

## Energy Efficiency Improvement and Positioning of Renewables in Asia

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In Asia, energy intensity per GDP unit, which indicates efficiency of energy use in macro terms, has been shrinking (improving) as shown in Table 1. Primary energy consumption in ton of oil equivalent in producing a US dollar of GDP in purchasing power parity terms (in 1995 price) shrank (improved) by 0.9%/year from 0.27 in 1971 to 0.22 in 1999 in all Asia but OECD-joining Japan and South Korea, and China and Hong Kong. This compares quite well with the OECD total of 1.3%/year and the world average of 1.1%. In terms of Asia total, with China and Hong Kong included, energy intensity dropped 1.5%/year from 0.23 to 0.15 over the same 28 years. It is because China improved its energy intensity as sharp as 4.2%/year from 0.83 to 0.25. Vietnam also recorded remarkable improvements at an annual rate of 2.4% during the same period. Some argue that the economic growth rates announced by socialist countries in their GDP statistics are often exaggerated. And yet, the recent improvements can be explained well by such factors as modernization of old-fashioned technologies transferred from the former Soviet Union, East Europe, etc., increased economic efficiency after a market economy was introduced, and heavier weight held by less energy-consuming service sectors of the economy. It means Asia was so energy-intensive 28 years ago that there was plenty room for improvement. In other words, any longer intensity can hardly shrink at a tempo as quick as in the past. In their long-term energy supply and demand outlooks, many institutions put that China is likely to keep its energy efficiency improvement rate as a sustainable trend. Their views, however, can be a reflection of their overestimation or too much expectation. Conspicuous electrification (electricity shift) taking place in many Asian economies can be confirmed by the tempo of mounting electricity intensity (per GDP unit). China alone still registers a slight decline and thus keeps falling. This can be reversed ahead. It is in sharp contrast with India, where electricity shifts are under way at a high pitch. Yet, given that hugeness of China's energy intensity improvement can dwarf the rate of its electricity intensity improvement, it

is quite probable that electricity shifts are advancing in China as well. At any rate, energy efficiency trends in China, responsible for 55% of primary energy supply (1999) in all Asia but Japan and South Korea, will certainly determine Asia's mainstreams. It will get involved crucially in Asia's environmental conservation and energy security.

Considering renewable energies in Asia, the combustible renewables & wastes (so-called biomass) hold an important position. In all Asian economies but Japan and South Korea, biomass accounted for 48% of total primary energy supply in 1971. Covering 66% in India and 40% in China of their energy needs, biomass was an indispensable energy source for their daily life. In 1999, or 28 years later, having shifted to oil, coal, electricity, gas, etc. largely in urban areas, the share of biomass fell to 26% in Asia regionwide, to 41% in India, and to 19% in China. In absolute terms, however, biomass consumption keeps growing nearly 2% a year, thus still serving as an important energy source. In Vietnam, biomass still covers more than 60% of its total primary energy supply. These mean symbiosis with nature still continues in Asia. Biomass, responsible for only about 10% worldwide, accounts for a quarter in Asia with China included, and a third without China. It is a fully indigenous energy, which absorbs CO<sub>2</sub> while growing as a plant. Therefore, although it produces CO<sub>2</sub> when used as an energy source, resultant CO<sub>2</sub> emissions are neutral to global warming and biomass can be counted as equivalent to such renewables as hydro. It is beneficial to both energy security and warming abatement. Biomass, however, symbolizes impoverished, inconvenient life and probably accelerates disappearing forests, etc. Two decades ahead, the share of biomass is likely to diminish to nearly 10% even in Asia. Supplanting fossil energies, notably oil, are likely to push import dependence up. In return for convenient cozy life, will Asia direct toward anxieties for both environment and energy security?

New-stage commitments are under way. The renewables, such as innovative technology-based biomass of new type, solar, wind and geothermal, currently remain only a fraction in Asia regionwide. But, given such positive efforts as technology transfer from industrialized countries, like Japan and the U.S., distributed renewable energy supply systems, involving no

large-scale infrastructure, are found particularly suitable for Asia characterized by sparsely-populated vast lands. Under the backup of JICA, NEDO and many international organizations, among others, the Institute of Energy Economics, Japan, hand in hand with renowned private firms for their hardware capabilities, is engaged actively in software services, particularly project planning/designing, as part of developing-country assistance and international cooperation.

TABLE1 ENERGY EFFICIENCY IMPROVEMENT AND ELECTRICITY SHIFT IN ASIA

	PRIMARY ENERGY SUPPLY/GDP(PPP,1995PRICE) UNIT*TOE*1000/1000US\$.95PRICE.ppp			ELECTRICITY INTENSITY UNIT:kWh/US\$1955price		
	1971	1999	%/Y	1971	1999	%/Y
CHINA	0.83	0.25	-4.2	1.23	1.19	-0.1
Hong KONG	0.14	0.12	-0.5	0.21	0.23	0.3
INDIA	0.32	0.22	-1.3	0.47	0.93	2.5
INDONESIA	0.22	0.25	0.5	0.07	0.37	6.1
MALAYSIA	0.35	0.24	-1.3	0.22	0.58	3.5
PHILIPPINES	0.3	0.25	-0.6	0.26	0.42	1.7
SINGAPORE	0.13	0.15	0.5	0.19	0.27	1.3
KOREA	0.17	0.26	1.5	0.07	0.25	4.7
TAIWAN	0.18	0.17	-0.2	0.37	0.51	1.2
THAIGHLAND	0.23	0.2	-0.5	0.16	0.52	4.3
VIETNAM	0.49	0.25	-2.4	0.24	0.76	4.2
ASIA TOTAL	0.27	0.21	-0.9	0.3	0.59	2.4
JAPAN	0.22	0.17	-0.9	0.21	0.24	0.5
OECD	0.32	0.22	-1.3	0.3	0.33	0.3
WORLD	0.33	0.24	-1.1	0.34	0.42	0.8

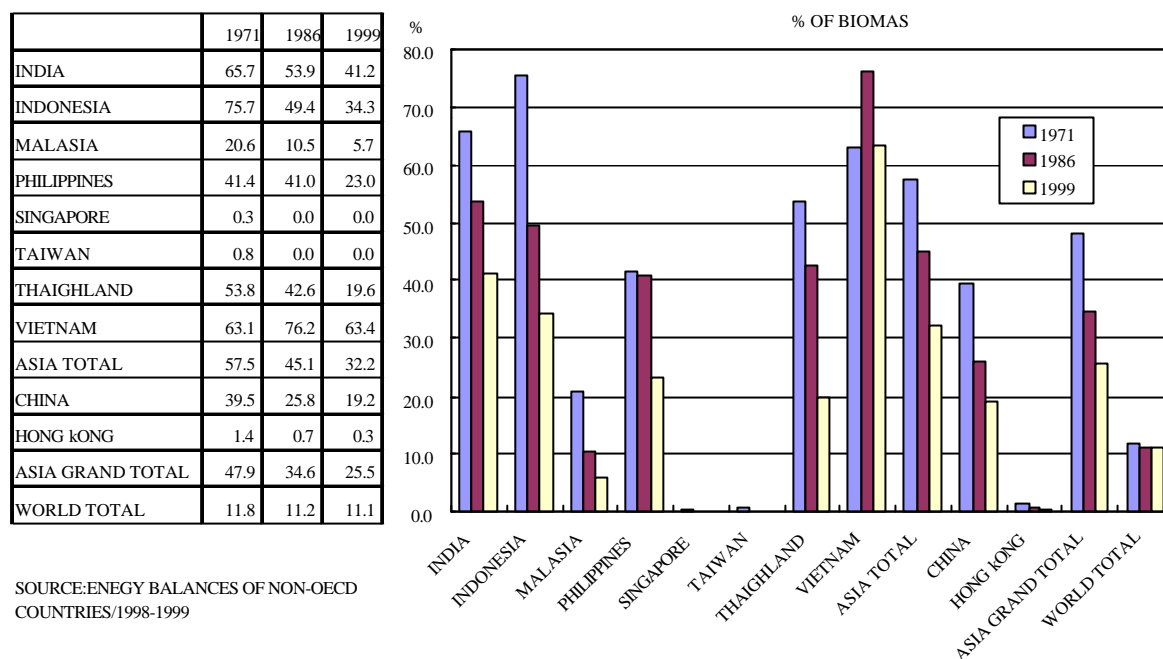
SOURCE:ENERGY BALANCES OF NON-OECD COUNTRIES/1998-1999

TABLE 2 TRENDS FOR PRIMARY SUPPLY OF COMMBUSTIBLE RENEWABLES AND WASTE IN ASIA

	(A)TOTAL PRIMARY SUPPLY				(B)COMMBUSTIBLE RENEWABLES AND WASTE				(B)/(A)*100		
				%/Y				%/Y			
UNIT:MTOE	1971	1986	1999	99/71	1971	1986	1999	99/71	1971	1986	1999
INDIA	183.77	306.82	480.42	3.5	120.74	165.45	198.02	1.8	65.7	53.9	41.2
INDONESIA	36.31	77.03	136.12	4.8	27.48	38.03	46.64	1.9	75.7	49.4	34.3
MALAYSIA	6.03	17.76	42.65	7.2	1.24	1.87	2.45	2.5	20.6	10.5	5.7
PHILIPPINES	14.61	22.87	40.73	3.7	6.05	9.37	9.36	1.6	41.4	41.0	23.0
SINGAPORE	2.96	8.33	22.69	7.5	0.01				0.3	0.0	0.0
TAIWAN	10.58	36.77	79.92	7.5	0.08	0.01	0.01	-7.2	0.8	0.0	0.0
THAIGHLAND	14.12	27.17	70.42	5.9	7.60	11.57	13.83	2.2	53.8	42.6	19.6
VIETNAM	19.79	22.57	35.21	2.1	12.48	17.19	22.34	2.1	63.1	76.2	63.4
ASIA TOTAL	356.15	637.15	1,080.46	4.0	204.96	287.65	348.02	1.9	57.5	45.1	32.2
CHINA	390.14	737.64	1,106.24	3.8	154.20	190.65	212.94	1.2	39.5	25.8	19.2
HONG KONG	3.47	8.42	17.89	6.0	0.05	0.06	0.05	0.0	1.4	0.7	0.3
ASIAGRANTOTAL749.47	749.00	1,383.42	2,203.89	3.9	359.00	479.00	561.00	1.6	47.9	34.6	25.5
WORLD TOTAL	5,462.22	7,879.02	9,702.80	2.1	646.94	885.14	1,080.78	1.8	11.8	11.2	11.1

SOURCE:ENERGY BALANCES OF NON-OECD COUNTRIES/1998-1999

FIG.1 ( % ) of BIOMAS IN THE MAIN ASIAN COUTRIES



SOURCE:ENEgy BALANCES OF NON-OECD COUNTRIES/1998-1999