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Department of Environment
Bangkok Metropolitan Administration (BMA)
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1. Fact about Bangkok

- **Density Population**: 3,634 persons/ km² (2010)
  - Inner areas: 11,400 persons/ km² (2008)
  - Outer areas: 2,400 persons/ km² (2008)

- **Population**
  - Registered: 5,701,394 persons (2010)
  - Non Registered: ~ 4.0 million (2009)

- **GDP per capita**
  - Thailand: ~ $8,479 (2010)
  - Bangkok: ~ $12,187 (2010)

- **Average life expectancy**: 73.4 years

- **No. of Households**: 2,400,540 households (2010)

- **Community (Registered)**: 1,967 communities (2008)

- **Registered Vehicles**
  - New registered: 774,589 units (2010)
  - Collective registered: 6,103,719 units (2010)

- **Length of streets**: ~ 4,150 km

- **Mass rapid transit**: 79.5 km (2010)
  - BTS + MRT + Airport Link
  - Future project: 233.6 km (2016) / 388.7 km (2019) / 506.6 km (2029)

- **Total residential electrical use per capita**: 1.433 megawatt hour (2010)

- **Location**: the eastern and northern hemisphere and above the equator

- **Total Areas**: 1,568.737 km² (2010)

- **Average Ground Level**: +0.50 to +1.50 m MSL
  - MSL: Mean Sea Level

- **Seasons**
  - Rainy (May – October)
  - Cool (November – January)
  - Hot (February – April)

- **Temperature**
  - Lowest: 11.7 °C (1999)
  - Average: 28.0°C (2009)

- **Annual Rainfall**
  - Highest: 2,272 mm. (2009)
  - Average: 1,656.1 mm. (1998 – 2010)

- **Main River**: Chao Phraya (98.5 km)
Bangkok Metropolitan Administration (BMA)

- 61 City Councilors
- 16 Departments
- 50 Administrative Districts
- 6 Administrative Zones
- 68 Health centers
- 38 Youth centers
- 436 BMA' schools
- 600 BMA' buildings
- Personnel: 95,573 persons (2010)
  - Officers: 22,025 persons
  - Teachers: 16,042 persons
  - Permanent Employees: 42,226 persons
  - Temporary Employees: 15,280 persons

Environmental Information

- Solid waste
  - Generation rate: ~ 0.98 kg./capita/day
  - Collected waste: 8,769.38 tons/day
  - Disposal: 90% by sanitary landfill

- Waste water
  - Daily water effluent: ~ 2.5 million m³/day
  - Percentage of city population: 42% served by wastewater collection

- Green Areas
  - Total Public Park Areas: 24.42 km² in 2010
  - Green Areas per capita: 4.37 m²/capita
  - Main Public Parks: 27 parks

- Fuel consumption
  - Diesel: 193 Million liter
  - Biodiesel: 5.6 Billion liter
  - Gasoline: 980 Million liter
  - Gasohol: 1.6 Billion liter
2. Bangkok Policy


Steering Committee For Action Plan on Global Warming Mitigation 2007 - 2012
- Working Group for Improvement of Transportation System
- Working Group for Promotion of Renewable Energy
- Working Group for Energy Conservation and Building Retrofit
- Working Group for Solid Waste and Wastewater Management
- Working Group for Expansion of Green Areas

5 Strategies for a sustainable metropolis

Strategy 1: Strengthening Infrastructure for Regional Mega-City.
Strategy 3: Striving for Green Bangkok.
Strategy 4: Providing Good Quality of Life in Cultural Mega-City.
Strategy 5: Mastering Best Service and Mega-City Management.

7 Strategies for Green Bangkok Development
Based on Bangkok Metropolitan Administration Plan (2009-2012)
3. Measures to Tackle Climate Change

1) Mitigation Policies and Measures

2) General Adaptation Measures

2-3 May 2007: Held the meeting among government and private sectors to seek the cooperation to mitigate the Global Warming.

Draft the Bangkok Declaration on the Cooperation of Alleviating the Global Warming

9 May 2007: 36 Organizations jointly signed the Bangkok Declaration on the Cooperation of Alleviating the Global Warming at the United Nations Conference Centre, Bangkok

Following the declaration’s signing, Bangkok organized campaigning events on the 9th day of each month to raise awareness among Bangkokians of global warming concerns.

14-17 May 2007: Bangkok Governor joined C 40 Large Cities Climate Summit in New York City, USA → initiated to prepare Bangkok Global Warming Action Plan
Drafted the 5-year plan (2007-2012) targeted at reducing Bangkok’s total GHG emission in the year 2012 by 15% below business as usual projection.


Assigned the Steering Committee to follow up the implementation activities in the action plan.

Now!!!

At present, on process of the evaluation to prepare the Bangkok Master Plan on Climate Change 2013-2023.

#### Comparison of GHG Emission in the Future Under Different Scenarios Against Current GHG Emission Condition

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<thead>
<tr>
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<tbody>
<tr>
<td>Transportation</td>
<td>21.18</td>
<td>25.30</td>
<td>19.77</td>
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<tr>
<td>Biofuels Energy (reduced GHG)</td>
<td>14.86</td>
<td>16</td>
<td>13.75</td>
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<tr>
<td>Electricity</td>
<td>1.13</td>
<td>1.13</td>
<td>0.95</td>
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<tr>
<td>Waste / Wastewater</td>
<td>1.13</td>
<td>1.13</td>
<td>0.95</td>
</tr>
<tr>
<td>Waste Recycle (reduced GHG)</td>
<td>1.13</td>
<td>1.13</td>
<td>0.95</td>
</tr>
<tr>
<td>Others (estimate 15% of total GHG emission from other sectors)</td>
<td>5.58</td>
<td>6.36</td>
<td>6.36</td>
</tr>
<tr>
<td>Green Area (reduced GHG)</td>
<td>(-0.10)</td>
<td>(-0.10)</td>
<td>(-1.00)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42.65</strong></td>
<td><strong>48.69</strong></td>
<td><strong>38.94</strong></td>
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</tbody>
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Comparison of GHG Emission in the Future Under Different Scenarios Against Current GHG Emission Condition

- GHG emissions 7.1 tons CO₂ equivalent / capita /year under business as usual (BAU)
- GHG emissions in future 5.5 tons CO₂ equivalent /capita /year under the implementation of activities in 5-year Action Plan

Ultimate Goal: 15% reduction of GHGs emission through the implementation of activities under the preceding 5 initiatives

Figure: Reduction in Bangkok’s future GHG Emission Under the 5-year Action Plan

**Initiative 1: Expand Mass Transit and Improve Traffic System**
- **Action Plan 1:** Expand the Mass Transit Rail System within the Bangkok Metropolitan Area
- **Action Plan 2:** Improve Public Bus System
- **Action Plan 3:** Improve Traffic System

**Initiative 2: Promote the Use of Renewable Energy**
- **Action Plan 1:** Promote the Use of Biofuels

**Initiative 3: Improve Building Electricity Consumption Efficiency**
- **Action Plan 1:** Improve Building Energy Consumption Efficiency
- **Action Plan 2:** Electricity Conservation Campaign for Bangkokians

**Initiative 4: Improve Solid Waste Management and Wastewater Treatment Efficiency**
- **Action Plan 1:** Increase Efficiency in Solid Waste Management
- **Action Plan 2:** Increase Efficiency in Wastewater Treatment

**Initiative 5: Expand Park Area**
- **Action Plan 1:** Plant trees in the Bangkok Metropolitan Area
- **Action Plan 2:** Plant trees in the Neighboring Province Areas
Expand Mass Transit and Improve Traffic Systems

- **Target CO₂ Emission Reduction 5.53 Million Tons in 2012**

Expand the Mass Transit Rail System within the Bangkok Metropolitan Area; reduction CO₂ emitted 2.4 million ton

- Support the implementation of mass transit rail systems in the Bangkok Metropolitan Area (BTS 23 km. Extended 7 stations, 33.5 km.)

Improve Public Bus System; reduction CO₂ emitted 1.43 million ton

- Implement a Bus Rapid Transit System (BRT)
- Support improvements to the existing Public Bus System

Improve Traffic System; reduction CO₂ emitted 1.7 million ton

- Improve the road network
Promotion the use of Renewable Energy

➤ Target CO₂ Emission Reduction 0.61 Million Tons in 2012

Promote the Use of Biofuels

➤ Promote the Use of Gasohol; reduction CO2 emitted 0.27 million ton

- Promote the use of gasohol in BMA organization (since 2008)
- using gasohol (E10) in BMA vehicles
- Promote the use of gasohol for Bangkok residents (since 2005)
- gasohol E10 E20 and E85 as alternative fuel

➤ Promote the Use of Bio-Diesel; reduction CO2 emitted 0.34 million ton

- The project of Biodiesel for Thai Society under Sufficiency Economy (since 2007)
- collaborating with BPC
- Project of biodiesel production from used cooking oil (small scale) (since 2010)
- Capacity 100 l/batch producing biodiesel by BMA
- Encourage the use of biodiesel (B5) in BMA organization (since 2008)
- BMA vehicles
- Promote the use of biodiesel for Bangkok residents
- Enforcement B2 in 2008 and B3 in 2010
- B5 as alternative fuel
Improve Building Electricity Consumption Efficiency

**Target CO₂ Emission Reduction**: 2.25 Million Tons in 2012

### Improve Building Energy Consumption Efficiency

- **Energy Efficiency in all BMA buildings**; reduction CO₂ emitted 0.01 million ton
- **Promote and support the implementation of Energy Conservation Scheme in Privately Owned Buildings**; reduction CO₂ emitted 0.42 million ton

### Electricity Conservation Campaign for Bangkokians

- **Campaign for efficient use of electrical appliances**; reduction CO₂ emitted 0.7 million ton
- **Campaign for reduced use of air conditioning systems**; reduction CO₂ emitted 0.41 million ton
- **Support energy efficiency labeling of, and proper maintenance**; reduction CO₂ emitted 0.44 million ton
- **Scheme for, electrical appliances promote the Use of energy-saving appliances**; reduction CO₂ emitted 0.14 million ton
- **Promote the use of energy-saving light bulbs**; reduction CO₂ emitted 0.13 million ton
Increase Efficiency in Solid Waste Management

- Improve efficiency in organic waste management; reduction CO₂ emitted 0.1 million tons
- Support solid wastes reuse and recycling; reduction CO₂ emitted 0.28 million tons

Increase Efficiency in Wastewater Treatment

- Increase wastewater treatment capacity; reduction CO₂ emitted 0.05 million tons
- Reduce household wastewater; reduction CO₂ emitted 0.03 million tons

Target CO₂ Emission Reduction 1.0 Million Tons in 2012
Expand Park Areas

Target CO₂ Emission Reduction 1.0 Million Tons in 2012

Plant Trees in the Bangkok Metropolitan Area

- Plant trees in the area under the jurisdiction of the Bangkok Metropolitan Administration; absorption CO₂ 0.14 million tons
- Campaign and Support tree planting on private land in Bangkok; absorption CO₂ 0.32 million tons

Plant Trees in the Neighboring Province Areas

- Plant trees in neighboring province areas; absorption CO₂ 0.54 million tons
Concrete Actions to Achieve the Set Goal

Launch of campaigns

- Stop! Warming up Bangkok City
- Using of energy saving bulbs
- Stop idling vehicles
- Tree planting
- Using cloth bags
- Waste reduction
- Renewable energy
- Building retrofit program
- Earth Hour
- Solar water heater system and solar cell system in BMA's schools
- Ride to Work, and etc.
1) Ministry of Energy

- Awareness raising on energy conservation for school children 435 schools.
- Anaerobic digestion system for organic waste at schools 80 schools will extend more 84 schools in 2012
- Signed a MOU on 19th July 2011 for encouraging energy conservation and renewable energy development
2) The Federation of Thai Industries

- Waste recycling system in universities
- Formalization of scavenger (Saleng) groups
- Recycling handicrafts competition and marketing
- Collection recyclable waste in village
3) Electricity Generating Authority of Thailand

- Signed a memorandum of cooperation to reduce global warming by promoting the use of thin tube number 5 (T5) size 28 W
- Support 10,000 energy saving bulbs for replacing in BMA’s fresh markets
- Targeting replacing 13,000 saving bulbs in 2 BMA’s hospitals

4) The Bangchak Petroleum Public Co.Ltd.

- Cooperation for biodiesel production from used cooking oil

Collected used cooking oil from residents, BMA schools and other targets such as department store supermarket Saleng and Queen Sirikit National Convention Center to produce Biodiesel

5) The Energy Senate Committee

BMA cooperated with the Energy Senate Committee organizing a training program for 870 BMA’s teachers and students on Energy Conservation in 2010.

Organized the contest of the diary the schools sending the diaries for contest are 365 from the total of 409 schools.

Disseminated the Energy Conservation Manual to national level.
6) Ministry of Natural Resources and Environment

Projects and Activities in Reducing Waste

- Campaign of using cloth bags instead of plastic bags
- Launching the project “No Bag, No Baht”: 12 million plastic bags in 2010.

Singed MOU “Promote Green Purchasing”
7) Metropolitan Electric Authority

- Signing MOU with Metropolitan Electric Authority to implement an Energy Efficiency Building Retrofit Program on 14th September 2010
- Plan to install Building Energy Management System (BEM) as a computer management center at district office
8) Private Partnership
- Supporting in tree planting
- Waste separation
- Publication Guideline to reduce global warming
- Organizing a seminar on Energy Efficiency Building Retrofit Program. The target group are high building sector and business sectors

9) Raise Awareness Through Media Partnership
- Publication of “50 designs for home decoration to combat global warming”
1) World Bank

- Sectoral Strategy Implementation; i.e. SWM, Climate Change Impact and Adaptation of Coastal Cities.
- Support preliminary audit and assistance in the preparation of a feasibility study of Energy Efficiency Project.
- Technical support to prepare feasibility related to BRT.
- Global Environmental Facility (GEF) : support to prepare
  1) Development of the navigation in Klong Sansaeb Project
  2) Retrofitting of the public Works Department and Drainage and Sewerage Department Buildings Project.
2) JICA

- Capacity Building on Climate Change Adaptation and Mitigation for Implementation in Bangkok will finish in 2011
- Production of BMA Global Warming Handbook
- The project for Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand
  - Enhancement of knowledge and expertise of TGO and BMA staff on GHG mitigation
  - Developing Project Idea Note (PIN) Project Design Document (PDD) for the Clean Development Mechanism (CDM):
    1) Biogas generation from food waste at schools (PDD)
    2) Natural gas vehicles (PIN Project)
    3) Biodiesel from cooking oil of BMA forklift (PIN Project)
- Support the technical support on the Mitigation and Adaptation Master Plan of Bangkok.
3) UNEP

- Awareness Building and Monitoring by producing the handbooks
  - Bangkok Assessment Report on Climate Change 2009
  - Guideline to reduce global warming for youths, office and family
- Awareness Pilot Demonstration; Building Retrofit
- Bangkok towards environmental capital of ASEAN
- Sustainable Social Housing Initiative (SUSHI)
4) C40 and Clinton Climate Initiatives

- Energy Efficiency Building Retrofit Program
- Jointly held seminar, targeting private sectors (Feb 9, 2008)
  - 35 private building projects have already implemented and can reduce 30% of energy consumption.
5) Agence Française de Développement (AFD)

- BMA-AFD partnership on climate change
- BMA-AFD signed MOU on their cooperation on climate change on 14 Dec 2009 at BMA’s city hall.
- To support the technical assistance on the following topics:
  1) The promotion of alternative energy
  2) The conversion of solid waste and wastewater to alternative energy
  3) The best practices on sustainable urban environment and to raise the public awareness of climate change mitigation

6) Establishment of Urban Green Development Institute

- To move the urban development under the concept on Environmental Conservation and Quality of Life
- By using the knowledge and experience of Bangkok to support the Green Urban Management
7) WWF

- Earth hour; Launch switching-off light every year on March to raise awareness on climate change.
- Earth hour road show.
- Parade campaign on 4 commercial roads Silom, Siam, Kao San road and Yowaraj.

- Central World in 2008 saved 73.34 megawatts.
- Kao San road in 2009 saved 1,423 megawatts.
- In 2010 saved 1,620 megawatts.

Bringing the world together to fight Climate Change
8) ASEAN + 6 City Forum on Climate Change on 25-27 June 2008

- Participating Cities: Albay, Beijing, Delhi, Fukuoka, Jakarta, Kuala Lumpur, Luang Prabang, Phnom Penh, including sister cities Jakarta and Vientiane.
- Bangkok Declaration for ASEAN+6 City Forum on Climate Change.

9) Cool ASEAN, Green Capitals Initiative on 2 – 3 November 2009

- Participating Cities: Bangkok, Manila, Vientiane, and Jakarta.
- Implemented signing date of the Founding Declaration of the Cool ASEAN, Green Capitals in March 2010.
The World Bank supported BMA for publication “Climate Change Impact and Adaptation Study for Bangkok Metropolitan Region” which found that:

In the Upper Gulf of Thailand:
- The relative average sea level rise is about 1.3 cm/year
- The land subsidence rate is about 1 cm/year
- Therefore, the sea level rise is about 3 mm/year

In 2050,
- The sea level rise would be about 12.3 cm (41 years)
- If the accumulated land subsidence to 2050 is 20 cm
- The relative sea level rise would be about 32.3 cm
1) Flood Protection

- Polder System: to prevent overtop the riverbank and overland flow from surrounding area consist of:
  - Dikes: BMA must construct 77 km. The dike can protect overflow up to 2.50 m.
  - Pumping Stations: There are 369 stations total capacity 1,531 m³/sec.
  - Drainage Tunnels: There are 7 drainage tunnels which 19 km. long and 155 m³/sec. of pumping capacity

- The Monkey Cheek Project

  BMA provides the Monkey Cheek capacity of 12.7 million cubic meters for flood mitigating.
Sea wave protection Bamboo Type

The rehabilitation of mangrove forest along the shoreline

Plans to construct rock-pile embankments along the shoreline
3) Create public awareness

- Raising Awareness through activity to provide knowledge and understanding about global warming for the public
- Promoting knowledge and awareness about disaster prevention and mitigation
4) Support capacity building activities to raise the capability of Bangkok City Officer

- Capacity Building on Climate Change Adaptation and Mitigation for Implementation in Bangkok related in 5 initiatives of Action plan
5) Technical Support

- To develop Information System for City Management with 3 dimensions (360 degree) integrated with GIS map.

The classification of land use.
4. Awards of Great Pride

ASEAN ENVIRONMENTALLY SUSTAINABLE CITY AWARD

Energy Awards

Climate Change Certificate

Thailand Energy Award 2010: Excellence Awards for Energy Conservation and
THANK YOU FOR YOUR ATTENTION

http://www.bangkok.go.th