EUROPEAN
COMMISSION

Brussels, 22.1.2014
SWD(2014) 19 final

PART 2/2

COMMISSION STAFF WORKING DOCUMENT

Energy Economic Developments in Europe

Accompanying the document

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Energy prices and costs in Europe

{COM(2014) 21 final}
{SWD(2014) 20 final}

Part III

Renewables: Energy and Equipment Trade Developments in the EU

OVERVIEW

The Energy and Climate agenda provides a comprehensive regulatory and policy framework that favours the emergence of new green sectors. This means that energy markets in the context of well-designed policies, can offer many opportunities for growth and jobs. The report scrutinises the development of new technologies and energy sources - solar and wind - and their impact on trade flows as a way to assess one dimension of competitiveness.

Chapter 1 provides an overview of renewable developments in the EU and other parts of the world. In Europe, the support to renewable sectors stepped up from 2007 and has represented a strong opportunity to accelerate the expansion of less mature technologies such as wind and solar.

Chapter 2 gives a close look at trade developments in the EU and Member States in the wind and solar equipment sector. It also analyses the drivers of trade of wind and solar equipment, including the role of research and innovation.

Chapter 3 analyses the impact of renewable developments on the energy trade bill. More specifically, it provides some estimates on the avoided fuel costs.

1. RENEWABLES DEVELOPMENT IN THE EU AND THE WORLD

1.1. INTRODUCTION

The development of renewable energy in the EU has been promoted with a view to reaching a 20% share in gross final consumption of energy by 2020 as defined by the European Council in 2007 and Directive 2009/28/EC on renewable energy ([1]). Before these targets, an indicative target to have 21% of its electricity coming from renewable energy sources by 2010 has been formulated in Directive 2001/77/EC on the promotion of renewable electricity. Over the last decade, the EU-27 has increased the share of renewable sources in gross electricity generation by 50%, from 13.6% in 2000 to 20.4% in 2011. EU share in world's total renewable electricity generation went from 14.8% in 2000 to 16.5% in 2011. Only China generates more electricity through renewable sources than the EU.

Renewables expansion increases diversification and security of energy supply while contributing to the reduction of greenhouse gases emissions. Despite strong research and innovation efforts, some types of renewable energies were too costly to expand through market forces. Therefore, development of some renewable technologies has been accompanied by support through feed-in tariffs and feed-in premiums, green certificates, priority in the grid, tax incentives and other support measures. Annual subsidies to renewable energy in the EU amounted to EUR 36 billion in 2011, more than half of worldwide subsidies to renewables.

This chapter presents an overview of renewable development, especially of renewable electricity, in the EU and its main economic partners. It also looks at the development of support schemes in Member States as these are the main instruments used to promote renewables. Section 2 reviews the evolution of renewable electricity generation in the EU and other parts of the world Section 3 analyses whether this evolution was guided by the support schemes in place. Conclusions are presented in section 4.

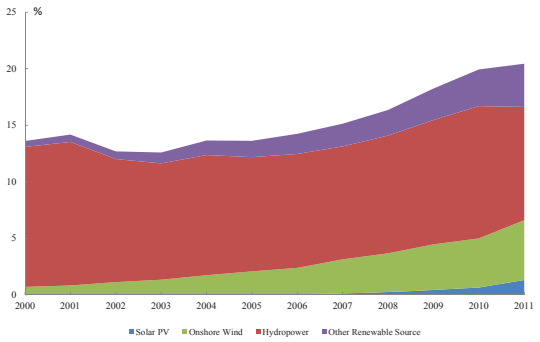
([1]) Before these targets, an indicative target to have 21% of its electricity coming from renewable energy sources by 2010 has been formulated in Directive 2001/77/EC on the promotion of renewable electricity

1.2. EVOLUTION OF RENEWABLE ELECTRICITY IN EU-27 AND ITS MAIN ECONOMIC PARTNERS

1.2.1. Evolution of renewable electricity in EU-27

The share of renewable sources in gross electricity generation grew by 50% over the decade, from 13.6% in 2000 to 20.5% in 2011. However, this evolution has not been monotonic over time (Graph III.1.1). After a slight decrease between 2001 and 2003, renewables share have increased at a high rate, in particular from 2007 onwards when the EU agreed to have a target for renewables, i.e. to reach a share of 20% of gross final consumption of energy by 2020.

Graph III.1.1: **Share of Solar PV, Wind, Hydropower and other renewable sources in EU-27 gross electricity generation**



Source: Commission Services based on Eurostat database.

The evolution of renewables has not been homogeneous across renewable sources (Graph III.1.1). The target agreed at EU level did not include any obligation on the renewable mix to be achieved.

Until 2007, hydropower was the most important renewable source and it remained the highest (renewable) contributor to gross electricity generation despite a slight decrease of its share over the last decade. This relative evolution could be explained by the efforts made to support the other renewable sources, but also by the implementation of the EU Water Framework Directive (WFD) initially established in 2000, and which limits the approval of new hydropower projects and allocation of concessions and

permissions ([2]). The share of hydropower in electricity generation showed substantial variability from one year to another, depending on annual rainfalls and water levels.

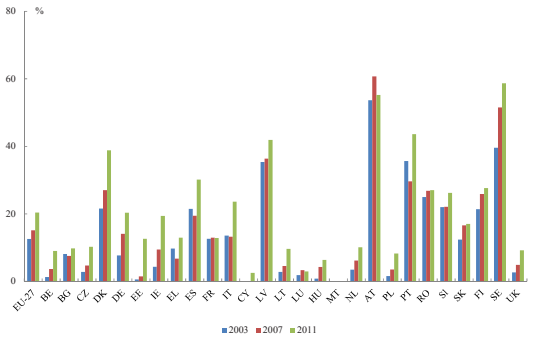
By contrast, solar photovoltaic (PV) displayed the largest expansion during the same period, from 2007 onwards. Solar PV grew on average 87 % per year between 2007 and 2011, starting from a 0.11 % share in 2007 to 1.37 % in 2011. The combination of initial high level of support and a learning curve effect leading to a fall of solar modules prices contributed to making this technology more and more attractive.

The share of wind increased during the same period. In 2011, it contributed to 5.46% of EU-27 gross electricity generation comparing to a 0.74 % share in 2000. This expansion has been monotonic over time, with a higher growth rate in the last years.

Finally, the share of other renewable sources has increased from 0.5% in 2000 to reach 4.3% of gross electricity generation in 2011. A vast majority of electricity under this category is produced from solid biomass, biogas and waste, with minor contribution of geothermal, offshore wind and thermal solar power.

The same evolution is observed across Member States. Overall, the share of renewables in gross electricity production has increased in all Member States between 2003 and 2011 (except Latvia) but at a different pace (Graph III.1.2). The highest increases are observed in Estonia, Denmark, Lithuania and Ireland. While renewables account for more than 40% of gross electricity generation in Latvia, Portugal, Sweden, Austria and Denmark, their share is rather low in small countries such as Malta and Cyprus. Arguably, the size of these countries does not allow them to fully exploit the economies of scale associated with renewables. However, larger countries such as the United Kingdom, France, Netherlands, Belgium, Poland, Czech Republic and Bulgaria still do not use renewables as extensively as the relatively good natural conditions for wind energy ([3]) would predict.

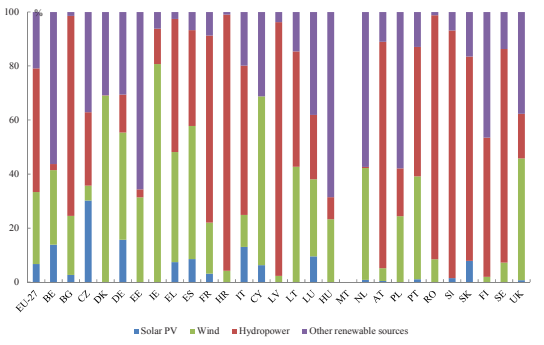
Graph III.1.2: **Share of renewable sources in gross electricity generation by Member State in 2003, 2007 and 2011**



Source: Eurostat

The renewable mix differs across Member States. Denmark and Ireland mostly use wind onshore to produce renewable electricity (above 70% in 2011). By contrast, a large number of Member States obtain most of their renewable electricity from hydropower. As regards solar PV, it is still marginal in most Member States except in Czech Republic, Germany, Belgium and Italy where it already accounts for one sixth to one quarter of their renewable electricity.

Graph III.1.3: **Share of solar PV, wind, hydropower and other renewable sources in gross renewable electricity generation in 2011**



Source: Commission Services based on Eurostat database.

([2]) Strategic Energy Technologies Information System (SETIS), European Commission. http://setis.ec.europa.eu/technologies/Hydropower/info. Ecologic Institute (2011) presents a discussion on the Water Framework Directive and hydropower.

([3]) European Environment Agency (2009).

Box III.1.1: Renewable Energy Policies in the main EU economic partners

In 2012 the US senate approved the Clean Energy Standard Act. This legislation introduced in the US the first nation-wide targets to clean energy. This adds to previous federal and state-level policies that provided tax incentives, grants and loans to support the growth of renewables (Energy Independence and Security Act 2007, Energy Improvement and extension Act 2008 – Tax incentives and American Recovery and Reinvestment Act 2009: Appropriations for Clean energy).

China's renewable policy started in 2005 with the introduction of the Renewable Energy Law (subsequently amended in 2009) that introduced feed-in-tariffs, tax incentives and mandatory connection and purchase policy to renewable sources. In 2009, at the UN Climate Change conference held in Copenhagen, China committed to reduce its carbon intensity emitted by unit of GDP (by 40-45% by 2020 based on 2005 levels) and to raise its share of renewable energy sources in terms of primary energy consumption to 15% by 2020.

Japan's renewable policy was reviewed and extended in 2009 and 2010. However the main changes occurred in 2011 and 2012, following Fukushima nuclear power plant disaster. Japan committed to triple its power generation from renewables by 2030 comparing with 2010 values. In 2012, Japan launched a new feed-in-tariff system for solar, wind and other renewables that is among the most generous worldwide ([1]).

Australia and Brazil also committed to targets on renewable energy generation by 2020. The Australian Government comprise to add 45 TWh of electricity and heat generated through renewable sources (comparing with 2010 values). Brazil aims to generate 80% of its electricity in 2020 through renewables (based on the expansion of large hydropower projects and mandatory minimum blending levels for ethanol). India set in 2010 an ambitious target on solar energy (20 GW by 2022).

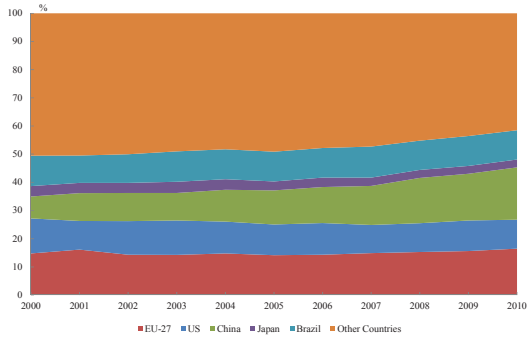
([1]) International Energy Agency (2012a)

1.2.2. Evolution of RES-E in EU-27 and main economic partners

Over the past years, the expansion of renewable electricity has been observed in the rest of the world. Similarly to the EU, other major countries have adopted policies promoting the use of renewable energy (Box III.1.1). World renewables electricity net generation has increased by 45% between 2000 and 2010 ([4]) with the highest growth for China (+245%), the EU27 (+62 %) followed by the US, Brazil and Japan.

China more than doubled the electricity generated through renewables sources during this period. The growth of renewables has been particularly significant since 2007, when the government launched the national plan for renewable energy development setting medium (Box III.1.1). Over the past decade, China has been catching up on renewable and has become the largest renewable producer with around 18.6% of the world electricity net generation through renewable sources in 2010 followed by EU27 (Graph III.1.4).

Graph III.1.4: **Share of EU-27, US, China, Japan and Brazil in world net renewable electricity generation**



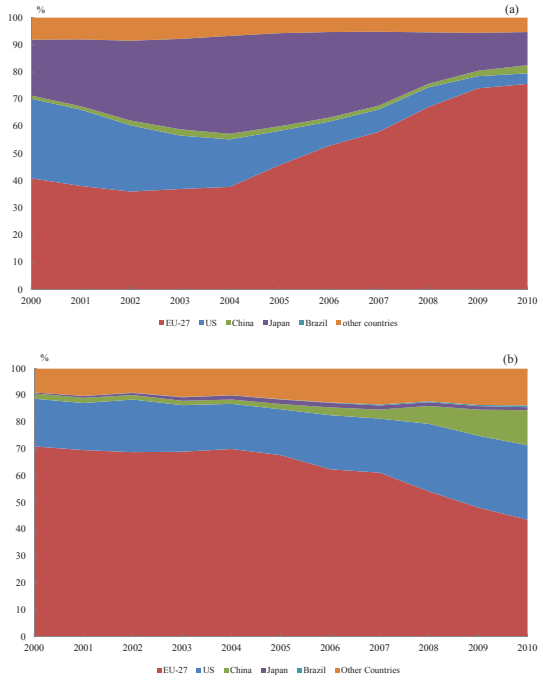
Note: Data correspond to the net electricity generation. Net electricity is the gross electricity minus electricity consumed within the plant for auxiliary services.
Source: United States Energy Information Administration.

Compared to the rest of the world, EU-27 has strong positions in solar PV and wind (Graph III.1.5). It produced around 70% of world's electricity net generation from solar PV sources.

([4]) US Energy Information Administration.

This share has been increasing considerably over time, which suggests that EU-27 has been investing much more in this source than its main economic partners. Almost 44% of world's electricity net generation through wind in 2010 was produced in EU-27, which makes it the world leader also in this source. However, the EU-27 share has been decreasing over time, due to a quick expansion of wind sources in the US and China.

Graph III.1.5: **Share of Eu-27, US, China, Japan and Brazil in world net electricity generation - solar PV (a) - Wind (b)**



Source: United States Energy Information Administration

1.3. SUPPORT SCHEMES AND RENEWABLES DEVELOPMENT

The generation cost of renewable electricity remains generally higher than that of conventional technologies, with some exceptions. Solar power plants traditionally had very high generation costs, but these costs have fallen substantially over the last years. On-shore wind power and small hydro costs are also more expensive than those of coal-fired plants, although they have the potential to compete with them if local conditions are in their favour.

1.3.1. Support instruments

Due to higher costs of renewable energy, Member States provide various forms of support in order to increase their share in energy production and consumption to the levels required by the Renewable Directive ([5]). The objective is to compensate for the relative higher costs of this energy source compared to other fossil fuels. There are also huge fixed costs that create economies of scale as the average cost per unit produced decreases as the quantity increases. With subsidies, private firms can invest in renewables and have similar rate of returns as conventional energy sources. Finally, as renewables develop, one could expect that there will be further technology development, which will reduce the costs of these technologies over time and render them competitive in the longer run ([6]).

The most common renewable electricity support schemes include feed-in tariffs, feed-in premiums and green certificates (Table III.1.1). Feed-in tariffs provide the eligible renewable power producer with a guaranteed price for the power they feed into the grid. Feed-in premiums provide the producers with a guaranteed premium in addition to the electricity market price. Both of them may be capped with a ceiling related to electricity wholesale prices. Green certificates are normally based on a quota obligation to have a certain percentage of the electricity sourced from renewable sources. The authorities issue these certificates to producers of renewable energy, who sell them separately from the electricity.

([5]) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources
([6]) Canton and Johannesson Lindén (2010)

1.3.2. Development of support schemes

Table III.1.1: **Renewable electricity support instruments in member States**

		AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	EL	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
Electricity	FIT	x	x	x	x	x	x		x	x		x	x	x	x	x	x	x	x	x			x			x	x	x
	Premium					x	x	x	x	x						x					x					x		x
	Quota obligation		x													x	x		x			x		x	x			x
	Investment grants		x		x	x					x		x	x			x	x	x	x								
	Tax reductions/ exemptions		x							x	x		x						x		x	x			x		x	x
	Financial incentives			x			x		x											x	x	x				x		
Heating	Investment grants	x	x	x	x	x	x		x		x		x	x	x		x	x	x	x	x	x	x		x	x	x	x
	Tax reductions/ exemptions	x	x					x				x	x			x	x				x				x			x
	Financial incentives			x			x		x			x											x					
	Premiums											x																
Transport	Quota obligation	x		x	x	x	x	x		x	x	x			x		x	x	x		x	x	x	x		x	x	x
	Tax reductions/ exemptions	x	x		x	x	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x

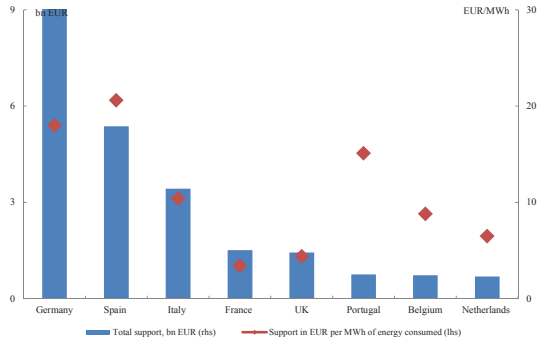
Source: SWD(2012) 164

Total amount of subsidy to electricity generation from RES amounted in 17 Member States ([7]) to EUR 25.2 billion in 2010 ([8]). These 17 Member States accounted for 92% of RES electricity generation in the EU; assuming similar level of support in the other Member States, the level of subsidy in the EU-27 would have amounted to some EUR 27 billion ([9]). Three countries accounted jointly for 70% of the support to renewables: Germany, Spain and Italy followed by France and UK. However, according to more recent data, the costs of support to renewables have substantially risen in 2011 and 2012. For instance, in Germany, they increased from EUR 9.5 billion in 2010 to EUR 12.7 billion in 2012, and in Spain from EUR 5.4 billion to EUR 8.4 billion in 2012.

According to International Energy Agency (2013), subsidies to renewable energy in the EU-27 (including not only subsidies to electricity but also to transport and heating) amounted to EUR 27 billion in 2010 and to EUR 46 billion in 2012. IEA applied a different methodology than CEER.

In order to compare the burden of RES incentives on electricity consumers, one can divide the overall support level by final electricity consumption. The average weighted support level was 9.3 EUR/MWh in 2010, compared to average end-user electricity price in EU in 2010 of 128 EUR/MWh for industrial consumers and 173 EUR/MWh for households. The average level of support per unit of electricity produced was the highest in Spain (18 EUR/MWh), followed by Germany, Portugal and Italy (Graph III.1.6).

Graph III.1.6: **EU Member States with the highest support to renewable energy sources, 2010**



Source: CEER (2012)

([7]) Data based on replies to CEER questionnaire, to which 17 Member States replied. 10 Member States have not replied to the questionnaire: Bulgaria, Cyprus, Denmark, Greece, Ireland, Lithuania, Latvia, Malta, Poland, Slovakia.
([8]) CEER (2013).
([9]) If the other countries had the same average support as the 17 Member States accounting for 92% of renewable electricity generation, EU-27 would receive 27.3 bn. Assuming a lower support than average of the remaining countries would lead to a total around 27 bn.

Box III.1.2: **Electricity tariff deficit in some Member States**

Some Member States have over the last years accumulated so-called electricity tariff deficits. These deficits emerge because the regulated electricity prices do not cover the corresponding costs borne by electricity utilities. In some countries like Spain, Portugal and Greece, the authorities and regulatory bodies explicitly use the term "electricity tariff deficit" and monitor its size. However, the problem is broader and concerns also the other Member States where electricity costs are higher than the relevant regulated tariffs[1]. For instance in France, the regulated electricity tariffs do not cover the actual costs of the incumbent electricity company, state-controlled EDF, which has by far the largest share in French electricity market. In Bulgaria, the regulated energy prices are also too low to match the corresponding costs. In Malta, the rigidity in price regulation measures has led to an accumulation of debts in the electricity company.

The scope of the tariff deficit differs from one country to another. The deficit can be caused by a mismatch between the total end-user electricity price and the corresponding costs (this is the case in Portugal or France), between the access costs - including transmission, distribution and support to renewables - and the corresponding tariff (in Spain), or between the costs and revenues of the special account to support renewables (in Greece). It is important to distinguish between long-term significant tariff deficits, which are difficult to eliminate, and short-term mismatches between end-user prices and costs caused by incidental factors, which can be easily adjusted in the following year.

The main factor which triggered the emergence of tariff deficits in the recent years was a substantial increase in electricity prices (see Part II, chapter 1). Several factors contributed to this price increase, in particular rising costs of fossil fuels worldwide and the deployment of renewable technologies. In some countries, generous subsidies granted to solar and wind power producers triggered massive investment in these sectors, which in turn inflated the amount of subsidies needed to remunerate the investors. This support is mainly financed as a surcharge on electricity price. The other factors contributing to rising electricity prices include limited competition and transparency in the energy sector in some Member States, subsidies to the conventional energy producers, as well as the remaining long term purchase power agreements.

In the majority of Member States, rising electricity costs were fully reflected in end-user prices, sometimes unevenly across consumers' segments, i.e. industries and households (see Part II, chapter 1). However, in some countries, the authorities considered that increasing the regulated tariffs to the level fully corresponding with so quickly rising electricity costs was not possible. This has led to the emergence of tariff deficits. These deficits may be exacerbated in some countries by a high number of unpaid electricity bills, in relation to difficult financial situation of many households and firms.

The financial burden resulting from the tariff deficit is initially borne by the electricity suppliers or distributors. However, following the court decisions, the electricity companies that bear the tariff deficit burden are usually entitled as creditors to recover the corresponding amounts, with interests. In Spain and Portugal, the rights of the utilities to recover the accrued tariff deficit were turned into fixed-income securities; in Spain these securities are explicitly guaranteed by the government. The accumulated tariff debt – including the securitized part – amounts to 2-3% of GDP in both Spain and Portugal.

In spite of the securitisation of the "old" tariff deficit, new tariff deficit continues to emerge as the regulated tariffs are still too low to match the corresponding costs. The expected deficits in 2013 range from 0.3% of GDP in Greece and Spain and 0.6% of GDP in Portugal to up to 1% of GDP in Bulgaria.

In order to reduce these deficits, the easiest solution, in theory, would be to increase tariffs to the cost recovery level. However, this is not always possible. If the deficits are high, their elimination would require

[1] Regulated electricity end-user prices for households existed in 17 Member States in 2011 and in 12 Member States for non-household consumers. However, the existing price regulations can take different forms: they can be integral (i.e. cover the whole electricity price) or cover a part of electricity price, corresponding to some cost elements. Moreover, all Member States apply regulations of electricity transport and distribution costs, charged by transmission and distribution system operators which are natural monopolies.

(Continued on the next page)

Box (continued)

substantial electricity prices hikes. They could adversely affect industrial competitiveness and households' purchasing power, and would not be acceptable for energy consumers.

Therefore Member States with tariff deficits usually combine limited tariff increases with other measures splitting the burden of the corrective action between the energy consumers, the energy sector and sometimes public finance. These measures include, first of all, reductions in the support to renewable producers (including co-generation), to the other energy generators (such as capacity payments or coal subsidies) and reduced remuneration of energy transport and distribution. For instance, Spain recently replaced its feed-in tariff for renewable energy by a compensation mechanism guaranteeing RES generators a certain yearly rate of return on investment, introduced similar rules for energy transport and distribution and reduced substantially capacity payments for gas plants ([2]). In Bulgaria, the government introduced grid access tariffs for renewable energy producers and prohibited access to the energy system of a part of the grid-connected renewable capacity. While such changes may be indispensable to reduce the tariff deficit, they may be legally challenged by the electricity companies, and may also negatively affect overall investment in green energy.

Other measures to phase out tariff deficits include new taxes with revenues earmarked to reduce the tariff deficit. Depending on the country, they may include taxes on electricity production and on specific technologies (hydro generation, nuclear, lignite). Other sources of revenues, earmarked to reduce the tariff deficit, include the revenues from the sale of CO2 allowances (in Spain and Greece) and even a part of the revenues from the TV license fee (in Greece). Moreover, Greece, Portugal and Spain have decided to eliminate regulated end-user tariffs for households and SMEs, with an exception of vulnerable consumers.

In spite of these measures, electricity tariff deficits persist in many countries. They distort electricity prices, deteriorate the financial situation of energy utilities and increase uncertainty for investors in this sector and for all electricity consumers. They also involve a contingent liability for public finance. For these reasons, several Member States have committed to the elimination of tariff deficits. In Greece, Portugal and Spain, phasing out of electricity tariff deficits has been included in the memoranda of understanding describing the conditionality of their financial assistance programmes.

([2]) These measures are part of the 2013 electricity sector reform package in Spain, aimed at a complete elimination of the annual deficit of the electricity system from 2014 on.

The costs of support are usually borne by electricity consumers as a surcharge on retail electricity price. Usually the amount of this surcharge is set by the energy regulator, on the basis of actual costs, but in some countries the government approves the tariffs. In some countries, like Spain and Portugal, setting electricity tariffs at a too low level, not sufficient to cover the costs, led to a deficit of electricity system (electricity tariff deficit – Box III.1.2), which may be a contingent liability of the state budget and therefore a burden on public finance.

Box III.1.3: **Renewable and Employment**

In addition to energy and environmental benefits, the development of renewable is expected to bring benefits in terms of growth and jobs. Current gross employment in the renewable sector amounts to some 1.2 million jobs, and is forecast to rise to 3 million by 2020. However, the net employment effect of renewable policy (taking into account job losses in the other sector) is much lower, in the range of 300-400,000 jobs.

When discussing the impact of renewable energy on employment, one should distinguish "gross" from "net" employment impact. "Gross" means the total number of jobs created in the renewables sector, including manufacturing and instalment of investment installations, operation and maintenance activities, as well as production of fuels (mainly biofuels and other biomass). "Net" means taking into jobs losses in conventional energy, indirect jobs losses due to reduced incomes if renewables lead to increased energy prices, and other indirect effects.

A recent comprehensive report on the state of renewable energies in Europe ([1]) estimated current "gross" employment in RES at 1.19 million in 2011. This included 312,000 jobs in photo-voltaic solar sector, 274,000 jobs in solid biomass, 270,000 jobs in wind energy, 109,000 jobs in biofuels and the rest in the other branches. Germany accounted for almost one third of RES jobs (379,000), followed by France (178,000), Italy, Spain and Sweden.

The number of jobs in renewables has been successively growing over the last year, and is expected to grow further. A major EU-funded EmployRES project ([2]) estimated gross employment in RES at 2.8 million jobs in 2020, of which some 1.2 million in RES installation and manufacturing, 0.4 million in operation & maintenance and 1.2 million in fuel production (biomass, biofuels). Last year, Commission services ([3]) estimated gross job potential in renewable energy sector at 3 million jobs by 2020, or some 1.2% of total EU employment.

The EmployRES study and some other studies also look at net employment effect. They deduct from the gross job numbers the employment losses in conventional energy sector, take into account the secondary employment effects of changes in incomes (higher incomes in RES, lower in conventional energy), as well as secondary employment losses due to reduced consumption because of increase in end-user energy prices resulting from RES deployment. This study estimated net employment effect of RES deployment in the EU (in comparison to the scenario without any support to RES) at some 310,000 – 370,000 additional jobs in 2010 and 390,000 – 420,000 jobs in 2020. These employment gains are rather modest as they represent less than 0.2% of EU labour force.

One of the reasons of positive net employment effect of renewables is higher labour intensity of the renewable energy in comparison to conventional technologies. The renewable energy sector generates more jobs per megawatt of power installed, per unit of energy produced, and per EUR of investment, than the fossil fuel-based energy sector. According to Wei et al (2009) ([4]) this job generation effect of RES is particularly high for PV solar (0.87 job-years/GWh), but for biofuels (0.21) and wind (0.17) it was also much higher than for coal and gas (0.11). It was also high for energy efficiency (0.38). For solar power, high job generation effect is caused by employment in construction, installation and manufacturing (CIM) being much higher per MW than for the other technologies, while labour use for maintenance is similar to the other energy sources. On the other hand, higher labour intensity means lower labour productivity. This adverse impact of renewables development and green growth policies on labour productivity certainly should not be overlooked.

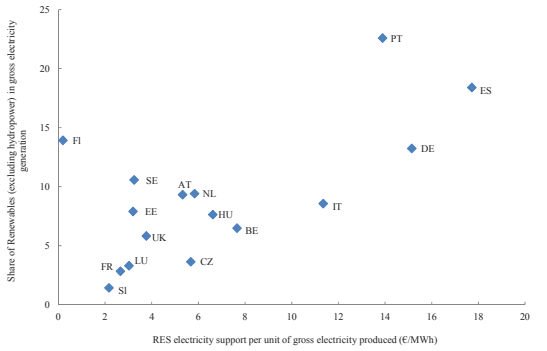
([1]) Observ'ER report, (2012)
([2]) Ragwitz, M. et al (2009)
([3]) SWD(2012)92
([4]) Wei, M., S. Patadia, M.Kammen (2009)

The Graph below shows that **Spain, Germany and Portugal, which have the highest average level of support per unit of electricity produced, have also the highest combined share of wind**

and solar power in electricity generation ([10]). This would suggest that providing high level of support per kWh was effective in these countries to stimulate the development of renewable electricity in these countries ([11]). In the other Member States, the correlation between the support level and share of wind and solar power is however weaker. For instance, Italy and Austria have a similar level of wind and solar energy in the electricity mix, but the support level per unit of electricity produced is more than twice higher in Italy. This weaker relationship could be largely explained by the fact that the level of support guaranteed to the investors in each renewable technology varied from one country to another, and changed in time. Other factors, such as differences in renewable energy potential of each country, state policies concerning award of licenses etc. should be also taken into account.

Some countries agreed in the past to provide overgenerous long-term support to renewables, especially to the solar power. More specifically, when comparing the remuneration to renewable generators with electricity (and heat) generation costs, substantial differences in remuneration and profitability between Member States are observed ([12]). For instance, as regards onshore wind, in 2011 support levels were too high in comparison to generation costs in Italy, Romania, Slovakia, the United Kingdom and some other countries. Support to solar power was in this year overly generous in Greece, Italy, Spain and Cyprus ([13]).

Graph III.1.7: **Share of rewewable sources (excluding hydropower) in gross electricity generation and RES electricity support in EU Member States -2010**



Source: Eurostat and CEER (2012)

1.4. CONCLUSIONS

Renewable energy production expanded substantially in the EU over the last decade. The share of renewable electricity in the EU electricity production increased from 13.6% to 20.4% between 2000 and 2011. Most of this growth can be attributed to wind, solar power, which increased its share in electricity production from almost zero a decade ago to 5.4% for wind and 1.4% for solar in 2011. Some Member States, like Denmark, Spain and Portugal, produce 15-20% of their electricity from wind and solar. Electricity produced from biomass also increased substantially over the last decade.

As the generation cost of these renewable sources remain generally higher than that of conventional technologies, their increased deployment required generous subsidies to renewable energy investors. These subsidies were necessary to respond to some market failures: positive externalities of renewables such as avoided greenhouse gas emissions and pollution, huge fixed investment costs, contribution to technological progress and decreased generation costs in the longer run.

The development of renewables should be seen in the global context. World renewables electricity

([10]) Denmark and Ireland, which also have very high shares of wind energy in electricity mix, are not mentioned here as they have not provided data to the CEER Status Review, on which this section is based.

([11]) This is an indicative comparison. A more detailed analysis is included, for instance, in the RE-SHAPING project reports (see footnote below). A new study on cost-efficiency of subsidies to electricity generation has been launched by the European Commission services.

([12]) http://www.reshaping-res-policy.eu . EU-funded RE-SHAPING project, implemented by a consortium led by Fraunhofer Institute. The remuneration level was calculated as a sum of the net present value of the expected support payments (plus energy price, in case of feed in premiums and green certificates, or if support lasts less than 20 years). The remuneration level was normalised to a common payback period of 20 years and is based on an assumption of the same discount rate. The comparison was carried out per technology category, while the tariffs within one category might differ significantly. The remuneration level was compared to electricity and heat generation costs, distributed over the whole lifetime of the renewable power plant.

([13]) Re-Shaping project (2011)

net generation has increased by 45% between 2000 and 2010, with the highest growth in China, followed by the EU, US, Brazil and Japan. The EU has strong position in solar PV and wind, as it produced in 2010 around 70% of world's electricity generated from solar PV and 44% of global wind production. These developments provide opportunities and risks for the EU renewable sector and the whole economy. They are related to trade flows in renewable energy equipment, maintaining the leading position in green technologies and possible expansion to non-EU markets, as well as possibilities to avoid some imported fuel cost.

2. RENEWABLES COMPETITIVENESS DEVELOPMENT: THE CASE OF WIND AND SOLAR EQUIPMENTS

2.1. INTRODUCTION

The development of renewable energy fulfils several objectives, including the reduction of greenhouse gas emissions, security of supply, job creation and strengthening industrial competitiveness ([14]). This chapter analyses how the recent expansion of renewables, most notably solar PV and wind sources, has contributed to EU-27 trade performance and competitiveness in this sector.

The competitiveness of the EU-27 renewable industry is looked at in two ways. Firstly, trade performance in renewables equipment and components is analysed, as trade developments have followed the renewables expansion and the EU has been able to build competitive strength in some components (wind). Second the drivers to trade, including the role of innovation, are assessed. The EU-27's share in the world's clean energy patents was around 40% in 2011.

This chapter is organized as follows. Section 2 presents an overall picture of EU27 trade in solar and wind components and equipment and discusses innovation in solar and wind in the EU27 and its Member States. Section 3 describes the international competitiveness of EU27 in these sectors. Conclusions are presented in section 4.

2.2. RENEWABLE COMPONENTS AND EQUIPMENT TRADE FLOWS ([15])

The expansion of renewable energy sources has contributed to increasing trade flows in renewable components and equipment (see Box 1 for a brief description of the industry). More specifically, intra and extra EU27 trade in wind and solar components have increased considerably between 2000 and 2012 ([16]).

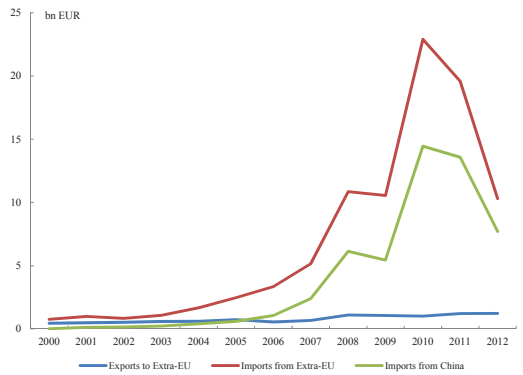
2.2.1. EU27 renewable component and equipment trade flows

2.2.1.1. EU-27 components and equipment trade with Extra-EU

The EU-27 has a considerable trade deficit with the rest of the world in solar components and equipment. This trade deficit became more pronounced from 2006 onwards when Chinese exports to the EU started to increase (Graph III.2.1). The worsening of the EU's trade position has been driven by the evolution of imports.

EU imports of solar components are very concentrated. In 2012, 75% of EU-27 imports of solar components came from China (31% in 2006). Despite the decrease in EU imports over the two last years, China has managed to remain the first exporter of solar components to the EU. By contrast, extra-EU-27 exports of solar components are more diversified. In 2012, 60% of extra-EU exports went to 5 countries. In 2012, 25% of extra-EU-27 exports of solar components went to Japan, and 14% to the US.

Graph III.2.1: **EU-27 exports and imports of solar components from Extra-EU**



Source: Commission Services based on Eurostat database.

([14]) Philibert (2011)

([15]) This section focuses on trade in renewable equipment. Chapter 3 deals with the energy part.

([16]) Depicting trade flows of renewable components with the Harmonised System (HS) nomenclature is rather difficult, as many of these components are also used in other end-use sectors. After a careful analysis of the HS nomenclature and existing literature, four main wind and two solar HS items have been included. This rather restrictive approach probably under-estimates the total trade affected by these two renewable sources. However, it leads to more accurate figures on the evolution of the trade associated with these sources

Box III.2.1: Components in wind and solar industry

Solar components included in this study are: photosensitive semiconductor devices, including photovoltaic cells (HS code: 85414090) and inverters with power handling capacity > 7.5 kva, excluding a kind used with telecommunication apparatus, automatic data-processing machines and units thereof (HS code: 85044088).

No studies are available on the value chain and contribution of each activity of the solar power industry to direct GDP and trade. However, photovoltaic cells are already the result of melting the silicon, to obtain the wafers that then are machined and coated. Therefore, it includes almost all stages of photovoltaic modules production. Moreover, the last production stage is to combine the solar modules with the inverters, a component that is also included in this analysis. Thus, even if one cannot precisely estimate the share of the trade related with the solar power industry covered by these two components, this value is expected to be rather high.

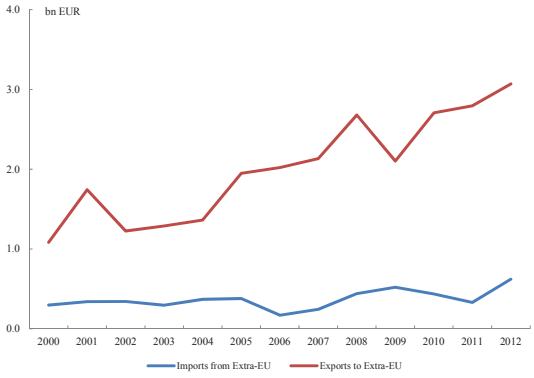
Wind components are: wind-powered generating sets (HS code: 85023100) , towers and lattice masts of iron or steel (HS code: 73082000), ac generators "alternators", of an output > 750 kva (HS code: 85016400), gear boxes for machinery, excluding those for civil aircraft (HS code: 84834094), parts of electrical lightening or signalling equipment, windscreen wipers, defrosters and demisters of a kind used for motor vehicles, n.e.s, excluding burglar alarms for motor vehicles (HS code: 85129090) and parts of engines and motors, n.e.s (HS code: 84129090).

EWEA (2012b) estimates that in the wind industry, wind turbine and component manufactures accounted for 36.70% of this sector's contribution to direct GDP in 2010. Service providers and developers accounted respectively for 20.5% and 42.8%. However, wind turbine and component manufactures represent 85% of this sector's exports. The same study estimates that EU-27 exports of wind turbine and component manufactures amounted to around 7.5 bn EUR in 2010. The exports of the six components included in this study were 2.7 bn EUR in the same year. This suggests that these components cover around 36% of the total exports in wind turbine and components.

In 2012, EU-27 had a trade surplus of around 2.45 billion EUR in wind components and equipment with the rest of the world. This trade performance has been constant since 2008 with the exception of 2009, when the surplus was around 1.6 billion EUR (Graph III.2.2). These good performances are driven by the presence of positive trade balances with a large number of countries.

EU exports of wind components are quite diversified. In 2012, 55% went to 5 countries, and one third to US and Canada. Similarly, 59% of extra EU imports of wind components come from 5 countries, including 40% from China. Once again, imports from China started to increase after 2006 (imports from China represented a low share until 2006, around 4%).

Graph III.2.2: **EU-27 exports and imports of wind components from Extra-EU**



Source: Commission Services based on Eurostat database.

Box III.2.2: **Measuring the drivers of trade in solar power and wind equipment**

The renewable sector has expanded over the past decade. While some renewable sources were already profitable, others as wind and solar benefited from the support policies put in place in many countries (chapter 1). The renewable development has induced trade flows both between EU-27 Members States and with Non-EU countries; the EU-27 has built a strong position with the rest of the world in the trade of wind components, while trade in solar components has been characterized by a large trade deficit. In addition, Intra-EU trade ([1]) is larger than EU-27 trade with the rest of the world both in solar and wind components (1.3 times larger for the former and 2.1 for the latter). This justifies the inclusion of trade flows with the rest of the world as well as trade flows within EU Member States when conducting this exercise.

Beyond the support policies towards these new sectors implemented by governments, it is important to understand the other drivers of trade. As these technologies become more and more mature, subsidies will be phased out and the development of these sectors should be driven by other factors. This box focuses on analysing the drivers of EU Member States imports of and exports of solar and wind components.

In order to measure the drivers of trade, an ex-post econometric exercise is conducted. The methodology employed follows an augmented gravity model, generally used in empirical trade literature which benefits from strong theoretical foundations ([2]), and already applied in a similar exercise studying the drivers of Chinese exports of solar components (see Cao, J. and Groba, F., 2013).

The baseline model studying the determinants of EU Member States imports of solar components from Non-EU countries is given by the following regression ([3]):

$$\ln(imports_{ijpt}) = \beta_0 + \beta_1 \ln(pop_{it}) + \beta_2 \ln(pop_{jt}) + \beta_3 \ln(GDPPC_{it}) + \beta_4 \ln(GDPPC_{jt}) + \beta_5 \ln(Know_{it}) + \beta_6 \ln(Know_{jt}) + \beta_7 share_{it} + \beta_8 share_{jt} + \delta_t + \gamma_i + \gamma_j + \alpha_p + \varepsilon_{ijpt}$$

where i are EU Member States, j EU Member States or non-EU countries, p are the different solar components and t the years covered in this analysis (2000-2012); $\ln(imports_{ijpt})$ is the log of EU Member State i imports of the solar component p from other ([4]) EU or non-EU partner j at time t, β_0 is a constant, $\ln(pop_{it})$ and $\ln(pop_{jt})$ are the log of the number of inhabitants of the EU Member State i and EU or non-EU partner j at time t; $\ln(GDPPC_{it})$ and $\ln(GDPPC_{jt})$ are the log of the nominal GDP PC at current prices of the EU Member State i and EU or non-EU Member State j at time t ([5]); $\ln(Know_{it})$ and $\ln(Know_{jt})$ measure the stock of knowledge of EU Member State i and EU or non-EU partner j in solar energy technology at time t ([6]); $share_{it}$ and $share_{jt}$ are the solar in total net electricity generation of EU Member State i and EU or non-EU partner j at time t; finally, a large set of fixed effects were employed. δ_t controls for year specific fixed effects, γ_i and γ_j for fixed effects at the reporter (EU Member State importing component p) and partner (EU or non-EU Member State exporting component p) levels and α_p for fixed effects at the product level.

This large set of control variables assures that traditional variables used to control for geographical and cultural reasons behind trade persistence are controlled through the fixed effects (i.e. distance between

([1]) Trade is measured as the sum of EU-27 Member States imports and exports.
([2]) See De Benedictis and Taglioni (2011) for a review on this methodology.
([3]) Appendix 1 describes the variables used.
([4]) Since a country does not trade with itself, i and j cannot refer to the same country at the same time.
([5]) De Benedictis and Taglioni (2011) for an explanation on why one should include the GDP measure in nominal terms when performing a gravity model. In this case however, using a deflated measure would not bias the coefficient as time fixed effects are included in the regression.
([6]) Appendix 1 explains the methodology used to build this measure in detail. This measure takes in consideration that the productivity of knowledge strongly depends on existing knowledge plus new innovation (see Porter and Stern, 2000).

(Continued on the next page)

Box (continued)

partners, common language, existence of historical relations, between others). This method is proven to provide reliable results as long as the idiosyncratic error term is not correlated with the explanatory variables.

The time period under study is 2000-2012 and the data covers the trade relations between the EU Members and between EU Members and a diverse cross-section of twenty non-EU trade partners accounting for 95% of EU-27 imports of solar components from the rest of world in 2012 (ranging between 90% and 96% in the sample years); and accounting for 84% of EU-27 exports of wind components to the rest of the world in 2012 (ranging between 82% and 97% in the sample years) ([7]).

Population and GDP per capita control for the effect of market size and income, respectively, in EU Member States imports/exports of solar components. Positive coefficients are expected in both cases, i.e. large countries are expected to have a larger trade volume, and higher income is expected to be associated with higher trade flows of more capital intensive products. As regards innovation, positive coefficients are expected for exporter (be it EU or non EU), in particular as the stock of knowledge takes into account the new innovations and the existing knowledge base in the economy. As regards the importer, the expected sign of the coefficient is less clear. One the one hand, high innovative potential in the renewable solar component industry might reduce imports, but, if associated with some particular components, it might lead to increased imports of all solar components. The share of solar electricity generation gives a proxy of the country's effort/potential for this renewable source. Coefficient is expected to be positive, i.e. the higher the development of renewable generation, the higher induced imports of equipment.

([7]) Notice that other countries have not been included to avoid zero trade flows, as it would not allow this log-linear formulation. This is a common problem in this model. Cipollina, M. et al (2013) discusses this topic.

(Continued on the next page)

Box (continued)

Table 1: Coefficient estimates for the gravity equations studying the determinants of EU Member States imports and exports of solar components from/to other EU or from/to twenty major non-EU trade partners

	(1)	(2)	(3)
	ln(imports)	ln(imports)	ln(imports)
ln(population i)	9.047***	9.367***	
ln(population j)	0.548	-0.419	
ln(GDPPC i)	0.004	0.614***	
ln(GDPPC j)	0.597**	0.843***	
ln(GDP i)			0.069
ln(GDP j)			0.749***
ln(Know i)	0.057		0.105*
ln(Know j)	0.378***		0.410***
pat i		0.010***	
pat j		-0.001	
share solar i	21.569***	32.844***	26.506***
share solar j	39.246***	60.08***	42.227***
Constant	-154.19***	-148.55***	-11.79*
Observations	5667	9349	5667
Year FE	yes	yes	yes
Poduct FE	yes	yes	yes
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes

	ln(exports)	ln(exports)	ln(exports)
ln(population i)	-3.873	-0.2870281	
ln(population j)	1.273	-3.024**	
ln(GDPPC i)	1.073**	1.587***	
ln(GDPPC j)	0.517**	0.350*	
ln(GDP i)			0.959**
ln(GDP j)			0.466*
ln(Know i)	0.030		0.009
ln(Know j)	0.263***		0.255***
pat i		0.005***	
pat j		0.000	
share solar i	32.511***	36.485***	30.635***
share solar j	51.032***	79.805***	49.490***
Constant	37.087	47.766	-27.351***
Observations	5319	8538	5319
Year FE	yes	yes	yes
Poduct FE	yes	yes	yes
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes

Table 1 presents the estimates for this baseline model (regression 1). Regression 2 and 3 use patents as a flow instead of a stock and Nominal GDP instead of Population and GDP per capita, respectively. Results confirm the importance of the relative size of the solar market as means to increase trade flows, the same happening with nominal GDP and GDP per capita at least in the importing country. Population has the expected coefficient sign and significant levels (only for imports of EU countries). The share of solar electricity generation is positive and significant, which tends to shows that the higher the development of solar electricity, the higher trade flows. As regards knowledge, the coefficient is only significant for exporting countries.

(Continued on the next page)

Box (continued)

Table 2: Coefficient estimates for the gravity equations studying the determinants of EU Member States imports and exports of wind components to twenty major non-EU trade partners

	(1)	(2)	(3)
	ln(exports)	ln(exports)	ln(exports)
ln(population i)	-7.209***	-2.813	
ln(population j)	1.273	0.623	
ln(GDPPC i)	0.474***	0.492***	
ln(GDPPC j)	0.281	0.288*	
ln(GDP i)			0.426**
ln(GDP j)			0.263
ln(Know i)	0.191***		0.111**
ln(Know j)	-0.007		-0.014
pat i		0.010***	
pat j		-0.001	
share wind i	10.99***	8.154	9.551***
share wind j	2.264	2.572*	2.113
Constant	102.522**	39.718	-7.551**
Observations	15510	17899	15510
Year FE	yes	yes	yes
Poduct FE	yes	yes	yes
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes

	ln(imports)	ln(imports)	ln(imports)
ln(population i)	-4.538**	-4.900***	
ln(population j)	-0.268	1.47	
ln(GDPPC i)	0.096	0.105	
ln(GDPPC j)	0.972***	1.003***	
ln(GDP i)			0.109
ln(GDP j)			0.906***
ln(Know i)	-0.031		-0.070
ln(Know j)	0.212***		0.183***
pat i		0.000	
pat j		0.006***	
share wind i	-4.743**	-2.665**	-6.143***
share wind j	11.417***	10.78176***	10.884***
Constant	79.525*	54.463*	-16.936***
Observations	14891	16993	14891
Year FE	yes	yes	yes
Poduct FE	yes	yes	yes
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes

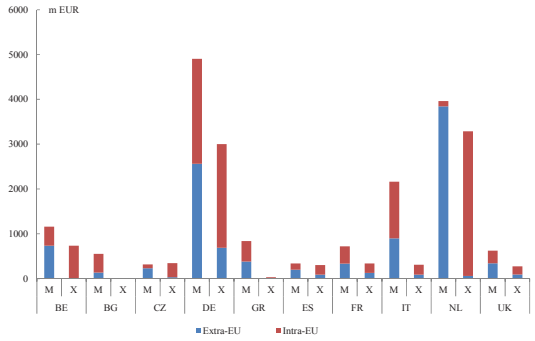
The same empirical test is carried out in the wind sector. The regression is the same as the model used for solar components. In this case, the components p correspond to wind components; the share of wind electricity in electricity generation is taken as a proxy for renewable support. The stock and flow of patents also corresponds to wind patents.

Results presented in table 2 suggest that the stock of knowledge triggers exports in the wind industry for EU and non EU countries. This confirms the role of innovation in improving a country's position in this industry. In addition, the coefficient associated with the exporter's share of wind in total net electricity generation is also positive, which might suggest that high effort on developing wind energy might established a know-how that has triggered these countries exports.

2.2.1.2. *Member States trade of components and equipment with extra and intra-EU*

In general, most Member States display a trade deficit in solar components, and a trade surplus in wind components. Trade volumes differ significantly across Member States. Germany and Netherlands have the largest trade volumes, both inside and outside the EU. Germany had the largest trade deficit (intra and extra EU) in solar components in 2012 (1.9 billion EUR). Most of the deficit with the rest of the world comes from China. Italy had the second largest trade deficit in 2012 (1.86 billion EUR). Only the Czech Republic displayed a small trade surplus (Graph III.2.3).

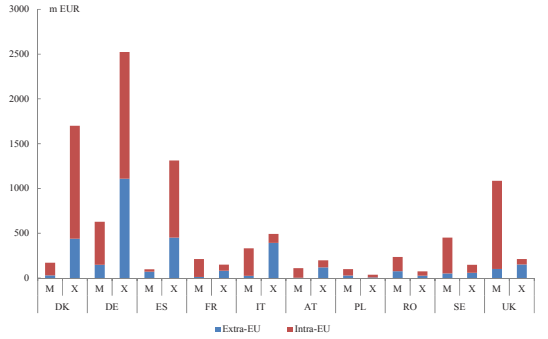
Graph III.2.3: **EU Member States intra and extra-EU imports (M) and exports (X) of solar components and equipment in 2012**



Source: Commission Services based on Eurostat database.

As regards wind components, Germany, Denmark and Spain have the largest trade volumes in the EU. In 2012, these three countries displayed a trade surplus (1.9, 1.5 and 1.2 billion EUR respectively). Italy and Austria also had trade surpluses in wind components, while the other Member States faced a trade deficit, with the United Kingdom and Sweden having the largest ones (873 and 302 million EUR respectively). In both cases, the overall trade deficit was driven by a large trade deficit with Intra-EU countries (Graph III.2.4).

Graph III.2.4: **EU Member States intra and extra-EU imports (M) and exports (X) of wind components and equipment in 2012**



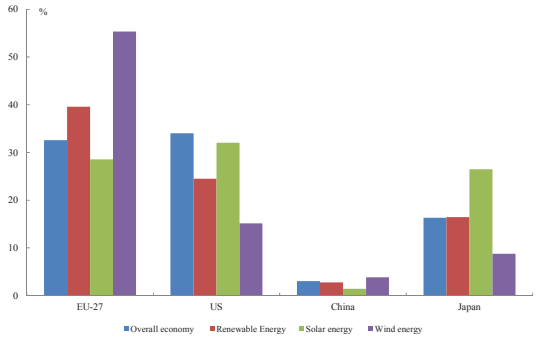
Source: Commission Services based on Eurostat database.

2.2.2. Innovation and trade performances

This section analyses whether this trade evolution is consistent with the innovation position of these industries. Innovation is measured by patents, which reflect the output of the innovative activity.

Over the last decade, the share of EU-27 in total world patent applications was 32.5%. This share is even higher in the renewable energy sector (39.6%), probably reflecting the fact that the EU was an early mover in most renewable industries (Graph III.2.5). The performance in wind and solar have differed during 2000-2011. The EU-27 share in solar energy patents was only 28.5% during this period. Moreover, between 2007 and 2011, when the trade performance of the sector deteriorated in Europe, the share was only 24.8%. By contrast, in the wind industry the EU-27 share was 55% of world applications, well above any other country and well above the EU average in all industries. Compared to the EU, the share of the US in renewable patents is lower. Japan displays a relatively high share of patents in solar panels. The share of China is still low in renewables, including solar and wind; however, its share more than doubled between 2007 and 2011.

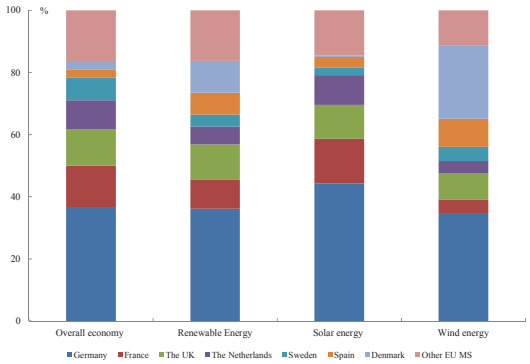
Graph III.2.5: **Average share of EU-27, US, China and Japan in world's total, renewable, solar and wind patents from 2000 to 2011**



Note: Data on applicant's country of residence have been used. They measure the country's ownership of inventions. The same measure has been used in graph 6. The count of patents related to renewable, solar and wind industries are directly provided by the OECD, and therefore follow their definition of these industries.
Source: OECD Patents Statistics

Germany is the main contributor to EU patents in the renewable energy sectors, including the solar sector (45%) (Graph III.2.6). Around 23.5% of EU patents in the wind energy sector were registered by Danish companies, which is in line with the trade and competitiveness performances of Denmark in this sector. The share of Spain in wind is also quite high (9.1% compared to a 2.4% share in the overall economy and 7.1% in the renewable sector).

Graph III.2.6: **Average share of EU Member States in EU-27 total, renewable, solar and wind patents from 2000 to 2011**



Source: Commission Services based on OECD Patents Statistics database.

2.3. INTERNATIONAL COMPETITIVENESS OF EU SOLAR AND WIND ENERGY INDUSTRIES

In this section, international competitiveness is assessed using two indicators - revealed comparative advantage (RCA) ([17]) and the relative trade balance (RTB) ([18]).

2.3.1. Revealed comparative advantages

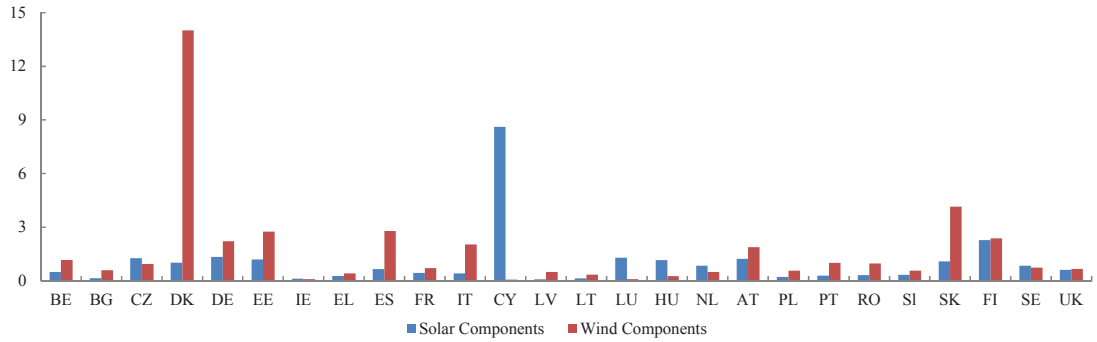
EU-27 and the US do not display a revealed comparative advantage in the solar industry. In the wind industry, EU-27 presents the highest RCA index. Japan has performed above the world average both in the solar and wind industry. China has revealed comparative advantage in the solar industry (Graph III.2.8).

The situation is heterogeneous across Member States (Graph III.2.7). Denmark, Germany, Estonia, Austria, Slovakia and Finland perform better than the world average in both solar and wind. Denmark presents a particularly high RCA in the wind industry, which reflects the support policy to wind since the 1970s. In the solar industry, only Cyprus presents a strong revealed comparative advantage, followed by Czech Republic and Finland.

([17]) The RCA index compares the share of the solar and wind sector exports in the EU's total goods exports with the share of the same sector's exports in the total world's exports. This measure is also computed for the EU main trade partners, for comparability. Values higher (lower) than 1 mean that the solar or wind industry in the EU (or EU economic partner) performs better than the world average, and is interpreted as a sign of comparative (dis)advantage. The RCA index for product "i" is defined as follows: $RCA_i = \frac{\frac{X_{EU,i}}{\sum_i X_{EU,i}}}{\frac{X_{W,i}}{\sum_i X_{W,i}}}$ where X is the value of exports, and w is the reference group, the world economy. The final index is constructed as a simple average of the annual indexes computed for the period 2007-2011 (the last five years of available data).

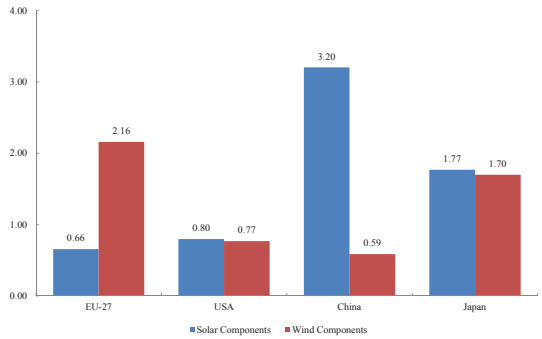
([18]) The relative trade balance index measures the trade balance relative to the total trade in the sector. The RTB indicator for product "i" is defined as $RTB_i = \frac{X_i - M_i}{X_i + M_i}$ where X_i i is the value of product's "i" exports and imports. The relative trade balance index ranges between -1 and 1 in a symmetric manner, and it is usually used for comparisons across countries and time. By comparison, the revealed comparative advantage is asymmetric, as relative disadvantage area ranges between 0 and 1, while the relative advantage area between 1 and infinite. See Sanidas and Shin (2010).

Graph III.2.7: **Average Revealed Comparative Advantage Indexes of solar and wind industries in the EU-27 Member States from 2007 to 2011**



Note: RCA for Member States include both intra and extra EU trade.
Source: Commission Services based on UNComtrade database.

Graph III.2.8: **Average Revealed Comparative Advantage Indexes of solar and wind industries in the EU-27, USA, China and Japan from 2007 to 2011**



Note: In this section, the UN Comtrade was used instead of the Comext provided by the Eurostat. This is explained by the fact that Comext provides limited data to Non-EU countries, which would not allow the computation of these indexes.
Source: Commission Services based on UNComtrade database.

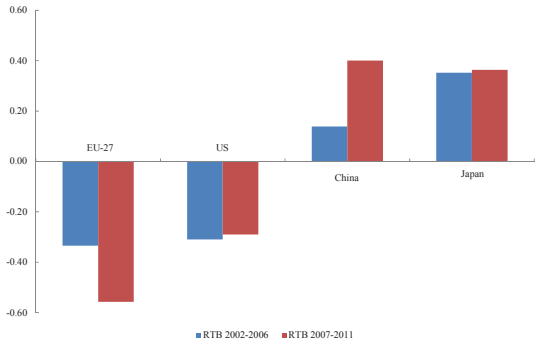
2.3.2. Relative trade balance

The EU-27 displays a negative relative trade balance ([19]) in the solar industry which has worsened over time (Graph III.2.9). In comparison, the situation of the US has remained relatively stable. Japan presents a positive and constant pattern, while China has improved its position during the same period.

By contrast, **the EU-27 performs very well in the wind industry** (Graph III.2.10), once again having a RTB index around 0.5 in both periods. Only Japan presents a slightly higher value, but this has decreased over time. Both China and the USA present negative index values, although China improved significantly during the second period.

Once again, the situation is heterogeneous at the Member State level (Graph III.2.11). Some countries display a positive relative trade balance in both solar and wind components (Denmark, Estonia, Finland and Slovakia) while others present a negative RTB in both solar and wind components. Almost one third of the Member States combine a negative relative trade balance in solar components with a positive one in wind components.

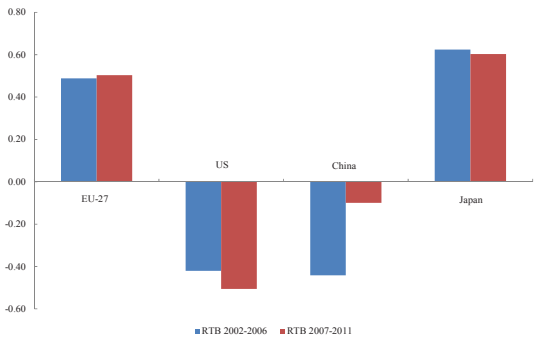
Graph III.2.9: **Average relative trade balance Index of the solar industry in the EU-27, USA, China and Japan**



Source: Commission Services based on UNComtrade database.

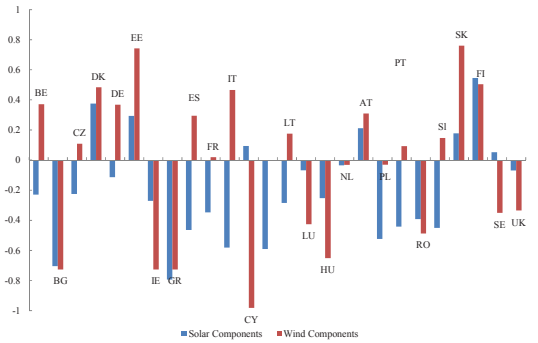
([19]) In this case the index was calculated for two periods of five years each (2002-2006 and 2007-2011), as the symmetry of this index allows for comparability across time.

Graph III.2.10: **Average relative trade balance Index of the wind industry in the EU-27, USA, China and Japan**



Source: Commission Services based on UNComtrade database.

Graph III.2.11: **Relative Trade Balance Indexes of solar and wind industries in the EU-27 Member States from 2007 to 2011**



Note: RCA for Member States include both intra and extra EU trade.
Source: Commission Services based on UNComtrade database.

2.4. CONCLUSIONS

The wind and solar power sector has benefitted from massive support across the world (chapter 1) which has stepped up its development and the related trade of equipment and components.

Compared to the rest of the world, the EU-27 has built a strong position in wind energy components that led to a trade surplus of around 2.45 billion EUR in 2012. This coincides with a large share in world wind patents since the 2000s. Within the EU, Germany, Denmark and Spain display good performances both in trade and innovation.

By contrast, the EU-27 has not yet managed to build such a position in the trade of solar energy components, mostly due to a negative trade balance with China, which has emerged as a key player over the past years. Overall, the EU-27 deficit in 2012 was 9 billion EUR, while in 2010 the figure was 21 billion EUR. Only a few Member States (Czech Republic and Cyprus) display a trade surplus in these components and it is mostly driven by a surplus with other EU countries.

3. ENERGY TRADE BALANCE AND AVOIDED FUEL COSTS

3.1. INTRODUCTION

The development of renewable energy sources has been promoted to increase diversification and security of energy supply. It is also considered as a way to reduce pollution and emissions of greenhouse gases, caused by combustion of conventional fuels. It is also expected to improve security of supply and to be positive for the EU external energy trade balance. The EU is traditionally net importer of energy and its import dependency has increased over the past years, from 47% in 2000 to 54% in 2011 ([20]). Renewables can help EU avoiding some fuel imports and thus reducing its trade deficit in energy sources.

This chapter analyses the impact of renewable on the energy trade balance. More specifically, it assesses the scale of avoided costs of imported fuels, in the context of EU huge deficit in energy products. Section 2 provides an overview of the EU energy trade balance. Section 3 assesses the avoided fuel costs. Conclusions are presented in section 4.

While the previous parts of this paper focused on renewable electricity, the current part adopts a broader perspective and analyses not only avoided costs of imported fuels thanks to the use of renewables in electricity, but also in heat production and transport. This approach is necessary to have a full picture of avoided costs of imported fuels, as they are higher in heating and transport than in electricity.

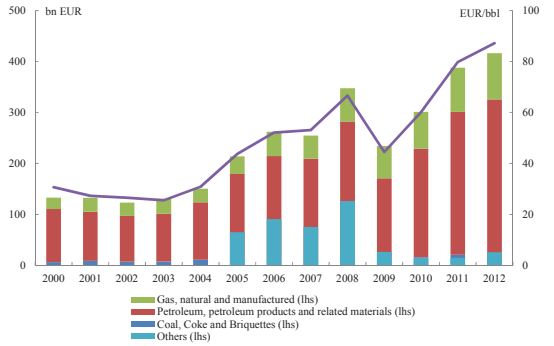
3.2. TOTAL ENERGY TRADE BALANCE

The EU has a strong trade deficit in trade in energy products with non-EU countries, which reached EUR 421 billion (3.3% of EU GDP) in 2012. The EU spent EUR 545 billion on imports of energy products from outside the EU, while extra-EU exports in this category amounted to EUR 124 billion

The deficit has increased over the last years as it was only EUR 150 bn in 2004 (in current prices).

As Graph III.3.1 shows, the value of EU energy trade balance seems to be linked to the price of crude oil, as the increase of the oil price in 2005-2008 and 2010-2012 has contributed to aggravating the trade. This can be explained by the high share of oil in extra-EU energy imports ([21]) (63% in 2012) and by the fact that import prices of gas are frequently indexed to oil prices. Apart from changing prices of oil and other fuels, EU trade deficit was influenced by changes in demand for imported fuels resulting from diminishing domestic production of fuels, energy efficiency efforts, the expansion of renewables, changes in the economic activity and in households' purchasing power. The overall EU dependence on imported fuels increased gradually until 2006, and since then remained stable around 53-54% (53.8% in 2011).

Graph III.3.1: **EU-27 trade deficit in energy products and crude oil prices, 2000-2012**



Source: Eurostat, World Bank

Among the energy products, crude oil and refined petroleum products contributed the most to the energy trade deficit. Oil deficit was equal to EUR 275 bn, or 2.2% of GDP in 2011 Trade deficit in gas amounted to EUR 105 bn and a smaller deficits was recorded for coal and electricity.

Within the EU, new Member States (EU-12) tend to have a larger energy trade deficit than the EU-15 countries: seven EU-12 countries had over 2007-2011 an average deficit larger than or equal to 5% of GDP (Bulgaria, Cyprus, Lithuania, Slovakia, Hungary, Slovenia and Latvia), whereas

([20]) European Commission (2013a) provides an analysis of energy dependence of the EU and Member States

([21]) European Commission (2013c)

none of the EU-15 countries exceeds this threshold.

Graph III.3.2: **Member States trade balance in energy products as % of GDP, 2012**

Source: Eurostat

EU negative trade balance in energy products and high energy imports have several negative macroeconomic implications. They imply substantial transfer of wealth from EU energy consumers to energy producers outside the EU, especially to the Gulf States, which have particularly low crude oil production costs ([22]). Moreover, high energy imports make Member States vulnerable to the inflationary pressures originating from energy price shocks and their impact on GDP. In particular, energy-intensive economies run risk of competitiveness erosion, depending on the energy intensity and energy efficiency performance ([23]).

3.3. AVOIDED COSTS OF IMPORTED FUEL

EU external trade deficit in energy products may be partially reduced thanks to the development of renewables, which are largely produced domestically. Renewables replace a part of non-renewable fuels in the EU energy mix, which saves some costs of imported fuels.

This section provides an estimate of the amount of the savings in imported fuels cost, achieved thanks to the deployment of renewables. The main assumption is that the renewable energy replaces the same amount of energy received from non-renewable sources, i.e. from fossil fuels and other sources such as nuclear power.

The assessment is made separately for three main energy sectors: electricity, heating and transport (including cooling) ([24]) (Box III.3.1). These three sectors represent together over 90% of EU final energy consumption, heating accounting for almost half of it. In 2010, heating represented 43% of EU final energy consumption, compared with 21% for electricity and 32% for transport.

([22]) According to Kelley and Bishop (2010), the wealth transfer to Gulf States (from all the importers, not only from the EU) was estimated at USD 490 billion per year when crude price was $75 per barrel. With current prices exceeding $100/bbl, this transfer must be even higher. A part of this transferred wealth returns to the EU and other oil importers, for instance in form of goods and services purchased in these countries.

([23]) Ciscar et al (2004). According to one of the calculations, every $10 rise in the price of oil per barrel leads on average to a 0.94 per cent decline in GDP for those importing oil.

([24]) The Renewable Directive set a specific mandatory target on the transport sector: a 10% share of energy from renewable sources in transport by 2020. Electricity and heating are included in the overall target of 20% share of renewable energy in the final energy consumption by 2020.

Box III.3.1: **Assessing avoided imported fuel costs**

As regards electricity, the assessment involves first the calculation of the cost of fuel input to electricity generation from conventional energy sources, for each of the main types of fuel (hard coal, gas, oil) and by Member State. For this purpose, IEA data on the volumes of fuel inputs and the relevant fuel unit costs have been used ([1]). As the next step, the ratios of hydro, wind and solar power generation to the non-renewable power generation have been calculated. By multiplying these respective ratios by the cost of fuel input, the value of coal, gas and oil avoided thanks to the use of hydro, wind and solar energy has been assessed.

In this calculation ([2]), it is assumed that renewable electricity replaces not only electricity from fossil fuels but also nuclear power. This is in line with the changes observed over the last decade ([3]). It is also assumed that renewables replace a mix of conventional fuels equivalent to the one used to actually produce electricity in the given year, which is a certain approximation. This may underestimate the fact that renewables replace mainly the most expensive technologies, depending on their relative costs and available capacities.

However, the avoided fuel costs include the cost of both domestic and imported fuels. While from the point of view of energy savings brought about by renewables both domestic and imported bring the same benefits, they should be treated differently as regards the impact on energy trade balance: imported fuels aggravate energy trade deficit, while domestic fuels do not ([4]). Therefore, in order to assess the costs of imported fuels, the avoided costs of domestically produced fuels (i.e. of coal, gas and oil produced in the EU) .This has been done by multiplying the avoided fuel costs of oil, gas and coal by the respective import dependency ratios for coal, gas and oil respectively.

$$Avoided\ Import\ Fuel\ Cost_{Electricity} = \sum\left(Cost_{fuel} * Input_{fuel} \right) * (RESPROD / NONRESPROD) * (Imp_{fuel}/GIC_{fuel})$$

where $Input_{fuel}$ is the fuel input for thermal generation for each type of fuel; $Cost_{fuel}$ is the unit cost of fuel for each type of fuel; RESPROD is the renewable electricity production, separately for wind, solar, hydro and biomass; NONRESPROD is the non-renewable electricity production; Imp_{fuel}/GIC_{fuel} is the dependency ratio on imported gas, oil and coal.

As regards heat, the assessment involves first the calculation of the average cost of replaced conventional fuel used for heating per energy unit (toe). This calculation is based on IEA data on fuel costs. The average cost of fuel is multiplied by the volume of renewable energy used for heating, which gives us the cost of avoided fossil fuel thanks to the use of biomass. We assume that biomass used in heating replaces the same amount of heat from non-renewable sources, in the same proportion as in the current energy mix. However, like in case of electricity, the avoided fuel costs used in heating include the cost of both domestic and imported fuels, while our purpose is to calculate the costs of imported fuels. Therefore the avoided fuel costs have been divided between the costs of oil, gas and coal, and multiplied by their respective import dependency ratios.

As regards transport, the amount (in toe) of biofuels used in a given year was multiplied by the unit cost of replaced petrol and diesel fuel (using the IEA data about energy unit costs). This calculation gives us the cost of avoided fossil fuel thanks to the use of biofuels. This value has been multiplied by the import dependency ratio on oil, to eliminate the impact of domestic oil production and assess the avoided costs of imported fuels.

([1]) International Energy Agency (2012b)
([2]) See Appendix 2 for data description.
([3]) Between 2005 and 2010, the share of RES in EU electricity generation increased by 6 percentage points and of gas by 4 points, while the share of coal, nuclear and petroleum decreased by 5, 3 and 2 pp respectively (European Commission 2012b). This shows that RES replaces not only fossil fuels, but also nuclear power in the electricity mix.
([4]) Although EU is a net importer of fuels, a small part of domestically produced fuels is exported. If fuel is not sold internally, it still has the same value as the imported fuel because it can be exported at that price.

(Continued on the next page)

Box (continued)

Avoided Import Fuel Cost$_{Transport\ or\ Heating}$ = *Cost*$_{fuel}$ * RESPROD *(Imp$_{fuel}$/GIC$_{fuel}$)

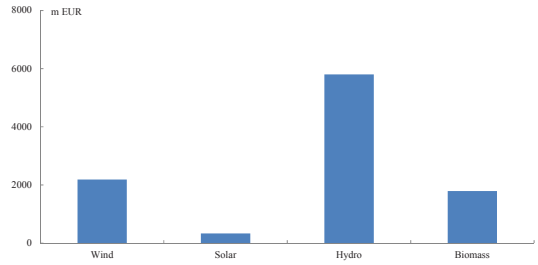
where Cost$_{fuel}$ is the cost of unit of fuel; RESPROD is the production of renewable heating/biofuels; Imp$_{fuel}$/GIC$_{fuel}$ is the dependency ratio on imported gas, oil and coal (oil only in transport).

3.3.1. Avoided fuel cost in electricity

In 2010, the avoided imported fuel cost in electricity generation amounted to EUR 10.2 billion for EU-27 in 2010, including EUR 5.8 billion for hydro power, EUR 2.2 billion for wind power, EUR 1.8 billion for biomass and EUR 0.3 billion for solar power. While 2011 and 2012 data are not available yet ([25]), the avoided fuel costs increased in these years in comparison to 2010, due to increased renewable production and rising oil and gas import prices.

It is important to remember that wind, solar or hydro power investments made in a given year save fuel costs over the entire lifetime of these installations, during at least 20-25 years. For instance, thanks to wind and solar installations which were put into operation in 2010, some EUR 460 million of imported fuel costs were saved in 2011, but some EUR 7.5 billion can be saved over the lifetime of this equipment ([26]).

Graph III.3.3: **Avoided imported fuel costs thanks to renewable electricity - 2010**

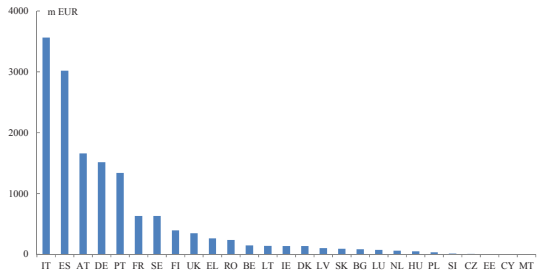


Source: Commission Services based on Eurostat and International Energy Agency databases.

Among Member States, avoided costs of imported fuels thanks to the use of renewable energy were the highest in Italy and Spain, followed by Austria, Germany and Portugal (Graph III.3.4). One could in principle expect that countries with higher production of renewable electricity would have higher avoided imported fuel costs. Graph III.3.5 shows that this is not always the case. For instance, Italy saves more imported fuel costs than Germany and Spain, which have higher RES production. Austria saves twice more imported fuel costs than Sweden or France, although produces less renewable electricity than these countries. This could be explained by differences in the fuel mix for non-renewable electricity generation in these countries, and by differences in the share of imports in fuel consumption. Italy produces its non-renewable electricity mainly from gas and uses relatively much oil for electricity generation; these fuels are usually more expensive and fully imported. Spain and Germany use more coal for electricity generation, which is cheaper and partially domestically produced, than Italy. France and Sweden have high shares of nuclear power. As we assume that renewable energy replaces the same amount of energy received from non-renewable sources, i.e. from fossil fuels and nuclear, a high share of nuclear means that each unit of renewable electricity produced replaces less imported fossil fuels than in the countries without or with low nuclear power. This concerns also the other countries with high share of nuclear power, such as Belgium, Hungary or Slovakia.

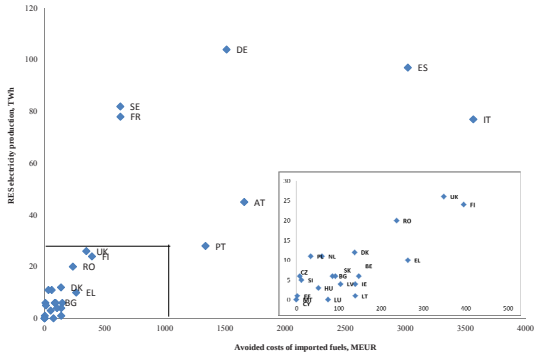
([25]) In particular, data on the costs of fuel input to electricity generation are not available yet for 2011 or 2012.
([26]) Assuming average lifetime of 25 years and using 4% discount rate

Graph III.3.4: **Avoided imported fuel costs thanks to renewable electricity by Member States - 2010**



Source: Commission Services based on Eurostat and International Energy Agency databases.

Graph III.3.5: **Renewable electricity generation and avoided imported fuel costs - 2010**



Source: Commission Services based on Eurostat database.

3.3.2. Avoided fuel costs in heating and transport

The production of renewables contributes to replacing fossil fuel costs used not only in electricity, but also in heat production and transport.

In heating, fossil fuels provide some 80% of energy used for this purpose, with the highest share of gas (43%) followed by solid fuels (29%). Renewable energy – biomass – represented in 2010 some 15% of energy used for heat production. Most of the biomass used for heating in the EU is domestically produced, and the imports of biomass are rather marginal. In 2010, EU consumption of biomass used for heating amounted to 72.5 Mtoe, while imports accounted for some 3 Mtoe only ([27]).

In transport, oil products represented almost 95% of fuel consumption ([28]). The EU is highly dependent on oil imports, which in 2010 represented 84% of EU oil consumption. EU dependency on oil products was growing over the recent year due to depletion of domestic oil reserves and diminishing of crude oil production. Biofuels represented in 2010 3.8% of final energy demand in transport. However, not all EU biofuels production was domestic: some 35% of bioethanol used in the EU and 22% of biodiesel was imported. Moreover, a part of feedstock for production of biofuels by EU industry is also imported.

As regards the calculation of avoided fuel costs in heating and electricity, the methodology has been similar to the methodology applied to electricity (Box III.3.1).

According to our calculation, the avoided costs of imported fuels, replaced by biomass used for heating, amount at EUR 12.2 billion in 2010. This includes EUR 6.9 billion of imported gas costs, EUR 3.3 billion of imported oil and EUR 2 billion of imported coal. France and Sweden, followed by Germany, Finland and Italy, had the highest amounts of avoided costs of imported fuels due to biomass use among Members States (Graph III.3.7).

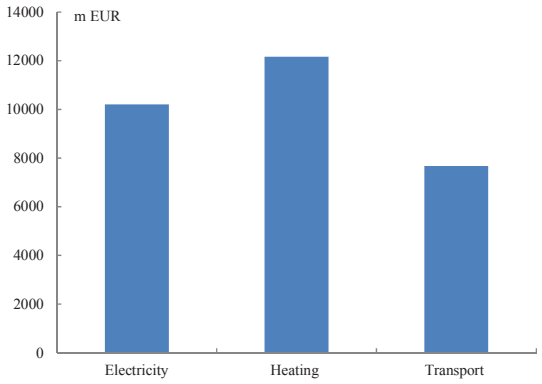
As regards transport, the avoided costs of imported fuels, replaced by biofuels, amounted at EUR 7.6 billion in 2010. This included EUR 5.8 billion saved thanks to the production of biodiesel and EUR 1.8 billion thanks to bioethanol. ([29]). Among Member States, avoided costs of imported fuels thanks to the use of renewable energy in transport were the highest in Germany, France, Italy and Spain (Graph III.3.7).

([27]) Data from the Impact Assessment on biomass sustainability (under preparation). One of the limitations in the calculation is the fact that imported wood, biomass and the feedstock for biofuels can be used for energy purposes but also for other non-energy purposes: wood for furniture or paper, biofuel feedstock – as edible oil.

([28]) Including maritime bunkers.

([29]) For comparison, the support to biofuels in the form of tax exemptions was estimated at some EUR 3 billion a year in EU-27, not taking into account market transfers resulting from mandatory blending requirements,

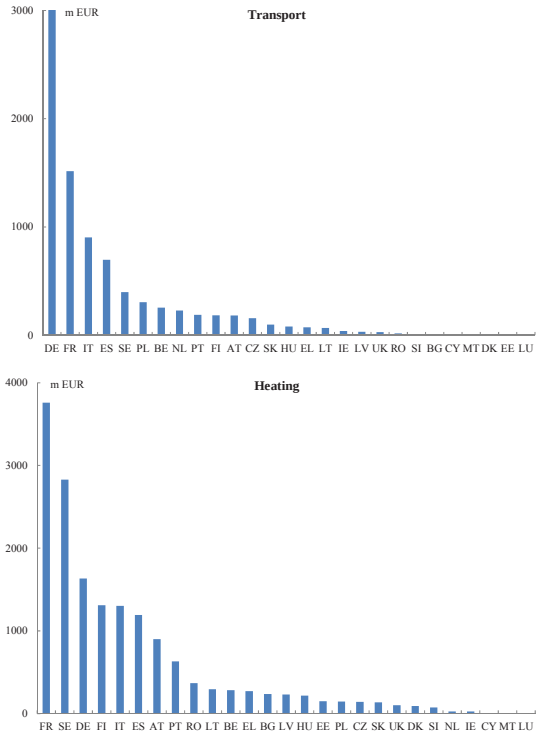
Graph III.3.6: **Avoided total fuel costs and imported costs thanks to renewable energy, 2010**



Source: Commission Services based on Eurostat and International Energy Agency databases.

Altogether, the avoided costs of imported fuel saved thanks to the use of renewable energy amounted to some EUR 30 billion in the EU in 2010. This estimate given in this paper applies rather cautious assumptions and should be considered as a low estimate ([30]).

Graph III.3.7: **Avoided fuel costs thanks to renewable use in heating and transport by Member States, 2010**



Source: Commission Services based on Eurostat and International Energy Agency databases.

However, EU production of renewables is expected to substantially increase over the coming years in order to reach the objective of 20% share of energy from renewable sources in gross final consumption of energy in 2020. Total renewable energy production amounted to 150 Mtoe in 2010 and is expected to increase to 238 Mtoe by 2020 ([31]), i.e. by 59%. With unchanged fuel prices, this would imply an increase in the avoided imported fuel costs to some EUR 50 billion in 2020 (in 2010 prices). The actual increase in avoided fuel costs is likely to be much more significant as most reference scenarios for 2020, including IEA's, EIA's and the Commission's, project for substantial price increases for EU fossil import prices.

3.4. CONCLUSIONS

The development of renewables allows Member States to save a part of costs of imported fossil

([30]) For instance, European Wind Energy Association (2012) calculated the avoided fuel cost thanks to wind energy (i.e. including avoided costs of domestic and imported fuels) at EUR 5.7 billion in 2010

([31]) European Commission (2013b)

fuels and thus to reduce its trade deficit in energy products. According to our calculations, these avoided imported fuel costs amount to some EUR 30 billion a year in 2010. This amount is in 2010 still rather limited in comparison to EU external trade deficit in energy products (EUR 304 billion in 2010, but increased to EUR 421 billion in 2012). It is also comparable to the amount of subsidies received by the renewable sector in 2010 (some EUR 27 billion). Our calculation applies, however, rather cautious assumptions and should be considered as a low estimate.

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APPENDIX 1

Data description for the model measuring the drivers of trade in solar power and wind equipment

Variable	Description	Source	Sample
Imports and Exports	Product HS codes are presented at box 1. In euros	COMEXT (Eurostat)	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2012
Imports and Exports	In dollars.	Comtrade (UN)	US, China, Japan, EU27 2002-2011
Population	Total number of people per country	World Development Indicators (World Bank)	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2012
Nominal GDP	In current US dollars	World Development Indicators (World Bank)	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2012
GDP per capita	In current US dollars	World Development Indicators (World Bank)	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2012
Patents	Number of applications by the applicant's country of residence	OECD Patents Statistics	EU-27 Member States and nineteen non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Thailand, Turkey and United States of America 2000-2011
Stock of knowledge	The stock of knowledge comes from authors own computations. It applies the perpetual inventory method to the patents data described above. At year t technology i (wind or solar photovoltaic) the stock value is: $Stock_{it}=(1-\delta)\ Stock_{it-1}+InnoPatApp_{it}$ Where the base year was 1976 (the first year of available data), and the discount rate ( ) is assumed to be 0.15, following Cao and Groba (2013).	OECD Patents Statistics	EU-27 Member States and nineteen non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Thailand, Turkey and United States of America 2000-2011
Net electricity generation by wind and solar	Billion kilowatt-hours This source does not present values individually to solar power, as it aggregates tide and wave with solar power. However, the bias in the true values is not considerable as both tide and wave are still marginal.	US Energy Information Agency	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2011
The share of solar or wind power in total net electricity generation comes from authors own computations based on the data on net electricity described above plus data on total net electricity generation provided by the same source. It was simply divided the former by the latter.	Percentage Points	US Energy Information Agency	EU-27 Member States and twenty non-EU trade partners: Australia, Brazil, Canada, Chile, Republic of China, Hong Kong, India, Indonesia, Israel, Japan, Republic of Korea, Malaysia, Mexico, Philippines, Russian Federation, Switzerland, Taiwan, Thailand, Turkey and United States of America 2000-2011

APPENDIX 2

Data description for assessing avoided imported fuel costs

Variable	Description	Source	Sample
Fuel input for electricity generation	Million tonnes (coal, oil) GWh (gas)	International Energy Agency	EU-27 Member States 2010
Unit cost of fuel in electricity, heating and transport	USD/tonne (coal, oil) USD/MWh (gas) USD/toe (heating, transport)	International Energy Agency	EU-27 Member States (average cost for MS for which data are available was used) 2010
Unit cost of fuel in heating and transport	EUR/1000 L	European Commission: Oil Bulletin	EU-27 Member States (average cost for MS for which data are available was used) 2010
Exchange rate EUR/USD	Ratio	Eurostat	2010
Renewable electricity generation (total and by technology: wind, solar, hydro, biomass) and non-renewable electricity generation	TWh	European Commission DG Energy	EU-27, Member States 2010
Renewable energy in heating and transport	Mtoe	European Commission	EU-27 2010
Import dependency ratio	Net imports / (gross energy consumption + bunkers). Separately for oil, gas, coal. In %	Eurostat	EU-27, Member States 2010

Energy Unit Costs in Europe and the world

Austria										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.42	0.4%	0.18	-0.2%	7.7	0.2%	*10.3%*	*11.1%*	8.4	10.1%
Textiles and Textile Products	0.36	0.0%	0.20	4.0%	7.2	4.1%	*3.5%*	*1.9%*	8.5	1.6%
Leather, Leather and Footwear	0.18	-2.2%	0.31	5.0%	5.5	2.7%	*0.6%*	*0.3%*	6.4	0.3%
Wood and Products of Wood and Cork	1.24	7.4%	0.09	-3.8%	10.5	3.3%	*4.5%*	*4.4%*	10.8	4.8%
Pulp, Paper, Paper , Printing and Publishing	1.71	-0.8%	0.08	8.3%	13.7	7.4%	*9.6%*	*7.7%*	15.3	7.0%
Coke, Refined Petroleum and Nuclear Fuel	12.88	-14.0%	0.69	39.6%	883.0	20.0%	*3.1%*	*0.8%*	1076.2	0.9%
Chemicals and Chemical Products	1.54	-5.4%	0.14	9.8%	21.7	3.9%	*6.5%*	*8.1%*	22.9	8.0%
Rubber and Plastics	0.31	4.5%	0.20	-4.0%	6.1	0.4%	*4.2%*	*4.0%*	7.3	3.5%
Other Non-Metallic Mineral	1.50	4.1%	0.13	0.6%	18.9	4.7%	*6.0%*	*5.3%*	20.9	4.6%
Basic Metals and Fabricated Metal	1.26	2.5%	0.21	4.5%	26.4	7.1%	*14.8%*	*17.7%*	34.0	19.2%
Machinery, Nec	0.14	4.0%	0.17	-4.3%	2.3	-0.5%	*11.7%*	*14.0%*	2.6	14.7%
Electrical and Optical Equipment	0.15	4.0%	0.21	0.9%	3.0	4.9%	*13.0%*	*13.1%*	3.4	12.8%
Transport Equipment	0.15	-1.5%	0.20	0.7%	3.2	-0.8%	*6.4%*	*7.3%*	3.5	8.7%
Manufacturing, Nec; Recycling	0.19	6.4%	0.30	-1.7%	5.6	4.6%	*5.6%*	*4.3%*	6.4	3.6%
Total Manufacturing	1.58	-0.7%	0.11	5.0%	18.1	4.3%			23.5	

Belgium										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.55	1.1%	0.16	-0.3%	8.9	0.8%	12.5%	14.5%	10.7	12.5%
Textiles and Textile Products	0.37	-2.9%	0.21	-2.4%	7.8	-5.2%	5.1%	3.8%	9.5	3.3%
Leather, Leather and Footwear	0.34	2.9%	0.13	-6.5%	4.5	-3.8%	0.2%	0.2%	5.7	0.2%
Wood and Products of Wood and Cork	1.01	-4.2%	0.08	1.6%	8.2	-2.7%	1.5%	1.6%	9.8	1.5%
Pulp, Paper, Paper , Printing and Publishing	0.81	2.5%	0.10	-3.7%	7.8	-1.4%	8.2%	7.7%	9.6	6.7%
Coke, Refined Petroleum and Nuclear Fuel	46.45	-5.3%	0.19	7.8%	883.1	2.0%	2.9%	4.3%	922.9	6.1%
Chemicals and Chemical Products	3.95	0.7%	0.10	4.2%	40.0	4.9%	19.0%	19.8%	43.4	21.2%
Rubber and Plastics	0.26	-13.7%	0.27	15.4%	6.8	-0.5%	3.6%	3.9%	7.9	4.1%
Other Non-Metallic Mineral	1.58	-2.9%	0.14	6.1%	21.9	3.0%	5.2%	6.0%	25.4	5.2%
Basic Metals and Fabricated Metal	1.57	-6.9%	0.15	12.0%	23.5	4.3%	14.4%	15.0%	28.6	16.7%
Machinery, Nec	0.08	-4.1%	0.39	2.9%	3.1	-1.2%	6.6%	6.8%	3.3	7.0%
Electrical and Optical Equipment	0.13	-5.7%	0.23	2.5%	2.9	-3.4%	8.8%	7.2%	2.8	6.9%
Transport Equipment	0.29	-0.5%	0.13	3.6%	3.7	3.0%	8.8%	6.4%	4.1	6.2%
Manufacturing, Nec; Recycling	0.30	-8.7%	0.27	12.3%	8.0	2.4%	3.1%	2.8%	9.5	2.5%
Total Manufacturing					54.1	5.4%			75.4	

Bulgaria										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					26.1	0.2%	20.3%	15.9%	26.1	15.9%
Textiles and Textile Products					13.0	-5.0%	12.2%	14.9%	13.0	14.9%
Leather, Leather and Footwear					18.7	-6.6%	1.4%	1.3%	18.7	1.3%
Wood and Products of Wood and Cork					50.9	1.6%	1.4%	2.0%	50.9	2.0%
Pulp, Paper, Paper , Printing and Publishing					13.6	-5.7%	4.1%	4.4%	13.6	4.4%
Coke, Refined Petroleum and Nuclear Fuel					988.2	9.6%	11.9%	6.3%	988.2	6.3%
Chemicals and Chemical Products					76.2	-3.7%	10.1%	6.4%	76.2	6.4%
Rubber and Plastics					32.3	-0.1%	2.2%	2.9%	32.3	2.9%
Other Non-Metallic Mineral					68.5	-4.8%	4.0%	7.8%	68.5	7.8%
Basic Metals and Fabricated Metal					76.4	-2.8%	12.2%	17.4%	76.4	17.4%
Machinery, Nec					21.3	8.0%	10.1%	8.2%	21.3	8.2%
Electrical and Optical Equipment					17.5	3.0%	5.2%	6.1%	17.5	6.1%
Transport Equipment					12.7	6.3%	2.4%	2.3%	12.7	2.3%
Manufacturing, Nec; Recycling					23.0	-1.7%	2.4%	4.1%	23.0	4.1%
Total Manufacturing					99.1	0.9%			99.1	

Czech Republic										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.69	-3.0%	0.10	-2.3%	6.7	-5.2%	13.0%	11.8%	6.9	9.7%
Textiles and Textile Products	0.86	-5.4%	0.14	3.3%	12.2	-2.3%	5.4%	3.2%	14.2	2.9%
Leather, Leather and Footwear	0.16	-16.8%	0.03	-16.9%	0.4	-30.8%	0.6%	0.3%	0.5	0.3%
Wood and Products of Wood and Cork	0.88	0.4%	0.14	4.9%	12.8	5.4%	3.4%	3.7%	13.0	3.3%
Pulp, Paper, Paper , Printing and Publishing	1.49	-0.5%	0.05	-4.9%	7.1	-5.4%	5.7%	5.5%	6.9	5.2%
Coke, Refined Petroleum and Nuclear Fuel	58.49	-7.1%	0.96	36.7%	5611.1	27.0%	1.6%	0.1%	4191.1	0.2%
Chemicals and Chemical Products	10.18	-1.9%	0.10	6.6%	100.6	4.5%	6.6%	4.3%	101.1	4.8%
Rubber and Plastics	0.44	-19.2%	0.23	26.3%	10.2	2.1%	4.8%	8.8%	11.0	8.6%
Other Non-Metallic Mineral	2.31	-2.3%	0.08	0.6%	17.4	-1.8%	7.9%	6.3%	15.6	5.7%
Basic Metals and Fabricated Metal	3.21	-3.5%	0.07	-1.4%	22.3	-4.9%	14.8%	14.4%	22.3	15.7%
Machinery, Nec	0.44	-5.0%	0.19	5.0%	8.5	-0.2%	9.6%	11.0%	8.4	11.0%
Electrical and Optical Equipment	0.20	-12.0%	0.13	7.5%	2.6	-5.4%	12.0%	11.1%	2.8	11.2%
Transport Equipment	0.30	-8.6%	0.17	7.4%	5.1	-1.8%	10.2%	15.6%	4.9	17.8%
Manufacturing, Nec; Recycling	0.16	-22.4%	0.29	24.6%	4.6	-3.3%	4.4%	4.0%	5.7	3.8%
Total Manufacturing	2.50	-5.0%	0.08	1.7%	20.0	-3.4%			22.4	

Denmark										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.60	0.1%	0.15	1.3%	8.8	1.4%	15.9%	18.1%	13.6	15.7%
Textiles and Textile Products	0.30	-1.8%	0.23	4.5%	6.8	2.6%	2.4%	1.2%	7.9	1.3%
Leather, Leather and Footwear	0.20	6.9%	0.50	10.1%	10.1	17.7%	0.3%	0.0%	12.4	0.0%
Wood and Products of Wood and Cork	0.85	-0.8%	0.07	2.1%	5.8	1.3%	2.9%	2.2%	7.9	1.9%
Pulp, Paper, Paper , Printing and Publishing	0.21	-3.5%	0.20	5.0%	4.1	1.4%	10.7%	8.5%	5.1	8.2%
Coke, Refined Petroleum and Nuclear Fuel									996.2	1.7%
Chemicals and Chemical Products					7.0	1.5%	11.2%	12.5%	9.0	14.3%
Rubber and Plastics	0.31	-9.4%	0.19	10.5%	6.0	0.0%	5.1%	4.4%	7.2	4.7%
Other Non-Metallic Mineral	1.87	0.2%	0.10	2.2%	18.4	2.5%	4.7%	3.8%	24.2	3.6%
Basic Metals and Fabricated Metal	0.20	-3.2%	0.35	5.7%	6.9	2.3%	10.7%	9.3%	8.7	10.1%
Machinery, Nec	0.15	-0.3%	0.26	2.9%	3.9	2.6%	14.4%	15.6%	6.5	15.2%
Electrical and Optical Equipment	0.09	-5.1%	0.19	3.5%	1.8	-1.7%	12.3%	15.8%	2.5	17.1%
Transport Equipment	0.48	9.4%	0.08	-9.3%	3.6	-0.8%	3.0%	2.9%	28.6	0.7%
Manufacturing, Nec; Recycling	0.18	-3.5%	0.24	4.3%	4.3	0.7%	6.0%	4.8%	5.1	5.6%
Total Manufacturing					17.8	1.9%			24.6	

Germany										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					13.6	4.5%	8.6%	7.2%	12.4	6.2%
Textiles and Textile Products					12.9	4.6%	2.1%	1.4%	11.9	1.3%
Leather, Leather and Footwear					6.2	-1.0%	0.2%	0.2%	5.8	0.2%
Wood and Products of Wood and Cork					14.1	7.6%	1.9%	1.3%	13.2	1.2%
Pulp, Paper, Paper , Printing and Publishing					10.8	4.6%	8.0%	6.3%	10.2	5.4%
Coke, Refined Petroleum and Nuclear Fuel					1511.4	12.8%	1.2%	0.6%	1375.5	0.7%
Chemicals and Chemical Products					22.2	-0.7%	9.7%	10.5%	20.9	10.1%
Rubber and Plastics					14.1	9.6%	4.7%	4.6%	13.5	4.5%
Other Non-Metallic Mineral					20.7	2.9%	3.8%	2.9%	19.0	2.7%
Basic Metals and Fabricated Metal					16.2	2.3%	13.2%	14.4%	14.0	16.2%
Machinery, Nec					3.0	-0.1%	14.6%	17.1%	2.7	17.0%
Electrical and Optical Equipment					3.3	1.9%	15.5%	15.0%	3.1	15.4%
Transport Equipment					5.6	0.2%	13.4%	15.5%	5.2	16.6%
Manufacturing, Nec; Recycling					10.4	5.9%	3.0%	2.8%	10.2	2.5%
Total Manufacturing	1.8	-0.1%	0.1	3.3%	19.7	3.2%			18.4	

Estonia										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	1.25	-4.6%	0.14	5.2%	17.6	0.3%	17.7%	15.5%	17.6	15.5%
Textiles and Textile Products	0.85	-6.2%	0.12	5.9%	10.4	-0.7%	12.5%	6.9%	10.4	6.9%
Leather, Leather and Footwear	1.37	9.4%	0.05	-7.2%	7.1	1.4%	1.6%	0.6%	7.1	0.6%
Wood and Products of Wood and Cork	2.04	-0.5%	0.08	2.7%	15.7	2.2%	13.1%	12.4%	15.7	12.4%
Pulp, Paper, Paper , Printing and Publishing	1.61	-0.8%	0.10	5.7%	16.0	4.9%	7.9%	8.3%	16.0	8.3%
Coke, Refined Petroleum and Nuclear Fuel	16.06	-11.2%	0.04	-5.3%	72.0	-15.9%	0.6%	3.5%	72.0	3.5%
Chemicals and Chemical Products					47.9	-3.2%	4.3%	5.2%	47.9	5.2%
Rubber and Plastics	0.51	-3.0%	0.24	1.7%	12.4	-1.3%	2.7%	3.0%	12.4	3.0%
Other Non-Metallic Mineral	5.84	-0.2%	0.04	-3.2%	21.6	-3.4%	5.7%	5.6%	21.6	5.6%
Basic Metals and Fabricated Metal	0.39	0.6%	0.23	9.1%	9.0	9.7%	7.8%	10.6%	9.0	10.6%
Machinery, Nec	0.86	0.8%	0.09	6.5%	7.7	7.3%	3.3%	5.1%	7.7	5.1%
Electrical and Optical Equipment	0.30	-8.5%	0.10	5.6%	3.0	-3.4%	9.2%	13.4%	3.0	13.4%
Transport Equipment	0.58	-1.5%	0.10	9.1%	6.1	7.5%	4.9%	3.6%	6.1	3.6%
Manufacturing, Nec; Recycling	1.39	-5.3%	0.10	8.2%	13.4	2.4%	8.6%	6.5%	13.4	6.5%
Total Manufacturing	3.46	-2.5%	0.05	2.7%	16.2	0.1%			16.2	

Ireland										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					4.7	-3.3%	12.6%	17.2%	5.1	17.2%
Textiles and Textile Products					5.9	2.0%	1.1%	0.6%	6.9	0.5%
Leather, Leather and Footwear					1.5	-12.4%	0.1%	0.1%	1.8	0.1%
Wood and Products of Wood and Cork					12.3	3.7%	1.1%	0.8%	12.3	0.9%
Pulp, Paper, Paper , Printing and Publishing					0.8	-4.0%	13.5%	12.3%	0.9	14.6%
Coke, Refined Petroleum and Nuclear Fuel					271.2	15.5%	0.9%	1.0%	290.5	0.8%
Chemicals and Chemical Products					1.5	-2.3%	33.2%	40.3%	1.7	41.1%
Rubber and Plastics					14.8	9.7%	1.6%	1.6%	15.6	1.3%
Other Non-Metallic Mineral					22.5	7.0%	3.2%	1.9%	23.4	1.6%
Basic Metals and Fabricated Metal					46.4	6.6%	3.4%	2.7%	53.8	2.3%
Machinery, Nec					3.0	-3.2%	2.4%	2.0%	3.4	1.8%
Electrical and Optical Equipment					2.9	12.6%	24.8%	17.4%	3.1	16.1%
Transport Equipment					4.4	4.8%	1.6%	1.4%	5.0	1.2%
Manufacturing, Nec; Recycling					298.9	14.9%	0.5%	0.6%	313.0	0.5%
Total Manufacturing					8.7	7.3%			8.0	

Greece										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.60	2.2%	0.26	2.4%	15.9	4.7%	24.8%	34.1%	15.9	34.1%
Textiles and Textile Products					27.4	9.4%	12.6%	8.7%	27.4	8.7%
Leather, Leather and Footwear					10.4	0.7%	1.0%	0.7%	10.4	0.7%
Wood and Products of Wood and Cork	0.66	0.4%	0.16	-4.1%	10.7	-3.7%	2.6%	1.4%	10.7	1.4%
Pulp, Paper, Paper , Printing and Publishing	0.32	-6.9%	0.36	10.0%	11.4	2.5%	7.0%	7.6%	11.4	7.6%
Coke, Refined Petroleum and Nuclear Fuel	53.37	-8.6%	0.09	7.7%	458.8	-1.5%	6.7%	7.4%	458.8	7.4%
Chemicals and Chemical Products	1.28	-5.5%	0.17	13.0%	21.6	6.7%	6.7%	5.8%	21.6	5.8%
Rubber and Plastics	0.65	4.1%	0.26	2.0%	16.7	6.1%	3.3%	3.3%	16.7	3.3%
Other Non-Metallic Mineral	3.02	-1.7%	0.09	2.7%	27.4	1.0%	8.4%	5.2%	27.4	5.2%
Basic Metals and Fabricated Metal	1.23	-9.3%	0.32	15.1%	39.6	4.4%	9.8%	11.5%	39.6	11.5%
Machinery, Nec					13.1	-3.6%	3.5%	3.1%	13.1	3.1%
Electrical and Optical Equipment	0.88	8.5%	0.24	-2.7%	21.1	5.6%	3.9%	3.0%	21.1	3.0%
Transport Equipment					33.7	9.4%	3.9%	3.6%	33.7	3.6%
Manufacturing, Nec; Recycling	0.43	-1.7%	0.23	-1.0%	9.7	-2.7%	5.6%	4.6%	9.7	4.6%
Total Manufacturing	4.74	-2.2%	0.11	3.3%	53.3	1.0%			53.3	

Spain										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.74	-0.6%	0.15	7.7%	10.9	7.1%	13.3%	16.9%	11.4	17.2%
Textiles and Textile Products	0.59	-1.6%	0.15	6.7%	8.6	4.9%	5.5%	3.2%	9.0	2.9%
Leather, Leather and Footwear	0.50	-0.6%	0.18	8.0%	8.8	7.4%	1.6%	1.0%	9.2	1.0%
Wood and Products of Wood and Cork	1.17	3.7%	0.13	0.7%	15.5	4.4%	2.4%	1.9%	16.4	1.8%
Pulp, Paper, Paper , Printing and Publishing	0.88	0.5%	0.15	6.2%	13.6	6.8%	8.8%	9.2%	14.4	9.3%
Coke, Refined Petroleum and Nuclear Fuel	60.24	2.4%	0.19	5.0%	1137.1	7.5%	2.6%	1.8%	1660.6	2.0%
Chemicals and Chemical Products	2.52	-3.1%	0.16	4.0%	39.6	0.8%	9.1%	11.1%	42.9	12.1%
Rubber and Plastics	1.22	8.9%	0.16	-1.5%	19.7	7.2%	4.4%	4.4%	20.8	4.5%
Other Non-Metallic Mineral	3.07	1.2%	0.09	4.4%	27.9	5.6%	7.5%	7.0%	28.6	6.3%
Basic Metals and Fabricated Metal	1.23	-0.9%	0.14	5.1%	17.2	4.1%	15.1%	16.2%	18.8	17.1%
Machinery, Nec	0.19	0.6%	0.34	3.6%	6.5	4.2%	6.9%	7.5%	6.7	7.5%
Electrical and Optical Equipment	0.26	3.0%	0.30	1.7%	8.0	4.8%	6.9%	5.7%	8.3	5.1%
Transport Equipment	0.30	-0.2%	0.29	5.2%	8.8	5.0%	10.8%	9.1%	9.3	9.2%
Manufacturing, Nec; Recycling	0.27	4.6%	0.15	-0.5%	3.9	4.0%	5.1%	4.9%	4.0	4.2%
Total Manufacturing	2.95	0.5%	0.12	3.3%	35.9	3.8%			49.8	

France										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.60	-0.8%	0.24	6.5%	14.6	5.7%	12.8%	14.1%	18.4	12.4%
Textiles and Textile Products	0.21	-13.3%	0.34	16.7%	7.1	1.2%	3.9%	2.9%	8.2	2.6%
Leather, Leather and Footwear	0.15	-5.5%	0.22	5.4%	3.4	-0.4%	0.7%	0.8%	4.0	0.7%
Wood and Products of Wood and Cork	2.35	5.4%	0.04	-1.4%	8.9	3.9%	1.7%	1.7%	11.9	1.6%
Pulp, Paper, Paper , Printing and Publishing	0.51	-4.7%	0.22	10.2%	11.2	5.0%	8.2%	8.0%	12.5	8.1%
Coke, Refined Petroleum and Nuclear Fuel	47.86	-2.8%	0.37	16.6%	1777.3	13.3%	2.4%	1.4%	1349.8	2.9%
Chemicals and Chemical Products	2.76	-3.7%	0.20	9.2%	54.5	5.2%	9.8%	11.0%	69.1	9.6%
Rubber and Plastics	0.18	-8.1%	0.65	15.2%	11.5	5.9%	5.0%	4.9%	13.6	4.7%
Other Non-Metallic Mineral	1.50	0.3%	0.12	2.0%	18.7	2.3%	3.9%	4.7%	22.6	4.2%
Basic Metals and Fabricated Metal	0.96	-2.1%	0.12	4.6%	11.5	2.4%	14.9%	15.1%	12.3	17.8%
Machinery, Nec	0.11	-4.4%	0.38	6.7%	4.0	2.0%	8.5%	10.0%	4.5	11.0%
Electrical and Optical Equipment	0.13	-4.9%	0.42	12.7%	5.6	7.2%	12.9%	8.8%	6.9	8.7%
Transport Equipment	0.22	-1.4%	0.28	4.6%	6.2	3.2%	11.6%	12.5%	6.5	11.6%
Manufacturing, Nec; Recycling	0.25	3.2%	0.26	-0.1%	6.7	3.1%	3.6%	4.1%	8.0	4.2%
Total Manufacturing	2.26	-1.8%	0.17	7.9%	39.3	6.0%			56.1	

Italy										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.45	-1.1%	0.38	5.9%	17.4	4.7%	10.0%	11.7%	18.3	11.0%
Textiles and Textile Products	0.28	-3.5%	0.50	6.6%	13.8	2.9%	9.9%	8.5%	14.7	7.6%
Leather, Leather and Footwear	0.12	-3.7%	0.37	2.4%	4.5	-1.4%	2.9%	3.0%	4.9	2.9%
Wood and Products of Wood and Cork	0.33	1.6%	0.33	1.6%	10.9	3.3%	2.6%	2.1%	11.7	1.9%
Pulp, Paper, Paper , Printing and Publishing	0.67	0.9%	0.24	2.5%	16.0	3.4%	6.1%	6.1%	17.0	5.6%
Coke, Refined Petroleum and Nuclear Fuel	77.97	6.0%	0.28	8.6%	2148.3	15.1%	1.8%	0.7%	1439.2	1.5%
Chemicals and Chemical Products	2.49	-1.3%	0.12	5.0%	30.7	3.6%	7.5%	7.6%	35.8	7.2%
Rubber and Plastics	0.62	3.9%	0.32	0.5%	20.0	4.4%	4.5%	3.7%	20.9	3.7%
Other Non-Metallic Mineral	2.16	0.5%	0.18	2.9%	39.2	3.4%	5.5%	4.8%	42.6	4.5%
Basic Metals and Fabricated Metal	1.40	5.6%	0.10	-3.2%	14.5	2.2%	15.4%	16.3%	16.8	18.3%
Machinery, Nec	0.24	-0.1%	0.32	2.2%	7.6	2.1%	13.0%	14.2%	7.8	15.4%
Electrical and Optical Equipment	0.24	0.2%	0.34	2.2%	8.2	2.4%	9.5%	9.8%	8.2	9.6%
Transport Equipment	0.16	-1.8%	0.60	3.5%	9.6	1.7%	6.0%	5.8%	10.4	5.2%
Manufacturing, Nec; Recycling	0.19	2.8%	0.30	-0.5%	5.7	2.2%	5.2%	5.7%	5.9	5.6%
Total Manufacturing	2.34	1.1%	0.13	2.4%	30.2	3.5%			37.7	

Cyprus										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					15.1	5.4%	37.0%	30.0%	15.1	30.0%
Textiles and Textile Products					9.6	0.2%	6.0%	2.5%	9.6	2.5%
Leather, Leather and Footwear					11.7	-2.5%	1.3%	0.4%	11.7	0.4%
Wood and Products of Wood and Cork					7.2	3.2%	6.0%	7.5%	7.2	7.5%
Pulp, Paper, Paper , Printing and Publishing					7.5	2.3%	8.4%	9.8%	7.5	9.8%
Coke, Refined Petroleum and Nuclear Fuel							0.9%	0.0%		
Chemicals and Chemical Products					8.2	2.6%	6.3%	6.3%	8.2	6.3%
Rubber and Plastics					16.3	4.9%	3.1%	3.8%	16.3	3.8%
Other Non-Metallic Mineral					38.2	6.4%	10.5%	15.1%	38.2	15.1%
Basic Metals and Fabricated Metal					22.3	1.2%	8.0%	12.4%	22.3	12.4%
Machinery, Nec					10.7	2.7%	2.6%	2.9%	10.7	2.9%
Electrical and Optical Equipment					13.5	13.2%	1.8%	2.3%	13.5	2.3%
Transport Equipment					13.3	0.8%	1.0%	1.3%	13.3	1.3%
Manufacturing, Nec; Recycling					7.1	3.3%	7.0%	5.8%	7.1	5.8%
Total Manufacturing					17.0	-9.1%			17.0	

Latvia										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					17.8	5.9%	27.4%	23.8%	17.8	23.8%
Textiles and Textile Products					15.2	0.7%	11.2%	5.1%	15.2	5.1%
Leather, Leather and Footwear					7.2	-8.1%	0.2%	0.2%	7.2	0.2%
Wood and Products of Wood and Cork					30.8	0.3%	19.1%	19.0%	30.8	19.0%
Pulp, Paper, Paper , Printing and Publishing					3.4	3.1%	8.6%	9.1%	3.4	9.1%
Coke, Refined Petroleum and Nuclear Fuel										
Chemicals and Chemical Products					59.7	-2.2%	3.0%	6.4%	59.7	6.4%
Rubber and Plastics					11.0	1.4%	1.6%	2.9%	11.0	2.9%
Other Non-Metallic Mineral					70.8	0.8%	2.9%	4.8%	70.8	4.8%
Basic Metals and Fabricated Metal					44.1	5.9%	9.7%	9.9%	44.1	9.9%
Machinery, Nec					17.1	5.9%	3.8%	2.8%	17.1	2.8%
Electrical and Optical Equipment					6.4	0.9%	3.8%	6.5%	6.4	6.5%
Transport Equipment					32.2	6.5%	3.2%	3.8%	32.2	3.8%
Manufacturing, Nec; Recycling					12.0	1.4%	5.4%	5.9%	12.0	5.9%
Total Manufacturing	2.06	-1.7%	0.13	3.7%	25.8	2.0%			25.8	

Lithuania										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.74	-4.5%	0.38	6.1%	27.9	1.3%	23.0%	24.3%	27.9	24.3%
Textiles and Textile Products	0.52	-1.1%	0.38	5.4%	19.8	4.3%	18.2%	7.2%	19.8	7.2%
Leather, Leather and Footwear	1.43	2.0%	0.23	-2.4%	33.2	-0.5%	1.5%	0.2%	33.2	0.2%
Wood and Products of Wood and Cork	1.23	1.1%	0.26	-3.8%	31.4	-2.8%	6.7%	7.3%	31.4	7.3%
Pulp, Paper, Paper , Printing and Publishing					23.9	-1.0%	6.9%	6.4%	23.9	6.4%
Coke, Refined Petroleum and Nuclear Fuel					788.0	6.9%	9.4%	7.9%	788.0	7.9%
Chemicals and Chemical Products	8.45	-5.9%	0.25	7.6%	213.3	1.3%	5.8%	10.5%	213.3	10.5%
Rubber and Plastics					91.1	0.4%	3.1%	4.9%	91.1	4.9%
Other Non-Metallic Mineral	4.27	-4.3%	0.08	1.4%	32.7	-3.0%	3.7%	3.3%	32.7	3.3%
Basic Metals and Fabricated Metal					13.7	-0.8%	3.4%	4.6%	13.7	4.6%
Machinery, Nec	0.30	-14.6%	0.42	16.6%	12.8	-0.4%	3.0%	3.1%	12.8	3.1%
Electrical and Optical Equipment	0.20	-16.2%	0.83	19.8%	16.6	0.3%	7.5%	5.0%	16.6	5.0%
Transport Equipment					21.0	3.4%	2.7%	5.3%	21.0	5.3%
Manufacturing, Nec; Recycling	0.35	-3.2%	0.40	1.1%	14.2	-2.1%	5.2%	10.0%	14.2	10.0%
Total Manufacturing	9.43	-0.2%	0.11	4.6%	107.0	4.4%			107.0	

Luxembourg										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.65	3.8%	0.09	-5.7%	5.9	-2.1%	8.5%	10.6%	5.9	10.6%
Textiles and Textile Products	0.61	-3.8%	0.21	11.2%	12.6	7.0%	7.1%	4.7%	12.6	4.7%
Leather, Leather and Footwear							0.0%	0.0%		
Wood and Products of Wood and Cork	2.03	24.2%	0.04	-15.9%	7.9	4.5%	1.7%	1.6%	7.9	1.6%
Pulp, Paper, Paper , Printing and Publishing	0.43	0.7%	0.21	7.2%	9.1	8.0%	7.4%	7.4%	9.1	7.4%
Coke, Refined Petroleum and Nuclear Fuel										
Chemicals and Chemical Products	1.08	-2.7%	0.07	6.1%	7.9	3.3%	5.4%	4.0%	7.9	4.0%
Rubber and Plastics	0.53	6.4%	0.24	4.1%	12.8	10.8%	14.9%	11.2%	12.8	11.2%
Other Non-Metallic Mineral	2.93	-2.3%	0.07	6.3%	20.9	3.8%	10.4%	8.0%	20.9	8.0%
Basic Metals and Fabricated Metal	3.02	9.0%	0.05	-8.9%	15.9	-0.7%	31.7%	36.1%	15.9	36.1%
Machinery, Nec	0.37	2.3%	0.08	-4.8%	3.0	-2.6%	6.7%	7.9%	3.0	7.9%
Electrical and Optical Equipment	0.33	2.6%	0.14	3.5%	4.4	6.3%	4.1%	5.8%	4.4	5.8%
Transport Equipment	0.61	3.3%	0.14	5.2%	8.8	8.6%	0.5%	1.4%	8.8	1.4%
Manufacturing, Nec; Recycling	0.89	0.7%	0.18	11.3%	16.3	12.0%	1.7%	1.4%	16.3	1.4%
Total Manufacturing	1.41	2.4%	0.09	-0.3%	12.0	2.1%			12.0	

Hungary										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.94	3.9%	0.18	-1.5%	17.3	2.4%	14.0%	11.9%	16.6	9.2%
Textiles and Textile Products	0.38	-2.9%	0.22	-2.3%	8.5	-5.2%	5.6%	1.9%	10.1	1.4%
Leather, Leather and Footwear	0.31	0.3%	0.38	4.0%	12.0	4.4%	1.2%	0.6%	13.6	0.6%
Wood and Products of Wood and Cork	0.69	-6.6%	0.32	10.5%	22.0	3.1%	1.9%	1.2%	23.2	0.8%
Pulp, Paper, Paper , Printing and Publishing	0.67	-3.5%	0.21	5.4%	14.2	1.7%	5.3%	5.0%	14.8	4.2%
Coke, Refined Petroleum and Nuclear Fuel	19.76	-1.2%	0.10	-0.5%	207.3	-1.7%	5.8%	6.9%	224.8	8.1%
Chemicals and Chemical Products	5.87	-0.8%	0.15	5.6%	85.6	4.8%	9.2%	8.8%	96.7	8.5%
Rubber and Plastics	0.35	-5.1%	0.38	3.9%	13.6	-1.4%	3.9%	5.1%	14.1	5.3%
Other Non-Metallic Mineral	2.47	-3.3%	0.17	6.3%	42.2	2.7%	4.7%	3.7%	47.7	2.5%
Basic Metals and Fabricated Metal	2.25	-3.5%	0.14	2.4%	30.7	-1.2%	9.2%	7.7%	33.8	7.4%
Machinery, Nec	0.28	-3.3%	0.20	-3.7%	5.6	-6.8%	6.4%	17.2%	5.7	27.2%
Electrical and Optical Equipment	0.13	-2.9%	0.43	7.5%	5.6	4.4%	18.5%	14.9%	5.8	11.3%
Transport Equipment	0.24	-0.6%	0.28	3.7%	6.5	3.1%	12.1%	12.9%	6.1	11.8%
Manufacturing, Nec; Recycling	0.28	-4.5%	0.36	3.6%	10.3	-1.0%	2.2%	2.2%	11.7	1.7%
Total Manufacturing	2.85	-2.8%	0.11	3.6%	32.6	0.7%			36.6	

Malta										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					9.7	2.4%	13.9%	14.2%	9.7	14.2%
Textiles and Textile Products					10.9	14.1%	9.4%	3.9%	10.9	3.9%
Leather, Leather and Footwear					5.3	8.8%	1.3%	0.1%	5.3	0.1%
Wood and Products of Wood and Cork					9.3	11.6%	0.3%	0.5%	9.3	0.5%
Pulp, Paper, Paper , Printing and Publishing					7.6	4.9%	6.4%	10.7%	7.6	10.7%
Coke, Refined Petroleum and Nuclear Fuel					49.1	-4.9%	0.1%	0.0%	49.1	0.0%
Chemicals and Chemical Products					6.4	-8.6%	2.2%	13.3%	6.4	13.3%
Rubber and Plastics					15.2	7.8%	6.6%	4.5%	15.2	4.5%
Other Non-Metallic Mineral					14.3	3.7%	2.4%	4.2%	14.3	4.2%
Basic Metals and Fabricated Metal					9.0	8.1%	2.6%	3.8%	9.0	3.8%
Machinery, Nec					7.5	2.9%	1.6%	1.3%	7.5	1.3%
Electrical and Optical Equipment					10.7	13.9%	37.8%	24.0%	10.7	24.0%
Transport Equipment					5.6	-2.9%	4.9%	7.9%	5.6	7.9%
Manufacturing, Nec; Recycling					4.1	0.4%	10.6%	11.6%	4.1	11.6%
Total Manufacturing					8.7	6.1%			8.7	

Netherlands										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.53	-3.6%	0.16	4.2%	8.7	0.4%	17.0%	23.2%	9.0	21.9%
Textiles and Textile Products	0.39	-3.5%	0.19	5.1%	7.3	1.4%	2.1%	1.4%	7.2	1.4%
Leather, Leather and Footwear	0.21	-6.4%	0.35	13.2%	7.5	6.0%	0.2%	0.2%	7.6	0.2%
Wood and Products of Wood and Cork	0.49	9.3%	0.12	-6.9%	5.7	1.7%	1.6%	1.7%	6.4	1.3%
Pulp, Paper, Paper , Printing and Publishing	0.59	1.2%	0.13	4.4%	7.6	5.7%	12.6%	11.0%	7.2	10.0%
Coke, Refined Petroleum and Nuclear Fuel	47.94	-5.3%	0.34	11.1%	1649.3	5.2%	2.5%	2.3%	4141.2	1.3%
Chemicals and Chemical Products	9.46	-3.3%	0.11	9.0%	100.7	5.5%	14.5%	14.0%	95.4	18.2%
Rubber and Plastics	0.31	-5.0%	0.31	8.6%	9.6	3.2%	3.2%	3.3%	11.5	2.9%
Other Non-Metallic Mineral	1.25	-1.9%	0.14	4.9%	18.1	3.0%	3.7%	3.7%	18.3	3.1%
Basic Metals and Fabricated Metal	1.75	-1.4%	0.10	6.4%	17.7	4.9%	11.6%	11.7%	19.4	11.1%
Machinery, Nec	0.45	0.0%	0.08	1.5%	3.4	1.4%	8.5%	9.5%	3.2	10.7%
Electrical and Optical Equipment	0.13	3.3%	0.76	5.8%	10.0	9.3%	9.7%	5.8%	10.4	5.8%
Transport Equipment	0.18	1.5%	0.24	1.6%	4.2	3.1%	5.5%	4.1%	4.3	5.1%
Manufacturing, Nec; Recycling	0.10	-3.4%	0.34	0.9%	3.3	-2.5%	7.3%	8.1%	3.5	7.0%
Total Manufacturing	5.27	-1.1%	0.11	5.5%	58.8	4.3%			79.0	

Poland										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					15.4	0.6%	17.8%	18.2%	18.3	17.6%
Textiles and Textile Products					8.9	1.6%	6.3%	4.4%	10.2	4.3%
Leather, Leather and Footwear					6.4	-0.8%	1.1%	0.6%	7.1	0.7%
Wood and Products of Wood and Cork					14.5	3.2%	4.7%	3.8%	17.9	4.0%
Pulp, Paper, Paper , Printing and Publishing					8.6	2.1%	9.0%	7.6%	10.8	7.8%
Coke, Refined Petroleum and Nuclear Fuel					304.4	-3.8%	3.0%	3.8%	275.6	6.5%
Chemicals and Chemical Products					45.2	1.4%	7.4%	7.2%	56.7	7.3%
Rubber and Plastics					13.0	0.1%	5.1%	6.2%	16.5	6.7%
Other Non-Metallic Mineral					38.4	0.8%	7.5%	6.3%	49.6	6.7%
Basic Metals and Fabricated Metal					28.5	-2.9%	10.7%	12.1%	40.8	13.5%
Machinery, Nec					6.6	-3.6%	7.8%	7.9%	7.3	6.5%
Electrical and Optical Equipment					5.9	-5.1%	8.4%	7.5%	11.0	5.0%
Transport Equipment					8.1	-4.1%	6.1%	9.0%	11.3	8.2%
Manufacturing, Nec; Recycling					9.7	2.2%	4.9%	5.4%	11.5	5.4%
Total Manufacturing	2.96	-7.0%	0.09	6.6%	28.0	-0.8%			39.7	

Portugal										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					10.1	6.3%	13.8%	13.1%	10.1	13.1%
Textiles and Textile Products					8.7	3.4%	15.9%	12.2%	8.7	12.2%
Leather, Leather and Footwear					4.6	3.9%	4.4%	3.5%	4.6	3.5%
Wood and Products of Wood and Cork					7.2	1.2%	4.0%	5.0%	7.2	5.0%
Pulp, Paper, Paper , Printing and Publishing					10.7	10.0%	10.4%	8.8%	10.7	8.8%
Coke, Refined Petroleum and Nuclear Fuel					865.1	-16.5%	0.4%	2.8%	865.1	2.8%
Chemicals and Chemical Products					41.7	1.5%	5.2%	5.9%	41.7	5.9%
Rubber and Plastics					10.7	4.8%	3.1%	4.0%	10.7	4.0%
Other Non-Metallic Mineral					30.8	6.1%	9.9%	8.3%	30.8	8.3%
Basic Metals and Fabricated Metal					11.6	3.7%	9.7%	10.9%	11.6	10.9%
Machinery, Nec					5.0	3.0%	5.4%	6.2%	5.0	6.2%
Electrical and Optical Equipment					2.9	0.0%	7.0%	8.4%	2.9	8.4%
Transport Equipment					4.1	2.9%	6.3%	5.8%	4.1	5.8%
Manufacturing, Nec; Recycling					10.9	4.6%	4.4%	5.0%	10.9	5.0%
Total Manufacturing					36.4	4.7%			36.4	

Romania										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					7.3	-5.8%	30.5%	26.6%	7.3	26.6%
Textiles and Textile Products					9.1	1.2%	10.1%	6.7%	9.1	6.7%
Leather, Leather and Footwear					6.9	-3.9%	1.9%	1.7%	6.9	1.7%
Wood and Products of Wood and Cork					5.4	-4.6%	4.3%	3.9%	5.4	3.9%
Pulp, Paper, Paper , Printing and Publishing					7.7	-6.7%	3.7%	4.7%	7.7	4.7%
Coke, Refined Petroleum and Nuclear Fuel					220.7	-6.5%	4.7%	4.6%	220.7	4.6%
Chemicals and Chemical Products					59.0	-5.1%	5.3%	4.1%	59.0	4.1%
Rubber and Plastics					6.9	-6.5%	2.2%	4.0%	6.9	4.0%
Other Non-Metallic Mineral					24.1	-6.9%	5.0%	5.4%	24.1	5.4%
Basic Metals and Fabricated Metal					40.0	-6.5%	9.3%	9.9%	40.0	9.9%
Machinery, Nec					15.0	-3.8%	6.0%	4.8%	15.0	4.8%
Electrical and Optical Equipment					6.3	-0.4%	6.0%	6.9%	6.3	6.9%
Transport Equipment					9.3	-7.2%	5.2%	12.3%	9.3	12.3%
Manufacturing, Nec; Recycling					11.8	2.2%	5.9%	4.4%	11.8	4.4%
Total Manufacturing					24.1	-6.0%			24.1	

Slovenia										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.77	2.5%	0.17	1.8%	12.8	4.4%	10.5%	8.4%	12.8	8.4%
Textiles and Textile Products	0.47	-3.6%	0.21	8.1%	10.0	4.3%	7.4%	3.5%	10.0	3.5%
Leather, Leather and Footwear	0.32	-13.6%	0.20	14.8%	6.2	-0.8%	2.0%	1.1%	6.2	1.1%
Wood and Products of Wood and Cork	1.17	-0.2%	0.11	-0.7%	12.6	-0.9%	3.9%	3.3%	12.6	3.3%
Pulp, Paper, Paper , Printing and Publishing	1.56	-4.0%	0.12	4.4%	18.6	0.2%	8.4%	7.4%	18.6	7.4%
Coke, Refined Petroleum and Nuclear Fuel					98.2	-25.1%	0.1%	0.0%	98.2	0.0%
Chemicals and Chemical Products	0.91	-5.2%	0.18	15.0%	16.4	8.9%	11.0%	15.3%	16.4	15.3%
Rubber and Plastics	0.46	-1.7%	0.20	1.3%	9.1	-0.5%	5.5%	6.8%	9.1	6.8%
Other Non-Metallic Mineral	3.17	-0.7%	0.11	3.0%	34.5	2.3%	4.4%	3.9%	34.5	3.9%
Basic Metals and Fabricated Metal	0.93	-5.7%	0.24	10.2%	22.7	3.9%	16.3%	16.7%	22.7	16.7%
Machinery, Nec	0.23	-6.5%	0.26	5.1%	5.8	-1.7%	9.1%	11.6%	5.8	11.6%
Electrical and Optical Equipment	0.22	-2.9%	0.28	5.6%	6.3	2.6%	11.9%	10.7%	6.3	10.7%
Transport Equipment	0.34	-2.6%	0.18	-0.9%	6.3	-3.5%	4.0%	6.6%	6.3	6.6%
Manufacturing, Nec; Recycling	0.25	-4.3%	0.29	1.2%	7.3	-3.1%	5.4%	4.6%	7.3	4.6%
Total Manufacturing	0.77	-4.9%	0.18	6.6%	13.7	1.5%			13.7	

Slovakia										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.63	-13.9%	0.26	17.5%	16.1	1.1%	12.1%	9.1%	16.1	9.1%
Textiles and Textile Products	0.34	-11.9%	0.22	10.8%	7.6	-2.4%	5.9%	3.3%	7.6	3.3%
Leather, Leather and Footwear	0.59	2.5%	0.19	8.6%	11.1	11.4%	2.4%	1.1%	11.1	1.1%
Wood and Products of Wood and Cork	0.69	-5.5%	0.09	-0.2%	6.0	-5.6%	3.3%	6.4%	6.0	6.4%
Pulp, Paper, Paper , Printing and Publishing	4.60	8.7%	0.04	-6.3%	19.2	1.9%	7.7%	6.2%	19.2	6.2%
Coke, Refined Petroleum and Nuclear Fuel	69.94	1.9%	0.18	9.7%	1268.7	11.8%	5.8%	1.6%	1268.7	1.6%
Chemicals and Chemical Products	15.11	1.0%	0.09	14.1%	140.2	15.2%	7.4%	3.8%	140.2	3.8%
Rubber and Plastics	0.55	-9.4%	0.26	9.0%	14.5	-1.2%	3.9%	5.6%	14.5	5.6%
Other Non-Metallic Mineral	2.73	-11.2%	0.12	9.6%	32.5	-2.7%	6.1%	5.7%	32.5	5.7%
Basic Metals and Fabricated Metal	6.00	-5.5%	0.05	0.8%	30.7	-4.8%	16.5%	19.9%	30.7	19.9%
Machinery, Nec	0.25	-15.6%	0.33	14.1%	8.4	-3.7%	8.0%	6.9%	8.4	6.9%
Electrical and Optical Equipment	0.11	-10.8%	0.48	13.9%	5.4	1.6%	9.5%	13.8%	5.4	13.8%
Transport Equipment	0.34	-13.5%	0.17	15.8%	5.7	0.2%	8.2%	12.2%	5.7	12.2%
Manufacturing, Nec; Recycling	0.19	-17.1%	0.38	20.1%	7.3	-0.5%	2.9%	4.5%	7.3	4.5%
Total Manufacturing	4.67	-7.0%	0.09	5.6%	40.1	-1.8%			40.1	

Finland										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.77	1.6%	0.10	-0.3%	7.7	1.3%	6.0%	9.7%	9.6	8.6%
Textiles and Textile Products	0.62	6.1%	0.08	-6.9%	5.0	-1.2%	1.5%	1.3%	5.6	1.1%
Leather, Leather and Footwear	0.29	-2.4%	0.05	-8.1%	1.6	-10.4%	0.3%	0.3%	1.7	0.2%
Wood and Products of Wood and Cork	1.78	2.7%	0.06	-3.8%	10.5	-1.2%	4.6%	3.7%	10.4	4.4%
Pulp, Paper, Paper , Printing and Publishing	4.49	-0.6%	0.05	2.5%	20.7	1.9%	23.6%	15.7%	21.3	17.0%
Coke, Refined Petroleum and Nuclear Fuel	56.34	-5.4%	0.16	7.0%	899.2	1.2%	1.3%	2.2%	1686.4	1.8%
Chemicals and Chemical Products	2.83	0.6%	0.12	-2.0%	34.1	-1.4%	5.1%	8.5%	35.1	10.1%
Rubber and Plastics	0.87	1.1%	0.06	-0.2%	5.3	0.9%	3.2%	3.5%	6.2	3.5%
Other Non-Metallic Mineral	1.33	0.0%	0.10	3.9%	13.2	3.9%	3.1%	3.3%	16.7	3.5%
Basic Metals and Fabricated Metal	1.74	-3.1%	0.07	-0.1%	12.9	-3.2%	10.3%	12.8%	18.7	14.0%
Machinery, Nec	0.15	0.6%	0.11	-1.7%	1.7	-1.1%	10.5%	15.2%	1.7	16.9%
Electrical and Optical Equipment	0.08	-3.5%	0.16	12.0%	1.3	8.0%	25.4%	18.2%	1.5	13.4%
Transport Equipment	0.35	5.7%	0.09	-8.0%	3.2	-2.7%	2.9%	3.3%	2.5	3.2%
Manufacturing, Nec; Recycling	0.69	6.6%	0.06	-6.3%	3.9	-0.2%	2.2%	2.4%	4.9	2.2%
Total Manufacturing	2.87	-2.1%	0.10	6.5%	29.9	4.3%			42.9	

Sweden										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco	0.39	-2.7%	0.22	9.6%	8.6	6.6%	7.8%	8.8%	8.7	7.3%
Textiles and Textile Products	0.30	-2.4%	0.19	4.7%	5.8	2.1%	1.1%	0.9%	5.9	0.9%
Leather, Leather and Footwear							0.1%	0.0%		
Wood and Products of Wood and Cork	1.23	-5.6%	0.11	13.1%	13.6	6.8%	3.5%	4.0%	14.8	3.5%
Pulp, Paper, Paper , Printing and Publishing	4.16	1.3%	0.05	7.4%	20.8	8.8%	15.7%	12.4%	21.3	11.3%
Coke, Refined Petroleum and Nuclear Fuel	40.02	-23.7%	0.25	32.5%	988.1	1.1%	1.0%	1.5%	1127.2	1.4%
Chemicals and Chemical Products	1.07	-7.4%	0.17	14.9%	17.9	6.4%	11.0%	14.3%	17.9	12.3%
Rubber and Plastics	0.75	3.4%	0.08	3.3%	6.3	6.8%	2.9%	3.0%	6.5	2.9%
Other Non-Metallic Mineral	1.18	-5.0%	0.19	5.7%	21.8	0.4%	2.0%	2.6%	22.3	2.7%
Basic Metals and Fabricated Metal	1.64	1.3%	0.09	2.8%	14.0	4.2%	13.7%	13.2%	15.7	14.2%
Machinery, Nec	0.09	-2.9%	0.29	3.3%	2.6	0.4%	11.8%	12.6%	2.7	15.3%
Electrical and Optical Equipment	0.06	-14.5%	0.29	17.4%	1.6	0.4%	12.2%	15.0%	1.7	13.2%
Transport Equipment	0.22	-0.2%	0.24	8.6%	5.2	8.4%	14.5%	8.8%	5.1	12.8%
Manufacturing, Nec; Recycling	0.53	-0.6%	0.14	-0.5%	7.2	-1.1%	2.8%	2.8%	7.9	2.1%
Total Manufacturing	2.60	-2.3%	0.10	8.0%	25.1	5.6%			26.5	

UK										
	Energy Intensity* (10MJ/$)		Real Energy price ($/10MJ)		RUEC (%)		*Share of sector in Manufacturing VA*		*RUEC level*	*Share of sector in Manufacturing VA*
	level 2009	annual growth rate	level 2009	annual growth rate	level 2009	annual growth rate	*level 2000*	*level 2009*	*2011*	
Food, Beverages and Tobacco					8.6	4.0%	13.4%	15.2%	8.9	16.0%
Textiles and Textile Products					8.0	5.7%	3.9%	2.5%	8.3	2.4%
Leather, Leather and Footwear					3.1	4.3%	0.5%	0.2%	3.2	0.3%
Wood and Products of Wood and Cork					7.9	2.7%	1.5%	2.1%	8.3	1.8%
Pulp, Paper, Paper , Printing and Publishing					6.1	5.6%	13.4%	13.1%	6.3	11.4%
Coke, Refined Petroleum and Nuclear Fuel					624.9	2.5%	1.6%	1.9%	627.5	2.8%
Chemicals and Chemical Products					13.3	2.6%	9.9%	11.4%	13.9	9.6%
Rubber and Plastics					10.4	5.9%	5.1%	5.5%	10.8	5.0%
Other Non-Metallic Mineral					17.0	3.4%	3.3%	4.0%	17.5	3.7%
Basic Metals and Fabricated Metal					14.6	4.6%	10.6%	10.7%	15.6	11.1%
Machinery, Nec					6.6	3.4%	8.2%	8.6%	6.7	10.1%
Electrical and Optical Equipment					4.0	3.1%	13.5%	9.6%	4.1	8.7%
Transport Equipment					5.8	3.5%	10.6%	10.7%	5.9	12.8%
Manufacturing, Nec; Recycling					7.7	6.3%	4.3%	4.4%	8.1	4.4%
Total Manufacturing					20.5	4.6%			26.2	

* including feedstock

EU-27 Member States average (2010-2012) intra and extra-EU imports and exports of Solar components, in million EUR

	Export		Import	
	Extra	Intra	Extra	Intra
Austria	16.40	219.00	89.70	143.00
Belgium	15.30	793.00	897.00	531.00
Bulgaria	0.40	8.01	94.00	207.00
Cyprus	0.04	54.90	7.38	32.10
Czech Republic	17.90	592.00	714.00	374.00
Denmark	3.46	18.90	57.60	31.10
Estonia	0.08	0.92	1.05	4.05
Finland	6.16	8.51	23.60	12.70
France	92.70	282.00	818.00	935.00
Germany	768.00	3780.00	5730.00	3130.00
Greece	0.81	43.90	232.00	344.00
Hungary	2.72	335.00	231.00	16.20
Ireland	0.52	2.79	3.58	8.79
Italy	58.90	199.00	3160.00	2700.00
Latvia	0.13	0.01	0.08	0.26
Lithuania	0.28	0.89	2.69	3.74
Luxembourg	0.42	98.30	17.20	80.20
Malta	0.02	0.02	4.34	2.39
Netherlands	39.10	3660.00	4220.00	257.00
Poland	1.03	61.50	3.72	10.90
Portugal	7.55	53.00	20.40	58.40
Romania	0.28	41.40	8.44	66.40
Slovakia	0.86	41.20	57.20	258.00
Slovenia	2.44	111.00	113.00	45.80
Spain	53.40	753.00	546.00	382.00
Sweden	14.70	132.00	84.60	29.10
UK	52.30	376.00	461.00	275.00

Note: the solar components include the hscodes presented in box III.3.2

EU-27 Member States average (2010-2012) imports and exports of Solar components to China, Japan and the USA, in million EUR

	Exports				Imports			
	China	Japan	USA	Others	China	Japan	USA	Others
Austria	0.77	0.03	1.35	14.25	40.10	1.66	1.53	46.41
Belgium	1.31	0.84	0.81	12.33	757.00	7.67	55.30	77.03
Bulgaria	0.04	0.00	0.00	0.36	60.40	0.01	0.97	32.63
Cyprus	0.01	0.00	0.00	0.03	5.95	0.00	0.02	1.41
Czech Republic	1.64	6.40	3.03	6.83	488.00	95.40	11.70	118.90
Denmark	0.65	0.06	0.99	1.76	48.40	0.27	4.83	4.10
Estonia	0.01	0.00	0.00	0.06	0.77	0.01	0.01	0.25
Finland	0.20	0.08	0.07	5.81	1.08	4.22	11.00	7.31
France	21.90	2.63	9.30	58.87	390.00	16.40	84.30	327.30
Germany	111.00	129.00	123.00	405.00	3610.00	277.00	288.00	1555.00
Greece	0.17	0.16	0.01	0.47	213.00	0.68	1.75	16.57
Hungary	0.85	0.46	0.78	0.63	2.46	226.00	0.04	2.50
Ireland	0.01	0.06	0.27	0.18	1.62	0.51	0.99	0.46
Italy	4.11	0.22	1.53	53.03	2440.00	62.20	64.00	593.80
Latvia	0.00	0.00	0.00	0.13	0.06	0.00	0.01	0.01
Lithuania	0.00	0.00	0.02	0.25	2.05	0.19	0.14	0.31
Luxembourg	0.00	0.00	0.04	0.38	4.27	0.02	0.05	12.85
Malta	0.02	0.00	0.01	0.00	2.15	0.00	0.05	2.14
Netherlands	3.14	2.50	5.43	28.03	3230.00	16.10	20.10	953.80
Poland	0.02	0.01	0.08	0.92	1.81	0.28	0.11	1.52
Portugal	0.07	0.00	0.09	7.39	15.80	0.05	2.31	2.24
Romania	0.02	0.00	0.06	0.20	5.24	0.25	0.15	2.80
Slovakia	0.01	0.00	0.00	0.84	30.70	0.36	0.25	25.89
Slovenia	0.00	0.00	0.00	2.43	85.70	0.23	0.56	26.51
Spain	11.00	1.12	7.04	34.24	293.00	5.74	27.70	219.56
Sweden	3.29	0.24	3.86	7.31	13.40	7.53	2.72	60.96
UK	1.45	23.70	13.70	13.45	170.00	116.00	11.70	163.30

Note: the solar components include the hscodes presented in box III.3.2

EU-27 Member States average (2010-2012) intra and extra-EU imports and exports of Wind components, in million EUR

	Export		Import	
	Extra	Intra	Extra	Intra
Austria	34.10	53.70	2.12	36.40
Belgium	30.60	75.90	5.62	61.90
Bulgaria	2.40	24.70	3.68	12.10
Cyprus	0.06	0.02	1.44	1.83
Czech Republic	10.80	33.80	5.82	33.70
Denmark	170.00	288.00	11.20	28.30
Estonia	2.47	12.10	0.41	1.80
Finland	10.70	2.57	4.07	11.10
France	28.10	38.40	7.03	98.40
Germany	240.00	369.00	44.80	238.00
Greece	0.38	7.77	1.96	28.00
Hungary	3.06	31.80	2.02	16.60
Ireland	0.10	5.49	0.27	12.60
Italy	65.00	37.50	8.07	84.90
Latvia	2.40	0.63	0.08	2.52
Lithuania	0.32	0.79	1.07	1.37
Luxembourg	0.01	0.22	0.01	0.49
Malta	0.01	0.00	0.05	0.05
Netherlands	36.40	21.20	10.90	17.80
Poland	3.07	34.90	5.19	40.30
Portugal	7.38	16.60	0.61	4.15
Romania	8.68	28.00	9.84	64.40
Slovakia	1.09	20.00	4.15	21.70
Slovenia	1.60	8.77	6.11	18.90
Spain	101.00	195.00	14.60	35.00
Sweden	13.00	15.10	7.54	90.00
UK	34.50	20.50	26.80	221.00

Note: the wind components include the hscodes presented in box III.3.2

EU-27 Member States average (2010-2012) imports and exports of Wind components to China, Japan and the USA, in million EUR

	Exports				Imports			
	China	Japan	USA	Others	China	Japan	USA	Others
Austria	5.28	0.32	11.10	17.40	0.42	0.61	0.02	1.07
Belgium	4.60	1.02	3.78	21.21	0.81	6.51	0.90	0.00
Bulgaria	0.00	0.00	0.00	2.39	0.83	0.00	0.00	2.84
Cyprus	0.00	0.00	0.00	0.06	0.61	0.00	0.01	0.81
Czech Republic	1.34	0.05	1.27	8.14	0.89	5.36	0.24	0.00
Denmark	0.62	0.11	82.90	86.37	4.39	0.14	0.04	6.64
Estonia	0.06	0.04	2.69	0.00	0.04	0.00	0.08	0.29
Finland	1.03	1.51	0.57	7.59	1.22	0.07	0.04	2.75
France	3.08	0.49	1.31	23.22	2.84	0.67	0.52	3.00
Germany	19.30	12.20	34.30	174.20	7.11	0.57	2.69	34.43
Greece	0.00	0.00	0.00	0.38	0.81	0.00	2.14	0.00
Hungary	2.72	0.07	0.84	0.00	0.26	0.79	0.16	0.81
Ireland	0.00	0.00	0.02	0.08	0.17	0.00	0.07	0.03
Italy	1.47	0.20	29.10	34.23	3.53	0.10	1.11	3.33
Latvia	0.00	0.00	0.00	2.40	0.05	0.00	0.05	0.00
Lithuania	0.00	0.00	0.00	0.32	1.20	0.00	0.00	0.00
Luxembourg	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Malta	0.00	0.00	0.00	0.01	0.01	0.00	0.08	0.00
Netherlands	0.07	0.88	0.36	35.09	8.64	0.97	0.40	0.89
Poland	0.72	0.37	0.26	1.72	4.98	0.16	0.07	0.00
Portugal	0.00	0.00	0.04	7.34	0.70	0.10	0.01	0.00
Romania	1.55	0.37	0.48	6.29	6.84	0.00	1.91	1.08
Slovakia	0.20	0.00	0.10	0.79	0.16	0.66	0.26	3.07
Slovenia	0.08	1.74	0.13	0.00	0.18	0.00	0.02	5.91
Spain	4.81	0.60	19.60	75.99	9.43	0.86	0.91	3.40
Sweden	0.21	0.17	7.49	5.13	3.71	0.18	0.06	3.60
UK	1.00	0.99	12.00	20.51	7.80	7.41	6.84	4.74

Note: the solar components include the hscodes presented in box III.3.2

EU28 Member States average (2010-2012) exports of Solar components to the other EU Member States, in million EUR

	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
Austria		11.10	19.50	0.13	0.03	5.48	0.31	0.01	0.05	6.37	74.30	1.44	2.14	0.02
Belgium	0.73		8.52	0.01	2.72	17.40	1.94	0.16	0.02	177.00	372.00	5.70	0.22	0.01
Bulgaria	0.05	0.08		0.03	0.08	0.47	0.00			0.06	1.45	3.51	0.05	
Croatia	0.34	0.00				0.02	0.09	0.00		0.04	3.99		0.03	
Cyprus	0.35									2.01	41.60	7.97		
Czech Republic	3.23	3.28	7.83	0.11	0.00		0.10	0.00	0.00	4.61	441.00	9.15	0.17	0.18
Denmark	0.68	0.01	0.00	0.01	0.00	0.02		0.00	0.18	0.30	4.42	0.01	0.00	0.00
Estonia		0.03		0.00					0.70		0.15		0.00	
Finland	0.00	1.39				0.14	0.01	0.66		1.05	4.02	0.07	0.00	0.04
France	0.69	18.40	0.42	0.04	0.82	0.24	0.84	0.01	5.58		86.90	3.52	0.43	1.58
Germany	104.00	189.00	74.30	1.32	32.90	375.00	32.80	2.82	3.15	511.00		285.00	19.90	3.64
Greece	0.22	0.34	21.30	0.00	1.13	0.46				0.22	6.52			0.00
Hungary	8.07	13.60	0.20	0.00		1.91	2.90	0.00	0.00	34.50	187.00	3.19		0.01
Ireland		0.09				0.01				0.14	0.10	0.00	0.00	
Italy	6.95	4.01	6.46	9.24	2.16	2.18	0.27	0.03	0.11	12.40	101.00	36.70	0.53	0.16
Latvia					0.00		0.00	0.00		0.00	0.00			
Lithuania		0.01	1.47	0.00			0.04	0.00	0.01	0.01	0.00			
Luxembourg	0.21	56.10	1.38	0.00	0.00		0.01		0.00	16.20	19.40	0.14	0.00	0.02
Malta		0.00					0.00		0.00		0.00			
Netherlands	14.70	248.00	73.80	0.08	3.27	28.60	7.54	0.25	1.01	94.70	2460.00	28.30	4.40	2.33
Poland	0.02	0.00	0.01	0.01	0.00	2.53	0.00	0.00	0.01	0.11	51.50	0.00	0.05	0.00
Portugal	0.05	0.53	5.65		0.00	2.01	0.22			2.17	28.60	2.30	0.01	
Romania	0.01	0.00	3.89	0.00		0.16	0.00			0.57	5.04	0.01	0.01	
Slovakia	1.47	0.00	1.11	0.02	1.73	18.50	0.05	0.00	0.02	0.02	0.57	0.01	7.00	
Slovenia	0.33	7.46	11.20	0.80	0.18	11.00	0.00	0.00	0.00	0.62	22.60	0.75	0.97	0.00
Spain	1.79	9.97	1.21	0.02	6.32	12.20	1.47		0.02	101.00	161.00	19.50	0.01	0.14
Sweden	1.15	1.22	0.00	0.00	0.00	10.30	1.73	1.02	14.10	5.08	61.90	0.04	0.20	0.01
UK	0.96	3.50	0.09	0.02	0.02	0.44	1.99	0.05	0.23	22.80	193.00	1.29	0.25	1.43

	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	UK
Austria	53.30	0.01	0.01	1.37	0.14	1.25	1.91	0.32	1.94	13.10	9.79	3.87	0.96	9.09
Belgium	77.60	0.00	0.49	9.88	0.02	60.30	2.49	7.18	1.39	1.93	10.50	13.00	0.32	20.30
Bulgaria	0.97		0.00	0.00	0.01	0.68	0.00	0.01	0.90	0.00	0.00	0.08		0.36
Croatia	44.30					0.09	0.02		0.00		0.21	0.05	0.00	0.13
Cyprus	4.15					0.95								0.13
Czech Republic	53.40	0.00	0.07	1.61		1.14	0.11	0.36	3.24	55.50	0.18	0.69	0.02	7.39
Denmark	0.35	0.00	0.10		0.00	10.50	0.42	0.01	0.00	0.00	0.00	0.37	0.81	0.70
Estonia	0.00	0.01	0.00			0.00	0.00			0.00		0.00	0.05	0.01
Finland	0.12	0.01	0.09			0.08	0.03	0.00	0.00	0.04	0.00	0.03	0.75	0.03
France	95.10	0.02	0.15	11.20	1.01	4.73	0.46	1.24	1.65	0.37	0.25	21.00	4.10	21.30
Germany	1460.00	1.09	3.98	38.80	3.72	157.00	32.80	14.10	18.70	49.80	15.80	168.00	21.80	159.00
Greece	11.20				0.32	0.08	0.00	0.02	0.50	1.89	0.05	0.37		0.01
Hungary	35.90		0.02	0.08		15.60	0.09	0.04	0.32	0.33	0.14	3.50	0.00	28.60
Ireland	2.03					0.00	0.20					0.06		0.18
Italy		0.00	0.07	0.20	0.19	1.93	2.21	1.30	2.66	1.62	3.65	6.22	0.48	5.88
Latvia			0.00	0.00									0.00	0.00
Lithuania	0.30	0.00			0.00	0.00	0.00					0.04	0.00	0.01
Luxembourg	5.23		0.01			0.26	0.00			0.38	0.03	0.01	0.00	0.06
Malta	0.02					0.00	0.00						0.00	
Netherlands	278.00	0.02	0.33	40.70	0.16		2.96	21.60	42.50	5.92	4.97	203.00	2.87	94.70
Poland	6.36	0.01	0.02	0.10	0.00	0.01		0.00	0.02	0.03	0.00	0.72	0.02	0.03
Portugal	4.70				0.04	0.89			0.93	0.94	0.00	5.85		0.06
Romania	27.00					0.00	0.00			0.00		7.26	0.00	0.01
Slovakia	0.58					0.04	0.01	0.02	10.70		0.01	0.01	0.03	0.01
Slovenia	43.00		0.08		0.03	7.35	0.01		0.84	2.10		0.18	0.00	2.67
Spain	384.00		0.01	0.00	0.09	20.40	0.01	19.40	0.81	4.54	0.46		0.01	9.86
Sweden	19.70	0.02	0.20	0.00	0.16	3.69	0.75	0.26	0.01	0.83	0.06	9.85		0.09
UK	122.00	0.01	0.21	0.81	3.83	13.60	0.30	0.17	0.65	2.01	0.25	4.20	1.43	

Note: that the solar components include the hscodes presented in box III.3.2)

Note: The values represent exports from the Member State in column A to the trade partner in the other columns

EU28 Member States average (2010-2012) exports of Wind components to the other EU Member States, in million EUR

	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland
Austria		2.17	1.51	0.40	0.06	3.25	1.90	0.43	0.29	5.58	28.00	1.66	1.69	0.23
Belgium	2.57		0.12	0.09	0.08	3.93	1.85	0.27	1.54	7.57	35.10	0.56	8.50	0.45
Bulgaria	0.10					0.35				0.31	3.63	3.02	0.00	0.01
Croatia	0.07	0.02	0.23			0.09			0.10	0.36	0.04			
Cyprus												0.31		
Czech Republic	1.24	0.68	0.51	0.02	0.02		0.49	0.01	0.88	3.29	13.30	0.07	0.41	0.01
Denmark	0.76	1.80	0.30	2.84	0.03	1.65		0.06	5.56	5.48	41.20	0.53	0.48	2.59
Estonia		0.00			0.15		13.80		8.73		3.20			0.06
Finland	1.64	2.58	0.67	0.13	0.23	1.06	1.74	1.42		2.64	13.60	0.64	0.37	0.32
France	1.63	3.12	0.09	0.05	0.16	1.47	0.52	0.03	0.21		13.60	0.23	0.57	0.18
Germany	23.50	26.70	9.13	1.47	4.77	28.40	49.50	0.78	8.16	67.80		17.90	3.42	6.03
Greece	0.11	0.01	0.30		1.53	0.07	0.57			0.66	0.46			
Hungary	2.56	5.70	0.09	0.12		8.99	0.00	0.00		6.10	21.00	0.00		0.05
Ireland		0.00			0.00		0.04		0.02	0.02	0.00			
Italy	1.53	2.87	0.84	0.13	0.23	1.18	0.51	0.08	1.03	9.03	24.90	2.81	1.68	0.18
Latvia	0.00				0.00	0.00	0.08	0.25	0.08		0.12			
Lithuania		0.00	0.01	0.00		0.01	0.03	0.11	0.01	0.00	0.06	0.00	0.02	0.00
Luxembourg	0.01	0.17	0.00	0.01		0.05	0.01	0.00	0.03	0.31	0.15		0.27	0.00
Malta														
Netherlands	0.07	6.52	0.01	0.01	0.01	0.33	0.19	0.07	0.09	1.39	6.85	0.08	0.16	0.15
Poland	1.13	3.22	0.01	0.01	0.01	3.76	0.36	0.19	0.16	7.42	9.41	0.01	0.09	0.17
Portugal	0.63	0.33	0.10	1.82	0.00	0.17	0.04		0.00	3.94	4.43	1.34	0.02	0.05
Romania	10.50	11.50	0.14		1.13	0.19	0.24	0.01	1.24	2.05	4.16	0.55	1.45	0.05
Slovakia	1.74	2.38	1.19	0.01	0.24	3.14	5.42	0.00	0.01	0.87	6.32	0.10	0.48	0.22
Slovenia	1.06	0.02	0.05	0.32		0.24	0.00			0.45	3.79	0.00	2.55	
Spain	0.96	3.83	1.72	2.61	1.65	1.52	2.24	0.03	0.51	16.70	15.20	6.59	12.70	3.41
Sweden	0.05	0.09	0.04	0.01	0.00	0.59	0.34	0.71	0.71	1.66	12.40	0.02	0.03	0.01
UK	3.64	1.08	0.03	0.02	0.04	0.40	1.52	0.00	0.12	3.30	5.73	0.03	0.50	0.79

	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	UK
Austria	10.70	0.25	0.12	0.03	0.03	2.05	1.51	0.90	2.97	3.50	0.73	2.62	1.02	2.88
Belgium	4.41	0.30	0.30	0.23	0.11	1.06	4.81	1.08	3.36	0.71	2.68	6.46	2.72	4.23
Bulgaria	2.27					0.00	0.11		14.30	0.00		0.67	0.00	0.07
Croatia	0.41					0.41	0.04		0.01	0.01	0.47		0.02	0.00
Cyprus														
Czech Republic	1.00	0.01	0.01	0.01	0.00	0.19	1.93	0.01	3.57	1.76	1.09	0.59	0.75	5.47
Denmark	7.70	1.76	1.11	0.35	0.00	6.65	8.53	0.42	13.70	0.19	0.19	5.37	39.60	130.00
Estonia	1.57	0.16	0.05			0.09	0.00					0.78	0.04	
Finland	7.21	0.07	0.40	0.07		3.15	1.01	0.31	0.70	0.31	0.13	4.23	3.27	3.30
France	4.74	0.06	0.05	0.36	0.03	3.29	1.82	0.49	0.84	0.44	0.53	5.08	0.62	7.19
Germany	70.20	0.67	1.88	2.38	0.22	17.80	15.50	8.07	9.51	7.37	9.76	29.00	12.90	40.10
Greece	1.96		0.04		0.00	0.00		1.04	0.17			1.54		5.48
Hungary	9.39	0.00	0.01	0.02	0.00	0.01	3.84		0.52	3.17	0.76	6.28	0.12	0.16
Ireland	0.00	0.00	0.00		0.00	0.01		0.00				0.00	0.00	4.60
Italy		0.19	0.13	0.10	0.03	1.16	2.55	0.34	0.77	0.77	0.75	2.92	0.42	9.07
Latvia			0.13				0.02			0.00			0.03	
Lithuania	0.00	0.27				0.21	0.05		0.01	0.02		0.00	0.21	0.00
Luxembourg	0.30	0.00				0.01	0.02	0.01	0.02	0.01	0.00	0.04	0.06	0.07
Malta														
Netherlands	2.79	0.07	0.04	0.19	0.04		0.68	0.04	0.09	0.53	0.09	0.49	0.21	7.76
Poland	1.85	0.11	0.12	0.00	0.00	2.26		0.02	0.92	1.53	0.22	2.84	3.36	1.98
Portugal	2.41			0.03		0.02	0.55		0.84		0.10	3.40	0.02	2.29
Romania	0.73	0.10	0.12			0.80	0.23	0.01		0.01	0.02	0.32	0.02	0.55
Slovakia	0.91	0.03	0.09	0.02	0.00	1.45	0.12	0.00	0.04		0.83	0.11	2.61	0.39
Slovenia	0.10	0.00	0.00		0.00	0.00	0.00	0.05	0.00	3.30		0.11	0.00	0.34
Spain	42.60	0.01	0.01	0.01	1.12	1.42	29.30	2.70	23.10	0.03	0.44		7.69	18.40
Sweden	0.46	0.12	0.01	0.03	0.00	1.71	0.39	0.02	0.00	0.07	0.00	0.10		0.51
UK	1.64	0.02	0.02	0.01	0.01	5.35	0.32	0.21	0.03	0.10	0.01	1.57	0.74	

Note: the solar components include the hscodes presented in box III.3.2

Note the values represent exports from the Member State in column A to the trade partner in the other columns