This is the accepted manuscript of the article, which has been published
in Hunter, Tina S. et al. (ed) Routledge Handbook of Energy Law.
London: Routledge. ISBN: 978-1-138-32445-9.
http://dx.doi.org/10.4324/9780429450891-40

Energy transitions and the law

Kim Talus and Pami Aalto

What is an energy transition?

At the most basic level, "energy transition" can be understood as a fundamental change to the pre-existing state of the energy system. Usually it is expected that these changes concern large trends taking place at the international or global level, and that the changes are long lasting and also shape the societies in question. This relatively simple notion of energy transitions is not the only possible option. Theoretically driven transition studies refer to "transitions" to entail "far reaching changes to sectors of economy in which new technologies, institutional structures and organizations emerge and existing ones change or decline. Such transitions are referred to as socio-technical transitions".[1] Socio-technical systems which are fundamentally transformed can be viewed as a "network of actors (organizations but also individuals) and institutions, such as societal and technical norms, standards, regulations or user practices as well as material artefacts and knowledge".[2]

Today, the energy world is going through a number of fundamental transitions. The most commonly discussed and examined transition is the transition towards a more sustainable energy system.[3] For energy transitions researchers who focus on this area of transition studies, "Sustainability transitions are long-term transformational process of established industries, socio-technical systems and societies to more sustainable modes of production and consumption."[4] Sustainability transitions or sustainable development can be defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[5] It has a strong environmental aspect built into it ("environmental sustainability"[6]) but it also has an economic and social aspect to it. Also the 1992 Rio Declaration includes these elements: "States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation".[7] In practice, combining these environmental, social and economic aspects of

[1] F. Kern and J. Markard, 'Analysing Energy Transitions: Combining Insights from Transition Studies and International Political Economy'. In: T. Van de Graaf, B. Sovacool, A. Ghosh, F. Kern and M. Klare, *The Palgrave Handbook of the International Political Economy of Energy* (Palgrave 2016), p. 291.
[2] Ibid, p. 293.
[3] 'Energy system' here includes generation, transmission and distribution as well as end-use. Moving to a more sustainable energy system requires changes in all these areas including introduction of renewable energy, energy efficiency measures, adaptation of network regulation and so on.
[4] Transitions network, https://transitionsnetwork.org/about-strn/
[5] 'Our Common Future: Report of the World Commission on Environment and Development' (1987), 41 http://www.un-documents.net/our-common-future.pdf..
[6] Term used for example at UN Environment program at https://www.unenvironment.org/about-un-environment/sustainability/why-sustainability-matters
[7] ''Rio Declaration on Environment and Development' http://www.unep.org/documents.multilingual/default.asp?documentid=78&articleid=1163., Principle 12.

sustainability, often presupposes increased resource efficiency, that is, actions extracting more outputs from a smaller amount of resources.[8]

Such transitions affect all stakeholders, from industries with vested interests, to governmental actors and to end consumers. The impact is of course not symmetric and highly dependent on the actor.[9] The drivers of such transitions also vary. They range from technological breakthroughs and innovations to specific efforts to change through governmental policies and laws that reflect these policies. Also, in reality they are often a combination of these and other influencing factors. For example, the United States (US) shale revolution is primarily credited to the innovative and entrepreneurial spirit of the US energy industry, as well as private ownership of subsoil.[10] It is somewhat underappreciated how the federal government has played a significant role in this "revolution". Among other things, US federal government pursued R&D focusing on energy technologies, which subsequently served the profit interests of the industry and eventually the fiscal interests of the federation. The federal government was directly involved in drilling in the 1970s, introduced tax incentives in the 1980s and research funding in the 1980s and 1990s. This paved the way for two significant technological innovations – horizontal drilling and hydraulic fracturing – which are the bedrock of the shale revolution, enabling the industry to increase productivity and efficiency to control production costs and ultimately, via a combination of bankruptcies and successes in the industry, make large-scale development profitable.[11] In other words, the success story behind the US shale gas revolution, is a combination of industry activities and governmental policies.

This chapter will examine the role of law and policy in creating and facilitating energy transitions. It will examine two areas of energy markets that currently undergo a significant transition: the sustainable energy transition and the liquefied natural gas (LNG) market transition. In both cases, law and policy play a role. For sustainable energy transition this role is that of creator. It is the driving force in the path towards a more sustainable energy system. For LNG, the role of law and policy is that of a facilitator. It supports the increasingly liquid and global LNG markets. The chapter is organized to first provide some background to energy market transitions. It will discuss and show how the energy industry has always been subject to change and has undergone several significant transitions. After this background, the chapter will first examine the transition of the LNG market from local and rigid market to an increasingly liquid and global market. Finally, it will focus on the sustainable energy transition.

Transitions and the energy industry

[8] United Nations Environment Program, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication* (2011), retrieved from: http://web.unep.org/greeneconomy/resources/green-economy-report.

[9] P. Aalto, M. Bilgin and K. Talus, 'How to Manage Energy Transitions? Interests, Frames and the Structuration of Energy Policies in the USA and Germany' (forthcoming), article manuscript under review in an international journal.

[10] Some of these elements have been well discussed in M.-K. Pyhäranta, State ownership of petroleum resources: an obstacle to shale gas development in the UK? 10 (2017) 4 *Journal of World Energy Law and Business*, p. 358–366

[11] O. Anderson, 'Shale Revolution or Evolution: Opportunities and Challenges for Europe', 4 (2013) *Global Business Law Review*, pp. 1-26.

The energy industry has undergone several significant and fundamental transitions. In fact, it is an industry that has transitioned over the decades from local markets to increasingly international markets. While the increase in the gross consumption of hydrocarbon-based fuels is a trend that has continued since the early days of industrialization, a notable change that has taken place over the last decades relates to the relative importance of different fuel types. In the early days of industrialization, the modern economy was largely fueled by coal. This came to an end between the World Wars I and II when oil replaced coal as the primary energy carrier in the world. Similarly, oil industry at its origins was primarily for lighting purposes and local in scope. Only with the automotive industry (and electric lighting) did the oil industry transform into a more significant and international industry.[12]

Today's energy mix is a result of such transitions. The current global energy mix is much more balanced than before, with oil covering 31.9 percent, coal 27.2 percent, natural gas 21.9, renewables 14.0 percent and nuclear power 4.9 percent of the world primary energy demand in 2016.[13] For global electricity generation in 2016, coal still stands for 37 percent of the overall supply, with its share decreasing from 2000 by only two percentage points. The most notable long-term change is, however, the decrease in the share of oil in electricity generation, dropping from 24.8 percent in 1973 to 4 percent in 2016. Its share has largely been replaced by natural gas based production (from 12.1 to 24 percent).[14] The IEA has developed different scenarios for the future development of the world's energy system and its New Policies scenario suggests that by 2040, the world's energy demand is covered almost equally by oil, gas, coal and low-carbon sources (renewables and nuclear power).[15] BP Energy Outlook for 2040 suggests a similar scenario.[16]

As such, while today's energy transitions can, and should, be viewed as revolutionary, they can also be viewed as continuing the long-term change in the industry. Energy industry has never been a stable industry but rather an industry that has always developed and evolved. Given that this is an industry that plays a vital role for the existence of other sectors of the economy and existence of modern societies more generally, it is of paramount importance to understand these transitions and their underlying drivers.

The next section will now focus on the LNG market transition.

Liquefied natural gas market transition

[12] The role of oil for the industrial world has been excellently captured by Daniel Yergin in his, now notorious, book, D. Yergin, *The prize* (New York: Free Press 1991). He illustrates the change from coal to oil in a section discussing how wars where previously fought along the railway lines. This came to an end when the French army deployed the taxi fleet of Paris to move troops to a critical location. The decision to move away from coal to oil in sea transportation and to nationalise what is today BP is also discussed in detail by Yergin.
[13] International Energy Agency [IEA] *World Energy Outlook 2018*, p. 79.
[14] Ibid.; IEA, *Key World Energy Statistics 2017*, available at https://www.iea.org/publications/freepublications/publication/KeyWorld2017.pdf
[15] International Energy Agency [IEA] *World Energy Outlook 2018*, p. 79.
[16] See BP, 'Energy Outlook 2040', (2018), p. 69, available at https://www.bp.com/content/dam/bp-country/de_ch/PDF/Energy-Outlook-2018-edition-Booklet.pdf.

LNG markets are going through a rapid and fundamental transition. Where the previous era for LNG deliveries was marked by point to point sales from an exporting country to an end-destination importing country, todays LNG world looks very different and is rapidly moving towards a liquid global commodity market. The growth of this market in the 2010s has been rapid, not only within the pivotal Asian LNG markets where the traditional pattern witnessed East Asia's emerging economies importing LNG primarily from South East Asia and the Middle East.

Infrastructure development, alongside technological innovation in areas such as floating LNG liquefaction and regasification facilities has allowed for East Asian states to increase their volumes and new countries to join the LNG trade. Japan alone accounts for a third of global LNG imports, followed by China, South Korea and India with roughly a tenth each.[17] Notably, each one of them has during the 2010s sought additional security of supply from Russian LNG, produced in the Sakhalin Island since 2008 and since 2017, also in the Yamal peninsula's Arctic conditions.[18] American and Australian LNG is also entering the Asian markets forcefully. By contrast, in the EU context, for example for Lithuania, interest in introducing competition to pipeline-based deliveries from Russia's Gazprom and responding the perceived weaknesses in the security of supply underpinned the floating LNG regasification terminal completed in 2014. Similar interest in diversifying supply drove the three LNG agreements with US suppliers signed by Poland's PGNiG during the course of 2018; these may eventually lead to the existing agreement with Gazprom to be allowed to expire by 2022.[19] These decisions must be understood in the context of new perceptions of Russian supplies following several conflicts on prices and transit fees between Gazprom and its counterparties in Ukraine and Belarus.[20] Finally, some countries have moved to natural gas or LNG for environmental reasons. Malta is an example that combines environmental interests with infrastructure improvements. A floating LNG regasification terminal allowed the small Mediterranean island to make the investment and move its power production from oil to natural gas based system.

The number of end-destination buyers and sellers have grown significantly: For long-term contract deliveries the markets have moved from six importing countries and three exporting countries in 1971 to 11 importing countries and 12 exporting countries in 2000 and in 2017 markets had reached 40 importing countries and 19 exporting countries.[21] Players in the energy spot market have grown in a similar fashion: from eight importers and six exporting countries

[17] International Gas Union, 2017 World LNG Report. Available at https://www.igu.org/sites/default/files/103419-World_IGU_Report_no%20crops.pdf.
[18] S. Tabata and X. Liu, 'Russia's energy policy in the Far East and East Siberia'. In: Aalto, P. (Ed.), *Russia's Energy Policies: National, interregional and global levels* (Edward Elgar, Cheltenham,UK 2012), pp.156–184; P. Aalto and I. Jaakkola, 'Arctic Energy Policy: Global, International, Transnational and Regional Levels'. In: G. Hønneland and L.C. Jensen (eds) *Handbook of the Politics of the Arctic* (Cheltenham: Edward Elgar 2015), pp. 128-43..
[19] T. DiChristopher, 'Poland's goal of ditching Russian natural gas bolsters American LNG and Trump's energy agenda', CNBC News 19 December 2018, available at https://www.cnbc.com/2018/12/19/polands-goal-of-ditching-russian-gas-yields-opportunity-for-us-lng.html.
[20] M. Balmaceda, 'Russia's Central and Eastern European Energy Transit Corridor: Ukraine and Belarus'. In: Aalto, P. (ed.) *Russia's Energy Policies: National, Interregional and Global Dimensions* (Edward Elgar, Cheltenham 2012).
[21] International Gas Union, 2017 World LNG Report. Available at https://www.igu.org/sites/default/files/103419-World_IGU_Report_no%20crops.pdf.

in 2000 to 33 end markets and 29 exporting countries in 2017, including re-exports, most of which took place in Europe and East Asia. The market share of non-long-term deliveries (meaning spot and short-term contract deliveries) was 30% of all deliveries in 2017.[22] While new long-term contracts are still signed, for new projects in particular, the share of non-long-term deliveries is rising.

New type of players in the markets have also emerged . In addition to the traditional sellers and end-destination buyers, various types of portfolio players have emerged and become increasingly important in the market.[23] Not only do these new players add to the number of buyers and sellers in the market, they also increase liquidity as they can buy large volumes of LNG without necessarily having locked demand for all volumes.[24] Also re-exportation has become more economical with ample available capacities in re-gasification terminals driving down the price of offloading and reloading. Both the growth of trading parties as well as non-user sellers have contributed to the growing liquidity of the markets.

These changes in the markets have not come without changes in the legal frameworks or their application. Similarly, the changes have put pressure on the traditional contracting methods, such as LNG sale and purchase agreements (LNG SPAs).[25] Some of the changes seen in the markets include a shortening of contract duration; more frequent price revisions; moves away from oil price indexation of natural gas prices, and increasing flexibility.

Markets and industry are primarily driving these changes, but for some elements of the transition there is also a regulatory push. This includes, among others, the move away from destination clauses and other diversion clauses, as well as profit-sharing mechanisms. In this area, the efforts by the European Commission (EC) and the Japanese Fair Trade Commission (JFTC) are particularly important. EU competition law investigations by European Commission focusing on various pipeline and LNG contracts and practices in early and mid-2000s,[26] and the more recent antitrust report by the JFTC in 2017 focusing on international LNG trade, have reached partially similar conclusions.[27] While the concerns of EC were primarily related to liquidity of EU internal gas markets, the JFTC focused on free trade in LNG and liquidity of international LNG markets. However, it is possible to see common elements and concerns. Both the EU and Japan are concerned with the impact of cargo

[22] Ibid.
[23] See for example, *LNG Journal*, "Commodities firms continue to increase their volumes of LNG for trading from key producers", https://lngjournal.com/index.php/latest-news-mainmenu-47/item/95821-commodities-firms-continue-to-increase-volumes-of-lng-for-trading-from-key-producers.
[24] Bloomberg, "Tankers Going Nowhere Indicate LNG Market Becoming More Like Oil", https://www.bloomberg.com/amp/news/articles/2018-11-27/tankers-going-nowhere-indicate-lng-market-becoming-more-like-oil?__twitter_impression=true
[25] Generally on these agreements, see R. Maalouf; "International LNG Contracts" *OGEL* 3 (2018), www.ogel.org
[26] An overview of these cases is provided in K. Talus, 'Long-term natural gas contracts and antitrust law in the European Union and the United States', *Journal of World Energy Law and Business* 4 (2011) 3, 1-67. For an analysis of destinations clauses in LNG contracts, see: E. Wäktare, 'Territorial Restrictions and Profit Sharing Mechanisms in the Gas Sector: The Algerian Case' (2007) 3 *Competition Policy Newsletter* 19 and H. Nyssen and I. Osborne, 'Profit splitting Mechanism in a Liberalised Gas Market: The Devil Lies in the Detail' (2005) 1 *Competition Policy Newsletter* 25–30.
[27] Japan Fair Trade Commission, *Survey on LNG Trades* https://www.jftc.go.jp/en/pressreleases/yearly-2017/June/170628.html.

diversion restrictions, which are commonly used in LNG SPAs. These clauses prevent the buyer from redirecting the LNG to alternative delivery destinations.

Historically many LNG SPAs included destination clauses that prevented the buyer from diverting a cargo to any destination (or terminal) other than the original contractual destination (or terminal). Other similar clauses used in both historical contracts and more recent contracts include other types of diversion clauses such as consent clauses, requiring the consent of the seller to any diversion, and profit-sharing clauses, enabling the seller to participate on any additional net profit generated by the buyer at the new destination.[28] With increasing LNG trade and growing liquidity of international LNG markets such traditional clauses have in many cases been viewed as anticompetitive and have the potential to violate various national or regional antitrust laws. Today's practices relating to LNG cargos are moving towards more and more destination flexibility. This development is particularly visible in the US based LNG which does not include destination restrictions. As such, the buyer of US LNG is free to divert the cargo for any reason it may have.

It is obvious that these type of destination restrictions are problematic from the perspective of increasing the liquidity of LNG markets internationally. It is precisely because of this that the antitrust authorities have provided guidance on which type of diversion clauses are to be seen as anticompetitive and thus prohibited and which type of clauses can still be accepted from the antitrust perspective. Furthermore, in order to support the development towards a liquid global LNG trade and to provide clarity and certainty for LNG market participants, a working group supported in the context of an ongoing project initiated by European Commission and Japanese Ministry for Economy, Trade and Industry, created a model diversion clause that can be used as part of LNG SPA's.[29]

As noted above, changes in the market, including increasing liquidity, is primarily due to 'real world' changes, as opposed to changes in the 'legal world'. The role of law in LNG market transformation can be qualified as facilitative. The primary drivers for change have been industry innovation and market economics, while security of supply issues have fueled new demand for increasing import volumes in Asia and Europe in particular. At the same time, for example Vivoda notes how energy security issues are fundamentally complex as they involve several variables and attributes -- in addition to the supply of LNG, also demand side management and conservation, policy measures, efficiency of use, links to the vulnerability of critical infrastructure, technology reliability risks, as well as acceptance issues and environmental externalities, issues areas where for example Asian states vary considerably.[30] Variation among the EU Member States along the different variables of gas supply security is

[28] For an overview of past and present contractual models in LNG projects, see R. Maalouf, "International LNG Contracts", *OGEL* 2018 (www.ogel.org) or in more detail, P. Roberts, *Gas and LNG Sales and Transportation Agreements, Principles and Structure* (Sweet & Maxwell, 5th edn, 2017).
[29] The model diversion clause and guidance note to accompany the model clause are available at: https://www.ogel.org/legal-and-regulatory-detail.asp?key=21040. An academic article explaining the background is available at: https://www.ogel.org/journal-advance-publication-article.asp?key=575.
[30] V. Vivoda, 'Evaluating Energy Security in the Asia-Pacific Region: A Novel Methodological Approach', *Energy Policy* (2010) 38(9): 5258-5263.

also considerable.[31] In a word, law and policy adjust to these changes in innovation, market developments and energy security needs, and further support the developments in the direction required by the evolving energy system and needs of energy policies.

The next section will now focus on the other significant transition: the transition towards a more sustainable energy system.

Sustainable transition towards low carbon energy systems

The transition to a more sustainable power system is primary driven by public sector intervention into energy markets. It is not, or at least primarily, traceable to technological innovation or economic advances as was the case with LNG market transition, but rather to governmental decision-making at national and, very importantly, international level. At the same time, the rapidly decreasing deployment costs of renewable energy, in particular wind power and solar PV technology, has significantly facilitated national and international governance. For example in the USA, the levelized costs of wind power make it close to being competitive with natural gas in many states, while in some solar power is cheaper.[32] In Germany, the levelized costs of renewable power (including $C0_2$ price and investment costs) were already 2015 competitive with those of fossil fuels for newly built power plants.[33]

The basic framework created in order to drive energy systems towards more sustainable direction is international in nature. These frameworks do not always include binding or directly applicable provisions, but rather provide for a general framework for regional or national action. An example is the UN Framework Convention on Climate Change, which provides a wide framework for policy action to mitigate climate change. It has led to a number of important international mechanisms that directly or indirectly support sustainable energy policies. For example, it supports sustainable energy initiatives through the Technology Mechanism,[34] and funding through the Financial Mechanism.[35] A majority of the technical assistance has been energy related,[36] and many of the intended nationally determined contributions in this context have related to renewable energy deployment (feed-in tariffs and investment in renewable generation and grid infrastructure, for example) and energy

[31] F. Proedrou, *EU Energy Security in the Gas Sector: Evolving Dynamics, Policy Dilemmas and Prospects* (Abingdon: Routledge 2012).
[32] T. Covert, M. Greenstone and C.R. Knittel, 'Will we ever stop using fossil fuels?', *Journal of Economic Perspectives*, 2016) 30(1), 117-138, here p. 128.
[33] Agora Energiewend, 'Insights from Germany's Energiewende: State of affairs, trends and challenges' (2015). Available at: https://www.agora-energiewende.de/fileadmin/Projekte/2015/Understanding_the_EW/Key_Insights_Energy_Transition_EN_Stand_7.10.2015_web.pdf, 15 February 2018.
[34] UNFCCC, 'Technology Mechanism' http://unfccc.int/ttclear/templates/render_cms_page?TEM_home.
[35] UNFCCC, 'Climate Finance' http://unfccc.int/cooperation_and_support/financial_mechanism/items/2807.php. See also UNFCCC Decision 3/CP.17, 'Launching the Green Climate Fund, Annex: Governing Instrument for the Green Climate Fund' (15 March 2012) UN Doc FCCC/CP/2011/9/Add.1, paras 37–38.
[36] CTCN, 'Progress Report: January 2014 – August 2015' (2015) < https://www.ctc-n.org/sites/www.ctc-n.org/files/ctnc_progressreport_final.pdf> accessed 1.5.2018, at 26.

efficiency.[37] Similarly to this, the Paris Agreement (COP 21) reinforces international cooperation in this area, including in terms of financial support.[38] Like many other international frameworks, the Paris Agreement is based on recognition of national sovereignty and imposes few binding rules on nation states.

These international frameworks drive national policies. The national policies are in turn implemented in the form of soft and hard law instruments. It is these instruments, hard law in particular, that often drive the transition towards a more sustainable energy law. This section will use as an example the EU measures to transition the energy production system to a more sustainable system. Given that energy transition in this sense is perhaps more central to the energy policy of the EU than for many of its partners and competitors, this choice is logical.

Sustainable transition: European Union as the example

What we need is 'improvements in the implementation of existing legislation, integrating environmental concerns into other policies, encouraging the market to work for the environment, and empowering citizens and changing behavior'.[39] As this quote from the European Commission illustrates, the idea is to persuade citizens to do what is expected of them on a voluntary basis, and if this approach does not work, then they must be compelled to act as required by harder instruments of law. In practice, this is what has largely taken place. After using less formal instruments of persuasion, which are still used in some areas, the Commission has moved to these harder instruments of law. The EU moved from 'voluntary targets' for renewables and biofuels, as set out in the first Directives in this area, to binding targets under the current Directive 2009/28/EC.[40]

The progress to the status quo in the EU has been a result of progressive steps towards the binding targets that exist under Directive 2009/28/EC. As a first step, Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market,[41] set an indicative target of doubling the share of renewables in EU energy consumption from 6% to 12% in 2010. This meant a share for electricity production of 22%.[42] This overall EU target was then translated into national targets. Both targets were related to the EU's Kyoto commitments. To achieve the targets Member States *could* provide for rules giving renewable energy sources priority access to transmission and distribution channels on a

[37] UNFCCC, 'Synthesis Report on the Aggregate Effect of the Intended Nationally Determined Contributions: Note by the Secretariat (30 October 2015) UN Doc FCCC/CP/2015/7, paras. 154-155.
[38]Generally, see Leal-Arcas, R. and Minas R. (2016). Renewable Energy Law. In: Morgera E. and Kulovesi K (eds). Research Handbook in International Law and Natural Resources. Edward Elgar.
[39] European Commission, 'European Climate Change Programme, Report' (June 2001), p. 45/46.
[40] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, *OJ L 140, 5.6.2009, p. 16–62.*
[41] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market, *OJ L 283, 27.10.2001, p. 33–40.*
[42] Article 3 (4) of Directive 2001/77/EC.

mandatory basis, though unlike after the 2009 Renewable Energy Directive[43] this was not mandatory.[44]

Today, the backbone for the current EU climate and renewable energy policy measures is provided by the '20-20-20 by 2020' climate and energy targets set in 2007.[45] For renewable energy, the objective is a legally binding 20% overall share of renewable energy production in the EU by 2020. The '20-20-20 by 2020' objectives also include 20% targets for increasing energy efficiency and reducing greenhouse gas emission which are, however, beyond the scope of the present chapter.[46] The overall objective of a 20% share for renewable energy in the EU by 2020 has been translated into a national renewable energy target for each of the 28 Member States. Unlike the previous EU legal regime for renewable energy,[47] Directive 2009/28/EC[48] (the 'Renewable Energy Directive') also made the national targets binding. For example, the target for Finland is 38% (from a 2005 level of 28.5%) and the French target is 23% (from a 2005 level of 10.3%). These targets can be achieved by using various measures within the country but also through joint projects[49] or "statistical transfers" between Member States. They can even be achieved through cooperation with non-EU countries[50] as long as the electricity is consumed within the EU, under certain conditions, which eliminate the most obvious problems connected with third country cooperation, such as only new installations and no double support. The binding nature of the national targets has resulted in a considerable increase in investment in renewable energy in the EU.[51] However, this trend is not limited to Europe, as investment in this area has increased globally. In most cases, the development can be traced to the regulatory frameworks that enable investments in this area.[52]

For EU, the development has been remarkable. The quantity of renewable energy produced within EU has increased overall by 66.6 % between 2006 and 2016, translating to an average

[43] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (*OJ L 140, 5.6.2009, p. 16).*
[44] Article 7 (1) of Directive 2001/77/EC.
[45] 'Renewable Energy Road Map. Renewable energies in the 21st century: building a more sustainable future' (COM(2006) 848 final), Brussels, 10.1.2007. For analysis, see K. Kulovesi, E. Morgera & M. Muñoz, "Environmental Integration and Multifaceted International Dimensions of EU Law: Unpacking the EU's 2009 Climate and Energy Package", 48 *Common Market Law Review* (2011), 829-891.
[46] These are discussed in S.-L. Penttinen and K. Talus, 'The development of Sustainability Aspects in EU Energy Law', *Research Handbook in Climate Change Mitigation Law* (Edward Elgar 2015). See also A. Johnston & G. Block, *EU Energy Law* (Oxford University Press 2012).
[47] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market (*OJ L 283, 27.10.2001, p. 33).*
[48] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (*OJ L 140, 5.6.2009, p. 16).*
[49] Articles 7 and 8 of Directive 2009/28/EC.
[50] Article 9 of Directive 2009/28/EC.
[51] http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Electricity_generated_from_renewable_energy_sources,_EU-28,_2003%E2%80%9313_YB15.png.
[52] http://www.worldbank.org/en/topic/energy/publication/rise---regulatory-indicators-for-sustainable-energy.

increase of 5.3 % per year.[53] The EU's climate and energy objectives and targets were updated through a Council Decision on 24 October 2014[54] and were included in the Energy Union framework[55] and the 'summer package' adopted in July 2015.[56] As part of efforts made in relation to 'transforming Europe's energy systems',[57] the updates include objectives for the period after 2020. The following goals have been set for 2030 in respect of sustainable development:

- Greenhouse gas emissions to be cut by 40% compared to 1990 levels.
- Renewable energy to constitute at least 27% of overall energy consumption.
- Energy savings of at least 27% compared with the business-as-usual scenario.[58]

Without going into the details of the new objectives, the fact that the new rules on renewable energy involve replacing individual targets for Member States with an EU-wide binding target to raise the share of renewables in the energy mix to at least 27% by 2030 is worth highlighting. It is possible that this decision will have a negative effect on renewable energy deployment in many EU Member States. However, it is also possible that the trend towards more renewable energy created through binding laws and regulations have had their intended impact and sparked development in this area far enough to drive down the price of renewable energy

Similar process has also taken place in relation to energy efficiency.[59] The initial 'soft' instruments included:

- voluntary agreements with industry groups for introducing more energy- or environment-efficient equipment[60] (mainly voluntary agreements between industry sector competitors, often grouped together in an industry association, facilitated by and then formally notified by the Commission[61]);

[53] https://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics#Renewable_energy_produced_in_the_EU_increased_by_two_thirds_in_2006-2016.
[54] See also communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A policy framework for climate and energy in the period from 2020 to 2030, COM/2014/015 final.
[55] See http://ec.europa.eu/priorities/energy-union/index_en.htm.
[56] Commission press release, Transforming Europe's energy system - Commission's energy summer package leads the way (IP 15/5358) Brussels, 15 July 2015.
57 Transforming Europe's energy system - Commission's energy summer package leads the way (IP/15/5358) Brussels, 15 July 2015.
[58] A policy framework for climate and energy in the period from 2020 to 2030 (COM(2014) 15).
[59] For this, see K. Talus, EU Energy Law and Policy – A critical account (OUP 2013).
[60] For example, agreement with the lamp manufacturers to increase the sale of CFLs by 2005; with the car industry on reduction of CO2 emissions., EUC Climate Change Report of June 2001 at p. 46; with the European Automobile manufacturers association, with Japanese and Korean car manufacturers, see: (COM (1999) 4446 final); (COM (1996) 561); (COM (1998) 495 final); EU Green Paper on greenhouse gas emissions trading (COM (2000) 87 final), p. 20-21
[61] "A unilateral commitment of the industry that the Commission takes note of and covers by a corresponding recommendation addressed to industry". See for example para. 32 of the Green Paper on greenhouse gas emissions trading within the European Union (COM/2000/0087 final).

- best practice initiatives aimed at identifying and then spreading environment-efficient innovations;
- efforts to build up 'EU energy/environmental labels' into 'environmental brands' able to attract a consumer following, and
- setting of 'targets' for energy efficiency intended to focus attention on and galvanise efforts to achieve the target.[62]

As is illustrated by using EU renewable energy targets as the example, law and policy has been the primary driver behind the transition towards sustainable energy systems. The initial approach based on soft-law and voluntary targets was subsequently replaced by hard-law and binding targets. This approach has now shown its effectiveness and the EU is on its way to the overall objective of a 20% share for renewable energy in the EU by 2020. The impact on the EU approach, together with various government initiatives around the world, has been remarkable. The volumes of renewable energies coming onstream has been significant. Due to opportunities this has provided for private investments and innovation the prices of renewable energy technologies and cost of generation has declined rapidly and as noted, is now becoming market competitive without any government involvement in the form of subsidy. In this sense, the command-control approach taken has been successful.

That law and policy driven energy transition is taking place at an increasing speed can be well illustrated by referring to the case of northern EU Member State Finland. It features from the outset a somewhat tricky case for a full-scale energy transition despite having 39% of primary energy consumption from renewable sources already in 2015 – mostly consisting of biomass and hydropower.[63] The constraints to the transition include that Finland is highly energy intensive with significant heavy industries in forestry, chemical and metal sectors that together account for some 90% of energy consumption in the industry.[64] The country has relatively cold winter temperatures, is sparsely and unevenly populated while significant industrial clusters are far away situated from the main export ports, paving the way to road and fossil fuel based transport. These features, accompanied by a relatively centralized energy system and an energy industry traditionally geared for satisfying the industrial demand and heating needs in buildings also in peak demand situations, mean significant inertia for ambitious regulation and policy.[65]

Against this background a major turnaround has taken place. The country's 2015 Climate Change Act (609/2015) proceeds from many UNFCCC and EU level commitments. In line

[62] Note in particular the discussion of initiatives in the Commission Report, 'European Climate Change Programme' (June 2001); for an example of Commission initiatives to encourage oil companies to undertake voluntary agreements to refrain in the future from chartering tankers older than 15 years (COM (2000) 603 final), 27 September 2000.
[63] Statistics Finland, 'Energian hankinta ja kulutus 2015'. Available at: https://tilastokeskus.fi/til/ehk/2015/ehk_2015_2016-12-07_fi.pdf, here pp. 28-33.
[64] Työ- ja elinkeinoministeriö [TEM], '100-prosenttisesti uusiutuviin energialähteisiin perustuva energiajärjestelmä: Kansalliseen energia- ja ilmastostrategiaan liittyvä tarkastelu 24.11.2016' (2016). Available at: https://tem.fi/documents/1410877/3570111/100+prosenttia+uusiutuvaa+tarkastelu.pdf/8e4ee341-77c5-4447-b6ce-1f2686a3daec/100+prosenttia+uusiutuvaa+tarkastelu.pdf.pdf, accessed 4 February 2019.
[65] P. Toivanen, P. Lehtonen, P. Aalto, T. Björkqvist, P. Järventausta, S. Kilpeläinen, M. Kojo, F. Mylläri, 'Finland's 2030 energy system as envisioned by expert stakeholders', *Energy Strategy Reviews* (2017) 18: 150-6. (doi: 10.1016/j.esr.2017.09.007).

with the Union's 2011 Energy Roadmap, which seeks to reduce greenhouse gas emissions by 80-95% compared to 1990,[66] the Act sets the target of 80% less emissions by 2050. It is, however, true that for a long time 'merely' complying with UN and EU level regulation and policy was characteristic of Finnish energy policy targets, and this target, too, adopts the minimum of the 80-95% range despite being an ambitious, albeit a very long-term goal. In fact, a lot of domestic policy debate for a long time revolved around the commitment to reaching the EU's 20-20-20 target by 2020. Yet, following the 2015 Paris agreement, and consequent new policy momentum on European and Nordic levels, the Finnish debate decisively turned towards accepting and working on a full-scale energy transition.[67]

To kick-start the transition, the Ministry for Economic Affairs and Employment launched a wide-based working group on smart grids in 2016. The group issued in 2018 several recommendations for new regulation and policies pushing on the agenda of the EU's 2016 winter package by seeking to involve consumers, enable energy communities and corresponding new business models to maintain competitiveness in the context of energy transition.[68] An independent report on the implementation of the Paris targets also found a compelling need for more ambitious targets in renewable energy, energy efficiency and overall emission reduction, and attracted considerable policy attention.[69] In 2018, the Government of Finland made a political commitment for becoming carbon-free by 2045, following a parliamentary agreement, just like Sweden had concluded a similar agreement in 2016 for a 100% carbon neutral society by 2045.[70] The Government of Finland also submitted legislation to the Parliament in October 2018 for phasing out the energy use of coal by 2029 and pledged to halve the energy use of imported oil by 2030. Although the target set for 250,000 electric vehicles and 50,000 gas-fuelled vehicles (including biogas-fuelled) by 2030, and for increasing the share of renewable transport fuels to 40%,[71] do not directly flow from any obligations of EU policies, they respond to the wider policy global and the agenda of EU energy and transport policies after Paris 2015.

The new activism of Finland is not entirely unrelated to the new governance mechanism of the 2016 winter package, whereby Member States submit their national climate and energy policy plans for EU level examination. In other words, whereas previously sovereignty was

[66] European Commission, 'Energy Roadmap 2050', Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions, Brussels, 15.12.2011 COM(2011) 885 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0885&from=EN.

[67] S. Kilpeläinen and P. Aalto, 'Renewable Energy in Finland: from Production-Centric to a Grid-Centric System', P. Midford and E. Moe (eds) *Differential Success: Barriers and Solutions in Renewable Energy Development in Japan, East Asia and Northern Europe*. (2018 forthcoming).

[68] Ibid.

[69] Rocha, Marcia, Sferra, Fabio, Scaeffer, Michiel, Roming, Niklas, Ancygier, Andrzej, Parra, Paola, Cantzler, Jasmin, Coimbra, Alain, Hare, Bill, 'What does the Paris climate agreement mean for Finland and the European Union?' **(**Helsinki: Sitra 2016). Available at: https://www.sitra.fi/en/publications/what-does-paris-climate-agreement-mean-finland-and-european-union/, accessed 4 February 2019.

[70] 'Ramöverenskommelse mellan Socialdemokraterna, Moderaterna, Miljöpartiet de gröna, Centerpartiet och Kristdemokraterna' (2016), available at: https://www.regeringen.se/49cc5b/contentassets/b88f0d28eb0e48e39eb4411de2aabe76/energioverenskommelse-20160610.pdf.

[71] Ministry of Economic Affairs and Employment, 'Government report on the National Energy and Climate Strategy for 2030' (2017), available at: https://tem.fi/documents/1410877/2769658/Government+report+on+the+National+Energy+and+Climate+Strategy+for+2030/0bb2a7be-d3c2-4149-a4c2-78449ceb1976.

highly important for Member States in energy questions, within this system they share more of it than before in order to more effectively implement common policies.

Conclusion

As has been noted in this chapter, energy has always undergone significant transitions. In most cases, these transitions have been driven by the industry and the markets. They are connected with innovation and economics. Such market driven 'real-world' transitions can be rapid and change the industry structures in a very fundamental way. In these occasions, the role of law and policy has been to adapt or support the transition.

Law and policy can also function as the driver for a transition. The best example of this is the ongoing transition to more sustainable energy systems. The difference with primary government driven transitions appears to be the pace. When policy and the reflecting laws change, the world needs to adapt. This adaptation is not obvious and is certainly not rapid. When pre-existing structures need to be altered and vested interests of market participants are in play, this move slowly. In addition to the sustainable energy transition, there are other European examples of administratively driven changes: the introduction of competitive electricity and gas markets did not take place overnight. Instead, the change to decades of efforts from the governmental side. Laws and policies had to be created, altered and adapted.[72]

Both transitions that followed changes in the markets and industry and those that followed from government policies and laws, have pros and cons. Industry driven changes may be impacted by the vested interests of the industry. These and other impacting factors can lead to 'market failures'. But-government driven transitions can lead to 'government failures'. These failures can be traced back to inadequate understanding or markets, to inadequate policies or regulatory frameworks or other similar factors. In both cases, there are risks involved. But despite this, transitions are a *status quo* for the energy world. Global energy adapts and evolves through these transitions. Firms succeed and fail with these transitions, but the industry as a whole moves on.

[72] For this, see K. Talus, EU Energy Law and Policy – A critical account (OUP 2013).