Efforts to shift to Low-Carbon City
—Challenges by Environmental Model City Yokohama

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Introduction of the City of Yokohama

1 Introduction of the City of Yokohama

2 Measures through mobilization of citizen power

3 Expansion of energy policies

4 Efforts to shift to Low-Carbon City

Environmental Model City Yokohama

Certified as an Environmental Model City by the Prime Minister in July 2008
Overview of the City of Yokohama

| Population | 3.68 million |
| Number of Households | 1.59 million |
| Participation in Neighborhood Associations | Percentage of participation 80% |
| Number of registered NPOs | Approx. 1,100 |

Citizens with a High Level of Public Spirit

2 Measures through mobilization of citizen power

Efforts to mobilize citizen power

Engine to promote environmental policy in Yokohama → Citizen power of 3.68 million

Achievements of “Yokohama G30”

- Problem: Waste emissions increasing faster than population
- Target: Cut waste emissions by 30% by 2010 (from 2001 level)

- Full separation of waste
- Started in 2003
- Collection/recycling of used products

- Target achieved 5 years ahead of schedule (about 40% reduction as of 2009)
- Effects of reduction
  - Saved ¥110 billion it would have cost to replace two incineration plants
  - Saved ¥3 billion in running costs
  - Equivalent to a 47% cut in CO₂

- Taking every opportunity to enlighten, explain and encourage
  - Explanatory meetings for citizens (more than 11,000 times)
  - Campaigns at all stations; events; etc.
“Citizen Power” supporting Hama-Wing

Construction costs

Operation costs

Citizens～
Special city bond
・published to collect funds from citizen (¥280 million)
・bought by more than 300 citizens (sold out in 3 days)

Subsidy of ¥200 million

Sponsoring～“Y-Green Partners”

Special sponsors
KRIN

Sponsors (right) and 8 other companies (not shown)

“Yokohama Eco Activities (Eco Katsu)”

A slogan aiming for citizens to become intimately familiar with climate change prevention measures and participate easily in eco-friendly activities

With the hope that those who have not been interested in eco-friendly activities up until now will start taking action on their own

Environmental Household Accounts

Visualization of the effects of CO₂ reduction through energy-conservation activities

Some areas achieved on average reduction of over 10%!

Energy-Saving Activities by Children

Elementary schoolchildren become “Energy-Saving Leaders” in their families

Saving energy at home during summer vacation

Started in 2004
31,000 students from 167 schools participated in 2009

・Reduction of 615t-CO₂
・Donated ¥900,000 by 46 companies for WFP forestation project
Yokohama Eco School (YES)

Aims to expand activities for learning how to tackle climate change problems based on the unified brand “YES”

- Collaborative partners: 74
- YES seminars held: 263
- Participants: 27,500
  (April to December 2010)

3 Expansion Energy Policies

Targets to increase renewable energy

- Target by 2025: Reduce greenhouse gas emissions by more than 30% compared with 2004
- Plans to achieve 20% through energy-conservation, and the remaining 10% will be achieved through renewable energy
- Aims to increase renewable energy by ten-fold to achieve this target

<table>
<thead>
<tr>
<th>Year</th>
<th>CO2 emissions (t-CO2/person)</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>5.74</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5.24</td>
<td></td>
</tr>
<tr>
<td>2025</td>
<td>4.02</td>
<td></td>
</tr>
</tbody>
</table>

-30%: energy-conservation
1/3: introduction of renewable energy

Position of solar energy among renewable energy options

Amount of possible renewable energy use

Percentage of introduction of renewable energy (2004)

<Source: “Yokohama Energy Vision 2” (March 2008)>
Importance of Solar Energy

Mobilizes various kinds of energy resources centered on solar energy

① Most of the waste power generation and sewage biomass energy are already in use.
② The renewable energy with the highest potential for use in the city is solar energy.

> Ten-fold increase will be achieved by explosive expansion in solar energy

<table>
<thead>
<tr>
<th>year</th>
<th>2000</th>
<th>2004</th>
<th>2007</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>energy use efficiency</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Subsidies for solar power and solar thermal systems in residences

Aims to introduce renewable energy in residences

◆ Solar Power Generation System
  • In cooperation with Kanagawa Prefecture
  • 40,000 yen /kW, maximum of 150,000 yen
  • Number of planned total subsidies in 2010 2,000 (900 in 2009)

◆ Solar Thermal System
  • Original subsidy by the City of Yokohama
  • ¥40,000 or ¥80,000 (depending on equipment)
  • Number of planned total subsidies : 200

Introduction of solar power generation in public facilities

1997～2008: installed at 30 schools in the city,
  total generation of 291.25kW
2009: installed 184 elementary and junior high schools,
  total generation of 1,840kW

Other facilities :
  • ward offices
  • water treatment plants
  • welfare facilities etc.

Public facilities “Mega Solar”

Introduction of LED for locally-managed security lights

◇ Background
  • Need to reduce the burden for management of security lights by local communities
  • Emergency employment measures
  • Advanced measures as an environmental model city

◇ Outline
  Replaced 11,000 locally-managed fluorescent security lights in the city with LED lights
  Budget: 750 million yen

◇ Effect of introduction
  Reduction of CO₂ emissions: 165t—CO₂/year
Bio-diesel fuel produced by used cooking oil

Refines used cooking oil collected from elementary schools into BDF at private welfare facilities

Used as an alternative to heavy oil at Wastewater Treatment Plants • • • Revenue of CO₂

Integration of environment and welfare

Yokohama Green Valley

Aims to construct a pioneer area for renewable energy technology

Development of the Environment and Energy Industry

• Support and provision of information for the introduction of renewable energy and energy-conservation technologies in small and medium businesses
• Cultivation of venture companies through industry-academic-government collaboration

Expansion of Energy Policies

• Energy Monitoring
• Sharing of EVs (electric vehicles)

Creation of an Environmental Education Base

• Environmental education projects collaborating with universities in the city
• Utilization of natural environment-related facilities and social infrastructure for social studies field trips/visits

New Midterm Four-Year Plan (2010-2013)

(1) Future Vision (2) Yokohama Growth Strategy (3) Basic Policies (4) Administrative and Financial Operations

(1) Future Vision: 10 years later
(2) Yokohama Growth Strategy
(3) Basic Policies (現在の様々な課題に対応、沿革)
(4) Administrative and Financial Operations (現在の様々な課題に対応、沿革)
Yokohama Growth Strategy

Upwardly revised reduction targets of GHG
To Reduce by 25% by 2020 and 80% by 2050

Yokohama Growth Strategy

Environmental Cutting Edge City Strategy

Toward low carbon society, it provides new business opportunities through creation of new demand - to encourage technical innovation of local SMEs, for vitalization of Yokohama economy

Provision of new business opportunities by creation of new demand

| Household Sector: Massive introduction of EVs | Private Sector: Increased investment by environmentally-friendliness |

Encouragement of technical innovation of local Small and Medium-sized Enterprises

| Support growth of local SMEs in Environmental field | Leading Project: Yokohama Green Valley |
| Attraction of environmental related enterprises | Creating new business opportunities |

YSCP Vision and Objectives

YSCP aims to build the "Next Generation Energy Infrastructure and Social System" that maximizes CO2 reduction in the forefront of innovation.

Background

- Increasing need for energy security
- Economic development (green innovation)
- Cities as center of CO2 emissions
- Environmental Model City

YSCP Vision and Objectives

- Ambitious CO2 reduction target (64,000t-CO2 by 2014)
- Export overseas as a city scale infrastructure package
- Assemble Advanced Knowledge, Build in Yokohama, Expand Abroad

Demonstration Areas for Smart Communities (METI)

- Applied from local authorities from all over Japan to seek the participation from various players and the positive cooperation from residents
- Yokohama, Toyota, Keihanna and Kitakyusyu were selected as demonstration areas in April 2010 and the master plans were submitted in August 2010.

- Control only one sector (Household)
- Comprehensive control of several sectors
- Low dependency on systems (Decentralized control)
- High dependency on systems (Central control)
- Detached housing type
- Residential Complex type
- Big city type
- Local major urban area type
YSCP Overview

YSCP Target Quantity

Aims to achieve the following by 2014:

- To reduce CO2 emissions by 64,000 t-CO2
- To introduce Home Energy Management System (HEMS) to 4,000 households
- To introduce 2,000 units of EVs

Highlight① Home Energy Management System

・Introduces combined patterns of multiple PV and energy saving equipments to houses and buildings
・Examines to minimize the costs by combining with reforming and expansion of efficiency by insulating materials
Highlight ② Community Energy Management System

Absorbs power output fluctuation from renewables by integrating stationary battery with HEMS and BEMS.

Smart initiatives in three areas + Integrated management of three areas with large scale network.

Achieves efficient energy management by managing both demand side and stationary energy storage.

Highlight ③ Energy Management with Charge and Discharge Enabled EV

Increase usage of solar power and lower EV CO2 footprint by developing Charge and Discharge enabled EVs that can be leveraged as clean energy storage in the three areas.

Maintains EV user satisfaction and minimize societal cost.

Show Case of Green Technologies

Smart Community Exhibition (Nov. 7～14, 2010)
APEC Smart Community Exhibition

◆ Visitors:
  Approx 600 visitors from 22 countries and regions (including Japan)

◆ VIPs visited from abroad
  11/9 Administrative Vice Minister of International Trade Industry, Malaysia
  11/11 Ambassador Extraordinary and Plenipotentiary of the United States of America to Japan, United States of America
  11/12 Minister of Foreign Affairs, Thailand
  11/13 Secretary of Foreign Affairs, Philippines

Yokohama Green Power (YGP) Project

Background

- Needs to construct the infrastructures for Smart City
- Measures to promote new renewable energy

Objectives

1. Construction of the infrastructures for Smart City
   - Aims to construct the infrastructures for Smart City preparing for Community Energy Management System (CEMS) by introducing PV and Home Energy Management System (HEMS) in a set in fiscal year 2010

2. Measures to promote new renewable energy
   - Implementation of business model for massive installation of PV, utilizing know-how of private companies
   - Construction of the system aiming for accelerating to promote renewable energy in addition to existing subsidies

Yokohama Green Power (YGP) Scheme

- PV and HEMS Package Contract
  - Bulk procurement and intensive introduction to one specific area
  - Providing one-stop service from installation, maintenance, discard to re-cycling

City of Yokohama

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Yokohama Green Power (YGP)

**Home Energy Management System (HEMS)**

PV System

- **PV panel**
- **Community Energy Management System (CEMS)**
- **Data store/Control of Electricity Meter**
- **IT Home Gateway**
- **Internet**
- **Home appliances**
- **Selling Surplus Electricity**

**Offer** (Nov. 2010~)

**Price**

- Introduction of PV and HEMS and Data provision...
- PV(3kw) and HEMS will be provided at only 1.2 million yen (approx. 10,000 USD) – normally 1.8 million yen worth

**Privileges**

- ORIX Car shearing - Special rates for membership registration
- Free maintenance service of PV panels etc.

※After deduction of subsidies. Price may be subject to change depending on the types of roofs.

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**Cost & Subsidy (FY 2010)**

(Unit: Thousand JPY)

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<thead>
<tr>
<th></th>
<th>Usual Case</th>
<th>YGP</th>
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<tbody>
<tr>
<td>Without Subsidy</td>
<td>2250</td>
<td>1720</td>
</tr>
<tr>
<td>Subsidy from national gov’t (70 thousand JPY per 1 kW)</td>
<td>−210</td>
<td>−210</td>
</tr>
<tr>
<td>Subsidy from the Prefecture and the City of Yokohama (40 thousand JPY per 1 kW)</td>
<td>−120</td>
<td></td>
</tr>
<tr>
<td>Subsidy from YGP (70 thousand JPY per 1kw AND 100 thousand JPY per HEMS)</td>
<td>−310</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1900</td>
<td>1200</td>
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