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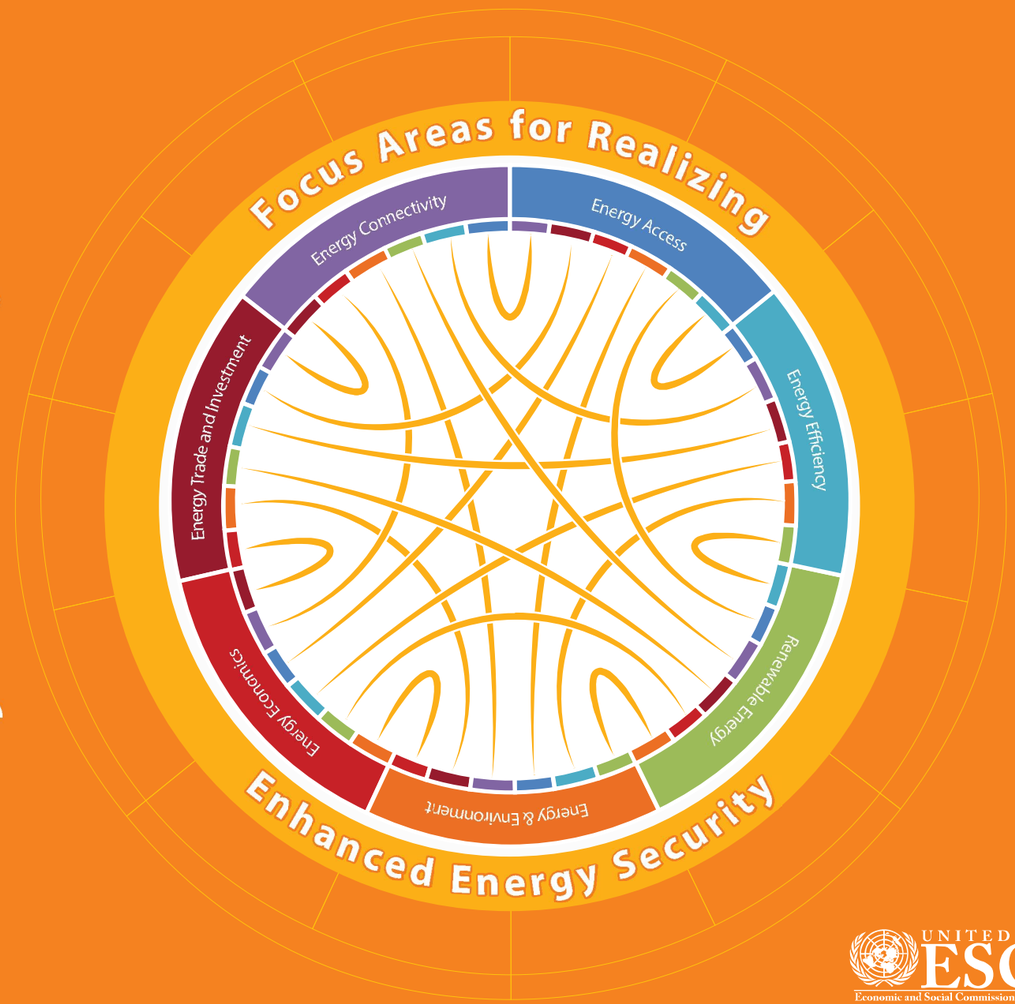
Statistical Perspectives



UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

Statistical Perspectives

ST/ESCAP/2662

Focus Areas for Enhanced Energy Security

ENERGY ACCESS
Working towards universal access to modern energy services can advance inclusive social and economic development.

ENERGY EFFICIENCY
Adopting efficiency measures can significantly enhance economic competitiveness and reduce greenhouse gas emissions.

RENEWABLE ENERGY
Developing new and renewable energy sources can diversify the energy mix and create new job opportunities.

ENERGY AND ENVIRONMENT
Shifting consumption towards sustainable energy can minimise environmental impacts and improve the future outlook for the well-being of our citizens and planet.

ENERGY ECONOMICS
Improving fiscal policy and financing mechanisms can incentivise and strengthen markets for sustainable energy.

ENERGY TRADE AND INVESTMENT
Promoting trade and investment can optimise the development and utilisation of current and emerging energy resources.

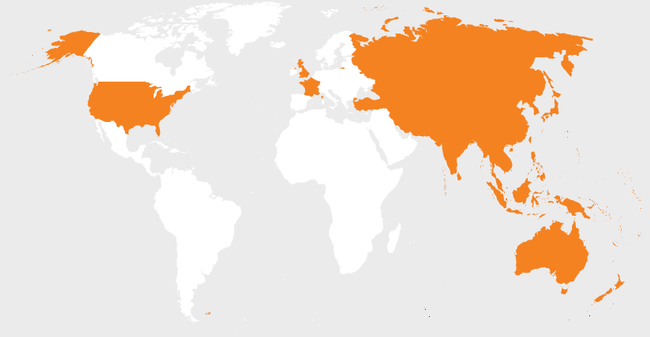
ENERGY CONNECTIVITY
Developing infrastructure and harmonised energy policies can increase regional economic integration and resilience.

The statistics presented in this publication primarily cover member States located in the Asia-Pacific region. However, Associate and Non-regional members appear in select charts and tables. Due to data limitations, only selected countries are used in several of the statistical representations. Additionally, "Pacific (AUS, NZ)" indicates that data for the Pacific subregion represents only Australia and New Zealand.

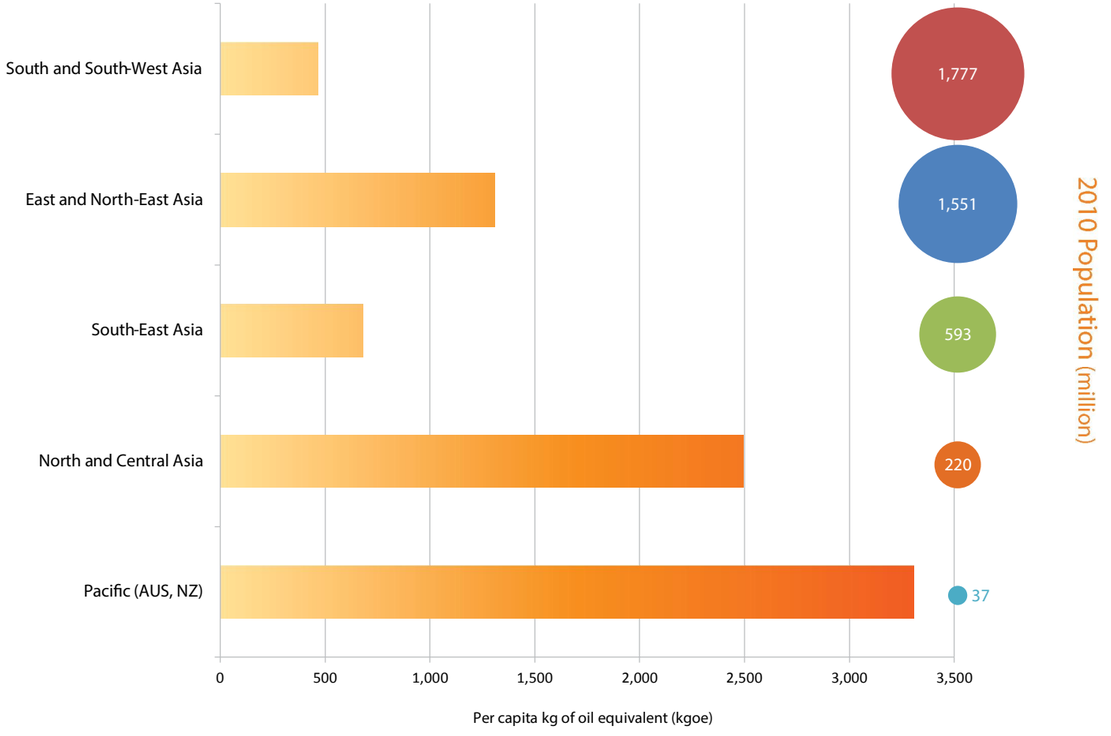
This publication is for reference only. Graphs and charts are based on data sources consulted for this publication. Additional data sources may exist that are not represented. In some cases, data sets may not be complete. ESCAP cannot confirm methodologies of data sources.

East and North-East Asia	North and Central Asia	South-East Asia	South and South-West Asia	Pacific	Associate Members	Non-regional Members
China	Armenia	Brunei Darussalam	Afghanistan	Australia	American Samoa	France
Japan	Azerbaijan	Cambodia	Bangladesh	Fiji	Cook Islands	United Kingdom (UK)
Korea, Democratic People's Republic of (Korea, DPR)	Georgia	Indonesia	Bhutan	Kiribati	French Polynesia	Netherlands
Korea, Republic of (Korea, Rep. of)	Kazakhstan	Lao PDR	India	Marshall Islands	Guam	United States of America
Mongolia	Kyrgyzstan	Malaysia	Iran, Islamic Republic of (Iran, IR)	Micronesia, Federated Stated of (Micronesia, FS)	Hong Kong, China	
	Russian Federation	Myanmar	Maldives	Nauru	Macao, China	
	Tajikistan	Philippines	Nepal	New Zealand	New Caledonia	
	Turkmenistan	Singapore	Pakistan	Palau	Niue	
	Uzbekistan	Thailand	Sri Lanka	Papua New Guinea	Northern Mariana Islands	
		Timor-Leste	Turkey	Samoa		
		Viet Nam		Solomon Island		
				Tonga		
				Tuvalu		
				Vanuatu		

Member states listed in blue are considered "Asia-Pacific Developed Countries". Other member States are considered "Asia-Pacific Developing Countries".



Per Capita Final Energy Consumption, 2010

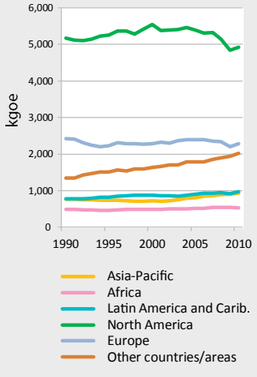


Data source: ESCAP Statistical Database based on data from IEA

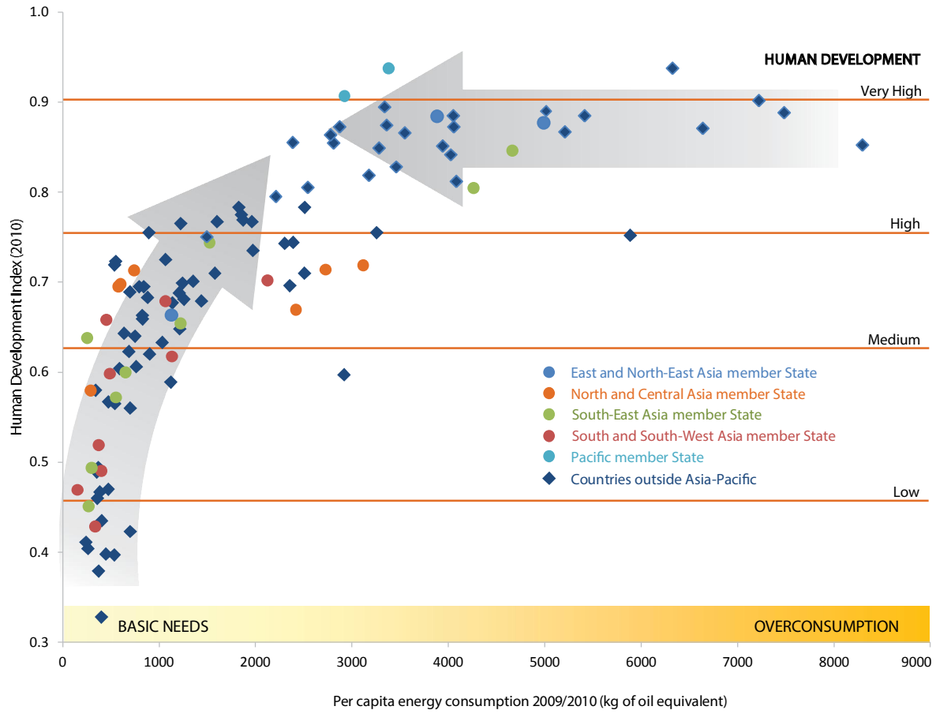
Data source: ESCAP Statistical Database based on data from WPP2010

The HUMAN DEVELOPMENT INDEX (HDI), developed by UNDP, is a measure of human development and is a composite statistic of life expectancy, education, and income indices. The index is published annually. In this chart, the 2010 index was used to match against the most recent data for energy consumption.

Per Capita Energy Consumption by Global Region



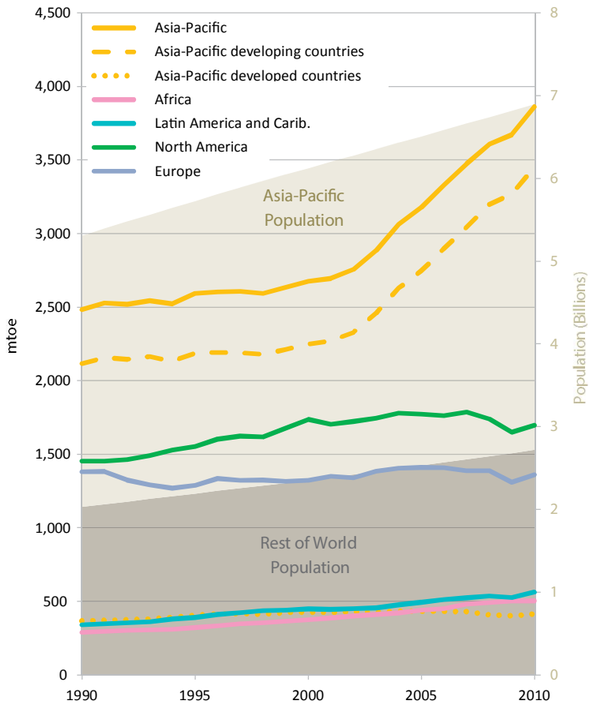
Energy Consumption and Human Development



Data source: ESCAP Statistical Database based on data from IEA

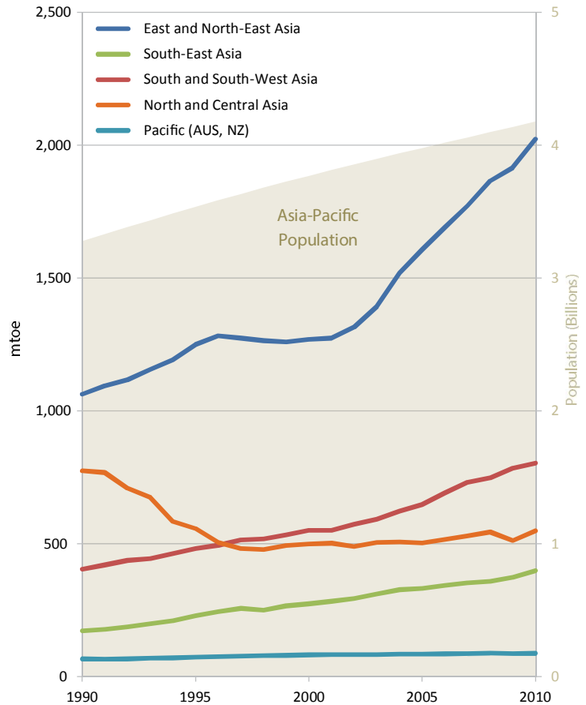
Data sources: World Bank, UNDP, and ESCAP Statistical Database based on data from IEA

Total Energy Consumption and Population by Global Region



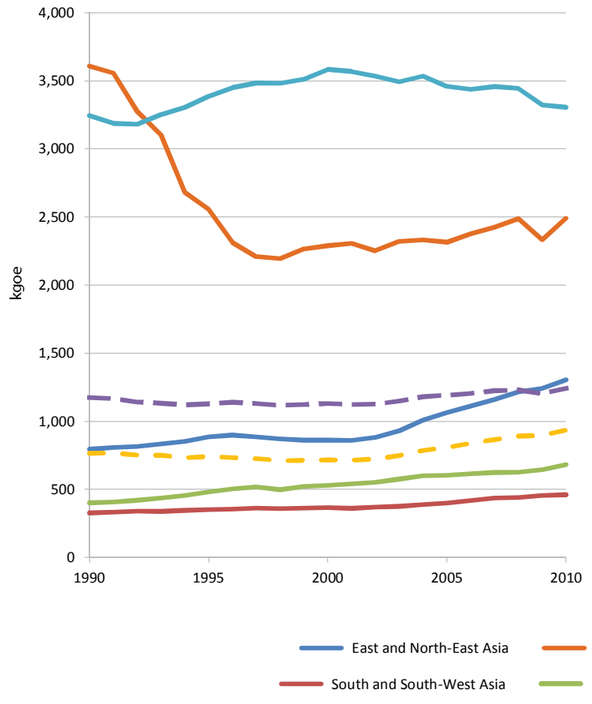
Data source: ESCAP Statistical Database based on data from IEA and WPP2010

Total Energy Consumption and Population by Asia-Pacific Subregion



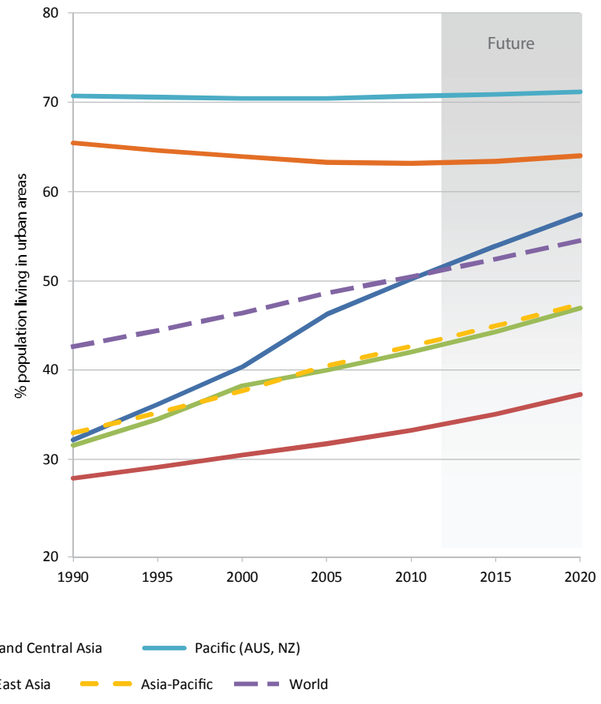
Data source: ESCAP Statistical Database based on data from IEA and WPP2010

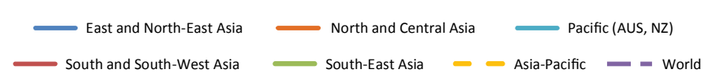
Asia-Pacific Per Capita Energy Consumption



Data source: ESCAP Statistical Database based on data from IEA

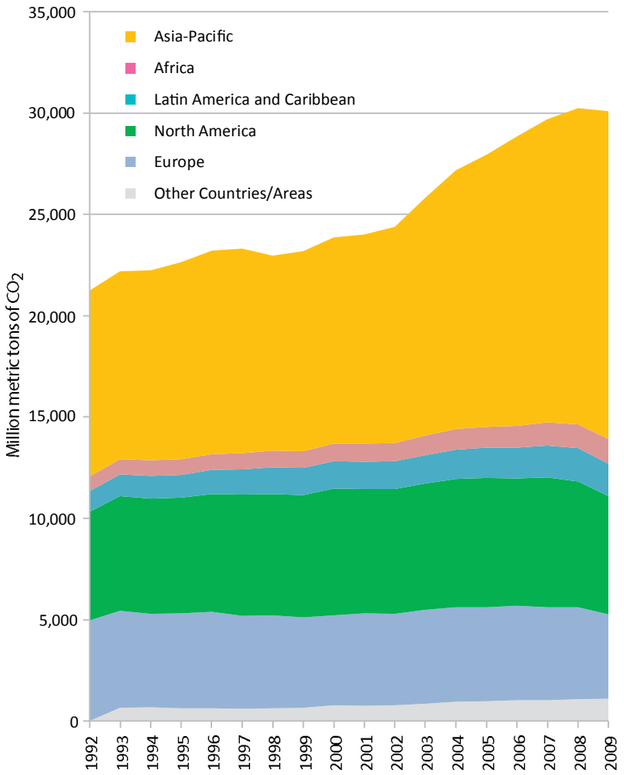
Asia-Pacific Urbanisation Trends





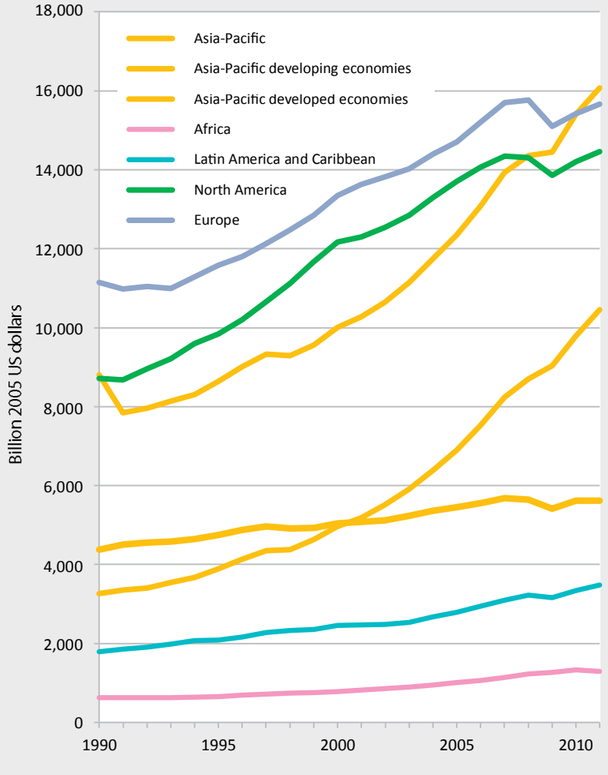
Data source: ESCAP Statistical Database based on data from WPP2010

Global Cumulative Carbon Dioxide ($C0_2$) Emissions



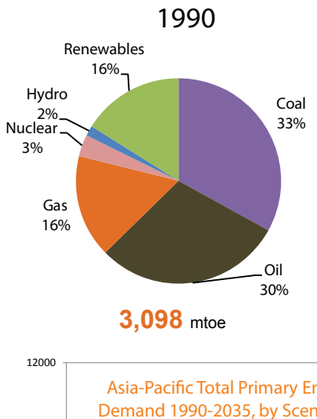
Data source: ESCAP Statistical Database based on data from MDG Indicators database

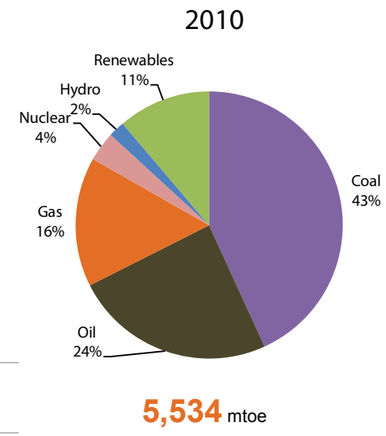
GDP in 2005 Constant Prices

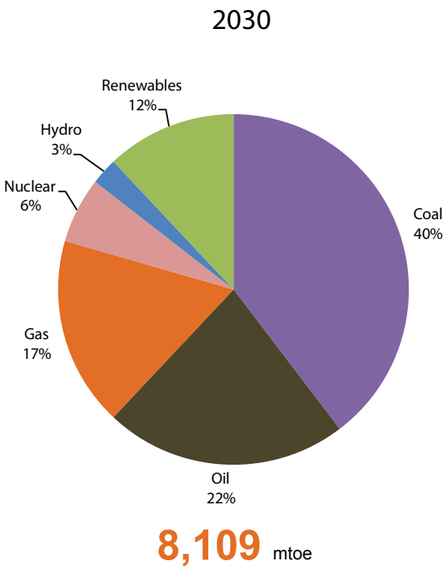


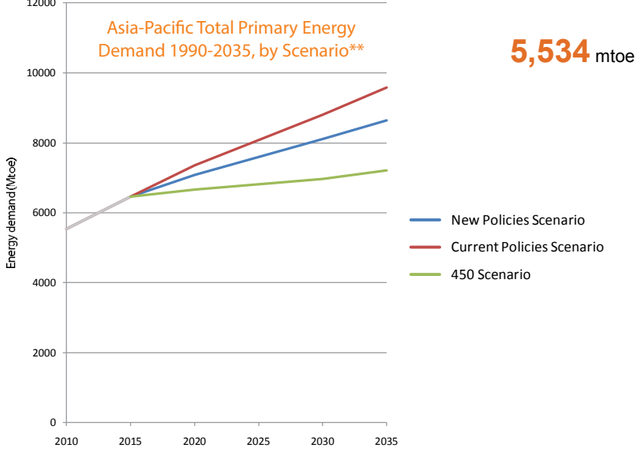
Data source: ESCAP Statistical Database based on data from NAMAD

Asia-Pacific* Total Primary Energy Demand Outlook in the New Policies Scenario**







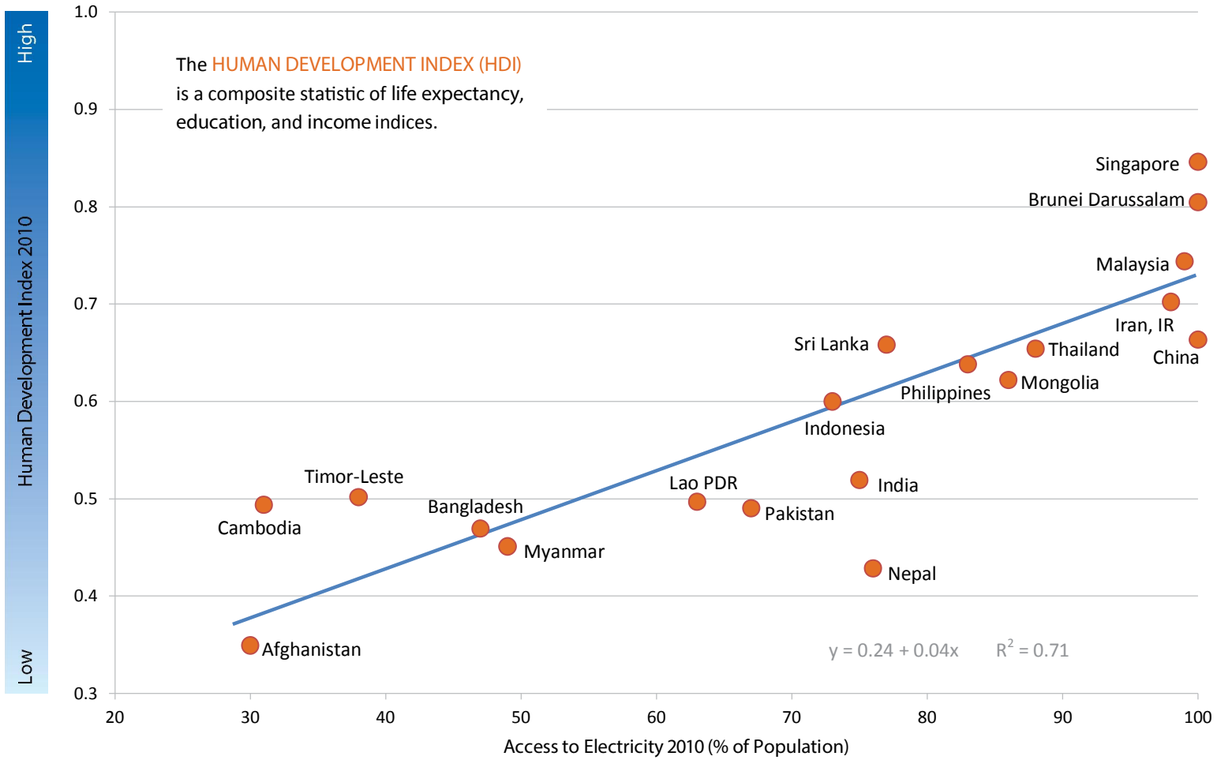


Source: Based on data from IEA World Energy Outlook (WEO) 2012

* Data excludes the following ESCAP member States: Armenia, Azerbaijan, Bhutan, Georgia, Iran IR, Kazakhstan, Kyrgyzstan, Marshall Islands, Micronesia, Nauru, Palau, Tajikistan, Turkey, Turkmenistan, Tuvalu, Uzbekistan.

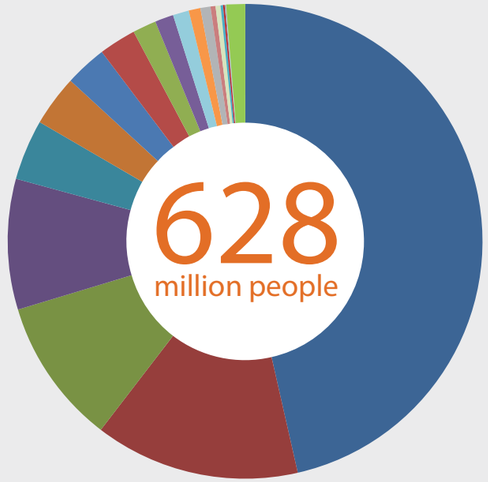
** See References and Notes section for an explanation of the IEA Current Policies Scenario, New Policies Scenario and 450 Scenario.

Access to Electricity and Human Development, Selected Countries, 2010



Data sources: IEA WEO 2011, UNDP

People without Access to Electricity, 2010

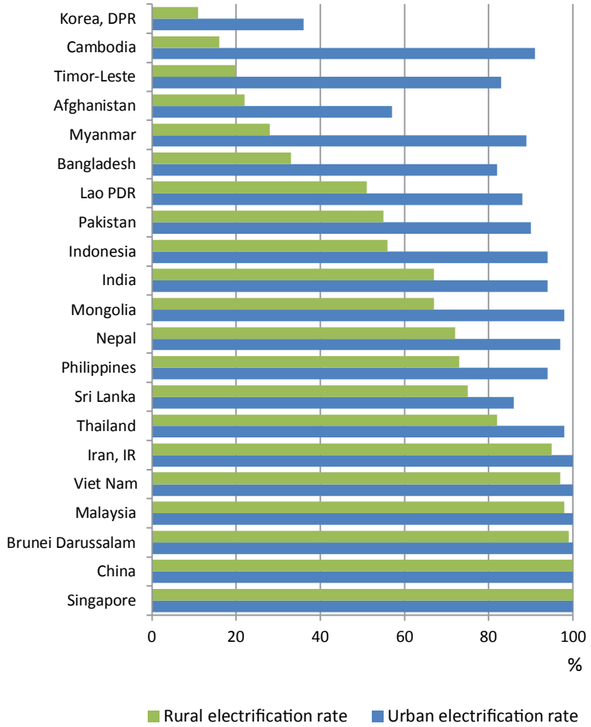


Number of people without electricity access (millions)

293	India	16	Philippines	2.1	Viet Nam
88	Bangladesh	10	Cambodia	1.2	Iran, IR
63	Indonesia	8	Thailand	0.7	Timor-Leste
56	Pakistan	7	Nepal	0.4	Mongolia
26	Myanmar	5	Sri Lanka	0.2	Malaysia
22	Afghanistan	4.2	China	8	Rest of Asia
18	Korea, DPR	2.2	Lao PDR		

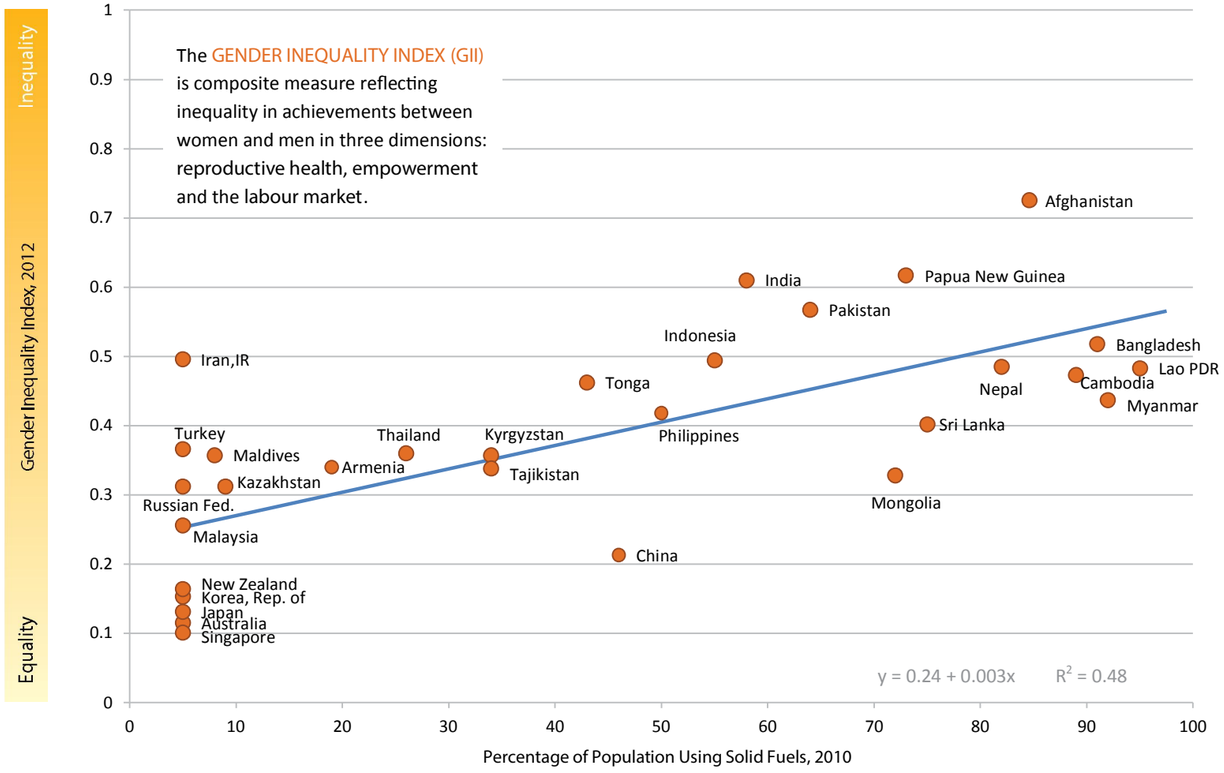
Note: Due to rounding, total differs from the sum of all countries.
Data source: IEA WEO 2012

Rural and Urban Electrification Rates, Selected Countries, 2010



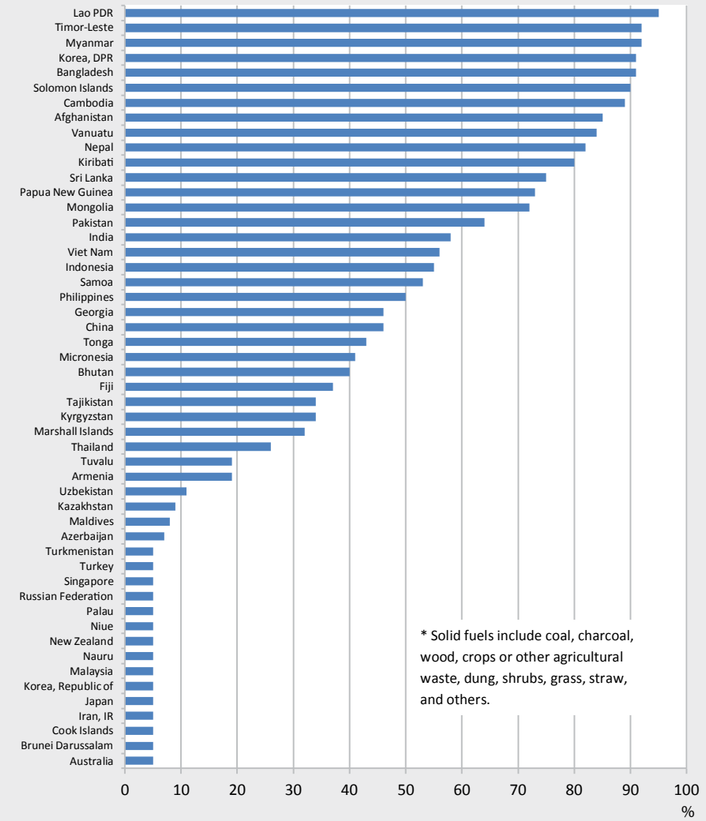
Data source: IEA WEO 2011

Solid Fuel* Use and Gender Inequality, Selected Countries



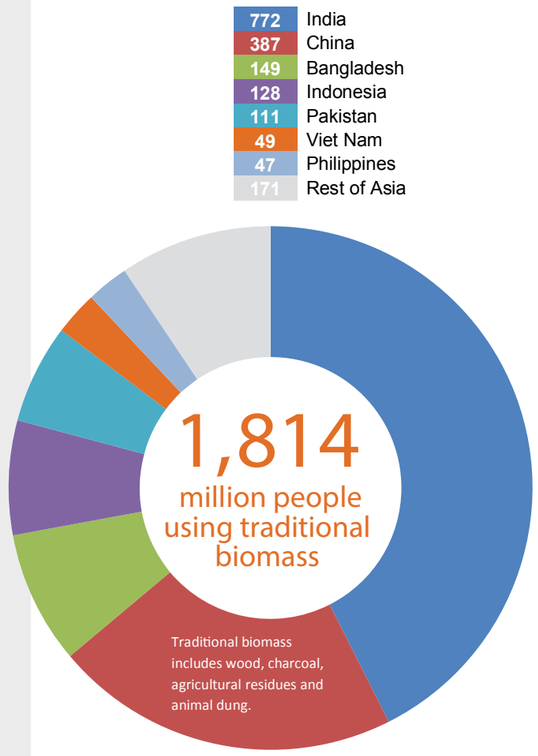
Data sources: UNDP, UN Data

Percentage of Population Using Solid Fuels* 2010



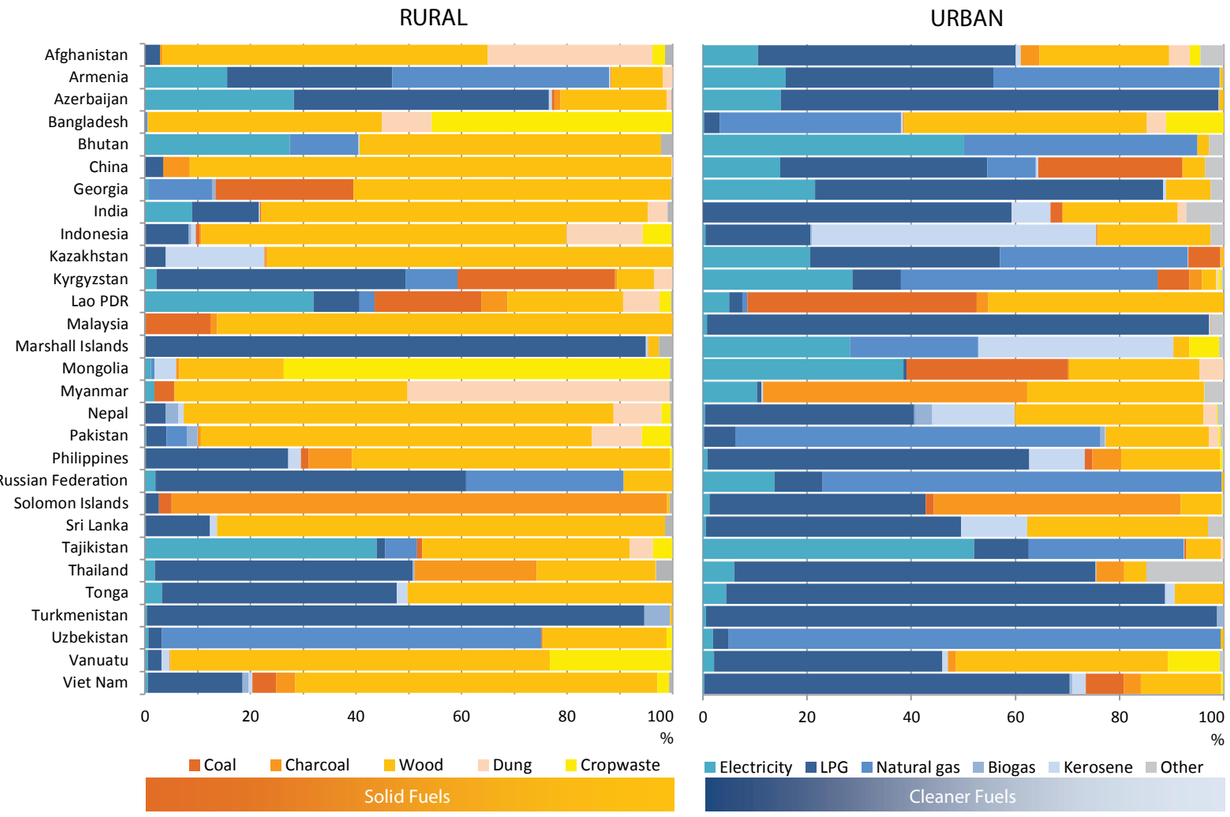
Data source: United Nations Statistics Division based on data from the MDG Indicator Database

People Using Traditional Biomass 2010 (millions)



Data source: IEA WEO 2012

Primary Cooking Fuel Mix for Selected Asia-Pacific Countries, 2010



Data source: WHO Household Energy Database

Estimated DALYs Per 1,000 Capita from Indoor Air Pollution, 2004

The **disability-adjusted life year (DALY)** is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.

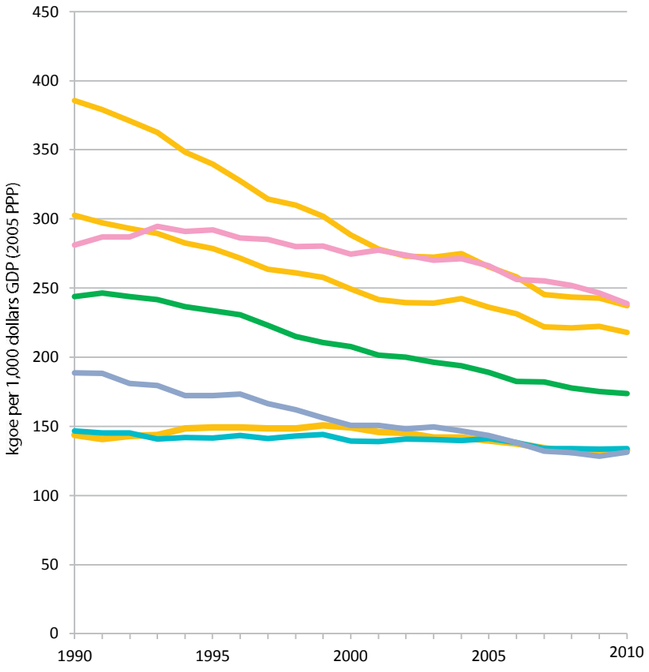
Data source: WHO

Estimated Deaths from Indoor Air Pollution, 2004

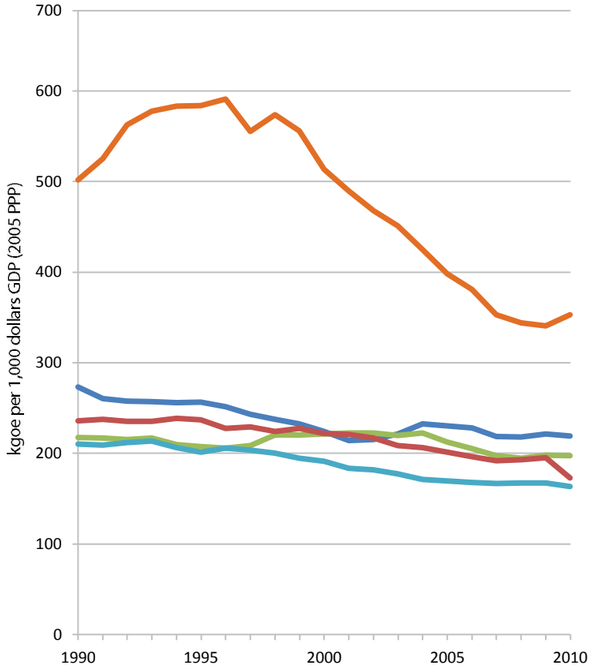
Kazakhstan	100
Solomon Islands	100
Bhutan	200
Georgia	200
Iran	300
Mongolia	300
Armenia	400
Russian Federation	600
Azerbaijan	1,100
Papua New Guinea	1,600
Kyrgyzstan	2,100
Lao PDR	2,600
Tajikistan	3,300
Turkey	3,400
Sri Lanka	4,300
Uzbekistan	6,200
Cambodia	6,600
Philippines	7,200
Nepal	8,700
Thailand	10,500
Myanmar	18,100
Viet Nam	23,800
Indonesia	45,300
Bangladesh	49,400
Afghanistan	54,000
Pakistan	56,100
India	488,200
China	548,900

Data source: WHO

Global Regional Primary Energy Intensity

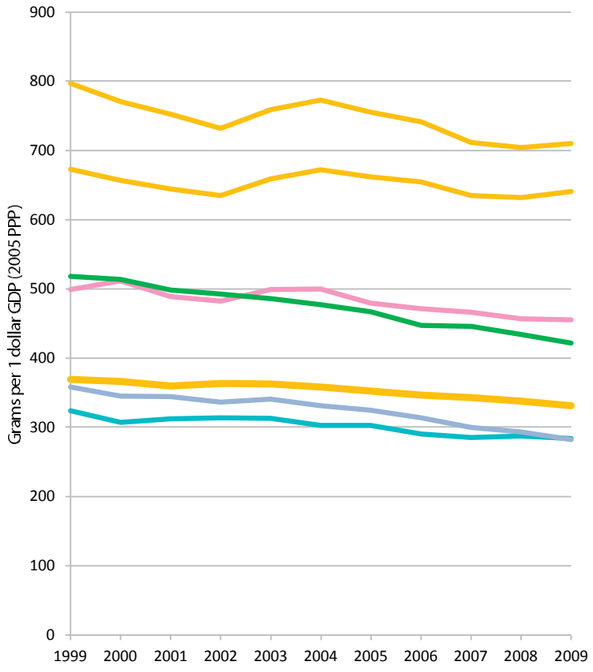


Asia-Pacific Subregional Primary Energy Intensity

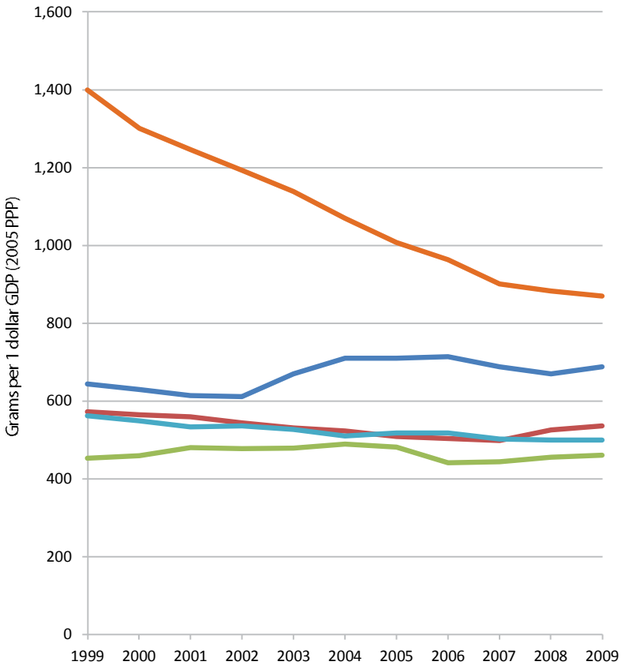


Data source: ESCAP Statistical Database based on data from IEA

Global Regional Carbon Intensity



Asia-Pacific Subregional Carbon Intensity



Data source: ESCAP Statistical Database based on data from MDG Indicators database

Selected Energy Use and Intensity Reduction Targets

	Energy Use (TPES)	Energy Use (TFC)	Energy Intensity	Reduction Target (%)	Baseline Year	Target Year
East and North-East Asia						
China			●	16	2010	2015
Hong Kong, China			●	45	2005	2030
Japan			●	30	2003	2030
Korea, Rep.			●	45	2006	2030
South-East Asia						
Brunei Darussalam			●	25	2005	2030
Cambodia		●		10	BAU	2030
Indonesia			●	1%/yr		2025
Lao PDR		●		10	BAU	2030
Malaysia		●		10	2011	2030
Myanmar	●			5	BAU	2020
	●			10	BAU	2030
Philippines		●		10	BAU	2030
Singapore			●	20	2005	2020
			●	35	2005	2030
Thailand			●	15	2005	2020
			●	25	2005	2030
Viet Nam		●		8	2006	2015
South and South-West Asia						
India		●		5	2010	2015
North and Central Asia						
Kazakhstan			●	10	2011	2010
			●	25	2011	2020
Russian Federation			●	40	2007	2020
Pacific						
New Zealand			●	1.3%/yr	2010	2021

Sources: China Twelfth Five-Year Plan (2011-2015), APEC Sydney Joint Declaration, Japan Energy Conservation Centre, Republic of Korea National Energy Basic Plan (2008 - 2030), ASEAN Centre for Energy, Indonesian National Energy Conservation Master Plan (2005), Sustainable Singapore Development Blueprint (2009), Thailand 20-Year Energy Efficiency Development Plan (EEDP) 2011-2030, Vietnam National Energy Efficiency Program (VNEEP, 2006 -2015), Comprehensive Plan for Energy Efficiency Improvement in the Republic of Kazakhstan (2012-2015), Energy Efficiency and Energy Sector Development National Program of the Russian Federation (2013-2020), New Zealand Energy Efficiency and Conservation Strategy (2011-2016)

Note:
TPES = Total Primary Energy Supply
TFC = Total Final Consumption
BAU = Business as usual

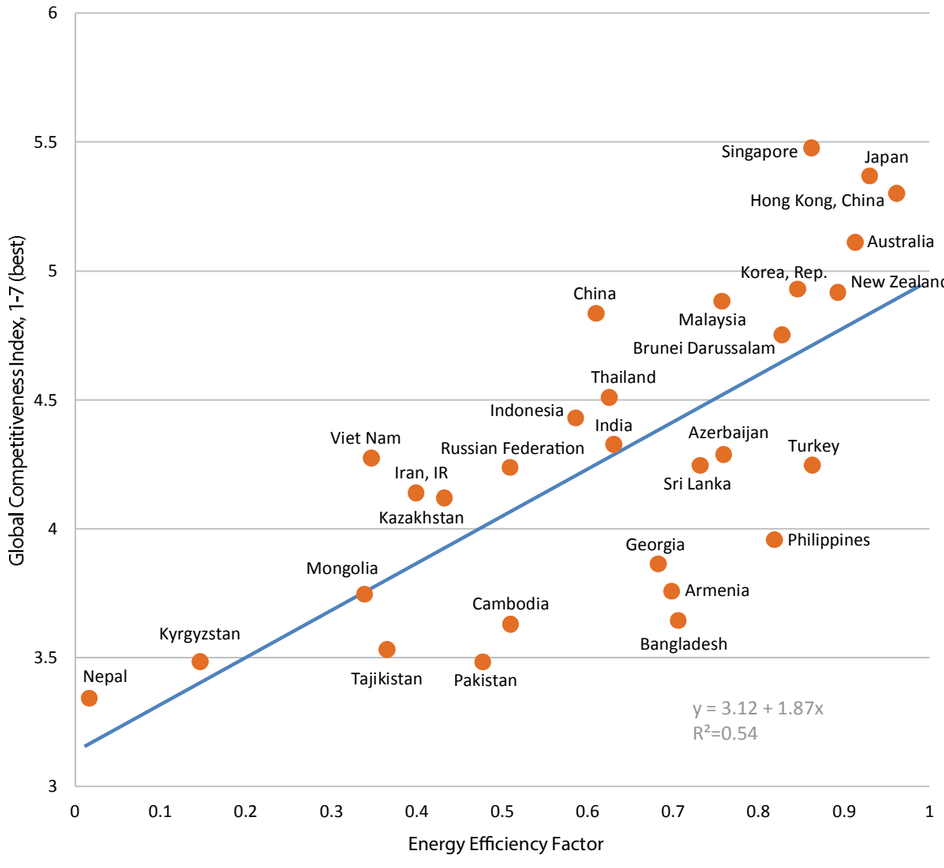
The GLOBAL COMPETITIVENESS INDEX is a composite statistic published annually by the World Economic Forum. The index is comprised of over 100 variables under 12 pillars including: institutions, infrastructure, macroeconomy, health and primary education, higher education, goods market efficiency, labour markets, financial markets, technological readiness, market size, business sophistication, and innovation.

Data source:
World Economic Forum

The ENERGY EFFICIENCY FACTOR value is derived from subtracting final energy intensity (total final consumption per unit GDP [kgoe/2005 Contant USD]) from 1. A higher value represents greater efficiency.

Data source: ESCAP Statistical Database based on data from IEA and NAMAD

Energy Efficiency and Economic Competitiveness, 2010



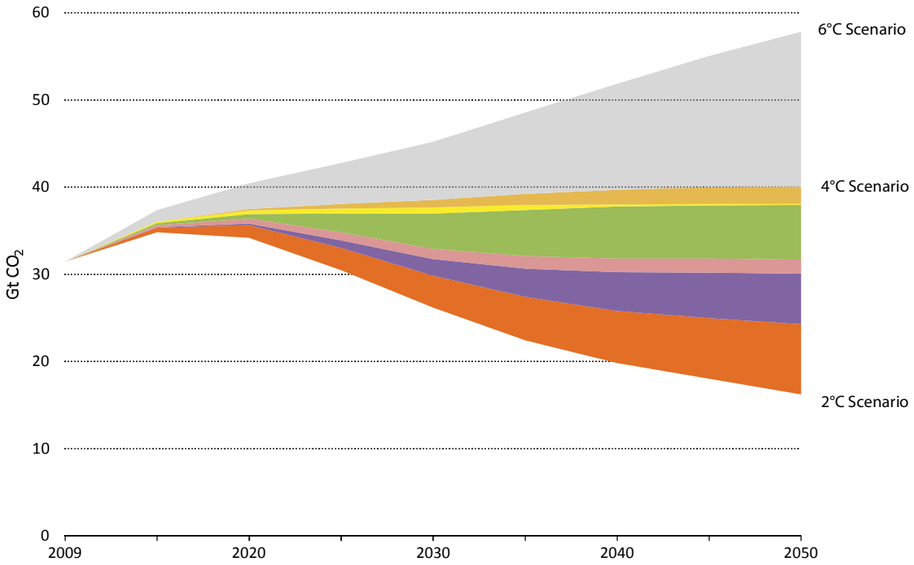
LIMITING GLOBAL WARMING

The 6°C Scenario (6DS) is largely an extension of current trends and is broadly consistent with the Current Policies Scenario*. By 2050, energy use almost doubles (compared with 2009) and total Green House Gas (GHG) emissions rise even more. In the absence of efforts to stabilise atmospheric concentrations of GHGs, average global temperature rise is projected to be at least 6°C in the long term.

The 4°C Scenario (4DS) takes into account recent pledges made by countries to limit emissions and step up efforts to improve energy efficiency. It is broadly consistent with the New Policies Scenario.

The 2°C Scenario (2DS) describes an energy system consistent with an emissions trajectory that recent climate science research indicates would give an 80% chance of limiting average global temperature increase to 2°C. It is broadly consistent with the 450 Scenario. It sets the target of cutting energy-related CO_2 emissions by more than half in 2050 (compared with 2009) and ensuring that they

Technological Contributions to Global Emissions Reductions to Achieve the 2°C Scenario

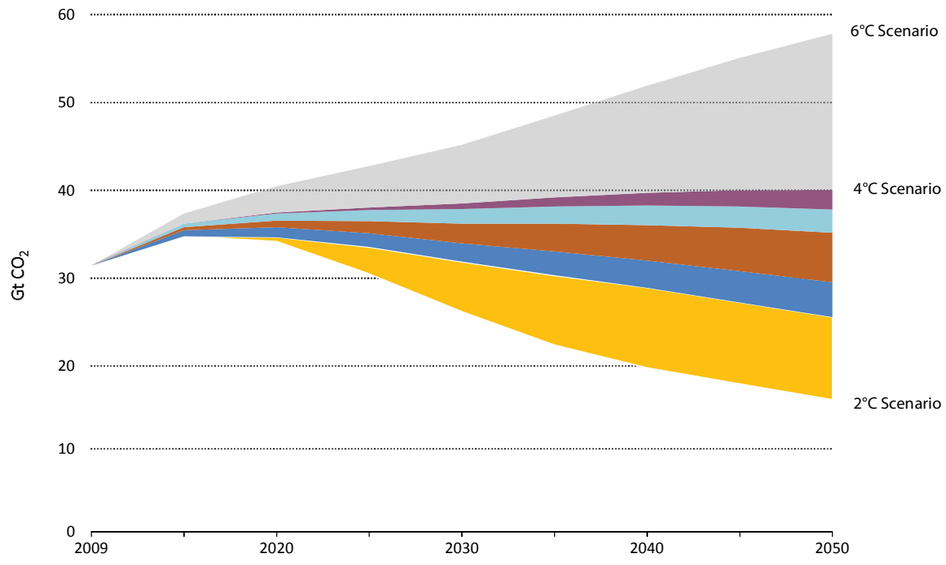


End-use fuel and electricity efficiency 31%
CCS 22%
End-use fuel switching 9%
Renewables 28%
Power generation efficiency and fuel switching 3%
Nuclear 9%

Note: CCS = Carbon Capture and Storage
Source: IEA, Energy Technology Perspectives 2012

**See the References and Notes section for a further explanation of the various scenarios.*

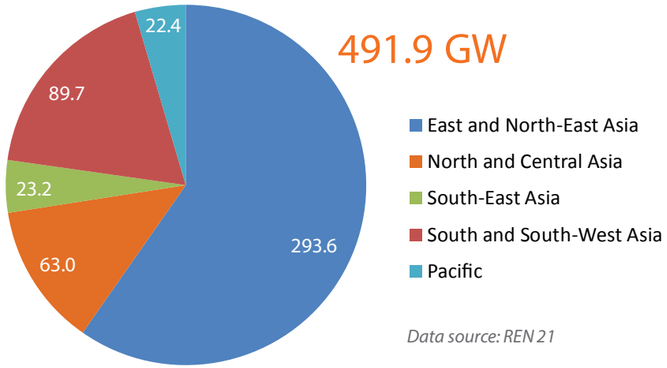
Sectoral Contributions to Global Emissions Reductions to Achieve the 2°C Scenario



Power generation 42%
Industry 18%
Transport 21%
Buildings 13%
Other transformation 7%

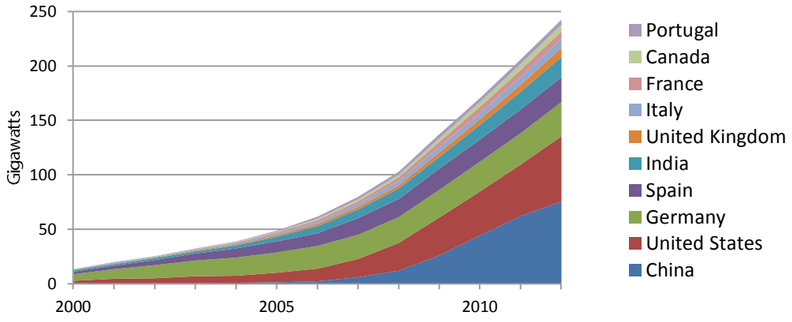
Source: IEA, Energy Technology Perspectives 2012

Asia-Pacific Installed Renewable Energy Capacity Including Hydro (GW), 2009/2010



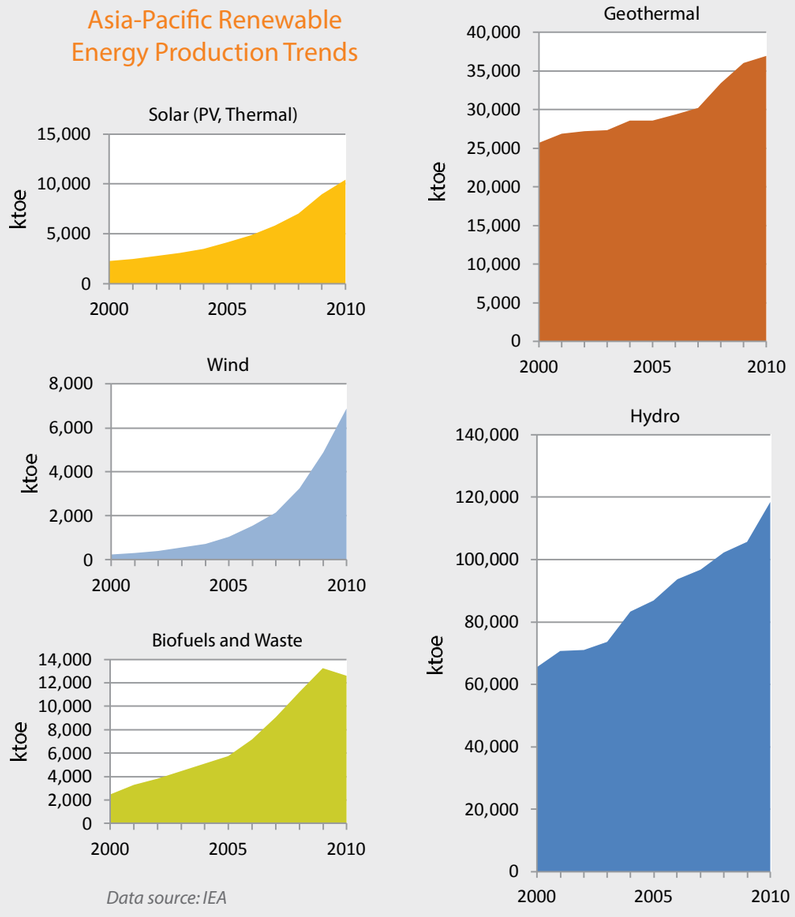
Data source: REN 21

Cumulative Installed Wind Power Capacity in Top Ten Countries, 1990-2012



Source: EPI from Worldwatch, CREIA, DOE, GWEC, EWEA

Asia-Pacific Renewable Energy Production Trends



Data source: IEA

Renewable Energy Policies, Selected Countries

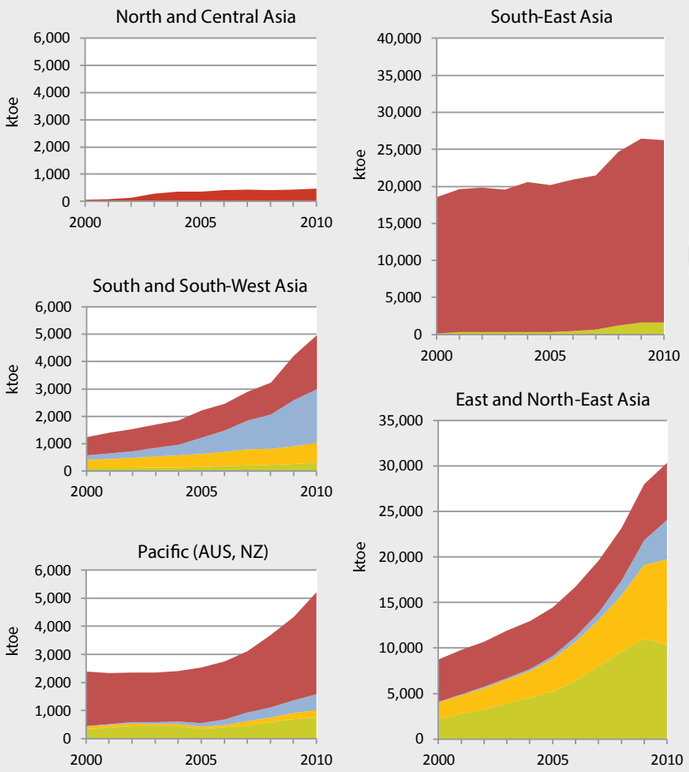
Country	Capital subsidy, grant, or rebate	Investment or production tax credits	Tax reductions	Energy Production payment	Public investment, loans or grants	Public competitive bidding	Feed-in tariff (incl. premium payment)	Electric utility quota obligation / RPS	Net metering	Biofuels obligation / mandate	Heat obligation/ mandate	Tradable REC
	Fiscal Incentives				Public Financing		Regulatory Policies					
Armenia							●					
Australia	●				●		●			●		●
Bangladesh	●		●		●							
China	●			●	●	●	●	●		●	●	
India	●	●			●	●	●	●		●	●	●
Indonesia	●	●	●		●	●	●	●		●		
Iran, IR		●		●			●					
Japan	●				●		●	●	●			●
Kazakhstan							●					●
Korea, Rep.	●	●	●		●			●	●	●		●
Kyrgyzstan	●		●					●				
Malaysia			●		●	●	●	●		●		
Marshall Isl.			●									
Mongolia						●	●					
Nepal	●	●	●		●	●						
New Zealand	●											
Pakistan	●				●		●		●			
Palau								●				
Philippines	●	●	●	●	●	●	●	●	●	●		
Russian Fed.	●											
Singapore					●				●			
Sri Lanka	●		●	●	●		●	●	●	●		
Thailand			●		●		●			●		
Turkey	●						●					
Viet Nam	●	●	●									

RPS = Renewable Portfolio Standard

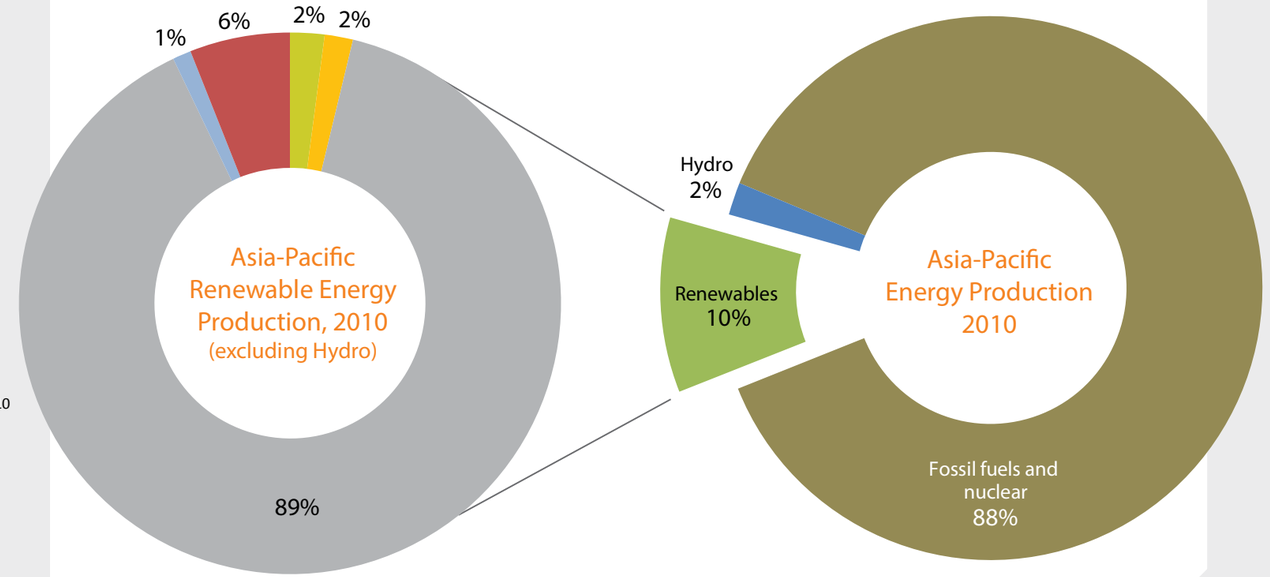
● national-level policy ● state/provincial policy

Source: REN21 Renewables 2012 Global Status Report

Asia-Pacific Renewable Energy Production, by Subregion
(excluding Hydro and Solid Biomass)



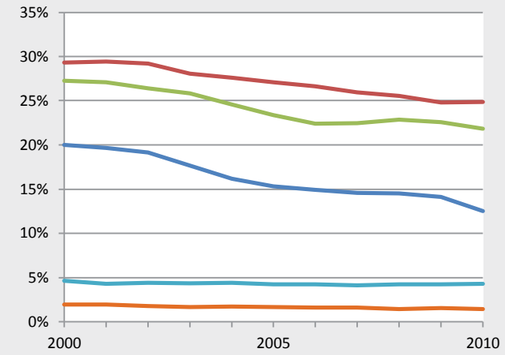
Source: IEA



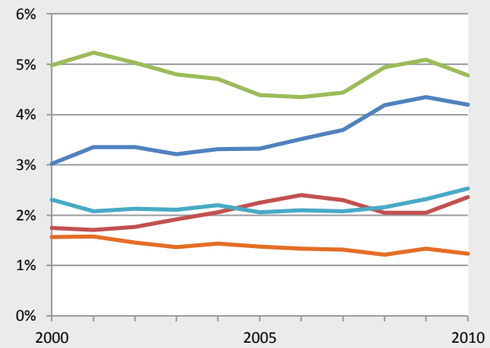
** Includes: biogas, sludge gas, landfill gas, renewable municipal waste, biodiesel, and biogasoline.*

Data source: IEA

Renewables** as % of Total Energy Production



Renewables (excluding Solid Biomass***) as % of Total Energy Production

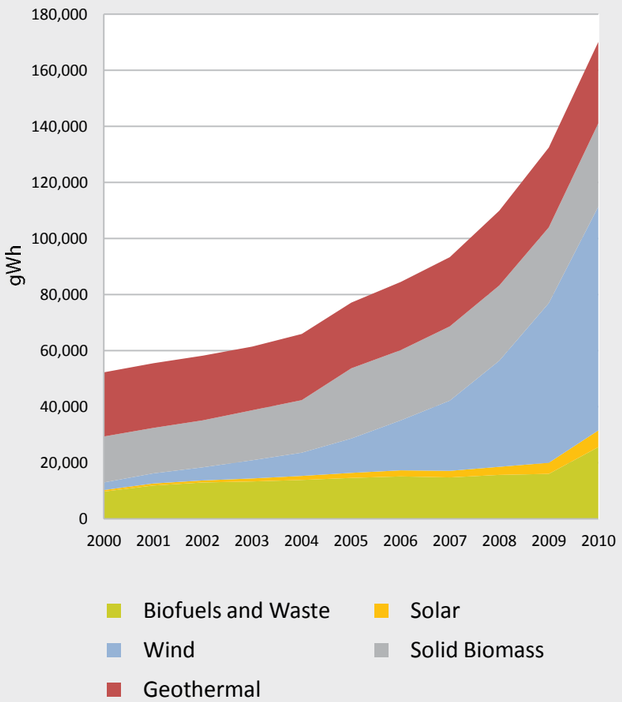


*** Includes: hydro, geothermal, solar PV, solar thermal, tidal, wind, municipal waste (renewable), solid biomass, charcoal, landfill gas, sludge gas, other biogases, biogasoline, biodiesel, and other liquid biofuels.*

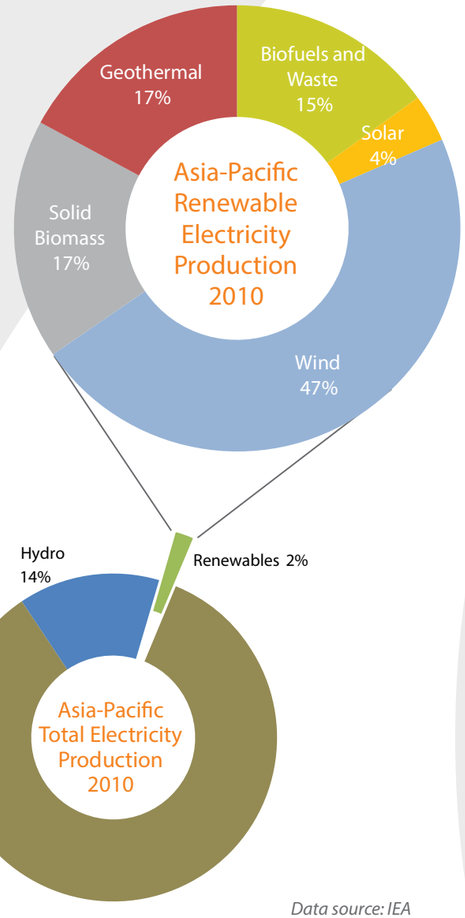
**** Solid biomass includes a multitude of woody materials such as firewood, wood chips, bark, sawdust, shavings, chips, sulphite lyes, and animal waste.*

Data source: IEA

Asia-Pacific Electricity Production from Renewables
(excluding Hydro)



Data source: IEA



Data source: IEA

Potential Employment Creation through Off-Grid Renewable Electricity

	Jobs per megawatt
Solar	30
Small Hydro	4
Biomass	15
Wind	22

Source: IRENA, 2012

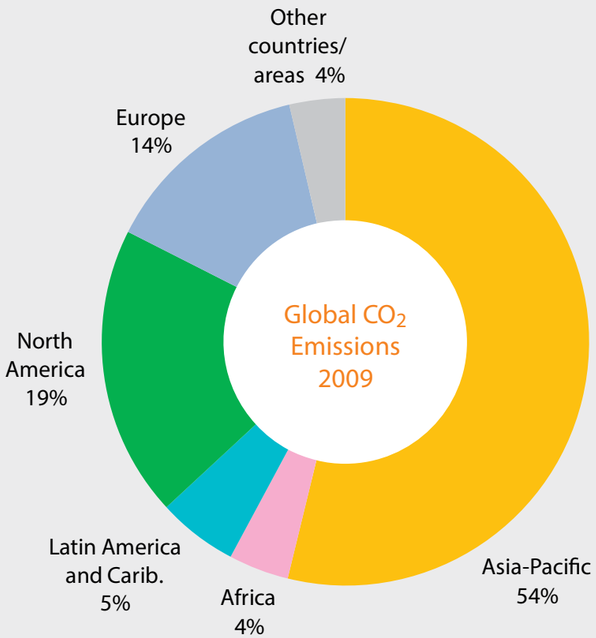
Average Employment over Life of Power Plants
(Estimated jobs per megawatt of average capacity)

	Manufacturing, Construction, Installation	Operations & Maintenance/ Fuel Processing	Total
Solar PV	5.76–6.21	1.20–4.80	6.96–11.01
Wind Power	0.43–2.51	0.27	0.70–2.78
Biomass	0.4	0.38–2.44	0.78–2.84
Coal-Fired	0.27	0.74	1.01
Natural Gas-Fired	0.25	0.7	0.95

Source: UNEP, 2008

Renewable Energy Employment 2009/10

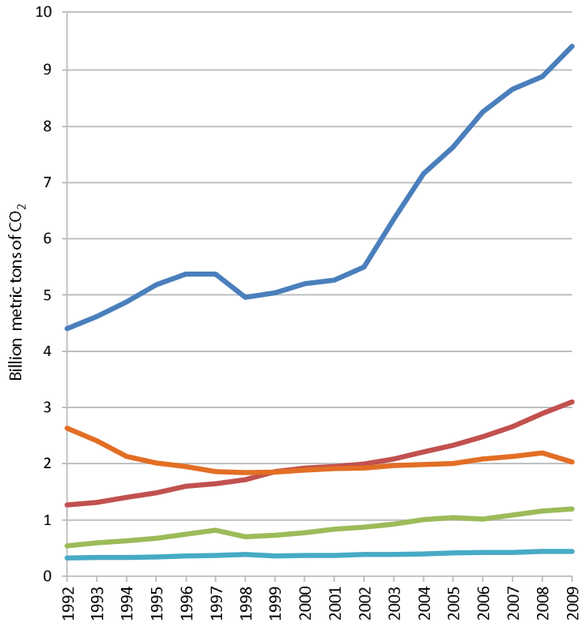
Source: ILO, 2012



30.1 billion tonnes

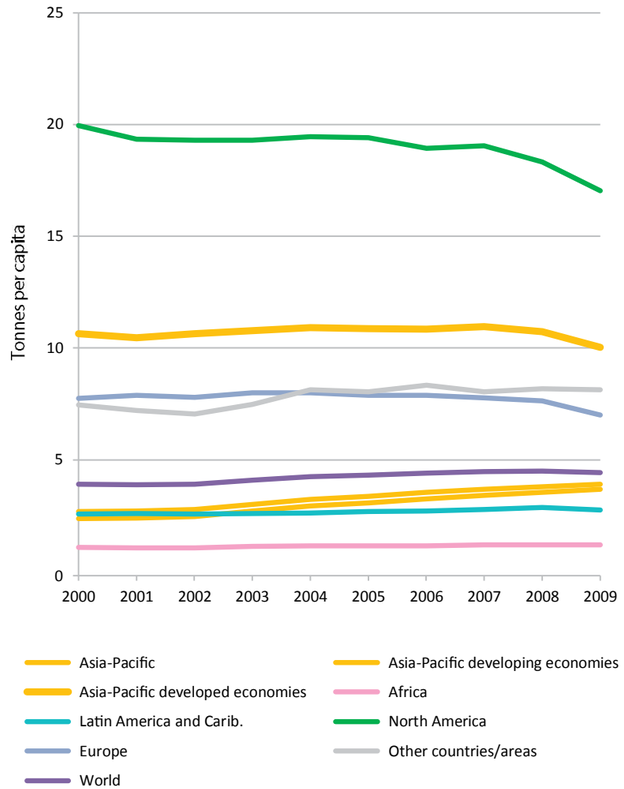
Data source: ESCAP Statistical Database based on data from MDG Indicators database

Total CO_2 Emissions by Asia-Pacific Subregion

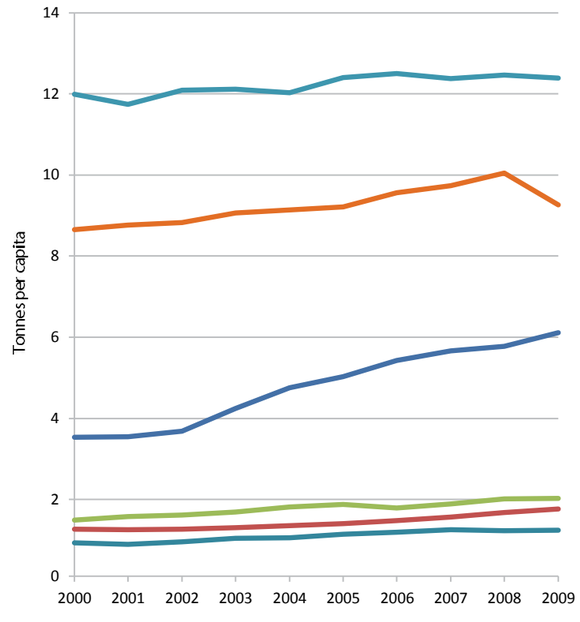


Data source: ESCAP Statistical Database based on data from MDG Indicators database

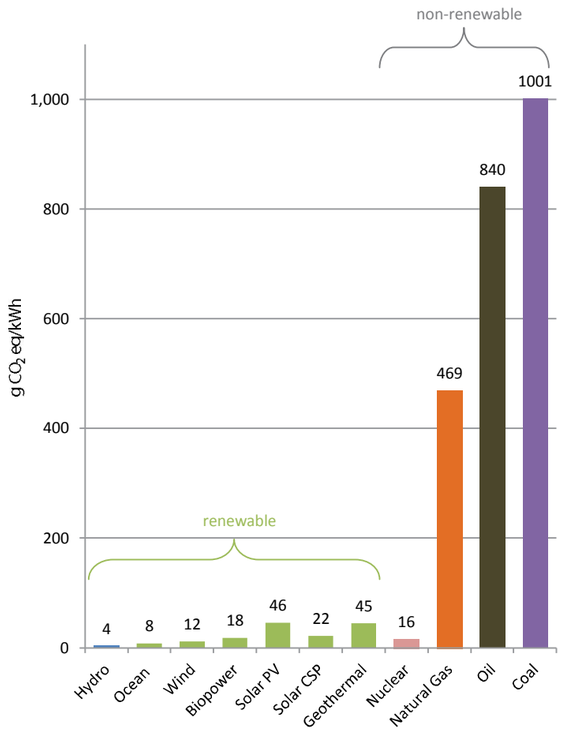
Global Per Capita CO_2 Emissions



Per Capita CO_2 Emissions by Asia-Pacific Subregion



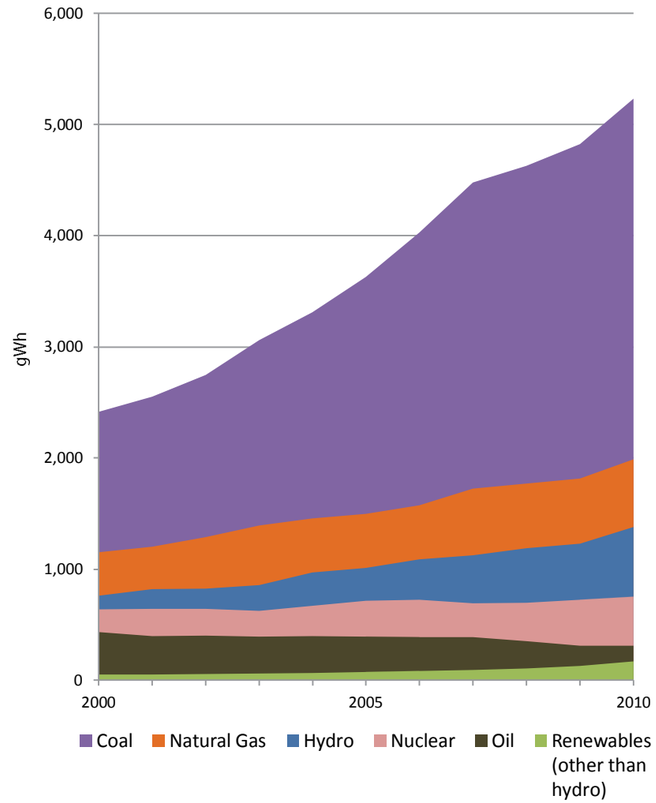
Median Lifecycle GHG Emissions from Electricity Generation Technologies



CSP = Concentrating solar power

Source: Adapted from IPCC SRRES, 2011

Asia-Pacific Electricity Production by Resource

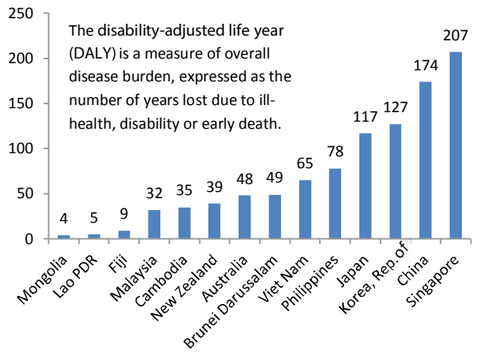


Data source: IEA

WHO Air Quality Particulate Matter (PM10) Level Targets

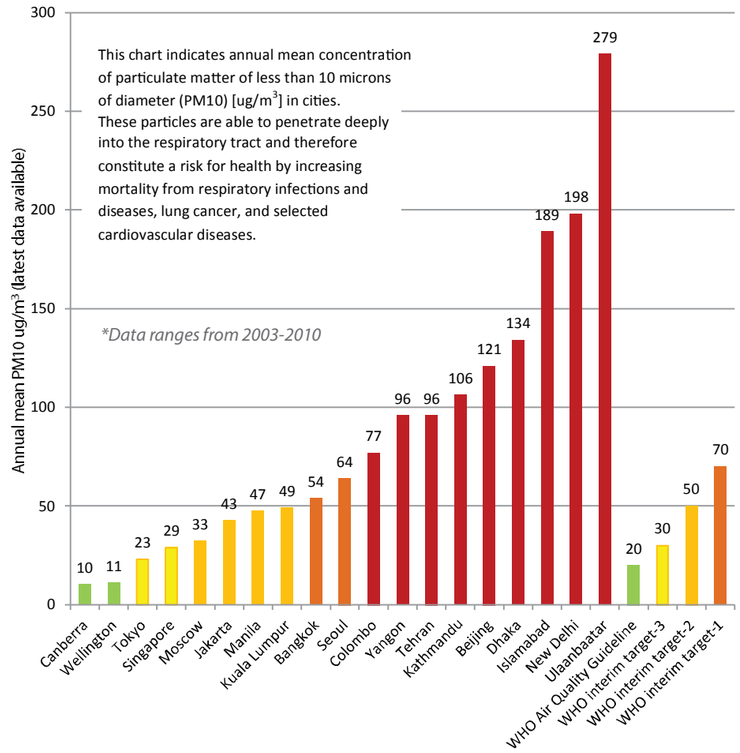
WHO Air Quality Guideline	20	Recommended value representing an acceptable and achievable objective to minimize health effects
WHO interim target-3	30	In addition to other health benefits, these levels reduce mortality risk by another approximately 6% compared to WHO-IT2 levels
WHO interim target-2	50	In addition to other health benefits, these levels lower risk of premature mortality by approximately 6% compared to WHO-IT1
WHO interim target-1	70	These levels are estimated to be associated with about 15% higher long-term mortality than at AQG
Outside of WHO target range		

Outdoor Air Pollution Attributable DALYs per 100,000 Capita, 2004



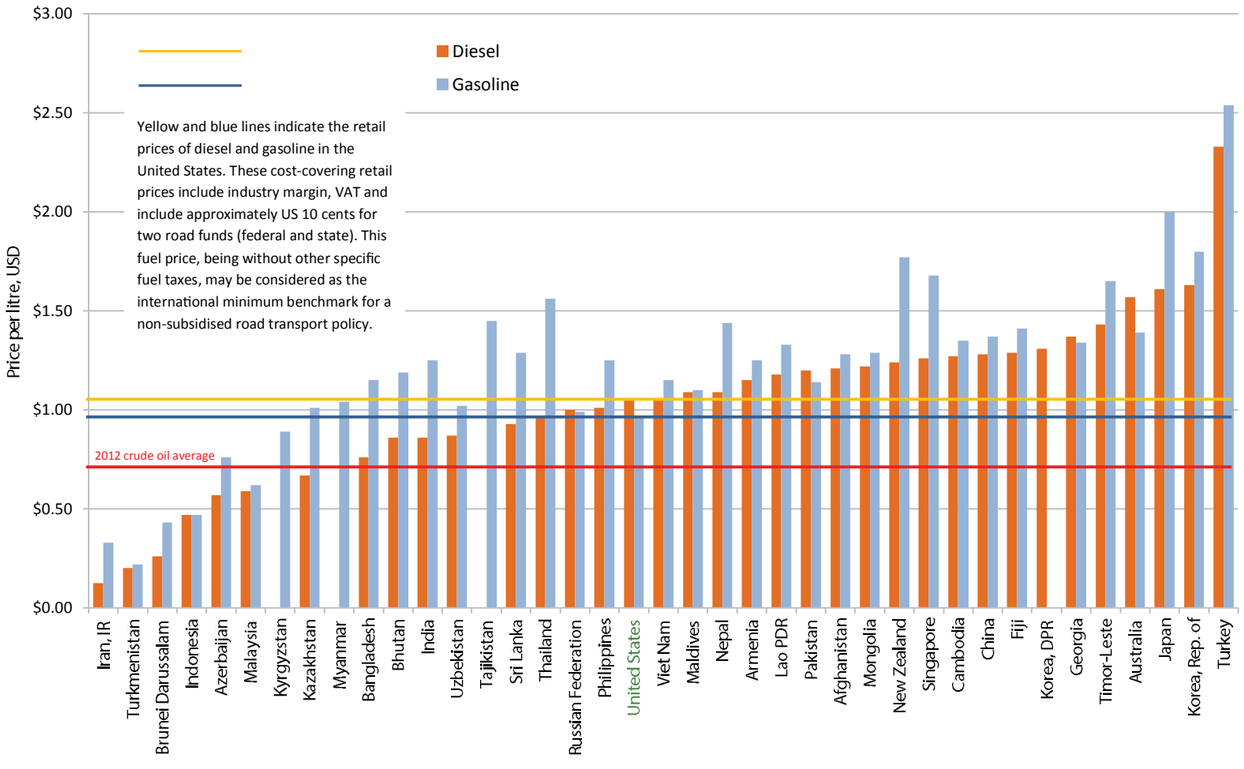
Data source: WHO Global Health Observatory

PM10 levels in Selected Asia-Pacific Cities*



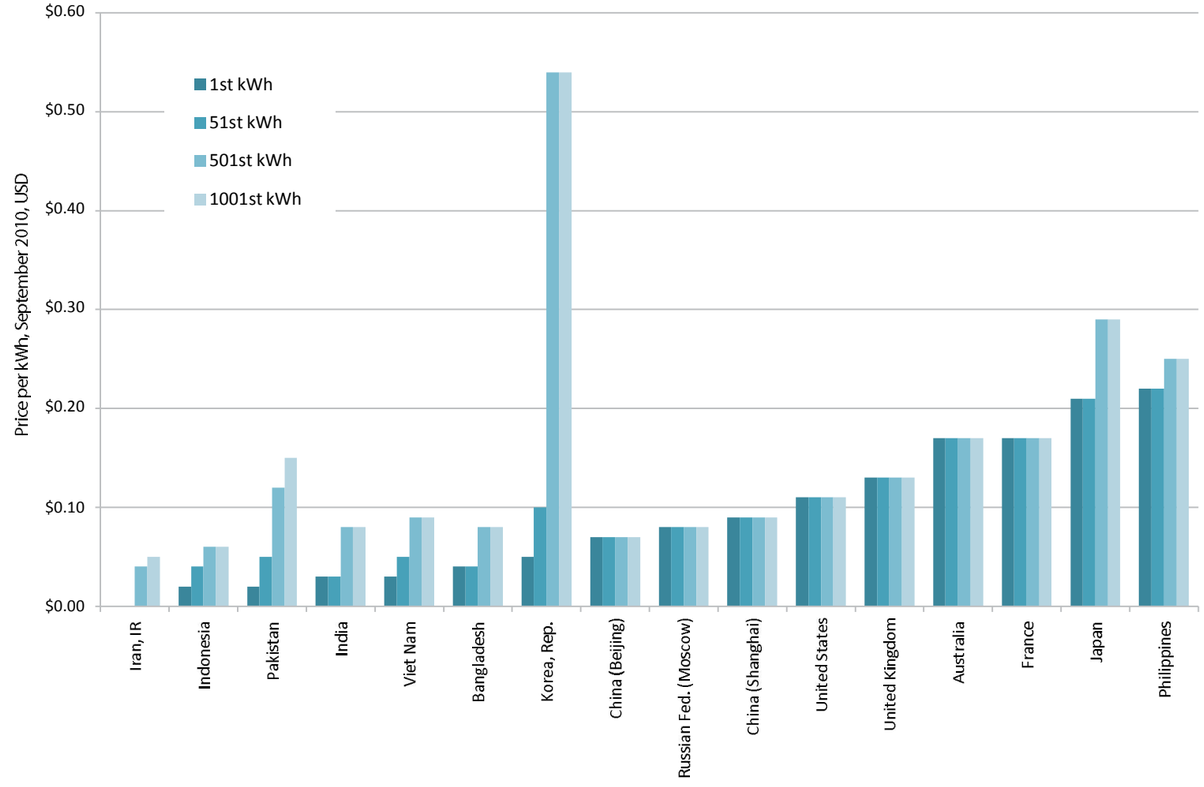
Data source: WHO Urban Outdoor Air Pollution Database

Asia-Pacific Diesel and Gasoline Pump Prices, 2012



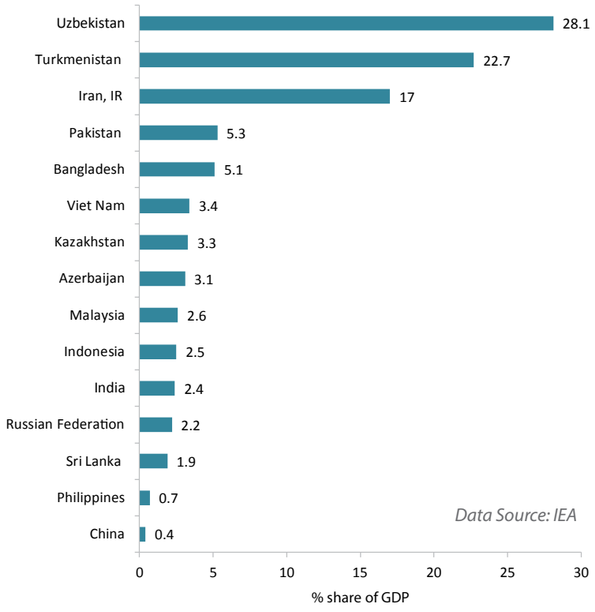
Data source: World Bank statistical database based on data from GIZ

Household Electricity Tariffs for Selected ESCAP Member States, September 2010



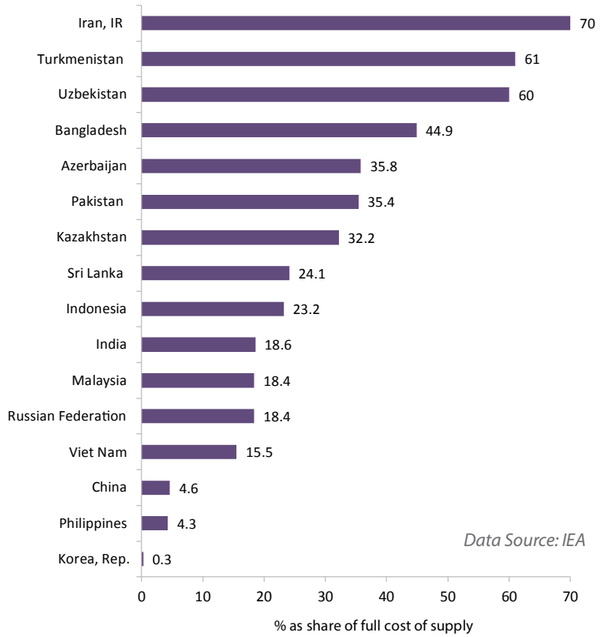
Data source: GTZ "Power in G-20 and N-11 Countries – At What Cost?" 2010

Total Oil, Natural Gas, Coal and Electricity Subsidies as Share of GDP for Selected Asia-Pacific Countries, 2011



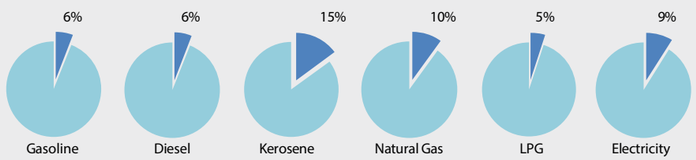
Data Source: IEA

Average Fossil Fuel Consumption Subsidisation Rate of Selected Asia-Pacific Countries, 2011



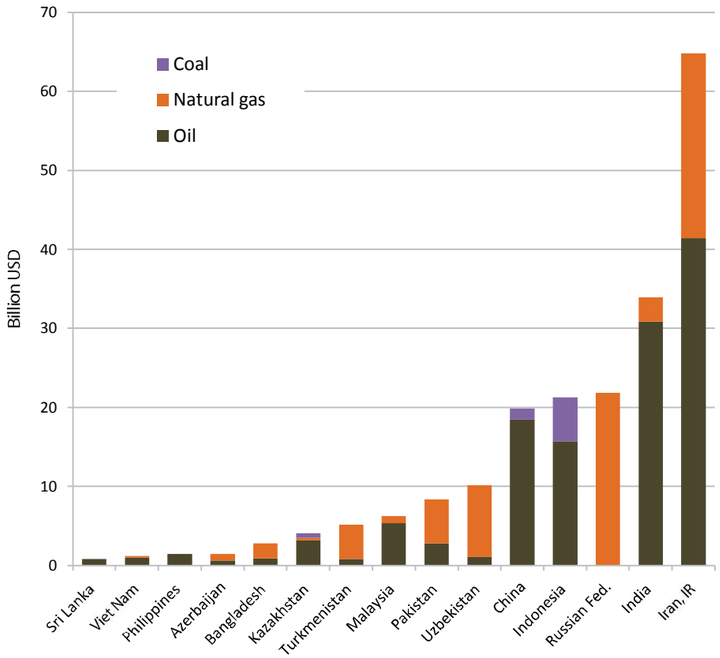
Data Source: IEA

Global Share of Fossil Fuel Subsidies Received by the Lowest 20% Income Group 2010



Data source: IEA WEO 2011

Fossil Fuel Subsidies for Selected Asia-Pacific Countries, 2011

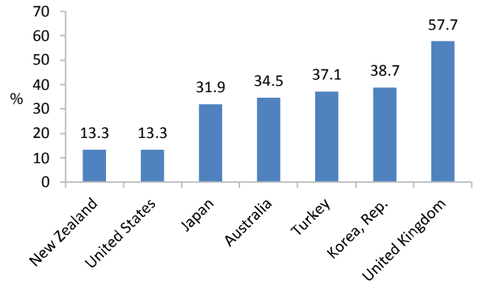


Data Source: IEA

Subsidies by Fuel ($billion), 2011

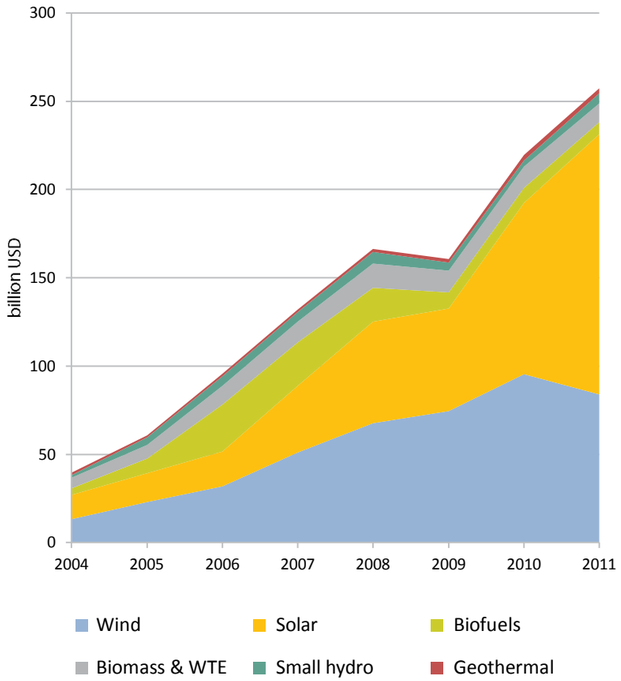
	Oil	NG	Coal	Total
Iran, IR	41.39	23.4	0	64.79
India	30.86	3.03	0	33.89
Russian Fed.	0	21.87	0	21.87
Indonesia	15.72	0	5.56	21.28
China	18.45	0	1.39	19.84
Uzbekistan	1.06	9.09	0	10.15
Pakistan	2.79	5.54	0	8.33
Malaysia	5.35	0.89	0	6.24
Turkmenistan	0.83	4.36	0	5.19
Kazakhstan	3.19	0.33	0.58	4.10
Bangladesh	0.87	1.89	0	2.76
Azerbaijan	0.65	0.83	0	1.48
Philippines	1.46	0	0	1.46
Viet Nam	1.02	0.16	0.02	1.20
Sri Lanka	0.82	0	0	0.82

2012 4th Quarter Percentage of Taxes in Automotive Diesel Prices for Non-Commercial Use



Data Source: IEA

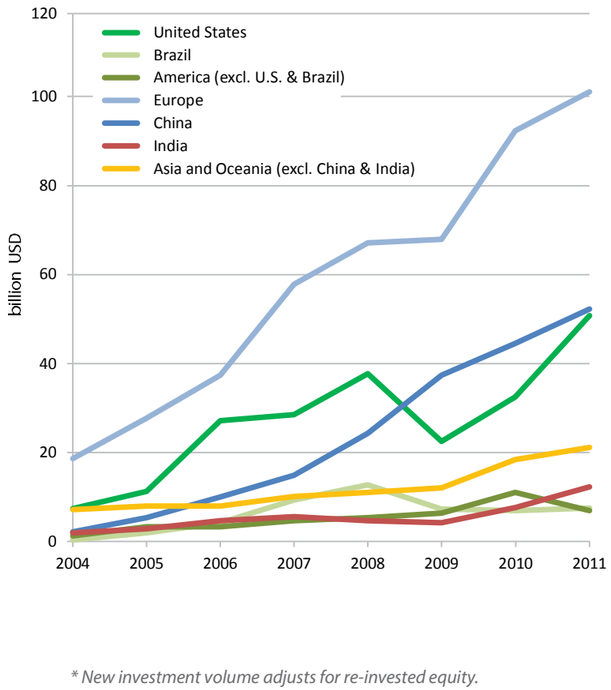
Global New Investment* in Renewable Energy by Sector, 2004-2011



Note: WTE = waste to energy

Data source: Bloomberg New Energy Finance, UNEP

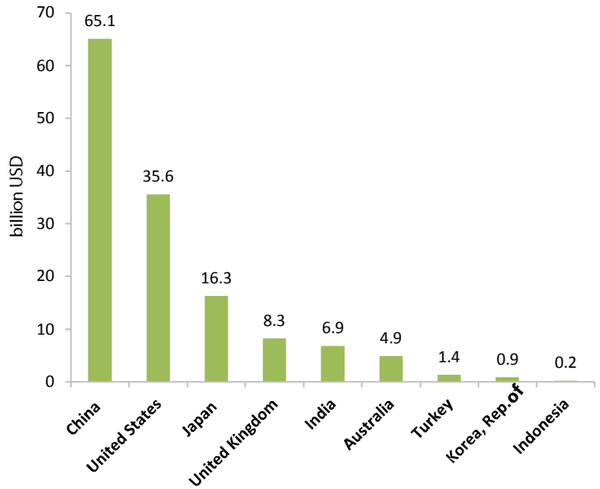
Global New Investment* in Renewable Energy by Region, 2004-2011



** New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.*

Data source: Bloomberg New Energy Finance, UNEP

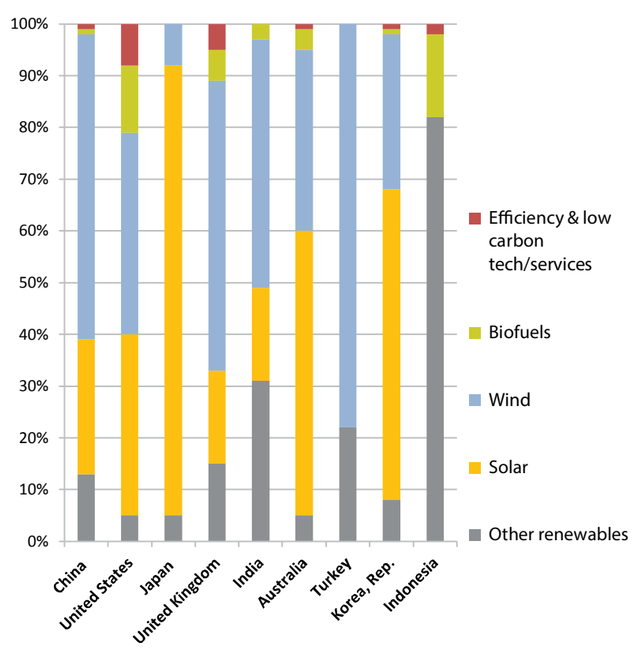
Total Clean Energy** Investment for Selected ESCAP Member States, 2012



*** Clean energy includes: all biomass, geothermal, and wind generation projects of more than 1 MW; all hydro projects between 1 and 50 MW; all marine energy projects; all biofuels projects with a capacity of 1 million litres or more a year; and all solar projects, excluding those less than 1 MW in size. Efficiency & low carbon technology investment is comprised of financial investment in technology companies covering energy efficiency, smart grid, energy storage, advanced transportation, carbon capture and storage, and general clean energy services companies. Investment in efficiency and low-carbon technology projects by governments and public financing institutions was excluded.*

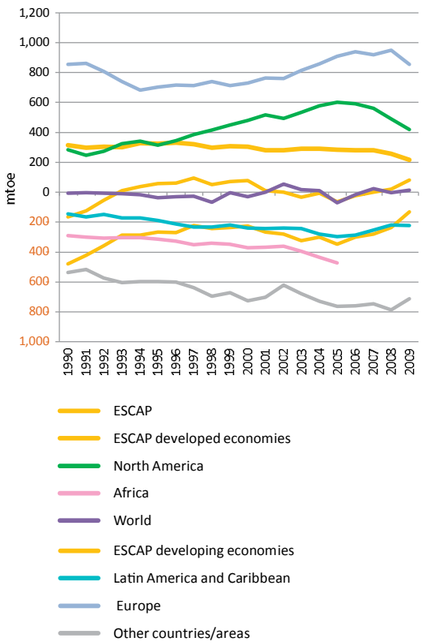
Data source: Bloomberg New Energy Finance as published in The Pew Charitable Trusts report Who's Winning the Clean Energy Race? 2012 edition

Distribution of Clean Energy** Investment for Selected ESCAP Member States, 2006-2012



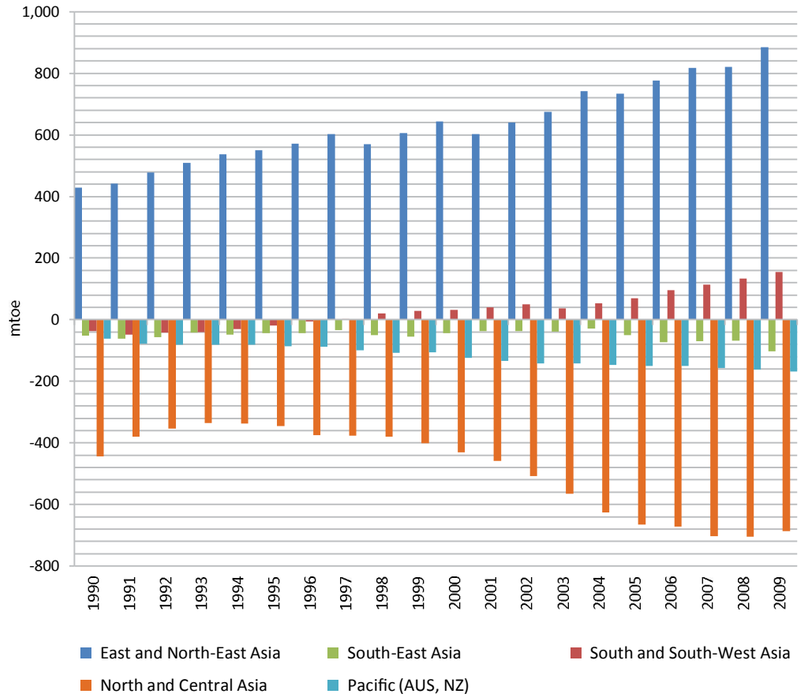
Data source: Bloomberg New Energy Finance as published in The Pew Charitable Trusts report Who's Winning the Clean Energy Race? 2012 edition

Global Net Energy Imports



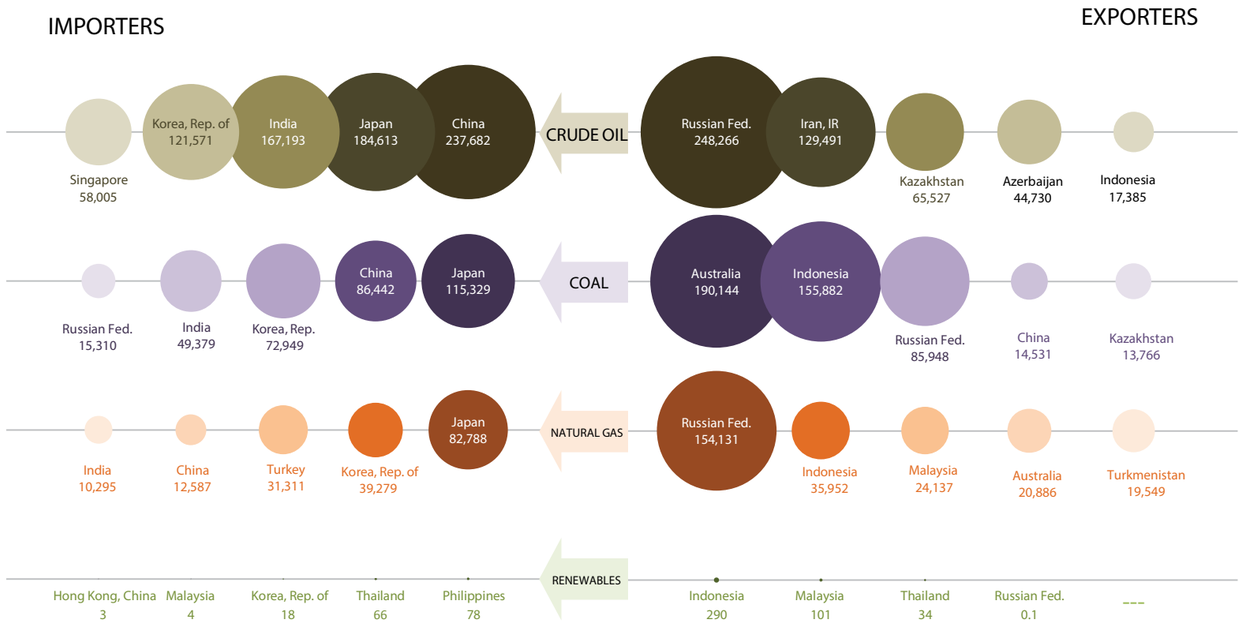
Data source:
ESCAP Statistical Database based on data from IEA

Asia-Pacific Subregional Net Energy Imports



Data source: ESCAP Statistical Database based on data from IEA

Asia-Pacific Top 5 Importers and Exporters by Energy Resource, 2010 (ktoe)

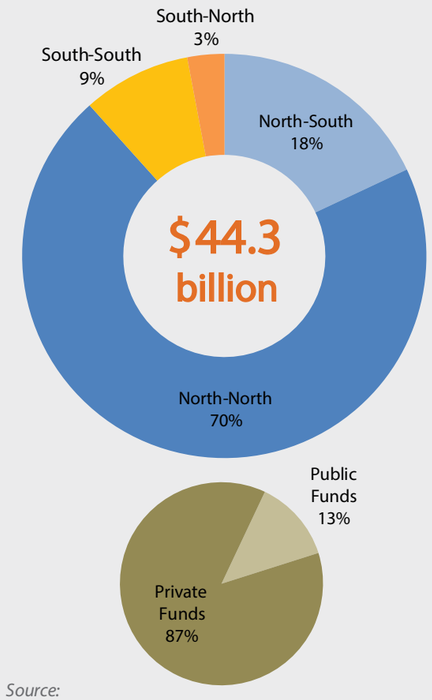


Note: "Coal" is comprised of coal and peat. "Renewables" includes hydro.

Data source: IEA

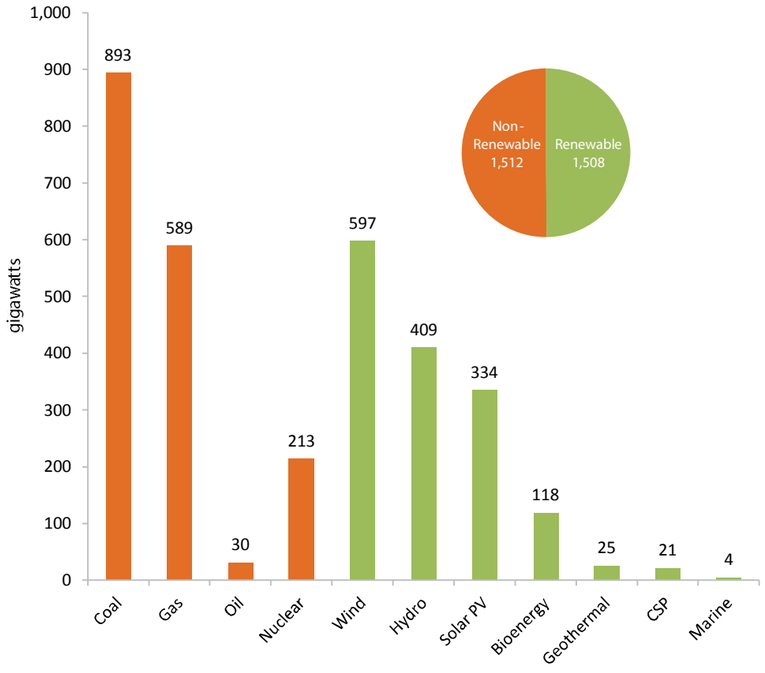
Global Cross Border New Investment in Clean Energy, 2011*

**New build asset finance for renewable energy projects only. Investment volumes show cross-border investments only. Domestic investments are excluded.*



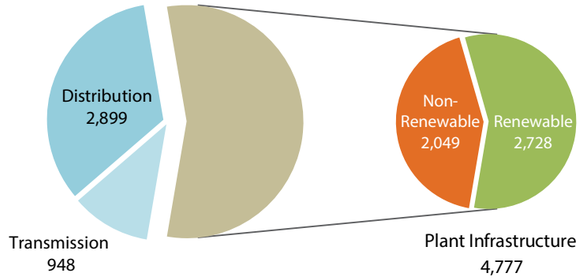
Source:
Bloomberg New Energy Finance White Paper
"North-South Clean Energy Investment Flows:
An $8bn Step to a $100bn Goal".

Asia-Pacific** Cumulative Gross Capacity Additions by Source under the New Policies Scenario*** 2012-2035



Data source: IEA WEO 2012

Asia-Pacific** Needed Investment in Electricity-Supply Infrastructure under the New Policies Scenario*** 2012-2035 ($2011 billion)

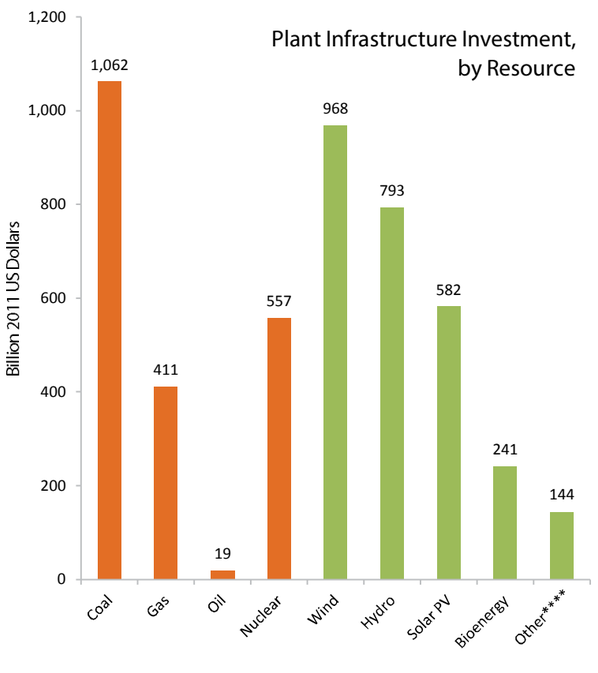


$8,624 (billion)

*** Excludes the following ESCAP member States: Armenia, Azerbaijan, Bhutan, Georgia, Iran IR, Kazakhstan, Kyrgyzstan, Marshall Islands, Micronesia, Nauru, Palau, Tajikistan, Turkey, Turkmenistan, Tuvalu, Uzbekistan.*

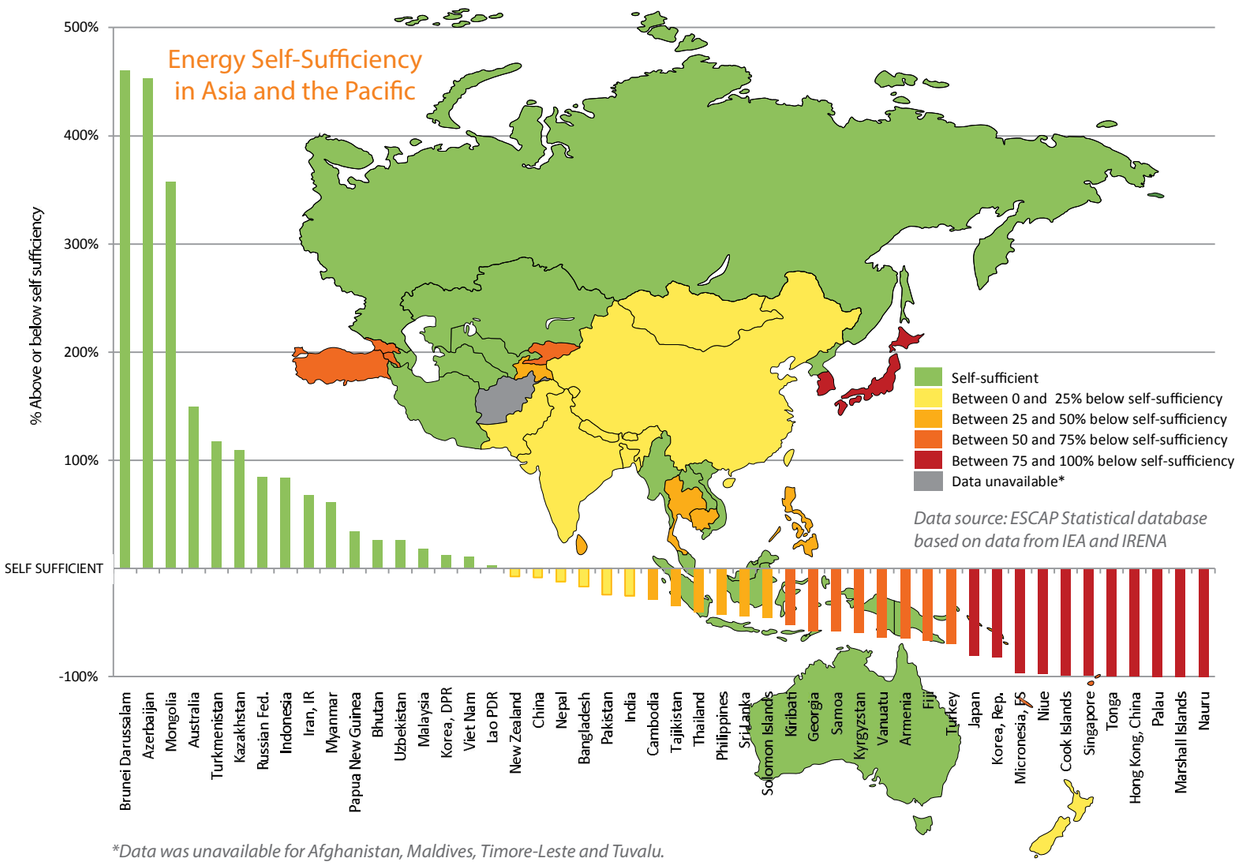
**** New Policies Scenario: A scenario in the IEA World Energy Outlook which takes account of broad policy commitments and plans that have been announced by countries, including national pledges to reduce greenhouse gas emissions and plans to phase out fossil energy subsidies, even if the measures to implement these commitments have yet to be identified or announced.*

***** Includes geothermal, concentrating solar power and marine.*



Data source: IEA WEO 2012

Energy Self-Sufficiency in Asia and the Pacific

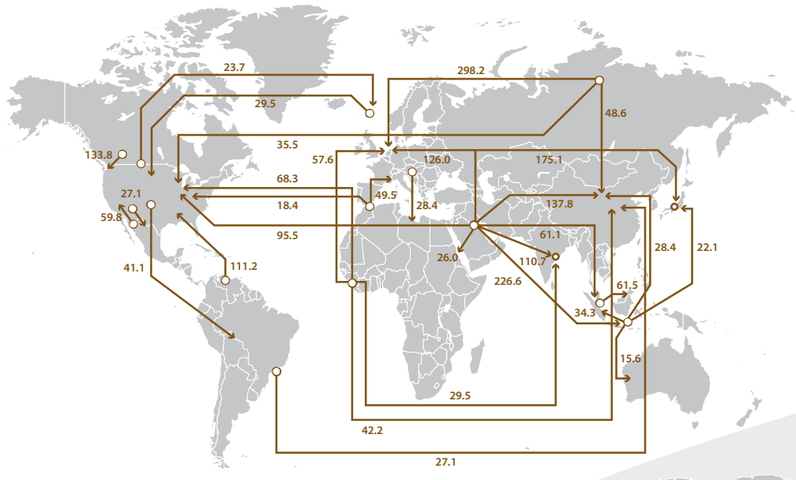


Data source: ESCAP Statistical database based on data from IEA and IRENA

**Data was unavailable for Afghanistan, Maldives, Timore-Leste and Tuvalu.*
Note: Energy self-sufficiency values for this chart were derived by subtracting the ratio of production over TPES from one.

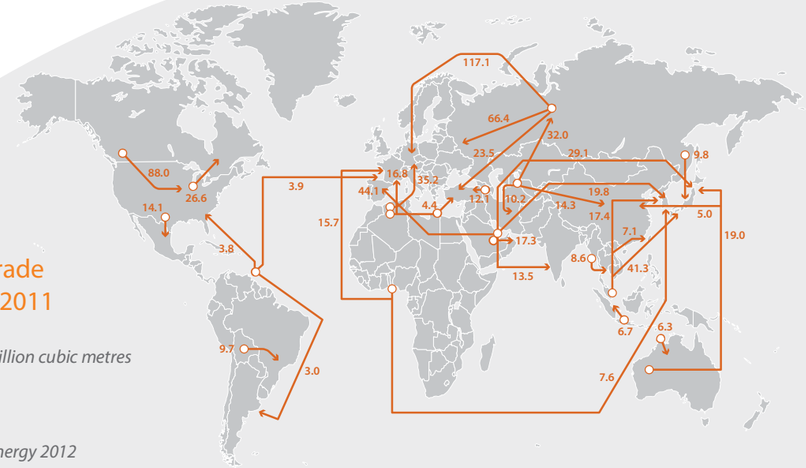
Major Oil Trade Movements, 2011

Oil trade movements are represented in million tonnes



Major Gas Trade Movements, 2011

Gas trade movements are in billion cubic metres



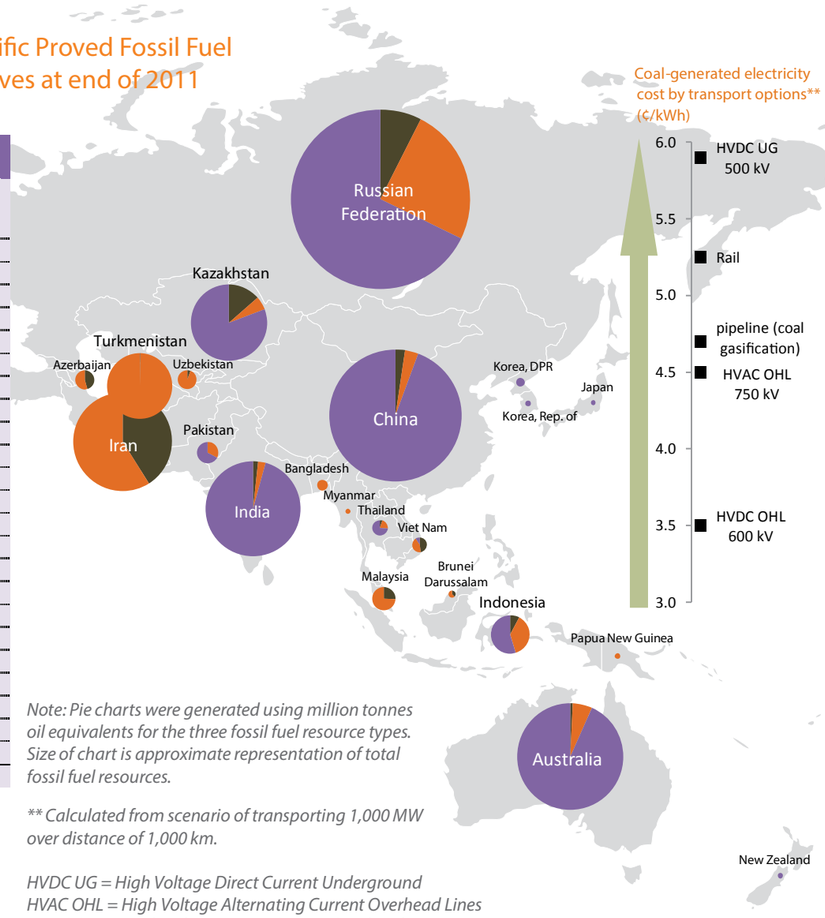
Source: Adapted from BP Statistical Review of World Energy 2012

Asia-Pacific Proved Fossil Fuel Reserves at end of 2011

	Oil	Natural Gas	Coal*
	Thousand million tonnes	Trillion cubic metres	Million tonnes
Australia	0.4	3.8	76,400
Azerbaijan	1.0	1.3	-
Bangladesh	-	0.4	-
Brunei Darussalam	0.1	0.3	-
China	2.0	3.1	114,500
India	0.8	1.2	60,600
Indonesia	0.6	3.0	5,529
Iran	20.8	33.1	-
Japan	-	-	350
Kazakhstan	3.9	1.9	33,600
Korea, DPR	-	-	600
Korea, Rep.of	-	-	126
Malaysia	0.8	2.4	-
Myanmar	-	0.2	-
New Zealand	-	-	571
Pakistan	-	0.8	2,070
Papua New Guinea	-	0.4	
Russian Federation	12.1	44.6	157,010
Thailand	0.1	0.3	1,239
Turkmenistan	0.1	24.3	-
Uzbekistan	0.1	1.6	-
Viet Nam	0.6	0.6	150
Other Asia Pacific	0.1	0.3	3,708
Total	43.4	123.5	456,453

** Includes anthracite, bituminous, sub-bituminous and lignite*

Fossil fuels data source: BP
Coal-generated electricity cost source: ABB Review 1/2008



Note: Pie charts were generated using million tonnes oil equivalents for the three fossil fuel resource types. Size of chart is approximate representation of total fossil fuel resources.

*** Calculated from scenario of transporting 1,000 MW over distance of 1,000 km.*

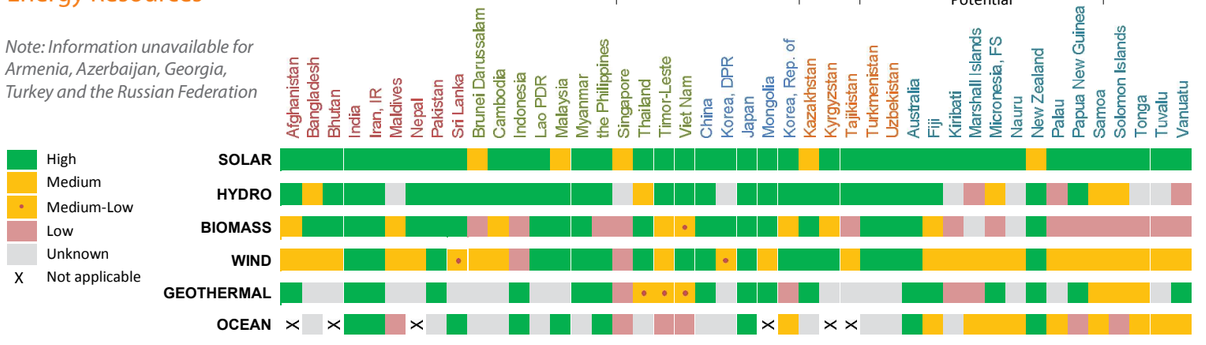
HVDC UG = High Voltage Direct Current Underground
HVAC OHL = High Voltage Alternating Current Overhead Lines
HVDC OHL = High Voltage Direct Current Overhead Lines

Note: Proportions represented are independent of each other and therefore are not directly comparable.

Resource	Measurement	Data Source
Oil	Proved reserves	BP 2012
Gas	Proved reserves	BP 2012
Coal	Proved reserves	BP 2012
Hydro	Technical potential (kWh)	ESCAP 2008
Solar	Total potential (KWh/m²/day)	NREL 2008
Wind	Area (km²) Class 3-7 Wind at 50m	NREL 1990
Geothermal	kWh	GEA 1999
Uranium	Proved reserves	EEP 2008

Asia-Pacific Renewable Energy Resources

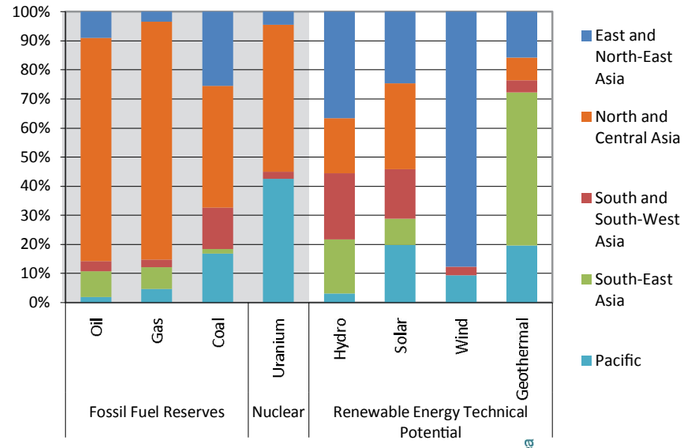
Note: Information unavailable for Armenia, Azerbaijan, Georgia, Turkey and the Russian Federation



Data Source: IRENA

Note: The information on resources should be taken as an indication only. It refers to a general trend of available resources, and does not pre-judge the feasibility of individual projects. The thresholds are indicative, and do not refer to any technological choice. The IRENA analysis is based on literature.

Asia-Pacific Renewable Energy Resource Distribution



Smart Grid Technology, Maturity Levels, Development Trends and Action Areas

GENERATION	TRANSMISSION	DISTRIBUTION	INDUSTRIAL	SERVICE	RESIDENTIAL
Wide-area monitoring & control					
Information and communication technology (ICT) integration					
Renewable and distributed generation integration*					
Transmission enhancement applications**					
•Develop evolutionary regulation to support more variable and distributed approaches •Develop regulatory mechanisms to encourage business and markets to enable wider system flexibility	•Continue Smart Grid deployment to increase visibility and reliability •Assess status of regional transmission systems and future requirements	Distribution grid management			
		Advanced metering infrastructure (AMI)			
		Electric vehicle charging infrastructure			
		•Determine policy to use Smart Grids to leverage investments •Promote real-time energy usage info and pricing	Customer-side systems (CS)		
•Practical sharing of Smart Grid costs & benefits •Cyber security					

Maturity Level: Mature / Dev'ing
Development Trend: Moderate / Fast

Source: adapted fromOECD/IEA 2011 Technology Roadmap: Smart Grids

** Battery storage technologies are less mature than other distributed energy technologies*
*** High Temperature Superconducting technology is still in the developing stage of maturity*

Top 5 Electricity Importers (GWh), 2010

Viet Nam	India	Thailand	Hong Kong, China	Uzbekistan
5,599	5,610	7,287	11,047	12,000

Top 5 Electricity Exporters (GWh), 2010

Russian Fed.	China	Uzbekistan	Iran, IR	Hong Kong, China
19,091	19,059	12,087	6,707	2,609

Selected Asia-Pacific Multilateral Cross-Border Power Interconnections

Central Asia – South Asia Regional Electricity Market (CASA 1000)

Countries
Afghanistan
Kyrgyzstan
Pakistan
Tajikistan

Capacity
1,300 MW

Investment
Approx. US$ 950 million

Status
World Bank board of approval expected in 2013

SAARC Market for Electricity (part of SAARC Energy Ring)

Countries
Afghanistan
Bangladesh
Bhutan
India
Iran, IR
Kyrgyzstan
Maldives
Myanmar
Nepal
Pakistan
Sri Lanka
Tajikistan
Turkmenistan
Uzbekistan

Investment
Approx. US$ 1 billion over next 5 years on priority projects

Status
Draft Framework Agreement under consideration by SAARC
Study on Regional Power Exchange forthcoming in 2013

SAARC non-member

GMS Power Market

Countries
Cambodia
China
Lao PDR
Myanmar
Thailand
Viet Nam

Capacity *
•2,767 MW existing
•5,545 MW committed thru 2015
•31,400 MW identified projects

Status
Completion target by 2028

ASEAN Power Grid

Countries
Brunei Darussalam
Cambodia
Indonesia
Lao PDR
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam

Capacity**
More than 32,000 MW

Investment
Approx. US$ 5.9 billion

Status
•9 interconnections operational
•Remaining 7 ready by 2020

** Capacity under the GMS Master Plan 'base case'*
*** Approximation based on available information for about 14 out of 16 interconnections*

Note: This is not an exhaustive list. Bilateral initiatives are not included.

Sources: World Bank World - Central Asia South Asia Electricity Transmission and Trade Project (CASA 1000), 2012; SAARC Website www.saarc-sec.org; ADB Update of the GMS Regional Master Plan 2010; ASEAN Economic Community Handbook for Business 2012, ASEAN Community Project Information Sheets 2012; HAPUA website www.hapuasecretariat.org

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Overview of Scenarios Presented in IEA's World Energy Outlook

Current Policies Scenario: A scenario that assumes no changes in policies from the mid-point of the year of publication.

New Policies Scenario: A scenario which takes account of broad policy commitments and plans that have been announced by countries, including national pledges to reduce greenhouse-gas emissions and plans to phase out fossil-energy subsidies, even if the measures to implement these commitments have yet to be identified or announced.

450 Scenario: A scenario which sets out an energy pathway consistent with the goal of limiting the global increase in temperature to 2°C by limiting concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO_2.