BEACON Bridging European & Local Climate Action

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THE ENERGY TRANSITION FOR GREEN GROWTH ACT IN FRANCE

Study

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

European Climate Initiative EUKI

The Energy Transition for Green Growth Act in France

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Abbreviations

COP	Conference of the Parties
ETS	Emission trading scheme
EU	European Union
GHG	Greenhouse gas
IEA	International Energy Agency
LTECV	Loi relative à la transition énergétique pour la croissance verte
NGO	Non-Governmental Organisation
POPE	Programme d'Orientation de la Politique Énergétique Française
PPE	Programmation pluriannuelle de l'énergie
SNBC	Stratégie nationale bas-carbone
UNFCCC	United Nations Framework Convention on Climate Change

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1 Summary

This study examines **the Energy Transition Green Growth Act** (*Loi relative à la transition énergétique pour la croissance verte – LTECV*) and its possible transferability to the German context.

Despite its title that emphasises an energy transition, the law is also a climate law that sets comprehensive climate targets. The LTECV or Energy Transition Act is a recent French climate law, building on previous climate and energy legislation and establishing a comprehensive list of targets and measures extending beyond a pure climate framework law. France's climate policy was initially spurred by France's entry into United Nations Framework Convention on Climate Change in 1992 and its subsequent ratification of the Kyoto Protocol in 1998. Since then, several iterations of climate law have been legislated and expanded upon, ultimately culminating in the efforts known as the Energy Transition Act. The Energy Transition Act differs from other main European climate laws, such as the United Kingdom's and Sweden's, in that though the aim of reducing greenhouse gas emissions does feature in the body of the legislation, it is a vast legal document incorporating not only matters relating to climate change mitigation, but general policy pathways towards low-carbon economic development. These provisions range from compliance and reporting mechanisms, to detailed methods of governance, to green innovation incentives and retro-fitting subsidies.

Additionally, the law contains the pledge towards a reduction of nuclear energy in France. Nuclear comprises about three quarters of power production in the French energy mix and the Energy Transition Act provides plans to move towards a marked reduction, though recent political events and declarations have altered the timeline towards this goal. Another specified provision is the so called 'Factor of Four', which aims to reduce France's overall CO_2 emissions by 75% by 2050 over 1990 levels. Given that emissions in France were already comparatively quite low in 1990 and that France did not 'profit' – in terms of emissions reductions – from a collapse of emissions-intensive industry through reunification – this goal is comparable to, if not more ambitious, than Germany's goals. Another quite distinct feature is the codified aspect of stakeholder communication and inclusion, which has catalysed inclusionary practice for both the private sector and climate action on the local level. With a plethora of articles and a myriad of decrees to accompany it, the law seeks to cover all facets of national energy policy and aims to move towards a future that is both prosperous, efficient and, above all, climate neutral. With regards to its extensive provisions for specific policies and measures, the LTECV appears comparable to the German Climate Protection Plan 2050 (Klimaschutzplan 2050).

The effectiveness of the law is hard to measure at this point due to its recency as well as the double function of the law and the resulting contradictory goals of defining a pathway away from the dominant source of low-carbon energy in France while at the same time achieving ambitious climate goals. However, there are promising indicators of its effectiveness – for example through its inclusion of an ambitious carbon tax trajectory, which has proven to be an effective emission reduction tool in other countries.

While a law comprising climate targets and a set of policy measures is similarly possible in Germany, the transferability of specific policy contents to the German context is limited because of stark differences in terms of institutional structure and the point of departure in a transformation to a low-carbon economy.

2 Introduction to the law

The French Energy Transition for Green Growth Act (Loi relative à la transition énergétique pour la croissance verte – LTECV) contains various ambitious energy and climate targets covering multiple sectors and timeframes. The most relevant ones are the following:

- Reducing GHG emissions by 40% by 2030 compared to 1990 and by 75% by 2050.
- Reduce final energy consumption by at least 50% by 2050 compared to 2012.
- Reduce the use of fossil fuels by 30% in 2030 compared to 2012.
- Limit the total output of energy from nuclear power to its current level of 63.2 GW and reduce the share of energy from nuclear power to 50% by 2025 (currently at 75%).
- Increasing the share of energy from renewable energy sources to 32% by 2030.
- A carbon-pricing trajectory to be imposed on the carbon component of fossil fuels, starting at EUR 14.5 per tonne of CO_2eq in 2015 and increasing to EUR 56/tCO_2 in 2020 and EUR 100/tCO_2 in 2030.

In addition to these climate and energy targets, the LTECV includes numerous other provisions, covering eight topics in total:

- The future energy system, renewable energies and nuclear safety
- Energy efficiency in the building sector
- Clean transportation
- Waste management and the circular economy
- Renewable energies
- Nuclear safety
- Simplifying administrative procedures
- New measures to enable citizens, companies and local authorities to take action

The framework established by the LTECV is very complex and involves multiple levels of government, as well as a variety of policy reforms and implementation mechanisms. Aside from the empowerment of regional and local authorities, the LTECV details two main tools for the energy transition, which the government is obligated to publish every five years: The National Low-Carbon Strategy (SNBC) and Multiannual Energy Programme (PPE). The SNBC details the actions to be taken towards a low-carbon economy and covers both energy and non-energy sectors. The emission reduction trajectory consistent with achieving a 75% reduction of GHG emissions by 2050 is broken down for all economic sectors. The PPE contains policies targeting all aspects of electricity production, energy efficiency and security of supply. The PPE details the policies proposed to achieve the targets of the LTECV. It must be compatible with the carbon budgets and sectoral limits established by the SNBC. Overall, the LTECV is being implemented through more than 150 different regulations. Both the SNBC and the PPE must undergo regular detailed reviews and the government is obligated to present progress reports to parliament. An important part of the Act's governance framework is a system of carbon budgets, setting an overall emission limit not to be exceeded in each budget period. Each budget covers a period of five years. The LTECV emphasises a collaborative approach and is implemented through a series of action plans and regulations.

3 National context

3.1 Legislative and political context

France is a unitary semi-presidential constitutional republic, with the popularly elected president acting as the head of state and the prime minister serving as head of government. The president enjoys supreme executive authority and drives the national policymaking agenda. The bicameral parliament consists of the National Assembly (the lower house, directly elected in single-member constituencies) and the senate (upper house, indirectly elected by elected officials). The second level of government consists of 18 administrative regions that are divided into 13 metropolitan regions and five overseas departments. These have no legislative authority but do enjoy executive powers, in particular over matters concerning economic and social development, regional planning, education, and cultural matters (Woloch et al., 2018). This includes areas that fall under the regulation of the LTECV, such as housing and regional planning, giving the regions an explicit role in the implementation of this law

To initiate the legislative process for a law such as the LTECV, a bill has to be submitted to one of the chambers. This can be done by the prime minister, by a deputy or a group of deputies, or senator or a group of senators (Boring, 2016). Initially, the commission of the respective chamber to which the bill was submitted will discuss, amend and vote on the bill, before the entire chamber does the same. In order for the bill to pass through parliament, it has to be adopted in identical form by both chambers. Finally, the bill also needs to be signed and promulgated by the president, who does not have the power of veto, but can ask the parliament to re-examine the bill. In the French legislative system, it is important to differentiate between laws and regulations. Laws concern the domains of the constitution and must be adopted by the parliament. Regulations govern the domain outside of the constitution and specify how laws are implemented, and do not need to be voted on by the parliament. The Energy Transition for Green Growth Act falls under the first category, constituting a law which in turn is implemented through a number of regulations, as will be elaborated further in the following chapters.

France held presidential elections in May 2017 and parliamentary elections in June 2017, with the two major issues being the economy — France was at the time experiencing a 10% unemployment rate and weak GDP growth, still not having fully recovered from the 2008 crisis — and immigration.

The former minister of the Economy, Emmanuel Macron, and his party ‘La République en Marche!’ enjoyed a two-part victory. France has since doubled down on European values as well as its commitment to the EU itself and is subsequently striving for a bigger role on the international stage.

On the economic front, Macron has embraced globalisation and has vowed to improve both France’s business climate and its competitiveness (Barkin, 2017, Criss, 2017). Under his presidency, environmental issues have gained visibility, but the resignation of the respected environment minister Nicolas Hulot citing disappointment in the current environmental actions in August 2018 has cast a more critical light on the government’s work on this issue (Bock, 2018). While the international community generally regards Macron as being favourable towards climate protection, he faces more criticism from his own ranks and constituency (Mouchon, 2018). In Macron’s election year 2017 France missed its carbon budget by an additional 6.7% (Réseau action climat, 2018).

3.2 Sectoral overview and national climate policy

France has one of the lowest CO_2-intensities among the OECD countries (IEA, 2017). This primarily stems from France's electricity mix, which is dominated by nuclear power (73% in 2016).

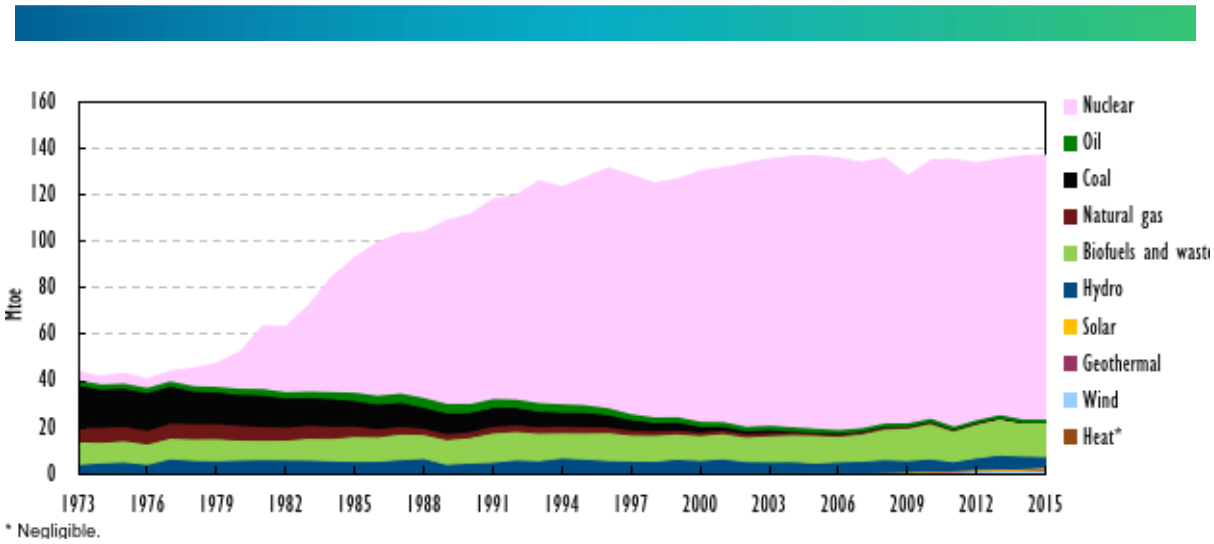

Figure 1: French energy production by source, 1973–2015.
Source: IEA, 2016:21

This constitutes a decisive difference between France and most other countries which are much more reliant on fossil fuels for energy generation. While the installation of renewable energy sources is slowly increasing, nuclear power remains dominant.

Overall GHG emissions have decreased steadily since 2005, remaining largely stable before then. Compared to 1990, emissions were 16.4% lower in 2015 (Ministry for an Ecological and Solidary Transition (2017b)). The transport sector accounts for nearly 30% of GHG emissions in France and is the largest emitting sector. In the residential sector, which in 2015 accounted for 18.9% of emissions, only a slight reduction of 2.5% compared to 1990 has been achieved so far (Ministry for an Ecological and Solidary Transition (2017b)).

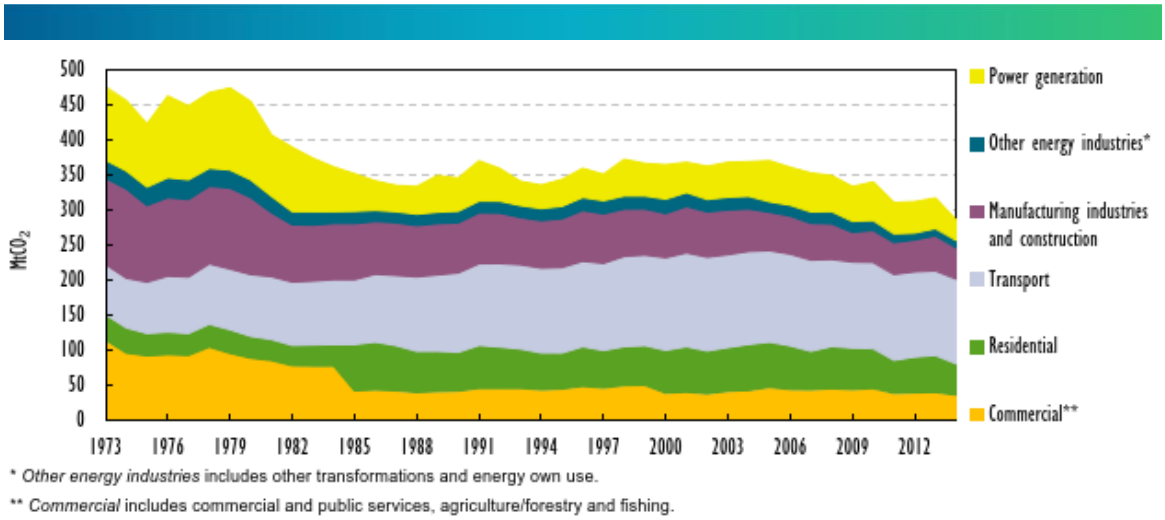

Figure 2: CO_2 emissions by sector, 1973–2014.
Source: IEA, 2017:36

Taking the year 2015 as a point of departure, France has also managed to reduce its total CO_2 emissions from fuel combustion by 22% over their peak levels in 2005, which translates to 16% compared to 1990 levels. According to the IEA, this is mainly due to emissions reductions in the industry and energy sector, while emissions from transport, waste, and buildings have increased (IEA, 2017).

France signed the UN Framework Convention on Climate Change in 1992 and ratified the Kyoto Protocol in 1998 and the Paris Agreement in 2016. The first time France defined its climate policy was in its National Climate Change Program in 2000, which for the first time, defined France's integrated climate policy. Subsequent Climate Plans following in 2004, 2006, 2009, 2011, 2013 and 2017 further defined the policy and established a framework for measures to be implemented in different sectors of the economy. These plans are a catalogue of measures to be implemented in order to reach France's emission reduction targets.

In 2005, the Energy Programme Act (Programme d'Orientation de la Politique Énergétique Française – or POPE steering law) was adopted, defining the national objectives and orientations of France's energy policy. It included a target to reduce GHG emissions by 3% annually and decrease total emission by 75% by 2050. It also contained a target to increase the share of renewable electricity in national energy production to 10% of total energy demand by 2010. To reach these targets, the government is obligated to elaborate a Climate Plan every two years. The POPE Law also established a series of incentives such as tax exemptions or energy labels. It constituted the first legal anchoring of climate mitigation objectives in France. A further important impetus for French legislation for energy transition was provided by the Grenelle process between 2007 and 2009, which entailed extensive consultation between state and non-state actors. The objectives defined in the consultation were implemented with the Grenelle I (2009) and Grenelle II (2010) laws. Grenelle I set the sector-specific objectives, while Grenelle II provided the more detailed implementation framework for Grenelle I (Grantham Research Institute, 2015). The targets of Grenelle I include the 'Factor Four" reduction of GHG emissions established by the POPE Law, the application of the EU's targets for renewable energy, energy efficiency and GHG emissions for 2020, and ambitious targets for the buildings and transport sectors. The specific policies and measures laid out in Grenelle II include a carbon tax, incentives for renewable energy and improvement of energy efficiency of buildings, amongst others.

Much like the LTECV, these laws comprise not only energy and climate policy provisions, but also incorporate numerous sectoral policies, especially regarding the transport, buildings and agriculture sectors. These laws therefore also constitute the main sectoral policies for climate mitigation.

4 General description of the law

4.1 History

Several factors led to the adoption of the Energy Transition for Green Growth Act (Loi relative à la transition énergétique pour la croissance verte – LTECV, hereafter also referred to as the Energy Transition Act)**.** Strong momentum for France's energy and climate legislation was provided by the country's role as host of the 21st meeting of the conference of the parties (COP) to the UNFCCC in Paris. In the run-up to this event, France had the chance to present strong leadership for political action in the fight against climate change. This leadership role provided domestic momentum for adoption of the LTECV. In addition, the law was able to build on principles introduced by previous legislation. For example, it confirmed the 'Factor Four" trajectory first introduced by the POPE Law of 2005 and renewed by the Grenelle Act in 2009. This strong regulatory environment helped enable the inclusion of some provisions establishing obligations for powerful stakeholders. For example, the carbon reporting obligations for companies included in Article 173 of the LTECV built on a history of similar regulation, beginning in 2001 with the requirement that companies report on measures regarding their environmental and social impact (Mason et al., 2016).

The history of climate and energy legislation outlined in section 3.2 provided a basis for further comprehensive legislation to be adopted. From the POPE Law of 2005 to the Energy Transition for Green Growth Act, the development included a gradual increase in the involvement of NGOs, a more significant role for energy efficiency and renewable energy development, and the empowerment of local authorities. The introduction of the more controversial measure of significantly reducing the share of nuclear power in France's energy mix was initiated by growing public concern about nuclear safety following the Fukushima incident (Mathieu, 2016). This led to society re-thinking France's future energy system. Another important factor in gathering support for the LTECV was the framing of energy and climate policies as part of future green growth strategy for France.

The **process of adopting** the LTECV began in 2012 with a list of measures agreed upon by the Socialist Party and the Green Party which were to be introduced if the left-wing party bloc achieved a majority in the upcoming presidential and parliamentary election (Mathieu, 2016). This agreement mainly focused on a shift in the energy system towards renewable energy generation and reducing the share of nuclear power. After the election of François Hollande as president in May 2012, an extensive, unprecedented public consultation process was launched, lasting from November 2012 to July 2013. This National Debate on the Energy Transition (DNTE) involved thousands of national and local stakeholders and was intended to determine the best way for a transition towards a low-carbon economy. In September 2013 a large environmental conference was organised to debate a number of measures for climate, energy and environmental policy. The recommendations resulting from the public consultation and the environmental conference formed the basis of the draft LTECV (Nachmany et al., 2015). According to ecology and energy minister at the time, Ségolène Royal, '5,034 amendments were submitted in the public hearing, of which 970 have been adopted, during 150 hours of debate, preceded by several hundreds of hours of work in the committees' (EURACTIV, 2015).

In October 2014, the draft legislation was adopted by the National Assembly and passed to the senate for approval before being adopted by the French Parliament in July 2015 (Mason et al., 2016). The law passed comfortably through parliamentary voting, despite some opposition from centre-right parties and abstention from the communist and far-right parties (MacEwen, 2015). It is general consensus that the controversial aspects of the LTECV were able to pass the legislative process without being watered down (ibid., 2015). However,

directly after being adopted, the law was challenged by a group of senators from the Republican Party who asked the Constitutional Court to review its legality based on the claim that the procedure followed was not in accordance with the principle of bicameralism. The court rejected the claim and the law was subsequently published in the *Journal officiel de la République française* in August 2015 (Mason et al., 2016). The energy transition law resulting from this process includes 212 articles going far beyond the issue of nuclear energy, covering all areas of energy transition.

4.2 Functioning

As mentioned in section 1, instead of a law purely focused on climate change, the Energy Transition for Green Growth Act has a much broader scope. It contains numerous quantified targets for the French economy, many of them for individual sectors. The main targets included in the Act are:

- Reducing GHG emissions by 40% by 2030 compared to 1990 and by 75% by 2050.
- Reduce final energy consumption by at least 50% by 2050 compared to 2012.
- Reduce the use of fossil fuels by 30% in 2030 compared to 2012.
- Limit the total output of energy from nuclear power to its current level of 63.2 GW and reduce the share of energy from nuclear power to 50% by 2025 (currently at 75%).
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- A carbon-pricing trajectory to be imposed on the carbon content of fossil fuels, starting at EUR 14.5 per tonne of CO_2eq in 2015 and increasing to EUR 100/tCO_2.

In addition to these climate and energy targets, the LTECV includes numerous other provisions, covering eight topics in total (see section 2 for the full list). In contrast to a purely technical climate change framework legislation, the LTECV also includes detailed policy plans and proposals for how the emission reduction and energy targets are to be achieved, covering different sectors of the economy.

Governance mechanisms

An important part of the Act's governance framework is a system of carbon budgets, setting an overall emission limit not to be exceeded in each budget period. Each budget covers a period of five years. The budget levels are laid out in the National Low-Carbon Strategy (SNBC). The first three of those budgets were adopted by decree at the same time as the SNBC itself (Decree No. 2015-1491 of 18 November 2015):

- 2015–2018: 442 Mt CO_2eq,
- 2019–2023: 399 Mt CO_2eq,
- 2024–2028: 358 Mt CO_2eq.

The LTECV imposes a legal obligation on the government to achieve emission reductions, diversify energy and enshrines into law France's national contribution to the global fight against climate change (LTECV, 2015). It comprises a list of legally binding energy targets (see list of main targets above), which imposes an obligation on the government. The different programmes at the national and regional level must take the overall 'Factor Four' target for 2050 into account. Obligations are also imposed on municipalities and private businesses of a certain minimum size. Investors are required to disclose the environmental impact of their portfolios, including the impact on climate change (MacEwen, 2015). The increase in the level of the CO_2-tax needs to be ratified in the annual budget law. However, the LTECV does mean a strong legal anchoring of many detailed regulations.

A specific feature of the LTECV is its focus on empowerment of additional stakeholders, which is a significant change to the previously more centralised energy policy. The role of local authorities is strengthened by the Act by giving them a role in the implementation of the energy transition. The main focus here is on local authorities promoting energy efficiency in their constituencies. This was complemented by a call for local projects and the labelling of over five hundred communities as 'energy positive territories for green growth' by the French government (Council of Ministers, 2017). These communities receive financial support for the implementation of energy transition projects (Mathieu, 2016). The LTECV emphasises a collaborative approach and is implemented through a series of action plans and regulations. A system of regular review and reporting obligations is also incorporated in the governance structure of the LTECV with carbon budgets being revised every five years, plus regular revisions of the individual implementation decrees.

The government must present **progress reports** to the parliament on an annual basis. These reports have to detail the state's public expenditure on climate policy and the overall financing of the energy transition (which also includes an evaluation of private financial resources being invested). It also assesses whether these resources are sufficient to reach the LTECV's objectives (IEA, 2017). Reviews of the main implementation mechanisms, detailed in the following paragraph, are conducted with input from the Expert Committee for the Energy Transition. This committee was established by the LTECV and consists of eight independent experts. Its particular focus is to provide an opinion on the Multiannual Energy Programme (Programmation pluriannuelle de l'énergie - PPE) and input into the reviews of the National Low-Carbon Strategy (Stratégie nationale bas-carbone - SNBC).

Implementation mechanisms

Aside from the empowerment of regional and local authorities, the LTECV details two main tools for the energy transition, which the government is obligated to publish every five years: The National Low-Carbon Strategy (SNBC) and Multiannual Energy Programme (PPE), which will be discussed in more detail in the following paragraph. Less central are the regional planning schemes (SRCAE) which detail the local implications of the

SNBC and PPE. Overall, the LTECV is implemented through more than 150 different regulations (IEA, 2017). For example, the government aims to increase the renovation rate in the building sector and impose an obligation on owners to carry out energy efficiency measures when undertaking certain renovation measures (Ministry for Ecological and Solidary Transition, 2017). A further implementation mechanism is the Clean Mobility Plan. One of the core provisions of the law is a significant increase in tax duty imposed on the carbon content of fossil fuels from EUR 14.5 per tonne of CO_2 to EUR 100/tCO_2 by 2030. It would go beyond the scope of this study to analyse the individual policies implemented by the LTECV. The focus will therefore be on the most relevant ones. These include the **carbon price trajectory** outlined above, the focus of future **building retrofits** on energy efficiency, especially for low-income households and a string of **new planning instruments** that are meant to develop a coherent transition strategy. As mentioned above, the two most significant of these planning tools are the National Low-Carbon Strategy and the Multiannual Energy Programme.

In order to implement the measures included in the LTECV, the **National Low-Carbon Strategy (SNBC)** was adopted by decree in November 2015, along with the regulation establishing the first three carbon budgets. It details the actions to be taken towards a low-carbon economy and covers both energy and non-energy sectors. The emission reduction trajectory consistent with achieving a 75% reduction of GHG emissions by 2050 is broken down for all economic sectors (Ministry for an Ecological and Solidary Transition, 2017). A first evaluation of the progress achieved under the strategy will take place in 2018 and will be revisited every five years. The strategy's implementation is monitored regularly, and progress reports are presented to the stakeholders involved. These evaluations form part of the 5-yearly review process of the strategy (IEA, 2017). The SNBC is based on detailed modelling and emission reduction scenarios, along with an assessment of the macroeconomic impacts (Lavergne, 2016).

The other main implementation programme for the LTECV is the **Multiannual Energy Programme (PPE)**. The first PPE was adopted by decree in October 2016, covering the period up until 2023. The PPE contains policies targeting all aspects of electricity production, energy efficiency and security of supply. The PPE details the policies proposed to achieve the targets of the LTECV. It must be compatible with the carbon budgets and sectoral limits established by the SNBC. As laid down in the LTECV, each PPE must cover a 10-year period (with the exception of the first PPE covering only eight years) and is revised every five years. At the end of this five-year period, the government is obligated to report on the progress achieved in the energy transition (Ministry for an Ecological and Solidary Transition, 2017). According to the LTECV, the PPEs have to detail public authorities' priorities for action in order to achieve the energy-related objectives of the Act (LTECV, 2015).

Both the SNBC and the PPE have to undergo regular detailed reviews that allow for the improvement and adjustment of the measures outlined in these policy packages. Regarding the SNBC, a set of 150 indicators has been developed to assess the policies and measures detailed in the strategy. This extensive progress monitoring allows for the activities realised under the SNBC to be evaluated by interested parties and stakeholders, thereby holding the government accountable and enabling the identification of possible points for improvement. The reference scenario already included in the SNBC further supports this process by allowing for deviations from this trajectory to be clearly identified and remedied. The indicators are analysed on an annual basis with input from the Expert Committee for the Energy Transition. The outcomes of this process are published every two years, after being presented to the stakeholders involved in the development of the low-carbon strategy (IEA, 2017). In addition to regular reviews of the SNBC and PPE, other implementation decrees are evaluated in a similar procedure, resulting in very detailed tracking of progress in different areas.

In 2017, a new 'Climate Plan' was presented by the responsible minister at the time, Nicolas Hulot, following a request for such a plan by the French President and the Prime Minister (Embassy of France in London, 2017). This policy plan aims at carbon neutrality by 2050, thereby increasing the level of ambition of previous plans, including the LTECV targets. The plan is intended to mobilise all government ministries and to accelerate the transition speed to a low-carbon economy in light of the targets included in the Paris Agreement (Gouvernement, 2018). In the Climate Plan, the government has committed to the revision of the SNBC and PPE by the end of 2018. The revised SNBC will include the aim of carbon neutrality by 2050 (Climate Plan, 2017). It aims to mobilise all actors in French society towards reaching the targets of the Paris Agreement, addressing citizens, businesses and the territories. This new policy plan covers a period of five years and represents the government's commitment to updating the strategic documents for implementation of the LTECV and adding to actions taken so far. It is meant to make the commitment to the goals of the Paris Agreement and the fight against climate change irreversible by enshrining it into law (Climate Plan, 2017). This recent development in French climate policy marks further ambitious goal-setting by the government that needs to be followed up with equally ambitious action. The goals of the Climate Plan will be integrated into the review process of the SNBC (Ministry for an Ecological and Solidary Transition, 2017).

4.3 Interlinkages with other policy instruments

Even before the adoption of the LTECV, namely with the 2009 Grenelle Act, France began to supplement targets established under the EU framework with national sectoral targets for energy efficiency and emissions reductions (OECD, 2016).

The LTECV continues to operate within the regulatory framework of the European Union. Many of its provisions directly or indirectly interact with EU directives and policies, most importantly the EU Emissions Trading Scheme (EU ETS) and the Renewable Energy Directive. The EU ETS also covers the French power sector and a large proportion of industrial installations. An important dynamic exists between the EU ETS and the French carbon-pricing policy under the LTECV.

Another important instrument located at EU level is the Renewable Energy Directive, obligating Member States to reach specific targets for renewable energy generation. Under the Renewable Energy Directive, France has a target of 23% of energy production stemming from renewable sources by 2020 (Henard, 2010). This target can be seen as a milestone towards the 2030 renewable energy goal included in the LTECV. Further significant interactions occur with the EU's Energy Efficiency Directive which mandates binding measures to be implemented by the Member States in order to reach the EU's overall energy efficiency target. Given the fact that improved energy efficiency is an explicit goal of the LTECV with a reduction of final energy consumption by 50% by 2050 compared to 2012, this appears to be in line with the EU target of 30% increased energy efficiency by 2030. The LTECV and its many related regulations implement a number of goals set at EU level, concerning energy efficiency, renewable energy, the transport sector and waste.

In addition, many of the sectoral targets and policies are interlinked with the numerous directives and policies located at EU level. It would go beyond the scope of this paper to analyse the different interactions in detail given the complexity and number of the LTECV's objectives. It should be stated that numerous complex interactions can already be identified between the different targets of the LTECV itself. While the exact impacts of these interactions are difficult to discern at this point, some are already clear. An important connection exists between the reduction of nuclear energy and GHG emissions. Without a clear target for GHG emissions, the

reduction of nuclear energy would likely lead to an increase in fossil fuel-based energy generation. With the climate mitigation framework put in place by the LTECV, an increase in renewable energy to replace nuclear capacity should be the consequence. Yet, this effect requires a strong political commitment to increasing the share of renewable energy. This commitment appears so far to be lacking in the case of France.

5 Impacts of the law

5.1 Effectiveness

Given the short time-frame since adoption of the LTECV, it is difficult to assess its impact on emission reductions to date. However, its implementation has been driven forward by a string of action plans and government decrees. By April 2017 almost all of the 162 relevant decrees had been published (Council of Ministers, 2017).

A series of policy instruments have been implemented and according to government progress reports, meaningful results have already been achieved, including increased installed capacity in solar and wind energy as well as the presence of more than 100,000 electric vehicles on the road and more than 15,000 charging stations installed (Council of Ministers, 2017). But given the small installed capacity of renewable energy sources in France at the start of the LTECV, the installation rate would have to increase substantially in order to meet France's renewable energy objectives for 2020. It is therefore questionable whether the measures taken through the LTECV will be sufficient. An important constraint regarding the GHG emission reduction effects of the LTECV is the fact that the French power sector is already mostly decarbonised, making further reductions in this area difficult. The main mitigation efforts therefore need to be achieved in the transport, building and agriculture sectors. These are much more complex to decarbonise, and many other countries have been facing significant difficulties achieving progress in these sectors (Sweden being a marked exception).

Regarding emission developments that can already be observed, overall GHG emissions have actually increased between 2015 and 2017. While this development is too soon after adoption of the LTECV to be primarily affected by its policies, it does mean a deviation of its objectives. A recent report published in September 2018 indicates that France is not on track to meet eight out of its nine sectoral targets included in the LTECV. In 2017, emissions arising from the building sector were 22.7% above the target level. Overall, France's GHG emissions were at a level 6.7% higher than the 2017 objective (Observatoire Climat-Energie, 2018). The only sector on track to reach the target set out in the LTECV is the industrial sector, according to the assessment by the independent NGO 'Observatory on Energy and Climate'. This evaluation indicates significant demand for further actions to be taken in order to meet the goals of the LTECV. Yet it should be emphasised that new measures implemented under the LTECV in the transport and building sectors will only achieve emission reduction effects with a time-lag.

Projections for the development of nuclear energy foresee a gap between the LTECV target and the actual reduction in its share in the energy mix. The measures outlined in the PPE have been criticised by environmental NGOs as only leading to a decrease in the share of nuclear energy production to 65% by 2023, far short of the 2025 target of a 50% share (Mathieu, 2016).

While the carbon price constitutes a major building block of the energy transition policy and important source of funding for the energy transition, its legal anchoring remains relatively weak given that it has to be confirmed (and can therefore be overruled) by each annual budget bill (Rüdinger, 2015). The effectiveness of this instrument therefore depends on the long-term political commitment of consecutive governments.

5.2 Cost efficiency

The measures included in the Energy Transition Act and its underlying implementation strategies aim at a large-scale restructuring of the French economy. This requires immense investments in the coming decades. The overall cost efficiency of the LTECV largely depends on the effectiveness of the policies, programmes and funds anchored in this legislation. The long-term and mid-term targets included in the LTECV, specified for different sectors, can provide much needed certainty for investments in low-carbon technologies. Since the LTECV already details some of the individual policies for achieving its list of targets, it can ensure that private investments can be made according to those policy frameworks and provide planning certainty. However, it appears that some targets included in the LTECV, namely the nuclear energy reduction target, still remain changeable. The amendment of this core target undermines planning certainty that could otherwise be realised.

A particularly significant provision of the LTECV regarding cost of the energy transition is the rapid scaling-up of the carbon price component of fossil fuels. The level determined in the LTECV is for one tonne of carbon to be valued at EUR 56 in 2020 and EUR 100 in 2030. This carbon price will encourage investments in low-carbon technologies and infrastructure and incentivises the reduction of fossil fuel consumption. Parallel to this tax increase, tax reductions in other areas will be realised in order to offset the financial impacts (LTECV, 2015).

One of the main provisions of the LTECV affecting private companies and investors is **Article 174** which establishes mandatory carbon disclosures for listed companies in addition to existing reporting obligations for institutional investors (IEA, 2017). Investors are required to report on how environmental, social and corporate governance aspects are factored into their investment policies, along with carbon-based aspects. Companies of a certain minimum size must produce annual reports detailing the financial risks related to climate change impacts and measures taken to reduce these risks and impacts on the company's activities. For institutional investors, defined as asset owners and investment managers, requirements for annual reports include outlining how their investment decisions take environmental, social and governance criteria into account and how their investment policies align with the goals of the LTECV (Mason et al., 2016).

These reporting obligations result in an integration of climate change considerations into investment decisions and firmly establish climate risk on investors' agendas (Mason et al., 2016). However, the decree implementing Article 173 does not detail legal enforcement of the law. Given the amount of investments necessary to achieve the French energy transition, the involvement of private companies and investors can be seen as an important step towards mobilising these investments and steering investment decisions towards low-carbon developments.

5.3 Co-benefits and side-effects

In contrast to many climate change laws which exhibit a purely target-based and institutional nature, the Energy Transition Act through its implementation plans explicitly aims at the mobilisation of different actors in society and the economy to achieve its goals. Its goals go beyond energy, climate and environmental aspects and specifically incorporate economic and social concerns such as the development of low-carbon technology sectors as a driver for economic growth and the reduction in energy poverty (for example by demanding 50% of building retrofits to be carried out for low-income households).

One of the main benefits of the LTECV is that it consolidates the quite scattered energy and climate policy governance into an integrated framework for the energy transition (IEA, 2017). Prior to the adoption of the LTECV, the French governance framework was characterised by a multitude of overlapping and complex regulations, pursuing different objectives over various timeframes. One of the LTECV's significant benefits has been outlining all energy and climate policy objectives in one document (OECD, 2016). Yet, the LTECV still contains a large number of goals that are not always mutually supportive.

The integration of regional and local planning tools has led to an uptake of climate change as a political issue by many sub-national actors. This, along with the extensive public consultation and enabling processes, facilitates the creation of communities of interest and an ongoing debate between stakeholders (OECD, 2016). This participatory approach is being continued by the current government, with an online public inquiry into citizen's preferences regarding the revised National Low-Carbon Strategy, which will be presented in late 2018. The results of the survey were already incorporated into a public debate about the Multiannual Energy Programme (Ministère de la Transition écologique et solidaire, 2018a). This process also increases the visibility of climate change as an overarching issue and allows for the transparency required for successful policy implementation. The regular reporting and review obligations for the SNBC and PPE, as detailed in section 4.2 facilitate the position of climate change on the political agenda and help make sure the issue remains in the public eye.

As a law that covers a large scope of sectors, actors and measures, the effects of its adoption can be expected to go beyond the reduction of GHG emissions. One particular impact is the tackling of air pollution, which has repeatedly exceeded safe limits in Paris and is one of the aims of the clean transport measures included in the LTECV. Raising the carbon tax to the amounts set in the LTECV is likely to have significant financial and fiscal effects. Deductions in other parts of the taxation system are meant to offset any negative impacts from the carbon price, especially for low-income households.

It is the explicit aim of the LTECV to create new employment and facilitate economic growth. The National Low-Carbon Strategy states that an energy transition and development of a low-carbon economy will lead to the creation of between 100,000 and 350,000 additional jobs between 2015 and 2035, in addition to an expected increase in GDP by 0.8% in 2020 and 1.5% in 2030 (Ministère de la Transition écologique et solidaire, 2015). The adoption of the measures included in the law is expected to create 75,000 jobs in the housing sector through retro-fitting (Grantham Research Institute, 2015). On the other hand, the rapid reduction in the share of nuclear energy in the French energy mix will have negative impacts on the nuclear industry (MacEwen , 2015). There are also concerns that the costs will be passed onto end consumers via increased prices and that emissions will increase given a partial replacement by fossil fuels.

5.4 Success factors and challenges

While the LTECV is subject to many different challenges which will be discussed here, it is also important to briefly indicate its main success factors. These include the early involvement of a large number of stakeholders, following an integrated approach to climate and energy policy which streamlines a number of previously separate policies and regulations, and significant political momentum as host of the landmark Paris Climate Conference.

Immediately after its adoption, the implementation of the energy transition law was regarded as a major challenge, requiring more than 150 implementing decrees. Based on the number of decrees adopted since then, this challenge has been met. Based on the effectiveness of each policy, however, many challenges remain. Establishing a robust tracking framework based on a unified set of indicators covering all relevant sectors of the energy transition is necessary to enable a detailed assessment of progress towards the various LTECV targets.

While the multi-level planning and governance framework of the LTECV has been widely commended and includes many relevant actors in the implementation process, this has also led to a myriad of different procedures and lack of clarity over competencies and obligations (Rüdinger, 2015). This negatively affects accountability as it is difficult for outside stakeholders to identify which authorities are potentially not complying with the obligations imposed by the LTECV. Developing a coherent planning and policy landscape for the energy transition that is in accordance with the various objectives and instruments listed in the LTECV constitutes a major challenge. Since most of the planning tools at national level are supported by equivalent plans at the regional and local level, the unclear allocation of responsibilities can easily lead to duplication of efforts and overlaping actions. Clear guidelines regarding the interactions between these plans at different levels are therefore deemed necessary to address this challenge.

Given the important role that sub-national authorities occupy in the implementation of the energy transition, the resources allocated to them for this task have been criticised as insufficient, specifically regarding the financial means for building renovations or further development of public transportation (Conseil Économique, Social et Environnemental, 2018). Another challenge for successful implementation of the LTECV is related to its governance structure. The framework it introduces can be described as 'governance by objectives" (Rüdinger, 2015), incorporating a string of targets and instruments. The challenge lies in following up on this structure with effective measures of implementation.

An **important recent development** is the fact that the target of reducing the share of nuclear energy to 50% by 2025 has already been revised by the government, based on the argument that it would be too expensive to uphold and would lead to an increase in GHG emissions due to a diversion of energy production towards fossil fuels (Sénat, 2018). The decision to abandon the 2025 target was taken by then-Minister for the Ecological Transition Nicolas Hulot. It followed a report by the French electricity transmission system operator RTE which stated that the original goal would have implied increased GHG emissions (RFI, 2018). The 2017 Climate Plan with its increased stringency of emission reduction targets indicates a clear commitment to ambitious climate policy, building on the LTECV and raising its level of ambition. However, it has been criticised by different stakeholders and NGOs that the political will to ensure the execution of all the LTECV's provisions is lacking and will not be able to achieve the declared targets (Mathieu, 2016). While significant progress has been made regarding energy efficiency, with France's energy intensity declining annually by an average of 1.4% between 2000 and 2016 (Ministère de la Transition écologique et solidaire, 2018b), the same cannot be said for the development of renewable energy capacity. In 2016, the share of renewable energy sources in the energy mix was 16%, compared to 9.6% in 2005 (Ministère de la Transition écologique et solidaire, 2018c). This constitutes a rather slow increase in renewable energy and calls into question the achievability of the 2020 target a of 23% share of renewable sources in the energy mix.

In August 2018, highly regarded minister for the Ecological and Solidary Transition, Nicolas Hulot unexpectedly resigned. His successor, François de Rugy, has presented a pragmatic approach of combining environmental and climate concerns with economic growth and has so far declined to set a specific date for the achievement of the LTECV's nuclear target (Sauer, 2018a). Considering the combination of these developments, the major challenge

for the LTECV is safeguarding it against turning into an ‘empty shell’ in the absence of ambitious implementation measures and execution of its objectives.

6 Transferability

6.1 General comparability of the context

In France, the national government lays out energy policy, passes the legislation and manages the support programmes such as financial incentives. Policies laid out at both the federal and regional level are binding for the départements, as well as for their municipalities (OECD, 2017). French municipalities have traditionally had little room for manoeuvre, including the realm of energy governance, but the trend has again turned towards decentralisation since the 1990s. Municipalities (and groupings of municipalities) are now represented on the national level by associations (Multee, 2018) and are able to influence local energy-related decisions through urban and land planning, building renovation schemes, etc. (Kuhlmann, 2018, Poupeau, 2014). In Germany, the vertical coordination between the different levels of energy governance is also strong but reflects the federal system of government. Energy-related legislation is decided on the federal level, which sets out a minimum level of ambition for the states ('Länder'), which need to comply but can, and often do, build up on these goals to ensure optimal effectiveness and/or raise the level of ambition. They are, crucially, also involved in drafting legislation on the federal level in the first place, which is uncommon in the EU (Multee , 2016).

In France climate issues fall within the domain of the Ministry for Ecological and Solidary Transition. Its Department of Climate and Energy Efficiency within the Directorate General for Energy and Climate (MEDDE) is responsible for shaping of the domestic climate and energy policy (Ministry for an Ecological and Solidary Transition, 2017). In Germany, responsibility for climate policy lies with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (commonly known as the Federal Ministry for the Environment, BMU), while energy policy, including energy efficiency and renewable energy resources, falls under jurisdiction of the Federal Ministry for Economic Affairs and Energy (BMWi) (IEA, 2013).

An important difference is the structure of the two countries' energy sectors. While the largest share of electricity in France is generated by nuclear power plants (77% in 2015), followed by hydropower, coal, wind and solar power only play a minor role in the energy mix. This is in stark contrast to Germany's continued use of coal-fired plants, plus a much larger share of renewable energy sources.

Given the low-carbon intensity of the French energy sector, a lot of the focus of the LTECV has been placed on other sectors, mainly the building sector. In Germany, a different focus and policies will be necessary to reach the country's emission reduction goals. The prominent role within the LTECV occupied by the reduction in the share of nuclear power is not transferrable to Germany as a complete phaseout of nuclear energy has already been determined, independently of any climate policy considerations. In addition, the French strategy is one of retaining a balance between nuclear energy and intermittent renewable energy sources. A complete phaseout of nuclear power is not planned.

6.2 Properties of the instrument

The Energy Transition for Green Growth Act is less a climate change law and more a law for the long-term energy transition and low-carbon economic growth. It is based on numerous targets, many of which are not targeting GHG emissions explicitly but only indirectly. Given the fact that it consists of a catalogue of measures that are

grounded in a very different point of departure compared to Germany, the extent to which this law provides valuable lessons for Germany is very limited.

Important distinctions can also be made to other national pieces of climate change legislation, for instance the UK's Climate Change Act (CCA), which was one of the earliest comprehensive framework laws with respect to climate change and GHG emissions reduction. It contains strict emissions targets and five-year carbon budgets. An independent advisory board is a key feature of the Act producing an annual progress report about the carbon budgets. Furthermore, the government can be held accountable by parliament for any failure to achieve the targets. The French Energy Transition Green Growth Act (LTECV) is per se not a climate change law, but an Act on Energy Transition implemented through a wide series of action plans and regulations that is legally binding for the public sector. In both countries it is unclear however, if legal mechanisms to enforce the acts (or to punish non-compliance) will hold up under judiciary review. Similar to the CCA, the French government is obligated to present progress reports to parliament. While the LTECV contains detailed plans and policies for the achievement of its energy and emission goals, the CCA specifies the emission targets but leaves the decision on the means to the government. A main difference between both policies is their stance on nuclear energy: its reduction is anchored in the French LTECV but the British CCA does not entail policy proscriptions for nuclear energy management. A more detailed comparison of the efficiency of both acts can only be concluded once the still recent LTECV has undergone its first round of evaluation.

Some of the main lessons to be drawn from the LTECV are of a procedural nature, whereas the structure of the LTECV is not directly transferrable to the German context, given a very different starting point in the energy mix and sectoral distribution of GHG emissions. The process is, however, more comparable to the process undertaken in the formulation of the Klimaschutzplan 2050 (Climate Protection Plan 2050), which included a process of broad participation. The Energy Transition for Green Growth Act followed an extensive public consultation, involving thousands of stakeholders and organised around six issue-specific working groups (Green European Foundation, 2014). This process has been commended by most observers as highly participatory and allowing for different perspectives to be included in the LTECV. Given the short time-frame within which the German climate law is planned to be adopted, a similar process will be difficult to realise. However, public consultations are also conducted for the reviews of the SNBC and PPE and offer important opportunities for contributions from stakeholders. A similar process could be transferred to the German context.

While the target structure around GHG emissions, energy efficiency and renewable energy can serve as a possible model for German climate legislation, a focus only on emission reduction goals such as can be found in the UK Climate Change Act appears to offer a clearer structure. On the other hand, in the absence of a simultaneous target for the reduction of nuclear energy and a consistent increase in renewable energy capacity, this might again favour nuclear energy and not sufficiently support the long-term transition. A set of consistent and mutually supporting targets can, if implemented congruently, facilitate the long-term energy transition. While individual sector targets and policies are not directly transferrable, they indicate an opportunity to integrate the numerous German climate and energy policies at different political levels into a coherent framework. On the other hand, this approach would make a climate law increasingly complex and unclear, as can be seen in the case of the LTECV.

Including both intermediate targets until 2030 and a long-term trajectory to 2050 provides certainty regarding the political direction of travel. Breaking these targets down into five-yearly carbon budgets setting overall emission limits gives a clearer indication and guidance for policy instruments needed to remain within the

budget. This type of structure, which has been widely adopted in national climate change legislation in different countries, can serve as a model for Germany.

Apart from the climate and energy legislative framework established by the LTECV, it includes a comprehensive list of sector-specific measures which makes it in many ways comparable to the German Climate Protection Plan 2050. The main difference being that the latter does not have the same legal anchoring as the LTECV, but both follow the aim of large-scale economic transformation towards an almost carbon-neutral economy by the middle of the century. Besides this long-term target, they outline intermediate milestones and targets, with sector-specific measures covering all economic activities. Both the LTECV and Climate Protection Plan were based on a wide-ranging dialogue and participation process.

Decentralising energy and climate policy fits well with the German federal governance structure. Yet it should be ensured that responsibilities are clearly allocated, allowing for accountability and preventing duplication of efforts. Streamlining the activities and administrative processes at different levels by integrating them under one umbrella framework can constitute a significant improvement in the governance of climate policy. The integration of regional and local planning tools has led to an uptake of climate change as a political issue by many sub-national actors. This, along with the extensive public consultation and enabling processes, facilitates the creation of communities of interest and an ongoing debate between stakeholders (OECD, 2016). While public participation can be a co-benefit of such a governance structure, it should not be the primary goal of climate legislation and should be facilitated in a way that it does not lead to a slowing down of progress given that the transformation towards a low-carbon economy also requires a significant amount of centrally coordination of activities.

Clearer regulation of parliamentary oversight, government reporting obligations and independent assessments by an expert advisory body is a further area that could be improved upon and should occupy a more central role in German climate law. The lack of such provisions in the French Energy Transition Act has been criticised by researchers (Sauer, 2018b).

6.3 Potential impacts

Given the limited institutional lessons that can be transferred to the German case, the potential impacts of a law following the French example are difficult to outline. Establishing legally binding emission limits is the main aspect of a climate law. The French Energy Transition for Green Growth Act extends far beyond this goal and covers a wide range of targets, which are both economy-wide and sector-specific. This aspect makes it quite comparable to the German Klimaschutzplan 2050 (Climate Protection Plan 2050). The impacts of this comprehensive legislation depend on how it is put into action.

Including sub-national authorities in the implementation of a climate law, as was done in the French case, facilitates the tangibility and visibility of climate change mitigation. Along with the extensive dialogue processes both during drafting and adoption of the LTECV and its implementation can serve as an example for similar processes in Germany. This process can foster citizen engagement and public support for action to tackle climate change. It is therefore an option for increasing societal ambition for and buy-in to the fight against climate change. The exact impacts of similar processes in Germany are of course difficult to predict. Aligning societal, economic and political efforts through broad participation can have a positive impact on the effectiveness of climate mitigation activities. Encouraging industry action through disclosure obligations can facilitate investments in low-carbon areas of economic development. By requiring companies and investors to detail their

financial risk related to climate change also raises awareness and establishes it in investors' financial decision-making. While this does not necessarily have a direct effect on GHG emissions, it is an important step towards incorporation of the financial sector in climate policy.

6.4 Conclusions

In contrast to other national climate change legislation such as the UK's Climate Change Act, the French Energy Transition for Green Growth Act can be regarded as piece of legislation comprising all aspects of sustainable economic growth. This extensive scope together with very detailed provisions for implementation at different levels and with different timeframes makes this a highly complex piece of legislation. It is the basis for dozens of strategies, action plans, policy programmes and regulations, all of which interact with each other and involve different actors. It is therefore possible to conclude that the LTECV exhibits a lack of focused core target and governmental procedures which would steer French climate policy.

A similar approach offers the potential to streamline different climate and energy policies as well as administrative processes at different levels. However, the French experience also indicated that this can lead to an overly complex construct of regulations, strategies, policy measures and implementation obligations. This often makes the allocation of responsibilities unclear, leading to lower accountability and possible duplication of efforts. In contrast to a climate framework law, the LTECV includes a catalogue of measures to be taken forward and should therefore be evaluated more as such a catalogue than a legal and institutional structure. The question of transferability therefore includes a political choice regarding the purpose of a German climate law. While some benefits can come with the French approach of detailed policies outlined as part of climate legislation, the model of the UK Climate Change Act offers a clearer institutional and procedural structure, as well as a clear and accountable framework.

The overall impact on emission reductions is difficult to attribute to the LTECV since the objectives and measures of this legislation extend far beyond the scope of climate policy. Emission developments in different sectors of the economy are mainly attributable to specific policies implemented on the basis of the LTECV.

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