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Biomass Utilization in Vietnam

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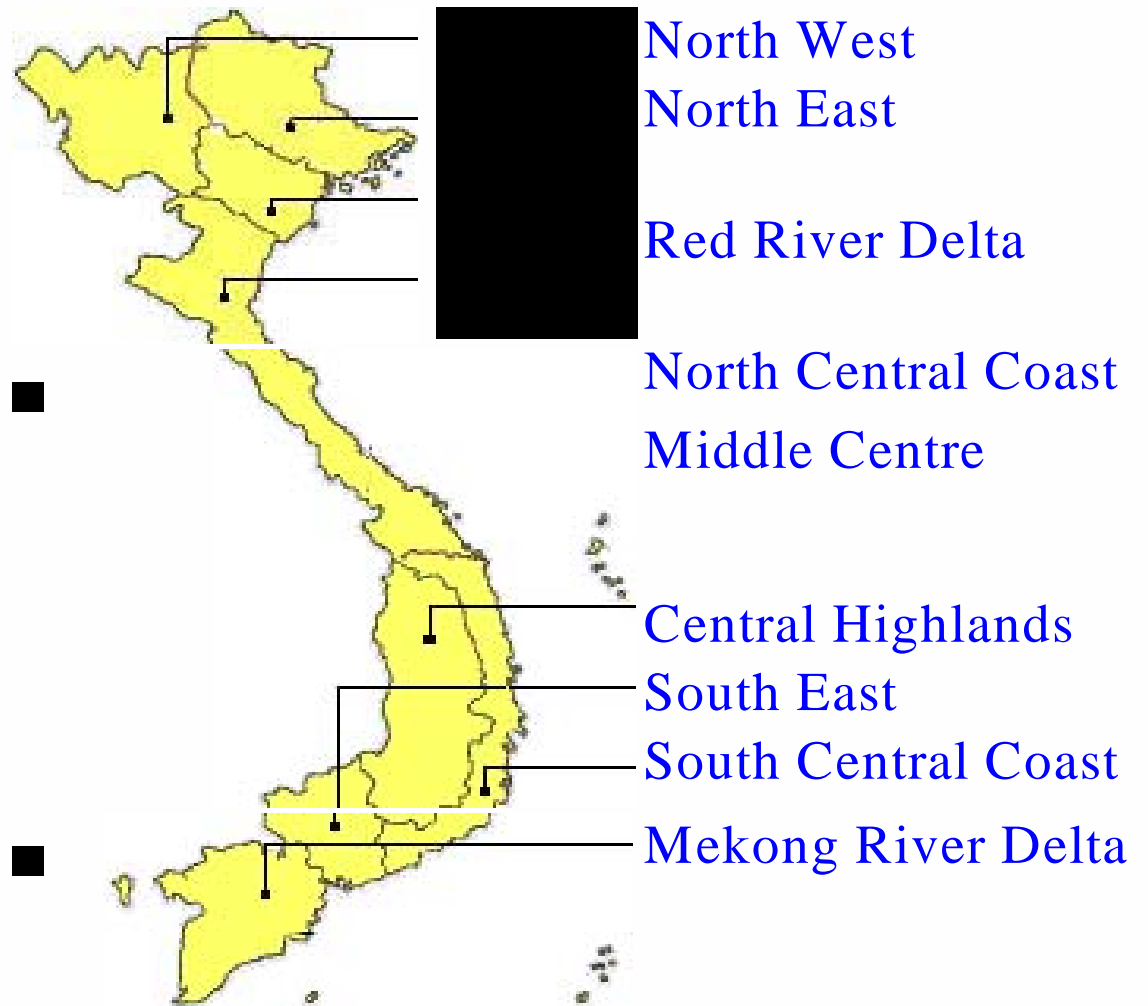
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Regions and Provinces of Viet Nam



Contents

1. Role of biomass in Vietnam
2. Biomass utilization
3. Biomass potential

1. Role of biomass in Vietnam

- **Biomass sources are mainly woods or waste, by-product as straws, rice husks, bagasses, and some different plants... This is an important energy source, it makes up biggest share of energy consumption structure in Vietnam, especially in mountainous, island or remote areas.**
- **70% of total rural people depend on the biomass to solve daily cooking demand.**
- **Biomass now is used as fuel in different production sectors: brick, tile, lime, terracotta, ceramic, food grains and foodstuffs, coffee, rubber, coconut oil production...**

1. Role of biomass in Vietnam

Biomass consumption in the nineties [KTOE]

Year	Final energy consumption				Wood energy consumption	
	Commercial energy	Biomass energy	Biomass energy share of total consumption, %	Total	Wood energy	Share of total consumption, %
1990	4489.30	12390	73	16879.30	5693	34
1992	5087.67	12938	71	18025.67	6339	35
1994	6258.00	12800	67	19058.00	7500	39
1995	7896.00	12840	62	20736.00	8230	39
1997	9301.0	13300	59	22601.00	8295	37
Growth in 87-97	7.69%	1.47%		3.56%	4.68%	

2. Biomass utilization

Biomass utilization mainly includes:

- **Biomass utilization in household: Final utilizations in this field include cooking, pigs breeding and warming. Total biomass energy consumption in this field is calculated to be about 31.78 million tons of wood equivalent.**
- **Biomass utilization in industries field: Final utilizations in this field include agricultural products and foods processing as vermicelli, cake, bean, coffee, wine, tobacco, sugar... and construction material as brick, tile, lime, china and glass... Total biomass energy in this field is calculated to be about 8.5 million tons of wood equivalent.**

2. Biomass utilization

Biomass consumption by areas, biomass types and final uses in Vietnam in 1995 [KTOE]

Using fields	Wood	Rice husk	Straw	Bagasse	Other biomass	Total
Household	6858.5	950	1380	203.5	903	10295
The North mountain and midland areas	1773	70	160	25	100.5	2128.5
The Hong river delta areas	701	230	720	20	20	1691.0
The North-Central areas	1048	200	400	30	120	1798.0
The South-Central coastal areas	685	150	100	30	235	1200.0
The Highland areas	567	-	-	-	35	602.0
The South-East areas	628	100	-	16	145	889.0
The Cuu Long river delta areas	1465.5	200	-	83.5	247.5	1987.5
Industries - small and medium industries						3005.6
Sugar production (generates electricity)				357.1		357.1
Construction material production	536.5	840.0		70	300	1748.5
Other	900.0					900.0
Total	8295.0					13300



3. Biomass potential

A. Biomass-rice husk

Rice husk output.

No	Region	Thous.tons				
		1995	1999	2000	2001	2002
	Whole country	4992.74	6278.76	6505.9	6421.68	6812.7
1	Red river Delta	1018.08	1276.68	1317.32	1283.88	1337.06
2	North East	291.52	382.26	413	449.98	465.78
3	North West	65.78	74.44	80.72	88.14	90.3
4	North Central Coast	428.16	526.92	564.8	593.38	627.78
5	South Central Coast	283	340.74	336.32	341.42	341.08
6	Central Highlands	85.9	102.48	117.36	129.24	121.9
7	South East	253.96	316.3	335.84	336.14	333.22
8	Mekong River Delta	2566.34	3258.94	3340.54	3199.5	3495.58

3. Biomass potential

A. Biomass-rice husk

Potential for electricity generation

(30% of rice husk) (LHV: 3330Kcal/kg, Humidity: 13%)

No	Region	Thous.tons				
		1995	1999	2000	2001	2002
	Whole country	922.60	1169.18	1188.76	1152.45	1249.17
1	Red river Delta	152.7	191.5	197.6	192.6	200.5
2	North East	0	0	0	0	0
3	North West	0	0	0	0	0
4	North Central Coast	0	0	0	0	0
5	South Central Coast	0	0	0	0	0
6	Central Highlands	0	0	0	0	0
7	South East	0	0	0	0	0
8	Mekong River Delta	769.90	977.68	1002.16	959.85	1048.67

3. Biomass potential

A. Biomass-rice husk: Rice mills

	Province	Number of rice mills available in the list	Province rice production -2002-Thous. tons
1	An Giang	144	2452
2	Bac Lieu	31	699
3	Ben Tre	4	392
4	Binh Duong	11	35
5	Ca Mau	3	418
6	Can Tho	24	2206
7	Ho Chi Minh	10	182
8	Long An	176	1729
9	Phu Yen	21	289
10	Soc Trang	40	1633
11	Tien Giang	13	1281
11	Tay Ninh	57	570
12	Tra Vinh	47	986
13	Others	34	
14	Total	615	

3. Biomass potential

B. Biomass - bagasse

Bagasse output

No	Region	Thous - tons				
		1995	1999	2000	2001	2002
	Whole country	3213.33	5328.09	4513.29	4397.07	5047.05
1	Red river Delta	59.52	42.09	41.25	39.03	40.89
2	North East	71.79	204.42	210.9	178.08	198.54
3	North West	71.73	166.71	144.3	152.4	178.8
4	North Central Coast	169.86	794.4	822.9	808.05	939.96
5	South Central Coast	513.39	859.65	749.07	703.5	718.26
6	Central Highlands	181.95	459.21	327.54	357.24	406.35
7	South East	526.38	902.88	729.72	829.77	905.19
8	Mekong River Delta	1618.71	1898.73	1487.61	1329	1659.06

3. Biomass potential

B. Biomass-bagasse

Potential for elec. generation

LHV: 2000Kcal/kg, Humidity: 50%

No	Region	Thous - tons				
		1995	1999	2000	2001	2002
	Whole country	1606.66	2664.04	2256.64	2198.53	2523.52
1	Red river Delta	29.76	21.045	20.625	19.515	20.445
2	North East	35.895	102.21	105.45	89.04	99.27
3	North West	35.865	83.355	72.15	76.2	89.4
4	North Central Coast	84.93	397.2	411.45	404.025	469.98
5	South Central Coast	256.695	429.825	374.535	351.75	359.13
6	Central Highlands	90.975	229.605	163.77	178.62	203.175
7	South East	263.19	451.44	364.86	414.885	452.595
8	Mekong River Delta	809.355	949.365	743.805	664.5	829.53



3. Biomass potential

B. Biomass-bagasse

Sugar mills

Area	Number of mills	Capacity Tsugarcane /day	Number of mills with Cogen	Installed Cogen capacity,MW
North	8	7000	4	8
Central	22	45800	16	62.4
South	17	37250	11	49.7
Total	47	90050	31	120.1

3. Biomass potential

C. Biomass-wood

Wood supply potential by areas and whole country in 1998

[10³ tons]

Area	Natural forest	Grown forest	Non - forest land	Dispersion crops	Industry and fruit trees	Other land	Wood waste
North east+west	2550.0	2026.3	3595.9	925.6	64.9	1322.0	243.7
Red river delta	596.0	266.5	18.9	368.9	15.6	135.8	294.8
North central	1350.0	978.8	1311.9	1005.9	54.4	146.3	241.7
South Central	1840.0	734.8	774.3	1223.0	232.5	584.8	171.8
The Highland	2750.0	399.1	932.3	111.6	160.1	599.4	229.9
South-East	325.0	473.7	194.8	321.5	437.8	121.1	158.6
Mekong river delta	75.4	646.0	448.2	2093.0	1424.7	255.4	308.0
Whole country	9400.0	5525.2	7176.3	6045.5	2390.0	2165.3	1648.5

3. Biomass potential

D. Liquid biofuel-Ethanol

Production

No	Area	Output (million litres/year)
1	Eastern and Western North	1.83
2	Red River Delta	10.20
3	Central and Tay Nguyen Provinces	7.70
4	Ho Chi Minh city and Eastern South Prov	19.50
5	Mekong River Delta	12.40
	Total	51.63

3. Biomass potential

D. Liquid biofuel

Big companies

No	Company	Output (million year/year)	Material
1	Lam Son Sugar Company	25	Molasses
2	Hanoi Wine Company	3.0	Starch
3	Dong Xuan Wine Company	1.0	Starch
4	Quang Ngai Ethanol Company	4.0	Molasses
5	Hoa Binh Sugar Company	1.0	Starch material
6	Binh Tay Wine Company	3.0	Molasses + starch

3. Biomass potential

D. Liquid biofuel - Ethanol

Raw material: molasses

Company, factory	Output (ton/day)	Sugar cane production (thousand ton)	Molasses production (ton)
Vietnam	82,450	11,839	591,950
North Provinces	26,850	3,637	181,850
Central Provinces	24,450	3,252	162,600
Southern Provinces	31,150	4,950	247,500

3. Biomass potential

D. Liquid biofuel - Ethanol

Raw material: Starch sources

Crop	Area (Mha)	Yield (Quinta/ha)	Production (Mton)
Rice	7.45	46.3	34.5
Corn	0.91	32.2	2.93
Batata	0.22	72.4 (max: 279)	1.59
Casava	0.37	141 (max:500)	5.2

3. Biomass potential

D. Liquid biofuel – Bio diesel

- Coconuts oil
- Jatropha
- Peanut oil
- Soybean oil
- Etc.

Need of more investigation.



Thank You

