

Are We Doing Enough? Global Action on Climate Change

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INTRODUCTION



ARE WE DOING ENOUGH? NATIONALLY DETERMINED CONTRIBUTIONS TO GLOBAL ACTION ON CLIMATE CHANGE

The signatories of the 2015 Paris Agreement submitted 'nationally determined contributions' (NDCs), their individual and voluntary planned actions to reduce emissions and otherwise tackle climate change, with the intention to achieve the Paris aspiration of limiting warming to no more than 1.5°c by 2100. Five years after the Agreement, the deadline is approaching to review and update the NDCs.

How does the review process work? How ambitious and achievable are the existing NDCs, and how are they likely to be upgraded? What would the impact of existing and new NDCs be on energy production and demand? And what will the current round of NDC updates bring in the process of climate diplomacy?

Sustainability Report

This research paper is part of a 12-month series published by the Al-Attiyah Foundation every year. Each in-depth research paper focuses on a prevalent sustainable development topic that is of interest to the Foundation's members and partners. The 12 technical papers are distributed to members, partners and universities, as well as made available online to all Foundation members.



- The Paris Agreement of 2015 aspired to limit global warming levels to no more than 1.5°c by 2100.
- The signatories to the Agreement, nearly all countries across the planet, agreed to submit voluntary NDCs outlining their plans to meet their share of the required greenhouse gas (GHG) emissions mitigation, and also discussing their plans for climate adaptation and finance.
- The NDCs are meant to be updated every five years, so new NDCs should be submitted in 2020, ideally including greater ambition on mitigation. Covid-19 and political developments, notably the role of the US, may delay some countries' updates until 2021.
- Current NDCs are very varied in ambition, detail and methodology.
 Overall, they appear consistent with 2.3-3.5°c of warming, well above the Paris aspirations. Only a few countries, mostly small emitters, have NDCs that appear consistent with the 1.5°c goal.
- Existing NDCs examined here are strong on efficiency and renewable targets, and (for developing countries) land-use change, but generally weak on industry, electric transport, aviation, nuclear, hydrogen, and carbon capture, use and storage (CCUS).
- As formulated, the NDCs would probably have a relatively modest impact up to 2030, and a stronger one thereafter. They would reduce energy use through efficiency, and cut coal consumption, with the main effect being in the power sector.

 Several major emitters have indicated they will not strengthen their NDC targets in this round. This will put the burden of deeper material commitments on the EU, China, India and the GCC. But NDC updates in 2020 should bring more detail and specificity, possibly updates on technologies that have advanced since 2015 such as solar power and battery cars, and more attention on adaptation.

THE NDC PROCESS

The Paris Agreement of 2015 (which entered into force on 5 October 2016 marked a change in approach to global climate change policy, from the Kyoto Protocol which, in principle, established binding emissions limits on developed countries.

COP15 in Copenhagen in 2009 did not yield a binding successor to the Kyoto Protocol, which expired in 2012. Instead, the resulting accord stated that countries would seek to keep global warming below 2°c; that developed countries (in the Kyoto definition) would submit emissions plans for 2020 by the end of 2010, and that developing countries would implement 'Nationally Appropriate Mitigation Actions' (NAMAs) to slow emissions growth. A Green Climate Fund was established. And the parties agreed to assess implementation of the accord by 2015, which was ultimately when the Paris talks took place.

In 2013, countries were asked to submit their intended nationally determined contributions (INDCs), seen as a compromise between the developed countries' Kyoto/Copenhagen commitments to reduce emissions, and the developing countries' NAMAs.

Under the Paris approach, signatories were to prepare and communicate NDCs, reflecting "common but differentiated responsibilities" i. When a country ratified Paris, its INDC became its NDC unless it chose to submit a new NDC. Both developed and developing countries submit NDCs, and thus all are expected to make mitigation efforts. These NDCs are determined by each country, and their implementation is voluntary (there is no direct enforcement mechanism). In principle, the sum of the ambitions of all NDCs should achieve the Paris goal of limiting warming to no more than 2°c, and attempting to keep warming below 1.5°c, beyond pre-industrial levels. NDCs also include commitments on adaptation to climate change and to climate finance and may include climate-related efforts on such issues as gender equality, economic equality, human development, biodiversity, human rights and a 'just transition' ".

Eight countries have not yet ratified the Agreement, including four important oil producers: Iran, Iraq, Libya and Angola, with Turkey, Yemen, Eritrea and South Sudan ⁱⁱⁱ. The US confirmed it would sign the Paris Agreement on 1 April 2016 and submitted its NDC on 3 September 2016. However, the Trump administration announced on 1 June 2017 that the US would leave the Paris Agreement, a withdrawal that becomes effective on 4 November 2020. The EU submitted one NDC on behalf of all member countries.

Each country determines how it compiles its NDC, and the responsible body. This would typically involve a nation's Ministry of Environment along with the Ministry of Energy (or equivalent), Ministry of Finance/Economy, Ministry of Planning and others.



THE NDC PROCESS

NDC targets should be harmonised with national development plans (if any). Stakeholder consultation could include, "the Federal, State and Local Governments, civil society, private sector, communities and individuals...and the media" ^{iv}, including environmental and development-oriented NGOs, and possibly also the security services.

PERIODIC REVIEW OF NDCS

NDCs are intended to run on a five-year cycle. During 2020, countries should submit new NDCs if their original covered the period up to 2025 or update their NDC if their original ran until 2030. Parties were also invited to communicate their long-term low-GHG development strategies by 2020.

So far, four countries have submitted their second NDC: Marshall Islands (2018), Suriname (2019), and Norway and Moldova (2020). Japan has reaffirmed its existing 2030 NDC. Another 41 countries have indicated they will update their NDCs, and 68 have stated that they will enhance them. The US will presumably not submit an updated NDC in 2020, though it will likely do so in 2021 if a Democratic administration is elected and re-joins the Paris Agreement ^v.

So far, 17 parties have submitted their longterm strategies, including the EU as a bloc as well as five individual EU members, the US, Mexico, Canada, Japan, Singapore, Costa Rica, Fiji, the Marshall Islands, Ukraine, the UK, and Benin ^{vi}. The effects of the updated NDCs are discussed below.



HOW WILL COVID-19 AFFECT THE NDC REVIEWS?

COP26 was intended to be held in Glasgow, Scotland, in November 2020 but because of the Covid-19 pandemic, the event has been rescheduled to November 2021. Despite this, countries are still expected to submit their updated NDCs in 2020. The crisis may delay or interrupt some of the process and increases the uncertainty around specific actions and targets.

For instance, Chinese researchers think the country may not submit its new NDC before the US election, because of the focus on Covid-19 and the policy impact of a possible change of American administration. Or, China and India may submit nominal updates to their NDCs in 2020 and give enhanced targets later when there has been time to engage with the US and fully take into account the effects of the virus vii.

The health restrictions and economic impacts of the pandemic have strongly reduced emissions, due to lower travel and other activity. Initial estimates suggest a 4.5% drop in GHG emissions during 2020 ^{viii}. This effect is likely to be mostly temporary, although renewable energy has gained in its share of the mix.

Plans for a 'Green New Deal' from the Democratic Party in the US, and a 'European Green Deal' in the EU, could see an intensified focus on the environment in post-viral recovery plans. This may be reflected in NDC updates, though the US will not submit one this year, as the Trump administration's withdrawal becomes effective on 4 November 2020.



A relatively small number of countries are responsible for most energy production and consumption and GHG emissions. Consideration of just China, the US, the EU and GCC covers around 50% of emissions and fossil fuel production; the top ten countries/ blocs gives coverage of almost 80%; the top 20 covers around 90%. Mining and use of coal are even more concentrated. However, agriculture and land-use change emissions (deforestation, reforestation) are more evenly distributed, including in countries which are not large fossil-fuel users or producers.

The Paris Agreement was intended to provide all countries a platform to contribute to tackling climate change, in line with the principle of common but differentiated responsibilities. Therefore, this discussion will cover a selection of representative countries, including the major emitters, energy producers and consumers; small island developing states (SIDS); and least developed countries (LDCs). Morocco and Gambia are covered because they are the only two countries assessed as 'Role Models' by Climate Action Tracker; Ethiopia and Bhutan as LDCs ^{ix} assessed as '2°c Compatible' by Climate Action Tracker *; Costa Rica as another notable environmental leader; and the Marshall Islands and Fiji as SIDs which have submitted updated NDCs and/or long-term strategies.

Other country groupings could be considered, for instance the Association of South-East Asian Nations (ASEAN), the Commonwealth

CO ₂ emissions	c	Oil		Gas		Coal	
	Production	Consumption	Production	Consumption	Production	Consumption	Generation
China	GCC	US	US	US	China	China	China
US	US	China	Russia	EU	Indonesia	India	US
EU	Russia	EU	GCC	Russia	US	US	EU
India	Canada	GCC	Iran	China	Australia	EU	India
Russia	Iraq	India	China	GCC	India	Japan	Russia
GCC	China	Japan	Canada	Iran	Russia	South Africa	Japan
Japan	Iran	Russia	Australia	Canada	South Africa	Russia	Canada
Iran	Brazil	South Korea	Norway	Japan	EU	South Korea	GCC
South Korea	Nigeria	Canada	EU	Mexico	Colombia	Indonesia	Brazil
Indonesia	Kazakhstan	Brazil	Algeria	UK	Kazakhstan	Vietnam	South Korea
Canada	Mexico	Iran	Malaysia	India	Other Asia-	Australia	Mexico
					Pacific		
South Africa	Norway	Mexico	Indonesia	Egypt	Canada	Turkey	UK
Mexico	EU	Indonesia	Egypt	South Korea	Mongolia	Kazakhstan	Iran
Brazil	Algeria	UK	Turkmenistan	Australia	Vietnam	Other Asia	Turkey
						Pacific	
Australia	Angola	Thailand	Uzbekistan	Thailand	Turkey	Taiwan	Indonesia
UK	Libya	Singapore	Nigeria	Argentina	Other	Ukraine	Taiwan
					Europe		
Turkey	UK	Australia	Argentina	Pakistan	Other Africa	Malaysia	Australia
Thailand	Venezuela	Turkey	UK	Algeria	Ukraine	Other Europe	South Africa
Vietnam	Colombia	Taiwan	Thailand	Indonesia	Serbia	Philippines	Vietnam
Taiwan	India	Malaysia	Trinidad	Uzbekistan	Mexico	Thailand	Egypt

TABLE 1 TOP 20 COUNTRIES IN DESCENDING RANK ORDER IN EMISSIONS AND FOSSIL FUEL PRODUCTION AND USE ^{xi}

of Independent States (CIS), the Shanghai Cooperation Organisation (SCO), China's Belt and Road Initiative (BRI), the G77 coalition of 134 developing countries, the African Union, the Arab League, or the Organization of Petroleum-Exporting Countries (OPEC). Of course, many countries are members of several of these organisations.

The top 20 in each category of CO_2 and energy consumption are shown in (Table 1), counting the EU (ex-UK) and GCC as single blocs, and including CO_2 emissions from fossil fuel combustion only (excluding non- CO_2 greenhouse gases, and CO_2 from other sources such as cement and land-use change).

Some other countries, such as New Zealand, Norway, Singapore and smaller non-EU European countries will likely also follow the policies of their bigger neighbouring states. The success of

TABLE 2 SHARE OF KEY ENERGY OUTPUTS BY COUNTRY GROUP ^{xii}

% of world	China +	Тор	Тор	
total	US + EU +	10	20	
	GCC			
CO ₂ emissions	56.7%	77.1%	88.8%	
Oil production	46.3%	78.8%	92.5%	
Oil	53.6%	73.5%	87.5%	
consumption				
Gas	40.7%	77.1%	90.4%	
production				
Gas	48.5%	75.6%	88.4%	
consumption				
Coal	58.9%	95.1%	99.7%	
production				
Coal	64.0%	89.1%	96.8%	
consumption				
Electricity	58.6%	79.1%	89.5%	
generation				

lower-income countries, particularly in Africa, will also depend heavily on technology and aid from wealthier states.

NDCs of key selected countries are shown below and analysed in terms of their key provisions.

NDCs' overall ambition xiii

Not all NDCs explain a specific ambition, but usually, they quantify the emissions reduction to be expected by 2020 or other dates. 'BAU' in the table refers to 'Business as Usual' projections, ie without mitigation. In the following discussion, many countries do not give quantitative targets in their NDCs for specific areas, and in these cases, an extract of the qualitative language is mentioned. The table on the following page indicates that an issue is not mentioned in a country's NDC.

Overall ambitions are very variable in the way they are defined (quantities, per cent versus a baseline data, per cent versus businessas-usual, intensity of GDP), the actual level, and whether land-use or international offsets are included. Some countries also define unconditional and conditional mitigation, depending on climate diplomacy developments or the provision of finance and technology. Some countries do not quantify their mitigation at all. A few, such as Indonesia, Morocco and the Marshall Islands, give detailed sectoral breakdowns of planned mitigation.

There is relatively little coverage of macroeconomic measures to achieve these targets – namely a carbon cap or tax – apart from China, the EU and South Korea, which have active carbon trading schemes (so do some US states, though the nation's NDC does not mention this).

Country	Emissions reduction	Carbon tax /	
		сар	
China	Peak CO ₂ by 2030	Build on	
	Carbon intensity - 60-65%	emissions	
	below 2005 by 2030	trading pilots	
US	GHG -26-28% on 2005 by	No use of	
	2025	international	
		C markets	
EU	-40% on 1990 by 2030	Emissions	
		trading	
		scheme	
		active. No use	
		of	
		international	
		C markets	
India	GHG intensity -33-35% on	Coal and oil	
	2005 by 2030	taxes	
Russia	-25-30% on 1990 by 2030	Cap-and-trade	
		system now	
		abandoned	
Saudi	-130 Mt/CO $_2$ e on BAU by	×	
Arabia	2030		
UAE	Not specified	×	
Qatar	Not specified	×	
Kuwait	Not specified	×	
Oman	-2% on BAU by 2030 (-1.8	×	
	Mt)		
Bahrain	Not specified	×	
Japan	-26% on 2013 level by	Allowing the	
	2030	Joint Crediting	
		Mechanism	
Iran	-4% on BAU by 2030	Allows for	
	-8% on BAU by 2030 with	carbon credits	
	end of sanctions and		
	provision of finance		
South	-37% on BAU of 850.6	Includes 16	
Korea	Mt/CO ₂ e by 2030 (-31.5%	Mt/CO ₂ per	
	on estimated 2020 level)	year credits	
		from	
		international	
		markets.	
		Active	
		emissions	
		trading	
		scheme	

Indonesia	-26% vs BAU by 2020	Mentioned
	-41% vs BAU by 2020 with	indirectly
	international assistance	
	-29% vs BAU by 2030	
	(2.869 Gt/CO ₂ e).	
	Detailed reduction	
	scenarios by sector	
Morocco	-42% below BAU by 2030,	Use of
	equivalent to 527	international
	Mt/CO ₂ e reduction	market
	between 2020-30,	mechanisms
	conditional on financing.	
	Unconditional -17% below	
	BAU.	
Gambia	-44.4% by 2025 and -	Would be a
	45.4% by 2030	host country
		for
		international
		carbon credit
		mechanisms
Costa	Carbon neutral by 2021	Creating
Rica	44% emissions on BAU by	forest carbon
	2030, -3.07 Mt/CO ₂ e.	credits
Ethiopia	-64% on BAU by 2030 (-	Will sell
	255 Mt/CO ₂ e)	carbon credits
Bhutan	Remain carbon-neutral	Will sell
		forestry and
		hydropower
		export offsets
Marshall	-32% on 2010 level (185	No purchase
Islands ^{xiv}	kt/CO ₂ e) by 2025; -45%	of credits
	on 2010 level by 2030	
Fiji	-10% on BAU by 2030;	×
	conditional -30% on BAU	

NDCs on low-carbon energy

This relates to the introduction of low-carbon energy, particularly in power generation, with renewables including wind, solar, biomass, hydropower and other technologies. Coal refers to reducing coal use or replacing with natural gas. CCUS covers carbon capture, use and storage, as well as other carbon removal technologies.

Country	Renewables	Nuclear	Coal	CCUS
China	Non-fossil 20% by 2030	Develop	Improve efficiency to	R&D and
			300g coal/kWh	demonstration
US	Clean Air Act. EIA projects 24% of electricity in	EIA projects 16% of	EIA projects 22% of	×
	2019 to 32% in 2030	electricity in 2019 to	electricity in 2019 to	
		10% in 2030	17% in 2030	
EU	32% of final energy by 2030	×	×	General mention
India	Non-fossil capacity 40% by 2030. 60 GW wind,	63 GW by 2032.	Improve generation	×
	100 GW solar, 10 GW biomasses, by 2022	Advanced reactors	efficiency	
Russia	4.5% by 2024	×	×	×
Saudi Arabia	Solar, wind, geothermal, waste-to-energy	×	×	Petrochemical 0.55
				Mt/year and CO ₂ -EOR
UAE	24% clean energy by 2021		×	CCUS network
Qatar	Employ with technology transfer	×	×	×
Kuwait	\checkmark	×	×	×
Oman	Increase	×	×	×
Bahrain	Pilot solar	×	×	Industrial CCUS
Japan	22-24% by 2030	20-22% by 2030	26% by 2030	CO ₂ use in chemicals
Iran	Mentioned	Mentioned	×	Mentioned
South Korea	20% by 2030 (3% in 2017), total 129 GW by 2040	Reducing	Probably reducing	×
Indonesia	23% by 2025, 31% by 2050	×	30% by 2025, 25% by	'Clean coal'
			2050	
Morocco	52% of electricity production by 2030	×	×	×
Gambia	To be used in lighting, health, water pumping,	×	×	×
	communications			
Costa Rica	Already ~98%; target 100% by 2030	×	×	×
Ethiopia	Increase renewables, particularly hydro	×	×	×
Bhutan	Increase hydro exports to offset 22.4 Mt/CO ₂ e.	×	×	×
	Diversify into solar, wind, biomass			
Marshall	Solar to replace oil power; small-scale wind;	×	×	×
Islands	biomass; ocean energy			
Fiji	100% renewables by 2030 from 60% in 2013	×	×	×

All the NDCs examined include renewables, often with detailed quantitative targets, split by technology. Only India and the UAE specifically mention nuclear as a low-carbon approach. Very few give specific mentions for reducing coal use. Some, particularly the oil-exporting states, cover carbon capture, use and storage (CCUS).

NDCs on efficiency and subsidies

These topics relate to improving energy efficiency, removing energy or fossil fuel subsidies, cutting fugitive emissions and flaring in the petroleum industry, and reducing non- CO_2 GHGs such as hydrochlorofluorocarbons (HCFCs).

Efficiency features heavily in all the examined NDCs, often with detailed quantitative targets per sector. However, specific efficiency technologies and policies are rarely covered, apart from vehicle fuel efficiency standards, appliance standards and low-energy lighting.



Similarly, the reduction of non-CO₂ GHGs is often mentioned in general, but apart from capturing landfill and fugitive methane, not generally specified further.

Country	Efficiency	Subsidies	Flaring / methane	Non-CO2
China	Improve. 50% new green buildings	Price reform	×	HCFC reduction
US	Vehicle, appliance and building efficiency standards	×	×	Alternatives to
				HFCs
EU	Improve 32.5% by 2030	×	×	
India	Vehicle efficiency standards; energy conservation act;	Fossil fuel	×	×
	standards, labelling; CFL and LED lighting; industrial	subsidy cuts		
	efficiency trading			
Russia	×	×	Flaring rules mostly	×
			avoided	
Saudi Arabia	Industry, building and transport efficiency covering	×	Minimise	×
	>90% of energy demand			
UAE	Building and appliance standards, demand-side	Tariff reform	Reduce further	×
	management, district cooling	and fuel		
		subsidy		
		removal		
Qatar	Improve	×	Reduce methane	×
			from waste	
Kuwait	New refinery, clean fuels	×	×	×
Oman	Efficiency improvement	×	Reduce	Reduce HCFCs
Bahrain	Efficiency programmes; vehicle standards; efficient	×	Flare reduction	NOx reduction
	lighting			
Japan	Broad set of efficiency policies across industry,	×	-12.3% methane on	-6.1% N ₂ O on
	buildings, transport, lighting		2013 level by 2030	2013 by 2030
				-25.1% fluorinated
				cases on 2013 by
				2030
Iran	Improved generation and demand efficiency. Energy	Phase out	Reduce gas leakage	×
	service companies	subsidies	and flaring	
South Korea	Vehicle efficiency standards comparable to EU levels.	×	×	×
	Building efficiency standards			
Indonesia	In industry, water & final consumption	×	In industry &	
			agriculture	
Morocco	Energy consumption -15% below BAU by 2030	Continue	×	HCFC mentioned
		reducing fossil		but minor
		fuel subsidies		
Gambia	Reduce transmission losses; vehicle efficiency	×	Landfill methane	Covered but no
	standards		capture	specific mitigation
Costa Rica	Residential, industrial and transport efficiency	×	Reduction from	Reduction of N ₂ O
			agriculture	from agriculture
Ethiopia	Public transport	Already	×	Reduction of N ₂ O
		removed fossil		and CH ₄ from
		fuel subsidies		agriculture
Bhutan	Vehicle standards; improve efficiency in buildings,	×	×	CH ₄ and N ₂ O
	industry, appliances			covered but no
				specifics
Marshall	Generation and demand efficiency	×	Landfill methane	N ₂ O mentioned;
Islands			recovery	others negligible
Fiji	-10% CO ₂ cuts from efficiency	×	×	×

NDCs on transport

This discusses topics related to lower-carbon or more efficient transport.

Electric vehicles (EVs) are not mentioned as often as might be expected, and generally without quantitative targets or specific policies. This might change in the next round of NDCs, given the improvement in EVs' cost and performance since 2015. Biofuels occur in eight of the 22 NDCs studied. Hydrogen is only considered a significant option by Japan and South Korea. Rail and other public transport are quite widely included. Overall, this does indicate the



Country	Electric vehicles (EVs)	Biofuels	Hydrogen	Public transport
China	Priority	×	×	30% in cities by 2020
US	State-level measures and CAFE	Renewable fuel	×	×
	standards	standard		
EU	35% passenger cars by 2030	14% in transport by 2030	× (see below)	Incentivise rail
India	Domestic manufacturing	20%	Vehicle storage	Increase freight railways; city metros
Russia	×	×	×	×
Saudi Arabia	×	×	×	×
UAE	Encourage by regulations	×	×	Rail network and metros
Qatar	×	×	×	Introduced
Kuwait	×	×	×	New metro & railway
Oman	×	×	×	×
Bahrain	×	×	×	Light rail
Japan	Promoted	×	'Hydrogen society' by 2050	Promote rail
Iran	×	Mentioned	×	×
South Korea	430,000 by 2022	×	15 GW by 2040	×
Indonesia	×	90-100% B30	×	×
Morocco	×	×	×	Large-scale public transport in urban centres
Gambia	×	Mentioned	×	×
Costa Rica	Electric transport is key	×	×	Electric train
Ethiopia	×	×	×	Invest in rail
Bhutan	Promote	×	×	Improve mass transit; introduce non-road transport
Marshall	Electric boats	Coconut oil	×	×
Islands		blending		
Fiji	Option	Option	Research	Ruled out

difficulty most countries found in proposing realistic policies to reduce transport emissions, especially from shipping and aviation, which are mentioned in very few NDCs.

NDCs on agriculture, land-use and industry

These parts of NDCs cover emissions from landuse and industry, particularly related to process

Country	Agriculture	De/re-reforestation	Waste	Industry
China	Reduce CH_4 and N_2^0	Forest stock +4.5	Recycling. Recover landfill CH4	Promote low-carbon
	emissions	billion m3 by 2030		industry. Circular
				economy. Conservation &
				efficiency.
US	Improved fertilisers, soil	Avoid deforestation	EPA ^{xvii} standards	×
	management, other			
	measures			
EU	Some offsets allowed			Efficiency targets
India	2.5-3 Gt/CO ₂ e sink by	'Green India' mission;	Recycling and waste-to-energy	Energy efficiency; fly ash
	2030	24% forest cover in		reuse; GHG disclosure
		2013 to 33% long-term		
Russia	New nitrogen fertilisers	'Maximum possible	Waste management system	×
		account of absorbing	and landfill reclamation	
		capacity of forests'		
Saudi Arabia	×	×	Recycling and waste-to-energy	Efficiency
UAE	×	Coastal carbon	Increase treatment	CCUS, efficiency,
		sequestration		diversification
Qatar	×	×	Treat, reduce and recycle	×
Kuwait	×	×	×	×
Oman	Unspecified carbon sinks		Methane recovery from landfill	Improve efficiency
Bahrain	×	Coastal carbon	×	Efficiency
		sequestration		
Japan	Sequester 0.6% of 2013	Sequester 2% of 2013	Reduce methane from waste	Improve efficiency6.5%
	emissions	emissions		CO ₂ on 2013 by 2030
Iran	Sustainable agriculture	Forest management	Waste-to-energy mentioned	Modern technologies
South Korea	×	-22 Mt/CO ₂ per year	×	Energy efficiency
		from forestry sinks		
Indonesia	Low-emission crops;	REDD+	Paper recycling, refuse-derived	Cement, ammonia, steel,
	water efficiency; biogas;	Halt unplanned	fuel, landfill gas	aluminium feedstock and
	cattle feed supplements	deforestation by 2030		efficiency improvements
Morocco	4% of 17% unconditional m	nitigation target, 8% of	Waste management plan,	48% of total energy
	42% conditional target		recycling	savings from industry
Gambia	Reduce methane from	Afforestation; reduce	Recycling, landfill methane	Efficiency
	rice	firewood use	capture	
Costa Rica	Reduced non-CO ₂	Pay for reduced	Recycling and waste	Efficiency and fuel-
		emissions	management	switching
Ethiopia	-90 Mt/CO ₂ e by 2030	-130 Mt/CO ₂ e by 2030	×	-20 Mt/CO ₂ e by 2030
Bhutan	Smart agriculture	Maintain current	Zero-waste	Energy efficiency; higher-
		forest cover; continue		value and 'green'
		C neutrality		industries
Marshall	Agriculture rehabilitation	Mangrove	Pre-sorting and landfill	×
Islands		rehabilitation	methane capture	
Fiji	Waste use; minimise soil	REDD+ mitigation	Biogas from waste	Biomass
	erosion			

and fuel emissions in industry, deforestation or other forms of carbon loss from ecosystems, and mostly non- CO_2 GHG in agriculture, notably methane and nitrous oxide. REDD+ refers to 'reducing emissions from deforestation and forest degradation', along with sustainable management of forests, specifically in developing countries.

Not surprisingly, the developing countries discuss agricultural emissions (generally a much larger share of their total than for developed countries) in some detail. Forestry and coastal 'blue carbon' emissions or offsets are important for many of the heavily forested developing countries. Nearly all NDCs mention capturing landfill methane, and many include waste recycling and re-use.

Industrial emissions are generally to be tackled by efficiency measures, and sometimes by changing of feedstocks or fuel switching. This is problematic given that most energy-intensive industries in competitive economies already operate quite close to maximum feasible efficiency levels. Very few NDCs mention renewable heat, CCUS or hydrogen as options for industrial decarbonisation, and very few (Bhutan is an exception) discuss the potential to shift the industrial base into new and 'green' sectors. This highlights industry alongside transport as another problematic sector, where the first round of NDCs covered incremental improvements but struggled to identify realistic policies for deep decarbonisation.



NDCs on adaptation and climate finance

This group of NDC goals relates to adaptation (how countries will deal with the inevitable

impacts of unavoidable climate change), and how they will receive, use or provide climate finance for themselves or other countries' mitigation and adaptation efforts.

Country	Adaptation	Climate finance
China	National strategy for adaptation; strengthen	New financing mechanisms; emissions trading;
	international cooperation; requirement to support	developed countries to provide finance ^{xvi} ; Green
	developing countries	Climate Fund
US	Not mentioned	Not mentioned but addressed by other policies
EU	Not mentioned but addressed by other policies	Not mentioned but addressed by other policies
India	National Action Plan on Climate Change. Forestry,	Tax-free infrastructure bonds. Adaptation needs
	agriculture, water, poverty reduction, capacity-	\$206 billion during 2015-2030. Energy efficiency
	building, health, disaster relief and other	funds.
	programmes.	
Russia	Measures on drought and fires	×
Saudi Arabia	Marine protection, reduced desertification, water,	NDC not contingent on climate finance, but
	weather warning	technology transfer requested
UAE	Water conservation, wetlands, food security	Mentions mobilisation of climate finance for
		high-income developing countries
Qatar	Water conservation & desalination	Mentions mobilisation of climate finance for
		developing countries
Kuwait	Green belts, food security, district cooling, coastal	×
	monitoring	
Oman	Sea-level rise, fisheries, water scarcity, floods, energy	Transfer of funds, capacity building and
	security, food security	technology transfer from UNFCCC
Bahrain	Coastal resilience; water scarcity; artificial reefs	Transfer of funds, capacity building and
		technology transfer
Japan	x	JCM to cut 1 Gt/CO ₂ by 2030
Iran	Water scarcity, food security	\$17.5 billion for unconditional mitigation and
		\$52.5 billion for conditional mitigation
South Korea	National Adaptation Plan 2010	×
Indonesia	Forest management, soil and water conservation,	Needs international finance
	national adaptation plan; resilience in food, water	REDD+ financing
	and energy; disaster preparedness	
Morocco	Detailed adaptation plan. Manage impact on	Requires \$35 billion for adaptation 2020-30
	agriculture, aquaculture, forestry, fishing, tourism	Needs \$24 billion financial support for its
	and sensitive ecosystems. Manage water scarcity.	mitigation commitment, out of \$50 billion total
		cost
Gambia	National adaptation plan, including flood resilience,	Access to Green Climate Fund. Renewable energy
	agriculture, disaster preparedness	and efficiency funding are priorities.
Costa Rica	Preparing adaptation plan covering water,	Forestry finance; microcredit
	biodiversity, disaster risk	
Ethiopia	Focused on drought, floods, fire, pests and diseases	National fund; requires global climate change
		finance
Bhutan	Water security, resilient agriculture forest	REDD+ credits; hydropower offsets
	monitoring, health, infrastructure	
Marshall Islands	Disaster resilience; sea-level rise	Relies on external finance
Fiji	Sea defences, relocation, cyclone proofing	Conditional target requires \$500 million
		financing

Adaptation is covered in varying levels of detail in the NDCs examined. Several refer to existing or to-be developed national adaptation plans for more detail. Common themes, especially for developing countries, are sea defences, water scarcity, food security, disaster preparedness, and managing impacts on agriculture. Infrastructure and urban resilience receive surprisingly little coverage, as do wider issues of adaptation such as international trade, migration and security.

Coverage of climate finance is similarly very varied. The developed countries usually cover it with other policies, such as their contribution to the Green Climate Fund. Many developing countries give specific figures for required finance and make mitigation efforts contingent on receiving finance and technology transfer. Carbon credits from forestry or other offsets are also a frequent element. Sometimes national funds are discussed in detail, but there is relatively little discussion surrounding international private finance. That element may also change in NDC updates, given the much greater commitment recently from major financial institutions to provide 'green' financing.



WHAT WILL THE EFFECT OF EXISTING AND NEW NDCS BE ON GLOBAL ENERGY PRODUCTION AND DEMAND?

The effect of the NDCs depends firstly on their scope and ambition; secondly, on how much they are tightened up in each successive five-year review (assuming the Paris process continues); and thirdly, on how much countries actually deliver on their NDCs.

Because of the inconsistent formats, baselines and time periods of the NDCs, the use or not of international credits, and the inclusion or not of land-use changes, between different countries, it is very hard to make a specific estimate of changes in emissions ^{xvii}. The effect on the energy mix is even more complicated, because emissions targets set 'top-down' could be met with multiple different combinations of sectoral actions. Some countries do not give numerical figures for their BAU or emissions reduction targets at all or specify a numerical reduction against BAU without guantifying the BAU. Some countries' emissions are conditional, either on others' adopting more ambitious goals, or on the provision of finance and/or technical assistance. The possible return of the US from January 2021 onwards is clearly another critical factor.

Overall, implementation of the actions in the NDCs are estimated to result in GHG emissions in 2030 of 47-63 Gt/CO₂e, compared to global emissions in 2010 of 51 Gt/CO₂e. Pathways that limit warming to 1.5°c have 2030 emissions of 25-30 Gt. So, the NDCs as currently formulated lead to outcomes between a slight fall and a significant increase in emissions, but they are not yet consistent with the Paris goal.

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Analysis of Asian countries indicates that implementation of their NDCs will replace coal with renewables, nuclear and gas. Between 2014 and 2030, the share of coal will fall from 67% to 49%, gas will rise from 8% to 11%, renewables from 21% to 31%, and nuclear from 2% to 8% ^{xviii}. Nevertheless, overall power sector emissions would still rise because of demand growth.

WHAT WILL THE EFFECT OF

EXISTING AND NEW NDCS

PRODUCTION AND DEMAND?

BE ON GLOBAL ENERGY

The results of a global analysis for the electricity sector are shown in (Figure 1) and (Figure 2).

FIGURE 1 GLOBAL ELECTRICITY PRODUCTION BY SOURCE, CURRENT POLICIES SCENARIO ^{xix}



FIGURE 2 GLOBAL ELECTRICITY PRODUCTION BY SOURCE, NDC SCENARIO ^{XX}

As can be seen, up to 2030, the difference of implementing the NDCs is not very large. Overall electricity consumption is somewhat reduced (-7%), nuclear and renewables increase, CCS begins to be introduced. The main effect is a plateau in coal consumption instead of a sharp increase. After 2030, the differences are much more marked, with a decline in coal almost to zero by 2050, a sharp reduction in gas, significant appearance of CCS and expansion of renewables and nuclear. Primary energy use is 9% lower in 2030 with the NDCs. The share of renewables and nuclear in all primary energy is 18.5% in 2030 and 19.5% in 2050 in the 'current policies' case, compared to 23.3% and 46.7% respectively in the NDC case.

The largest share of emissions reductions in this analysis come in the power sector. Industrial mitigation is mainly by reducing intensity, particularly in steel, while transport mitigation is primarily through electrification. Building sector reductions come through efficiency in heating, cooling and appliances. Land-use becomes a net sink for CO_2 between 2020 and 2030 due to reforestation and avoided deforestation. Energy-related methane and nitrous oxide are reduced, but non- CO_2 agricultural GHGs are seen as hard to reduce.





Many countries' NDCs do not even contain all their active climate policies or have levels of ambition below those that will be reached on 'business as usual' trends. For instance, China's NDC does not mention carbon taxes or markets, but the country does have a pilot emissions trading system applying to eight cities and provinces, with prices up to \$9/tonne CO_2^{xxi} . China's CO_2 emissions are likely to peak well before 2030, its NDC commitment ^{xxii}.

The US's NDC refers to numerous other policies, laws and projections without discussing them specifically; but its 45Q tax credit does provide support for CCUS projects.

Analysing the EU's NDC is complicated because there are numerous other EU policies and directives implicitly included in the NDC or introduced subsequently. Also, many of the EU's binding climate-related goals, such as its renewable and efficiency targets, are to be achieved by individual policies within each member state. The EU's NDC target of a 40% reduction in GHG emissions on 1990 levels by 2030 is, in combination with other policies, likely to result in a 48% reduction ******iii. Hydrogen was not mentioned in the EU's 2016 NDC but is covered by its July 2020 hydrogen strategy ******iv.

In the case of India, its non-fossil generation target would already improve its GHG intensity more than the NDC target *******. Saudi Arabia does not mention nuclear power in its NDC and does not give quantitative renewables targets, but it does have active programmes in both.

Economic and technological circumstances have also changed since 2015. Gas is currently more affordable versus coal; and the cost for renewables (particularly solar and wind), batteries and electric vehicles have all fallen sharply. The Covid-19 pandemic has severely reduced economic growth and so emissions in most countries. Accounting for these factors and the 'double-dipping' and conservatism in the original NDCs implies that the 2020 updates could be substantially more ambitious.

However, a number of leading emitters – Australia, Japan, Russia, USA, Indonesia, New Zealand and Singapore – have indicated that they will not strengthen their mitigation targets in their next submission. Eight, mostly very small, emitters have indicated stronger targets (including the four new NDCs discussed below) ******.

A further trend in the updates to NDCs seen so far is to strengthen the specificity of planned measures and projects. This is in contrast to many countries' first NDCs, which were very general, avoided quantitative targets, or referred to policies and plans yet to be developed or finalised. It is likely that, in the five subsequent years, that as more states submit their second NDCs, the level of detail will be much greater even if the overall mitigation ambitions do not change. More stakeholder dialogue and feedback has been taken into account, sometimes challenging the realism of certain proposed measures. There are also some minor updates to methodology, such as changes in global warming potential for non-CO₂ gases, and in the way land-use changes are accounted for.

The (few) updates made so far show these changes, except in the case of Japan, which just reaffirmed its existing NDC.

AMBITION AND ACHIEVABILITY

- The Marshall Islands xxvii added an indicative target to reduce its emissions 58% below 2010 levels by 2035. It also included a detailed new climate strategy to 2050, and committed to producing a national adaptation plan by 2019. The new climate strategy includes more on electric vehicles, renewables and hydrogen than in its first NDC.
- Suriname XXVIII broke down its mitigation commitment into more defined projects and measures. There are additional commitments in areas such as transport efficiency, a renewable energy law and increasing the renewable target from 25% by 2025 to 35% by 2030. It introduced a more robust plan on adaptation. Stakeholder feedback challenged the realism of ambitions on forest cover.
- Norway *** increased its mitigation target from a 40% reduction by 2030 to a 50% reduction and 'towards 55%' by 2030.
- Moldova ^{xxx} included adaptation (which was not in its first NDC). It increased its mitigation target from 64-67% below 1990 levels in 2030 to 70% below, and its conditional target from 78% to 88%.

Current policies are falling short of the NDC targets. For instance, Climate Action Tracker suggests that Paris pledges and targets would give 2.3-3.5°c of warming (mid-case 2.8°c) by 2100, in contrast with the 1.5°c goal. However, actual policies are set for warming of 2.3-4.1°c (mid-case 3°c) **xxxi**. In other words, governments are not yet implementing sufficient policies to reach their NDC commitments, which are themselves not enough to achieve the Paris goal.

Overall, Climate Action Tracker ranks most countries' efforts under their NDCs as insufficient to meet the Paris goals (Table 3). This may change when new NDCs are released and if firm policy commitments are made to deliver them.

Highly Insufficient 1.5°C insufficie insufficie 2-3°C compatible compatib nt >4°C nt le 3-4°C China Australia Bhutan Morocco Gambia Indonesia Brazil Costa Rica Saudi Japan Canada Ethiopia Singapore Chile India South EU Kenya Africa Ukraine South Kazakhstan Philippines Korea UAE Mexico New Zealand Norway Peru Switzerland

TABLE 3 CLIMATE ACTION TRACKER RATING OF COUNTRIES' MITIGATION EFFORTS XXXII

Therefore, technical and economic conditions for tighter mitigation, and the climate imperative, have strengthened since 2015. But as a set of major emitters will not tighten their targets, any significant overall increase in ambition will have to come from the remaining big GHG producers, notably the US, EU, China, India, and GCC.



IMPLICATIONS FOR MAJOR OIL AND GAS PRODUCERS

- Most major oil and gas producers' NDCs are very light on detail and specific commitments. This may be tightened up in the second round.
- NDCs mention some key technologies relevant to reducing the petroleum sector's carbon footprint, notably efficiency and CCUS, but the updates will need to cover hydrogen and go much deeper into realistic decarbonisation strategies, policies and projects.
- The overall impact of the NDCs particularly reduces coal demand, less so oil and gas, at least up to 2030. Efforts on efficiency will reduce overall energy demand.
- The reduction in coal creates an opportunity for increasing the use of gas and 'blue' (gas-derived) hydrogen in the medium term.
- After 2030, three new rounds of NDCs will be active (the 2020, 2025 and 2030 updates), assuming the process continues, therefore current NDCs are less relevant to the post-2030 period.
- Some technologies, such as EVs and hydrogen, that are not very strongly represented in the NDCs have gained in interest and competitiveness recently, so overall climate policy cannot be simply analysed in terms of the past NDCs.
- Land-use change should become an important carbon sink. Oil and gas producers can work with states with major forestry and agricultural sectors, as well as developing their own 'blue carbon' sinks.

 The NDCs will also have secondary impacts which affect oil and gas producers, particularly catalysing the development of non-fossil technologies. Climate finance may be available to lesswealthy fossil fuel producers to aid them in transition.



CONCLUSIONS

The NDC process outlined in the Paris Agreement has succeeded in the aim of getting virtually all countries to submit plans to reduce emissions and outline other climate actions. In some cases, these plans are ambitious and detailed.

However, the approach suffers from being voluntary, and decided nationally – leading to an inconsistency of metrics, timelines and levels of cuts. The overall result of the initial round of NDCs will be insufficient to meet the Paris goals, and in many cases, even falls short of countries' actual policies.

Some of these issues should be addressed in the updated round of NDCs, to be submitted this year. Levels of ambition should increase in some cases, and most countries should improve the detail and actionability of their submissions. The discussion of adaptation should also be more comprehensive. Technology has improved, which makes approaches such as solar power, offshore wind and electric vehicles more feasible to implement on a large scale.

2020 has brought a sharp increase in political and economic uncertainty because of the dependence of the US's commitment on the November elections, the difficult relationship between China and the US, and the continuing impact of the Covid-19 pandemic, which has delayed the planned in-person COP26 meeting in Glasgow by a year. As a result of these uncertainties, several countries may choose to postpone their updates to 2021.

Major oil- and gas-exporting countries have generally submitted rather non-specific and limited NDCs. They are likely to come under greater scrutiny in the next round. The NDC process offers some opportunities to them, for instance low-cost GHG reductions by cutting flaring and fugitive methane and introducing CCUS; new energy industries in areas such as hydrogen; medium-term coalto-gas switching boosting demand for their exports; and cooperation with LDCs on landuse carbon credits. But as climate policy in some regions, notably the EU and perhaps the US, becomes more stringent, they will have to deepen their NDC commitments to protect their access to markets and finance.

Given the voluntary nature of the NDCs, and the current inadequacy of the aggregate result, there will be more pressure to improve their effectiveness, and compel or encourage cooperation from countries deemed not to be doing enough. This can take the form of:

- 'Clubs' on specific issues to share finance and technology, such as hydrogen xxxiii, CCUS or REDD+, as advocated by David Victor xxxiv;
- Penalties / incentives, such as border carbon tariffs to penalise imports from countries without carbon pricing or with carbon footprint in excess of specified levels xxxv, or carbon credits for forestry activities;
- Other political and economic tactics, potentially including sanctions, boycotts or diplomatic pressure; and
- Conditional commitments, for instance some LDCs' offer of deeper cuts if they receive sufficient climate finance, or mutual pacts to increase mitigation if other countries do so.

i. <u>https://unfccc.int/files/meetings/paris_nov_2015/applica-tion/pdf/paris_agreement_english_pdf</u>

ii. <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7351418/</u>
iii. <u>https://www.climatechangenews.com/2020/03/01/coun</u>tries-yet-ratify-paris-agreement/

iv. Nigeria's NDC, https://www4.unfccc.int/sites/ndcstaging/ PublishedDocuments/Nigeria%20First/Approved%20Nigeria%27s%20INDC_271115.pdf

v. http://blogs.law.columbia.edu/climatechange/2020/03/11/ returning-to-paris-the-next-u-s-ndc/

vi. <u>https://unfccc.int/process/the-paris-agreement/</u> long-term-strategies

vii. <u>https://www.climatechangenews.com/2020/04/13/chi-na-may-delay-submitting-climate-plans-amid-economic-slow-down/</u>

viii. https://journals.plos.org/plosone/article?id=10.1371/ journal.pone.0235654

ix. <u>https://unctad.org/en/Pages/ALDC/Least%20Devel-oped%20Countries/UN-list-of-Least-Developed-Countries.</u> aspx; Gambia is also an LDC

x. https://climateactiontracker.org/countries/

xi. Qamar Energy analysis of data in BP Statistical Review of World Energy 2020; CO2 emissions are those from fossil fuel combustion only

xii. Qamar Energy analysis of data in BP Statistical Review of World Energy 2020

xiii. NDCs in this and the following discussion have been taken from <u>https://www4.unfccc.int/sites/ndcstaging/Pages/Latest-</u> <u>Submissions.aspx</u>, with supplementary analysis at <u>https://</u> climateactiontracker.org/countries/

xiv. For Marshall Islands' first NDC of 2016

xv. Environmental Protection Agency (USA)

xvi. China still considers itself a developing country for the purposes of climate diplomacy and finance; this is debatable (see <u>https://www.energypolicy.columbia.edu/china-still-developing-country-and-why-it-matters-energy-and-climate for a</u> recent discussion)

xvii. e.g. see discussion in <u>https://unfccc.int/sites/default/files/</u> resource/329_IIASA_NDC_Uncertainty_final.pdf

xviii. https://www.adb.org/sites/default/files/publica-

tion/437896/sdwp-054-nationally-determined-contributions-energy.pdf

xix. https://static-content.springer.com/esm/art%3A10.100 7%2Fs10584-017-2027-8/MediaObjects/10584_2017_2027_

MOESM1_ESM.pdf

xx. <u>https://static-content.springer.com/esm/art%3A10.100</u> 7%2Fs10584-017-2027-8/MediaObjects/10584_2017_2027 MOESM1_ESM.pdf

xxi. <u>https://www.climatescorecard.org/2020/03/china-seek-ing-to-set-carbon-price-through-its-emissions-trading-sys-tem-ets/</u>

xxii. <u>https://www.nature.com/articles/s41467-019-09159-0</u> xxiii. <u>https://climateactiontracker.org/countries/eu/pledg-</u> es-and-targets/

xxiv. <u>https://ec.europa.eu/energy/sites/ener/files/hydro-gen_strategy.pdf</u>

xxv. <u>https://climateactiontracker.org/countries/india/pledg-es-and-targets/</u>

xxvi. <u>https://climateactiontracker.org/climate-target-up-</u> <u>date-tracker/</u>

xxvii. https://www4.unfccc.int/sites/ndcstaging/Published-Documents/Marshall%20Islands%20Second/20181122%20 Marshall%20Islands%20NDC%20to%20UNFCCC%20 22%20November%202018%20FINAL.pdf

xxviii. <u>https://www4.unfccc.int/sites/ndcstaging/Pub-lishedDocuments/Suriname%20Second/Suriname%20</u> <u>Second%20NDC.pdf</u>

xxix. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Norway%20First/Norway_updated-NDC_2020%20(Updated%20submission).pdf xxx. https://www4.unfccc.int/sites/ndcstaging/Published-

Documents/Republic%20of%20Moldova%20Second/

MD_Updated_NDC_final_version_EN.pdf

xxxi. <u>https://climateactiontracker.org/publications/govern-</u> ments-still-not-acting-on-climate-crisis/

xxxii. https://climateactiontracker.org/countries/

xxxiii. See e.g. <u>https://hydrogencouncil.com/en/</u>

xxxiv. See e.g. <u>http://e15initiative.org/wp-content/up-loads/2015/09/E15-Climate-Change-Victor-FINAL.pdf</u> xxxv. See e.g. <u>https://www.bruegel.org/2019/08/border-car-</u>

bon-tariffs-giving-up-on-trade-to-save-the-climate/





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