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Geopolitical Economy of Energy Security in the European Union, the Persian Gulf, the Caspian Region and China

Mehdi P. Amineh and Wina H.J. Crijns-Graus

1 Introduction

Security of energy supply is an important part of the long-term development goals of the EU, as it pursues such key policy objectives as competitiveness and stability. Concerns about energy security have been raised by declining European energy production, the strain on global demand exerted by newly industrializing economies such as China and India, and the political instability in many energy-producing regions such as the Middle East and North Africa (MENA) and the Caspian Region including Russia (CR) (EEA, 2008; Amineh and Yang 2010; 2012). Although the EU is believed to hold a significant amount of shale gas that could contribute to its supply security, prospects for its development seem bleak in a number of member states because of strong environmental opposition and uncertainty about the true extent of deposits. The ratification of the Lisbon Treaty in 2007 created a new legal basis for EU energy policy. The Treaty legally determined solidarity in matters of energy policy within the EU, but member states have been permitted to retain control of external supply security and their domestic energy mix. However, internal supply security is now on the agenda of the Commission. The implication of current EU legislation is that the Union does not yet have an agency with the authority to set a limit to the level of import dependence.

Although there is no direct common policy directed toward increasing energy security, energy supply security is linked to a wider set of policies on climate change, such as the Climate and Energy Package of December 2008 (European Commission, 2008) and attempts to improve competitiveness. Specific aims in the Package include increasing energy efficiency by 20 percent, and realizing a 20 percent share of renewable energy in the EU's primary energy mix. An increase in renewable energy would reduce greenhouse gas emissions and reliance on imported fossil fuels. But this begs the question: are these policies sufficient to ensure energy supply security? Fossil fuel imports have increased throughout the last decade, despite a growth in the use of renewable energy

sources. Another question is what contribution the deployment of new fossil fuel technologies such as shale-oil and shale-gas might make to energy supply. These are concerns that influence many decisions, for instance, those on long-term oil or gas purchases or (low) levels of infrastructure funding. The majority of these are made at a national level, leading to difficulties in ensuring a coordinated EU approach to energy policy across multiple, potentially conflicting objectives (energy security, environmental concerns, and competitiveness) (CRS, 2008). This chapter explores the following, interconnected topics; [1] current and past trends in production, supply and demand, and the trade in energy in the EU, against the background of the vast changes that have occurred in the last half decade and [2] threats to the security of the supply of oil and natural gas from regions of import, plus [3] the influence of the geopolitical economic shift underway in the CEA and ME regions, partly as a result of China's rapid industrialization and the changes in US energy demands. In the discussion of the second topic two regions are distinguished that include key energy suppliers from the:

- Middle East and North Africa (MENA): Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, Yemen.
- Of which seven are located in the Persian Gulf (Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates)
- Caspian region (CR): Azerbaijan, Kazakhstan, Turkmenistan, Iran, and Russia.

Firstly, in Section 3 an overview is given of the energy policy in the EU whose aim is to increase energy supply security. Although policies at the EU- and member states-level have booked some successes in the field of energy security, fossil fuel import dependence in the EU has substantially increased in recent years, and it seems questionable if the policies implemented are sufficient to change the trends in the period up to 2020. This is more deeply explored in Section 4 by examining developments in fossil fuel use and imports in the EU in the period 1990–2012, in conjunction with expected developments in the period up to 2050. Besides the development of total primary energy use and the reliance on fossil fuels, we assess import dependence per fossil fuel, followed by overall import dependence on energy supply and fossil fuel production and future trends. Thereafter, Section 5 discusses developments in global energy supply and demand, in relation to the impact these might have on future energy security in the EU. A specific focus is placed on oil and gas reserves, production,

consumption, and net exports. In Section 6 the impact of renewable energy use and energy-efficiency improvement on energy security in a global context are assessed, especially when more stringent climate policies are implemented. Past growth rates (1971–2012) are explored for different types of renewable energy and the required future growth rates in 2 degree scenarios. Section 7 focuses on the geopolitical aspects of the EU energy supply security from the Persian Gulf and CR and discusses the political economy of energy of these EU suppliers. Defining features are the existence of a patrimonial state structure, the resource curse, lack of economic diversification, and SWFs, complicated by the existence of politicized Islam and related social movements. Sections 8 and 9 focus on the geopolitics of the Middle East, including the post-World War II US hegemony in the Middle East, the influence of the Arab Spring and the possible dissolution of US hegemony. This will be followed by a discussion of major contender states, with focus on China as a newly involved actor in the region. This will be supported by an analysis of Chinese energy sector investments, trade and contracts with several countries from the ME and CEA, energy and geopolitics in the Middle East. Section 9 discusses the structural challenges these issues present to the energy supply security of the European Union from the Middle East in particular. Finally, Section 10 will present our final conclusions.

2 Concepts and Data

This section explains definitions and concepts, theory, and the main data sources used.

2.1 *Definitions*

In this section we give definitions of the key concepts used in the analysis of issues related to energy supply security. These refer to energy security, geopolitics, and the relationship between energy security and geopolitics and between geopolitical risks and energy security.

Definitions of the concept 'energy security' range from the narrow issues of physical supply disruptions to wider ones engaging the economy, the environment, and the political consequences of changes in the energy market, resources, and fossil reserves. According to a simple definition of the UNDP (2004), energy security can be defined as the availability of energy at all times in various forms, in sufficient quantities, and at reasonable and/or affordable prices, without any unacceptable or irreversible impacts on the environment. Energy security can be threatened by different types of scarcity that in turn can

be affected by different types of geopolitical forces. According to Amineh and Houweling (2003, 2006, 2007), the need for energy security is being heightened by limited reserves and increasing extraction costs.

The combination of increasing oil and gas consumption, diminishing reserves, and geopolitical rivalry creates a setting for both the EU and other major consumer-countries such as China that can be characterized as one of demand-induced, supply-induced, and structural scarcity, or a combination thereof. We shall discuss these three types of scarcity in a bit more detail. "Demand-induced scarcity" is caused by three factors. The first is population growth in consuming countries. The second is rising per capita income in high-income countries that are the major per capita consumers and importers, and in late industrializing economies, particularly in South and East Asia (mainly China and India), in which the bulk of the world population lives. Demand-induced scarcity therefore varies for groups at different levels of per capita income. Those who cannot afford market prices find themselves excluded without any actor deciding to exclude them. Owing to the lopsided distribution in societies, according to their level of per capita income, demand-induced scarcity will enter into the lives of high-income societies last. These are the countries that industrialized first, using cheap energy. The third is technological change. The history of technological change since the 1850s has rendered access to fossil energy more, not less, important to the production of wealth and power. Without energy, other resources cannot be mobilized or used. Technological innovation, governance, and households depend on it. "Supply-induced scarcity" is caused by the dwindling of stock. In reality, demand- and supply-induced scarcity interact. Extraction costs, refining and retail, plus profit mark-ups determine prices. The intersection of demand and supply determines consumer price. However, supply-induced scarcity should be studied in its own right. One reason is that the dwindling of stock is not translated into gradual price increases by the price mechanism. However, price volatility will increase as awareness spreads that stocks are dwindling. Supply-induced scarcity, or its anticipation, can be expected to provoke a process of competitive power projection by economically as well as militarily capable and import-dependent nations whose purpose is to gain control of stock or territory in which stocks are located either by strategic investment or force. Domestic regime strength and military capability determine the capacity of target countries to ward off unwanted cooperation from outsiders.

This brings us to the third type of scarcity, called "structural scarcity". Structural scarcity is supply-induced by the deliberate action of a major power, by non-state actors such as major oil companies, or by producer cartels such as the Organization of Petroleum Exporting Countries (OPEC) or the powerful

National Oil Companies of the resource-rich countries. In the run-up to World War I, the British blocked Germany's Berlin-Baghdad Rail Project; during World War II, Nazi Germany competed with the British for influence in Iraq and tried to capture Baku. Japan waged war with America to gain access to oil in the Dutch East Indies. A major power that manages to gain control of conditions of access to the stock of third parties has the option of inducing scarcity in selected outsiders (see Yergin 1991; Bromley 1991).

In the current "unipolar military order", the US can opt to induce scarcity for allies, competitors, and enemies alike by interdicting the maritime transport of oil and gas. However, this option is available only after oil and gas have been brought to ports and ships from the territory of extraction. By extending the country's defense perimeter into the heartland of energy supply, America is equipping itself with the capacity to induce structural scarcity for contenders by diverting flows on land. This is the aim of its "foreign energy policy". Particular attention is paid to keeping the region richest in oil, the Persian Gulf, within the American sphere of geopolitical power projection.

The Russo-Ukrainian gas crisis of 2009 provides an excellent illustration of how Gazprom induced structural scarcity in 18 European countries simply by shutting down the gas pumps, that were under its control. Over the past decades there have been many instances of structural-induced scarcity, for example, the overthrow of Premier Muhammad Mossadeq of Iran in 1953 and the support for and alliance with Saddam Hussein in Iraq, until he invaded Kuwait (see Yergin 1991; Amineh 1999; Klare 2001; Abrahamian 2012).

In this study, we shall focus on the availability of oil and gas in sufficient quantities, and in particular on the risks of supply disruptions of oil and gas. The research consists of two parts; a quantitative part in which we assess the risks to energy security on the basis of indicators and a second part that focuses on the geopolitical risks.

In the first part we identify developments for demand-induced and supply-induced scarcity. The indicators used to analyze developments include import dependence, fossil fuel production in the EU and global, fossil fuel reserves in the EU, shale-oil and shale-gas reserves, and global developments in energy consumption and supply. We look both at trends in the period 1990–2012 and at future predictions.

In the second part, the geopolitical risks are assessed by a qualitative analysis. One geopolitical risk to the security of supply of the EU is when a change or breakdown in the global system or a part of that system takes place (exclusivity/discrimination, autarky, war/civil war, political boycott, failed states, terrorism, power rivalry) and results, or could result, in the absolute or relative disruption of energy (oil and gas) flows to the EU. Data on the geopolitical risk

have also been provided by a set of interviews with both the policy makers in the resource-rich countries and with expert scholars.

2.2 Data Sources

The main data sources used are described in brief below. All energy data presented in this volume are based on lower heating value. IEA Extended Energy Balances are used for general developments in energy demand and supply (IEA, 2014). For biomass, the sum is taken of the following categories: primary solid biomass, biogases, bio-gasoline, biodiesels, other liquid biofuels, charcoal, and renewable municipal waste. Non-renewable municipal waste is not included. Throughout this paper, primary energy use is expressed by the physical energy content method, as used in IEA and Eurostat statistics. This means that, for wind and solar energy, the amount of primary energy is equal to the amount of final energy. For biomass and nuclear electricity a conversion efficiency of 33 percent is used and for geothermal electricity an efficiency of 10 percent. For renewable energy compounded annual growth rates are used to express relative growth, see Formula 1:

$$\text{Growth rate (percent/yr)} = (RE(\text{year } x) / RE(\text{year } y))^{(1/(x-y))} - 1 \quad (\text{formula 1})$$

- Where RE is renewable energy in EJ

For import dependence, the Eurostat Statistics Database (Eurostat, 2015) is used. This database includes imports and exports to countries within the EU, by country of origin or destination. The conversion rates used are 41.868 TJ/tonne crude oil and 29.3 GJ/tonne coal. Natural gas use given in TJ-higher heating value is converted into lower heating value with a factor of 0.9.

Import dependence at the EU level is calculated by dividing net imports (imports—exports) to EU countries by “gross inland consumption”. For exports, the following data tables are used: nrg_134a for natural gas; nrg_133a for crude oil; nrg_132a for solid fuels; and for imports: nrg_124a for natural gas; nrg_123a for crude oil; nrg_122a for solid fuels. For gross inland energy consumption and production, data tables: nrg_101a for solid fuels; nrg_102a for oil; nrg_103a for gas; and nrg_100a for total gross inland energy consumption are used.

Unless otherwise specified, the data for the EU refer to EU28, thereby including Croatia that joined the EU in 2013.

For fossil fuel reserves, the British Petroleum Statistical Review of World Energy 2013 (BP, 2013) is used. Conversion factors used are one cubic foot natural gas equals 0.9783 MJ and one “barrel of oil equivalent” (boe) equals 5.4 GJ

(both lower heating value). Shale-oil and shale-gas reserves are based on the report “Technically Recoverable Shale Oil and Shale Gas Resources” by the US Energy Information Administration (2013).

Future projections are based on a number of sources including the World Energy Outlook 2012 (IEA, 2012), BP Energy outlook 2030 (BP, 2011 and 2012), the International Energy Outlook by US EIA (2012 and 2013f), and official EU projections (European Commission, 2013d).

3 The European Union’s Energy Security Policy

Energy supply security in the EU was addressed in the green papers “Towards a European Strategy for the Security of Energy Supply” (European Commission, 2000) and “A European Strategy for Sustainable, Competitive and Secure Energy” (European Commission, 2006). The latter paper discusses Europe’s dependence on imported energy (demand-induced scarcity) and fluctuations in demand and the action that is needed to ensure that there is an uninterrupted energy supply. It discusses various ways to achieve this:

- Opening up the markets because this is believed to create a stable, competitive environment in which companies invest.
- Creating a European Energy Supply Observatory to monitor the energy market and identify potential shortfalls.
- Re-examining the Directives on security of supply of gas and electricity from the perspective of security of supply, particularly with regard to the EU’s oil and gas stocks.
- The choices of member states in their energy mix could be reviewed at a European level by means of a Strategic EU Energy Review. This Review would offer member states a clear European framework in which to choose their energy mix, that would take into account sustainability, competitiveness, and the security of energy in the EU.
- An integrated approach toward tackling climate change that involves energy efficiency improvement and renewable energy use.

These green papers formed the basis of energy policy in the EU. Electricity and gas markets were liberalized in the period 1998 to 2004 and a Market Observatory for Energy was established in 2008. Strategic Energy Reviews in 2007 (COM 2007/1) and 2008 (COM 2008/0781) led to the European Council’s agreement on energy policy targets for Europe.

As a result, in December 2008, an energy and climate change 'package' was adopted to attain the objectives of reducing greenhouse gas emissions, as well as increasing energy efficiency and renewable energy use by 2020 (COM 2008/30). Central to the strategy is a strengthening and expansion of the Emissions Trading Scheme (ETS). Emissions from the sectors covered by the system will be cut by 21 percent by 2020 compared with levels in 2005. Emissions from sectors not included in the EU ETS (such as transport, housing, agriculture, and waste) will be cut by 10 percent from 2005 levels by 2020. The overall target for the EU is to reduce 20 percent of greenhouse gas emissions by 2020 in comparison to 1990. For renewable energy use the target is to generate 20 percent of final energy demand by renewable energy sources by 2020, legislated through the RE Directive (COM 2008/19). This Directive establishes an overall EU binding target of 20 percent of renewable energy sources in energy consumption, as well as binding national targets in line with the overall target by 2020. The Directive on energy efficiency (COM 2012/27) established a framework for the achievement of 20 percent energy efficiency improvement in 2020 (measures include e.g. ecodesign, labeling, energy performance of buildings, energy efficient products, and cogeneration). Lastly, through the CCS Directive (COM 2009/31) the package promotes the deployment of Carbon Capture and Storage (CCS).

In order to support the goals set for 2020, the European Strategic Energy Technology (SET) Plan was developed. This plan aims to accelerate the development of low carbon technologies (e.g. in the area of renewable energy, energy conservation, nuclear reactors, and CCS). It also sets the ambitious target of 80–95 percent greenhouse gas emission reduction in EU, in comparison to 1990 levels, for 2050 (European Commission, 2010).

In principle the energy and climate package will have a positive impact on energy security. Greater use of renewable energy sources will increase the amount of indigenous energy production in the EU (with the exception of biomass imports). Energy efficiency improvement is an essential step, if not in reducing absolute energy use, then at least in limiting the growth of energy use. Limiting energy use results in fewer needed energy imports in absolute terms. The implementation of carbon capture and storage also could impact positively on energy security. It would allow continued use of coal, while still reducing greenhouse gas emissions. Since EU member states have larger reserves of coal than of either gas or oil, this could improve security of supplies (WEC, 2007).

The 2nd Strategic Energy Review stipulates that a number of infrastructure developments should be recognized as energy security priorities of the Community. These include:

- Better linking between the Baltic region and the EU,
- Development of a Southern Gas Corridor for supply from CR and the Middle Eastern sources;
- Sufficient LNG capacity or availability for all member states on basis of solidarity arrangements,
- Completion of a Mediterranean energy ring, linking Europe with the Southern Mediterranean through electricity and gas interconnections (also to help develop the vast solar and wind energy potential);
- Development of North-South gas and electricity interconnections within Central and Southeast Europe,
- Development of a blueprint for a North Sea offshore grid, interconnecting national electricity grids, and plugging in planned offshore wind projects.
- Consolidate the partnership with Russia to make it more stable, and
- The diversification of energy import to secure a sustainable supply of oil and gas.

As a follow-up, in 2008 the Commission tabled the Green paper "Towards a Secure, Sustainable and Competitive European Energy Network" (COM 2008/782). It discusses the aging European energy networks and the poor east-west and south-north connections. These make it more difficult for energy to move around the EU and this means that some regions are more vulnerable to supply disruption. With energy imports set to rise, new import routes are urgently needed to give the EU greater flexibility in its supplies. The paper also states that a clear and stable legal framework is the main precondition for stimulating private sector investment in generation and transmission/transport. Creating this framework is one of the principal aims of the energy and climate package and the third internal energy market package on the completion of the internal gas and electricity market. The third internal energy market package (IP 2007/1361), adopted in 2009, should stimulate investments, synergies, efficiencies, and innovation in energy networks.

Umbach (2010) has analyzed the degree to which policies implemented contribute to ensure energy security in the EU. He found that, although energy security has forced its way up the European policy agendas, the member states have largely failed to forge a coherent European energy security strategy after the spring summit of 2007. The principal missing factor has continued to be political solidarity, despite the 'solidarity clause' in the Treaty on the Functioning of the European Union. The 2nd Strategic Energy Review of November 2008 has recommended new initiatives to overcome this lack by promoting concrete infrastructure and political solidarity. If the EU is able to implement these decisions, this could have beneficial impacts on energy security.

Planned infrastructure developments are on the way and have been devised principally to diversify natural gas imports. A Southern Gas Corridor to transport natural gas from the Caspian region to Austria via Turkey is planned to be in operation by 2019 (Ratner et al., 2013). Russia's energy strategy is one of the main constraints on the project. The construction of the Russian pipeline, South Stream, and the involvement of the Eastern European countries weaken the pipelines in the context of the Southern Gas Corridor both commercially and geologically. In this project, however, Gazprom is cooperating with major western banks and European energy companies such as ENI, EDF, and Wintershall as shareholders. The project promises to improve the gas supply to Eastern European countries. In 2012, the NorthStream Pipeline, that connects Russia directly to Germany, went into operation. These infrastructure developments are necessary to facilitate required natural gas imports and to increase the diversity of supply from different regions. However, good infrastructure opportunities might increase energy imports even more and might therefore have an uncertain impact on energy security. By illustrating Russian determination and its concomitant strategy to control the transit routes to the Union, the Russian South Stream and Nord Stream are also determining the diversification efforts of the EU.

To conclude, although policies at EU and individual member states level have booked some successes in the field of energy security, imported fossil fuels dependence in the EU has only increased in recent years, as we shall show in Section 4. A big question-mark still hangs over whether the policies implemented are sufficient to change the trends in the period up to 2020.

4 Import Dependence in the EU: Past Trends and Future Developments

Because of a combination of high consumption, few resources, and limited domestic production, the EU is a net importer of energy. In this section, we shall take a look at developments in import dependence in the EU in the last two decades. Firstly, we discuss the development of total primary energy use and the reliance on fossil fuels (Section 4.1). After that we shall assess import dependence per fossil fuel (Section 4.2 natural gas; 4.3 crude oil; and 4.4 coal), followed by a look at the overall import dependence of energy supply (Section 4.5). Lastly, we discuss developments in fossil fuel production in the EU (Section 4.6) and future trends (Section 4.7).

FIGURE 11.1 *Total primary energy supply in EU28 by source.*
SOURCE: BASED ON IEA, 2014

4.1 *Total Primary Energy Use*

Figure 11.1 shows the development of total primary energy supply in the EU28 in the period 1990–2012, by energy source. A number of things are apparent when looking at the trends. Firstly, the share of coal in the fuel mix has decreased to be replaced by a higher use of natural gas. Oil and nuclear have stayed about the same. Secondly, fossil fuels are an important part of primary energy supply. Their share has slightly decreased from 83 percent in 1990 to 79 percent in 2000 and 74 percent in 2012, mainly to be replaced by more biofuels/waste use, that has increased from 3 percent in 1990 to 8 percent in 2012 (see Figures 11.2 and 11.3). The total share of renewable energy increased from 5 percent to 12 percent in this period, from 3.1 EJ to 8.3 EJ. A strong growth is particularly visible in a relative sense for solar/wind/other from 0.02 percent in 1990 to 1.6 percent in 2012. Hydro remains constant at around 1.5 percent.

Coal as a share in fossil fuel consumption decreased from 33 to 24 percent in the period 1990–1998 and, since then has remained constant, while the share of natural gas increased from 22 percent in 1990 to 30 percent in 2000 and 32 percent in 2012 (IEA, 2014). Oil as share in fossil fuel use remained at about 45 percent in this period.

In an absolute sense, the development of primary energy use has shown a decreasing trend since 2006, reducing from 75 EJ then to 69 EJ in 2012. The economic recession has played some role in this, but in combination with a lower energy intensity (energy use per unit GDP), that showed an average decrease of 3 percent per year (see Figure 11.4).

FIGURE 11.2 *Primary energy use in EU28 by source (percentage of supply).*
SOURCE: BASED ON IEA 2014

FIGURE 11.3 *Renewable energy use in EU28 (EJ).*
SOURCE: BASED ON IEA, 2014

FIGURE 11.4 *Energy intensity (based on total primary energy supply (TPES)).*
SOURCE: BASED ON IEA, 2014

Primary energy use per capita slightly increased, by 5 percent, in the EU in the period 1990–2005 and thereafter has shown a decreasing trend, ending up 7 percent below 1990 level in 2013 (see Figure 11.5). This decrease is mainly attributable to the trend of energy use in industry that was 30 percent below the 1990 level in 2013. Part of the decrease in industry in the early 1990s was because of the unification of East and West Germany and hence the closure of many inefficient industrial plants. The second strong decrease is visible in 2008, caused by the recession. Electricity consumption per capita generally shows an upward trend, with a 17 percent increase in 2014 compared to 1990 level, but also here the recession is visible after 2008. This is partly caused by reduced electricity use in industries. Similarly, the energy use in transport first shows an increasing trend up to 2007 (+18 percent) and then decreases to 5 percent above 1990 level in 2013. The energy use in buildings and agriculture stayed more or less stable during this period.

CO₂ emissions per capita have decreased faster than primary energy use per capita because of the simultaneous fuel mix change (more renewables). The same is visible in carbon emissions per unit GDP compared to primary energy use per GDP.

Figure 11.6 shows the development of specific CO₂ emissions per capita for the ten largest CO₂ emitters worldwide. The value for the EU is 47 percent higher than the global average but below those of the United States, Canada, Russia, South Korea, Japan, Iran, and China. The CO₂ emissions per

Notes:

- Transport, industry and buildings, and agriculture per capita include total final energy use of these sectors (based on IEA, 2014 and 2015)
- For primary energy use per GDP, GDP is corrected for Purchasing Power Parity (PPP) and is given in 2005 constant prices (based on IEA, 2014 and 2015)
- CO₂ emissions per GDP include only emissions from fossil fuel combustion and GDP is based on PPP in 2012 prices (based on Olivier et al., 2015).

FIGURE 11.5 *Development of specific energy use and CO₂ emissions in EU28 (indexed at 1990 level = 100 percent).*

SOURCE: BASED ON IEA, 2014

capita are strongly related to the volume of primary energy use per capita, as shown in Figure 11.5, and the carbon intensity of the fuel mix used as shown in Figures 11.1–3.

4.2 *Natural Gas*

Figure 11.7 and Figure 11.8 show the origin of natural gas use in the EU28 in the period 1990–2013 by country. The category ‘own supply’ refers to natural gas that is produced and consumed within a country’s borders. Intra-EU imports/exports refer to natural gas that is imported and exported by countries within the EU28. This consists for 95 percent of natural gas exports from the Netherlands mainly to Germany, Italy, and Belgium. The figures show that net imports of natural gas in the EU in recent years have come mainly from Russia, Norway, Algeria, Qatar, and Nigeria. In the period from 1990 some shifts

FIGURE 11.6 *Development of CO₂ emissions from fossil fuel combustion per capita for the 10 largest emitters in 2014.*
SOURCE: BASED ON OLIVIER ET AL., 2015

FIGURE 11.7 *Natural gas supply in EU28 by country.*
SOURCE: BASED ON EUROSTAT, 2015

FIGURE 11.8 *Natural gas supply in EU28 by country as shares.*
SOURCE: BASED ON EUROSTAT, 2015

are visible. The contribution of Norway has increased from 7 to 20 percent. Furthermore, the entrance of Qatar is visible, beginning with 1 percent in 2004 and increasing to ~6 percent in 2010–2013.

Total net imports for natural gas supply amounted to 65 percent in 2013. This is a strong increase in comparison to 1990 when net imports amounted to ~46 percent. The difference can be explained by a decreasing share of domestic supply and an increase in imports from Norway. If we ignore Norway, that is closely related to the EU28, the import dependence reduces from 38 percent in 1990 and to about 42 percent in the years 2000–2013.

A large share of natural gas imports come from the MENA region (Middle East and North Africa) and the Caspian Sea Region. In 2013 these countries delivered 65 percent of natural gas imports, a decrease in comparison to 1990 when 85 percent originated from these regions. This is mainly a result of the increasing share of Norway in imports.

4.3 *Crude Oil*

Figure 11.9 shows the development of crude oil use in the EU28 by country of origin, in the period 1990–2013. There is a growing trend for crude oil supply

FIGURE 11.9 *Crude oil supply in EU28 by country of origin.*
SOURCE: BASED ON EUROSTAT, 2015

up to 2005 only to decrease thereafter. Both in an absolute and a relative sense there is a strong increase in the crude oil supply from Russia, from 1 EJ in 1990 to 7 EJ after 2002, with an increasing share from 5 percent to 30 percent after 2004 (see Figure 11.10). Import dependence on oil has increased from ~75–80 percent in the period 1990–2000 to 88 percent in 2013. Excluding Norway, these figures reduce to 60 percent in the 1990s and to around 75 percent in 2010–2013. Domestic and intra-EU supplies have decreased from 20 percent in 1990 to 12 percent in 2013. Intra-EU imports and exports consist mainly of the oil supply to the Netherlands, Germany, Sweden, and France from the UK and Denmark.

The same can be said of natural gas. A large share of oil imports originate from the MENA and Caspian Sea region, corresponding to 73 percent in 2013. In contrast to natural gas, this is an increase in comparison to 1990 level when the share of imports from these regions was 66 percent.

4.4 *Coal*

The development of the coal supply in EU clearly shows the impact of the economic crisis, with a sharp decrease in coal supply in 2009 and a slightly increasing trend thereafter (see Figure 11.11). As was the case for natural gas and crude oil, Russia is also the biggest supplier of coal to the EU. Its share increased in

FIGURE 11.10 *Crude oil supply to EU28 by country of origin as shares*
SOURCE: BASED ON EUROSTAT, 2015

FIGURE 11.11 *Coal supply in EU28 by country of origin.*
SOURCE: BASED ON EUROSTAT, 2015

FIGURE 11.12 *Coal supply in EU28 by country of origin as shares.*
SOURCE: BASED ON EUROSTAT, 2015

the period 2000–2013 from 3 to 17 percent (see Figure 11.12). The second source of coal is from Colombia contributing 13 percent in 2013, followed by the United States with 12.6 percent and Australia with 4.2 percent. Other countries have fairly small shares. The contribution of South Africa slowly decreased from 12 percent in the early 2000s to 3.9 percent in 2013. Overall import dependence on coal increased sharply from 21 percent in 1990 to 36 percent in 2000, 44 percent in 2010, and to as much as 57 percent in 2013. Notable is the increase of United States in coal imports in 2011. As a result of the shale-gas revolution, the US has increased the level of its coal exports (EUISS, 2013).

4.5 *Total Primary Energy Supply Security*

Table 11.1 summarizes net import rates per fossil fuel source in EU. Looking at the trends in imports of the different fossil fuels, we can see that crude oil and natural gas have the highest import rates of 88 and 65 percent respectively in 2013; excluding Norway, these figures decrease to 78 and 42 percent, respectively.

All fossil fuels show increasing rates of import dependence in the period 1990–2013. The share of natural gas imports increased from 46 to ~65 percent,

TABLE 11.1 *Net import rate in EU per fossil fuel source (share of energy use in EU28 that is net imported)*

	1990	1995	2000	2005	2010	2011	2012	2013
Coal	21 percent	25 percent	36 percent	45 percent	44 percent	47 percent	51 ¹ percent	57 percent
Natural gas	46 percent	44 percent	49 percent	56 percent	60 percent	65 percent	65 percent	65 percent
Oil	80 percent	74 percent	75 percent	82 percent	85 percent	86 percent	88 percent	88 percent
Total primary energy use	43 percent	42 percent	46 percent	51 percent	51 percent	53 percent	54 percent	54 percent
Excluding Norway	39 percent	35 percent	37 percent	42 percent	42 percent	45 percent	47 percent	49 percent

SOURCE: BASED ON EUROSTAT (2015)

crude oil from 75–80 to 85–88 percent, and coal had the strongest increase, from 21 to 57 percent.

The overall import dependence on total primary energy supply in the EU amounted to 54 percent in 2013, rising from 43 percent in 1990. Excluding Norway, these shares are 39 percent in 1990 and 49 percent in 2013.

Figure 11.13 shows the development of total primary energy use in the EU, broken down by the origin of the energy. The category ‘own supply’ includes energy supply from fossil fuel production, renewable energy, and nuclear energy use within EU countries. “Intra-EU” refers to supply from other countries inside the EU and consists mainly of natural gas supply from the Netherlands and oil supply from the UK. The figure shows that among fossil fuel imports, crude oil is highest in an absolute sense, followed by natural gas imports.

Figure 11.14 shows a breakdown of primary energy supply by country of origin. All countries supplying 1 EJ or more of fossil fuels to the EU in 2013 are included. Two main countries from which fossil fuel sources are derived can be identified: Russia and Norway. Their shares have increased from 8 in 1990 to 19 percent in 2013 for Russia and from 4 to 8 percent, for Norway. The remaining imports come from a number of countries, such as Algeria (natural gas), Saudi-Arabia (oil), and Columbia (coal). The share of MENA and the Caspian Sea Region in total imports equaled 63 percent in 2013, the same as in 1990.

FIGURE 11.13 *Total primary energy use in EU28 by type of origin.*
SOURCE: BASED ON EUROSTAT, 2015

FIGURE 11.14 *Total primary energy use in EU28 by country of origin as shares.*
SOURCE: BASED ON EUROSTAT, 2015

FIGURE 11.15 *Fossil fuel production in EU28 by country in 2013.*

SOURCE: BASED ON EUROSTAT, 2015

4.6 *Production of Fossil Fuels in the EU and Reserves*

In Sections 4.2–4.5 we can see decreasing amounts of ‘own supply’ of fossil fuels within the EU. In this section, we discuss the production and reserves of fossil fuel sources in comparison to their consumption.

Figure 11.15 shows fossil fuel production in 2013 by country. More than 70 percent of fossil fuel production in the EU occurs in only four countries: UK, Germany, Poland, and the Netherlands. The remaining countries have overall low fossil fuel production. Of fossil fuel production, coal is the largest with 43 percent, followed by natural gas with 37 percent and oil the remaining 19 percent in 2013.

Figure 11.16 shows the trend of fossil fuel production in the EU in the period 1990 to 2013. In comparison to 1990, oil production in the EU had decreased by 42 percent in 2013, natural gas by 24 percent and, most notably, coal by 51 percent. In the last 20 years, many coal-mines in Europe have been closed, mainly because of the availability of cheaper imported coal. In 2008 the European Commission paid 3 billion EUR state aid to mines (Euroobserver, 2010). By 2018, subsidies to coal-mines will end and loss-making coal-mines will need to have been closed by 2014 (Hrushka, 2010). Further decreases in coal production are therefore to be expected.

Table 11.2 shows consumption, production, and reserves of fossil fuels in the EU and what their global share is. In 2014, oil consumption in the EU amounted to 24 EJ, equal to about 14 percent of global consumption. This represents a

FIGURE 11.16 Fossil fuel production in EU28 in period 1990 to 2013.

SOURCE: BASED ON EUROSTAT, 2015

TABLE 11.2 Consumption, production and reserves per fossil fuel source in 2014 and between brackets share in global

Unit: EJ	Oil	Natural gas	Coal
Consumption	24 (14 percent)	13 (11 percent)	11 (7 percent)
Production	2.9 (1.6 percent)	4.5 (3.8 percent)	6.3 (3.9 percent)
Reserves	31 (0.3 percent)	52 (0.8 percent)	1643 (6.3 percent)
R/P ratio	11.2	11.3	111

SOURCE: BP (2015)

1.5 percent decrease compared to 2013 and it has continued in a decreasing trend since 2016. Oil production has declined over the last years and now stands at approximately 2.9 EJ per year, or 1.6 percent of global production. Even worse for future prospects are the EU's oil reserves that currently stand at 31 EJ, a staggeringly low 0.3 percent of global reserves and declining (BP, 2015).

The statistics on natural gas are not much more optimistic. In 2014, gas consumption stood at 13 EJ, or 11 percent of total world consumption, a 12 percent

decrease from the year before and again has been continuing a decreasing trend since 2010. At the same time, gas production in 2014 fell 10 percent on the previous year to 4.5 EJ (BP, 2015), continuing the decreasing trend and making EU production 4 percent of global production. Again, the state of the reserves is aggravating the problem, with the current standing at 52 EJ or 0.8 percent of global reserves and decreasing (BP, 2013). In other words, the EU possesses insufficient natural gas and oil reserves to meet future demand.

The coal situation is different, mainly in terms of reserves. Coal consumption is somewhat lower in comparison to natural gas and oil with 11 EJ in 2014, representing 7 percent of global consumption. Coal production on the other hand is higher with 6 EJ in 2014, equivalent to 4 percent of global coal production. Most notable, however, are the coal reserves that are much higher, representing 6 percent of global reserves with 1643 EJ, sufficient to meet more than 100 times the coal consumption in the EU in 2014.

These data include conventional fossil fuel production and reserves, but what about unconventional resources? Table 11.3 shows estimated reserves of shale-oil and shale-gas in the EU by country. Clearly these are higher than the conventional reserves of oil and gas with 70 EJ for shale-oil and 462 EJ for shale-gas, equivalent to 3.7 and 6.6 percent of global reserves. Shale-oil reserves are thereby limited in comparison to consumption and would barely be sufficient for three years. Shale-gas reserves on the other hand would cover 35 times the 2014 consumption. However countries in the Middle East, North Africa, and Russia are estimated to have large reserves of shale-gas (~1400 EJ) and shale-oil (~700 EJ) (derived from US EIA, 2013a). So local shale-gas production could compete with importing (cheaper) shale-gas.

This section clearly shows the decreasing fossil fuel production in EU and its increasing import dependence in the last two decades. In terms of reserves, only coal and shale-gas production are options for larger-scale fossil fuel production within the EU; and these are sufficient to cover demand for a couple of decades. However, with the trend in the closure of mines, because of cheaper imports, tapping the coal reserves would be an unlikely development, at least in the short term. The production of shale-gas, on the other hand, is under discussion and drilling tests are being conducted in many EU countries. In the US, shale-gas contributed 47 percent to the total natural gas production in 2013 (US EIA, 2015). It seems likely that (some) EU countries will follow suit sooner or later.

Furthermore it is apparent that in the case of oil, both global reserves and own EU reserves, the future looks bleak. The combination of renewables and electric transport would therefore be a way to improve energy security. This combination might also be beneficial to helping balance the supply and

TABLE 11.3 *Unproved technically recoverable shale gas and shale-oil in the European Union*

In EJ	Shale-oil	Shale gas
Bulgaria	1	17
Denmark	0	31
France	25	134
Germany	4	17
Netherlands	16	25
Poland	18	145
Romania	2	50
Spain	1	8
Sweden	0	10
United Kingdom	4	25
<i>European Union</i>	<i>70 (3.7 percent)</i>	<i>462 (6.6 percent)</i>

Note: Conversion factors: 1 cubic foot natural gas = 0.9783 MJ (lower heating value). 1 boe = 5.4 GJ (lower heating value).

SOURCE: US EIA (2013A)

demand for electricity; for instance, charging electric cars at night when electricity demand is low, but wind production might be comparatively high.

In terms of import dependence, the large share of Russia and Norway in fossil fuel imports is noticeable. Natural gas production in Norway is still increasing, but natural gas reserves are being exploited at a rapid pace (Soederbergh et al., 2009). After 2020, decreasing production is expected, potentially leading to a lesser role of Norway in gas supply.

4.7 *Trends Towards Fossil Fuel Import Dependence in the EU*

Expectations are that the EU's dependence on fossil fuel imports will continue to grow. Since 2000 the European Commission has repeatedly warned (Green Paper) that the EU's net energy import dependency will rise from 51 percent in 2005 to 70 percent of the EU's total energy requirements by 2030. Moreover, in 2011 40 percent of the EU's oil imports originated from MENA countries; by 2030 this figure will reach 90 percent. The situation for gas is similar. In 2012, 35 percent of the EU's gas imports came from Russia, 34 percent from Norway, and 15 percent from Algeria. According to the European Commission, by 2030 this is expected to be 60 percent from Russia and an 80 percent overall import

dependency (BP, 2012). It is a particular cause for alarm that the EU's import dependency on gas from Russia is likely to grow and that gas is increasingly replacing oil as the main energy source. The Energy and Climate package is expected to have a positive impact on energy security. But what will the impact of the "20-20-20 targets" be on import dependence? The document "EU Energy, Transport and GHG Emissions Trends to 2050" (European Commission, 2013d) presents a reference scenario that includes the expected impacts of these policies. In this scenario, EU primary energy use will decrease from 70 EJ in 2013 to about 68 EJ in the period 2020–2050. In spite of the implementation of energy efficiency and renewable energy, net imports will increase from 54 percent in 2013 to 57 percent in 2030, and 59 percent in 2050. This is mainly related to decreasing EU fossil fuel production, that will be partly compensated by increasing renewable energy supply. Fossil fuel production within the EU will decrease from 15 EJ in 2013 to 11 EJ in 2030 and 6 EJ in 2050, whereas renewable energy supply will increase from 7.7 EJ in 2013 to 12 EJ in 2030 and 15 EJ in 2050 (see Figure 11.17). Net natural gas imports, as share of natural gas consumption, will increase from 65 percent in 2013 to 72 percent in 2030 and 83 percent in 2050. Oil imports will increase from 88 percent in 2013 to 90 percent in 2030 and 97 percent in 2050. Finally, coal imports will reduce from 57 percent in 2013 to 49 percent in 2030 and to 44 percent in 2050.

To conclude, trends predict a growing import dependence in the EU, but it is only one of the factors that might influence energy security. The importance of import dependence for energy security within EU will hinge largely on global developments in the field of energy supply and demand. In Section 5, we shall therefore look at expected developments in the field of energy demand on the one hand (Section 5.1) and energy supply (Section 5.2) on the other hand.

5 Developments in Global Energy Demand and Supply

5.1 *Developments in Global Energy Demand*

Global primary energy demand, according to the International Energy Agency—World Energy Outlook 2012 (IEA, 2012)—is projected to increase by over one-third in the period 2012 to 2035, although this is heavily dependent on, among other factors, the level of economic growth up to then. Sixty percent of this growth is expected to be underpinned by rising living standards in China, India, and the Middle East. Meanwhile, there is a pronounced shift away from oil, coal (and, in some countries, nuclear) toward natural gas and renewables. The growth of demand in industrialized or Organization for Economic Cooperation and Development (OECD) countries, such as the EU member

FIGURE 11.17 *Production and net imports in EU in period 1990–2050 in reference scenario.*
SOURCE: BASED ON EU, 2013

states and the US, will be more modest, given that they already have high levels of per capita use. As a result, it is predicted that in 2035 more than 30 percent of world energy demand will come from developing countries, specifically from China that is now the largest leading global energy consumer. According to BP, since 2010 China has already overtaken the US as the world's biggest energy

user. Its total share in energy consumption was 22 percent in 2012, compared with 18 percent of the US (BP, 2013). Over the next two decades, oil is expected to remain the main fuel for industries and households, accounting for about 40 percent of global energy consumption. It is expected that global oil demand will increase by 33 percent from 171 EJ in 2010 to 227 EJ in 2040 (see Table 11.4).

The US EIA (2013f) anticipates an even higher growth of 63 percent in the global demand for natural gas during the period 2010–2040, from 111 to 181 EJ. Gas import dependency will increase substantially in all major consumer markets, except those in East and Southeast Asia, in which import dependency is already very high.

Table 11.4 shows that in most industrialized countries, total oil demand is expected to decline as natural gas use increases. High annual growth rates are estimated for natural gas use in China (5.3 percent) and Africa (3.1 percent). For oil the highest annual growth rates are expected in India (3.1 percent) and China (2.5 percent).

5.2 *Developments in Global Energy Supply*

In Section 5.1 we have seen that substantial increases are expected in natural gas and oil demand (45 percent increase in period 2010–2040 for oil and gas together). However, in the period to 2035, global oil and gas supplies are predicted to originate in fewer countries than today (IEA, 2012). This is owing to the fact that proven oil and gas reserves are unevenly distributed around the world and that only a few countries are surplus producers. We shall therefore look into the situation of oil and gas reserves in more detail (5.2.1) and at developments in production thereafter (5.2.2).

5.2.1 Oil and Gas Reserves

In Section 4 we discussed oil and gas reserves in the EU and found them to be small. But what about global reserves and how are they divided over countries? Table 11.5 shows proven oil and natural gas reserves in the world and in key countries located in MENA and the Caspian region including Russia, in 2012.

The total global oil stock at the end of 2012 was estimated to be 9,000 EJ proven reserves, of which as much as 73 percent was located in OPEC countries (BP, 2013). Fourteen countries account for 90 percent of the total global proven oil reserves: Saudi Arabia, Iraq, United Arab Emirates (UAE), Kuwait, Iran, Venezuela, Russia, Mexico, US, Libya, China, Nigeria, Norway, and the UK. Just five countries (Saudi Arabia, Iraq, UAE, Kuwait, Iran) hold almost one-half of the world total proven oil reserves. Global natural gas reserves at the end of 2012 were estimated to be about 6,500 EJ. Proven gas reserves are slightly

TABLE 11.4 *Projected global oil and natural gas consumption 2010–2040*

Region/country	Oil			Natural gas		
	2010	2040	Annual average growth 2010–2040 (percent)	2010	2040	Annual average growth 2010–2040 (percent)
EJ						
North America	46	48	0.1	29	41	1.2
US	37	37	0.0	23	29	0.7
OECD Europe	29	28	-0.1	19	24	0.7
Industrialized Asia	15	16	0.1	6.6	10	1.3
Japan	8.7	7.7	-0.4	3.7	5.1	1.0
South Korea	4.3	5.3	0.6	1.5	2.4	1.7
Non-OECD Europe and Eurasia^a	9.5	14	1.2	21	29	1.0
Russia	5.9	7.7	0.9	15	19	0.9
Developing Asia	39	77	2.3	14	36	3.3
China	18	39	2.5	3.7	17	5.3
India	6.5	16	3.1	2.3	4.0	2.0
Central and South America	12	16	1.0	4.8	8.7	2.0
Middle East	13	20	1.3	13	25	2.2
Africa	6.7	9	1.0	3.5	8.6	3.1
World Total	171	227	0.9	111	181	1.7

Note: Conversion factors: 1 cubic foot natural gas = 0.9783 MJ (lower heating value), 1 boe = 5.4 GJ (lower heating value).

a Central Eurasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

SOURCE: BASED ON EIA-INTERNATIONAL ENERGY OUTLOOK (2013), TABLE A5 AND A6, PP. 184–185

less concentrated than oil reserves. Over 70 percent of natural gas reserves are located in the Persian Gulf region and Caspian Sea region. The proven gas reserves for Azerbaijan, Turkmenistan, Kazakhstan, and Iran are estimated to be 3,100 EJ, almost as much as the combined proven gas reserves in Europe, the US, and the Middle East.

TABLE 11.5 *Proven oil and natural gas reserve in the Caspian Sea Region, Europe, US, Persian Gulf Region and North Africa, 2012*

<i>Caspian Sea Region</i> [1]	Proven oil reserves (EJ)	Proven natural gas reserves (EJ)
Azerbaijan	38	31
Kazakhstan	162	45
Turkmenistan	3	605
Iran [2]	848	1162
Russia	471	1137
<i>Persian Gulf Region</i>	0	0
United Arab Emirates	528	210
Iraq	810	124
Kuwait	545	62
Oman	30	33
Saudi Arabia	1436	284
<i>North Africa</i>	0	0
Algeria	66	156
Egypt	23	70
Libya	259	53
Tunisia	2	
<i>US</i>	189	293
<i>EU27</i>	37	60
World Total	9012	6471

Notes: [1] The Caspian Sea Region refers to Azerbaijan, Kazakhstan, Turkmenistan, Iran, and Russia; Persian Gulf region countries refer to Iran, Iraq, Kuwait, Oman, Saudi Arabia, and the United Arab Emirates. [2] Iran is member of two regions, the Middle East and the Caspian Region.

SOURCE: BP, 2013

The Middle East has substantial gas reserves, but they remain largely untapped. This is because of the difficulties and costs involved in developing and bringing these gas reserves to market. Compared to the international oil market, the international gas market is still very much a regional one, divided into Asia's LNG market, the Russian-European market, and the North American market. The Caspian Sea region holds one of the world's largest oil and gas reserves, and this makes these countries very significant in global markets. Iran and

Russia are the two main powers in terms of oil and gas reserves in the Caspian region and have the largest energy reserves in the world (36 percent of global natural gas reserves and 15 percent of oil reserves). Iran is the world's largest owner of proven natural gas reserves and ranks fourth in world proven oil reserves. Russia ranks eighth in the world for proven oil reserves and is second for proven gas reserve.

5.2.2 Oil and Gas Production, Consumption and Net Exports

Table 11.6 shows oil production, consumption, and net exports for the years 2002, 2007, and 2012 in key oil- and gas-producer countries. It shows the development of the production, consumption, and the resulting exports in the last decade. The increased net exports of the Caspian Sea Region in comparison to 2002 are clearly visible. These increases are principally attributable to increased production in Azerbaijan, Kazakhstan, and Russia. Increases in the United Arab Emirates, Iraq, Kuwait, and Saudi Arabia are notable. In 2012, the largest oil-exporting countries were Saudi Arabia and Russia, together supplying 25 percent of oil consumption.

To meet growing global oil and gas demands, IEA projections indicate that world oil supply from outside OPEC, that was less than 97 EJ in 2011, will reach its plateau, up to over 105 EJ per year, in the mid-2020s and then drop back to 99 EJ by 2035 (IEA, 2012). The bulk of the increase is expected to come from a surge in unconventional energy production in the US and Canada, and deepwater production offshore in Brazil. It is expected that a large share of the Middle East's oil export in 2035 will reorient toward newly industrializing Asian countries, mainly China (IEA, 2012). Nonetheless, the market share of the OPEC countries in oil supply is expected to increase from 43 percent in 2012 to 46 percent in 2030, and is continuing a longstanding growth trend (BP, 2012). According to IEA (2012), Iraq is an important resource-rich country that can become a geopolitical leader in the oil market. Projected Iraqi oil production will rise from 6 EJ in 2012 to 12 EJ in 2020, and then to over 16 EJ in 2035. This would mean exports of over 8 EJ in 2020 and of over 12 EJ in 2035, up from more than 4 EJ in 2012.

Iran, on the other hand, is showing decreasing levels of oil production. For the past several years, western governments have imposed an economic sanctions regime on Iran designed to pressure the Iranian ruling elite into giving up its uranium enrichment program. Until 2012, these sanctions were not targeted at Iran's petroleum sector, that accounted for well over 70 percent of Iran's government revenues during the past decade. The reasons can be found in the reliance by some European and Asian countries on Iranian oil supplies; investment by international oil companies in Iran's oil and gas sector; and the role of

TABLE 11.6 *Caspian Sea Region, Persian Gulf Region and North Africa oil production, consumption and exports 2002–2012*

Country	Production			Consumption			Net export*		
	2002	2007	2012	2002	2007	2012	Exports 2002	Net exports 2007	Net Export 2012
<i>Caspian Sea Region</i>									
Azerbaijan	0.6	1.7	1.7	0.1	0.2	0.2	0.4	1.5	1.7
Kazakhstan	2.0	2.9	3.4	0.3	0.5	0.5	1.5	2.4	2.7
Turkmenistan	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2
Iran	7.1	8.5	7.3	2.9	3.7	3.9	4.3	4.7	3.6
Russia	15.3	19.8	21.0	5.0	5.5	6.3	9.9	14.2	14.2
<i>Persian Gulf Region</i>									
United Arab Emirates	4.8	5.9	6.7	0.8	1.1	1.4	4.0	4.9	5.1
Iraq	4.2	4.2	6.1	1.0*	1.1*	1.5*	3.0	3.0	4.4
Kuwait	4.0	5.2	6.2	0.6	0.8	0.9	3.4	4.5	4.8
Oman	1.8	1.4	1.8	0.1*	0.2*	0.3*	1.7	1.2	1.5
Saudi Arabia	17.6	20.2	22.7	3.3	4.3	5.8	14.1	16.0	17.1
<i>North Africa</i>									
Algeria	3.3	3.9	3.3	0.4	0.6	0.7	2.7	3.3	3.0
Egypt	1.5	1.4	1.4	1.0	1.3	1.5	0.4	0.0	-0.2
Libya	2.7	3.6	3.0	0.5*	0.5*	0.3*	2.3	3.1	2.6
Tunisia	0.1	0.2	0.1	0.2*	0.2*	0.2*	0.0	0.0	0.0
World Total	148	162	170	155	171	177	—	—	—

SOURCES: BASED ON DATA FROM US EIA (2013C), * BASED ON DATA FROM BP (2013)

Iranian oil production in an era of rising emerging market demand and slow non-OPEC supply growth. This situation began to change in 2012, when relatively low global oil demand growth and strong increases in non-OPEC liquid production created an opportunity for the international community to tighten sanctions targeting Iran's oil sector. As a result of stronger sanctions implemented by the United States and many of its EU member-state allies, Iran's oil production fell to 6 EJ—its lowest level since 1989 (BP, 2013). New US sanctions that came into effect in February 2013 are likely to begin removing additional Iranian barrels from the market soon. However, the window of opportunity in which the market can comfortably withstand the loss of additional Iranian oil while minimizing oil price volatility and damage to the global economy is small, extending no later than mid-2014. While non-OPEC supply growth in 2014 is currently expected to meet or exceed growth in 2013, global oil demand will probably accelerate, leading to a tighter oil market. For example, although an estimate is not yet available from EIA-DOE, it is currently expected that global demand will grow by 2.6 EJ in 2014 compared to 2.0 EJ in 2013. The presence of a nuclear Iran in a Middle East region already fraught with instability is likely to lead to long-term risks to oil markets and costs for the United States and the global economy.

Table 11.7 shows natural gas production, consumption, and net exports for the years 2002, 2007, and 2012. Russia is currently the world's second largest natural gas producer, after the United States (BP, 2013). In terms of net exports, Russia is largest, supplying 20 percent of world natural gas consumption.

Non-OECD Europe, Eurasia, and the Middle East accounted for approximately 40 percent of global natural gas production in 2012 (BP, 2013). These regions are expected to account for 80 percent of the increase in production between 2005 and 2030 (BP, 2011). At the same time, OECD countries will decline in their share of global natural gas production from 39 to 27 percent. Hence, it is estimated that, by 2030, supplies of gas to the world market will originate in fewer countries than today because some of the existing sources will be exhausted.

To conclude, import dependence in the EU is expected to increase in the coming two decades. However, global trends show that fossil fuel production is likely to be more concentrated in fewer countries, while global demand for energy is expected to increase substantially. This combination could severely impact on energy supply security in the EU, depending on factors such as conditions in supplying countries and geopolitical factors. We shall examine these issues in Section 7, after we have assessed the possible role of renewable energy and energy efficiency improvement in global energy use, in Section 6.

TABLE 11.7 *Caspian Sea Region, Persian Gulf Region and North Africa natural gas production, consumption and exports 2002–2012*

Country	Production*			Consumption*			Net export*		
	2002	2007	2012	2002	2007	2012	2002	2007	2012
<i>Caspian Sea Region</i>									
Azerbaijan	0.2	0.4	0.6	0.3	0.3	0.4	-0.1	0.1	0.2
Kazakhstan	0.5	0.3	0.4	0.5	0.4	0.4	-0.1	-0.1	0.0
Turkmenistan	1.8	2.4	2.3	0.4	0.7	0.7	1.5	1.7	1.6
Iran	2.6	3.9	5.2	2.7	3.9	5.3	-0.1	0.0	-0.1
Russia	19.3	21.1	23.3	13.3	14.9	17.4	6.0	6.2	6.2
<i>Persian Gulf Region</i>									
United Arab Emirates	1.5	1.7	1.8	1.3	1.7	2.6	0.2	0.0	-0.4
Iraq	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kuwait	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Oman	0.3	0.4	0.5	0.3	0.4	0.5	0.0	0.0	0.0
Saudi Arabia	0.5	0.8	0.9	0.2	0.4	0.6	0.3	0.5	0.3
<i>North Africa</i>									
Algeria	2.7	2.9	2.9	0.7	0.9	1.1	2.0	2.0	1.8
Egypt	0.9	1.6	2.1	0.9	1.1	1.8	0.0	0.5	0.4
Libya	0.2	0.5	0.3	0.2	0.2	0.1	0.0	0.3	0.1
Tunisia	0.1	0.1	0.1	0.1	0.1	0.1	-0.1	0.0	-0.1
World Total#	87	81	116	0.9	80	115	-	-	-

SOURCES: * BP, 2013 AND US EIA, 2013C

6 Long-term Trends in Renewable Energy and Energy Efficiency

In Section 4 we focused on fossil fuel use, production, import dependence, and reserves in the EU and in Section 5 we discussed global developments in energy use and supply. However, so far we have not discussed the impacts that renewable energy and energy efficiency improvements might have on energy security in a global context, especially when more stringent climate policies are implemented. Many studies agree that a transition to a sustainable energy supply is needed in order to safeguard the supply of energy for future generations and to cut back on greenhouse gas emissions. Limiting the average global surface temperature increase to 2°C, compared to pre-industrial average, is commonly regarded as an adequate means of avoiding dangerous climate change (IPCC, 2013). In many scenarios that envision a development of an energy supply that would be in line with a 2 degree target, a large component of the solution consists of renewable energy and energy efficiency (IPCC, 2011). Renewable energy would be in the range of 200–300 EJ by 2050; equivalent to 40–80 percent of total primary energy supply in 2050. This would mean an increase by a factor of 3 compared to 74 EJ in 2012 (IEA, 2014).

In spite of a significant increase in the use for renewable energy in the period 2000 to 2012 (from 54 EJ to 74 EJ), the share of renewable energy in total energy use has remained constant at 13 percent (IEA, 2014). One reason can be found in the growth of total energy use and hence non-renewable energy use that has also increased.

At the moment biomass is the largest source of renewable energy used globally, equivalent to 10 percent of total primary energy use in 2012, followed by hydro-power responsible for 2 percent (IEA, 2014).

A transition in energy supply in order to help achieve a 2 degree target would require a strong growth in renewable energy and energy-efficiency, in both an absolute and a relative sense. Moreover, a strong shift is needed to renewable energy sources other than biomass and hydro.

Many studies have assessed the increases in renewable energy that would be needed in many different scenarios (e.g. IPCC (2011), Krey and Clarke (2011), Cochran et al. (2014)).

This section explores past growth rates for different types of renewable energy and required future growth rates in 2 degree scenarios. For this purpose, past trends in renewable energy use in the period 1971 to 2012 are analyzed and compared to future contributions. This period shows the emergence of solar, wind, and geothermal energy, and biomass use for transport fuels and electricity generation. The analysis of future contributions shows the implementation of renewable energy use in 2 degree scenarios.

Section 6.1 gives an overview of past trends in renewable energy use and energy-efficiency and the future contributions are discussed in Section 6.2.

6.1 *Past Trends in Renewable Energy Use*

Figure 11.18 and Figure 11.19 show the development of global renewable energy supply in the period 1971–2012, with and without biomass and hydro, respectively. Overall renewable energy use more than doubled from 30 EJ in 1971 to 74 EJ in 2012. The share of biomass in renewable energy use has slowly decreased from 85 percent in 1971 to 73 percent in 2012. This is mainly a result of an increasing share of hydro, from 14 percent to 18 percent, and an increase in geothermal energy use, from 1 percent to 4 percent. Figure 11.19 shows the emergence of solar thermal energy (mainly after 1990) and wind power (after 2000), that accounted for 1 and 2 percent of renewable energy use, respectively in 2012.

Table 11.8 shows growth rates of renewable energy for four decades and for the overall period 1971–2012. Growth rates can be used to express the deployment level (see e.g. Santalco (2012) and Krey and Clarke (2011) and are seen as indicators of the pressure on infrastructures that is required to support the technologies. There is a clear increase in the growth rates after 2000, as energy and climate policies have taken effect. Distinctly visible is the entrance of wind and solar thermal power in the 1980s and of solar PV in the 1990s.

In spite of the higher growth rates after 2000, the share of renewable energy in total primary energy use has remained constant at 13 percent during the period 1971–2012. This is visible in the total trend of primary energy use in Figure 11.20. Although the growth rates of renewable energy use do increase from 1.5 percent/yr in the period 1990–2000 to 2.6 percent/yr in the period 2000–2012, non-renewable energy (especially coal and natural gas) experienced a similar increase in growth rates from 1.4 percent/yr to 2.3 percent/yr.

Because of the large share of biomass in renewable energy use, this source is looked into in a bit more detail. In an absolute sense, primary biomass use for energy has increased from 26 EJ in 1971 to 56 EJ in 2012 (see Figure 11.21). Since 1971, there has been a clear shift in the sectors that use biomass. Most notable is the decrease in the residential sector from 72 percent in 1971 to 60 percent in 2012. This decrease is a result of an increase in electricity plants (including combined heat and power plants) to 10 percent and transport to 4 percent in 2012. The share of industry remains constant at about 15 percent. The main subsectors in the industries in which biomass is used are pulp and paper, food, tobacco, and wood products.

In 1971, 87 percent of biomass was used in non-OECD countries and this had decreased to 79 percent in 2012. The top 10 countries that use biomass,

FIGURE 11.18 *Global renewable energy supply from 1971–2012 (EJ).*
SOURCE: BASED ON IEA, 2014

FIGURE 11.19 *Global renewable energy supply from 1971–2012 without biomass and hydro (EJ).*
SOURCE: BASED ON IEA, 2014

TABLE 11.8 *Yearly growth rates per period per renewable energy source*

	1971–1980	1980–1990	1990–2000	2000–2012	1971–2012
Biomass	2.1 percent	1.8 percent	1.2 percent	2.2 percent	1.8 percent
Hydro	4.0 percent	2.2 percent	2.0 percent	2.9 percent	2.7 percent
Geothermal	12.8 percent	10.6 percent	4.4 percent	2.1 percent	7.0 percent
Wind		79.6 percent	23.2 percent	26.4 percent	
Solar thermal		53.1 percent	9.8 percent	13.2 percent	
Solar photovoltaics			46.9 percent	46.7 percent	
Tide, wave and ocean	-0.1 percent	1.9 percent	0.1 percent	-0.6 percent	0.0 percent
Total renewable energy use	2.5 percent	2.1 percent	1.5 percent	2.6 percent	2.2 percent
Non-renewable energy use	3.1 percent	2.0 percent	1.4 percent	2.3 percent	2.2 percent
Total primary energy use	3.0 percent	2.0 percent	1.4 percent	2.4 percent	2.2 percent

SOURCE: BASED ON IEA, 2014

in absolute sense are shown in Figure 11.3. China, India, and Africa together account for nearly 60 percent of biomass use. The EU and North America for 18 percent and the rest of Asia for 20 percent. There is a clear increase visible in biomass use in the EU28 after 1990 and North America after 2000, partly attributable to increased biomass use for electricity generation and biofuels production.

Regional Renewable Trends and Growth Rates

Figure 11.23 shows the development of renewable energy use by region in the period 2000–2012. In an absolute sense Africa, China, and OECD Europe consumed most renewable energy in 2012.

Table 11.8 shows global renewable energy growth rates but, of course, there are strong regional differences in the uptake of renewable energy. Table 11.9 shows growth rates in the period 2000–2012 for the IEA world regions (OECD Americas, OECD Europe, OECD Asia Oceania, Non-OECD Europe Eurasia, China, India, Other non-OECD Asia, Latin America, Africa, Middle East).¹

1 See IEA (2013b) for country inclusions in IEA regions.

FIGURE 11.20 *Global primary energy use from 1971–2012 (EJ).*
SOURCE: BASED ON IEA, 2014

FIGURE 11.21 *Biomass energy use per sector.*
SOURCE: BASED ON IEA, 2014

FIGURE 11.22 *Biomass energy use per country.*

SOURCE: BASED, ON IEA, 2014

Of the renewable energy sources, solar and wind power show by far the strongest growth of 21 percent/yr, globally. Strong regional differences in growth rates are present per source. High overall renewable energy growth rates are visible in OECD Europe and the Middle East. OECD Europe has the highest regional RE growth rate and simultaneously a stabilizing amount of primary energy use. The share of renewable energy thereby increased from 7 percent in 2000 to 12 percent in 2012. The high growth rates in the Middle East are related to the very low amount of renewable energy used, amounting to only 0.4 percent of primary energy use in 2012, up from 0.3 percent in 2000.

For biomass, the highest growth occurred in the Middle East (6.1 percent) and OECD Europe (5.6 percent/yr). The overall growth of biomass was moderate with 2.2 percent/yr. Hydro-power growth was highest in China with 12 percent/yr, as was geothermal with 9 percent/yr and solar/wind with 30 percent/yr. Because of a low growth rate of biomass in China (0.5 percent/yr), the

FIGURE 11.23 *Renewable energy use per region in period 2000–2012*

SOURCE: BASED ON IEA, 2014

overall renewable energy growth rate was more moderate with 2.9 percent/yr; especially when this is compared to the growth rate in total primary use of 7.8 percent/yr, leading to a decrease in the share of renewable energy from 19 percent in 2000 to 10 percent in 2012.

The lowest overall renewable energy growth occurred in the OECD Americas and non-OECD Europe and Eurasia (1.4 percent/yr). The regions with the highest shares of renewable energy in 2012 were Africa (48 percent), Latin America (29 percent), and other non-OECD Asia and India (25 percent). Latin America has a high share of renewable energy use, mainly attributable to hydro use and biofuels. Africa and non-OECD Asia both have high shares of (traditional) biomass use.

Table 11.10 shows the trends for the 10 largest countries in terms of energy use in 2012; China (122 EJ), United States (89 EJ), India (33 EJ), Russia (32 EJ), Japan (19 EJ), Germany (13 EJ), Brazil (12 EJ), South Korea (11 EJ), France (11 EJ), and Canada (11 EJ). Together these countries were responsible for 63 percent of total primary energy use in 2012. The European Union (69 EJ) has also been included for reasons of comparison and the joint EU energy and climate policy. Including EU coverage, the countries account for 71 percent of total primary energy in 2012 (IEA, 2014).

TABLE 11.9 *Yearly growth 2000–2012 per renewable energy source*

	Biomass	Hydro	Geo-thermal	Solar/Wind/ other	Total renewable energy	Total primary energy	Share RE 2000	Share RE 2012
OECD Americas	1.4 percent	0.6 percent	-1.8 percent	18.6 percent	1.4 percent	-0.3 percent	6.5 percent	8.0 percent
OECD Asia Oceania	3.3 percent	-0.9 percent	1.7 percent	7.1 percent	2.0 percent	0.4 percent	3.7 percent	4.5 percent
OECD Europe	5.5 percent	0.1 percent	4.7 percent	20.9 percent	4.7 percent	0.0 percent	7.3 percent	12.7 percent
Latin America	3.4 percent	2.3 percent	7.8 percent	21.9 percent	3.1 percent	3.0 percent	28.7 percent	29.2 percent
India	1.8 percent	4.5 percent	0.0 percent	26.7 percent	2.1 percent	4.7 percent	34.0 percent	25.2 percent
China	0.5 percent	12.0 percent	8.7 percent	29.4 percent	2.9 percent	7.8 percent	19.2 percent	10.9 percent
Middle East	6.1 percent	8.9 percent	0.0 percent	7.8 percent	7.9 percent	5.5 percent	0.3 percent	0.4 percent
Non-OECD Europe and Eurasia	2.5 percent	0.3 percent	16.9 percent	27.0 percent	1.4 percent	1.5 percent	3.9 percent	3.9 percent
Africa	2.9 percent	3.4 percent	11.6 percent	26.4 percent	2.9 percent	3.3 percent	51.8 percent	49.6 percent
Other non-OECD Asia	1.4 percent	5.4 percent	2.6 percent	12.0 percent	1.8 percent	3.0 percent	29.7 percent	25.6 percent
World	2.2 percent	2.9 percent	2.1 percent	20.7 percent	2.6 percent	2.4 percent	13.0 percent	13.5 percent

SOURCE: BASED ON IEA, 2014

Of the countries included, Germany has the highest overall growth rate for renewable energy with 11 percent/yr. Combined with a 0.8 percent/yr decrease in primary energy use, this leads to an increase in the share of renewable energy from only 3 percent in 2000 to 12 percent in 2012.

As has China, India and Russia have decreasing shares in renewable energy, because of a quite high growth in total primary energy use compared to renewable energy use.

6.2 *Future Contribution of Renewable Energy and Energy-efficiency*

Now we look at the increase in the use of renewable energy sources (RES) in the scenarios available for limiting global temperature increase to 2°C. Stabilizing greenhouse gas concentration in the air to 450 ppm would be needed to hope to achieve this target (see e.g. Elzen and Meinshausen (2005), Rogelj et al. (2009) and IPCC (2013)). This would correspond to an energy system consistent with an emissions trajectory in which energy-related CO₂ emissions will have decreased globally by more than half in 2050 (compared with 2009 level) and ensuring that they will continue to fall thereafter (IEA, 2012). An increase in renewable energy and an improvement in energy-efficiency will be the key measures for reducing these emissions.

Krey and Clarke (2011) review 162 long-term energy scenarios in terms of differences and similarities. This study was used in the IPCC “Special Report on Renewable Energy Sources and Climate Change Mitigation”, in which 164 long-term energy scenarios are evaluated (Fischedick et al., 2011). These scenarios are divided into two categories “< 400 ppm” and “400–600 ppm”. Since a 2 degree target is generally related to a concentration of 450 ppm in 2050, both categories are included in this study. To complement these, available scenarios published after this study are also taken into account. These are:

- IEA “Energy Technology Perspectives” (ETP) edition 2012 (IEA, 2012)
- Greenpeace/ EREC Energy [r]evolution (ER) scenario, edition 2012 (Greenpeace/EREC, 2012)
- WWF/Ecofys Energy scenario 2011 (WWF/Ecofys, 2011).
- Global Energy Assessment (GEA), Energy pathways for sustainable development (Riahi et al., 2012)

These scenarios cover global energy supply and have sector detail available with a time-frame up to 2050. Not included are the Shell New Lens Scenarios (Royal Dutch Shell, 2013), since these do not reach the 2 degree C target, and the five UNEP (2012) Global Environmental Outlook scenarios, that do not include sufficient detail.

TABLE 11.10 *Yearly growth 2000–2012 per renewable energy source by country*

	Biomass	Hydro	Geo-Thermal	Solar/ Wind/ other	Total renewable energy	Total primary energy	Share RE 2000	Share RE 2012
China	0.5 percent	12.0 percent	8.7 percent	29.4 percent	2.9 percent	7.8 percent	19.2 percent	10.9 percent
United States	1.8 percent	0.8 percent	-2.6 percent	18.0 percent	2.0 percent	-0.5 percent	4.8 percent	6.5 percent
India	1.8 percent	4.5 percent	0.0 percent	26.7 percent	2.1 percent	4.6 percent	34.0 percent	25.2 percent
Russia	0.6 percent	0.1 percent	19.2 percent	8.2 percent	0.4 percent	1.7 percent	3.4 percent	2.9 percent
Japan	4.9 percent	-1.0 percent	0.0 percent	2.7 percent	1.5 percent	-1.2 percent	3.3 percent	4.6 percent
Germany	10.9 percent	-0.1 percent	15.1 percent	18.4 percent	10.8 percent	-0.8 percent	3.2 percent	12.0 percent
Brazil	4.4 percent	2.6 percent	0.0 percent	33.0 percent	3.9 percent	3.5 percent	38.9 percent	40.7 percent
South Korea	9.7 percent	-0.7 percent	69.8 percent	13.6 percent	8.6 percent	2.8 percent	0.9 percent	1.8 percent
France	2.4 percent	-1.4 percent	-3.4 percent	30.3 percent	1.9 percent	0.0 percent	6.6 percent	8.4 percent
Canada	0.0 percent	0.5 percent	0.0 percent	35.5 percent	0.5 percent	0.0 percent	16.9 percent	18.0 percent
European Union—27	6.3 percent	-0.4 percent	1.6 percent	22.2 percent	5.6 percent	-0.2 percent	6.1 percent	12.1 percent
World	2.2 percent	2.9 percent	2.1 percent	20.7 percent	2.6 percent	2.4 percent	13.0 percent	13.5 percent

SOURCE: BASED ON IEA, 2014

Key characteristics of the scenarios included are given in Table 11.11. For reasons of comparison, the 6 degree scenario of the IEA ETP is included. This is a baseline scenario that is broadly consistent with the World Energy Outlook (WEO) “Current Policies” scenario that runs up to 2035 (IEA, 2013b).

In the GEA and ETP scenarios, energy-related greenhouse gas emissions will amount to 17 Gtonne CO₂ by 2050 (compared to 59 in 2050 in the 6 degree scenario). Both aim to stabilize greenhouse gas concentration levels at 450 ppm. The Greenpeace/EREC ER scenario explores a higher level of greenhouse gas emission reduction, to only 3 Gtonne. This would increase the chance of limiting global temperature increase to 2 degree. The WWF/Ecofys scenario aims to achieve a (near) 100 percent renewable energy deployment and ends up with only 1 Gtonne CO₂ in 2050. In terms of renewable energy deployment, the ER scenario is highest with 394 EJ, compared to 219–286 in both the ETP and GEA scenarios. The WWF is in the middle with 247 EJ. The GEA consists of two trajectories: Efficiency and Supply. The Efficiency trajectory focuses strongly on energy-efficiency improvement and has a more moderate primary energy use of 530 EJ in 2050. The Supply trajectory focuses on low carbon energy supply with more renewables and more carbon capture and storage (15 Gtonne CO₂ in 2050, compared to 6 Gtonne in the Efficiency scenario).

Table 11.12 shows the deployment of renewable energy in the different scenarios by type. The values in this table might deviate somewhat from those reported in the source because of the conversion to physical energy content method (see Section 2).

In most scenarios, biomass will remain the largest renewable energy source in 2050, with the exception of the ER scenario, in which solar amounts to 105 EJ in 2050, compared to 72 EJ for biomass. The growth of biomass would be mainly in biomass electricity and biofuels. Hydro power does not show a large increase in the scenarios. The amount of wind ranges from 20–50 EJ in 2050 and, for a considerable part (20–30 percent), it consists of offshore wind. The role of tidal, wave, and ocean energy, plus that of geothermal electricity, will remain limited.

The share of renewable energy will amount to 40–80 percent of final energy use in 2050. Figure 11.24 shows the renewable energy use in the scenarios aggregated to five categories: biomass, hydro, wind, solar, and other, and their relative and absolute contributions. This shows a clear shift in the dominance of biomass in 2012 to much higher contributions of mainly wind and solar energy.

In Table 11.13 the annual growth rates of renewable energy in the scenarios are compared to the past growth rates in Table 8. The baseline scenario IEA ETP 6DS is included and the range of the 2 degree scenarios is included.

TABLE 11.11 *Key characteristics of 2 degrees scenarios*

	Scenario	End year	Target	GHG emissions from energy (Gtonne CO _{2eq})	Global primary energy use (EJ)	Share RES RES (EJ)	
IEA Energy Balances	Base year	2012	–	32	560	13 percent	74
IPCC (2011)	< 400 ppm	2050	< 400 ppm	NA	NA	NA	190–350
	400–600 ppm		400–600 ppm	NA	NA	NA	140–190
IEA ETP 2012	2DS	2050	2 °C	17 in 2050	697	41 percent	286
	6DS	2050	6 °C	59 in 2050	880	15 percent	132
Greenpeace/ EREC	Energy [r] evolution 2012	2050	2 °C	3.1 in 2050	481	82 percent	394
WWF/ Ecofys (2011)	The Energy report	2050	100 percent RE	0.9 in 2050	260	95 percent	247
Global Energy Assessment 2012	Efficiency	2050	2 °C	17	530	41 percent	219
	Supply				754	38 percent	286

SOURCES: IEA,2014, FISCHEDICK ET AL.,2011, IEA,2012, TESKE ET AL.,2012, WWF, ECOFYS
AND OMA,2011, RIAHI ET AL.,2012

Remarkable is that even the baseline ETP 6DS scenario contains a much lower growth in energy use in the period 2011–2050 than it did in the past (1.2 percent compared to 2.2 percent per year for primary energy use). All the 2 degree scenarios have an even much lower development ranging from negative growth (decrease) to a very moderate growth of 0.6 percent per year for primary energy use. The growth rates for renewable energy are in the range of 3–5 percent in the 2 degree scenarios compared to 2 percent in the past. This means quite a stronger uptake in renewables, even compared to the period 2000–2012 that showed a relatively high growth rate of 2.6 percent per year.

TABLE 11.12 *Renewable energy use in selected scenarios*

	IEA (2014)	IPCC (2011)		IEA ETP 2012 ^{IV}		Green- peace [r] evolution	WWF/ Ecofys Energy report 2011	GEA 2012	
	2012	400–600 ppm	< 400 ppm	6DS	2DS	2012		Efficiency	Supply
Year	2012	2050	2050	2050	2050	2050	2050	2050	2050
Biomass	54	75–160	120–180	90	150	72	105	99	139
Biomass electricity ^I	1.4	NA	NA	6.6	9.9	10	16	14	19
	4.7			15	36	32	53	42	57
Biofuels (final)	2.5	NA	NA	NA	31	6.7	NA	17	35
Biomass CCS	0	NA	NA	0	1.2	0	NA	7	24
Hydro	13	30–35	30–35	21	26	18	15	21	27
Wind	1.9	20–45	20–45	9.2	22	50	32	23	29
Wind onshore	1.7	NA	NA	7.8	15	39	25	NA	NA
Wind offshore	0.1 ^{III}	NA	NA	1.4	7	11	6.7	NA	NA
Geothermal	2.8	3–5	3–10	8.0	50	61	16	3	11
Geothermal electricity	0.2	NA	NA	1.4	3.5	14	4.9	1	3
Geothermal heat	2.6	NA	NA	6.6	47	47	11	2	8
Solar	1.3	10–30	15–80	5.6	36	105	80	73	80
Solar thermal heat	0.9	NA	NA	2.0	14	45	21 ^{II}	24	30
Concentrated solar thermal electricity	0.02	NA	NA	1.6	12	34	22	NA	NA
Solar photovoltaics	0.3	NA	NA	2	10	26	37	NA	NA
Tide, wave and ocean	0.002	NA	NA	0.4	1.9	7.4	0.9	NA	NA
Total renewable energy use (primary)	73	140– 190	190– 350	134	286	313	249	219	286

TABLE 11.12 *Renewable energy use in selected scenarios (cont.)*

	IEA (2014)	IPCC (2011)	IEA ETP 2012 ^{IV}		Green- peace [r] evolution	WWF/ Ecofys Energy report 2011	GEA 2012		
	2012	400–600 ppm < 400 ppm	6DS	2DS	2012		Efficiency	Supply	
Total renewable energy use (final)	67	NA	NA	126	229	285	212	191	248
Total final energy consumption	376	NA	NA	610	560	351	261	396	547
Share renewable energy in final (percent)	18 percent	NA	NA	21 percent	41 percent	81 percent	81 percent	48 percent	45 percent
Total primary energy use	560	NA	NA	880	697	398	293	530	754
Share renewable energy in primary (percent)	13 percent	NA	NA	15 percent	41 percent	79 percent	85 percent	41 percent	38 percent

^IIncludes renewable municipal waste. Top numbers are final and bottom numbers are primary energy.

^{II}Includes 8.8 EJ concentrated solar thermal heat in industries

^{III}Derived from Lorc (2014)

^{IV}Since only renewable heat as a total is known, the same division between geothermal and solar heat is assumed in 2050 as it is in 2011.

SOURCES: DERIVED FROM IEA, 2014, FISCHEDICK ET AL., 2011, IEA, 2012, TESKE ET AL., 2012, WWF, ECOFYS AND OMA, 2011, RIAHI ET AL., 2012.

Renewable energy sources with high growth rates in the range of 10 percent per year in the 2 degree scenarios are wind (especially offshore wind), geothermal electricity, solar heat, PV and CSP, and ocean energy.

All in all, renewable energy is growing much faster than primary energy use in all 2 degree scenarios, even in the baseline 6 degree scenario. This is a clear difference with past trends in which only a slightly higher growth of renewable energy in comparison to primary energy use occurred after 2000.

Table 11.14 compares regional growth rates in the period 2000–2012 and the period 2012–2050. These last growth rates are based on the average growth rates per region for four selected scenarios in the IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation (Fischedick et al., 2011). These values are consistent with the lower end growth rates in the 2 degree scenarios as presented in Table 11.13.

It is clear from Table 11.14 that in most regions much higher growth rates are needed for a long-term period (~40 years) than have occurred in the last 12 years. The exceptions are OECD Europe and Latin America, in which past overall renewable energy growth outnumbers the future predictions.

The biggest increase in renewable energy uptake would be needed in non-OECD Europe and Eurasia (5.7 percent/yr compared to 1.4 percent/yr), OECD Americas (3.8 percent/yr compared to 1.4 percent/yr), and OECD Asia Oceania (5.0 percent/yr compared to 2.0 percent/yr).

Solar and wind energy showed high growth rates in the period 2000–2012 (~20 percent/yr), but it is doubtful if these high growth rates can be sustained. Future growth of 9 percent/yr on average would be needed.

Table 11.15 shows the growth rates for primary energy use, renewable energy use, and the share of renewable energy in total primary energy use for the years 2000, 2012, and 2050. From this table it is clear that the required change in primary energy use is a far greater necessity than is a change in renewable energy growth rates. Shares of renewable energy in total energy would increase drastically in all regions. The OECD regions all need negative growth rates in primary energy use, whereas most non-OECD regions can afford a limited increase up to 0.8 percent/yr.

The analysis of past trends makes it very clear that, in spite of the comparatively high growth of renewable energy in the period 2000–2012, this share increased only slightly as the result of a similar increase in non-renewable energy use. Only a few countries managed to increase the share of renewable energy in their fuel mix. Most notably Germany demonstrated an effective increase in renewable energy from 3 percent in 2000 to 12 percent in 2012. This was achieved by a high overall growth rate for renewable energy of 11 percent/yr and a decrease in primary energy use of 0.8 percent/yr. Energy and climate policies in the EU28 overall showed an effect by increasing the share of renewable energy from 6 percent in 2000 to 12 percent in 2012, with a slightly decreasing energy use. China and India showed decreasing shares of renewable energy because of the high growth rate of total energy use combined with more moderate overall growth rates of renewable energy. This suggests that, in order to increase the share of renewable energy use, the most challenges might be expected in non-OECD countries.

FIGURE 11.24 *Renewable energy use per scenario, absolute and relative.*

SOURCE: DERIVED FROM IEA, 2014; IEA, 2012; TESKE ET AL., 2012, WWF, ECOFYS AND OMA, 2011, FISCHEDICK ET AL., 2011

TABLE 11.13 *Yearly growth rates of renewable energy by period¹*

	1971-1980	1980-1990	1990-2000	2000-2012	1971-2012	ETP 6DS (percent/yr 2 degrees scenarios from 2011-2050) (percent/yr from base year to 2050)
Biomass	2.0 percent	1.9 percent	1.1 percent	2.2 percent	1.8 percent	1-3 percent
Electricity	3 percent	1.1 percent	2 percent	9 percent	6 percent	5-8 percent
Biofuels			1 percent	1 percent	2 percent	5-7 percent
Hydro	4.0 percent	2.2 percent	2.0 percent	2.9 percent	2.8 percent	0.4 percent-2.7 percent
Wind		8.0 percent	23 percent	26 percent		7-10 percent
Onshore	NA	NA	NA	NA	NA	6-8 percent
Offshore	NA	NA	NA	NA	NA	14-16 percent
Geothermal energy	13 percent	1.1 percent	4 percent	2 percent	7 percent	3-8 percent
Electricity	13 percent	10 percent	4 percent	3 percent	7 percent	7-12 percent
Heat	13 percent	1.1 percent	4 percent	2 percent	7 percent	4-8 percent
Solar		53 percent	10 percent	16 percent		7-13 percent
Heat		53 percent	10 percent	13 percent		8-11 percent

TABLE 11.13 *Yearly growth rates of renewable energy by period^I (cont.)*

	1971–1980	1980–1990	1990–2000	2000–2012	1971–2012	ETP 6DS (percent/yr 2 degrees scenarios from 2011–2050) (percent/yr from base year to 2050)
<i>Photovoltaics</i>						
CSP ^{II}			47 percent	47 percent	6 percent	11–14 percent
Tide, wave and ocean				20 percent	15 percent	21–24 percent
Total renewable energy use (primary)	2.4 percent	2.2 percent	1.5 percent	47 percent	15 percent	17–24 percent
Total final energy use	2.6 percent	1.6 percent	1.2 percent	2.6 percent	2.2 percent	3–5 percent
Total primary energy use	3.0 percent	2.0 percent	1.4 percent	2.0 percent	1.8 percent	-0.9–1 percent
Share renewable in primary (percent)	13 percent	13 percent	13 percent	2.4 percent	1.2 percent	-1.9–0.6 percent
				13 percent	13 percent	15 percent ^{III}
						41–95 percent ^{III}

^IBiomass CCS is excluded in table since it was not present in 2011

^{II}CSP = Concentrated Solar Power (electricity)

^{III}in 2050

TABLE 11.14 *Growth rate per renewable energy source and world region*

	Biofuels & waste		Hydro		Geothermal		Solar/ wind/ other		Total renewable energy	
	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050
OECD Americas	1.4 percent	2.8 percent	0.6 percent	0.4 percent	-1.8 percent	5.1 percent	18.6 percent	8.4 percent	1.4 percent	3.8 percent
OECD Asia	3.3 percent	4.2 percent	-0.9 percent	2.3 percent	1.7 percent	4.7 percent	7.1 percent	9.0 percent	2.0 percent	5.0 percent
OECD Europe	5.5 percent	2.0 percent	0.1 percent	1.1 percent	4.7 percent	5.5 percent	20.9 percent	5.7 percent	4.7 percent	3.0 percent
Latin America	3.4 percent	1.4 percent	2.3 percent	1.5 percent	7.8 percent	7.4 percent	21.9 percent	14.1 percent	3.1 percent	2.8 percent
Middle East	6.1 percent	12.4 percent	8.9 percent	2.4 percent	-	-	7.8 percent	20.5 percent	7.9 percent	13.2 percent
Non-OECD Europe and Eurasia	2.5 percent	5.6 percent	0.3 percent	1.8 percent	16.9 percent	13.9 percent	27.0 percent	14.0 percent	1.4 percent	5.7 percent

TABLE 11.14 *Growth rate per renewable energy source and world region (cont.)*

	Biofuels & waste		Hydro		Geothermal		Solar/ wind/ other		Total renewable energy	
	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050	2000–2012	2012–2050
Africa	2.9 percent	0.4 percent	3.4 percent	4.3 percent	11.6 percent	9.8 percent	26.4 percent	17.2 percent	2.9 percent	1.5 percent
Non-OECD Asia	1.2 percent	2.4 percent	9.5 percent	2.3 percent	3.3 percent	6.8 percent	28.4 percent	8.7 percent	2.3 percent	3.4 percent
World	2.2 percent	2.1 percent	2.9 percent	1.8 percent	2.1 percent	6.7 percent	20.7 percent	8.9 percent	2.7 percent	3.3 percent

SOURCE: BASED ON IEA, 2013 AND FISCHEDICK, 2011

TABLE 11.15 *Growth rates for primary energy use, renewable energy use and the share of renewable energy in total primary energy use*

	Total primary energy use (percent/yr)		Renewable energy (percent/yr)				Share of renewable energy in total primary energy use		
	2000–2012	2012–2050	2000–2012	2012–2050	2000	2012	2050		
OECD Americas	-0.3 percent	-0.2 percent	1.4 percent	3.8 percent	6.5 percent	8.0 percent	36 percent		
OECD Asia	0.4 percent	-0.6 percent	2.0 percent	5.0 percent	3.7 percent	4.5 percent	35 percent		
Oceania									
OECD Europe	0.0 percent	-0.1 percent	4.7 percent	3.0 percent	7.3 percent	12.7 percent	40 percent		
Latin America	3.0 percent	0.8 percent	3.1 percent	2.8 percent	28.7 percent	29.2 percent	61 percent		
Middle East	5.5 percent	0.1 percent	7.9 percent	13.2 percent	0.3 percent	0.4 percent	46 percent		
Non-OECD									
Europe and Eurasia	1.5 percent	-0.3 percent	1.4 percent	5.7 percent	3.9 percent	3.9 percent	36 percent		
Africa	3.3 percent	0.7 percent	2.9 percent	1.5 percent	51.8 percent	49.6 percent	68 percent		
Non-OECD Asia	6.1 percent	0.1 percent	2.3 percent	3.4 percent	29.7 percent	25.6 percent	55 percent		
World	2.4 percent	0.0 percent	2.7 percent	3.3 percent	13.0 percent	13.5 percent	48 percent		

SOURCE: BASED ON IEA, 2014 AND FISCHEDICK, 2011

The overall increase in renewable energy amounted to 2.2 percent/yr in the period 1971–2012 and 2.6 percent/yr in the period 2000–2012. In order to be consistent with a 2 degree pathway, these growth rates will need to increase to 3–5 percent/yr. An especially high growth in the order of 10 percent/yr would be required for wind, solar, and geothermal energy. This would lead to a change in the mix of renewable energy used, with a much higher share of variable renewable energy sources (VRES). Much ink has been spilt about the challenges of integrating these sources into the current energy infrastructures. Overall wind- and solar-energy use would need to increase by as much as a factor of 30–60 in 2050, compared to 2012 (from 3 EJ to 58–155 EJ). The share of renewable energy would have to be in the range of 40–80 percent of energy use, with the share of wind and solar amounting to 25–54 percent of renewable energy use, to decrease consistently by 0.1–0.5 percent/yr in OECD regions. This said, a decrease in energy use has not occurred in OECD countries in the past 40 years, except for a couple of years during a time of recession. Therefore this would require a break away from past trends. However, it is especially in non-OECD regions that the need for change is huge. Regional growth rates for energy use in the period 2000–2012 range from 1.5 percent/yr to 6.1 percent/yr and should decrease to be within the range of 0.2 percent/yr to 0.9 percent/yr. Therefore, one major challenge, besides increasing the uptake of renewable energy, will lie in the decrease of energy use growth rates in non-OECD countries.

In a business-as-usual scenario, primary energy use will grow from 560 EJ in 2012 to 880 EJ in 2050, while in a 2 degree scenario average primary energy use is slightly lower than 2012 with 530 EJ in 2050. Furthermore, the shares of renewable energy use in a 2 degree scenario would range between 35–61 percent and 48 percent globally, a doubling of renewable energy in 2050, compared to the business-as-usual projections.

Needless-to-say, the impact on energy security would be large. However, it appears from this analysis that improvements, especially in energy-efficiency, have not been very large, especially in non-OECD countries, raising doubts about their feasibility. Strong new policies would be needed to achieve both the increase in renewables and improvements in energy efficiency.

7 EU Energy Security and Geopolitics

As shown above, global oil and gas markets are looking bleak as the result of ever-growing energy consumption, an increasing exhaustion of conventional reserves, and a growing geographical concentration of production. Against this background, it is likely that state and corporate actors will assign more

significance to economic and resource concerns, and energy relations will be increasingly politicized. On the one hand, the growing energy imports of countries such as China and India can be added to those of the EU and the US. Moreover, the anticipation of future supply disturbances is generally reflected in rising oil and gas prices, and, in particular, their increasing volatility and the inelastic demand by major consumers. On the other hand, on the basis of the location and the increasing scarcity of world oil and gas reserves, a geographical concentration of energy supplies is expected to materialize in the politically unstable countries of the Persian Gulf and the Caspian Region. This section provides an overview of the main domestic and geopolitical factors that threaten the European Union energy supply security, with a primary focus on the resource-rich countries of the Persian Gulf. In any discussion of the EU's Energy supply security, five concerns have to be taken into consideration. One major domestic concern is the way in which the state and society is constructed and functions. Almost all Arab resource-rich countries belong to a type of patrimonial rentier-state and society. Following Weber (1968), this regime type displays three main characteristics. Firstly, it relies on personalist rule based on loyalty to an individual; governments do not have a professional, career-oriented view. Secondly, loyalty is based on bonds between persons at different levels of power in a network of patron-client relations, who determine the distribution of rents. Lastly, the personal authority of individual leaders exists by virtue of their traditional status. These types of state and society rely on a surplus of natural resources. This results in poor and uneven economic development, a "traditional" centralized power structure, corruption, and violent conflicts. These factors have proven to stir civil unrest, for instance, the 'Arab Spring', and pose a future threat to the oil-producing countries of the Persian Gulf (Anderson & Slahsen 2012; Meissner 2010; Ross 2001, 2011; Schwartz 2008). The Sovereign Wealth Funds (SWFs) managed by patrimonial rentier-state systems have domestic and global impacts. SWFs have proven to be an asset in both the developing and developed economies that manage these assets. The funds have been used to buffer the 'Dutch Disease', or to encourage industrialization, economic diversification, and eventually the development of civil society. The rub is that, in patrimonial states SWFs are undermined by corruption and the diverting of assets away from long-term socioeconomic development, to benefit political elites. In fact, Arab SWFs are now one factor contributing to the persistence of the Arab patrimonial rentier-state system. Secondly, the ME, and to some extent the CEA, regions are having to deal with the existence of politicized religion and corresponding social forces and movements. These are the outcome of the failed development (of state and society) and unsuccessful moves toward democratization. Thirdly, the ME and CEA regions are

dealing with geopolitical crises, or the geopolitics of war and conflict. Fourthly, throughout history, the region has been subjected to external interventions by different major-state powers, including those by France, the United Kingdom, and the United States. This has created a complex set of alliances that, as will be elaborated on, is continuously shifting. This has greatly influenced the domestic situation in the RRCs of the ME and CEA regions. Fifthly, in the post-Cold War era, geopolitical landscape in the ME and CEA is shifting. The emergence of China and other Asian economies has resulted in their increased presence in the Middle East. This has been prompted by a growing need for energy, and the expansion of Asian markets. The recent discovery of energy resources in the US has led to speculation that there will be less US-presence in the region. If emerging Asian economies were to increase their presence in the Middle East as US interests recede, this would pose serious risks to EU energy security. This has long been a concern to US allies in the European Union and Asia. These five domestic and geopolitical issues potentially threaten both EU energy supply security and overall trade and investment in the ME and CEA regions.

7.1 *The Patrimonial Rentier-State and Society*

7.1.1 Patrimonial Power Structures

Patrimonialism is a type of absolute authority in which all power flows directly through the leader and the ruling elites. The Arab rentier-states located in the Persian Gulf are categorized as fitting into this type of (semi-)traditional power-structure. In this sort of state, the ruler exercises his power without restraint and at his own discretion. The binding norms and relations of the bureaucratic administration are constantly subverted by the personal and arbitrary decisions of the ruler, who does not feel subject to ideological constraints. In some sense, the organization of the power and the staff of the ruler are similar to the traditional patrimonialism described by Max Weber (1968). In a patrimonial rentier-state, society is demoralized and unproductive for a number of reasons. When the public is stripped of any real power, the emancipation of society is not a viable option for change or growth. Arab patrimonial rentier-states have 'agreements' with society, in which the state provides 'material benefits' in return for the persistence of a limited or undemocratic structure. The prevailing governance structures in the resource-rich Arab states have led to two mutually reinforcing processes. These include "no public accountability of the state, and an ever increasing concentration of political and economic power in the hands of few" (see UNDP 2011). The ultimate risk of these conditions is that they pave the way for a gradual potential for social uprising and civil unrest.

The lack of jobs, demographic shifts, and a growing population of educated youth, among other factors, have caused revolts, regime change, civil unrest, and war in some Arab states during the so-called 'Arab Spring'.

7.1.2 The Resource Curse

Resource-rich Arab countries in the Middle East can be classified as a type of patrimonial rentier-state or states in which the economy is dependent on the export of natural and mineral resources. In the resource-rich Arab countries, oil-led economic growth has ushered in premature de-industrialization and reinforced the subordinate position of the region in the global economy. The 'Dutch Disease', as it is called, attracts policy to one lucrative sector of the economy. In this case, the focus is the resource-based industry. Attention paid to other sectors like agriculture, non-oil manufacturing, and services is scant. The problem with this state of dependence on the resource-sector is that the commodity is becoming increasingly volatile.

In the case of the resource-rich Arab patrimonial states of the Persian Gulf, organized into the Gulf Cooperation Council (GCC), composed of Saudi Arabia, United Arab Emirates (UAE), Kuwait, Qatar, Oman, and Bahrain, the economy has been shaped by the exportation of oil and gas. Table 11.16 illustrates the dependence of state revenues and GDP on exports of oil and gas in the resource-rich Arab countries of the Persian Gulf. Despite their volatility, fuel exports comprise more than 80 percent of merchandise exports in many of these states, making their economies dangerously fragile, unsupported by other sectors.

According to the UNDP *Arab Development Challenges Report*, this economic structure is responsible for the failure of the Arab region to generate decent and productive jobs for its people (UNDP, 2011). An alternative economic structure would emphasize a sectoral diversification and occupational specialization. This would produce a more autonomous workforce, equipped with specialized skills. Ideally, this would improve their bargaining power with the ruling elites, and could create a setting that allows for self-regulating interest groups (Mahdavy 1970; Schwartz 2008; Ross 2001, 2011; Carlos 2013).

7.1.3 The Lack of Economic Diversification

As discussed above, given the importance of resources to the domestic economy, rentier-states provide limited support to other economic sectors. Non-oil sectors that do exist become inherently linked to resources. Construction and services, for instance, are dependent on oil revenues in most Arab Middle East countries, because these funds are used to build infrastructure (UNDP 2011).

TABLE 11.16 *Export earnings and state budget based on oil and gas in GCC-countries (percent)*

	Export earnings (percent)	State budget (percent)	GDP (percent)
Bahrain	69	86	24
Kuwait	90	93	45
Oman	65	77	41
Qatar	91	80	46
Saudi Arabia	85	85	50
UAE	69	77	32

SOURCE: MARTIN HVIDT (2014)

Other areas of manufacturing, like rubber, plastics, chemicals and food, also experience volatility because of their strong connection to petroleum (UNDP, 2011). Innovation and industrial capacity are underdeveloped, and the current situation leads “to a more rudimentary economic structure relative to what one would expect from the level of GDP per capita” (UNDP, 2011).

In other words, GDP per capita is high, but in no way results from a diversified modern industrial economy. High GDP per capita is the price regimes pay to keep society out of policy making and to eliminate any need for regime accountability. GDP is therefore a misleading indicator to use to judge the condition of the economy. Table 11.17 indicates the strength of the per capita GDP in the region, and this is linked to the resource exports in Table 11.16. The following numbers are therefore connected to resource export earnings and are as precarious as the commodity on which these high figures rely.

Despite the numbers presented above, the Arab states of the Middle East (not only the resource-rich states) have been described as the least industrialized countries in the world; an astounding statement considering the wealth some of these states have at their disposal to increase growth in agriculture, manufacturing, and services (Looney 1994; Shochat 2008; Hvidt 2014; see also Karshenas & Hakimian. 2005). These economies could have a head-start in modernizing their economic structure but have so far chosen not to do so. Political elites are overwhelmingly concerned with personal power, rather than with strengthening the overall structure of their economies.

Before the Libyan uprisings that began in February 2011, the share in income from oil exports contributed to 70 percent of the country’s GDP and about 85 percent of government revenues. Moreover, as a result of declining oil prices,

TABLE 11.17 *GDP per capita 1980–2011 (USD\$)*

	1980	1990	2000	2011
Bahrain	8,538	8,529	11,928	22,467
Kuwait	20,882	8,947	19,787	51,497
Oman	5,182	6,455	9,062	23,133
Qatar	34,990	15,446	29,914	89,736
Saudi Arabia	16,692	7,206	9,354	24,416
UAE	42,964	28,066	34,476	39,058

SOURCE: WORLD BANK (2013)

funding for social welfare programs in the region is diminishing. There is a strong possibility that the long-term reality be permanent political unrest in the region (Heritage 2011; Amineh & Yang 2012; see also Table 1).

Large oil incomes create political incentives that affect authoritarian regimes and their domestic and foreign policies. At least four distinct incentives can be identified (see Amineh 2010; Colgan 2011).

- Firstly, oil generates financial resources that can be used to finance military capacity and campaigns.
- Secondly, oil income generates significant financial incentives to avoid any international conflict that would interrupt the state's export of oil.
- Thirdly, oil income increases a state's propensity to use financial resources to achieve foreign policy objectives, such as providing allies with direct foreign aid, support for foreign insurgents, and funding for ideological instruments such as religious or educational institutions. Saudi Arabia, Iran, and Russia are three concrete examples of this propensity.
- The fourth, and perhaps most subtle, political incentive generated by oil income is that it encourages leaders to take risks. A significant body of research illustrates how an authoritarian resource-rich economy can have negative political consequences (Karl 1997; Ross 2001, 2010; Hertog 2010). The ruling elites of the resource-rich authoritarian regimes often have a high degree of political autonomy, and therefore face a low risk of being removed from office by risky and potentially unpopular actions. The ruling elite of oil-based authoritarian regimes can use the state's oil income to purchase political support, thereby allowing them room to take significant risks, including those involved in aggressive foreign policy adventurism. The

oil revenues also enable a number of authoritarian resource-rich regimes to finance state-led industrial development (see Amineh 2010).

7.2 *Economic Structure of Rentier-states in the Middle East*

Although exports mixes are one-dimensional, the variety and magnitude of imports is overwhelming. Imported goods range from manufacturing to services and agriculture. This signifies the inability of these states to stand alone in certain economic sectors. Table 11.18 indicates the kinds and magnitude of goods that these states import, including everything from computers, cars, foods, and textiles to luxuries. Imports are irregular, and contribute to over half of each respective state's amount of consumption.

As most resource-rich Arab countries lack diversified industrial sectors, any attempt to immerse themselves into the global economy has "benefited mostly industries with static comparative advantage, particularly those linked with petroleum" (UNDP 2011). While the services sector has blossomed in other developing economies in Asia, it has done little to benefit the economies of the Middle East, in which services fall at the low end of the value chain, contribute little to local knowledge-development, and lock countries into inferior positions in global markets (Looney 1994; see also Karshenas & Hakimian 2005; Shochat 2008; Hvidt 2014). Unguided sectors have been left to weaken.

7.2.1 Domestic Challenges and Political Risks for Investment in Resource-rich Arab States

Future involvement in the region comes with increasing obstacles. One primary problem with investing here is the volatility of resources. An insuperable social aspect to consider is the instability in these countries precisely because of the persistence of a patrimonial rentier-system and a lack of a role for civil society. The growing groups of young people might not be as easily 'bought' as older generations, as we witnessed in the Arab revolutions in 2011. Currently, patrimonial states have the capability to buy-out or suppress dissatisfied populations, but for how long is uncertain.

Political motives are yet another consideration. The region does not exist without corruption and the ruling political elites are the primary beneficiaries of the existing policies. The future, therefore, is unpromising. Rentier-states lead to backward development and cover their shortcomings by constructing modern metropolises and concealing poverty; a move that does nothing more than distract observers from weakened economic structures. Perhaps making it worse, is the fact that no actions are currently being taken to remedy problems of this magnitude.

TABLE 11.18 *GCC imports of goods and services, 1990–2010 average (percent)*

Country	Percent of GDP	Percent of Consumption
Bahrain	67	125
Kuwait	29	53
Oman	41	76
Qatar	30	86
Saudi Arabia	31	56
UAE	54	79
GCC Average	42	79

SOURCE: IMF MIDDLE EAST AND CENTRAL ASIA DEPARTMENT (2011) INCLUDING FOOD, OTHER NON-DURABLE CONSUMPTION GOODS, INTERMEDIATES, AND DURABLES

State-sponsored terrorism is another unattractive feature of these countries. These states have funded terrorist groups. Qatar was accused of funding Islamic fundamentalism in Mali, Saudi Arabia was quoted in a secret memo exposed by WikiLeaks as being a significant financial supporter of Al-Qaeda and other terrorist groups (Walsh 2014).

One of the reasons for the persistence of these states and societies is the huge wealth collected in so-called Sovereign Wealth Funds (SWFs), created by oil surpluses. These assets will be discussed in more detail in the following section.

7.2.2 SWFs and the Persistence of the Arab Patrimonial Rentier-state System

SWFs are powerful political tools in global markets. These funds allot assets to meet different criteria according to the interests of the state that possesses them. SWFs have existed in one form or another for the last two centuries, originating in banking systems that were created to lend finances for economic development. Such funds are state-run investment pools financed by foreign exchange assets. Depending on the source of the assets, they can be divided into commodity funds—mainly oil funds—and non-commodity funds. In March 2014, the financial assets stored in SWFs were estimated to amount to USD\$6,357 trillion, of which USD\$3,808 trillion or 59 percent is related to oil and gas (Bahgat 2009:283; SWF Institute 2014). Table 11.19 illustrates the strength of oil- and gas-based funds and the array of actors directing them, specifically in the RRCs of the Middle East and Central Eurasia. Currently, the

TABLE 11.19 *Top 20 oil and gas related Sovereign Wealth Funds, 2014*

Country	Sovereign Wealth Fund	Assets \$Billion	Inception	Origin
UAE-Abu Dhabi	Abu Dhabi Investment Authority	\$773	1976	Oil
Saudi Arabia	SAMA Foreign Holdings	\$676	n/a	Oil
Kuwait	Kuwait Investment Authority	\$410	1953	Oil
Qatar	Qatar Kuwait Investment Authority	\$170	2005	Oil & Gas
Russia	National Wealth Fund	\$88	2008	Oil
Russia	Reserve Fund	\$88.4	2008	Oil
Algeria	Revenue Regulation Fund	\$77.2	2000	Oil & Gas
UAE-Dubai	Investment Corporation of Dubai	\$70	2006	Oil
Kazakhstan	Kazakhstan National Fund	\$68.9	2000	Oil
Libya	Libyan Investment Authority	\$66	2006	Oil
UAE-Abu Dhabi	International Petroleum Investment Company	\$65.3	1984	Oil
Iran	National Development Fund of Iran	\$58.6	2011	Oil & Gas
UAE-Abu Dhabi	Mubabala Development Company	\$55.5	2002	Oil
Azerbaijan	State Oil Fund	\$34.1	1999	Oil
Kazakhstan	National Investment Corporation	\$20	2012	Oil
Iraq	Development Fund for Iraq	\$18	2003	Oil
UAE-Federal	Emirate Investment Authority	UAE-10	2007	Oil
Oman	State General Reserve Fund	\$8.2	1980	Oil
Oman	Oman Investment Fund	\$6.0	2006	Oil
Saudi Arabia	Public Investment Fund	\$5.3	2008	Oil

SOURCE: SOVEREIGN WEALTH FUND INSTITUTE. <http://www.swfinstitute.org/fund-rankings/>

SWFs of Gulf Cooperation Council (GCC) countries hold about USD\$2 trillion in assets, accounting for approximately one-third of global SWF assets. Within the GCC, the Abu Dhabi Investment Authority has secured USD\$773 billion in assets and manages the largest SWF. Abu Dhabi is followed by SAMA Foreign Holdings of Saudi Arabia and Kuwait, that control an investment pool of USD\$675.9 billion and USD\$410 billion, respectively. Arab resource-rich countries are well represented in the top ten of the biggest SWFs in the world.

As Herman Schwartz (2012) points out, SWFs fall into three categories: In the first category, SWFs serve as a buffer for problems that occur in resource-rich, exporting states threatened by an undiversified economy and the 'Dutch Disease'. The second type of SWF is used to finance industrial development and the private sector, with related forces. Finally, SWFs can be used as a means of "patrimonial rent extraction via political capitalism" (Schwartz, 2012). Individuals seeking personal gain are in control of the SWFs in this category, directing finances back toward political elites.

Although the label SWF is used to indicate all three types, it can be argued that the motives behind these assets are not always similar.

7.2.3 Sovereign Wealth Funds (i) Buffer for Resource-exports and (ii) Strategy for Economic Development

SWFs can be a valuable tool that can help both developing and advanced economies. In resource-rich states, the task of the first type of SWF is to avoid the resource curse and prevent the 'Dutch Disease'. Therefore SWFs can be used in single-sector economies facing rising exchange rates and poor competition in an undiversified market. According to Schwartz (2012), SWFs can aid in economic diversification and they can also assist in preventing the 'Dutch Disease' by sterilizing sudden increases in export revenues. The Netherlands (hence the name 'Dutch Disease') relied heavily on newfound gas reserves in the second half of the twentieth century, and quickly discovered that its reliance on a single-sector/market was volatile and weakened the structure of the economy. Norway's exploitation of oil since the 1960s has benefited the Norwegian economy, but the government has used SWFs to ensure this was the case, becoming an exemplary case of how to manage these assets. Instead of using finances procured from oil to enhance production, assets can be placed in SWFs to stimulate more dependable returns. This involves keeping finances offshore instead of holding them idle or investing locally. This, Schwartz (2012) claims, "raises the political and economic salience of the raw material sector" and it diversifies "a country's income sources outside of that country and away from concentrated local risks." In support of the claim that SWFs are by

no means a new idea, those that were working historically in developmental states have now taken over the role of international and state-owned banks [or the old development banks], sailing under new colors (Schwartz 2012). In this second category of SWFs, developing economies such as China now, Germany and Japan in the nineteenth century, and the Four Asian Tigers (Hong Kong, Taiwan, South Korea, and Singapore) in the second half of the twentieth century, are outstanding examples of the exploitation of assets for state-led industrial development. States use these funds to develop the economy and to stimulate the business class. Ideally, developmental states are working with related forces toward the development of their civil society through industrialization and institution-building.

7.2.4 The Third Type of SWFs: Patrimonial Rulers

Because of the incomplete separation of the state budget from the private wealth of rulers, the combination of patrimonial rentier-power structures and SWFs lacks transparency and motives are often questionable and corrupt. Patrimonial rentier-states act independently of society, and direct finances to benefit political elites, paying scant attention to structural economic development. This makes up the third and by far the most effective type of Sovereign Wealth Fund.

One-third of the world's Sovereign Wealth Funds (SWFs) are controlled by the Arab GCC-patrimonial rentier-states. The question is, do SWFs play a role in economic development and the diversification of the rentier-based economy in these countries? The GCC countries could convert their volatile and exhaustible oil incomes into a more stable financial stream of wealth that could be used to develop and diversify their economy in the long term (El-Kharouf et al. 2010). However, the absence of a long-term economic development strategy in patrimonial rentier-states hampers the restructuring of an oil dependent state-society and economy.

Table 11.19 makes it obvious that, after nearly forty years of diversification policies, the contribution of the oil and gas sectors to the GCC economies remains almost the same. Nevertheless, the Arab GCC ruling elites have been involved in some domestic and, more recently, cross-border economic activities. According to the IMF, between 2000 and 2009, financial services, construction services, non-hydrocarbon manufacturing, and tourism in the region grew (2011). Financial institutions and banking investments have increased and these countries no longer rely on the West to watch their resource revenues. Furthermore, Qatar, Dubai, and Abu Dhabi hold percentages of the London Stock Exchange, NASDAQ, and Citigroup, respectively, and in 2009

the Saudi prince, Alwaleed Bin Talal, became the single biggest shareholder in Citigroup (Harris, 2009; see also Bernstein, Lerner & Antoinette Schoar. 2009). Resource-rich Arab states have had some success in other areas as well, such as commercial and public transport and air transportation hubs (United Arab Emirates, Qatar Airways, Etihad) as well as maritime transport links (Gulf shipping lanes and ports). Other categories that have been emerging as sources of diversification include healthcare; in early 2014 the Dubai Health Authority (DHA) aimed to become one of the top destinations in the world for medical tourism (Saber 2014). World sports like motor-racing, professional golf and tennis competitions, and the 2018 Fifa World Cup in Qatar will continue to promote the region to visitors, with the hope of attracting future investment or other global interests. Sport, however, offers only a temporary solution, and even Qatar is importing labor to build the stadiums to host the World Cup. Despite all the attempts of these states, they have failed to transform their rentier-state economy, and society. Data show that the oil sector continues to dominate the economy. The GCC states continue to sell their oil and gas on the world market, and use the revenues to import almost all of their living requirements, and large parts of their labor force (see Looney 1994; ESCWA 2001; Belawi 2011).

Domestically, the impact of the emergence of SWFs presents an interesting paradox. As we have discussed above, in theory, the SWFs of resource-rich countries in the Persian Gulf and the Caspian region can be used to put some assets aside to counter the negative effects of the resource curse and volatile oil prices, or to invest in domestic socio-economic development programs. Oil wealth could be used to ensure economic development and political stability (and thereby enhance the legitimacy of the regime) as well as to preserve the prosperity of future generations, even after the depletion of the existing resources (Baghat 2009; Amineh 2010; Karshenas & Hakimian 2005).

However, the way SWFs are managed in patrimonial states—dominated by ruling elites—can undermine sustainable economic development and growth, as well as precluding the establishment of an autonomous business class and a strong civil society. Bernstein, Lerner & Schoar (2009) argue that the SWF's politically motivated investment strategy in these countries leads to misguided policy attempts to support underperforming but politically connected local industries rather than to the creation of savings as a buffer for the long run. Hence, the wealth accumulated in these SWFs creates political lineages between the political leaders already involved in leading the SWF, and the domestic investment targets of the funds. The establishment of an autonomous business class, focused on economic success instead of political motivations,

is thereby undermined (see Chang 2002; Hinnebusche 2006; Kamrava 2007; Amineh 2010).

SWFs contribute to the strengthening of patrimonial rulers and the rentier system, and leave the resource curse unaddressed. SWFs are not being proactive, in which case they could offer stability through buffering, diversification of the economy, and/or developing civil society forces. In the case of patrimonial societies, SWFs act alone and mainly in the interest of the ruling elites. SWFs thereby form a supplement that strengthens and maintains regimes, and add to the power of the political elites in these states. In this system, those who control the money control the power. SWFs are just another means of perpetuating a damaging patrimonial state system in the rentier-states in the Arab Gulf region.

7.3 *Politicized Islam and Related Social Movements*

Islam as a political ideology with related social movements emerged gradually during the nineteenth century in response to the expansion of Europe in a time in which the last Islamic empires of Ottoman Turkey, Safavid Persia, and Mughal-India went into decline. In the twentieth century post-colonial state-societies of the Muslim world, it has been a reaction to the failure of strong nation-state building, sustainable development, and democratization (Senghaas, 2002; Amineh, 2007).

As the result of industrial revolutions, Western Europe was transformed into the dominant region in the world system. Sequential industrial development entailed the socio-economic and political transformation from agricultural-based (and/or pastoral-tribal) to industrial-based societies. Sequentially from first to last, Great Britain and its colonies (America, New Zealand, and Australia), Western Europe, Eastern Europe, and finally a number of developing countries, among them the so-called Asian Tigers, China, and India began to industrialize. The era in which sequential development took place was also the period of reactive nation-state-building, and efforts to close the productivity-power gaps with developed countries. In the nineteenth century, the Islamic empires failed to imitate or adjust to the power-wealth-generating machinery of industrial development. As a result, they were threatened with colonization, humiliation, and exclusion (see Amineh, 2007).

In the twentieth century, politicized Islamic ideas with correspondent social movements and forces began to emerge across the Muslim Middle East, as a response to both domestic and global politics. The emergence of these radical Islamic forces was a series of responses to the efforts of the secular ruling elites of the post-colonial states to build-up a strong nation-states and western-oriented socio-economic modernization.

When traditional cultures are confronted with the combination of exogenous pressures and indigenous modernization, they are faced with a structural and consequently mental transformation that makes them vulnerable to deep internal conflict. As Senghaas has shown (1988), this happened in Western Europe during the emergence of capitalism, continued throughout the industrial revolution, and is now a global phenomenon. Nothing has shaped the modern world more powerfully and persistently than capitalist industrial development. It destroyed old patterns of economic, political, and social life, creating conditions that spawned conflict, wars, and revolutions between the modern and the traditional. It made dynamism and progress its cornerstone. Capitalist industrial development is necessary to the development of civil society with its corresponding modern social classes and institutions and is crucial to the growth of democratization (Moore 1966: 418). These modern social classes benefit from capitalism, the rule of law, a free market, the rise of both professionalism and meritocracy. They have therefore been a main engine behind gradual reforms, and the principal drivers of modernization processes.

At the beginning of a development and modernization process, it is unclear whether traditional culture can be sustained in the context of future developments. A return to tradition and an emphasis on a real or imaginary cultural heritage are obvious attempts to preserve identity, and simultaneously to participate in technological progress. In the long-term, there is no alternative to imitation and/or innovation. The complexity of politics, society, economy, and culture is not restricted to Europe and the western sphere, and in order to avoid "chronic conflicts" (civil war), this new complexity must be matched by complex institutional arrangements and mentalities. Political rivalry within the different traditional forms of European culture developed into a political elimination contest, occasionally leading, if not to a consensus, to victory for the stronger party. In a way, this political rivalry had positive effects on the innovative potential of Europe. As Dieter Senghaas points out, "Innovation was encouraged by the subsequent development of a competitive economy [industrial capitalism], that extended over whole territories and was later to become a global phenomenon, making economic competition the quintessential logic of social systems" (Senghaas 1988: 3). It eventually led to the kind of modern society that today determines life throughout the West.

In the non-European world, the exogenous modernization pressures of colonial—and imperial—expansion in the nineteenth and twentieth century were followed by indigenous economic and societal modernization processes. Indigenous attempts to achieve political, social, and economic modernization were responses to the pressures of marginalization (hand-in-hand with humiliation) generated by the empires of the impending European-based, modern

world system. Attempts at modernization in Islamic empires have taken place intermittently since the mid-nineteenth century, driven initially by their political elites and then, after the break-up of empires into smaller states and regions, by the post-colonial secular nationalist elites in parts of the Muslim countries.²

External pressures and internal attempts at modernization and development resulted in different Muslim counter-reactions in the societies of the Muslim Middle East after the beginning of the twentieth century. In general, since the colonial period developing countries have been confronted with a dilemma: they could either spurn their own culture and begin a “catch-up” program to become equal in wealth and power to the West, or adhere to their own culture and religious traditions, but remain materially weak (see Gellner 1992). In the years following independence, many countries resolved the dilemma of identity and development by choosing the first option. After the disintegration of the Islamic empires, the first generation of their elite to gain power, beginning in the early 1930s—Atatürk in Turkey, Reza Shah followed by his son Muhammad Reza Shah in Iran, Gamal Abd al-Nasser in late-1940s Egypt and, later, the ruling elites in Iraq, Syria, and Algeria—opted for an authoritarian path to modernization.

Authoritarian modernization in most Muslim societies embraced “economic welfare”, “democracy”, “secularism”, “democratic socialism”, and “non-alignment” in international relations. In general, the political elites of these Islamic societies were convinced that “developmental or authoritarian states” could promote political stability and economic development and that this process would be threatened if any religion, ethnicity, or caste dominated politics. Even more importantly, some Muslim countries in the Middle East, such as Iran and Turkey in the 1970s and 1980s, succeeded in creating a relatively modern economic structure and made fairly successful attempts to modernize a part of the state and society. In the case of Iran under the Shah, the regime was ideologically unable to legitimate the newly introduced secular institutions, create a space for political participation, and foster a basic level of economic welfare for the citizenry (see Amineh 1999: Chs. 10 and 11). Elsewhere, political strategies such as secular nationalism or Arab-socialism (e.g. Iraq, Syria, Algeria, Libya, and Egypt) were unable to achieve a balance between economic development and the political participation of rising modern, urban-based populations, particularly the urban-middle class that was a product of

2 For modernization and reform in the Ottoman and Persian empires see: Findley. (1980); Lewis (1969); Pamuk (1987); Islamoglu-Inan (1987); Ayubi (1995); Owen. (1992); Zürcher (1993); Abrahamian (1982); Amineh (1999) and Amineh & Eisenstadt. 2007.

modernization. Since the 1970s, the unsuccessful state-led development and modernization projects of the post-colonial secular states and the conflict between religious nationalism and secular nationalism have been the subjects of intense dissatisfaction in vast sections of the Muslim countries of the Middle East. The failure of secular state-led modernization and development has steadily led to the rise of politicized Islam as an 'alternative' dynamic social force in the Muslim countries of the Middle East; one that has even developed a transnational orientation and influence.

Wahhabism-based political Islam is perhaps best defined as a desire to return to Islam's Golden Age, when most other regions of the world, including Europe, were in decline. During the Golden Age of the Muslim Empires of the Umayyad and Abbasid Caliphs, who ruled between 661–750 and 750–1258 ACE respectively, the Muslim World was ruled by a caliphate system based on strong wealth and power structures, and achieved significant progress in science and philosophy. Present-day radical Jihadist forces, such as al-Qaeda and ISIS, desire a unified Islamic order and the restoration of the caliphate-system. These forces view the western powers and Arab authoritarian and/or dictatorial systems as an obstacle to this objective, and are prepared to use violence against them. In a suffocating political environment, and feeling culturally demonized by the West, these types of social forces have primarily targeted local authorities and western powers, considered the perpetrators of their humiliation.

Al-Qaeda and ISIS are variations of radical Islamic political ideology (known as Islamism, Revivalism, Radical Islam, Fundamentalism) that developed in the period between the wars and has carried on up to the present, despite its crisis in the late 1980s and 1990s. Its main ideological representatives were Hasan al-Banna (1906–1949, Egypt), Rashid Rida (1865–1935 Syria), Sayyed Abdullah al-Mawdudi (1903–1979, India/Pakistan), Sayyed Qutb (1906–1966, Egypt), Ayatollah Ruhollah Khomeini (1902–1989, Iran), Mohammad Baqir Sadr (1935–1980, Iraq), and Ali Shari'ati (1933–1975, Iran).³ Some important related organizations are the al-Ikhwan al-Muslimun, or the Muslim Brotherhood Organization, in Egypt (founded in 1928) and later in Syria and other Arab Muslim countries; the Jama'at-I Islami in Pakistan (1941); the Hizb ut-Tahrir al-Islami, the Islamic Liberation Party, in Lebanon (1953); the Tanzim al-Jihad in Egypt (1979); the Mujahideen-e Khalq in Iran (1960s), the Supreme Council for Islamic Revolution of Ayatollah Mohammad Baqir Al Hakim (1939–2003) in Iraq; the Lebanese Hezbollah (1970s); and Osama Bin Laden's

3 See Mitchell (1969); Qutb (1981); Qutb (1980); Binder (1988); Khomeini (1979); Khomeini (1981).

al-Qaeda.⁴ Islamism can be considered a radical reaction to the intensification of western capitalism and civilizational expansion, mainly after World War II, and the socio-economic, political and, most importantly, cultural influences it has exerted on the Islamic world.

Generally, despite the great political ideological differences between these thinkers and related movements, these organizations have been a response to westernized and modernized authoritarian regimes and their socioeconomic and cultural modernization programs in the Islamic world.

In contrast to the contemporary East Asian countries, modernization processes in most Muslim countries have failed, or were fragmented, leading to a chronic developmental crisis that has posed an obstacle to successful socio-economic development and prevented an appreciation of the pluralization of value orientation. Under these conditions, a profound defensiveness has taken root against any unduly cultural innovation, not only among the lower classes, but also among the middle classes, who tend to be much more socially mobile and therefore more susceptible to frustration caused by the prevailing circumstances. Only a small circle of careerists and *nouveaux riches* have accepted cultural innovation. The middle classes have formed a fertile social stratum for Islamist recruitment, leading to the emergence of radical Islamic movements in the 1960s and 1970s. These ideas and movements cannot be reduced to a single common denominator, since they are characterized by different features, whether gaining political power by using religion, rallying the religious community for reasons of solidarity, revitalizing one's own traditional values, struggling against the western "devil," or a mixture of all these motives. These movements do not appreciate the pluralism of values but perceive it instead to be the core problem, an expression of cultural decadence and a repetition of pre-Islamic "ignorance" and moral turpitude (*jahiliya*), according to Sayyid Qutb (1906–1966).

As an alternative to the capitalist pluralistic social order, this stream of political Islam and its related social forces (despite its variations) calls for the creation of a non-secular Islamic state order by radical means, namely: the use of violence. By creating a complex political ideology and organization, Islamism has been able to compete with secular and westernized trends and

4 The notion that al-Qaeda is a transnational network of so-called Islamic terrorism operating under a single leadership and through a coordinated regime of programs, strategies, and tactics "is an illusion". But, it does exist as a powerful set of ideas inspired by Qutb. For a documentary on the roots and activities of the Taliban and the organization of Osama Bin Laden and Ayman Zawahiri, see "The Power of Nightmares," presented over three nights from Tuesday 18 to Thursday 20 January, 2005 at 23.20 GMT on BBC Two.

forces—especially through translating Islamic tradition and symbols into a popular language and thereby securing the support of the urban-based poorer social classes and groups all across Iran, Egypt, Pakistan, Lebanon, Palestine, Iraq, Afghanistan, and Algeria. It has played a key role in Muslim countries, something that cannot be denied by even the most secular politicians. Islamism (in all its forms) and its concept of social order is based on a hostile attitude toward the globalization of some western-based institutions, such as nation-states, and, more importantly, trends toward the universalization of their secular and modern normative structures.⁵ Some Islamist worldviews, for instance, the ideas of Sayyid Qutb (Qutb 1983; Qutb 1981; Khomeini 1979), or the political ideology of al-Qaeda, are not compatible with European concepts of social order. Islamists—on the basis of Sayyid Qutb's ideas and influenced by Wahhabism and Deobandism⁶—target the secular state/society, because they despise its basis in popular sovereignty. Even nationalist ideologies like

5 Capitalist expansion as a social relation or globalization was accompanied by the emergence and spread of the nation-state worldwide. However, norms and values are not included in this process, as they relate to the cultural production of meaning. As Clifford Geertz (1973) rightly states, the cultural production of meaning is always local. But, if norms and values spread beyond the local cultures in which they are rooted, they can assume a universal character or become universalized. This means that the concepts of globalization and universalization refer to different domains: while globalization has a structural and institutional connotation, universalization has a normative character. The contemporary world structures have to deal with processes of a simultaneous success in universalization; there is a parallel development of structural globalization and cultural fragmentation. Cultural revival manifests itself in political strategies that call for a return to allegedly authentic, indigenous, cultural roots. In the non-western world the nation-state is severely affected by this disharmony: although it is globalized, it lacks an essential cultural basis. Islamists consider the nation-state to be an “export from the West” and therefore question its legitimacy. Hence Islamism can be considered the challenging “milestone on the road” towards a de-westernization in world politics; of a “total revolt against the West”.

6 The Sunni Deobandi sect was founded as an Islamic revival movement in 1851 by Muhammad Qasim Nanautvi (d. 1880) and Rashid Ahmad Gangohi (d. 1908) in the city of Deoband in India. Its aim was to unite the Muslims against the British expansion in and the colonization of India. It later developed into an opposition movement against its own “neo-colonial” political elite. It aims at purifying Islam, excluding everything non-Islamic, rejecting all other religions, and forbidding western-style education or indeed any education not directly related to the Qur'an. The movement shares the Taliban's view on women and regards Pakistan's Shi'a minority as non-Muslims. It seeks a pure leader to reconstruct Pakistani society on the basis of the model of the Prophet Muhammad. President Musharraf, himself a Deobandi, was actually born in the city from which the school took its name. Most of the Taliban leadership attended Deobandi-influenced seminaries in Pakistan.

pan-Arabism, pan-Turkism, or pan-Iranism are perceived to have been infiltrated by secular tendencies. The global resurgence of a fundamentalist variant of political Islam is mainly a response to unsuccessful attempts by the secular-authoritarian regimes of Muslim countries to modernize politics and society, spur socio-economic development, and create a democracy.

Islamic extremism has no military solution. Stating its political goal of overcoming “exclusion and ‘humiliation’”, ISIS draws on religious ideology, nostalgia for a glorious past, deep-rooted societal impairments, and psychological outrage. As root causes of unrest persist, ISIS and similar movements will feed on them. America’s self-congratulatory killing of the Al-Qaeda leader Osama Bin Laden did not prevent ISIS, an Al-Qaeda offshoot, from continuing to gain ground.

To achieve change, the causes of these catastrophes must be understood and addressed. Authoritarian and patrimonial political rulers and foreign powers must bear the responsibility, as they have suppressed popular demands for political reform, ruined economies, provoked regional conflict, and humiliated beleaguered populations. Ideologies, especially religion, have promoted obliviousness and intolerance; they and their institutions must be reformed or else replaced by new drivers of change, namely: the younger generations.

Coercive diplomacy must be replaced by involvement, advancing economic cooperation, protecting regional environments, and promoting sustainable democratic development; first and foremost the European Union must act primarily to support and assist socio-economic development as a condition of the growth of civil society with related social forces (middle class, working class) as well as institutions that favor democratic transition. Both the United States and European Union must reduce their negative interference, including arming dictatorial regimes, in favor of long-term socio-economic development and political transition. These potential developments will diminish Islamic extremism. The Arab Spring and the earlier Green Movement in Iran failed because of the complete absence or the weakness of modern democratic social classes and groups with related institutions.

8 Energy and the Geopolitical Economy in the Middle East

Throughout the last decade, the resource-rich countries of the Middle East and Central Eurasia have gradually been redirecting their political, economic, and security relationships with the West toward Asia in general, China in particular. China is emerging as a potential geopolitical actor in the ME and CEA, alongside the United States. Several crucial political and economic developments have paved the way for this geopolitical shift:

- (a) economic globalization (mainly the transnationalization of finance and manufacturing and the internationalization of the function of states (Cox 1987; Ikeda 1996; Hoogvelt 1998; Nayar 1998)).
- (b) the nationalization of oil companies in the resource-rich Middle Eastern countries (Yergin 1991; Diwan, 2007).
- (c) the rise and transnational activities of industrializing Asian countries, accompanied by the decline in American hegemony (Ramu 1995; Chang 2002; Schwartz 1994; Ramu & Shiva 1995; Chang 2002; Chin-Chiuan, Hsin-Yi 2010; Victor, et al. 2011).
- (d) the victory of the Iranian Islamic Revolution in 1979, and
- (e) the disintegration of the Soviet Union (Castells 1997; Cox 1998).

These political and economic developments are transforming the patterns of economic interdependence—including those in the energy sector—across Asia. Complementary political, economic and (even security) networks of transcontinental trade and investments, especially in the energy sector, have risen to a remarkable level (see Calder 2012; Jiang & Sinton 2011; Dannreuther 2011; Downs 2009; Leung 2011; Dittmer & Yu 2010; Victor et al. 2011). The rising oil and gas demand in the industrializing Asian countries, predominantly in those of China and India, and their lack of hydrocarbon energy sources, means that resource-rich ME/CEA countries will become an increasingly important partner of these countries. Nevertheless, the emergence of China forms serious strategic competition to the interests of the European Union and the US in these regions.

In the following sections we discuss the geopolitical implications of US-China involvement in the Middle East and its impact on EU-energy supply security.

8.1 *The United States Hegemony and the Middle East*

In the Greater Middle East (GME), in different historical phases, foreign policies resulting in competitive power projection have brought together Great Britain, France, the Soviet Union/Russia, Germany, the US, China, and the EU. Since World War II, the US has been the only major power that has invaded and occupied parts of the GME (see Amineh, 2007: 13–57). In that role, its power has exceeded those of England and France, the creators of the post-ww1 order in the Middle East, combined.

That the US was willing to take over the role of 'guardian' in the Persian Gulf from the UK was to a large extent the result of US concerns about domestic energy security. All US presidents since Roosevelt have agreed that attempts to secure domestic energy necessitated actions beyond legally recognized national borders. Between the end of the 1960s and the oil price hike of 1973,

energy security moved to the top of the American policy agenda. It became apparent that, after decades of low, stable oil prices, oil prices had again become volatile. US domestic production reached its peak in 1970, as the number of drilling-rigs had dropped by one-third compared to 1955 (Deffeyes 2001). Until then, high-cost producers had been protected by import quotas that warded off foreign competitors (Yergin 1991). By the early 1970s, a buyer's market had turned into a supplier-dominated market. In April 1973, Richard Nixon cancelled the quota system for imports; the United States thereby made its entrance into the world oil market as a consumer rather than a producer. This entrance was accompanied by the US as a strategic actor that began to overrule the domestic interest groups that had previously succeeded in receiving protection from politicians against low-cost foreign producers. Even though the US was able to outsource part of its industrial production to late-industrializing countries, something that greatly decreased the contribution of energy use to its GDP, the core US interest in the Middle East has nonetheless remained stable; securing oil and gas resources and their production and export has provided the main pillar of its global hegemony.⁷ This interest has remained intact even as concrete policies toward the region have changed.

In terms of US policies toward the Middle East, the year 1979 counts as a major turning-point, because of two geopolitically important events. These were: the victory of the Iranian Islamic Revolution and the Russian invasion of Afghanistan. The regional instability that followed was portrayed as threatening US hegemony, partly because it lost Iran as its ally, but also because these events were seen as a potential threat to the security of oil resources in the Persian Gulf region.

Responding to the pro-Soviet government in Kabul and the Soviet invasion of Afghanistan in 1979, the US armed the Mujahedin (the forces fighting the Afghan forces and the allied SU army) to "induce a Soviet Military Intervention".⁸

7 For other studies of US interests, see Elizabeth Wishnick, *Growing US Security Interests in Central Asia*, Carlisle Barracks, PA: Strategic Studies Institute, US Army War College, 2002; *Idem.*, *Strategic Consequences of the Iraq War: US Security Interests in Central Asia Reassessed*, Carlisle Barracks, PA: Strategic Studies Institute, US Army War College, 2004; Jacquelyn K. Davis and Michael Sweeney, *Central Asia in US Strategy and Operational Planning, Where Do We Go From Here?* Cambridge, MA and Washington, DC: Institute for Foreign Policy Affairs, 2004; Lieutenant Colonel Jon E. Chicky, USA, *A Military Strategy for Central Asia*, Student Research Project, US Army War College, 2004, *passim*; and the author's two earlier studies, *The Future of Transcaspian Security*, Carlisle Barracks, PA: Strategic Studies Institute US Army War College, August, 2002; and *US Military Engagement with Transcaucasia and Central Asia*, Carlisle Barracks, PA: Strategic Studies Institute, US Army War College, June 2000.

8 As Brzezinski stated in the summer of 1979.

The creation of the Rapid Deployment Force (RDF)—that is now known as the US Central Command (CENTCOM)—in 1977 and the promulgation of the Carter Doctrine in 1980, were two other direct reactions to these geopolitical developments. President Carter's national security advisor, Brzezinski,⁹ formulated the core of Carter's doctrine: "An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force" (cited in Bromley 2007: 91; see also Jones 2012). President Carter encouraged America's deep attachment to the GME.

The new global politics that have emerged in the post-Cold War era have been characterized by unipolar (US) military power and economic tri-polarity, bound together by the triadic activity of multinationals, including TNOs and state-owned oil companies (i.e. North America, the European Union, and Southeast Asia). The United States has remained the main military geopolitical actor in the Middle East, even though it has simultaneously reduced its energy imports from the Gulf. The US pursues three primary strategic, geopolitical, and geo-economic priorities:

- (a) The first is providing continued support to its greatest strategic ally in the region, Israel.
- (b) The second is its relationship with the main resource-rich Arab countries located around the Persian Gulf.
- (c) Lastly, the US makes geostrategic efforts to contain emerging contender states, including China, Russia, Iran, and India. This is comparable to the containment of the former Soviet Union, including the creation of energy connections between CA and Afghanistan, bypassing Iran.

The US aims to create its own silk road on the Northern Distribution Network, bypassing Russian territory by running through Uzbekistan, Kazakhstan, the Caspian Sea, Azerbaijan, and Georgia. George H.W. Bush's administration (1989–1993) used a doctrine that followed on the previous Carter Doctrine, but relied on even more direct forms of intervention (Jones, 2012; Bromley, 2007; Klare 2002). The Iranian Islamic Revolution, as well as the "radical" secular Arab regimes in Iraq and Syria, allowed the US to deploy military forces on an unparalleled scale directly in the region. Geo-economically, however, the US

9 On the Carter Doctrine, see Zbigniew Brzezinski, *Power and Principle: Memoirs of the National Security Adviser, 1977–1981* (New York, 1983).

now has neither the preponderant resources (especially not after the First Gulf War) nor the political incentives to offer concessions to its allies.

Although containment activities directed toward possible contender states have been carried out since the Carter Administration, the emergence of new contender states¹⁰ has recently led to a loss of order and decreased the US' grip on the GME. This has induced attempts to contain newcomers, mainly China and India (and the post-Soviet Russian Federation and Iran). Since then, the US' aim has been to regain a stable balance of power in the region. The Pentagon (1992) clarified its policy in the current environment as having—among other goals—two objectives: (1) to prevent a new rival, whose resources would be sufficient to generate global power, from posing a threat to US domination in the GME; (2) to address sources of regional conflict and instability, and thereby promote increasing respect for international law, limit international violence, encourage democratic forms of government, and open economic systems. In short the aim was to address those “threatening” US interests, and US allies or friends, or those who could seriously unsettle international relations. Various interests have been mentioned: access to vital raw materials (primarily Persian Gulf oil), the proliferation of weapons of mass destruction and ballistic missiles, and threats posed to US citizens by terrorism. Promoting regional stability has become a significant policy aim.

The post-Cold War Carter Doctrine manifested itself in the first US-led war against Iraq, meant to reverse the invasion and occupation of Kuwait (1990–91), in the wake of the actions of Saddam Hussein's regime and the potential threat it posed to the control of Kuwaiti and Saudi oil. Notwithstanding US victory in that war and the generally benign security of oil supply during the 1990s plus declining real oil prices, there were a number of problems associated with this new form of control. Although America supported Saddam Hussein in his long war against the Islamic Republic of Iran during the 1980s, it sought to expell Iraq from Kuwait in 1991. US sanctions after the war led to an impoverishment of the Iraqi people, and consequently to a diminution of the Iraqi state's ability to serve as a buffer against future revolutionary Iranian influence in the Middle East. A coalition led by the US drove back Saddam Hussein' Iraqi forces after they invaded Kuwait. Despite the fact that the US stated it was

10 The multipolar world arrived with the rise of new contender states that have evolved and expanded quickly as a result of globalization. The shifting world order and rise of potential rivals has been graphically described by Yergin (1992: 14): “With the end of the Cold War, a new world order [was] taking shape [where] economic competition, regional struggles and ethnic rivalries may replace ideology as the focus of international—and national—conflict.”

there because of the violation of Kuwait's territorial integrity, it has also been argued that the region's oil was an incentive for the Gulf War¹¹ (Mahdi, 2010). Only during the administration of President George Bush Junior (2001–2009) was it openly acknowledged that its objective was to secure the energy supply from the region. Compared to George H.W. Bush and Clinton (1993–2001), George W. Bush's Administration was unique in that energy resources were *openly* claimed to be policy goals of US foreign and military policies. Control over resources and transport routes was used as a means to strengthen America's hegemonic status even more directly than before.

The relationship between the US and the Middle East has not proven to be without complications (Anderson 1981; Pollack 2002; Bromley 2005; Haass & Indyk 2009; Roy 2009; Stokes & Raphael 2010; Lesch & Haas 2011; Michaels 2011; Atlas 2012; Byman 2012). In the post-Cold War era, American activities in the region have intensified, stirring up some serious problems for US interests. US sanctions against Iraq have led to an impoverishment of the Iraqi people and a diminution of the Iraqi state's ability to serve as a buffer against future Iranian influence in the Middle East. Furthermore, the US-led invasion of Iraq in 2003, although it did topple the Saddam Hussein regime, impoverished Iraq and gave Iran an even stronger strategic advantage in the region. During the 1980s, the United States armed, equipped, and trained Sunni Islamic forces to fight the Soviet army in Afghanistan. Among their leaders was Osama bin Laden. The United States welcomed the Taliban to power in Afghanistan in 1996. On the one hand, it hoped that the Taliban regime could contain the influence of the Shi'ite-based Islamic Republic of Iran in the region. On the other hand, it hoped that it would open the way for a centralized government in Afghanistan, crucial to the CentGas Consortium (*Pipeline News*, 12–18 October 1996; see also Amineh & Houweling 2003; see further Callari 2002; Almaty, Financial Times, 25 December 2001).

11 See for the relevance of oil in the US foreign policy: Foiuskas and Gökyay, *The New American Imperialism*: 152–153, 174, Dan Briody, *The Halliburton Agenda: The politics of oil and money* (New Jersey: Wiley, 2004): 199, Chalmers Johnson, *The Sorrows of Empire: Militarism, Secrecy and the End of the Republic* (London: Verso, 2006 edition): 145–146, 155, Michel Collon, *Media Lies and the Conquest of Kosovo: NATO's Prototype for the Next Wars of Globalization* (New York: Unwritten History: 2007): 6, 8, 29, 34, 35, 91, 93, 97, 99, 104, 105, 107, 108, 112–114, 118, 121, 123, 124, 127–130, 134–136, 145, 154, 156, 172, 210 and Peter Dale Scott, "The Background of 9/11: Drugs, Oil and US Covert Operations", in David Ray Griffin and Peter Dale Scott (eds) *9/11 and American Empire: Intellectuals Speak Out* (Gloucestershire: Arris Books, 2007): 76.

Since the declaration of the War on Terror, the US has actively tried to defeat al-Qaeda and the Taliban.¹² The “war on terror” was used as the motivation behind the invasions of Afghanistan in 2001 and Iraq in 2003. The US toppled the Taliban, that provided sanctuary and support for al-Qaeda, in 2001. The US adjusted its strategy in 2002 to one of defeating the Taliban military (that had evolved into a guerilla organization trying to re-seize power) and building core institutions in Afghanistan. The latter goal was related to the objective of promoting democracy. In 2003, the George W. Bush Administration provided another example of direct intervention by invading Iraq. As said, the US-led invasion of Iraq in 2003 did topple the Saddam Hussein regime but it impoverished Iraq and gave Iran an even stronger strategic advantage in the Middle East.

The war against Iraq and Afghanistan had made it possible for the US to create a long-term military presence in the Persian Gulf. Whether or not the US succeeds, its effort is eliciting responses from other actors both near and far. If it is successful, a long-term American military presence will open the door for American (as well as their allies) enterprises and (non-)faith-based non-governmental organizations to gain a foothold in the region. This might empower the US to shape host societies and set conditions for outside access to the region’s oil and gas. This, in turn, would give the US indirect control of the economic and technological development of potential contenders such as China, India, Russia, and even Iran. Despite its position of global military dominance since the Soviet collapse and its expanded powerbase in the region, the US has so far failed to realize a policy power projection in the ME and CEA in general and victory in the ‘global War on Terror’ in particular. Its lack of policy success in the region has undoubtedly damaged the American image of competence and credibility as a hegemonic power.

8.1.1 The Arab Spring and US Interests in the Region

During the Arab Spring in 2011, the United States watched authoritarian regimes they viewed as allies fall from power one after another, leaving it to have to decide quickly on new actors it would prefer to fill the vacated political positions. Such replacement actors included the controversial Muslim Brotherhood in Egypt (see for instance Salloukh & Bassel 2013; Bassam 2013; Burnell 2013; Mitchell et al. 2013; Byman 2012; Brown 2013; Bayat, 2013). With

12 After the death of charismatic leader of the Taliban, Mullah Mohammed Omar, in 2013, the organization split up between different groups. For an interesting review and analysis on the origin, ideology, and the practices of Taliban see, Ahmad Rashid (2010, 2nd Edition), *Taliban*, New Haven, Connecticut: Yale University Press.

Morsi behind bars, the US found a new liberator friend in the person of the dictator, Sisi. Syria has especially complicated conditions in the region because of its drawn-out civil war; nor has it been atypical if the relatively express regime changes in Egypt or Libya are taken into consideration. Furthermore, the situation in Syria has essentially revealed the role of the US as being that of a fickle observer in contrast to the active involvement of Iran and Russia in supporting al-Assad. The region is tumultuous and unrest has invited some potentially undesirable actors to participate in future relations.

American allies in the region, e.g. the resource-rich Arab countries of Saudi Arabia, Qatar, and the UAE, are becoming uneasy about US policy (see Blanchard, 2012). These states have witnessed civil wars, that have incurred monumental social movements and regime changes, in the region around them. So far, the resource-rich Arab patrimonial states have been able to pay off their societies in order to prevent such unrest and revolts. The US understands it cannot please one party without harming another. Take Bahrain, for example. The regime has the support of Washington (in cooperation with Saudi Arabia and the GCC), negatively impacting on the protestors. Furthermore, it offers the Muslim Brotherhood in Egypt support; a movement that both Saudi Arabia and the UAE see as a political threat. Perhaps most importantly, as the United States stood by and watched ally dictators fall, other Gulf resource-rich countries—that appear to be mounting a counter-revolution against the Arab revolts to their west and south—entertain the possibility of it happening to their regimes. These episodes reflect the US policy failure, mainly in the ME.

8.1.2 Speculation of the Dissolution of the American Hegemony

The deposit, extraction, and export of ME and CEA energy resources are the primary sources of economic interest to major state powers and corporations. American hegemony could decline even further because of its uncertain future reliance on oil in the Middle East (see Mercill 2008). Despite the so-called American 'shale energy revolution', that has given rise to predictions that the United States will become the largest global oil producer by 2020, and be fully energy self-sufficient by 2035, the US will remain dependent on and the protector of oil from the region for both itself and its allies, principally the European Union.

Some have concluded that the shale gas revolution in America will mean it can finally leave the Persian Gulf, but the situation is far more complex than merely vacating the Middle East. The importance of oil, among other commodities, will continue to play a key role in US power projection in the Greater Middle East (Amineh 2007; Haass & Indyk 2009) and the Persian Gulf region in particular, despite the 'shale energy revolution'. According to the EIA-IEO

2014, over the next two decades, as shale-oil production peaks, the US will still import over 25 percent of its total oil consumption. Because of the shale-oil surge, US oil import dependence has been enormously reduced over the last five years, from 56 percent in 2008 to 32 percent in 2013 (US EIA 2014). Although the huge increase in Canadian oil imports—from 16 percent in 2004 to 32 percent in 2013—has significantly altered the composition of the US imports portfolio, today Saudi Arabia and the wider Persian Gulf still contribute around 20 percent of US oil imports. Shale-oil production and imports from Canada and Mexico will lead to a relative reduction in oil supplies from the Persian Gulf in the medium-term. This might explain why the Obama Administration, although it did adhere to the well-established foreign-policy strategy toward the Middle East, has been pursuing a less clear-cut Middle-East policy than its predecessors (see Jones 2012; Krieg). This has been deemed a strategy of shifting engagement. However, as the shale-oil stock is expected to decline in the second half of the next decade, this supply will dwindle. Nevertheless, even during the medium-term downturn, the Persian Gulf will remain one of the top three oil suppliers of the US. The cost-price benefit that the Persian Gulf suppliers enjoy means that there will always be a significant market for their oil in the US. These trends have prompted speculation about future US military behavior in the Persian Gulf and what it could mean for the energy supply security of the EU. The EU will continue to rely on energy from the region. Even if Washington chooses to import little or no oil from the region, there is still the matter of energy supply for allies, counterterrorism, and nuclear proliferation. If, however, the US military presence in the region is downgraded, Beijing (and perhaps India and Japan) could see their countries assuming larger roles in securing their own energy interests. This would involve removing any threats they see to their energy security.

Current bilateral agreements between China and Russia, China and Iran, and Russia and Iran, but also regional cooperation pacts such as the Shanghai Cooperation Organization (SCO)¹³ and China's most recent 'One Belt One Road' (OBOR) policy strategy, are stepping-stones to such a development. The SCO is well on its way to becoming an integrated Asian economic, political, military, and energy network capable of counterbalancing US regional influence. The OBOR strategy includes the creation of an alternative sea route that seems to provide a direct alternative to a US-secured system of oil transport, as well as an alternative system for regional capitalist development. This means that the People's Republic is becoming the main strategic concern of US hegemony,

13 The member countries of the SCO are Russia, China, Kazakhstan, Kyrgyzstan, and Tajikistan. Iran, India, and Pakistan have observer status in the organization.

and its global interests. This rift between the US and China (and Russia) is set to become the main geopolitical-strategic reality in Central Asia, with the EU, Japan, and India playing a secondary role.

However, it must be borne in mind that energy is not the only determinant of geopolitical relations, and that the pursuance of other vital interests will also impact on energy relations around the world. For instance, the Cold War was a dominant factor in international relations and in the way certain regions were approached in the past. During the Cold War period, the Soviet gas campaign met with substantial resistance from the US, that feared Europe's vulnerability as a result of such structural import dependence. Similar dependencies on other suppliers did not meet with this kind of resistance. Indeed, geopolitics is a multifaceted arena in which energy is only one of the many political, military, economic, and ideological agendas pursued.

The objective of US policy makers is not just to obtain oil and gas from the ME and CEA but also to control their flow to oil and gas markets in the west and in Southeast Asia. US economic interests are combined with strategic interests to weaken the influence of China, Russia, and Iran in the region and also to ensure better control of both resources and the shipping lanes in the Persian Gulf.

The US is reflecting its current interest in the region by its continued control of the Straits of Hormuz—avenue sea lane that boasts 20 percent of all oil trade. The US supplies the majority of the military assets that allow the free flow of ships through the straits. Eighty-five percent of this trade travels to Asian markets, while only 10 percent is directed to the US (see US EIA 2013d).

One of the major obstacles and concerns for the US and its hegemony is the increasing influence of a number of contender states, mainly China, Russia, and Iran in the ME and CEA. American priority in the region is to ensure Iran does not develop a nuclear weapon and to curb its geopolitical ambitions, and this includes supporting Israel. The role the US takes in this is detrimental to the global oil trade because US-led sanctions intended to cripple Iran end up disrupting oil to other actors. China is the largest global energy consumer and currently imports the bulk of its oil from the Middle East. Recently, Russian influence in the region has been increasing. Russia's diplomatic mediation prevented US and NATO military intervention in Syria by establishing an agreement to put the disputed weapons under international control. This move has enlarged the influence of Russia and undoubtedly prevented the US from deeper involvement in a predicament that Washington created (see Ghilès 2013).

To secure its increasing energy needs, China must also increase its presence and influence in the region. China is now one of the key geopolitical actors in

the ME and CEA and the main consumer of the Persian Gulf's crude oil. China's diplomatic, economic, and even security relationships with the key resource-rich countries of the region pose a growing threat to the position of the US in the region.

9 China's Oil Dependency and its Geopolitical Economy Implications

Rapid capitalist state-led industrial development in China created—as it did in other advanced and emerging economies—a dual result: it generated wealth and power, but it also created domestic resource scarcity and the societal pressure of unfulfilled energy demands. These developments create a problem in China's cross-border economic activity, directed toward getting access to resources and markets beyond its state borders. Global primary energy demand, according to the International Energy Agency—World Energy Outlook 2012—is projected to increase by one-third over the period 2012 to 2035 (Amineh & Yang 2014). Sixty percent of this growth is expected to originate in rising living standards in China, India, and the Middle East. British Petroleum (2013) predicted that by 2035 more than 30 percent of world energy demand will come from developing countries, specifically from China, that is now the largest global energy consumer. In 2010 China already overtook the US as the world's biggest energy user, whose total share of energy consumption was 22 percent in 2012, compared to 18 percent of the US (BP, 2013). Table 11.20 highlights China's increasing dependence on oil supplies from resource-rich countries. Approximately half of its imports in 2013 and 2014 came from the resource-rich countries of the Persian Gulf.

During the last 10 years, the Middle East has been the main supplier of oil and gas to China. This makes China one of the main forces in the competition for the strategically important energy supplies from this region; the other two main contenders are the US and the EU. The Chinese state-class and their state-led companies, mainly China's National Oil Companies (CNOCs, including PetroChina's parent company, the Chinese National Petroleum Company—the CNPC—and Sinopec's parent the China Petrochemical Corporation—the CPC), and some other large Chinese companies, are involved in the oil and gas reserves of resource-rich countries of the Middle East and Central Eurasia.

It is therefore no longer a question of if and when China's global expansion transforms into a formidable presence in Middle East; the question now is what role China will play in the region in the future? China's growth is dependent on securing resources, and Washington's hegemony is being contested.

TABLE 11.20 *China's crude oil imports by source, 2005, 2013 and 2014*

Oil exporting states	China		
	2005	2013	2014
Persian Gulf	42 percent	51 percent	51 percent
Saudi Arabia	19 percent	19 percent	16 percent
Kuwait	<0.5 percent	3 percent	3 percent
Iran	11 percent	8 percent	9 percent
Iraq	0.8 percent	8 percent	9 percent
Oman	10 percent	9 percent	10 percent
UAE	<0.5 percent	4 percent	4 percent
Other countries	58 percent	49 percent	
Angola	14 percent	14 percent	13 percent
Russia	7 percent	9 percent	11 percent
Sudan	5 percent	<0.5 percent	2 percent
Yemen	5 percent	<0.5 percent	
Republic of Congo	4 percent	2 percent	2 percent
Indonesia	3 percent	<0.5 percent	
Kazakhstan	1 percent	4 percent	2 percent
Venezuela	<0.5 percent	6 percent	4 percent
Brazil	<0.5 percent	2 percent	2 percent
Other countries	18 percent	12 percent	9 percent

SOURCE: THE OBSERVATORY OF ECONOMIC COMPLEXITY, THE MASSACHUSETTS INSTITUTE FOR TECHNOLOGY MEDIA LAB. (RESULTS 2005); EIA US ENERGY INFORMATION ADMINISTRATION (2013D); EIA US ENERGY INFORMATION ADMINISTRATION (2014D)*APPROXIMATELY HALF OF THEIR IMPORTS IN 2013 AND 2014 ARE FROM THE RESOURCE-RICH COUNTRIES IN THE PERSIAN GULF

Its current growth rate—in term of trade—places China ahead of the US and the EU.

9.1 *US, EU Concern about China's Activities in the Middle East*

At the moment, the EU depends mainly on oil and gas imports from Russia and, to a lesser extent, from the Caspian Region (see Section 4). Hence, non-Russian resources are crucial to the EU in order to balance energy dependence

by not relying too heavily on a politically unreliable Russia. China, and now other industrializing Asian countries are forming a new competitive geopolitical force threatening the EU energy supply security. China is on the path to becoming an even stronger economic partner for the ME and CEA.

China's diplomatic, political, and economic activities in both the Middle East and in Central Eurasia have underscored China's increasing presence in the vast area stretching from Kazakhstan to the Persian Gulf. With China's stature in the region growing, some ME and CEA countries are responding by 'looking East' for alternative alliances. The increased Chinese footprint gives smaller regional powers an additional partner alongside their traditional ties with the United States and the European Union and their major member states. In this context, China has rapidly expanded its diplomatic, political, and economic ties with the resource-rich countries of the Caspian and the Persian Gulf. Between 2005 and 2009, China's total trade volume with the Middle East increased 87 percent to USD\$100 billion and reached about USD\$222 billion in 2012. In 2010, China surpassed the United States as the main destination for the Middle East's exports (Chen 2011; Wood 2014). China's oil imports are almost as large as those of the US and are growing by more than 10 percent per year and are meeting almost 60 percent of domestic consumption. Between 2000 and 2012, China accounted for about 50 percent of the growth in world oil consumption (nearly 75 percent in combination with India and Southeast Asian countries) (Noel: 2014: 248). Figure 11.25 illustrates the rapid growth in the oil trade between China and the Persian Gulf Region, that can be perceived as a threat to both US and EU regional interests, and the growth occurring between 2000–2012, when China's trade surpassed both the US and the EU.

The problem for China, the US, and the EU mentioned above is that the main global oil and gas reserves are concentrated in a few geopolitically unstable regions and countries in the Middle East and the Caspian region. China focuses especially on four key resource-rich countries: Saudi Arabia, Iran, Iraq, and Kazakhstan in the Middle East and Central Eurasia. In 2013, these countries accounted for 35 percent of the total oil export to China. Although Saudi Arabia and Iran are China's main oil suppliers, much of China's presence and expanding role in the region is linked to Iran and its larger geopolitical importance. Saudi Arabia has been of great political value to the US, but China has proven to have benefited immeasurably from Saudi Arabia's resources. Table 11.21 compares the total oil trade of selected key resource-rich countries in this study: Iran, Iraq, Saudi Arabia, and Kazakhstan with China, the US, and the EU.

Figure 11.26 and Table 11.22 measure the magnitude of trade growth between China and its Middle East key energy partners. These numbers illustrate that China has become a major trading partners for all four countries, reflecting its

Note: data for the EU for Qatar, Bahrain, and UAE is not available.

FIGURE 11.25 Total Gulf Oil-Trade-Comparison (in USD millions).

SOURCE: US CENSUS BUREAU: US BUREAU OF THE ECONOMIC ANALYSIS; NATIONAL BUREAU OF STATISTICS OF CHINA; EIA; EUROPEAN COMMISSION, MARKET OBSERVATORY FOR ENERGY, REGISTRATION OF CRUDE OIL IMPORTS AND DELIVERIES IN THE EUROPEAN UNION EU 27

growth of trade in and economic involvement with the ME and the CEA countries. China's need for imported resources has multiplied five times between the period of 2005–2014.

China's growth has led it into the top two of those importing from these selected countries. Note that China has a position leading the US in each, with the exception of Saudi Arabia, in which it is only marginally behind the level of US imports. In the case of Qatar, the difference is more noticeable. Turkmenistan is by far the most dependent on China, as 73 percent of its total exports between 2011 and 2013 went to China.

9.2 China's Prospects in the Middle East

Chinese foreign direct investments are one cornerstone of the globalization of China's economy. Between 2005 and 2014, Chinese investment in the six selected resource-rich countries has exceeded over 100 billion US dollars. Table 11.23 and Figures 11.27 and 11.28 depict the total outward FDI from Chinese companies into Kazakhstan, Iran, Russia, Turkmenistan, Saudi Arabia, Iraq, and Qatar, measured in billions of US dollars.

TABLE 11.21 *Total Oil-Trade of selected resource-rich countries—Comparison (in millions of dollars per day)*

Key resource-rich countries	China		US		The European Union-27	
Year	2005	2012	2005	2012	2005	2012
Iran	2,487	36,466	185.6	253	12,182	5,637
Iraq	975	17,568	6,076.3	21,3194	4,380	16,240
Saudi Arabia	3,098	73,314	20,589.8	73,639	22,008	39,151
Kazakhstan	NA	NA	NA	NA	10,370	22,932
Russia	NA	63,409	24,780	31,218	65,238	103,854
Total	NA	NA	NA	NA	48,940	83,960

SOURCE: US CENSUS BUREAU; US BUREAU OF THE ECONOMIC ANALYSIS; NATIONAL BUREAU OF STATISTICS OF CHINA; EIA; EUROPEAN COMMISSION, MARKET OBSERVATORY FOR ENERGY, REGISTRATION OF CRUDE OIL IMPORTS AND DELIVERIES IN THE EUROPEAN UNION EU 27

Kazakhstan (USD\$23.49 billion) was the largest recipient of FDI at the end of 2014, followed by Russia (USD\$20.88 billion), Saudi Arabia (USD\$19.49 billion), Iran (USD\$17.17 billion), Iraq (USD\$14.84 billion), Turkmenistan (USD\$3.73 billion), and Qatar (USD\$3.5 billion). Kazakhstan, Russia, and Saudi Arabia are respectively the seventh, eighth, and ninth largest recipients of Chinese Outward FDI in the world (Heritage Foundation 2015). Chinese Outward FDI in these countries peaked in the immediate aftermath of the Global Recession in 2009, when China emerged from the global crisis relatively unscathed and in much better shape economically than most western countries. It invested a total of USD\$21.61 billion in these countries. The year 2009 saw more than 20 percent of the investments of Chinese companies in these countries. In the years since then, outward FDI has decreased, particularly in 2011, 2012, and 2014, as the Chinese government has focused on combating corruption in its state-led national oil companies. The vast majority of China's outward investment in the abovementioned resource-rich countries has gone into the energy sectors of these countries. Apart from Turkmenistan, in which 100 percent of total Chinese FDI is directed toward natural gas production, the lion's share of Chinese FDI in the energy sectors of Iran (USD\$11.63 billion), Iraq (USD\$14.03

Note: slight differences might occur because of rounding.

FIGURE 11.26 *Trend in oil trade relations of Iran, Iraq, Kazakhstan, Saudi-Arabia with China: 2005–2014.*

SOURCE: US CENSUS BUREAU: US BUREAU OF THE ECONOMIC ANALYSIS; NATIONAL BUREAU OF STATISTICS OF CHINA; EIA; EUROPEAN COMMISSION, MARKET OBSERVATORY FOR ENERGY, REGISTRATION OF CRUDE OIL IMPORTS AND DELIVERIES IN THE EUROPEAN UNION EU 27

billion), Kazakhstan (USD\$20.88 billion), Russia (USD\$9.79 billion), and Saudi Arabia (USD\$6.82 billion) is allocated to oil production. This mirrors the larger role played by oil in China's primary energy consumption, in which it accounts for 20 percent of consumption, compared with 5 percent for natural gas and 1 percent for hydroelectricity (EIA, China 2015).

The largest upstream projects of Chinese National Oil Companies' in the Middle East and the Caspian regions are in Iraq, Iran, and Kazakhstan. The CNPC is the dominant actor in Iraq, with large investments in oil projects in the Rumalia Oilfields. Along with Sinopec, it has also been the dominant actor in Chinese investments in the Azadagan Oilfields in Iran and the Kashagan Oilfield in Kazakhstan. These companies also have large investments in oil production projects in both Russia and Saudi Arabia. Chinese companies such as the CNPC, the CIC, and Huadian have also invested in natural gas projects in Iran (worth USD\$3.35 billion), Kazakhstan (worth USD\$5.98 billion), and Russia (worth USD\$1.9 billion). These have been allocated primarily to

TABLE 11.22 *Top five export-destinations and import origins of case countries 2005–2013*

Countries	Top 5 export destination 2005–2007	Top 5 export destination 2008–2010	Top 5 export destinations 2011–2013	Top 5 import origin 2005–2007	Top 5 import origin 2008–2010	Top 5 import origins 2011–2013
Iran	Japan 15.0 percent China 12.0 percent India 6.55 Italy 6.2 percent South Korea 5.9 percent	China 17.5 percent Japan 13.29 percent India 12.2 percent South Korea 7.3 percent Italy 4.8 percent	China 31 percent India 14 percent Japan 9.8 percent South Korea 8.9 percent Iraq 4.7 percent	Germany 11.6 percent China 10.6 percent UAE 9.9 percent South Korea 6.2 percent Italy 5.0 percent	China 16.3 percent UAE 13.6 percent Germany 10.5 percent South Korea 7.2 percent Italy 5.2 percent	China 21.3 percent Turkey 10.9 percent South Korea 9.8 percent India 6.2 percent Germany 5.8 percent
Iraq	USA 42.3 percent Italy 11.3 percent India 10.8 percent South Korea 5.4 percent China 2.3 percent	USA 30.1 percent India 16.0 percent Italy 9.6 percent South Korea 9.0 percent China 8.2 percent	India 23 percent USA 20.3 percent China 16.3 percent South Korea 11.3 percent Italy 5 percent	Turkey 23.0 percent UAE 19.7 percent Iran 16.1 percent USA 8.51 percent China 5.7 percent	Turkey 23.6 percent China 11.8 percent UAE 8.1 percent Germany 4.12 percent USA 4.1 percent	Turkey 28.7 percent China 14.3 percent Iran 9 percent South Korea 5 percent USA 4.8 percent

Countries	Top 5 export destination 2005–2007	Top 5 export destination 2008–2010	Top 5 export destinations 2011–2013	Top 5 import origin 2005–2007	Top 5 import origin 2008–2010	Top 5 import origins 2011–2013
Kazakhstan	Italy 11.9 percent Russia 11.5 percent China 11.5 percent France 9.6 percent Netherlands 4.3 percent	China 15.3 percent Russia 8.2 percent France 7.9 percent Italy 7.2 percent Netherlands 5.7 percent	China 19.7 percent Russia 8.8 percent Netherlands 8.4 percent Italy 8.1 percent France 7.3 percent	Russia 36.3 percent China 9.5 percent Germany 7.6 percent USA 5.5 percent Ukraine 4.0 percent	Russia 29.3 percent China 14.3 percent Germany 7.3 percent Ukraine 5.31 percent USA 4.85 percent	Russia 37 percent China 16 percent Germany 5.6 percent Ukraine 4.9 percent USA 4.1 percent
Saudi Arabia	USA 14.6 percent Japan 14.5 percent South Korea 8.3 percent China 6.3 percent India 5.7 percent	Japan 7.9 percent USA 7.4 percent China 6.2 percent South Korea 5.5 percent India 3.7 percent	Other Asia: 32.3 percent China 7.2 percent USA 7.1 percent Japan 7 percent South Korea 5.2 percent	USA 12.0 percent Germany 8.3 percent Japan 7.8 percent China 7.9 percent UK 5.0 percent	USA 11.05 percent China 10.6 percent Germany 5.2 percent Japan 6.8 percent India 4.6 percent	China 12.3 percent USA 11.3 percent Germany 7.2 percent South Korea 5.6 percent Japan 5.5 percent

TABLE 11.22 *Top five export-destinations and import origins of case countries 2005–2013 (cont.)*

Countries	Top 5 export destination 2005–2007	Top 5 export destination 2008–2010	Top 5 export destinations 2011–2013	Top 5 import origin 2005–2007	Top 5 import origin 2008–2010	Top 5 import origins 2011–2013
Russia	Netherlands 8,7 percent Germany 6,6 percent China 4,6 percent Ukraine 4,7 percent USA 4,3 percent	Netherlands 9,8 percent Germany 5,9 percent China 5,4 percent Ukraine 5 percent USA	Netherlands 8,8 percent China 7,6 percent Germany 6,1 percent Ukraine 5,3 percent Italy	Germany 16,3 percent China 9,3 percent Ukraine 5,8 percent Italy 5 percent Finland 4,5 percent	Germany 14,6 percent China 13 percent Japan 8,6 percent Ukraine 5,5 percent Italy 4,5 percent	China 14,6 percent Germany 14,3 percent Ukraine 5,5 percent Belarus 4,5 percent USA 4 percent
Qatar	Japan 40 percent South Korea 18,8 percent Singapore 9,1 percent India 4,5 percent Spain 3,2 percent	Japan 32,7 percent South Korea 17,7 percent Singapore 8,9 percent India 7,6 percent Thailand 3,4 percent	Japan 28,6 percent South Korea 19,7 percent India 11,8 percent Singapore 6,3 percent China 5,9 percent	USA 10,1 percent Japan 9,5 percent France 8,6 percent Germany 7,1 percent UAE 6 percent	USA 8,3 percent Italy 8,1 percent UAE 8 percent Japan 7,7 percent Germany 7,7 percent	UAE 13,45 percent USA 9,9 percent UK 9,5 percent Germany 7,6 percent China 7,3 percent

Countries	Top 5 export destination 2005–2007	Top 5 export destination 2008–2010	Top 5 export destinations 2011–2013	Top 5 import origin 2005–2007	Top 5 import origin 2008–2010	Top 5 import origins 2011–2013
Turkmenistan	Ukraine	Ukraine	China	Russia	China 19,5 percent	Turkey 23,7 percent
	59 percent	52 percent	73 percent	13,3 percent		
	Azerbaijan	Turkey	Ukraine	Turkey	Russia 19 percent	China 16,3 percent
	6,2 percent	10,5 percent	5,6 percent	12,9 percent		
	Hungary	Italy	Turkey	China	Turkey 17,5 percent	Russia 16 percent
	5 percent	3,5 percent	5 percent	10,7 percent		
	Italy 4,3 percent	Kazakhstan	Italy 4,9 percent	USA 7,8 percent	Ukraine 8 percent	Germany 6,4 percent
	Iran 3,1 percent	2,9 percent				
		Romania	Kazakhstan	Ukraine	Germany 6,6 percent	Ukraine 5,6 percent
		2,1 percent	1,8 percent	5,9 percent		

SOURCE: THE OBSERVATORY OF ECONOMIC COMPLEXITY, <http://atlas.media.mit.edu>

TABLE 11.23 *Total Outward FDI from Chinese Companies in Kazakhstan, Iran, Russia, Turkmenistan, Iraq, Saudi Arabia, and Qatar (billions of USD\$)*

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total Investment at end of 2014
Iran	1.74	2.8	2.33	—	5.11	1.79	0.93	1.25	0.71	0.51	17.17
Kazakhstan	4.5	1.91	1.54	—	3.79	2.55	0.95	1.26	5.3	1.69	23.49
Russia	—	5.41	—	0.3	0.78	3.58	0.65	1.62	5.17	3.37	20.88
Turkmenistan	—	—	—	—	3.13	—	—	—	—	0.6	3.73
Iraq	—	—	0.92	3.02	5.83	0.11	2.46	0.13	2.37	—	14.84
Saudi-Arabia	1.1	—	5.77	0.6	2.97	1.86	3.3	1.73	0.89	1.26	19.49
Qatar	0.1	0.54	—	—	0.24	—	1.85	—	0.6	0.17	3.5
Yearly Total	7.44	10.66	10.56	3.93	21.85	9.89	10.14	5.99	15.04	7.60	103.1

SOURCES: DATA ARE BASED ON HERITAGE FOUNDATION'S CHINA GLOBAL INVESTMENT TRACKER DATABASE 2015 AND CHINA NATIONAL BUREAU OF STATISTICS 2015

FIGURE 11.27 *Total Outward FDI from Chinese Companies in Kazakhstan, Iran, Russia, Turkmenistan, Iraq, Saudi Arabia, and Qatar (billions of \$USD)*
SOURCE: DATA ARE BASED ON THE HERITAGE FOUNDATION'S CHINA GLOBAL INVESTMENT TRACKER DATABASE 2015 AND THE CHINA NATIONAL BUREAU OF STATISTICS 2015

FIGURE 11.28 *Total Outward FDI from Chinese Companies in Kazakhstan, Iran, Russia, Turkmenistan, Iraq, Saudi Arabia and Qatar (billions of \$USD)*
SOURCE: DATA ARE BASED ON THE HERITAGE FOUNDATION'S CHINA GLOBAL INVESTMENT TRACKER DATABASE 2015 AND THE CHINA NATIONAL BUREAU OF STATISTICS 2015

production and refineries. Chinese investments in the hydroelectric sectors of Iran, Kazakhstan, Russia, and Saudi Arabia, have mostly been assigned to the construction of dams and the upgrading of electric grids. Other investments in the energy sectors of Iraq and Kazakhstan include the construction of power plants and nuclear energy projects.

In contrast, the upstream activities of the CNPC and its domestic peers in Iran have decreased in recent years. The Iranians suspended the contract of the CNOOC for the development of the North Pars Natural Gasfield in 2011 because of lack of progress, and the CNPC withdrew from developing Phase 11 of South Pars, the world's largest natural gasfield in 2012 (after the Iranians had threatened to void the CNPC's contract because of lack of progress). The CNPC is behind schedule in developing the Azadegan Oilfield, and Sinopec's work on the Yadavaran Oilfield has reportedly suffered delays (see Downs 2013; *International Oil Daily*, 1 April 2013; *International Oil Daily* 24 June 2012; *Platts Oilgram News*, 2 May 2012).

One benefit China has in dealing with Iran is its favorable geographical location. Bordering the Caspian Sea and the Persian Gulf, Iran can serve as a geographical bridge for China's efforts to secure energy resources in Central Asia and the Middle East; a situation that Kaplan (2012) calls 'the Iranian pivot'. At the moment, China imports a large amount of its energy, both oil and gas, from the Caspian Sea region in order to reduce its dependence on oil from the Persian Gulf nations. As an active participant in the Caspian Sea oil and gas projects, China has brought and channeled energy through the long pipelines that fan out east from the Caspian Sea and snake through Turkmenistan, Uzbekistan, and Kazakhstan into Xinjiang and the rest of China (Fazilov & Chen 2013). China's ambition to secure more Central Asian oil has been facilitated by the Neka Pipeline in northern Iran, constructed by a consortium of Chinese oil companies, including both the CNPC and SINOPEC, in 2003. The reasons for the shrinking presence of China's oil companies in Iran include sanctions that have made it difficult for China's oil companies to secure the equipment and technologies needed to operate in Iran, unhappiness with contract terms, (pre-nuclear deal), uncertainty about whether Iran's nuclear program will spark a military conflict, and reported instructions from China's leadership to move slowly in Iran. It seems as though the China-Iran energy cooperation will improve as a result of the nuclear deal with the US and/or the 5+1 countries nuclear deal with Iran. In the 2000s, China's NOCs were happy to negotiate contracts for projects that would almost certainly have been awarded to major international oil companies in the absence of sanctions. It goes without saying that the IOCs have not been in any rush to invest large sums of money into Iran. However, as China is looking to raise crude oil imports from

Iran, this could still cause tensions with the United States that is still feeling its way in its relations with Iran. China-Iran energy relations have continued to improve, for instance, in 2012 when the Zhuhai Zhenrong Corp (a state-led Chinese corporation)—that was sanctioned by Washington in early 2012 to supply gasoline to Iran—established a supply contract with the National Iranian Oil Company (NIOC). Since the nuclear deal, Iran has introduced a new type of energy-sector contract, the Iran Petroleum Contract (IPC).¹⁴ According to the NIOC, the IPC is a way to combine the Iranian desire for foreign investments with the reality of clerical opposition to [western-] involvement. The IPC is comparable to a service contract, but for a longer period of time. Although the details of the deal remain unclear, it therefore remains to be seen if it will fall under the IPC. In November 2016, the CNPC, in conjunction with Total, announced a USD\$6 billion gas deal with state-owned Petropars to help develop an offshore gasfield, known as South Pars.

The energy supply security of the European Union, (mainly) from the Middle East faces a number of challenges:

1. The persistence of Arab, patrimonial rentier-states and societies, that are a domestic and geopolitical source of permanent political instability, conflict, and tension. So far the SWFs managed by these patrimonial rentier-state systems have only been used by ruling elites to divert assets away from long-term socioeconomic development, aiming instead at individual profit. This practice is facilitated by a lack of transparency and the persistence of corruption and clientalism.
2. Secondly, the ME, and to some extent the CEA, is having to deal with the existence of politicized religion and its concomitant social forces and movements. These are the outcomes of failed development (of state and society) and unsuccessful moves toward democratization.
3. Thirdly, the ME and the CEA regions are dealing with geopolitical crises, or the geopolitics of war and conflict
4. Importantly, the region has been subjected to external intervention.
5. The emerging economies of Asia, especially China, are beginning to involve themselves in, and are exert an impact on the post-Cold War geopolitics of the ME and the CEA, inducing the commencement of a geopolitical shift. The power structure of the patrimonial rentier-states and societies has inarguably created a condition for permanent tension, conflict, and instability at the domestic and regional levels. The course

14 Official website: <http://www.nioc.ir/portal/home/?generaltext/165305/165357/165361/New-contracts-models> Last visited on 10-11-16 at 15:04.

the ruling elites of these states have so far taken, allied with the lack of sustainable development and political democratization, has created a chronic developmental crisis in these regions and countries. This can be defined as “a mutually reinforcing combination of a deep economic crises and cultural frictions, which become entrenched in the public domain, leading to militant confrontations between cultural groups within the [state and] society [as well as between states and societies].” This state of crisis is the consequence of failed attempts at nation-state-building, sustainable development, and democratization (see Amineh 2007, Ch 1; 2010; see also Berger 2011).

The threats to the EU supply-security are only compounded when the geopolitical shift underway in the region is added. It is impossible to predict what will happen in the upcoming decades. However, it is certain that the emerging Asian economies involved in the ME and the CEA, especially China, will influence the future geopolitical and geo-economic reality in these regions. China relies on resources to encourage domestic development. The resource-rich countries in the Middle East have long been a destination from which to acquire these resources.

10 Conclusions

As one of the world's largest importers of oil, gas, and coal, the EU is a major player in the international energy market. However, as member states keep the upper hand on foreign policy, it remains a dwarf on the political stage. It has been argued that the energy challenges facing Europe need a coherent external policy to enable Europe to play a more effective international role in tackling common problems with energy partners worldwide. It would certainly allow the EU to speak with one voice in their external [energy] relations.

Currently, the EU is still wrestling with the establishment of a common energy policy. Although the European Commission has laid down clear priorities, overlapping competences of policy-making institutions within the EU and its member states, complex government-business ties, and competing energy priorities all conspire to hamper the effective establishment and execution of a common energy policy. Finally, distrust among member states about which interests will prevail has led to caution, hindering the formulation and implementation of coherent strategies on which the common external energy policy should focus in pursuit of the Commission's goals.

The last two decades have been marked by decreasing fossil fuel production in the EU (from 28 EJ in 1990 to 16 EJ in 2012) and increasing import dependence (from 43 percent of energy use in 1990 to 53 percent in 2012). Countries from which its main energy sources are obtained are Russia, Norway, Algeria (natural gas), Saudi Arabia (oil), and Columbia (coal). The share of the Middle East and North Africa (MENA) and the Caspian Sea Region in total imports totaled 62 percent in 2012. The import dependence of the EU is expected to increase in the upcoming two decades, to 57 percent by 2030. Proven oil and gas reserves in the EU are very limited. Shale-gas reserves, at least those estimated, could cover nearly 30 times the natural gas consumption in 2012, and might offer a temporary solution to security of natural gas supply. However, it is apparent that in the case of oil the outlook of both global reserves and own EU reserves looks bleak.

At the same time, global trends show an increasing demand for energy in the coming two decades, concentrated mainly in developing countries, specifically in China, that is now the largest global energy consumer. Fossil fuel production is likely to become concentrated in fewer countries. The Persian Gulf area and the Caspian Sea region hold some of the world's largest oil and gas reserves, and these will make them increasingly significant in global markets. The combination of increasing oil and gas consumption, diminishing reserves, and geopolitical rivalry creates a setting in which the situation of the EU can be characterized as one of demand- and supply-induced scarcity and structural scarcity.

The global demand for oil and gas, rising political instability in many producer countries, and the approaching 'peak-oil' situation (2010–2020) are beginning to change the overall balance of power in the relationship between energy producer and consumer states in a way that gives the former a real advantage. The energy supply security of the European Union, mainly from the Middle East, faces a number of domestic and geopolitical challenges:

1. The persistence of the Arab patrimonial rentier-states and societies, that rely on personalist rule, patron-client relations, and personal (traditional) authority. These types of state and society rely on their surplus of natural resources. This results in poor and uneven economic development, a centralized power structure, corruption, and violent conflicts. The course the ruling elites of these states have so far chosen, compounded by the lack of sustainable development and political democratization, has created a chronic developmental crisis in these regions and countries. This has now become entrenched in the public domain, leading to militant confrontations between cultural groups within the states as well as between

states. These state-types are a domestic and geopolitical source of permanent political instability, conflict, and tension. So far, as they are underpinned by corruption, the SWFs they manage are diverting assets away from long-term socioeconomic development to benefit political elites. The populations in the patrimonial rentier-states of the Persian Gulf are supported by finances earned through resource exports in exchange for keeping quiet about state affairs. Weak civil society, the result of failed development, and the forces, institutions, and organizations associated with this, is contributing to the survival and dominance of patrimonial regimes in resource-rich countries of the Arab Middle East. Conversely, the Arab resource-rich countries' Sovereign Wealth Funds (SWFs) have contributed to the enduring persistence of the existing patrimonial-based rentier-state system. The SWFs are not acting as tools to restructure and diversify economic sectors, the pattern in some developing countries, but aggravate the problem of a detached state-society system in which the regimes continue to treat the economy as their personal cash machine.

2. Secondly, the ME, and to some extent CEA, has to contend with the existence of politicized religion and its concomitant social forces and organizations. The latter are mainly the outcome of failed development (of state and society) and unsuccessful moves toward democratization. Attempts to dissolve radical Islamic forces such as al-Qaida and ISIS militarily do not tackle these underlying, structural causes of radical politicized Islamic movements, meaning they will continue to spring up in these regions.
3. Thirdly, the ME and CEA regions are dealing with geopolitical crises, or the geopolitics of war and conflict, partly as the result of structural problems, but also because;
4. The region has been subjected to external intervention by major powers. In the post-Second World War era, the United States has been dominant in efforts to protect Arab patrimonial states and societies in the resource-rich countries of the Middle East in particular.
5. Lastly, the emerging newly industrializing Asian economies, especially China, are having an impact on the post-Cold War geopolitical shift underway in the Middle East and CEA. The threats to EU supply security increase when this geopolitical shift underway in the region is added. As the shale-oil revolution in the US will decrease US dependency on foreign reserves, at least until the shale-oil stock is expected to begin to decline in the second half of the next decade, the emerging Asian economies, especially China, will increasingly rely on foreign, including ME and CEA,

reserves. If the US military presence in the region is downgraded, Beijing (and perhaps India and Japan) could see their countries assuming larger roles in securing their own energy interests.

Rapid state-led industrial development in China created—as in other advanced and emerging economies—a dual result: it did generate wealth and power, but it also created domestic resource scarcity and the societal pressure of unfulfilled energy demands. These developments set the scene for China's cross-border economic activity, aimed at getting access to resources and markets beyond state borders. During the last 10 years, the Middle East has been the main supplier of oil and gas to China. China's diplomatic, political, and economic activities in the Middle East as well as in Central Eurasia have underscored China's increasing presence in the vast area stretching from Kazakhstan to the Persian Gulf. With China's stature in the region growing, some ME and CEA countries are responding by 'looking East' for alternative alliances. China's huge investments in the energy sectors of Iran, Iraq, Kazakhstan, Qatar, Saudi Arabia, and Turkmenistan—exceeding 100 billion US dollars between 2005 and 2014—, energy imports—exceeding those the US in all these countries except for Saudi Arabia—, and their increasing partnerships with the NOCs of these countries [mainly through their own NOCs], are creating interlinkages that could have a huge impact on the global energy market, on which the EU relies. This is especially true as China is increasing its cooperation with Russia and other resource-rich countries in the context of different multilateral organizations such as the Shanghai Cooperation Organization, the 'One Belt One Road' Project, and the Asian Infrastructure Investment Bank; projects that might be deemed *statist multilateralism*.

It is impossible to predict what will happen in the coming decades. Nevertheless it is certain that the emerging Asian economies, especially China, involved in the ME and CEA will influence future geopolitical and geo-economic directions.

To conclude, the increasing diplomatic, economic, and even security relations between ME and CEA resource-rich countries and the upcoming contender states of China, Russia (and to some extent India), will influence EU energy supply security. With a patrimonial state-structure, volatility of resources, and emerging Asian economies to compete against, especially as these economies, specifically China, are increasingly integrating the CEA and ME countries into a newly created system of multilateral frameworks, all mean that the region will not be a stable source of energy supplies without the EU's preparedness to responding to future threats.

FIGURE 11.29 *Chinese Outward FDI in Iran, Iraq, Kazakhstan, Russia, Saudi Arabia and Turkmenistan, by Sector in period 2005-2014 (\$USD billions)*
SOURCE: DATA ARE BASED ON HERITAGE FOUNDATION'S CHINA GLOBAL INVESTMENT TRACKER DATABASE 2015 AND CHINA NATIONAL BUREAU OF STATISTICS 2015