Background

A resolution that came out of the 2009 National Energy Conference initiated the Implementation of the Low Carbon City Program. The objectives include forming two low carbon exemplary communities in each city and county within two years, four low carbon cities and two low carbon islands within five years, and four low carbon living circles with one each in northern, central, southern and eastern Taiwan by 2020. The Taiwan EPA subsequently set up the Eco Community Implementation Office on June 15, 2009, to implement the Low Carbon City program accordingly.
The concept of low carbon communities

A. Major indices
   a. Rural type – based on the ratio of energy self-sufficiency (Renewable energy consumption/total energy consumption)
      - Household electric consumption
      - Fossil fuels consumption
      - Renewable energy consumption
   b. Urban type – Based on Greenhouse Gas emission per Capita (Tonnes/Capita)

B. Secondary indices – Resource recycling rate
   a. Solid waste recycling rate – Based on the ratio of solid waste recycling to the total solid waste.
   b. Wastewater recycling rate – Based on the ratio of wastewater recycling to the total water.

C. Other supplementary measures (in cope with local conditions)

D. Classification of low carbon city
   a. Rural type – Based on the ratio of energy self-sufficiency (Renewable energy consumption/total energy consumption)
   b. In case the average household electricity consumption in urban area is 10%-50% lower than that area or the rural area, the rural type on classification for assessment will be adopted.
   c. The resource recycling rate is 10% more than the national average.

The correlation between low carbon and Eco community

Low carbon
   High self-sufficient ratio
   ✓ Raise the ratio of renewable energy
   ✓ Energy conservation

Resource recycling
   Re-use of waste resources
   ✓ Waste recycling
   ✓ Waste water recycling
   ✓ Use of bio-mass

Eco community
   ✓ Providing friendly environment for the development of biological diversity
   ✓ Green product and green consumption

Energy self-sufficiency assessment table

<table>
<thead>
<tr>
<th>Level</th>
<th>Fail</th>
<th>Primary</th>
<th>Normal</th>
<th>Good</th>
<th>Excellent</th>
<th>Outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of self-sufficiency</td>
<td>10%</td>
<td>10%-25%</td>
<td>25%-50%</td>
<td>50%-75%</td>
<td>75%-90%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Numbers represent as ‘Carbon Footprint’, which is the total set of greenhouse gas emissions caused by an organization, event or product.

Green Leaf, means health, environmental production.

135g CO₂

Taiwan Carbon Footprint Label

Love environment, 'reduce' carbon dioxide, implement green consumption, and create a low carbon dioxide society.

PV Bus Shelter
Ten Declarations for Carbon Reduction
1. Setting air conditioners at 26 degrees Celsius with no leakage
2. Turning off lights and unplugging appliances behind
3. Adopting energy saving light bulbs, saving more money
4. Adopting green label to save energy and water
5. Bicycling and walking more for good health
6. Not driving the car one day a week
7. Adopting more fuel-efficient cars to cut carbon emission
8. Eating more vegetables and less meat
9. Carry your own cup, bowl, chopsticks, handkerchief, and shopping bag
10. Use less energy/resources to save the earth

Low carbon community promotion initiative

<table>
<thead>
<tr>
<th>Renewable energy + energy conservation</th>
<th>Low carbon buildings</th>
<th>Green transportation system</th>
<th>Low carbon living</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Renewable energy planning</td>
<td>❖ Low carbon building management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>❖ Wind power</td>
<td>❖ Including foundation conservation, foundation water conservation, water saving, waste reduction, water resource, waste water and refuse improvement</td>
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<tr>
<td>❖ Natural gas replaced by Solar thermal energy</td>
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<tr>
<td>❖ Photovoltaic</td>
<td>❖ Green building material</td>
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<tr>
<td>❖ Bio-mass energy</td>
<td>❖ Life cycle assessment (Production, process, use, demolition, disposal)</td>
<td></td>
<td></td>
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<tr>
<td>❖ Hydrogen energy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>❖ Energy conservation</td>
<td>❖ Low carbon transportation</td>
<td></td>
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<tr>
<td>❖ Replacement into highly efficient air-conditioners and refrigerators</td>
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<td></td>
<td></td>
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<tr>
<td>❖ Installation of LED and compact fluorescent lamps</td>
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<tr>
<td>❖ Advanced metering infrastructure</td>
<td>❖ Public transport system</td>
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<tr>
<td></td>
<td>❖ Bicycle (electric bicycle)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>❖ electric scooter</td>
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<td></td>
<td>❖ Hybrid Car</td>
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<tr>
<td></td>
<td>❖ Low carbon bus (electric, bio-mass, hydrogen)</td>
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<tr>
<td></td>
<td>❖ Smart transport system</td>
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<tr>
<td></td>
<td>❖ Bicycle network system</td>
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<tr>
<td></td>
<td>❖ LED lighting and traffic light</td>
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<td>❖ Vehicle lowest efficiency standard</td>
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<td></td>
<td>❖ carbon fixation/sink – planting and green roof</td>
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<tr>
<td></td>
<td>❖ Low carbon consumption – energy saving label, water saving label, environmental protection label products.</td>
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<tr>
<td></td>
<td>❖ Low carbon – eat local foods, eat seasonal foods, do not use disposable cutlery.</td>
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<tr>
<td></td>
<td>❖ Low carbon education – promotion in family, society, school and office.</td>
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</tbody>
</table>
Low Carbon Pilot Area

A. Smangus

a. Background:
Smangus is located at a high elevation (1,590 m) in the mountains of Hsinchu County in northern Taiwan. There is a total of 28 households with 154 residents, all belonging to the aboriginal Atayal Tribe. One of the last areas to have electricity supplies in Taiwan, Smangus was connected to the national power grid in 1979. Before that, flashlights and gas lamps were the main illumination sources. In 1991 Smangus's primary forest area became a tourist site. The vehicle transport network was built in 1995 and a cellular base station was built in 2004. In 2008, with the sponsorship and assistance from the Bureau of Energy and the Industrial Technology Research Institute, the Extensive Lighting Revolution project was implemented. As Smangus residents start to enjoy better quality of life, a low-carbon lifestyle should be implemented.

b. Focus points and the benefits
✓ Energy conservation – entirely installed with LED energy saving light bulbs and a street Lamp Control System. Becoming the first demonstration place with a revolutionary lighting system in Taiwan. Through the lighting improvement, a total of 60% of electricity consumption has been conserved.
✓ Planning the 3R, i.e., Repress, Reuse and Recycle system, of the regional refuse and wastewater.
✓ The investigation and analysis of water quality, volume and pollution load of wastewater.
✓ The assessment of methods, sites, plans and detailed designs of regional wastewater treatment systems.
✓ The feasibility, engineering assessments, site selection, planning and detailed design of regional sewerage water purification and recovery systems.
✓ Both the volume of waste and polluted water are significantly decreased.
B. Kinmen

a. Background:
Kinmen is situated off the southeastern coast of Fujian Province, in the Taiwan Strait, less than 2 kilometers from Xiamen on the mainland. With a total area of 150,456 square kilometers, Kinmen is composed mostly of granite. In addition to the main island, Kinmen covers another 12 islets, including Dadan, Erdan, Dongding and Beiding. For the Low Carbon City Program, the Environmental Protection Administration will turn Kinmen into a low carbon island by 2014.

b. Focus points and the benefits
✓ Renewable energy – wind power, solar thermal energy and photovoltaic electricity.
✓ Green transport – phased replacement of rented motorcycles with electric scooters.
✓ Energy conservation – use energy saving lighting and promotion of advanced metering infrastructure.
✓ Using the stillage from Kinmen Kaoliang Liquor for cattle feeding and organic composting.
✓ Other low carbon measures – promote zero waste, water recycling and environmental greening.

Low Carbon Demonstration Area - Kinmen
C. Penghu

a. Background:
Penghu is situated in the middle of the Taiwan Strait, between China and Taiwan, and is the only island county of Taiwan. It consists of 90 islands, with a total area of 127.9636 square kilometers. There are two wildlife preservation areas in Penghu, Mao Island Seabird Refuge and Wangan Island Green Turtle Refuge, and a basalt nature reserve. Furthermore, the Ministry of Communications has also set up Penghu National Scenic Area.

b. Focus points and the benefits
✓ Renewable energy – mainly wind power, solar thermal energy and photovoltaic. The use of renewable energy in the local electric power grid increased from 0.01% to 69%, with the ratio renewable energy of total energy rising from 2.76% to 51%.
✓ Energy conservation – including the use of energy saving appliances (such as high efficiency air conditioners and refrigerator promotion), installment of LED traffic lighting, energy efficient lamps, and the use of advanced metering infrastructure. Household energy conservation of 10%.
✓ Low carbon buildings – green buildings and green materials.
✓ Resource recycling – rainwater reservoir system and drainage system.
✓ Green transport – the use of electric scooters and buses.
✓ Waste energy recycling (zero output) of the overall reduction of greenhouse gas emissions was 59%.
✓ Emissions per capita reduced from 5.4 t CO₂/capita to 2.1 t CO₂/capita.
✓ Creation of local employment opportunities.
D. Green Island and Little Liuqiu

a. Background:
Green Island is situated in the Pacific Ocean, about 33 kilometers off the eastern coast of Taiwan. It is a volcanic island where winds blow and waves pound away at the rocks all year round, creating a beautiful and diverse coast. The total area of Green Island is about 16 square kilometers and is the Taiwan region’s fourth largest island.

Little Liuqiu is situated in the Taiwan Strait, about 14 kilometers off the southwestern coast of Taiwan. Of Taiwan’s offshore islands, it is the only coral island. Liuqiu is 6.8 square kilometers. Its non-residential land consists of agricultural land, forests with diverse tree species, grassland and beaches. It is full of strange rocks, a variety of coral and many beautiful ocean landscapes.

For the Low Carbon City Program, the Ministry of Transportation and Communications will turn Green Island and Little Liuqiu into green-ecological tourist islands by 2014.

b. Focus points and the benefits
- Green transportation – the use of electric scooters and low carbon tour buses.
- Water resource recycling use – Water saving and wastewater recycling systems.
- Zero waste island – waste reduction and resource recycling.
- Low carbon environmental education – promote ecological protection and energy saving.
Towards Low Carbon Cities in Taiwan