Overview of Toyota City

- Population: 422,305 (as of June 1, 2014)
- Area: 918.47 km² (18% of Aichi Prefecture)
- Industrialized urban areas and hilly & mountainous depopulated areas coexist.

Specialties of Toyota City

- Pear
- Peach

Prius

Smart Mobility Toyota City
Recent Status of Designation, etc. by Government

Environment
Challenge to reduce greenhouse effect gas (balancing the environment with vitalization of the industry & region)

Traffic (ITS)
Realization of environmentally friendly traffic society utilizing ITS

Energy

2008 (H20)  2009 (H21)  2010 (H22)  2011 (H23)  2012 (H24)  2013 (H25)  2014 (H26)  2015 (H27)

Designated on January 23, 2009
Environmental Model City Action Plan 1st term (Fiscal 2009 - 2013)

Designated on March 24, 2009
ITS Demonstration Experiment Model City (Fiscal 2008 - 2012)

Designated on April 8, 2010
Next-generation Energy and Social System Verification Area (Fiscal 2010 - 2014)

Designated in December 2011
General Special Area for Regional Vitalization <Special district for next-generation energy/mobility creation> (Fiscal 2011 - 2015)
Efforts for “Environmental Model City”

[Target for CO₂ reduction]
2030: 30% reduction
2050: 50% reduction

Residents
Realizing Earth-friendly lifestyles
- Promote adoption of smart houses
- Use Toyota eco points to encourage pro-environmental behavior of citizens
- Improve environmental awareness of citizens through visualization

Forestry
Create woodland for 100 years from now
- Maximize absolute CO₂ sequestration
- Promote the use of local materials
- Carry out forest environmental education and public awareness activities

Industry
Fostering next-generation industry and transportation
- Build environmental sales network to spread use of environmental products
- Encourage use of sustainable materials (production facilities designed with attention to environmental sustainability)
- Foster and support environmental and energy industries

Transportation
Building the future of mobility
- Create a public transportation network that is good for people and the environment
- Encourage automation of next-generation automobiles, including the provision of infrastructure
- Use diverse modes of transport to reduce carbon emissions over transportation

City center
Vision: knowledge spreading from Ecoful Town
- Toyota Ecoful Town, a place to experience how Toyota City is mastering challenges
- Create a city center of greenery and people

Hybrid City Toyota
Model Environmental City
Next-generation Energy and Social System Verification Area
Efforts jointly by citizens, universities, companies and the city government

Chairperson
Toyota City

Vice-chairperson
Toyota Motor Corporation

Coordination entities
Toyota City, Toyota Motor Corporation, Chubu Electric Power Co., Inc., Denso Corporation and Dream Incubator Inc.

Day of Establishment: August 5, 2010
Description of Activities
1. Planning, promoting and coordinating communication of the Low-Carbon Social System Verification Project
2. Coordinating communication of related agencies and organizations
3. Publicizing information to the public and PR activities
4. Other activities needed to achieve objectives of this council

Project Participants
(as of the end of September 2013): 50 organizations

At home Move Destination Whole living sphere

Construct the promotion structure by establishing the "Toyota City Low-Carbon Society Verification Promotion Council"
Overall Picture of the Toyota City Low-Carbon Society Verification Project
Optimizing charge with electricity generated through photovoltaic power generation, according to schedule of vehicle use and weather forecast.

Discharging electricity from the secondary cell of the vehicle as necessary while observing electricity use at home.

Target: reduction of CO2 emissions by 70% or more in a single house (from the 2005 level)
Housing Complexes for Verification (Higashiyama Area)

Japan's first verification in citizens' actual lives
September 2011 -
Higashiyama Area: 28 households, Takahashi Area: 39 households

Using ITS to resolve traffic congestion and promoting environmentally-friendly driving

Promoting the use of next generation vehicles

Promoting the use of public transportation

Achieving lower-carbon through a variety of means of transportation
Our New Efforts

Ha: mo RIDE

Cooperation

Ha: mo NAVI

<Objectives>
Promote use of public transportation systems while securing the convenience of movement.
Contribute to regional energy management by charging time control, etc.

<Objectives>
Connect individual traffic services with each other to promote their use according to traffic conditions. Provide support to realize a low-carbon and seamless transportation system.

Transfer from public transportation service very easily.
With an ultra-compact EV, move on narrow streets smoothly and, of course, eco-friendly.
Drop off near the destination!

Electrically assisted bikes are also available for users' convenience.

Multi-modal route guide through smartphone

Vehicles

PAS
P-COM
T-COM
i-ROAD
Optimizing Energy Use in Commercial and Public Facility etc.

- Environment-friendly public facility development
- Emergency power of the car battery
- Smart school
- Delivery route
- Utility grid
- Solar power generation
- Delivery center
- Portable storage battery
- Eco logistics utilizing battery with refrigerator truck
- Maximum utilization of areal solar power generation
- 5kW
- Recommendation of optimal charging locations
- Remaining battery level
- MP van
- Utility grid
- Solar power generation
- DC
- 5.5kWh
- (1) Cable charging
- (2) Non-contact charging
- PCS
- Electricity and heat storage EMS with battery for commercial facilities 6kWh
- D.C. drive heat pump water heater
- Retail store
- Hot water
- Development of hydrogen stations
- Toyota City Low-Carbon Society Verification Promotion Council

- Weather information
- Season and day of the week
- Hourly traffic volume, etc.
- Consumption of various energies
- Behavior

Various data → EDMS (Energy Data Management System)
- Data collection → Data storage
- Data mining (Statistics, analysis and estimation)
- Support for actions/equipment control

Achieving optimum usage of energy as the whole society system

Conserving energy by making energy consumption visible

Various community activities
- Eco-friendly activities
- Environmental education

Awards for ecologically beneficial activities

Charging/discharging functions based on advance reading of the future balance of supply and demand

Support for green consumer behavior and optimizing the energy usage of society
Achieving eco-friendly lifestyles with high QOL (quality of life) and no laborious effort
Encouragement of Change in Behavior through Eco-Points

When much electricity generated by the photovoltaic generation system is supplied and less electricity is in demand, **plus points are added**.

When less electricity generated by the photovoltaic generation system is supplied and much electricity is in demand, **minus points are added**.

When plus points are added, use and store points.

When minus points are added, stored electricity is used.

When energy is in surplus, there is no need to use stored energy.

When energy level is reduced, stored energy is used.
CO₂ reduction effect of the verification project so far

Targeted Reduction of Electricity and Result of Verification

<table>
<thead>
<tr>
<th>Emission of CO₂ Ton/year</th>
<th>Electricity Consumption kWh/year</th>
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<tbody>
<tr>
<td>Energy Consumption 2005</td>
<td>Targeted Reduction</td>
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<tr>
<td></td>
<td>Actual Reduction</td>
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<td>Actual Reduction</td>
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<tr>
<td></td>
<td>Photovoltaic Generation</td>
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<td></td>
<td>Photovoltaic Generation</td>
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</tbody>
</table>

- **Target:** Reduction by 70%
- **Actual:** Reduction by 55%
- **Actual:** Reduction by 75%

Results from Housing Complex for Verification

Number of sample: 19  Source: DENSO Corp., TOYOTA Housing Corp.

Best Effect: Households successfully reduced their energy use by 75 %. (Target Achieved)
Voices from Residents in Smart Houses

Joint meeting of coverage to residents
(November in 2011)

- “We are saving energy saving while enjoying.”
- “It seemed difficult at first but my interest and understanding deepened, so I started to use it.”
- “I like it because the system seeks to optimize energy usage. It tackles problems in the environment without strain.”

Opinion exchange session with
Governor of Miyagi Prefecture (July in 2012)

- “It is enjoyable to check with the HEMS how effectively we can save energy.”
- “I try to clean and wash when the EDMS display is blue. I can’t believe how easily it all is.”
- “I commute by PHV to work every day and there is still gas left in my tank without needing to fill up for three months.”
International Publicity

Innovation Fair 2013 (July 2013 Geneva)

Secretary General Ban Ki-moon and Mayor Ota

Mayor Ota making a speech at the Implementation Forum in Geneva

International Visitors to Toyota Ecoful Town (90,000 people from over 70 countries)

High-level Symposium on Sustainable Cities in Toyota (January 15th 16th, 2015)

Object: To publicize and propagate the concept of an Environment Model City through the verification of low-carbon Society

Participant: International Organizations, Governments, Private Sectors etc.

Discussion with UN DESA is underway for details of the Symposium.
Ecoful Town: an area to visualize efforts in Toyota City