Economic Radar of the Sustainable energy sector in the Netherlands

Edition 2014

Statistics Netherlands

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Explanation of symbols

.	Data not available
*	Provisional figure
**	Revised provisional figure (but not definite)
x	Publication prohibited (confidential figure)
–	Nil
–	(Between two figures) inclusive
0 (0.0)	Less than half of unit concerned
empty cell	Not applicable
2013–2014	2012 to 2013 inclusive
2013/2014	Average for 2013 to 2014 inclusive
2013/'14	Crop year, financial year, school year, etc., beginning in 2013 and ending in 2014
2011/'12–2013/'14	Crop year, financial year, etc., 2011/'12 to 2013/'14 inclusive

Due to rounding, some totals may not correspond to the sum of the separate figures.

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Information
Telephone +31 88 570 70 70, fax +31 70 337 59 94
Via contact form: www.cbs.nl/information

Where to order
verkoop@cbs.nl
Fax +31 45 570 62 68

Contents

1. Introduction and background

In this introduction we present the objective of this study and some background information on the relevance of the sustainable energy sector for the Dutch economy.

1.1 Motive, purpose and structure of this report

This report is a continuation of the Sustainable Energy Sector (SES) Radar of 2013 (CBS, 2013) and contains four chapters. The first chapter discusses the motive of this study and the relevant policy context. Chapter 2 covers the definitions, concepts and methodology used in the compilation of the economic figures for the SES. In chapter 3 we discuss new methods to properly monitor the installation phase of the SES. Chapter 4 discusses the plans of Eurostat with respect to monitoring the Environmental Goods and Services Sector (EGSS), which, in the future, will put the SES Radar in an international perspective. It is important to note that the SES is part of the 'environmental goods and services sector' in an environmental accounting context. The European Commission is preparing a legal base for the EGSS right now. Finally, chapter 5 contains some recommendations for further research.

In this report we do not discuss or interpret the figures in depth. Interpretation and discussion of the figures on the SES is part of the publication *Nationale Energie Verkenning* (NEV, 2014). The NEV project is led by the ECN in collaboration with consortium partners Netherlands Enterprise Agency (RVO), Netherlands Environmental Assessment Agency (PBL) and Statistics Netherlands (CBS). We refer to this publication for an economic interpretation of the Radar results.

1.2 Background information

The increasing importance of sustainable energy sources provides economic opportunities within the Netherlands and abroad (exports). Economic, technological and geopolitical developments have the potential to make the sustainable energy sector (SES) one of the fastest growing industries in the Netherlands (Ecorys, 2010). This study aims to monitor whether these opportunities have been realised in the recent past. The SES includes energy producers and manufacturers of machinery, researchers, transport and storage companies, and other companies active in the value chain of sustainable energy goods and services. Indirect economic effects of activities in the SES value chain (spill-over effects) are not part of this study. The SES comprises industries in energy saving, renewable energy systems as well as industry profiles that make fossil energy relatively more sustainable (e.g. carbon capture and storage (CCS)).

The Dutch economy has a tradition of substantial economic activity in the energy sector. Where the first half of the 20th century was characterised by the extraction of coal in the south of the Netherlands, the second half was characterised by the extraction of natural gas in the north of the country. Furthermore, the port of Rotterdam serves as a gateway

for all kinds of fossil fuels to the inland areas of Europe, constituting economic activity in both the refinery and the distribution of fossil fuels. Although fossil fuels are still the main source of energy on a global scale, there is a growing awareness of the need for alternative energy sources. European policy documents have elaborated such robust trends as electrification and the increasing share of new energy systems (Communication by the EC of EU energy roadmap 2050, 15 December 2011). Global concerns about climate change and the limited fossil resources, and national concerns about import dependency, made the importance of sustainable energy sources self-evident and indicate a new global and European perspective on energy consumption and production. And also on the comparative economic advantage of well-functioning energy systems in the creation of a decarbonised, competitive and secure energy sector in the EU and nationally. This is reflected by increasing investments in renewable energy worldwide (e.g. Clean Energy Progress Report (OECD/EIA, 2011)) and in the national and international climate and energy goals. The public debate also revolves around public spending on incentives for households and companies.

Recent economic policy in the Netherlands is characterised by the formulation of nine '*top sectors*'. The objective of this policy is to further strengthen those economic activities where the Netherlands holds a strong worldwide position.[1)] The economic activities discussed in this study are part of the top sector Energy. Economic data have been used by the SER in elaborating the 2013 energy agreement known as the '*Energieakkoord*'.[2)]

Finally, the SES plays an important role in the aim for 'Green growth', or sustainable growth, which is high on the Dutch political agenda (Ministry of Economic Affairs (EZ, 2013)).

[1)] Http://www.rijksoverheid.nl/onderwerpen/ondernemersklimaat-en-innovatie

[2)] Energy Agreement for Sustainable Growth by over 40 Dutch governmental and non-governmental organisations as well as financial institutions. This agreement aims to promote energy saving and cleaner energy technologies in the Netherlands while creating job opportunities and export opportunities (SER, 2013)

2. Concepts, definitions and methodology

This chapter provides a detailed description of the activities included in the sustainable energy sector (scope and boundaries, section 2.1). The methods applied to compile the economic indicators for the SES are presented in section 2.2. Section 2.3 contains the definitions of the economic variables (e.g. production, value added and export), and the delineation and classification of the sustainable energy sector. Section 2.4 is about the revision of methodologies and its impact on radar figures.

2.1 Scope and boundaries

This is the fourth consecutive edition of the Economic Radar of the Sustainable Energy Sector published by Statistics Netherlands (CBS, 2011a; CBS, 2012a, CBS, 2013a). For more information, see the previous publications.

Prior to the SES Radar by Statistics Netherlands, Ecorys conducted a study, commissioned by the Ministry of Economic Affairs (EZ), on the SES in 2010 (Ecorys, 2010). That study defined the SES as follows:

"Sustainable energy is the energy we can use indefinitely without compromising the environment and the possibilities for future generations. Sustainable energy, better called pure renewable energy, is not generated by using fossil fuels or chemical minerals, which are all finite. We assume that the sun, water and the air are infinite sources. From an economic perspective and the 'Trias Energetica' we also look at activities with a direct impact on sustainable energy policy in manufacturing. So energy saving will be dealt with (less energy consumption means less energy production) but we also examine activities such as developing the grid, electric transport, hydrogen technology, and capture and storage of CO_2 (CCS)." (Ecorys, 2010).

SES comprises companies in sixteen product profiles in energy saving, renewable energies and companies making fossil energy more sustainable such as CCS.

The structure in which the data are presented is designed with the economic value chain in mind. First, the SES is broken down into two sub-sectors, the non-exploitation phase (N-SES) – in earlier studies this phase was referred to as the P-SES where P stands for pre-exploitation – and the exploitation phase (E-SES). Ecorys (2010) defined them as:

Non-exploitation phase (N-SES): Companies active in value chains before or after the exploitation phase, such as the production of renewable energy systems, R&D focusing on sustainable energy technologies, transport of wind turbines, trade in biomass. Also included are companies and institutions dealing with energy saving. Distribution of renewable energy is not included in the N-SES.

Exploitation phase (E-SES): The actual production of renewable energy (operation and maintenance).
The N-SES mainly concerns companies and institutions involved in activities that precede the physical production of sustainable energy: for example the development and production of solar cells, wind turbines and frugal energy technologies. This is a heterogeneous group of companies, active in many different industries. Electric power

companies are not included in the N-SES. Most of their activities in renewable energy relate to deployment and these activities are part of the exploitation phase in this study.

It is insightful to distinguish the two sectors, as the N-SES is more R&D intensive while the E-SES is much more capital intensive. Furthermore, the N-SES is of particular economic interest due to its high-level employment, while the E-SES indicates the stage of new energy deployment in the Netherlands. Moreover, this distinction allows us to investigate whether investment in technological innovation is reflected in increased use of sustainable technology in the Netherlands.

In contrast to other studies (Ecorys, 2010 and Roland Berger, 2010), this study is limited to quantifying activities that have a direct relation to the SES, while indirect effects (spill-over effects) on other sectors are not included. To give an indication of the indirect effects, Ecorys (2010) considers them to be a factor 2. On the other hand, this study does not consider possible negative effects like job losses in the conventional energy sector.

This framework distinguishes different processes and products within the SES.
More precisely, the sustainable energy sector is broken down into sixteen product profiles (table 2.1.1) and seven process profiles (table 2.1.2).

2.1.1 Overview of product profiles

Solar PV
Solar - Concentrated Solar Power (CSP)
Solar thermal energy
Biogas
Biomass (solid) & waste
Biofuels (including the production of bio fuels)
Bio-refining
Wind on shore
Wind off shore
Aero-thermal & geo-thermal energy
Energy from water
Energy saving
Electric road transport
Smart grids
Hydrogen technology
CO_2 capture and storage (CCS)

2.1.2 Overview of process profiles

R&D
Consultancy
Transport (of biomass, wind turbines, etc.)
Preparation/raw material production
Supply, assembly and construction
Production of energy carriers
Installation

International context

Finally, it is important to note that in an environmental accounting context, the SES is part of the 'environmental goods and services sector', for which Statistics Netherlands has

developed a new set of statistics. These statistics are the result of a European (Eurostat) handbook on guidelines for constructing European statistics that structurally monitor the Environmental Goods and Services Sector. These statistics are also part of the System of Environmental Economic Accounting (SEEA), which was formally adopted by the statistical department of the United Nations in 2012. The SEEA describes an international system of harmonised concepts for the compilation of environmental accounts.

2.2 Methodology

The data for the N-SES and E-SES are compiled in different ways. In this section we discuss the underlying methodologies for both sectors.

Non-exploitation phase

In 2011 Statistics Netherlands designed a population of companies from its business register that all belong to the N-SES (i.e. N-SES 2011 population). The basis for this population was formed by the companies belonging to the environmental goods and services sector, which was already monitored by Statistics Netherlands. Ecorys and Energieonderzoek Centrum Nederland (ECN) supplied additional companies to complete this population of companies. These companies can be selected from the Dutch business register, which allows Statistics Netherlands to derive economic indicators specific to this set of companies. Such an approach is generally referred to as a 'micro data approach'.

The fact that a large set of companies is only partially active in activities related to sustainable energy deserves special attention. For instance, a company that installs and maintains solar installations is often also active in traditional construction activities. Or companies that are active in sustainable energy research might also allocate part of their research capacity to environmentally related research. The SES Radar deals with this phenomenon by expert guessing a so called 'specialisation factor'. This factor indicates what share of a company is active in the N-SES, which implies that only that share of the company is considered part of the N-SES. There are three main methodological problems with this approach.

First, there is no unambiguous and objective method available to determine a company's specialisation factor, so the specialisation factor is affected by the subjectivity of the expert's opinion. Second, this share is applied identically and consistently over employment, value added and production figures, ignoring the fact that it might differ per variable. Third, the specialisation factor is considered constant over time, which implies that developments in the specialisation factors are not considered. For instance, when a company has a stable number of employees and allocates more employees to sustainable energy related activities, this is not observed in the figures presented in this report. This third problem applies mainly to companies that are not fully specialised, because it is not unreasonable to assume that these companies switch more easily between business activities than specialised companies. For this reason, the figures presented in this report generally distinguish between specialised and non-specialised

companies, because the trends observed in specialised companies probably represent the general trends in the SES more accurately.

This population served as the starting point in this report as well. However, the population has substantially been updated and revised. In order to perform this update, we consulted a selection of data sources. The department of energy statistics at Statistics Netherlands, ECN, NL Agency (subsidy and patent department) and PolderPV all shared a list of companies that might potentially be active in the SES. Furthermore, a set of potential SES companies was collected by looking at start-up companies from Dutch technical universities. Finally, websites of business associations of the SES were used to identify additional companies. The total collection of new companies were all studied and classified as either part of the N-SES or not. This procedure led to the updated N-SES 2013 population.

Due to the revision, figures for reporting years 2008 to 2011 are different in this report from the figures presented in the 2013 SES Radar for two reasons. First the population has been updated and second specialisation factors at the micro level have been revised. It should also be noted that in contrast to the 2012 SES Radar, the production of biofuels is now included in the figures of the E-SES instead of in the figures of the N-SES. Quantification of the effect of the revision is part of section 2.4.

Exploitation phase

An alternative computation technique was developed for the E-SES. This approach is not based on company level information (micro data) but on industry level information (meso statistics). At industry level, Statistics Netherlands has access to data on the physical production of the various sustainable energy technologies (*Hernieuwbare energie in Nederland*, CBS (2014a)). These data are combined with price information on energy (source: National Accounts, international trade data and energy statistics), figures on product-based SDE/MEP subsidies and information on maintenance and operational costs (ECN, 2008, 2009 and ECN, DNV KEMA 2013). For more information see also the 2011 Radar.

All data collected for both the N-SES and E-SES are presented in such a way that they are comparable with the data presented in the 2011 SES Radar (van Rossum et al., 2011), the 2012 SES Radar (Vuik et al., 2012) and the 2013 SES Radar (Zult et al., 2013). Furthermore, because this report will be publicly available, all data are aggregated and presented in such a way that the results are anonymous with respect to individual companies.

Export and import figures

The export and import figures are, for the most part, compiled with the same method as the employment, value added and production figures of the N-SES figures, using the company level specialisation factors. The companies in the N-SES are simply linked to the import and export data in goods.

However, the figures are compiled differently for biofuels and biomass. They are compiled directly from the trade in goods database, which is possible because biofuels and biomass can, to a large extent, be directly linked to specific product codes (HS codes, see Annex B). This direct method is an improvement because in the case of biofuels and biomass a large part of the trade flows comes from companies that are also involved in other, conventional energy carriers. However, the method also involves some complications that require further explanation. First, some large, specialised biofuel producing companies export their biofuels under an HS code that belongs to a conventional energy carrier. Despite their conventional HS code, the flows of these specific companies can be considered exports in biofuels, as these companies produce only biofuels. Second, biofuel producing companies also import raw materials that serve as input for the production of biofuels. Imports of these raw materials by biofuel producers are included in our figures. International trade of these basic materials by other businesses (e.g. wholesale traders) are not included, because of the multipurpose problem. Third, biomass imported for other purposes than conversion into energy is not considered imports of biomass.

There is room for improvement in the method for compiling trade figures from the international trade figures. First, because the scope of the HS codes is not always specific enough to identify whether it is a renewable energy carrier, such as with biofuel or biomass. Second, the trade database does not allow us to identify trade in services, because the appropriate data at the company level (business unit) is not available for the trade in services.

Gross capital formation

To monitor gross capital formation developments in the exploitation phase of the sustainable energy sector (E-SES), data have been used of NL agency/RVO as well as figures by Statistics Netherlands on the newly installed capacity of wind and solar installations. Figures on the capital formation related to the exploitation of solar and wind power installations are based on newly installed capacity and investment costs per unit MW. Other exploitation phase capital formation is based on the EIA schemes. Companies can apply for a subsidy (i.e. tax exemption) if they think their capital formation projects comply with the EIA (*Energie investeringsaftrekregeling*) criteria. Every year NL Agency publishes a detailed overview of these applications (see NL Agency (2012, 2011, 2010, 2009, 2008)).
Figures for the N-SES are based on the gross capital formation survey data that are available at Statistics Netherlands (using the company level specialisation factors).
The figures on patents were provided by the Netherlands Patent Office which is part of RVO. Patents are direct results of innovation and are therefore indicative for the quality and quantity of R&D in the SES. Like in previous years, the patents department of NL Agency collected a number of patent statistics which we describe here. One advantage of patents is that they are classified in accordance with the International Patent Classification (IPC). They can therefore be linked directly to energy technologies, making it possible to pinpoint more precise relevant innovation activities.

2.3 Definitions of the economic indicators

This study uses the same definitions and concepts as the System of National Accounts (Statistics Netherlands (2014b)). The SNA provides a quantitative description of the economic process within a country and its economic relations with other countries. It distinguishes production, accumulation and distribution of income, spending and finance. All these concepts are determined based on the resident principle. Residents are all individuals and companies that belong to the Dutch economy. Any person or company (including companies under foreign control) residing in the Netherlands for longer than one year belongs to this group of residents. We use several key concepts from the SNA to monitor the SES: production, value added, and employment in full- time equivalents (FTEs). Exports, imports and capital formation are part of SNA framework as well. The figures on innovation and R&D are not explicitly part of SNA, all concepts are also defined below.

Production or output (basic prices): Production covers the value of all goods produced for sale, including unsold goods, and all receipts for services rendered. It also includes the market equivalent of goods and services produced for own use, such as own account capital formation, services of owner-occupied dwellings and agricultural products produced by farmers for their own consumption. Production is valued at basic prices, defined as the price received by the producer excluding trade and transport margins and the balance of taxes and subsidies on products. This is the price the producer is ultimately left with.

Gross value added (basic prices): Gross value added at basic prices by industry is equal to the difference between output (basic prices) and intermediate consumption (purchaser prices). Gross means inclusion of consumption of fixed capital. All value added figures in this report are gross value added figures, unless specified otherwise.

Employed persons (FTE): Someone working for a company, an institution or a private household located in the Netherlands. Full-time equivalents (FTE): a measure of labour volume, calculated by converting all full-time and part-time jobs to full-time jobs. Including self-employed persons.

Exports of goods: Exported goods are goods that have been exported by residents from the Dutch economic territory to the rest of the world. Exports of services include services of Dutch transport enterprises abroad, port services, ship repair services and engineering works by Dutch contractors abroad. Also included in exports of services is the expenditure by foreign tourists, inhabitants of border areas and diplomats in the Netherlands.

Imports of goods: Imported goods are goods intended for residents that are imported from abroad into the Dutch economic territory. These include raw materials, semi-manufactured products, fuels and final products. They also include imported goods that are re-exported without undergoing any processing. Imports of services include among other things expenditure abroad by Dutch tourists, inhabitants of border areas and diplomats.

Gross fixed capital formation: Expenditure for produced tangible or intangible assets that are used in the production process for more than one year, such as buildings, dwellings, machinery, transport equipment, etc.

2.4 Revision of methodologies and its impact on radar figures

For the 2014 SES Radar, the SES company population that was used for the 2013 SES Radar has been under scrutiny. This led to a revision in the population of companies that constitute the N-SES figures in earlier reports. Also the E-SES figures have been revised by implementing new insights. In this section we discuss the main changes in methodologies and scope.

Exploitation phase (production, value added and employment)

MEP/SDE are abbreviations for Dutch subsidy schemes that aim to stimulate the production of sustainable energy. These subsidies are included in the production (output) and value added is measured in basic prices. Measuring in basic prices means that subsidies on products are added while taxes on products are deducted.

New insights on production prices have been implemented. In previous publications, prices for all energy carriers (electricity, heat and gas) were based on the monetary production (value) of energy from the national accounts and the physical production from the Energy balance (quantity). In the current publication this approach has been applied only to the production of heat for 2012 and 2013. The electricity price from 2007 to 2013 is now based on data collected for price statistics and data on trade margins as compiled by Statistics Netherlands. The price for natural biogas is based on the annual report of Gasterra (2013) where both turnover and quantities (m^3) are presented for 2012 and 2013. The prices are recalculated as far back as 2001 on the basis of price indices from the national accounts.

Non-exploitation phase (production, value added and employment)

Wind offshore and wind on land have been revised as a result of improved knowledge sharing between RVO, TNS NIPO/DECISIO and Statistics Netherlands. The figures of Statistics Netherlands were reconciled for the year 2012, which resulted in a revised time series (employment, production and value added) for the wind energy sector. The results for employment in 2012 are aligned. However, some differences remain for value added and productions due to conceptual (basic prices versus market prices) and methodological differences. A methodological difference is the approach for the

exploitation phase. Statistics Netherlands bases its results on the statistics on wind energy (physical) production. The Decisio/TNS NIPO results are based on survey data as well as economic ratios for the electricity producing industry.

Electric transport (ET) has been revised due to increased knowledge sharing between RVO, Dutch Organisation for Electric Transport (DOET), and Statistics Netherlands. Survey material of RVO/DOET has been used to improve the quality of statistics on electric transport. DOET has held a survey among companies in the electric transport (ET) sector where most respondents were members of DOET active in different industries such manufacturing, construction and consultancy. In the survey the ET companies were asked to provide both their total number of FTE's and their number of FTE's that could be attributed to ET related activities. ET's share in the employment of the responding businesses was applied to the total employment of the non-responding ET businesses as available in the employment register of Statistics Netherlands. Production and value added per FTE ratios of different Statistical Classification of Economic Activities in the European Community (NACE) classes were applied to estimate production and value added figures. As the survey concerns 2013, figures on the number of newly registered vehicles and newly installed charging stations (RVO, 2014) were used to obtain a time series for the 2008 – 2013 period.

Energy saving figures are revised due to a change in scope. Insulation installation activities are now included in the scope of the Radar. Furthermore, new insights on the population of insulation material producers has been implemented. See section 3.1 for more details.

Installation of solar PV, solar thermal and heat pumps figures are compiled by combining figures on newly installed capacity and an employment factor (number of FTE's required to install one unit of capacity). Many companies in the construction installation industry have a wide portfolio of products, e.g. the installation of home security systems, solar panels and central heating systems. The share of renewable energy related activities within these business is difficult to estimate. Using a model based on the installed capacity, statistics aim to provide better insight in the dynamics of the technologies involved. See section 3.2 for more details.

In the 2008–2011 timeframe, several large biofuel production facilities were constructed, mostly in the Rotterdam seaport. Based on the investment figures available from the fixed capital formation questionnaire, an estimate for the employment, production and value added in the construction of biofuel production plants was added to the N-SES figures. In previous Radar publications these activities were unaccounted for.

International trade

International trade in insulation materials is now based on a selection of relevant HS codes (international trade codes). In earlier reports the trade in insulation materials was based on the micro population and its corresponding specialisation factors. Additionally, for trade in biofuels, the trade flows of well-known specialised biofuel producers have been under scrutiny. As these companies solely produce biofuels it is certain that their imports of basic materials serve as input for biofuels while their exports can only be biofuel, even when they are recorded under a different name (which can

occur for various reasons). Both these import and export flows are now part of the trade figures. Exports of *raw* materials by businesses other than well-known specialised biofuel producers (which potentially can be used for the production of biofuels) are not included (multipurpose problem). Biofuels as end products are registered as import and export flows. Vegetable oils, for example, can be used for energy purposes but also for all kinds of other purposes (like shampoo).

Capital formation

Capital formation figures are generally compiled from two sources. First, for the N-SES figures, a company level survey on capital formation expenditures is available at Statistics Netherlands. This survey can be linked to the micro population. Second, the E-SES is compiled from data on the Energy Investment Allowance (EIA), a subsidy scheme for energy-efficient technologies and durable energy. In addition to these two main data sources, a specific calculation method is applied for capital formation in solar and wind energy. This calculation is based on combining price information (euros per KW) that can be found in an annual series of ECN reports (2007 – 2013) with energy capacity figures (MW for wind and square metres for solar) compiled by the energy department of Statistics Netherlands.
In order to investigate the impact of this revision, table 2.4.1 below compares a set of core economic indicators for the year 2011, for which figures are presented in both reports.

2.4.1 Core indicators for total SES for the year 2011 in radar 2013 and 2014

	Radar 2013	Radar 2014				
	total	total	insulation installation	Revision	Scope expansion	Total
	fte			**%**		
Employment	19,100	44,400	20,400	26	107	132
	mln euros					
Production	6,810	10,660	2,300	23	34	57
Value added	2,400	4,220	1,030	33	43	76

Table 2.4.1 shows that the changes made in the methodologies and scope as well as the new information that became available have led to a considerable revision of the results published in the previous year. The expansion of the scope had the greatest impact, i.e. the newly included installation of insulation activities in existing houses and other buildings. Adding the MEP/SDE subsidy scheme to the value added and production of the exploitation phase also had a substantial effect on the value added and production indicators.
It should be noted that the work on the economic figures of the sustainable energy sector is still a 'learning process'. On-going interaction and discussions with stakeholders, such as the organisations that signed the 2013 Energy Agreement for Sustainable Growth *(Energieakkoord)*, and researchers as well as the international statistical community will result in future improvements and possibly extensions of the figures on the SES.

3. New methodologies in 2014

In chapter 3 we discuss new developed methodologies to properly monitor the installation phase of the SES. Most indicators that are discussed so far can be compiled for t –22 months. However, for employment in the N-SES there are some alternative data available (the employment register) that allows for a more recent figure (t –10 months). In chapter 3 this quick estimate is discussed too.

3.1 Insulation installation activities

One of the objectives of the 2013 Energy Agreement for Sustainable Growth *(Energie-akkoord)* is an increase in job opportunities in the insulation installing activities. Previous Radars, published by Statistics Netherlands, covered part of the energy saving related activities. Insulation installation activity in houses and other buildings was not included. However, the relevance of these insulation activities was underlined in the discussions with stakeholders and third parties that evolved around the previous Radars. The next two paragraphs discuss the scope and methodology used in the compilation of the economic figures. Next the figures for the core economic indicators are presented.

Scope of the insulation installation sector

Companies and institutions dealing with energy saving in the built environment are categorised under the N-SES. The focus in this paragraph is on insulation installation activities by companies in the Netherlands in existing as well as in newly built constructions. Though eventually only insulation of existing constructions is considered within the scope of the N-SES. Installing insulation and double glazing in new buildings is the rule rather than the exception and cannot be seen as a characteristic activity of the sustainable energy sector.

Installation activities are taken on by many non-specialised companies, i.e. companies that perform other activities beside installing insulation. Therefore it is not feasible to identify all these companies and their share of insulation installation activities, which rules out the micro approach that is used for most of the N-SES figures.

The selection of relevant insulation materials, e.g. mineral wools and expandable polystyrene (see annex C for detailed product codes), took place in consultation with the ECN, Buildsight and RVO. Insulation products are broken down into 'glass' and 'insulation materials'. Contrary to multi-layered glass, many other insulation materials are multipurpose. These multipurpose materials are not fully relevant for insulation. These issues are discussed in the next section.

Methodology

The method to construct figures for insulation installing activities is developed in consultation with the ECN, RVO and Buildsight and makes use of data sources available within Statistics Netherlands and valuable data from Buildsight and the ECN.

Data from Buildsight and the ECN

The Ministry of the Interior commissioned RVO to outsource the research to calculate sales of insulation materials in the Netherlands to Buildsight. The insulation industry agreed to exchange sales information on insulation materials with Buildsight – together with the ECN and RVO. This information is strictly confidential at the micro level, but Statistics Netherlands had access to this information on an aggregated level (Agentschap NL, 2013).

Although the methodology for the installation of glazing differs slightly from the approach for the other insulation materials, both rely partly on the 'national sales' of the relevant materials. Because some materials are multi-purpose in the case of 'other insulation materials' we decided to calibrate the level of production on the production figures of Buildsight and the ECN.

In the case of other insulation materials, the development in the national sales was still used for constructing the time series for 2001–2009 for insulation activities. The development in the sales on the Dutch market is used as a proxy for the development in the insulation installing industry. The actual level of insulation activity is based on information of Buildsight and the ECN.

Glazing

Multi-layered glass is a single purpose product that is only applied in the construction industry for insulation purposes. Combining data on the foreign trade, manufacturing and trade margins in/of double glazing (i.e. Sales on the Dutch market = Production + Wholesale margins + Imports – Exports) available at Statistics Netherlands, provides insight in the national sales of relevant materials. The effects of stock changes are not taken into account explicitly within this model. To some extent we tried to amend the balance item (sales on the Dutch market) for stock-changes as follows: $(1/3*X_{t-1})+(2/3*X_t)$ where X stand for sales on the Dutch market.

'Economic ratios are used to calculate production, employment and value added based on the national sales of multi-layered glass for the years 2001–2012. Economic ratios are derived from the business survey of Statistics Netherlands. At a micro level companies in relevant industries have been selected (NACE 43 'Specialised construction activities' for all glazing) The relevant ratios[1)] are:

- the purchase of raw and auxiliary materials of goods for each unit of production (this ratio is only applied for glass installing activities)
- the amount of labour (FTE) for each unit of production
- the value added for each unit of production

Not all of the data used were available up to 2013. Therefore, for production values and employment in 2013 we used information from Buildsight about the 2012–2013 developments in glass sold (volumes) on the Dutch market as an indication of the developments in insulation activities. Price changes are taken into account. A ratio, the value added for each unit of production, is then used for calculating the value added in 2013.

[1)] Because of the limited amount of observations in some years, the fluctuations were toned down and outliers eliminated.

The distinction between newly built and existing constructions in 2011 and 2012 is based on figures (turnovers and working hours) from Buildsight and the ECN for these years. The production of glazing in newly build constructions for earlier years is based on the development of the production value in the 'Construction of buildings' industry (NACE 41). This assumes that the development in glazing activities for new buildings equals the developments in the total industry for constructing and developing residential and non-residential buildings. The remnant was assigned to glazing in existing constructions. Then ratios were used for calculating employment and value added for the earlier years in existing as well as in newly built constructions.

Insulation material

In the case of insulation materials, the sales on the Dutch market (balancing item) are not only sold to the building sector, as some materials are also used for packaging and other purposes. Therefore the balancing item cannot be used to determine the level of insulation activities in the Netherlands. Alternatively, we used information from Buildsight and the ECN related to insulation installation activities in existing buildings versus new buildings for 2010–2012.

The total production values of insulation installation activities for earlier years were calculated using the 2010 values and the development (2001–2010) in national sales of relevant insulation materials. The share in the national sales used in the construction industry is assumed constant over the years.

In order to distinguish activities related to new construction from insulation of existing buildings, the development of the insulation installation in newly constructed buildings is assumed to be equal to the development in the output of the 'Construction of buildings' industry (NACE 41). The remnant is assigned to the insulation activities in existing buildings.

After the production values for insulation installation activities in existing and new buildings were calculated, ratios (the amount of labour (FTE) for each unit of production and the value added for each unit of production) were used to calculate the employment and value added. The ratios are based on respondents in the annual business survey of Statistics Netherlands in the most appropriate industries – NACE (Rev 2) 43 'Specialised construction activities' for insulation installation in new buildings and NACE (Rev 1[2]) 4532 'Insulation work activities' for insulation installation in existing buildings[3].

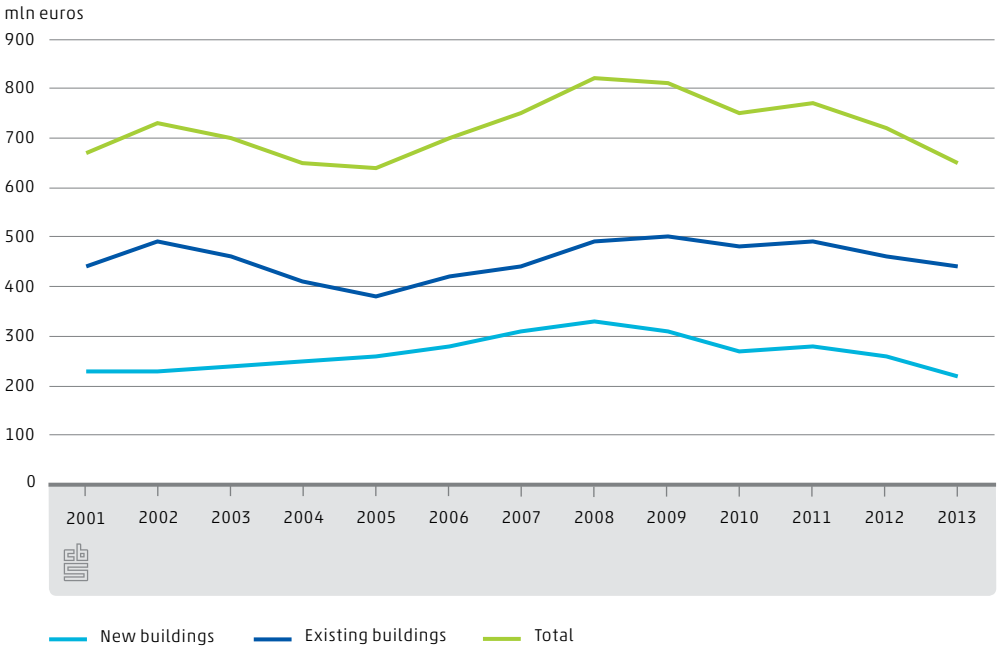
Production values and employment in 2013 are based on information from Buildsight about the 2012–2013 development in insulation materials sold (volumes) on the Dutch market as an indication of the developments in insulation activities. Price changes are taken into account. The earlier mentioned ratio 'value added for each unit of production' is used for calculating the value added in 2013.

[2] The current industry classification NACE Rev 2 (SBI 2008) has no distinct 'Insulation work activities'. The outdated NACE Rev 1 allows for identification of more specialised businesses.
[3] The ratio for existing buildings differ from new buildings because it takes more hours to install insulation in an existing building than in a new building.

Results

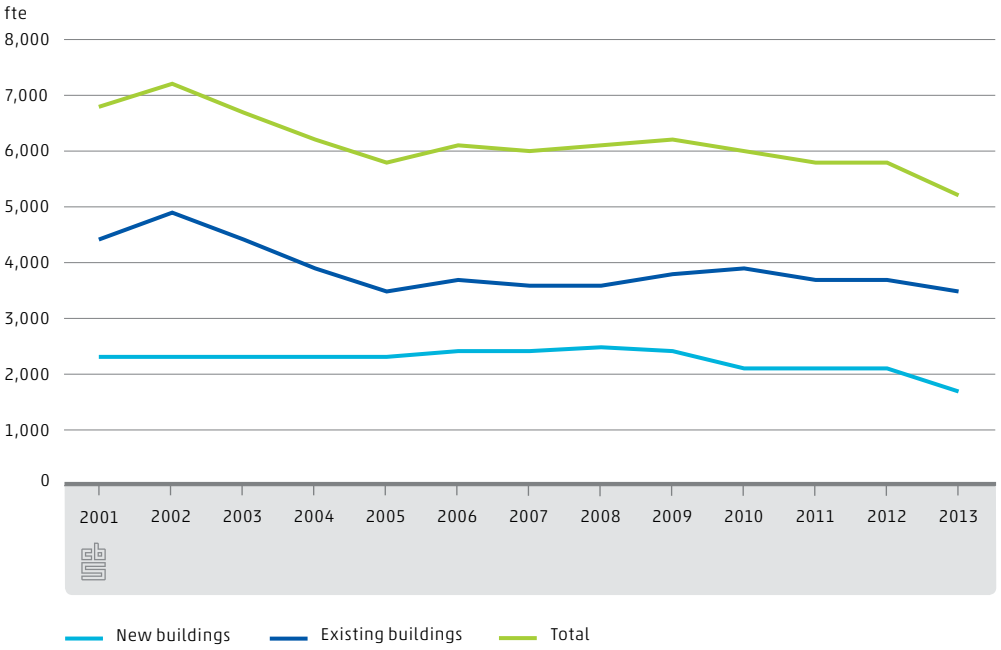
Glass installing

3.1.1 Production value for glass installation



The production value for installation of glass fluctuates over the years. After a decline in 2002–2005, the production value grew between 2005 and 2008, but has shown a downward trend ever since. In 2013 the production level was more or less equal to that in 2001. It can be concluded that the glass installation industry had not grown in comparison to 2001. During the whole period, the production value of glass installation activities in existing buildings surpassed glass installation activities in new buildings. The production value of glass installation activities in existing buildings has declined slightly from 2009 onwards, while the production value of glass installation activities in new buildings has declined considerably. This pattern can be explained by the temporarily subsidy scheme for insulation glass where homeowners could apply for a discount of 35 euros per m^2 (EIB, 2012).

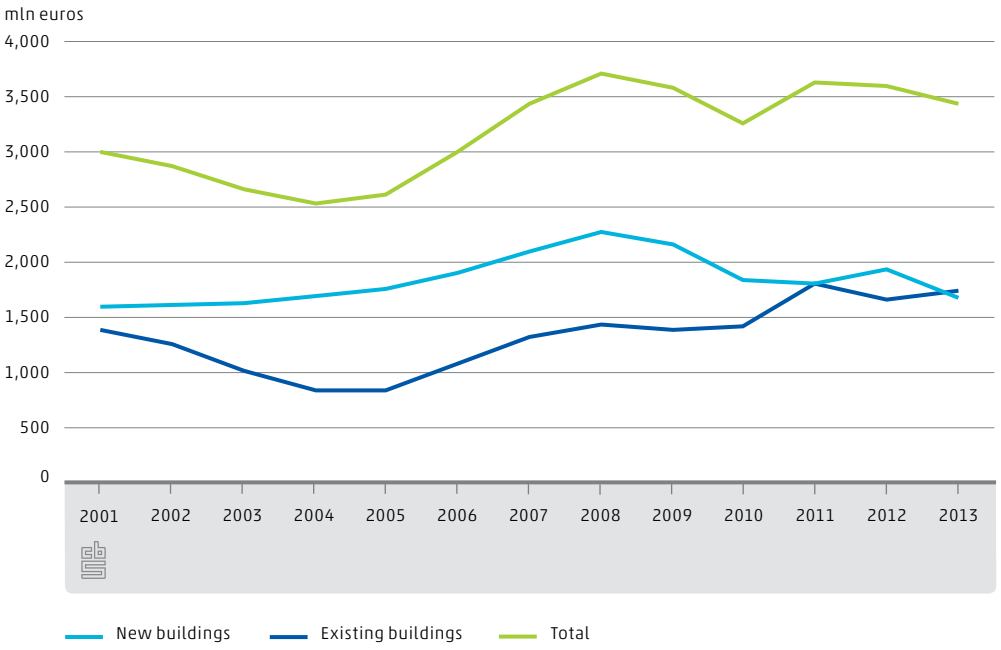
3.1.2 Employment in glass installation



Overall, employment in glass installing activities decreased over 2001 and 2013. However, the period 2005–2009 did show a slightly upward trend.

Insulation installation

3.1.3 Production value for insulation installing activities (glass excluded)



Overall, production value in insulation installation activities has shown growth over the period 2001–2013. Growth peaked between 2004–2008, mainly due to growth in

insulation installation activities in new buildings and some due to growth in existing buildings.

The bulk of production in insulation installation activities took place in new buildings, in contrast to glass insulation activities. On the other hand, insulation installation activities in existing buildings have grown stronger. This can partly be explained by the economic crisis that had a major impact on the construction industry, while insulation installation activities in existing buildings was stimulated.

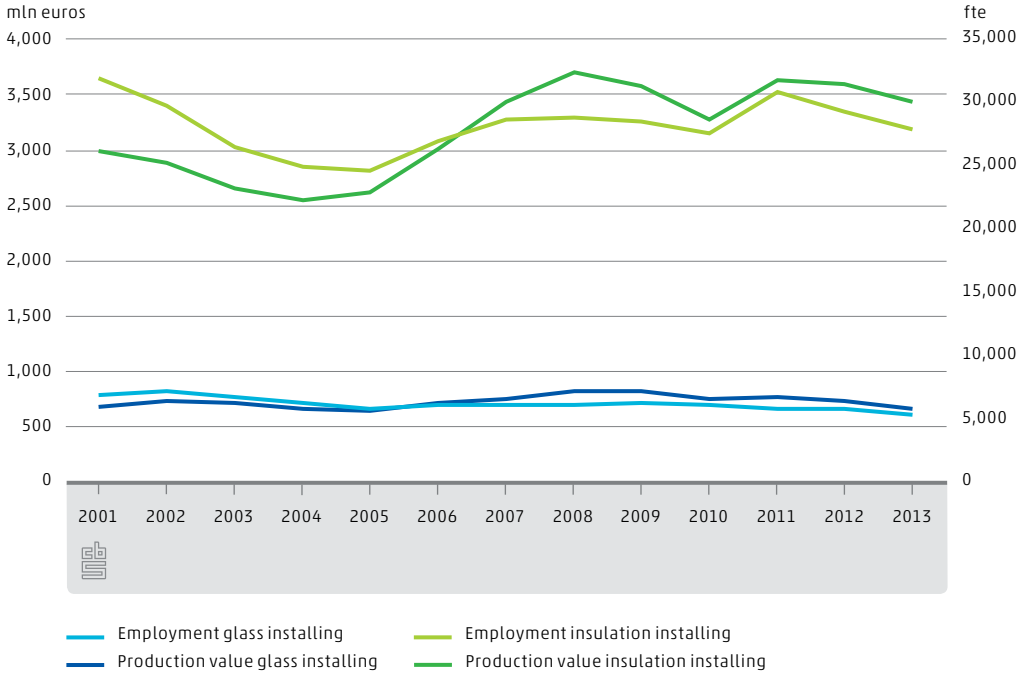
Employment in insulation installation was lower in 2013 than in 2001. However, this was mainly due to a substantial decrease over 2001–2005 after which the employment level more or less stabilised. However, the financial crisis did lower the level of insulation installation activities in new buildings, simply because fewer new buildings were being built. This was compensated by an increase of insulation installation activities in existing buildings, suggesting that after the financial crisis households, instead of switching houses, invested more in their current house, which was also stimulated by energy saving subsidy schemes[4].

3.1.4 Employment in insulation installing activities (glass excluded)

In conclusion, employment in glass and insulation activities decreased between 2001 and 2013. This can partly be explained by the economic crisis which had a big impact on the construction sector. Also the production per FTE increased, because while employment levels decreased, the production levels of insulation increased and glass production remained stable. This upward/stable trend in production is mainly the result of the construction of new buildings before the crisis. Furthermore, the decline in employment seems to have been cushioned by a number of energy saving subsidies during the crisis.

[4] http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2009/09/07/actueel-overzicht-stimuleringspakket.html
http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2012/01/24/evaluatie-stimuleringspakket-woningbouw.html

3.1.5 Overview production value for and employment in glass and insulation installing activities



The results should be considered as experimental and there is still room for improvement. Future fine tuning of methodology and assumptions applied as well as any availability of new data sources may result in the updating of figures.

3.2 Installation of solar PV, solar thermal and heat pumps

Installation of solar PV, solar thermal and heat pumps is based on the newly installed capacity and an employment factor (number of FTE's per unit of installed capacity). Many companies in the construction installation industry have a wide portfolio of products, e.g. the installation of home security systems, solar panels and central heating systems. The share of renewable energy related activities within these companies is difficult to estimate. By using a model based on the installed capacity, statistics aim to provide better insight in the dynamics of the technologies involved. The source of the employment factor differs for each technology.

Solar PV

The newly installed capacity (in Megawatt (MW)) of solar panels (PV) is available at Statistics Netherlands (Energy statistics). A suitable employment factor for direct employment proved difficult to find. Fortunately studies by Cameron and van der Zwaan (2012) as well as by Rutovitz and Harris (2012) provide insight in available employment

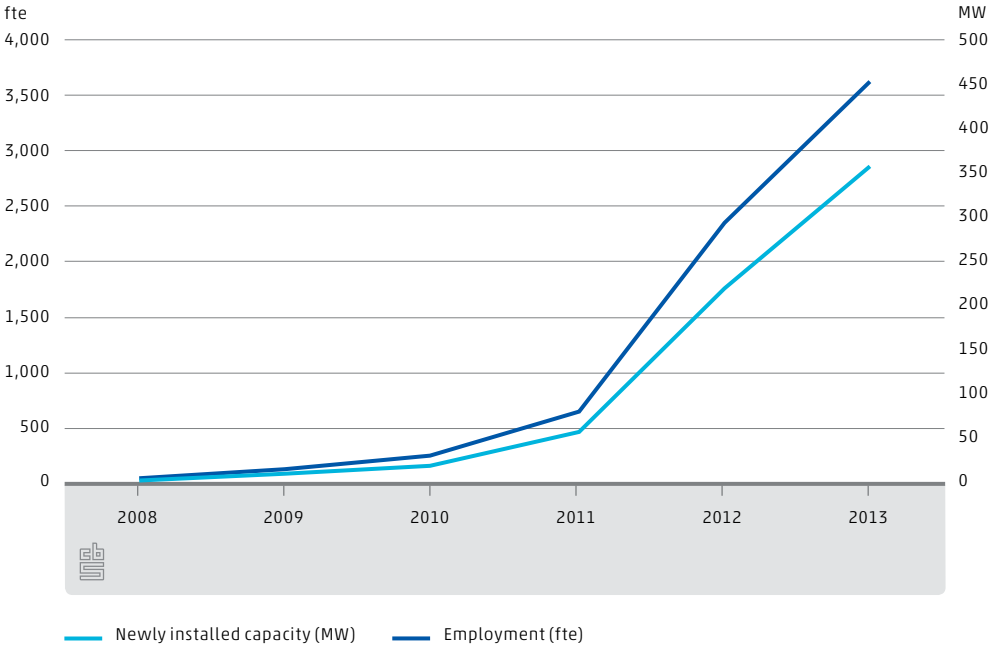
factors of the installation of solar PV. In the Cameron study, employment factors range from 7 to 33 per MW. In the Rutovitz study the range is smaller, 9 to 12.6 FTE per MW. Both studies present an overview of available factors for different reference years and geographical areas.

The median of the employment factors presented in both studies is 11.3 FTE per MW, which is applied to the newly installed capacity (MW) in the Netherlands in 2011. Learning by doing and innovation is likely to reduce the employment factor over time. A so called 'decline factor', is presented for solar PV by Rutovitz and Harris (2012). An annual decline of 5.3 percent is estimated for the employment per newly installed MW of solar PV in the 2010–2015 period. When we apply this decline rate to 2008–2013 for the Netherlands and set the employment factor to 11.3 FTE per MW in 2011 we get the figures that are presented in figure 3.2.1.

Solar Thermal

Statistics on the size in square meters of newly installed solar thermal installations are available at Statistics Netherlands. A consultation of a specialised consultancy company named '*Ik ben Ra*', resulted in suitable employment factors. Employment is estimated at between 150 and 250 FTE in the 2008–2013 period.

3.2.1 Direct employment in the installation phase and newly installed capacity in the Netherlands



Heat pumps

The capacity of newly installed heat pumps, measured in thermal MW, is monitored by the Energy statistics department of Statistics Netherlands. A positioning paper published by the Dutch heat pump association (Dhpa, 2013) on heat pumps and the Dutch economy

has a section on the employment in the installation phase. An employment factor of 328 FTE per PJ is presented.

Although the Dhpa report focusses on residential buildings, this employment factor was applied to all newly installed heat pumps in 2012, so including e.g. office buildings. To obtain a time series, the development in the installed capacity in 2008–2013 was applied to the 2012 direct employment in the installation of heat pumps. The result is a fairly stable figure of around 350–400 FTE in installation of heat pumps the 2008–2013 period.

Production and value added of the installation phase are based on the production and value added in the specialised construction activities (Industry 43 of NACE).

Capital formation, such as the purchase of a transportation van by installers of solar PV, solar thermal and heat pumps, is no longer included in the Radar 2014 figures. This is also true for any foreign trade by businesses in these activities. Previously these activities were based on the micro data approach (section 2.2.1), which allowed for an estimate for capital formation and foreign trade. The new methodology lacks this opportunity. However, improving the quality and dynamics of the employment figure outweighs the omission of the capital formation and foreign trade in the installation stage, which is mostly locally orientated.

3.3 A quick estimate for employment

Most indicators that are discussed so far can be compiled for *t* –22 months. However, for employment in the N-SES there are some alternative data available (the employment register) that allows for a more recent figure (*t* –10 months). The basic idea of the method is that the N-SES population is linked to the employment register, which gives us the FTE's for each company in 2012 and 2013, showing employment growth for this period. There are two methodological issues that evolve from the fact that our N-SES population is rooted in 2012. First, not every company that was identified in 2012 is still identified in 2013, and potentially new businesses will enter the SES in 2013. This can have three reasons. First, because a company went bankrupt in 2013, second because a new company started in 2013, and third due to some administrative changes in units, like a merger or partition of a company. A bankruptcy or new company represents an actual development while an administrative change might not affect the real number of sustainable energy related FTE's. Due to the lack of information and time we assume that the number of bankruptcies, new companies and administrative changes together follow the same employment developments as the companies that are identified both in 2012 and 2013. So, in other words, the development of a retraceable subgroup was used as a proxy for total development.

For the exploitation phase we constructed recent figures based on the available physical production figures. For installation activities (like solar panels) we used the developments in installed capacity. For insulation installation activities we used data of BuildSight to construct data for 2013. The results can be summarised as follows:

3.3.1 Year-on-year development employment 2012-2013

	%
N-SES (excluding insulation activities)	7.7
E-SES	6.7
Insulation activities	2.8
Total	5.6

4. Towards an international perspective

International harmonisation of the SES figures would increase their comparability and therefore make them more useful and valuable. This section describes the relevant developments and efforts that mainly take place on the European level.

4.1 Harmonisation activities at Statistics Netherlands

From the Dutch perspective there are international as well as bilateral efforts to increase international cooperation and harmonisation with respect to the SES. In a national accounting context, the SES is part of the 'environmental goods and services sector', for which Statistics Netherlands has recently developed a new set of statistics. These statistics are the result of a European (Eurostat) handbook on guidelines to construct European statistics that structurally monitor the Environmental Goods and Services Sector. These statistics are also part of the System of Environmental Economic Accounting (SEEA), which has been formally adopted by the statistical department of the United Nations in 2012. The SEEA describes an international system of harmonised concepts for the compilation of environmental accounts.

Statistics Netherlands also invests in improving cooperation and harmonisation at the bilateral level. There have been close contacts with researchers from DESTATIS, the German statistical bureau, in order to harmonise the Dutch and German SES definitions and classifications. This has recently led to the conclusion that there are a lot of differences that need to be resolved in order to increase comparability between the SES statistics of both bureaus. Statistics Netherlands aims to harmonise the environmental goods and services sector at the Eurostat level to overcome such differences. A study visit by the ONS, the UK statistical bureau, to the Netherlands took place in the autumn 2013 and a return visit in the winter of 2014.

4.2 Harmonisation activities at the European level

The international cooperation and harmonisation is constituted by the 'Regulation on European Environmental Economic Accounts' (REEEA), which is governed by Eurostat and the European Commission. REEEA came into place in concordance with the recent adoption of the System of Environmental Accounting (SEEA) by the United Nations and is in line with it. The SEEA formulates a classification of resource management activities (CreMa). Three subcategories of resource management of this internationally recognised framework represent Sustainable Energy Sector (SES) activities. These are 'Production of energy from renewable resources' (i.e. CreMa 13A), Heat/energy saving and management (CReMA 13B), and Minimization of the use of fossil energy as raw materials (CReMA 13C).

The European Parliament has adopted a legal base for the EGSS. The key elements of the legal base are the stated as follows. 'Statistics shall be compiled and transmitted on a yearly basis and shall be transmitted within 24 months of the end of the reference year. In order to meet user needs for complete and timely datasets, the Commission (Eurostat) shall produce, as soon as sufficient country data become available, estimates for the EU-27 totals for the main aggregates of this module. The Commission (Eurostat) shall, wherever possible, produce and publish estimates for data that have not been transmitted by Member States within the deadline. The first reference year is the year in which this Regulation enters into force. In the first data transmission, Member States shall include annual data from 2013 to the first reference year. In each subsequent data transmission to the Commission, Member States shall provide annual data for the years n-3, n-2, n-1 and n, where n is the reference year.' The Regulation is an important step for international harmonization of statistics on the SES.

5.

Summary and recommendations

This chapter first presents time series figures on employment, production and value added of the SES and the subsectors N-SES and E-SES. Next it will provide recommendations and intentions for future research.

5.1 Summary table

This report presents economic figures for the years 2008–2013 on the sustainable energy sector (SES). Table 5.1.1 presents the key indicators for the sustainable energy sector in the Netherlands.

5.1.1 Key indicators for the sustainable energy sector

		2008	2009	2010	2011	2012	2013
Indicator	**Sector**	**fte**					
Employment	SES	36,500	37,700	39,400	44,400	43,000	45,400
	E-SES	2,200	2,400	2,400	2,800	3,000	3,200
	N-SES (specialised)	4,900	5,300	5,400	5,300	5,100	.
	N-SES (non-specialised)	29,400	29,900	31,500	36,400	34,900	.
		mln euros					
Production	SES	8,900	9,030	9,220	10,660	11,730	.
	E-SES	1,350	1,650	1,730	2,180	3,040	.
	N-SES (specialised)	1,390	1,430	1,340	1,220	1,230	.
	N-SES (non-specialised)	6,170	5,950	6,150	7,260	7,460	.
Value added	SES	3,760	3,910	3,900	4,220	4,230	.
	E-SES	1,090	1,220	1,130	1,230	1,280	.
	N-SES (specialised)	410	380	400	410	440	.
	N-SES (non-specialised)	2,260	2,320	2,370	2,580	2,510	.
Exports of goods	SES	3,040	2,870	3,690	5,270	5,630	.
Imports of goods	SES	3,290	2,670	3,070	4,580	5,590	.
Capital formation	SES	2,060	1,000	1,810	1,460	1,530	.

5.2 Recommendations and future developments

This is the fourth consecutive year that the SES Radar has been published by Statistics Netherlands. The annual calculation of the economic key figures (employment, value added, production, trade and investment) is very useful in evaluation of the Dutch SES.

Part of the economic potential of the SES lies in the exports of services such as transport and installation of offshore wind facilities abroad. So far, the services exports and imports have not been included in the Radar. The data collection of the international trade in services by Statistics Netherlands is executed on a more aggregated level, not

at the level of individual company units but at the level of a group of companies that are part of the same holding. It will be a challenge to makes estimates for these trade flows.

Monetary economic values are only available in current prices. Ideally we should measure these developments in terms of volume as well. However, this would require proper deflation of the figures, which would be a major challenge.

More international coordination and harmonisation would be very useful because it is interesting for policymakers to see how the Dutch SES performs in comparison with the SES in other (European) countries such as Germany, Denmark and the UK. Economic relations between countries have a major effect on the Dutch SES. Increasing international comparability of the SES figures will add to their significance and interpretation. The upcoming legal base (Eurostat) for compiling statistics on the Environmental Goods and Services Sector will help in this respect. The SES is part of the Environmental Goods and Services Sector.

Strengthening the cooperation with other organisations in the field of 'the economy of renewable energy and energy saving'. This cooperation is already increasingly implemented by sharing more knowledge with the ECN, RVO, PBL and branch associations.

While the inclusion of new data sources and methodologies in 2014 results in a substantial quality improvement of the figures, it should be noted that the work on the economic figures of the sustainable energy sector is still a 'learning process'. On-going interaction and discussions with stakeholders, such as the organisations that signed the 2013 '*Energieakkoord*', researchers as well as the international statistical community should result in future improvements and possibly extensions of the figures on the SES.

Annex

A Tables on key figures for product and process profiles

A1 Employment in the non-exploitation phase of the SES

	Specialised					Non- specialised					Total N-SES				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
	fte														
Product															
Solar	1,100	1,300	1,400	1,400	1,100	1,200	1,400	1,600	2,000	3,600	2,300	2,800	3,000	3,400	4,800
Bio gas	100	200	100	100	100	200	200	300	300	300	400	400	400	400	400
Bio mass (solid) & waste	300	400	500	400	500	300	300	400	400	400	700	700	900	800	800
Bio fuels (fuel production excluded)	100	100	200	100	100	1,200	1,400	1,400	1,800	600	1,300	1,500	1,600	1,900	700
Bio refining	200	200	200	200	200	200	200	200	200	200	500	500	400	500	400
Wind onshore	500	600	600	600	600	500	400	500	700	900	1,000	900	1,100	1,300	1,500
Wind offshore	200	200	300	300	300	2,300	2,400	2,400	2,600	2,600	2,500	2,600	2,700	2,900	3,000
Heat & geo thermal energy /energy from water	300	400	400	400	400	1,500	1,500	1,500	1,500	1,500	1,800	1,900	1,900	1,900	1,900
Energy saving	1,600	1,500	1,400	1,300	1,300	21,100	21,200	22,200	25,700	23,000	22,700	22,800	23,600	27,000	24,400
Electric transport	0	0	0	0	0	300	300	400	600	1,200	300	300	400	600	1,200
Smart grids/Hydrogen technology/ CO_2 capture and storage	300	300	400	300	300	600	600	500	600	600	800	900	900	900	900
Total	4,900	5,300	5,400	5,300	5,100	29,400	29,900	31,500	36,400	34,900	34,300	35,200	37,000	41,600	40,000
Process															
Installation	300	400	400	300	300	19,700	20,300	21,400	25,600	23,500	20,100	20,700	21,700	25,900	23,900
R&D	800	800	900	800	900	1,200	1,200	1,300	1,300	1,300	2,000	2,000	2,100	2,100	2,200
Supply, assembly and construction	2,700	3,000	3,000	2,900	2,600	6,200	6,200	6,500	6,800	7,100	8,900	9,200	9,500	9,700	9,700
Preparation/Raw material production	100	100	100	100	100	300	300	300	300	300	300	400	400	400	400
Consultancy/Transport	900	1,000	1,000	1,100	1,100	2,000	1,900	2,100	2,300	2,800	3,000	3,000	3,200	3,400	3,800
Total	4,900	5,300	5,400	5,300	5,100	29,400	29,900	31,500	36,400	34,900	34,300	35,200	37,000	41,600	40,000

A2 Value added in the non-exploitation phase of the SES

	Specialised					Non- specialised					Total N-SES				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
	mln euros														
Product															
Solar	80	80	70	70	100	110	120	150	170	240	190	200	230	240	330
Bio gas	10	10	10	10	10	20	20	30	30	20	30	30	40	40	30
Bio mass (solid) & waste	30	40	40	40	20	30	30	30	40	30	60	70	70	80	50
Bio fuels (fuel production excluded)	10	20	50	10	30	130	140	200	220	140	150	160	250	230	170
Bio refining	20	10	10	10	10	30	30	30	20	20	50	30	40	40	40
Wind onshore	40	40	30	60	60	60	40	70	80	120	100	80	100	140	180
Wind offshore	20	20	20	40	40	290	380	360	330	320	320	410	380	360	350
Heat & geo thermal energy /energy from water	20	30	40	30	40	110	110	120	120	110	140	140	160	150	140
Energy saving	140	100	90	120	120	1,340	1,330	1,270	1,440	1,320	1,480	1,430	1,360	1,550	1,450
Electric transport	0	0	0	0	0	20	30	30	50	90	20	30	30	50	90
Smart grids/Hydrogen technology/ CO_2 capture and storage	20	20	30	20	20	100	90	90	90	100	130	110	120	120	110
Total	410	380	400	410	440	2,260	2,320	2,370	2,580	2,510	2,660	2,700	2,770	2,990	2,950

A2 Value added in the non-exploitation phase of the SES (end)

	Specialised					Non- specialised					Total N-SES				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
	mln euros														
Process															
Installation	20	30	30	40	40	1,230	1,310	1,280	1,480	1,340	1,260	1,340	1,310	1,510	1,390
R&D	60	60	60	60	30	170	160	180	180	180	230	220	240	240	220
Supply, assembly and construction	230	200	210	210	250	630	620	640	640	660	860	820	850	850	910
Preparation/Raw material production	10	10	10	10	10	30	30	30	30	30	30	30	30	40	40
Consultancy/Transport	80	90	90	100	90	200	200	240	250	300	280	280	330	350	390
Total	410	380	400	410	440	2,260	2,320	2,370	2,580	2,510	2,660	2,700	2,770	2,990	2,950

A3 Production in the non-exploitation phase of the SES

	Specialised					Non- specialised					Total N-SES				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
	mln euros														
Product															
Solar	400	440	420	340	260	330	370	430	490	660	730	810	840	830	930
Bio gas	30	40	20	20	20	80	90	80	90	80	110	130	100	120	100
Bio mass (solid) & waste	70	80	110	100	110	90	70	90	100	100	160	150	200	200	200
Bio fuels (fuel production excluded)	20	40	80	20	40	630	550	610	940	1,030	650	600	690	970	1,060
Bio refining	60	20	30	30	50	90	70	70	80	80	150	90	100	110	130
Wind onshore	210	220	170	180	190	160	100	150	190	250	370	310	320	360	440
Wind offshore	70	50	60	100	100	840	1,010	1,060	980	960	910	1,070	1,120	1,080	1,060
Heat & geo thermal energy /energy from water	70	70	80	70	90	300	280	300	320	300	370	350	390	390	380
Energy saving	420	410	320	310	320	3,360	3,130	3,080	3,680	3,470	3,780	3,540	3,390	3,990	3,800
Electric transport	0	0	0	0	0	60	60	80	160	300	60	60	80	160	300
Smart grids/Hydrogen technology/ CO_2 capture and storage	50	50	60	50	50	240	210	190	220	230	280	260	260	270	280
Total	1,390	1,430	1,340	1,220	1,230	6,170	5,950	6,150	7,260	7,460	7,560	7,380	7,500	8,480	8,690
Process															
Installation	160	170	140	130	150	2,900	3,010	3,060	3,600	3,280	3,060	3,180	3,200	3,740	3,430
R&D	130	130	150	140	150	470	410	430	500	520	600	540	580	650	670
Supply, assembly and construction	830	840	820	700	650	2,230	2,000	2,000	2,470	2,910	3,050	2,840	2,830	3,170	3,560
Preparation/Raw material production	80	80	40	30	50	80	70	80	90	90	160	150	120	120	140
Consultancy/Transport	190	210	190	220	220	490	450	570	590	670	680	660	770	810	880
Total	1,390	1,430	1,340	1,220	1,230	6,170	5,950	6,150	7,260	7,460	7,560	7,380	7,500	8,480	8,690

A4 Economic indicators for the exploitation phase of the SES

	Hydropower	Windenergy	Solar energy	Biomass & Biofuels	Biogas	Heat and geothermal	Total E-SES
	fte						
Employment							
2008	0	800	0	800	600	0	2,200
2009	0	900	0	900	700	0	2,400
2010	0	700	0	900	700	0	2,400
2011	0	900	100	1,100	800	0	2,800
2012	0	900	100	1,300	800	0	3,000
	mln euros						
Production							
2008	10	580	0	640	90	30	1,350
2009	10	640	0	840	120	30	1,650
2010	10	510	10	1,040	130	30	1,730
2011	10	630	10	1,360	130	50	2,180
2012	10	600	20	2,210	140	60	3,040
Value added							
2008	10	470	0	490	90	30	1,090
2009	10	510	0	530	120	30	1,220
2010	10	400	10	540	130	30	1,130
2011	10	490	10	550	130	50	1,230
2012	10	460	20	590	140	60	1,280

A5 International Trade products in the SES

	2008	2009	2010	2011	2012
	mln euros				
Imports					
Solar & Wind	560	610	770	630	430
Biomass & biofuels[1)]	1,810	1,340	1,530	3,040	4,110
Energy saving	650	520	550	650	680
Electric transport, Smart grids/Hydrogen technology/CO_2 capture and storage	270	200	220	260	370
Total	3,290	2,670	3,070	4,580	5,590
Exports					
Solar & Wind	620	600	700	700	420
Biomass & biofuels[1)]	1,520	1,510	2,040	3,590	4,160
Energy saving	800	670	840	870	920
Electric transport, Smart grids/Hydrogen technology/CO_2 capture and storage	100	90	110	110	140
Total	3,040	2,870	3,690	5,270	5,630

[1)] Includes E-SES

A6 Capital formation in the SES

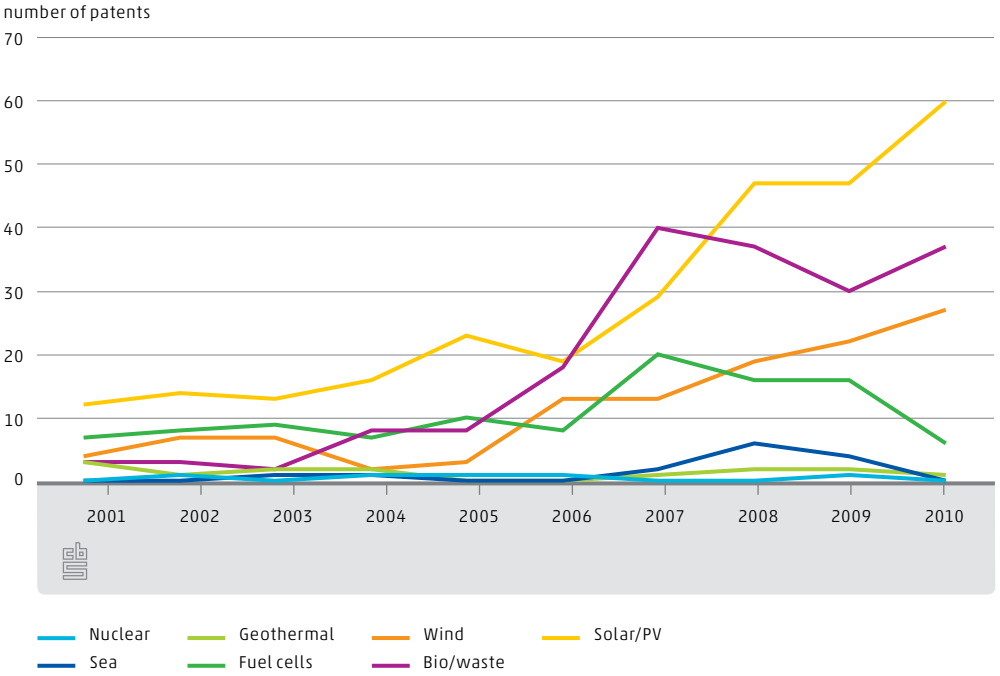
	2008	2009	2010	2011	2012
	mln euros				
Solar	70	160	140	200	460
Wind	600	100	90	190	240
Other	1,390	740	1,580	1,070	830
SES total	2,060	1,000	1,810	1,460	1,530

A7 Types of patent applications by N-SES companies over 2006-2011

Content type	Number of companies
No relation with sustainable energy or environment	117
Indirect relation with sustainable energy or environment	32
Relation with environment	30
Relation with sustainable energy	84

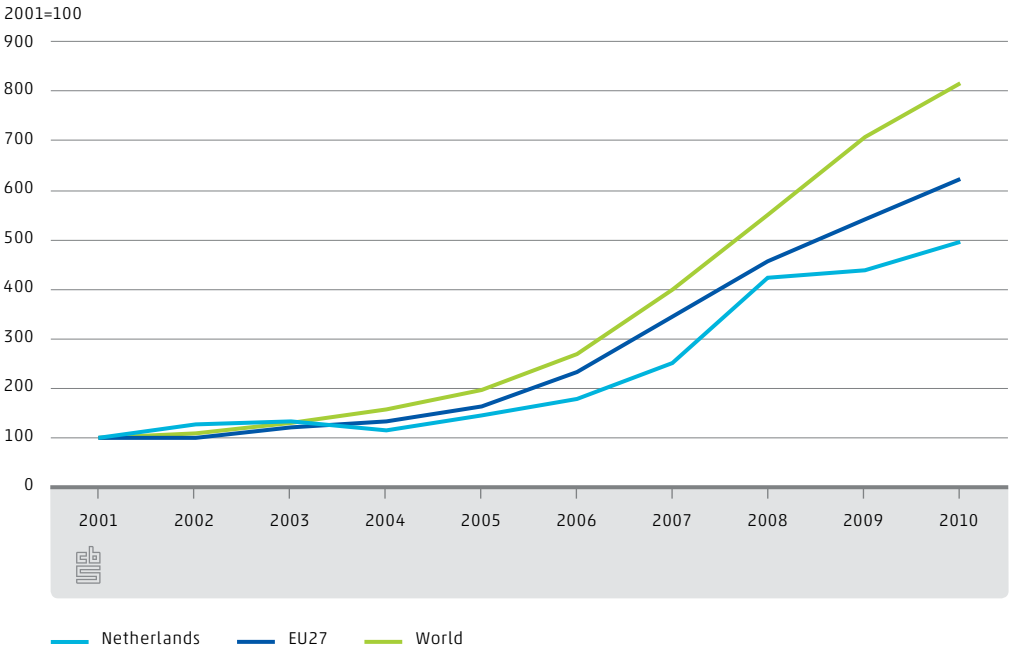
Source: Patent Office NL Agency.

A.8 Patents related to sustainable energy by Dutch companies



Source: Patent Office RVO.

A.9 International patent applications



Source: Patent Office RVO.

B Productcodes international trade biofuels and biomass

B1 HS codes (international trade) and description of biofuels and biomass

HS code	Category	Valid from year	Raw material/ final product
15162095	Biofuels	2008	Raw material
15162096	Biofuels	2008	Raw material
15162098	Biofuels	2008	Raw material
15180010	Biofuels	2008	Raw material
15180031	Biofuels	2008	Raw material
15180039	Biofuels	2008	Raw material
15180091	Biofuels	2008	Raw material
15180095	Biofuels	2008	Raw material
15180099	Biofuels	2008	Raw material
22071000	Biofuels	2008	Final product
22072000	Biofuels	2008	Final product
29051100	Biofuels	2008	Final product
29091910	Biofuels	2008	Final product
38249091	Biofuels	2008	Final product
44013010	Biomass	2008	Final product
44013090	Biomass	2008	Final product
44013020	Biomass	2008	Final product
44013100	Biomass	2012	Final product
38260010	Biofuels	2012	Final product
38260090	Biofuels	2012	Final product
44013910	Biomass	2012	Final product
44013990	Biomass	2012	Final product

For an exact description of the HS codes see the international trade figures on statline, e.g. http://statline.cbs.nl/StatWeb/selection/default.aspx?DM=SLNL&PA=81268NED&VW=T.

C Details of glass and insulation installation

C1 Prodcom codes and description of insulation and glass

Prodcom-code	Category	Valid in years	Description
26.14.12.10	Insulation material	1993–2007	Glass fibre mats (including of glass wool)
23.14.12.10	Insulation material	2008–2012	Voiles, webs, mats, mattresses, boards and other articles of glass fibres, except woven fabrics
26.14.12.30	Insulation material	1993–2007	Glass fibre voiles (including of glass wool)
23.14.12.30	Insulation material	2008–2011	Glass fibre voiles (including of glass wool)
23.14.12.37	Insulation material	2012	Glass fibre voiles made of glass wool
26.82.16.10	Insulation material	1993–2007	Slag wool, rock wool and similar mineral wools and mixtures thereof, in bulk, sheets or rolls
23.99.19.10	Insulation material	2008–2012	Slag wool, rock wool and similar mineral wools and mixtures thereof, in bulk, sheets or rolls
26.14.12.93	Insulation material	1993–2007	Other articles of glass fibre, of non-textile fibres, bulk, flocks, others
23.14.12.93	Insulation material	2008–2012	Other articles of glass fibre, of non-textile fibres, bulk, flocks, others
23.14.12.97	Insulation material	2008–2012	Glass fibres, incl. glass wool, and articles thereof (excl. staple fibres, rovings, yarn, chopped strands, woven fabrics, also narrow fabrics, thin sheets 'voiles', webs, mats, mattresses and boards and similar nonwoven products, mineral wool and articles thereof, electrical insulators or parts thereof, optical fibres, fibre bundles or cable, brushes of glass fibres, and dolls' wigs)
24.16.20.35	Insulation material	1993–2007	Expansible polystyrene, in primary forms
20.16.20.35	Insulation material	2008–2012	Expansible polystyrene, in primary forms
25.21.41.20	Insulation material	1993–2007	Cellular plates, sheet, film, foil and strip of polymers of styrene
22.21.41.20	Insulation material	2008–2012	Cellular plates, sheet, film, foil and strip of polymers of styrene
25.21.41.50	Insulation material	1993–2007	Cellular plates, sheets, film, foil and strip of polyurethanes
22.21.41.50	Insulation material	2008–2012	Cellular plates, sheets, film, foil and strip of polyurethanes
26.12.13.30	Glass	1993–2007	Multiple-walled insulating units of glass
23.12.13.30	Glass	2008–2012	Multiple-walled insulating units of glass

C2 Economic figures for glass and insulation installing activities

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	mln euros												
Glass installing activities													
Production value													
Existing buildings	440	490	460	410	380	420	440	490	500	480	490	460	440
New buildings	230	230	240	250	260	280	310	330	310	270	280	260	220
Total	670	730	700	650	640	700	750	820	810	750	770	720	650
Value added													
Existing buildings	210	240	220	200	190	200	220	240	240	240	240	230	210
New buildings	110	110	110	120	130	130	150	160	150	130	130	130	110
Total	320	350	340	310	310	340	370	400	400	380	370	350	320
	fte												
Employment													
Existing buildings	4,400	4,900	4,400	3,900	3,500	3,700	3,600	3,600	3,800	3,900	3,700	3,700	3,500
New buildings	2,300	2,300	2,300	2,300	2,300	2,400	2,400	2,500	2,400	2,100	2,100	2,100	1,700
Total	6,800	7,200	6,700	6,200	5,800	6,100	6,000	6,100	6,200	6,000	5,800	5,800	5,200

C2 Economic figures for glass and insulation installing activities (end)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	mln euros												
Insulation installing activities													
Production value													
Existing buildings	1,400	1,260	1,020	840	840	1,090	1,330	1,440	1,400	1,420	1,820	1,660	1,750
New buildings	1,600	1,620	1,630	1,700	1,770	1,910	2,110	2,280	2,170	1,850	1,810	1,950	1,690
Total	3,000	2,880	2,660	2,540	2,620	3,010	3,440	3,710	3,580	3,270	3,630	3,600	3,440
Value added													
Existing buildings	640	590	490	400	390	510	610	660	660	630	790	700	800
New buildings	730	760	780	800	830	880	970	1,040	1,020	810	790	820	780
Total	1,370	1,350	1,260	1,190	1,220	1,390	1,570	1,700	1,680	1,440	1,580	1,520	1,590
	fte												
Employment													
Existing buildings	16,400	14,400	11,300	9,300	8,900	11,000	12,300	12,400	12,500	13,200	16,700	14,100	14,800
New buildings	15,700	15,400	15,100	15,600	15,600	16,000	16,300	16,400	16,100	14,300	14,000	15,200	13,100
Total	32,000	29,800	26,500	24,900	24,600	27,000	28,600	28,800	28,500	27,500	30,800	29,300	27,900

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