

SUPPLEMENTAL CHAPTER ON ENERGY INVESTMENT

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INTRODUCTION

Adequate investment in energy infrastructure is essential to the economic stability and growth of APEC economies, as well as to insuring energy security and environmental sustainability. Therefore, APERC has assessed the capital investments in energy infrastructure that are likely to be required under business-as-usual Outlook assumptions between 2010 and 2035.

Investment estimates are based on the amount of physical capacity in the energy supply chain that will be required in each economy to meet the energy demand projected in this business-as-usual outlook. An investment requirement for each specific type of facility in each economy was estimated by multiplying an economy-specific capital cost per unit of capacity by the estimated capacity requirement for that type of facility. Capacity requirements took into account the need for replacement of existing facilities at the end of their normal operating life as well as new facilities needed to expand capacity.

The energy supply chain is broken into four stages: extraction, transformation, transportation, and distribution. Four energy industries are considered: coal, oil, gas, and electricity and heat. The electricity

and heat industry includes all facilities used to generate electricity from nuclear or renewable sources, including hydro, wind, geothermal, and solar. Investment requirements for nuclear fuel processing, directly utilised renewables (such as biofuels and biomass), and non-commercial energy supply were not considered. Investments for international energy transportation within the APEC region were shared equally between exporter and importer. Investments for international energy transportation between a non-APEC economy and an APEC economy were attributed entirely to the APEC economy.

Table 16.1 shows typical facilities for each combination of energy supply chain stage and energy source. The actual investment calculations were, however, done on a much more detailed level, taking into account the specific type of facility or technology being utilised. Examples of the level of detail considered would be the cost per MW of combined cycle gas turbine generating facilities, or the cost per Mtoe per year for an LNG liquefaction plant. APERC's researchers estimated the projected unit costs of each type of facility in each economy based on published engineering studies or actual project plans.

Table 16.1: Typical Energy Facilities by Energy Source and Supply Chain Stage

	Coal	Oil	Gas	Electricity and Heat
Extraction	Coal mines	Oil wells and field facilities	Gas wells and field facilities	(not applicable)
Transformation	Coal cleaning and processing facilities	Oil refining facilities	Gas processing facilities	Electricity generation (Including all nuclear, hydro, and renewables)
Transportation	Domestic and international coal transportation facilities and equipment (rail, water, trucks)	Domestic and international oil transportation facilities and equipment (pipelines, rail, water, trucks)	Domestic and international gas transportation facilities and equipment (pipelines, LNG shipping)	Electricity transmission lines and substations
Distribution	Local delivery terminals and equipment	Local delivery terminals and equipment	Gas distribution pipelines	Electricity distribution lines and equipment

Source: APERC Analysis (2012)

Unless otherwise noted, all figures presented are simple sums of the investments required each year over the 2010–2035 outlook horizon, with no adjustments for the time value of money. As with other monetary values reported in this Outlook, values are reported in 2005 US dollars, with

purchasing power parity (PPP) rates used to convert from local currency.

In most cases, a range of figures was developed for each type of facility. In the graphs in this chapter, the outer circle of the graphs reflects the higher cost

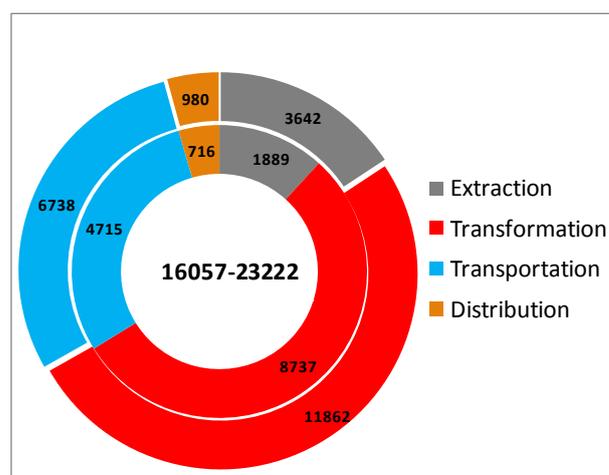
estimates while the inner circle reflects lower cost estimates.

There are several tables at the end of this chapter summarising the energy investment requirements for APEC economies. Tables 16.2–16.3 summarize the energy investment requirements by supply chain stage, while Tables 16.4–16.5 summarize the investment requirements by energy source. Table 16.6 summarizes investment in the electricity and heat sector.

ENERGY INVESTMENT REQUIREMENTS IN THE APEC REGION

To meet projected energy demand growth, APEC economies will require between USD16 and USD23 trillion to be spent for energy infrastructure development over the outlook horizon. Looking at the breakdown by supply chain stage in Figure 16.1, it can be seen that when using the higher cost estimates, the energy transformation sector dominates with a 51% share followed by the transportation sector with a 29% share. Extraction of primary energy will require 16% of future energy investment in the APEC region, while distribution will require a 4% share.

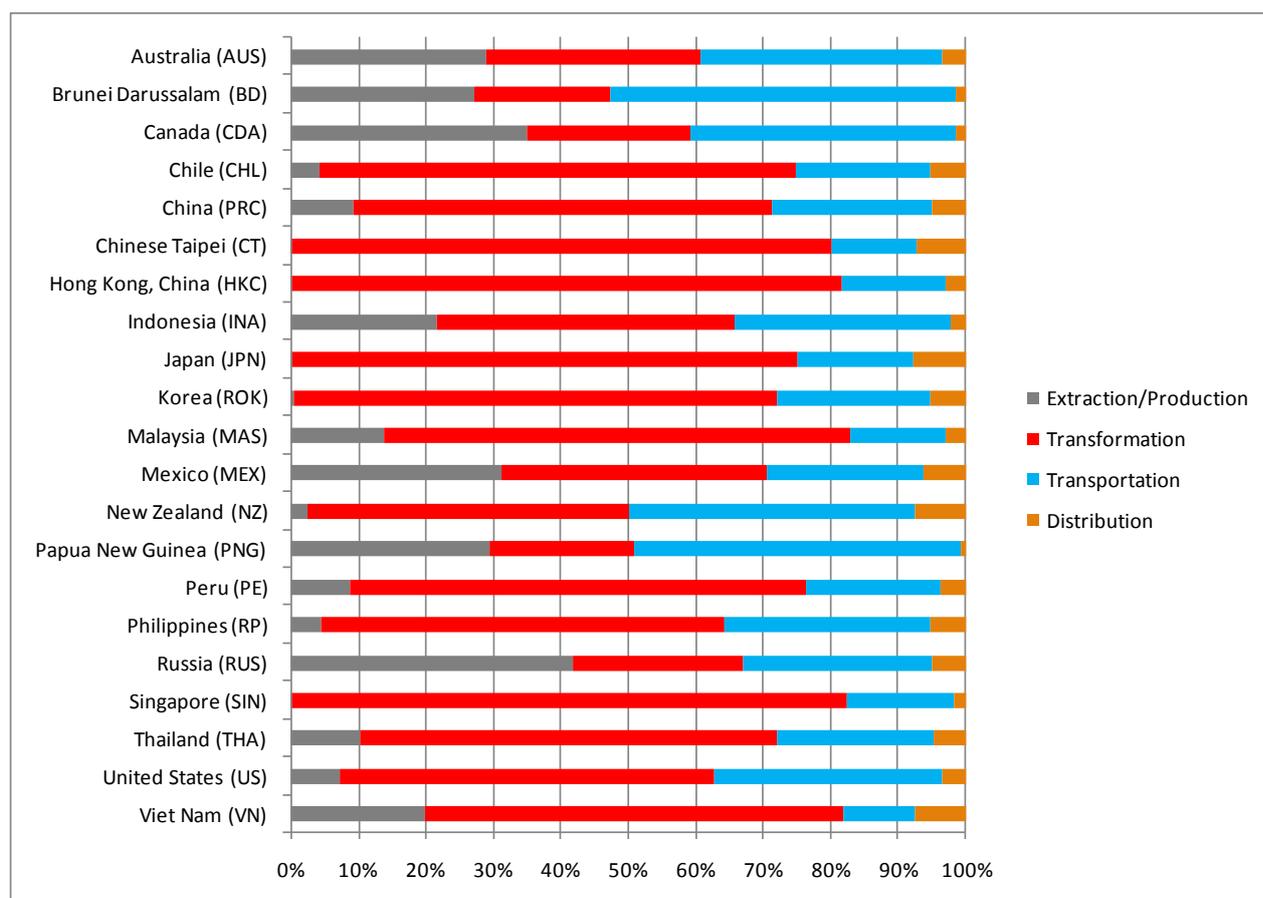
Figure 16.1: Total Investment Requirements by Energy Supply Chain Stage, in Billion 2005 US dollars



Source: APERC analysis (2012)

However, these proportions vary significantly between APEC economies depending on resource availability, geography, and energy infrastructure maturity (see Figure 16.2). Geography impacts heavily on transportation investment, as higher spending for transportation is needed when energy production and consumption are separated by long distances. Australia, Brunei Darussalam, Canada, New Zealand, Papua New Guinea and the United States demonstrate this point as a significant proportion of their total investment is expected to be in transportation facilities (which includes import/export infrastructure).

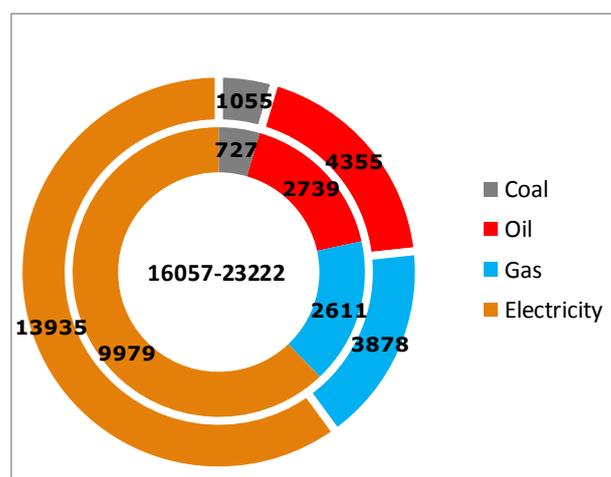
Figure 16.2: Total Investment Requirements by Supply Chain Stage by APEC economy, as a percentage



Source: APERC analysis (2012)

Looking at the breakdown by energy source in Figure 16.3 it can be seen that when using the higher cost estimates, electricity and heat supply will account for the largest share of investment requirements at 60%. Oil is expected to require 19%, natural gas 17%, and coal 4% of total energy investment in the APEC region by 2035.

Figure 16.3: Total Investment Requirements by Energy Source, in Billion 2005 US dollars

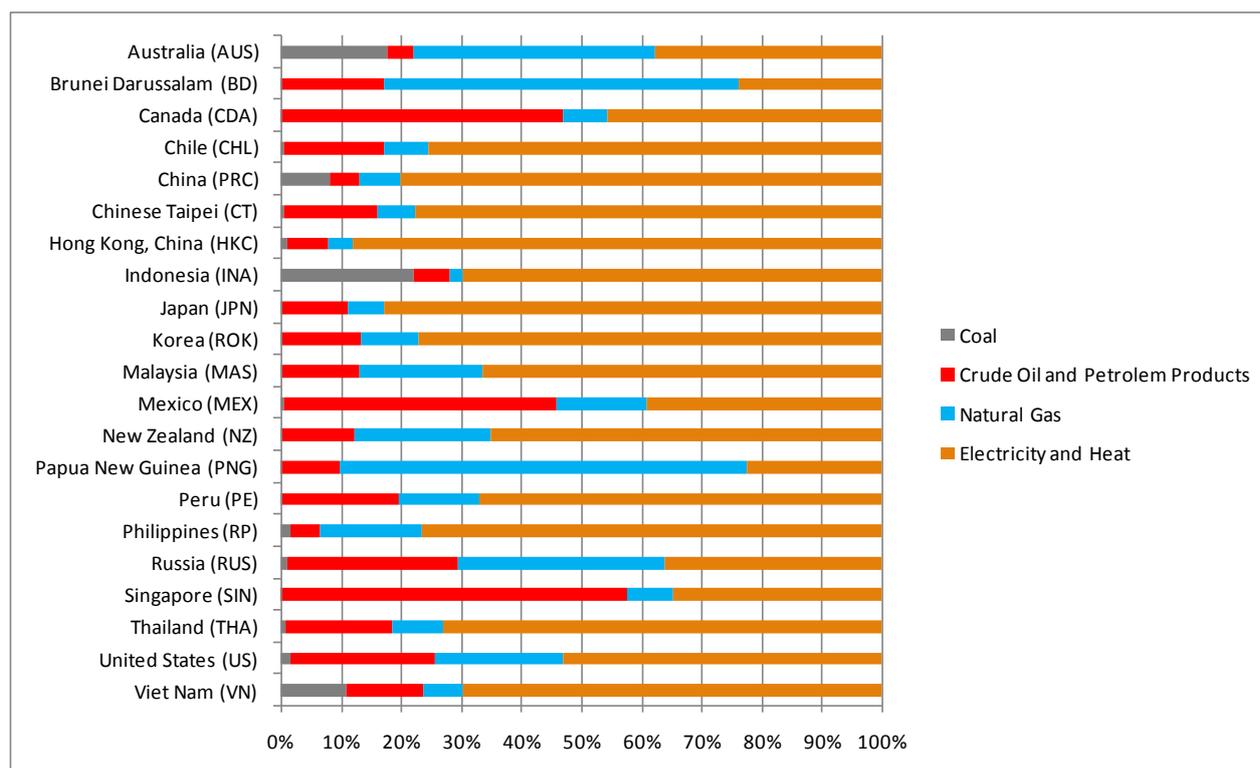


Source: APERC analysis (2012)

As can be seen in Figure 16.4, the share of investment in electricity generation, distribution and transmission is quite substantial in most APEC economies. The largest shares of investment in electricity and heat can be found in economies with limited oil and gas resources that would otherwise be expected to require investment: Chile; China; Hong Kong, China; Japan; Korea; the Philippines; Chinese

Taipei; and Thailand. Singapore is a notable exception, as it will need to make substantial investment in its refining industry and in oil and LNG port facilities.

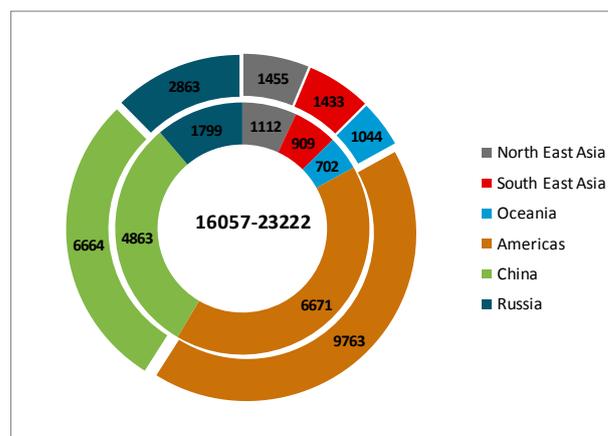
Figure 16.4: Total Investment Requirements by Energy Source for Each APEC Economy, in Percent



Source: APERC analysis (2012)

Looking at the breakdown by region, Figure 16.5 shows that when using the higher cost estimates, the Americas and China will have the largest shares of total APEC region energy investment, accounting for 42% and 29% respectively. Russia follows with an expected share of 12%. The three top investment heavy economies – United States, China and Russia – will require up to USD17 trillion to be spent on energy infrastructure through to 2035, or 73 % of the total for the APEC region.

Figure 16.5: Total Energy Investment Requirements by Region, in Billion 2005 US dollars

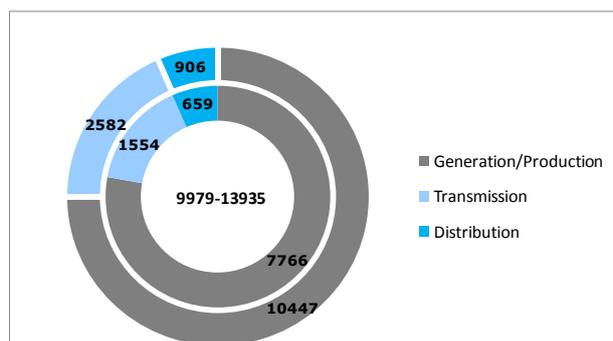


Source: APERC analysis (2012)

Electricity and Heat Supply

Investment requirements for the electricity and heat sector in the APEC region are estimated at USD10 – USD14 trillion (see Figure 16.6). Under the higher cost estimates, generation of electricity and heat will dominate investment requirements for the industry at 75%, while transmission will account for 19%, and the remaining 6% will be invested in distribution networks.

Figure 16.6 Total Investment Requirements for Electricity and Heat Industry, Billion 2005 US Dollars



Source: APERC analysis (2012)

FINANCING ENERGY INVESTMENT

The necessary energy investment over the outlook period will generally require only a small share of total GDP. The average for the APEC region is 1.4% when considering high estimates (see Fig 16.7). Energy investment as a share of GDP appears to be unrelated to the economy's stage of development, as indicated by their projected 2035 GDP per capita.

The higher shares for the five outliers in Figures 16.7-16.9 – Australia, Brunei Darussalam, Canada, Papua New Guinea, and Russia – are a result of their large investments in gas and oil. As shown in Figure 16.9, their shares will be large even in the transformation, transportation, and distribution stages as they will need make large investment in pipelines and LNG trains/terminals. The economy with the lowest investment as a share of GDP is Hong Kong, China, which can be attributed to its lack of domestic resources and small physical size.

Figure 16.7: Total Investment as Share of Cumulative GDP

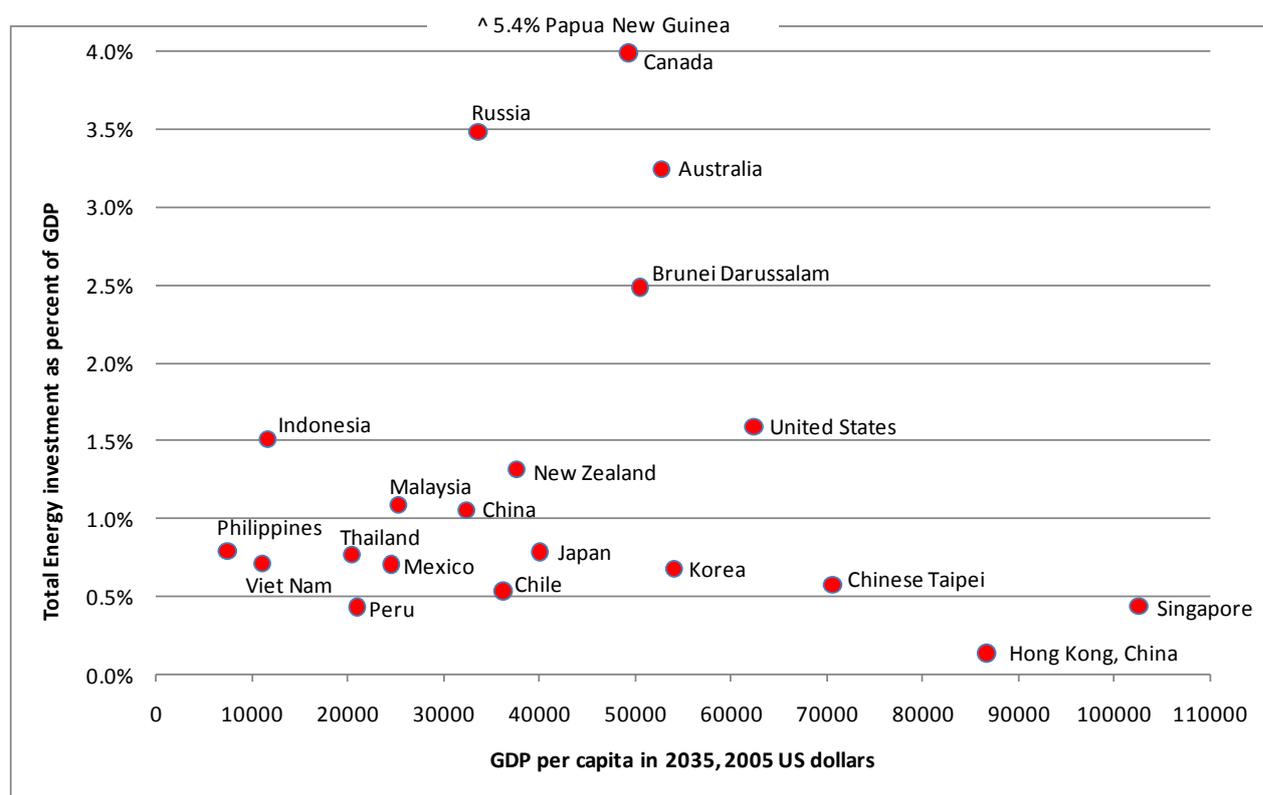
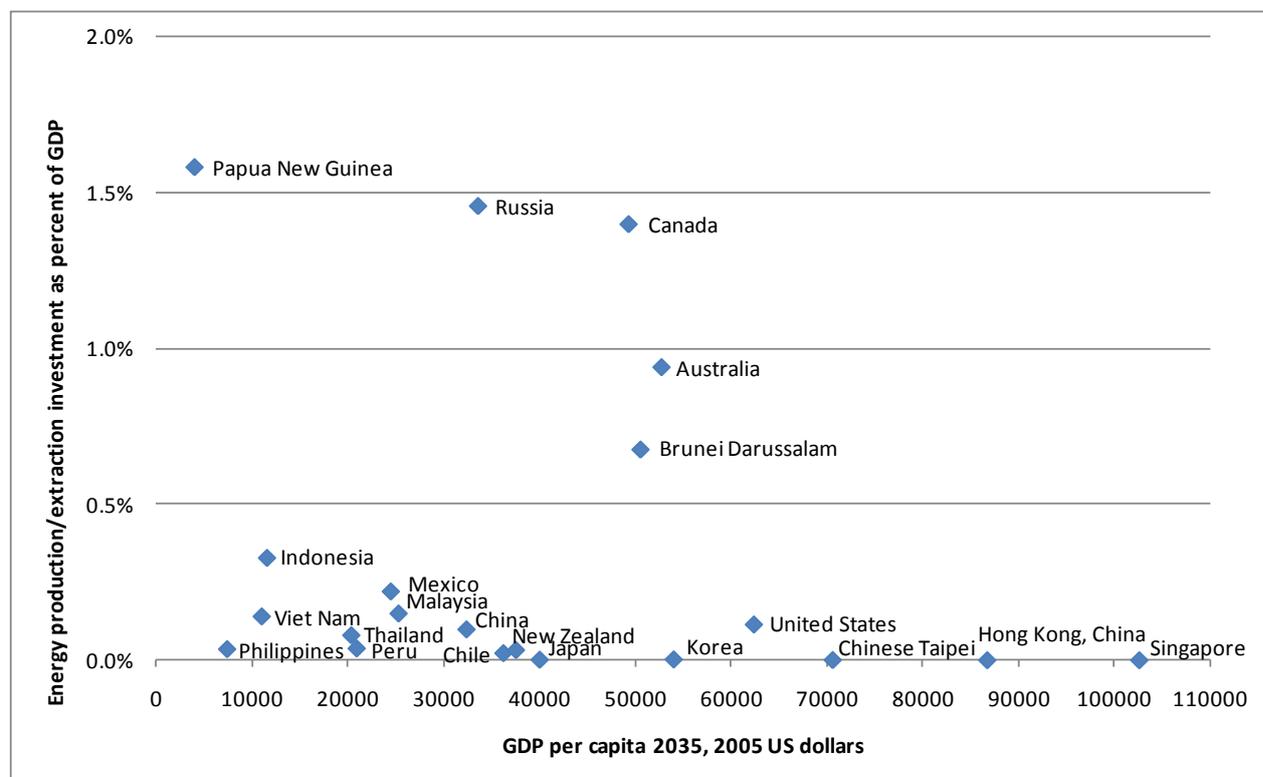
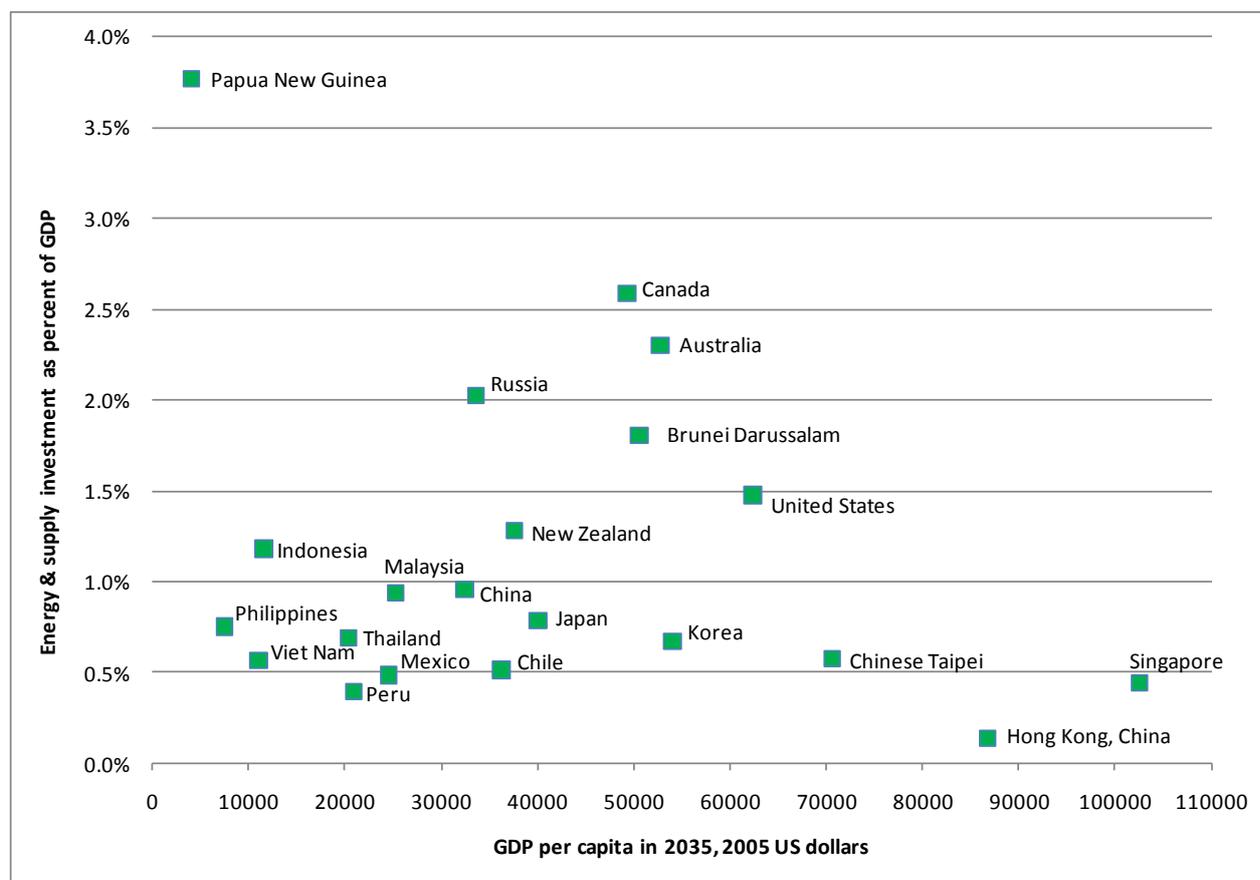


Figure 16.8: Primary Energy Extraction/Production Investment as Share of Cumulative GDP



Source: APERC analysis (2012)

Figure 16.9: Energy Investment for Transformation, Transportation and Distribution as Share of Cumulative GDP



Source: APERC analysis (2012)

Given the generally small shares of total GDP that energy investment will require, and the generally highly profitable nature of these investments, this analysis suggests that the necessary energy investments over the 2010–2035 outlook horizon should be affordable in every APEC economy.

Energy-related projects are distinguished by their capital intensity and long construction lead times. They are also vulnerable to construction and operating cost risks, as well as energy price volatility. Therefore a necessary pre-condition for adequate investment is a regulatory regime in each economy that fosters a stable investment climate and that permits returns on investment reflective of the high degree of risk often involved.

Table 16.2: Energy investment in the APEC region by energy supply chain stage (billion 2005 US dollars)

Member Economy/Region	Total		Extraction/ Production	Transformation	Transportation	Distribution
	Low	High				
Australia (AUS)	637	- 951	217 - 276	141 - 301	254 - 341	25 - 33
Brunei Darussalam (BD)	9	- 15	2 - 4	1 - 3	6 - 8	0 - 0
Canada (CDA)	827	- 1711	112 - 601	331 - 412	366 - 675	18 - 24
Chile (CHL)	44	- 61	2 - 3	32 - 43	8 - 12	2 - 3
China (PRC)	4863	- 6664	456 - 625	3009 - 4130	1152 - 1571	244 - 338
Chinese Taipei (CT)	147	- 181	0 - 0	121 - 144	16 - 23	10 - 13
Hong Kong, China (HKC)	14	- 18	0 - 0	11 - 14	2 - 3	0 - 1
Indonesia (INA)	375	- 762	68 - 166	252 - 335	43 - 244	12 - 17
Japan (JPN)	702	- 902	1 - 2	535 - 676	108 - 154	58 - 70
Korea (ROK)	250	- 355	1 - 1	178 - 254	56 - 80	15 - 19
Malaysia (MAS)	166	- 184	25 - 26	115 - 127	21 - 26	4 - 6
Mexico (MEX)	311	- 424	100 - 132	123 - 166	69 - 98	20 - 27
New Zealand (NZ)	38	- 52	1 - 1	17 - 25	16 - 22	3 - 4
Papua New Guinea (PNG)	27	- 41	9 - 12	4 - 9	14 - 20	0 - 0
Peru (PE)	36	- 54	3 - 5	25 - 36	7 - 11	2 - 2
Philippines (RP)	100	- 126	4 - 6	63 - 75	28 - 39	5 - 7
Russia (RUS)	1799	- 2863	689 - 1199	546 - 717	475 - 806	90 - 141
Singapore (SIN)	36	- 50	0 - 0	29 - 41	6 - 8	1 - 1
Thailand (THA)	132	- 186	13 - 19	84 - 115	28 - 43	7 - 9
United States (US)	5452	- 7512	167 - 542	3062 - 4169	2030 - 2544	193 - 257
Viet Nam (VN)	92	- 110	18 - 22	57 - 69	10 - 11	7 - 8
APEC	16057	- 23222	1889 - 3642	8737 - 11862	4715 - 6738	716 - 980
Northeast Asia	1112	- 1455	2 - 4	845 - 1089	182 - 260	83 - 103
Southeast Asia	909	- 1433	130 - 242	602 - 765	141 - 378	35 - 48
Oceania	702	- 1044	227 - 290	162 - 334	284 - 383	28 - 37
Americas	6671	- 9763	384 - 1283	3571 - 4827	2480 - 3340	236 - 314
China	4863	- 6664	456 - 625	3009 - 4130	1152 - 1571	244 - 338
Russia	1799	- 2863	689 - 1199	546 - 717	475 - 806	90 - 141

Note: "0" means non-existent or insignificant

Source: APERC analysis (2012)

Table 16.3: Energy investment in the APEC region by energy supply chain stage (percent)

Member Economy/Region	Total	Extraction/ Production	Transformation	Transportation	Distribution
Australia (AUS)	100	34 - 29	22 - 32	40 - 36	4 - 3
Brunei Darussalam (BD)	100	25 - 27	11 - 20	62 - 51	2 - 2
Canada (CDA)	100	14 - 35	40 - 24	44 - 39	2 - 1
Chile (CHL)	100	4 - 4	72 - 71	19 - 20	6 - 5
China (PRC)	100	9 - 9	62 - 62	24 - 24	5 - 5
Chinese Taipei (CT)	100	0 - 0	83 - 80	11 - 13	7 - 7
Hong Kong, China (HKC)	100	0 - 0	82 - 82	15 - 15	3 - 3
Indonesia (INA)	100	18 - 22	67 - 44	11 - 32	3 - 2
Japan (JPN)	100	0 - 0	76 - 75	15 - 17	8 - 8
Korea (ROK)	100	0 - 0	71 - 72	22 - 22	6 - 5
Malaysia (MAS)	100	15 - 14	70 - 69	13 - 14	2 - 3
Mexico (MEX)	100	32 - 31	39 - 39	22 - 23	6 - 6
New Zealand (NZ)	100	3 - 2	45 - 48	43 - 42	8 - 7
Papua New Guinea (PNG)	100	33 - 30	15 - 21	51 - 48	1 - 1
Peru (PE)	100	9 - 9	68 - 68	19 - 20	4 - 4
Philippines (RP)	100	4 - 5	63 - 60	28 - 31	5 - 5
Russia (RUS)	100	38 - 42	30 - 25	26 - 28	5 - 5
Singapore (SIN)	100	0 - 0	82 - 82	16 - 16	2 - 2
Thailand (THA)	100	10 - 10	64 - 62	21 - 23	5 - 5
United States (US)	100	3 - 7	56 - 55	37 - 34	4 - 3
Viet Nam (VN)	100	20 - 20	62 - 62	10 - 10	7 - 8
APEC	100	16 - 17	52 - 51	27 - 27	5 - 5
Northeast Asia	100	0 - 0	78 - 77	16 - 17	6 - 6
Southeast Asia	100	13 - 14	60 - 57	23 - 25	4 - 4
Oceania	100	24 - 20	28 - 33	45 - 42	4 - 4
Americas	100	12 - 17	55 - 51	28 - 27	4 - 4
China	100	9 - 9	62 - 62	24 - 24	5 - 5
Russia	100	38 - 42	30 - 25	26 - 28	5 - 5

Note: "0" means non-existent or insignificant

Source: APERC analysis (2012)

Table 16.4: Energy investment in the APEC region by energy source (billion 2005 US dollars)

Member Economy/Region	Total		Crude Oil and Petroleum Products	Natural Gas	Coal	Electricity and Heat
	Low	High				
Australia (AUS)	637	- 951	27 - 41	293 - 382	135 - 170	181 - 358
Brunei Darussalam (BD)	9	- 15	2 - 3	6 - 9	0 - 0	1 - 3
Canada (CDA)	827	- 1711	157 - 801	91 - 127	2 - 2	577 - 781
Chile (CHL)	44	- 61	7 - 10	3 - 5	0 - 0	34 - 46
China (PRC)	4863	- 6664	230 - 333	410 - 460	404 - 542	3818 - 5329
Chinese Taipei (CT)	147	- 181	20 - 28	7 - 11	1 - 1	119 - 140
Hong Kong, China (HKC)	14	- 18	1 - 1	1 - 1	0 - 0	12 - 16
Indonesia (INA)	375	- 762	35 - 47	11 - 17	70 - 168	259 - 530
Japan (JPN)	702	- 902	69 - 98	36 - 54	3 - 3	595 - 747
Korea (ROK)	250	- 355	24 - 46	23 - 34	1 - 1	202 - 273
Malaysia (MAS)	166	- 184	17 - 24	33 - 38	0 - 1	115 - 123
Mexico (MEX)	311	- 424	144 - 193	43 - 64	1 - 2	123 - 166
New Zealand (NZ)	38	- 52	5 - 6	10 - 12	0 - 0	23 - 34
Papua New Guinea (PNG)	27	- 41	2 - 4	21 - 28	0 - 0	4 - 9
Peru (PE)	36	- 54	7 - 10	5 - 7	0 - 0	24 - 36
Philippines (RP)	100	- 126	5 - 6	17 - 21	1 - 2	77 - 97
Russia (RUS)	1799	- 2863	526 - 815	564 - 984	14 - 33	695 - 1031
Singapore (SIN)	36	- 50	21 - 29	3 - 4	0 - 0	13 - 17
Thailand (THA)	132	- 186	23 - 33	11 - 16	1 - 1	96 - 135
United States (US)	5452	- 7512	1410 - 1813	1015 - 1597	81 - 116	2946 - 3986
Viet Nam (VN)	92	- 110	9 - 14	6 - 7	12 - 12	64 - 77
APEC	16057	- 23222	2739 - 4355	2611 - 3878	727 - 1055	9979 - 13935
Northeast Asia	1112	- 1455	114 - 173	67 - 100	4 - 5	927 - 1176
Southeast Asia	909	- 1433	110 - 155	88 - 111	85 - 184	626 - 983
Oceania	702	- 1044	34 - 51	324 - 422	136 - 170	209 - 401
Americas	6671	- 9763	1725 - 2827	1158 - 1800	84 - 120	3704 - 5015
China	4863	- 6664	230 - 333	410 - 460	404 - 542	3818 - 5329
Russia	1799	- 2863	526 - 815	564 - 984	14 - 33	695 - 1031

Note: "0" means non-existent or insignificant

Source: APERC analysis (2012)

Table 16.5: Energy investment in the APEC region by energy source (percent)

Member Economy/Region	Total	Crude Oil and Petroleum Products	Natural Gas	Coal	Electricity and Heat
Brunei Darussalam (BD)	100	17 - 17	68 - 59	0 - 0	15 - 24
Canada (CDA)	100	19 - 47	11 - 7	0 - 0	70 - 46
Chile (CHL)	100	16 - 17	7 - 7	1 - 0	76 - 75
China (PRC)	100	5 - 5	8 - 7	8 - 8	79 - 80
Chinese Taipei (CT)	100	14 - 15	5 - 6	0 - 1	81 - 78
Hong Kong, China (HKC)	100	7 - 7	4 - 4	1 - 1	88 - 88
Indonesia (INA)	100	9 - 6	3 - 2	19 - 22	69 - 70
Japan (JPN)	100	10 - 11	5 - 6	0 - 0	85 - 83
Korea (ROK)	100	10 - 13	9 - 10	0 - 0	81 - 77
Malaysia (MAS)	100	10 - 13	20 - 20	0 - 0	69 - 66
Mexico (MEX)	100	46 - 45	14 - 15	0 - 0	40 - 39
New Zealand (NZ)	100	12 - 12	26 - 23	0 - 0	61 - 65
Papua New Guinea (PNG)	100	8 - 10	76 - 68	0 - 0	16 - 22
Peru (PE)	100	18 - 19	14 - 13	0 - 0	67 - 67
Philippines (RP)	100	5 - 5	17 - 17	1 - 2	77 - 77
Russia (RUS)	100	29 - 28	31 - 34	1 - 1	39 - 36
Singapore (SIN)	100	58 - 58	7 - 8	0 - 0	35 - 35
Thailand (THA)	100	17 - 18	9 - 8	1 - 1	73 - 73
United States (US)	100	26 - 24	19 - 21	1 - 2	54 - 53
Viet Nam (VN)	100	10 - 13	7 - 7	13 - 11	70 - 70
APEC	100	16 - 17	21 - 20	4 - 4	59 - 59
Northeast Asia	100	10 - 12	6 - 6	1 - 1	84 - 81
Southeast Asia	100	18 - 18	19 - 17	5 - 5	58 - 59
Oceania	100	8 - 9	49 - 44	7 - 6	35 - 42
Americas	100	25 - 30	13 - 13	1 - 1	61 - 56
China	100	5 - 5	8 - 7	8 - 8	79 - 80
Russia	100	29 - 28	31 - 34	1 - 1	39 - 36

Note: "0" means non-existent or insignificant

Source: APERC analysis (2012)

Table 16.6: Energy Investment as Percent of GDP by Energy Supply Chain Stage

Member Economy/Region	Total Energy Investments	Extraction/ Production of Primary Energy	Transformation, Transportation and Distribution
Australia (AUS)	2.17 - 3.24	0.74 - 0.94	1.43 - 2.30
Brunei Darussalam (BD)	1.55 - 2.48	0.39 - 0.68	1.15 - 1.81
Canada (CDA)	1.93 - 3.99	0.26 - 1.40	1.67 - 2.59
Chile (CHL)	0.39 - 0.54	0.02 - 0.02	0.37 - 0.51
China (PRC)	0.77 - 1.06	0.07 - 0.10	0.70 - 0.96
Chinese Taipei (CT)	0.47 - 0.58	0.00 - 0.00	0.47 - 0.58
Hong Kong, China (HKC)	0.11 - 0.14	0.00 - 0.00	0.11 - 0.14
Indonesia (INA)	0.74 - 1.51	0.13 - 0.33	0.61 - 1.18
Japan (JPN)	0.61 - 0.79	0.00 - 0.00	0.61 - 0.78
Korea (ROK)	0.48 - 0.68	0.00 - 0.00	0.47 - 0.67
Malaysia (MAS)	0.98 - 1.09	0.15 - 0.15	0.83 - 0.94
Mexico (MEX)	0.52 - 0.71	0.17 - 0.22	0.35 - 0.49
New Zealand (NZ)	0.95 - 1.31	0.03 - 0.03	0.92 - 1.28
Papua New Guinea (PNG)	3.55 - 5.36	1.17 - 1.58	2.38 - 3.77
Peru (PE)	0.29 - 0.43	0.03 - 0.04	0.27 - 0.40
Philippines (RP)	0.63 - 0.79	0.02 - 0.04	0.60 - 0.75
Russia (RUS)	2.19 - 3.48	0.84 - 1.46	1.35 - 2.02
Singapore (SIN)	0.31 - 0.44	0.00 - 0.00	0.31 - 0.44
Thailand (THA)	0.55 - 0.77	0.05 - 0.08	0.49 - 0.69
United States (US)	1.15 - 1.59	0.04 - 0.11	1.12 - 1.48
Viet Nam (VN)	0.59 - 0.71	0.12 - 0.14	0.47 - 0.57
APEC	0.95 - 1.37	0.11 - 0.22	0.84 - 1.16
Northeast Asia	0.53 - 0.69	0.00 - 0.00	0.53 - 0.69
Southeast Asia	0.67 - 1.06	0.10 - 0.18	0.58 - 0.88
Oceania	2.06 - 3.06	0.67 - 0.85	1.39 - 2.21
Americas	1.11 - 1.63	0.06 - 0.21	1.05 - 1.42
China	0.77 - 1.06	0.07 - 0.10	0.70 - 0.96
Russia	2.19 - 3.48	0.84 - 1.46	1.35 - 2.02

Note: “0.00” means non-existent or insignificant

Source: APERC analysis (2012)

Table 16.7: Energy Investment in the Electricity and Heat Industry in the APEC Region (billion 2005 US dollars)

Member Economy/Region	Total Power and Heat	Power Generation and Heat Production	Transmission Lines	Distribution of Electricity and Heat
Australia (AUS)	181 - 358	123 - 274	37 - 56	21 - 28
Brunei Darussalam (BD)	1 - 3	1 - 2	1 - 1	0 - 0
Canada (CDA)	577 - 781	286 - 348	274 - 411	16 - 22
Chile (CHL)	34 - 46	28 - 38	4 - 6	2 - 3
China (PRC)	3818 - 5329	2849 - 3898	747 - 1121	222 - 310
Chinese Taipei (CT)	119 - 140	104 - 120	6 - 8	9 - 12
Hong Kong, China (HKC)	12 - 16	11 - 14	0 - 1	0 - 0
Indonesia (INA)	259 - 530	227 - 300	23 - 217	9 - 13
Japan (JPN)	595 - 747	475 - 589	64 - 90	56 - 67
Korea (ROK)	202 - 273	159 - 216	28 - 39	15 - 18
Malaysia (MAS)	115 - 123	101 - 107	10 - 10	4 - 5
Mexico (MEX)	123 - 166	80 - 104	25 - 37	18 - 24
New Zealand (NZ)	23 - 34	14 - 21	6 - 9	3 - 4
Papua New Guinea (PNG)	4 - 9	4 - 8	0 - 1	0 - 0
Peru (PE)	24 - 36	21 - 31	2 - 3	1 - 2
Philippines (RP)	77 - 97	60 - 71	12 - 19	5 - 7
Russia (RUS)	695 - 1031	453 - 583	156 - 312	86 - 135
Singapore (SIN)	13 - 17	12 - 17	0 - 0	0 - 0
Thailand (THA)	96 - 135	67 - 91	23 - 37	6 - 8
United States (US)	2946 - 3986	2635 - 3549	133 - 200	178 - 237
Viet Nam (VN)	64 - 77	55 - 66	3 - 3	7 - 8
APEC	9979 - 13935	7766 - 10447	1554 - 2582	659 - 906
Northeast Asia	927 - 1176	750 - 939	98 - 138	80 - 99
Southeast Asia	626 - 983	524 - 653	71 - 288	31 - 42
Oceania	209 - 401	141 - 303	43 - 66	24 - 32
Americas	3704 - 5015	3050 - 4070	438 - 657	216 - 288
China	3818 - 5329	2849 - 3898	747 - 1121	222 - 310
Russia	695 - 1031	453 - 583	156 - 312	86 - 135

Note: “0” means non-existent or insignificant

Source: APERC analysis (2012)