ENERGY IN KOLKATA

Metropolis without electricity

1:200 000

1:200000

FARAKKA POWER PLANT

WBSEB BANDEL POWER PLANT

PAPER FACTORIES

FROM GANGES

WBSEB DURGAPUR POWER PLANT

POWER PLANT (6)

POWER PLANT OUTSIDE MAP (6)

EXISTING FACTORY (4)

EXISTING INDUSTRIAL PARK (2)

PROPOSED INDUSTRIAL GROWTH CENTRE - 2025 (2)

MAIN ROAD

RAILWAY

DHAPA A SPECIFIC NATURAL AREA

CITY OR MUNICIPALITY OUTLINE

MAIN RIVER OR LAKE

PAPER AND GLASS INDUSTRY

CESC TITAGARH

HOOGHLY RIVER

PAPER AND GLASS INDUSTRY

PAPER INDUSTRY

CESC COSSIPORE

GLASS INDUSTRY

DHAPA LANDFILL AREA

CESC SOUTHERN POWER PLANT

EAST KOLKATA WETLANDS

LEATHER INDUSTRY

INDUSTRIAL CLUSTER

GLASS INDUSTRY

CESC BUDGE BUDGE POWER

WBSEB KOLAGHAT POWER PLANT

TO BAY OF BENGAL

WEST BENGAL ENERGY SUPPLY CAPACITY

(1,5)

UNDER WEST BENGAL GOVERNMENT

CAPACITY 3149 MW

POWER PLANTS DURGAPUR (thermal)
BAKRESWAR (thermal)
KOLAGHAT (thermal)
BANDEL (thermal)

UNDER GOVERNMENT OF INDIA

CAPACITY 2640 MW (in West Bengal)

POWER PLANTS DAMODAR (thermal/hydel)
FARAKKA (thermal)
KAHELGAON (thermal)
CHUKHA (hydro)
RANGIT (thermal)

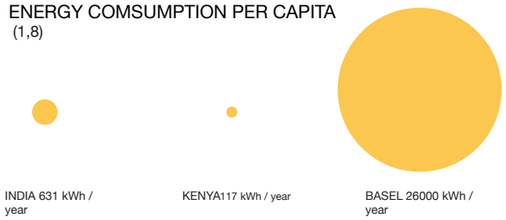
UNDER PRIVATE SECTOR: CESC

CAPACITY 1181 MW (in West Bengal)

POWER PLANTS BUDGE BUDGE (thermal)
SOUTHERN (thermal)
TITAGARH (thermal)
(COSSIPORE and MULAJORE, old stations)

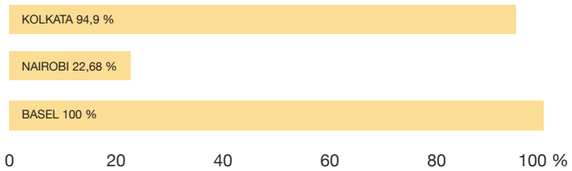
ENERGY COMSUMPTION PER CAPITA

(1,8)



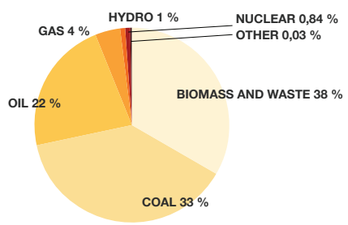
HOUSEHOLDS CONNECTED TO ELECTRICITY SUPPLY

(4,8)



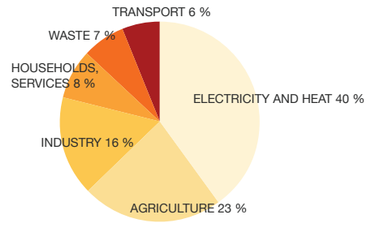
INDIA ENERGY SOURCES 2007

(3)



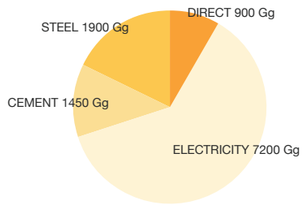
INDIA CO2 PRODUCERS 2007

(3)



KOLKATA CO2 PRODUCERS 2003

(1) Amounts in Giga grams=1000 tons



KOLKATA ENERGY SUPPLY

In Kolkata most of the power is generated by the thermal power stations situated in-side the city's area. Electricity has been commercially produced since 1899. In 2001 94,9 % of all households was connected to the electrity supply network. (4)

Paraffin lamps and candles still exist in most households; the city has learned to live without electricity during the frequent electric breaks up to the 1980s. The industrial consumption decreased around 1997 due to a relocation of industrial activity from the city, which helped the electricity supply to catch up with the demand. (7)

ENERGY SOURCES

The energy consumed in Kolkata metropolitan area consists of biomass, coal petroleum and diesel. The consumption of biomass fuel mainly in the form of wood, dung-cake and waste is even higher in Kolkata than in other parts of India. (1)

CO2 ?

The major contributor of CO2 emission in both India and Kolkata is electricity consumption. In Kolkata biomass is the most important source of household energy and its percentage has increased in the 1990s. The consumption of bio-fuels emits methane, and the increase of biomass energy production has followed by an increase in methane rates. Use of solar and hydro power is still marginal, but both are being examined by the municipality. (1)

SOURCES:
(1) Institute for Global Environmental Strategies. Energy and Emissions in South Asian Mega-cities. 2003. (2) Master Plan for traffic and transportation in KMA 2001-2025. KMC 2001. (3) WWF Climate Scorecard. ALLIANZ 2007. Downloaded 9.10. at knowledge.allianz.com/ en/globalissues/ (4) Bronger, Dirk et al. Marginalsiedlungen in Megastaedten Asiens. Berlin 2007. (5) West Bengal Goverment. Power utilities in West Bengal. Downloaded 9.10.2008 at http://wbpower.nic.in/utility.htm (6) Racine, Jean. Calcutta 1981: the city, its crisis and the debate on urban planning. New Delhi 1990. (7) Chaudhuri, Sukanta. Calcutta: The living city. Volume II: The present and Future. 3.edition 2005. (8) Birchler, Sarah. Kenya energy production and consumption. Article in publication. Nairobi Atlas. ETH Studio Basel 2007.

WATER IN KOLKATA

From deficit to overflow

1:200000

FROM GANGES

HOOGHLY RIVER

LEVÉE

MAIN RIVER OR LAKE

SMALL RIVER

WETLANDS

FLOODED CITY AREAS IN MAJOR FLOODS 1978 AND 1999

WATER TREATMENT PLANT

BOOSTER PUMPING STATION (DELIVERS WATER TO NEIGHBORHOOD WELLS+TAPS)

MAIN DRAINAGE CANAL

ZOOM-IN TO A NEIGHBORHOOD

A SPECIFIC NATURAL AREA

CITY OR MUNICIPALITY OUTLINE

ZOOM-IN : MANICKTALA BUSTEE (3)

PALTA WATER PLANT

JORABAGAN WATER PLANT

WATGUNGE WATER PLANT

GARDEN REACH WATER PLANT

LEVÉE

EAST KOLKATA WETLANDS

TO BAY OF BENGAL

DRAINAGE

LEVEE

SALT LAKE CITY

EAST KOLKATA WETLANDS

HOOGHLY RIVER

+15,0 m

+10,0 m

+5,0 m

SECTION OF KOLKATA TOPOGRAPHY (CHAUDHURI, 2005)

35 000 m

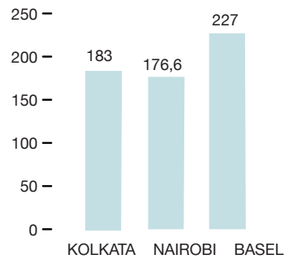
WATER CANAL
OPEN WELL
TAP SUPPLY

OPEN DRAIN
LATRINE

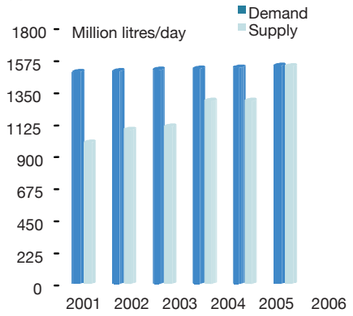
KOLKATA CITY WASTE
+
ALGAE
+
BACTERIA
+
SUNSHINE

= FISH FOOD IN THE WETLANDS

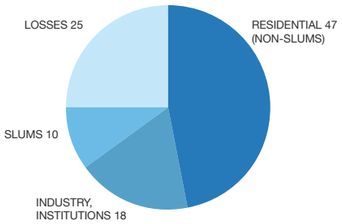
WATER COMSUMPTION PER CAPITA
(1,2)



KOLKATA WATER SUPPLY/DEMAND
(1)



KOLKATA WATER USE 2006
(1)



WATER SUPPLY:
RIVER AS SOURCE

Kolkata city drinking water is taken from river Hooghly and purified in 4 water treatment plants. At first the purified water reaches the booster pumping stations, which serve as containers and keep up water pressure in the distribution network. From there it is distibuted to neighborhood wells and taps. For every 39 slum dwellers, the municipality has provided 1 tap. Several wealthy houses have their own water containers and pumps. Until the past years flooding, leaking canalisation and unsufficient capacity have caused scarcity in water supply.(1,3)

DRAINAGE:
TOWARDS THE MARSHLANDS

Kolkata drainage work through a network of open cimented and non-cimented canals. The main drainage basin is East Kolkata Wetlands; the whole right bank of Hoogly drains its sewage towards the lowlands. Drainage canals are often blocked by waste, as the municipality does not provide all slum dwellers with waste pick-up. The canal network used to serve for small boat traffic, but it is currently too blocked for the function. (5,7)

EAST KOLKATA WETLANDS:
NATURAL FILTERING SYSTEM

East Kolkata Wetlands is the south-eastern drainage basin of Kolkata city, which covers an area of approximately 12,000 ha. In the wetlands, a natural system of using sewage water and waste has been established: as all sewage water drains to the ponds of EKW, it produces in nutritients when biodegrading. Local fish farmers make use of the waste water as fish food. The same principle of "waste farming" is used for agriculture in the landfills of Dhapa. The wetlands produce altogether 8000 tons of fish and 50 tons of vegetables annually. (7)

FLOODING:
DRAINAGE WATER SPREADS DISEASES

Kolkata has suffered from major floods in 1978, 1999 and 2007. The aim of the municiplity is to enhance both canalisation and waste management, so that waste does not block the open drainage canals. During floods drinking water ofter gets polluted by flooding sewage water, thus during the rainy season diseases are likely to spread in the city. (4,7)

SOURCES:
(1) Kolkata Metropolitan Planning authority. Master plan for traffic and transportation 2001-2025. (2) Birchler, Sarah. Kenya energy production and consumption. In: Nairobi Atlas. ETH Studio Basel 2007. (3) Racine, Jean. Calcutta 1981: the city, its crisis and the debate on urban planning. New Delhi 1990. (4) Kapur, Anu. Disasters in India: studies of grim reality. New Delhi 2005. (5) Bronger, Dirk et al. Marginalsiedlungen in Megastaedten Asiens. Berlin 2007. (6) Stang, Friedrich. Calcutta: Eine Metropole in der Krise. Koeln 1993. (7) Kolkata Environment Improvement Project (KEIP), 2000. KMC 2000.

WASTE IN KOLKATA

Grassroot recycling

1:200000

PAPER FACTORY

GLASS FACTORY

FROM GANGES

PAPER FACTORIES

GLASS FACTORIES

HOOGHLY RIVER

PAPER FACTORY

GLASS FACTORY

PAPER FACTORIES

GLASS FACTORIES

PAPER FACTORY

METAL RECYCLING

PLASTIC RECYCLING

GLASS FACTORIES

DHAPA LANDFILL AREA

PAPER FACTORY

EAST KOLKATA WETLANDS

GLASS FACTORIES

GLASS FACTORY

GLASS FACTORY

TO BAY OF BENGAL

MAIN RIVER OR LAKE

SIGNIFICANT GREEN AREA

LOCAL WASTE DEALER (1)

LANDFILL SITE

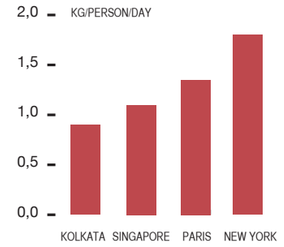
RECYCLING INDUSTRY: PRIVATE OR MUNICIPAL (1)

MAIN ROAD

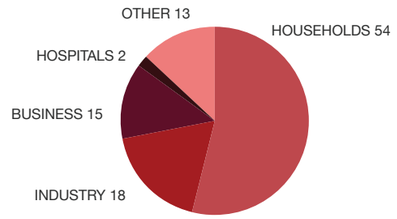
DHAPA A SPECIFIC NATURAL AREA

CITY OR MUNICIPALITY OUTLINE

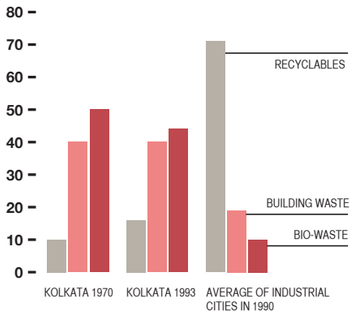
WASTE PRODUCTION PER CAPITA (1)



KOLKATA WASTE PRODUCERS (T)



DUMPED WASTE COMPOSITION (1)



WASTE PRODUCERS HOUSEHOLDS, INSTITUTIONS, INDUSTRY (1)

UNTREATED
20 % OF ALL WASTE

TRADE OF RECYCLED MATERIALS
10 % OF ALL WASTE

TREATED BY MUNICIPALITY
70 % OF ALL WASTE

MEANS OF COLLECTION

STREET SWEEPING

DOOR PICKUP

ROADSIDE BINS

COMMUNITY BINS

TRUCK TRANSFER (3)

RAG PICKERS

There are 20.000-60.000 in rag pickers kolkata, of which approximately 60% are children. Rag pickers earn in average 750 rupies (11,5 euros) per month. (1)

LOCAL WASTE DEALERS

Waste dealers operate on different levels: some buy from households, some from rag pickers. There are ambulant dealers and 868 (1999) permanent shops in Kalkuta. Waste trade usually follows a chain of resellers in 2 or 3 levels until it ends up to re-use, a recycling centre or dump site. (1)

DHAPA LANDFILLS

GARBAGE DISPOSAL SITES 602.78 ha. 95% of Kolkata waste is dumped at Dhapa.
AGRICULTURE 4,959.86 ha. Once a dump site is filled up and closed, the site is used for cultivating vegetables.
WATER BODY 5,852.14 ha, of which 45 % is used for fish farming. The fish get their nutrition from the city sewage water that drains to the area.

RECYCLING INDUSTRY

The factories in the city buy recyclable raw materials from the waste dealers and the municipality.

SOURCES:
(1) Trettin, Lutz. Abfallswirtschaft und informelles Sektor in der City of Calcutta. Bochum 2002.
(2) Kolkata Environment Improvement Project (KEIP), 2003. Master Plan on Solid Waste Management.
(3) Hazra, Tumpa and Goel, Sudha. Solid waste management in Kolkata, India: Practices and challenges. Indian Institute of Technology 2008.
(4) Chaudhuri, Sukanta. Calcutta: The living city. Volume II: The present and Future. 3.edition 2005.
(5) Bronger, Dirk. Marginalsiedlungen in Megastaedten Asiens. Berlin 2007.
(6) Racine, Jean. Calcutta 1981: the city, its crisis and the debate on urban planning. New Delhi1990.
(7) Urban age India. Conference Report 2007.