

Sustainable Urbanization in Japan Aiming towards a Low-Carbon City

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Urbanization and Energy Consumption

- Currently, over half of the world's population lives in urban areas.
- Their consumption of energy accounts for two-thirds of total consumption of the world.
- By 2030, 60% of the world's urban population will be consuming over 70% of the world's energy.
- The world's urban population will reach 6.3 billion in 2050, which will account for about 70% of the world population. Therefore, greenhouse gases caused by urban activities will account for most of the world's emissions.



- A common awareness that the reduction of energy consumption in urban areas is the key to dealing with future climate change issues is gradually developing.
- In Japan, the movement of trying to reduce greenhouse gas emissions at the local level has started to gain momentum.



**The Earth Summit
(United Nations Conference on
Environment and Development)
Rio de Janeiro, Brazil, 1992**

**United Nations Framework
Convention on Climate Change
(UNFCCC)**

**Convention on Biological
Diversity
(CBD)**



Challenges

- To stop the rise in concentration of greenhouse gases such as CO² in the atmosphere and stabilize them, in order to keep the negative impacts caused by global warming/climate change at an acceptable level.



- The world's annual emissions need to be reduced to 3.1 billion tons, which is seen as the level of the world's natural carbon sinks, and half of the world's annual emissions in 1990.
- The sooner emissions are reduced in half, the sooner will it be possible to stabilize the level of CO² concentration.



CO² Reduction Target

- ⇒ By 2050, reduce half of the world's emissions below 1990 levels
- ⇒ In developed countries, reduce emissions by 80% below 1990 levels
- ⇒ Measures: 80% reduction by synergistic effects generated by a combination of energy saving/efficient energy use and introduction of new energy

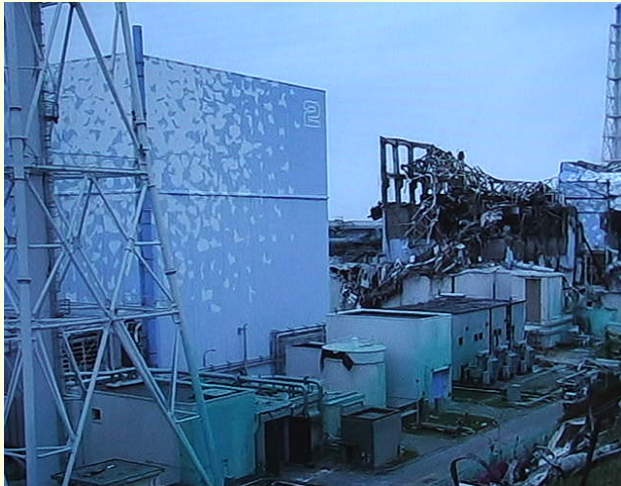


Japan's Efforts

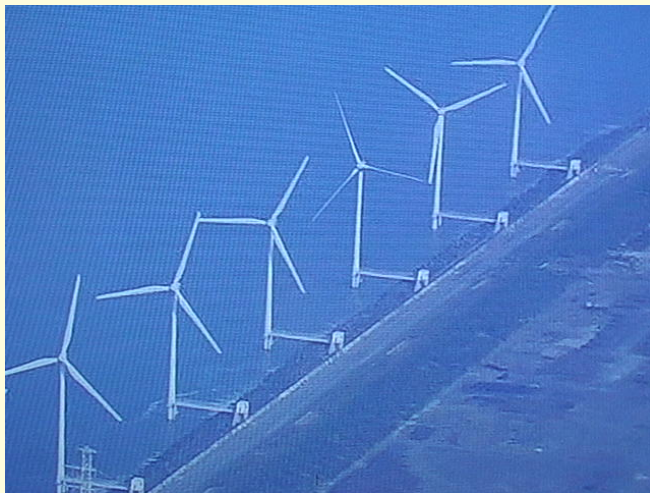
- At the 2008 G8 Summit held at Toyako, Japan declared that it would strive to achieve a low carbon (LC) society with a 60%-80% reduction of greenhouse gas emissions by 2050.
- Following a change of government, the Basic Act on Global Warming Countermeasures that was approved by the Cabinet in March 2010 clearly states that the mid-term target is a reduction by 25% below 1990 levels by 2020, and the long-term target is to make an 80% reduction by 2050.
- Total CO² emissions in Japan were 1,144 million tons in 1990. When including other greenhouse gas emissions, the conversion to CO² was 1,261 million tons.



Future energy policy



On September 22, 2011, the government decided that by March 2012 it would formulate a concrete proposal on the “Best Mix,” the optimal combination of energy resources comprising the three pillars of:



Reduced dependence on nuclear energy;
Development of renewable energy; and
Promotion of efficient energy use.



- The draft proposal will show several plans the government is targeting regarding the ratio of nuclear power, fossil fuels, and renewable energy from 2030 onwards.
- Each of the plans will indicate what the electricity bill and carbon footprint of each household will be.
- They will also include the target of limiting the amount of electricity use by promoting energy efficiency.
- In addition, forecasts as to whether it will be possible to secure a stable supply of fossil fuels such as oil, and the extent it would be possible to develop technologies for improving fossil-fuel electric power generation to reduce pollution.
- They will be prepared in a way that Japanese citizens will be able to comprehensively make an evaluation as to which would be the optimal plan.



Legal Structure and Plans for Achieving the Goal

- Liaison among the 1998 Act on Promotion of Global Warming Countermeasures, Basic Environmental Plan, National Spatial Plan, National Land-Use Plan, Environmental Impact Assessment, Urban planning, etc.
- The revised Act on Promotion of Global Warming Countermeasures in 2008 required large- and medium-sized cities to formulate and implement local government action plans, which establish policies and projects to reduce CO² emissions in districts where they apply.



- Policies and projects include:
 - promotion of the introduction of local renewable energy;
 - promotion of energy efficiency by businesses and local residents;
 - improvement of public transport and green space in local communities; and
 - cyclical use of resources, among others



Initiatives of Local Governments

- Published official documents suggest local governments include a plan for CO² reduction when formulating and implementing urban planning and plans for the improvement of agricultural promotion areas.
 - This clarified that **local governments can implement policies pertaining to global warming countermeasures.**
- ⇒ In June 2009, the Ministry of the Environment (MOE)-Japan prepared a useful **manual** that can be referred to by local governments when devising actions plans for global warming countermeasures.
- ⇒ In August 2010, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT)-Japan formulated the **Low-Carbon City Development Guideline.**
- It is necessary for the **environmental administration and urban planning administration to work in close cooperation.**
 - Specifically, for actual implementation cooperation not only from the **administration, but also from businesses and citizens,** is required.



MOE-Japan Manuals

- Current estimates of greenhouse gas emissions and absorption
- Future projections of greenhouse gas emissions and absorption
- Policies for limiting greenhouse gas emissions
- Case examples of policies of local governments



Ministry of Land, Infrastructure and Transport (MLIT) Low Carbon City Development Guideline

- ① Considers the development of an LC city when revising the urban planning master plan
- ② Pays due consideration to the reduction of carbon pollution when developing comprehensive urban/regional transportation strategies, urban transportation facilities, redevelopment projects, and urban facilities development
- ③ Considers the city development policy when formulating a new action plan
- ④ Analyses the effects of measures to develop an LC city



Strategies and Methods

- Strategies: Designing cities, EST, Green Houses and Buildings, Sustainable Production and Consumption and a Recycling-oriented Society: 3R, development of new energy (renewable energy source)
- Methods: Technology development, regulations, shift in our life styles, financial and market-based tool, Greening and Biodiversity
⇒ Green Economy



Designing Cities

- Area-wide urban renewal provides a great opportunity to optimize energy use through, for example, the introduction of new energy.
- In the initial Kyoto Protocol Target Achievement Plan formulated in April 2005, the promotion of area-wide energy usage was first set out as a measure on the basis of the formation of a low-carbon urban/regional structure and socioeconomic systems.
- In this plan that was revised in March 2008, respective measures under pertaining to the promotion area-wide energy usage were newly added towards the realization of a compact, low-carbon urban structure.



- Challenge 25 Community Development Project: to achieve the objective of establishing communities with low environmental burden to reduce CO² emissions by 25% as part of efforts to revitalize communities (Government provides a financial incentive.)
- Construction of LC New Town: Realization of a compact, LC structure.
- Renewal of LC districts: Building LC cities while putting best use to urban-oriented infrastructure and stocks of urban facilities ⇒ Urban redevelopment project, land readjustment project, and reconstruction project following an disaster.



- Increase in carbon sinks by creating and maintaining green space
 - Increase in the ratio of green space in urban districts
 - Afforestation of abandoned farm land on a constant basis
 - Increase in carbon sinks through forestry management
- ⇒ Construction of urban districts covered with green forests



Smart Community

A society that reflects the coming generation not only in terms of electrical power, but also of heat, transport, communication, water supply, and other public services.



Examples

- “Tomorrow’s Smart City, Kashiwa, Chiba Pref.”
This project aims to develop cutting-edge models of a social system that can be employed in Japan and around the world.
Appendix 1
- Panasonic and Fujisawa City: Panasonic developed a “Sustainable Smart Town” with the cooperation of the public and private sectors by introducing energy-saving, energy-creating, and electricity storage technology at a former factory site that they own in Fujisawa City, Kanagawa Prefecture. Their initial aim is to have 70% self-support of electric power by generating and storing electricity utilizing solar cells and fuel cells. They are striving to generate 100% of electric power themselves in the future.



EST

- Population density of urbanizing area and vehicles' CO² emissions per capita are highly correlated.
- ⇒ In terms of transport energy consumption, travel distance can be shortened by creating compact urban districts as it reduces travel demand.
-
- ⇒ Due to reduced travel distance, a shift to walking and the use of bicycles, instead of cars, will be encouraged.
- Improvement of the public transport system, infrastructure, etc. is needed at the same time.





- Energy use varies depending on our lifestyles and mode of travel.
- In addition, the volume of greenhouse gas emissions varies depending on which energy we use.
- Means of transportation: cars, public transport (bus, new transit system, railway and tramway, etc.), NMT (bicycles, walking)
- Fuels: coal, petroleum, natural gas, biofuel, FC
- Automobiles: EV, PHV, FC, fuel-efficient cars



- In Obihiro City, Kyoto City, and Nagoya City, etc., bio-diesel made from tempura oils is used for garbage trucks and public buses.
- The project of collecting and recycling tempura oils has been carried out as a civic campaign.



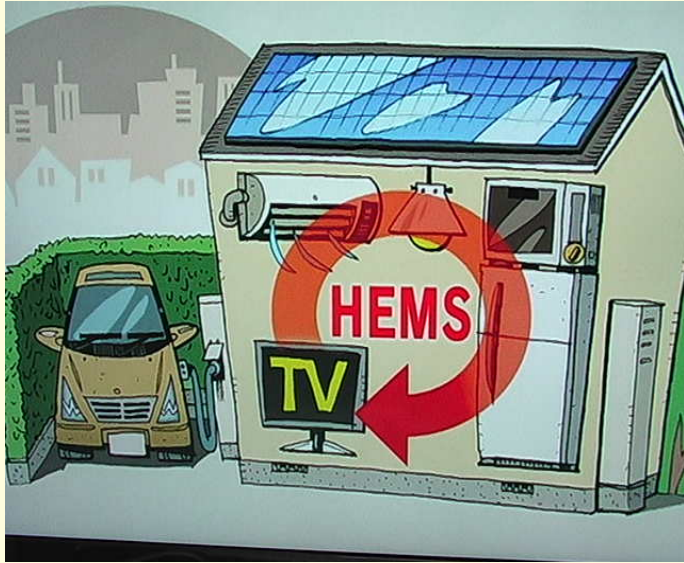
Green Buildings

- Green houses:
 - Insulate building frames;
 - Save energy by using energy-saving home appliances;
 - Needed energy can be supplied, firstly, through electric power generated by solar cells set up on the roof
- In reality, all parts of economic society is involved in energy consumption, production, and supply. As a result, more energy is generated than necessary and much of it is wasted. ⇒



- Optimally designed residential areas where each house can make best use of natural energy.
 - Use of rechargeable batteries in grids (in case of excess supply of natural energy)
 - Use of other power sources in grids (prioritizing the use of LC power sources, stopping the use of inefficient power sources, etc.)
 - Reduce the demand for energy in grids so that we can defer our energy use.
 - HEMS (Home Energy Management System): aiming at optimizing energy use by suppressing CO² emissions by utilizing a device to control home appliances inside the home.
 - Smart meter → Smart grid system
- ⇒ Saving electricity in each building, expanding the effort of energy conservation beyond one family to the entire community.





Policies:

Individual measures related to improving environmental performance of houses/buildings and LC urban development as seen in the introduction of eco-points given through environmentally-friendly renovation, 'green houses'



1. Housing eco-points: Similar concept to 'home appliances eco-point project' (encourage replacement with energy-saving home appliances to reduce CO² emissions. Unlike the case of providing cash which can be set aside as a result of a simple discount, a point system is more beneficial because points accumulated by people will certainly be used. Thus, it will provide a significant economic boost – have already shown some remarkable results). Up to 300,000 points will be provided for thermal insulation renovation of windows, floors, and walls as well as newly built environmentally-friendly residential homes (additional points will be provided when barrier-free renovations are undertaken). Solar heating facilities, low-flow toilets, and highly-insulated bathtubs which are introduced together with environmentally-friendly renovation and environmentally-friendly new homes are also available in exchange for eco-points.

Housing investment accounts for a large portion of GDP; thus it can result in new jobs for local workers.

Environmental measures will be carried out as an economic policy. ⇒ Green New Deal, Green Growth.



2. Special tax reduction measures for green homes:

Reduction of property tax.

Environmentally-friendly renovation is also subsidized (renovation construction costs for energy saving – 5 years of withholding tax credit: approximately 200,000 yen.



3. Environmentally-friendly renovation of schools, green showcase projects: raising awareness about the necessity of LC investments.

Education and learning are essential; especially, first-hand experiences are effective.

As for the process of constructing green homes, local designers and construction firms can be invited so that engineers can be provided with learning opportunities. Environmentally-friendly school renovation projects not only provides learning opportunities to local engineers, but also allows students to notice its effectiveness by experiencing the before and after of renovation, and thus is quite appealing.

Application of similar processes to homes can be expected.



- In addition to measures taken for each building, enhancing the functions of the district heating and cooling system, introducing large-scale cogeneration facilities, introducing a system to utilize sewage heat, utilizing waste heat from garbage incineration plants, and introducing renewable energies, etc.
- Achieving high demand response by working with sophisticated HEMS (Home Energy Management System).
- Example: “Honda Provides Smart Home to Japan City”



Column: Investment of 3,000,000 yen

- A great opportunity is when rebuilding a house. Windows can be changed to double windows, insulation material can be fully inserted between the walls, and solar panels installed. LED lighting and energy-efficient refrigerators can be installed and the car replaced with a hybrid one. You will be able to save 40,000 yen annually as a result of energy saving, and will receive 140,000 yen annually based on Feed-in-Tariff (FIT) for photovoltaic power generation. Moreover, you will save another 100,000 yen annually by driving a hybrid car and the initial 3,000,000 yen investment will be recouped within 11 years.





Sustainable Production and Consumption /Recycling-oriented Society: 3R

The enactment of environment-related laws has been provided: The Container and Packaging Recycling Law, The Household Appliance Recycling Law, The Food Recycling Law, The Automobile Recycling Law, The Construction Recycling Law, and Law for Promotion of Effective Utilization of Resources

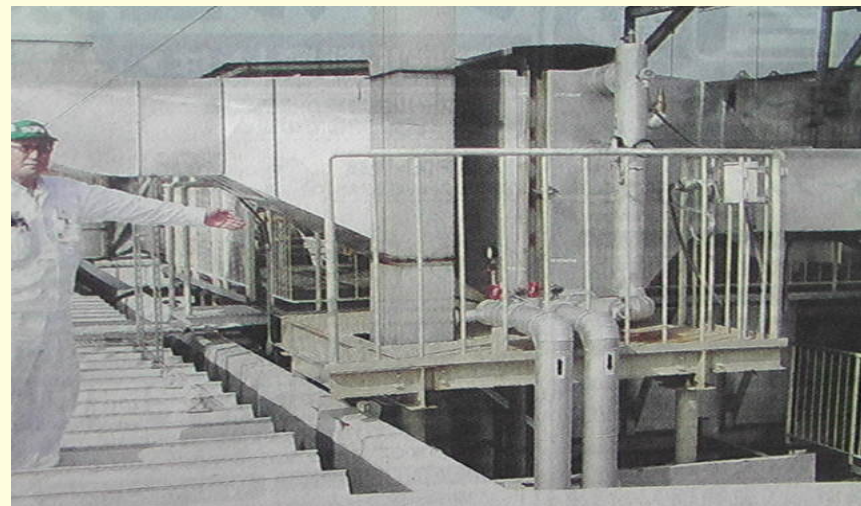


- As implicated in the term ‘Urban Mines,’ there is a large amount of natural resources buried under cities. It is important to ensure the reduction of resource use by raising the level of efficiency of how they are used. Encouraging the reuse and recycle of resources contained in products is also essential.

- In order to do so, technology to dismantle the product in order to extract resources, recycling technology, and manufacturing based on those technologies are necessary.



- Use of unused energy such as waste heat from urban unused energy sources which comes from factories and waste incineration plants.
- Combine available options and introduce to each region, district, and block.



Renewable Energy Sources



- Energy sources: biomass, wind power, solar power, solar heat, geothermal power, mini-hydropower, wave power, tidal power, Nuclear energy???
- The development of technology to convert to electricity and heat is necessary.
- The development of a storage battery is necessary.



Column

In Higashiomi City, Shiga Prefecture, all the cost of a solar power facility totaling ¥2,900,000 was covered by the residents. The investors received a local government-issued merchandise coupon worth about ¥4,000 per minimum investment of ¥100,000 as a dividend. In Higashiomi City, corporations and households pay Kansai Electric Power Co., Ltd. ¥23,000,000,000 for their electricity bills. However, the City is looking for ways to use the economic value of renewable energy for the economic development of the community, by replacing about 20% of electricity with solar energy.



- Case Example: "Solar plant cleans Kawasaki image"
- "19 prefectures, Softbank to build solar power farms in rice paddies"



Column: Clean Energy Town - Kuzumaki Town, Iwate Prefecture

It has a population of about 7,400, and 2,900 households. There are 10,000 cows in Kuzumaki Town, which is the largest number at the local government level in the Tohoku area. Milk, cheese, and wine made from fruit grown on a Japanese crimson glory vine are famous. To add value to their specialty products, they began making the effort to spread renewable energy from 10 years ago. About 300,000 people come to the town each year, including who come to observe the town's efforts and visitors.



- Facilities generating electricity by wind turbines, solar energy, cow dung, wood chips and garbage are scattered, and the town has aimed to become self-sufficient by renewable energy.
- Grazing lands covered with yellow-green grass spread out on a plateau at an altitude of 1,000m. Threading through this plateau are 12 white wind turbines 60m in height. These wind turbines are also the symbol of the town which has the motto, “Milk, Wine and Clean Energy”.



- In the town, a total of 15 wind turbines and about 500 solar panels have been installed at junior high schools and other facilities. There are two biomass power generation facilities that use cow waste, garbage, and wood chips as fuel. There are also four pellet boilers that burn pellets made from bark.
- Total electricity power generation is 56,125,000 kWh per year. It is calculated that this can cover 15,000 households, which is more than five times the number of households in the town.
- Mr. Shigeo Suzuki, the town mayor, is proud that Kuzumaki Town has changed useless things into valuable ones. Useless things are winds that hamper agriculture, cow waste, and bark classified as industrial waste. The basic principle is that the community uses the energy the community generates. “Wind turbines don’t disturb livestock. Coexistence.” The selling of electricity can become an industry.



Green Economy

- The World Bank ECO2 Cities: promoting the formation of cities balancing the environment and the economy. According to World Bank reports, environmentally sound cities that centre themselves on creating a low carbon society gain competitive power, and pursue resource and energy efficiency. In other words, reduced greenhouse gas emissions as a result of decreased carbon pollution can create wealth through CDM and emission trading.



- New businesses are being created, resulting from the birth of a new sense of value of global environmental protection and network-building among the city's local government, residents, companies, and universities.



- Green Investment: popularization of highly insulated houses, management of energy efficiency in the entire house by HEMS, improved efficiency (energy-saving) of air conditioners, heat pumps, water heaters, stoves and lighting, investment focusing on sustainability of a society such as reduction of standby energy = a wide range of investment in the promotion of LC society formation



- Scenario:
 - Making shifts in the economy with about 2% growth in order to achieve a LC society. This will bring about turnover from old-style industries which do not suit a LC society to new advanced industries and companies that promote research and development, technological innovation, and business models necessary in a LC society.

 - Friction resulting from the shift in employment and change in social system during the transfer should be limited. In addition, transfer at a stable pace in order to achieve less carbon pollution is advisable. With the aim of sharing the cost, the introduction of a carbon tax and emission trading can be considered.





Technology: the top-runner approach

- The technology should be achieved that is higher than the best performing product among current commercialized products



Barrier

- When new technology is introduced in a society, the current social system, infrastructure, economic efficiency, and lack of information and funds may become obstacles.
- To remove these obstacles, it is necessary to introduce new technologies and create an LC society, with the strong support of policies, including deregulations, price and fiscal policy, information service, education, and work training.
- Establishing a longer-term loan and investment system for LC technology so that long-term investments can be made.



- Human Resources Development:
 - Fostering engineers who have a good understanding of construction know-how and technology.
 - Fostering personnel responsible for measurements, reports, and confirmation of carbon accounting.
 - Fostering personnel for LC generation at various places, including universities, companies, and vocational training facilities, is essential for overcoming any barriers.



- Companies which move into the LC business will create more opportunities for employment, which will provide families with income. This cycle can increase consumer spending and stimulate the economy.
- On the other hand, some industries may not be able to continue their business as their traditional way of doing business does not fit into the new model, which will lead to job loss. This will reduce consumer spending and the economy will suffer a downturn. Friction may result by such a shift.
- Changes in the employment practices due to changes in industrial structure





- Contribute to the reduction of CO² emissions by in-house products
- Building an LC society by working in cooperation
- Cooperation with the citizens
- Cooperation with the local administration
- Cooperation with various industries



Overcoming the barrier of economic efficiency

- Taxation proportional to carbon content of coals, oils, and natural gasses \Rightarrow Tax revenue will be used by the government as campaign funds and subsidies to overcome “the barrier of information” and “the barrier of funds”
- Further reduction of CO² emissions can be achieved not only by expansion of renewable energy such as solar energy, wind power generation, and biomass, but also by investment in research and development of innovative energy technology.



- When the industrial structure shifts through the process of the reduction of CO² emissions, compensation for friction caused by changes in employment practices will be addressed.
- Scandinavian countries such as Sweden, Norway, Denmark, and Finland, as well as Holland, the UK, Germany, and Italy have already introduced a carbon tax and an energy tax as a form of an environmental tax. Tax rates range from 40 to 190 dollars.



- The tax revenue is used not only towards the reduction of greenhouse gas emissions, but also for solving new challenges that every country faces, including the issue of energy, environment, and social security.



The cap-and-trade system

A method to add “a carbon price” determined by the “emissions trading market,” instead of imposing taxes. “A carbon price” is added onto energy costs; this serves the same function as a carbon tax, and leads to the selection of low emissions technology.



- The difference in effectiveness is that while the amount of emission cuts of the entire country depends on the people's response towards taxation in the case of a carbon tax, the amount of CO² emissions reduction which is initially allocated to each company can certainly be reduced in the case of emissions trading.



Carbon offset between cities and rural communities

The possibility of combining manufacturing and forestry in the new institutional framework.

- Different from agricultural crops and wood products, the rich natural environment, and fresh water and air in the countryside had no market value till now.
- If activities such as protection of the rich natural environment, reduction of CO² to O₂ by afforestation and thinning can be perceived as economic activities, and if wind power, water power, and biomass can economically utilized as local resources, it will be possible for hilly and mountainous areas to emerge from a heavy reliance on public works projects which is not so cost-effective, and in doing so they can revitalize the areas through conservation of nature and use of local resources.



Example of Metropolitan Tokyo



All 62 municipalities of Tokyo started a joint research on “carbon offset” which offsets CO₂ emissions by afforestation.



- Shinjuku-ku (one of Metropolitan Tokyo's 23 special municipalities) bears the costs of forestation in Ina City, Nagano Prefecture, which offsets its CO₂ emissions. By connecting the CO₂ emissions reduction project with the conservation of neighbouring forests, the feasibility of revitalizing the local forest industry has been increasing. Carbon sinks which were created by a forest conservation project, including thinning in Ina City, offset CO₂ emissions in Shinjuku Municipality. A project is planned for the improvement of 30 to 50 ha of forests owned by Ina City every year. It will be possible to reduce 2000 – 3000t of CO₂ emissions annually. The forested area of Ina City is almost the same size as the Tokyo's special municipalities, and there still remain lots of forest which require thinning. In the future, there are expectations for the interaction of local people through the use of timber from forest-thinning and the forest itself.



Specific efforts taken in cities

Diverse perspectives such as procurement by local governments, investment in public utilities, partnership and education by consumers are important

⇒ increase in employment in the medium and short term as well as aiming at structural change of the whole concept of cities in the medium and long term

⇒ shift from energy-consuming industry to labour-intensive industry

⇒ It is possible to create various types of alternative energy-related industries by getting out of a fossil fuel-based energy supply structure, especially through the supply of alternative energy and utilization of information and communication technology.



Integrated polities

- In addition to technology and structure of industry, there is a need for integrated polities with an effective combination of the respective measures of “a carbon tax,” “emission trading,” “feed-in tariff (FIT),” various kinds of regulations, and “visualization”.
 - As for emission sources which can be easily identified, the amount of emissions will be allocated and also self-restraint applied.
 - For products which require energy, a high standard setting will be applied.
 - Besides, as for hard-to-identify minor emitters such as households, offices, and automobiles, an energy tax and carbon tax will be imposed so that energy conservation and reduction of CO² emissions can be promoted.



People's participation

- An LC society cannot be achieved without the participation of many people from all walks of life such as citizens, companies, public institutions, and the central government.
- City-wide efforts are also effective since not only does it have all the necessary factors, including infrastructure and technologies, but also there is a decision-making mechanism which is more flexible than that of the central government's and can easily take leadership.



- As for businesses, it is difficult to go ahead with long-term investments without clear national policies. Setting long- and mid-term reduction targets and national policies together with enactment of laws would be the clearest means of declaring intent.



- For later generations, “education” which teaches the limitation of nature and encourages people to take action based on their claims is important.



Changing people's lifestyle

- The public is given the role of changing people's lifestyle.
- It possesses long-term goals and considers the balance with the next generation, such as the central government, local governments and universities, carries out regulations, guidance, economic measures and promotion of education (ESD).
- As a result, this will encourage a shift in people's lifestyle and lead to a change in the product lineup.
- Appropriate investment in railways, busses, cycling paths, discount passenger tickets for public transport, electricity generation by waste disposal, and green parks and the local consumption of locally produced products can change how people travel.
- The public possesses the kind of power to change people's lifestyle.



Matrix of Strategies and Measures

- Strategies
 - Designing Cities
 - EST
 - Green Building
 - Sustainable Production and Consumption, 3R, Recycling-oriented Society
 - Renewable Energy Sources
 - Measures
 - Technology/Infrastructure
 - Regulations
 - Culture/Life Pattern
 - Pricing/Finance
 - Afforestation/Biodiversity
- ⇒ Green Economy



Designing Cities

Technology Infrastructure	Regulations	Culture Life Pattern	Pricing Finance	Afforestation, Biodiversity	Green Economy
<ul style="list-style-type: none"> • Compact cities • Land Readjustment • Urban redevelopment • District planning • Transfer of development rights • Public open space • Comprehensive designing system • Road network • Public transport network • Communication network 	<ul style="list-style-type: none"> • Land-use planning • Restrictions on floor area ratio, building coverage ratio, and height • Regulations on development • Permission for development • TOD • Special development zone • EIA 	<ul style="list-style-type: none"> • Trend towards residing in apartments • Intensive compact cities • Solar town • Wide-area energy use • Cooling and heating in a community • Routes of wind • Forest education • Environment museums • Smart Communities • Visualizing environmentally friendly acts 	<ul style="list-style-type: none"> • Challenge 25 City Development Project • City planning tax • Property tax • Green New Deal Fund 	<ul style="list-style-type: none"> • Green parks • Green coverage ratio • Reserves • Forestry management • Ecosystem network • Public open space • Forestry management • TDR 	<ul style="list-style-type: none"> • Green public investment • Processing of forest-thinning and timber from a community • Cap-and-trade • Eco-tourism



EST

Technology/ Infrastructure	Regulations	Culture Life Pattern	Pricing Finance	Afforestation, Biodiversity	Green Economy
<ul style="list-style-type: none"> • Promoting less polluting and low-carbon vehicles (HV, PHV, EV, FCV) • EV/PHV charging stand • Development of storage battery • Improvement of fuel efficiency • Development of IT components • Improvement of fuel quality • Biofuels • Power-assisted bicycles • Pavements and cycle paths • Bus priority lane (BRT) • New transport system such as LRT • Community bicycles • Smart cards (ETC, public transports), green tickets, ITS 	<ul style="list-style-type: none"> • Emission standard • Energy-saving standard • Fuel-efficiency standard • Fuel quality standard • Accuracy of low exhaust gas car approval • Automobile inspection • Monitoring, publication • EIA • TDM 	<ul style="list-style-type: none"> • Change in awareness towards the environment • Car sharing • Stopping use of private cars • Eco-driving • Modal shift(cars→ public transport, NMT) • Building economical logistic system (advanced management of logistic networks) • EV/HV taxi stand • ITS 	<ul style="list-style-type: none"> • Eco-car tax reduction • Subsidies • Eco points • Aid for technology development (financing) • Non-eco-car tax increase • TDM 	<ul style="list-style-type: none"> • Roadside trees • Pocket parks • Flower beds • Planting trees in median strips • Planting green along railway tracks 	<ul style="list-style-type: none"> • Green production • Green public investment • IT component industry • Investment in public transport infrastructure • Investment in development of advanced management of logistic network system



Green Buildings

Technology/ Infrastructure	Regulations	Culture Life Pattern	Pricing Finance	Afforestation, Biodiversity	Green Economy
<ul style="list-style-type: none"> • HEMS/BEMS • Smart meter, smart grid • Storage battery • Highly-insulated buildings • Energy-efficient equipment • LED (organic LED) • Heat pump • Utilizing natural energy • Natural air-conditioning • Zero emission houses • Power generation houses 	<ul style="list-style-type: none"> • Code of construction standards • Eco-standards • Evaluation system for environment performance 	<ul style="list-style-type: none"> • Green houses (insulating house frames, energy-saving home appliances, solar power generation, PHV) • Smart grid, life in a smart community • EDMS 	<ul style="list-style-type: none"> • Eco points • Tax reduction • subsidies • Reduction of property tax 	<ul style="list-style-type: none"> • Covering greenery with a wall • Green curtains • Green roof • Public open space • TDR 	<ul style="list-style-type: none"> • Investment in development of houses and buildings • Construction, selling and purchases of houses and buildings • Cap-and-trade • Industry of energy-saving home appliances



Sustainable Production and Consumption, 3R, Recycling-Oriented Society

Technology/ Infrastructure	Regulations	Culture Life Pattern	Pricing Finance	Afforestation, Biodiversity	Green Economy
<ul style="list-style-type: none"> • Dismantle technology • Extraction technology • Recycle technology • Urban mines (recycle use of material products) • Sustainable production • Use of unused energy (waste heat, sewage heat, food waste, hydrogen town) • Cascade use of energy 	<ul style="list-style-type: none"> • Various recycling laws • Separation criteria • Supply chain management (SCM) • Verification system 	<ul style="list-style-type: none"> • Separation campaigns • 3R education, campaigns • Eco-consumers/sustainable consumption • <i>mottainai</i> campaign • Initiative taken by the government and schools • Eco premium • work training • Cooperation among stakeholders 	<ul style="list-style-type: none"> • Eco-points • Eco-labeling • Subsidy • Carbon tax 	<ul style="list-style-type: none"> • Thinning, afforestation, wood fuel, bio-fuel • Wood waste • Cow dung • Crops • Kitchen waste (carbon-neutral) 	<ul style="list-style-type: none"> • Recycling business • Bio-business • Eco-electrical appliances, machine industry • Local production and local consumption • Cap-and-trade



Renewable Energy Sources

Technology/ Infrastructure	Regulations	Culture Life Pattern	Pricing Finance	Afforestation, Biodiversity	Green Economy
<ul style="list-style-type: none"> • Conversion technology to electricity and heat⇒ • Biomass • Wind power • Solar light • Mega-solar • Solar heat • Geothermal energy • Mini-hydroelectric generation • Wave power • Tidal energy power • Storage battery (nuclear energy???) 	<ul style="list-style-type: none"> • Relaxation of regulations • Separation of generation and transmission of electricity • Feed-in tariff (FIT) • Power stabilization 	<ul style="list-style-type: none"> • Co-existing with nature • Solar electric generation housings • Local production and local consumption of energy • Taking the initiative to introduce into public facilities 	<ul style="list-style-type: none"> • Use of new energy • Carbon tax (use as a lubricant for a shift) • Emissions trading • Feed-in tariff (FIT) • Aid to solar electric generation housings • Aid to development of geothermal power generation 	<ul style="list-style-type: none"> • Production of crop resources 	<ul style="list-style-type: none"> • New energy marketing business (selling electricity) • Development of storage batteries • Producing, selling, purchasing • Public investment in local production of electric power, power grids, etc. • Cap-and-trade





Thank you



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