Renewable Energy
Relevant Statistics/data

Selected indicators on Renewable energy development

Source: REN21

		2009	→	2010	→	2011
Investment in new renewable capacity (annual)[1]	billion USD	161	→	220	→	257
Renewable power capacity (total, not including hydro)	GW	250	→	315	→	390
Renewable power capacity (total, including hydro)[2]	GW	1,170	→	1,260	→	1,360
Hydropower capacity (total)[2]	GW	915	→	945	→	970
Solar PV capacity (total)	GW	23	→	40	→	70
Concentrating solar thermal power (total)	GW	0.7	→	1.3	→	1.8
Wind power capacity (total)	GW	159	→	198	→	238
Solar hot water/heat capacity (total)[3]	GW_{th}	153	→	182	→	232
Ethanol production (annual)	billion litres	73.1	→	86.5	→	86.1
Biodiesel production (annual)	billion litres	17.8	→	18.5	→	21.4
Countries with policy targets	#	89	→	109	→	118
States/provinces/countries with feed-in policies[4]	#	82	→	86	→	92
States/provinces/countries with RPS/quota policies[4]	#	66	→	69	→	71
States/provinces/countries with biofuels mandates[5]	#	57	→	71	→	72

Characteristics and costs: Typical energy costs

Source: REN21, based on different sources

RURAL ENERGY	Typical Characteristics	Typical Energy Costs (US cents/kWh)
Biogas digester	Digester size: 6–8 m^3	n/a
Biomass gasifier	Size: 20–5,000 kW	8–12
Solar home system	System size: 20–100 W	40–60
Household wind turbine	Turbine size: 0.1–3 kW	15–35
Village-scale mini-grid	System size: 10–1,000 kW	25–100

Characteristics and costs: all Renewable energies

Source: REN21, based on different sources

POWER GENERATION	Typical Characteristics	Capital Costs (USD/kW)	Typical Energy Costs (US cents/kWh)
Biomass Power Stoker boiler/steam turbine Circulating fluidised bed	Plant size: 25–100 MW Conversion efficiency: 27% Capacity factor: 70–80%	3,030–4,660	7.9–17.6
Geothermal Power	Plant size: 1–100 MW Types: binary cycle, single-and double-flash, natural steam Capacity factor: 60–90%	condensing flash: 2,100–4,200 binary: 2,470–6,100	condensing flash: 5.7–8.4 binary: 6.2–10.7
Hydropower (grid-based)	Plant size: 1 MW–18,000+ MW Plant type: reservoir, run-of-river Capacity factor: 30–60%	Projects >300 MW: <2,000 Projects <300 MW: 2,000–4,000	5–10
Hydropower (off-grid/rural)	Plant capacity: 0.1–1,000 kW Plant type: run-of-river, hydrokinetic, diurnal storage	1,175–3,500	5–40
Ocean Power (tidal range)	Plant size: <1 to >250 MW Capacity factor: 23–29%	5,290–5,870	21–28
Solar PV (rooftop)	Peak capacity: 3–5 kW (residential); 100 kW (commercial); 500 kW (industrial) Conversion efficiency: 12–20%	2,480–3,270	22–44 (Europe)
Solar PV (ground-mounted utility-scale)	Peak capacity: 2.5–100 MW Conversion efficiency: 15–27%	1,830–2,350	20–37 (Europe)
Concentrating Solar Thermal Power (CSP)	Types: trough, tower, dish Plant size: 50–500 MW (trough), 50–300 MW (tower); Capacity factor: 20–25% (trough); 40–50% (trough with six hours storage); 40–80% (solar tower with 6–15 hours storage)	Trough without storage: 4,500; Trough with six hours storage: 7,100–9,000; Solar tower with 6–18 hours storage: 6,300–10,500	18.8–29
Wind Power (onshore)	Turbine size: 1.5–3.5 MW Rotor diameter: 60–110+ meters Capacity factor: 20–40%	1,410–2,475	5.2–16.5
Wind Power (offshore)	Turbine size: 1.5–7.5 MW Rotor diameter: 70–125 meters Capacity factor: 35–45%	3,760–5,870	11.4–22.4
Wind Power (small-scale)	Turbine size: up to 100 kW	3,000–6,000 (USA); 1,580 (China)	15–20 (USA)

Characteristics and costs: Biofuel

Source: REN21, based on different sources

TRANSPORT FUELS	Typical Characteristics	Estimated Production Costs (US cents/Litre)	
Biodiesel	Feedstocks: soy, rapeseed, mustard seed, palm, jatropha, waste vegetable oils, and animal fats	Range: 16.5–177	Argentina (soy): 42–91; USA (soy): 55–82; Indonesia/Malaysia/ Thailand/Peru (palm oil): 24–100
Ethanol	Feedstocks: sugar cane, sugar beets, corn, cassava, sorghum, wheat (and cellulose in the future)	Range: 20–102	Brazilian sugar cane: 68 (2011) U.S. corn ethanol (dry mill): 40 (2010)

characteristics and costs: Solar Thermal

Source: REN21, based on different sources

HOT WATER/ HEATING/COOLING		Typical Characteristics	Capital Costs (USD/kW_{th})	Typical Energy Costs (USD/GJ)
BIOMASS HEAT	Biomass steam turbine CHP	Plant size: 12–14 MW_{th} Capacity factor: ~69% Conversion efficiency: 25%	430–1,170	13–80
	Biogas CHP	Plant size: 0.5–5 MW_{th} Capacity factor: ~80% Conversion efficiency: 25%	200–1,170	11.8–35.2
	Domestic pellet heating	Plant size: 5–100 kW_{th} Capacity factor: 13–29% Conversion efficiency: 86–95%	360–1,410	18.8–100
GEOTHERMAL DIRECT USE	Space heating (buildings)	Plant size: 0.1–1 MW_{th} Capacity factor: 25–30%	1,865–4,595	28–76
	Space heating (district)	Plant size: 3.8–35 MW_{th} Capacity factor: 25–30%	665–1,830	16–36
	Ground-source heat pumps	Plant size: 10–350 kW_{th} Capacity factor: 25–30%	1,095–4,370	20–65
SOLAR THERMAL	Domestic hot water systems	Collector type: flat-plate, evacuated tube Plant size: 2.1–4.2 kW_{th} (3–6 m^2); 35 kW_{th} (50 m^2)	China: 147–634 Small-scale: 1,670–1,730 Large-scale: 1,020–1,060	4.2–79 (China)
	Domestic heat and hot water systems	Collector type: flat-plate, evacuated tube Plant size: 4.2–11.2 kW_{th} (6–16 m^2; small-scale); 35 kW_{th} (50 m^2; medium-scale); 70–3,500 kW_{th} (100–5,000 m^2; district heating); >3,500 kW_{th} (>5,000 m^2; district heat with seasonal storage)	620–2,115 In Europe: Small-scale: 1,390–1,490 Medium-scale: 870–1,020 District heat: 460-780; with storage: 1,060	14–200

ທ່າແຮງພະລັງງານແສງຕາເວັນ ຢູ່ ສປປ ລາວ

Irradiance (Lower)	kWh/sq.m/day	3.6
Photovoltaic conversion efficiency	%	10%
Electricity generation	kWhe/sq.m/day	0.36
	kWhe/sq.m/year	131.4
Electricity consumption 2010	GWh/year	2441
	kWh/year	2,441,000,000.00
Area needed	sq.m	18,576,864.54
Land size needed	mxm	4,310.09
	kmxkm	4.31
Lao Land area	sq. km	236,800.00
	sq.m	2.368E+11
Portion of land for PV installation	%	0.0078%