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POLICY DEPARTMENT **A**
ECONOMIC AND SCIENTIFIC POLICY



Economic and Monetary Affairs

Employment and Social Affairs

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Internal Market and Consumer Protection

Review of EU-Third Country Cooperation on Policies Falling within the ITRE Domain in Relation to Brexit

STUDY for the ITRE Committee



DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

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STUDY

Abstract

This study was prepared at the request of the European Parliament's Committee on Industry, Research and Energy (ITRE). It provides a critical assessment of the implications of existing models of cooperation of third countries with the European Union in each of four thematic areas for which the ITRE is responsible (energy, electronic communications, research policy, and small business policy). The relative desirability to the EU of EEA membership, bilateral relationships (as with Switzerland), a new generation Free Trade Agreement (FTA), membership in the Energy Community, or participation in the Horizon 2020 or COSME programmes are considered.

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LIST OF ABBREVIATIONS

- AAL** Ambient Assisted Living
- ACER** Agency for the Cooperation of Energy Regulators
- ARTEMIS** Advanced Research and Technology for Embedded Intelligence and Systems
- BAU** Business as usual
- BEREC** Body of the European Regulators of Electronic Communications
- BBL** Balgzand Bacton Line (gas pipeline UK-Netherlands)
- CEER** Council of European Energy Regulators
- CEF** Connecting Europe Facility
- CH** Switzerland
- CIP** Competitiveness and Innovation Framework Programme
- CO2** Carbon Dioxide
- COSME** EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (SMEs)
- (A,V)DSL** (Asymmetric, Very-high-bit-rate) Digital Subscriber Line
- DSOs** Distribution System Operators
- EDCTP** European & Developing Countries Clinical Trials Partnership
- EE** Energy Efficiency
- EEA** European Economic Area
- EEC** European Economic Community
- EEN** European Enterprise Network
- EFG** Equity Facility for Growth
- EFTA** European Free Trade Association

- EFSI** European Fund for Strategic Investments (“Juncker Investment Plan”)
- EIA** Environmental Impact Assessment
- EIF** European Investment Fund
- EIS** European Innovation Scoreboard (previously IUS, Innovation Union Scoreboard) (Chapter 5)
Entreprise Investment Scheme (Chapter 6)
- EIT** European Institute of Innovation and Technology
- EIP** Entrepreneurship and Innovation Programme
- EICom** Eidgenössischen Elektrizitätskommission (Swiss energy regulator)
- EMRP** European Metrology Research Programme
- EMU** Economic and Monetary Union
- ENIAC** Joint Technology Initiative (JTI) in the field of nanoelectronics
- ENTSO-E** European Network for Transmission System Operators for Electricity
- ENTSOG** European Network for Transmission System Operators for Gas
- ENP** European Neighbourhood Policy
- EPFL** École polytechnique fédérale de Lausanne
- ERA** European Research Area
- ERAC** European Research Area and Innovation Committee
- ERC** European Research Council
- ESIF** European Structural and Investment Funds
- ESD** Effort Sharing Decision
- ETH Zürich** Eidgenössische Technische Hochschule Zürich

- EU** European Union
- EU ETS** European emission trading system
- EURATOM** European Atomic Energy Community
- FCH** Fuel Cells and Hydrogen
- FP** Framework Programme for research of the European Commission
- FTA** Free Trade Agreement
- FTTP** Fibre to the premises
- FTTH** Fibre to the home
- GDP** Gross Domestic Product
- GHG** Greenhouse gas(es)
- H2020** Horizon 2020 (8th Framework Programme for research)
- IEA** International Energy Agency
- IED** Integrated Energy Design
- IMI** Innovative Medicines Initiative
- (I)NDC** (Intended) Nationally Determined Contributions
- IPA** Instrument of Pre-Accession Assistance
- ITER** International Thermonuclear Experimental Reactor
- ITRE** Committee on Industry, Research and Energy
- IUK** Interconnector UK (gas pipeline UK-Belgium)
- JCG** Joint Consultative Group
- JPI** Joint Programming Initiative(s)
- JTI** Joint Technology Initiative(s)
- KICs** Knowledge and Innovation Communities
- LGF** Loan Guarantee Facility

LLU	Local Loop Unbundling
LNG	Liquid natural gas
M(S)CA	Marie (Skłodowska-)Curie Action(s)
MEPs	Members of the European Parliament
MNO	Mobile network operator
MTRs	Mobile call termination rates
MSIP	South Korean Minister of Science, ICT and Future Planning
NCPs	National Contact Points
NEEAP	National Energy Efficiency Action Plan
NERC	National Electricity Regulatory Commission of Ukraine
NIH	National Institutes of Health (United States)
NO	Norway
NordREG	Nordic Energy Regulators
NRA	National Regulatory Authority
NVE	Norwegian Water Resources and Energy Directorate
OECD	Organisation for Economic Co-operation and Development
Ofgem	Office of Gas and Electricity Markets (British energy regulator)
OTS	Ordinance on Telecommunications Services (Switzerland)
PoC	Proof of Concept
PCIs	Projects of Common Interest
PPP	Purchasing power parity (Chapter 3) Public-private partnership (Chapter 5)
R&I	Research and Innovation (previously R&D, Research and Development)

- RCN** Research Council of Norway
- RFEC** Regulatory Framework for Electronic Communications
- RLAH** Roam like at Home
- SICA** Specific International Cooperation Actions
- SME** Small and Medium Enterprise
- SMP** Significant Market Power
- SoS** Security of Supply
- SNSF** Swiss National Science Foundation
- TCA** Telecommunications Act (Switzerland)
- TEU** Treaty on European Union
- TFEU** Treaty on the Functioning of the European Union
- TSOs** Transmission System Operators
- UA** Ukraine
- UCPTE** Union for the Coordination of Production and Transmission of Electricity
- UK** United Kingdom
- WTO** World Trade Organization

EXECUTIVE SUMMARY

Background

The Committee on Industry, Research and Energy (ITRE) of the European Parliament called for this study in light of the UK's Brexit referendum of 23 June 2016 in order to help Members of the European Parliament (MEPs) and the general public understand the possible future relationship between the EU and the withdrawing Member State.

This report provides a critical assessment of the implications of existing models of cooperation between third countries (countries that are not EU Member States) and the European Union. It does not provide recommendations as to what approach to Brexit the Parliament should prefer, but instead seeks to inform those decisions.

The scope of the study corresponds to the thematic areas for which the ITRE Committee of the European Parliament is responsible. For each of the four major thematic areas within ITRE's remit (energy, electronic communications, research policy and small business policy), we take three countries as case studies. These are countries that have some existing form of cooperation with the EU, for instance through the *European Economic Area* and/or the *European Free Trade Area (EFTA)*. For each thematic area, one of the case study countries participates neither in EEA nor in EFTA, but has some other form of cooperation with the Union.

The strengths and weaknesses of existing models of third country cooperation are best understood through comparison with those of an existing EU Member State. To this end, we use the UK itself as the comparator, as it exists today and as it has existed in the recent past (i.e. prior to the Brexit referendum). Covering arrangements with the UK has the additional advantage that it provides useful background to those who must negotiate arrangements with the UK.

Strengths and weaknesses of existing models of cooperation with third countries

For energy and for electronic communications, we have assessed (1) the degree to which policy and regulation are harmonised, (2) the degree to which economic conditions have converged, and (3) the degree to which markets are open in both directions.

On energy we observe that the UK and Norway have largely implemented EU internal energy market rules, while Switzerland and Ukraine have not. All of these partner countries have followed the EU somewhat on climate, renewables, environmental and efficiency policies.

Each of these countries contributes substantially in its own way to the EU's energy system as a producer (Norway, Switzerland), a major market (UK), a transit country (UK, Switzerland, Ukraine), or a provider of flexibility (Norway, Switzerland). However these countries have variable links to EU energy markets.

At the same time, each of these countries has severe bottlenecks in its interconnection arrangements for electricity, gas or both with at least one of its neighbours.

Interconnection arrangements with the Republic of Ireland may require careful attention during the Brexit negotiations, inasmuch as the UK provides the Republic of Ireland's interconnection to continental Europe and to Norway.

Concerning **electronic communications**, EEA membership as exemplified by Norway offers nearly the same advantages as EU membership. Policy and regulation are

extensively harmonised, and are synchronised over time, albeit with a time lag that can be significant. Network operators' prices have converged, facilitating market entry and the offering of cross-border services and roaming.

Coordination with Switzerland by means of bilateral agreements is significantly weaker, inasmuch as regulation of electronic communications is not one of the areas covered by a bilateral agreement. The Swiss National Regulatory Authority (NRA) is fully engaged in EU regulatory discussions, but regulatory policy cannot be said to be harmonised. Moreover, the absence of a review process by the European Commission means that there is no external brake on any tendency for the NRA to be gentle with Swiss network operators, apparently leading to high wholesale payments to Swiss network operators in comparison to those in the EU. This problem is compounded by an implementation in Swiss law where the NRA is empowered to intervene only when a complaint is lodged.

The arrangements with South Korea, which are based on the Free Trade Agreement (FTA) of 2011, have performed well but in fulfilling very different goals. The objective of the "new generation" Free Trade Agreement (FTA) with South Korea is reciprocal market access. Neither regulatory harmonisation nor scale economies were explicit goals; nonetheless, some modest tendency for the South Korean FTA to promote liberalisation and regulatory convergence is visible.

As regards **research policy**, the goals include not only the strengthening of European competitiveness, but also the facilitation of mobility and training for researchers, and the promotion of international connections. Third countries with an *association* agreement with the *Horizon 2020 (H2020)* programme are eligible for funding, and enjoy roughly the same advantages as EU Member States; other third countries, however, are not eligible for funding, except to a very limited degree through *Science and Technology (S&T)* cooperation agreements. The UK is a net beneficiary of EU Framework Programme funding, as is Switzerland. Norway, with only modest research and innovation capabilities, benefits from being an associated country. Switzerland, a leading innovation country, demonstrates the advantages of an associated status even more persuasively. Conversely, the experience of the United States clearly demonstrates the limitations of participation as a third country that does not qualify for an associated status.

The February 2014 referendum where the Swiss effectively called for the introduction of a quota system for foreign workers put these benefits at risk, and led to the suspension of Switzerland's status as an associated third country for H2020 purposes. Swiss participation in H2020 dropped dramatically as a result. The matter was resolved in December 2016.

As regards **small business policy and the COSME programme**, only countries with one of several special relationships with the EU are eligible to participate. For candidate or accession countries such as Turkey, COSME fosters lending to SMEs with the aim of strengthening growth in the economy in order to bring the candidate country closer to the EU's level of development, and also serves to familiarise the country's institutions with the proper and responsible management of EU-provided funds in preparation for their future management of Structural and Investments funds. For EFTA/EEA members such as Iceland, COSME participation can increase the connections between the country's economy (and specifically of SMEs) and the European Single Market, and is thus a natural extension of granting a country access to the Single Market.

Which are the preferable models for the EU?

In all respects, EEA membership is the option that best preserves the benefits to the EU of the UK's EU membership, including scale economies and regulatory harmonisation. It is also the mechanism that best adapts to changes in EU law and regulation over time.

Bilateral arrangements in conjunction with EFTA membership (the Swiss case) is clearly inferior to EEA membership in terms of the degree of consistency achieved, the degree of economic convergence achieved, and the ability to adapt to changes in the EU *acquis*.

Participation in the Energy Community (as with Ukraine) can achieve a good degree of legal harmonisation with the EU *acquis* with regards to energy; however, this harmonisation of rules can be challenging to enforce in practice. The Energy Community makes a positive contribution to stability and security of supply, and to environmental sustainability, but is less effective when it comes to ensuring fair market access for EU firms.

A new generation FTA (as with South Korea) that also addresses regulatory issues in (for instance) electronic communications can provide for reciprocal market access, but it is limited in practice in its ability to drive regulatory convergence.

Participation in the H2020 programme and the COSME programme are somewhat independent of these options. Each offers benefits both to the EU and to the partner country. Indeed, research cooperation potentially benefits all concerned. One must however bear in mind that the EU's relationships with its major trading partners entail elements of both cooperation and of competition. The relative balance of these two with the post-Brexit UK is not yet clear, but has direct implications for the EU's preferred choice of relationship.

1. INTRODUCTION

This study provides a critical assessment of the implications of existing models of cooperation of third countries with the European Union. For purposes of this study, a *third country* is any country which is not a Member State of the European Union.

The Committee on Industry, Research and Energy (ITRE) of the European Parliament called for the study in consequence of the UK's Brexit referendum of 23 June 2016, in order to help Members of the European Parliament (MEPs) and the general public to understand the possible future relationship between the EU and the withdrawing Member State.

This report does not provide recommendations as to what approach to Brexit the Parliament should prefer, but seeks rather to inform that decision by assessing the strengths, weaknesses, and possible applicability to the UK case of various existing models whereby countries that are not EU Member States interact with the EU.

1.1 THE PROCESS TRIGGERED BY THE UK'S REFERENDUM

There has never before been an instance where an entire Member State chose to withdraw from the European Union, but the possibility is foreseen in the treaties that form the legal basis of the European Union.² Pursuant to Article 50 of the *Treaty on European Union (TEU)*,³ "[a]ny Member State may decide to withdraw from the Union in accordance with its own constitutional requirements. A Member State which decides to withdraw shall notify the European Council of its intention. In the light of the guidelines provided by the European Council, the Union shall negotiate and conclude an agreement with that State, setting out the arrangements for its withdrawal, taking account of the framework for its future relationship with the Union. It shall be concluded on behalf of the Union by the Council, acting by a qualified majority, after obtaining the consent of the European Parliament. The Treaties shall cease to apply to the State in question from the date of entry into force of the withdrawal agreement or, failing that, two years after the notification ..."

The respective roles of the European institutions are thus defined in broad terms, and the consent of the European Parliament to the corresponding agreement with the UK is required.

UK Prime Minister Theresa May lodged the notification called for by Article 50 TEU on 29 March 2017.

The European Council adopted negotiating guidelines as envisioned in Article 50 TEU at its meeting of 29 April 2017.⁴

The European Parliament adopted its position as regards the negotiations on 5 April 2017.⁵

The UK has also made its negotiating position known.⁶

² For a summary of the process, see: Eva-Maria Poptcheva (2016), "Article 50 TEU: Withdrawal of a Member State from the EU", February 2016.

³ Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community, 17 December 2007, 2007 O.J. (C 306) 1.

⁴ European Council (2017), Special meeting of the European Council (Art. 50) (29 April 2017) – Guidelines.

⁵ European Parliament (2017), "European Parliament resolution of 5 April 2017 on negotiations with the United Kingdom following its notification that it intends to withdraw from the European Union (2017/2593(RSP))", P8_TA-PROV(2017)0102.

⁶ UK government (2017), "The United Kingdom's exit from and new partnership with the European Union".

1.2 OUR APPROACH TO THE STUDY

The primary focus of this study is on models of cooperation that fall somewhere between the two polar cases of highly engaged EU membership (the status quo) versus having no special relationship with the EU (which is the default outcome if the EU and the UK fail to agree on any model of closer cooperation two years after the triggering of Article 50 TEU).⁷

The scope of the study corresponds to the thematic areas for which the ITRE Committee of the European Parliament is responsible. For each of the four major thematic areas within ITRE's remit (energy, electronic communications, research policy and small business policy), we take three countries as case studies. These are countries that have some existing form of cooperation with the EU, for instance through the *European Economic Area* and/or the *European Free Trade Area (EFTA)*. For each thematic area, one of the case study countries participates neither in EEA nor in EFTA.

The strengths and weaknesses are best understood through comparison to those of an existing EU Member State. To this end, we use the UK itself as the comparator, as it exists today and as it has existed in the recent past (i.e. prior to the Brexit referendum). In doing so, we also provide UK-specific background that may be useful to those conducting the negotiations as regards the thematic areas for which ITRE is responsible.

1.3 OUR METHODOLOGY

Our overall approach to the study consisted of the following elements:

- Building the evidence base:
 - Extensive desk research of the relevant treaty, legislative and regulatory instruments, together with assessment of data and reports that indicate how effective (or otherwise) current arrangements may be.
 - Stakeholder interviews to establish how these cooperative instruments work in practice, and the degree to which they are (or are not) effective.
- Tabulation into tables, by sector and by country, to facilitate cross comparison.
- Formulation of findings and conclusions.

Our desk research covered the key treaty, legislative and regulatory instruments for each of the thematic sectors, and also a range of sectorial data, indicators of the effectiveness of transposition and implementation of EU measures where relevant, and studies and data that bear on the effectiveness of measures where cooperation is relevant.

Interviews served to verify and expand on the results of the desk research, and also to obtain stakeholder perceptions as to the effectiveness of current arrangements. The questions were highly tailored to the subject matter and country to be addressed. A list of interviewees appears in the Annex to this study.

Tabulation of key elements by country and by thematic sector facilitated comparison.

Our findings and conclusions flow directly from the evidence base, and from the tables that were created based on the evidence base. We provide comparisons between countries, and also between thematic areas, so as to identify similarities and differences, strengths and weaknesses.

⁷ The UK would presumably continue to be a WTO member, but this plays no significant role in the analysis in this study.

1.4 Structure of this report

Following this introductory chapter, we provide (in Chapter 1) an overview of two of primary institutional vehicles that are used by countries that seek a close association with the European Union but either do not want or cannot accept EU membership – the European Economic Area (EEA) and the European Free Trade Area (EFTA). These arrangements are not mutually exclusive – three of the four EFTA members are also EEA members.

Chapters 3, 4, 5 and 6 then provide case studies in the thematic areas of energy, electronic communications, research policy, and small business policy, respectively. In each of these chapters, after presenting necessary introductory material, we present (1) an overview of the relevant situation in each of the countries in question, (2) the treaty and legal basis for cooperation with the EU, (3) how each of the countries has structured its overall cooperation with the EU in the thematic area in question, (4) details of how that participation is implemented, and (5) an overall assessment.

Finally, we provide an integrated summary of our findings in Chapter 7.

2. GENERAL MODELS OF PARTICIPATION IN THE EU

KEY FINDINGS

- Norway enjoys access to the European Single Market by virtue of its membership of the European Economic Area (EEA), Switzerland by virtue of numerous EU-Switzerland bilateral agreements. Both are members of the European Free Trade Area (EFTA).
- The February 2014 referendum in which the Swiss effectively called for the introduction of a quota system for foreign workers led to the suspension of several aspects of Switzerland's relationship with the EU, including discussions of energy policy and association with the H2020 programme. This matter is now resolved for the H2020 programme, and discussions of energy policy have resumed.
- In understanding the differences between an EU Member State and an EEA member that is not an EU Member State, the difference between a Regulation and a Directive is of special relevance. A Regulation has direct effect on EU Member States, while a Directive must first be transposed into national law in order to have effect in a Member State.
- There are substantial differences between the EU Member States, and also between EEA members, as regards (1) timeliness of transposition, (2) accuracy of transposition, and (3) correctness of implementation of EU Directives. Moreover, some Directives are more problematic than others.
- In the EEA, Regulations must also be transposed in general, leading to similar concerns.
- For the EEA, new EU acts are continuously assessed for relevance to the EEA, and those that are relevant are systematically transposed so as to maintain consistency across all 31 EEA members. The institutional design embodied in the EEA Agreement was intended not only to achieve an initial harmonisation in the thematic areas covered by the agreement, but also to maintain consistency over time (albeit with a small time lag).
- By contrast, individual bilateral agreements with Switzerland can be revised when necessary, but (in contrast with the EEA) there is no process to systematically ensure overall consistency, internal coherence, or continued relevance on an ongoing basis as EU law and regulation evolve.

There are a number of existing arrangements for third country cooperation with the EU, with significantly different implications for the selected areas (energy, electronic communications, research policy, and COSME programme-related industry issues).

Among the forms of participation (not all of which are relevant to the thematic areas within ITRE's remit) are:

- Membership of the European Economic Area (EEA) and of the European Free Trade Association (EFTA) (i.e. Norway, Iceland and Liechtenstein);
- Bilateral agreements with the EU together with participation in the EFTA (i.e. Switzerland);
- Bilateral agreements together with candidacy for accession to the EU (e.g. Turkey);
- Establishment of a Free Trade Agreement (FTA) (e.g. South Korea);
- Participation in the Energy Community (e.g. Ukraine);

- Relationships with overseas territories (mostly current or former colonies);
- WTO membership; and
- Other bilateral arrangements.

These mechanisms differ substantially in terms of the areas of cooperation, the degree and kind of cooperation, and the means to enforce compliance with obligations.

This section compares and contrasts different forms of third country participation in the European Union and its associated institutions. We discuss membership in the European Economic Area (EEA) in Section 2.1, and membership in the European Free Trade Area (EFTA) in Section 2.2. In Section 2.3, we discuss those forms of participation that are specifically relevant to the thematic areas within ITRE's remit. Finally, we provide a comparative assessment in Section 2.4.

Free trade and other bilateral arrangements are dealt with in the chapters relevant to the functional area with which they are associated, since they are better understood in that specific context.

2.1. Membership in the European Economic Area (EEA)

The European Economic Area (EEA) was initially created to provide an alternate path to some of the benefits of EU membership for countries that for one reason or another had chosen not to become Member States, or that had not yet become Member States.

2.1.1. Objectives

The EEA Agreement is clear in setting out its goals. "The aim of this Agreement of association is to promote a continuous and balanced strengthening of trade and economic relations between the Contracting Parties with equal conditions of competition, and the respect of the same rules, with a view to creating a homogeneous European Economic Area, hereinafter referred to as the EEA."⁸

To achieve those goals, the EEA Agreement is to provide for:

- "the free movement of goods;
- the free movement of persons;
- the free movement of services;
- the free movement of capital;
- the setting up of a system ensuring that competition is not distorted and that the rules thereon are equally respected; as well as
- closer cooperation in other fields, such as research and development, the environment, education and social policy."⁹

The EEA thus addresses directly the four freedoms of free movement, plus a range of supporting instruments, and permits cooperation in areas such as research and development. At the same time, its binding provisions do not concern:

- the common agricultural policy and the common fisheries policy (although the agreement contains provisions on trade in agricultural and fishery products);

⁸ Art. 1 EEA Agreement.

⁹ Art. 2 EEA Agreement.

- the customs union;
- the common trade policy;
- the common foreign and security policy;
- the field of justice and home affairs (although all the EFTA countries are part of the Schengen area); or
- the economic and monetary union (EMU).¹⁰

2.1.2. Treaty and legal considerations

The fundamental treaty basis for the existence of the EEA is set forth in Title V of the *Treaty on the Functioning of the European Union (TFEU)*:¹¹ “The Union may conclude with one or more third countries or international organisations agreements establishing an association involving reciprocal rights and obligations, common action and special procedure.”¹² The specific agreement created under this authority is the EEA Agreement of 1994.¹³

The parties to the EEA Agreement are the EU as a whole, the Member States, and three of the four members of the European Free Trade Association (EFTA): Norway, Iceland, and Liechtenstein. As we explain in Section 2.2. EFTA member (Switzerland) was blocked from ratifying the EEA Agreement by a referendum held on 6 December 1992.

2.1.3 Institutional design

Strategic governance and guidance of the EEA Agreement is the responsibility of the *EEA Council*. The EEA Council is responsible “for giving the political impetus in the implementation of this Agreement and laying down the general guidelines for the EEA Joint Committee”. The EEA Council is comprised of the members of the Council of the European Communities, representatives of the European Commission, and one member representing the government of each of the three signatory EFTA States.¹⁴

It is the *EEA Joint Committee* that has primary responsibility for implementing the EEA Agreement. The EEA Joint Committee meets at least monthly. It is comprised of representatives of the parties to the EEA Agreement: the European Community, the Member States,¹⁵ Iceland, the Principality of Liechtenstein, and the Kingdom of Norway.¹⁶

Not every EU Regulation or Directive is taken on board in the EEA. When the EU enacts a Regulation, a decision must be taken as to whether it is appropriate to the EEA, in which case it could either be added to “the Annexes to this Agreement or [incorporated due to the] decisions of the EEA Joint Committee”.¹⁷ *The Joint Committee thus plays a key role.*

¹⁰ Aydan Bahadır and Fernando Garcés de los Fayos (2016), “The European Economic Area (EEA), Switzerland and the north”, European Parliament, page 2.

¹¹ Consolidated Version of the Treaty on the Functioning of the European Union, 9 May 2008, 2008 O.J. (C 115) 47.

¹² Articles 217 TFEU. See also Art. 218 TFEU.

¹³ Agreement on the European Economic Area (OJ No L 1, 3.1.1994, p. 3; and EFTA States’ official gazettes), as updated on multiple occasions (most recently in 2016).

¹⁴ Arts. 89-91 EEA Agreement.

¹⁵ The EEA Agreement has been updated as new Member States have joined the EU.

¹⁶ Arts. 92-92 EEA Agreement. The Swiss Confederation was deleted from the list of signatories when they declined to ratify the EEA Agreement in consequence of a Swiss referendum held on 6 December 1992.

¹⁷ Art. 7 EEA Agreement.

For EU acts that are to be taken on board through either mechanism, the EEA Agreement stipulates that they “shall be binding upon the Contracting Parties and be, or be made, part of their internal legal order as follows: (a) an act corresponding to an EEC regulation shall as such be made part of the internal legal order of the Contracting Parties; (b) an act corresponding to an EEC directive shall leave to the authorities of the Contracting Parties the choice of form and method of implementation.” This implies that EU Directives must be transposed into national law by the EFTA Contracting Parties, much as is the case among EU Member States (see Section 2.1.). Since the EFTA Contracting Parties are not EU Member States, EU Regulations do not automatically take effect, and consequently also require transposition into national law.

Under the provisions of the EEA Agreement, the EFTA Contracting Parties are not confronted with new EU acts only after they have been enacted. The EEA Agreement envisions a consultation process. “As soon as new legislation is being drawn up by the EC Commission in a field which is governed by this Agreement, the EC Commission shall informally seek advice from experts of the EFTA States in the same way as it seeks advice from experts of the EC Member States for the elaboration of its proposals.”¹⁸

The EEA Agreement also establishes “an independent surveillance authority (*EFTA Surveillance Authority* [emphasis added]) as well as procedures similar to those existing in the Community including procedures for ensuring the fulfilment of obligations under this Agreement and for control of the legality of acts of the EFTA Surveillance Authority regarding competition.”¹⁹ The Surveillance Authority monitors the timeliness and accuracy of the transposition of EU acts.

The EEA Agreement goes on to establish the *EFTA Court* that is similar in structure to the Court of Justice of the European Union (CJEU). The detailed arrangements for the EFTA Surveillance Authority and for the EFTA Court are set forth in an agreement between the EFTA Contracting Parties.²⁰ The Court’s name notwithstanding, its competence is generally limited to matters related to the EEA Agreement. It can deal with alleged infringements, and with disagreements between EFTA countries and the EFTA Surveillance Authority. Within its remit, the EFTA Court has extensive authority.²¹

The EEA Agreement also establishes an *EEA Joint Parliamentary Committee* composed of equal numbers of members of the European Parliament and members of Parliaments of the contracting EFTA countries. The EEA Joint Parliamentary Committee is empowered to express its views in the form of reports or resolutions, but generally serves in an advisory or liaison role without operative responsibility.

¹⁸ Art. 99 EEA Agreement.

¹⁹ Art. 108 EEA Agreement.

²⁰ “Agreement between the EFTA states on the establishment of a surveillance authority and a court of justice” (OJ L 344, 31.1.1994, p. 3; and EFTA States’ official gazettes). See especially Arts. 27 through 41.

²¹ “The EFTA States concerned shall take the necessary measures to comply with the judgments of the EFTA Court.” Agreement between the EFTA states on the establishment of a surveillance authority and a court of justice. Op. cit., Art. 33.

2.1.4 Overall assessment

Since the objective of EEA membership is to provide the EU and the EEA member with many of the benefits of EU membership for third countries that for one reason or another will not or cannot become EU Member States, comparison to EU Member States is the appropriate measure.

In understanding the differences between an EU Member State and an EEA member that is not an EU Member State, the difference between a *Regulation* and a *Directive* is of special relevance. A Regulation has direct effect on European Member States, while a Directive must first be *transposed* into national law in order to have effect.²²

The time frame in which a Directive must be transposed into national law is generally specified in the text of the Directive itself. Transposition is not always accomplished within the specified time frame. Timeliness of transposition can be more problematic with some Directives than with others – for example, transposition of the Cost Reduction Directive²³ was delayed in nearly all Member States, leading the Commission to open infringement proceedings on 23 March 2016 against 24 of the 28 Member States.²⁴

Timeliness of transposition also varies substantially from one Member State to the next. The Commission's stated goal has historically been the timely transposition of 99% of all Directives, with a goal to further improve this to 99, 5% over time.²⁵ As of 2015, five Member States (BE, LU, PL, RO, and SI) did not achieve the 99% goal, expressed here in terms of achieving less than 1% delayed transposition (see Figure 1).

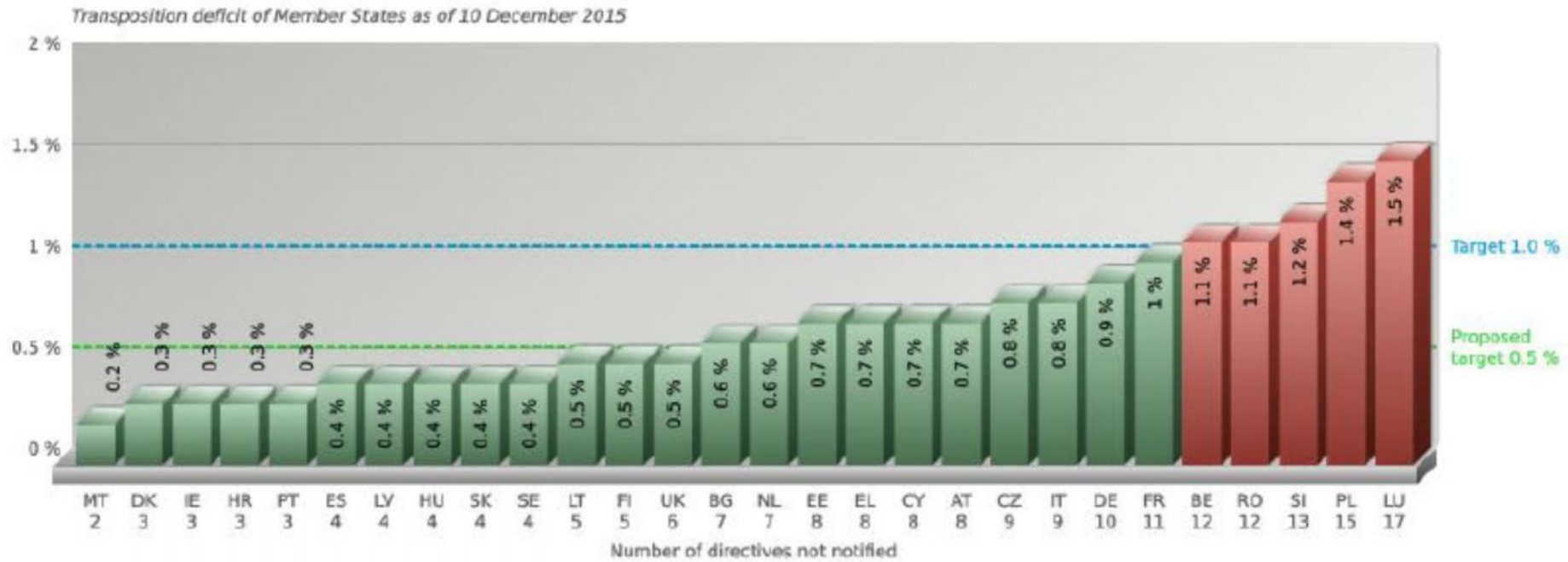
²² Art. 288 TFEU. "A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States. A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods."

²³ Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks.

²⁴ European Commission (2016), database at https://ec.europa.eu/info/law_en, viewed 24 July 2016.

²⁵ European Commission (2011), "Single Market Act: Twelve levers to boost growth and strengthen confidence: Working together to create new growth", COM(2011) 206 final, page 21.

Figure 1. Transposition deficit among the Member States as of 10 May 2015.



Source: European Commission (2016), Single Market Scoreboard: Performance per governance tool: Transposition (Reporting period: 05/2015 - 12/2015)²⁶

²⁶ These figures relate only to Directives that have direct relevance to the Single Market (Art. 26 and Art. 114(1) TFEU), including those that relate to the freedom of movement of persons, goods, services or capital, or to supporting policies such as taxation, employment, social policy, education, culture, public health, energy, transport, environment (except for preservation of nature), information society and media.

That a Directive has been transposed does not necessarily mean that it has been *correctly* transposed. Further, even if the transposition into national law is nominally correct, the *implementation* at Member State level may be flawed. Commission infringement proceedings are not unusual. Once again, the Commission has stated its goal that it should not need to file infringement proceedings due to flawed transposition or implementation of Directives for more than 0, 5% of all Directives.²⁷ The current EU average for infringement cases based on flawed transposition stood at just 0, 7%, which is above the desired range. Further, 24 infringement proceedings were open against Poland, representing 2.2% of all “single market” Directives.²⁸

The institutional design described in Section 2.1.2 is intended not only to achieve an initial harmonisation in the thematic areas covered by the EEA Agreement, but also to maintain consistency over time (albeit with a small time lag). The required date of transposition in the EEA will generally be later than that in the EU due to assessment process undertaken by the EEA Joint Committee (see Section 2.1.2).

As of 2015, Norway, Liechtenstein and Iceland achieved timely transposition of Directives with relevance to the Single Market in 100%, 98.8%, and 98, 2% of all cases, respectively.²⁹

For EEA members, transposition is required not only for Directives, but also for Regulations. Of the 2.526 Regulations in force in the EFTA States on 30 November 2016, 65 had not yet been transposed by Iceland, while only 5 had not yet been transposed by Norway.³⁰

Of the 172 pending infringement cases in the EEA, “62 concerned the incorrect implementation or application of Internal Market rules ..., whereas 24 cases concerned the late transposition of directives ... The remaining 86 cases concerned the late transposition of regulations” (see Figure 2).³¹

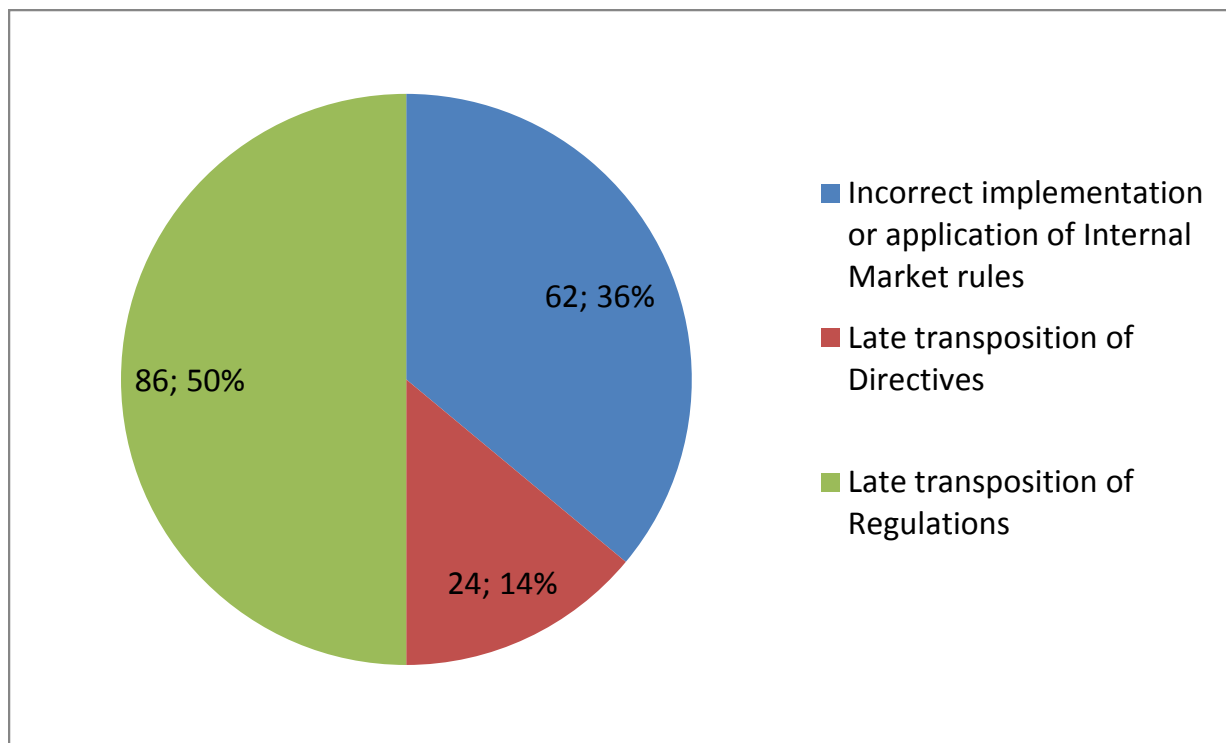
²⁷ European Commission (2011), “Single Market Act: Twelve levers to boost growth and strengthen confidence: Working together to create new growth”, COM(2011) 206 final, page 21.

²⁸ European Commission (2016), Single Market Scoreboard: Performance per governance tool: Transposition (Reporting period: 05/2015 - 12/2015. Again, these figures relate only to Directives that have direct relevance to the Single Market (Art. 26 and Art. 114(1) TFEU), including those that relate to the freedom of movement of persons, goods, services or capital, or to supporting policies such as taxation, employment, social policy, education, culture, public health, energy, transport, environment (except for preservation of nature), information society and media.

²⁹ European Commission (2016), Single Market Scoreboard: Performance per governance tool: Transposition (Reporting period: 05/2015 - 12/2015. Again, these figures relate only to Directives that have direct relevance to the Single Market (Art. 26 and Art. 114(1) TFEU), including those that relate to the freedom of movement of persons, goods, services or capital, or to supporting policies such as taxation, employment, social policy, education, culture, public health, energy, transport, environment (except for preservation of nature), information society and media.

³⁰ EFTA Surveillance Authority (2017), “Internal Market Scoreboard No. 39: EEA EFTA States of the European Economic Area”, January 2017

³¹ EFTA Surveillance Authority (2017), “Internal Market Scoreboard No. 39: EEA EFTA States of the European Economic Area”, January 2017, page 7.

Figure 2. Causes of pending infringement cases in EEA members, December 2016.

Source: EFTA Surveillance Authority (2017), "Internal Market Scoreboard No. 39: EEA EFTA States of the European Economic Area", Bruegel calculations³²

2.2. Membership in the EFTA

The European Free Trade Area (EFTA) was founded by the Stockholm Convention of 4 January 1960.³³ The immediate aim at the time, as EFTA notes, was "to provide a framework for the liberalisation of trade in goods amongst its Member States. At the same time, EFTA was established as an economic counterbalance to the more politically driven European Economic Community (EEC)."³⁴

Its membership and its functions have continuously evolved. The original signatories were Austria, Denmark, Norway, Portugal, Sweden, Switzerland and the United Kingdom. Finland joined in 1961, Iceland in 1970, and Liechtenstein in 1991.

Many of the original functions of the EFTA were effectively subsumed by the European Union as the United Kingdom and Denmark left the EFTA and joined the EU in 1973, Portugal in 1986, and Austria, Finland and Sweden in 1995.

One could also say that many of the EFTA's functions were subsumed by the EEA. At the same time, the EFTA plays a central role in administering the EEA through the EFTA Surveillance Authority and the EFTA Court (see Section 2.1.3).

³² Page 7.

³³ Convention establishing the European Free Trade Association, consolidated version, last amended on 1 July 2013 (hereinafter the *EFTA Convention*).

³⁴ EFTA, "The European Free Trade Association", <http://www.efta.int/about-efta/european-free-trade-association>, viewed 21 April 2017.

At the time at which the EEA was formed, only Norway, Iceland, Liechtenstein, and Switzerland remained in the EFTA. All four signed the EEA Agreement, but Swiss voters rejected ratification in a referendum held on 6 December 1992.

Switzerland is thus the only EFTA member that is not also an EEA member. Since EEA aspects have already been addressed in Section 2.1., our prime focus in this section will be on Switzerland as a distinct model of third country cooperation with the EU.

The EFTA views its role today as comprising (1) management and oversight of the EFTA Convention, which forms the legal basis of the EFTA and governs free trade relations between the EFTA States; (2) EFTA's worldwide network of free trade and partnership agreements; and (3) oversight of the European Economic Area (EEA) Agreement.

The free trade aspects of the EFTA are noteworthy. From the outset, each EFTA member was free to establish its individual customs duties against, or its individual free trade agreements with, non-EFTA countries. At the same, there was a coordinated policy to collectively negotiate Free Trade Agreements (FTAs) with global and European partners. Many of the European agreements have been subsumed by the EEA memberships of three of the four EFTA countries, and by Switzerland's bilateral relationships with the EU. The global FTAs are however highly relevant. EFTA States currently have 27 FTAs in place covering 38 countries.³⁵

As far as arrangements with Switzerland, the EFTA as such plays hardly any role. It is the bilateral agreements with Switzerland that are important in enabling Swiss integration and participation in the European Single Market, not Switzerland's EFTA membership.

2.2.1. Objectives

The stated objectives³⁶ of the EFTA are:

- to promote a continued and balanced strengthening of trade and economic relations between the Member States with fair conditions of competition, and the respect of equivalent rules, within the area of the Association;
- the free trade in goods;
- to progressively liberalise the free movement of persons;
- the progressive liberalisation of trade in services and of investment;
- to provide fair conditions of competition affecting trade between the Member States;
- to open the public procurement markets of the Member States;
- to provide appropriate protection of intellectual property rights, in accordance with the highest international standards.

It is noteworthy that these objectives do not go quite as far as the four freedoms of the European Union. Free trade in goods is an explicit objective,³⁷ but as regards free movement of persons, and trade in services and of investment, the goal is more modestly expressed in terms of "progressive liberalisation". In many respects, the EFTA was envisioned as a somewhat looser partnership than that of the European Union.

³⁵ EFTA, Free Trade Agreements, <http://www.efta.int/free-trade/free-trade-agreements>, viewed 21 April 2017.

³⁶ Art. 2 EFTA Convention.

³⁷ See also Art. 3 EFTA Convention. "Customs duties on imports and exports, and any charges having equivalent effect, shall be prohibited between the Member States."

2.2.2. Treaty and legislative considerations

As previously noted, the European Free Trade Area (EFTA) was founded by the Stockholm Convention of 4 January 1960. The Convention has subsequently been amended many times.³⁸

Arrangements with the EEA have already been covered in Section 2.1., and will not be further discussed here.

Swiss access to the European single market has been assured to date through 82 bilateral agreements dated 1956 through 2016.³⁹ These cover many of the thematic areas addressed in this study, including energy and environment (Chapter 3), and research cooperation through Horizon 2020 (Chapter 5). At the same time, the coverage is uneven. Switzerland does not participate in the COSME programme (Chapter 6). Switzerland is in constant dialogue with the European Union, but is not covered by the Regulatory Framework for Electronic Communications (Chapter 4).

2.2.3. Institutional design

The EFTA Council is the highest governing body of EFTA, where the four EFTA States meet at ambassadorial or ministerial level. Decisions are taken by consensus.⁴⁰

The Chairmanship of the EFTA rotates every six months among the four EFTA Member States.

The EFTA has a staff, the EFTA Secretariat, most or all of whom are on three year contracts.⁴¹

The EFTA Surveillance Authority and the EFTA Court have already been covered in Section 2.1.3, and will not be further addressed here.

2.2.4. Overall assessment

In comparison with the arrangements with the EEA, the bilateral arrangements with Switzerland appear to be static and rather inflexible.

For the EEA, new EU acts are continuously assessed for relevance to the EEA. Those that are relevant are systematically transposed so as to maintain consistency across all 31 EEA members.

Individual bilateral agreements with Switzerland can be revised when necessary, but there is no process to systematically ensure overall consistency, internal coherence, or continued relevance on an ongoing basis as EU law and regulation evolve.

2.3. Other forms of cooperation with third countries

There are many other forms of cooperation, some of which are specific to particular sectors or thematic areas. These different forms of association have very different characteristics in terms of how they function, and of who is permitted to participate.

Several forms of cooperation beyond EU, EEA, and EFTA membership that have been considered in this study:

³⁸ Convention establishing the European Free Trade Association, consolidated version, last amended on 1 July 2013 (hereinafter the *EFTA Convention*).

³⁹ For a list of treaties, search for "Switzerland" at (viewed 21 April 2017): <http://ec.europa.eu/world/agreements/searchByCountryAndContinent.do?id=4&letter=S&countryFlag=treaties>.

⁴⁰ EFTA, "Frequently asked questions on EFTA and the EEA", <http://www.efta.int/faq>, viewed 21 April 2017.

⁴¹ EFTA, "Managing the EFTA Secretariat", <http://www.efta.int/about-efta/the-efta-secretariat>.

- Membership in the EEA clearly represents close integration with the European Union, together with inclusion in the internal market.
- The bilateral relationships between Switzerland and the EU provide a degree of integration with the EU and inclusion in the internal market that is less than that provided by EU or EEA membership, but greater than that provided by the other forms of cooperation considered in this study.
- New generation Free Trade Agreements (FTAs) such as those with Korea (see Chapter 4) and Canada can promote trade and a degree of regulatory harmonisation, but their primary function is reciprocal market access. They represent a looser form of association than EEA membership.
- The Energy Community seeks to extend the EU internal energy market to Southeast Europe and beyond. Members are committed to implement the relevant EU energy *acquis communautaire*, to develop an adequate regulatory framework, and to liberalise their energy markets in line with the *acquis* under the Treaty.
- Participation in Horizon 2020 joint research projects (including funding) is open not only to EU Member States, but also (under suitable conditions) to EFTA members, candidate or accession countries, countries with which research agreements exist, and to some 130 developing countries (see Section 5.3). Participation without funding is open in principle to all countries.
- Participation in the COSME programme (see Chapter 6), which seeks to strengthen the competitiveness of small and medium enterprises (SMEs), is open to EEA members, candidate or accession countries, or countries falling within the scope of the European Neighbourhood Policies (ENPs). Participation in COSME has not been available to global trading partners and competitors such as the United States.

2.4. Comparative assessment

EU membership, EEA membership, and the Swiss case (where bilateral agreements between Switzerland and the EU drive scale economies and harmonisation rather than Switzerland's EFTA membership) provide different degrees of integration with correspondingly different degrees of harmonisation of law and regulation, and different advantages and disadvantages for the countries concerned (see Table 2).

Other forms of cooperation are not dealt with here, but rather in the chapters that address the thematic areas to which they are relevant.

Table 1. Implications of different forms of association with the EU in terms of harmonisation.

	EU Membership	EEA Membership	Bilateral agreements (EFTA Membership)
Scope of implementation of EU acts	All EU legislation must be implemented.	Relevant EU legislation must be implemented, but delays in transposition are possible.	Bilateral arrangements harmonise some aspects.
Process for accommodating new EU acts	Regulations have direct effect, Directives must be transposed.	Regulations and Directives must be transposed, often with delay.	New bilateral arrangements could be put in place.

Source: Bruegel

Table 2. Advantages of different forms of close association.

	EU Membership	EEA Membership	Bilateral agreements (EFTA Membership)
What are advantages for the EU?	Scale economies, gains in societal welfare, consistency and simplicity of administration.	Scale economies, gains in societal welfare, limited simplification of administration.	Scale economies, gains in societal welfare.
What are advantages for the partner country?	Access to the EU single market, ability to influence policy, at some sacrifice of autonomy.	Access to the EU single market, limited ability to influence policy, at some sacrifice of autonomy.	Access to the EU single market, limited sacrifice of autonomy.

Source: Bruegel

3. ENERGY

KEY FINDINGS

- Arrangements differ substantially between the pre-Brexit UK, Norway (NO) as a model EEA member, Switzerland (CH) as a country that has tried to organise its energy relations with the EU through bilateral agreements, and Ukraine (UA) as a country whose energy relations with the EU are largely based on its membership in the Energy Community. Benefits flow in both directions.
- Each of these four countries contributes substantially in its own way to the EU's energy system as a producer (NO, CH), a major market (UK), a transit country (UK, UA, CH) or a provider of flexibility (CH, NO).
- Each of the four countries benefits from the EU's energy system as an export market (NO, CH), a transit system (UK, CH), or a flexible supplier (CH, UK, UA, NO).
- All four countries demonstrate more or less severe infrastructure bottlenecks towards neighbouring EU countries. For CH, limited electricity connections with Italy; for NO limited electricity connections with the Continent; for UA, limited electricity connections with the EU; and for the UK, a limited (or a total lack of) electricity and gas connections with all potential trading partners (NO, IE, BE, FR, NL, and ES) limit energy flows.
- The energy transition will reshape the roles of individual countries in Europe's energy system. The transition is likely to increase the benefits of market integration. Planned infrastructure projects (especially between the UK and the Continent) indicate a desire to increase cross-border energy exchanges.
- NO, the UK and UA have largely implemented EU internal energy market rules, while CH has partially imitated EU rules. Due to structural issues in UA and NO, only the UK can actually be considered to be a part of the internal energy market. EU electricity and gas companies are dominant in the UK, but have only very limited activities on the CH, NO and UA markets. At the same time, companies from NO, CH and the UK have some activities in the EU market.
- The three partner countries have somewhat followed the EU on climate, renewables, environmental and efficiency policies. NO has the highest targets for renewables, energy efficiency and emissions reduction, while UA has the lowest. CH and UK sit in between, with CH being more ambitious in terms of renewables and energy efficiency targets.
- In terms of security of supply, the high-level obligations on solidarity in the EU Treaty (UK) and on mutual assistance in the Energy Community Treaty (UA) have not yet been tested. For CH and NO, no such obligations exist. Despite a lack of clearly defined mechanisms, countries and companies are likely to work together across borders in an energy crisis, especially if it affects only one of the countries.

In this chapter, we discuss models of third country⁴² cooperation in the area of energy and environment. The pre-Brexit **UK** serves as a benchmark for comparison, and also enables us to provide possibly useful background to those who must negotiate Brexit arrangements.

We analyse arrangements in **Norway** as an example of an EEA member, **Switzerland** as a country that has many bilateral agreement with the EU and happens to be an EFTA member, and **Ukraine** as a member of the Energy Community (see 3.3.1.4).

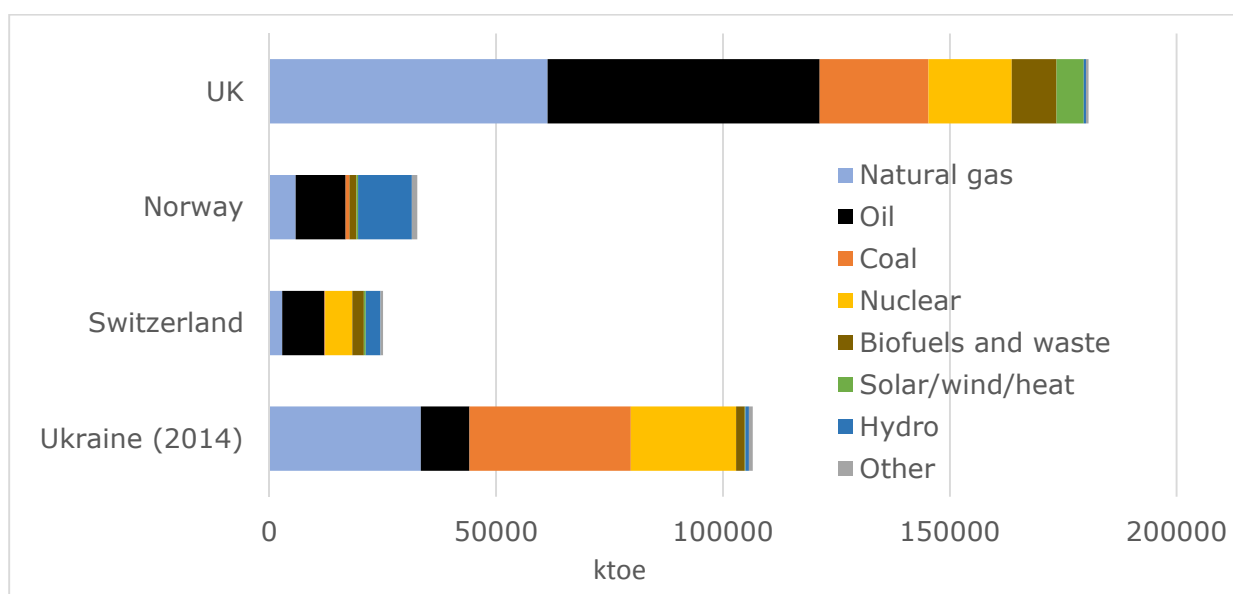
⁴² Here and throughout, a third country is any country that is not an EU Member State.

3.1. Market and industry structure for the countries under consideration

This section describes the energy markets of the four countries and how they are physically integrated with the EU energy market. This is essential in order to understand the benefits each side (the EU versus a third country) can expect from cooperation.

The energy markets of the UK, Norway, Switzerland, and Ukraine are profoundly different (see Figure 3). Natural gas is a major energy source in the UK, Norway and Ukraine, but not in Switzerland. Oil plays an important role in the UK, Norway and Switzerland, but not in Ukraine. Coal is used extensively in Ukraine, but hardly at all in Switzerland and Norway. Norway is the only country of the four that does not use nuclear energy, and together with Switzerland it stands out by featuring a significant share of hydro-power. Only the UK has a noticeable share of variable renewables (i.e. wind and solar).

Figure 3. Energy mix: total primary energy supply, 2015 (ktoe).



Source: International Energy Agency, accessed in April 2017.

The CO₂ emissions relative to GDP of the four countries are also very different (see Table 3, with Switzerland standing as the best performer in the area, followed by Norway, the UK and Ukraine.⁴³

⁴³ The emission profiles of the four countries are very different, but the sectoral peculiarities somewhat cancel out so that the per capita emissions are relatively close to the EU average. The low emissions in electricity production in Norway are offset by the substantial emissions from oil and gas extraction. The high emissions in the coal based electricity sector in Ukraine are somewhat compensated by the much lower standard of living in the country. In this respect, Switzerland with its clean energy mix and very high standard of living is a mirror-image of Ukraine. Finally, the UK emissions are also close to the EU average, with the above-average standard of living and oil and gas extraction being compensated by a relatively small energy-intensive industry and a not too dirty fuel mix.

Table 3. CO₂ emissions, per capita and per GDP PPP (2014).

	CO ₂ emissions (Mt of CO ₂)	CO ₂ /population (t CO ₂ /capita)	CO ₂ /GDP PPP (kg CO ₂ /2010 USD)
UK	407,8	6,3	0,17
Norway	35,3	6,9	0,11
Switzerland	37,7	4,6	0,09
Ukraine	236,5	5,2	0,68

Source: International Energy Agency, accessed in April 2017.

The energy mixes of the countries are largely driven by the available supply. Both the UK and Norway benefit from oil and gas production in the North Sea. Where Norway is a major oil and gas exporter, the UK is a net importer. Furthermore, the UK is set to become more reliant on imports over time due to rapidly depleting domestic resources. Ukraine also produces some oil and gas domestically, but for the time being it remains a net importer of both fuels. The two hydro-power countries (Switzerland and Norway) not only benefit from exporting this clean energy, but also benefit from the ability to store energy when electricity is cheap. This partly explains the over-proportionate amounts of electricity imports and exports.

Figure 4. Energy imports, exports and balances, 2015 (ktoe)

Source: International Energy Agency, accessed in April 2017.

All four countries have electricity, gas and oil interconnectors with one or more EU Member States.

Even though the **UK** is separated by the English Channel from continental Europe, it is connected through sub-sea electricity and gas interconnectors with the Republic of Ireland, the Continent, and Norway – but compared to the size of its market, it is more isolated than the other three countries. In addition, the Louth-Tandragee electricity interconnector (~1500 MW) and the South-North gas Pipeline (~70 GWh/d) (together with some smaller local border crossings) connect Northern Ireland with the Republic of Ireland. In addition, the UK hosts the second-largest liquefied natural gas (LNG) terminal capacity in the EU, which allows it to serve as an entry point for LNG into the EU market. In the next five years, electricity interconnectors that are already contracted are expected to triple the UK's cross-border capacity.⁴⁴ An additional 10 GW of capacity connecting the UK to the Republic of Ireland are under consideration. Together, these capacity expansions would not only allow the UK to rely on non-UK supplies in times of domestic generation scarcity, but would also make the UK a hub for electricity exchanges between the Continent, the Republic of Ireland, and Scandinavia.

The European Commission has engaged in almost 200 key energy infrastructure projects to help create an integrated EU energy market. These projects are known as *Projects of Common Interest (PCIs)*. Whether the UK participates in PCIs is largely independent of whether the UK is an EU Member State or not; moreover, the level of funding is relatively small. The most tangible advantage to the UK would be access to the *Connecting Europe Facility (CEF)*, which annually disburses about € 800 million to enlisted electricity and gas network projects in the 28 Member States and beyond, which is to say that the individual funding is very small compared to the sums typically involved in these infrastructure investments. Furthermore, all existing UK PCIs might justifiably qualify to receive funding even if the UK were no longer a member of the EU. If an energy infrastructure project promotes the energy interests of the EU, non-EU countries can host PCIs as well. Thus, multiple PCIs are currently in progress in Norway (2), Switzerland (5), Ukraine (1) and the UK (17),⁴⁵ and connections between European and non-European countries such as Israel and Algeria are also on the list.

As a large oil and gas producer, **Norway** has numerous oil and gas export pipelines connected to continental Europe. Its electricity system is synchronised with its Nordic neighbours, and at the same time its subsea direct current cables to the Netherlands and Denmark enable exchange of electricity with these non-synchronised areas. In the coming years, the NSN-cable between Norway and England (1400 MW), the NordLink-cable between Norway and Germany (1400 MW) and the NorthConnect between Norway and Scotland (1400 MW) would more than double Norway's subsea-connections (currently 2400 MW) with the rest of Europe. Norway benefits not only from exporting electricity and storing electricity, but also from being able to rely on electricity imports from its neighbours when hydro-power becomes scarce in dry years.

Switzerland, being geographically located at the centre of the EU, serves as an important transit country for gas and electricity, in particular connecting Italy to central Europe. Switzerland's electricity system is synchronised with that of its neighbours, allowing it to

⁴⁴ According to Chatham House (Chatham House, 2017, *Staying Connected*:

Key Elements for UK–EU27 Energy Cooperation After Brexit:

<https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2017-05-10-staying-connected-energy-cooperation-brexite-froggatt-wright-lockwood.pdf>, p.17) the contracted connections are:

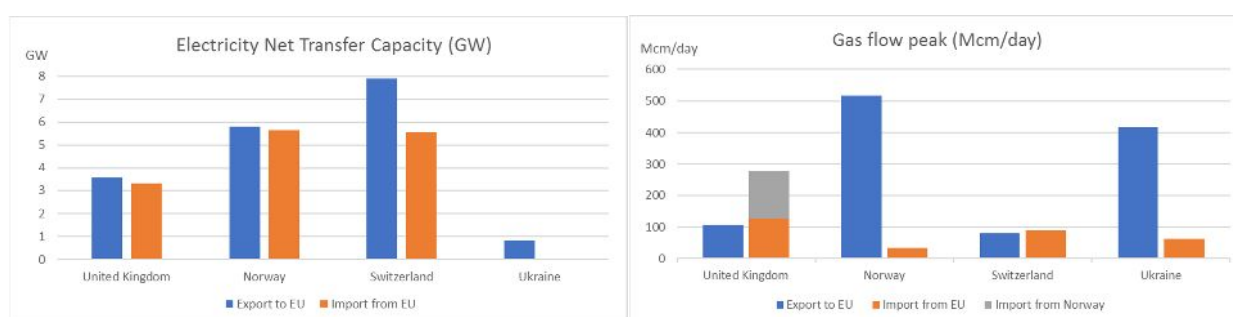
ElecLink with France (1,000 MW), Nemo with Belgium (1000 MW), NSN with Norway (1400 MW), IFA-2 with France (1000 MW), FABLink with France (1400 MW), Aquind with France (2000 MW), Viking Link with Denmark (1000MW), NorthConnect with Norway (1400MW)

⁴⁵ The number of PCIs appears in parentheses. The PCI connecting Norway and the UK is counted for each country.

exchange electricity in all directions. Due to commercial restrictions (long-term contracts on important Swiss-French capacities) and physical limitations (especially on the border-points with Italy) Switzerland remains a bottleneck for electricity transmission. As bottleneck capacities often imply different electricity prices on both sides of the border, Switzerland currently benefits from using or selling this capacity. Given that Switzerland plans to phase out nuclear, and the country might hence have to rely more on cross-border flows, Switzerland seems prepared to increase international capacities.

Ukraine is a major transit country for Russian gas to the EU. At the same time, Ukraine also uses a recently-built gas interconnector with Slovakia⁴⁶ to import gas from the EU. In terms of electricity, Ukraine has strong legacy interconnections with Hungary, Slovakia and Poland. But exchange is technically very limited as only a small part of Ukraine (the so called Burshtyn Island) is synchronised with the continental European electricity system.⁴⁷ This might, however, change in the future, as full synchronization of Ukraine is currently under evaluation.

Figure 5. Electricity (GW) and gas (Mcm/day) infrastructure capacities.



Source: ENTSO-E and ENTSOG, accessed in April 2017.

Note: electricity capacity is the annual Net Transfer Capacity (NTC) to and from the EU (in GW). Gas capacity is the maximum daily gas flow to and from the EU (in Mcm/day). The UK-EU capacities presented exclude connections between the Republic of Ireland and Northern Ireland (electricity: ~1.5 GW; no gas flows according to ENTSOG).

To conclude, each of four countries contributes to the EU energy sector in its own way. The UK provides substantial LNG import capacity and indirectly connects the Republic of Ireland to the EU market. Norway is an important supplier of oil, gas and flexible electricity. Switzerland also provides flexible electricity and serves as a major transit country. Ukraine provides transit and storage services for Russian gas destined for use in the EU.

The energy system of each of the four countries also benefit from the EU. Norway benefits from access to a predictable market for its energy exports.

Switzerland profits from selling electricity transmission capacity and monetizing its flexible hydro-capabilities on the EU market. Currently, Switzerland benefits from cheap electricity imports and gas transit through EU territory.⁴⁸ In the longer term, Switzerland will possibly also rely more on electricity deliveries from the EU. Ukraine makes substantial profits from its role as gas transit country, and benefits from the gas reverse flows from Slovakia, Hungary and Poland which allowed the country to end its dependency on gas imports from Russia.

⁴⁶ As well as smaller existing interconnectors with Hungary and Poland.

⁴⁷ Ukraine's exports to the EU is limited to 0.8 GW. Maximum power transmission with the EU could increase to 4 GW in case of complete synchronization (Ukraine Energy Strategy Draft 2016).

⁴⁸ Switzerland also relies on gas storage in the EU, as it has no own storage facilities.

The UK largely benefits from the EU energy market in terms of security of supply. As far as electricity is concerned, interconnections help the UK to secure supply when the domestic electricity balance is tight. As far as gas is concerned, imports from the Continent help the UK to manage domestic supply risk (consider, for example, the repeated shut-down of its major gas storage facility).

3.2. Treaty and legal considerations

According to Article 194 of the Treaty of the Functioning of the European Union (TFEU), energy legislation is generally an EU competence, unless it touches the national fuel mix. As most energy legislation would affect the fuel mix, the treaty provision on the energy-competence is seen as being deliberately ambiguous.

3.2.1. Internal Energy Market

The European energy market (electricity and gas) is mainly shaped by the provisions set in the *Third Energy Package*,⁴⁹ which entered into force in September 2009.

Directive 2009/72/EC (electricity) and *Directive 2009/73/EC* (gas) ensure that energy networks can be used by everybody at fair terms. To do this, they require that the network business is effectively unbundled from other parts of the value chain (supply, retail)⁵⁰ Network operators must apply the *third-party access principle*, which allows any supplier to obtain non-discriminatory access to the network in order to be able to supply customers. The conditions of access to the networks are regulated by National Regulatory Authorities. The Directive requires independent national regulators (own legal entity, budgetary authority, sufficient funding) that are capable of issuing binding decisions and imposing penalties. Regarding the rights of customers, the Directive defines that retail customers can choose and change suppliers quickly and without extra costs and that they are entitled to receive relevant consumption data. Furthermore, EU countries are required to establish an independent mechanism for settlement of disputes.

Regulation (EC) No 713/2009 sets up the *Agency for the Cooperation of Energy Regulators (ACER)* to ensure the functioning of the internal energy market for electricity and gas.

Regulation (EC) No 714/2009 (electricity) and *Regulation (EC) No 715/2009 (gas)* establish the European Network for Transmission System Operators for Electricity and Gas (ENTSO-E and ENTSO-G) that were given the mandate to organise the operation of the European electricity and gas infrastructure and market.

Based on framework guidelines developed by ACER, the ENTSOs draft a series of complex Network Codes which are – after a policy process involving ACER, the European Commission and the Member States – becoming directly applicable legislation across the EU. Members of the ENTSOs (EU and non-EU) have the same rights in preparing these network codes.

⁴⁹ The package consists of the two Directives *2009/72/EC* and *2009/73/EC* about common rules for the concerning internal market in electricity and internal market in gas respectively, and three Regulations about the conditions for access to the natural gas transmission networks (*(EC) No 715/2009*), for access to the network for cross-border exchange of electricity (*(EC) No 714/2009*) and about the establishment of the Agency for the Cooperation of Energy Regulators (ACER) (*(EC) No 713/2009*).

⁵⁰ Member states can choose between three options “Ownership Unbundling” (no ownership affiliation between energy producer and network operator), “Independent System Operator” (producer is allowed to own a network, but operation is handled by an independent company), and “Independent Transmission System Operator” (producer is allowed to own network but operation is handled by an independent subsidiary).

In November 2016, the European Commission submitted the “Clean Energy Package”, which proposes changes in the design of the European energy market such as market-based pricing, a clarification of the roles of DSOs and TSOs, and a market-based dispatch of power generation.

3.2.2. Renewable Energy and Energy Efficiency

3.2.2.1. Renewable Energy

Directive 2009/28/EC establishes the target that 20% of total energy should be generated from renewable sources within the European Union by 2020. EU Member States also must ensure that at least 10% of the energy used in the transport sectors comes from renewable sources. The Directive sets out individual national renewable energy targets taking the different starting points into account (ranging from 10% for Malta to 49% for Sweden). While the Directive allows cooperation among EU Member States to achieve those targets (e.g. through statistical transfers or joint support schemes), Member States have largely decided to achieve their targets individually.

The 2030 climate and energy framework, as adopted by the European Council in October 2014,⁵¹ proposes an EU-wide 27% share for renewable energy in 2030. In contrast to the 2020 targets, the 2030 targets are not broken down to the level of individual Member States. The legal basis for the target - the Revised Renewable Energy Directive - is part of the “Clean Energy Package” that the European Commission tabled to the European Parliament and the Council in November 2016.

3.2.2.2. Energy Efficiency

To reach a Union-wide energy consumption reduction of 20% (compared to prior projections) by 2020, *Directive 2012/27/EU* establishes a set of binding measures for Member States. They are required to use energy more efficiently in all stages of the chain, and have to set their own national energy efficiency targets. Countries are required to implement a number of specific measures such as obliging energy distributors to reduce consumption, renovations of public buildings to make them more energy efficient, and improving access to consumption data for customers. For 2030, an energy-efficiency target of at least 27% has been endorsed by the European Council. The European Commission has proposed a target of 30% in the “Clean Energy Package”.⁵²

Directive 2010/30/EU sets up a framework for the labelling of energy-related consumer products. When sold to retail customers, products must have a label containing information about the (electric) energy consumption. Additional technical information must also be made available by the supplier.

Directive 2010/31/EU requires national authorities to set cost-effective minimum energy performance requirements for buildings. New buildings have to meet these minimum standards, while existing buildings must upgrade their performance when undergoing a major renovation. National authorities must implement and operate a certification system that provides relevant information on energy consumption for prospective purchasers or tenants.

⁵¹ European Council, Conclusions on 2030 Climate and Energy Policy Framework, https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145356.pdf

⁵² Proposal for a Directive of the European Parliament and of the Council amending Directive 2012/27/EU on energy efficiency, <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1485938766830&uri=CELEX:52016PC0761>

3.2.3. Climate and Environment

3.2.3.1. Climate

The EU has decided to reduce greenhouse gas emissions by 20% by 2020 (from 1990 levels). To reach this target, the European *emission trading system (EU ETS)* was established in 2005 (2003/87/EC) and operates now in Phase 3 (2013-20). It is a *cap and trade* system that covers some 45% of the greenhouse gas emissions in the EU28 plus Iceland, Liechtenstein, and Norway. About 11,000 emission intensive installations in power generation and manufacturing fall under the EU ETS. Emissions from the sectors covered are to be reduced by 21% in 2020 compared to 2005 levels. The EU ETS also covers the aviation sector (only flights within the EEA), but a different, less stringent cap has been imposed on this sector. The revision of the EU ETS for Phase 4 (2021 – 2030) is at the moment at the stage of trilogue negotiations. It is expected that the agreed revision will comprise a stricter emission cap, together with a number of design changes.

The *Effort Sharing Decision (ESD)* establishes binding annual greenhouse gas emission targets for EU countries for the period 2013-20. These targets cover emissions from most sectors not included in the EU ETS, such as transport (except aviation and international maritime shipping), buildings, agriculture and waste. The emission targets are set based on EU Member States' relative wealth: they range from a 20% reduction by 2020 to a 20% increase compared to 2005 levels. In aggregate, they amount to an EU-wide 10% reduction.

3.2.3.2. Environment

Directive 2014/52/EU defines a list of public and private projects (primarily large-scale infrastructure projects) that must conduct an *Environmental Impact Assessment (EIA)* prior to starting construction. For projects that appear in a secondary list, national authorities must decide whether an EIA is needed. Every EIA has to follow a predefined procedure defined in the Directive.

Directive 2010/75/EU obliges Member States to control and reduce the impact of industrial emissions on the environment. Installations are only allowed to operate with a permit that specifies the conditions for operation, and they are obliged to use the best available techniques. The permit for an installation has to take into account the entire environmental performance of the plant (i.e. an "integrated approach"). The rules, for example, imply that many existing coal-fired power plants would need to be modernised or closed.

3.2.4. Security of Supply

To date, most EU energy security of supply legislation is aimed at ensuring that individual Member States do not have to rely on other Member States for security of energy supply. While Article 194 of the Treaty calls for solidarity between the Member States in energy affairs, it has never been tested.

Directive 2004/67/EC establishes a single framework concerning measures to safeguard the security of supply of natural gas. Within this framework, Member States can define their own policies that are transparent, solidarity-based, non-discriminatory and consistent with the requirements of a single market in gas. The Directive requires that Member States must ensure the security of supply of gas for their household customers inside their territory in case of a partial disruption of national gas supplies, and of exceptionally cold temperatures during a peak period. Member States are allowed to extend the scope to small and medium-sized enterprises (SMEs) and other customers and to require the industry to set minimum

targets for a possible future contribution of storage. The European Commission is empowered to monitor the activities of the Member States.

Directive 2005/89/EC establishes measures aimed at safeguarding security of electricity supply so as to ensure the proper functioning of the EU internal market for electricity, an adequate level of interconnection between Member States, and an adequate level of generation capacity and balance between supply and demand. Member States are required to define general, transparent and non-discriminatory policies on security of electricity supply compatible with the requirements of a competitive single market for electricity. Transmission network operators are required by the Directive to set minimum rules and obligations to ensure continuous operation of the transmission and, where appropriate, the distribution network under foreseeable circumstances. The Directive also calls on Member States to encourage the establishment of wholesale markets, to require network operators to ensure that an appropriate level of generation reserve capacity is maintained, to facilitate the development of new generation capacity, and to encourage energy conservation and technology for demand management in real time.

Directive 2009/119/EC imposes an obligation on Member States to build up and maintain minimum reserves of crude oil and petroleum products in order to mitigate the risks of supply disruption. This EU stockholding obligation is consistent and linked with the oil stockholding obligation developed under the International Energy Agency (IEA).

Regulation (EU) No 994/2010 provides a set of rules aimed at guaranteeing that Member States act on their national responsibilities to collectively enhance EU security of supply. The Regulation introduces rules to secure supplies to protected customers (e.g. customers that use gas for heating) in severe conditions, including in the case of infrastructure disruption under normal winter conditions. The Regulation provides standards to achieve a more interconnected EU gas market and a more secure gas infrastructure. To this end, Member States have to ensure that the gas network is robust enough to withstand the disruption of the largest infrastructure (N-1 standard) at national or regional levels. The Regulation also obliges Member States to establish national preventive action and emergency plans with well-defined crisis levels (early warning, alert, emergency), in consultation with neighbours at regional level, based on a detailed assessment of the risks.

To improve electricity supply security, the European Council of October 2014 called for all Member States to achieve interconnection of at least 10% of their installed electricity production capacity by 2020.

3.3. Implementation at national level

This section discusses the implementation of various aspects of European energy policy in the four countries analysed.

3.3.1. Institutional setting

3.3.1.1. The United Kingdom

Transposition requirements

All EU Directives must be transposed into UK law, and Regulations and Decisions directly apply.

Jurisdiction

Infringement procedures on whether the UK fails to implement EU law or disputes over competition policy are settled definitively by the CJEU.

Shaping decisions

As a full EU Member State, the UK can vote on all EU legislation in the Council of the European Union.

Regulator

The British regulator Ofgem (Office of Gas and Electricity Markets) is a full member of ACER and as such sits on the Board of Regulators that decides on the regulatory policy of ACER. It has a substantial influence on the decisions, opinions and recommendations of the Agency. As a full EU Member State, the UK's TSOs⁵³ are member of ENTSOG and ENTSO-E.

3.3.1.2. Norway

Transposition requirement

As a member of the European Economic Area, Norway must in general implement all EU energy and climate related legislation⁵⁴ as this is considered to be EEA relevant legislation. With the EEA Joint Committee's decision from 5 May 2017, EEA countries will also have to implement the third energy package, from which Norway was previously exempted.

Jurisdiction

The EFTA Surveillance Authority is (like the European Commission for the EU) the guardian of the EEA Agreement (see Section 2.1) The EFTA Court has ultimate jurisdiction on decisions by the EFTA Surveillance Authority.⁵⁵

Shaping decisions

Norway is consulted in the process of developing new EU legislation, but has no voting rights. Norway can also influence the Joint Committee Decisions to amend the EEA Agreement with certain EU legislation.

Regulator

The NVE (the Norwegian national regulatory author) is a member of the Council of European Energy Regulators (CEER) and the Nordic Energy Regulators (NordREG), but not of ACER. Hence, it cannot vote on important European regulatory decisions. Norway is an observer without voting rights in ENTSOG (via Gassco) and a member with voting rights in ENTSO-E (via Statnett).

⁵³ As the (gas) Interconnector (UK) Limited is also active in Belgium, it might actually be treated as an EU member's TSO even after Brexit.

⁵⁴ In order to be applicable in the EEA, EU acts have to be incorporated into the EEA Agreement, more concretely into one of its Annexes or Protocols. These amendments to the EEA Agreement are done by means of Joint Committee Decisions (JCDs). These decisions constitute international agreements and are adopted according to the simplified procedures foreseen in the EEA Agreement.

⁵⁵ The Court is mainly competent to deal with infringement actions brought by the EFTA Surveillance Authority against an EFTA State with regard to the implementation, application or interpretation of EEA law rules, for giving advisory opinions to courts in EFTA States on the interpretation of EEA rules, and for appeals concerning decisions taken by the EFTA Surveillance Authority. Thus, the jurisdiction of the EFTA Court largely corresponds to the jurisdiction of the Court of Justice of the European Union over EU States. The proceedings before the EFTA Court consist of a written part and an oral part and all proceedings will be in English. In direct actions, the judgment is rendered in English only. Advisory opinions are rendered in English and in the language of the requesting court.

3.3.1.3. *Switzerland*

Transposition requirements

EU-Swiss relations are based on bilateral treaties. Switzerland is not obliged to transpose European legislation into Swiss legislation. Switzerland applies the autonomous adaptation principle (*Autonomer Nachvollzug*) which means that the Swiss legislature is inspired by EU legislation although there is no obligation to change its domestic legislation.⁵⁶

The ongoing negotiations between Switzerland and the EU about an energy agreement (regulating cross-border electricity trading, harmonising safety standards, enabling free market access and guaranteeing Switzerland's membership in the various committees) have been on hold in consequence of the Swiss immigration referendum 2014 (not to be confused with the 1992 referendum whereby the Swiss rejected EEA membership).⁵⁷ Switzerland voted to limit European immigration through quotas, implying a unilateral departure from the principle of free movement of persons. As all EU-CH bilateral treaties are co-dependent, a termination of a single treaty would lead to a termination of all treaties, affecting an eventual EU-CH energy agreement. Hence, the European Commission decided to suspend talks on the energy agreement with Switzerland following the referendum. On 22 December 2016, Switzerland and the EU concluded an agreement that a new Swiss law (in response to the 2014 referendum) will in principle not limit the free movement of EU workers to Switzerland. Consequently, talks on a bilateral energy arrangement with Switzerland were restarted. The European Union is negotiating much more carefully than before so as to not set an unfavourable precedent for the upcoming Brexit talks. This demonstrates that sectoral bilateral agreements are subject not only to agreements in other policy areas, but also to wider political considerations.

Jurisdiction

There is no court that oversees the implementation of bilateral agreements.

Shaping decisions

As a third country, Switzerland has no formal influence on the legislation passed by the EU.

Regulator

The Swiss national electricity regulatory authority *Eidgenössischen Elektrizitätskommission (ElCom)* is not represented in ACER, and is present only as an observer at CEER. After the bilateral energy agreement, Switzerland might become a member of ACER. Switzerland (Swissgas AS) is observer in ENTSOG and hence has no voting rights. As Switzerland was already a founding member of the *Union for the Coordination of Production and Transmission of Electricity (UCPTE*, the predecessor to ENTSO-E) in 1951, Swissgrid AG is a full member in ENTSO-E.

3.3.1.4. *Ukraine*

Ukraine is a member of the Energy Community. The Energy Community aims to extend the EU internal energy market to transition countries in the EU's neighbourhood on the basis of a legally binding framework. It was established by an international treaty that entered into

⁵⁶[http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2012/120355/LDM_BRI\(2012\)120355_REV2_EN.pdf](http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2012/120355/LDM_BRI(2012)120355_REV2_EN.pdf)

⁵⁷ <http://www.bfe.admin.ch/themen/00612/00618/?lang=en>, <https://www.thenewfederalist.eu/swiss-energy-transition-without-europe>

force in 2006 and now includes 8 contracting parties. As three former members became members of the EU, it is often seen as a stepping stone to full EU membership.

Transposition requirements

The whole set of the EU energy *acquis* has to be transposed by Energy Community members, such as Ukraine. This growing body of legislation – that largely mirrors the EU energy *acquis* with some delay – is called the Energy Community *acquis*.

Jurisdiction

Failure to implement the Energy Community *acquis* could only be sanctioned through the Energy Community. The Secretariat of the Energy Community is (like the European Commission for the EU) the guardian of the Energy Community Treaty. The Ministerial Council can impose sanctions, e.g. by withdrawing the voting rights of countries that fail to comply with the *acquis*.

Shaping decisions

Decisions to take over new EU energy legislation into the Energy Community *acquis* are taken by the Energy Community's Ministerial Council⁵⁸ based on a proposal by the European Commission. Ukraine can vote in the Ministerial Council on which new parts of the EU *acquis* should become part of the Energy Community *acquis*. Whilst decisions are generally taken by consensus, the majority required to adopt a proposal depends on the Treaty basis under which the measure was proposed.

Regulator

The NERC (National Electricity Regulatory Commission of Ukraine) is represented neither in the CEER nor in the ACER. Ukraine (Ukrtransgaz) is observer in ENTSOG and not part of ENTSO-E (no voting right in neither of the two bodies). Ukrenergo's application to become an observer at ENTSO-E was rejected in September 2016.

3.3.2. Internal Energy Market

A summary of the degree of participation of each of the four countries in EU wholesale and retail markets for electricity and gas is shown in Table 4.

Table 4. Summary of the internal market: Activities of companies from/in the EU.

	in EU				from EU			
	retail		wholesale		retail		wholesale	
	electricity	gas	electricity	gas	electricity	gas	electricity	gas
UK	+	+	+	++	++	++	++	++
Norway	0	0	++	++	+	0	+	+
Switzerland	++	++	++	+	0	0	0	+
Ukraine	0	0	0	0	0	0	0	+

Source: Bruegel

Note: ++ = strong; + = limited; 0 = negligible or absent

3.3.2.1. UK

The UK is fully integrated into the EU internal energy market and in compliance with all relevant legislation. Several major utilities from other EU countries (RWE, Iberdrola, EdF, E.on) are active in the quite competitive UK electricity and gas market. At the same time, UK gas companies (Shell, BP) are major players on the EU gas wholesale market.

Due to its island situation, it is connected only through asynchronous interconnectors with the rest of the EU.⁵⁹ Consequently, in contrast to continental countries that have developed a joint system for allocating cross-border capacities (where flows on the German-French border affect flows on the German-Dutch border in a synchronised system), the UK interconnectors with France and the Netherlands are individually managed. As merchant interconnectors, they also do not fall under the EU regulatory regime.

In terms of gas, the UK is linked to the EU by three pipelines: Moffat to Ireland, Interconnector UK (IUK) with Belgium, and the Balgzand Bacton Line (BBL) which enters from the Netherlands. The respective national regulatory authorities (Ofgem in the UK, CREG in Belgium, ACM in the Netherlands and CER in Ireland) are currently charged with regulating and supervising these pipelines (IUK (Ofgem and CREG), BBL (Ofgem and ACM) and Moffat (Ofgem and CER) under the EU Third Energy Package.⁶⁰

⁵⁹ The UK has electricity interconnectors with: France, Netherlands, Northern Ireland and the Republic of Ireland: <https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors>

⁶⁰ p. 3 <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/01/Brexit-impact-on-gas-markets-OIES-Energy-Insight.pdf>, January 2017.

THE IRISH SINGLE ELECTRICITY MARKET

A special case of two jurisdictions

On November 1 2007, the Single Electricity Market (SEM) was founded comprising the wholesale electricity markets of the Republic of Ireland and Northern Ireland. The SEM is a gross mandatory pool market into which all electricity generated on or imported into the island of Ireland must be sold, and from which all wholesale electricity for consumption on or export from the island of Ireland must be purchased. Operating with dual currencies and in multiple jurisdictions, the SEM represents the first market of its kind in the world.

The SEM is regulated by the SEM Committee (SEMC), a joint body that consists of the Commission for Energy Regulation (CER) of Ireland and the Utility Regulator of Northern Ireland. It consists of three representatives of both regulatory authorities (RA) along with two independent members. "The objective of the SEMC is to protect the interests of electricity consumers [...] by promoting an effective competition between [undertakings engaged in the SEM]".⁶¹

During the establishment of the SEM, a trading and settlement code (TSC) was developed that provides the rules by which the market and its participants may operate, setting out the detailed rules and procedures concerning the sale and purchase of wholesale electricity in the market. The SEMC makes final decisions on the approval, amendment or rejection of modifications to the TSC. Core regulating tasks, such as issuing of licences to generate power or to operate as a TSO, still remain in the hands of the national RA. The operation of the SEM is conducted by the SEMO, a joint-venture of the Irish TSO EirGrid plc and the Northern Irish TSO SONI Limited.

Source: Website of the Utility Regulator⁶² (Northern Ireland), the Commission for Energy Regulation⁶³ (Ireland), 'The decision making authority for the Single Electricity Market on the island of Ireland'⁶⁴, and the Single Electricity Market Operator (SEMO)⁶⁵

3.3.2.2. Norway

Norway fully participates in the EU internal energy market.

Norway is a full member of Europe's internal electricity market. It operates a joint electricity market with Sweden, Finland and Denmark (Nordpool) that is one of the prime examples of regional integration in the EU. Its rules are largely in line with the corresponding EU legislation, including the Third Energy Package.

Norway is Western Europe's most important source of gas. Norwegian gas exports account for approximately 25% of EU gas consumption, with almost all Norwegian exports going to EU. The main EU importers of Norwegian gas are Germany, the UK, France, the Netherlands and Italy. From a legal perspective, the Third Energy Package was proposed in 2009 as an act with possible EEA relevance. It was then adopted under scrutiny by the EEA. In 2013, a Draft EEA Joint Committee Decision incorporating the act into the EEA Agreement was sent to the European Commission.

⁶¹ <https://www.semcommittee.com/>

⁶² <https://www.uregni.gov.uk/>

⁶³ <http://www.cer.ie/>

⁶⁴ <https://www.semcommittee.com/>

⁶⁵ <http://www.sem-o.com>

Despite the dominant role of the state-owned firm Statoil (~80% of production), several EU upstream gas companies (e.g., Shell and Total) are active in Norway.

The domestic gas market is dominated by two local suppliers. Electricity production and supply is again mainly served by Norwegian companies (Finish Fortum seems to be the only major non-Norwegian electricity retailer). At the same time, Norwegian state-owned companies (Statkraft and Statoil) are active in the EU wholesale electricity and gas market.

In March 2017, the European Commission published a proposal for a Council Decision aimed at incorporation of the Third Energy Package into the EEA Agreement on the basis of the draft Decision of the EEA Joint Committee.

The EU Commissioner for Climate Action and Energy and the Norwegian Minister for Petroleum and Energy annually meet for the EU-Norway Energy Dialogue, a platform aimed at coordinating energy policies, including in the areas of research and technological development.

3.3.2.3. Switzerland

The EU and Switzerland have traded electricity for decades. Switzerland was a founding member of the Union for the Co-ordination of Production and Transmission of Electricity that established a synchronised electricity system between six central-west European countries in 1958. Since then, Switzerland has been a major electricity transit country with about 10% of the continental European cross-border electricity passing through Swiss territory. Due to Switzerland's physical integration in the European continental energy landscape and the existing synergies in electricity trading, the EU and Switzerland are currently negotiating an agreement on energy. The aim of the agreement is to build a legal basis for their existing close cooperation and to establish a common basis for resolving any challenges that might arise in the future. In addition to the questions of market access and cross-border electricity trading, negotiations are taking place on the promotion of renewable forms of energy and transparency in the wholesale trade in electricity.

Switzerland has not yet adopted any of the relevant EU internal gas market legislation. Swissgas remains a vertically integrated company, there is no independent regulator, and only large gas consumers can choose their suppliers. In the electricity sector, Swissgrid is unbundled and an independent regulator guarantees third party access to the network, but only large consumers can choose their supplier. Consequently, all households and most industrial consumers in Switzerland buy gas and electricity from local suppliers and they appear to largely be happy with this. Hence, full energy market liberalisation is a politically highly sensitive issue that would likely be challenged in a referendum. A second contentious issue is that some Swiss companies enjoy long-term contracts that guarantee them access to some interconnectors. In the negotiations on a bilateral agreement, the EU seeks both to open the end consumer market to (foreign) competition and to phase out long term transmission rights.

At the gas wholesale level, EU gas companies such as E.on and Engie are active in Switzerland. While the Swiss electricity market is quite closed to EU companies, Swiss electricity companies such as EGL, Alpiq and REPOWER are quite active in the EU wholesale and retail market.

3.3.2.4. Ukraine

Ukraine is not yet a genuine part of the EU internal energy market. As a member of the Energy Community, Ukraine has implemented most parts of the EU energy *acquis* into domestic legislation.

Recent reforms in the gas sector have actually allowed western companies to become active on the Ukrainian market. Ukraine's gas transmission system operator, Ukrtransgaz, is legally unbundled from Naftogaz and ownership unbundling is planned. Gas distribution systems remain under the control of retailers. The new gas market law and a developing body of secondary legislation are introducing fair conditions for access to the networks, in line with EU rules. But it will take time and political will to create a truly functioning gas market.⁶⁶

Currently, there is no competitive electricity market in Ukraine. Ownership of the electricity sector remains highly concentrated. On the one hand, one private group controls most of the thermal power generation and some of the largest distribution networks; on the other hand, the state owns the nuclear and hydro-power plants as well as the transmission network, which in its current form is incompatible with EU legislation. Consequently, most prices (including generators bidding prices) are still regulated. The transmission system operator also fails to provide fair access to domestic and cross-border transmission lines. A new electricity law (that should resolve some of the issues) has just been agreed in Parliament.

⁶⁶ See e.g., Zachmann (2017): Boosting gas trading in Ukraine.

3.3.3. Renewable Energies and Energy Efficiency

Table 5. Renewables, energy efficiency and Greenhouse Gas emissions targets.

Targets			
	Renewables	Energy efficiency	Greenhouse Gas Emissions
UK	15% by 2020 (in 2015 it was 8,3%)	18% by 2020 (vs 2007 BAU projections)	-57% by 2030 vs 1990 levels
Norway	67,5% by 2020 (from 61% in 2010)	(*)	By 2030 (vs 1990 levels): <ul style="list-style-type: none"> • -40% (conditional target) • -100% (unconditional target)
Switzerland	<ul style="list-style-type: none"> • 24 % by 2020 (from 16,2% in 2008) • By 2035: reach average domestic production of renewable energy of 11.400 GWh plus 37.400 GWh of hydro power. 	By 2035 reduce (vs 2000 levels): <ul style="list-style-type: none"> • average per capita energy consumption by 43% • average per capita electricity consumption by 13% 	-50% by 2030 vs 1990 levels (INDC not yet ratified)
Ukraine	11% by 2020 (from 6% in 2015)	Reduce final energy consumption by 9% in 2020 (6,5 mln toe)	-40% by 2030 vs 1990 levels

Source: European Commission, European Environment Agency, Energy Community, UK Government, Swiss Federal Office of Energy SFOE, Norway Government, Cicero, EnerCEE, accessed in April 2017⁶⁷.

Note: * The Energy Efficiency Directive (Directive 2012/27/EU) itself does not currently apply to Norway, but most EU Energy Efficiency policies have in practice been transposed into Norwegian law.

⁶⁷ https://ec.europa.eu/clima/policies/strategies/2030_en#tab-0-0

<https://fullfact.org/economy/uks-renewable-energy-target/>

http://www.bfe.admin.ch/php/modules/publikationen/stream.php?extlang=en&name=en_586742611.pdf

<http://www.eea.europa.eu/publications/energy-support-measures/case-study-switzerland>

<https://www.regjeringen.no/globalassets/upload/UD/Vedlegg/Protokoll/141006-posisjonspapir-EU-klima-energi.pdf>

<https://naturvernforbundet.no/getfile.php/1380239/Bilder/Klima/Klimablogg/Presentasjon%20Anne%20Therese%20Gullberg%20CICERO.pdf>

3.3.3.1. *The United Kingdom*

Renewable Energy

Within the EU 2020 target for renewable energy, the UK is obliged to reach a share of 15%. As of 2015, the UK had reached a share of 8,3% of energy consumption coming from renewable sources.⁶⁸

Energy Efficiency

Complying with the EU Energy Efficiency Directive, the UK aims to reduce final energy consumption by 18% by 2020 compared to the 2007 BAU projection.⁶⁹

3.3.3.2. *Norway*

Renewable Energy

As shown in Section 3.1., Norway's electricity production is largely based on hydro-power. After implementing the EU Renewables Directive in 2012, Norway's national target for renewable energy as a fraction of all energy consumed is thus set at an impressively high 67,5% by 2020, up from 61% in 2010.⁷⁰ Norway plans to achieve this largely by having a share of 114% of renewable sources in its electricity consumption. They intend to export clean electricity.

Energy Efficiency

The Energy Efficiency Directive (Directive 2012/27/EU) does not directly apply to Norway, but most EU Energy Efficiency policies have been transposed into Norwegian law.^{71 72} It is one of the instances where Norway opts out of EU legislation.

3.3.3.3. *Switzerland*

Renewable Energy

As Switzerland plans to phase out nuclear, which currently is its main electricity source, the country plans to substantially increase the share of renewables in the electricity mix. Switzerland aims to increase the share of renewables in its total energy consumption from 16, 2% in 2008 to 24% by 2020. A further national goal is to reach an average domestic

http://www.enercee.net/fileadmin/enercee/images-2016/Ukraine/Energy_strategy_2035_eng.pdf

[https://www.energy-](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3430146/067A653E3AF24F62E053C92FA8C06D31.PDF)

community.org/portal/page/portal/ENC_HOME/DOCS/3430146/067A653E3AF24F62E053C92FA8C06D31.PDF

⁶⁸ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540953/Chapter_6_web.pdf

⁶⁹ https://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_united-kingdom.pdf

⁷⁰ Norway's National Renewable Energy Action Plan under Directive 2009/28/EC.

⁷¹ As of April 2015, the following legislation related to energy efficiency have been implemented in Norway:

- EU Directive on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products and implementing regulations.
- EU Directive establishing a framework for the setting of eco-design requirements for energy-related products.
- EU Directive on Fuel Economy and CO2 Labels for Cars: EU directive on availability of consumer information regarding fuel economy and carbon dioxide emissions in marketing of new passenger cars is implemented, and in process for light vehicle cars.
- EU Directive on the Energy Performance of Buildings I
- EU Directive to Promote Cogeneration of Heat and Power.

⁷² Norwegian Implementation of EU Directives on Energy Efficiency

<https://www.duo.uio.no/bitstream/handle/10852/51812/FINAL.pdf?sequence=1>

production of renewable energy of 11.400 GWh (excluding hydro-power) plus 37.400 GWh of hydro-power by 2035.

Energy Efficiency

As compared to 2000 levels, Switzerland aims to reduce average per capita energy consumption by 43% and average per capita electricity consumption by 13% by 2035.

3.3.3.4. Ukraine

Renewable Energy

By Decision 2012/04/MC-EnC,⁷³ the Energy Communities Ministerial Council adopted Directive 2009/28/EC and determined the Contracting Parties' binding national targets: 11% for Ukraine in 2020.⁷⁴ Though in its 2016 Draft Energy Strategy, Ukraine has set an objective of raising the share of renewable energy in the gross final consumption of energy from 6% in 2015 to 8% in 2020 and to 15% in 2030.

Energy Efficiency

In accordance with the decisions of the Energy Community made in December 2009, September 2010, and in October 2011, the Contracting Parties of the Energy Community (including Ukraine) are in the process of implementation of the European Directives on energy efficiency:

1. Directive 2006/32/EC on energy end-use efficiency and energy services.
2. Directive 2010/31/EC on the energy performance of buildings.
3. Directive 2010/30/EC on labelling of energy products.

The Energy Efficiency Directive, which will repeal the first and third of these (i.e. Directive 2006/32/EC and Directive 2010/30/EC), must be implemented in Energy Community Countries by 15 Oct 2017.⁷⁵

Directive 2006/32/EC requires Ukraine to develop and implement a national energy efficiency action plan. Ukraine's main target in the NEEAP is to reduce final energy consumption by 9% in 2020 compared to the average of 2009-2015 (6,5 mln toe).⁷⁶ Given the recent decline in energy consumption, this target can be achieved without any effort.

According to the Energy Community Secretariat's assessment, Ukraine has not transposed large parts of the energy efficiency acquis.⁷⁷

According to its reference scenario, Ukraine aims at reducing the GDP energy intensity from 0,25 ktoe/USD in 2015 to 0,12 ktoe/USD in 2035 (GDP in PPP).

⁷³ https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4530464/47F3BE12FC666AE2E053C92FA8C050F3.pdf

⁷⁴ This is reflected in Ukraine's NREAP: https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3430146/067A653E3AF24F62E053C92FA8C06D31.PDF

⁷⁵ https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Obligations/Energy_Efficiency

⁷⁶ https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/4072398/2E55BBE3551E2A67E053C92FA8C028B9.pdf

⁷⁷ https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Obligations/Energy_Efficiency/Transposition

3.3.4. Environment and Climate

3.3.4.1. The United Kingdom

Climate

As an EU Member State, the UK has ratified the Paris Agreement, and the NDC sets the target of GHG emission reduction at 40% below 1990 levels by 2030. Under the 5th carbon budget in the UK's Climate Change Act, the UK has a GHG reduction target of 57% for 2028-2032, compared to 1990. The UK is part of the EU ETS, but some of its installations actually face a higher carbon price due to the UK carbon price floor.⁷⁸

Environment

As an EU Member State, the UK has transposed EU environmental Directives into national legislation. The "Town and Country Regulations" (2011) applies Directive 2011/92/EU. Consultations concerning the implementation of Directive 2014/52/EU have recently begun. The Industrial Emissions Directive is transposed into national UK legislation.

3.3.4.2. Norway

Climate

Norway has ratified the Paris Agreement and it agreed bilaterally to reduce its emissions as if it were a full EU member. Its targets aim at a GHG emission reduction of 40% below 1990 levels by 2030. In addition, Norway aims at 100% emission reduction, i.e. becoming carbon neutral, by 2050.⁷⁹ Norway participates fully in the EU ETS, using this mechanism to achieve its climate policy goals.

Environment

Directive 2011/92/EU, which defines EIA rules and is considered to be EEA relevant, has been transposed into Norwegian national law. Directive 2014/52/EU, which amends the former Directive, has not yet been transposed. The Industrial Emissions Directive is fully transposed.

3.3.4.3. Switzerland

Climate

Switzerland aims to reduce GHG emissions by 50% in 2030 compared to 1990 levels, but it has not yet ratified the Paris Agreement. Switzerland has its own ETS that is largely compatible with the EU ETS. The Swiss system is small compared to the EU system, and the prices have been higher in the past. Negotiations on linking have been concluded in January 2016, but the ratification process has not yet been completed.⁸⁰

⁷⁸ UK House of Commons BRIEFING PAPER Number CBP05927 23 November 2016.

⁷⁹<http://www4.unfccc.int/submissions/INDC/Published%20Documents/Norway/1/Norway%20INDC%2026MAR2015.pdf>

⁸⁰ https://www.eda.admin.ch/content/dam/dea/de/documents/fs/05-FS-Emissionshandel_de.pdf

Environment

Switzerland has its own Environmental Impact Assessment legislation⁸¹, yet European EIA legislation is not transposed into Swiss legislation. Switzerland has implemented its own regulation on industrial emissions and has not transposed any EU legislation.

3.3.4.4. Ukraine

Climate

Ukraine has ratified the Paris Agreement and its INDC sets the target of GHG emission reduction at 40% below 1990 levels by 2030. This is not very ambitious, given that emissions dropped massively after the end of the Soviet Union. Ukraine has no ETS, but it is discussing the implementation of a national ETS. An existing carbon tax is very low and ineffective.

Environment

There is no coherent legislative framework governing environmental impact assessments in Ukraine. The Energy Community initiated infringement actions. The Large Combustion Directive (predecessor of the Industrial Emissions Directive) has to be transposed into national law by the end of 2017. According to a Ministerial Council Decision in 2015, Contracting Parties must implement the Industrial Emissions Directive. For Ukraine, the deadlines for existing plants are set at 1 Jan 2029 for SO₂ and dust and 1 Jan 2034 for NO_x⁸².

3.3.5. Security of Supply

3.3.5.1. The United Kingdom

As an EU Member State, the UK has fully transposed the EU legislation on security of energy supply into national legislation. To date, however, the UK does not meet its interconnector target.

3.3.5.2. Norway

As a reliable and market-driven exporter, Norway substantially contributes to the EU's security of energy supply. There is a long-standing collaboration between Norwegian and EU companies to lend each other support to avoid supply disruptions. Domestically, Norway has not implemented EU security of supply legislation, which it does not consider to be EEA relevant.

3.3.5.3 Switzerland

Switzerland has not amended its national legislation along the lines of the EU acquis on security of energy supply. To date, however, this lack of formal adoption has not prevented Switzerland from close technical collaboration with the EU and on the issue of security of energy supply.

3.3.5.4. Ukraine

Ukraine has no legal framework in place for the establishment of emergency oil stocks. On gas, Ukraine imposed (until recently) the maintenance of 50% mandatory gas stock reserves

⁸¹ <http://www.oecd.org/environment/country-reviews/2451893.pdf>

⁸² https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Obligations/Environment/Acquis_Large_Combustion_Plants

on all gas suppliers. This requirement was cancelled in November 2016 with the entry into force of the law “On the Natural Gas Market (regarding gas stock reserve)”.⁸³ Under this new regulation, gas suppliers might be obliged to create gas stock reserves in the amount of only 10% of monthly supply volume, and only in cases of emergency.

3.4. Comparative assessment of different arrangements

Table 6 assesses the level of harmonisation of legal arrangements on energy and climate between the EU and its partners. Different colours indicate different degrees of harmonisation (green: high; yellow: medium; red: low).

Table 6. Comparison of benchmark countries as regards energy.

	Member State UK	EEA member Norway	Bilateral agreements Switzerland	Energy Community Ukraine
Internal Energy Market	Full EU member; all EU legislation implemented, many EU companies active in UK market	Joint energy market; rules largely in line with TEP; EU companies find it difficult to enter NO market	Switzerland has partially adopted EU internal market legislation in electricity, but not in gas	EU legislation largely transposed, reforms under way, but no competitive market yet
Renewable Energies and Energy Efficiency	Full EU member; all EU legislation implemented	Transposed: RE directive; Labelling directive; housing directive	RE goal set (independently) EE goal set (independently)	RE goals set Large parts of EE not adopted; not ambitious
Climate + Environment	EU ETS in place; all EU legislation transposed, except latest EIA Directive.	Part of the EU ETS; EU legislation transposed, except latest EIA Directive.	Domestic ETS that is compatible with EU ETS; No transposition of EU environmental legislation	No ETS in place; Full IED only >2028; No transposition of EU environmental legislation
Security of Supply (SoS)	Full EU member; all EU legislation implemented, interconnector target not reached	Substantially contributes to EU SoS, but does not implement EU SoS legislation	Substantially contributes to EU SoS, but does not implement EU SoS legislation	Ambiguous effect on EU SoS; does not implement EU SoS legislation

Source: Bruegel

⁸³ Law No. 1541-VIII.

Table 7 highlights how the EU and each of the partner countries benefit from the relative relationships.

Table 7. Advantages of alternative arrangements.

	Member State Pre-Brexit UK	EEA member Norway	Bilateral agreements Switzerland	Energy Community Ukraine
What are advantages for the EU?	<p>Connection to the Rep. of Ireland.</p> <p>UK is a market for electricity export; a significant retail market for EU companies; and an additional source of gas supply (via LNG & UK prod.)</p>	<p>The EU gets security of supply (1) for gas, because Norway is a reliable supplier; (2) for electricity due to the flexibility contribution of Norway.</p>	<p>The EU benefits from the electrical storage capacity of Switzerland, as well as electricity and gas transit. EU firms supply gas to Switzerland. The Swiss electricity market, however, is effectively closed to EU suppliers.</p>	<p>The EU benefits from gas transit through UA.</p> <p>When fully operational, the UA energy market will be an integral part of the IEM.</p>
What are advantages for the partner country?	<p>The UK continues to benefit from the EU in terms of security of (electricity and gas) supply.</p>	<p>Norway gets access to the large and liquid EU gas market, can sell its electricity balancing services and rely on electricity imports in dry years.</p>	<p>Switzerland benefits in terms of electricity and gas security of supply, gas transit through the EU and congestion rents at the CH border. Swiss firms supply electricity to the EU.</p>	<p>Ukraine benefits from security of supply, cheaper imports and internal energy market development.</p>

Source: Bruegel

In Table 8, we provide our assessment of the relative desirability of different models of third country cooperation from the perspective of the EU. This is independent of the feasibility of arriving at the arrangements in question. The baseline for comparison is taken to be the case where there is no special relationship between the EU and the UK post-Brexit (depicted in the rightmost column).

Table 8. Relative desirability of different models of cooperation in the field of energy from the perspective of the EU.

Thematic area: Energy					
Country	Pre-Brexit UK	Norway	Switzerland	Ukraine	
Relationship	Member State	EEA member	Bilateral agreements	Energy Community	No special relationship
Legal basis for relationship	TEU/TFEU	EEA Agreement	Bilateral agreements	Energy Community Treaty	Not applicable
Negotiating considerations	Energy collaboration is a positive sum game in which all partners can gain in terms of security of supply, the cost of energy, and advancing environmental sustainability by pooling complementary energy resources.				
Energy exchanges based on proper market signals	++	++	+	+	0
EU companies gain fair access	++	0	-	-	0
Contributes to supply security (infra+solidarity)	+	+	+	+	0
Promotes environmental sustainability	++	++	+	+	0

Source: Bruegel

Note: ++: much better than the baseline; +: better than the baseline; 0: comparable to the baseline

4. ELECTRONIC COMMUNICATIONS

KEY FINDINGS

- As regards electronic communications, EU membership maximises harmonisation of law and regulation, as well as scale economies. Arrangements with the United Kingdom have worked well to date in terms of implementation of the Regulatory Framework for Electronic Communications (RFEC).
- In comparison with EU membership (as exemplified by the UK itself today), EEA membership as exemplified by Norway offers nearly the same advantages. Indeed, Norway's timeliness in transposing EU Directives is better than that of many EU Member States. Policy and regulation are extensively harmonised, and are synchronised over time, albeit with a time lag that can be significant.
- Coordination with Switzerland is significantly weaker. Regulation of electronic communications is not covered by any bilateral agreement. Dialogue with the Swiss NRA (which enjoys observer status at BEREC) is extensive, and Switzerland cooperates voluntarily in a number of statistics-gathering activities. Nonetheless, regulatory policy cannot be said to be harmonised. Moreover, the absence of a review process by the Commission means that there is no external brake on any tendency for the NRA to be gentle with Swiss network operators, apparently leading to (for instance) wholesale payments to Swiss network operators that are high in comparison with those that are found in the EU. This problem is compounded by an implementation in Swiss law where the NRA is empowered to intervene only when a complaint is lodged.
- Arrangements with South Korea can be said to have performed well, but in fulfilling very different goals. The cooperative model with South Korea is primarily driven by the first of the "new generation" Free Trade Agreements (FTAs). The objective of the FTA is reciprocal market access. Trade and Foreign Direct Investment (FDI) have grown since the FTA came into force. Neither regulatory harmonisation nor scale economies were explicit goals. At the same time, the FTA appears to have had the effect of encouraging liberalisation of certain aspects of South Korean regulation, even in cases where the FTA did not compel the change.

This chapter provides an assessment of models of third country⁸⁴ cooperation in selected countries in the field of electronic communications.

The choice of countries in this chapter reflects the same considerations that apply to our assessment of energy, of research policy, and to a lesser degree to our assessment of policies to support SMEs.

As elsewhere, we compare arrangements in third countries to those in an EU Member State, using arrangements with **the UK** itself today and in the recent past as the basis for comparison. The assessment of current arrangements in the UK may also be useful to those who must negotiate future arrangements with the UK.

Norway provides an interesting case study to the extent that it is a member of both the European Free Trade Area (EFTA) and the European Economic Area (EEA). **Switzerland** provides an interesting but distinct case study to the extent that it has numerous bilateral agreements in place with the EU that collectively provide Switzerland with access to the European Single Market. Switzerland happens to be a member of the European Free Trade Area (EFTA), but not of the European Economic Area (EEA), inasmuch as Swiss voters

⁸⁴ Here and throughout, a third country is any country that is not an EU Member State.

rejected ratification of the EEA Agreement in a referendum held on 6 December 1992 (see Section 0).

South Korea provides a third case study. Arrangements between South Korea and the EU are governed in many spheres by a Free Trade Agreement (FTA) entered into in 2011. The FTA with Korea was the first of a new generation of FTAs that delve into broader issues, including the regulation of electronic communications and of e-commerce.

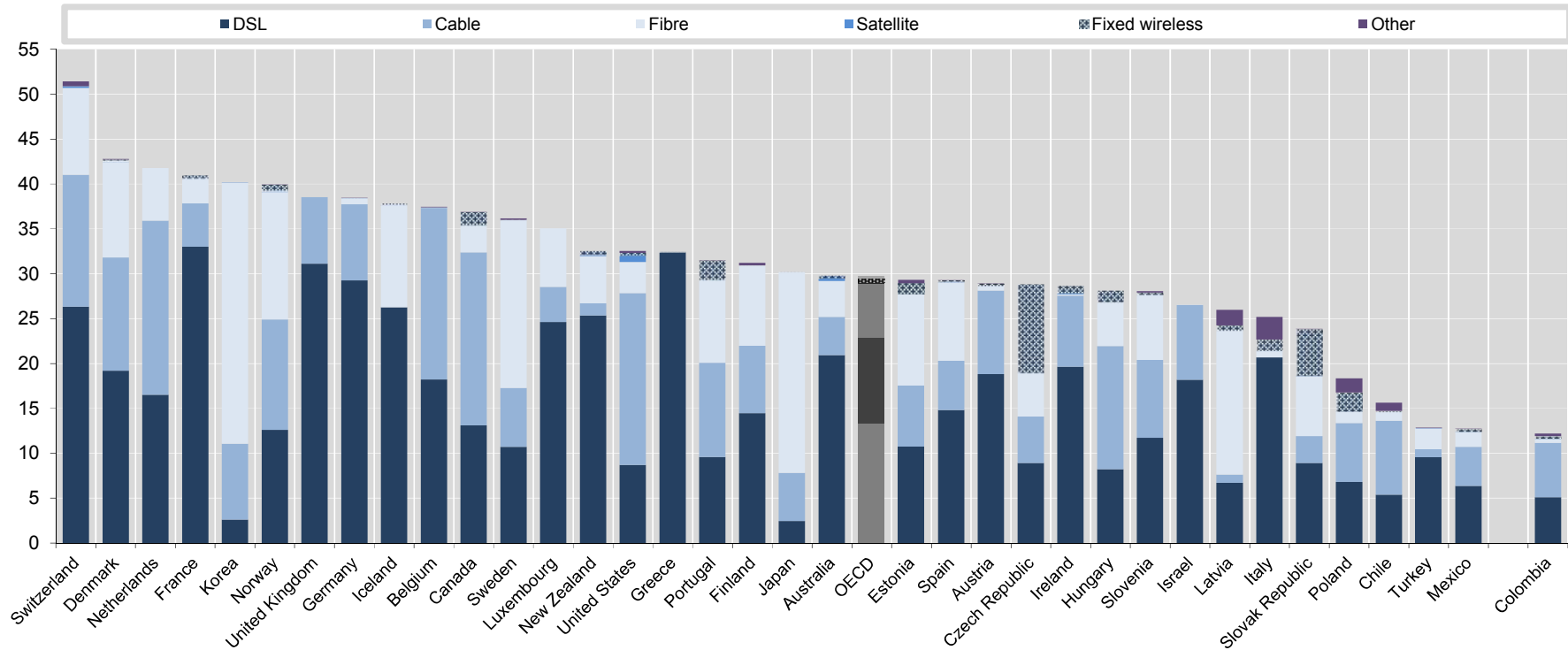
Here as elsewhere, we provide (1) a brief overview of market factors for each of the countries under consideration (Section 4.1); (2) a discussion of relevant treaty and legal aspects (Section 4.2); (3) an assessment of the overall implementation of law and regulation of electronic communications at national level (Section 4.3); (4) a more detailed discussion of specific policy elements including *mobile termination rates (MTRs)*, local loop unbundling (LLU), and international mobile roaming (Section 4.4); and (5) an overall comparative assessment (Section 4.5).

4.1. Market factors for the countries under consideration

The four countries considered here are among the most advanced in the world in terms of their electronic communications markets, and also in terms of their policy and regulatory approaches to electronic communications.

We compare these countries to one another and to other developed countries in terms of their deployment, adoption, and use of broadband services. According to OECD statistics, all four countries have among the highest fixed broadband penetration in the world (see Figure 6), and also among the fastest broadband (as measured by Akamai, M-Lab, and Ookla) in the world (see Figure 7).

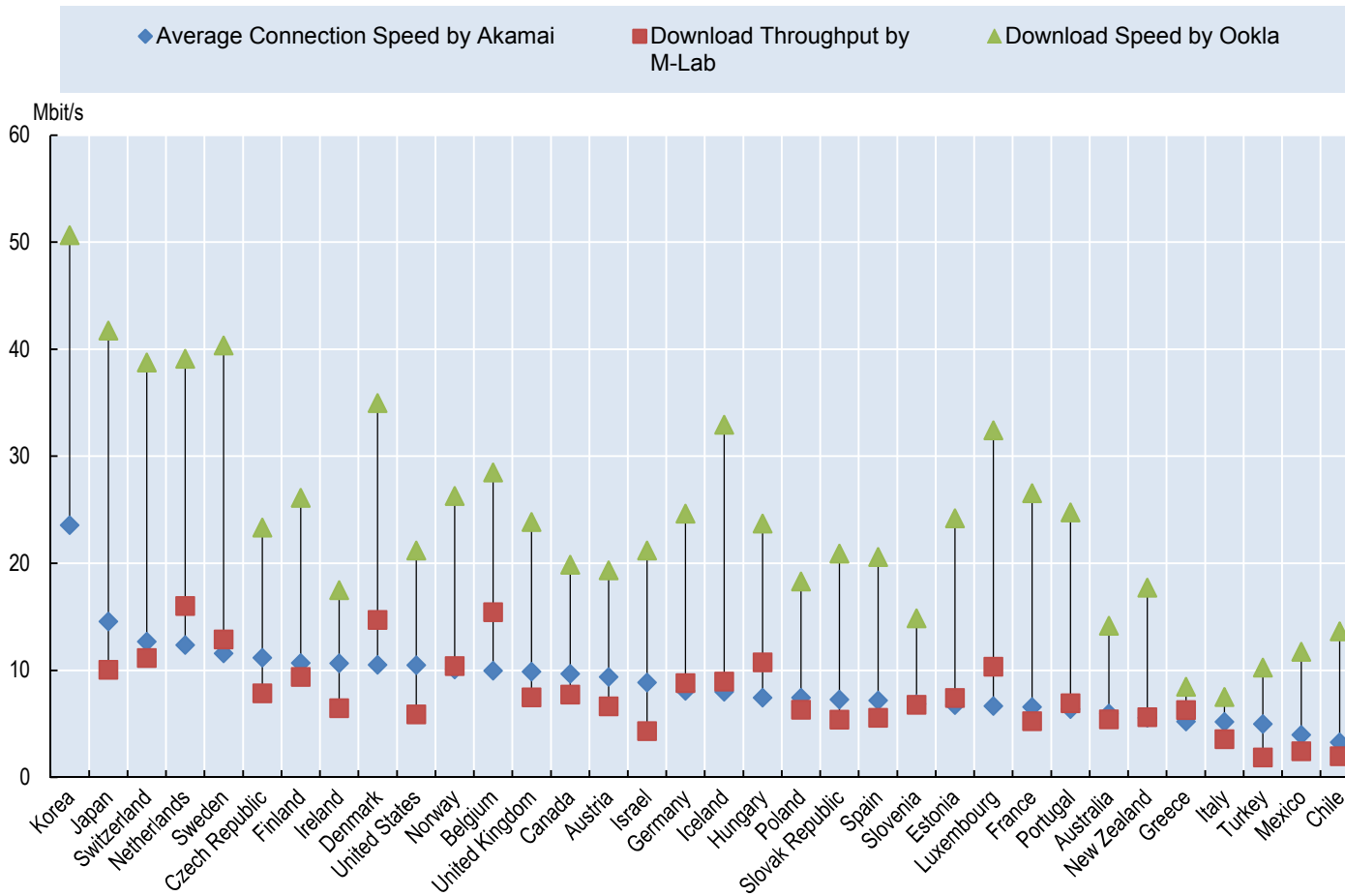
Figure 6. Fixed broadband subscriptions per 100 inhabitants, by technology, June 2016



Source: OECD Broadband statistics⁸⁵

⁸⁵ See <http://oecd.org/sti/ict/broadband>, viewed 22 April 2017.

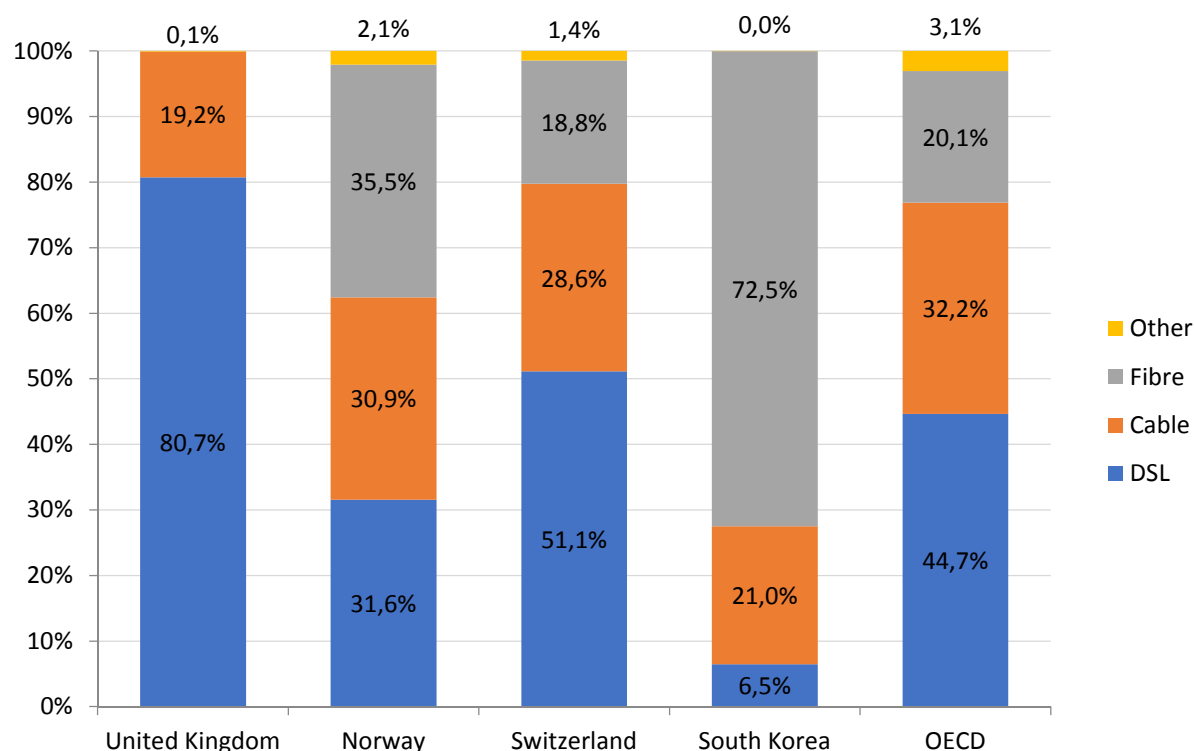
Figure 7. Actual download speeds, fixed or unspecified broadband, Akamai, M-Lab and Ookla, Mbit/s (2015)



Source: OECD Digital Economy Outlook 2015 - © OECD 2015

The data in Figure 8 also serve to demonstrate that the mix of technologies among the four countries is very different. These data are broken out differently than in Figure 7. A very high fraction (72,5%) of the broadband lines in Korea, which is known for extremely fast broadband networks, are fibre (i.e. *fibre to the premises (FTTP)* or *fibre to the home (FTTH)*). Conversely, a high fraction of broadband lines in the UK (80,7%) are DSL, while the deployment of FTTP/FTTH is negligible. Both diverge widely from the OECD aggregate of 44,7% DSL and 20,1% fibre.

Figure 8. Fixed broadband subscriptions by technology as a percentage of all fixed broadband subscriptions, June 2016



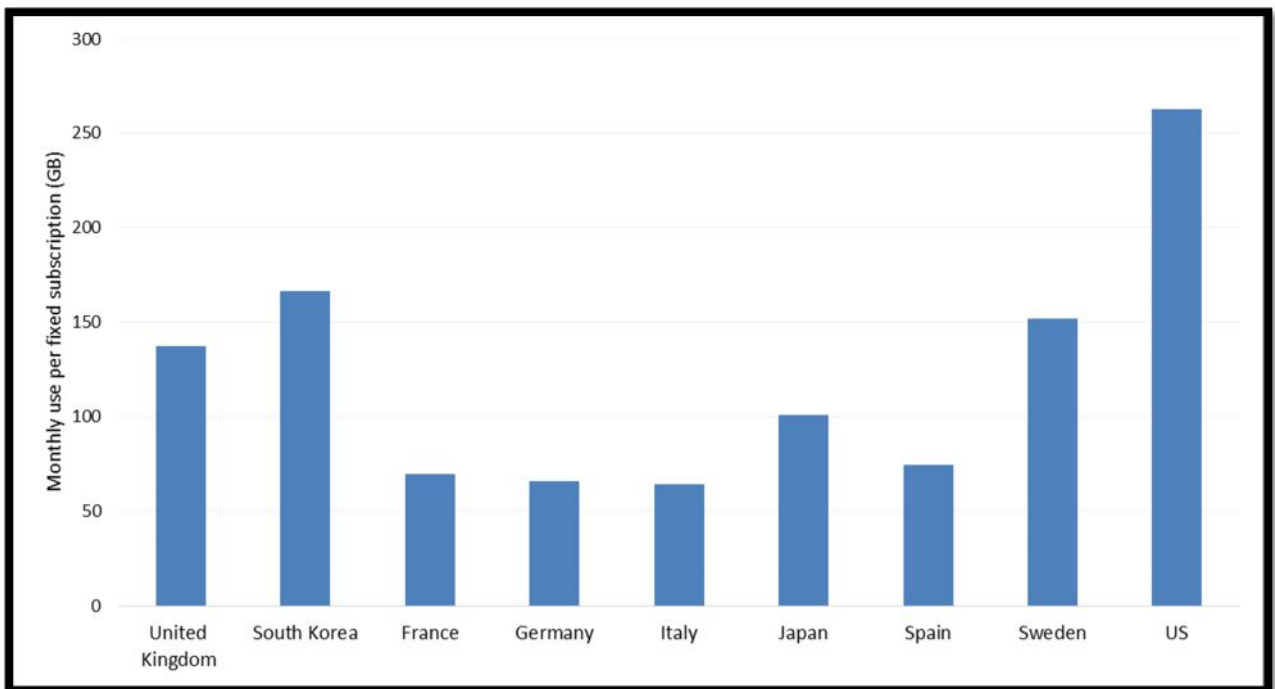
Source: OECD Broadband statistics,⁸⁶ Bruegel calculations

It is clear from Figure 7 that Korean broadband networks are indeed very fast, but one should interpret this observation with care for two distinct reasons. First, the difference in actual speed delivered to consumers is far less than one might infer from the technology mix differences (see again Figure 8). Second, even though UK networks are not as fast as those in Korea or Japan, the average *usage* of the fixed broadband network in the UK (expressed in GB/month) is much greater than that in natural comparator countries such as France, Germany, Spain and Italy (see figure 9).

Perhaps surprisingly, the average usage of the fixed broadband network in the UK is also greater than that in Japan, which like Korea has very fast networks. The data do not suggest that the UK is impeded by the extensive use of VDSL.

⁸⁶ See <http://oecd.org/sti/ict/broadband>, viewed 22 April 2017.

Figure 9. Monthly use (GB) of fixed broadband per subscription, selected countries, 2016



Source: Cisco Visual Networking Index, Bruegel calculations

Many other trends are visible in the four countries, such as (1) a general decline in the number of fixed telephone lines, (2) increasing importance of mobile broadband services, and (3) growing significance of so-called *over-the-top (OTT)* electronic communication services that are delivered over the Internet rather than over conventional telecommunications networks.

4.2. Treaty and legal considerations

Regulation of electronic communications within the European Union is based on the five Directives that comprise the *Regulatory Framework for Electronic Communications (RFEC)*.⁸⁷ In addition, a number of supporting legislative instruments are relevant to the analysis in this chapter, including Regulation 2015/2120 which deals with network neutrality and roaming.

In addition, a number of supporting legislative instruments are relevant to the analysis in this chapter, including Regulation 2015/2120 which deals with network neutrality and roaming.

The RFEC was launched in 2002 as a means of strengthening scale economies across Europe, and of introducing competition into a telecommunications sector that had not yet been fully liberalised.⁸⁸ It did this primarily (1) by ensuring that Member States could not introduce needless barriers to entry of new market players (in the Authorisation Directive), and (2) by introducing a complex set of measures that oblige National Regulatory Authorities (NRAs) in each of the Member States to periodically evaluate markets where a competition problem that might hinder competitive entry was likely to be present, to identify any market players that currently possessed problematic barriers to entry (i.e. *Significant Market Power*, or *SMP*), and to impose proportionate remedies (such as *local loop unbundling*, or *LLU*) to address and SMP problems that they might find (in the Framework Directive and in the Access Directive).

The RFEC deals with a wide range of additional issues, including (1) the management of scarce resources such as radio spectrum and numbers; (2) consumer protection aspects that are specific to electronic communications; and (3) the provision of universal service (i.e. ensuring that basic electronic communications are available to all at an affordable price).

⁸⁷ The Regulatory Framework for Electronic Communications (RFEC) is identified in Recital 5 of Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive), [2002] OJ L108/33, <http://data.europa.eu/eli/dir/2002/21/oj> (consolidated version: <http://data.europa.eu/eli/dir/2002/21/2009-12-19>) as consisting of the Framework Directive itself and the four Specific Directives. Article 2 point (I) of the Framework Directive goes on to define the Specific Directives. These are Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services (Authorisation Directive), [2002] OJ L108/21, <http://data.europa.eu/eli/dir/2002/20/oj> (consolidated version: <http://data.europa.eu/eli/dir/2002/20/2009-12-19>); Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive), [2002] OJ L108/7 (<http://data.europa.eu/eli/dir/2002/19/oj> (consolidated version: <http://data.europa.eu/eli/dir/2002/19/2009-12-19>); Directive 2002/22/EC of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive), [2002] O. 2002 L108/51, <http://data.europa.eu/eli/dir/2002/22/oj> (consolidated version: <http://data.europa.eu/eli/dir/2002/22/2016-04-30>); and Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications), [2002] OJ L201/37), <http://data.europa.eu/eli/dir/2002/58/oj> (consolidated version: <http://data.europa.eu/eli/dir/2002/58/2009-12-19>). Amendments to these directives are reflected in the consolidated versions.

⁸⁸ For a list of explicit objectives, see Art. 8 Framework Directive. See also Garnham, N. (2004), 'Contradiction, Confusion and Hubris: A Critical Review of European Information Society Policy', keynote address to the EuroCPR conference, Barcelona, March, 2004; available at: <http://www.cprsouth.org/wp-content/uploads/2011/11/garnham-debate.pdf>.

The RFEC was modernised and improved in 2009. The European Commission put forward a further major overhaul in 2013; however, the proposals were not well thought through,⁸⁹ and most were rejected either by the Parliament or by the Council.⁹⁰ In September 2016, the European Commission put forward a new European Electronic Communications Code that seeks to further improve the RFEC and to collect the five Directives into a single Directive.⁹¹ The analysis in this chapter is based on the RFEC in its present form, not on the proposed Code.

The **United Kingdom** is fully subject to the RFEC, and will continue to be so as long as it is an EU Member State. In fact, the UK was a major driver of the original RFEC, and its NRA Ofcom continues to be a major driver of progressive innovations within the RFEC.

As an EEA member, **Norway** is also fully subject to the RFEC and to most related EU legislation. Electronic communications are not excluded from the scope of the EEA Agreement (see Chapter 2).

Electronic Communications in Norway are governed by the Electronic Communications Act.⁹² The Act appears to represent a fairly straightforward and direct transposition of the RFEC into Norwegian national law.

In many cases, the Electronic Communications Act relies on the EFTA Surveillance Authority to interpret European instruments as appropriate. For instance, the definition of geographic markets where the Norwegian NRA Nkom is obliged to assess possible SMP, and the principles to be applied in assessing those markets, are to be determined by the EFTA Surveillance Authority.⁹³ In practice, the EFTA Surveillance Authority documents are often identical to the corresponding Recommendations of the European Commission.⁹⁴

When an EU Member State makes a decision such as a market analysis that “would affect trade between Member States”, it is required to notify the Commission, BEREC, and the NRAs of the other Member States of its decision at the same time.⁹⁵ A similar provision appears in the Norwegian Electronic Communications Act; however, the notification is to the EFTA Surveillance Authority, and the time frames are strikingly long. “The Authority⁹⁶ shall send a reasoned proposal for new market analysis of the relevant market within three years from the date for the applicable decision in the market. In special cases, the deadline may be extended by three years.

⁸⁹ J. Scott Marcus, Ilsa Godlovitch, Pieter Nooren, Bram van den Ende, Jonathan Cave and Werner Neu: “How to Build a Ubiquitous EU Digital Society”, November 2013, available at: [http://www.europarl.europa.eu/RegData/etudes/etudes/JOIN/2013/518736/IPOL-ITRE_ET\(2013\)518736_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/JOIN/2013/518736/IPOL-ITRE_ET(2013)518736_EN.pdf).

⁹⁰ Regulation 2015/2120, which addresses network neutrality and provides for Roam like at Home (RLAH), resulted from this initiative.

⁹¹ European Commission (2016), Proposed Directive establishing the European Electronic Communications Code, at: <https://ec.europa.eu/digital-single-market/en/news/proposed-directive-establishing-european-electronic-communications-code> viewed 22 April 2017.

⁹² ACT No. 83 of 04 July 2003: Act relating to electronic communications (The Electronic Communications Act).

⁹³ Section 3-2 and 3-3 Electronic Communications Act.

⁹⁴ Nkom (2016), Relevant Markets, <https://eng.nkom.no/market/market-regulation-smp/about/relevant-markets>, viewed 22 April 2017.

⁹⁵ Art. 7 Framework Directive.

⁹⁶ Under Section 1-4 Electronic Communications Act, the Authority is “the King, the Ministry and the Norwegian Post and Telecommunications Authority”

The deadline for analysis of markets that have not previously been notified to the EFTA Surveillance Authority is two years from the decision made by the EFTA Surveillance Authority on new recommendations for the relevant market.”⁹⁷

Directives tend to be transposed into national law somewhat later than in the EU Member States, and some interpretation on the part of the EFTA Surveillance Authority may be required; however, consistency with EU rules is generally ensured. Regulations must also be transposed into national law, since they do not automatically have direct effect in EEA member countries (see Chapter 2).

As an EEA member, Norway has observer status in the *Board of European Regulators of Electronic Communications (BEREC)*,⁹⁸ an association of European NRAs that has official duties under the RFEC. Norway is in fact very active in BEREC Working Groups. The Norwegian government is of the view, however, that it should be a member of BEREC rather than an observer – due to the disagreement on this point, the 2009 revisions to the RFEC have not formally been adopted (although most provisions that do not relate to BEREC have in practice been transposed into Norwegian national law).

As an EFTA member that is not an EEA member, **Switzerland** is not subject to the RFEC. Switzerland has numerous bilateral agreements in place with the EU, but there is no overall agreement that addresses electronic communications.

Electronic Communications in Switzerland are governed by the *Telecommunications Act (TCA)* of 30 April 1997 as amended,⁹⁹ as supplemented by the *Ordinance on Telecommunications Services (OTS)* of 9 March 2007.¹⁰⁰ The Ordinance specifies in legislation many details that in other countries might have been left to the discretion of the NRA. The Swiss legislation reflects some of the principles of the RFEC, but diverges in important respects.

Switzerland does not have an explicit legal entitlement to participate in BEREC,¹⁰¹ but nonetheless enjoys observer status in practice at BEREC.¹⁰² BEREC can choose to admit parties not specifically named in the BEREC Regulation, and it has chosen to do so.

In the case of **South Korea**, the notable instrument for third country cooperation is the Free Trade Agreement of 2011.¹⁰³ The FTA covers basic telecommunications services, as defined in the WTO “Services Sectoral Classification List” document MTN/GNS/W/120, to include:

- a) Voice telephone services
- b) Packet-switched data transmission services

⁹⁷ Section 9-3 Electronic Communications Act.

⁹⁸ Art. 4(3) BEREC Regulation.

⁹⁹ Telecommunications Act (TCA) of 30 April 1997 (status as of 1 July 2010), 784.10. This is a courtesy translation provided by the Federal Office of Communications (Ofcom), the Swiss NRA.

¹⁰⁰ *Ordinance on Telecommunications Services (OTS)* of 9 March 2007 (status as of 13 June 2016), 784.101.1. This is a courtesy translation provided by the Federal Office of Communications (Ofcom), the Swiss NRA.

¹⁰¹ Art. 4(3) BEREC Regulation. “BEREC may invite other experts and observers to attend its meetings.”

¹⁰² BEREC Office (2016), List of the Members and Observers of the Management Committee of the Office of the Body of European Regulators for Electronic Communications (BEREC Office) established pursuant to Articles 7 (1) and 4 (1) of Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office, BEREC Office ref. No MC (16) 51.

¹⁰³ Art. 7.25 and 7.27 through 7.36 South Korea FTA.

- c) Circuit-switched data transmission services
- d) Telex services
- e) Telegraph services
- f) Facsimile services
- g) Private leased circuit services¹⁰⁴

The key provisions of the FTA in regard to electronic communications can be summarised as follows:

- The **regulatory authority** for telecommunications must be independent of any supplier of telecommunications services; sufficiently empowered to regulate the telecommunications services sector; and employ procedures and take decisions that are impartial with respect to all market participants.¹⁰⁵
- A **licence** can be required to obtain frequencies, numbers and rights of way. Procedures to obtain authorisation should be simple, the time should be reasonable, and any licence fees should not exceed reasonable administrative costs.¹⁰⁶
- **Major suppliers** may not be permitted to (1) engage in anti-competitive cross-subsidisation; (2) use information obtained from competitors with anticompetitive results; or (3) fail to make available information about essential facilities that is needed to enable competitors to provide services.¹⁰⁷
- **Interconnection** should be commercially negotiated. Major suppliers must provide interconnection under non-discriminatory terms, conditions and rates, and the rates must moreover be cost-oriented, transparent, and reasonable.¹⁰⁸
- Relevant service providers (other than VoIP providers) must provide **number portability** to the extent technically feasible, and on reasonable terms and conditions.¹⁰⁹
- "Any procedures for the allocation and use of **scarce resources**, including **radio frequencies, numbers and rights of way**, shall be carried out in an objective, timely, transparent and non-discriminatory manner."¹¹⁰
- **Confidentiality** must be preserved without restricting trade in services.¹¹¹
- Suitable provisions must be in place for **dispute resolution**.¹¹²
- As regards **cross-border transfers of personal data**, the Parties to the FTA commit "to protect fundamental rights and freedom of individuals, shall adopt adequate safeguards to the protection of privacy, in particular with regard to the transfer of personal data".¹¹³

¹⁰⁴ Art. 7.27 South Korea FTA, footnote 32.

¹⁰⁵ Art. 7.28 South Korea FTA.

¹⁰⁶ Art. 7.29 South Korea FTA.

¹⁰⁷ Art. 7.30 South Korea FTA.

¹⁰⁸ Art. 7.31 South Korea FTA.

¹⁰⁹ Art. 7.32 South Korea FTA.

¹¹⁰ Art. 7.33 South Korea FTA.

¹¹¹ Art. 7.35 South Korea FTA.

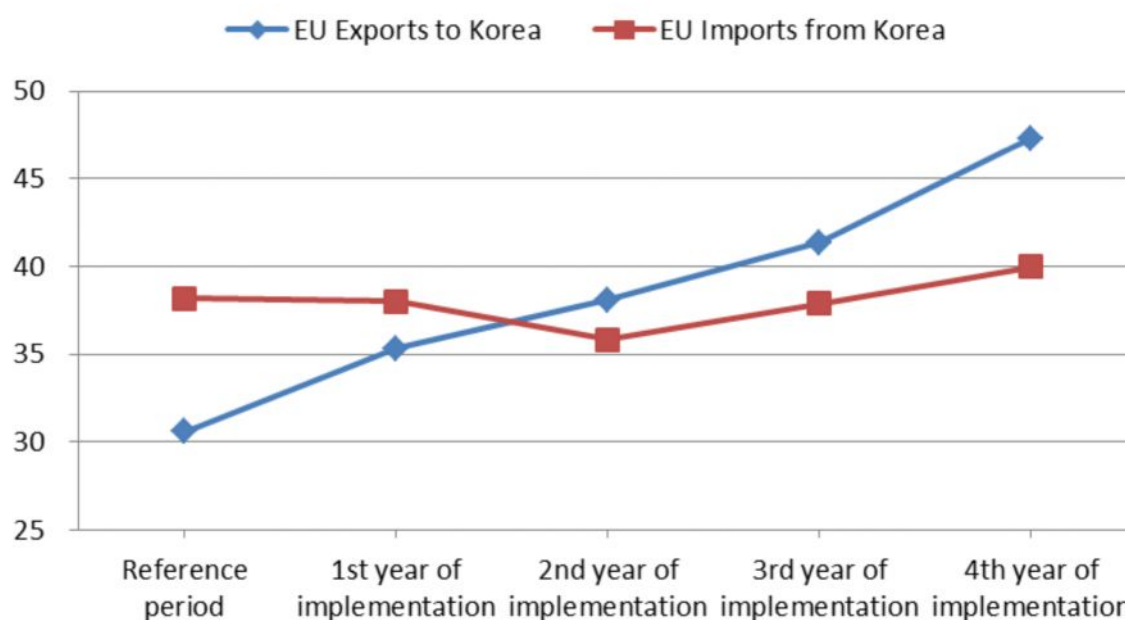
¹¹² Art. 7.36 South Korea FTA

¹¹³ Art. 7.43 South Korea FTA.

- Electronic commerce must be fully compatible with international standards on data protection, and are not to be subject to customs duties on deliveries by electronic means.¹¹⁴

The European Commission finds that the overall effects to date of the FTA on the EU have been positive: "Based on more than four years of implementation, one can conclude that the EU-Korea FTA has worked very well. EU exports of goods to Korea increased by 55% in the fourth year of FTA implementation, compared to the 12-month period before the FTA took effect. On the EU-side, exports of fully and partially liberalised goods have also increased more than exports overall, with an increase of 57% for fully liberalised goods and 71% for partially liberalised goods. Also trade in services has increased by 11% in EU exports to Korea and 4% in EU imports from Korea in 2014 compared to 2013. Over the same period, bilateral FDI stocks have increased by 35%."¹¹⁵ The increase in exports from the EU to South Korea is clearly visible in Figure 10. South Korea has also benefitted, but those benefits have been less dramatic.

Figure 10. EU Exports to and imports from Korea (€ billion), July 2010-June 2015



Source: European Commission (2016)¹¹⁶

Telecommunications regulation in South Korea is subject to the *Telecommunications Business Act*.¹¹⁷ Large portions of the Telecommunications Business Act deal with authorisation or withdrawal of telecommunications services.

¹¹⁴ Art. 7.48 and 7.49 South Korea FTA.

¹¹⁵ European Commission (2016), "Annual Report on the Implementation of the EU-Korea Free Trade Agreement", COM(2016) 268 final, 30 June 2016.

¹¹⁶ European Commission (2016), "Annual Report on the Implementation of the EU-Korea Free Trade Agreement", COM(2016) 268 final, 30 June 2016.

¹¹⁷ Telecommunications Business Act (partially amended by Law No. 8867 dated 29 February 2008). The analysis in this chapter is based on an English language courtesy translation provided by the Korean MCC, which functions as the NRA for South Korea.

The Act also provides for consumer protection, and offers many of the same procompetitive instruments that appear in the European RFEC.

Upon receipt of a request for the provision of telecommunications facilities from another common carrier, for example, a common carrier that possesses essential facilities or whose business size or market share is sufficiently large must make its telecommunications facilities by concluding an agreement.¹¹⁸ Furthermore, the KCC (the South Korean NRA) is empowered to impose local loop unbundling.¹¹⁹

The FTA places few explicit requirements on South Korea in terms of harmonisation of regulation of electronic communications with that of Europe; however, an interviewee has suggested that the FTA with EU (and the earlier, wide-ranging FTA between South Korea and the United States) had the effect of encouraging liberalisation of the South Korean regulatory system. Resale was introduced, for instance, enabling the emergence of dozens of Mobile Virtual Network Operators (MVNOs), and the authorisation process was simplified somewhat.

On 16 June 2014, European Commission Vice President Neelie Kroes and South Korean Minister of Science, ICT and Future Planning (MSIP) Mun-kee Choi signed a "Joint Declaration on Strategic Cooperation in Information Communications Technology (ICT) and 5G".¹²⁰ Focus areas include network and communications, 5G, cloud computing.

The Commission announced at the same time¹²¹ that an industry memorandum of understanding would be concluded between the 5G Infrastructure Association (whose members include Alcatel-Lucent, Atos, Deutsche Telekom, Ericsson, Nokia, Orange, Telecom Italia, Telenor and Telefonica) and South Korea's 5G Forum.

These are promising steps, inasmuch as South Korea is a leader in technology for mobile services. At the same time, the Joint Declaration does not appear to contain any specific commitments. The corresponding memorandum of understanding has reportedly been concluded.¹²² It calls for cooperation "on the organization of a series of 'Global 5G Events' in the interest of efficiency and building global consensus on 5G." The impact appears to be positive, but limited".

4.3. Implementation at national level

A key focus in this section is the degree to which procedures in the four countries achieve *regulatory harmonisation* and *economic convergence* with the EU. The degree of consistency with European regulation achieved by Norway, Switzerland and South Korea varies greatly, but the differences are more obvious in some policy aspects than in others.

¹¹⁸ Art. 33-5 Telecommunications Business Act.

¹¹⁹ Art. 33-6 Telecommunications Business Act.

¹²⁰ "Joint Declaration between the Republic of Korea and the European Commission on Strategic Cooperation in the Area of Information and Communications Technology and 5G",
at:http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?action=display&doc_id=6067
viewed 23 April 2017.

¹²¹ European Commission (2014), "Landmark agreement between the European Commission and South Korea on 5G mobile technology", http://europa.eu/rapid/press-release_IP-14-680_en.htm viewed 23 April 2017.

¹²² 5GPPP (2015), "Memorandum of Understanding (MoU) to cooperate on the organization of a series of "Global 5G Events" in the interest of efficiency and building global consensus on 5G":
<https://5g-ppp.eu/leading-5g-visionary-organizations-in-europe-usa-japan-south-korea-and-china-sign-multi-lateral-memorandum-of-understanding-for-global-5g-events/> viewed 14 May 2017.

The **United Kingdom** is fully subject to RFEC, and will remain so as long as the UK continues to be a Member State of the EU.

The UK was indeed one of the main drivers of the procompetitive aspect of the RFEC as adopted in 2002, and continues to be a major driver of permissible innovation within the scope of the RFEC.

As a first example, consider the functional separation of BT Group plc (the holding company that is the parent of the UK incumbent) that led to the creation of a wholesale-only infrastructure provider, Openreach. This functional separation was nominally voluntary on the part of BT, but in practice was done under threat of a referral of BT to the UK competition authorities. It was put in place not as a matter of regulation, but rather as a series of undertakings between BT and Ofcom, the UK NRA.

The functional separation had not been explicitly foreseen by the RFEC, but it was not prohibited, and was accepted by the Commission.¹²³ It appears to have been somewhat effective in combatting longstanding challenges in achieving non-discrimination between provision of wholesale services to BT competitors in comparison to the prices, terms and conditions of corresponding services to BT itself.

The arrangement was creative and forward-looking, but it has not been fully successful. Many argue that Openreach had insufficient incentives to deploy new fibre-based technology in the UK (see Section 4.1). Consumers have complained of poor service, while competitors “such as Sky, TalkTalk and Vodafone, which use Openreach's network to offer broadband to consumers, have long complained of high charges, poor service and failure to invest in the division.”¹²⁴ This led to calls for BT to fully separate Openreach as an entirely distinct firm, which BT has now agreed to do.¹²⁵

As another noteworthy example, Ofcom was a leader in the use of *sub-national markets* for the market analysis that comprises a central element of the RFEC. The RFEC does not fix the geographic bounds over which market definition and market analysis should be conducted, but it is almost always done for the Member State as a whole, on the theory that competition in one part of the Member State influences prices, terms and conditions throughout. The practical reality is that doing a more granular analysis is time-consuming and difficult. In the UK, there were good reasons to believe that competition was very different in certain densely populated areas than elsewhere. Ofcom pioneered the process of conducting this challenging analysis, imposed remedies for bitstream access on BT that were less stringent in selected areas, and obtained approval from the Commission through the normal notification process.¹²⁶

As an EEA member, **Norway** is fully subject to the RFEC. All indications are that these arrangements achieve a high degree of consistency with evolving EU arrangements; however, a substantial lag time is sometimes in evidence.

As noted at the start of Section 4, Norway is generally prompt in transposing Regulations and Directives, generally meeting the dates established by the EFTA Surveillance Authority

¹²³ The 2009 amendments to the RFEC explicitly deal with voluntary and with involuntary separation of a network operator. Art. 13a and 13b Access Directive.

¹²⁴ Dearbail Jordan (2017), “BT Openreach deal aims to shake up UK broadband”, *BBC News*, 10 March 2017, <http://www.bbc.com/news/business-39228115> viewed 23 April 2017.

¹²⁵ Ibid. “Ofcom said that Openreach will become a distinct company with its own staff, management and strategy ‘to serve all of its customers equally’.”

¹²⁶ Under Art. 7 Framework Directive.

which however will tend to be later than the corresponding dates for EU Member States. *Indeed, by this measure, Norway's compliance could be said to be better than that of many EU Member States.*

When one considers the list of markets that Nkom, the Norwegian NRA, has identified as being "susceptible for ex-ante regulation in Norway" (see Table 9), time lags are evident. As Nkom notes, "The numbering follows ESA's recommendation of 2008, with the exception of Market 15 which refers to ESA's first recommendation of 2004."¹²⁷ The last of these markets has been deemed to be subject to competition, and has not been subject to market analysis in the EU for many years (although individual Member State NRAs are permitted to analyse markets that they deem to have competition problems under market conditions specific to their Member State pursuant to the so-called *three criteria test*).

As previously noted, the long delay in transposition of the RFEC reflects a lack of agreement between the Norwegian government and the European institutions as to Norway's appropriate role in BEREC – Norway feels that it should be entitled to membership, and not just observer status. The continued regulation of call origination on mobile networks has however been maintained for substantive reasons, and not merely as a result of delay. With only two Mobile Network Operators (MNOs) in Norway, Nkom is of the view that the Norwegian mobile call origination market is not sufficiently competitive to justify deregulation at this time.

Table 9. Markets susceptible to ex ante regulation in Norway, 2017.

Market	Description
3	The wholesale markets for voice call termination on the public network at a fixed location
4	The market for wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location
5	The market for wholesale broadband access
6	The wholesale market for leased lines with capacity up to and including 8 Mbit/s
7	The wholesale markets for voice call termination on individual mobile communications networks
15	The wholesale market for access and call origination on public mobile telephone networks

Source: Nkom¹²⁸

¹²⁷ Nkom (2016), Relevant Markets, <https://eng.nkom.no/market/market-regulation-smp/about/relevant-markets>, viewed 22 April 2017.

¹²⁸ Ibid.

Provisions in **Switzerland** (as an EFTA member that is not a member of the EEA) are not identical to those in the EU, but they are directionally similar.

As explained in Section 4.2, a key element of the RFEC obliges the National Regulatory Authority (NRA) to periodically evaluate markets where a competition problem that might hinder competitive entry is likely to be present, to identify any market players that currently possess problematic barriers to entry (i.e. *Significant Market Power*, or *SMP*), and to impose proportionate remedies (such as *local loop unbundling*, or *LLU*) to address any SMP problems that they might find.

The Swiss Telecommunications Act does not use the term *SMP*, nor does it require the Swiss NRA to periodically assess whether *SMP* is present; however, it provides a somewhat equivalent mechanism. Arrangements are to be commercially negotiated; however, any network operator can lodge a complaint with the Swiss NRA. This means in effect that instead of imposing remedies *ex ante* (in advance), the Swiss NRA can only respond *ex post* in response to a complaint.

Once a complaint has been lodged, the Swiss NRA applies substantially the same tools and methods as an EU Member State NRA. As in the EU, determinations are made broadly in line with competition law and economics. "If the question of dominance in the market must be assessed, the Office [i.e. the NRA] shall consult the Competition Commission."¹²⁹

The remedies imposed tend to be similar to those employed in the EU. "Providers of telecommunications services that have a dominant position in the market must provide access to other providers in a transparent and non-discriminatory manner at cost-oriented prices in the following forms to their facilities and their services:

- a) fully unbundled access to the local loop;
- b) fast bitstream access for four years;
- c) rebilling for fixed network local loops;
- d) interconnection;
- e) leased lines;
- f) access to cable ducts, provided these have sufficient capacity."¹³⁰

For South Korea, it is not meaningful to speak of harmonisation *per se*. *The goals of the FTA had to do with reciprocal market access, not with regulatory harmonisation*. Mechanisms under the Korean Telecommunications Business Act are substantially different from those used in Europe. Nonetheless, the same issues are addressed, often in ways that would tend to achieve somewhat comparable results.

At the same time, interviewees tell us that the FTAs with the EU and even more so with the US have promoted liberalisation in South Korea, and have in a few instances motivated South Korea to implement regulatory reforms that bring it more in line with US and EU practice, even in the absence of a specific FTA-driven obligation to do so. For instance, South Korea had no provisions for simple resale of wholesale access prior to enactment of the FTA with the US. The implementation of these wholesale provisions subsequently enabled more than two dozen Mobile Virtual Network Operators (MVNOs) to enter the South Korean market.

¹²⁹ Art. 11a(2) Telecommunications Act.

¹³⁰ Art. 11(1) Telecommunications Act.

Similarly, South Korea's FTA with the EU called for simplicity as regards the authorisation provisions that enable market entry. The FTA did not compel changes in South Korea's rules, but has in fact contributed to some simplification and liberalisation.

4.4. Considerations for specific policy elements

In this section, we will consider *mobile call termination rates (MTRs)*, wholesale charges for *Local Loop Unbundling (LLU)*, and international mobile roaming as examples that demonstrate the similarities and differences among implementation in the three countries, expose the degree to which economic convergence is achieved or not, and serve to compare them to EU Member States such as the UK in its present form.

MTRs are wholesale payments that the *mobile network operator (MNO)* that originates a voice call makes to the MNO that completes or terminates the call. The consumer does not see these payments at wholesale level, but they influence the price that the consumer pays at retail. In practical terms, the MTR that is paid sets a lower bound on the price that the originating MNO will wish to charge at retail level for a mobile-to-mobile call. A high MTR thus has some tendency to soften competition, and to lead to higher consumer prices.¹³¹

These rates have been regulated in the EU since the RFEC was introduced in 2002.¹³² In 2009, the European Commission recognised that the rates imposed in many of the Member States were well in excess of real underlying costs, and consequently introduced a harmonising Recommendation in order to bring them more rapidly into the appropriate range.¹³³

The regulation of MTRs can be shown to have increased the societal welfare of Europe overall.¹³⁴

Table 10. Average Mobile Termination Rate (MTR) per country (€ cents as of July 2016)

Country	Average MTR (€ cents)
United Kingdom	0,6393
Norway	0,6976
Switzerland	5,9232
South Korea	2,0813
EU-28 (simple average)	1,0435
EU-28 (weighted average)	1,0836
OECD average	1,5769

Source: BEREC (2016), OECD (2015), Bruegel calculations

¹³¹ The full interactions between MTR and retail price are in fact complex, and well beyond the scope of this study.

¹³² A few Member States, notably including the UK, had already imposed regulation on MTRs prior to the introduction of the RFEC. Fixed network termination rates were regulated in most Member States even prior to the introduction of the RFEC.

¹³³ European Commission (2009), Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC), 7 May 2009, (2009/396/EC), in: Official Journal of the European Union, L 124/67, 20.05.2009, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:124:0067:0074:EN:PDF>.

¹³⁴ See Section 5.1 of J. Scott Marcus, Ilsa Godlovitch, Pieter Nooren, Bram van den Ende, Jonathan Cave and Werner Neu: "How to Build a Ubiquitous EU Digital Society", November 2013, available at: [http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET\(2013\)518736_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET(2013)518736_EN.pdf).

A few observations flow from this comparison. First, the United Kingdom and Norway have very similar MTRs, and are both well within the range for EU Member States. Second, South Korea is slightly above the OECD average but not out of line with it (and also not out of line with non-EU OECD members). The striking observation, however, is that *MTRs in Switzerland are more than a factor of five higher than the EU average. In fact, Switzerland had the highest MTR in the OECD as of November 2014.*

The reasons for these high charges shed light on the unique characteristics of Swiss arrangements. Recall that the Swiss NRA has no authority to regulate *ex ante*; instead, it can only respond *ex post* to complaints. High MTRs have a tendency to benefit all mobile network operators (MNOs); consequently, no MNO was motivated to complain about high MTRs, so the MTRs continue to this day to be subject to commercial negotiation, and not subject to regulation.

An interviewee informs us that a foreign MNO was unhappy with the high MTRs, and threatened the Swiss MNO with a WTO complaint. (A foreign MNO has no standing to lodge this kind of complaint with the Swiss NRA.) MTRs were in practice reduced as a result (and thus are no longer at the levels shown in Table 10), we are told, but due to commercial pressure rather than regulatory action. No effect is yet visible, however, in the latest BERC statistics.¹³⁵

The wholesale prices paid for Local Loop Unbundling (one of the remedies that can be imposed on a fixed network operator that possess SMP) also provide an interesting case study. In this case, domestic network operators lodged complaints, and the Swiss NRA responded by modelling the cost of providing the service using substantially the same cost modelling tools and techniques that any EU NRA would use. Once again, Switzerland is well above the EU average, and is (with the exception of Finland, where LLU prices are widely viewed as being excessive) higher than prices of any EU Member (see Table 11 and Figure 11). Prices in Norway are higher than average, but generally within the expected range.

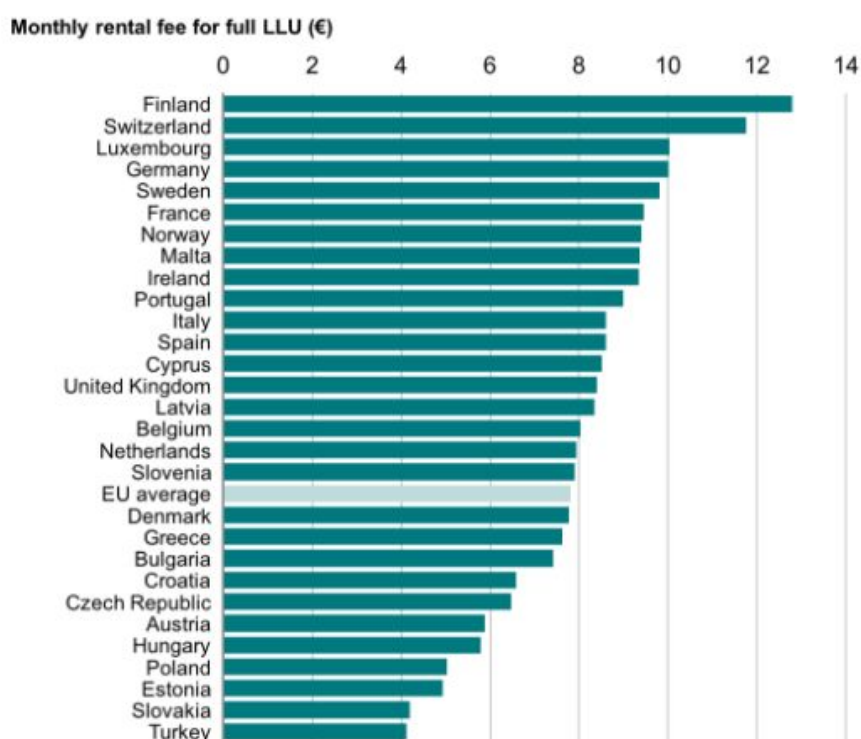
Swiss prices for LLU are clearly high, but are they unreasonably high? Perhaps, but it is not altogether clear. Labour costs in Switzerland are high, the Swiss franc is strong relative to the Euro, and the terrain in parts of Switzerland is mountainous. All of these factors could contribute to a price that is somewhat higher than the EU average.

¹³⁵ BERC (2016), Termination rates at European level July 2016, BoR (16) 218.

Table 11. Wholesale monthly rental fee for full (not shared) unbundled local loops per country (€ as of April 2017)

Country	Average price per full unbundled local loop (€)
Norway	9,46
Switzerland	11,88
EU-28 (simple average)	7,80

Source: Cullen International

Figure 11. Wholesale monthly rental fee for full (not shared) unbundled local loops per country (€ as of April 2017)

Source: Cullen International

International mobile roaming provides another useful point of comparison. As with MTRs, the regulation of roaming to date in Europe can be shown to have benefitted societal welfare.¹³⁶

The Roaming Regulations of 2007, 2009, 2012, and 2015 (i.e. Regulation 2015/2120) are all directly and fully applicable to Norway, Liechtenstein and Iceland as EEA members.

¹³⁶ See Section 5.2 of J. Scott Marcus, Ilsa Godlovitch, Pieter Nooren, Bram van den Ende, Jonathan Cave and Werner Neu: "How to Build a Ubiquitous EU Digital Society", November 2013, available at: [http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET\(2013\)518736_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/518736/IPOL-ITRE_ET(2013)518736_EN.pdf). This analysis does not necessarily hold for *Roam Like at Home (RLAH)*, the effects of which are highly uncertain. See J. Scott Marcus and Georgios Petropoulos (2016), "Challenging prospects for roam like at home", Bruegel.

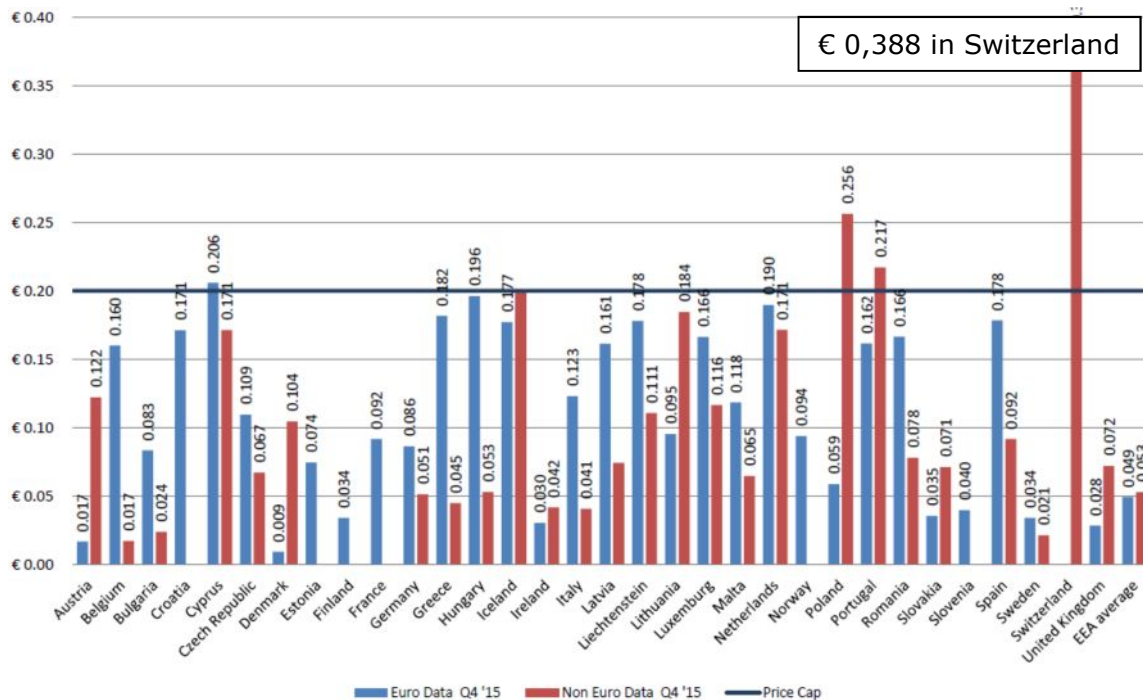
The roaming regulations are not applicable to Switzerland, however, which means that Swiss network operators have no entitlement to the capped wholesale roaming prices that are available to network operators based in the EU/EEA.

Since these underlying wholesale costs are higher in Switzerland than in EU/EEA countries, the prices that consumers pay when roaming could be expected to be substantially higher than those paid by other Europeans when roaming in EU/EEA countries, which is indeed the case.

The data collected every six months by BEREC confirms that the retail price of roaming data services in Norway and in the UK is in the range mandated for EU Member States and EEA members (see Figure 12).

The Swiss NRA voluntarily participates in BEREC’s collection of statistical data concerning wholesale and retail roaming prices. The consequences in terms of consumer prices are thus well documented. As of Q4 2015, average retail prices paid by those with EU mobile services per Mb of data when roaming in an EU/EEA Member State were € 0,049 on the regulated Eurotariff, € 0,053 on unregulated plans. The maximum allowed was € 0,20. For roamers with Swiss mobile services, to whom the regulated Eurotariff is not available, the average price per Mb of roaming data when roaming was a whopping € 0,388 – more than seven times as great as the European average, and nearly twice as great as the highest permitted retail price in the EU. This is clearly visible in Figure 12, where the retail price per Mb of data for Swiss roamers corresponds to the tall red column on the right. There is no blue column for Switzerland because there is no regulated Eurotariff price.

Figure 12. Average retail data price per Mb in Q4 2015 (prepaid+postpaid)



Source: BEREC (2016)¹³⁷

¹³⁷ BEREC (2016), "International Roaming: BEREC Benchmark Data Report: October 2015 – March 2016", BoR (16) 160, 23 September 2016, page 59.

The high price of roaming is not something that the Swiss NRA can fix in any simple way. It is a direct consequence of the decision taken by Swiss voters years ago to remain outside of the EEA. Since the payment that Swiss MNOs make to EU/EEA MNOs for “outbound” roaming is higher than that paid by EU/EEA MNOs, this is the expected outcome. If the cost of providing the service is higher, the price must also be higher.

In sum, Norway seems to be in line with EU arrangements, while Swiss arrangements do not appear to encourage price economic convergence with the EU. Indeed, Swiss prices for MTRs were high not only in comparison to EU Member States and to Norway, but even in comparison with South Korea (where no specific arrangements to ensure convergence exist). This is possibly a consequence of the absence of a systematic review process on Swiss regulatory decisions. For EU Member States, by contrast, the European Commission’s systematic review of regulatory remedies put forward by Member State NRAs¹³⁸ produces downward pressure on these charges, which would tend to benefit consumers.

4.5 Comparative assessment of different arrangements

In the context of electronic communications law, regulation, and policy, it is clear that the various arrangements studied have different strengths and weaknesses.

EU membership maximises harmonisation of law and regulation, as well as scale economies. As regards implementation of the RFEC, arrangements with the **United Kingdom** have worked well to date.

In comparison with EU membership (as exemplified by the UK itself today), EEA membership (as exemplified by **Norway**) offers nearly the same advantages. Policy and regulation are extensively harmonised, and are synchronised over time, albeit with a time lag that can be significant.

Coordination with **Switzerland** by means of bilateral agreements is significantly weaker. Regulation of electronic communications is not one of the areas that is covered by a bilateral agreement. Dialogue with the Swiss NRA (which enjoys observer status at BEREC) is extensive, and Switzerland cooperates voluntarily in a number of statistics-gathering activities. Nonetheless, regulatory policy cannot be said to be harmonised. Moreover, the absence of a review process by the Commission¹³⁹ means that there is no external brake on any tendency for the NRA to be gentle with Swiss network operators, apparently leading to wholesale payments to Swiss network operators that are much higher than those that are typical in the EU. This problem is compounded by an implementation in Swiss law where the NRA is empowered to intervene only when a complaint is lodged.

Arrangements with **South Korea** can be said to have performed well, but in fulfilling very different goals. Trade and Foreign Direct Investment (FDI) have increased. The cooperative model with South Korea is primarily driven by the first of the “new generation” Free Trade Agreements (FTAs). The objective of the FTA is reciprocal market access. Neither regulatory harmonisation nor scale economies were explicit goals.

At the same time, interviewees tell us that the FTAs with the EU and even more so with the US have promoted liberalisation in South Korea, and have in a few instances motivated South Korea to implement regulatory reforms that bring it more in line with US and EU practice, even in the absence of a specific FTA-driven obligation to do so.

¹³⁸ Art. 7 and 7a Framework Directive.

¹³⁹ Art. 7 Framework Directive.

A Joint Declaration is in place between South Korea and the EU¹⁴⁰ as regards cooperation in regard to 5G mobile technology, cloud computing, and network and computing technology in general. Cooperation in these areas is positive in general, but the tangible benefits of the Joint Declaration and the memorandum of understanding are not clear.

The following Table 12 assesses the level of harmonisation of legal arrangements for electronic communications between the EU and its partners. Different colours indicate different degrees of harmonisation (green: high; yellow: medium; red: low). As previously noted, the FTA sometimes inspires policy liberalisation in South Korea, even in cases where it does not specifically require it.

Table 12. Comparison of benchmark countries as regards electronic communications.

	Member State Pre-Brexit UK	EEA member Norway	Bilateral agreements Switzerland	FTA partner South Korea
Regulatory harmonisation is sought	Yes	Yes	Unclear	No
Regulatory harmonisation is achieved	Yes	Yes, albeit with a time lag	Mixed	Coincidental, except where inspired by WTO or FTA issues
Wholesale prices are similar	Yes	Yes	No	Mostly yes

Source: Bruegel

Table 13 highlights how the EU and each of the partner countries benefit from the relative relationships.

¹⁴⁰ See "Joint Declaration between the Republic of Korea and the European Commission on Strategic Cooperation in the Area of Information and Communications Technology and 5G", at http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?action=display&doc_id=6067 viewed 23 April 2017. See also 5GPPP (2015), "Memorandum of Understanding (MoU) to cooperate on the organization of a series of "Global 5G Events" in the interest of efficiency and building global consensus on 5G":

<https://5g-ppp.eu/leading-5g-visionary-organizations-in-europe-usa-japan-south-korea-and-china-sign-multi-lateral-memorandum-of-understanding-for-global-5g-events/> viewed 14 May 2017.

Table 13. Advantages of alternative arrangements.

	Member State Pre-Brexit UK	EEA member Norway	Bilateral Agreements Switzerland	FTA partner South Korea
What are advantages for the EU?	Scale economies, gains in societal welfare, harmonisation that facilitates market entry.	Similar to those of a Member State, but very slightly less effective.	Similar to those of a Member State, but very substantially less effective (harmonisation).	Reciprocal market access, gains from trade. Limited regulatory convergence.
What are advantages for the partner country?	Scale economies, access to the European single market, gains in societal welfare, harmonisation that facilitates market entry.	Similar to those of a Member State, but very slightly less effective.	Similar to those of a Member State, but very slightly less effective (harmonisation). Little sacrifice of autonomy.	Limited regulatory convergence.

Source: Bruegel

In Table 14, we provide our assessment of the relative desirability of different models of third country cooperation from the perspective of the EU. This is independent of the feasibility of arriving at the arrangements in question. The baseline for comparison is taken to be the case where there is no special relationship between the EU and the UK post-Brexit (depicted in the rightmost column).

In the case of South Korea, regulatory harmonisation is not an explicit goal, but the FTA nonetheless plays some role in encouraging liberalisation and a modest degree of harmonisation in practice. It is for that we distinguish between seeking harmonisation versus achieving it.

In terms of economic convergence, Switzerland actually performs worse than many developed countries that have no relationship with the EU. In terms of desirability, however, we rated this model of third country cooperation no worse than any country with which the EU has not relationship. The reasoning is that the UK is unlikely to diverge so widely from European wholesale prices, even in the absence of an agreement that compels this result (but with the notable exception of international mobile roaming, where the UK will likely be subject to the same limitations as Switzerland).¹⁴¹ These prices are highly converged with the rest of the EU at present. Moreover, the UK regulated MTRs even before the EU imposed an obligation to do so.

Table 14. Relative desirability of different models of cooperation in the field of electronic communications from the perspective of the EU.

Thematic area: Electronic communications					
Country	Pre-Brexit UK	Norway	Switzerland	South Korea	
Relationship	Member State	EEA member	Bilateral agreements	FTA	No special relationship
Legal basis for relationship	TEU/TFEU	EEA Agreement	None cover electronic communications	Arts. 7.25 thru 7.36 FTA	Not applicable
Negotiating considerations	Regulatory harmonisation facilitates cross-border services, market entry, and portability and roaming. Together with economic convergence, harmonisation facilitates cross-border market entry.				
Regulatory harmonisation is sought	++	++	0	0	0
Regulatory harmonisation is achieved	++	++	+	0 to +	0
Economic convergence	++	++	0	0	0

++: much better than the baseline; +: better than the baseline; 0: comparable to the baseline

Source: Bruegel

¹⁴¹ J. Scott Marcus (2016), Mobile roaming, Brexit, and unintended consequences, Bruegel blog.

5. RESEARCH POLICY

KEY FINDINGS

- The UK is a net beneficiary of EU Framework Programme funding. The UK received 14,4% of the FP7 allocated budget (about € 6 billion), but contributed only around 12% of the funding according to its GDP weight (around 12%). The UK's lead universities did very well.
- Norway, with research and innovation that is only modestly strong (but well-endowed with national public funding for R&I), demonstrates that being an associated country can offer prospects for collaboration with excellent research actors based in the EU.
- Switzerland, a leading innovation country with strong science institutes (ETH and EPFL), demonstrates the advantages of an associated status even more persuasively. Like the UK, Switzerland is a net beneficiary of EU Framework Programme funding, having contributed CHF 2,3 billion into FP7 and having received CHF 2,5 billion. There are many additional advantages as well, related to access to research networks and attracting research talent.
- The February 2014 referendum in which the Swiss effectively called for the introduction of a quota system for foreign workers led to the suspension of Switzerland's status as an associated third country for H2020 purposes, and thus ran the risk of rendering the Swiss research system less attractive internationally. Swiss participation in H2020 dropped dramatically as a result. The matter was resolved in December 2016, but levels of Swiss participation in some H2020 activities do not appear to have fully returned yet to their prior levels.
- Both Norway and Switzerland illustrate the importance of having a well-developed national strategy in place for research cooperation with the EU.
- The experience of the United States clearly demonstrates the limitations of participation as a third country that does not qualify for an associated status.

The *Framework Programmes (FPs)* are the EU's main instruments for implementing its common science, research and innovation policy. They are planned and budgeted on a multiannual basis. The current incarnation is part of *Horizon 2020 (H2020)*. Applications for ERC projects in the FPs (under the IDEAS pillar) are prepared by individual researchers to calls without pre-determined subjects, peer-reviewed, with excellence as the only selection criterion. Applications for collaborative projects under Horizon 2020 (under the Industrial Leadership or Societal Challenges pillar) are jointly prepared by researchers from one or more countries, normally in response to specific calls for proposals, and are evaluated by independent experts. In addition to the Framework Programmes, there are four Joint Programmes undertaken by Member States with financial support from the European Commission. Finally, there are public-private partnerships (PPPs) known as *Joint Technology Initiatives (JTIs)* where the EU and industry join forces.

In this chapter, we provide background on the forms of third country¹⁴² research cooperation with the EU that are available through H2020 as well as the Joint Programmes and JTIs (Section 5.1), discuss the current status of research and innovation activities of the four countries that we are reviewing (Section 5.2), briefly review the treaty and legal basis for research cooperation with the EU (Section 5.3), discuss the form of participation employed by each of the four countries (Section 5.4) and the level of participation (Section

¹⁴² Here and throughout, a third country is any country that is not an EU Member State.

5.5), and close with a comparative assessment of strengths and weaknesses of each form of participation (Section 5.6).

Here as elsewhere we use the pre-Brexit UK as a model EU Member State, which has the additional advantage of providing possibly useful background information to those who must negotiate Brexit. We take Norway as a model EEA member with an association agreement in H2020. Switzerland is a country with a bilateral association agreement that is not an EEA member. In this case, we take the United States as a model of a third country that participates in the H2020 programme but is not associated with it.

5.1. The Framework Programmes, Horizon 2020, and other forms of research cooperation

The *Framework Programmes (FPs)* are research and innovation programmes that are planned and budgeted on a multiannual basis. H2020, the current Framework Programme, is the EU's main instrument today for implementing its common science, research and innovation policy. The various thematic points of emphasis and instruments have continuously adapted to reflect Europe's social and political needs. H2020 has a strong emphasis on more targeted calls, emphasising impact and relevance on societal challenges identified in the EU's overall 2020 objectives. Since their inception, the budgets of the FPs have steadily increased.

Applications for H2020 projects are jointly prepared by researchers from one or more countries, normally in response to specific EU calls for proposals, and are evaluated by independent experts. This means that the EU research funds are awarded to scientific institutions and companies from the participating countries on a competitive basis, the key criterion being the excellence of the projects. There are no national quotas.

Framework Programme 7 (FP7) ran from 2007 until 2013. Defining features of the programme were its large overall budget (about € 55 billion including the *Euratom* fusion research programme¹⁴³) and significant support for fundamental research via the introduction and implementation of the *Ideas* programme. The *Ideas* programme, which was organised from the bottom up, was administered by the *European Research Council (ERC)* and had access to significant financial resources (€ 7,5 billion). However, most of FP7 resources (€ 32,4 billion) were allocated to the *Cooperation* programme which was focused on transnational research cooperation and exchanges between the public and private sectors and was subdivided into several thematic areas (including health, information and communication technologies [ICT], energy, environment, transport, and space). Finally, the *People* programme (which included the *Marie Curie Fellowships (MCA)*) was endowed with a budget of € 4,8 billion.

Horizon 2020 (H2020), the successor to FP7, is also running for a seven-year period from 2014 to 2020. The programme has essentially taken over the thematic priorities of FP7, but is organised slightly differently. It is organised around three main pillars (Excellent Science, Industrial Leadership, and Societal Challenges). The Horizon 2020 budget of more than € 80 billion is substantially greater than that of FP7, which includes funding for Euratom and ITER.¹⁴⁴

¹⁴³ The Euratom programme, which was established in 1958, covers both nuclear fusion and nuclear fission.

¹⁴⁴ Launched in 2007, the International Thermonuclear Experimental Reactor (ITER) is a new dedicated nuclear fusion research facility of global importance. It is currently under construction in Cadarache (France). Its main objective is to demonstrate the energy efficiency of nuclear fusion. Europe, the United States of America, China, South Korea, Japan, India and Russia are the seven partners in this project. Europe is responsible for

The H2020 budget also includes the European Institute of Innovation and Technology (EIT). Based in Budapest (Hungary), the EIT enables the launch of Knowledge and Innovation Communities (KICs), designed to boost Europe's innovative capacity by strengthening cooperation between research institutes, universities and industry.

The FPs are financed partly by contributions from associated countries in proportion to their *gross domestic product (GDP)*, and partly by the EU Member States through their regular contributions to the EU.

In addition to the Framework Programmes, there are four *Joint Programmes with Member States*. These are programmes jointly undertaken by Member States, with financial support from the European Commission.¹⁴⁵ The current joint programmes are (1) Eurostars, (2) the European & Developing Countries Clinical Trials Partnership (EDCTP), (3) the Ambient Assisted Living (AAL), and (4) the European Metrology Research Programme (EMRP).¹⁴⁶

Finally, *public-private partnerships (PPPs)* have been put in place that take the form of *Joint Technology Initiatives (JTIs)*. They represent the joining of forces between the EU and industry and provide funding for large-scale, longer-term and high risk/reward research.¹⁴⁷ Five JTIs were established under FP7: 1) Clean Sky in the field of aviation, 2) Innovative Medicines Initiative (IMI) in the field of drug research, 3) Fuel Cells and Hydrogen (FCH), 4) ENIAC in the field of nanoelectronics and 5) Advanced Research and Technology for Embedded Intelligence and Systems (ARTEMIS) for embedded electronic systems.¹⁴⁸

5.2. Research and innovation in the countries under consideration

This section summarises the structural characteristics of the *research and innovation (R&I)* systems of the four countries: the UK, Norway, Switzerland, and the United States. This includes an analysis of the performance of their respective research systems (their science and public research systems, and their private research, development and innovation), including the strengths, weaknesses, and the international orientation of their research systems. It assesses the characteristics of their research policies, and the budget that they provide for public research. This is essential in order to understand the benefits that each side can expect from cooperation.

Our assessment throughout this section is based on the European Commission's *European Innovation Scoreboard (EIS)* (known in previous years as the *Innovation Union Scoreboard (IUS)*).¹⁴⁹ The measurement framework used in the EIS distinguishes between three main types of indicators and eight innovation dimensions, reflecting 25 different indicators. The *Enablers* capture the main drivers of innovation performance external to the firm and cover three innovation dimensions: (1) *Human resources*, (2) *Open, excellent and attractive research systems*, and (3) *Finance and support*. *Firm activities* capture the innovation efforts at the level of the firm, grouped into three innovation dimensions: (4) *Firm investments*, (5) *Linkages & entrepreneurship*, and (6) *Intellectual assets*. *Outputs* cover

the lion's share of the construction of ITER (six parts out of eleven). Because of its complexity, the reactor is unlikely to start operations before 2023.

¹⁴⁵ European Commission (2014), "Investing in partnerships in research and innovation", http://europa.eu/rapid/press-release_MEMO-14-289_en.htm viewed 26 April 2017.

¹⁴⁶ The legal authority for these programmes is Art 185 Treaty on the Functioning of the European Union (TFEU).

¹⁴⁷ European Commission (2014), "Investing in partnerships in research and innovation", http://europa.eu/rapid/press-release_MEMO-14-289_en.htm viewed 26 April 2017.

¹⁴⁸ The legal basis is Art. 187 TFEU.

¹⁴⁹ European Commission (2017), European Innovation Scoreboard 2016. See also Veugelers, R., 2015, Matching research and innovation policies in EU countries, Bruegel Working Paper 2015/16.

the effects of firms' innovation activities in two innovation dimensions: (7) *Innovators* and (8) *Economic effects*.

Based on their scoring on EIS indicators, countries are grouped into four categories: *Innovation Leaders* with innovation performance well above the EU average; *Strong Innovators* with innovation performance above or close to the EU average; *Moderate Innovators* with innovation performance below the EU average; and *Modest Innovators* with innovation performance well below the EU average.

5.2.1. Research and innovation in the UK

The UK is a strong performer on EISM it is above the EU average, but is slightly behind the Innovation Leaders, and is thus a *Strong Innovator*. It is rising faster than the EU on its EIS score. The best performing dimensions for the UK are *Open, excellent and attractive research systems* and *Human resources*. UK science is highly productive. It hosts several universities at the forefront of global university league tables. The excellence of UK science is correlated with a strong openness. International scientific co-publications and non-EU doctorate students represent noteworthy strengths for the UK.

The UK performs well in a number of world-class and highly innovative sectors such as pharmaceuticals, aerospace and automotive. It also has strengths in venture capital investments and in new sectors such as digital design. Nevertheless, a relative weakness is the dimension of *Firm investments*. While UK foreign-owned firm R&D is high, UK-owned firm R&D is a concern.

Public investments in R&D are likewise a weakness in the UK. The UK's public R&D expenditures amount to only 0,57% of its GDP (2015), considerably lower than the EU28 average (0,72%). Cuts to the government support of R&D have affected the public sector, in contrast to the business sector which has seen an increase in funding from government in recent years. A system of tax incentives to stimulate R&D spending has produced visible results, yet these appear to have been insufficient to reverse the relative weakness of *firm investment*.

5.2.2. Research and innovation in Norway

Norway is a *Moderate Innovator* in the EIS Scoreboard, scoring below but close to the EU average. Norway's performance compared to the EU increased until 2011, peaking at close to 93%, but relative performance has since then been in decline and is just below 89% of the EU average in 2015.

Norway is performing below the EU average for most Innovation Capacity dimensions. The strongest innovation dimension for Norway is *Open, excellent and attractive research systems*, where Norway scores 85% higher than the EU average. Norway scores particularly high on International scientific co-publications and non-EU PhD students. Attracting foreign research talents to Norwegian R&D institutions has been a declared priority in Norwegian R&D policies. Quality measures give a picture of Norwegian research as productive, but more average in terms of the ability to develop cutting edge research when compared to top countries such as the UK, Sweden, Denmark or the Netherlands.

Except for a short period of stagnation following the financial crisis, public R&D expenditures have increased substantially in the years after 2011. Estimates for 2016 indicate that public allocations to R&D for the first time will reach 1% of GDP, a target originally set to be reached by 2019-20. On the other hand, total (public and private) R&D expenditure only accounts for 1,71% of GDP (2014), reflecting a weaker private sector R&D involvement.

This is primarily due to a high level of GDP and a high share of value creation in resource based industries, such as fisheries and oil and gas. A relatively high share of Norwegian business research is performed by SMEs.

The total increase in public R&D spending throughout the period includes increased allocations to schemes that encourage Norwegian participation in the EU Framework Programme for Research and Innovation, Horizon 2020, by € 45 million.

Research Council of Norway (RCN) plays a key role in coordinating, managing and funding international cooperation initiatives. Research Council of Norway's research funding programs incorporate funding earmarked for international research cooperation. Transatlantic cooperation holds a prominent place in the RCN's international strategy. The US and Canada are among the countries with which research cooperation is considered to be of special national priority.

5.2.3. Research and innovation in Switzerland

Switzerland is an *Innovation Leader* in the EIS Scoreboard. It is the most innovative country in Europe, with the highest EIS score. Although its lead over the EU has been declining since 2011, it still remains substantial (almost 52% above the EU average in 2015).

Switzerland is performing well above the EU average in all EIS dimensions. Its lead is particularly important on *open, excellent research* systems and on *firm investments*, where its score is more than twice as high as the EU average.

The Swiss R&I system can be characterised by the coexistence of a university dominated public sector, which strongly focuses on basic research and human resources training, and a strong private R&D sector, which is essentially self-financed and dominated by a small number of large multinational companies who rank among the top companies worldwide in terms of R&I volume. The strength of the Swiss corporate R&D is correlated with a high connectedness to science (as witnessed through public-private scientific co-publications) and internationally (as witnessed through eg license and patent revenues from abroad).

Like the UK, the Swiss science system has an open and competitive academic labour market, which is highly attractive internationally – almost half of the research personnel in Swiss universities has a foreign nationality. Swiss universities are able to train a large number of (foreign) PhD graduates, which are largely hired by companies for their research activities.

Swiss R&D actors are well funded, with the country almost reaching the 3% target for R&D. The funding system is characterized by a clear divide between public funding, strongly oriented towards universities and basic research, and private funding of R&D activities from private companies. Public R&D investment increased consistently in the last two decades with growth rates well above the EU average. The State does not directly support private R&D. There are only indirect instruments through joint projects with public research.

5.2.4. Research and innovation in the United States

The R&I system of the **United States** continues to be the most robust system in the world. Among individual countries, the US remains by far the biggest R&D performer in the world, accounting for almost 30% of global R&D expenditures. It has an R&D to GDP ratio of 2.7%. While the US is the current world leader in R&D, other countries are catching up.¹⁵⁰

¹⁵⁰ European Commission, 2016, "Priorities for international cooperation in research and innovation", Staff Working Document Accompanying the document from the European Commission to the European Parliament,

The US provides innovation-friendly framework conditions, and its investment climate makes it an attractive place to commercialise innovative products, services and solutions. In addition, the US has one of the world's strongest legal systems for the protection of intellectual property rights and deep financial markets.¹⁵¹

Among individual countries, the US science base is the largest one in the world (for a single country), with 19% of all scientific publications having a US author. But China is set to overtake the US in terms of the percent of all publications (18% in 2013). As a block, the EU-28 holds 25%. In terms of the quality of scientific publications, however, the US still is by far the leader. 2% of its publications are among the 1% most highly cited publications in their field, i.e. twice as high as could be expected. For the EU this is 1,3%, and is on the rise, but is still far below the US.¹⁵²

The US has multiple world class research universities. 15 of the 20 highest ranked universities in the Shanghai worldwide ranking of universities (2016) are in the US.

In view of the high quality and quantity of its research output, its exceptional research facilities at national laboratories and its highly reputed, leading universities, the US attracts foreign talents and is sought after as a partner in scientific collaborations.

It is important to underscore that much US-EU scientific cooperation occurs organically. For the EU, the US is the most important partner for international scientific collaboration, just as the EU is the most important partner for the US.¹⁵³

The United States has been more innovative than the EU, as measured by its EIS score, but the performance lead is steadily decreasing. Between 2008 and 2013, the US innovation index was more than 20% higher than that of the EU, but since 2014 the US lead has dropped below 20%. The US is performing better on most components of EIS compared to the EU, except for public R&D expenditures where the EU is on equal footing with the US. The US lead holds particularly for *open, excellent science systems* and *firm investment*. US businesses spend about 58% more on R&D, and the US is more successful in commercializing new technologies as measured by a 26% higher score for License and patent revenues.

Notwithstanding its many strengths, the US innovation system is not without its challenges. For example, the US system is suffering from sustained declines in support for public universities, and in public funding for the national R&D effort. The US federal investment in research and development (R&D) largely stagnated after 2010.

Ongoing structural problems also include the political blockage on immigration with its potential adverse implications for accessing the global talent pool.

the European Economic and Social Committee and the Committee of the Regions, "Implementation of the strategy for international cooperation in research and innovation".

¹⁵¹ Ibid.

¹⁵² Own calculations on the basis of US, NSF, Science and Engineering Indicators, 2016; (year of measurement 2013).

¹⁵³ About 40% of extra EU partners are from the US and somewhat more than 40% of US partners are from the EU (2013). Although this is still the largest, the numbers are on decline, reflecting the rise of Asia. Source: EC-DG R&I, Science, Research and Innovation Performance in the EU, 2016.

5.3. Treaty and legal considerations of participation in the EU's H2020 Framework Programme

Legal entities established in Member States of the European Union or in a country associated with H2020 are eligible for funding in EU's Framework Programmes. EFTA countries are eligible as associated countries provided that they (1) have a good capacity in science, technology and innovation; (2) have a good track record of participation in Union research and innovation programmes; and (3) are fair and equitable in dealing with intellectual property rights.¹⁵⁴ To date, this holds for all EFTA countries.

In addition, research organisations in some 130 developing economy countries are eligible for funding. Participants from other non-associated third countries may in general take part in projects, but only if they finance their participation themselves.

To describe the association with EU research policy, we will look at the two types of relationships between the EU and countries that are not EU Member States: *associated third countries* (Section 5.3.1) and other third countries (Section 5.3.2).¹⁵⁵

5.3.1. Participation as an associated third country in EU's H2020 Framework Programme

An *associated third country* is eligible for funding for the programme, and is generally obliged to make financial contributions.

Association with Horizon 2020 by third countries is governed by Article 7 of the Horizon 2020 Regulation.¹⁵⁶ Association with Horizon 2020 takes place through the conclusion of an international agreement on the basis of which the country makes a financial contribution to all or part of H2020. Financial contributions to H2020 are based on the ratio of the associated country's GDP to the combined GDP of all EU Member States. Association agreements operate throughout the duration of H2020. Legal entities from associated third countries have a similar status to those in Member States, and can participate under the same conditions as entities from Member States.

Associated status also means that official delegates from associated countries can sit on the management committees of the specific programmes, as well as on various steering committees. This is important, as it gives the associated country direct access to information and enables it to participate in the implementation of running EU research framework programmes and to contribute to the design of future programmes.

As of 1 January 2017, the following countries are associated with Horizon 2020: Iceland, Norway, Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, Turkey, Israel, Moldova, Switzerland, the Faroe Islands, Ukraine, Tunisia, Georgia, and Armenia.

In terms of size of participation and corresponding EU budget, the three most important associated countries are Switzerland, Norway and Israel.

¹⁵⁴ Art. 7 Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC.

¹⁵⁵ The status of accession candidate countries is not considered here. Also, the case of developing countries eligible for funding is not further discussed here.

¹⁵⁶ European Union (2013), Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC.

5.3.2. Participation of other third countries in the EU's H2020 Framework Programme

The EU's Framework Programme H2020 is open to participation from across the world. European researchers can include partners from anywhere in the world when preparing Horizon 2020 proposals. The international dimension is specifically prevalent in the Marie Curie Fellowships.

In the collaborative projects, beyond the general openness of its calls, the desire for extra-EU participation can be specifically flagged in targeted areas. When extra-EU participation is explicitly flagged, the participation of extra-EU partners is strongly encouraged and is considered to add value to the proposals.

This general openness to third countries is however underutilised. For example, there were 866 applicants to FP7 in 2013 from as many as 87 third countries, with a total requested EU financial contribution of € 52,5 million in retained proposals. These figures represent just 6,4% of the total number of applicants, and just 1% of the total amount of requested EU contribution in retained proposals, reflecting a modest utilisation of third country participation.

Third countries that are not associated nonetheless have the potential option to negotiate a *Science and Technology (S&T)* cooperation agreements with the EU. Nineteen third countries concluded S&T cooperation agreements with the European Union. In terms of size of participation and corresponding EU budget, the two most important third countries in this context are the US and Russia.

In FP7, a new approach towards international cooperation was developed, aiming to reinforce international research collaboration throughout the Framework Programme. Special instruments (*Specific International Cooperation Actions (SICA)*, coordinated calls, twinning of projects, and more) were established to implement these objectives allowing both geographical and thematic targeting. In addition, a specific programme dedicated to international cooperation provides funding to support activities (INCO-NETs, BILATs, ERA-NETs, NCP networks, and so on) designed to underpin the S&T policy dialogue and to promote cooperation opportunities under FP7 for international partners. Not all of these instruments have been retained in H2020.

In addition, the *EURAXESS Links* initiative (funded under the Specific Actions part of the *People* Programme) helps to maintain the link with European Researchers abroad in order to keep them updated on research policy, funding and cooperation opportunities in Europe, while reinforcing their role as catalysts to boost cooperation with their host countries.

5.4 Forms of participation in cooperative research with the European Union

The four countries participate in Horizon 2020 in different ways. Those that are an EU Member State or associated country are eligible for funding, and may be obliged to make a contribution. The US does not contribute and is in general not eligible for funding, but can participate (see Section 5.3.2).

5.4.1 The United Kingdom

As long as the UK continues to be a Member State, legal entities established in the UK are automatically eligible for funding in EU's Framework Programs. The contribution of the UK to the Framework Program runs through its contribution to the EU budget. In 2014, the UK contributed 10% of the H2020 budget.¹⁵⁷

5.4.2 Norway

Norway is a member of the EEA and the EFTA, meaning that it is subject to the "four freedoms" of the single market – the free movement of goods, people, services and capital.

Since the EEA Agreement entered into force in 1994, Norway has participated in the EU Framework Programmes on research and innovation as an associated EEA-EFTA country (see 0). Participation in the Framework Programmes and in the European Research Area is now a core element in Norwegian research policy. Norway takes part in all ERA-groups as an observer.

As an associated EEA-EFTA country, Norway's annual contribution appears as a specific budget allocation to Brussels, amounting to almost € 250 million yearly, or 7% of its total national public R&D budget.

In spring of 2014, the Norwegian government presented a strategy for cooperation with the EU on research and innovation¹⁵⁸. The strategy is aimed at improving Norway's returns from its association. It establishes a target to increase Norwegian participation in the EU Horizon 2020 Programme by about 60% compared with previous programmes, and to increase Norway's total return from Horizon 2020 to 2% of total competitive funding in the programme, up from 1,67% in the previous FP7. This ambition is followed by a number of concrete measures and support mechanisms, including increasing the so-called *STIM-EU scheme*. Under the *STIM-EU* scheme, the allocation mechanism of the block grants to universities depends on the number of EU projects acquired. This is expected to motivate institutes to maintain and strengthen their participation in EU-projects. The strategy also calls for better alignment and harmonisation of national instruments and priorities with those set by Horizon 2020 and the ERA agenda.

5.4.3. Switzerland

Switzerland is now an associated country (see Section 5.3.1) to the H2020 Framework Programme. Switzerland is not a member of the EEA, but is a member of the EFTA.

Swiss research entities have been participating in the FPs since 1988. From 1992 until 2003, this was as a third country, with Swiss project participations directly funded by the Swiss Confederation. In 2004, Switzerland became an associated country to the FPs. From then on, Switzerland contributed to the EU's global FP budget at a fixed rate (relative to

¹⁵⁷ http://ec.europa.eu/budget/figures/2007-2013/index_en.cfm

¹⁵⁸ Norway Ministry of Education and Research, 2014. <https://www.regjeringen.no/en/dokumenter/strategy-for-research-and-innovation-cooperation-with-the-eu/id762473/>

its GDP), while Swiss researchers gained the same rights in terms of submitting project proposals and receiving funding from Brussels as their colleagues from EU member states.¹⁵⁹

Switzerland intends to continue its association with H2020. As a result of the outcome of the Swiss referendum of 9 February 2014 on the mass immigration initiative, and Switzerland's subsequently not signing the protocol on Croatia in consequence, the European Union rejected Switzerland's full association with the Horizon 2020 package. After long negotiations, Switzerland and the EU agreed on a partial association, which provisionally came into effect on 15 September 2014 and ran until the end of 2016.¹⁶⁰ The partial association restricted the participation to the first *Excellent Science* pillar of H2020, to actions under *Spreading Excellence and Widening Participation*, and to Euratom and ITER Fusion for Energy. On 16 December 2016, the Swiss Parliament adopted the application law for Art. 121a of the Constitution, respecting the Bilateral Agreements with the EU in all aspects. On the same day, the Swiss Federal Council ratified the protocol extending the free movement of persons to Croatia, thus fulfilling the necessary condition for Switzerland's full association with Horizon 2020 as of 2017. Following this ratification, Switzerland regained full association with the entire Horizon 2020 programme from 1 January 2017 on,¹⁶¹ as well as with the Euratom Programme 2014-2018 and activities carried out by ITER Fusion for Energy. Swiss participation in some H2020 activities have returned to pre-2014 levels, while others continue to be depressed.¹⁶²

5.4.4. The United States

Inasmuch as the US is a third country that is not associated, the European Union does not automatically fund partners from the US. In principle, US partners must bring their own funding to the table. This funding may come from the participating institutions, or from US government funding agencies.

As an open programme, US participation is welcomed in all Calls for Proposals in the EU's H2020 Framework Programme. In addition, US participation in targeted areas is specifically flagged in open calls, as was for example the case in the *Blue Growth* part of Horizon 2020 for 2016-2017 covering Arctic research.

Research and innovation cooperation between the EU and the US is governed by the *Agreement for Scientific and Technological Cooperation*. It was originally signed in 1998, renewed four times for 5 years each time and is now valid until October 2018. The Joint Consultative Group (JCG) which oversees this cooperation agreement meets every two years.

Moreover, a bilateral cooperation agreement on fusion energy research was signed by the US and the European Atomic Energy Community (Euratom) in 2001. Both the US and Euratom are members of the ITER project.

¹⁵⁹ Swiss Secretariat for Education, Research and Innovation (SERI), 2015, Swiss Participation in European Research Framework Programs, Facts & Figures.

¹⁶⁰ Ibid.

¹⁶¹ See also Eric Maurice (2016), "EU and Switzerland agree on free movement", euObserver, 22 December 2016, <https://euobserver.com/justice/136398> viewed 14 May 2017.

¹⁶² An interviewee reports that Switzerland is now performing as usual for the ERC and the excellent science priority. For the industrial leadership and societal challenges portion of H2020, however, there had been a decrease in participation and a huge drop in coordinations. Hard data are not yet available, but Swiss participation in this latter group of programmes has likely not yet returned to pre-2014 levels.

Based on the work of the *Joint Consultative Group (JCG)*, cooperation on research and innovation with the US is addressing four priority areas: Marine and Arctic Research, Research Infrastructures,¹⁶³ Health Research, Transportation Research, and Materials research / Critical Raw Materials / Nano safety and regulatory research / Health and Safety research (nano-EHS).

Most programme-level cooperation with the US is via the US National Institutes of Health (NIH), but also with the National Science Foundation (NSF) and outside of government with the Bill and Melinda Gates Foundation.

The US is the EU's main partner when it comes to health research in terms of numbers of US participations in the Framework Programmes (both FP7 and Horizon 2020). US participants in projects under the Horizon 2020 Health, Demographic Change and Wellbeing Societal Challenge are automatically eligible for funding (European researchers are also eligible for funding in US NIH projects).

More recently, following the EU-US Summit in March 2014, EU and US leaders underlined the commitment "to expand cooperation in research, innovation and new emerging technologies", referring to space cooperation, the Transatlantic Ocean Research Alliance, the GPS/Galileo agreement, climate change, energy, digital economy and cyber security. For the latter, it was "decided to launch a comprehensive EU-US cyber dialogue to strengthen and further our cooperation including on various cyber-related foreign policy issues".¹⁶⁴

The general framework conditions for EU-US cooperation have been improving over various Framework Programmes. Nevertheless, US participants still perceive barriers for participation in Horizon 2020. In October 2016, an Implementing Arrangement between the EU and the US was signed that facilitates cooperation between US organisations and Horizon 2020 participants in cases where the US organisations are funded by the US and do not receive any funding from the Horizon 2020 programme. It simplifies cooperation between a selected Horizon 2020 project and a US entity by enabling researchers to organise their cooperation outside the formal Horizon 2020 Grant Agreement signed for each project while fully respecting the Agreement.

The third country network of National Contact Points (NCPs) is the main source of guidance, practical information and assistance on all aspects of participation in Horizon 2020. It has benefited in the recent years from the *US pilot National Contact. BILAT USA 4.0* is a bilateral coordination activity funded by the European Union under Horizon 2020 to enhance and develop science, technology and innovation partnerships between the European Union and the US, to spread information, to support the policy dialogue, and to analyse the progress of transatlantic science and technology cooperation. The US also has a *EURAXESS* link to promote networking activities among European and US researchers.

Beyond its relations with the EU, the US has established a global network of scientific cooperation and is also a bilateral partner country for many EU Member States in science, technology or innovation cooperation.

¹⁶³ In the domain of Research Infrastructures, a number of collaborative initiatives have been ongoing amongst European facilities and their US counterparts such as those conducted in the frame of the CERN LHC or the dialogues set up in the Environmental and Earth Sciences domain where Research Infrastructures play an important role in supporting the Transatlantic Ocean Research Alliance.

¹⁶⁴ European Commission, 2016, Roadmap for EU - USA S&T cooperation.

5.5. Level of participation in EU's Framework Programmes

The previous section of this report dealt with the *mechanisms employed* to engage with European Framework Programmes. This section addresses the *level of engagement*. As H2020 is still running, a more comprehensive assessment of engagement can be made based on historical data for the previous Framework Programme, FP7.

5.5.1. The United Kingdom

The UK, with about 74.000 FP7 applicants, accounted for about 13% of all FP7 applications (and likewise accounts for about 13% of all H2020 applications). It is the second highest country among the EU-28 in terms of the number of applications, right behind Germany.

The UK's success rate in FP7 was 23%, somewhat higher than the EU average of 22%. It ranked seventh in terms of the applicants' success rate. In the H2020 Programme, the success rates are in general lower than in FP7. The UK's success rate in H2020 was 15%, higher than the EU average of 13%.

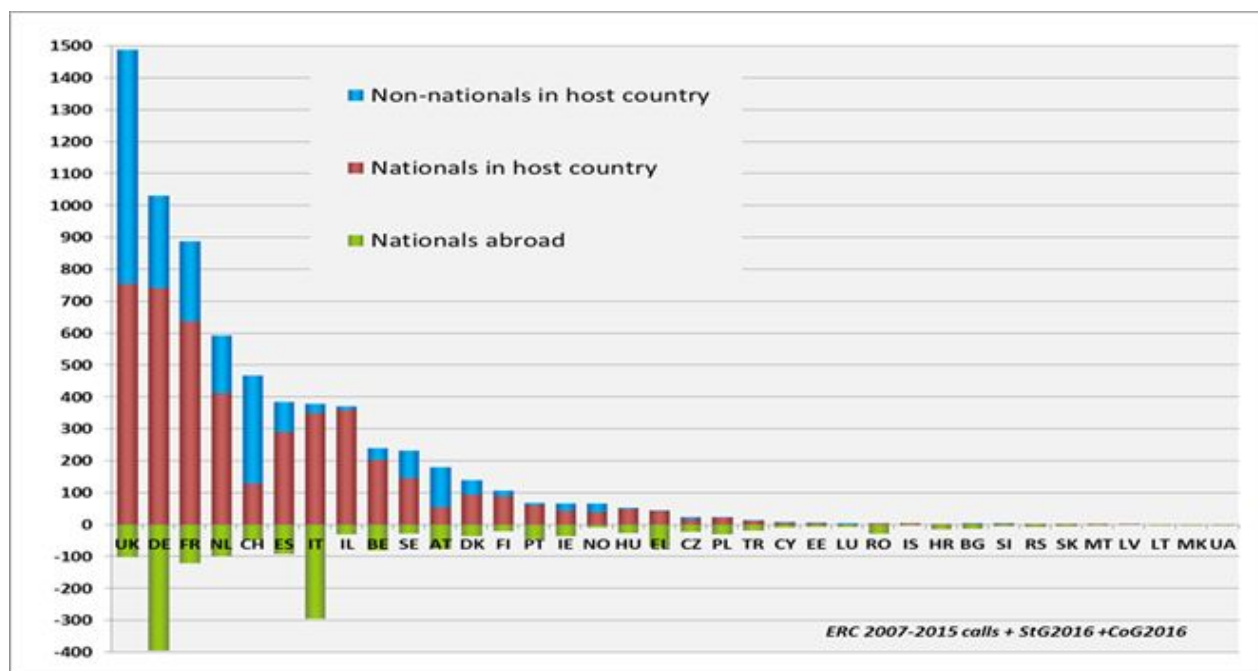
The UK received 14,4% of the FP7 allocated budget, which amounts to about € 6 billion. It thus ranks second among EU Member States in terms of funding, right behind Germany.

With its high success rate, the funding received was more than what the UK contributed to FP7 according to its GDP weight (around 12%).

The parts of the FP7 that are most important for UK are *ERC* in terms of budgets and *MCA* in terms of number of applications. The UK is the country with the highest number of successful ERC grants, the highest number of Proof of Concept (PoC) top up grants for ERC grantees, and an above average ERC success rate.

It is important however to note that that for all ERC calls until 2015, 48% of the ERC grants which the UK universities host are with non-UK principal investigators. Mobility of researchers plays an important role here, and is also a European objective. As Figure 13 makes clear, a large fraction of winners of ERC calls working in the UK (the blue portion of the leftmost column in the chart) are not UK nationals (and the same could be said of Switzerland). The UK's success in ERC is therefore very much linked to its use of the ERC instrument to attract non-UK top talent.

Figure 13. Nationals versus non-nationals among ERC grant winners, 2007-2015.



Source: European Research Council (2017)¹⁶⁵

Table 15. Percentage metrics of UK performance in the FP7 programme.

	% of total EC contribution to UK	% of UK applicants	Success Rate
ERC	25%	10%	14%
MCA	16%	24%	23%
COOP-ICT	13%	20%	16%
COOP-Health	12%	7%	30%

Source: Bruegel calculations on the basis of EC, DG Research & Innovation, 7th FP Monitoring Report, 2015

The majority of UK beneficiaries are universities, representing 59% of all UK FP7 applicants, and receiving 71% of all EC contributions to the UK in FP7. The most active institutions in terms of EC contributions granted are its top universities: Oxford, Cambridge, UCL and Imperial College.¹⁶⁶ Oxford, Cambridge and UCL are also the top three universities hosting the most ERC grants. For Oxford and Cambridge, somewhat less than half of their ERC grants are non-UK, while for UCL, this is about 60%.

¹⁶⁵ European Research Council (2017), "ERC Funded Projects", <https://erc.europa.eu/projects-figures/erc-funded-projects> viewed 16 May 2017.

See also European Research Council (2017), "ERC Starting Grants 2016 Outcome: Indicative statistics", https://erc.europa.eu/sites/default/files/document/file/erc_2016_stg_statistics.pdf viewed 16 May 2017.

¹⁶⁶ An interviewee from UCL, the third largest UK recipient, confirmed that about half of their research funding comes from the European Commission.

Table 16. Quantitative metrics of UK performance in the FP7 programme.

	Nr of FP7 participations	Nr of ERC grantees	Share of Non-UK ERC grantees	EC Contributions FP7 (mEURO)	Share of UK EC contribution
Oxford	719	173	46%	437	6.3%
Cambridge	737	169	47%	424	6.1%
UCL	610	125	58%	353	5.1%
Imperial	657	78	n.a.	325	4.7%

Source: Bruegel calculations on the basis of EC, DG Research & Innovation, 7th FP Monitoring Report, 2015

Note: ERC data are based on calls between 2007-2015.

UK SMEs made 14.438 applications representing 22% of all UK FP7 applicants. UK SMEs received 13% of all EC contributions from the UK, a total of € 914 million or 73% of EC contributions to private for profit UK grant holders. The UK's SME applicant success rate of 22% is higher than the EU average of 20%. UK SMEs received 15% of all SME EU grants. UK SMEs perform particularly well in bidding for the *SME instrument* of the EU R&I programme which supports European collaboration and market access.

In addition to the FP, the UK also participates in all major initiatives of Art 185 and 187 (i.e. Joint Programmes and JTI PPPs). The UK provides location centres for the EIT-KICs for *Digital* and for *Climate*.

5.5.2. Norway

Norway had 2144 participations in FP7, which represents 1.5% of all applications. This is about half the number of Swiss participations. Norway's success rate of 24% is similar to that of Switzerland, and higher than the EU average (22%). In total, Norway received € 737,5 million, or 1,89% of all competitive funds in the seventh framework programme (2007-2013). Although the total success rate is quite high, Norway receives a significantly lower share of the total EU FP budgets than it contributes, and also receives proportionately less than the other Nordic countries (Sweden 3,8%, Denmark 2,4% and Finland 2,1%). In the ERC, Norway's success rate is below average.

The Norwegian research institute sector acquired the largest share of funding from FP7 (about 39%). The higher education sector follows with 34% and the private sector with 21%. A general concern for the future of Horizon 2020 in Norway is the need to mobilise higher education institutions in general and the university hospitals and health trusts in particular. At the same time, the hitherto strong performance of research institutes cannot be taken for granted, especially since the first results of Horizon 2020 reveals lower success rates for some of the traditionally strongest Norwegian research institutes.

Norway has participated in 65 ERA-NETs and 6 ERA-NETs Plus since the schemes were launched. Furthermore, Norway is participating in all of the ten existing JPIs, although not with the same engagement in all initiatives. The JPI on *Oceans* is headed by Norway.

5.5.3. Switzerland

Participation in the EU-FPs is one of the priorities of Swiss science policy. Researchers from Swiss universities and the private sector have been participating in the framework programmes since 1987, initially with the status of an unassociated third country status and since 2004 (during FP6) with the status of an associated third country.

Following the increased Swiss engagement in FP from a non-associated third country to associated status, there was a steady increase in the number of participations and total contributions. Whereas 501 Swiss participations received funding totalling just under CHF 127 million under FP3 (1990–1994), the figure rose to 4.269 participations and total contributions of just under CHF 2,5 billion under FP7 (2007–2013).

Switzerland's 4.269 participations in FP7 (including *coordination* roles, i.e. where a Swiss participant serves in the role of a coordinator in a cooperative project with multiple partners) account for 3,2% of the total from all countries.

With 972 coordinations (4% of all project coordinations and 22% of all Swiss participations), Switzerland ranks seventh as regards coordinations.

With its 4.269 participations, € 1,8 billion (4,2% of all EU contributions) were committed to Swiss research and innovation institutions. 70% of this amount went to universities. The FPs are the second most important source of public funding for researchers in Switzerland after the Swiss National Science Foundation (SNSF).

Among universities, the lion's share went to two institutions: ETH Zurich and EPFL. ETH Zurich received € 337 million with 562 participations, while EPFL received € 305 million with 508 applications.

22% went to Swiss companies. Swiss companies mainly benefited from the *Cooperation* programme, and received 20.5% of the funds awarded to Swiss institutions under this programme. As Swiss national funding for research typically does not go to companies, the FP was therefore the most important source of public funding for research and innovation for Swiss companies and in particular SMEs.

The most important programme areas from the perspective of Swiss institutions are: ERC (30.4% of contributions to Swiss institutions), ICT (18%), MCA (12%), Health (10%), and Nanosciences, Nanotechnologies and New Production Technologies (8%). Project proposals involving at least one Swiss research institution have an average success rate of 25%, as compared to the European average of 22%. In the ERC, Switzerland has an average success rate of 22%, the highest success rate among all countries. EPFL is the 4th and ETH the 5th largest recipient of ERC grants. The Swiss success in ERC is very much driven by its international openness, as about 70% of its ERC grantees are non-nationals.

The Swiss Confederation transferred a total of CHF 2,3 billion to the European Union for Switzerland's participation in FP7. In return, funding totalling CHF 2,5 billion was committed to Swiss institutions. This means that Switzerland benefitted from a net return flow. Comparing the share of contributions awarded to Swiss participants under FP7 (4,16% with the share of Switzerland's contribution to the FP7 budget (2,86%)) leaves a ratio of 1.45.

In FP7, Switzerland participated in three Art 185 initiatives. Eurostars, AAL and EMRP were implemented by a total of 183 projects including Swiss partners. For these projects, around CHF 27 million of the funding came from the EU, while Switzerland contributed CHF 54 million. Self-financing by the participating Swiss companies amounted to CHF 88 million. Switzerland participated in 4 JTIs (Art 187). Switzerland contributed € 8,8 million to EURATOM nuclear fusion program and received project funding totalling € 20,5 million. Under the FP7 nuclear fission programme, CHF 18,2 million were awarded to 58 participants from Switzerland by the European Commission, while Switzerland's contribution to the programme amounted to CHF 14,3 million. Many Swiss companies supply components for ITER. By the end of 2014, they had received contracts totalling € 76,1 million.

An initial comparison of the data for FP7 with the data for Horizon 2020 shows a massive decline in Swiss participation in Horizon 2020, in terms of both numbers of participations and financial contributions. H2020 Swiss participations were only 7,5% of FP7 Swiss participations. The decline is even more evident with regard to the number of Swiss coordinations in H2020 (only 1,5% of FP7 coordinations). These developments clearly correlate with the switch to partial association in the period 2014-2016, and demonstrate the dramatic impact of Switzerland's loss of full association status. A further concern would be the potential isolation of Swiss based researchers. "The fear is that over the long term, third-country status could lead to a loss of expertise and could reduce Switzerland's influence in research circles, both in Europe and indeed globally."¹⁶⁷

5.5.4. The United States

Despite some challenges to systematically integrate US entities in Horizon 2020 consortia, the US has been in the early phase Horizon 2020 the leading non-associated third country participant (in terms of participation and funding), followed by Russia. Nevertheless, this participation is still minor relative to what the size of the US science and research system and the frequency of EU-US co-publications would suggest.

In FP7, the US had 1603 participations, which is the largest number from a third country (25% of all third country applications), but its participation is still minor, representing somewhat more than 1% of all applications. The US success rate of 25% is higher than average, but the EC budget obtained is minimal, with only 0,2% of the total EU FP7 budget allocated to the US.¹⁶⁸

The US is not currently taking the role of coordinator in any EU-funded H2020 projects. The US participates mostly through the Marie Skłodowska-Curie actions (MSCA).

Concerning participation in Horizon 2020, US applicants have submitted 608 proposals (in 2014-2015), involving 772 participations to collaborative actions of Horizon 2020, leading to 63 successful projects, involving 78 participations, with a success rate of 15,1% (as compared to 12,7% overall). US participants have received € 12,3 million euros from the European Commission and have contributed with € 6,5 million. The MSCA calls in 2014 and 2015 have led to US organisations hosting Europeans on 374 occasions. Furthermore, 107 Americans are currently participating in the MSCA after two years of calls for proposals.¹⁶⁹

Focusing on ERC grants, only 8% of all ERC grants allocated in 2007-2015 went to principal investigators of non-EU/AC nationality.¹⁷⁰ Of these, 40% (only 218 grants, representing 3% of all ERC grants) went to US researchers.

¹⁶⁷ SERI, Swiss Participation in European Research Framework Programs, Facts & Figures 2015, page 8.

¹⁶⁸ In general the EU contribution to third countries is minimal, with 1.5% of the total EU FP7 budget allocated to third parties.

¹⁶⁹ http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020_localsupp_usa_en.pdf

¹⁷⁰ Non-EU/AC PI can obtain ERC grants if they have a host institution in an EU/AC country, and spend at least 50% of their work time in the EU. The ERC offers a top up of up to one million euro for researchers moving to the EU. They may maintain an affiliation with the home country.

5.6. Comparative assessment of different arrangements

Table 17 summarises the main features of the four countries examined.

Table 17. Characteristics of benchmark countries in terms of Research and Innovation.

	R&I Status (SII)	Science Status	Basis for participation	FP7 (07-13) Funded Appl'ns (%)	FP7 (07-13) Success Rate	FP7 (07-13) Funds Received (€ mio) (%)
UK	Strong Innovator	Top	Member State	16716 (13%)	23%	5985 (14%)
NO	Moderate Innovator	Average	Associated	2144 (1.6%)	24%	737 (1.8%)
CH	Innovation Leader	Top	Associated	4270 (3.2%)	25%	1803 (4.3%)
US	Innovation Leader	Top	Unassociated	1603 (1.2%)	26%	92 (0.2%)
ALL				130697 (100%)	22%	41597 (100%)

Source: Bruegel calculations on the basis of EC, DG Research & Innovation, 7th FP Monitoring Report, 2015

It is clear that the **UK's** current involvement in the EU FP as a Member State is a win for the UK. With relatively low national public funding for R&I in the UK, there is high interest to participate from UK R&I actors, particularly from its leading universities, but also from innovative SMEs. The large number of UK applicants together with an above average success rate results in the UK being the largest recipient of EU FP funds after Germany.

With its excellent science base, it is no surprise that the major UK beneficiaries are its universities, and especially the top universities in Cambridge, Oxford and UCL. The most important part of the FP program for the UK, in terms of success rate and funds acquired, is the ERC, where the UK is also heavily involved in the review panels and in the Scientific Council, governing the ERC.¹⁷¹ The success of UK universities in EU funding is rooted in their excellent science base, enabling them to attract non-UK talent using FP funding. This holds obviously for MSCA fellowships, but also for ERC funding, where almost half of the successful ERC PIs hosted in the UK are non-UK nationals. The benefits to the UK are therefore not only in terms of attracting money from the EU FPs, but also by means of attracting foreign talent that are successful applicants in EU funding and who further strengthen the UK's science base. The mobility of scientific talent is therefore an integral part of the UK's successful engagement in the EU's FP. Furthermore, networking is a unique feature of the FP, facilitating teaming up with other top institutions. In these funded FP collaborations, the UK is substantially more likely to be in the coordinating lead.

¹⁷¹ The UK currently has three Scientific Council members among the 22.

It is not only UK universities that benefit, but also UK SMEs that fare well in the EU FPs in collaborative networks with other EU partners.

The UK experience demonstrates the advantages of being a Member State. Other models of association in terms of research and innovation are less likely to bring equivalent rewards.

Compared to an unassociated third country status (see Section 5.3.2), the status of associated third country offers better prospects. **Norway**, well-endowed with national public funding for R&I, but with only a modestly strong S&I system, is heavily looking to improve its S&I system through international openness and collaboration, inter alia through its association with the EU's FPs. Its challenge is to get more leverage out of its contribution to the EU, by improving the number of applications from its universities and their success rate. The UK being a much stronger S&I country, but with less national public funds for R&I and a political climate which is more restrictive on immigration, is not on the same footing as Norway.

Switzerland, a leading innovation country with strong science institutes (Eidgenössische Technische Hochschule Zürich (ETH Zürich) and École polytechnique fédérale de Lausanne (EPFL), is getting more out of its association status than that it invests. This is due to a high interest from Swiss institutions (both private and public) to apply for EU funding and an above average success rate, especially in the ERC scheme. Beyond the funding acquired, Switzerland is also using the EU applications to recruit talent from abroad and/or to cooperate with them.

This is however something which a more restrictive Swiss immigration policy could jeopardise. The February 2014 referendum where the Swiss effectively called for the introduction of a quota system for foreign workers¹⁷² led to suspension of Switzerland's status as an associated third country for H2020 purposes, and thus ran the risk of rendering the Swiss research system less attractive internationally. The Swiss case therefore demonstrates the more vulnerable position of associated countries.

A restrictive immigration policy conflicting with the EU's free mobility of persons may jeopardise Switzerland's position as an associated country for Horizon 2020 purposes. The demonstrated dramatic impact of temporarily limiting Swiss participation in the Framework Programme, even though only partial, clearly illustrates this vulnerability.

The experience of the **United States** clearly demonstrates the limitations of having only a non-associated third country status. The interest in applying for FP funding with US partners is limited because there is little or no funding for these third country participants. In addition, applicants established in non-associated third countries face extra administrative hurdles that need to be overcome by well negotiated implementation agreements, and these agreements may take a long time to fine tune. Although the success rates may be high for a country like the US with an excellent R&I system, the budgets that can be secured from the EU are much more restricted. For a non-associated country applying for EU FP funding, national funding will not necessarily fill any gaps in funding, particularly when this public national funding is on decline. In addition, being a non-associated third country limits the ability to play a pivotal coordination role in funded networks.

The rationale for participation in the Framework Programme is broadly similar for the EU and for all participants. In all cases, there is a desire to strengthen research and innovation,

¹⁷² This should not be confused with the 1992 referendum where the Swiss rejected EEA membership.

to benefit from economies of scale, and to enhance global competitiveness – the spill-overs into the broader economy that result from a robust research and innovation system could potentially be far greater than the investments made. At the same time, the question of who benefits from a strengthening of the research and innovation system is important. Additional important considerations for all concerned are cross-country mobility, training of researchers (consider for instance that the US is a substantial participant in the Marie Skłodowska-Curie Actions), as well as the facilitation of cross-border networks.

In Table 18, we provide our assessment of the relative desirability of different models of third country cooperation from the perspective of the EU. This is independent of the feasibility of arriving at the arrangements in question. The baseline for comparison is taken to be the case where there is no special relationship between the EU and the UK post-Brexit (depicted in the rightmost column).

Table 18. Relative desirability of different models of cooperation in the field of research policy from the perspective of the EU.

Thematic area: Research Policy					
Country	Pre-Brexit UK	Norway	Switzerland	United States	
Relationship	Member State	EEA member	Bilateral agreements	No special relationship	No special relationship
Legal basis for relationship	TEU/TFEU	Association Agreement	Association Agreement	S&T Cooperation Agreement	Not applicable
Negotiating considerations	Research policy is a positive sum game in which all partners can gain. Nonetheless, the balance between cooperation and competition needs careful reflection.				
Cost sharing for research	++	+	++	0 to +	0
Enhanced connections	++	+	+	0 to +	0
Enhanced research capacity for global competitiveness	++	+	++	0 to +	0
Mobility of researchers	++	+ to ++	+	0 to +	0

++: much better than the baseline; +: better than the baseline; 0: comparable to the baseline

Source: Bruegel

6. SMALL BUSINESS AND COSME PROGRAMME-RELATED INDUSTRY ISSUES

KEY FINDINGS

- For Candidate or Accession countries, COSME fosters lending to SMEs with the aim of strengthening growth in the economy in order to bring the candidate country closer to the EU's level of development. COSME also serves to familiarise the country's institutions with the proper and responsible management of EU-provided funds, in preparation for their future management of Structural and Investments funds.
- For EFTA/EEA members and European Neighbourhood Policy (ENP) countries, the objective of COSME participation might be to increase the connection of the country's economy (and specifically of SMEs) to the European Single Market. With this view, COSME cooperation is a natural extension to granting a country access to the Single Market.
- Conceptually, COSME membership is generally available only to countries where cooperative interests are likely to dominate competitive interests. As such for instance it is not available to global trading partners and competitors such as the United States. This trade-off will have to be assessed in the case of post-Brexit UK.

This chapter provides an assessment of models of third country¹⁷³ cooperation as regards small business in general and the COSME programme in particular.

The choice of countries in this chapter reflects similar considerations to those that apply to our assessment of energy, electronic communications, and research policy. As elsewhere, we compare arrangements in third countries to those in an EU Member State, using arrangements with **the UK** itself today and in the recent past as the basis for comparison. The review of current arrangements in the UK may also be useful to those who must negotiate future arrangements with the UK.

Given that Norway does not participate in the COSME programme, we instead use **Iceland** as a model EEA country. For a third country that is neither an EEA nor an EFTA member, we use **Turkey**. Both Iceland and Turkey participate in COSME.

In this chapter, we describe the COSME programme, review programmatic factors relevant to the three countries assessed, and review legal considerations associated with the programme in Sections 6.1, 6.2, and 6.3 respectively. Chapter 6.4 discusses national implementation, while Section 6.5 provides a comparative assessment.

¹⁷³ Here and throughout, a third country is any country that is not an EU Member State.

6.1. The Programme for Competitiveness of Enterprises and SMEs (COSME)

Launched in 2014, the Programme for Competitiveness of Enterprises and SMEs (COSME) is an EU policy aimed at helping SMEs by supporting their access to financing and, more broadly, improving their competitiveness. COSME is an attempt to rationalise previously existing EU programmes. COSME builds on the *Entrepreneurship and Innovation Programme (EIP)*, which was part of the *Competitiveness and Innovation Framework Programme (CIP)* for the 2007-2013 Financial Framework.¹⁷⁴ For the financial period 2014-2020, COSME has a total budget of € 2, 3 billion.

According to EU Regulation 1287/2013, these funds are to be allocated as follows:

- At least 60% of the budget is to be used on financial instruments aimed at improving access to finance for SMEs in the form of both equity and debt;
- Measures aimed at improving SMEs' access to markets both inside and outside of the Union (i.e. internationalisation) are financed with 21,5% of the COSME budget;
- Improving more broadly the competitiveness and sustainability of enterprises, and specifically SMEs, is financed with 11% of the budget;
- Promoting entrepreneurship is allocated 2, 5% of the budget.

As it is evident from these objectives, COSME has a high potential degree to overlap with other EU spending programmes. There is risk of overlap not only with the European Structural and Investment Funds (ESIF), which are aimed at investing in job creation and a sustainable balanced growth, but also with the Horizon 2020 programme, which has likewise taken over some of the activities of the EIP. More recently, COSME's implementation has been closely intertwined with the newly launched European Fund for Strategic Investments (EFSI), the so-called Juncker Investment Plan. As such, it has taken on an even greater strategic importance for the current Commission.

The European Commission is responsible for the overall implementation of COSME. In practice, however, responsibility is somewhat fragmented. While the practical operations connected to objective 1 (Access to Finance) are for the most part delegated to the European Investment Fund (EIF), the other activities are largely delegated to the Executive Agency for Small and Medium-sized Enterprises (EASME), an agency of the Commission's DG GROW.

While the overall size of COSME might seem small vis-à-vis the overall size of the EU economy, it must be noted that, like the EFSI, the COSME branch related to access to finance leverages on the private sector. In particular, it is estimated that together the Loan Guarantee Facility (LGF) and the Equity Facility for Growth (EFG), the two instruments used by the EIF for COSME purposes, will mobilise € 25, 5 billion of financing for SMEs across the EU, despite being based on only € 1,3 billion in commitments from the EU budget 2014-2020¹⁷⁵

Aside from the financial objective, it is important to understand specifically what COSME funds have been used for in practice, as this is important in understanding the potential role of COSME for the UK following Brexit.

¹⁷⁴ For a broader discussion of similarities and differences between CIP and COSME, see European Parliament (2012), "Differences and Similarities between CIP and COSME".

¹⁷⁵ Department for Business, Energy and Industrial Strategy (2016)

As far as the internationalisation of SMEs, COSME supports the European Enterprise Network (EEN). With over 3.000 experts and more than 600 member organisations, the Network provides advice to SMEs who are looking for international business, technology, and research partners within the Single Market or in other countries¹⁷⁶. In 2015 alone, over 450.000 SMEs benefited from the services of the EEN (European Commission, 2016). COSME also supported other similar activities, such as the IPR SME Helpdesk, offering advice to SMEs facing issues related to intellectual property rights, particularly in third countries such as China. Likewise, the EU Japan Centre for Industrial Cooperation facilitated SME activities in Japan, and was funded with € 2,6 million coming from the COSME budget in 2014 (European Commission, 2016).

Regarding framework conditions for SMEs, and competitiveness more broadly, COSME funds were used for a vast array of activities, ranging from high-level groups on administrative burden, aimed at exchanging good practices on how to minimise the weight of bureaucracy, to monitoring the implementation of the Small Business Act in all Member States. This information also fed into the European Semester recommendations.

Finally, as far as entrepreneurial culture, COSME funds were largely used to fund the Erasmus for Young Entrepreneurs programme – a mobility scheme involving at different levels over 12.000 candidates (€ 7,3 out of € 12,9 million), and various forms of exchanges of best practices and mentoring programmes (European Commission, 2016).

¹⁷⁶ <http://een.ec.europa.eu/about/about>

6.2. Programmatic factors for the countries under consideration

SMEs represent the bulk of economic activity in Europe and beyond. As shown in Table 19, 93% of businesses in the EU have less than 10 employees. Comparable figures are found in the UK, Iceland, and Turkey. They represent alone more than half of the value added and of the employees in all of the economies considered.

Table 19. Number of enterprises.

	EU28		UK		Iceland		Turkey	
	Number	Share	Number	Share	Number	Share	Number	Share
Micro (1-9)	21,000,000	93.0%	1,588,043	89.1%	14,471	90.2%	2,399,097	96.9%
Small (10-49)	1,310,047	5.8%	161,385	9.1%	1,278	8.0%	50,169	2.0%
Medium-sized (50-249)	219,936	1.0%	26,449	1.5%	236	1.5%	22,010	0.9%
SMEs (1-249)	22,529,983	99.8%	1,775,877	99.7%	15,985	99.6%	2,471,276	99.8%
Large	43,719	0.2%	6,017	0.3%	63	0.4%	4,238	0.2%
Total	22,573,702	100%	1,781,894	100%	16,048	100%	2,475,514	100%

Source: Bruegel based on Eurostat; Turkish data from Turkish Statistical Institute

Note: Data for 2013 covers total business economy: repair of computers, personal and household goods, except financial and insurance activities (based on Eurostat categories, as used in SBA fact sheets).

As such, it should come as no surprise that most governments put in place multiple programmes aimed at fostering SME growth and job creation, as this is often a key element of industrial and economic development policies. The UK, Iceland, and Turkey are no exception. Within our context, it is crucial to understand that these national efforts come as a complement to COSME and often are larger in scope than COSME itself.

Turning specifically to **the UK**, perhaps the main policy targeted to SMEs is the British Business Bank, a public financial institution recently set up by the UK government. The Bank aims specifically at improving access to finance for SMEs.

It services over 43.000 SMEs for an estimated total loan value of over £3 billion per year.¹⁷⁷ There are additional programmes, including the *Enterprise Finance Guarantee*, targeted at SMEs lacking adequate collateral or a credit history; the *ENABLE Guarantee Programme*, designed as a government loan guarantee; and the *Help to Grow* or *Enterprise Capital Funds* aimed at high-risk companies.

National governments can also make use of important tax relief to help SMEs. In the UK, the *Enterprise Investment Scheme (EIS)* is an example of this, incentivising equity investment in SMEs.

All these schemes, which were substantially stepped up in the aftermath of the financial crisis of 2008, make the UK a clear front-runner in terms of financial environment for SMEs.

¹⁷⁷ British Business Bank (2015), British Business Bank performance highlights.

The European Commission has noted¹⁷⁸ that “the access to finance profile shows no real weaknesses”. The report further notes how instead areas where “further efforts would be needed” are in improving the participation of British SMEs into global (and European) value chains. Nonetheless, overall, the UK has one of the most vibrant SME sectors in the EU.

There are some similarities between the UK’s situation and that of **Iceland**. In fact, using a battery of quantitative indicators, the European Commission concluded¹⁷⁹ that “the country exceeds all EU member states on access to finance”. Likewise, the country performs above the EU average on entrepreneurship. However, the country has struggled on internationalisation.

On the other hand, **Turkey** scores below the EU average on almost all SME-related indicators, including access to finance and internationalisation.¹⁸⁰ According to the OECD,¹⁸¹ “access to finance is one of the major priority areas for Turkish SME policy”. And indeed KOSGEB – the main governmental body executing SME policies – has put in place as many as 8 different support programmes, for a total credit volume of over € 4 billion in the period 2003-14. It must be noted that judging from internationally available quantitative indicators, Turkey nonetheless enjoys a relatively vibrant entrepreneurial environment.¹⁸²

These different situations in terms of quality of the SME environment will play a role when considering different options for the EU and comparing the UK’s future arrangements with other Third Countries currently engaged in COSME.

6.3. Treaty and legal considerations

The relevant legal provisions establishing and regulating COSME are contained in Regulation 1287/2013.¹⁸³ For the purposes of this study, perhaps the most important elements are contained in Article 6, which lays the foundations for COSME cooperation with Third Countries.

In particular, it explains how non-EU member states can join COSME only if they are:

- European Free Trade Association (EFTA) countries which are members of the European Economic Area (EEA);
- acceding countries, candidate countries and potential candidates;
- countries falling within the scope of the European neighbourhood policies.

In addition to all EU Member States, there are therefore a number of non-EU countries taking part in COSME. Montenegro, Turkey, Former Yugoslav Republic of Macedonia, Albania, Serbia, Bosnia, Moldova, Armenia, and Ukraine have all signed bilateral agreements to access COSME. It must be underlined that Moldova, Armenia, and Ukraine do not have access to the relevant COSME financial instruments, as certain high standards of financial accountability are required for issues related to the protection of the Union’s

¹⁷⁸ European Commission (2016c), 2016 SBA Fact Sheet: United Kingdom.

¹⁷⁹ European Commission (2015), 2015 SBA Fact Sheet: Iceland.

¹⁸⁰ European Commission (2016b), 2016 SBA Fact Sheet: Turkey

¹⁸¹ OECD (2016), Financing SMEs and Entrepreneurs 2016: An OECD Scoreboard

¹⁸² European Commission (2016a), Report from the Commission to the European Parliament and the Council

¹⁸³ European Parliament and Council (2013), Regulation (EU) No 1287/2013 of the European Parliament and of the Council of 11 December 2013 establishing a Programme for the Competitiveness of Enterprises and small and medium-sized enterprises (COSME) (2014 - 2020) and repealing Decision No 1639/2006/EC (COSME Regulation).

financial interest.¹⁸⁴ As such, the COSME participation of these three countries revolves around policies supporting competitiveness and entrepreneurship more broadly.

However, not all countries that are in the position to do so have decided to join COSME. Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, and Tunisia would all have the right to negotiate accession to COSME, but have not (yet) expressed interest in doing so.

EEA countries can participate in principle, though Norway and Lichtenstein chose not to. Switzerland has no legal basis on which to participate, as it is only an EFTA member but not an EEA member. On the other hand, as an EFTA and EEA member, Iceland has fully participated in COSME since 2014.

Clearly, participation in the scheme requires financial contributions to the COSME budget. These are spelled out explicitly in an individual agreement between each participating third country and the EU, but generally are computed based on the country's GDP size vis-à-vis the Union. However, it should be noted that funds are not earmarked by country, but are rather assigned on a demand basis. When deciding whether to join this policy, it is therefore difficult for a country to make direct financial cost-benefit calculations ex ante, even if solely for the SME lending component of COSME.

6.4 Implementation at national level

While 40% of COSME funds are used on EU-level activities, the largest share (60%) is allocated to improving access to finance for SMEs (see Section 6.1). These funds have a strong national implementation element. As discussed above, the task of pursuing COSME's Objective (1) is delegated to the EIF, which in practice can achieve it both on the debt or equity side, by means of a loan guarantee or equity instrument. In line with its standard operating practices, the EIF further delegates the implementation of its policies to national financial intermediaries. In the UK, these are EZBOB and iwoca Ltd. These intermediaries select financial beneficiaries in accordance with their normal business practices, taking into account the eligibility criteria of the COSME *Loan Guarantee Facility (LGF)* or the *European Investment Fund (EIF)*. These arrangements typically require that financing be provided to those SMEs that would otherwise be unable to obtain funding, given their lack of collateral or generally perceived high risk.

To date, the UK has benefitted significantly from COSME. At the end of March 2016, COSME loan backing was worth € 60 million, covering almost 3000 British SMEs. Under COSME's predecessor, CIP (2007-2013), the UK received € 96, 2 million from financial instruments.

Following the Brexit vote, the UK's participation in COSME-related activities is open to discussion.

6.5. Comparative assessment of different arrangements

COSME can be seen as a policy that offers distinct benefits to different categories of countries: Member States, Candidate Member States, and Neighbouring Countries. Going beyond the mere wording of the Regulation, for each category, there are reasons to believe that the same policy has different underlying objectives.

In the instance of Member States, there are reasons to believe that the deep goal of COSME is to strengthen growth and job creation, in line with the objectives of the Union spelled out in Art. 3 of the TFEU. However, it is important to understand that in doing so, it is not

¹⁸⁴ Art. 20 COSME Regulation.

to be seen as a regional development programme, inasmuch as the COSME funds are not earmarked by country and, most importantly, SMEs that are successful in the fund application process could easily be located in richer regions or cities. Given that criteria were not put in place to prevent this from happening, COSME should be viewed as being more comparable to the European Social Fund than to the Regional Development Fund. Moreover, given the objective of promoting internationalisation of SMEs, it can also be seen as a policy aimed at leveraging more fully the benefits of the Single Market. For purposes of our benchmarking exercise, the UK pre-Brexit clearly falls in this basket.

As regards Candidate or Accession countries, the goals of COSME are somewhat similar, and in line with the overall pre-accession convergence process. The rationale of the programme is to foster lending to SMEs in a Third Country with the aim of strengthening growth in that economy. In this regard, COSME is very similar to the Instrument of Pre-Accession Assistance (IPA). COSME is geared towards bringing candidate countries closer to the EU's level of development. In addition, it serves to familiarise their institutions with the proper and responsible management of EU-provided funds, in preparation for their future management of Cohesion Policy funds. In doing so, it also aims at strengthening the candidate country's economy in order to prepare it for access to the highly competitive Single Market, where goods, services, capital, and labour can circulate freely. Although Turkey's accession to the EU is increasingly being questioned, it seems reasonable to consider Turkey as falling within this category for the purposes of our benchmarking exercise.

There is then a third category that could be referred to as Neighbours. This category includes multiple countries, from EFTA/EEA members to European Neighbourhood Policy (ENP) countries. As the ENP is not a relevant comparison for post-Brexit UK,¹⁸⁵ we focus here on the EFTA/EEA countries. The objective of COSME participation for an EEA country is likely to be limited to increasing the connection of the country's economy (and specifically of SMEs) to the European Single Market. With this view, COSME cooperation is a natural extension of granting a country access to the Single Market. For purposes of our benchmarking exercise, Iceland would naturally fall in this category.

The characteristics of COSME membership relative to different kinds of participating countries appears in Table 20, while the advantages to the EU and to the partner country, respectively, appears in Table 21. The advantages to the EU and to the partner country are largely similar because the interests of both are largely aligned. COSME membership is available only to countries where cooperative interests are likely to dominate competitive interests. COSME membership is not available to global trading partners and competitors such as the United States.

¹⁸⁵ ENP relates to the EU's cooperation with its Southern and Eastern neighbours, aimed at establishing closer economic and political ties. As such, it would not naturally interest the UK post-Brexit. Even if with some stretch of interpretation the UK were somewhat included in the list of ENP countries, we note that all the ENP members have a level of development hardly comparable with the UK. Israel, as the only advanced economy in this basket, maintains nonetheless a comparably low degree of cooperation under ENP with the EU.

Table 20. Alternative COSME cooperation models

	Pre-Brexit UK	Iceland	Turkey
Legal basis for COSME cooperation	EU Member State e.g. pre-Brexit UK e.g. Iceland e.g. Turkey	EFTA/EEA member	EU Candidate
Similar EU policy already in place	European Social Fund	Single Market	IPA
SME main problem	Internationalisation	Internationalisation	Access to finance
COSME main objective	Growth and strengthen the Single Market	Strengthen the Single Market	Prepare for membership (SM and Cohesion funds)

Source: Bruegel

Table 21. Advantages of COSME membership.

	EU Member State Pre-Brexit UK	EEA member Iceland	EU Candidate Turkey
What are advantages for the EU?	Scale economies, gains in societal welfare thru growth and job creation.	Scale economies, gains in societal welfare thru growth and job creation.	Scale economies, gains in societal welfare thru growth and job creation. Helps bring the candidate country closer to the EU's development level. Familiarises the country's institutions with the responsible management of EU-provided funds, in preparation for their future role.
What are advantages for the partner country?	Scale economies, gains in societal welfare thru growth and job creation.	Increases the connection of SMEs with the European Single Market, thereby providing gains in societal welfare thru growth, gains in trade, and job creation.	Increases the connection of SMEs with the European Single Market, thereby providing gains in societal welfare thru growth, gains in trade, and job creation.

Source: Bruegel

In Table 22, we provide our assessment of the relative desirability of different models of third country cooperation from the perspective of the EU. This is independent of the feasibility of arriving at the arrangements in question. The baseline for comparison is taken to be the case where there is no special relationship between the EU and the UK post-Brexit (depicted in the rightmost column).

Table 22. Relative desirability of different models of cooperation as regards small business policy and COSME from the perspective of the EU.

Thematic area: Small business policy / COSME				
Country	Pre-Brexit UK	Iceland	Turkey	
Relationship	Member State	EEA member	EU Candidate	No special relationship
Legal basis for relationship	TEU/TFEU	Art. 6 COSME	Art. 6 COSME	Not applicable
Negotiating considerations	The relative balance of cooperative versus competitive aspects needs careful reflection.			
Regulatory harmonisation is sought	++	0	0	0
Regulatory harmonisation is achieved	++	0	0	0
Economic convergence	++	+	+	0

+ +: much better than the baseline; + : better than the baseline; 0 : comparable to the baseline

Source: Bruegel

7. FINDINGS

This chapter recapitulates our findings, provides insights across the thematic areas, and identifies the models of third country cooperation that could be preferable for the EU in each of the four thematic areas within ITRE's remit (energy, electronic communications, research policy, and small business policy and COSME).

7.1 Strengths and weaknesses of existing models of cooperation with third countries

For **energy** and for **electronic communications**, we have assessed (1) the degree to which policy and regulation are harmonised, (2) the degree to which economic conditions have converged, and (3) the degree to which markets are open in both directions.

What we observe as regards **energy** is that the UK and Norway have largely implemented EU internal energy market rules, while Switzerland and Ukraine have not. All of these partner countries have followed the EU somewhat on climate, renewables, environmental and efficiency policies.

EU electricity and gas companies are dominant in the UK, but have only very limited activities on the Swiss, Norwegian and Ukrainian markets. At the same time, companies from Norway, Switzerland and Ukraine are somewhat active in the EU market. Each of these countries contributes substantially in its own way to the EU's energy system as a producer (Norway, Switzerland), a major market (UK), a transit country (UK, Switzerland, Ukraine) or a provider of flexibility (Norway, Switzerland).

At the same time, each of these countries demonstrates severe bottlenecks in its interconnection arrangements for electricity, gas or both with at least one of its neighbours. Interconnection arrangements with the Republic of Ireland may require careful attention during the Brexit negotiations, inasmuch as the UK provides the Republic of Ireland's interconnection to continental Europe and to Norway. A unique feature is the Single Electricity Market (SEM) of the Republic of Ireland and Northern Ireland, which is a mandatory pool market into which all electricity generated on or imported into the island of Ireland must be sold, and from which all wholesale electricity for consumption on or export from the island of Ireland must be purchased.

For **electronic communications**, EEA membership as exemplified by Norway offers nearly the same advantages as EU membership. Policy and regulation are extensively harmonised, and are synchronised over time, albeit with a time lag that can be significant. Prices between network operators have converged, facilitating market entry and the offering of cross-border services and roaming.

Coordination with Switzerland by means of bilateral agreements is significantly weaker, inasmuch as regulation of electronic communications is not one of the areas covered by a bilateral agreement. The Swiss National Regulatory Authority (NRA) is fully engaged in EU regulatory discussions, but regulatory policy cannot be said to be harmonised. Moreover, the absence of a review process by the Commission means that there is no external brake on any tendency for the NRA to be gentle with Swiss network operators, apparently leading to high wholesale payments to Swiss network operators in comparison to those in the EU. This problem is compounded by an implementation in Swiss law where the NRA is empowered to intervene only when a complaint is lodged.

The arrangements with South Korea, which are based on the Free Trade Agreement (FTA) of 2011, have performed well but in fulfilling very different goals. The objective of the "new generation" Free Trade Agreement (FTA) with South Korea is reciprocal market access.

Neither regulatory harmonisation nor scale economies were explicit goals; nonetheless, some modest tendency for the South Korean FTA to promote liberalisation and regulatory convergence is visible.

As regards **research policy**, the goals include not only the strengthening of European competitiveness, but also facilitating mobility and training for researchers, and the promotion of international connections. Third countries with an *association* agreement with the *Horizon 2020 (H2020)* programme are eligible for funding, and enjoy roughly the same advantages as EU Member States; other third countries, however, are not eligible for funding, except to a very limited degree through *Science and Technology (S&T)* cooperation agreements. The UK is a net beneficiary of EU Framework Programme funding, as is Switzerland. Norway, with only modest research and innovation capabilities, demonstrates that being an associated country can offer prospects for collaboration with excellent research partners based in the EU. Switzerland, a leading innovation country, demonstrates the advantages of an associated status even more persuasively. The February 2014 referendum in which the Swiss effectively called for the introduction of a quota system for foreign workers put these benefits at risk, and led to the suspension of Switzerland's status as an associated third country for H2020 purposes. Swiss participation in H2020 dropped dramatically as a result. The matter was resolved in December 2016. The experience of the United States clearly demonstrates the limitations of participation as a third country that does not qualify for an associated status.

As regards **small business policy and the COSME programme**, only countries with one of several special relationships with the EU are eligible to participate. For candidate or accession countries such as Turkey, COSME fosters lending to SMEs with the aim of strengthening growth in the economy in order to bring the candidate country closer to the EU's level of development, and also serves to familiarise the country's institutions with the proper and responsible management of EU-provided funds in preparation for their future management of Cohesion Policy funds. For EFTA/EEA members such as Iceland, COSME participation can increase the connection of the country's economy (and specifically of SMEs) to the European Single Market, and is thus a natural extension of granting a country access to the Single Market.

Table 23 provides a summary of the strengths and weaknesses of each established form of third country cooperation with the EU.

Table 23. Overall implications of different models of third country cooperation

Model of cooperation	Strengths	Weaknesses
EU Member State	Achieves most extensive harmonisation. Maximises scale economies.	Some loss of autonomy for the Member State.
EEA membership	Achieves very extensive harmonisation, albeit with time lags. Maximises scale economies.	The thematic areas relevant to this study are harmonised, but others are not. Delays in harmonisation. The third country is less subject to EU influence in selected areas than an EU Member State, but has little influence on EU policy.
Bilateral agreements (EFTA member) i.e. the Swiss case	Achieves harmonisation where mutually agreed, albeit with time lags. Maximises scale economies.	Only certain sectors are covered by bilateral agreements. Harmonisation is limited. The third country is less subject to EU influence in selected areas than an EEA member or an EU Member State, but has little influence on EU policy.
Energy Community	Achieves strong legal harmonisation with EU <i>acquis</i> and hence provides an anchor for regulatory stability.	Some limitations in enforcing compliance. Does not address issues outside of energy.
Free Trade Agreement (FTA)	Achieves or maintains reciprocal market access, gains in trade. Encourages but does not require limited regulatory convergence.	Neither attempts nor achieves close regulatory convergence or scale economies.
Framework Programme	Strengthens research and innovation. Enhances competitiveness. Facilitates mobility and cross-training for researchers.	Does not address a range of other issues outside of research and innovation.
COSME	Increases the connection of SMEs in the target country with the European Single Market, thereby providing gains in societal welfare through growth, gains in trade, and job creation.	Does not address a range of other issues outside of SME policy.

7.2. Which are the preferable models for the EU?

In all respects, EEA membership is the option that best preserves the benefits to the EU of the UK's EU membership, including scale economies and regulatory harmonisation. It is also the mechanism that best adapts to changes in EU law and regulation over time.

Bilateral arrangements in conjunction with EFTA membership (the Swiss case) are clearly inferior to EEA membership in terms of the degree of consistency achieved, the degree of economic convergence achieved, and the ability to adapt to changes in the EU acquis.

Participation in the Energy Community (as with Ukraine) can achieve a good degree of legal harmonisation with the EU acquis in regard to energy; however, this harmonisation of rules can nonetheless be challenging to enforce in practice. The Energy Community makes a positive contribution to stability and security of supply, and to environmental sustainability, but is less effective when it comes to ensuring fair market access for EU firms.

A new generation FTA (as with South Korea) that also addresses regulatory issues in (for instance) electronic communications can provide for reciprocal market access, but is limited in practice in its ability to drive regulatory convergence.

Participation in the H2020 and COSME programmes are somewhat independent of these options. Each offers benefits both to the EU and to the partner country. Indeed, research cooperation potentially benefits all concerned. One must however bear in mind that the EU's relationships with its major trading partners entail elements of both cooperation and of competition. The relative balance of these two elements with the post-Brexit UK is not yet clear, but bears directly on the EU's preferred choice of relationship.

In Table 24, we provide a thematic sector-by-sector assessment of the relative desirability of different models of third country cooperation for all four thematic areas from the perspective of the EU. This is independent of the feasibility of arriving at the arrangements in question. The baseline for comparison is taken to be the case where there is no special relationship between the EU and the UK post-Brexit (depicted in the rightmost column).

Explanation of specific entries appears in some cases in the section of the report that covers that thematic area: Section 3.4 for energy, Section 4.5 for electronic communications, Section 5.6 for research policy and H2020, and Section 6.5 for small business policy and the COSME programme.

Table 24. Relative desirability of different models of cooperation in all thematic areas from the perspective of the EU.

Thematic area: Energy					
Country	Pre-Brexit UK	Norway	Switzerland	Ukraine	
Relationship	Member State	EEA member	Bilateral agreements	Energy Community	No special relationship
Legal basis for relationship	TEU/TFEU	EEA Agreement	Bilateral agreements	Energy Community Treaty	Not applicable
Negotiating considerations	Energy collaboration is a positive sum game in which all partners can gain in terms of security of supply, the cost of energy, and advancing environmental sustainability by pooling complementary energy resources.				
Energy exchanges based on proper market signals	++	++	+	+	0
EU companies gain fair access	++	0	-	-	0
Contributes to supply security (infra+solidarity)	+	+	+	+	0
Promotes environmental sustainability	++	++	+	+	0
Thematic area: Electronic communications					
Country	Pre-Brexit UK	Norway	Switzerland	South Korea	
Relationship	Member State	EEA member	Bilateral agreements	FTA	No special relationship
Legal basis for relationship	TEU/TFEU	EEA Agreement	None cover electronic communications	Arts. 7.25 thru 7.36 FTA	Not applicable
Negotiating considerations	Regulatory harmonisation facilitates cross-border services, market entry, and portability and roaming. Together with economic convergence, harmonisation facilitates cross-border market entry.				
Regulatory harmonisation is sought	++	++	0	0	0
Regulatory harmonisation is achieved	++	++	+	0 to +	0
Economic convergence	++	++	0	0	0
Thematic area: Research Policy					
Country	Pre-Brexit UK	Norway	Switzerland	United States	

Thematic area: Energy					
Country	Pre-Brexit UK	Norway	Switzerland	Ukraine	
Relationship	Member State	EEA member	Bilateral agreements	No special relationship	No special relationship
Legal basis for relationship	TEU/TFEU	Association Agreement	Association Agreement	S&T Cooperation Agreement	Not applicable
Negotiating considerations	Research policy is a positive sum game in which all partners can gain. Nonetheless, the balance between cooperation and competition needs careful reflection.				
Cost sharing for research	++	+	++	0 to +	0
Enhanced connections	++	+	+	0 to +	0
Enhanced research capacity for global competitiveness	++	+	++	0 to +	0
Mobility of researchers	++	+ to ++	+	0 to +	0
Thematic area: Small business policy / COSME					
Country	Pre-Brexit UK	Iceland	Turkey		
Relationship	Member State	EEA member	EU candidate		No special relationship
Legal basis for relationship	TEU/TFEU	Art. 6 COSME	Art. 6 COSME		Not applicable
Negotiating considerations	The relative balance of cooperative versus competitive aspects needs careful reflection.				
Regulatory harmonisation is sought	++	0	0		0
Regulatory harmonisation is achieved	++	0	0		0

++: much better than the baseline; +: better than the baseline; 0: comparable to the baseline

Source: Bruegel

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ANNEX: INTERVIEWS CONDUCTED

The following were interviewed for the study. Some interviewees asked not to be identified.

Country	Name of the Interviewee	Affiliation
Energy		
UK	Ryan McLaughin	Head of European Electricity Markets at Ofgem
NO	<i>Declined to be named</i>	Professor, Department of Economics, University of Oslo
CH/NO	Zoltan Gyulay	Head of Market Team at ENTSO-E
CH	Matthias Finger	Full Professor Management of Network Industries, Ecole Polytechnique Fédérale Lausanne (EPFL)
UA	Dirk Buschle	Deputy Director Energy Community Secretariat
EU	Jonathan Gaventa	Director at E3G
EU	Matti Supponen	Policy Co-ordinator - Policy and project officer, DG ENER
Electronic communications		
NO	Karin Skyllingstad and Christina Christensen	Senior Adviser: Department of Civil Aviation, Postal Services and Telecommunications, Ministry of Transport and Communications
CH	René Dönni Kuoni	Director, Head Division Telecom Services and Post: Federal Office for Communications (OFCOM Switzerland)
KR	Kang Hayun	KISDI (South Korea)
Research Policy		
UK	Michael Browne	Head of European Research at University College London
CH	Martin Müller	Co-Head of the SwissCore Office in Brussels (Contract Office for European Research Innovation and Education)
COSME-related issues		
UK	Alexandra Renison	Head of Europe & Trade Policy at the Institute of Directors (IoD)
TR	Mustafa Alperen Ozdemir	MÜSİAD (Independent Industrialists' and Businessmen's Association)

NOTE

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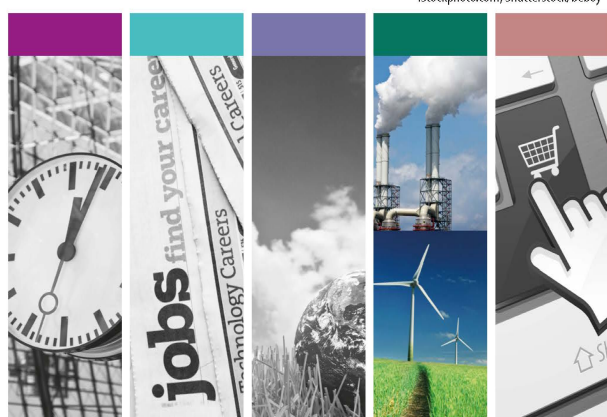
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