FIDIC-EFCA 2012 Consulting Engineering Industry Survey

Part 1 - Europe

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Bricad Associates, Switzerland

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References, spreadsheets and background notes to this report are available on the survey website, survey.peterboswell.net.

KEY FIGURES - European Union 27 Member States (EU27), 2009

Domestic demand from investment	
GFCF, Gross Fixed Capital Formation (excluding repair and maintenance)	bEUR 3250
Investment (including construction repair & maintenance) requiring consulting engineering and architecture services (called “the services”)	bEUR 2924
Percent of investment (including construction repair & maintenance) requiring the services that is spent on the services	12%
Domestic demand for the services	bEUR 351
% demand met by:	
consulting engineering and architecture industry	51%
other industries	26%
in-house own-account production	23%
Distributions of the domestic investment (GFCF) / demand	
Construction	80% / 56%
Equipment	14% / 11%
Own-account design	2.4% / 16%
Other (R&D; weapon systems)	3.6% / 17%
Domestic use from supply-use tables	
Domestic use (purchaser’s prices) of the services	bEUR 336
Percent of investment requiring the services that is used for the services	12%
Percent use met by consulting engineering & architecture industry / in-house own-account production	83% / 17%
Production and exports	
Domestic production (purchaser’s prices)	bEUR 360
Domestic production (basic prices)	bEUR 346
Exports (basic prices, 2008)	bEUR 50.8
Percent of domestic production exported (2008)	14.7%
Export destinations (2008)	25% intra-EU27 75% extra-EU27
Turnover and trends	
Total turnover (effectively purchaser’s prices)	bEUR 321
Turnover / Domestic use and demand	2010: + 0.6% / - 0.6% 2011: - / - 8.2% 2012: - / - 0.9%

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HIGHLIGHTS

Demand

The domestic demand for consulting engineering and architecture services in the European Union's 27 countries in 2009, the first year for which the new, more accurate Eurostat industry statistics became available, was EUR 351 billion.

The demand scales as the investment measured in terms of the Gross Fixed Capital Formation (GFCF) requiring consulting engineering and architecture services.

Consequently, some 12% of investment was spent of consulting engineering and architecture services.

Extrapolation indicates that the demand dropped steeply until 2011, with a possible increase in 2012 once finalised Eurostat data are available.

Demand has been decreasing not only because the total investment decreased but also because the shares of investment in construction and equipment decreased.

Most of the demand (56%) arises from investment in construction (80% of total GFCF requiring consulting engineering and architecture services).

Own-account in-house production of architectural and engineering designs corresponds to 16% of the domestic demand.

There is a significant demand from investment in equipment (10%) and an important demand from investment in R&D and weapon systems (18%).

The equipment and other non-construction areas of investment that give rise to a demand are not met by the domestic consulting engineering industry (including architecture) in many countries.

Use

Using newly available Eurostat data for the supply and use of consulting engineering and architecture services in many European countries in 2009 it is shown that the domestic use of the services scales as the GFCF requiring the services.

The use corresponds to 12% of the GFCF requiring consulting engineering and architecture services.
The EU27 use for 2009 is estimated as EUR 336 billion.
As would be expected, the demand corresponds to an upper limit of the use. This indicates that the demand analysis based on a top-down macroeconomic approach is reliable and can continue to be used to model the consulting engineering industry, notably for the many countries which do not publish the supply-use tables required by the European Union.

Further confirmation is given by the reasonable agreement between estimates of own-account in-house production of architectural and engineering designs for three countries.

Total exports from the EU27 countries amounted to 14.7% of domestic production, with 75% going outside the EU27 and 25% remaining inside the EU27 countries.

Trends

A complete set of finalised statistics for 2012 may indicate a small increase in both use and demand in 2012, in line with indexes of architecture and engineering production and of turnover showing an increase starting in 2011.

The one-year lag between increases in demand and business activity is probably due to a change in the way in which investments are spent.

Estimating the demand

The following features of the macroeconomic approach based on investment to estimate demand are highlighted:

- the need to include construction repair and maintenance;
- the need to include research and development;
- the significant amount of own-account production.

Further work

Scatter in both the demand and supply data suggest that, for the larger EU27 economies:

- the poor classification of industry output may lead to use being overestimated (e.g., France);
- overestimating construction repair and maintenance may lead to demand being overestimated (e.g., Spain).

FIDIC-EFCA 2012 Consulting Engineering Industry Survey

Part 1 - Europe

1 - INTRODUCTION

The FIDIC-EFCA 2012 Consulting Engineering Industry Survey aims to quantify the domestic demand for the industry's services (including architecture) on a national and regional basis, and to relate these to measures of business activity, notably domestic use, production and turnover. The present report covers the 27 European Union Member States (designated "EU27"), with data and analysis extended to a further 10 extra-EU27 European countries (Albania, Bosnia, Croatia, Macedonia, Montenegro, Norway, Russia, Serbia, Switzerland, Ukraine) in relation to modelling the industry. A subsequent report will cover all extra-EU27 European as well as other regions.

2 - DEMAND FOR CONSULTING ENGINEERING & ARCHITECTURE SERVICES

2.1 - Introduction

The unified 1993 System of National Accounts (SNA93) was revised in 2008. SNA08 classifies investments as follows:

- Non-financial assets
  - Produced assets
    - Fixed assets
    - Inventories and Valuables
  - Non-produced assets
    - Natural resources; Contracts, leases and licences; Goodwill and marketing assets
- Financial assets

The demand for consulting engineering services arises from investments in non-financial produced fixed assets.

The following steps are needed in order to estimate the demand for consulting engineering services arising from investments in each of the asset groups that make up non-financial produced fixed assets:

- Step 1: Match the types of investment to the types of services supplied by the industry.
- Step 2: Estimate the investment for the relevant parts of the various asset groups.
- Step 3: Estimate the percentage of the investment in each relevant asset group that requires consulting engineering services.
- Step 4: Estimate the percentage of this requirement that is spent on services.

2.2 - Step 1 - Investment requiring consulting engineering & architecture services

2.2.1 - Consulting engineering industry

Consulting engineering and architecture services are supplied:

a) by the consulting engineering industry comprising firms whose main activity (by convention, more than 50% by turnover) involves the supply of consulting engineering services that are invoiced to clients;
b) by firms outside the consulting engineering industry whose main business activity is not the provision of consulting engineering services, e.g., contractors or manufacturers;
c) in-house as own-account production (see insert).

Services supplied by a) and b) are traded in the market and their volumes are captured by national accounts.

Own-account in-house production is consumed internally and is not accounted for by national accounts. However, own-account in-house production satisfies some of the demand for consulting engineering services so it needs to be considered.

Estimating the demand from investment thus has an important role to play in quantifying activities that were often excluded from national accounts, notably own-account production and, prior to SNA08, research and development and weapon systems development.

In the case of the consulting engineering services, it can be assumed that own-account production is carried out by firms outside the consulting engineering industry.

Own-account in-house production

Own-account in-house activities are activities normally associated with a specific industry that are carried out outside the industry by businesses, governments and non-profit institutions and are not traded in the market. Since under the current national accounts convention all purchased design services are used up in current period production, official statistics do not collect information on own-account design activities (the most important own-account activity for consulting engineering and defined as the process of originating and developing a plan for a product).

2.2.2 - Industry activities

NACE (derived from the *Nomenclature statistique des activités économiques dans la Communauté européenne*) is the acronym used to designate the various statistical classifications of economic activities developed since 1970 in the European Union. NACE provides the framework for collecting and presenting a large range of statistical data according to economic activity. The NACE Revision 2 of 2008 is reflected in SNA08 and its use is mandatory within the EU statistical system.

Integrated with the NACE classification of economic activities is the *Classification of Products by Activity* (CPA), last revised in 2008.

The EU-level NACE and CPA classifications for industries and for products and services form part of an integrated system of statistical classifications at the world level, as shown in Table 1, where the UN *International Standard Industrial Classification* (ISIC) was adopted in 2006 and the UN *Central Product Classification* (CPC) was finalised in 2009. So national statistics produced on the basis of NACE are comparable at the EU and world levels.

	World Level	EU Level
Industries	ISIC	NACE
Products and services	CPC	CPA

Table 1 - Classification of economic activities and products.

The NACE-CPA structure means that every good or service produced in the market can be assigned to a single NACE activity.

The M71 (Architectural and Engineering Activities) CPA division, see Appendix A, illustrates this one-to-one correspondence with the NACE Revision 2 M71 (Architectural and Engineering Activities) division which splits out the M71 division as follows:

M71: Architectural and Engineering Activities; Technical Testing and Analysis
- 71.11: Architectural Activities
- 71.12: Engineering Activities and Related Technical Consultancy
- 71.20: Technical Testing and Analysis

The consulting engineering industry (including architecture) is defined as the industry that supplies:

- M71 services
- less some specific M71 services
- plus some specific services that are classified under other CPA divisions.

Adjustments to service classifications that are needed in order to estimate the activity of the consulting engineering industry are:

- Remove activities involving technical testing and analysis (M71.20).
- Add in items that are excluded in M71.12 (Engineering Activities and Related Technical Consultancy):

a) Research and Development (R&D) activities related to engineering, see M72.19: add in M72 (R&D).
b) Test drilling in connection with mining support activities, see B09.10 and B09.90.
c) Industrial design in connection with specialised design services, see M74.10.
d) Activities for which more advanced professional, scientific and technical skill levels are required, see M74.9.

It has been suggested that the following activities could also be included as consulting engineering industry activities:

e) Development or publishing of associated software, see M58.29, M62.01.
f) Activities of computer consultants, see M62.02, M62.09.
g) Aerial photography, see M74.20.

It is generally agreed by the industry that these activities are not core business areas and do not need to be included.

In summary therefore, for the purposes of the survey it was assumed that consulting engineering industry supplied consulting engineering services defined as CPA division M71 (Architectural and Engineering Activities; Technical Testing and Analysis) services with the following adjustments:

- remove Technical Testing and Analysis (M71.20);
- add in R&D (M72);
- add in test drilling in connection with mining support activities;
- add in the special design and advanced technical activities of division M74-M75 (Professional Services).

2.2.3 - Types of fixed asset investment requiring consulting engineering services

Under SNA08, the domestic investment in non-financial produced fixed assets that are used repeatedly or continuously in production processes for more than one year is measured using Gross Fixed Capital Formation (GFCF; see insert). GFCF includes several groups of non-financial produced fixed assets:

a) Construction
   - Dwellings (excluding land)
   - Other buildings and structures (roads, bridges, dams, aitports, etc.)
b) Equipment
   - Transport equipment (ships, railways, aircraft, etc.)
   - Other machinery and equipment (plant, goods, etc.);
c) Weapons systems
d) Cultivated Assets: major improvements to managed forests, livestock, etc.
e) Intellectual property products: Research and Development (R&D); mineral exploration and evaluation; in-house own-account production of architectural and engineering designs; computer software and databases; etc.

The consulting engineering industry supplies services meeting the demand arising from investment in these various groups of produced fixed assets.

a - Construction

It is assumed that all of the Construction investment, for both new build (measured as GFCF) and repair and maintenance, requires consulting engineering services.

b - Equipment

The consulting engineering services required for investment in equipment will include many different types (design, supervision, development, manufacturing control, installation, etc.).

c - Military weapon systems

In SNA93, the acquisition of armaments was not recorded as GFCF but as consumption. SNA08 recognizes that military personnel are engaged in the production and use of weapon systems and that weapon systems have value and can be sold.

In SNA08, expenditure on weapon systems that meets the general definition of assets has been reclassified as a new item of GFCF. Consulting engineering services are supplied to meet the demand arising from investment in military weapon systems, mainly through the supply of design and project management services.

d - Cultivated assets

Cultivated assets give rise to a very small demand for consulting engineering services, mainly as a result of investment in land and forests requiring management.

e - Intellectual property products

The main types of intellectual property products that need to be considered because they require consulting engineering services are:

1) Research and Development (R&D)
2) Mineral exploration and evaluation
3) Own-account design

1) R&D

National accounts aim to capitalise all of the main types of R&D (basic, strategic, applied, experimental). Consulting engineers and to some extent architects are active in all these areas so the entire R&D GFCF represents a demand for consulting engineering services.

2) Mineral exploration and evaluation

Expenditures on mineral exploration are classified under SNA08 as contributing to GFCF since mineral exploration creates a stock of knowledge about the reserves that is used as input in future production activities.

There are also own-account mineral exploration services carried out in-house by firms inside and outside the mining industry that are not traded in the market but which need to estimated as they represent a demand for consulting engineering services.

Gross Fixed Capital Formation

Gross Fixed Capital Formation (GFCF) comprises the acquisitions, less disposals, of non-financial fixed assets (e.g., machinery, buildings, etc.) by resident producers. These fixed assets are used repeatedly or continuously in the production of other goods and services for more than one accounting period (usually a year). Also included in GFCF are major improvements to existing fixed assets (e.g., upgrading and enhancement) that significantly improve their productivity or life span.

GFCF is not a measure of total investment, because only the value of net additions to fixed assets is measured. Net Fixed Capital Formation is a better measure than GFCF for the capital consumed in the process of production. However, available estimates of depreciation cannot be compared between countries so gross measures are used in preference to net measures for practical reasons.

Of the three methods for measuring GFCF - flow of funds (sum of saving and net capital inflow from abroad); commodity flow (by type of assets and change in stock by industry of use); expenditure (by adding GFCF by industry of use) - the focus has always been on the value added and expenditure approaches. For measures of economic activity, it is more appropriate to focus on the expenditure approach.

3) Own-account architectural and engineering design

It is necessary to estimate non-traded consulting engineering services performed outside the consulting engineering industry that are not included in national accounts as construction and equipment investments. The consulting engineering industry will be mainly concerned with own-account architectural and engineering designs for investment in both construction and equipment.

Table 2 summarises the types of services, classified according to the CPA, that are supplied by the consulting engineering industry to meet the investment in non-financial produced fixed assets.

Consulting engineering industry services			SNA08 GFCF asset group						
CPA Division	CPA Group		Construction	Equipment	Cultivated assets	Intellectual Property Products			Weapon systems
						R&D	Mineral exploration & evaluation	Own-account design	
M71	M71.1	Architectural and Engineering Activities	x					x	
M72	M72.19	R&D activities related to engineering				x			
B	B09.10 and B09.90	Test drilling in connection with mining support activities					x		
M74	M74.10	Industrial design in connection with specialised design		x				x	x
	M74.9	More advanced professional, scientific and technical skill levels are required		x				x	x

Table 2 - Types of services, classified according the CPA divisions and groups, supplied by the consulting engineering industry to meet the investment in non-financial produced fixed assets, classified according to the 2008 revision of the System on National Accounts (SNA08).

2.3 - Step 2: Investment amounts

The total amount of fixed investment (measured in terms of GFCF) in each of the asset groups requiring consulting engineering services (see Table 2) needs to be estimated.

2.3.1 - Construction, Equipment and Cultivated Assets

The various sources for GFCF-related data are listed in Appendix B. *OECD Statistics*, the OECD's statistics agency, gives the GFCF for each of six groups classified according to SNA93 under Construction, Equipment and Cultivated Assets:

- Construction
  - Dwellings (excluding land)
  - Other buildings and structures (roads, bridges, dams, etc.)
- Equipment
  - Transport equipment (ships, railways, aircraft, etc.)
  - Other machinery and equipment (plant, goods, etc.);
- Cultivated Assets (managed forests, livestock, etc.) and intellectual property type fixed assets (mineral exploration, designs, software, artistic originals, etc.).

These data are still reliable for use with the SNA08 classification used in the present survey for both construction GFCF and equipment GFCF. But the enlarged scope of GFCF in SNA08 has not yet been accounted for in OECD statistics. So estimates for weapon systems and intellectual property products need to come from other sources.

2.3.2 - Weapons systems GFCF

In the USA in 2010, the expenditure on weapon systems was 0.7% of GDP, equivalent to some 0.5% of the consumption of fixed capital. Australia estimated its weapon systems GFCF as about 1% of GFCF in 2007-8. Canada has estimated weapon systems' GFCF as 0.6% of GFCF.

Pending the availability of national accounts' GFCF data, the value of capital expenditure should be used. On this basis the EU27 weapon systems GFCF is about 1% of total GFCF.

2.3.4 - Intellectual property products GFCF

a) R&D

Estimating GFCF for R&D is challenging (see insert). For the UK, R&D GFCF amounted to about 9% of pre-SNA08 GFCF without R&D, but capital expenditure in R&D production needs to be removed to avoid double counting. For the Netherlands in 2009, R&D GFCF without capital expenditure was 5% of GFCF. For France in 2004, R&D GFCF was estimated to be 3% of GFCF. Canada has estimated R&D GFCF as 6% of GFCF.

It is reasonable to assume that the GFCF for R&D amounted to 5% of total GFCF without R&D.

b) Mineral exploration and evaluation

The French national statistics agency INSEE, which records mineral exploration as an investment, estimated that mineral exploration accounted for 0.005% of total GFCF in 2004. Given the small GFCF for mineral exploration, the demand for mining support services arising from investment was not considered.

c) Own-account design

Detailed studies of own-account production by Haskel et al [1] of architectural and engineering designs in the UK in 2004 indicated that they accounted for 20% of the output of the CPA M71.1 product given in supply-use tables (see below). An earlier estimate for Sweden by Edquist [2] gave 26%. An estimate for France by Delbecque et al [3] in 2004 made using a different approach gave 40%. Some limited information is also available for Germany (see Peters et al [4]).

It is therefore assumed that own-account architectural and engineering design corresponds to 30% of the output of the CPA M71.1 product.

These data referred only to the market sector. For the whole economy, the non-market investment is assumed to be in the same proportion as the share of the non-market sector in the related industry's total output given in the NACE-CPA supply tables described below. Shares were typically less than 1% for the M71 industry so the non-market contribution was ignored.

Determining how much of this own-account spending can be considered as an investment requires several ad hoc assumptions. In the present case, since the spending represents a potential demand, all of the spending was added to the GFCF requiring consulting engineering services.

Research and Development GFCF

Estimating GFCF for R&D is challenging owing to:

- double counting due to own-account production (suppliers are also users);
- the need to remove expenditure on equipment and construction works used for R&D purposes as these items are classified as expenditure on tangible assets under the relevant product groups;
- overlaps between R&D and other recognised intellectual property products, in particular computer software and databases;
- over 90% of R&D activity is undertaken on own account, and representative market price data for R&D products are not available;
- the national accounts convention that imports of R&D services are made by R&D performers, and that they will be used as intermediate inputs for own-account R&D and thus not included in GFCF;
- the assumption that R&D funded by non-residents represents exports of R&D services and is not included in GFCF.

2.4 - Step 3: Investment amounts requiring consulting engineering & architecture services

Step 3 in estimating the demand for consulting engineering services needs, for each asset group, an estimate of the percentage of the GFCF that would be expected to require consulting engineering services.

2.4.1 - Construction investment

For investment in construction, the durability of buildings means that construction GFCF includes newly built structures and depreciation, but repair and maintenance is not taken into account so the potential demand for consulting engineering services estimated from GFCF is underestimated.

Gruenberg [5] has shown that in the UK the construction industry output for repair and maintenance was on average 0.56 times the new build construction output for the period 1997 to 2006. The total investment in a given year is therefore 1.56 times the new-build investment given by the GCFC for construction.

It is assumed that all new build and maintenance and renovation investment requires consulting engineering services.

FIDIC and EFCA Member Associations were surveyed to estimate the construction industry turnovers for new build and for repair and maintenance. Few were able to respond. For the remainder, since European countries are relatively homogeneous, is was assumed that Construction GFCF should be multiplied by a factor of 1.56 to account for repair and maintenance.

2.4.2 - Equipment investment

FIDIC and EFCA Member Associations were surveyed to estimate the percentage of equipment investment requiring consulting engineering services.

The consulting engineering services required for investment in equipment will include many different types (design, supervision, development, manufacturing control, installation, etc.). Countries with a poorly developed manufacturing sector are expected to need a relatively small amount of services.

On the other hand, for countries such as Germany with developed manufacturing services in major industries where

there are large economies of scale (e.g., the car industry), the percentage requiring consulting engineering services may be relatively high. This is also the case in countries such as Norway with a major oil and gas extraction industry where, for example, the design of sophisticated offshore platforms is a major activity. Indeed, the fees for consulting engineering services for sophisticated plant and offshore platforms for extracting gas and oil may represent more than 20% of the investment.

To assist the Member Associations, Appendix C shows how the percentage of the investment in equipment that requires consulting engineering services can be estimated by adding up the amount of investment in each industry category that requires these services.

An example is given in the appendix for Australia which resulted in a value of 60% - a value that is generally considered appropriate for most European economies.

2.4.3 - Weapons systems

While investment in weapon systems represents a small part of total GFCF, the percentage requiring consulting engineering services is large and the fee levels are high given the technical requirements. Demand arising from investment in weapon systems therefore needs to be considered.

It is reasonable to assume that 50% of the weapon systems GFCF required services of the type that can be supplied by consulting engineers.

2.4.4 - Cultivated assets

Investment in cultivated assets provides limited opportunities for the consulting engineering industry, and they are usually ignored in business surveys.

2.4.5 - Intellectual property products

a) Research and Development

The distribution of spending for R&D is typically in Europe:

Pharmaceuticals	19%
Technical hardware	17%
Automotive	16%
Software	7%
Electrical	7%
Other	34%

It is reasonable to assume that 70% of the R&D GFCF requires services of the type that can be supplied by consulting engineers.

b) Mineral exploration and evaluation

Given the small GFCF for mineral exploration, the potential demand for mining support services arising from investment was not considered.

c) Own-account design

It was assumed that 100% of own-account architectural and engineering design spending requires services of the type that can be supplied by consulting engineers.

2.5 - Step 4: Fee level for each type of investment requiring services

Step 4 in estimating the demand for consulting engineering services (including architecture) requires, for each asset group, an estimate of the percentage of the GFCF requiring consulting engineering services that is expected to be spent on fees.

2.5.1 - Construction and equipment

Member Associations were asked in the survey to estimate the fee percentages for both construction and equipment GFCF. To assist Member Associations, a method was developed (see Appendix D) for estimating these percentages.

2.5.2 - Weapons systems

For weapon systems, some 35% of total cost is spent on development and procurement and 65% is spent during operation. It is estimated that the spending on services of the types that can be supplied by consulting engineers are 50% and 5% of these amounts, respectively. So the percentage of investment that is spent on fees for the types of services that can be supplied by consulting engineers is 20%.

2.5.3 - Intellectual property products

For intellectual property, it was assumed that the percentage of investment in R&D and own-account design that was spent on fees for the types of services that can be supplied by consulting engineers was the same, and equal to 80%.

2.6 - Summary

The demand for consulting engineering services for an asset group in a particular country, for example construction in Austria, is as follows:

Construction GFCF requiring consulting engineering services
= Construction GFCF
  x Percentage of Construction GFCF requiring consulting engineering services

Demand (Construction)
= Construction GFCF requiring consulting engineering services
  x Percentage expected for fees

The total demand was then simply the sum of the demand for each asset group.

Table 2 summaries the parameters assumed for calculating the demand for consulting engineering services arising from investment in the relevant asset groups.

Asset group		GFCF	Percentage of GFCF requiring services	Percentage expected for fees	Comments
Construction		From National Accounts as reported by Eurostat, in EUR at current prices.	100%	Survey question (typically 5%)	Include new build and repair and maintenance, each with the same percentage expected for fees.
Equipment		From National Accounts as reported by Eurostat, in EuUR at current prices.	Survey question (typically 58%)	Survey question (typically 10%)	
Cultivated Assets		Small, and can be ignored	-	-	
Intellectual property	R&D	4% of total GFCF (from Eurostat)	70%	80%	
	Mineral exploration & evaluation	Small, and can be ignored	-	-	
	Own-account design	30% of CPA M71.1 supply at producer prices, from supply - use tables published by Eurostat.	80%	80%	For architectural and engineering designs. Own-account production by non-market producers is small and can be ignored.
Weapon systems		1% of total GFCF (from Eurostat)	50%	20%	

Table 3 - Values of the parameters used to calculate the demand.

2.7 - Demand

Fig. 1 gives the demand for each country for Europe in 2009. The total demand is bEUR 389 for all 37 European countries, with the European Union 27 countries accounting for bEUR 351 (Lichtenstein is not included).

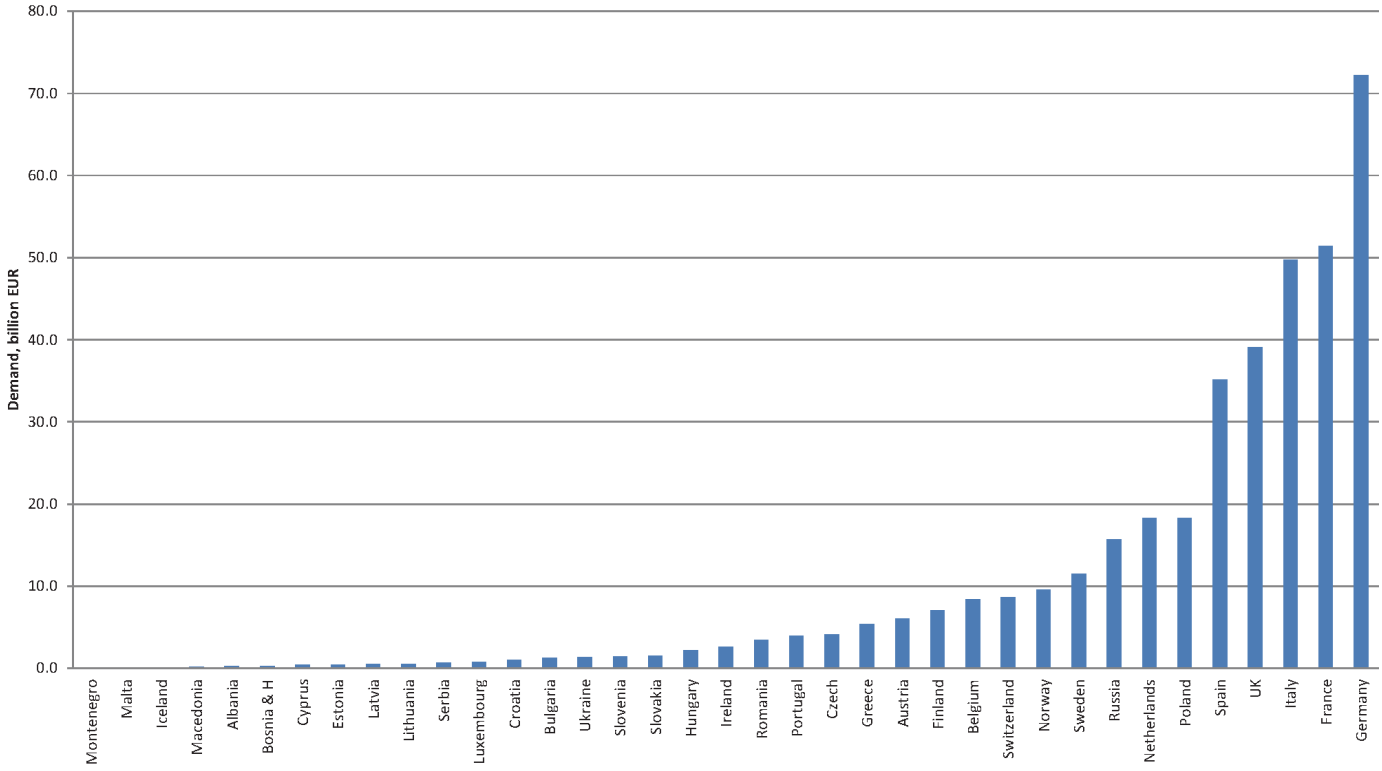

Fig. 1 - Domestic demand for consulting engineering services for European countries in 2009 (in billion EUR).

The demand for consulting engineering services for the European Union 27 countries is plotted in Fig. 2 as a function of the GFCF requiring services. There is a reasonable correlation, showing that the demand represented some 12% of the investment (GFCF) which in principle requires consulting engineering services.

Of course, the demand only represents a potential demand. A comparison with the actual domestic use should show that the use (see below) does not exceed the demand.

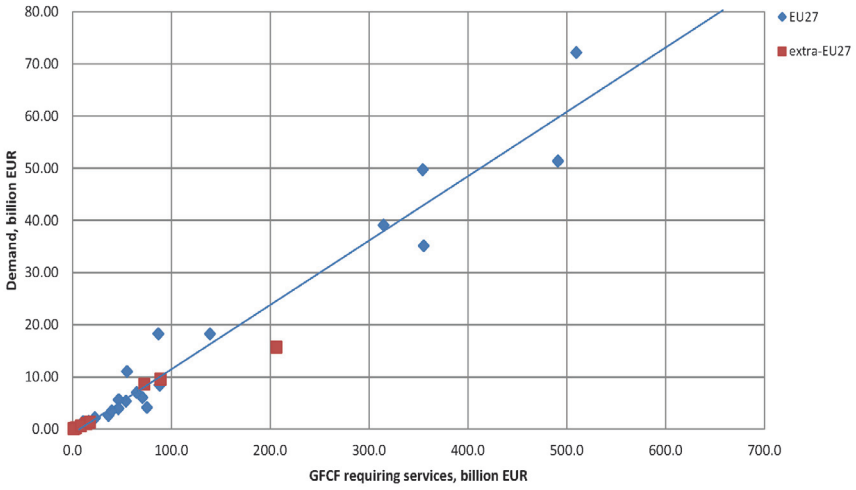

Fig. 2 - Demand, in billion EUR, of consulting engineering services for the EU27 countries and the 10 extra-EU27 European countries (square points, in red) in 2009 as a function of the GFCF requiring consulting engineering services.

2.7.1 - Investment components

For the EU27 countries in 2009, Fig. 3a shows that construction investment represented the asset group with the largest share (80.3%) of the GFCF requiring consulting engineering services, followed by equipment investment (13.9%), own-account architectural and engineering design (2.4%), R&D (2.0%), and weapon systems (1.4%).

In general terms, one can say that in 2009, architectural and engineering services responded to all of the construction investment, to a small part of the R&D investment and to 50% of own-account investment. So architectural and engineering services responded to about 82% of the investment requiring consulting engineering and architecture services while engineering related to manufactured products ("industrial product engineering") responded to 18% of the investment.

2.7.2 - Categories of demand

Fig. 3b shows that for the EU27 countries in 2009, construction investment led to 56.3% of the demand, followed by own-account architectural and engineering design (16.4%), R&D (14.2%), equipment investment (10.6%), and weapon systems investment (2.5%).

Building and architectural related activities therefore made up two-thirds (67%) of the demand for consulting and engineering services as opposed to 33% for largely manufacturing industry related activities.

2.7.3 - Evolution of the demand

Table 4 indicates that total demand in the base year (2009) for the EU27, extra-EU27 and European countries was 351, 38 and 389 billion EUR respectively.

The evolution of the demand for the period 2009-2012 for the EU27 countries was also calculated (see Table 4 and Fig. 4) with the reasonable assumptions that:

a) the percentage of investment spent on services did not change significantly during the period;
b) fees earned by consulting engineers for each type of asset group did not change significantly during the period;
c) since the demand scales as the GFCF requiring services, the demand for the years 2010 to 2012 could be obtained by scaling the demand for 2009.

It can be seen that the demand decreased continuously by 11% over the period in spite of a small (2%) increase in the GFCF invested in construction, equipment, cultivated assets and intellectual property. This is because the proportion of the investment that requires consulting engineering services decreased by 11%, largely owing to a decrease of 9% in the investment in construction requiring services. In other words, the investment profile changed significantly.

The year-on-year decrease in demand from 2010 to 2011 is very small and finalised GFCF data for 2012 could in fact lead to a small increase in demand in agreement with the latest market surveys (see below).

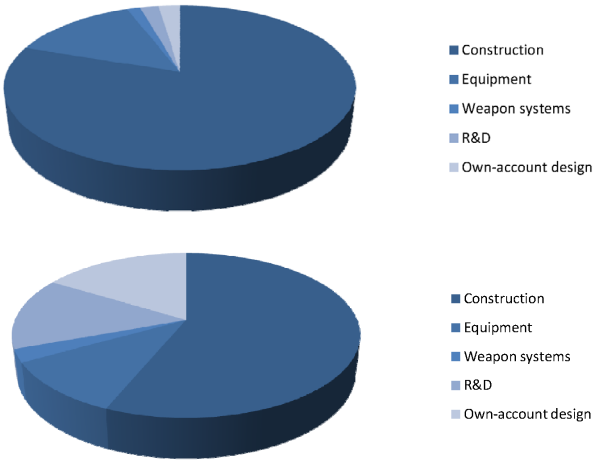

Fig. 3 - Asset groups requiring consulting engineering services for the EU27 countries in 2009: a, upper) share by the amount of investment (GFCF, billion EUR) requiring consulting engineering and architecture services; b, lower) share by demand.

Countries	Demand, bEUR			
	2009	2010	2011	2012
EU27	351	349	320	313
extra-EU27	38			
Europe	389			

Table 4 - Domestic demand, in billion EUR, for the EU27 countries, the extra-EU27 European countries and for all 37 European countries.

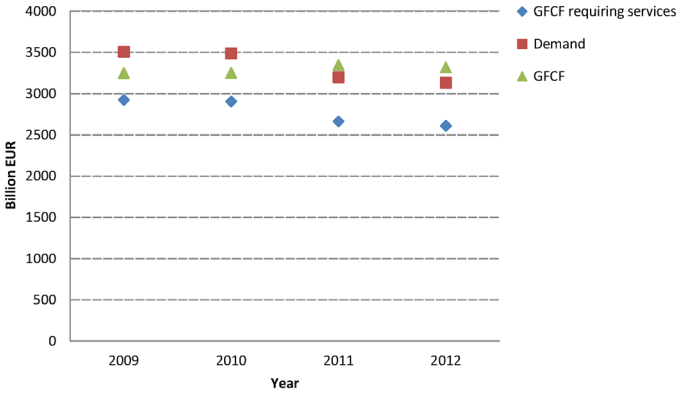

Fig. 4 - Total GFCF, GFCF requiring consulting engineering services and demand (multiplied by a factor 10) for the EU27 countries for 2009 to 2012, in billion EUR.

3 - CROSS-CHECKS

3.1 - Introduction

The demand estimated from investment can be cross-checked with data coming from:

1 Domestic use of consulting engineering services from national accounts' supply-use tables (see below) - that are based in data reported by business enterprises and their production units - combined with Eurostat *Structural Business Statistics* (SBS) reporting the turnover for enterprises.

2 In-house, own-account production.

3 Industry trends coming from Eurostat *Short-Term Business Statistics* (STS) - that reports changes in turnover from surveys of business units - combined with industry surveys carried out by Member Associations.

3.2 - Domestic use from supply-use tables

3.2.1 - Description

Definitive estimates of Gross Domestic Product (GDP), a basic and defining statistic for all economies, are produced by reconciling and balancing annual estimates of expenditure, income and production in current prices through a supply and use framework.

Supply and Use Tables (SUTs; see insert) are therefore a core feature of the national accounts system. They show where goods and services are produced and where they are used in intermediate consumption, final consumption, gross capital formation, and exports. They provide consistency and coherency between the three accounts of the national accounts framework.

Eurostat now requires EU countries to transmit SUTs annually in a standard format for 60 NACE industries and 60 CPA products.

Flows of services described in SUTs are preferably valued at basic prices (see insert) to exclude distortions caused by net commodity taxes on products paid by the producer. However, producer prices are often used since valuation at basic prices is not always feasible.

Adding margins and taxes to, and subtracting subsidies from, a basic price results in the purchaser's price which is the value of a product or service as paid for by a purchaser, and which is often the valuation of output in business statistics such as turnover,

It should be noted that national accounts cover both market and non-market producers. However, the distinction between market producers and producers for own final use on the one hand and other non-market producers on the other hand is only used for an industry when both types of producers are present within one industry. In general, this distinction will therefore only be used for subclassifying a very limited number of industries, e.g., health care and education as opposed to the industries supplying the consulting engineering services.

2.2.2 - Use of consulting engineering services

a - Adjustments

The adjustments to the CPA M71 product division described above for estimating the demand for consulting engineering services were applied to the SUTs published by Eurostat,

Supply-Use Tables

A supply table describes the supply of different kinds of product (or service). A distinction is made between domestic output by industry and imports. A row in the supply table describes the supply of a particular product for various industries. A column in the supply table describes the total output of an industry by the kinds of product.
A use table describes the use of different kinds of product. A distinction is made between intermediate consumption by industry and final expenditure. Final expenditure is broken down into exports, final consumption expenditure by households, final consumption expenditure by general government, gross fixed capital formation and changes in inventories. A row in the use table describes the destination of each product.
By definition, the total of each row in the use table is equal to the corresponding row total in the supply table. Some additional columns are introduced in order to make up for the differences that result from different valuation methods applied in the supply and use tables (supply tables are at basic prices; use tables are at producer prices excluding valued added taxes). The total of each column in the use table equals by definition the corresponding column total in the supply table.

Basic and Purchaser's Prices

Basic prices refer to the valuation of products before they are conveyed to markets. They reflect the actual revenues receivable by the producer and therefore the actual production costs incurred by the producer. The supply table is valued at basic prices. Imports c.i.f. which exclude import duties are treated as equivalent to basic prices. The basic price is therefore the value of the product at the moment it leaves the producer and enters the market.
Producer's prices are equal to basic prices plus taxes and subsidies; purchaser's prices are producer's prices plus trade and transport margins.
The purchaser's price is the price a purchaser actually pays for a product or service: including taxes less subsidies on the products (but excluding deductible taxes like VAT on the products); including any transport charges paid separately by the purchaser to take delivery at the required time and place; after deductions for any discounts for bulk or off-peak-purchases from standard prices or charges; excluding interest or services charges added under credit arrangements; excluding any extra charges.

starting in 2008 and the product group turnover published by Eurostat in its *Structural Business Statistics* table for services. Turnover is the total value of sales by producing enterprises, comprising the total amount invoiced and corresponding to the market sales at producer's prices of services supplied to third parties.

Generally, for the CPA M71 product category and the other categories involving consulting engineering (M72, M74-5 and B09, see above), turnover (at producer's prices) will be similar in magnitude to the domestic supply of consulting engineering services at purchaser's prices obtained from SUTs.

Typically, using France in 2009 as the example, the adjustments made to the M71 product division to obtain the domestic use of consulting engineering services are:

- CPA Division M71 use at purchaser's prices was bEUR 63.01 of which some bEUR 5.27in exports was removed. bEUR 12.9 million was used by the M71 industry itself and this was also removed to eliminate double counting. The OECD turnover table giving the turnover of enterprises was then used to estimate the percentage of the M71 supply that involved technical testing and analysis. This was some 11%, which was removed, assuming that the use of testing services was in the same proportion as their supply.
- CPA Division M72 R&D services valued at bEUR 36.60 were used after removing exports and use by the M72 industry itself. The turnover data indicated that 85% was for natural science and engineering of which an estimated 67% was for engineering so the M72 services involving engineering was bEUR 20.78 at purchaser's prices.
- The same procedure was applied to add in test drilling in mining and quarrying (in Division B09) and special design activities for industrial design (in Division M74-75).

Table 5 summarises the adjustments for France for 2009, in purchaser's prices. Generally, the contributions for test drilling and special design are small compared to that for the use of R&D services.

CPA Division	Use, bEUR
M71	39.5
M72: R&D	20.8
B09: Test drilling	0.32
M74-75: Special design	0.19
Total:	*60.8*

Table 5 - Use of consulting engineering services in France in 2009 from supply-use tables.

b - Domestic use

Most supply and use data are for 2009 with a few data points for 2008 owing to the unavailability of supply-use tables for 2009 for some countries. The European countries reporting SUTs plotted in Fig. 5 include all the major European economies (Germany, UK, France, Italy, Spain, Netherlands) but not Poland.

Market and Non-Market Producers

Non-market producer sell their goods and services at non-significant prices, made operational by the convention that if less than 50% of total costs is covered by sales on the market, the enterprise is defined as a non-market producer.
Examples of non-market producers are government, health and amateur sporting clubs. The production of non-market producers is by definition equal to the sum of costs, containing intermediate consumption, compensation of employees and consumption of fixed capital (depreciation), implying that net operation surplus equals zero.

Excluding Spain, Fig. 5 shows that the domestic use of consulting engineering services is strongly correlated with the GFCF investment that requires consulting engineering services (construction – new build and renovation and maintenance; equipment; weapon systems; R&D; own-account design).

The correlation corresponds to domestic use making use of 12% of the GFCF requiring consulting engineering services.

The data point for Spain obtained from a draft SUT for 2008 diverged strongly. This implies that the demand is overestimated, possibly because among the major European economies, Spain in 2008 is characterised by a booming new-build construction sector. It may be reasonable to assume that using the same estimate for construction maintenance and renovation as for other European economies overestimates the Construction GFCF, and thus the demand.

The scaling of domestic use with the GFCF requiring services applies for those countries for which SUTs are available. For the EU27 countries, they represent some 85% of the GFCF that requires consulting engineering services, so the correlation between domestic use and GFCF provides a useful model for the consulting engineering industry for the EU27 countries and probably for Europe as a whole.

c - Domestic use for 2009

In order to estimate the total domestic use for the EU27 countries and for Europe, it was assumed that the supply for countries for which there were no SUTs corresponded to 12%

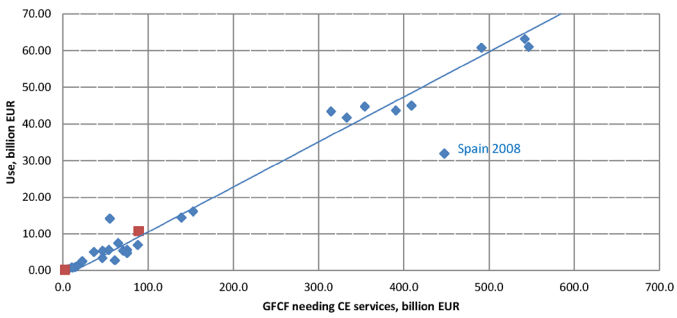

Fig. 5 - Domestic use of consulting engineering services at purchaser's prices for European countries as a function of the investment (GFCF) requiring these services (red squares are for extra-EU27 European countries).

of the GFCF requiring consulting engineering services. This gave the values for the domestic use indicated in Table 6.

d - Comparison of demand and domestic use

Fig. 6 compares, for the EU27 countries, the domestic use of consulting engineering services at purchaser's prices estimated from SUTs with the demand calculated from the GFCF requiring consulting engineering services.

Most data points fall close to or below the line that plots the demand as equal to the domestic use. This indicates that the demand corresponds to an upper limit of the domestic use. This is what would be expected because it is difficult to capture all the traded and non-traded services.

The fact that the demand gives close to an upper limit to the domestic use confirms that the macroeconomic approach based on investment is, as expected, related to the actual use obtained from SUTs.

For many countries, SUTs are unavailable and the macroeconomic investment approach represents the only method for quantifying business activity. In these cases the demand will give an upper limit to the domestic use of consulting engineering services. This is an important and very useful result.

e - Domestic use for the period 2009-12

Given that domestic use represents 12% of GFCF investment requiring consulting engineering services it is possible to extrapolate the use beyond the base year (2009) in the same way as for the demand. The same general trends arise for both the demand and the use since both scale with the GFCF requiring consulting engineering services. Indeed the demand and use curves are very similar since there is no difference in the scaling factors (12% for demand; 12% for use).

For completeness, Fig. 7 gives the EU27 demand and domestic use of consulting engineering services for the period 2009-2012.

	Domestic demand, bEUR	Domestic use, Purchaser's prices, bEUR
EU27 countries	351	336
ex-EU27 countries	38	50
All European countries	389	386

Table 6 - The domestic demand and use of consulting engineering services in Europe in 2009, in billion EUR.

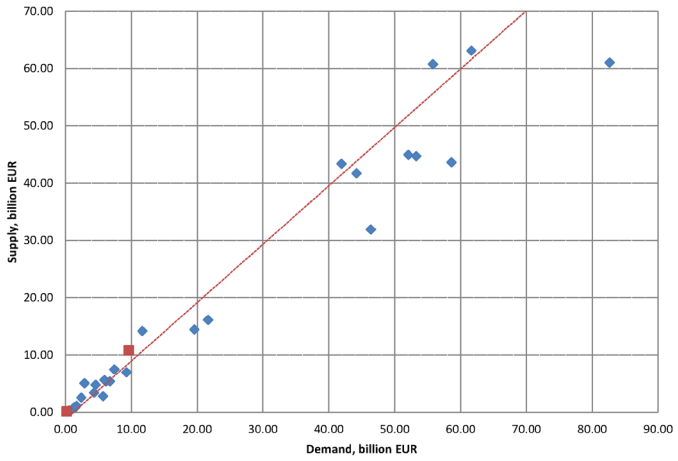

Fig. 6 - Domestic use of consulting engineering services as a function of demand for 2008 to 2010 for most EU27 countries and some extra-EU27 European countries (red squares).

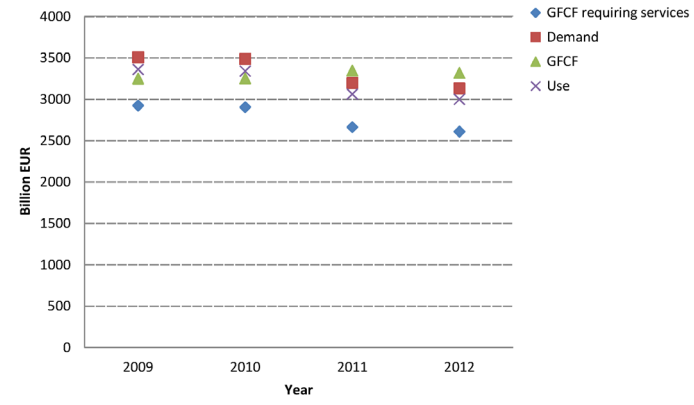

Fig. 7 - Total GFCF, GFCF requiring consulting engineering services, and domestic demand and use (both multiplied by a factor 10) for the EU27 countries for 2009 to 2012, in billion EUR.

3.3 - In-house own-account production

As discussed for demand, the own-account production of architectural and engineering designs represents 15% of domestic demand.

The assumed own-account product for the SUTs is compared in Table 7 with the percentage derived from the production in-house by industries other than consulting engineering. The latter was obtained from the survey that asked Member Associations to estimate the percentage of the demand that was supplied in-house. The two different types estimates are in reasonable agreement. These also agree with literature estimates for 2004, confirming again that the demand estimated from investment reflects accurately the supply of consulting engineering services.

The demand analysis used the result of the detailed analysis for the UK in 2004 indicating that own-account production amounted to 30% of the domestic use at purchaser's prices of the CPA M71.1 product without technical testing. The total domestic use was estimated using the SUTs and for the countries that did not report SUTs, the scaling of use with GFCF. On this basis the amount of domestic use of the CPA M71.1 product in 2009 that is met by own-account production is 17% of total use.

Country	Demand, 2009		Use, 2009		Supply, 2004	
	Survey % of demand	bEUR	Assumed % M71.1 use	bEUR	Reference	bEUR
France	21.0	10.8	30	9.5	Delbecque et al, 2004	10.8
Sweden	10.0	1.1	30	2.2	Edquist, 2004	6.3
UK	23.6	9.2	30	8.3	Haskel, 2004	10.2

Table 7: Comparison of own-account production in 2009.

3.4 - Exports and Imports

3.4.1 - National

The analysis so far has compared demand with the domestic use, at purchaser's prices, of consulting engineering services, where the use is the total use from SUTs less exports.

The domestic production of consulting engineering services is given by the domestic use less imports plus exports and is therefore equal to total use less imports.

In order to estimate the percentage of the domestic production that is exported it is necessary to consider basic prices which suffer from fewer distortions between countries owing to taxes, margins and subsidies.

		Year	Imports			Exports		
			Basic prices, bEUR	% of total imports	% of domestic production	Basic prices, bEUR	% of total exports	% of domestic production
All services (CPA divisions M71, M72, B09, M74-75)								
	Total EU27	2009	49.6		14.3	50.8		14.7
	Extra-EU27	2008	34.9	70	10.1	38.3	75	11.1
	Intra-EU27	2008	14.7	30	4.2	12.5	25	3.6
CPA M71.1 (architecture and engineering) services only								
	Extra-EU27	2008	18.5		5.2	25.8		7.2

Table 8: Total, intra-EU27 and extra-EU27 imports and exports for consulting engineering services for 2008 (domestic production was bEUR 346).

National SUTs give imports at basic prices and use and exports at purchaser's prices so the use and exports need to be converted to basic prices.

The estimated domestic demand assumes that consulting engineering services were made up from services classified under the M71, M72, B09, and M74-75 CPA divisions (see above). The *World Input Output Database* (WIOD) has calculated exports and use in both basic and purchaser's prices for 2009 for national SUTs where the product divisions are slightly different (based on the NACE Revision 1 classification). However, since margins on these services are very small and since taxes are fairly uniform for services classified under the same NACE division, the ratio of basic to purchaser's prices obtained from the WIOD SUTs can be used for the Eurostat SUTs.

For the EU27 countries, using the WIOD SUTs for the countries that reported Eurostat SUTs, use and exports in basic prices are as follows:

- domestic use of consulting engineering services: bEUR 378
- domestic production: bEUR 346
- total imports: bEUR 49.6
- total exports: bEUR 50.8, or 14.7% domestic production

3.4.2 - Regional (EU27)

From the EU27 regional SUT published by Eurostat, imports and exports in 2008 at basic prices into and from, respectively, the EU27 countries from outside (i.e., extra-EU27) amounted to bEUR 34.9 and bEUR 38.3, respectively for consulting engineering services supplied in the M71, M72, B09 and M74-75 CPA divisions. So intra-EU27 imports and exports were bEUR 14.7 and bEUR 12.5, respectively, for 2008 as summarised in Table 8 and assuming that the total exports as a percentage of total production did not change between 2008 and 2009.

Member Associations reported levels of exports that varied considerably (from 3% to 15% of the domestic demand).

As would be expected, the estimated 14.7% generally agreed with the level of exports for those countries with well-developed and well-organised industrial engineering sectors. Other countries on the other hand effectively exclude industrial engineering and possibly R&D and similar services, thus reporting the exports of services covered by the M71.1 (architectural and engineering services less testing) CPA division. Extra-EU27 exports of these services represented only 7.2% of domestic production (see Table 8).

3.5 - Turnover

Table 9 gives the Eurostat SBS turnover and the domestic production for the EU27 countries for the M71, M72, B09 and M74-75 consulting engineering services.

One normally aims to compare domestic production at purchaser's prices with turnover, which includes margins, taxes and duties except value-added tax. In principle, these two quantities do not necessarily agree if the turnover, that is generally taken from company accounts, included adjustments for write-offs and the like.

However, estimating production at purchaser's prices is complex so for this reason it is usual to compare turnover with domestic production at basic prices. For consulting engineering services, margins rarely exist and if they do they are very small. Taxes in the EU27 countries are generally low and fairly uniform between countries. Thus production at purchaser's prices will be a few percent larger than for basic prices, as indicated in Table 9.

The agreement between turnover and domestic production is reasonable given the nature of turnover statistics and difficulties in estimating production at purchaser's prices.

Year	Price type	Source	Group surveyed	bEUR
Turnover		Eurostat SBS	Enterprises	321
Domestic production	Basic prices	Survey	Member Associations	346
	Purchaser's prices			360

Table 9 - Comparison for the EU27 countries of domestic production with the turnover for consulting engineering services for the mix of CPA M71, M72, B09 and M74-75 services used to estimate demand and domestic use.

3.6 - Trends

There have been several surveys that monitored current business trends in the consulting engineering industry on a national basis. However, none of these surveys indicated a consistent EU27-wide trend.

The Eurostat STS short-term index of turnover (adjusted for the number of working days) for the EU27 countries for the M71 product (architectural and engineering activities and technical testing and analysis) decreased in 2010 and was forecast to increase in 2011 and 2012 (see Table 10).

Eurostat turnover data for 2010 for consulting engineering industry activities corresponding to activities in the M71, M72, B09 and M74-75 CPA divisions indicated an increase in turnover in 2010.

Year	Source	Units surveyed	2009	2010	2011	2012
M71 turnover index	Eurostat STS	Production units	100	98.81	102.6	105.5
M71, M72, B09 and M74-75 consulting engineering services turnover	Eurostat SBS	Enterprises	100	100.6		
M71, M72, B09 and M74-75 consulting engineering services demand	Survey	Member Associations	100	99.4	91.1	89.3
M71, M72, B09 and M74-75 consulting engineering services use	Eurostat SUTs	Enterprises	100	99.4	91.4	89.3

Table 10 - Eurostat short-term M71 industry turnover index for the EU27 countries compared with the evolution of turnover, demand and use (base year 2009: index = 100).

It is too early to tell if the Eurostat SUT data for 2010 and later will show that the use of consulting engineering services increased in 2010.

However, assuming that the scaling models for the use and the demand apply, both the use and the demand decreased from 2009 until 2011 to close to a constant value.

The GFCF amounts requiring services are very close for 2011 and 2012. When data for the GFCF in the various asset groups becomes available for 2012, the GFCF requiring services may in fact shown an increase in 2012, thereby increasing both use and demand.

In conclusion, a small increase in activity in 2010-11 is not confirmed at this stage by an increase in use or demand. It remains possible, however, that a complete set of finalised statistics for 2012 will indicate a small increase in both use and demand in 2012 in line with the trend for the M71 index and for the consulting engineering industry turnover.

It is a common feature of industry sectors involving major investment that increases in investment to halt a continuous decline in investment lead to a short-term increase in turnover. Thus is because projects that are immediately capable of receiving investment profit the most. In other words, the relation between investment and services turnover changes significantly when investment in construction and equipment is boosted to halt a decline in investment. This explains the one-year lag between an increase in turnover in 2010-11 and the plateauing of use and demand in 2011-12.

4 - CONCLUSIONS

For the 27 European Union Member States (the EU27 countries), the domestic demand for consulting engineering services (including architecture) estimated from the investment requiring the services was bEUR 351, which is equivalent to 12% of the investment requiring services. The survey of Member Associations indicated that the consulting engineering industry (including architecture) responds to 51% of the demand, with other industries and own-account production responding to 26% and 23%, respectively.

At the national level, the demand corresponds to an upper limit to the use of consulting engineering services obtained from Eurostat's newly available, mandatory supply-use tables. These tables now give a more accurate classification of the consulting engineering industry's activities following recent revisions to industry and product classifications. Some 83% of use was met by industry, with own-account production meeting 17%.

For the EU27 countries in 2009, the supply-use tables gave total domestic use as bEUR 336 and Eurostat business statistics gave turnover as bEUR 321 for the same mix of services used to estimate demand and use. These values for use and turnover are somewhat lower than the demand owing to the difficulties in capturing all supply and use in national statistics.

Total exports from the EU27 countries amount to 13.6% of domestic production, with three-quarters of exports exported outside the EU27 in 2008.

Most of the domestic demand (56%) arises from investment in construction (80% of the GFCF requiring consulting engineering services). The own-account in-house production of architectural and engineering designs corresponds to 16% of the domestic demand, followed by research and development (14%), investment in equipment (11%) and weapon systems (3%).

For the EU27 countries, the demand decreased by 11% from bEUR 351 in 2009 to bEUR 313 in 2012 in spite of a small increase (2%) in total GFCF. This is because the GFCF investment requiring consulting engineering services decreased by 11% (from bEUR 2924 to bEUR 2611) owing to a change in the profile of investments (e.g., the percentage of GFCF invested in new-build construction decreased by 9%).

Turnover data indicating a small increase (1-3%) in activity in 2010-11 for the EU27 countries may be confirmed by increases in use and demand when finalised statistics for 2012 become available.

5 - APPENDICES

A - CPA M71 (Architectural and Engineering Activities) Division

Division 71
Architectural and engineering services; technical testing and analysis services
- Group 71.1 Architectural and engineering services and related technical consulting services
  - Class 71.11 Architectural services
    - 71.11.1 Plans and drawings for architectural purposes
      - 71.11.10 Plans and drawings for architectural purposes
    - 71.11.2 Architectural services for buildings
      - 71.11.21 Architectural services for residential building projects
      - 71.11.22 Architectural services for non-residential building projects
      - 71.11.23 Historical restoration architectural services
      - 71.11.24 Architectural advisory services
    - 71.11.3 Urban and land planning services
      - 71.11.31 Urban planning services
      - 71.11.32 Rural land planning services
      - 71.11.33 Project site master planning services
    - 71.11.4 Landscape architectural services and architectural advisory services
      - 71.11.41 Landscape architectural services
      - 71.11.42 Landscape architectural advisory services
  - Class 71.12 Engineering services and related technical consulting services
    - 71.12.1 Engineering services
      - 71.12.11 Engineering advisory services
      - 71.12.12 Engineering services for building projects
      - 71.12.13 Engineering services for power projects
      - 71.12.14 Engineering services for transportation projects
      - 71.12.15 Engineering services for waste management projects (hazardous and non-hazardous)
      - 71.12.16 Engineering services for water, sewerage and drainage projects
      - 71.12.17 Engineering services for industrial and manufacturing projects
      - 71.12.18 Engineering services for telecommunications and broadcasting projects
      - 71.12.19 Engineering services for other projects
    - 71.12.2 Project management services for construction projects
      - 71.12.20 Project management services for construction projects
    - 71.12.3 Geological, geophysical and related prospecting and consulting services
      - 71.12.31 Geological and geophysical consulting services
      - 71.12.32 Geophysical services
      - 71.12.33 Mineral exploration and evaluation services
      - 71.12.34 Surface surveying services
      - 71.12.35 Map-making services

B - Data sources

GDP

Eurostat
EU27 plus additional mainly European countries
Euro, market prices
Latest data: until 2011
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_c&lang=en

UN
Source: World Bank
USD; current prices, all countries
Latest data: until 2011
http://data.un.org/Data.aspx?q=gdp&d=WDI&f=Indicator_Code%3aNY.GDP.MKTP.CD

OECD
National currency; current prices, output and expenditure approaches, all countries
Latest data: until 2011
http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1

GFCF

Eurostat
Absolute values
EU27 plus additional mainly European countries
Latest data: 2012 largely complete, with some forecast; 2013 forecast
Euro
http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do

World Bank
Absolute values
USD, current prices, all countries
Latest data: 2012 mostly complete
Sources: World Bank national accounts data; OECD National Accounts data files
http://data.worldbank.org/indicator/NE.GDI.FTOT.CD

UNECE
Absolute values
Latest data: 2011
http://w3.unece.org/pxweb/database/STAT/20-ME/2-MENA/?lang=1

Percentage of GDP
Current prices, all countries
Latest data: until 2011
Source: World Bank
http://data.un.org/Data.aspx?q=gdp&d=WDI&f=Indicator_Code%3aNE.GDI.TOTL.ZS

GFCF by Asset Group

Eurostat
EU27 plus additional mainly European countries
Latest data: 2012 largely complete or forecast; 2013 forecast
Euro
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_pi6_c&lang=en

OECD
National currency; current prices, all countries
Latest data: 2011 partially complete
http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1

Turnover by NACE Revision 2 Divisions

Eurostat Structural Business Statistics
Value of goods and/or services sold in the year
EU27 plus additional mainly European countries
Euro
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_1a_se_r2&lang=en
ec.europa.eu/eurostat/product?code=sbs_na_1a_se_r2&mode=view

Production by ISIC divisions

OECD
Value of goods and/or services produced (sold or stocked)
STAN Database for Structural Analysis (ISIC Rev. 4)
OECD countries
Latest data: until 2010; 2011 incomplete
http://stats.oecd.org/Index.aspx?DatasetCode=STAN08BIS

Eurotat Short-Term Business Statistics

Turnover Index
Latest data: 4th Quarter 2012 complete but many provisional entries and estimates
NACE Revision 2 M71 Division
Quartely
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sts_setu_q&lang=en

Supply-Use Tables

Eurostat
Most EU27 countries plus some mainly European countries
National currency and Euro
Latest data: 2008 - incomplete; 2009 - incomplete; 2010 - one country
Excel workbooks
http://epp.eurostat.ec.europa.eu/portal/page/portal/esa95_supply_use_input_tables/data/workbooks

WIOD
National SUTs at basic prices
Until 2011
EUKLEMS classification
http://www.wiod.org/database/nat_suts.htm

Euro official exchange rates

Eurostat; latest data: 2012; projections for 2013 and 2014
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ert_bil_eur_a&lang=en

C - Equipment GFCF requiring consulting engineering & architecture services

It is usually assumed that the percentage of Equipment Gross Fixed Capital Formation (GFCF) requiring consulting engineering services is about 58% and not 100%, since the design of much plant and equipment is part of their production and does not require separate and identifiable engineering services.

The percentage of the investment in equipment that requires consulting engineering services can be estimated by estimating the amount of investment in each industry category that requires these services.

A typical example is given by Equipment GFCF data for Australia that is broken down into several industry sectors. For each sector, the amount of investment that requires consulting engineering services is indicated to give an average of 60% of the total Equipment GFCF. A similar exercise can be repeated for each country.

Industry Sector	GFCF, million $AUS	% of GFCF requiring services	million $AUS
Agriculture, Forestry, Fishing	4978	20	996
Mining	26089	100	26089
Manufacturing	10592	100	10592
Electricity, Water, Gas and Waste Services	18139	100	18139
Construction	9,64	100	9164
Wholesale Trade	3673	10	367
Retail Trade	4324	20	865
Accommodation and Food Services	3191	30	957
Transport, Postal and Warehousing	12842	20	2568
Information, Media and Telecommunications	5788	10	579
Professional Services (Rental, Hiring & Real Estate; Scientific & Technical; Administrative & Support; Arts & Recreation; Other)	16632	10	1663
Other (Public Administration & Safety, Private Education & Training, Private Health Care & Social Assistance)	4514	10	226
Total	119126		72205 (60%)

D - Percentage of Construction GFCF spent on consulting engineering and architecture fees

In previous FIDIC-EFCA surveys, Member Associations were asked to give the percentage of the total investment (Equipment and Construction) that was spent on fees for consulting engineering services. Estimates varied from as low as 3% to 10%, with 8% being the average. In an effort to be more precise, Member Associations were asked in the present survey to indicate the percentage of investment that is spent on fees for consulting engineering services in each of the two areas: Equipment; Construction New Build and Repair and Maintenance (it is assumed that the percentages are the same for Construction New Build and Construction Repair and Maintenance).

In the case of Construction GFCF, to assist Member Associations, an approach has been developed for survey respondents to estimate the percentage of Construction GFCF that is spent on consulting engineering services. To adopt the approach, survey respondents need to estimate the following:

- Annual base salary for a contracts director, or equivalent.
- Charge out overhead factor.
- Percentage of the base charge out rate for other skills required for different types of projects.
- Breakdown of Civil Works Construction GFCF into Residential, Non-Residential and Works.

	Unit fee charged	Building		Energy plant		Earth moving		Roads, stormwater		Water, sanitation	
Profile		A		B		C		D		E	
		Man-years	Unit fee	Man-years	Unit fee	Man-years	Unit fee	Man-years	Unit fee	Man-years	Unit fee
Contracts director	1.0	0.5	0.5								
Contracts manager	0.8	1	0.8								
Senior site agent	0.7										
Site agent	0.6	2	1.2								
Site engineer	0.6	2	3.6								
Technician	0.5										
Planner	0.5										
Quantity surveyor	0.7										
Surveyor	0.6										
QA, Safety, etc	0.6	2	1.2								
Senior foreman	0.4	2	0.8								
Foreman	0.3	2	0.6								
Junior foreman	0.2										
CE man-years / 15 mUSD project			9.5		7.4		5.7		5.1		10.2
CE base fee/man-year, USD			15000		15000		15000		15000		15000
CE charge-out overhead factor			3		3		3		3		3
CE fee per 15 mio USD			427500		334125		256500		229500		450000
CE fee, % project value			2.85		2.23		1.71		1.53		3.06

Table 1 - Project profiles, taken from Merrifield. Per mUSD 15 of project work in 2005 (CE = Consulting Engineer).

The main steps are described below.

1. Fee income

A consulting engineering firm's staff requirements for projects with different profiles that make up Construction GFCF are first estimated in terms of man-years per year for say a project corresponding to an investment of mUSD 15.

The charge out rate for the firm's staff are given as a percentage of the most expensive (typically the contracts director, see Table 1). Multiplying the man-years required by the unit charge gives the total fee income for one year for the consulting engineering firm for a mUSD 15 project in 2005 with a given project profile.

Construction GFCF component		Percent of construction GFCF	Project Profile	Fee income, % construction GFCF
Residential	All	22.7	A	0.65
Non-Residential	All	17.1	A	0.49
Civil Works	Agriculture	12.0	C	0.67
	Installation of energy equipment (electricity, gas, etc) and communications equipment	4.8	B	0.11
	Other	4.1	E	0.12
			Total:	*2.20*

Table 2 - Consulting engineering services fees as a percentage of GFCF investment (Indonesia, 2005). The staff base annual salary (for a contracts director) is assumed to be USD 15,000 p.a. with a charge-out factor multiplier of 3.0.

2. Construction GFCF components

Construction GFCF is split into Residential, Non-Residential and Civil Works. Merrifield [6 has shown that buildings comprise most of Residential and Non-Residential Construction GFCF and that the project profile is very similar for both components (Profile A - Buildings).

It is often possible to obtain disaggregated estimates of the various components of Civil Works Construction GFCF.

A more or less standard disaggregation is into agriculture; roads bridges, harbours; installation of energy equipment (electricity, gas, etc) and communications equipment; other. Without at this stage adjusting the original project profiles of Table 1, one can calculate the total fees charged for Construction GFCF as a function of the GFCF. The numbers in Table 2 correspond to Indonesia.

Country	Year	GFCF											
		GFCF	GFCF components							GFCF			
		Eurostat	Construction New Build	Equipment % GFCF	Construction M&R	Weapon Systems	R&D	Own-Account		Total	Assumed	Survey	Assumed
			Eurostat	Eurostat	Survey	Assumed	Assumed	From summary	Calc				
		bEUR	% GFCF	% GFCF	% Construction output for M&R	% GFCF	% GFCF	mil EUR	%GFCF	bEUR	% of Construction investment	% of Equipment investment	% of Weapon Systems investment
Austria	2009	57.1	55.7	35.6	44.0	1.0	4.0	1407.0	0.02	79.5	100	60	50
Belgium	2009	70.9	55.7	41.3	44.0	1.0	4.0	1950.0	0.03	102.6	100	53	50
Bulgaria	2009	10.1	67.4	29.3	44.0	1.0	4.0	229.0	0.02	15.5	100	60	50
Cyprus	2009	3.5	67.8	31.5	44.0	1.0	4.0		0.00	5.4	100	60	50
Czech	2009	35.0	53.0	37.9	72.0	1.0	4.0	1318.0	0.04	81.0	100	60	50
Denmark	2009	40.4	49.3	37.9	40.0	1.0	4.0	1620.0	0.04	50.1	100	80	50
Estonia	2009	2.9	69.5	29.3	44.0	1.0	4.0	200.0	0.07	4.6	100	60	50
Finland	2009	34.0	65.7	38.9	60.0	1.0	4.0	1292.0	0.04	70.4	100	60	50
France	2009	367.5	65.1	24.2	44.0	1.0	4.0	11846.0	0.03	531.0	100	60	50
Greece	2009	45.9	56.6	22.8	44.0	1.0	4.0	1498.0	0.03	58.8	100	60	50
Hungary	2009	18.9	53.9	34.7	44.0	1.0	4.0	470.0	0.02	25.5	100	60	50
Iceland	2009	1.2	75.0	28.0	44.0	1.0	4.0		0.00	2.0	100	60	50
Ireland	2009	25.6	65.5	36.6	44.0	1.0	4.0	634.0	0.02	40.3	100	60	50
Italy	2009	294.7	54.7	39.6	44.0	1.0	4.0	9193.0	0.03	416.2	100	50	50
Latvia	2009	4.0	66.5	30.6	44.0	1.0	4.0	75.0	0.02	6.1	100	60	50
Liechenstein	2009												
Lithuania	2009	4.6	67.9	24.0	44.0	1.0	4.0	79.0	0.02	6.8	100	60	50
Luxembourg	2009	6.9	65.3	26.0	44.0	1.0	4.0		0.00	10.1	100	60	50
Malta	2009	1.0	53.9	34.7	44.0	1.0	4.0		0.00	1.4	100	60	50
Netherlands	2009	108.8	59.8	30.4	44.0	1.0	4.0	2243.0	0.02	153.5	100	60	50
Poland	2009	65.8	60.4	35.8	44.0	1.0	4.0	501.0	0.01	97.2	100	*59*	50
Portugal	2009	34.6	61.4	35.8	44.0	1.0	4.0	940.0	0.03	51.8	100	60	50
Romania	2009	28.9	52.7	43.6	51.0	1.0	4.0	522.0	0.02	44.8	100	60	50
Slovakia	2009	13.0	55.1	38.7	44.0	1.0	4.0	286.0	0.02	18.4	100	60	50
Slovenia	2009	8.2	59.1	34.8	44.0	1.0	4.0	85.0	0.01	11.9	100	*62*	50
Spain	2009	247.4	71.2	22.8	44.0	1.0	4.0	7875.0	0.03	380.7	100	60	50
Sweden	2009	52.6	43.9	38.9	44.0	1.0	4.0	2698.0	0.05	63.8	100	60	50

Investment requiring consulting engineering & architecture services							Demand							
Assumed	GFCF	GFCF	GFCF	GFCF	GFCF	GFCF requiring services	Survey				Calc			
	Calc	Calc	Calc	Calc	Assumed									
% of R&D investment	Construction	Equipment	Weapon Systems	R&D	Own-account (30% M711 supply), bEUR	bEUR	%	%	%	%	Demand, bEUR			
							Construction	Equipment	Weapon systems	R&D and Own-acccount	Construction	Equipment	Weapon Systems	R&D
70	56.81	12.22	1.14	1.60	1.41	70.6	5.0	5.0	20.0	80.0	2.8	0.6	0.2	1.3
70	70.47	15.52	1.42	1.98	1.95	88.0	5.8	5.8	20.0	80.0	4.1	0.9	0.3	1.6
70	12.14	1.77	0.20	0.28	0.23	14.2	5.0	10.0	20.0	80.0	0.6	0.2	0.0	0.2
70	4.19	0.65	0.07	0.10	0.00	4.9	5.0	10.0	20.0	80.0	0.2	0.1	0.0	0.1
70	66.33	7.97	0.70	0.98	1.32	75.3	2.5	6.5	20.0	80.0	1.7	0.5	0.1	0.8
70	33.20	12.25	0.81	1.13	1.62	46.6	8.0	5.0	20.0	80.0	2.7	0.6	0.2	0.9
70	3.66	0.52	0.06	0.08	0.20	4.3	5.0	10.0	20.0	80.0	0.2	0.1	0.0	0.1
70	55.82	7.93	0.68	0.95	1.29	64.7	8.0	8.0	20.0	80.0	4.5	0.6	0.1	0.8
70	427.44	53.30	7.35	10.29	11.85	491.0	6.7	6.7	20.0	80.0	28.6	3.6	1.5	8.2
70	46.46	6.29	0.92	1.29	1.50	54.0	5.0	10.0	20.0	80.0	2.3	0.6	0.2	1.0
70	18.20	3.94	0.38	0.53	0.47	22.7	5.0	10.0	20.0	80.0	0.9	0.4	0.1	0.4
70	1.61	0.20	0.02	0.03	0.00	1.8	5.0	10.0	20.0	80.0	0.1	0.0	0.0	0.0
70	29.92	5.61	0.51	0.72	0.63	36.2	4.0	4.0	20.0	80.0	1.2	0.2	0.1	0.6
70	287.62	58.41	5.89	8.25	9.19	354.3	10.0	10.0	20.0	80.0	28.8	5.8	1.2	6.6
70	4.75	0.73	0.08	0.11	0.08	5.6	5.0	10.0	20.0	80.0	0.2	0.1	0.0	0.1
									20.0					
70	5.55	0.66	0.09	0.13	0.08	6.3	5.0	10.0	20.0	80.0	0.3	0.1	0.0	0.1
70	8.00	1.07	0.14	0.19	0.00	9.3	5.0	5.0	20.0	80.0	0.4	0.1	0.0	0.2
70	0.96	0.21	0.02	0.03	0.00	1.2	5.0	10.0	20.0	80.0	0.0	0.0	0.0	0.0
70	116.09	19.83	2.18	3.05	2.24	139.0	10.0	10.0	20.0	80.0	11.6	2.0	0.4	2.4
70	71.00	13.90	1.32	1.84	0.50	86.7	19.0	19.0	20.0	80.0	13.5	2.6	0.3	1.5
70	37.99	7.44	0.69	0.97	0.94	46.4	5.0	5.0	20.0	80.0	1.9	0.4	0.1	0.8
70	31.06	7.55	0.58	0.81	0.52	39.4	5.0	10.0	20.0	80.0	1.6	0.8	0.1	0.6
70	12.81	3.02	0.26	0.36	0.29	16.2	5.0	10.0	20.0	80.0	0.6	0.3	0.1	0.3
70	8.68	1.78	0.16	0.23	0.09	10.7	11.0	11.0	20.0	80.0	1.0	0.2	0.0	0.2
70	314.35	33.89	4.95	6.93	7.88	355.2	6.4	6.4	20.0	80.0	20.1	2.2	1.0	5.5
70	41.29	12.27	1.05	1.47	2.70	55.0	14.0	14.0	20.0	80.0	5.8	1.7	0.2	1.2

		Total domestic use	CE services demand supplied					CE services supply		
			Market		Own-account			Market		
			CE industry	Other Industries				CE industry	Imports	Exports
		Summary table	Survey	Survey	Survey	Calc	Literature: 30% M71.1 supply	Calc	Survey	Survey
		bEUR, Purchaser prices	%	%	%	bEUR	bEUR	bil EUR	bEUR	bEUR
Own-account	Total									
1.13	6.09	5.42	51.1	22.5	26.4		1.1	3.11	100	100
1.56	8.42	7.00	28.6	22.5	48.9		1.6	2.41	0	220
0.18	1.23	0.94					0.2	0.00		
0.00	0.37									
1.05	4.16	4.81	60.0	23.0	17.0		1.1	2.49		
1.30	5.63	5.40	55.0	25.0	20.0		1.3	3.10	50	225
0.16	0.47	0.25	75.0	20.0	5.0		0.2	0.35		
1.03	7.03	7.50	55.0	20.0	25.0		1.0	3.87	0	300
9.48	51.39	60.77	53.0	26.0	21.0	10.8	9.5	27.24	0	3510
1.20	5.36	5.66	50.0	35.0	15.0		1.2	2.68	80	110
0.38	2.18	2.60	55.0	30.0	15.0		0.4	1.20	30	85
0.00	0.13						0.0			
0.51	2.60	5.08	40.8	17.8	41.4		0.5	1.06		
7.35	49.74	44.71	50.0	10.0	40.0		7.4	24.87		
0.06	0.48	0.30					0.1	0.00		
0.06	0.53	0.31					0.1	0.00		
0.00	0.63		51.1	22.5	26.4		0.0	0.32		
0.00	0.10									
1.79	18.26	14.47	36.6	34.8	28.6		1.8	6.68	0	0
0.40	18.27		67.0	22.0	11.0		0.4	12.24	80	0
0.75	3.94	3.45	51.1	22.5	26.4		0.8	2.01		
0.42	3.49						0.4	0.00		
0.23	1.52	1.15					0.2	0.00		
0.07	1.44	0.91	1.0	36.0	63.0		0.1	0.01	0	0
6.30	35.12		57.0	19.4	23.6		6.3	20.02	0	600
2.16	11.05	14.20	80.0	10.0	10.0	1.1	2.2	8.84	0	570

Albania	2009		55.0	38.0	44.0		4.0			3.5	100	60	50
Bosnia & H	2009		53.9	42.8	44.0		4.0			3.7	100	60	50
Croatia	2009		56.1	36.2	44.0		4.0			15.7	100	60	50
Macedonia	2009		59.1	37.4	44.0		4.0	38.0	2.2	2.6	100	60	50
Montenegro	2009		55.4	37.0	44.0		4.0			1.1	100	60	50
Norway	2009		72.0	28.0	44.0		4.0	2944.0	4.9	96.4	100	60	50
Russia	2009		55.0	38.0	44.0		4.0			233.5	100	60	50
Serbia	2009		53.4	48.1	44.0		4.0			9.8	100	60	50
Switzerland	2009		45.4	43.8	44.0		4.0			89.8	100	46	50
Ukraine	2009		55.0	38.0	44.0		4.0			20.0	100	60	50

70	2.47	0.57		0.07		3.1	5.0	10.0		80.0	0.1	0.1		0.1
70	2.48	0.66		0.07		3.2	5.0	10.0		80.0	0.1	0.1		0.1
70	11.21	2.43		0.31		14.0	5.0	10.0		80.0	0.6	0.2		0.3
70	1.84	0.39		0.05	0.02	2.3	5.0	10.0		80.0	0.1	0.0		0.0
70	0.79	0.18		0.02		1.0	5.0	10.0		80.0	0.0	0.0		0.0
70	77.21	10.09		1.68	1.57	89.0	8.0	8.0		80.0	6.2	0.8		1.3
70	163.56	37.97		4.66		206.2	5.0	10.0		80.0	8.2	3.8		3.7
70	6.31	1.91		0.19		8.4	5.0	10.0		80.0	0.3	0.2		0.1
70	56.50	14.04		1.95		72.5	10.0	10.0		80.0	5.7	1.4		1.6
70	14.03	3.26		0.40		17.7	5.0	10.0		80.0	0.7	0.3		0.3

0.00	0.24									
0.00	0.25									
0.00	1.05									
0.02	0.19	0.17								
0.00	0.07									
1.26	9.59	10.80	67.0	22.0	11.0			6.42	660	400
0.00	15.71		48.0	26.0	26.0			7.54		
0.00	0.65									
0.00	8.62		50.0	20.0	30.0			4.31	1330	3040
0.00	1.35									

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