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Elcano Policy Paper

Legislating for a low carbon and climate resilient transition: learning from international experiences

Alina Averchenkova - January 2019

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Grantham Research Institute on Climate Change and the Environment

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Introduction and acknowledgements

Alina Averchenkova[1]

The objective of this working paper is to inform policy experts, legislators and decision-makers on the recent trends in climate change policy-making around the world and to draw lessons learnt from the experiences with designing and implementing climate change legislation. The study in particular aims to contribute to the current debate in Spain on a draft climate change and energy transition law, as well as aid other countries currently working on climate legislation.

The report is structured in three parts. Part 1 provides an overview of the overall drivers for low carbon and climate resilient transition and the global trends on climate action and identifies the key building blocks of the climate governance frameworks that are important in the design of climate legislation. Part 2 reviews country experiences with designing and implementing climate change and energy transition laws and the executive frameworks in Chile, China, France, Germany, Mexico, the UK and the US. Part 3 draws lessons learnt from the comparative analysis of the case studies on the key elements of a comprehensive climate change law and provides recommendations for policy-makers. Through comparing the insights from each of the case studies the paper draws conclusions on the key considerations that should be addressed in the development of framework climate change and energy transition legislation.

The analysis draws on the latest existing studies assessing the experience with and performance of the legislative instruments in question complemented by assessing the texts of the laws. In this context the study has benefited from the author's previous work on the UK's Climate Change Act in collaboration with Sam Fankhauser and Jared Finnegan, and on Mexico's General Law on Climate Change in collaboration with Sandra Guzman. The case study on France draws upon a recent an in-depth analysis conducted by Andreas Rüdinger.

The author is grateful to several policy experts who have kindly provided contributions on Chile's climate change policy through informal interviews; to Gonzalo Escribano, Lara Lázaro and Dimitri Zenghelis for detailed review comments. The author also thanks Francisco Trincado for designing the visuals and Miguel de Avendaño, Juan Antonio Sánchez, Virginia Crespi de Valldaura, Luis Lázaro and María Dolores de Azategui for editing the paper. Finally, the author would like to gratefully acknowledge the support and contributions of José López-Tafall and his team at Acciona.

1 Alina Averchenkova is a Distinguished Policy Fellowand the lead for the Governance and Legislation research theme at the Grantham Research Institute on Climate Change and the Environment and CCCEP at the London School of Economics.

Executive summary

The urgency of action. Climate change is one of the most pressing issues for global and national development agendas. With the last 19 years having contained 18 of the warmest ones on record globally, the urgency to address both the causes and impacts of climate change is clear. According to the Fifth Assessment Report (AR 5) by the Intergovernmental Panel on Climate change (IPCC) for a likely chance of more than 66 per cent of keeping the global mean temperature increase below 2°C, global emissions of all greenhouse gases need to be net zero by 2100.

The economic and commercial case for accelerated low carbon transition is strong. Reaching the target of net zero emissions globally by the end of the century is technically and economically feasible but requires urgent action. The rapid technological change and the falling costs of the key low carbon technologies over the past two decades provide a solid foundation for accelerated decarbonisation. Ambitious action on climate change could yield direct a economic gain of US$26 trillion in 2018-2030 period compared with a business-as-usual scenario according to recent analysis by the New Climate Economy project. Most of the policy and investment decisions shaping the next two decades will be taken over the coming 2-3 years, which makes it a critical period for adopting appropriate policy frameworks.

Scaled-up action requires overcoming barriers to the low carbon transition. Barriers to low carbon investments can be addressed through price and policy signals, as well as mitigated through lowering or sharing the investment risks. Carbon pricing instruments, which now cover around 20 per cent of global greenhouse gas emissions in over 46 countries[2], have been shown to be particularly effective in improving viability of low carbon investments. The growing development of new financial instruments, such as green bonds, and the recent advances in the financial regulation on sustainable finance and risk disclosure, are further driving investment towards more sustainable technologies.

Shifts in the international policy landscape require ambitious national action. The adoption of the UN Sustainable Development Goals and the Paris Agreement on climate change in 2015 have set the goal for the global transition to net zero emissions in the second half of this century. Achieving these goals requires not only successful domestic implementation of the current emission pledges, but also a major political transformation in how countries approach climate action and define their ambition. Domestic framework climate change legislation comes to the forefront as the key means to consolidate political support for the climate agenda, to provide the framework for implementation of the Paris Agreement and for assessing progress, as well as to enable ratcheting-up of ambition going forward.

2 The World Bank. Carbon Pricing Dashboard. Available at: https://carbonpricingdashboard.worldbank.org/.

National climate change legislation and policies have grown twenty-fold over the past 20 years, with a remarkable growth in developing countries in recent years. Over time the attention has shifted from putting in place framework climate legislation or strategies for the articulation of greenhouse gas emission targets. In 2017 over 70 per cent of global greenhouse gas emissions were covered either by nationally binding climate legislation or by executive climate strategies with a clearly designated coordinating body, while climate legislation alone covered 44 per cent of emissions and 36 per cent of the population (Iacobuta *et al*. 2018).

Domestic laws and policies are not yet consistent with international commitments. Most countries need to align their domestic emission targets, enshrined in domestic legislation, and those committed through the nationally determined contributions (NDCs) to the Paris Agreement. In order to meet these targets and to be able to ratchet them up in the future, countries need to put in place strong domestic institutional frameworks and policies.

Framework legislation can help maintain policy continuity and enable implementation. The examples of countries considered in this study demonstrate a variety of approaches to national climate change policy and that there is no one size fits all. Putting policy into law with a strong Parliamentary oversight for implementation helps reduce the scope for backtracking and provides a mandate for policy-makers to advance action. The case studies on Mexico and the UK show that climate legislation has improved the quality of the political debate and helped maintain and strengthen the political consensus on and commitment to the long-term climate objectives through turbulent political times. The case of the US demonstrates how the lack of climate legislation can make climate policy extremely vulnerable to a change of leadership. There are clear advantages for embedding the core elements of the national climate change framework into a legislation for countries like Spain, with a long democratic tradition and limited scope for centralized policy-making by the national government.

The adoption of climate change legislation requires building political support. Developing a positive narrative around the benefits of climate change legislation and creating political momentum are key for passing a law. A positive narrative also helps avoid polarisation of the political debate as was the case in the US. Integrating climate change objectives with economic and social ones and linking the legal framework with a country's self-interest, development priorities and opportunities or co-benefits of climate action, such as in the example of China, have shown to be effective in getting political and public support for climate policy. Furthermore, following an inclusive process of cross-party development of the key features of the legislation and strong ownership by civil society through stakeholder consultation, as well as personal leadership from the country's leader, have shown to be effective in getting political buy-in for the legislation in Mexico, the UK, California, France and Germany. Consecutively cross-party and citizen support are the best shields against the risk of reversal of the legislation.

Scope of the law and the level of specificity in prescribing policies is one of the first critical decisions that need to be taken when developing a new legislation. A flexible approach, as in the UK and California, that delegates the choice of specific policies to meet the targets to the government could offer greater political acceptability for the law and flexibility to adjust the course based on changing economic conditions and lessons learnt. However, this model requires that clear institutional processes and statutory timelines for how and when the government should develop the detailed policies are specified in the law backed by strong parliamentary oversight and provisions for an independent review by an advisory body.

Part 1. Drivers and global trends in low carbon and climate resilient transition

Part 1 makes the case for urgent national action on climate change and reviews the global trends on how countries are addressing climate change through climate laws and executive policy frameworks. Chapter 1 reviews the key drivers of low carbon and climate resilient transition, including the recent scientific information on the dynamics in the greenhouse gas emissions and climate change impacts, considers the economic case for accelerating the transition, reviews the barriers that need to be addressed through policy frameworks, and outlines the policy developments at the international level. Chapter 2 presents the recent trends in national action on climate change based on the data in the Climate Change Laws of the World database developed and hosted by the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and on the results of the relevant analytical studies. Chapter 3 sets out the political economy considerations for a country's response to climate change and identifies key elements of national climate change frameworks, which are then taken as the basis for the analysis of the specific laws in Part 2 of this study.

1 Key drivers of the low carbon and climate resilient transition

Urgency of action

Climate change is one of the most pressing issues for global and national development agendas. The ever-growing body of scientific evidence over the past several decades clearly shows that human activity related to emissions of greenhouse gases (GHGs) and removal of carbon sinks is the primary cause of changes in the global climate system. According to the latest Statement on the State of the Global Climate by the World Meteorological Organization (WMO, 2018), global mean temperatures in 2017 were 1.1°C ± 0.1°C above pre-industrial levels and reached the highest five-year average on record. 2017 was one of the three warmest years on record and the warmest not influenced by an El Niño event (ibid). Most alarmingly the last 19 years contained 18 of the warmest years on record globally (NOAA, 2018).

Impacts of changing climate are not theoretical predictions to be tested in the distant future; they are increasingly becoming observable in the present day. Most countries are already experiencing climate change impacts at a significant cost to their societies. For example, overall risk of heat-related illness or death has increased steadily since 1980, with around 30 per cent of the world's population now living in climatic conditions that deliver deadly temperatures at least 20 days a year (WMO, 2018). Furthermore, 2017 was the year with the highest documented economic losses associated with severe weather and climate events (ibid).

According to the Fifth Assessment Report by the IPCCC (AR 5) for a likely chance of more than 66 per cent of keeping the temperature increase below 2°C, global emissions of all greenhouse gases need to be net zero by 2100 (IPCC, 2014). Yet, carbon dioxide emissions have grown from 6Gt a year in 1950 to about 37 Gt currently, and if they continue to grow at the past rates it is likely that the world would experience an increase in average global surface temperature over 3°C (Stern, 2018). The recently published Special IPCC report on 1.5 degrees estimates that the pledges under the Paris Agreement and the emission pathways associated with them would not limit global warming to 1.5°C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030 and that avoiding overshoot and reliance on future large-scale deployment of carbon dioxide removal can only be achieved if global CO2 emissions start to decline well before 2030 (IPCC, 2018).

Economic and commercial case for accelerated low carbon transition

Reaching the target of net zero emissions globally by the end of the century is technically and economically feasible but requires urgent action. According to the AR 5, there are several pathways to reach net zero emissions globally by the end of the century, all of which require action in four areas: (a) decarbonization of electricity; (b) rapid electrification using clean electricity and switching to lower-carbon fuels; (c) greater efficiency and less waste in all sectors; and (d) improved carbon sinks.

Over the past two decades the world has experienced rapid technological change and the falling costs of the key low carbon technologies, which provide a good basis for accelerated decarbonisation. Since 2010, energy intensity has declined at an average rate of 2.1 per cent per year globally, compared to the average rate of 1.3 per cent between 1970 and 2010 (IEA, 2017). This is the main factor behind the flattening of global energy-related greenhouse gas emissions since 2014, offsetting three-quarters of the impact of GDP growth. Without energy efficiency improvements since 2000, the world would have used 12 per cent more energy than it did in 2016 – equivalent to adding another European Union to the global energy market. However, global energy-related CO2 emissions grew by 1.4 per cent in 2017, reaching a historic high of 32.5 gigatonnes, a resumption of growth after three years of global emissions being stable (IEA, 2018). The increase in emissions was the result of global economic growth of 3.7 per cent, lower fossil-fuel prices and weaker energy efficiency efforts, which pushed up global energy demand by 2.1 per cent in 2017 (ibid).

The clean energy transition is being supported by the plummeting costs of renewable energy production, which is becoming cheaper than fossil fuel alternatives in a growing number of regions (IRENA, 2018). For example, since 2006 the costs for solar PV modules have fallen by 79 per cent, while battery prices for storage have also decreased by 79 per cent since 2010 (Bloomberg New Energy Finance, 2017; EIA, 2017). Currently more new power capacity is being added from renewable energy (excluding hydro) than from fossil fuels (coal, oil and gas, FS-UNEP, 2018). Technological advances with the EVs allowed the major car companies to declare the end of the internal combustion engine in the foreseeable future.

Box 1. Growing citizen concern over climate change

The emergence of more alarming and robust scientific evidence, coupled with the increasing frequency and severity of climate change impacts experienced by the population has led to increasing public concern over climate change and pressure on governments to act over the recent decades (Lazaro, 2018; Capstick *et al*., 2015; Real Instituto Elcano, 2018). According to the recent surveys, climate change is seen as the primary threat to their country for the citizens in Africa, Latin America and parts of the EU, including Spain (Pew 2017) and is among the top three most serious problems facing the world for citizens in Europe and the US alongside international terrorism and poverty and availability of drinking water (Pew 2017, Eurobarometer 2017). In Europe, citizens of Sweden and Denmark consider climate change as the most serious problem facing the world, while in Germany and France citizens rank it as the second most important foreign policy priority after fighting international terrorism. In Spain climate change was ranked as the second foreign policy priority from 2011 to 2016. In 2017 Spanish citizens ranked climate change as their leading foreign policy priority (Real Instituto Elcano, 2018).

The next 15 years will see doubling of investment in the world's infrastructure, with $80-$90 trillion to be invested to meet the current needs (Bhattacharya *et al*., 2015). This offers a key opportunity to direct these investments towards low carbon and climate resilient technologies, while failure to do so would make the future transition more challenging and costlier (ibid). According to the NCE (2014), to ensure that these investments lead to low carbon transition an additional USD 4.1 trillion would need to be invested over this period. At the same time, ambitious action on climate change could yield a direct economic gain of USD 26 trillion in 2018-2030 period compared with a business-as-usual scenario according to a new analysis by the New Climate Economy (Garrido *et al*, 2018).

However, the longer it takes to reduce global greenhouse emissions, the further and faster they would need to come down and at a greater cost, because greenhouse gases stay in the atmosphere for decades and therefore accumulate in stock.[3] The locking-in of carbon intensive infrastructure opens up the risk that assets will be devalued or have to be retired early in order to address climate change.[4] There is a very narrow window of opportunity over the next two decades to accelerate low carbon transition to ensure a reasonable chance of keeping warming below 2 degrees. Most of the policy and investment decisions shaping the next two decades will be taken over the coming 2-3 years, which makes it a critical period for adopting appropriate policy frameworks (NCE, 2018).

Overcoming barriers to low carbon transition

Despite the urgency of action indicated by science and the clear economic case for investment in low carbon transition, the scale of action and investment remains far below the required levels. The largest share of the investment for the transition would come from private sources. Business investment is driven by favourable risk-adjusted returns, which do not always favour low carbon investment. Most of the barriers have to do with the risk-reward relationship of the investment itself or with the country's wider investment climate. The private sector is likely to underprovide investing in technologies which resolve common externalities, like pollution or greenhouse gas emissions, or which produce knowledge spillovers that are hard to privately monetise because they accrue to society as a whole. Other barriers are related to low technical or other capacity levels and a lack of information or experience with low carbon technologies in the local market. These barriers vary by sector, technology and country and depend on the overall economic and political environment in each.

Mobilizing private capital and directing it to low carbon options requires appropriate price and policy signals, as well as mitigation or lowering of investment risks. The challenge for policy-makers as well as the opportunity, is to use policy tools and limited public resources wisely to create frameworks and incentives that will help improve returns on low-emission investments and make low-carbon technologies more competitive relative to high-carbon alternatives. This highlights the importance of policy frameworks in unlocking scaled up climate investment flows.

One effective policy instrument for addressing the barriers to low carbon investment is putting a price on carbon. According to the World Bank's Carbon Pricing Dashboard, as of 1 December 2018, 53 carbon pricing initiatives were implemented or scheduled for implementation, covering 46 national and 25 subnational jurisdictions globally. It is expected that in 2018, these initiatives would cover 11 GtCO2e, representing 19.8 per cent of global GHG emissions with a total value of USD 81.68 Billion.[5]

3 See IPCC Fifth Assessment Report (AR5) , IPCC https://www.ipcc.ch/report/ar5/ and also Fay, M; Hallegatte, S; Vogt-Schilb, A; Rozenberg, J; Narloch, U; Kerr, T. (2015) "Decarbonizing Development: Three Steps to a Zero-Carbon Future". *Climate Change and Development*. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/21842

4 See Stern, N. (2015) *Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change*. MIT Press, Cambridge, MA. See also Pfeiffer, A, Millar R, Hepburn C and Beinhocker E, (2016) "The '2°C capital stock' for electricity generation: Committed cumulative carbon emissions from the electricity generation sector and the transition to a green economy", *Applied Energy*, Vol. 179, Pages 1395-1408, (doi: 10.1016/j.apenergy.2016.02.093)

5 The World Bank (2018) *Carbon Pricing Dashboard*. Accessed on 22 December 2018 https://carbonpricingdashboard.worldbank.org/

Over the recent years significant advances have also been made in understanding the scale of the finance required to fund low carbon and climate resilient transition and of the policy instruments that help mobilize the investment. New financial instruments are evolving, for example the green bond market has grown eight-fold in three years.[6] A key development has been the recent advances in the financial regulation on sustainable finance and risk disclosure, which are raising awareness on climate change among the investors and asset managers and driving investment towards more sustainable technologies (see Box 2).

Box 2. Recent developments on financial disclosures and sustainable finance

Task Force on Climate-Related Financial Disclosures

An important shift in the attention that public and private financial institutions place on climate change was marked in December 2015 with the launch of the Task Force on Climate-Related Financial Disclosures (TCFD) by the Financial Stability Board and chaired by Michael Bloomberg. Its objective is to "develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders". The Task Force published a report with recommendations for disclosing transparent, comparable and consistent information about the risks and opportunities presented by climate change, so that the effects of climate change are integrated into business and investment decisions (TCFD, 2017). A forward look is necessary at the national policy level to assess the robustness of policies to a range of future outcomes (such as a rapid move to global decarbonisation, in line with recommendations of the Task Force for Climate Related Disclosures – see Zenghelis and Stern, 2016).

EU regulation on sustainable finance

Several initiatives targeting the financial community were also launched by the European Commission. In December 2016 the EU adopted a new regulation, the institutions for occupational retirement provision (IORP) II Directive, which requires pension funds to include consideration of environmental, social and governance (ESG) factors and to carry out their own risk assessment, including climate change-related risks. Furthermore, the Commission established a High-Level Expert Group on sustainable finance which comprised 20 senior experts from civil society, the finance sector, academia and observers. The group published a report in January 2018 proposing eight priority actions for the financial sector to support the low carbon transition.

Building on these recommendations, in March 2018 the Commission issued an Action Plan on Sustainable finance and in May 2018 adopted a package of measures implementing several key actions, including a proposal for a regulation to facilitate sustainable investment, a proposal for a regulation on disclosures relating to sustainable investments and sustainability risks and a proposal for amending the benchmark regulation that would create low-carbon and positive carbon impact benchmarks. The Commission has also proposed to include ESG considerations into the advice that investment firms and insurance distributors offer to individual clients. A technical expert group on sustainable finance (TEG) was formed to assist in the development of a unified classification system (taxonomy) for sustainable economic activities, an EU green bond standard, methodologies for low-carbon indices, and metrics for climate-related disclosure.

In 2015 France, through Article 173 of its Energy Transition Law, became the first country to pass a law introducing mandatory climate change-related reporting for asset owners and asset managers, as discussed later. Similarly, in March 2016, the Dutch central bank DNB announced it was taking steps to monitor and mitigate climate risk.

6 United Nations Environment Programme (2017) *Financial Centres for Sustainability: Reviewing Experience and Identifying options in the G7*. UNEP Inquiry & Corporate Knights, Inquiry Report. http://unepinquiry.org/publication/financial-centres-for-sustainability/

Major shift in the international policy landscape: the Paris Agreement

Over the past several years amidst the growing scientific and public concerns over climate change (see Box 1) and the recognition of risks and opportunities, significant advances have been made internationally and domestically in many countries to provide strong political and regulatory signals for low carbon and climate resilient transition. In September 2015 the UN Development Summit adopted the Sustainable Development Goals (SDGs): 17 goals including one specifically on climate change, which call for action by developed and developing countries to accelerate transition to sustainable development and promote a holistic approach to addressing development challenges, e.g. such as energy and water access, poverty alleviation and climate change.

The adoption of the Paris Agreement on climate change in December 2015 has marked a substantive shift in climate change governance and sets the goal for the global transition to net zero emissions in the second half of this century (e.g. Falkner, 2016; Fay *et al*., 2015). The international community has agreed to strengthen the global response to climate change to keep global temperature increase well below 2°C and to pursue efforts to limit it even further to 1.5° above pre-industrial levels.

The agreement has reached near-universal participation. As at 15 October 2018, 181 countries have ratified the Paris Agreement and 177 have committed to emission targets and other mitigation and adaptation objectives through the 'nationally determined contributions' (NDCs).[7] Countries have committed to update these NDCs every five years with new targets representing an increase in ambition over their previous submission, ensuring ratchet of ambition every five years. To assess the collective progress towards achieving the long-term goals of the agreement, the Paris Agreement established provisions for a periodic 'global stocktake', which will be held every five years starting in 2023.

However, the emission reduction levels pledged in the NDCs remain well below the levels consistent with the scenarios of keeping the temperature increase below 2 degrees (Rogelj *et al*., 2016; Rockström *et.al*., 2016; UNEP, 2016). Achieving the goals of the Paris Agreement requires not only successful domestic implementation of the current emission pledges, but also a major political transformation in how countries approach climate action and define their ambition. In this context domestic framework the climate change legislation comes to the forefront as a key means to consolidate political support for the climate agenda, to provide the framework for implementation of the Paris Agreement domestically and for assessing progress, as well as to enable ratchet of ambition going forward.

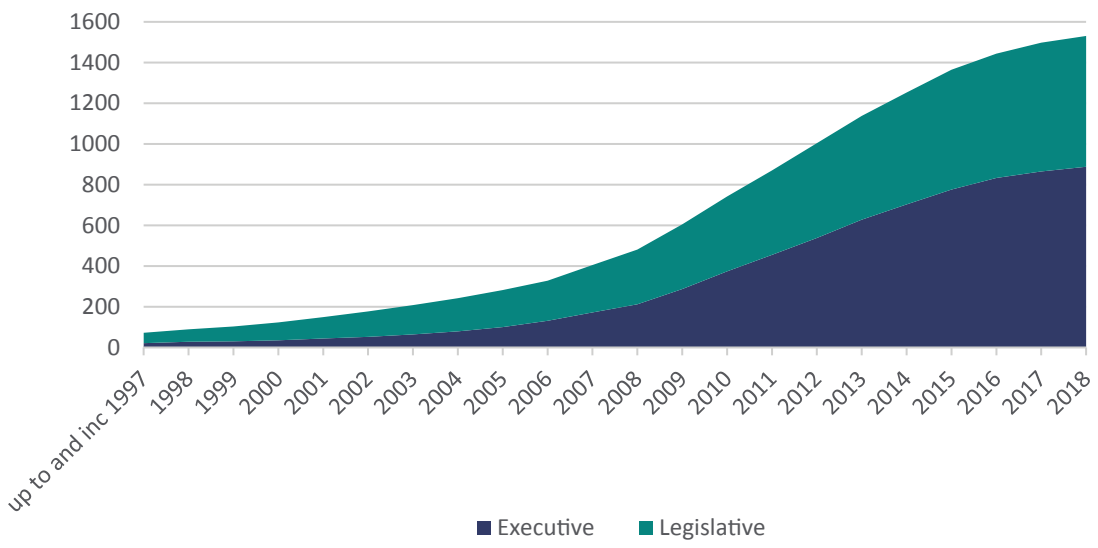
7 UNFCCC. "Paris Agreement - Status of Ratification" https://unfccc.int/process/the-paris-agreement/status-of-ratification accessed on 15 October 2018.

2 Global trends in legislating for low carbon transition

Twentyfold growth in laws and executive acts on climate change

Over the past two decades there has been a sustained growth in the number of climate change laws and policies introduced at the national level around the world. According to the Climate Change Laws of the World database (GRI, 2018), as at 30 September 2018 there were 1500 national laws and executive acts addressing aspects directly relevant to climate change (e.g. climate change strategy and targets, adaptation, mitigation, low carbon energy, agriculture and other sectors). Two decades ago, at the time of the adoption of the Kyoto Protocol in 1997 there were about 70 such laws and policies (see Figure 1). This over twentyfold growth in climate change legislation and policies over the past 20 years,[8] with a remarkable growth in developing countries in recent years, demonstrates the growing attention of legislators and governments to climate change (Nachmany *et al.*, 2017).

Figure 1. Total number of climate-related legislative and executive acts over time



Source: Data from the Climate Change Laws of the World database, as at 30 October 2018.

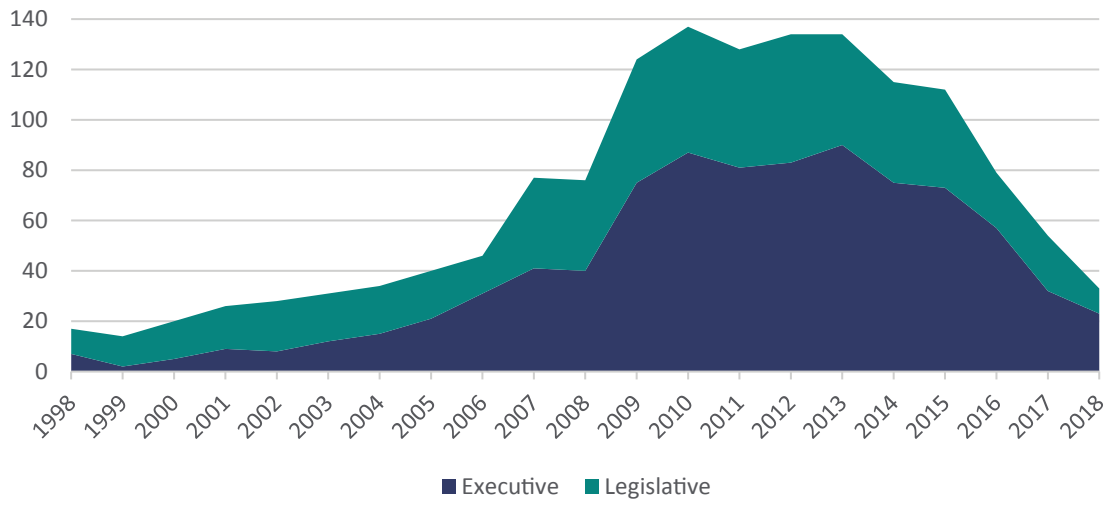
8 Based on data in the GRI (Global Reporting Initiative) 2018; data retrieved on 30 September 2018.

In the past four years, however, there has been a drop in the number of climate change laws and executive acts passed annually (see Figure 2). This decline could be due to the fact that many countries have already adopted the minimum basic legal and policy frameworks in the previous years and are focusing on refining and implementing the underlying policies. This hypothesis is to an extent supported by the observation that in the earlier years up to about 2009 there were more laws than policies passed each year, with executive policies becoming more dominant thereafter. Some of the decline could also be attributed to countries waiting for the guidance on the shape of the international framework in anticipation of the adoption of the Paris Agreement in 2015 (Nachmany *et al*., 2017) and the development of its rulebook that is currently underway.

Countries take different legal routes to climate policy

Countries approach national policymaking on climate change in different ways depending on their regulatory culture and maturity of climate policy. Some countries that have a strong parliamentary tradition adopt legislation through parliaments or national assemblies. Others rely on executive routes where the government issues executive orders, decrees, strategies or development plans (see Figure 2). Sometimes executive routes lead to an adoption of legislation at a later stage (Averchenkova *et al*., 2017). Overall, 42 per cent of entries in Climate Change Laws of the World are legislation, and the remaining 58 per cent are executive policies.[9]

Figure 2. Number of climate-related laws and executive acts passed annually



Source: Data from the Climate Change Laws of the World database, as of 30 October 2018.

9 As at 30 September 2018.

Over time the attention of countries has shifted from putting in place overall climate legislation or strategy in the period up to 2012, to the articulation of the greenhouse gas emission targets in 2012-2017 (Iacobuta *et al*., 2018). In 2017 over 70 per cent of global greenhouse gas emissions and 76 per cent of the population were covered either by nationally binding climate legislation or by executive climate strategies with a clearly designated coordinating body, while climate legislation alone covered 44 per cent of emissions and 36 per cent of the population. In the same year 76 per cent of countries had a national emissions target of some sort compared with 23 per cent in 2012 (ibid).

Developed countries are more likely to follow the legislative route. Among the G20 countries two thirds of climate interventions are legislative, in the least developed ones it is less than a quarter (Averchenkova *et al*., 2017). Considering specifically greenhouse gas targets, (Lacobuta *et al*. 2018) find that 90 per cent of developed countries[10] had some greenhouse gas targets enshrined in legislation in 2017, while only 4 per cent of developing countries[11] have placed emission targets into law and 65 per cent had them in the executive acts. The study also finds that larger emitting nations were better represented among the early movers adopting climate legislation and executive strategies (Lacobuta *et al*., 2018).

As the number of climate laws is growing, so does litigation activity related to climate change. A particularly interesting and important trend is the growth in the number of the strategic court cases that link climate and rights. Such cases challenge governments and corporations on climate action and influence policy ambition by urging mitigation, adaptation and compensation (Nachmany & Setzer, 2018).

Domestic laws and policies are not consistent with international commitments

However, consistency between the emission targets integrated in domestic legislation and those committed through the nationally determined contributions (NDCs) to the Paris Agreement remains a challenge. For example, all G20 countries included an emissions target for 2030 in their NDCs and had some form of domestic legislation or executive action in place that included targets. Yet a year after the Paris Agreement was adopted, the majority of G20 countries still needed to upgrade the level or scope of their domestic emissions targets specified in national climate laws or executive policies in order to be in line with NDCs (Averchenkova & Matikainen, 2016). Around 60 percent of the expected emissions reductions from the G20 were covered by targets where the timeframe of domestic targets needed updating, in most cases adjusting the domestic target from 2020 to 2025 and 2030 (ibid). These conclusions are consistent with the recently published analysis that looked at the consistency between the NDC and domestic targets globally and noted that adjustments are required to bring national frameworks into consistency with the NDCs in most countries (Nachmany & Mangan, 2018). According to the study, only 17 countries have set domestic targets for reducing greenhouse gas emissions that are clearly at least as ambitious as their pledged contributions to the goals of the Paris Agreement (ibid).

10 More specifically countries included in the Annex I of the UN Climate Change Framework Convention, UNFCCC.

11 More specifically countries not included in the Annex I of the UNFCCC, so called non-Annex I countries.

Sectoral focus of climate laws and executive acts

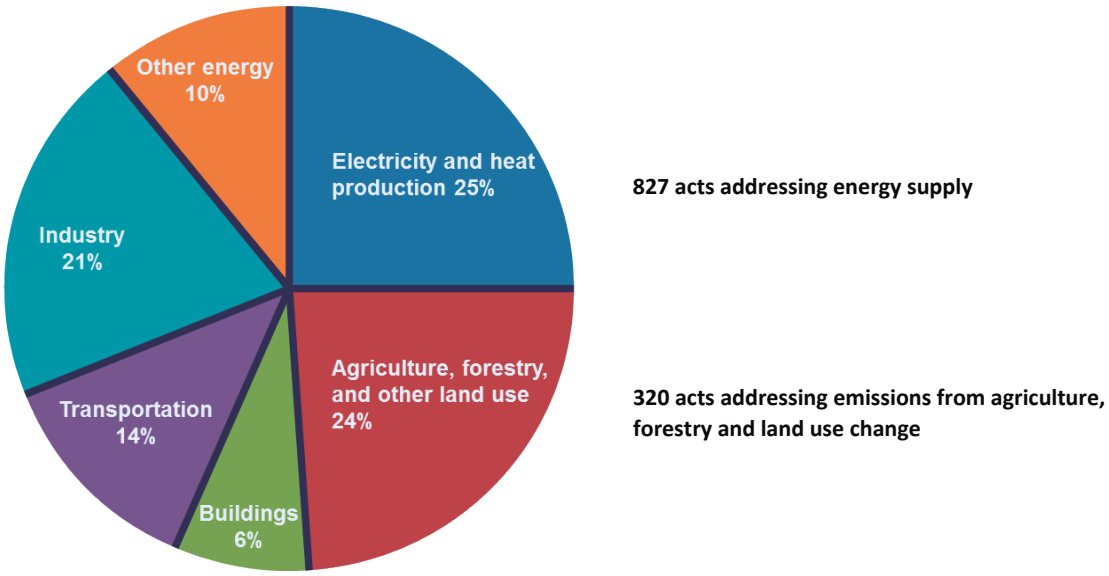
Domestic climate laws and policies differ in their scope: some are economy-wide while others target specific sectors; some design frameworks that specifically focus on climate change while others incorporate climate change into development plans and sustainable development strategies. Two-thirds of countries have at least one climate-specific piece of regulation or legislation, yet three quarters of laws and policies gathered in the Climate Change Laws of the World database[12] address climate change through the economic sectors. The energy sector accounts for most legislative and executive acts related to climate change according to the database, with 90 per cent of countries having regulations (e.g. on energy efficiency and renewable energy) which address climate change to some extent (Nachmany & Setzer, 2018).

For example, there has been a steady growth in the global share of greenhouse gas emissions covered by renewable energy targets in the past decade: from 45 per cent of emissions being covered in 2007 to 79 per cent in 2017, with a particularly rapid growth recently in developing countries (Iacobuta *et al*., 2018). In 2017, 71 per cent of countries had either legislative or executive renewable energy and/or electricity targets compared to 20 per cent in 2007, with most targets set through the executive route (44 per cent) rather than as legislative action (27 per cent) (ibid). Europe was reported as having the highest share of targets and particularly legislative ones. Overall, renewable energy and greenhouse gas emission targets were reported as the preferred instruments in national legislation and executive acts, having been adopted by more than 70 per cent of countries, while energy efficiency targets had lower traction at a national level (potentially due to many countries addressing energy efficiency at subnational or sectoral level, Iacobuta *et al*., 2018).

There are also sectors that have received less attention. For example, agriculture, forestry and land-use account for a roughly comparable share of global greenhouse gas emissions as heat and electricity production -about 25 per cent (see Figure 3). Yet there are 827 legislative and executive acts globally addressing low carbon energy supply and only 320 acts addressing emissions from agriculture, forestry and land use change. Similarly, fewer legislative and executive acts address adaptation. Partially this is due to the difficulty of separating adaptation into a distinct category of activities, where it is very closely linked to the core sectoral and overall development strategies. Yet provisions for risk assessment and adaptation strategies are becoming increasingly important considerations for framework laws and executive policies on climate change, in particular in the context of growing climate change impacts.

12 Based on data in the GRI (Grantham Research Institute) 2018

Figure 3. Sectoral focus of legislation and executive act does not match emissions profiles



Source: Calculated from the Climate Laws of the World database, as of 29 September 2018.

Forward look

While a lot of progress has been made in developing climate change laws and policies over the past several years, much work needs to be done. Successful implementation of the Paris Agreement requires that targets pledged internationally through the NDCs are fully integrated into domestic frameworks. In order to meet these targets and to be able to ratchet them up in the future countries need to put in place strong domestic institutional frameworks and policies. In this context many more countries are looking to develop and adopt new laws, strengthen their existing laws and policies, bringing them into line with the Paris Agreement. These laws have varying degrees of comprehensiveness and ambition.

Table 1. Examples of framework legislative acts on climate change

Name of the climate law passed	Year
UK Climate Change Act	2008
Mexico "General Law on Climate Change"	2012 and Decree of 2018
Honduras "Decree no. 297-2013 (Law on Climate Change)"	2014
Malta "Climate Action Act"	2015
Mexico "Energy Transition Law"	2015
France "Energy Transition Law"	2015
Ireland Climate Action and Low Carbon Development Act	2015
Finland Climate Change Act	2016
Kenya Climate Change Act	2016
Ecuador "Organic Code on the Environment"	2017
Paraguay "National Law on Climate Change no. 5875"	2017
Sweden "Climate Change Act"	2017
Norway "Climate Change Act"	2017
Peru "Framework Law no 30754 on Climate Change"	2018

Source: the author.

The UK Climate Change Act of 2008 was the first legislation that introduced legally binding targets and a ratchet mechanism for emission reduction nationally. Mexico's General Law on Climate Change of 2012 was amended in 2018 to bring it into consistency with the Paris Agreement and the NDCs, while Sweden's Climate Change Act of 2017 includes one of the most ambitious targets integrated into a law, which should reach net zero emissions by 2045. Much can be learnt through analysis of the different approaches that various countries take in their legislation and executive policies. At the time of writing several countries were in the process of developing framework climate and energy transition laws, including Spain, South Africa, Chile, Portugal and New Zealand, to name a few. The following chapters will provide an analysis of the key pieces of legislation and executive policies with the aim of providing useful insights for the countries' developing legislation.

3 Building blocks for climate legislation and national governance frameworks

This chapter discusses the key elements of national climate frameworks and sets out criteria for assessing and comparing climate laws and executive frameworks in various countries presented in the subsequent chapters (see Table 2 for an overview).

Table 2. Building blocks of legal frameworks on climate change: Criteria for assessment

Key elements of the legal framework	Qualitative assessment
(1) Institutional system • Coordination of implementation • Independent advice • Devolution • Stakeholder engagement	Political support
(2) Targets • Long term-target • Near and mid-term targets • Sectoral targets • Ratchet mechanism • Consistency with the NDC targets	Level of complexity
(3) Policy instruments • Processes for developing and adopting policies • Concrete instruments embedded in laws	Coverage of key governance functions and clarity of institutional mandates
(4) Finance • Budget for implementation of the law • Financial instruments	Overall consistency with the Paris Agreement
(5) Monitoring, accountability and enforcement	Level of flexibility vs. prescription

Source: the author.

The ability of governments to set and meet national climate change objectives (and their pledges made under the Paris Agreement) depend on a number of factors, including political support for climate agenda, quality of the domestic legislative or executive framework (based on the key building blocks discussed in Table 2 and below), effectiveness of the decision-making processes on climate change, existence of public and private bodies supportive to climate action (e.g. strong governmental agencies responsible for climate agenda and strong environmental NGOs or low carbon business groups), international engagement of a country on climate change, public opinion supportive to climate action, history of delivery on previous policies and no past policy abolition (Averchenkova & Bassi, 2016). Some of these factors (e.g. public opinion or history of policy abolition) are important to consider in the design of the legislative and policy proposals but lie outside of the immediate control of policy makers in the short-term. Others, however, such as political support, quality of

legislative frameworks and key bodies to implement the framework are central to the legislative process on climate change and can be directly influenced by policy-makers and legislators. Therefore, more attention is devoted to these factors in the following analysis.

The legal nature of climate change framework and policy continuity

As discussed earlier, countries take different approaches to govern their domestic climate change policy: some adopt legislation while others act through decisions by the executive branch of the government. There is no universal recommendation on one route being superior than the others much depends on the local political context and legal tradition, capacity and effectiveness of the state bureaucracy and the design of the policy framework itself. However, whichever route the country follows, policy-making needs to be underpinned by the appropriate processes and procedures to ensure effectiveness and political credibility (Averchenkova & Bassi, 2016).

Policy-makers are often driven by short-run political considerations and may renege on previous long-term commitments diminishing the ability of the state to manage long-term climate change action (Kydland & Prescott, 1977). Putting policy into law with a Parliamentary oversight can help reduce the scope for backtracking from earlier policy commitments. This makes legislation a particularly important instrument for ensuring continuity of climate change objectives, targets and policies (see, e.g. Egebo & Englander, 1992; Averchenkova & Bassi, 2016; Duwe *et al*., 2017). Embedding targets in law, for example, as opposed to setting them informally through white papers or statements, has been shown to make them more difficult to change procedurally and politically (OECD, 2015).

Enshrining long-term climate change objectives into legislative frameworks also ends the debate on whether to act and rather focuses the political discussions on implementation and provides a mandate for policy-makers to advance action (Duwe *et al*., 2017). A robust framework law on climate change also allows for the essential procedures (target setting, policy implementation and reviews, etc.) to be enforced by stakeholders through the courts, ensuring accountability and continuity of the implementation (ibid). Policy continuity can also be strengthened by making it more difficult to change the policy rules, e.g. by delegating responsibilities for climate policy away from politicians to independent bodies tasked with policy assessment and/or implementation, as discussed in more detail below (Kydland & Prescott, 1977).

Political consensus and buy-in

The level of political consensus on climate change across the key political parties is an important factor in the ability of countries to pass comprehensive climate laws and policies and to avoid serious policy reversals in the future (Averchenkova & Bassi, 2016). Political consensus is not static and tends to change based on the economic, social and political situation. A lack of political consensus may jeopardize the ability to maintain political commitment and lead to policy reversal, in particular in the face of a change of the ruling party or of the leader in charge due to elections (ibid), as evident in the case of the US discussed below.

A recent study (Duwe *et al*., 2017) outlines several strategies for building political support and consensus for climate change legislation and policies based on several empirical case studies. These strategies concern framing of the political discussion and the processes through which the legislation or executive policy are developed and negotiated. In terms of framing, an effective strategy for building political support has been the integration of climate change objectives with economic and social ones as part of a shared positive vision for the future of a country. Making the case for the adoption of the legal framework on climate change based on linkages to the country's self-interest and opportunities or co-benefits of action has shown to be effective in getting political buy-in (e.g. Averchenkova, Stern & Zenghelis, 2014; Duwe *et al*., 2017). The latter could include highlighting a range of benefits, including reductions in air pollution, strengthening energy security (which are, for example, the key drivers for China's climate agenda), fostering innovation and others. Process-related strategies include following an inclusive process of cross-party development of the key features of the climate change framework (e.g. as has been followed in Mexico); and strengthening ownership by civil society and businesses to generate political support through extensive stakeholder consultation (e.g. as followed in France and Germany as discussed below).

Furthermore, strong personal leadership on climate change from an individual in power may help overcome barriers inherent in the lack of political consensus and give a positive momentum to national climate policy. One of the recent examples was the former President Obama's leadership in introducing the Clean Power Plan in the US. The President enacted executive regulation based on the existing Clean Air Act and the decision of the Supreme Court recognising greenhouse gases as 'pollutants' that need to be regulated in the absence of sufficient support for climate change legislation in the Congress. The challenge, however, is that such regulatory initiatives in the absence of legislation and broader political support are vulnerable to the future change of leadership (as the US case shows with President Trump's abolition of the policy, as discussed below).

Institutional arrangements on climate change

Regardless of whether a country follows an executive or legislative route, there are certain elements that legal climate change frameworks need to contain to cover the key governance functions. These include delineation of authority and responsibilities for development and implementation of climate change policies and mechanisms for coordination of activities between agencies and across national and subnational levels of governance (devolution); provisions for keeping government accountable for implementation, including independent advisory bodies; mechanisms for engaging stakeholders; monitoring, accountability and enforcement mechanisms; and arrangements for financing the implementation of a law or executive act.

A mechanism for coordination of policy development and implementation horizontally between agencies and vertically across national, regional and local levels is an essential feature of institutional arrangements on climate change. To be effective coordination requires that a climate legislation or executive act sets strong and clear mandates that allocate responsibilities and gives sufficient authority to the agency in charge (defining an

agency in charge of coordination, with clear rules of procedure and designating financial resources; Willems & Baumert, 2003).

Devolution of power is another important element of national climate laws or executive acts. Countries differ in their approach to delegation of authority and responsibilities for the formulation and implementation of national climate targets and policies to sub-national levels (Somanathan *et al*., 2014). In China, the central government sets a national target that is then allocated downwards to provinces (which might present additional challenges in ensuring compliance). In Germany regions have veto power on national initiatives through the upper house of parliament. In other countries, e.g. in the US, sub-national initiatives on climate change became the major drivers of action, as discussed below, making up for the lack of leadership at the federal level.

Independent advice through independent bodies can play an important role in strategy formulation and in holding the government accountable for implementing climate change policies. Independent consultative bodies can support longer-term objectives through changing governments via non-partisan, science-based advice (e.g. see Fankhauser *et al*., 2018; Averchenkova *et al*., 2018). Many countries have set up such bodies through their climate change and energy transition laws, as discussed in more detail in the case studies below. The UK's Climate Change Committee, for example, has played a central role in maintaining political commitment and keeping the government in check on climate change during the implementation of the UK's Climate Change Act (Averchenkova *et al.*, 2018).

Stakeholder engagement: To survive through political changes over time and to be implemented effectively climate change laws and policies need to be perceived as legitimate by the key stakeholders. Mechanisms for building and maintaining buy-in from stakeholders, including relevant government ministries and agencies, industry, local governments, environmental NGOs and the scientific community, are key in this respect and are increasingly being included into climate laws and executive acts. Stakeholder engagement could be managed through sectoral ministries when specific policies are being developed; through a targeted consultation between a few key actors or through multi-stakeholder forums with an open exchange of views among all interested parties (ibid).

Finance: Successful implementation of climate legislation and executive acts requires allocation and mobilization of finance, mechanisms which should be determined at the outset and ideally integrated into the legislation or executive act. At the minimum this includes arrangements for securing a budget for the key agencies for implementing the legislation. It could also include provisions for broader financing mechanisms, establish a coordination mechanism on climate finance among the agencies (often led by the ministry of the environment or finance) or a specialized funding entity to pool and blend finance from different sources (e.g. Mexico's Climate Change Fund) (Nakhooda & Jha, 2014; Gupta, 2014).

Consistency with the Paris Agreement: In addition to the above basic governance functions, there are also certain requirements that national frameworks should meet to be consistent with the Paris Agreement. The key provisions of the agreement, including the commitment to submit and implement NDCs, as well as to increase the level of ambition over time, are legally binding on the states that ratify the agreement (Bodansky & Rajamani, 2016). To be consistent with the Paris Agreement domestic legislative and executive frameworks on climate change should include the following elements (see Box 3):

- medium-term and long-term targets (up to 2030 and 2050/end of century, that need to be consistent with the national NDC pledges and also with the overall temperature goal of the Paris Agreement and the objective to bring the world's greenhouse gas emissions to net zero by the end of the century;
- mechanisms for reviewing and ratcheting national ambition over time;
- measurement, reporting and verification system.

The elements considered above form the foundation of national climate change frameworks. Various countries in their climate laws and executive policies take different approaches to addressing the elements, some are more comprehensive than others, as discussed in more detail in the country case studies in Part 2 below.

In designing national climate change frameworks policy-makers and legislators should consider some overarching strategic questions, including:

- *What is the level of complexity of the institutional framework on climate change?*
- *Do the institutional arrangements cover the key governance functions or are there gaps? And is there clarity on the key institutional mandates?*
- *How consistent is the framework with the requirements of the Paris Agreement?*
- *What is the level of flexibility versus policy prescription associated with the governance framework?*

Box 3. Elements of national frameworks to ensure consistency with the Paris Agreement

Emission targets: The alignment of domestic targets with the ones committed to internationally is the first step in ensuring the consistency of domestic legislation and executive policies with the requirements of the Paris Agreement. This alignment involves three key aspects: ensuring the level of the emission reduction targets specified in the national legislation is not less ambitious compared to the NDC; scope of the target, that is, whether the mitigation actions are undertaken on a sectoral or economy-wide level; and timeframes (for more detail see Averchenkova and Matikainen, 2016).

Mechanism for reviewing and ratcheting national ambition: the Paris Agreement requires national efforts to be consistent with the long-term target of keeping temperature increase below 2°C and making best efforts to keep the rise within 1.5°C, as well as with the requirement for countries to peak emissions as soon as possible (Article 2 of the Paris Agreement, UNFCCC, 2015b). Therefore, in designing their national climate change law and policies countries should envision a process for assessing compatibility with these temperature objectives and peaking trajectories for emissions. The five-year cycle of ratcheting ambition under the Paris Agreement and the global stocktake to

assess the collective progress towards the long-term goals imply that countries require a mechanism at the national level for assessing and increasing ambition on climate change compatible with the international timelines for the ratchet.

Monitoring and accountability: Institutions for monitoring, reporting and verification (MRV) and for policy evaluation are essential for fulfilling the international commitments under the Paris Agreement and the UNFCCC. They are also key for enabling effective domestic policy evaluation, enforcement and future adjustment and should be addressed by laws and executive acts on climate change, including allocation of a clear mandate for managing the MRV system. While the international requirements for MRV under the Paris Agreement are still to be finalized through the rulebook, they will likely build on and enhance the existing arrangements to allow for assessing countries' performance on emission targets. There will also be reporting on adaptation actions in the future. All countries are already required to keep up to date a national inventory of greenhouse gas emissions and removals by sinks; to submit regular national communications and biennial update reports with information on mitigation and adaptation actions implemented and planned, projected greenhouse gas emissions, and on the financial support received, required and provided. Furthermore, countries will need to ensure they comply with the Paris Agreement's provision to develop and communicate mid-century, long-term low emission development strategies and domestic arrangements for measurement, reporting and verification (MRV) by 2020.

The answers to these questions are important not only in the context of assessing the overall quality of the governance frameworks and ensuring their effectiveness; they are critical at the early stages of developing the overall narrative, getting political buy-in and negotiating a law or a policy, as will be shown in more detail through the case studies.

Part 2. Case studies on climate and energy transition laws and executive frameworks

Part 2 reviews the experience of several countries with legislating and implementing executive policies on climate change and energy transition. The case study examples have been drawn from the experience of leaders in national climate change legislation. Firstly, the UK's Climate Change Act of 2008 was the first comprehensive national legislation to be adopted, which inspired the efforts of many over countries around the world over the past decade. It has piloted the approach of establishing a long-term target backed up by a series of progressively ambitions interim emission reduction targets or carbon budgets.

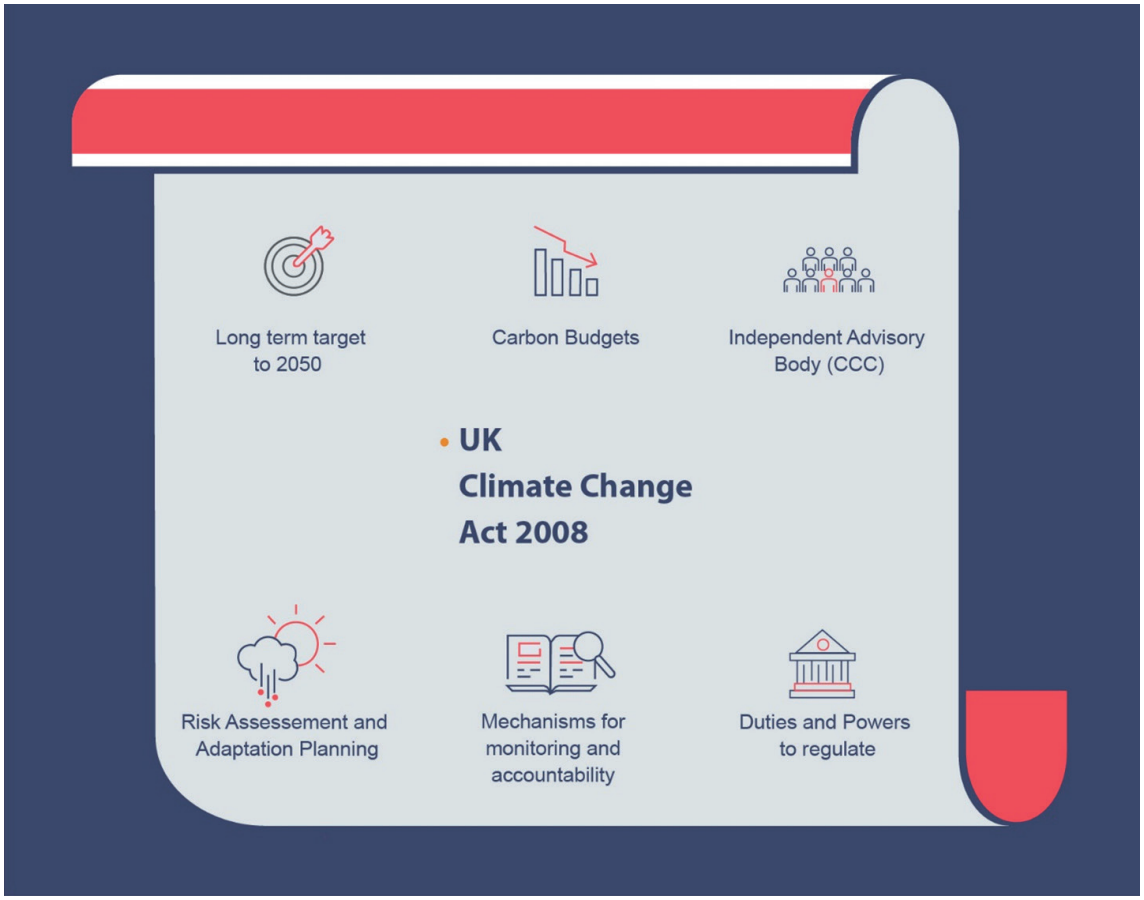
Secondly, Mexico's General Law on Climate Change is an example of the first ambitious climate change framework to be adopted by an emerging economy through a legislative route. Mexico's example offers interesting lessons learnt from a different national context, a country with a strong reliance on fossil fuels and strong opposition from the private sector to climate policy. Mexico's Energy Transition Law was enabled by and builds upon the General Law on Climate Change.

The youngest legal instrument that the study reviews is France's Energy Transition Law of 2015. Having learnt from the UK's Climate Change Act and the experiences of other countries, France has adopted an ambitious yet slightly energy-centric approach in its legislation of combining overall decarbonisation goals and policy planning and implementation instruments with detailed sectoral targets and policy measures.

The study also provides a brief overview of the experiences of several countries that have not yet adopted a national framework legislation on climate change, but have developed comprehensive executive frameworks (Germany, China), or are currently working on a climate law (Chile) or are of interest to Spain and the broader international audience by virtue of being large greenhouse gas emitters and key players in global policy (China and the US).

4 The UK's Climate Change Act of 2008

Figure 4. Key elements of the UK Climate Change Act



Source: the author.

Having passed the Climate Change Act (CCA) in 2008, the UK became the first country to legislate national emission reduction targets and to date remains a country with one of the most comprehensive national climate laws globally. The adoption of the Act was enabled by strong political commitment to the climate change agenda at the time. This commitment was manifested by the UK putting climate change on the agenda of the G8 Summit that it hosted in Gleneagles in 2005 and through the publication of an influential report *The Economics of Climate Change: The Stern Review* (Stern, 2007), commissioned by the Government. A strong cross-party consensus on the importance to act on climate change resulted in only three Members of Parliament voting against the Climate Change Bill at second and third reading (Fankhauser *et al.*, 2018; ClientEarth, 2016).

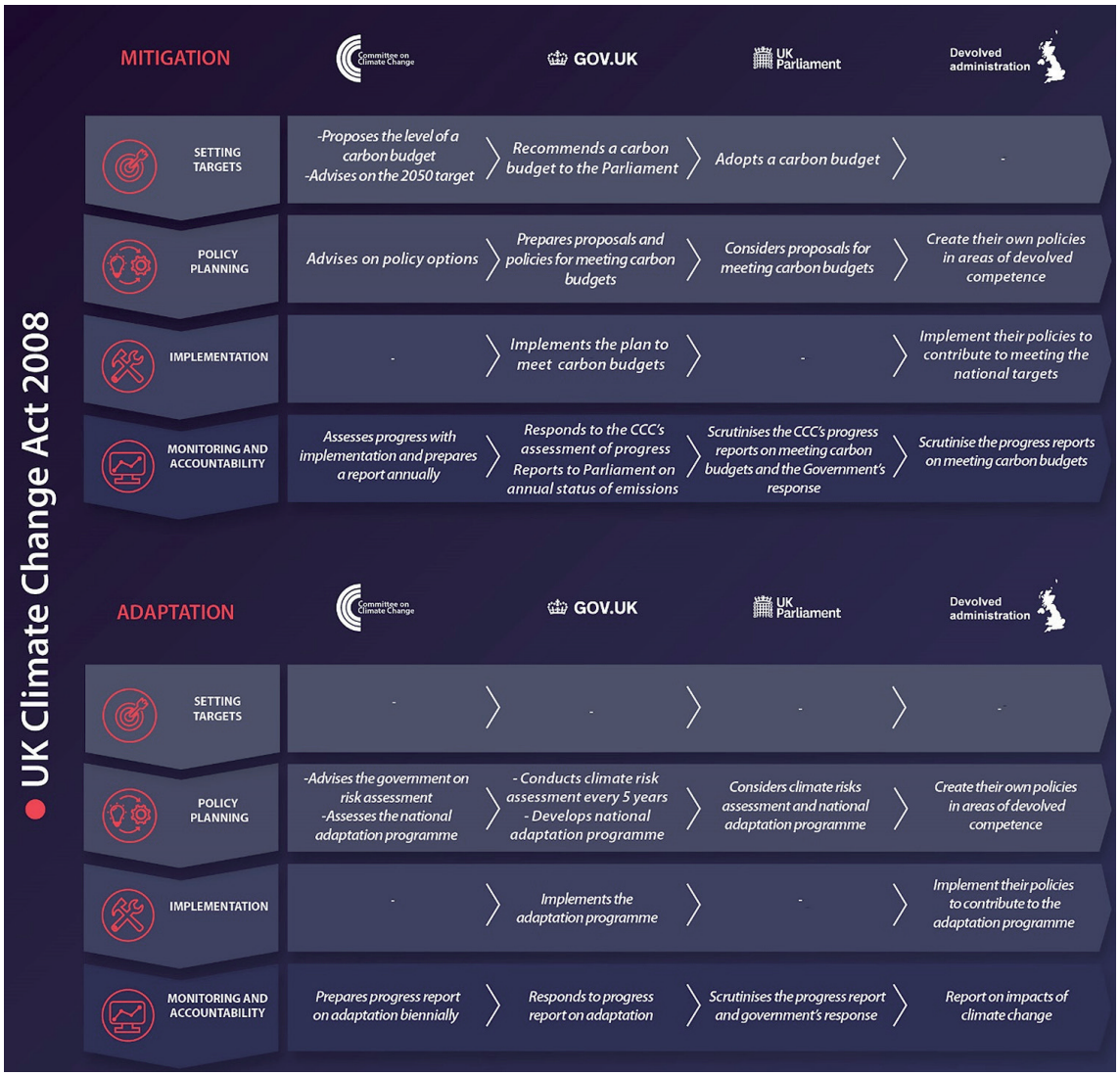
Ten years on, the Act's framework contains the key building blocks that are required to implement the Paris Agreement, including the long-term emission goal, provisions for ratcheting ambition over time, mechanisms for developing and assessing adaptation and mitigation policies and actions, mandatory progress monitoring and other (see Figure 4). The Act has 'survived' four changes in government and has played an important role in maintaining political commitment to climate policy through political and economic shocks that affected the UK over the past 10 years.

A recent study analysed the impact of the Act based on interviews with senior policy-makers, legislators, private sector and civil society experts who have been involved in the design and implementation of the Act (Fankhauser *et al*., 2018; see Box 4). It finds that the Act, among other things, has been instrumental in maintaining political commitment to climate policy, improving the quality of the political debate and enabling low carbon transition in the energy sector (Fankhauser *et al*., 2018). The framework set by the Act and the UK's experience in developing and implementing the legislation offer valuable insights for other countries (see Box 5).

Institutional system

The key governmental institutions responsible for dealing with climate change have been established prior to the adoption of the Act. The CCA defines the overall duties and powers of the government in respect to climate change policy, establishes an independent advisory body, the Committee on Climate Change (the CCC), and clarifies the mandates of the key players, including the Secretary of State, BEIS and DEFRA, devolved administrations and the CCC (see Figure 5).

Figure 5. Functions and mandates of the key institutions under the UK's Climate Change Act



Source: the author.

Coordination of implementation: Effectively coordination of implementation of the CCA and climate change policy overall is carried by the Secretary of State, who is mandated by the Act to present proposals for the carbon budgets and on the policies to reach them, having consulted with the relevant national authorities and subnational governments.[13]

13 Work on mitigation policy is led by the Department for Business, Energy and Industrial Strategy (BEIS), which is also responsible for promoting action on climate change internationally. The Department for Environment and Rural Affairs (Defra) leads on domestic adaptation policy, including the preparation and implementation of the National Adaptation Programme to address the risks set out in the UK Climate Change Risk Assessment 2017. Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017

Independent advice: The creation of the CCC has been the key innovative feature of the Act, which has later been applied by other countries. The CCC is an independent, non-governmental public body comprised of eight technical experts that has its own budget (currently £3.7 million, which includes consultancy budget) and secretariat. The Chair of the CCC is appointed for a period of five years by the Prime Minister, while the members of the Committee are appointed by the responsible Secretary of State[14], based on their recognised technical expertise rather than based on affiliation with or representation of stakeholder groups (Averchenkova *et al*., 2018). In the 10 years since its inception, the CCC has gained a reputation as a credible provider of analysis that is being used by politicians, government experts, private sectors and journalists, to name a few, across the political spectrum in the UK (ibid).

The committee has a clear mandate outlined in the Act to advise the government on the future carbon budgets and to assess progress in meeting them. Importantly, the Act requires the government to respond to CCC's recommendations, making it difficult to ignore the advice (Fankhauser *et al*., 2018). The mandate of the committee covers both mitigation and adaptation (through its Adaptation Sub-Committee). A recent study finds that evidence from the CCC is used beyond matters related to the CCA and featured prominently in the parliamentary debates on new legislation on energy, infrastructure, water and Brexit, among others (Averchenkova *et al*., 2018).

Devolution: The emission targets are set at the national level and the implementation mechanisms created by the Act focus on national government agencies (e.g. BEIS and DEFRA) with an oversight by the Parliament. The Act mandated the devolved administrations (Scotland, Wales and Northern Ireland) to create their own policies and implement national targets, but there are no provisions for councils, cities and the English regions (Fankhauser *et al*., 2018). Scotland and Wales have adopted their own climate change laws and policies, which draw upon and interact with the CCA. Interestingly, Scotland has moved to amend the level of its 2050 emission reduction target to 90 per cent below 1990 levels, which is more ambitious than the national one stipulated by the CCA.

Stakeholder engagement: There are no explicit provisions for stakeholder engagement in the Act. Stakeholders are consulted through the established processes, such as governmental public enquiries, hearings and via departmental engagement. The CCC carries out additional stakeholder engagement when developing its recommendations (e.g. see Averchenkova *et al*., 2018). The Act specifies however that the Secretary of State must consider the views of other national authorities when amending the 2050 target or determining the levels of the carbon budgets.

14 BEIS for the CCC and DEFRA for the Adaptation Subcommittee.

Box 4. Key achievements of the UK Climate Change Act

The power sector has been transformed: Over the past 10 years the UK power sector has transformed with the share of low carbon sources in the electricity mix reaching over 53 per cent in the second quarter of 2018, up from about 20 per cent in 2008. The Act was a major driver of this transformation, helping the UK decouple emissions from GDP.

The political debate on climate change has improved: The Act has transformed the way of conducting the political debate on climate change, creating clear a timeline and procedure for target setting, parliamentary scrutiny and reporting. The reports by the Committee on Climate Change established an agreed empirical evidence base.

The climate consensus has held: The Act has helped to preserve the political consensus on the need for climate action and the UK's long-term ambition, even though the commitment to specific climate policies has varied

The UK's international standing has grown: As one of the first comprehensive climate laws adopted globally the Act became the basis for the UK's extensive international engagement. It served as an inspiration to other countries and helped the UK take stronger leadership on climate change internationally.

Source: Adapted from Fankhauser *et al*., 2018.

Monitoring, evaluation and accountability or enforcement: The Act does not outline the reporting obligations of emissions, but mandates the Secretary of State to publish guidance on measurement of greenhouse gas emissions. It also required the government to develop guidance for reporting authorities on how to measure and report on the impacts of climate change. The Government is also mandated to report every five years on the risks to the UK of climate change, and publish a programme setting out how these impacts will be addressed.

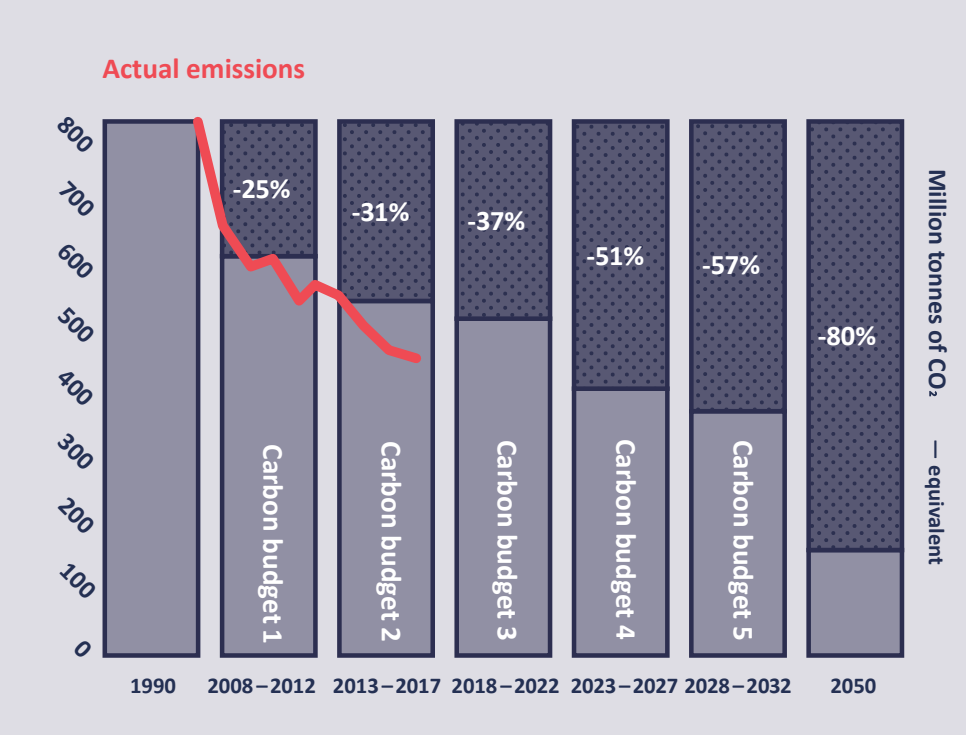
A key feature of the Act is the mechanism for ensuring accountability of the Government for its implementation. The Act requires the Secretary of State to develop policy proposals and plans to implement the carbon budget. The Secretary of State must also report to Parliament with an annual statement on greenhouse gas emissions. The CCC is mandated to prepare an annual report on the status of implementation of the carbon budgets and an assessment on whether the Government is on track to meet the budgets and further progress needed. Progress reports on adaptation are prepared by the CCC biannually and are also presented to Parliament. As noted above, the Secretary of State has a duty to present to Parliament a detailed response to the CCC's reports under clear timelines specified in the Act. This regular reporting keeps climate policy on the agenda and ensures transparency and accountability for progress (Fankhauser *et al*., 2018; ClientEarth, 2016). Strong Parliamentary oversight and the requirement for the Government to respond to the CCC's advice set the UK's accountability framework apart from other countries considered in this study, and ensure greater effectiveness of the independent body, as discussed in more detail in Part 3.

Targets

Long term-target: The Act defines a long-term economy-wide emission reduction target for greenhouse gas emissions to reach 'at least' 80 per cent below 1990 levels. This target was set based on the latest scientific information as presented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) and an assessment of a UK's fair contribution to the international objective of keeping a 50 per cent chance of limiting the increase in global mean temperatures below 2°C (CCC, 2008). Currently there is a debate in the UK on the need to bring this target into consistency with the objectives of the Paris Agreement to bring emissions 'to net zero' and to keep the temperature increase well below 2°C, and the CCC has been formally requested by the government to provide their recommendations on the issue by the end of March 2019.

Near and mid-term targets: Another innovative feature of the Act is the establishment of statutory five-year carbon budgets a mechanism that sets rolling medium-term targets 12 years in advance, to achieve the long-term emission objectives in a cost-effective way. Up to now, five carbon budgets have been agreed to 2032, with the latest budget limiting annual emissions on average to 57 per cent below the level in 1990 (see Figure 5).

Figure 6. Carbon budgets system in the UK's Climate Change Act



Source: Reproduced and adapted from Fankhauser *et al.*, 2018.

Sectoral targets: The CCA does not establish sectoral targets.

Ratchet mechanism: Effectively the system of carbon budgets provides for a ratchet mechanism to increase ambition from 2008 towards the 2050 target, the first one of its kind to be implemented at the national level for greenhouse gas emissions.

Policy processes and instruments

The Act focuses on the processes to determine and deliver policies rather than prescribing a policy instrument upfront. In that it leaves flexibility in the choice of policies to achieve the carbon budgets to the Government. This flexibility was a strategic decision taken at the outset and is built-into the design of the Act. As discussed, the Government outlines the key policies in its report on the proposed actions to meet the carbon budget. The main specific provision on policy instruments gives powers to the national agencies to regulate emission trading schemes and to introduce financial incentive schemes for waste. The Act also mandates a five-year cycle of Climate Change Risk Assessments followed by development of a National Adaptation Programme, with a flexibility for the government in proposing adaptation policies based on the results of the risk assessment.

In this flexible approach to policy prescription and the means to achieve the low carbon and climate resilient transition the Act differs from other laws considered in this report, namely from France's Energy transition law that sets specific levels of carbon tax and from Mexico's General law on climate change, which authorises the government to introduce carbon tax and emission trading scheme, even if not specifying the details. The downside of this flexibility is the risk of underperformance on emission targets. This is currently a growing concern in the UK, as it is widely anticipated to struggle with the achievement of emission targets set in the 4th and 5th carbon budgets based on the current policies foreseen in the Government's Clean Growth Strategy.

Finance: The CCA does not contain specific provisions on how its implementation should be financed. The government follows the customary budgetary process for financing implementation of a legislation.

Box 5. Lessons learnt from the experience with the UK Climate Change Act

- A comprehensive framework law helps coordinate and advance action to reduce greenhouse gas emissions and enhance climate resilience.
- Clear assignment of duties and responsibilities and clarity on the long-term direction of travel are the key factors for a law to be effective.
- Economy-wide, multi-year statutory targets, set in advance, help to chart a clear path towards the long-term objective.
- A strong independent body is important to ensure consistent policy delivery and evidence-based decision-making.
- The Act and its carbon budgets have helped to reduce emissions, particularly in the power sector, while the UK economy has continued to grow.

- The Act needs supplementing with a target for achieving 'net zero' emissions.
- Ability to hold the government to account should be strengthened through defining a statutory response time for the government to publish its carbon plans.
- Renewed political commitment to the implementation of the Act to strengthen buy-in across all parts of the government is required as more challenging sectors for reducing emissions are targeted.

Source: Adapted from Fankhauser et al., 2018.

Consistency with the Paris Agreement:

The UK's framework on climate change established by the CCA contains all the key elements that are required under the Paris Agreement. Its framework is guided by a long-term goal for 2050, backed up by progressively tight carbon budgets, and could serve as a potential prototype of how to translate the Paris Agreement into domestic frameworks. The UK does not have an individual target under the Paris Agreement, as its contribution is covered under the joint EU NDC of reducing greenhouse gas emissions by at least 40 per cent below 1990 by 2030. Yet its domestic target for annual emissions in 2028-2032 at 57 per cent below 1990 levels is consistent with the EU's NDC.

However, the compatibility of the UK's 2050 emission target of reaching 'at least 80 per cent' below 1990 levels with the objective of carbon neutrality by the end of the century under the Paris Agreement has been recently questioned by many NGOs, calling on the government to review the target and set the date for the country to reach net zero emissions. The Government launched a review on 15 October 2018 with a request to the CCC to prepare an assessment on the date for achieving net zero greenhouse gas emissions, on whether the 2050 target needed to be adjusted and on how emissions reductions might be achieved with cost and benefits in comparison to the current targets to be provided by the end of March 2019.[15]

Overall assessment

The Climate Change Act has had a key role in enabling low carbon transformation and in laying the foundation for climate resilience for the UK over the past decade. While the adoption of the Act was enabled by a strong political consensus on the importance of climate change in the UK, over the past decade the Act has helped to maintain that consensus in the face of political change. Long-term target backed up by the system of mid-term carbon budgets, strong Parliamentary oversight and the requirement for the Government to respond to the CCC's advice set the UK's accountability framework apart from other countries considered in this study, and ensured greater effectiveness of the independent body, as discussed in more detail in Chapter 8.

15 See the letter by the Government to the CCC. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/748489/CCC_commission_for_Paris_Advice_-_Scot__UK.pdf

However, while the Act provides certainty about carbon targets, it does not offer certainty about the underlying policies to achieve the targets and cannot therefore by itself fully make up for the lack of political commitment and stronger leadership (Fankhauser *et al*., 2018). This is particularly important given that the Act leaves much flexibility to the Government to design the underlying policies. In this context the continued success of the Act depends on the political leadership on climate change and continued cross-party support. Going forward the UK is facing challenges around bringing the Act in consistency with the Paris Agreement (as discussed earlier) and ensuring the next phase of its implementation delivers the required emission reduction as emissions from more difficult sectors such as heat, transport and agriculture need to be tackled. The main risk is maintaining political consensus, as these more challenging sectors are addressed. It would also be important to strengthen the safeguards against backsliding by the Government, for example through the introduction of statutory timeframes for the publication of the plans on meeting the next carbon budget (ibid).

5 Mexico's General Law on Climate Change and the Energy Transition Law

Context

Mexico's climate change policy has been driven to a large extent by its international leadership stance on climate change since the early 1990s, but also by its economic and political realities with significant continued dependence on the oil industry, deteriorating security situation and corruption challenges (Philip *et al*., 2016). Mexico's oil-related revenues comprise about 32 per cent of government revenue in 2013 and about 8 per cent of its GDP in 2016, with 80 per cent of energy generation based on fossil fuels (INECC, 2018). This explains the strong opposition to climate change policies the country experienced from the private sector. Business as Usual (BaU) projections predict doubling of energy consumption in Mexico before 2050 (IRENA, 2015).

Having hosted the successful session of international climate negotiations that resulted in the adoption of the Cancun agreements, Mexico also became the first emerging economy to submit an intended Nationally Determined Contribution to the Paris Agreement (EDF and IETA, 2018). A national framework started to emerge from around 2005, when the Government started to develop structural climate change and clean energy policies. Mexico adopted two significant pieces of legislation: the 2012 General Law of Climate Change (*Ley General de Cambio Climático* or LGCC in Spanish) and the 2015 Energy Transition Law, with the latter building on the former advancing specifically decarbonisation of energy production and consumption. These are outlined separately below.

5.1 The General Law on Climate Change

Figure 7. Key elements of Mexico's General Law on Climate Change

Source: the author.

The 2012 LGCC was adopted following 2 years of intensive negotiations. The law set the foundations of Mexico's climate change policy having outlined long-term objectives for emission reduction, clean energy targets and set up the institutional infrastructure required to deal with climate change (see Figure 7). In April 2018 Mexico became one of the first countries to amend its domestic climate law (LGCC) to bring it into greater consistency with the Nationally Determined Contribution (NDC) and the Paris Agreement.

Institutional system
The LGCC establishes the 'National System on Climate Change' (SINACC), that includes the Inter-Ministerial Commission on Climate Change (CICC), the Consultative Council on Climate Change (C3), and the National Institute of Ecology and Climate Change (INECC). It provides for participation of the representatives of the state governments, the associations of municipal governments and the representatives of the Mexican Congress.

- *Coordination of implementation* of the law is done through the CICC, which includes representation of fourteen federal ministries.
- *Devolution:* The law mandates Mexico's 32 states and 2,475 municipalities to develop local mitigation and adaptation programmes and provides for their representation in the SINACC.
- *Independent advice* is provided through the C3, which the law designates as the permanent consultative body of the CICC. Comprised of the representatives of civil society, private sector and academia with recognised expertise, C3 recommends studies and policies, proposes adaptation and mitigation goals and promotes stakeholder participation (INECC, 2018). Unlike the CCC, however, C3 does not have a designated budget, so its members operate on a voluntary basis.
- *Stakeholder engagement* is mainly envisioned through the C3.

Monitoring, evaluation and accountability: The LGCC mandates the government to develop, integrate and publish a Registry of emissions of greenhouse gases and short-lived climate forcers/pollutants from mobile and stationary sources. The Law also creates a transparency framework and tasks the CICC to develop an annual report on climate change. The Evaluation Coordination group is created to assess national climate change policy at least every two years. The law also imposes penalties for non-compliance with the requirements to submit information.

Targets: Already in its original reading in 2012, the law defined an aspirational goal of a 50 per cent reduction by 2050 below the baseline level of greenhouse gas emissions in the year 2000. The 2018 decree was motivated by bringing emission targets in consistency with the NDC and recognised the need to keep global temperature rise to within 2ºC above pre-industrial levels and to undertake efforts to keep this increase below 1.5 ºC. This objective is translated into a range of unconditional and conditional mid-term targets for 2030 for greenhouse gas and black carbon emissions and supported by clean energy and sectoral targets (see Figure 8 and Annex 1.)

Ratchet mechanism: No provisions for a ratchet mechanism are made in the law, although the 2018 decree mentions the need to increase ambition over time.

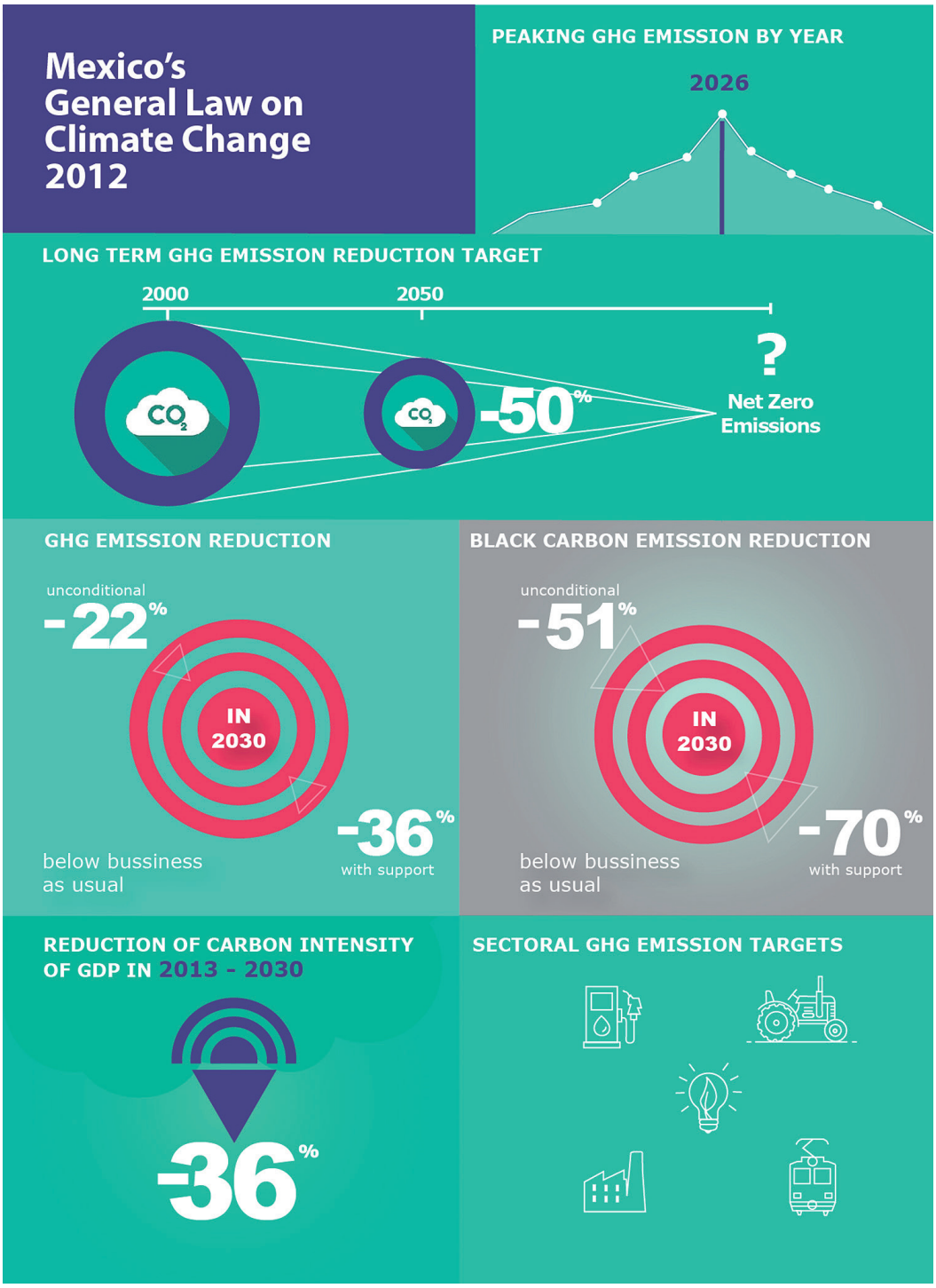
Consistency with the NDC targets: The 2018 decree brought domestic targets in consistency with those in Mexico's NDC.

Policy processes and instruments: The law defines and integrates mechanisms for developing climate change strategies. This includes:

- Creation of a National Strategy on Climate Change with a midterm vision for policy.
- A Special Programme on Climate Change (PECC) that specified mitigation and adaptation measures for the main sectors based on the national strategy, the national development plan and the sectoral programmes. The 2014–2018 PECC includes 30 mitigation-geared measures estimating an abatement of 83.2 MtCO2eq y by 2018.
- The 2018 decree mandated development of a national adaptation plan at the national level, and implementation of adaptation activities at the state and municipal levels. It also establishes emission trading scheme and enhances provisions for the transparency framework.

Finance: Budget allocation for implementation of the law has not been specified. Neither does the law contain provisions for a climate finance strategy, which was highlighted as one of the key gaps that affect the effectiveness of its implementation (Averchenkova & Guzman, 2018). The law created the Climate Change Fund, which should receive domestic and international finance and channel them into climate change actions.

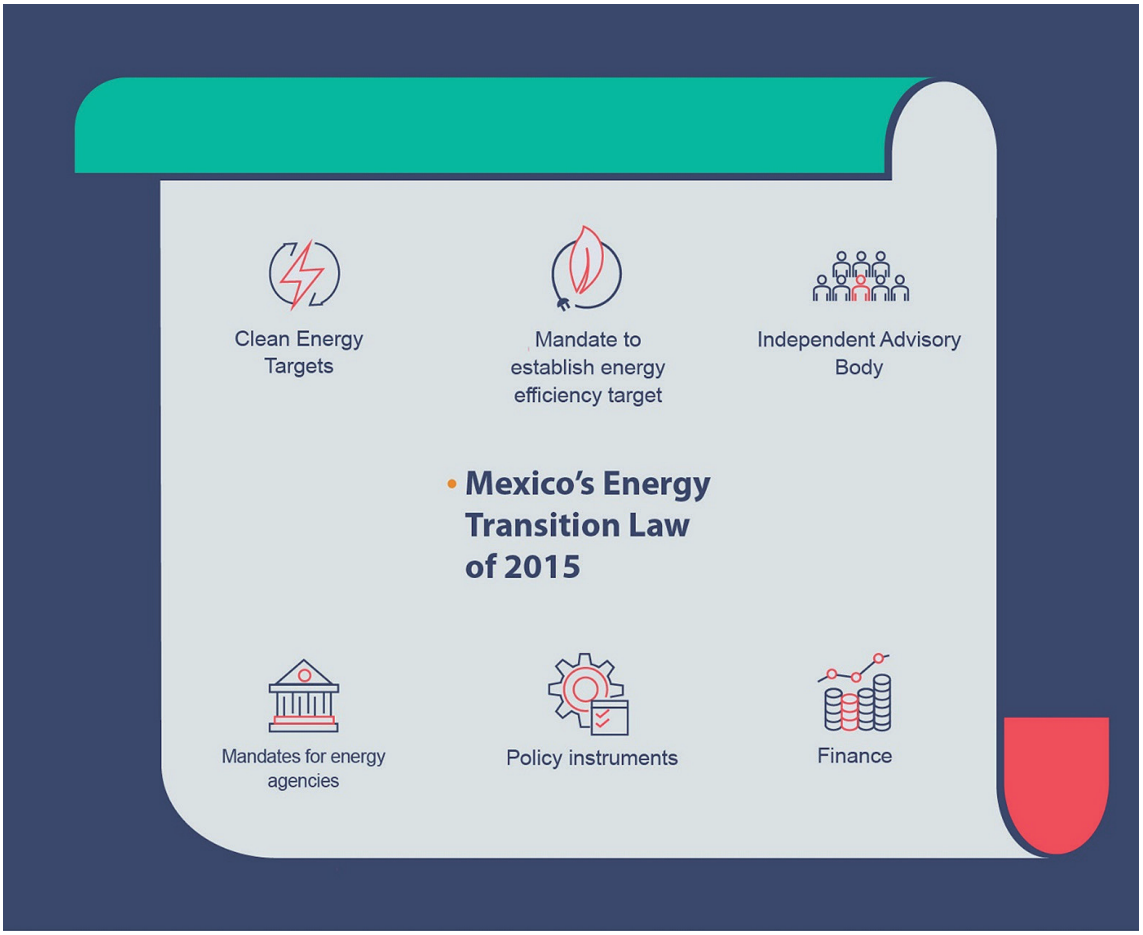
Figure 8. Quantitative targets in Mexico's General Law on Climate Change



Source: the author.

5.2 Mexico's Energy Transition Law

Figure 9. Key elements of the Energy Transition Law



Source: the author.

The Energy Transition Law (Ley de Transición Energética or LTE) was approved by the Mexican Congress on December 10, 2015. This law aims to operationalize the energy transition initiated with the constitutional energy reform in 2013. It establishes a legal framework for the efficient use of energy and gradual increase of clean energy in electricity production to achieve established greenhouse gas emission reduction goals. The law explicitly links to the objective of the LGCC for reduction of emissions and clean energy target that were set as aspirational in 2012. A recent study found that LGCC was an important precursor to the LTE and enabled its adoption, providing justification for the measures to decarbonise energy (Averchenkova and Guzman, 2018). Furthermore, coalitions of stakeholders that support climate change agenda and decarbonisation of the economy that were formed during the discussions on the LGCC were helpful in getting support for the LTE (ibid).

Institutional system: The law outlines institutional mandates for the implementation of the law for the key energy institutions: the Secretariat of Energy (SENER), the Energy Regulatory Commission (Comisión Reguladora de Energía or CRE), the National Centre for Energy Control and the National Commission for the Efficient Use of Energy. It also sets out several targets, programmes, strategies and mechanisms.

- *Coordination of implementation* of the law is mandated to the SENER, which is supported by the above agencies within their respective thematic area of focus.
- Independent advice and stakeholder engagement: The LTE created the Consultative Council for the Energy Transition as an advisory body on implementation of the law and as a body for stakeholder consultation. It also mandated creation of the National Institute of Electricity and Clean Energy as an independent body for the scientific studies on clean energy and emission reduction. The Mexican Centres of Innovation in Clean Energies are created to promote research and development of clean energy technology and build capacities in the scientific community.
- Devolution: Federal agencies are mandated to provide advice and technical support to the states and municipalities on request for the design and implementation of projects, programmes or local technical regulations related to energy efficiency and clean energy.

Targets

Long term-target: While LTE has not specified a long term goal, subsequently through the Energy Transition Strategy to Promote the use of Clean Technology and Cleaner fuels that stems from the LTE, Mexico has set a goal to generate 37.7 per cent by 2030 and 50 per cent by 2050 from clean electricity in addition to the original legislated mid-term target of 35 per cent electricity generation from clean energy by 2024 (CNUEE, 2016).

Near and mid-term targets: The LTE legislates the aspirational clean energy target set in the LGCC of 35 per cent electricity generation from clean energy by 2024 and sets new intermediate goals: 25 per cent by 2018 and 30 per cent by 2021. The law also mandates the government to establish energy efficiency targets.

Ratchet mechanism: No explicit mechanism for the ratchet is designed, but the targets and strategies need to be periodically reviewed.

Policy instruments: The LTE identifies three main implementation instruments:

- The Transition Strategy to Promote the Use of Cleaner Technologies and Fuels, with 15- and 30-year planning horizons containing the Clean Energy and Energy Efficiency Goals and assessment of compliance;
- The Special Programme for Energy Transition, that supports implementation of the Strategy, with clean energy targets, actions, instruments, and financial and regulatory mechanisms;

- The National Programme for the Sustainable Use of Energy that focuses on actions and projects on energy efficiency and energy conservation to meet the goals set in the LTE and is mandated to set an indicative energy efficiency goal.

The law also outlined several specific policy instruments, including the Flexible Compensation Mechanisms, that can be used to comply with the emission standards; mandatory acquisition of Clean Energy Certificates and the Intelligent Electrical Networks Programme that would support the modernization of the National Network of Transmission and of the General Distribution Networks. It also created an Excellence in Energy Efficiency, a voluntary process of certification and recognition for products, equipment and buildings with sustainable and efficient use of energy.

Finance: The LTE has extensive provision on finance and mandates the government to allocate resources from the federal budget for its implementation, to design and implement measures for attracting international finance and to establish support mechanisms and financial incentives to promote investments in energy efficiency and integration of distributed electricity generation systems.

Monitoring, accountability and enforcement: SENER is mandated to conduct an annual evaluation of progress with implementation of clean energy targets, report on greenhouse gas mitigation potential for the energy sector, coordinate updating of the emission inventory and publish annually the National Atlas of Zones with High Clean Energy Potential. The CRE is required to maintain a Public Registry of Clean Energy Certificates. The law also envisions regular inspections of the electricity industry and imposes penalties for the employees who do not comply with the requirements to provide information on energy consumption and imposes sanctions for non-compliance in sustainable energy use projects that use federal public funds.

Overall assessment

In 2015 Mexico emitted 683 million tons of carbon dioxide-equivalent (MtCO2e), two-thirds of which came from electricity generation, transport and industry (INECC, 2018). Over the past decade Mexican greenhouse gas emissions have been growing, although the average annual growth rate decreased to 0.8 per cent per year in 2010–2015, with emissions in 2015 reaching 54 per cent above the 1990 level (INECC, 2018). According to Climate Action Tracker, Mexico's unconditional target to reduce greenhouse gas emissions by 22 per cent below BAU level in 2030 is equivalent to 72 per cent above 1990 levels and 9 per cent above 2010 levels excluding LULUCF by 2030; while the conditional target of a 36 per cent reduction below BAU by 2030 translates to 40 per cent above 1990 levels and 11 per cent below 2010 levels excluding LULUCF by 2030 (CAT, 2018). However, while the current policies in Mexico will likely lead to an overall decrease in emissions below the levels in 2015, Mexico is likely to miss its 2020 and 2030 emission targets.

Mexico's performance is more positive in relation to clean energy transition. In 2006-2016 the installed capacity for renewable energy generation in Mexico grew 4.3 per cent on average per year, with solar and wind energy growing 33.6 per cent and 110.3 per cent

respectively (SENER, 2017). In a recent statement by Mexico's Vice Minister for planning and energy transition at SENER, Leonardo Beltrán, based on the current growth rate, Mexico could reach its goal of generating half of its power from clean energy by 2034, 16 years sooner than the target set in the Energy Transition Strategy (Canonica & Rodriguez, 2018). The LGCC has had a major impact on Mexico's climate change policy, having laid the institutional foundations for developing, mainstreaming and implementing the climate change agenda at the national, states and municipal level. According to a recent assessment it has also defined long-term objectives, strengthened political continuity and improved the quality of the political debate on climate change (Averchenkova & Guzman, 2018). Most importantly it has enabled advances in the low carbon energy transition by providing guidance on long-term climate change and clean energy objectives for energy reform (ibid). For a detailed overview of the lessons learnt see Box 6.

However, the country needs to close the gap between what is set out in the Law and the actual policy arrangements, processes and practices. Specifically, the law does not set sufficiently clear mandates or implementation guidelines for the responsible institutions and lacks strong accountability mechanisms, with no independent body entrusted with accountability and enforcement. The independent advisory body (C3) lacks strategy and allocated funding and is highly ineffective. The general mandate on the allocation of public funding is not sufficiently strong, resulting in the low levels of finance raised for climate policy in the recent years (Averchenkova & Guzman, 2018).

Box 6. Lessons from the implementation of Mexico's General Law on Climate Change

- The adoption of the law has been an important step in advancing Mexico's efforts on climate change and in strengthening its reputation globally in this area.
- Legislation helps set a long-term direction for climate policy in the face of future political change, including in emerging economies with a strong fossil fuel lobby like Mexico.
- To be effective, a climate law needs to back up long-term goals by intermediate steps to achieve them, and to define planning and implementation mechanisms and timelines.
- A climate law also requires a clear financing strategy and the backing of sufficient financial resources. Mexico needs to develop such a strategy and improve budgeting processes on climate change.
- Strong mechanisms for coordination beyond the environmental sector are needed to ensure adequate implementation. Ambiguities in institutional mandates can impede coordination, policy development and implementation.
- A strong accountability mechanism is essential, including an independent and effective policy evaluation and advisory body. The lack of dedicated financial resources impedes the effectiveness of the Consultative Council on Climate Change in this respect.
- The lack of an independent and adequately resourced monitoring and evaluation mechanism is a significant barrier to the effective implementation of the Law and Mexico's Nationally Determined Contribution (NDC) and needs to be addressed.

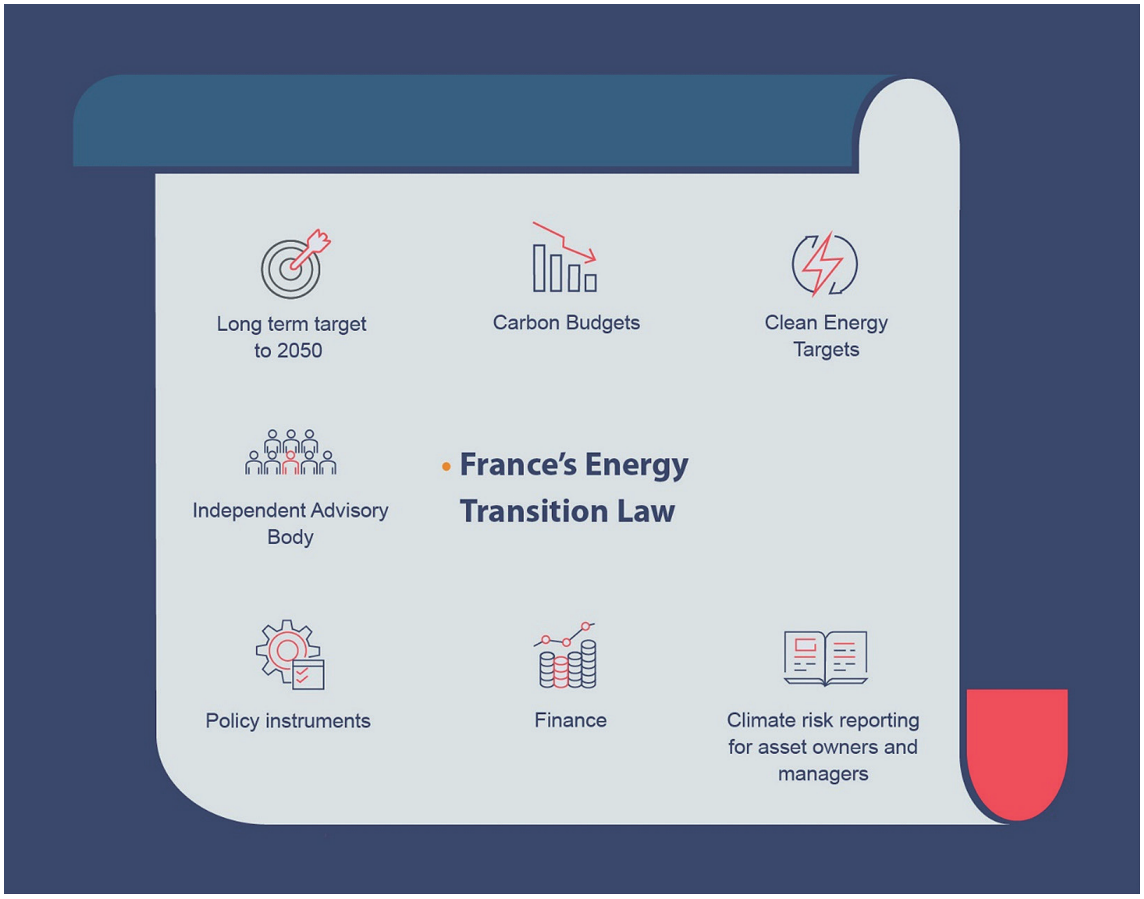
- A climate change law alone does not substitute for political leadership. Sustained commitment is required for successful implementation, particularly given the continued strong opposition to climate change policies in Mexico from fossil fuel dependent industries.
- Adoption of legislation increases political awareness of climate change, improves the quality of the political debate and helps maintain political consensus over time.
- The Law has guided the low-carbon transition in the energy sector providing long-term climate change and clean energy objectives for energy reform.
- The future challenge is to close the gap between what is set out in the Law and its implementation, which will require reviving political leadership.
- Capacity needs to be strengthened, and participation of the state and municipal government and sectoral agencies incentivised, including by targeting guidance on how to develop climate change plans and improving resource allocation.

Source: Adapted from Averchenkova and Guzman, 2018.

Closing these implementation gaps will require renewed commitment to the climate change agenda from the highest political level from the recently elected Government. While the adoption of the LGCC and the ETL laws has helped to strengthen a political consensus about the importance of climate change action and decarbonisation of energy, there are still significant disagreements about the form this should take. Strong opposition from fossil fuel-intensive companies slows implementation. The laws alone are not able to substitute for the political will necessary to implement, and leadership necessary to guide, the concrete policies necessary for achieving its goals.

6 France's Energy Transition for Green Growth Law

Figure 10. Key elements of France's Energy Transition Law



Source: the author.

Context

In 2015 France passed the Energy Transition for Green Growth Law (Energy Transition Law, see Figure 10), following two years of public consultation and debate. President Hollande announced the drafting of the law during his 2012 presidential election campaign. Negotiations of the law took 150 hours of parliamentary debate with over 5000 amendments submitted through the public hearings, of which 970 have been adopted (Euroactive, 2015; Collin, 2017). As a result, the law is very complex and ambitious in scope. It sets out to address energy transition and climate change covering several sectors of the economy (Dreyfus & Allemand, 2018).

Most of the implementing decrees under the law were adopted by November 2016. However, the challenge has been slow implementation, in particular in terms of guidance and commitment from the top down to the lower levels of government (Dreyfus & Allemand, 2018). According to the recent analysis France is not likely to meet its 2020 targets, while 2030 and 2050 targets are still achievable (ibid). In July 2017, the 'Minister for Ecological Transition and Solidarity' Hulot presented a five-year climate plan ("Plan Climat"), which stems from the Energy Transition Law (ETL). It sets a goal of carbon neutrality for France by 2050 as a new long-term target (Dreyfus & Allemand, 2018). The low carbon strategy established under the law, as discussed below, is set to be revised in 2018. It is widely expected that the revised climate neutrality target will be integrated into the revised strategy.

Institutional system

The Law strengthened the existing and created some new institutions to support climate change policy and low carbon energy transitions. This includes the creation of the new Expert Committee for the Energy Transition.

Independent advice: The law creates an independent advisory body the Expert Committee for Energy Transition, composed of five independent energy and climate experts. The Committee is responsible for monitoring and assessing the strategies and plans produced by the Government to implement the law and consulted during the drafting of the carbon budget and the low-carbon strategy. However, no dedicated resources have been made available to fund the contribution of experts (Duwe *et al.*, 2017). Another weakness of the French system compared to the UK is that there is no statutory requirement for the government to respond to the Committee's opinions, which are forwarded to the Parliament to be considered as part of the debate. This ambiguity in the mandate and the status of advice provided by the expert body diminishes its effectiveness (Rüdinger, 2015).

Devolution: Energy transition at the regional and local level is an important focus for the law, with an entire chapter devoted to energy transition in the territories. Provisions are defined for the regional energy efficiency programmes, including energy retrofit support schemes, financial support through public aid, third-party financing and banks. Yet the regional programme requires approval from the national government.

Stakeholder engagement: The adoption of the law was preceded by a very extensive stakeholder engagement and consultation process building on the Grennel process in 2007-2010, which developed an innovative model of engaging with the five groups of stakeholders: the state, local authorities, companies, unions and environmental NGOs (Rüdinger, 2018). However, the government was criticised for not having a clear plan for how the stakeholder input would then feed into the legislative process, which affected the overall credibility of the consultation. To address this challenge a special stakeholder commission was created (ibid).

Monitoring, evaluation and accountability or enforcement

The monitoring and reporting system on greenhouse gas emissions in France is very complex and includes several mechanisms, which the law does not simplify (Rüdinger, 2018). The

law mandates intermediary reporting every 2 years and a comprehensive evaluation report to be prepared by the Government at the end of each budget period to determine whether adjustments are required. It also envisions administrative and financial sanctions when the compliance with its provisions is breached by the entities covered (e.g. on energy efficiency standards). However, the accountability system created by the law has been criticised for not envisioning a parliamentary oversight for the low carbon strategy and multi-year energy plan, creating a risk of backsliding in the future. Also monitoring and policy evaluation is being performed by the government itself, potentially risking lack of independence and credibility (ibid).

Targets and ratchet mechanism

France's ETL establishes a multitude of targets, including long-term greenhouse gas emission and energy usage targets to 2050. These targets are supplemented by a series of mid-term emission reduction targets to 2030, as well as detailed energy production and consumption targets for 2030 for the whole economy and for the key sectors, waste reduction and other targets (for a detailed overview of the key targets see Figure 11 and Annex 2).

Like the UK's Climate Change Act, France's Energy Transition Law adopts multi-annual progressively ambitious carbon budgets covering several 5-year periods (3 years for the first budget). The carbon budgets for 2015-2018, 2019-2023 and 2024-2028 periods were published in 2015, while carbon budgets for the future periods need to be set at least 10 years in advance. The Energy Council assesses and issues an opinion on the levels of the future carbon budgets and on the progress with implementation of the current one, as discussed above. However, the law does not specify whether the review and adjustment of targets should only be towards increasing ambition. This is not fully consistent with the requirements of the Paris Agreement, which requires ambition to increase over time. The law also does not define which circumstances can be considered a legitimate reason for triggering the review of the levels of the targets (unlike the UK's CCA, which lists the key factors that should be addressed in these considerations).

Policy processes and instruments

The law mandates the government to develop a national low-carbon strategy every five years, which should specify the level of carbon budgets, an indicative trajectory to achieve the long-term targets and policy recommendations for all sectors. It also introduces a multi-year energy planning framework, which sets industry and region-specific objectives for energy supply and demand for two subsequent five-year periods. The law specifies policy interventions that aim at increasing the share of renewables in the energy mix and that reduce primary energy consumption. It also defines a trajectory for a carbon tax with a progressive increase from 14.5 euros per ton of CO2 in 2015, to 56 € in 2020 and 100 € by 2030. Several provisions concern reductions in air pollution, for example a clean transport programme with incentives for the purchase and use of low-emission vehicles, waste reduction and decoupling of economic growth from consumption of raw materials.

Finance

The Government is mandated to submit to Parliament a report on financing the energy transition as a part of an annual draft budget submission. This includes an assessment of the financial needs to implement the law, public and private finance invested and a comparison of needs with available resources. The Law also creates and strengthens several existing financial instruments, including:

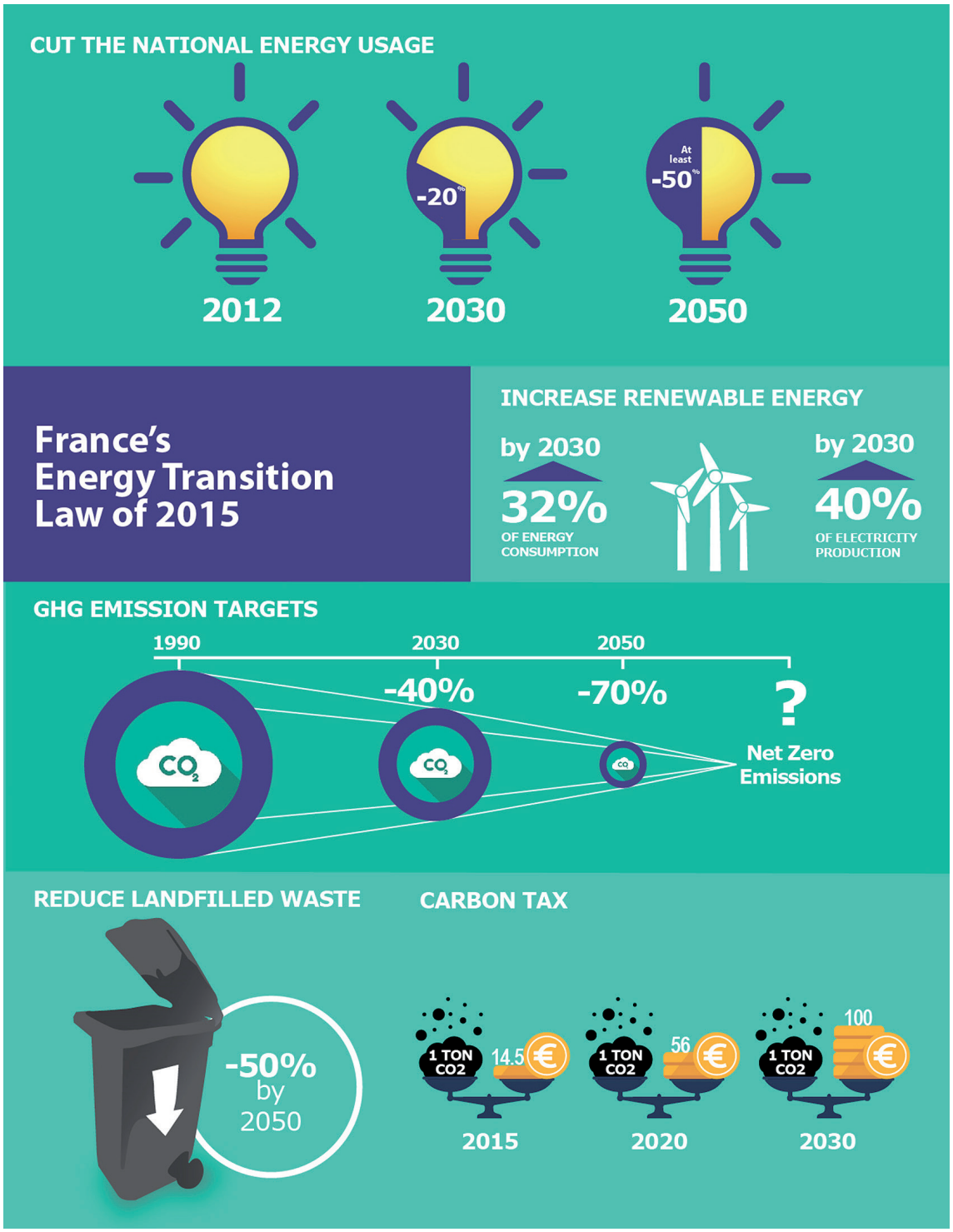
- The Caisse des dépôts, the public savings fund that supports projects by municipalities, has been increased by €5 billion. Loans will be used for financing energy retrofits of buildings, clean transport and renewables. Its energy transition financing fund allocated €1.5 billion over three years to support existing and new projects, including refurbishment for private dwellings and waste reduction.
- The Guarantee Fund for Energy Renovation is created to finance energy efficiency improvements in the housing sector. The ADEME (French Environment and Energy Management Agency) will incentivise local authorities and their groups to develop schemes for removing inefficient individual wood burners (Gouvernement.fr, 2018).

Climate Risk Reporting provisions

Through Article 173 of the ETL, France has introduced mandatory climate change-related reporting for asset owners and asset managers the first such initiative to be legislated in the world. This feature is widely regarded as the powerful and innovative feature of France's legal framework. The law requires institutional investors to report on the impact of both physical risks and 'transition' risks caused by climate change on their activities and assets. While investors may choose which data to report, it is suggested to address:

- The consequences of climate change and extreme weather events on the assets
- Changes in the availability and price of natural resources
- Policy risks related to the implementation of national and international climate targets
- Measures of past, current or future emissions of greenhouse gases (both direct and indirect)

Figure 11. Key quantitative targets in France's Energy Transition Law



Source: the author.

As at August 2018, 60 institutional investors were subject to the latter reporting requirements. The inclusion of physical impacts of climate change in a financial risk analysis is in line with the Task Force on Climate Reslated Financial Disclosures (TCFD's) recommendations. This new focus meets the demand of investors for enhancing financial risk assessment through taking better account of climate-related risks in order to allocate capital efficiently and avoid both stranded assets and litigation.

Overall Assessment

The adoption of the Energy Transition Law in France has been a major step towards institutionalizing and putting into a legal framework a strategic long-term vision and the key policy planning instruments for decarbonisation of the economy and energy transformation. Having set the long-term target to 2050 and a system of carbon budgets, complemented by decarbonisation targets for several sectors, France has also become the first country to legislate requirements for carbon disclosure for the investment community, which could have a transformational impact on the financial market. This firmly places France among the leading countries with strong national legal frameworks on climate change and low carbon energy transition.

However, several important gaps threaten the effectiveness of the implementation of the law, some of which stem from the law's design, while others relate to governance challenges in its execution. In the early years of the implementation of the law in 2015-2017 France has already fallen behind on several of its targets. The overall complexity of the law and excessively broad coverage present a significant coordination challenge.

Other gaps include the lack of clear financing mechanisms and relatively weak accountability mechanisms for the implementation of the law. This concerns the relatively weak mandate given to the Expert Committee on Energy Transition. In the absence of a requirement for the Government to respond to the Committee's recommendations, and without dedicated funding for its work, the committee risks having a limited impact, which in turn could lead to weak accountability in the implementation of the law.

Furthermore, the 2050 target included in the law is no longer compatible with the Paris Agreement and the need to transition to 'net zero' emissions. The announcement of the government of a climate neutrality target by 2050 is a welcome step in this context. It is important to see whether this revised target would be reflected in the revision of the national low carbon strategy and included in the law itself, which would be important to do to give the target appropriate legal status.

7 Climate change frameworks in China, Chile, Germany and the US

7.1 Climate Change Policy in China

Overview of national policy framework

In the past decade China has taken an increasingly ambitious approach to its climate policies, motivated by their interlinkages with energy security, air pollution and social stability. A shift in its development narrative and in the key economic drivers is expected to slow the growth and eventually decrease its greenhouse gas emissions. Following a period of rapid expansion of industrial capacity to reignite growth after the financial crisis, in the past few years China's economy has been slowing down, and the country must manage significant overcapacities in the coal and steel sectors.

Increasing pressure on limited resources in urban areas due to rapid urbanisation and the declining quality of air, soil and water due to resource-intensive development amplify growing concerns about social stability and unrest. The government's focus therefore has shifted toward higher quality growth, a 'new normal', which means that growth of emissions from the coal and steel sectors is likely to slow down over the coming years (Green & Stern, 2016). The government has focused increasingly on efforts to reduce air pollution, on energy efficiency and renewable energy as opportunities for economic growth, which helps reduce greenhouse gas emissions.

The overall strategic framework for climate change is backed up through the 13th Five-Year Plan (FYPs) released in March 2016, which outlines the development strategy for China for 2016-2020 and has a very strong political standing. The plan includes concrete targets, including peaking carbon emissions, increasing energy production from renewables, eliminating surplus coal capacity in the next five years and developing green infrastructure (Climate Laws of the World, 14 October 2018). Specifically the 13th FYP includes a target to reduce the carbon intensity of GDP by 18 per cent by 2020, which is complemented by energy production and consumption targets (for more detail on China's current climate change targets, institutions and policies see Annex 3). Yet implementation of climate policy takes place mostly at provincial or city levels, which often makes it difficult for the central government to be accountable for performance (Birney, 2014).

The Government has adopted several medium-to-long term plans and integrated the climate change goals, emission targets and low carbon development plans for specific sectors into its FYPs. From 2016 it has imposed a moratorium on new coalmine approvals for at least the next three years. However, there have been recently reports in the media on the potential new expansion of coal regardless of the moratorium.[16] It has also introduced energy efficiency standards for vehicles, buildings, appliances and industrial equipment (based on

16 Adam Vaughan *Satellite images show 'runaway' expansion of coal power in China*. The Guardian, 26 September 2018 https://www.theguardian.com/world/2018/sep/26/satellite-images-show-runaway-expansion-of-coal-power-in-china

Averchenkova *et al*., 2016a; Climate Laws of the World, 2018 and Xiaofeng *et al*., 2018). Furthermore, since 2015 China has been piloting a national carbon trading programme in the seven pilot schemes in Beijing, Chongqing, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin, which was scaled-up to the national Emissions Trading Scheme (ETS) for power generation in December 2017.

In 2013 China launched the Belt and Road Initiative (BRI) to improve regional cooperation and connectivity on a trans-continental scale with 65 other countries that account collectively for over 30 per cent of global GDP, 62 per cent of population, and 75 per cent of known energy reserves (World Bank[17]). The government highlighted that the initiative would adhere to the sustainable development goals, and China's banks have started to issue BRI-related green bonds with the proceeds designated for sustainable projects. The Industrial and Commercial Bank of China raised over USD 2 billion for projects in low-emission transport, renewable energy, energy efficiency and water resources management with its first One-Belt-One–Road climate bond in 2017 (Chi Lo, 2018). However, a recent analysis finds that China developed 240 coal-fired power projects in 68 countries in 2001-2016, most of them associated with the BRI, equivalent to about 25 per cent of China's domestic coal-fired capacity (ibid). This has serious negative implications on global greenhouse gas emissions.

While China has followed an executive regulatory route in its national climate change policy, in 2010 the government announced that a framework law on climate change and energy transition would be developed in the coming years. The first draft of the law was completed in 2014 and a consultation with ministries and other stakeholders started (Nachmany *et al*., 2015). However, securing agreement proved challenging due to some internal opposition (Averchenkova *et al*., 2016a). As at 2018, the drafting of the law is still reportedly in progress, but the issue has not yet been put into the schedule of the legislature (Xiaofeng *et al*., 2018).

Overall assessment

China has strengthened its international leadership on climate change and made significant progress domestically towards decarbonising its economy based on the narrative of economic opportunity and co-benefits. It has made its 2020 energy and decarbonisation targets more ambitious over time. In March 2018 China's lead official for climate change, Xie Zhenhua, announced that the country had met its 2020 carbon intensity target by 2017, three years ahead of schedule (Reuters, 2018).

Its NDC requires China to peak CO2 emissions by 2030 and would result in emission levels of 12.7–13.8 GtCO2e and a 64 per cent –70 per cent reduction of emission intensity below 2005 levels by 2030 (IEA, 2017a). While emissions declined between 2014 and 2016, leading many experts to suggest they may have reached a peak, 2017 alarmingly has seen China's overall emissions grow again (CAT, 2018, Accessed on 13 October 2018). This increase is mainly due to the increase in coal consumption, which rose for the first time in three years, and the growth in demand for other fossil fuels.

17 The World Bank "Belt and Road Initiative "29 March 2018 https://www.worldbank.org/en/topic/regional-integration/brief/belt-and-road-initiative

Climate Action Tracker assesses China to be on track to meet and potentially exceed its 2030 NDC targets based on its current policies. If, however, coal consumption does not continue to decline past 2017 (particularly should the reports on the renewed expansion of coal capacity indicate a new trend), and no additional policies are introduced to non-CO2¬ gases (CH4, N2O, HFCs etc.), China's total greenhouse gas emissions could continue to rise until at least 2030. Furthermore, China's NDC is not in line with the objective to limit warming to below 2°C, unless other countries make much deeper reductions (CAT, 2018). Implementation of current climate change policies in China depends on cooperation from provincial authorities and is being challenged by affected state-owned enterprises and regional interests. Adoption of a national climate change law in the future would help affirm the political commitment and priority given to climate action. An important concern going forward is the need to strengthen monitoring, enforcement and accountability for targets and policies and enhancing capacity to perform these tasks especially at the provincial and municipal levels (Neuweg & Averchenkova, 2018).

7.2. Climate Change Policy in the US

Overview of national policy framework

Climate change policy at the federal level in the US has been challenged by strongly divided political views on the issue and a strong lobby from the fossil fuel industry and 'climate sceptics' community. The US has experienced a more organized effort to question the science behind climate change than most other countries, which fed into the increased political polarization between the two main parties. As a result, several past initiatives to pass a comprehensive national climate change legislation through Congress have failed, and the country has been regulating greenhouse gases through executive action under the related existing laws.

The President may also issue Executive Orders, which do not create new law, but are directives to executive branch agencies. Such orders are highly vulnerable to political change and shaped by judicial rulings. Most notable court rulings required greenhouse gases to be covered by the 1970 Clean Air Act and its subsequent amendments, placing the regulation of these emissions under the responsibility of the Environmental Protection Agency (EPA) (Neuweg & Averchenkova, 2017). Since then several related policies have been introduced, including transport emissions standards, tax breaks for renewable electricity and energy efficiency programmes.

The Obama Administration put forward the Clean Power Plan (CPP), a comprehensive federal regulation that set a target to cut carbon dioxide emissions from the power sector by 32 per cent below 2005 levels by 2030 (EPA, 2017). The Plan was meant to serve as the main regulatory framework to achieve the US's NDC under the Paris Agreement of reducing emissions by 26-28 per cent below 2005 levels by 2025. President Trump already in his presidential campaign announced that he would cut all federal climate spending by repealing the Clean Power Plan, encouraging fossil fuel resources and withdrawing from the Paris Agreement.

The election of President Trump has led to opposition to ambitious climate action both in the executive and legislative branches at the federal level. On October 10, 2017, following a review as directed by the President's Energy Independence Executive Order, the EPA proposed to repeal the CPP and issued a proposal for new state guidelines for greenhouse gas emissions from individual power plants that would replace the CPP (EPA, 2017). According to this proposal, rather than limiting emissions of the whole state only emissions at individual power plants would be controlled. The Government also took other measures weakening climate change regulations, such as the planned relaxation of fuel efficiency standards for personal and freight vehicles, delays to methane emission reduction regulations for the oil and gas sector, plans on expansion of offshore oil and gas exploration, as well as an increase of import tariffs on solar cells and modules in January 2018.

In August 2017 the US submitted a formal withdrawal notice from the Paris Agreement. While the actual withdrawal can only happen legally in November 2020 after the results of the next US election, the implementation of the NDC by the federal government has already effectively stopped. The effect of the withdrawal decision is also being felt in terms of the low level of engagement of the US internationally and cuts to its climate funding contributions.

Action at the state level

In the absence of strong federal action on climate change in the US much progress has been made at the state and municipal levels, including a cap-and-trade system in California established through the Global Warming Solution Act or Assembly Bill 32 (AB 32 – see box) and the Regional Greenhouse Gas Initiative (RGGI), a market-based regulatory programe among Eastern US states that aims to reduce greenhouse gas emissions.

Twenty-nine states, Washington, D.C., and three territories have adopted renewable portfolio standards that require utilities to source a certain amount of energy from renewables and increase that amount over time, and a further eight states and one territory have set renewable energy goals (National Conference of State Legislatures, as at 18 October 2018).[18] States also set other relevant policies, such as building codes, retail energy rates and net metering policies for distributed generation, and a variety of energy efficiency programmes and standards.

Many cities have also adopted emission reduction targets. For example, Atlanta, Denver and Miami aim to achieve reductions of 20-25 per cent below 2005-07 levels by 2020, while Seattle is planning to reduce emissions by 100 per cent below 1990 by 2050 (Averchenkova *et al.*, 2016a).

Overall assessment

In the past decade significant emission reductions have been achieved in the US due to the substitution of gas for coal in power stations and to some extent due to the economic recession (Averchenkova *et al.*, 2016a). In 2017 electricity from renewable sources, especially

18 National Conference of State Legislature (2018) *State Renewable Portfolio Standards And Goals*. 20/VII/2018 http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx Accessed on 18 October 2018.

wind and solar, continued to increase, with wind reaching 6.3 per cent and utility-scale solar 1.3 per cent of total net generation, which are record shares for both fuels (EIA, 2018). Yet lowering concerns about energy security through the shale gas boom, low gas prices and the shift in the political position towards support to fossil fuels weaken economic incentives for innovation and the deployment of low-carbon technologies.

President's Trump decision to withdraw from the Paris Agreement has galvanized unprecedented attention and level of action at the state and city level. States, mayors, companies and universities are pledging to align themselves with the objectives of the Paris Agreement through a 'We are still in' declaration. As at 18 October 2018 the 'We are still in' declaration signatories covered organizations and individuals representing 169 million people across 50 states and USD 9.46 trillion.[19] Ten states and fifteen cities have signed on to the Below 2 MOU, committing to reduce greenhouse gas emissions 85-90 per cent below 1990 levels by 2050.[20]

Box 7. Climate Action in California

California, the second largest emitting state in the US after Texas, passed its first state climate change law (AB32) in 2006 that established an emission target to stabilise greenhouse emissions at their 1990 levels by 2020 and mandated the state's regulator, the Air Resources Board (ARB), to determine the options to achieve the target and to enact corresponding regulations (State of California, 2006). This legislation has been widely praised as a blueprint for a broad cap and trade law (Averchenkova *et al*., 2016a). The final rules adopted after an extensive consultation by the ARB in 2011 establish a cap-and-trade system that covers power, industry and transport and is complemented by a Low Carbon Fuel Standard and more stringent vehicle standards (Duwe *et al*., 2017). The trading scheme has linked to the province of Quebec in Canada and is seeking to link to the EU emission trading scheme.

The AB 32 originates from a 2005 executive order by former Governor Schwarzenegger that set targets of reducing greenhouse gas emissions 80 per cent below 1990 levels by 2050 and intermediate targets for 2010 and 2020. In 2015 Governor Brown passed another executive order, which upholds the previous 2050 target and set an additional one of 40 per cent emission reduction below 1990 levels by 2030 (State of California, 2015).

The Senate Bill 32 (SB32) of 2016 legislated the 2030 emission target set in the 2015 executive order of 40 per cent reduction below 1990 levels but did not include the 2050 target and prescribed any policy to meet the target (Duwe *et al*., 2017; State of California, 2016). A year later, in 2017, the state legislature passed the Assembly Bill 398 (ARB) that extends the emission trading programme into the future, but like the SB32 failed to mention the 2050 target (State of California, 2017).

The experience of California shows the importance of backing targets with a clear mandate and process for developing underlying policy. The laws have delegated the regulatory authority to the executive branch rather than identifying specific policy measures in the legislation itself (Duwe *et al*., 2017), like the approach taken in the UK's CCA. An extensive stakeholder consultation process by the regulator has allowed to strengthen buy-in for policies. 'Explicit depoliticisation of the implementation, through a mandate made strong by having been enshrined in law, is a key aspect of this framework's success', (Duwe *et al*., 2017).

19 We Are Still In. Available at: https://www.wearestillin.com/signatories

20 The Under2 Coalition. Available at: https://www.under2coalition.org/members, Accessed on 18 October 2018.

Seventeen states and territories have joined the US Climate Alliance, a bipartisan coalition of governors committed to reducing greenhouse gas emissions consistent with the goals of the Paris Agreement. Members commit to reducing greenhouse gas emission by at least 26-28 per cent below 2005 levels by 2025; to tracking and reporting progress and participating in taking stock; and accelerating new and existing decarbonisation and clean energy policies. Between 2005 and 2016, the Alliance States reduced their emissions by 14 per cent (USCA, 2018).

Currently the outlook for federal action on climate change is rather pessimistic. Hence the main regulatory drivers for reducing emissions will come from the state and city level initiatives. A recent study assessed non-state actions associated with 342 commitments, including 22 states,13 of which are members of the US Climate Alliance, 58 actions from 54 cities and 262 actions from 250 companies headquartered in the US. The study finds that if these current commitments are met, the US would already meet half of its pledge under the Paris Agreement by 2025. A similar analysis by America's Pledge (2018) finds that these commitments combined with market forces would decrease US emissions to 17 per cent below 2005 levels by 2025, roughly two-thirds of the way to the NDC target and that further deep decarbonization (towards 80 per cent or more by 2050) can be led by the bottom-up efforts of real economy actors based on deep collaboration and engagement.

7.3 Climate Change Policy in Germany

Overview of national policy framework

Being the largest emitter of greenhouse gases in Europe, Germany has placed significant priority on decarbonising its economy over the past two decades. With the largest share of emissions coming from the energy sector, Germany's climate change and energy policies are strongly intertwined.

Historically policies have been developed along the executive route in a rather centralised top-down fashion (Duwe *et al*., 2017). In terms of energy policy two decisions were particularly important: the adoption of the 2010 Energy Concept that set a comprehensive strategy for a long-term integrated energy pathway to 2050; and a decision to accelerate the phase-out of nuclear power by 2022 following the Fukushima accident in 2011, which led to the adoption of policy measures known as the Energiewende (IEA, Germany).[21] The Energy Concept set the overarching aim to reduce greenhouse gas emissions by 80 to 95 per cent by 2050 below the levels in 1990 and sub-targets for reduction of primary energy use and renewable energy expansion in 2020, 2030, 2040 and 2050 and for increasing energy efficiency. While it included a description of short-term implementing measures, the Concept failed to provide a systematic approach to action planning (Duwe *et al*., 2017).

21 International Energy Agency. *Germany*. https://www.iea.org/countries/germany/

Once it was clear that the existing policies would not be sufficient to meet 2020 greenhouse gas reduction target the Climate Action Programme was adopted in 2014 to close the gap by 2020 (BMUD, 2018). However, it has not been very effective in changing the course dramatically, mainly due to the lack of measures to address coal-fired power (ibid; Duwe *et al*., 2017).

In 2016 the Federal Cabinet adopted the Climate Action Plan 2050, which sets out the domestic objectives and strategy for implementing the Paris Agreement. An innovative feature in the development of the Plan was an extensive stakeholder engagement and consultation process -the first of its kind in Germany's climate change policy (Duwe *et al*., 2017). Public consultation lasted a year and half with a six-month active dialogue with general public, civil society, private sector, states and municipalities. The consultation was structured along several dialogue phases, involving meetings across and within the respective stakeholder groups, resulting in the formulation of 97 climate change measures presented to the Environment Ministry (Prognos, 2017). While the inclusive nature of the process has been acknowledged as an important factor in securing greater buy-in for the Climate Action Plan 2050, serious criticism of the process has been raised. This was mainly due to the failure of the draft Plan issued by the Ministry to include most of the recommendations produced through the stakeholder process, diminishing the value of the process (ibid). This experience is similar to the challenges in incorporating stakeholder input into the draft Energy Transition Law in France.

The plan established a long-term goal of becoming 'largely climate neutral' by 2050 and a mid-term target of at least 55 per cent reduction in greenhouse gas emissions below their levels of 1990 by 2030. The 2030 emission target is also broken down into specific emission reduction objectives below 1990 for the individual sectors, including 61-62 per cent emission reduction from energy sector, 49-51 per cent reduction for industry, 66-67 per cent reduction for buildings, 40-42 per cent for transport and 31-34 percent reduction of emissions in agriculture (BMUD, 2016). The Climate Action Plan 2050 envisions a ratchet mechanism for ambition with updates to be carried out every five years set to coincide with the international timetable for updating the NDCs (ibid). To facilitate implementation of the Plan, a Commission for growth, structural change, and regional development was created to develop a mix of instruments that will bring together economic development, structural change, social acceptability and climate protection.

Future outlook

While the Climate Action Plan 2050 lists implementation actions for each sector, it has been criticised for not defining clearly the timelines for when measures would be put in place, responsibilities and budgets or for (Duwe *et al*., 2017; Amelang et al., 2016). This ambiguity is a result of inter-ministerial negotiations during which an exit date for phasing-out coal-firing and several other details were removed (Amelang *et al*., 2016). While these political compromises allowed getting an agreement on the overall ambitious goals of the Plan, the ambiguity presents a significant risk to successful implementation. Going forward the government plans to develop a detailed programme of measures in 2018, which will outline concrete actions for the future (Duwe *et al*., 2017). The Government will publish annual reports on progress in implementation, which will be assessed through a scientific platform of institutions representing expertise across natural and social sciences. These assessments will feed into the 5-year revisions of the Plan, with the first one scheduled for 2019/2020 to coincide with the first ratchet period under the Paris Agreement. According to current estimates, greenhouse gas emissions will not be reduced by 40 per cent compared with 1990 by 2020 (BMUD, 2017).

7.4 Climate Change Policy in Chile

Overview of national policy framework

Chile is highly vulnerable to the impacts of climate change, some of which the country is already experiencing. Its most vulnerable sectors are mining, agriculture and forestry, hydropower, drinking-water availability and human health (IEA, 2018a). Chile's greenhouse gas emissions more than doubled since 1990, with energy responsible for about 77 per cent of emissions, making it a priority sector for decarbonisation efforts (ibid). The Chilean Congress ratified the Paris Agreement in January 2017. Under its NDC to the Paris Agreement Chile committed to reduce the CO2 intensity of its economy unconditionally by 30 per cent from the 2007 levels by 2030, and by 35-45 per cent subject to international finance.

Over the past decade Chile has made significant advances in developing its institutional framework and strategic planning to decarbonise the economy and more recently enhance climate resilience. The Ministry of the Environment oversees the development of climate change policy and coordinates other institutions. The Council of Ministers for Sustainability chaired by the minister of the environment and comprised of the key sectoral ministers, is the highest governing body on climate change policy. So far climate change policies in Chile emerged via the executive route and took the form of strategies and plans issued by the Government. These include, among others, the 2006 National Strategy on Climate Change operationalised through the National Action Plan for Climate Change for 2008–2012 and the National Action Plan for Sustainable Consumption and Production for 2017-2022 adopted in in 2017.

The launch in 2015 of the National Energy Policy 2050 has become an important political landmark for decarbonisation efforts. Coordinated by the Ministry of Energy, the process

involved an extensive public engagement, praised as an outstanding example of public consultation on energy policy internationally (IEA, 2018a). The Policy 2050 sets targets for the share of renewable energy in power generation of 60 per cent by 2035 and 70 per cent by 2050 (up from 40 per cent in 2017) and mandates the adoption of an energy efficiency law. The 2017 Mitigation Plan for the Energy Sector outlines in more detail the scenarios and defines sectoral contributions to the 2030 mitigation efforts while the Adaptation Plan for the energy sector will focus on addressing the impacts of climate change.

To ensure implementation of the strategic objectives, several concrete policies have been adopted. Chile became the first country in South America to introduce green taxes through the 2014 Tax Reform Law, which included carbon tax covering around 40 per cent of total CO2 emissions (IEA, 2018a). Carbon tax is applied on emissions from 2017 initially at a low level of USD 5/tCO2. There is however no provision for adjusting the level of tax in the future. The Government has adopted an Energy Efficiency Roadmap that aims to reduce final energy demand by 20 per cent below BAU by 2025. Chile is already considered a global leader on energy efficiency labelling for appliances, with mandatory labelling for close to 30 products (ibid) and it is expected that energy efficiency measures, particularly in mining, transport and heavy industry, have a large potential for contributing to meeting the NDC targets. The Government has also adopted an electric mobility strategy.

Chile has put great emphasis on transparency and consultation in developing its climate change and energy transition policies, not least through the Energy 2050 process. In November 2017 the Permanent Presidential Advisory Commission on Climate Change was set up. It is an independent body comprised of over 30 members from the public and private sector, which is mandated to develop proposals for the design of policy instruments to ensure compliance with domestic and international climate change objectives.

Future outlook

Earlier this year Chile announced a moratorium on new coal-fired power plants without carbon capture and storage capacity and a plan to phase out coal that currently makes up 41 per cent of electricity generation. These plans are aligned with the objectives set in the 2050 Energy Strategy. While these and other policy measures to decarbonise the Chilean economy, as discussed above, are major steps in the right direction, a recent analysis suggests that additional measures will be required for Chile to meet its NDC targets (IEA, 2018a; CAT, 2018). Policies that are already implemented are not sufficient for Chile to meet its NDC targets. Full implementation of the policies planned under the 2050 Energy Strategy would allow achieving the unconditional NDC targets but lowering emissions beyond this target requires a higher uptake of renewable energy by 2050 (CAT, 2018).

In July 2018 Chile's Minister of the Environment, Marcela Cubillos, announced the launch of a process to develop a framework law on climate change. The aim is to have a draft ready to enter the legislative process by July-August 2019. This process would be carried out bottom-up from the regions through a participatory dialogue with all key stakeholders

through July-December 2018 with a preliminary draft prepared by February 2019.[22] The consultations with the stakeholders in various regions are conducted on the basis of the Regional Committee on Climate Change (CORECC) through the Regional Dialogues on the Law of Climate Change.[23] While little detail is available yet on what the law might contain, it is likely to build to some extent on the existing key policy frameworks and strategies on climate change, in particular on the Energy Strategy 2050.

22 Chile. Ministerio de Medio Ambiente. *Gobierno anuncia inicio de elaboración de Ley de Cambio Climático para Chile*. 5/VII/2018 http://portal.mma.gob.cl/gobierno-anuncia-inicio-de-elaboracion-de-ley-de-cambio-climatico-para-chile/

23 Chile. Ministerio de Medio Ambiente. *El Comité Regional de Cambio Climático se reunió en miras a comenzar la discusión por nuevo proyecto de ley sobre el tema*. 4/IX/2018 http://portal.mma.gob.cl/el-comite-regional-de-cambio-climatico-se-reunio-en-miras-a-comenzar-la-discusion-por-nuevo-proyecto-de-ley-sobre-el-tema/

Part 3. Learning from experiences with climate and energy transition laws and executive frameworks

The experiences of the seven countries considered in this study demonstrate a variety of legislative and executive approaches to addressing climate change and low carbon energy transition. Countries differ in the ways they address the main building blocks for climate governance discussed in Chapter 3, in their relative levels of ambition and the track record of success in implementing the set objectives on climate change. There is no one-size-fits-all template for climate polices and frameworks. Different approaches will suit different national systems. Yet, lessons can be learnt across countries. The primary focus of Part 3 is a comparison of the key elements of various legislative instruments considered in the case studies on France, Mexico and the UK to identify key lessons learnt from a cross-country perspective and to draw recommendations for the experts involved in the design of the climate and energy transition legislation considered (see Annex 4 for a comparison of the laws considered and Annex 5 for a comparison of the executive frameworks). While a direct comparison between legislative and executive frameworks is less useful in this context, the chapter also draws on the experiences in China, Chile, Germany and the US where relevant.

Creating political momentum

Adoption of climate change legislation starts with a careful process of building political support. As discussed earlier, developing a positive narrative around the benefits of the legislation, as well as creating positive political momentum is key for the success of the process and for avoiding polarisation of the political spectrum as happened in the US. Useful insights could be drawn from comparing the political drivers or origins between the climate change and energy transition legislation in France, the UK and Mexico. In all three cases the legislative processes have been generated through a personal commitment by either the incoming Head of Government-to be (e.g. in France and the UK) in the wake of presidential or general elections.

In the UK the Conservative Party was seeking to attract young voters and climate change was a promising issue, given its rise on the international agenda and the growing public concern on climate change (Fankhauser *et al*., 2018). In Mexico, President Calderón was personally committed to addressing climate change and, having raised the country's international profile in this area, was keen to advance the domestic agenda through legislation that would protect long-term goals against future political swings. For President Calderon getting climate change law adopted was part of his political legacy. Similarly, the April 2018 Decree amending the law in line with the Paris agreement was adopted just a couple of months before the presidential elections, confirming the importance of the law in carrying the policy objectives through political change (Averchenkova & Guzman, 2018). The necessity for reforming the energy sector and the significant potential and benefits associated with renewable energy in Mexico have helped frame the domestic political discussions on climate policy. In France the adoption of the Energy Transition Law was preceded by a comprehensive stakeholder debate on a vision for energy transition, following an electoral promise by President François Hollande. This debate was initially driven by the

presidential commitment on the future of nuclear energy, rather than by the climate change agenda, which framed it as rather 'energy-centric' (Rüdinger, 2018).

Similarly, international factors played an important role in stimulating passage of climate change legislation in all of the three countries, which is consistent with conclusions of a broader study by Fankhauser *et al*., (2015), which found that climate legislation is enabled by international developments, such as hosting international climate negotiations. In the UK it followed the country's position as the chair of G7 where climate change was prominent on the agenda. In Mexico the debate on the law was launched shortly after the country hosted a highly successful Cancún climate change conference, while France passed its law just before the landmark 2015 Paris summit on climate change.

Scope, specificity and level of flexibility versus policy prescription

The scope of a legislative instrument and the level of specificity in prescribing particular policies or designing features for policy instruments is one of the first critical decisions that needs to be taken when developing a new law. The legal instruments considered through the case studies in this study of the countries that have adopted climate change and energy transition laws demonstrate a variety of approaches in this respect, which reflect varying political and policy-making traditions and economic realities.

The case of the UK demonstrates a flexible approach, where the government is given freedom to choose and design the best mix of policy instruments to apply in order to meet each carbon budget subject to a review by the Climate Change Committee (CCC) and parliamentary oversight. California took a similar approach by delegating to the executive branch the development of the underlying policies. The advantages of that approach are greater political acceptability due to the possibility of adjusting the course based on changing economic conditions and lessons learnt. However, this model requires that clear institutional processes and statutory timelines for how the government should respond to the mandate to develop the detailed policies are specified in the law. The lack of such a statutory timeline for policy plans to be put in place has increased the risk of backsliding, as evidenced with the recent experience in the UK on the fifth carbon budget and by the current gap identified by the CCC between the policies in place and the target in the carbon budgets (Fankhauser *et al*., 2018). Overall, such an approach would be more suitable for jurisdictions with good technical capacity in the executive branch to develop policies and strong accountability of the government to the legislature. Coordination of implementation has not yet presented big challenge in the UK, as the first ten years of implementation focused on the power sector, which is addressed by the same ministry as climate change (Business, Energy and Industrial Strategy, BEIS). Going forward, closer coordination will be required with other government department and the suitability of the flexible model will be further tested then.

Mexico's General Law on Climate Change and the Energy Transition Law follow a semi-flexible (or hybrid) approach, putting into law some of the core policy instruments, such as emission trading, announcing the introduction of the mandatory energy efficiency target, etc., while leaving the details open and mandating the government to develop them further. The experience of Mexico shows that being an emerging economy with strong opposition

to climate policy, it has faced a challenge in getting the policy instruments fleshed out and implemented mainly due to weak mandate and low capacity to coordinate activities across the sectors. The lack of detailed policy prescriptions and vague institutional mandates led to a number of governance failures in the actual implementation of the LGCC. The amendment of 2018, among others, identifies specific emission targets for the key sectors, is one attempt to address the challenges of engaging the key sectors. Mexico's ETL, which is more precise in terms of the policy instruments and the actions various institutions are expected to take on developing policies, and by when, seems to have been more effective with the implementation in its early years than the LGCC.

France takes the most prescriptive approach, where the Energy Transition Law itself determines not only the overall targets and policy instruments, but also sets the level of carbon price over time, indicates targets for several sectors, including energy, transportation, etc. This choice of approach reflects the historically more centralized governance tradition in France. While arguably this approach presents greater certainty by including the key targets and policies into the law, its weakness is in the difficulty and time it takes to negotiate the law and its potential lesser ability for course correction if required in the future. If chosen, a prescriptive model for legislation should include a clear mechanism for adjustment and transparently outline the key factors or types of circumstance that could trigger a change and a process for agreeing it.

A related political choice at the outset concerns the level of complexity of a framework climate change law or executive framework. In the quest for being comprehensive it is useful to consider the additional effort and therefore potential delay to agreeing the law and also the practical value of trying to cover too much. The latter is evident in the case of France, which faces a risk of overloading the legislation with excessive technical detail and makes the process of its adoption complex and lengthy (Rüdinger, 2018). As discussed, the French law took two years from the first draft to its adoption and involved 5000 amendments and 150 hours of debate.

Yet it is important to ensure that there are no major gaps in the coverage. One such gap across the case studies has been, for example, the coverage of adaptation. In the UK provisions on risk assessment and adaptation are part of the core legislation yet led to a weaker implementation record compared to mitigation (Fankhauser *et al.*, 2018) while in Mexico adaptation provisions were mainly strengthened only in 2018 through the amendment that mandated adaptation planning. France's Energy Transition Law leaves adaptation outside of the scope. Overall, there has been little analysis to date on the experiences with legislating on adaptation.

Institutional mandates and key functions

Clarity of the institutional mandates and coverage of the main climate and energy transition governance functions through these mandates are the essential factors of the effectiveness of the legislative instruments (and similarly of the executive frameworks). Depending on the national circumstances, the core features of the overall institutional framework may already be in place and determined by prior legislation or executive regulation (e.g. such as in the case of France and the UK), hence the framework climate change and energy transition

laws in such countries focus on clarifying the mandates of existing institutions and setting out new mandates that arise from the law, creating new institutions where gaps exist. The latter in particular relate to setting up new independent advisory and consultative bodies, as discussed below. In countries where there are gaps in the overall institutional framework to address climate or energy transition, the key features of such a framework could be included in the legislation, as in the cases of Mexico's LGCC.

An important criterion for institutional provisions in the legislative (and executive) instrument is the level of clarity of the mandates they set. Mexico's LGCC has been criticized for not providing enough clarity on the institutional mandates, as discussed earlier. In some instances, the law is vague on who is expected to undertake a particular action and does not provide much guidance to the sectoral ministries and subnational governments, which was shown to impede effective implementation (Averchenkova & Guzman, 2018). The UK has a more streamlined and less complex institutional set up in terms of implementing the legislation and designing and implementing climate change policy. The UK's CCA assigns clear responsibilities for the Secretary of State and also delineates mitigation to BEIS and adaptation matters to the Department for Environment, Food and Rural Affairs (DEFRA). It also sets a strong and clear mandate to the CCC to provide independent advice and assessment to which the government is mandated to respond.

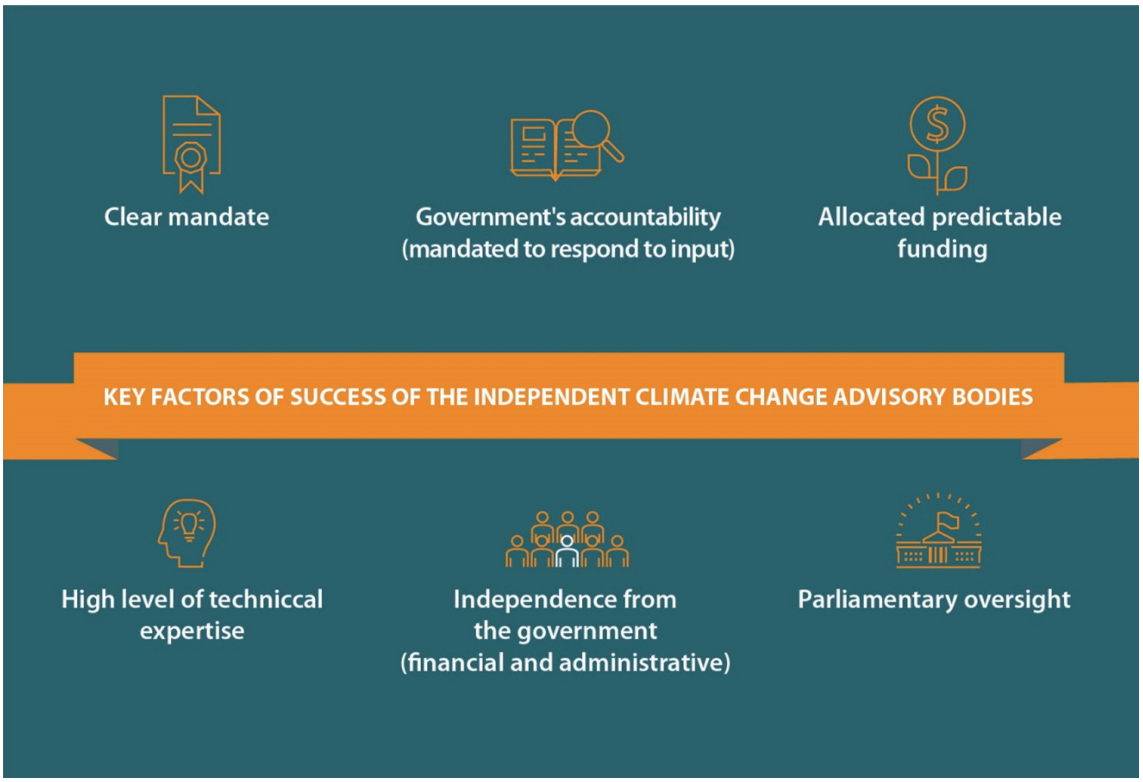
Parliamentary oversight and accountability

A common challenge for all legislative and executive frameworks considered is enforcement and accountability for implementation. For the legal instruments considered in this study the key mechanism for accountability is parliamentary oversight. The UK model maintains a close involvement of the Parliament and strong Parliamentary oversight both of the proposed policies to implement budgets and of the actual performance in implementation. Annual reporting by the government provides a major accountability mechanism for the implementation of the law, with the main incentive for compliance being the threat of a judicial review. In Mexico and France, the laws considered do not give much prominence to the Parliament. In both cases the lack of parliamentary oversight has been noted as a weakness to the accountability mechanisms.

Another key feature of the accountability mechanisms for climate change and energy transition laws is an independent assessment and consultation. All four laws considered in this study establish new independent consultative bodies to this end. The track record in their performance, however, varies. Based on the case studies, it could be concluded that there are several factors that determine the relative success of the independent advisory bodies (see Figure 12 for the factors of success) and the UK's example highlights the importance that independent bodies play in improving the quality of the political debate, in holding the government to account and providing quality analysis and policy evaluation, which are critical for effective learning. The CCC has been shown to have made a material difference to climate policy in terms of objectives (the statutory carbon targets), process (impact on parliamentary debate) and substance (e.g. influencing new laws on energy, infrastructure, housing and water) (Averchenkova *et al*., 2018). Its analysis is used in Parliament to provide a technical justification to political arguments for greater accountability and to push for

more ambitious action – both on mitigation (carbon budgets, long-term emissions targets) and adaptation (flood defence spending, climate risk management) (ibid).

Figure 12. Key factors of success of the independent climate change advisory bodies



Source: the author.

The UK's example highlights the importance that independent bodies play in improving the quality of the political debate, in holding the government to account and providing quality analysis and policy evaluation, which are critical for effective learning. The CCC has been shown to have made a material difference to climate policy in terms of objectives (the statutory carbon targets), process (impact on parliamentary debate) and substance (e.g. influencing new laws on energy, infrastructure, housing and water) (Averchenkova *et al.*, 2018). Its analysis is used in Parliament to provide a technical justification to political arguments for greater accountability and to push for more ambitious action – both on mitigation (carbon budgets, long-term emissions targets) and adaptation (flood defence spending, climate risk management) (ibid).

Mexico has been less successful in establishing an effective independent assessment, policy evaluation and advice function. Having created an independent consultative body, the C3, the LGCC has not provided it with a clear mandate and financial resources to function

effectively. Most importantly, the legislation does not mandate the government to respond to the C3's advice. Similarly, in France there is a concern that the government is 'being both the judge and party of the evaluation' (Rüdinger, 2018, p.8). As in the case of the C3 in Mexico, the Expert Committee for Energy Transition was meant to fulfil similar functions to the UK's CCC. Yet the legislation does not create a strong enough mandate for the institution (e.g. there is no provision for how and when the government needs to respond to its reports) and no financial resources are allocated for its operation (Rüdinger, 2018).

Table 3. Comparison of the key features of the independent advisory bodies on climate change

	UK CCA	Mexico GLCC	France ETL
Created through the law	yes	yes	yes
Clear mandate given	yes	partial	partial
Allocated predictable funding	yes	no	no
Government is mandated to respond to their report	yes	no	no
Parliamentary oversight	yes	no	no
High level of technical expertise	yes	yes	yes
Independence from the government (financially and administratively)	partial	partial	partial

Source: the author.

Stakeholder engagement and consultation processes

Another mechanism for ensuring accountability and buy-in of the law and the underlying policy frameworks is a transparent and inclusive mechanism for stakeholder consultation, including civil society, private sector, regional and city governments. In the case studies considered, useful insights could be learnt from the stakeholder consultation processes prior to the adoption of the Energy Transition Law in France, the Energy 2050 framework in Chile and Climate Action Plan 2050 in Germany. The key lessons from these experiences are that it is important to have very clear and specific objectives for the consultation process and to have a clear plan on how the outputs would feed into the parliamentary phase (final adoption of executive regulation as in the case of Chile and Germany), which has presented challenges in the case of France and particularly Germany, potentially risking to undermine credibility of stakeholder consultation. Similarly, transparency on how the inputs are dealt with was an issue in Mexico, in the course of public consultation on the LGCC, where civil society felt that their input was not taken on board when the formal draft was published, which affected trust of the key players in the process.

Compatibility of targets with the Paris Agreement

All countries considered have some distance to go to be fully compatible with the Paris Agreement. In terms of targets, France, Mexico and UK's framework laws on climate change and energy transition contain long-term targets for reducing greenhouse gas emissions by 2050 backed up by medium-term emission reduction targets in 2030, which are consistent with their respective national (in the case of Mexico) or regional (in the case of EU countries) NDCs to the Paris Agreement. Where further action is required is in terms of bringing the level of targets in accordance with the temperature goal of the Paris Agreement and of reaching global net zero emissions by the end of the century. According to CAT (2018) none of the countries' targets are compatible with the latter. France's Government has announced a new target for net zero emissions by 2050, it will need to integrate the target into the legislative framework. The UK is in the process of considering their target for net zero emissions. Germany has adopted a long-term target compatible with the Paris Agreement through executive regulation and aims to be 'largely carbon neutral' by 2050, although it has acknowledged it will not meet its 2020 targets. Chile is in the process of developing its climate law and has established 2050 targets for renewable energy. China has not communicated targets beyond 2030, while the US lacks a long-term target and framework at the federal level compatible with the Paris Agreement.

Provision for the ratchet of ambition and adjustment of long-term target over time

Provisions for the ratchet of ambition over time in line with the long-term goal towards net zero emissions is another element of a domestic framework law that becomes essential to ensure consistency with the Paris Agreement. Examples of France's Energy Transition Law and the UK's Climate Change Act, as well as Germany's Climate Action Plan 2050 offer useful examples for how such mechanisms could be designed. Particularly the system of 5-year carbon budgets pioneered in the UK's CCA and adopted later by France has proved to be an effective instrument that provides a flexible yet predictable means for policy and investment planning. For the latter the requirement for the budgets to be set in advance (12 years in the UK and 10 years in France) is key to afford sufficient lead time for the private sector to adapt. Carbon budgets that are adopted well in advance of their application also allow politicians to transcend short term electoral cycle calculations in their voting of CO_2 budgets.

Equally, it is important for climate legislation to have flexibility for the targets to be adjusted in the future, based on the new scientific evidence and other changing circumstances. This is the case, for example, with the UK's CCA. At the time of adoption its 2050 target was considered to be fully in line with the latest science, yet ten years on the new evidence shows that this level of action may not be sufficient. All three climate laws provide useful examples for how flexibility for adapting to future changes could be combined with legal certainty of long-term targets.

In the UK, the CCA adopts the language of 'at least 80 per cent' reduction of greenhouse gas emissions by 2050 and gives the authority to the Secretary of State to adjust the level of the target following the due process of consultation and analysis. These provisions on the one hand provide for an opportunity to adjust the target without having to amend or reopen the law itself and clearly provide the possible direction of travel for adjustment-towards

increased ambition. Mexico in the LGCC included its long term and medium targets in so called transitory articles, which are parts of the law that can be amended without the need to change the rest of the law. This then enabled the country to adjust the level of its targets in the 2018 amendment to bring it into line with Mexico's NDC.

However, the mechanisms for adjusting the target should be clearly defined to indicate circumstances that could trigger the adjustment to avoid potential back sliding. For example, Mexico's amendment to the LGCC of 2018 specifies that over time the ratchet of ambition would be required. The French Energy Transition Law, on the other hand, does not specify that adjustments of the targets could be only in the direction towards increased ambition, and neither does the UK's CCA. Yet the latter identifies the criteria that need to be considered in the adjustment of the target including the latest science and economic feasibility.

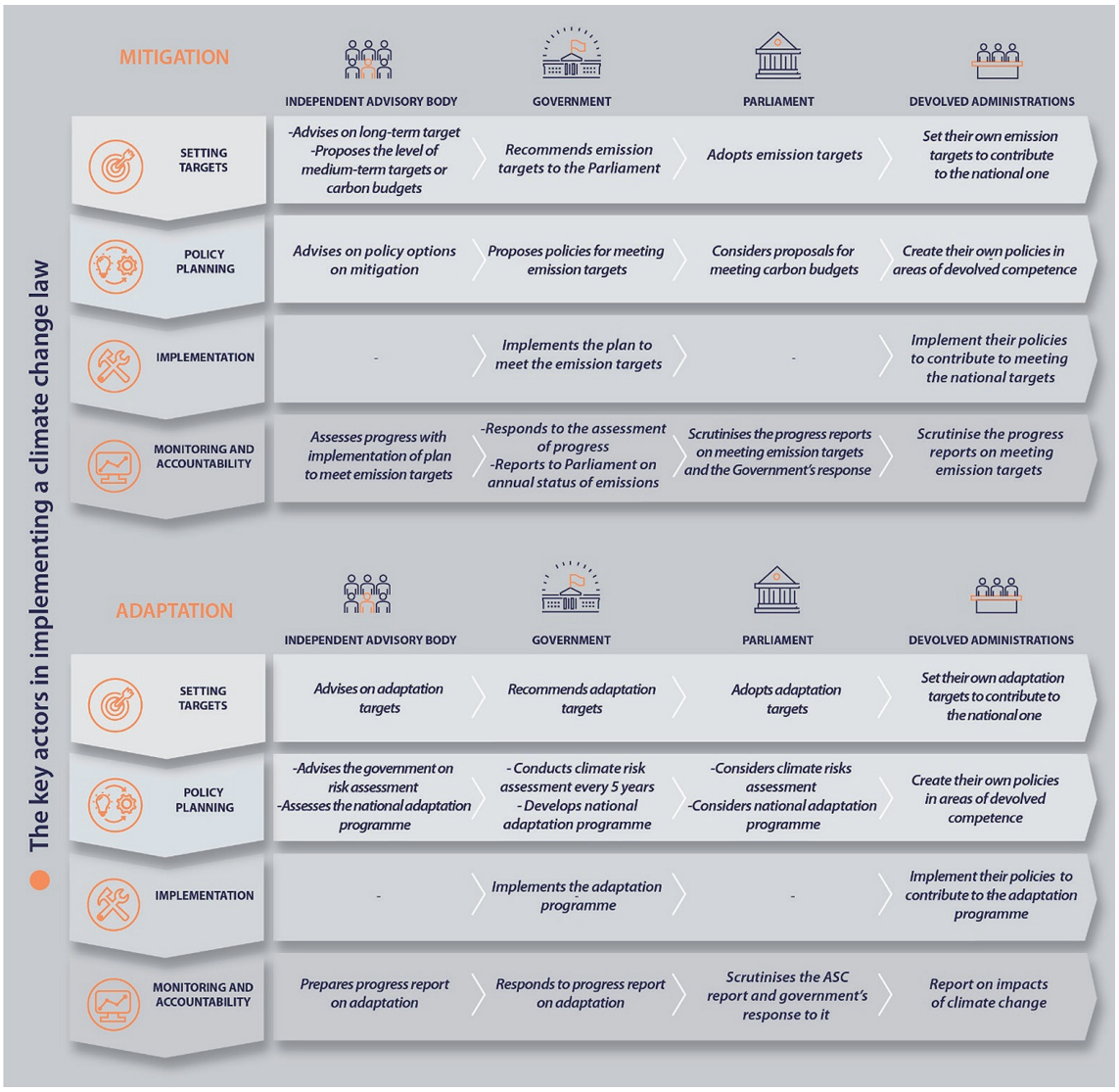
The examples of countries considered in this study demonstrate a variety of approaches to national climate change policy and that there is no one-size fits all. Some countries, like China with its strong central government, have been successful in adopting and implementing climate change frameworks via the executive route. Others, like the US, clearly show how in a democratic setting reliance purely on action by government in the absence of a legislative framework to protect the long-term objectives make climate change policies extremely vulnerable to future political change. Hence, there are clear advantages for embedding the core elements of the national climate change framework into a legislation, in particular for countries like Spain with a long democratic tradition and limited scope for centralized policy-making by the national government.

Figure 13 outlines the key elements that should be considered in developing a climate change law based on the analysis of country experiences in this study. Figure 14 presents the Functions and mandates in the implementation of a robust climate-change law.

Figure 13. Key elements to consider in the design of a climate law

Source: the author.

Figure 14. Functions and mandates in the implementation of a climate-change law



Source: the author.

Recommendations for Spain and other countries for designing framework legislation on climate change

Urgency of action on climate change requires the adoption of a comprehensive national framework compatible with the requirements of the Paris Agreement as soon as possible and ideally by 2020 when countries are expected to revise their NDCs to feed into the Global stocktake under the Paris Agreement. Policy makers and legislators should consider the following key recommendations:

1. *Timeframe for adoption of a law:* Spain and other countries should aim at passing a national framework climate change (or energy transition) law as soon as feasible and preferably prior to 2020. Adoption of a framework law that sets a long-term direction for decarbonisation and climate resilience in line with the objectives of the Paris Agreement and the key mechanisms for delivery before 2020 would place Spain among the leaders in the EU and internationally. It would also help consolidate and maintain political buy-in for climate policies over time in the face of future changes in the government and enable acceleration of transition. Taking two years or more to negotiate a law (as experienced in France and Mexico) would put Spain outside of these timeframes. While proximity to the next major elections could increase attention to climate change issues, there is also a greater risk of the debate becoming more politicised and polarised.
2. *Definition of scope of the law:* The scope of the law should cover the key elements of a national climate framework (as outlined in Figure 13), yet being too broad and trying to achieve too much could impede the effectiveness of a law and delay adoption, as demonstrated by the experience with France's Energy Transition Law. Excessive complexity of a law in terms of a number and types of targets and policy instruments could challenge the ease and effectiveness of its implementation. Mexico's model of setting overarching long- and mid-term climate change targets complemented by a clean energy target in a climate change law, and its Energy Transition Law provide useful examples to draw in this context. It is also important for a framework climate change law to cover adaptation. The UK's provisions of mandatory risk assessments and adaptation plans, with a strong role of an independent advisory body embedded into a law, provides a useful model for consideration. Spain's experience as one of the first countries to develop a national adaptation programme potentially provides a good basis to develop best practices in legislating on adaptation. It is important that the legislation foresees a clear pathway for risk assessments and adaptation planning and an independent assessment by the advisory climate change body.
3. *An inclusive and transparent stakeholder consultation process* is essential for getting public acceptance and buy-in from the private sector, civil society, devolved governments, sectoral agencies and the public for the legislation. As evidenced by the experiences in Chile, France and Germany, to be effective the stakeholder consultation process needs to be well structured with clear objectives and a plan for how its outputs would feed into the legislative process. To ensure sustained legitimacy and political support it might be useful to consider a longer-term arrangement for stakeholder engagement

that extends beyond the development and debate on the law into the implementation phase, particularly for countries without an established robust stakeholder engagement channel.

4. *Institutional mandates:* the law needs to set clear mandates for the key climate governance functions, including for responsibility and timelines for setting the levels of emission targets; for the design of underlying policies to implement the law and achieve the emission reductions; for coordination of implementation among the key sectors; for independent monitoring, policy evaluation and strategic assessment and for climate risk assessment and adaptation planning.
5. *Devolved administrations:* A climate change law should clearly delineate responsibilities between the national and subnational levels. The law should seek to empower and enable subnational action and promote a coherent approach in terms of the core elements (such as alignment to the overall target and strategic priorities, common methodologies for measuring and assessing progress). The law should do so while leaving enough flexibility for devolved administrations to take ownership and design their own adaptation and mitigation policies or actions, which is particularly important for countries like Spain with a strong degree of devolution. In this context an approach adopted by the UK's Climate Change Act of sharing a common analytical resource in the form of the independent advisory body between the national and devolved administrations to assist in the development and implementation of regional frameworks, as well as the establishment of targeted financial instruments to support implementation at the subnational level should be considered.
6. *Long-term objectives and net zero target:* To be consistent with the objectives of the Paris Agreement, a climate legislation should contain a long-term emission reduction target to 2050, which should be consistent with the objectives of achieving global net zero emissions by the end of the century and with the temperature goals of keeping warming below 1.5-2oC. Given that the developed countries should take the lead in achieving this objective, Spain should consider following the approaches adopted by the leading EU countries, some of which have already set the timeframes for achieving net zero emissions either in their laws (Sweden by 2045), or through executive regulation (Germany 'largely climate neutral by 2050') or statements (France by 2050). In this context, it is important for the legislation to define the timeline for coming to net zero.
7. *Mid-term emission reduction targets* should be consistent with the EU's NDC to the Paris Agreement and with Spain's respective contribution under the effort sharing agreement.
8. *Provisions for progressive ratchet of ambition* should be foreseen by the legislation to be consistent with the Paris Agreement. Carbon budgets have shown to be an effective tool in this context and the relevant provisions set out in the UK's Climate Change Act and France's Energy Transition Law could serve as useful models.
9. *A law should be backed up by a clear financing mechanism.* This at least should include a clear mandate to the government to undertake annual assessment of the financial needs for the implementation of the law and include necessary resources in the budget. Furthermore, financial mechanisms for enabling and encouraging private finance should be considered.

10. *The law should require a clear mandate to disclose climate risk exposure* to ensure the efficient allocation of capital. This would help meet the goal of article 2.1.c of the Paris Agreement and it would be in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) as well as with the EU's Action Plan on Sustainable Finance. Article 173 of the French law could be used as a role model to develop disclosure requirements subject to the characteristics of the country where it is applied.
11. *An independent advisory body on climate change and/or energy transition* is essential for ensuring quality in the policy design, accountability in policy implementation and strengthening political commitment to climate policy. Spain should consider including in the legislation provisions setting up such a body.
12. *To be effective, the provisions for the independent advisory body* on climate change or energy transition should define a clear mandate for it to regularly assess the government's policy proposals and progress with implementation; assign a dedicated budget; ensure a high level of expertise and require the government to respond to the body's assessments and recommendations.
13. *Accountability of the government for the implementation* of the law should be strengthened through regular assessment and reporting requirements and direct Parliamentary oversight.

Annexes

Annex 1. Targets set in Mexico's General Law on Climate Change

Long term-target	Already in its original reading in 2012, the law defined an aspirational goal of a 50 per cent reduction below the baseline level of greenhouse gas emissions in the year 2000 by 2050. The 2018 decree also recognised the need to keep the global temperature rise to within 2ºC above pre-industrial levels and to undertake efforts to keep this increase below 1.5 ºC in accordance with the Paris Agreement.
Near and mid-term targets	Originally in 2012 the Law set a target of 30 per cent greenhouse gas emission below business as usual (BAU) by 2020. These objectives were conditional on international support. The decree of 2018 amended the targets in accordance with the NDC, including an unconditional commitment to reduce greenhouse gas emissions by 22 per cent and black carbon emissions by 51 per cent below BAU by 2030. The decree indicated that emissions would peak by 2026 and that the intensity of greenhouse gas emissions per unit of gross domestic product will be reduced by about 40 per cent between 2013 and 2030. Furthermore, there is a conditional target of greenhouse gas emission reduction by 36 per cent and black carbon emission reduction by 70 per cent below BAU by 2030, if international support is provided.
Sectoral targets	The Law in its first reading set a target of 35 per cent of energy to be generated from clean sources by 2024. The amendment of 2018 additionally introduced sectoral targets for greenhouse gas emissions to meet the national objective of reducing greenhouse gas emissions by 22 per cent below BAU by 2030. Specifically, these include the following reductions in emissions below BAU by 2030: transportation -18 per cent; power generation -31 per cent; residential and commercial -18 per cent; oil and gas -14 per cent; industry -5 per cent; agriculture and livestock -8 per cent and waste -28 per cent.

Annex 2. Targets set in France's Energy Transition Law

Long term-target

- cut greenhouse gas emissions by 75 per cent by 2050 below 1990 levels;
- cut the national energy usage by at least 50 per cent below 2012 levels by 2050.

Near and mid-term targets

Cut greenhouse gas emissions by 40 per cent below the level of 1990 by 2030.

Reducing final energy consumption by 20 per cent between 2012 and 2030.

Reduce fossil fuel consumption by 30 per cent by 2030 compared to 2012 levels.

Reduce primary consumption of fossil fuels by 30 per cent compared to 2012 levels.

Increase the share of renewable energies in final energy consumption to 32 per cent by 2030, including:

- 40 per cent for electricity generation
- 38 per cent for final heat consumption
- 15 per cent for final fuel consumption
- 10 per cent for gas consumption by 2030

Sectoral targets

District heating and cooling systems are expected to deliver five times more heating and cooling from renewable and waste sources by 2030.

Reducing the nuclear share in electricity production from 75 per cent in 2015 to 50 per cent by 2025 (with an overall limit of production of 63.2 GW maximum).

Reduce landfilled waste by 50 per cent by 2025. Other waste targets and measures:

- 7 per cent reduction in household waste per capita by 2020 from 2010 levels and recycle 60 per cent of waste by 2025.
- the production, distribution, sale, provision and use of packaging or bags made wholly or partly from oxo-fragmentable plastic (not compostable) are prohibited;
- public agencies and local authorities are to decrease their office paper consumption by 30 per cent before 2020;
- from 1 January 2017, at least 25 per cent (40 per cent as of 1 January 2020) of paper products, stationery and fibre-based prints acquired by state services and local authorities are to be made from recycled paper with the rest to come from sustainably managed forests;
- increase by 30 per cent the ratio of the GDP per domestic material consumption over 2010-2030;
- strengthened powers for city mayors to deal with abandoned vehicles;
- better monitoring of waste, fight against chemical waste trafficking and unregulated waste disposal;
- other quantified limits apply to state and local authority construction work waste and raw materials use.

Annex 3. Key elements of China's national climate change framework

Institutional system
China is essentially a one-party state and develops policies through a top-down, centralized process using medium- and long-term plans and targets, most importantly the Five-Year-Plans (FYPs). Climate policy is developed under the leadership of the National Leading Group on Climate Change and the management of the National Development and Reform Commission (NDRC), which oversees climate policy development and coordination of all participating agencies, as well as developing economic reforms (Averchenkova *et al.*, 2016a; Hart et.al, 2014).

National plans and targets are broken down and allocated to provincial-level governments (Averchenkova *et al*., 2016b). Provinces and some specially designated municipalities can make their own legislation, which happens rarely (one exception is the recent laws for electric vehicle charging infrastructure (Zhang *et al*., 2016)). Yet implementation of climate policy takes place mostly at provincial or city levels, which often makes it difficult for the central government to be accountable for performance (Neuweg & Averchenkova, 2018).

Monitoring, evaluation and accountability or enforcement: Overall to date, most of the frameworks and initiatives relevant for monitoring and reporting of emissions have focused on tracking energy performance. In 2015, the National Standard Commission released the Requirements for greenhouse gas Emission Assessment and Reporting, covering 10 sectors (power generation; grid operation; magnesium and aluminium smelting; iron and steel production; civil aviation; plate glass production; cement, china and chemical production) (Xiaofeng *et al*., 2018). However, climate change-related law enforcement is very limited, and the authorities are still focusing on rulemaking (ibid).

Domestic targets
Long term-target: No targets beyond 2030.

Near and mid-term targets: The 13th FYP released in March 2016, includes a target to reduce the carbon intensity of GDP by 18 per cent by 2020. This corresponds to a 50 per cent reduction in carbon intensity of GDP relative to 2005 levels, a more ambitious target for carbon intensity than China pledged in the Cancún/Copenhagen agreement.

Sectoral targets: The 13th FYP caps energy consumption at 5 billion tonnes of standard coal equivalent by 2020, a 16.3 per cent increase in consumption from 2015 levels. It also announced plans to eliminate 500 million tonnes of surplus coal capacity in the next five years. There are further targets to reach 150GW of solar capacity, 200–300GW of wind capacity and 58GW of new nuclear capacity by 2020 (Xiaofeng *et al*., 2018). China also aims to turn 1 million hectares of marginal cropland into forest or grassland and to increase forest coverage to 23.04 per cent over the next five years.

Ratchet mechanism: There are no ratchet mechanisms explicitly envisioned in the 13th year plan.

Consistency with the NDC targets: Through its NDC to the Paris Agreement in December 2015, China has committed to:

- peak its carbon dioxide emissions by around 2030 and to make best efforts to peak earlier
- reduce the carbon intensity of GDP to 60–65 per cent below 2005 levels by 2030
- produce 20 per cent of total primary energy consumption from non-fossil energy sources by 2030 (China, 2015)

While these 2030 targets are not reflected in the 13th FYP, which goes up to the period of 2020, they are considered to be consistent with the targets for 2020 in the FYP (if extrapolated into the future) (e.g. CAT, 2018) and it is expected that 2030 NDC targets would be integrated into the 14th FYP.

Policy instruments: The Government has adopted several medium-to-long term plans such as the China National Climate Change Programme in 2007, the Climate Change Adaptation Strategy in 2013, and the National Plan for Climate Change (2014–2020) in 2014. It has also integrated the climate change goals, emission targets and low carbon development plans for specific sectors into its FYPs. The government has also imposed, from 2016 onwards, a moratorium on new coalmine approvals for at least the next three years. It has also introduced energy efficiency standards for vehicles, buildings, appliances and industrial equipment (based on Averchenkova *et al*., 2016a; Climate Laws of the World, 2018 and Xiaofeng *et al*., 2018).

The 13th FYP also tasks the government with developing the national carbon trading programme based on expansion of the seven pilot schemes in Beijing, Chongqing, Guangdong, Hubei, Shanghai, Shenzhen and Tianjin that operate since 2015. The programme went national in December 2018 and is expected to cover 1,700 companies in the first year. The process involves three stages: building nationwide date-reporting, registration and transaction log systems in year 1; pilot transaction of allowances in year 2 and checking the reliability of the market; and launch of spot trading of allowances and expansion of the market to other sectors in the future (Xiaofeng *et al*., 2018).

Finance: The Government set up measures to support renewable energy, including subsidy funds for qualified power generation from renewable energy (i.e. wind, biomass, solar, geothermal and ocean). It also sets a number of financial incentives and penalties through the Action Plan for the Transformation and Upgrading of Coal Power Energy Conservation and Emission Reduction39 in order to improve the efficiency of the coal sector and reduce its share in the energy mix.

Annex 4. Comparison of the climate and energy transition laws considered in the case studies on France, Mexico and UK

	Mexico GLCC (2012/2018)	Mexico ETL (2015)	UK CCA (2008)	France ETL (2015)
Scope	Climate change mitigation and adaptation (strengthened in 2018)	Energy transition Climate mitigation in energy sector	Climate change mitigation and adaptation	Climate Change Mitigation Energy Transition
		Institutional system		
Institutional set-up	Creates the overall National Climate Change System; Sets a coordination mechanism, but mandates are vague.	Spells out institutional mandates for the existing bodies; Gives new mandates to the existing bodies and the ministries in charge.	Defines some new institutional mandates for the existing bodies and the Secretary of State; Creates an advisory body.	Institutional mandates for the existing bodies
Independent advice	Creates the Consultative Council on Climate Change (C3)	Creates the Council for Energy Transition	Creates the Committee on Climate Change (CCC)	Sets the Expert Committee for Energy Transition
Devolution	Duty for the states and municipalities to develop and implement climate strategies	Mandate to federal agencies to provide advice and technical support to the states and municipalities	Mandate to devolved administrations to create policies and implement national ones	Mandate for the regional energy efficiency programmes and financial support
Stakeholder engagement	Via the C3	Via the Consultative Council for the Energy Transition	Via established channels for public consultation and the CCC	Creates the special Stakeholder Commission
Monitoring, evaluation	Mandates for Inventory, Registry and Transparency framework	Mandates regular MRV, but technical details outlined elsewhere	Mandate to develop MRV for emissions and climate impacts	MRV system set prior, the law does not streamline it
Finance	No special provision for funding the implementation is included;	Mandate to include implementation into draft annual budget;	No special provision for funding the implementation is included;	Mandate to include implementation into annual draft budget;

Cont.

	Mexico GLCC (2012/2018)	Mexico ETL (2015)	UK CCA (2008)	France ETL (2015)
	Creates a Climate Change Fund; No designated budget for the C3.	Some provisions and mandates on finance for implementation.	Designated budget envisioned for the CCC.	No budget for the Expert Committee for Energy Transition.
Accountability	Policy evaluation every 2 years	Annual evaluation of progress and publication of report; Some penalties for non-compliance	Annual report on progress by the Government to the Parliament; Independent assessment of progress with implementation by the CCC; Response by the Government to the CCC's assessment and recommendations; Every 5 years a report on climate risks and a programme to address them.	
		Targets, Ratchet and Policy Instruments		
Long term-targets	50 per cent greenhouse gas emission reduction below the level in 2000 by 2050	Reference is made to the LGCC's targets; A goal for 50 per cent clean energy by 2050 was set later in the Energy Transition Strategy.	At least 80 per cent greenhouse gas emission reduction below 1990 levels by 2050; The CCC was requested to develop net zero scenarios in 2018.	75 per cent greenhouse gas emission reduction below 1990 levels by 2050; Net zero goal was announced later in the executive strategy.
Near and mid-term targets	Unconditional and conditional greenhouse gas and black carbon reduction goals below BAU by 2030; Peak greenhouse gas emissions by 2026.	Clean energy target by 2024; Intermediate goals for 2018 and 2021. Clean energy target for 2030 was set later in the Energy Transition Strategy.	A system of 5-year carbon budgets for 2008-2050 set 12 years in advance	A system of 5-year carbon budgets (3 years for the first period) for 2015-2050 set 10 years in advance.

Cont.

	Mexico GLCC (2012/2018)	Mexico ETL (2015)	UK CCA (2008)	France ETL (2015)
Sectoral targets	Generate 35 per cent of energy from clean sources by 2024; Specific greenhouse gas targets for 2030 for the key sectors	Clean energy targets and mandates to set energy efficiency targets	No sectoral targets in the law itself	Multiple detailed sectoral targets for greenhouse gas emissions, clean energy, waste, etc.
Ratchet mechanism	2018 amendment notes the need to increase ambition, but no mechanism yet	Not explicitly set out	The system of carbon budgets provides for ratcheting ambition	The system of carbon budgets provides for ratcheting ambition
Consistency with the NDC targets	Targets consistent with the NDC. Not consistent with net zero target/1.5oC scenarios. Details on ratchet need to be developed.	Consistent with the NDC's energy targets.	Consistent with the EU's NDC target Not consistent with the net zero target/1.5oC scenarios	Consistent with the EU's NDC target Net zero target for 2050 needs to be integrated into the law or the strategies related to it.
Policy instruments	Mandates national strategy on climate change and special programmes with measures to implement the law; Mandate to develop national adaptation plan; Establishes emission trading scheme.	Mandates and sets several strategy processes for clean energy, energy transition and energy efficiency.	Choice of policies is left to the Government through reports on implementation of carbon budgets to be developed after the budgets are approved; Provisions for emission trading.	Mandates a low-carbon strategy to be developed every five years; Sets a multi-year energy planning framework; Defines the level of carbon tax for 2015, 2020, 2030; Outlines policies for reducing air pollution and waste.

Source: the author.

Annex 5. Comparison of executive frameworks on climate change in China, Chile, Germany and USA

	China	Chile	Germany	USA
Primary instrument	13th Five-year plan; currently developing a climate law	Developing a framework law on climate change	The Climate Action Plan 2050	No federal climate change framework; action is mainly at the subnational level
Institutional set-up	Centralised top-down approach led by the *National Development and Reform Commission of China* (NDRC); National targets are allocated to provinces; Implementation at the provincial and city level.	Centralised approach with extensive stakeholder engagement; The Permanent Presidential Advisory Commission on Climate Change.	Centralised approach with stakeholder engagement	The EPA is in charge at the national level; Currently decarbonisation efforts are led by subnational actors.
Targets, Ratchet and Policy Instruments				
Long term emission target	None	None for greenhouse gas emissions; Sectoral target for renewable energy	'Largely climate neutral' by 2050	None at the federal level. NDC target: 83% below 2005 by 2050
Near and mid-term targets	13th FYP: Reduce carbon intensity of GDP by 18% by 2020; NDC targets for 2030: to peak CO2 emissions by around 2030 and try to peak earlier; to reduce carbon intensity of GDP 60–65% below 2005 levels and 20% of primary energy consumption from non-fossil energy sources	Reduce the CO2 intensity of GDP unconditionally by 30% from the 2007 levels by 2030, and by 35-45% subject to international finance.	At least 55% reduction in greenhouse gas emissions below 1990 levels by 2030. The Clean Power Plan (suspended): to cut carbon dioxide emissions from the power sector by 32% below 2005 levels by 2030; A number of state and city initiatives in line with the NDC target.	NDC target: 26–28% below 2005 levels by 2025 (equivalent to 14% to 19% below 1990 levels);

Cont.

	China	Chile	Germany	USA
Sectoral targets	Cap energy consumption at 5 bn tonnes of standard coal equivalent by 2020 and eliminate 500 million tonnes of surplus coal capacity in 5 years; By 2020 reach 150GW of solar, 200–300GW of wind and 58GW of new nuclear capacity; Turn 1 million hectares of marginal cropland into forest or grassland, increase forest coverage to 23.04 % in 5 years.	The share of renewable energy in power generation of 60 per cent by 2035 and 70 per cent by 2050 (up from 40 per cent in 2017). Energy Efficiency Roadmap to reduce final energy demand by 20 per cent below BAU by 2025. Moratorium on new coal-fired power plants without CCS capacity and a plan to phase out coal.	61-62% greenhouse gas emission reduction from energy sector; 49-51% reduction for industry; 66-67% reduction for buildings, 40-42% for transport and 31-34% reduction of emissions in agriculture	N/A
Ratchet	none	None	updates every five years	none at the federal level
Consistency with the NDC targets	Domestic targets in 13th FYP go to 2020, they are considered generally consistent with the NDC; Not consistent with net zero target/1.5oC scenarios.	Lacks domestic policy framework that integrates the NDC targets.	Consistent with the NDC, but is behind on the actual performance.	Pending withdrawal from the Paris Agreement, federal action is not consistent with the NDC. Actions by states and non-state actors are estimated to meet about half to two third of emission reductions required under the NDC.

Cont.

	China	Chile	Germany	USA
Policy instruments	Adopted National Climate Change Programme (2007), the Climate Change Adaptation Strategy (2013), the National Plan for Climate Change (2014–2020) and integrated climate goals, targets and plans into the FYPs; From 2016 a moratorium on new coalmine approvals for 3 years; Energy efficiency standards; Emission trading scheme.	National Strategy on Climate Change (2006); the National Action Plan for Climate Change (2008–2012); the National Action Plan for Sustainable Consumption and Production (2017-2022); the National Energy Policy 2050; Carbon tax; Electric mobility strategy.	The Energiewende; A detailed programme of implementation measures to be published in 2018	The CPP is being repealed. New state guidelines for greenhouse gas emissions from power plants are under discussion. Planned relaxation of fuel efficiency standards for personal and freight vehicles, delays to methane emission reduction regulation, plans for expansion of offshore oil and gas exploration, and increase of import tariffs on solar cells and modules in January 2018. Most policy drivers in favour of low carbon transition are currently at the state level.

Source: the author.

References

America's Pledge (2018), *Fulfilling America's Pledge: How States, Cities, and Businesses Are Leading the United States to a Low-Carbon Future*. Bloomberg Philanthropies Support LLC. https://www.bbhub.io/dotorg/sites/28/2018/09/Fulfilling-Americas-Pledge-2018.pdf

Amelang, S., S Egenter, S. Götze, J. Wettengel (2016), *Reactions to Germany's Climate Action Plan 2050*. Clean Energy Wire, 14 November. https://www.cleanenergywire.org/news/reactions-germanys-climate-action-plan-2050

Averchenkova, A. & S. Guzman Luna (2018), *Mexico's General Law on Climate Change: Key achievements and challenges ahead*. Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy, November. Policy report.

Averchenkova, A., S. Fankhauser & J. Finnegan (2018), *The role of independent bodies in climate governance: the UK's Committee on Climate Change*. Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy. School of Economics and Political Science, October.

Averchenkova, A., S. Fankhauser & M. Nachmany (eds.) (2017), *Trends in Climate Change Legislation*. Edward Elgar, Cheltenham.

Averchenkova, A. & S. Bassi (2016), *Beyond the targets: assessing the political credibility of pledges for the Paris Agreement,* Grantham Research Institute on Climate Change and the Environment: The Centre for Climate Change Economics and Policy. Policy Brief, February

Averchenkova, A. & S. Matikainen (2016), *Assessing the consistency of national mitigation actions in the G20 with the Paris Agreement*. Centre for Climate Change Economics and Policy: The Grantham Research Institute on Climate Change and the Environment, Policy brief. http://www.lse.ac.uk/GranthamInstitute/publication/assessing-the-consistency-of-national-mitigation-actions-in-the-g20-with-the-paris-agreement/

Averchenkova, A., S. Bassi, K. Benes, F. Green, A. Lagarde, I. Neuweg, G. Zachmann (2016a), *Climate policy in China, the European Union and the United States: In-depth country analyses*. The Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy. Policy Brief, 17 November. http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/11/2630_GRI_3Jurisdictions_policy_report_web.pdf

Averchenkova, A., S. Bassi, K. Benes, F. Green, A. Lagarde, I. Neuweg, G. Zachmann (2016b), *Climate policy in China, the European Union and the United States: main drivers and prospects for the future*. Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy, Policy Brief, 17 November. http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/11/Averchenkova-et-al_2106-in-depth-country-analysis-v2.pdf

Averchenkova, A., N. Stern & D. Zenghelis (2014), *Taming the beasts of 'burden-sharing': an analysis of equitable mitigation actions and approaches to 2030 mitigation pledges*. Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy, December. GRI Policy paper.

Bhattacharya A., J. Oppenheim & N. Stern (2015), *Driving sustainable development through better infrastructure: Key elements of a transformation programme*. Global Economy & Development at Brookings: The Global Commission on the Economy and Climate: The Grantham Research Institute on Climate Change and the Environment. Working Paper 91, July. https://www.brookings.edu/wp-content/uploads/2016/07/07-sustainable-development-infrastructure-v2.pdf

Birney, M. (2014), "Decentralization and veiled corruption under China's: rule of mandates". *World Development*, 53 Pages 55-67 (doi: 10.1016/j.worlddev.2013.01.006)

BMUB. Germany (2017), *Climate Action in Figures: Facts, Trends and Incentives for German Climate Policy 2017 edition*. Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, November. https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/klimaschutz_in_zahlen_2017_en_bf.pdf

BMUB: Germany (2016), *Climate Action Plan 2050: Principles and goals of the German government's climate policy*. Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, November https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/klimaschutzplan_2050_en_bf.pdf

Bodansky, D. & L. Rajamani. (2016), *The Evolution and Governance Architecture of the United Nations Climate Change Regime*. Social Science Research Network. SSRN Scholarly Paper No. ID 2168859

Buchner B., M. Stadelmann, J. Wilkinson, F. Mazza, A. Rosenberg & D. Abramskiehn (2014), Global *Landscape of Climate Finance 2014*. Climate Policy Initiative, San Francisco (CA) November.

Canonica, R & D. Rodriguez (2018), *SENER official expects half of Mexico's power to come from clean energy by 2034*. Electric Power, Platts News Article & Story, 6 June. https://www.platts.com/latest-news/electric-power/houston/sener-official-expects-half-of-mexicos-power-26951536

CAT (2018), *Climate Action Tracker*. Climate Analytics: New Climate Institute: ECOFYS https://climateactiontracker.org/.

CCC. UK (2018), *Reducing UK emissions – 2018 Progress Report to Parliament*. Committee on Climate Change, London. https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf

CCC. UK (2008), *Building a low-carbon economy. The UK's contribution to tackling climate change*. Committee on Climate Change, London. https://www.theccc.org.uk/wp-content/uploads/2008/12/Building-a-low-carbon-economy-Committtee-on-Climate-Change-2008.pdf

Capstick S., L. Whitmarsh, W. Poortinga, N. Pidgeon & P. Upham (2015), "International trends in public perceptions of climate change over the past quarter century". *WIREs Climate Change*, Vol 6 (1) Pages 35–61. (doi: 10.1002/wcc.321)

Chi Lo (2018), *China megatrends: Belt and Road Initiative brings green opportunities and challenges.* BNP Paribas. 30 August https://www.bnpparibas-am.com/en/china-megatrends-belt-and-road-initiative-brings-green-opportunities-and-challenges/

Claire, C. (2017), *Lithium-ion Battery Costs: Squeezed Margins and New Business Models*. Bloomberg New Energy Finance, July 5. https://about.bnef.com/blog/lithium-ion-battery-costs-squeezed-margins-new-business-models/

ClientEarth (2016), *Mind the Gap: Reviewing the Climate Change Act*. ClientEarths, October. https://www.documents.clientearth.org/wp-content/uploads/library/2016-10-07-mind-the-gap-reviving-the-climate-change-act-ce-en.pdf

Collin, J.F. (2017), *La ley de transición energética francesa para el crecimiento verde y la Programación Plurianual de Energía 2016-2023*. ARI nº 18/2017, Real Instituto Elcano, 10/III/2017. http://www.realinstitutoelcano.org/wps/portal/rielcano_es/contenido?WCM_GLOBAL_CONTEXT=/elcano/elcano_es/zonas_es/europa/ari18-2017-collin-ley-transicion-energetica-francia-crecimiento-verde

CNUEE. México (2016), E*strategia de Transición para Promover el Uso de Tecnología y Combustibles más Limpios*. SENER. https://www.gob.mx/cms/uploads/attachment/file/182202/20161110_1300h_Estrategia_CCTE-1.pdf

Dreyfus M. & R. Allemand (2018), "Three Years After the French Energy Transition for Green Growth Law: Has the 'Energy Transition' Actually Started at the Local Level?". J*ournal of Environmental Law*, Vol. 30 (1), 1 March, Pages 109–133 (doi: 10.1093/jel/eqx031)

Duwe M., M. Freundt, E. Iwaszuk, D. Knoblauch, M. Maxter, L. Mederake, R. Ostwald, A. Riedel, K. Umpfenbach, E. Zelljadt, J. Finnegan & A. Rüdinger (2017), "*Paris compatible" governance: long-term policy frameworks to drive transformational change. A comparative analysis of national & sub-national case studies*. Ecologic Institute, November https://www.ecologic.eu/sites/files/publication/2017/paris_compatible_governance_-_ecologic_institute_report_0.pdf

Egebo, T. & A. S. Englander (1992), "Institutional Commitments And Policy Credibility: A Critical Survey And Empirical Evidence From The ERM". *OECD Economic Studies* No. 18. Spring 1992. https://www.oecd.org/economy/outlook/34250714.pdf

EIA. USA (2018), *Electric Power Monthly: July 2018*. US Energy Information Administration, Washington DC, November https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_1_01_a

EIA. USA (2018b), *2017 Solar Photovoltaic Cell/Module Shipments Report*. U.S. Energy Information Administration, Washington DC, August. https://www.eia.gov/renewable/annual/solar_photo/pdf/pv_full.pdf

EPA (2017), *State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units*. Environmental Protection Agency https://www.federalregister.gov/documents/2017/12/28/2017-27793/state-guidelines-for-greenhouse-gas-emissions-from-existing-electric-utility-generating-units

Euroactive (2015), *France targets carbon tax in energy transition law*. Euroactive, 27/VII/2015. https://www.euractiv.com/section/sustainable-dev/news/france-targets-carbon-tax-in-energy-transition-law/

Falkner, R. (2016), "The Paris Agreement and the new logic of international climate politics" *International Affairs*, 92, Pages. 1107–1125 (doi: 10.1111/1468-2346.12708)

Fankhauser, S., A. Averchenkova & J. Finnegan (2018), *10 years of the UK Climate Change Act*. The Centre for Climate Change Economics and Policy: The Grantham Research Institute on Climate Change and the Environment. Policy report, GRI.

Fankhauser, S., C. Gennaioli & M. Collins (2015), "Do international factors influence the passage of climate change legislation?", *Climate Policy*, 16 (3), Pages 318-331. (doi:10.1080/14693062.2014.1000814)

Fay, M., S. Hallegatte, A. Vogt-Schilb, J. Rozenberg, U. Narloch, T. Kerr (2015), *Decarbonizing Development: Three Steps to a Zero-Carbon Future*. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/21842

Frankfurt School-UNEP Collaborating Centre (2018), *Global Trends in Renewable Energy Investment 2018*. UNEP & Bloomberg, April. http://www.greengrowthknowledge.org/resource/global-trends-renewable-energy-investment-report-2018

Garrido, L., D. Fazekas, H. Pollitt, A. Smith, M. Berg von Linde, M. McGregor & M. Westphal (2018), *[Forthcoming] Major Opportunities for Growth and Climate Action: A Technical Note*. A New Climate Economy contributing paper. http://newclimateeconomy.net/content/technical-notes-and-fact-sheets.

Gouvernement.fr (2018), Energy Transition Website https://www.gouvernement.fr/en/energy-transition,

Grantham Research Institute on Climate Change and the Environment (2018) *Climate Change Laws of the World database* http://www.lse.ac.uk/GranthamInstitute/climate-change-laws-of-the-world/

Green, F., & N. Stern (2016), "China's changing economy: implications for its carbon dioxide emissions" *Climate Policy*, Vol. 17 Pages 1-15 (doi: 10.1080/14693062.2016.1156515)

Grimfeld, A., J. Jouzel, J-F. Le Grand & N. Notat (2010). *Rapport d'évaluation du Grenelle de l'Environnement*. La Documentation Française, Octobre. http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/104000587.pdf

Gupta S. (Coord.) (2014), "Cross-cutting Investment and Finance Issues". In: *Climate Change 2014: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Inter-governmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge (UK) & New York (USA)

Harrison, K., & L.M. Sundstrom (2010), "Introduction: Global Commons, Domestic Decisions" In: Harrison, K & L. M. Sundstrom *Global commons, domestic decisions: The comparative politics of climate change*. MIT Press, Cambridge (MA).

Hart, C., Z. Jiayan, Y. Jiahui, C. Cassisa, & H. Kater (2014), *Mapping China's Policy Formation Process*. China Carbon Forum, New York. http://www.chinacarbon.info/wp-content/uploads/2015/11/Mapping-Chinas-Climate-Policy-Formation-Process.pdf

IEA (2018a), *Energy policies beyond IEA countries: Chile 2018*. OECD/IEA, 23 January

IEA (2018b), *Global Energy & CO2: Status Report 2017*. OECD/IEA, Paris https://www.iea.org/publications/freepublications/publication/GECO2017.pdf

IEA (2017a), *Energy Efficiency 2017*. OECD/IEA, Market Report Series, 5 October

IEA (2017b), *World Energy Outlook 2017*. OECD/IEA, Paris https://www.iea.org/weo2017/

IEA (2014), *World Energy Outlook: 2014*. OECD/IEA, Paris https://webstore.iea.org/world-energy-outlook-2014

INECC. Mexico (2018), *Web del Sistema Nacional de Cambio Climático* https://www.gob.mx/inecc/acciones-y-programas/sistema-nacional-de-cambio-climatico-sinacc

IPCC (2018), *Global Warming of 1.5°C*. Intergovernmental Panel on Climate Change, Geneva. https://unfccc.int/topics/science/workstreams/cooperation-with-the-ipcc/ipcc-special-report-on-global-warming-of-15-degc

IPCC (2014a), "Climate Change 2014: Mitigation of Climate Change". Contribution of Working Group III to *the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge (UK) & New York (USA). https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf

IPCC (2014b), *AR5 Synthesis Report: Climate Change 2014*. Intergovernmental Panel on Climate Change, Geneve. https://www.ipcc.ch/report/ar5/

IPCC (2014c), "Climate Change 2014: Synthesis Report". Contribution of Working Groups I, II and III to *the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, 151 pp https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

IPCC (2007), *4th Assessment Report.* IPCC, Geneva https://www.ipcc.ch/assessment-report/ar4/

IRENA (2018), *Renewable Power Generation Costs in 2017*. International Renewable Energy Agency, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf

IRENA (2015), *Renewable Energy Capacity Statistics.* International Renewable Energy Agency, Abu Dhabi. http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Capacity_Statistics_2015.pdf

Keohane, R. & M. Oppenheimer (2016), "Paris: beyond the climate dead end through pledge and review?" *Politics and Governance*, 4 (3), Pages 142-151. (doi: 10.17645/pag.v4i3.634)

Kuramochi T., N. Höhne, S. Sterl, K. Lütkehermöller & J-C Seghers (2017), *States, cities and businesses leading the way: a first look at decentralized climate commitments in the US*. New Climate Institute, September https://newclimate.org/wp-content/uploads/2017/09/states-cities-and-regions-leading-the-way.pdf

Kydland, F., & E. Prescott (1977), "Rules Rather than Discretion: The Inconsistency of Optimal Plans" *Journal of Political Economy*, 85 (3), Pages 473-491. http://www.jstor.org/stable/1830193

Lacobuta G., N. Dubash, P. Upadhyaya, M. Deribe & N. Höhne (2018), "National climate change mitigation legislation, strategy and targets: a global update" *Climate Policy*, 18 (9), Pages 1114-1132. (doi: 10.1080/14693062.2018.1489772)

Lázaro Touza, L. (2018), "Governing the geopolitics of Climate Action after the Paris Agreement". In Considine & Paik (Eds.), *Handbook of Energy Politics*. Edward Elgar, Cheltenham.

Marjanac, S., L. Patton & J. Thornton (2017), "Acts of God, human influence and litigation" *Nature Geoscience*, 10 (9), Pages 616–619 (doi:10.1038/ngeo3019)

Nachmany, M., S. Fankhauser, J. Setzer & A. Averchenkova (2017), *Global Trends in Climate Change Legislation and Litigation*. Grantham Research Institute on Climate Change: The Centre for Climate Change Economics and Policy: Sabin Center: The Inter-Parliamentary Union. Policy Brief, May.

Nachmany M. & E. Mangan (2018), *Aligning national and international climate targets*. The Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy, London. Policy brief, October. http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/Aligning-national-and-international-climate-targets.pdf

Nachmany M. & J. Setzer (2018), *Global trends in climate change legislation and litigation: 2018 Snapshot*. The Grantham Research Institute on Climate Change and the Environment: Centre for Climate Change Economics and Policy, London. Policy brief, May http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/04/Global-trends-in-climate-change-legislation-and-litigation-2018-snapshot-3.pdf

Nachmany, M., S. Fankhauser, J. Davidová, N. Kingsmill, T. Landesman, H. Roppongi, P. Schleifer, J. Setzer, A. Sharman, C. S. Singleton, J. Sundaresan & T. Townshend (2015), *Climate Change Legislation in China: An Excerpt From the 2015 Global Climate Legislation Study. A Review of Climate Change Legislation in 99 Countries*. Grantham Research Institute on Climate Change and the Environment: GLOBE: Inter-Parlamentary Union. http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/CHINA.pdf

Nakhooda, S., & V. Jha (2014), *Getting it together: Institutional arrangements for coordination and stakeholder engagement in climate ¬finance*. Overseas Development Institute, Report, December. https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9200.pdf

NCE (2018), *Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times*. The New Climate Economy, Key Findings and Executive Summary. https://newclimateeconomy.report/2018/wp-content/uploads/sites/6/2018/09/NCE_2018_ExecutiveSummary_FINAL.pdf

NCE (2014), *Better Growth, Better Climate*. The New Climate Economy. https://newclimateeconomy.report/2014/

Neuweg, I. & A. Averchenkova (2017), "Climate change legislation and policy in China, the European Union and the United States". In: Averchenkova, A. S. Fankhauser & M. Nachmany, (eds.) *Trends in climate change legislation*. Edward Elgar, London

NOAA (2018), *NOAA'S Greenhouse Gas Index Up 41 Percent since 1990*. NOAA Research News. https://research.noaa.gov/article/ArtMID/587/ArticleID/2359/NOAA per cent E2 per cent 80 per cent 99s-greenhouse-gas-index-up-41-percent-since-1990

OECD (2015), *Climate Change Mitigation: Policies and Progress*. OECD, Paris.

Pfeiffer, A., R. Millar, C. Hepburn C & E. Beinhocker (2016), "The '2°C capital stock' for electricity generation: Committed cumulative carbon emissions from the electricity generation sector and the transition to a green economy". *Applied Energy*, 179 (1) Pages 1395-1408 (doi:10.1016/j.apenergy.2016.02.093)

Philip, G., J. Faust & M. Thunert (Coord.) (2016), *Mexico Report: Sustainable Governance Indicators 2016*. Bertelsmann Stiftung: SGI. http://www.sgi-network.org/docs/2016/country/SGI2016_Mexico.pdf

Prognos (2017), *Evaluierung der Stakeholder-Beteiligung an der Erstellung des Klimaschutzplans 2050: Abschlussbericht*. Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit. https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/ksp2050_evaluierung_stakeholderbeteiligung_bf.pdf

Real Instituto Elcano (2018), *Barómetro de la Imagen de España: 7ª Oleada. Resultados de febrero-marzo 2017*. RIE, Madrid, mayo http://www.realinstitutoelcano.org/wps/wcm/connect/7cb3a69f-1f93-4dd3-b0dd-0b7c0d7d6672/7BIE_Informe_mayo2017.pdf?MOD=AJPERES&CACHEID=7cb3a69f-1f93-4dd3-b0dd-0b7c0d7d6672

Reuters (2018), *China meets 2020 carbon target ahead of schedule: Xinhua*. Reuters. 27/III/2018. https://www.reuters.com/article/us-china-climatechange-carbon/china-meets-2020-carbon-target-ahead-of-schedule-xinhua-idUSKBN1H312U

Ritchie H & M. Roser (2018), "CO2 and other Greenhouse Gas Emissions" *OurWorldInData.org, May*. https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions

Rockström, J., H.J. Schellnhuber, B. Hoskins, V. Ramanathan, P. Schlosser, G.P. Brasseur, O. Gaffney, C. Nobre, M. Meinshausen, J Rogelj, & W. Lucht (2016), "The world's biggest gamble". *Earth's Future*, 4 (10). Pages. 465-470 (doi: 10.1002/2016EF000392)

Rogelj, J., M. den Elzen, M., Höhne, T. Fransen, H. Fekete, H. Winkler, R. Schaeffer, F. Sha, K. Riahi, & M. Meinshausen (2016), "Paris Agreement climate proposals need a boost to keep warming well below 2 °C". Nature nº 534, Pages.631-639 (doi: 10.1038/nature18307)

Rüdinger, A. (2018), *Best practices and challenges for effective climate governance frameworks: A case study on the French experience*. IDDRI, Studies N°03/18, May.

Rüdinger, A. (2015), *The French Energy Transition Law for Green Growth: At the limits of governance by objectives*. IDDRI, Issue Brief Nº 7/15, October.

SENER. México (2017), *Prospectiva de Energía Renovable: 2017-2031*. Secretaría de Energía, México D.F. https://www.gob.mx/cms/uploads/attachment/file/325642/Prospectica_de_Energ_as_Renovables_2017-2031.pdf

Somanathan E., T. Sterner, T. Sugiyama, D. Chimanikire, N.K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J.P. Montero, F. Teng, & T. Zylicz (2014), "National and Sub-national Policies and Institutions". In: *Climate Change 2014: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge (UK) & New York (USA). http://pure.iiasa.ac.at/id/eprint/11112/1/ipcc_wg3_ar5_chapter15.pdf

State of California, 2017. Assembly Bill No. 398.

State of California, 2016. Senate Bill No. 32.

State of California, 2015. Executive Order B-30-15.

State of California, 2006. Assembly Bill No. 32, Global Warming Solutions Act of 2006.

State of California, 2005. Executive Order S-3-05.

Stern, N. (2015), *Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change.* MIT Press, Cambridge (USA).

Stern, N. (2007), *The Economics of Climate Change Paperback: The Stern Review*. Cambridge University Press, Cambridge (USA)

TCFD (2017), *Recommendations of the Task Force on Climate-Related Financial Disclosures. Final Report*. Task Force on Climate-related Financial Disclosures. June, 15. https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-2017-TCFD-Report-11052018.pdf

UNEP (2016), *The Emissions Gap Report 2016: A UNEP Synthesis Report*. United Nations Environment Programme, Nairobi, November.

USCA (2018), *Fighting for our Future: Growing our economies and protecting our communities through climate leadership*. United States Climate Alliance, 2018 Annual Report (Executive Summary) https://static1.squarespace.com/static/5a4cfbfe18b27d4da21c9361/t/5b9bd9d8cd83667676651452/1536940505379/USCA_2018+Annual+Report-Executive+Summary_20180910-FINAL.pdf

Wettengel, J. (2016), "Germany's trimmed-down Climate Action Plan". *Clean Energy Wire Factsheet* 9/IX/2016 https://www.cleanenergywire.org/factsheets/germanys-trimmed-downclimate-action-plan

Willems, S & K. Baumert (2003), *Institutional Capacity and Climate Actions*. OECD/ IEA, Paris. http://www.oecd.org/env/cc/21018790.pdf

WMO (2018), *WMO Statement on the State of the Global Climate in 2017*. World Meteorological Organization, WMO-Nº 1212. https://library.wmo.int/doc_num.php?explnum_id=4453

World Bank, 2015. *Decarbonizing Development: Planning Ahead for a Future with Zero Emissions*. World Bank Group, Washington, DC.

Xiaofeng C., Ke H. & J. Xinyan (2018), "China" In: *The Environment and Climate Change Law Review*. Edited by T. Garrett. Second Edition. The Law Review.

Zhang, L., J. Zhuang & Y. Zhao (2016), *Local governments claim jurisdiction over e-vehicle charging industry*. International Law Office. 24/X/2016 http://www.lexology.com/library/document.ashx?g=04bb95f6-93bb-4863-9881-61dff021e350

Zenghelis D. & N. Stern (2016), *The importance of looking forward to manage risks: submission to the Task Force on Climate-Related Financial Disclosures*. Grantham Research Institute on Climate Change and the Environment: The Centre for Climate Change Economics and Policy, Policy paper, June. http://eprints.lse.ac.uk/67133/1/Zenghelis-and-Stern-policy-paper-June-2016.pdf

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