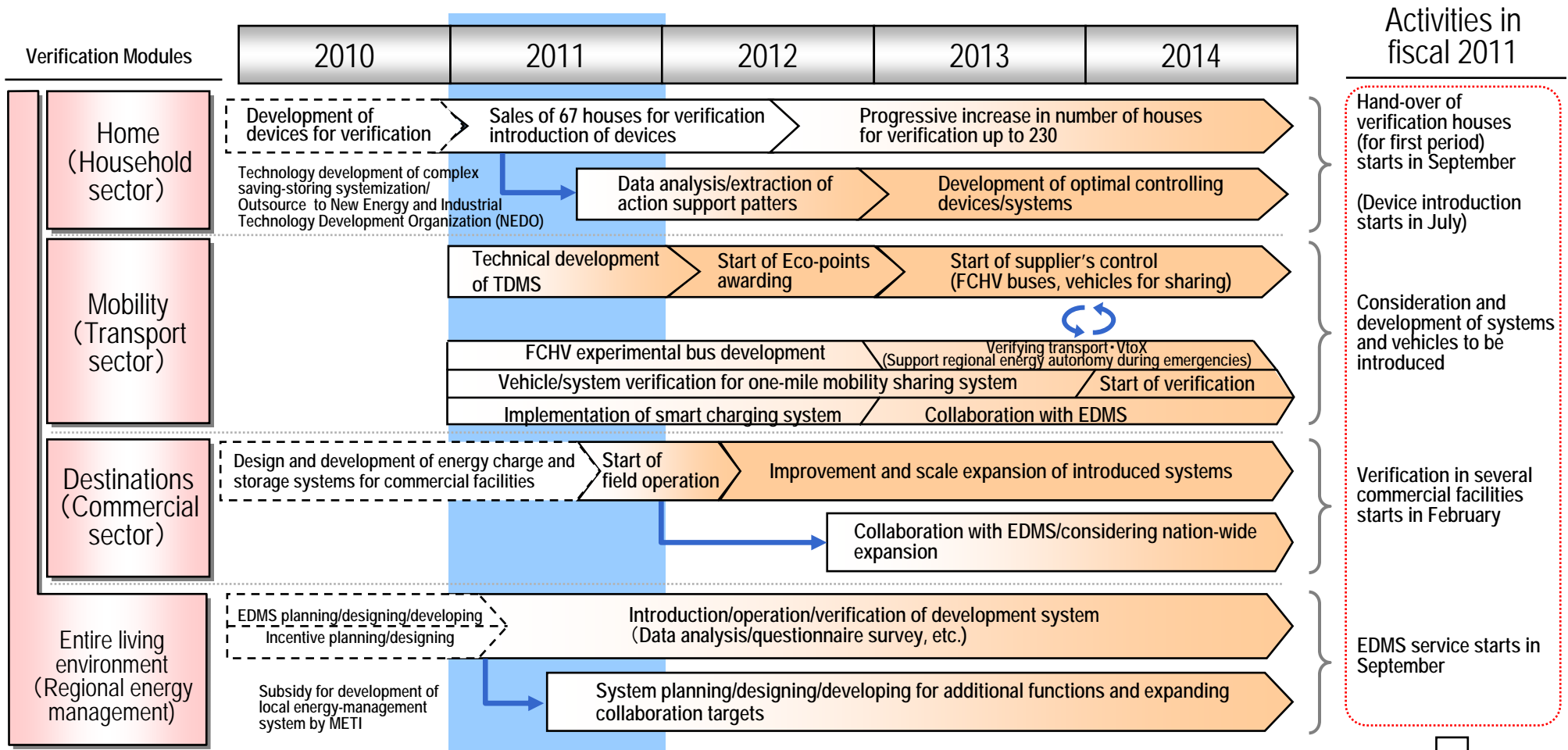
Action Support in Entire Everyday Living Sphere





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Entire Verification Schedule of Toyota City



Verification starts by handing over model houses to their owners in September

Visualization of making use of Low-Carbon Model Area



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Model House for Verification



太陽光パネル(3.2KW)

Solar panel (3.2KW)



エネファーム

Household fuel-cell co-generation
system "ENE-FARM"



エコキュート(370L)

CO₂ heat pump water heater
called "EcoCute" (370L)



蓄電池(5KWh)

Storage battery (KWh)



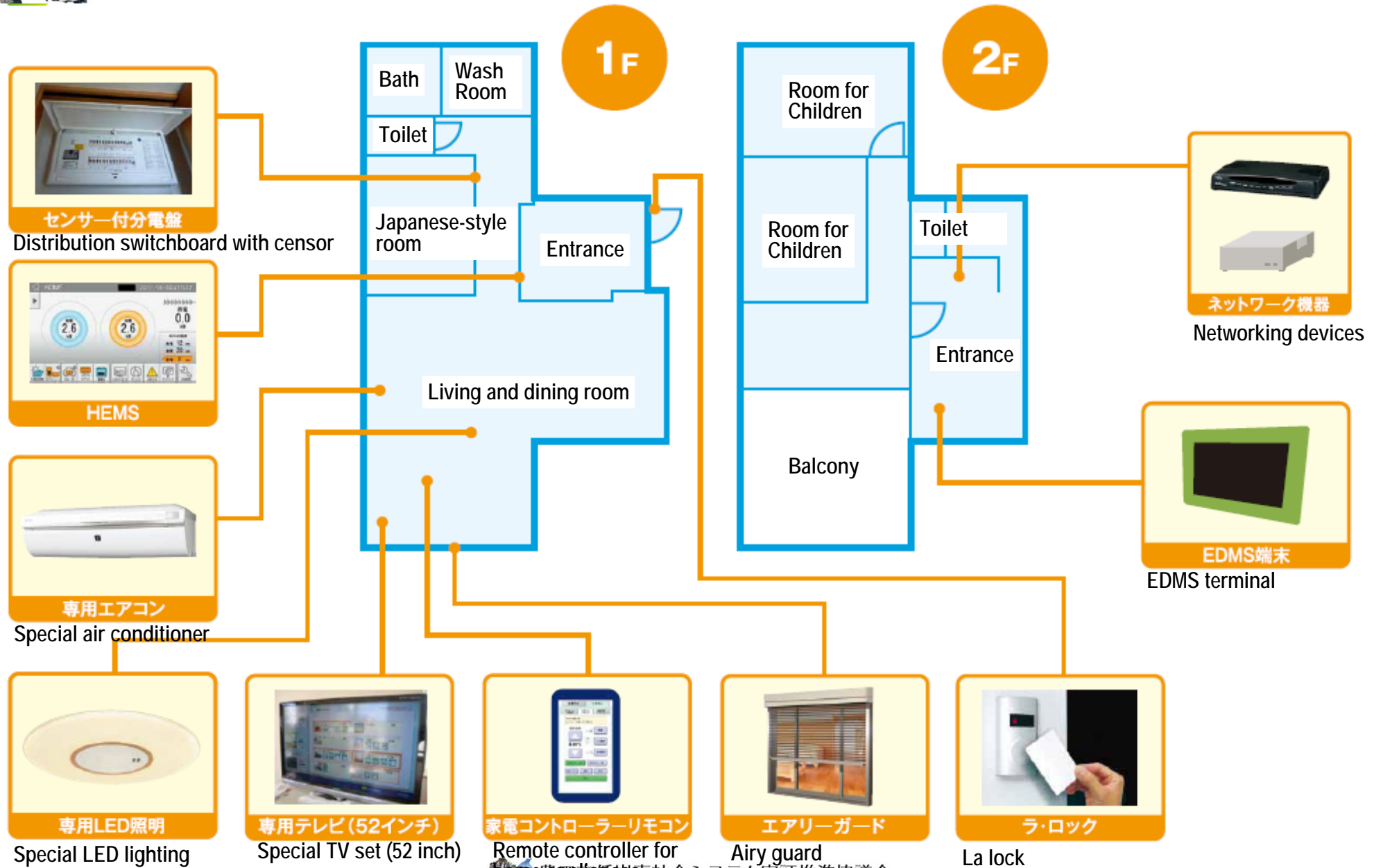
充電スタンド(V2H対応)

Charging stand (for V2H)





Model House for Verification





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Conclusion

Establishment of a low-carbon society system

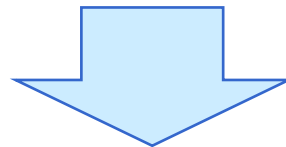
Combining environmental and energy technology as well as IT of prominent participating companies in Toyota City

Balance between citizens' satisfaction and ecology at the highest level

Pursuing optimal energy use not only at the level of the individual homes/residents but also at the level of the entire region

Continue upgrading of devices and systems while conducting verifications

Putting new products/services on the market even before the end of its verification



Create a low-carbon society that enables all citizens to enjoy affluence and disseminate the system as a model which can make valuable contributions to the world.

