

Design of the scenarios

The *World Energy Outlook-2019 (WEO-2019)* presents projections for different core scenarios that are differentiated primarily by their underlying assumptions about the evolution of energy-related government policies.

The **Stated Policies Scenario** (identical in design to the previous New Policies Scenario) provides a detailed sense of the direction in which today's policy ambitions would take the energy sector. The change in name to "Stated" from "New" is intended to clarify that this scenario does not speculate on how policies might evolve in the future. It incorporates policies and measures that governments around the world have already put in place, as well as the effects of announced policies, as expressed in official targets and plans.

Given that intended policies are typically not fully reflected in legislation or regulation, the prospects and timing for their realisation are based upon our assessment of relevant regulatory, market, infrastructure and financial constraints. Where policies are time-limited, they are generally assumed to be replaced by measures of similar intensity, but we do not assume future strengthening – or weakening – of future policy action, except where there already is specific evidence which bears on this. As the name indicates, this is a scenario and not a forecast. Our intention is to inform decision makers as they consider options, not to predict the outcomes of their deliberations.

The **Sustainable Development Scenario** (SDS) starts with the outcomes to be achieved and then assesses what combination of actions would deliver them. Its approach is different from that of the other scenarios, which define the starting conditions and then see where they lead. The outcomes embodied in the Sustainable Development Scenario are derived from the Sustainable Development Goals (SDGs) of the United Nations, providing an energy sector pathway that achieves: universal access to affordable, reliable and modern energy services by 2030 (SDG 7.1); a substantial reduction in air pollution (SDG 3.9); and effective action to combat climate change (SDG 13). The Sustainable Development Scenario is fully aligned with the Paris Agreement and lays out an integrated strategy to achieve climate, air quality and access objectives while also having a strong accent on energy security.

The **Current Policies Scenario** provides a baseline for the analysis by considering only the consequences of existing laws and regulation. It excludes the effects of stated ambitions and targets that have not yet been translated into operational laws and regulations. Comparisons between this scenario and the Stated Policies Scenario underline that achieving stated ambitions and targets should not be taken for granted, especially in countries and sectors where existing laws and regulations are already quite stringent.

This annex presents some framework elements of the scenarios, including population, economic growth and fossil fuel resources, which are held constant across the scenarios, and prices for fossil fuels and carbon dioxide (CO₂) emissions, which are not.

B.1 Population

Table B.1 ▶ Population assumptions by region

	Compound average annual growth rate			Population (million)		Urbanisation share	
	2000-18	2018-30	2018-40	2018	2040	2018	2040
North America	0.9%	0.7%	0.6%	490	559	82%	87%
United States	0.8%	0.6%	0.5%	328	368	82%	87%
Central and South America	1.1%	0.8%	0.6%	520	598	81%	86%
Brazil	1.0%	0.6%	0.4%	211	231	87%	91%
Europe	0.3%	0.1%	0.0%	692	695	75%	81%
European Union	0.3%	0.0%	-0.0%	513	508	76%	82%
Africa	2.6%	2.4%	2.2%	1 287	2 095	43%	54%
South Africa	1.3%	1.1%	1.0%	57	71	66%	76%
Middle East	2.2%	1.6%	1.4%	241	324	72%	78%
Eurasia	0.4%	0.4%	0.3%	234	249	65%	70%
Russia	-0.1%	-0.1%	-0.2%	145	138	74%	80%
Asia Pacific	1.0%	0.7%	0.5%	4 138	4 652	48%	60%
China	0.5%	0.2%	0.1%	1 400	1 422	59%	77%
India	1.4%	0.9%	0.7%	1 353	1 593	34%	46%
Japan	-0.0%	-0.4%	-0.5%	126	113	92%	94%
Southeast Asia	1.2%	0.9%	0.7%	654	768	49%	61%
World	1.2%	1.0%	0.9%	7 602	9 172	55%	64%

Note: See Annex C for definitions.

Sources: UN Population Division databases; IEA databases and analysis.

- As in previous editions of the *WEO*, we use the medium variant of the United Nations projections as the basis for our projections. In this variant, global population growth slows over the coming decades, but the total population nonetheless rises from 7.6 billion today to around 9.2 billion in 2040, an increase of 1.6 billion people.
- Around half of the increase in the global population to 2040 is in Africa, underlining the importance of this continent to the achievement of the world's sustainable development goals (see special focus on Africa in Part B). India accounts for 15% of the growth and becomes the world's most populous country in the near term as China's population growth stalls.
- The share of the global population living in cities and towns is assumed to rise to 64% in 2040 from 55% today. The addition of 78 million people on average each year to the urban population, predominantly in developing economies, means that urban public policies, design and infrastructure choices become crucial variables in the future of global energy. The coastal location of many of the world's largest cities also puts them in the front line when it comes to the impacts of a changing climate.

B.2 Economic growth

Table B.2 ▶ Real gross domestic product (GDP) growth assumptions by region

	Compound average annual growth rate			
	2000-18	2018-30	2030-40	2018-40
North America	2.0%	2.0%	2.1%	2.0%
United States	1.9%	1.9%	2.0%	2.0%
Central and South America	2.6%	2.7%	3.0%	2.9%
Brazil	2.3%	2.5%	3.1%	2.8%
Europe	1.8%	1.7%	1.5%	1.6%
European Union	1.6%	1.6%	1.4%	1.5%
Africa	4.3%	4.2%	4.3%	4.3%
South Africa	2.7%	2.1%	2.9%	2.5%
Middle East	3.9%	2.9%	3.6%	3.2%
Eurasia	4.0%	2.4%	2.3%	2.3%
Russia	3.4%	1.8%	1.9%	1.8%
Asia Pacific	6.0%	5.0%	3.7%	4.4%
China	8.9%	5.2%	3.3%	4.3%
India	7.3%	7.3%	5.2%	6.4%
Japan	0.8%	0.7%	0.7%	0.7%
Southeast Asia	5.2%	4.9%	3.8%	4.4%
World	3.7%	3.6%	3.1%	3.4%

Note: Calculated based on GDP expressed in year-2018 dollars in purchasing power parity terms.

Sources: IMF (2019); World Bank databases; IEA databases and analysis.

- As in *WEO-2018*, the global economy is assumed to grow at an average rate of 3.4% to 2040, although there have been some adjustments to individual countries and regions. A key revision comes in the Middle East, where lower near-term growth is based on the more downbeat forecasts from the International Monetary Fund (IMF). As noted in a *WEO-2018* special report, some traditional oil and gas producing regions are struggling with weak fiscal and external balances caused by lower commodity prices.
- Some other countries and regions have slightly lower near-term growth trajectories in this *Outlook* relative to the *WEO-2018*, including the United States, China, India, Southeast Asia, Russia and Europe. This reflects uncertainties over the impact of trade tensions, as well as potential financial vulnerabilities from large public and private sector indebtedness. The World Bank (2019) has also pointed to sluggish investment levels in many developing economies despite strong needs, a concern echoed in our *World Energy Investment* analysis for the energy sector (IEA, 2019).
- The way that economic growth plays through into energy demand depends heavily on the structure of any given economy, the balance between different types of industry and services, and on policies in areas such as pricing and energy efficiency.

B.3 Fossil fuel resources

Table B.3 ▶ Remaining technically recoverable fossil fuel resources, end-2018

Oil (billion barrels)	Proven reserves	Resources	Conventional crude oil	Tight oil	NGLs	EHOB	Kerogen oil
North America	240	2 364	244	177	141	802	1 000
Central and South America	288	852	246	60	50	494	3
Europe	15	116	60	19	29	3	6
Africa	125	452	310	54	86	2	-
Middle East	836	1 138	913	29	152	14	30
Eurasia	145	956	241	85	60	552	18
Asia Pacific	52	287	129	72	67	3	16
World	1 700	6 165	2 142	496	585	1 870	1 073

Natural gas (trillion cubic metres)	Proven reserves	Resources	Conventional gas	Tight gas	Shale gas	Coalbed methane
North America	15	141	50	10	74	7
Central and South America	8	84	28	15	41	-
Europe	5	47	19	5	18	5
Africa	19	101	51	10	40	0
Middle East	81	122	102	9	11	-
Eurasia	76	170	133	10	10	17
Asia Pacific	20	138	44	21	53	21
World	225	803	426	80	247	50

Coal (billion tonnes)	Proven reserves	Resources	Coking coal	Steam coal	Lignite
North America	258	8 390	1 032	5 839	1 519
Central and South America	14	61	3	32	25
Europe	135	977	188	388	402
Africa	13	297	35	262	0
Middle East	1	41	19	23	-
Eurasia	189	4 302	731	2 191	1 380
Asia Pacific	433	8 947	1 506	6 026	1 414
World	1 043	23 014	3 514	14 760	4 740

Notes: NGLs = natural gas liquids; EHOB = extra-heavy oil and bitumen. The breakdown of coal resources by type is an IEA estimate. Coal world resources exclude Antarctica.

Sources: BGR (2018); BP (2019); Cedigaz (2019); OGJ (2018); US DOE/EIA (2018, 2019); US DOE/EIA/ARI (2013, 2015); USGS (2012a, 2012b); IEA databases and analysis.

- The *WEO* supply modelling relies on estimates of the remaining technically recoverable resource, rather than the (often more widely quoted) numbers for proven reserves. Resource estimates are inevitably subject to a considerable degree of uncertainty.
- We distinguish in the analysis between conventional and unconventional resource types, but the distinction between the two, in practice, is an inexact and somewhat artificial one (and what is considered unconventional today may be considered conventional tomorrow).
- Remaining recoverable resources of conventional oil and gas are largely unchanged from last year's *World Energy Outlook*. The main adjustment to our estimates of remaining technically recoverable oil resources comes in the numbers for US tight oil. Total US tight crude and condensate resources in the *WEO-2019* amount to 155 billion barrels, a 35% increase from the 115 billion barrels included in the *WEO-2018*. The main revision is for tight oil resources in the Permian basin following new assessments from the United States Geological Survey (USGS). Its latest assessment of the Permian Delaware basin leads to a 50 billion barrel estimate of remaining technically recoverable crude oil and condensate resources; the *WEO-2018* included 22 billion barrels. Resources in the Permian Midland basin have also been revised up by around 33%, and there have been some upward revisions in smaller plays in Oklahoma and North Dakota.
- Remaining US shale gas resources in the *WEO-2019* are also higher than last year at 43 trillion cubic metres (tcm), a 25% increase from the level in the *WEO-2018*. The largest change is for the Haynesville/Bossier shale, for which the latest USGS assessment leads to a remaining technically recoverable resource estimate of 6.8; the *WEO-2018* included an estimate of 2.9 tcm. This revision does not have a large impact on the production profile in the Stated Policies Scenario, as the Haynesville shale is relatively expensive and it is assumed that the play is not developed in earnest until towards the end of the *Outlook* period.
- The remaining technical recoverable resources of fossil fuels are comfortably sufficient to meet the projections of global demand growth to 2040 in all scenarios.
- Overall, the gradual depletion of resources (at a pace that varies by scenario) means that operators have to develop more difficult and complex reservoirs. This tends to push up production costs over time, although this effect is offset by the assumed continuous adoption of new, more efficient production technologies and practices.
- Remaining technically recoverable coal resources are huge and more widely distributed than those of oil and gas. This means that, although environmental concerns are widespread, the availability of coal supply typically is not an issue.
- World coal resources are made up of various types of coal: around 80% is steam and coking coal and the remainder is lignite.

B.4 Fossil fuel prices

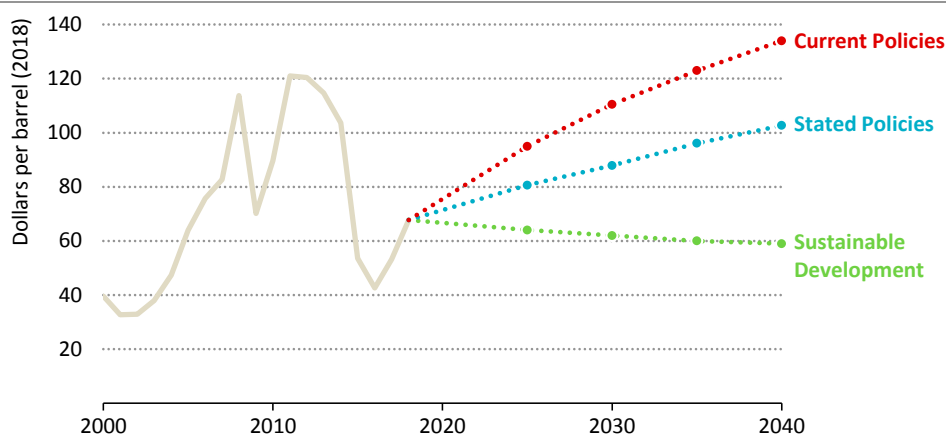
Table B.4 ► Fossil fuel prices by scenario

Real terms (\$2018)	2000	2010	2018	Stated Policies				Sustainable Development		Current Policies	
				2025	2030	2035	2040	2030	2040	2030	2040
IEA crude oil (\$/barrel)	40	90	68	81	88	96	103	62	59	111	134
Natural gas (\$/MBtu)											
United States	6.1	5.0	3.2	3.2	3.3	3.8	4.4	3.2	3.4	3.8	5.1
European Union	4.0	8.6	7.6	8.0	8.0	8.4	8.9	7.5	7.5	8.9	9.9
China	3.5	7.7	8.2	9.1	9.0	9.3	9.8	8.6	8.7	9.8	10.7
Japan	6.7	12.7	10.1	10.0	9.7	9.8	10.2	8.8	8.7	11.0	11.4
Steam coal (\$/tonne)											
United States	34	58	46	51	52	53	54	49	48	59	63
European Union	48	106	92	75	76	78	78	58	60	83	90
Japan	43	123	111	83	86	88	90	65	69	94	103
Coastal China	34	133	106	88	89	91	92	74	76	98	105

Notes: MBtu = million British thermal units. The IEA crude oil price is a weighted average import price among IEA member countries. Natural gas prices are weighted averages expressed on a gross calorific-value basis. The US natural gas price reflects the wholesale price prevailing on the domestic market. The European Union and China gas prices reflect a balance of pipeline and liquefied natural gas (LNG) imports, while the Japan gas price is solely LNG imports; the LNG prices used are those at the customs border, prior to regasification. Steam coal prices are weighted averages adjusted to 6 000 kilocalories per kilogramme. The US steam coal price reflects mine-mouth prices (primarily in the Powder River Basin, Illinois Basin, Northern Appalachia and Central Appalachia markets) plus transport and handling cost. Coastal China steam coal price reflects a balance of imports and domestic sales, while the European Union and Japanese steam coal price is solely for imports.

- The oil price in the Stated Policies Scenario is lower by around 10% in 2040 than in the *WEO-2018* New Policies Scenario. This is mainly due to the upward revision in estimated tight oil resources in the United States, which allows production to remain “higher for longer” and the market to find equilibrium in a lower range.
- The oil price follows a smooth trajectory to 2040. We do not try to anticipate any of the fluctuations that characterise commodity markets in practice, although near-term demand for oil remains robust in the Stated Policies Scenario.
- The risk of a price spike would be considerably reduced if oil demand were to follow the lower pathway of the Sustainable Development Scenario. In this scenario, tight oil production limits the need to develop higher cost oil and the market finds a balance at a much lower price. The risk of market volatility in this scenario remains significant, however, not least because of the strains that this scenario implies for many large producer countries in the light of their continuing dependence on hydrocarbon revenues.

Figure B.1 ▶ Average IEA crude oil price by scenario



The oil price trajectory varies widely between scenarios, reflecting their different supply, demand and policy elements

- Fiscal pressures complicate this task, but nonetheless we assume, in all scenarios, that major producers maintain a strategy of market management. This means that the marginal project required to meet demand is more expensive than would be implied only by the global supply cost curve.
- Natural gas prices in the Stated Policies Scenario are also lower than in last year's edition. A downward revision in the Henry Hub price in the United States is related to ample availability of associated gas and to the implications of a higher gas resource estimate.
- The US Henry Hub price also serves as a global reference price due to a large LNG export industry actively seeking arbitrage opportunities, and this brings down prices in major importing regions as well.
- Our projections assume movement towards a more integrated global gas market, in which internationally traded gas moves in response to price signals determined by the balance between supply and demand in each region.
- The apparent oversupply in coal markets in 2019, following the high prices in 2017-18, stems from a confluence of strong supply from exporters, and policies and market forces holding down import demand in some key regions. In the Stated Policies Scenario, coal prices continue to decrease slightly from current levels until the mid-2020s as markets rebalance.
- Long-term fundamentals dictate a modest coal price increase from the mid-2020s in the Stated Policies Scenario, reflecting upward cost pressure caused by worsening geological conditions, declining coal quality in mature mining regions and the need to tap more remote coal deposits.

Table B.5 ▶ CO₂ prices in selected regions by scenario (\$2018 per tonne)

Region	Sector	2030	2040
Current Policies			
Canada	Power, industry, aviation, others*	36	39
Chile	Power	5	5
China	Power, industry, aviation	20	31
European Union	Power, industry, aviation	27	38
Korea	Power, industry	28	39
Stated Policies			
Canada	Power, industry, aviation, others*	36	39
Chile	Power	12	20
China	Power, industry, aviation	23	36
European Union	Power, industry, aviation	33	43
Korea	Power, industry	33	44
South Africa	Power, industry	15	24
Sustainable Development			
Advanced economies	Power, industry, aviation**	100	140
Selected developing economies	Power, industry, aviation**	75	125

* In Canada's benchmark/backstop policies, a carbon price is applied to fuel consumed in additional sectors.

** Coverage of aviation is limited to the same regions as in the Stated Policies Scenario.

- National carbon pricing schemes are in place or planned in thirty countries around the world and this is reflected in our projections. Once China's national Emissions Trading Scheme is in place from 2020, the share of global emissions covered by carbon prices will rise to around 13% (from 7% today).
- The price of allowances in the European Union Emissions Trading Scheme rose steadily throughout 2018, averaging just under \$20/tonne, and it has continued to rise so far in 2019. Future levels are uncertain, not least because the announced plans of Germany to end its use of coal-fired power plants by 2038 could lead to a large surplus of allowances unless the emissions cap is reduced by a commensurate level.
- South Africa introduced a CO₂ tax of \$8.5/tonne in June 2019, although there are some tax breaks in the first phase (covering the period to 2022) that lower the effective tax rate to around \$0.5-3.5/tonne.
- In the Sustainable Development Scenario, a higher and broader CO₂ price is assumed, rising to \$140/tonne in 2040 in advanced economies and to \$125/tonne in selected developing economies such as Brazil, China, Russia and South Africa.
- There is an interplay between the CO₂ prices assumed and a variety of other policy measures such as vehicle and building efficiency standards, renewable energy targets and support for new technology development. Further details of these policies and measures are provided in Tables B.7 – B.11.

B.5 Power generation technology costs

Table B.6 ▶ Technology costs by selected region in the Stated Policies Scenario

		Capital costs (\$/kW)		Capacity factor (%)		Fuel and O&M (\$/MWh)		LCOE (\$/MWh)		VALCOE (\$/MWh)	
		2018	2040	2018	2040	2018	2040	2018	2040	2018	2040
United States	Nuclear	5 000	4 500	90	90	30	30	105	100	105	100
	Coal	2 100	2 100	60	60	30	30	75	75	75	75
	Gas CCGT	1 000	1 000	50	50	30	35	50	60	45	60
	Solar PV	1 550	830	21	23	15	10	95	50	95	60
	Wind onshore	1 660	1 500	42	44	10	10	55	50	55	55
	Wind offshore	4 300	2 060	41	48	35	20	155	70	150	75
European Union	Nuclear	6 600	4 500	75	75	35	35	150	110	145	115
	Coal	2 000	2 000	40	40	45	45	120	145	105	125
	Gas CCGT	1 000	1 000	40	40	60	70	90	115	75	85
	Solar PV	1 090	610	13	14	15	10	110	65	105	90
	Wind onshore	1 950	1 760	28	30	20	15	95	85	95	90
	Wind offshore	4 920	2 580	49	59	20	10	140	65	135	75
China	Nuclear	2 500	2 500	75	75	25	25	65	65	65	65
	Coal	800	800	70	70	35	30	50	70	50	65
	Gas CCGT	560	560	50	50	75	85	90	110	85	100
	Solar PV	880	490	17	19	10	5	60	35	60	60
	Wind onshore	1 180	1 160	25	27	15	10	60	55	65	60
	Wind offshore	2 780	1 460	32	44	25	10	120	45	120	50
India	Nuclear	2 800	2 800	80	80	30	30	70	70	70	70
	Coal	1 200	1 200	60	60	35	35	60	55	60	50
	Gas CCGT	700	700	50	50	80	80	95	95	90	80
	Solar PV	790	430	20	21	10	5	45	30	50	50
	Wind onshore	1 200	1 160	26	29	15	10	60	50	65	55
	Wind offshore	3 400	1 720	29	38	25	15	190	65	140	70

Note: O&M = operation and maintenance; LCOE = levelised cost of electricity; VALCOE = value-adjusted LCOE; kW = kilowatt; MWh = megawatt-hour; CCGT = combined-cycle gas turbine. LCOE and VALCOEs figures are rounded. Lower figures for VALCOE indicate improved competitiveness.

Sources: IEA analysis; IRENA Renewable Costing Alliance; IRENA (2019).

- Major contributors to the LCOE include: overnight capital costs; capacity factor that describes the average output over the year relative to the maximum rated capacity (typical values provided); the cost of fuel inputs; plus operation and maintenance. Economic lifetime assumptions are 25 years for solar PV, onshore and offshore wind.
- For all technologies, a standard weighted average cost of capital was assumed (7-8% based on the stage of economic development, in real terms).
- The value-adjusted LCOE (or “VALCOE”) incorporates information about both costs and the value provided to the system. Based on the LCOE, estimates of energy, capacity and flexibility value are incorporated to provide a metric of competitiveness for power generation technologies (see *WEO-2019* section 6.8). This metric provides a more robust approach to compare dispatchable technologies and variable renewables.
- Additional power generation cost information is provided online at iea.org/weo/.

B.6 Policies

The policy actions assumed to be taken by governments are a key variable in this *Outlook* and the main reason for the differences in outcomes across the scenarios. An overview of the policies and measures that are considered in the various scenarios is included in the Tables B.7 – B.11.

The policies are additive: measures listed under the Sustainable Development Scenario (SDS) supplement those in the Stated Policies Scenario (STEPS), which in turn supplement policies in the Current Policies Scenario (CPS). The tables begin with broad cross-cutting policy frameworks, followed by more detailed policies by sector: power, transport, industry and buildings. The “new policies” that are considered in the STEPS are derived from an exhaustive examination of announcements and plans in countries around the world.

Table B.7 ▶ Cross-cutting policy assumptions by scenario for selected regions

	Scenario	Assumptions
All regions	SDS	<ul style="list-style-type: none"> • Universal access to electricity and clean cooking facilities by 2030. • Staggered introduction of CO₂ prices (see Table B.5). • Fossil fuel subsidies phased out by 2025 in net-importing countries and by 2035 in net-exporting countries. • Maximum sulfur content of oil products capped at 1% for heavy fuel oil, 0.1% for gasoil and 10 ppm for gasoline and diesel. • Policies promoting production and use of alternative fuels and technologies such as hydrogen, biogas, biomethane and CCUS across sectors.
United States	CPS	<ul style="list-style-type: none"> • Extension and increase of “45Q” tax credits for carbon capture, utilisation and storage: rising to \$35/t CO₂ in 2026 for enhanced-oil or gas recovery, and to \$50/t CO₂ sequestered in saline geological formations. • State-level renewable portfolio standards. • Regional Greenhouse Gas Initiative: mandatory cap-and-trade scheme covering fossil fuel power plants in nine northeast states, and economy-wide cap-and-trade scheme in California with binding commitments.
European Union	STEPS	<ul style="list-style-type: none"> • NDC targets and 2030 Climate and Energy Framework: <ul style="list-style-type: none"> ◦ Reduce GHG emissions at least 40% below 1990 levels. ◦ Increase share of renewables to at least 32%. ◦ Partial implementation of goal to save 32.5% of energy use compared with business-as-usual scenarios. • Draft National Energy and Climate Plans (NECP) submitted in June 2019 in support of 2030 Climate and Energy Framework. • ETS reducing GHG emissions 43% below the 2005 level in 2030. • National Emission Ceilings Directive to reduce emissions of SO₂ by 79%, NO_x by 63%, PM_{2.5} by 49%, NMVOC by 40% and NH₃ by 19% below 2005 levels by 2030. • Increase share of renewables in heating and cooling by 1% per year to 2030.
Japan	STEPS	<ul style="list-style-type: none"> • NDC targets: economy-wide target of reducing GHG emissions by 26% below fiscal year 2013 levels by fiscal year 2030; sector-specific targets. • The 5th Strategic Energy Plan under the Basic Act on Energy Policy.

Table B.7 ▶ Cross-cutting policy assumptions by scenario for selected regions
(continued)

	Scenario	Assumptions
China	CPS	<ul style="list-style-type: none"> Action Plan for Prevention and Control of Air Pollution. ETS for the power sector.
	STEPS	<ul style="list-style-type: none"> NDC GHG targets: achieve peak CO₂ emissions around 2030, with best efforts to peak early; lower CO₂ emissions per unit of GDP 60-65% below 2005 levels by 2030. NDC energy target: increase the share of non-fossil fuels in primary energy consumption to 20% by 2030. 13th Five-Year Plan targets for 2020: <ul style="list-style-type: none"> Services sector value to be increased to 56%. Non-fossil fuels to reach 15% of TPED. Energy intensity per unit of GDP limited to 15% below 2015 levels. Carbon emissions per unit of GDP limited to 18% below 2015 levels. SO₂ and NO_x emissions reduced by 15%. “Made in China 2025” transition from heavy industry to higher value-added manufacturing. Expand the role of natural gas. ETS expansion to domestic aviation and selected industry sectors. Energy price reform, including more frequent adjustments in oil product prices and reduction in natural gas price for non-residential consumers. Three-year action plan for cleaner air, announced in July 2018.
India	CPS	<ul style="list-style-type: none"> National Mission on Enhanced Energy Efficiency. National Clean Energy Fund to promote clean energy technologies based on a levy of INR 400 (\$6) per tonne of coal. “Make in India” campaign to increase the share of manufacturing in the national economy.
	STEPS	<ul style="list-style-type: none"> NDC GHG target: reduce emissions intensity of GDP 33-35% below 2005 levels by 2030. NDC energy target: achieve about 40% cumulative installed capacity from non-fossil fuel sources by 2030 with the help of technology transfer and low-cost international finance. Efforts to expedite environmental approval and land acquisition for energy projects. Opening of coal, gas and oil sectors to private and foreign investors.
Brazil	STEPS	<ul style="list-style-type: none"> NDC GHG economy-wide targets: reduce GHG emissions 37% below 2005 levels by 2025. NDC energy goals for 2030: <ul style="list-style-type: none"> Increase share of sustainable biofuels to around 18% of TPED. Increase renewables to 45% of TPED. Increase non-hydro renewables to 28-30% of TPED and 23% of power supply. Partial implementation of National Energy Efficiency Plan.

Notes: CCUS = carbon capture, utilisation and storage; NDC = Nationally Determined Contributions; GHG = greenhouse gases; LPG = liquefied petroleum gas; SO₂ = sulfur dioxide; NO_x = nitrogen oxides; PM_{2.5} = fine particulate matter; NMVOC = non-methane volatile organic compounds; NH₃ = ammonia; TPED = total primary energy demand; ETS = emissions trading system. Pricing of CO₂ emissions is by emissions trading systems or taxes.

The policies and measures for the various scenarios pertaining to the regions of Africa and Southeast Asia can be found within the respective WEO 2019 special reports on Africa Energy Outlook and Southeast Asia Energy Outlook.

Table B.8 ▶ Power sector policies and measures as modelled by scenario for selected regions

Scenario		Assumptions
All regions	SDS	<ul style="list-style-type: none"> Increased low-carbon generation from renewables and nuclear. Expanded support for the deployment of CCUS. Efficiency and emissions standards preventing the refurbishment of old inefficient plants. Stringent pollution emissions limits for industrial facilities above 50 MW_{th} input using solid fuels, set at 200 mg/m³ for SO₂ and NO_x and 30 mg/m³ for PM_{2.5}.
	CPS	<ul style="list-style-type: none"> Extension of Investment Tax Credit and Production Tax Credit. State renewable portfolio standards. State 100% clean energy target by 2050. Mercury and Air Toxics Standards. New Source Performance Standards. Clean Air Interstate Rule regulating SO₂ and NO_x. Lifetimes of some nuclear plants extended beyond 60 years.
United States	STEPS	<ul style="list-style-type: none"> Extension and strengthening of support for renewables, nuclear and CCUS. Affordable Clean Energy Rules.
	CPS	<ul style="list-style-type: none"> Emissions performance standard of 420 g CO₂ per kWh for new coal-fired electricity generation units, and units that have reached the end of their useful life. New Brunswick and Alberta phase out unabated coal-fired power by 2030. Introduction of country-wide carbon pricing in 2019.
Canada	STEPS	<ul style="list-style-type: none"> Complete phase out of traditional coal-fired power in line with the Pan-Canadian Framework on Clean Growth and Climate Change. Emissions performance standard for natural gas-fired electricity generation.
	CPS	<ul style="list-style-type: none"> ETS in accordance with 2020 Climate and Energy Package. No new coal power plants post-2020 in 26 of 28 member states. Early retirement of all nuclear plants in Germany by end-2022. Removal of some barriers to CHP plants. Support for renewables in accordance with overall target. Industrial Emissions Directive.
European Union	STEPS	<ul style="list-style-type: none"> ETS in accordance with 2030 Climate and Energy Framework. Coal phase out in a subset of member states, notably in Finland, France, Germany, Italy, the Netherlands and United Kingdom. Extended and strengthened support to renewables-based power generation technologies in accordance with overall target taking into account draft National Energy and Climate Plans (NECP). Support the increased use of biogas and biomethane in the power mix. Further removal of barriers to CHP through partial implementation of the Energy Efficiency Directive. Power market reforms to enable recovery of investments for adequacy. New standards for Large Combustion Plants from the review of the Best Available Techniques Reference Document.
	STEPS	<ul style="list-style-type: none"> Third Master Energy Plan calls for 35%-40% renewables by 2040.
Korea	STEPS	<ul style="list-style-type: none"> Third Master Energy Plan calls for 35%-40% renewables by 2040.

Table B.8 ▶ Power sector policies and measures as modelled by scenario for selected regions (continued)

	Scenario	Assumptions
Japan	CPS	<ul style="list-style-type: none"> • Air Pollution Control Law. • Retail power market liberalisation. • Support for renewables-based power generation.
	STEPS	<ul style="list-style-type: none"> • Power mix targets by 2030 from the 5th Strategic Energy Plan. • Lifetime of some nuclear plants beyond typical lifetime of 40 years. • Non-fossil fuels to supply 44% of power generation by 2030, corresponding to carbon intensity of 370 g CO₂/kWh. • Implementation of the feed-in tariff amendment law. • Efficiency standards for new thermal power plants (coal: 42%; gas: 50.5%; oil: 39%).
China	CPS	<ul style="list-style-type: none"> • Air pollutant emissions standard for thermal power plants with limits on PM_{2.5}: 30 mg/m³; SO₂: 100-200 mg/m³ for new plants and 200-400 mg/m³ for existing plants; NO_x: 100-200 mg/m³. • ETS for the power sector.
	STEPS	<ul style="list-style-type: none"> • 13th Five-Year Plan targets for 2020: <ul style="list-style-type: none"> ○ 58 GW nuclear, 380 GW hydro, at least 210 GW wind and at least 110 GW solar. ○ Retrofit of 133 GW of CHP and 86 GW of condensing coal plants in order to increase flexibility. ○ Coal limited to 1 100 GW, by delaying 150 GW of new builds and retiring 20 GW of existing plants.
India	CPS	<ul style="list-style-type: none"> • Connect all willing households to electricity under the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) scheme. • Renewable Purchase Obligation and other fiscal measures to promote renewables. • Increased use of supercritical coal technology. • Restructured Accelerated Power Development and Reform Programme to finance the modernisation of transmission and distribution networks. • Pollution control rules limiting emissions from coal power plants.
	STEPS	<ul style="list-style-type: none"> • Environmental (Protection) Amendment Rules. • Strengthened measures such as competitive bidding to increase the use of renewables towards the national target of 175 GW of non-hydro renewables capacity by 2022 (100 GW solar, 75 GW non-solar) and 450 GW non-hydro renewables capacity target by 2050. • Expanded efforts to strengthen the national grid, upgrade the transmission and distribution network, and reduce aggregate technical and commercial losses to 15%. • Increased efforts to establish the financial viability of all power market participants, especially network and distribution companies.
Brazil	CPS	<ul style="list-style-type: none"> • Technology-specific power auctions for all fuel types. • Guidance on fuel mix from the Ten-Year Plan for Energy Expansion.
Chile	STEPS	<ul style="list-style-type: none"> • Coal phase out by 2030.
Middle East	CPS	<ul style="list-style-type: none"> • Partial implementation of nuclear programmes, including in Saudi Arabia and United Arab Emirates. • Partial implementation of renewable targets and programmes.
	STEPS	<ul style="list-style-type: none"> • Accelerated progress towards nuclear and renewables targets.

Notes: CCUS = carbon capture, utilisation and storage; MW_{th} = megawatts thermal; CHP = combined heat and power; SO₂ = sulfur dioxide; NO_x = nitrogen oxides; PM_{2.5} = fine particulate matter; g CO₂/kWh = grammes of carbon dioxide per kilowatt-hour; GW = gigawatts; PV = photovoltaic; ETS = emissions trading system.

Table B.9 ▶ Industry sector policies and measures as modelled by scenario in selected regions

Scenario		Assumptions
All regions	SDS	<ul style="list-style-type: none"> Stringent emissions limits for industrial facilities above 50 MW_{th} input using solid fuels, set at 200 mg/m³ for NO_x and SO₂ and 30 mg/m³ for PM_{2.5}. Emission limits for facilities below 50 MW_{th} based on size, fuel and combustion process. Industrial processing plants to be fitted with the best available technologies in order to obtain operating permits. Existing plants to be retrofitted within ten years. Enhanced minimum energy performance standards by 2025, in particular for electric motors; incentives for the introduction of variable speed drives in variable load systems, and implementation of system-wide measures. International agreements on steel and cement industry energy intensity targets. Mandatory energy management systems or energy audits. Policies to support increased recycling of aluminium, steel, paper and plastics. Policies to support increasing deployment of CCUS in various industry and fuel transformation subsectors. Wider hosting of international projects to offset CO₂ emissions.
United States	CPS	<ul style="list-style-type: none"> Better Buildings, Better Plants Program and Energy Star Program for Industry. Boiler Maximum Achievable Control Technology to impose stricter emissions limits on industrial and commercial boilers, and process heaters. Superior Energy Performance certification that supports the introduction of energy management systems. Industrial Assessment Centers providing no-cost energy assessments to SMEs. Permit program for GHGs and other air pollutants for large industrial installations. Business Energy Investment Tax Credit and funding for efficient technologies.
	STEPS	<ul style="list-style-type: none"> Further assistance for SME manufacturers to adopt “smart manufacturing technologies” through technical assistance and grant programs.
European Union	CPS	<ul style="list-style-type: none"> ETS in accordance with 2020 Climate and Energy Package. White certificate scheme in Italy and energy saving obligation scheme in Denmark. Voluntary energy efficiency agreements in Belgium, Denmark, Finland, Hungary, Ireland, Luxembourg, Netherlands, Portugal, Sweden and United Kingdom. EcoDesign Directive standards for motors, pumps, fans, compressors and insulation. Implementation of Medium Combustion Plant Directive. Industrial Emissions Directive.
	STEPS	<ul style="list-style-type: none"> ETS in accordance with 2030 Climate and Energy Framework. Implementation of Energy Efficiency Directive and extension to 2030: <ul style="list-style-type: none"> Mandatory and regular energy audits for large enterprises. Incentives for the use of energy management systems. Encouragement for SMEs to undergo energy audits. Technical assistance and targeted information for SMEs.
Japan	CPS	<ul style="list-style-type: none"> Energy efficiency benchmarking. Tax credits for investments in energy efficiency. Financial incentives for SMEs to invest in energy conserving equipment and facilities. Free energy audits for SMEs. Mandatory energy management for large business operators. Top Runner Programme of minimum energy standards for machinery and equipment.
	STEPS	<ul style="list-style-type: none"> Maintenance and strengthening of top-end low-carbon efficiency standards: <ul style="list-style-type: none"> Higher efficiency CHP systems. Promotion of state-of-the-art technology, faster replacement of ageing equipment. Continuation of voluntary ETS.

Table B.9 ▶ Industry sector policies and measures as modelled by scenario in selected regions (continued)

Scenario	Assumptions
China	<p>CPS</p> <ul style="list-style-type: none"> • “Blue Skies” environmental initiative implies accelerated elimination of outdated steel and aluminium production capacity; winter production cuts across producing regions; intensified capacity control over construction industry; prohibition of establishment of new chemical parks in key regions. • Partial implementation of Industrial Energy Performance Standards. • Mandatory adoption of coke dry-quenching and top-pressure turbines in new iron and steel plants. Support of non-blast furnace in iron production. • Mechanism to incentivise energy-efficient “leaders”, i.e. manufacturers and brands that exceed specific benchmarks set by the China Energy Label. • Pilot of China’s ETS for some provinces and industrial sectors. • Continuation of industrial energy intensity reduction contributing to the 13th Five-Year Plan target (2016-20).
	<p>STEPS</p> <ul style="list-style-type: none"> • Accelerated retrofit of older coal-fired industrial boilers. • Expansion of ETS to selected industry sectors. • “Made in China 2025” targets for industrial energy intensity. • Full implementation of Industrial Energy Performance Standards. • Enhanced use of energy service companies and energy performance contracting. • Clean Winter Heating Plan promoting the use of natural gas.
India	<p>CPS</p> <ul style="list-style-type: none"> • Energy Conservation Act: <ul style="list-style-type: none"> ◦ Mandatory energy audits. ◦ Appointment of an energy manager in seven energy-intensive industries. • National Mission on Enhanced Energy Efficiency (NMEEE): <ul style="list-style-type: none"> ◦ Cycle II and III of Perform, Achieve and Trade (PAT) scheme, which benchmarks facilities’ performance against best practice and enables trading of energy savings certificates. ◦ Income and corporate tax incentives for energy service companies, including the Energy Efficiency Financing Platform. ◦ Framework for Energy-Efficient Economic Development offering a risk guarantee for performance contracts and a venture capital fund for energy efficiency. • Energy efficiency intervention in selected SME clusters including capacity building.
	<p>STEPS</p> <ul style="list-style-type: none"> • Further implementation of the NMEEE’s recommendations including: <ul style="list-style-type: none"> ◦ Tightening of the PAT mechanism under Cycle III and continuation beyond 2020. ◦ Further strengthening of fiscal instruments to promote energy efficiency. • Strengthen existing policies to realise the energy efficiency potential in SMEs. • Implementation of ‘New Industrial Policy’ leading to a boost in domestic industrial production. ‘Make in India’ policy promotes manufacturing sector. • National steel policy target of 300 Mt annual production is achieved in the early 2030s. • Continuation of subsidy program to fertilizers.
Brazil	<p>CPS</p> <ul style="list-style-type: none"> • PROCEL (National Programme for Energy Conservation). • PROESCO (Support for Energy Efficiency Projects). • Partial implementation of the National Energy Efficiency Plan, with fiscal and tax incentives for industrial upgrading, investment in training efficiency and encouragement to reuse industrial waste. • Incentives to increase biomass use in industry.
	<p>STEPS</p> <ul style="list-style-type: none"> • Extension of PROESCO.

Notes: CCUS = carbon capture, utilisation and storage; MW_{th} = megawatts thermal; mg/m³ = milligrams per cubic metre; ETS = emissions trading system; SO₂ = sulfur dioxide; NO_x = nitrogen oxides; PM = particulate matter; CHP = combined heat and power; SMEs = small and medium enterprises; GHG = greenhouse gases.

Table B.10 ▶ **Buildings sector policies and measures as modelled by scenario in selected regions**

Scenario		Assumptions
All regions	SDS	<ul style="list-style-type: none"> • SDG 7.1: universal access to affordable, reliable and modern energy achieved by 2030. • Phase out least efficient appliances, light bulbs and heating or cooling equipment by 2030 at the latest. • Emissions limits for biomass boilers set at 40-60 mg/m³ for PM and 200 mg/m³ for NO_x. • Introduction of mandatory energy efficiency labelling requirements for all appliances. • Mandatory energy conservation building codes, including net-zero emissions requirement for all new buildings, by 2030 at the latest. • Increased support for energy efficiency measures, including building retrofits, direct use of solar thermal and geothermal, and heat pumps in certain economies. • Digitalisation of buildings electricity demand to increase demand-side response potential, through greater flexibility and controllability of end use devices.
	CPS	<ul style="list-style-type: none"> • Association of Home Appliance Manufacturers—American Council for an Energy-Efficient Economy Multi-Product Standards Agreement. • Energy Star: new appliance efficiency standards. • Steady upgrades of building codes; incentives for utilities to improve building efficiency. • Weatherisation programmes: funding for refurbishments of residential buildings. • Federal and state rebates for renewables-based heat, including Residential Renewable Energy Tax Credit for solar water heaters, heat pumps and biomass stoves.
United States	STEPS	<ul style="list-style-type: none"> • Partial implementation of the Energy Efficiency Improvement Act of 2015. • Mandatory energy efficiency requirements in building codes in some states, including California’s 2019 Building Energy Efficiency Standards and recent code updates in other states. • Tightening of efficiency standards for appliances.
	CPS	<ul style="list-style-type: none"> • Energy Performance of Buildings Directive 2010. • EcoDesign and Energy Labelling Directive including requirements for boilers to have 75-77% efficiency depending on size and to limit pollutant emissions (PM: 40-60 mg/m³; NO_x: 200 mg/m³ for biomass boilers and 350 mg/m³ for fossil fuel boilers; CO: 500-700 mg/m³). • Individual member state financial incentives for renewables-based heat in buildings.
European Union	STEPS	<ul style="list-style-type: none"> • Partial implementation of the Energy Efficiency Directive. • 2016 update of Energy Performance of Buildings Directive mandating new buildings to be “nearly zero-energy” from 2020, and increased retrofit rates. • Implementation of proposed voluntary Smart Readiness Indicator. • Mandatory labelling for sale or rental of all buildings and some appliances. • Further product groups in EcoDesign Directive. • Enhanced renewables-based heat support in member states. • Ban of gas boilers in new buildings in certain member states.
	CPS	<ul style="list-style-type: none"> • Building Efficiency Act for new buildings, renovations and extensions. • Top Runner Programme efficiency standards for home appliances. • Large operators to reduce energy consumption 1% per year and complete annual reports. • Energy efficiency standards for new buildings and houses larger than 300 m². • Capital Grant Scheme for renewable energy technologies.
Japan	STEPS	<ul style="list-style-type: none"> • Extension of the Top Runner Programme. • Voluntary equipment labelling programmes. • Building Energy Efficiency Act regulations for new large-scale non-residential buildings and incentives for all new buildings. • Net zero-energy buildings by 2030 for all new construction.
	CPS	<ul style="list-style-type: none"> • Building Efficiency Act for new buildings, renovations and extensions. • Top Runner Programme efficiency standards for home appliances. • Large operators to reduce energy consumption 1% per year and complete annual reports. • Energy efficiency standards for new buildings and houses larger than 300 m². • Capital Grant Scheme for renewable energy technologies.

Table B.10 ▶ Buildings sector policies and measures as modelled by scenario in selected regions (continued)

	Scenario	Assumptions
China	CPS	<ul style="list-style-type: none"> • Civil Construction Energy Conservation Design Standards. • Appliance standards and labelling programme. • Natural gas network extended to 57% of urban areas by 2020.
	STEPS	<ul style="list-style-type: none"> • Promotion of green buildings: <ul style="list-style-type: none"> ○ New urban residential buildings to increase energy efficiency by 20% from 2015 levels to 2020. ○ 50% of new urban buildings to meet energy conservation requirements. • Retrofit of 500 million m² of residential buildings and 100 million m² of public buildings. • Promotion of electricity to replace decentralised coal and oil boilers. • Urban gasification of 57% by 2020. • Solar water heaters to cover 800 million m² by 2020. • Mandatory energy efficiency labels for appliances and equipment. • Implementation of energy consumption standards for nearly-zero energy buildings. • Clean Winter Heating Plan: switch from coal to gas and electricity for 50 000 - 100 000 residences annually in each of the “26+2” main cities in the Beijing-Tianjin-Hebei region and surroundings. Financial support for fuel switching expanded to 43 cities.
	SDS	<ul style="list-style-type: none"> • Implementation of the draft standard for Building Energy Conservation and Renewable Energy Utilization, reducing average heating and cooling energy use by 30% in residential buildings and 20% in public buildings, relative to 2016 standards.
India	CPS	<ul style="list-style-type: none"> • Connect all willing households to electricity under the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) scheme. • Promotion of clean cooking access with LPG, including free connections to poor rural households through Pradhan Mantri Ujjwala Yojana (PMUY). • Measures under the National Solar Mission. • Energy Conservation Building Code 2007 with voluntary standards for commercial buildings. • “Green Rating for Integrated Habitat Assessment” rating system for green buildings. • Promotion and distribution of LEDs through the Efficient Lighting Programme.
	STEPS	<ul style="list-style-type: none"> • Standards and Labelling Programme, mandatory for air conditioners, lights, televisions and refrigerators, voluntary for seven other products and LEDs. • Phase out incandescent light bulbs by 2020. • Voluntary Star Ratings for the services sector. • Measures under the National Mission on Enhanced Energy Efficiency. • Energy Conservation in Building Codes made mandatory in eight states that regulate building envelope, lighting and hot water. • Efforts to plan and rationalise urbanisation in line with the “100 smart cities” concept. • Expand PMUY LPG cooking programme to reach 80 million low-income households by 2020.
Brazil	CPS	<ul style="list-style-type: none"> • Labelling programme for household goods and public buildings equipment.
	STEPS	<ul style="list-style-type: none"> • Partial implementation of National Energy Efficiency Plan. • Mandatory certification of public lighting; ban on inefficient incandescent bulbs.

Notes: SDG = Sustainable Development Goal; mg/m³ = milligrams per cubic metre; SO₂ = sulfur dioxide; NO_x = nitrogen oxides; CO = carbon monoxide; PM = particulate matter; LED = light-emitting diodes; LPG = liquefied petroleum gas; HVAC = heating, ventilation and air conditioning.

Table B.11 ▶ **Transport sector policies and measures as modelled by scenario in selected regions**

Scenario		Assumptions
All regions	CPS	<ul style="list-style-type: none"> International shipping: global cap of 0.5% on sulfur content in fuel in 2020 and tightened NO_x emissions standards in control areas by 2025, in line with International Maritime Organisation (IMO) regulation.
	STEPS	<ul style="list-style-type: none"> Road transport: fuel sulfur standards of 10-15 ppm. Aviation: International Civil Aviation Organization goal to improve fuel efficiency by 2% per year until 2020; aiming for carbon-neutral growth from 2020 onwards.
	SDS	<ul style="list-style-type: none"> Strong support for electric mobility, alternative fuels and energy efficiency. Retail fuel prices kept at a level similar to the STEPS, applying CO₂ tax across WEM regions. PLDVs: on-road stock emissions intensity limited to 55 g CO₂/km in advanced economies and 70 g CO₂/km elsewhere by 2040. Two/three-wheelers: phase out two-stroke engines. Light-duty gasoline vehicles: three-way catalysts and tight evaporative controls required. Light-duty diesel vehicles: limit emissions to 0.1 g/km NO_x and 0.01 g/km PM. Light commercial vehicles: full technology spill-over from PLDVs. Medium- and heavy-freight vehicles: 25% more efficient by 2040 than in the STEPS. Heavy-duty diesel vehicles: limit emissions to 3.5 g/km NO_x and 0.03 g/km PM. Aviation: fuel intensity reduced by 2.6% per year; scale-up of biofuels driven by long term CO₂ emissions target (50% below 2005 levels in 2050). International shipping: annual GHG emissions trajectory consistent with 50% below 2008 levels in 2050, in line with IMO GHG emissions reduction strategy.
United States	CPS	<ul style="list-style-type: none"> Renewables Fuel Standard 2. LDVs: Phase 2 of CAFE standards until 2020 and Safer Affordable Fuel Efficient rule for model years 2021-2026. LDVs: Tier 3 Motor Vehicle Emission and Fuel Standards, equivalent to Euro 6. Medium and heavy-duty trucks: low range of Phase 2 of EPA/NHTSA GHG emissions and fuel efficiency standards. HDVs: Tier 3 Motor Vehicle Emission and Fuel Standards, equivalent to Euro VI.
	STEPS	<ul style="list-style-type: none"> Moderate increase of ethanol and biodiesel use after 2022 driven by state policies. Electric cars: stock target of 4 million by 2025 across eight states. Road freight: support for natural gas.
European Union	CPS	<ul style="list-style-type: none"> Subsidy supporting biofuels blending, 7% cap on conventional biofuels blending rate. LDVs: Euro 6 emissions and fuel sulfur standards. HDVs: Euro VI emissions and fuel sulfur standards. Domestic aviation: ETS.
	STEPS	<ul style="list-style-type: none"> Announcements to phase out gasoline and diesel car sales including Denmark, Ireland, France, Netherlands, Norway, Slovenia, Sweden and United Kingdom. Renewable energy share in the transport sector of 14% by 2030; as well as a cap on food-based biofuels. Fuel Quality Directive, reducing GHG intensity of road transport fuels by 6% in 2020. CO₂ targets for PLDVs and commercial LDVs with an intermediate target of 15% below 2021 levels by 2025, new cars will emit on average 37.5% less CO₂ and new vans on average 31% less CO₂ below 2021 levels by 2030. CO₂ standards applied to subset of HDVs; 15% and 30% lower emissions by 2025 and 2030 respectively, assuming 2019 as a base year. Buses: Clean vehicles directive requires local authorities to purchase at least a quarter of low/zero-emission buses by 2025 and at least a third by 2030. Domestic aviation: ETS in accordance with 2030 Climate and Energy Framework.

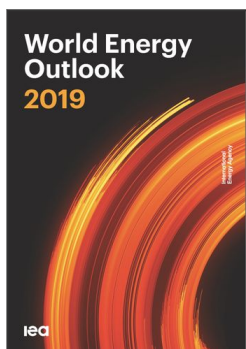
Table B.11 ▶ **Transport sector policies and measures as modelled by scenario in selected regions** (continued)

	Scenario	Assumptions
Canada	STEPS	<ul style="list-style-type: none"> EVs: The federal government aims for certain market shares of zero emission cars by 2040 (10% by 2025, 30% by 2030 and 100% by 2040).
Korea	STEPS	<ul style="list-style-type: none"> EVs: Korea targets for 430,000 BEVs and 67,000 FCVs by 2022.
Japan	CPS	<ul style="list-style-type: none"> Financial incentives for plug-in hybrid, electric and fuel cell vehicles. PLDVs: fuel-economy target at 19.4 kilometres per litre (km/L) by 2020. Post New Long-term Emissions Standards for LDVs and HDVs equivalent to Euro 6 and VI.
	STEPS	<ul style="list-style-type: none"> Heavy-duty vehicles: New fuel efficiency standards for trucks and busses enhancing fuel efficiency by 13.4% for trucks and 14.3% for buses by 2025 compared to 2015. PLDVs: fuel-economy target at 25.4 (km/L) by 2030. Revitalisation strategy: target sales share of next generation vehicles of 50-70% by 2030. EVs: stock target of 1 million by 2020, including purchase incentives and infrastructure. Basic Strategy for Hydrogen: fleet of 800 000 fuel cell vehicles and 1 200 buses by 2030.
China	CPS	<ul style="list-style-type: none"> Ethanol and biodiesel blending mandates of 10% and 7% respectively in some provinces. Promotion of fuel-efficient/ hybrid cars and EVs; consolidation of vehicle charging standards. PLDVs: cap on sales in some cities to reduce air pollution and traffic. LDVs: China 6 emissions standards and Euro 6 equivalent fuel sulfur standards. HDVs: China V (diesel) emissions standards and Euro VI equivalent fuel sulfur standards.
	STEPS	<ul style="list-style-type: none"> Subsidies for alternative-fuel vehicles, mainly public buses. Policy scheme for regulating the circulation of oil-fuelled scooters and support for electric scooters. PLDVs: <ul style="list-style-type: none"> Stock target of 5 million electric cars by 2020, including purchase and use incentives. New Energy Vehicle mandate: credit target of 12% of the car market by 2020. Fuel-economy target at 5 litres per 100 km by 2020, and enforcement of 4 litres per 100 km target by 2025. HDVs: Stage III of National Standard targeting a 15% reduction in fuel consumption compared to 2015 from 2021 onwards. Promotion of public transport in large and medium cities. Targets for roll out of hydrogen refuelling stations and hydrogen vehicles by 2030.
India	CPS	<ul style="list-style-type: none"> Increasing blending mandate for ethanol and support for alternative-fuel vehicles. LDVs: Bharat IV emissions standards and Euro 4 equivalent fuel sulfur standards. HDVs: Bharat IV emissions standards and Euro IV equivalent fuel sulfur standards.
	STEPS	<ul style="list-style-type: none"> Declared intent to move to 30% electric share in vehicle sales by 2030. Extended support for alternative-fuel two/three-wheelers, cars and public buses. National Biofuel Policy with indicative blending share targets for bioethanol and biodiesel. LDVs: Bharat VI emissions standards by 2020; fuel-economy standards at 113 g CO₂/km in 2022. HDVs: Bharat VI emissions standards by 2020; fuel-economy targets for 2018 and 2021. Dedicated rail corridors to encourage shift away from road freight. Phase II of the FAME for promoting electrification of vehicle fleet.

Table B.11 ▶ **Transport sector policies and measures as modelled by scenario in selected regions** (continued)

	Scenario	Assumptions
Brazil	CPS	<ul style="list-style-type: none"> • Ethanol blending mandates in road transport of minimum 27%. • Biodiesel blending mandate of 9% in 2018 and 10% in 2019. • LDVs: PROCONVE L6 emissions standards, equivalent to Euro 5 but without limit on PM; Euro 2 (gasoline) and Euro 4 (diesel) equivalent fuel sulfur standards. • HDVs: PROCONVE P7 emissions standards, equivalent to Euro V; Euro II (gasoline) and Euro IV (diesel) equivalent fuel sulfur standards.
	STEPS	<ul style="list-style-type: none"> • RenovaBio: further increase of ethanol and biodiesel blending mandates to cut carbon emissions from fuels sector by 10 % through 2028. • LDVs: Rota 2030 initiative targeting fuel efficiency improvement of 11% by 2022 compared to 2017 levels. • Local renewables-based fuel targets for urban transport. • National urban mobility plan. • Long-term plan for freight transport.

Notes: ppm = parts per million; WEM = World Energy Model; NO_x = nitrogen oxides; g/km = grammes per kilometre; PM = particulate matter; CAFE = Corporate Average Fuel Economy; PLDVs = passenger light-duty vehicles; LDVs = light-duty vehicles; HDVs = heavy-duty vehicles; EVs = electric vehicles; BEVs = battery electric vehicles; FCVs: fuel cell vehicles; GHG = greenhouse gases; g CO₂/km = grammes of carbon dioxide per kilometre; FAME = Faster Adoption & Manufacturing of Electric (and hybrid) vehicles; ETS = emissions trading system; EPA = Environmental Protection Agency; NHTSA = National Highway Traffic Safety Administration; PROCONVE = *Programa de Controle da Poluição do Ar por Veículos Automotores* (Motor Vehicles Air Pollution Control Program).



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