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ANNEX 10

DATA ANNEX: PHILIPPINES

FROM IDEAS TO ACTION: CLEAN ENERGY SOLUTIONS FOR ASIA TO ADDRESS CLIMATE CHANGE

June 2007
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DISCLAIMER
The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

Philippines country profile – Quantitative data

NOTE: This compilation is mostly based on regional datasets and to a limited extent on country-level primary data. While regional datasets offer the advantage of data consistency (definitions and units) and higher data quality, they are often outdated relative to national country data sets. Further, the assumptions made by regional research institutes to model future trends may vary from those adopted by national government institutes. As such, the data presented here is best used to evaluate broad differences between countries and obtain an overview of future trends, rather than provide specific information at a particular point in time.

Section 1. Introduction

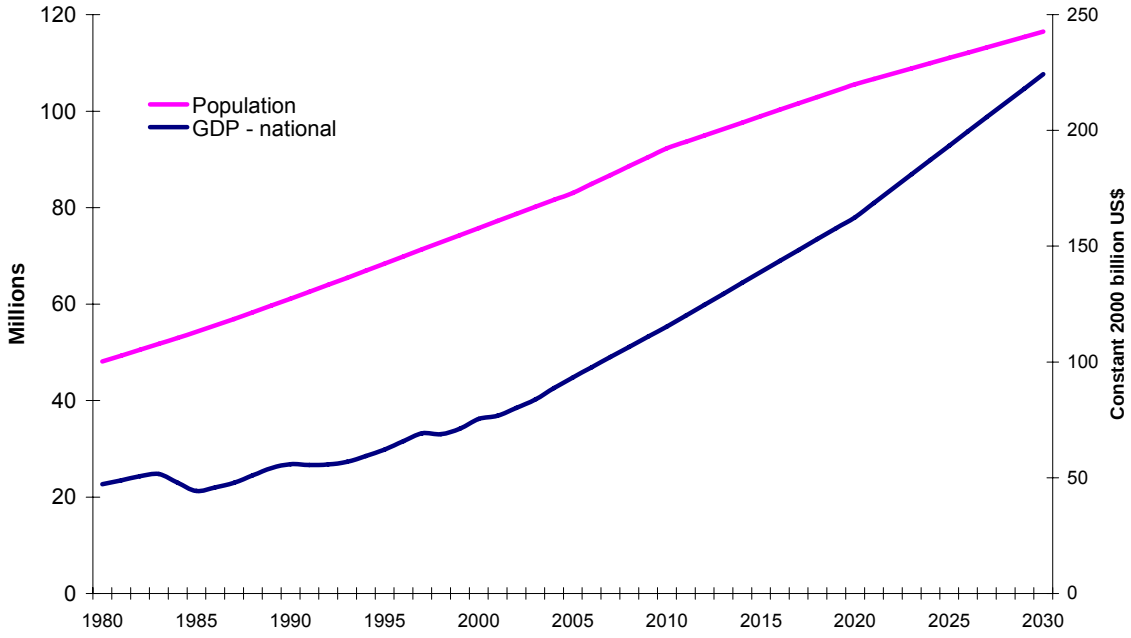
a) General data

Population (2005) [#]	87,857,473
Country area (km²) [#]	300,000
GDP - per capita (constant 2000 US$) [##]	1,124
Percentage of total people living in urban areas (%)[#]	60.20
Percentage of villages with electricity [%] (2006)	94.6

* Urbanization level is expected to reach 76% by 2030 [*#]

Source: [#] RECIPES (2006), [##] WDI (2006), [*#] APERC (2006).

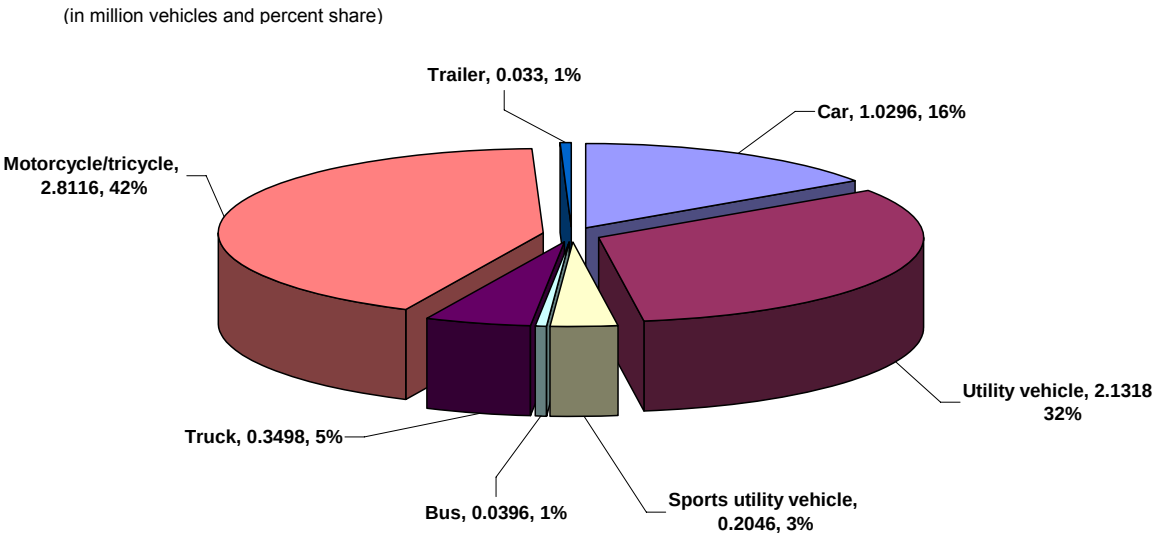
b) Growth in Population and GDP



Source: WDI (2006), APERC (2006)[1].

[1] Future projections

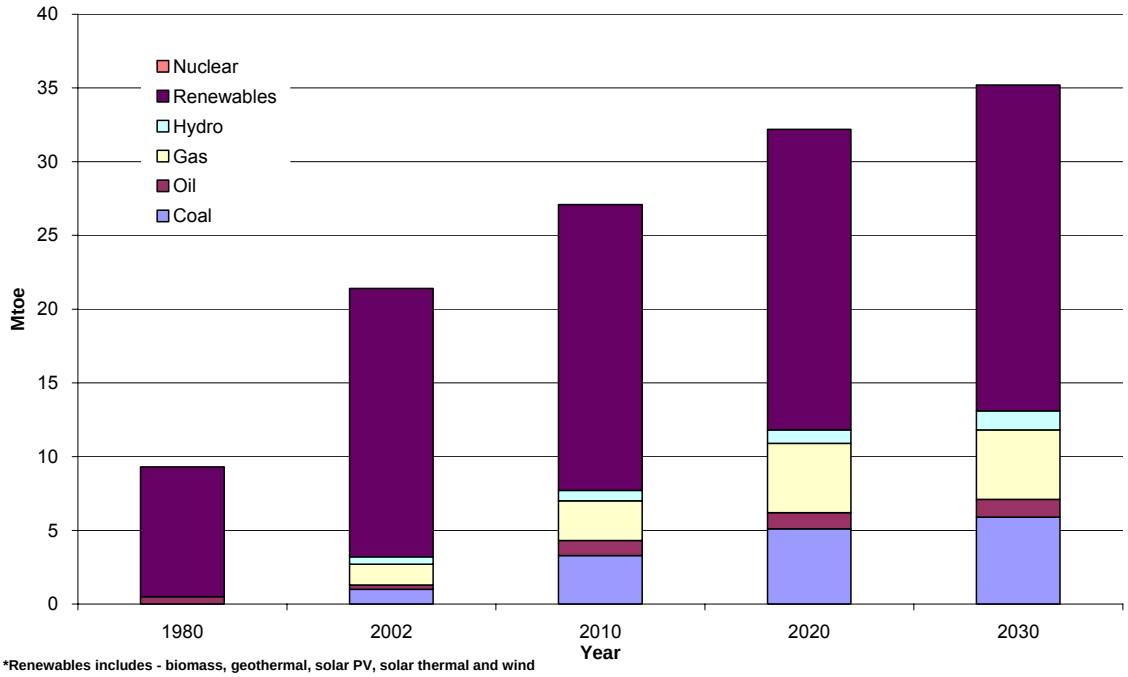
c) Number of vehicles in Philippines in the year 2005



Source: ADB (2006).

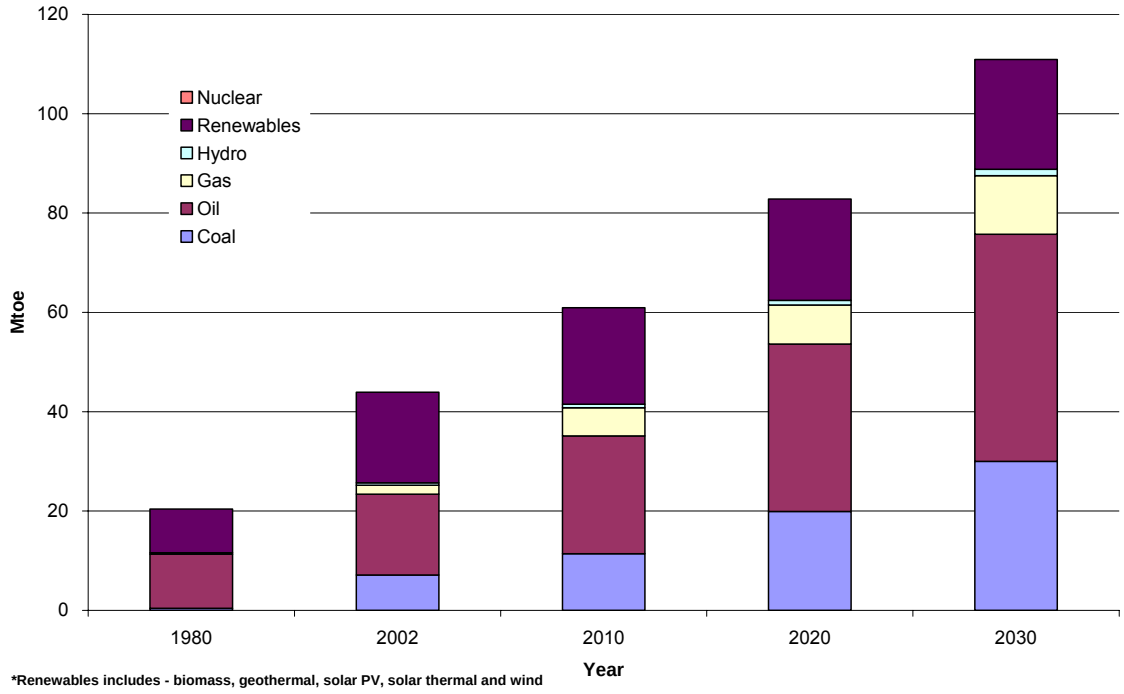
Section 2. Current status of energy supply and demand

d) Energy production by source



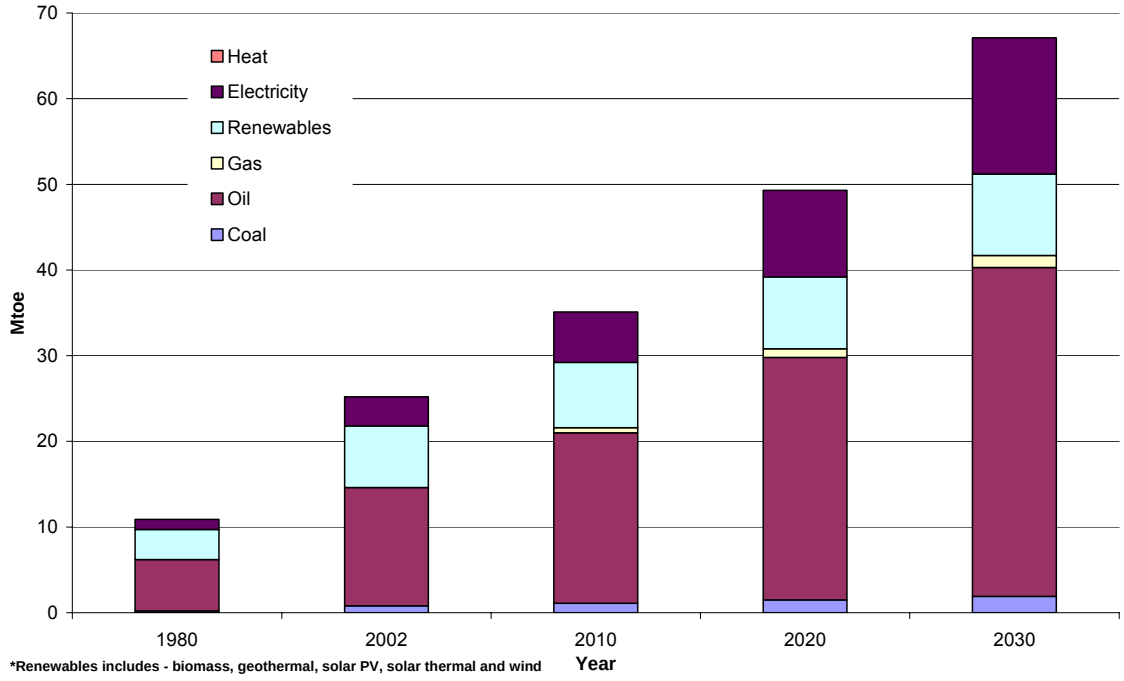
Source: APERC (2006).

e) Primary energy demand



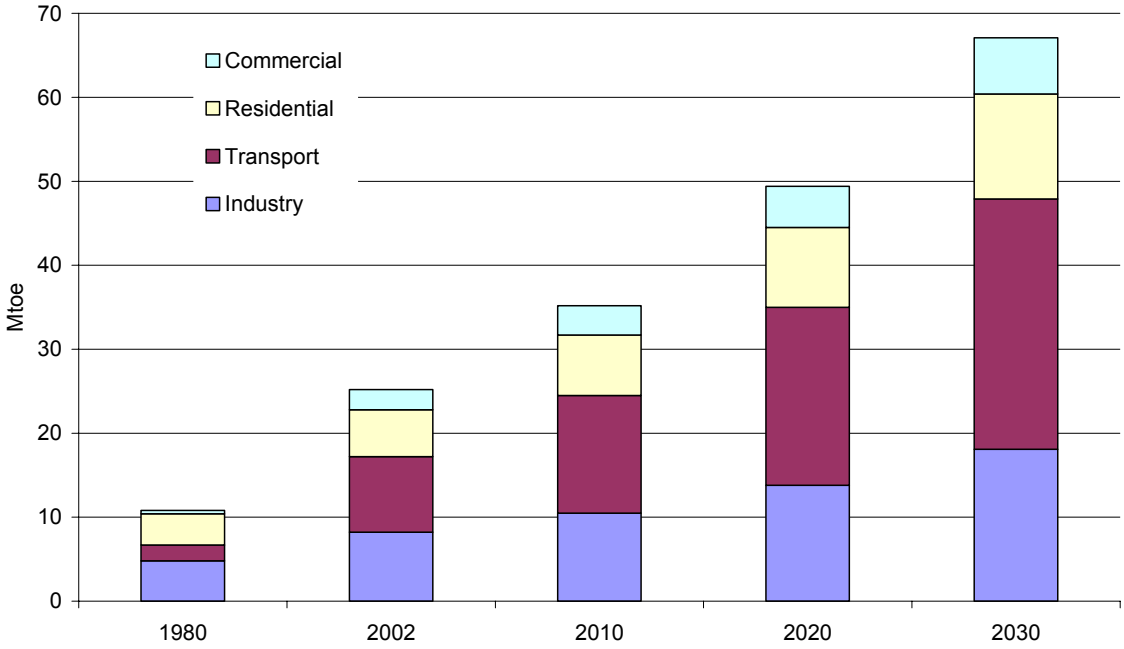
Source: APERC (2006).

f) Total final energy demand by Source



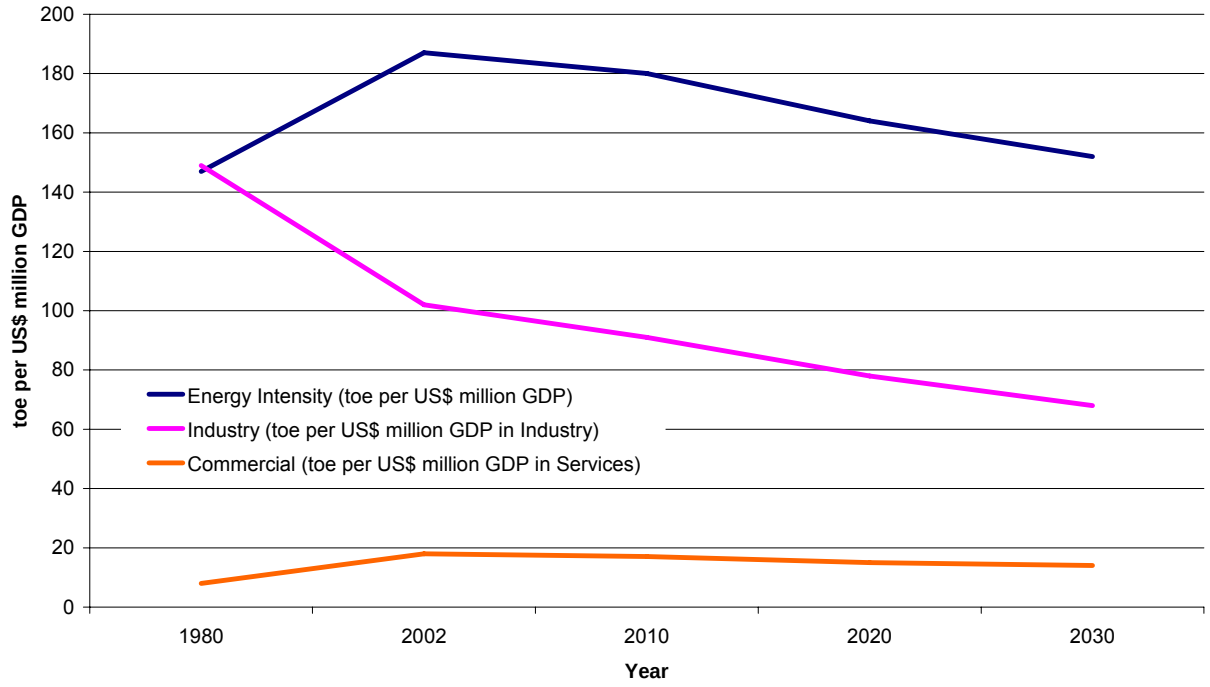
Source: APERC (2006).

g) Total final energy demand by sector



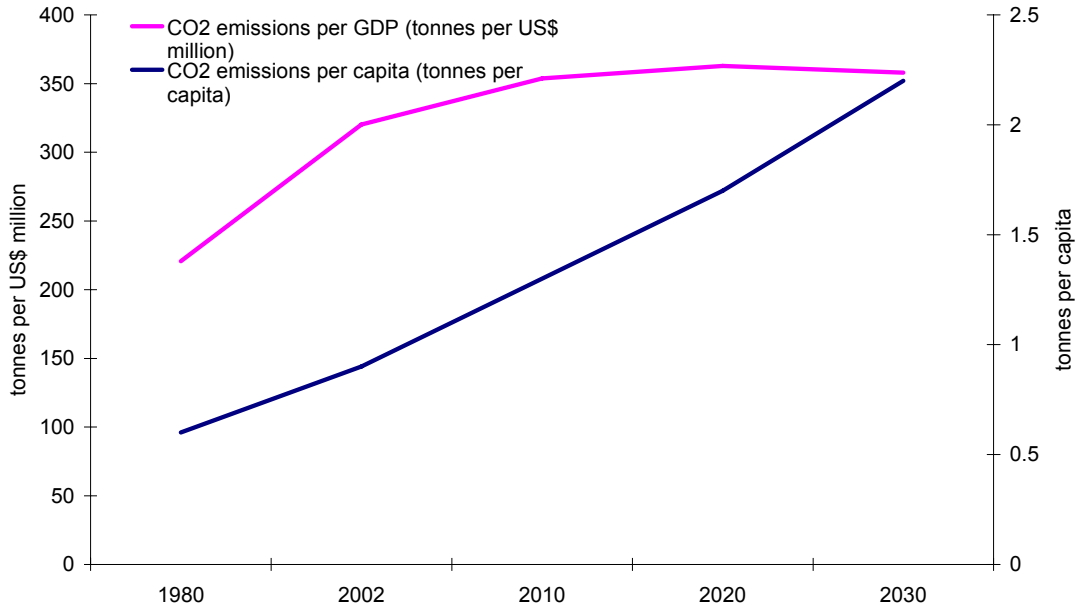
Source: APERC (2006).

h) Energy intensity



Source: APERC (2006).

i) CO_2 emissions intensity



Source: APERC (2006).

j) Energy reserves, including renewable energy, status and potential

Fossil Fuels	Reserves	Production	R/P ratio (years)
Petroleum (MMBFOE)	481		
Oil (MMBbls)	25	0.14	179
Natural Gas (BCM)	65	2.53	25.7
Condensates(MMBbls)	59	n.a.	-
Coal (million MT)	360.2	2.81	128.2

Source: DOE (2006).

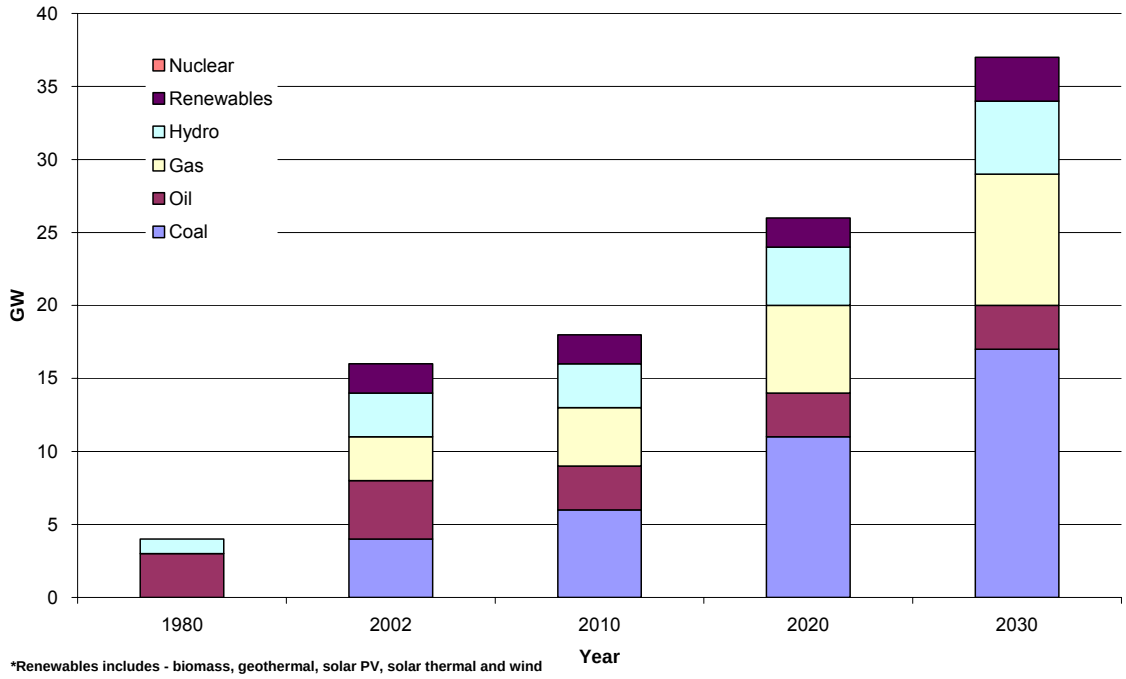
k) Comparative Costs of Power Generation

	Capital Cost ($/kW)	Generation Cost (US cents/kWh)
Fossil Fuels		
Coal Thermal	1,000-2,000	6.7
Bunker C Fuel Oil	1,000-2,000	13.9
Distillate – simple cycle gas turbine (GT)	<1,000	26.7
Bunker C – combined cycle GT	<1,000	8.0
Natural Gas – combined cycle GT	750	6.1
Renewables		
Geothermal	> 2,000	7.7
Large Hydro	> 2,000	4.6
Small Hydro	1800-2,000	6.4
Wind Energy	2,000	7.8
Solar PV [b]	5,300	28.0[c]
Bagasse cogen	1,900	6.2

Notes: [b]CEPALCO 1-MW PV Project; [c] required selling rate to recover US$1 MM invest of CEPALCO

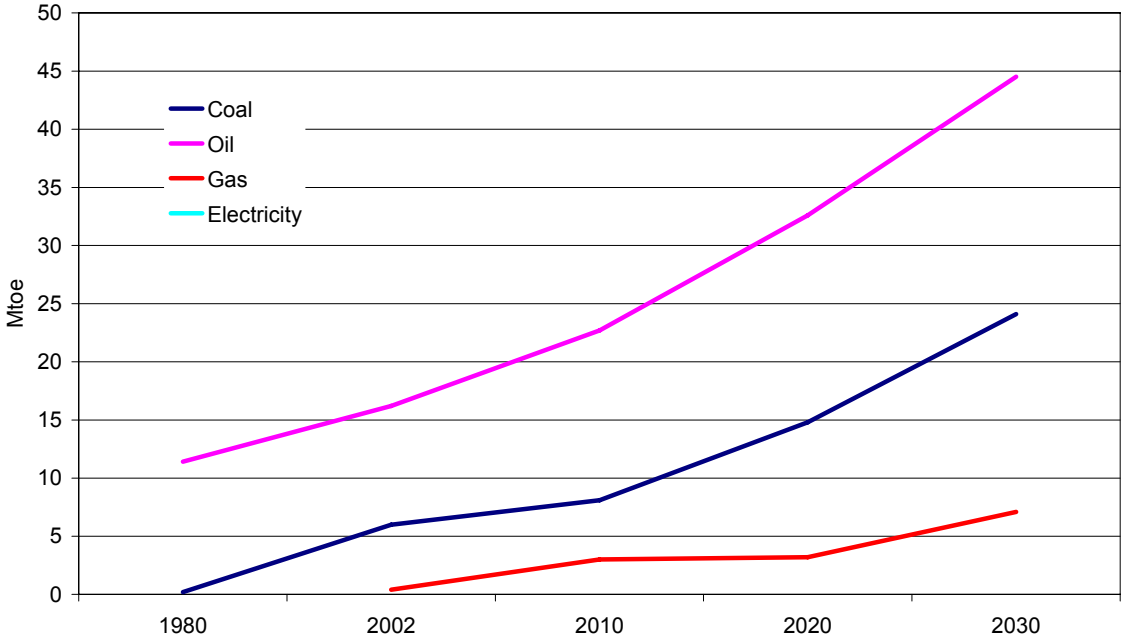
Source: DOE (2006).

l) Installed Electricity generation capacity



Source: APERC (2006).

m) Demand supply gap analysis

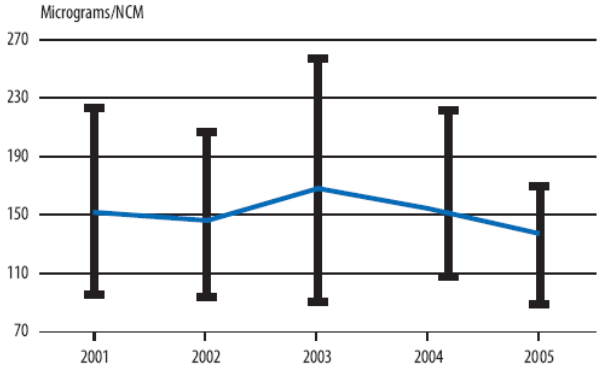


Source: APERC (2006).

Section 3. Environmental impacts related to energy use

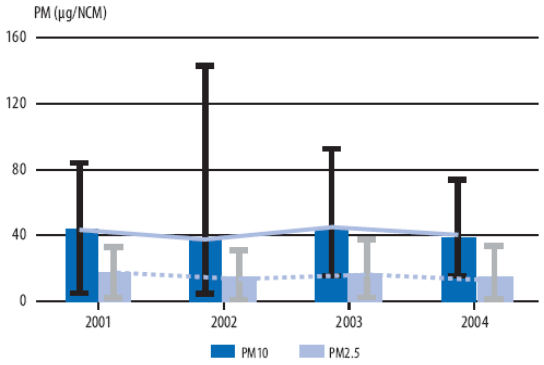
n) Ambient levels

Ambient TSP Concentration in Metro Manila, 2001–2005



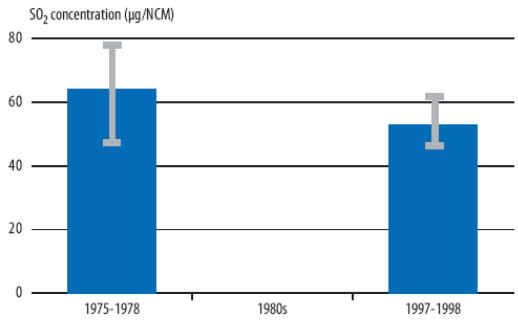
EMB = Environmental Management Bureau, NCM = normal cubic meter, TSP = total suspended particulate
Source: EMB, 2006.

PNRI PM10 and PM2.5 (ug/m^3) Monitoring Data—Poveda Station



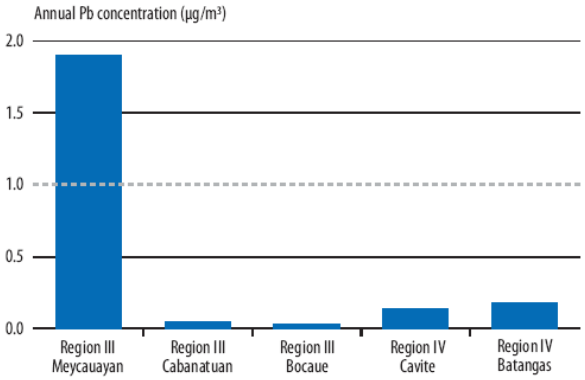
EMB = Environmental Management Bureau, NCM = normal cubic meter , PNRI = Philippine Nuclear Research Institute, PM2.5 = particulate matter with diameter less than 2.5 micrograms, PM10 = particulate matter with diameter less than 10 micrograms, ug/m3 = microgram per cubic meter
Source: EMB, 2006.

Historical SO_2 Data for NCR



EMB = Environmental Management Bureau, NCM = normal cubic meter, NCR = National Capital Region, NAAQGV = national ambient air quality guideline values, SO_2 = sulfur dioxide, ug = microgram
Source: EMB, 2006.

Lead (µg/m³) Monitoring Data for Regions III and IV



EMB = Environmental Management Bureau, ug/m³ = microgram per cubic meter
Source: EMB, 2006.

Philippine Guideline Values vs. WHO Guidelines and US Standards (ug/m³)

Pollutant	Averaging Time	Philippine NAAQGV[a]	WHO (2005)[b]	USEPA[d]
TSP	24 hours	230	—	—
	1 year	90	—	—
PM10	1 hour	200	—	—
	24 hours	150	50	150
	1 year	60	20	revoked
PM2.5	24 hours	—	25	15
	1 year	—	10	35
SO_2	10 minutes	—	500	—
	1 hour	340	—	—
	24 hours	180	20	365 (0.14 ppm)
	1 year	80	—	78 (0.03 ppm)
NO_2	1 hour	260	200	—
	24 hours	150	—	—
	1 year		40	100
O_3	8 hours	60	100	157 (0.08ppm)
	1 hour	140	—	235 (0.12ppm)
CO	1 hour	35,000	30,000[c]	40,000
	8 hours	10,000	10,000[c]	10,000
Pb	1 year	1	0.5[c]	—
	3 months	1.5	—	1.5

DENR = Department of Environment and Natural Resources, NAAQGV = national ambient air quality guideline values, NO2 = nitrogen dioxide, Pb = lead, PM2.5 = particulate matter with diameter less than 2.5 micrograms, PM10 = particulate matter with diameter less than 10 micrograms, ppm = parts per million, SO2 = sulfur dioxide, TSP = total suspended particulate, ug/m3 = microgram per cubic meter WHO = World Health Organization, US = United States, USEPA = United States Environment Protection Agency
Sources: [a] DENR (1999), [b] WHO (2005), [c] WHO (2000) and [d] USEPA (2006).

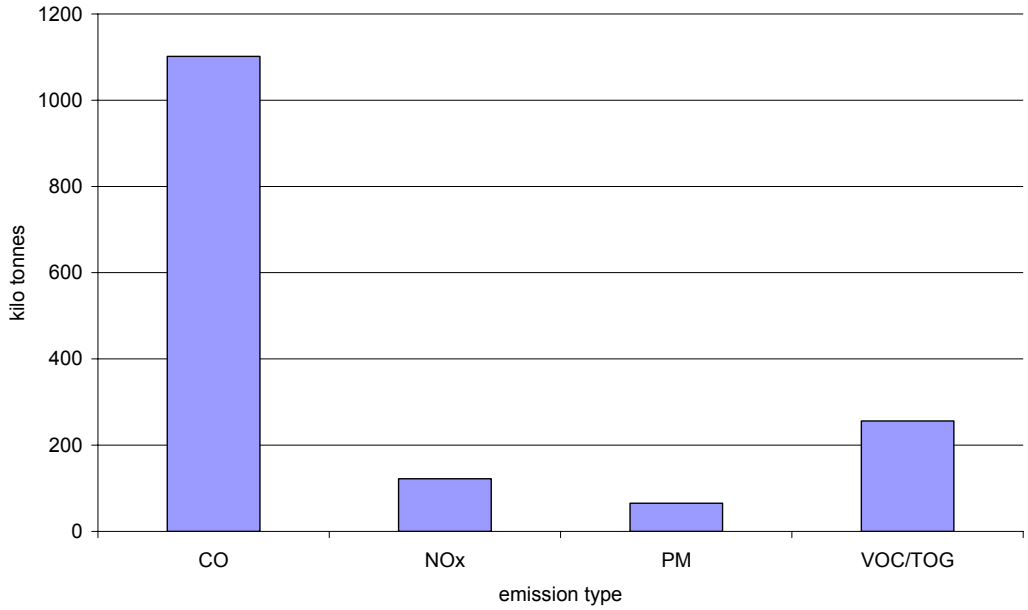
Notes:

Leaded gasoline was phased out in December 2000. There was a reduction of aromatics and benzene in gasoline to 35% and 2% by volume, respectively in 2003; and a reduction of sulfur content of automotive diesel fuel to 0.05% by weight in 2004. For diesel quality, with respect to sulfur content, the

Philippines is at Euro 1 level. Starting 1 July 2007, if the present administrative orders will be in place, both the fuel quality with respect to sulfur limits (diesel and gasoline) and the standards for new vehicles will be compliant with Euro II. The automotive industry has expressed its willingness to provide Euro IV-compliant vehicles by 2010; however, no policies are in place to adjust the present fuel standards in line with the Euro IV specifications.

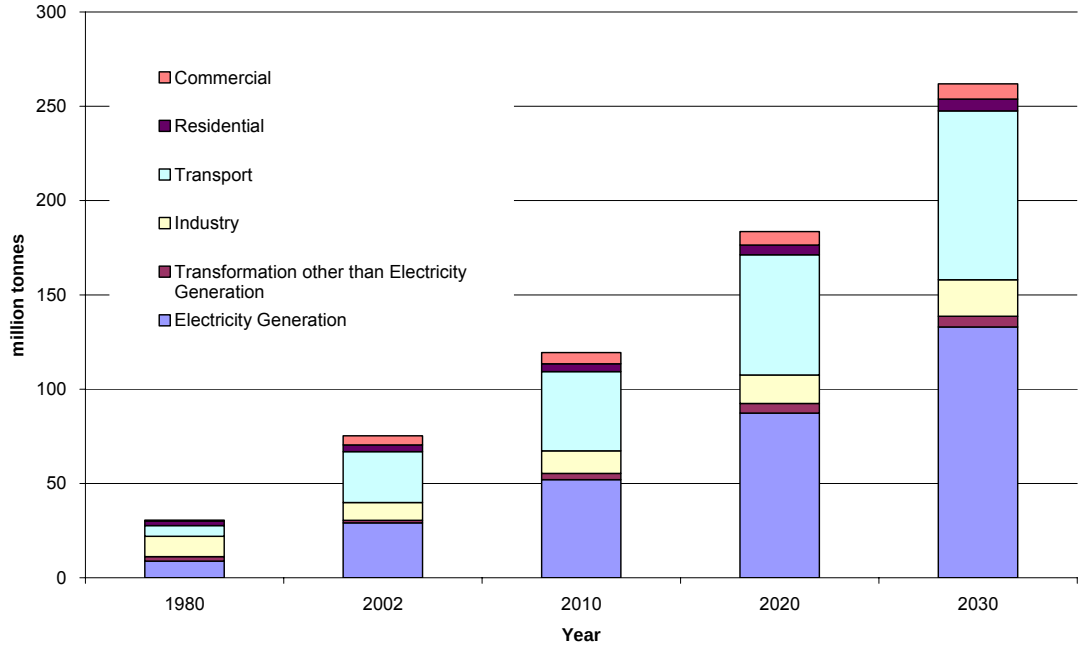
Source: ADB (2006)

o) Vehicular related emissions



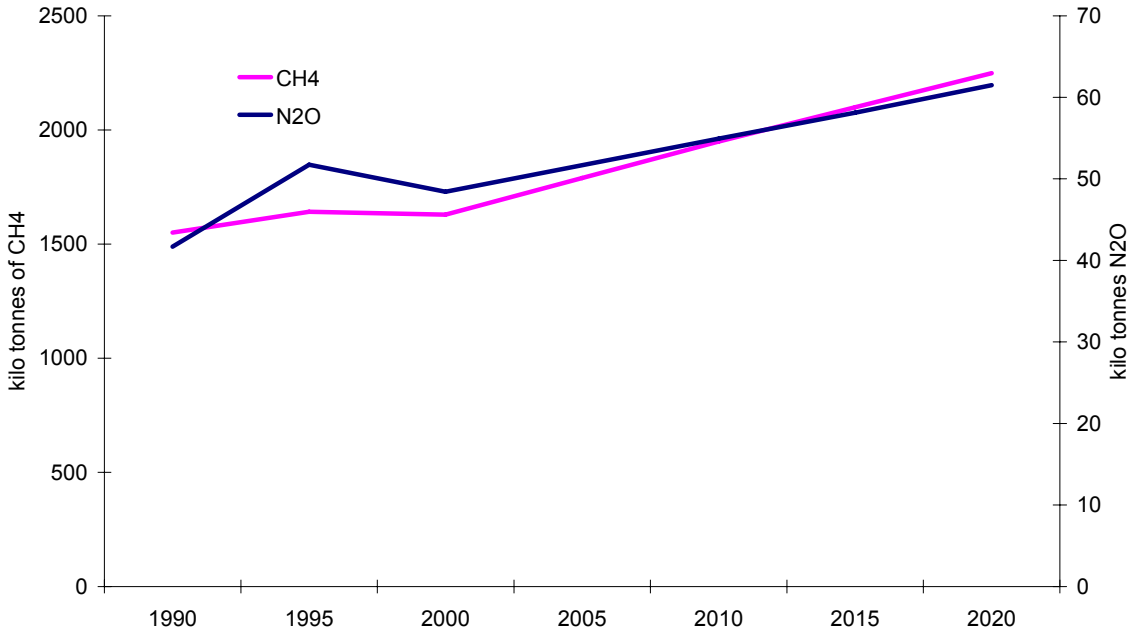
Source: ADB (2006).

p) CO_2 emissions sector wise



Source: APERC (2006).

q) Emission of other GHGs



Source: EPA (2006)

r) National aggregate emission of other gases

Type emission	Amount
SO_2 (kilo tons - 2001)	830
CO (kilo tons - 2001)	113503
PM (kilo tons - 2001)	467
NO_2 (kilo tons - 2001)	517
NO_X (kilo tons - 1994) #	317

Source: ADB (2006), # UNFCCC national communication

Section 4. Health impacts

s) Air Pollution Impacts on Public Health of Metro Manila

Morbidity	Mortality
10,000 excess cases of acute bronchitis	40-200 persons due to cardiovascular causes
300 excess cases of asthma	300-330 persons due to respiratory causes
9 excess cases of chronic bronchitis	

Source: DOH (2004)

Notes:

There is limited information on the economic and human health effects of air quality in the Philippines, but previous assessments suggest that poor air quality is a major incremental drain on the national economy through premature death and chronic respiratory illnesses; and PM is the largest contributor to these effects.

World Bank estimated in 2001 that the health costs of PM_{10} pollution in Metro Manila, Cebu, Davao, and Baguio cities reach more than $400 million. This cost is equivalent to almost 0.5% of the 2004 Philippine GDP. Accordingly, the World Bank Philippine Environment Monitor 2004 computed that the annual estimate for urban heath cost can amount to over $1.5 billion or 1.8% of the 2004 GDP. Nonetheless, most of the health impacts studies are focused only in Metro Manila.

A Department of Health Study (2004) reported, "considerable morbidity and mortality due to respiratory and cardiovascular diseases could have been prevented with better air quality in Metro Manila in 2002." The report estimated the following numbers of morbidity and mortality attributable to PM_{10} level higher than 50 $\mu g/m^3$ as shown in table below:

Source: ADB (2006).

Section 5. Clean energy outlook

t) Renewable energy outlook table

Renewables (MW)	Potential Capacity (MW)	Installed Capacity (MW)	Percent Utilization
Geothermal	2,758	1,930	70
Hydropower	5,823	3,219	55
Wind Energy	76,000	25	-
Bagasse	236	n.a.	
Solar	n.a.	n.a.	

Source of data: Compiled by ECO-Asia from various sources

u) Energy Efficiency outlook

Notes:

- An energy self-sufficiency target of 60 percent has been set for 2010, including, among other means, promoting a strong EE and conservation program aimed towards annual savings and deferred construction of power generating facilities.
- Potential energy savings from the industrial sector will reach 6.05 Mtoe, which could be realized through the implementation of (i) energy audit/recognition programs, (ii) performance certification of fans and blowers, and (iii) labeling of electric motors.
- Energy savings potential and energy efficiency improvements in the commercial sector add up to 0.46 Mtoe by 2014. The fuel and electricity conservation potential exists in government buildings, replacement of chillers, and lighting retrofits.

Source: ADB (2006b)

List of References

ADB (2006). Asian Development Bank,Country Synthesis Report on Urban Air Quality Management (Discussion Draft).

ADB (2006b). Asian Development Bank, Report of the Energy Efficiency Initiative, available at http://www.adb.org/Documents/Reports/Energy-Efficiency-Initiative/eeir-draft.pdf

APERC (2006). Asia Pacific Energy Research Centre, Energy Supply and Demand Outlook 2006. Volumes 1&2.

DOE (2006). Department of Energy, Philippines - *Philippine Energy Plan*.

DOH (2004). Department of Health, Philippines

EPA (2006). US Environmental Protection Agency. Greenhouse Gas Report: Global Anthropogenic Non-CO_2 Greenhouse Gas Emissions: 1990-2020, 2006.

RECIPES (2006). Country energy information - Renewable Energy in emerging and developing countries: Current situation, market Potential and recommendations for a win-win-win for EU industry, the Environment and local Socio-economic development; available at http://www.energyrecipes.org/reports/countryreports.php?action=select [accessed in December 2006].

UNFCCC national communication. National communication of Philippines to UNFCCC.

WDI (2006). World Development Indicators Database, The World Bank, Washington. .

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