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Report

Preparatory Studies for Product Group in the Ecodesign Working Plan 2012-2014: Lot 8- Power Cables DRAFT Task 2 report

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EXECUTIVE SUMMARY

VITO is performing the preparatory study for the new upcoming eco-design directive for Energy-related Products (ErP) related to power cables, on behalf of the European Commission (more info http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/index_en.htm).

In order to improve the efficient use of resources and reduce the environmental impacts of energy-related products the European Parliament and the Council have adopted Directive 2009/125/EC (recast of Directive 2005/32/EC) establishing a framework for the setting Ecodesign requirements (e.g. energy efficiency) for energy-related products in the residential, tertiary, and industrial sectors. It prevents disparate national legislations on the environmental performance of these products from becoming obstacles to the intra-EU trade and contributes to sustainable development by increasing energy efficiency and the level of protection of the environment, taking into account the whole life cycle cost. This should benefit both businesses and consumers, by enhancing product quality and environmental protection and by facilitating free movement of goods across the EU. It is also possible to introduce binding information requirements for components and sub-assemblies.

The MEErP methodology (Methodology for the Eco-design of Energy Using Products) allows the evaluation of whether and to which extent various energy-using products fulfill the criteria established by the ErP Directive for which implementing measures might be considered. The MEErP model translates product specific information, covering all stages of the life of the product, into environmental impacts (more info http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/methodology/index_en.htm).

The tasks in the MEErP entail:
Task 1 - Scope (definitions, standards and legislation);
Task 2 – Markets (volumes and prices);
Task 3 – Users (product demand side);
Task 4 - Technologies (product supply side, includes both BAT and BNAT);
Task 5 – Environment & Economics (Base case LCA & LCC);
Task 6 – Design options;
Task 7 – Scenarios (Policy, scenario, impact and sensitivity analysis).
Tasks 1 to 4 can be performed in parallel, whereas 5, 6 and 7 are sequential.
Task 0 or a Quick-scan is optional to Task 1 for the case of large or inhomogeneous product groups, where it is recommended to carry out a first product screening. The objective is to re-group or narrow the product scope, as appropriate from an ecodesign point of view, for the subsequent analysis in tasks 2-7.

The preparatory phase of this study is to collect data for input in the MEErP model an executive Summary of the complete study will be elaborated at completion of the draft final report.

Comment: This report is currently a working progress, as some parts of the study are missing comments and data from the stakeholders, therefore it shall not be viewed as a full report.

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LIST OF ACRONYMS

Al	Aluminium
Avg	Average
CSA	conductor Cross-Sectional Area
Cu	Copper
EC	European Commission
ERP	Energy Related Product
EU	European Union
LCA	Life Cost Analysis
LCC	Life Cost Calculation
LV	Low Voltage
MEErP	Methodology for Ecodesign of Energy related Products
MEEuP	Methodology for Ecodesign of Energy using Products
PRODCOM	PRODuction COMmunautaire
PVC	Polyvinylchloride
SME	Small and Medium sized Enterprise
TBC	To Be Completed
TBD	To Be Defined
VAT	Value Added Tax
Vac	Voltage Alternate Current
VITO	Flemish institute for Technological Research

Use of text background colours

Blue: draft text
Yellow: text requires attention to be commented
Green: text changed in the last update

CHAPTER 2 MARKETS

The objective of Task 2 is to present the economic and market analysis related to the products. The aims are:

- to place the product group within the total of EU industry and trade policy (subtask 2.1);
- To provide market and cost inputs for the EU-wide environmental impact of the product group (subtask 2.2);
- To provide insight in the latest market trends so as to indicate the place of possible Eco-design measures in the context of the market-structures and ongoing trends in product design (subtask 2.3, also relevant for the impact analyses in Task 3); And finally,
- To provide a practical data set of prices and rates to be used in a Life Cycle Cost (LCC) calculation (Subtask 2.4).

Summary of results:
TBC

Comment: This report is currently a working progress, as some parts of the study are missing comments and data from the stakeholders, therefore it shall not be viewed as a full report.

2.1 Generic economic data

2.1.1 Definition of 'Generic economic data' and objective

"Generic economic data" gives an overview of production and trade data as reported in the official EU statistics. It places the power cables within the total of EU industry and trade. To investigate the market, Europroms -Prodcom statistics are screened, and verified with recent data from stakeholders.

2.1.2 PRODCOM data

The PRODCOM statistics (published by EUROSTAT) have the advantage of being the official European Union (EU) source. PRODCOM data is based on manufactured goods whose definitions are standardised across the EU thus guaranteeing comparability. Although it is used and referenced in other EU policy documents regarding trade and economic policy, it does have its limitations. Many data points are unknown, estimated, confidential and therefore not available.

Based on the scope defined in task 1 only one relevant category (see Table 2-1) for this study has been found in the PRODCOM database.

Table 2-1: ProdCom data relevant NACE code

Prodcom Nace code	Description
27321380	Other electric conductors, for a voltage <= 1000 V, not fitted with connectors

The market data in quantity of units and monetary value (see Table 2-2) was obtained for the NACE code 27321380 from EUROSTAT for the years 2007 – 2012.

Table 2-2: EU27 ProdCom data on NACE code 27321380

Year	Quantity in kTon				Value in million €			
	Production	Import	Export	Apparent EU consumption	Production	Import	Export	Apparent EU consumption
1995*								
2007	1550				9300			
2008	2171				11648			
2009	1920				8400			
2010	2200				11100			
2011	2280				12600			
2012	2128				12300			

Table 2-3: Value per kg conductor based on ProdCom data (NACE code 27321380)

Year	Value in 1000 €	Quantity in Ton	€/kg
2007	9300000	1550000	6.00
2008	11647510	2171223	5.36
2009	8400000	1920000	4.38
2010	11100000	2200000	5.05
2011	12600000	2280000	5.53
2012	12300000	2128632	5.78
Average			**5.35**

Table 2-3 shows that the average value per kilo cable is **5.35** EURO/kg for the years 2007 till 2012.

Note: The ProdCom data include a broad range of electrical wires and cables, such as wires and cables for electrical installations inside and outside the buildings (e.g. LV distribution cables), wires and cables for data communication (coax cables are excluded), flexible cords, wires for internal wiring of control panels, instrumentation cables, elevator cable, and others. The category includes cables and wires with conductors made of copper, aluminium or any other material.

TBC

2.1.3 Generic economic data

For 2007 the global (world) copper demand was 24,2 million tonnes, of which 48% was used in manufacture of electric cable[1], or about 11 million tonnes.

Amount of copper sold in year xxx for use in power cables: xxx
Amount of aluminium sold in year xxx for use in power cables: xxx

2.1.4 Generic economic data: conclusion

TBC

2.2 Market and stock data

2.2.1 Sales data

2.2.1.1 Sales data from EU cable industry associations

To verify the ProdCom data with recent data from stakeholders a questionnaire was sent to the cable manufacturers[2].

Extra responses are needed to guarantee anonymity, stakeholders are still invited to use the enquiry form and to reply.

2.2.1.2 Sales of power cables in Europe according to working plan[3]

Table 2-4: Sales of power cables (kTon Copper)

Annual Sales (kTons eq. Copper)	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Industry	226	245	241	253	266	279	293
Services	202	219	216	227	238	250	263
Residential	284	308	303	318	334	351	368
Total	712	772	760	798	838	880	924

Table 2-4 shows that annual sales of wiring, expressed as kilotons equivalent copper, is estimated to be some 760 kton in 2010, and expected to increase to 924 kton in 2030.

[1] Source: www.eurocopper.eu> marketdata, EGEMIN study 2011 Modified Cable Sizing Strategies
[2] questionnaire for cable manufacturers, sent in context of this study, September 30th, 2013
[3] Study of the Amended Ecodesign Working Plan, Final report Task 3 – version 6 Dec. 2011

2.2.1.3 CRU Wire and Cable Quarterly report

Table 2-3 and Table 2-5 are extracted from the CRU[4] Wire and Cable Quarterly, Q3 2013 report[5]. Please note that CRU includes Russia and all of East Europe in Europe!

Building & Construction is part of the Insulated cables, which also includes power distribution cables and diverse industrial cables etc. from low to high voltage. Winding wire is enamelled wire (magnetic wire) in transformers.

Table 2-5: kTons of conductor for Europe 2013f (source: CRU Wire and Cable Quarterly, Q3 2013)

000 tons conductor content by region (2013f)		
Europe	**Cu**	**Al**
Bare Overhead Conductors	0	306
Insulated Cables	1828	531
Winding Wire	424	38
Subtotal	**2252**	**874**

Table 2-6: European consumption of wire & cable by type ('000 ton conductor independent of metal, 2013f) (source: CRU Wire and Cable Quarterly, Q3 2013)

Europe	
LV Energy	1073
Power Cable	1114
External Telecom	68
Internal/Data	218
Winding Wire	465
Sub-Total	**2938**

In the CRU report the following product sectors are used (Table 2-6):

- LV Energy: all cable whose primary function is the transmission of energy and rated at below 1kVac;
- Power Cable: comprises all energy cable rated at 1kVac and above;
- External Telecom: metallic cable used in telecommunication networks installed outside buildings;
- Internal/Data: all other types of cable used for the transmission of voice/data, including internal telephone cable, LAN data cable and all types of co-axials;
- Winding Wire: all types of round and flat enamelled and taped wire used in the windings of motors, transformers etc;
- Fibre Optic Cable: all types of cable containing optical fibres.

Note: there is a small mismatch between the Table 2-5 and Table 2-6 because some cables that are produced in Europe can be exported or others can be imported to fit the consumption in the second table.

Based upon Table 2-6 one can conclude that about 37 % (= 1073/2938) of wire and cable consumption in Europe is for LV energy cables. This category, however, includes among others the sales of cables in the LV distribution grid.

[4] http://www.crugroup.com/about-cru/industries_we_cover/wirecable/
[5] http://www.crugroup.com/about-cru/industries_we_cover/wirecable/

TBC

2.2.2 Stock data

Power cables are used in all type of buildings both residential and non-residential (industry and service). The annual sale depends on the amount of new buildings and building renovations. Especially building renovation is considered to increase in the coming years.

2.2.2.1 Stock data according to working plan

As illustrated in Table 2-7 the total amount of copper installed in buildings ('stock') is estimated to be some 18788 kton in 2010, expected to increase to 21583 kton in 2030.

Table 2-7: Total amount of copper installed in buildings[6]

Stock (kTons eq. Copper)	***2000***	***2005***	***2010***	***2015***	***2020***	***2025***	***2030***
Industry	*5991*	*6102*	*6538*	*6951*	*7395*	*7453*	*7511*
Services	*4338*	*4419*	*4734*	*5033*	*5355*	*5397*	*5439*
Residential	*6886*	*7014*	*7515*	*7989*	*8500*	*8567*	*8633*
Total	*17215*	*17536*	*18788*	*19974*	*21250*	*21417*	*21583*

2.2.2.2 Building stock

BPIE[7] estimates that there are **24 billion m²** of useful floor space (industry floor space excluded?) in the EU27 countries. The residential stock is the biggest segment with an EU floor space of **75%** of the building stock. Within the residential sector, different types of single family houses (e.g. detached, semi-detached and terraced houses) and apartment blocks are found. Apartment blocks may accommodate several households typically ranging from 2-15 units or in some cases holding more than 20-30 units (e.g. social housing units or high rise residential buildings).

[6] Study of the Amended Ecodesign Working Plan, Final report Task 3 – version 6 Dec. 2011

[7] BPIE study: Europe's buildings under the microscope – October 2011

Table 2-8: Extrapolated EU27 non–residential building stock[8] (year 2009?)

	Non-government owned offices	Trade facilities	Gastronomic facilities	Health facilities	Educational facilities	Industrial buildings	Public buildings	Other buildings	Total
Northern Europe EU27									
Buildings	27,134	16,679	6,597	20,288	59,247	194,613	27,134	26,885	**356,547**
Floor area [Mio m²]	47.7	29.3	11.6	35.6	104.1	194.6	9.0	47.2	**479.1**
Western Europe EU27									
Buildings	1,200,354	1,192,100	1,465,150	121,663	144,214	1,180,094	871,799	642,660	**6,818,034**
Floor area [Mio m²]	917.4	1,490.1	596.0	781.1	905.4	1,180.1	871.8	642.7	**7.384.6**
North Eastern Europe EU27									
Buildings	39,860	333,388	85,764	19,043	37,356	275,103	168,553	1,124,362	**2,083,428**
Floor area [Mio m²]	53.1	213.8	35.0	15.5	99.3	349.3	135.0	360.3	**1,261.2**
South Eastern Europe EU27									
Buildings	4,627	734,185	232,186	19,887	56,246	204,413	159,798	103,114	**1,514,456**
Floor area [Mio m²]	36.1	131.7	124.7	46.3	63.7	316.4	92.3	141.2	**952.5**
Southern Europe EU27									
Buildings	86,395	312,650	118,469	52,653	158,694	522,299	25,090	396,655	**1,672,906**
Floor area [Mio m²]	117.7	426.0	161.4	71.7	216.2	711.6	34.2	540.4	**2,279.2**
Total EU27									
Buildings EU27	1,358,370	2,589,001	1,908,167	233,535	455,757	2,376,522	1,230,343	2,293,676	**12,455,371**
Floor area EU27	1,171.9	2,291.0	928.7	950.2	1,388.7	2,752.0	1,142.3	1,731.8	**12,356.6**

Table 2-9: Number of non-residential buildings in the EU27 [1,000 units][9]

Age structure	Private offices	Trade facilities	Gastro-nomic facilities	Health facilities	Educa-tional facilities	Industrial buildings	Public buildings	Other buildings	Total
Until 1980	594.2	1,566.7	1,291.4	143.9	333.7	1,636.2	687.4	1.841.1	**8.102.7**
1980 -1989	223.1	329.7	373.5	29.9	71.7	329.3	173.5	183.6	**1701.8**
1990 -1999	373.3	459.1	207.2	38.4	56.1	237.1	318.1	505.7	**2,190.9**
2000-2009	197.3	481.3	99.7	35.3	22.2	377.6	177.0	601.0	**1,999.5**
Total	**1,387.8**	**2,836.8**	**1,971.8**	**247.6**	**483.1**	**2,580.2**	**1,356.0**	**3,131.4**	**13,994.8**

[8] Ecofys report, Panorama of the European non-residential construction sector, 9 December 2011
[9] Ecofys report, Panorama of the European non-residential construction sector, 9 December 2011

Table 2-10: Floor area of the non-residential building stock in the EU27 [Mio m²][9]

Age structure	Private offices	Trade facilities	Gastro-nomic facilities	Health facilities	Educa-tional facilities	Industrial buildings	Public buildings	Other buildings	Total
Until 1980	507.6	1,247.5	609.2	611.8	1,124.5	1,867.0	619.3	1,190.3	**7,783.1**
1980 -1989	185.8	272.1	176.0	121.7	152.4	362.5	169.0	205.6	**1,642.2**
1990 -1999	307.4	409.4	97.4	123.1	124.6	219.4	279.0	202.9	**1,757.1**
2000-2009	210.3	520.2	71.7	104.9	60.6	561.5	175.7	400.1	**2,108.2**
Total	**1,211.2**	**2,449.2**	**954.3**	**961.5**	**1.462.1**	**3,010.4**	**1,242.9**	**1,999.0**	**13,290.6**

2.2.2.3 Power cable stock

STOCK DATA: Estimation of the amount of copper of fixed wired conductors and cables in residential and non-residential buildings

Table 2-11: Stock of LV cables & wires in residential buildings[10]

Avg living area	109	m²
Avg Cu/100m²	**29.1**	kg/100m²
EU 27 Building Floor space	2,40E+10	m²
Residential Floor space	1,80E+10	m² (75% total building Floor space)
Total Cu	**5241**	kTon

Remark: Study of the Amended Ecodesign Working Plan, Final report Task 3 (v. 16 Dec. 2011)– residential = 7515kTon (= **41.75** kg/100m²) in 2010.

The diversity in terms of typology within the non-residential sector is vast. Compared to the residential sector, this sector is more complex and heterogeneous. It includes types such as offices, shops, hospitals, hotels, restaurants, supermarkets, schools, universities and sports centres while in some cases multiple functions exist in the same building. The non-residential stock counts for about 25% of the total EU27 Building floor space.

[10] Source: CuIoU survey European Copper Institute

Table 2-12: Stock of LV cables and wires in non-residential buildings - Services[11]

Avg Cu/100m²	**54**	kg/100m²
EU 27 Building Floor space	2.40E+10	m²
Floor space	6.00E+09	m² (25% total building Floor space)
Total Cu	**3250**	kTon

Remark: Study of the Amended Ecodesign Working Plan, Final report Task 3 (v. 16 Dec. 2011)– Services = 4734 kTon = **78.9** kg/100m²

Table 2-13: Stock of LV cables and wires in non-residential buildings - Industry[12]

Avg Cu/100m²	**139**	kg/100m²
EU 27 Building Floor space	2.40E+10	m²
Floor space	2752E+06	m²
Total Cu	**3825**	kTon

Remark: Study of the Amended Ecodesign Working Plan, Final report Task 3 (v. 16 Dec. 2011)– Industry = 6538 kTon

General assumption – see working plan:
Stock in non-residential buildings = 1.5 times stock in residential buildings. This means 1.5 x 5241 kTon= **7861** kTon as a total amount of copper used in non-residential (services + industry) buildings (Workplan= 11272 kTon)

The amount of copper and circuits in an real office building[13] is shown in Table 2-14 as an example.

Table 2-14: Example of an rea office building[13]

Amount of Ligth circuits	33
Amount of Socket outlet circuits	62
Amount of Dedicated circuits	34
Amount of Main feeders	1
Amount of Sub feeders	11
Cu total (kg)	2851
Floorspace (m²)	3059
Cu (kg/100m²)	**93**

[11] Source: CuIoU survey European Copper Institute
[12] Source: CuIoU survey European Copper Institute
[13] EnergyVille building, Waterschei, Belgium

2.2.2.4 Distribution of power cables based upon cross sectional area

Distribution of LV cables in residential buildings shown in Table 2-15 and in non-residential buildings shown in Table 2-16 is based upon a survey of the European Copper Institute[14].

Table 2-15: Distribution of LV cables in the residential buildings[15]

CSA (mm²)	% Weight	% Length
1.5	23.4	27.5
2.5	38.9	40
4	6,6	4.9
6	9,3	5.7
10	6.1	<1

Wires and cables with a CSA of 1.5 mm² are most common for lighting circuits; whereas 2.5 mm² wires and cables are most common for socket outlet circuits. These circuits counts for about 60.9 % of the total Copper used in fixed wired electrical installations in residential buildings.

Wires and cables with a CSA above 2.5 mm² are mostly used for dedicated circuits, e.g. electrical circuits for electrical heating, cooking, washing machine…
In residential buildings cables with a CSA of more than 10mm² are generally used for:

- connecting the LV circuit board to the main LV feeder in the street.
- connection between the LV main circuit board and sub LV circuit boards in the building (e.g. apartment).
- Equipotential- and secondary bonding.

Note: In the UK 1 mm² wiring is also used for lighting circuits. In Germany 1.5 mm² wire and cable are also used for socket outlet circuits.

Table 2-16: Distribution of LV cables in non-residential buildings[16]

CSA (mm²)	% Weight	% Length
1.5	2	15
2.5	13	58.6
4	2	4.9
6	3	5.1
10	3	3.2
16	3	2.4
25	4	2
35	6	1.9
50	5	1.2
70	11	1.8
95	12	1.4
120	9	0.9
150	6	0.4
185	13	0.8

[14] Source: CuIoU survey European Copper Institute
[15] Source: CuIoU survey European Copper Institute
[16] Source: CuIoU survey European Copper Institute

240	7	0.4
300	0	0
400	3	0.1
500	0	0
600	0	0

Wires and cables with a csa of 1.5 mm² are most common for lighting circuits; whereas 2.5 mm² wires and cables are most common for socket outlet circuits. These circuits counts for about 15 % of the total Copper used in fixed wired electrical installations in non-residential buildings. The total length of these cables counts for 73.6% of the total length of the installed cables.

2.2.3 New sales growth rate

The new sales are directly related to construction of new buildings. Hence, the new sales growth rates of power cables will be equal to the construction growth rate of new buildings.

In terms of growth, annual rates in the residential sector are around 1% over the period between 2005 and 2010 (BPIE)[17]. Except The Netherlands (in the case of multi-family houses), all other countries experienced a decrease in the rate of new build in recent years, reflecting the impact of the current financial crisis in the construction Sector (BPIE).

The Ecofys study[21] estimates the overall new construction rate for the non-residential buildings at **2.1%** and the new construction rate for the industrial buildings at **3.1%** (see Table 2-17).

2.2.4 Replacement sales growth rate

The replacement sales are directly related to the building renovations. However, renovations do not always include a replacement of the electric wiring. Hence, the replacement sales rate needs to be corrected downwards.

The renovation rates of buildings will have a large impact on future market trends. In the BPIE study 'Europe's buildings under the microscope – A country-by-country review of the energy performance of building'[18] three scenarios of renovation rates (in combination with different renovation depths) are considered.

In the Working plan the refurbishment rate has been set at **3%** following the rationale applied for thermal insulation products.

Public buildings are in the limelight at the moment due to the policies requiring to become close to zero energy building standards by the end of 2018 and a sectoral renovation rate of **at least 3%** is recommended.

Most estimates of overall renovation rates (other than those relating to single energy saving measures) are mainly between around 0.5% and 2.5% of the building stock per year.

[17] http://www.bpie.eu/
[18] http://www.bpie.eu/documents/BPIE/HR_%20CbC_study.pdf

In the BPIE study[19], it is assumed that the current (2011) prevailing renovation rate across Europe is **1%** .

The Ecofys study[21] estimates the overall renovation rate for the non-residential building sector at **12.4%** (see Table 2-17).

The Heinze [20] [21] study allows a better understanding of the non-residential modernisation market in Germany. The study is based on an extensive architect survey and investigates what kind of modernisation activities are typically realised in building renovations. The study indicates that in **59%** of all renovation activities in Germany the power cables are replaced.

Conclusion:
The assumption for this study is:

Residential replacement sales growth rate = 1% x 59% = 0.59%.
Non-Residential replacement sales growth rate = 12% x 59% = 7.08%.

Table 2-17: Summary of metabolism rates in representative countries and EU27[22]

	Germany	Hungary	Poland	Spain	Sweden	EU27 (weighted)
New construction rate						
Private offices	0.7 %	4.0%	5.3 %	4.7 %	1.2 %	**2.6 %**
Trade facilities	2.4 %	1.9 %	4.4 %	1.5 %	3.5 %	**2.4 %**
Gastronomic facilities	0.1 %	0.9 %	2.6 %	1.4 %	1.8 %	**0.9 %**
Health facilities	1.4 %	0.8 %	3.1 %	3.1%	0.5 %	**2.0 %**
Educational facilities	1.4 %	0.8 %	1.0 %	0.5%	0.4 %	**1.0 %**
Industrial buildings	3.5 %	1.7 %	1.9 %	3.5 %	1.3 %	**3.1 %**
Public buildings	0.9 %	0.7 %	5.3 %	4.0 %	n.a. %	**2.2 %**
Other buildings	1.0 %	2.7 %	1.6 %	8.4 %	2.5 %	**3.2 %**
Total (weighted)	**1.0 %**	**1.7 %**	**2.3 %**	**4.2 %**	**1.3 %**	**2.1 %**
Demolition rate						
Non-residential sector	0.29 %	n.a.	n.a.	0.1 %	0.6 %*	**0.2 %**
Renovation rate						
Overall renovation rate	**11.0 %**	**6.2 %**	**5.6 %**	**20.1 %**	**14.3 %**	**12.4 %**
Energy related renovation rate	2.3 %	1.7 %	1.2 %	4.1 %	2.8 %	**2.6 %**
Not energy related renovation rate	8.7 %	4.5 %	4.4 %	16.0 %	11.4 %	**9.8 %**

[19] Europe's Buildings under the Microscope (2011), http://www.bpie.eu/documents/BPIE/HR_%20CbC_study.pdf
[20] Modernisierungsmarkt 2008 - Modernisierungsaktivitäten von Bewohnern und privaten Vermietern im Wohnungsbau: Produktbereich Dach. Heinze GmbH. (Unpublished). German.
[21] Ecofys report, Panorama of the European non-residential construction sector, 9 December 2011
[22] Ecofys report, Panorama of the European non-residential construction sector, 9 December 2011

2.2.5 Market and stock data Summary

Table 2-18: Summary of growth rates

Sector	New Sales growth rate	Replacement sales growth rate
Residential	1%	0.59%
Services	2.1%	7.08%
Industry	3.1%	7.08%

Table 2-19: Summary of stock data

Sector	Building floor area	Amount of Cu material per 100m² empirical	Amount of Cu material per 100m² according working plan
Unit	Million m²	kg/100m²	kg/100m²
Residential	18000	29.1	41.75
Services	6000	54	78.9
Industry	2752	139	237

2.3 Market trends

Power cables are used in all type of buildings both residential and non-residential (industry and services). The annual sales depends on the quantity of new buildings and building renovations. Especially building renovation is considered to increase in the coming years.

Power cables are a mature product and available in standardized sizes.

2.3.1 Market production structures

Most cables in buildings use copper conductors. In Europe the largest copper Mine is located in Bulgaria (110000 metric ton per year). Production of copper in Europe is mainly located in Belgium (118000 metric ton), Bulgaria (284000 metric ton) and Germany (591000 metric ton) (source: US Geological Survey).

Cable manufacturers are and are grouped in the 'Europacable' association. Some of the main manufacturers of power cables are listed by alphabetical order:

- Brugg Cables, www.bruggcables.com, Switzerland
- General Cable, www.generalcable.es, Spain
- Hellenic Cables, www.cablel.com, Greece
- Italian Cable Company, www.icc.it, Italy

- Kabelwerk Eupen, www.eupen.com, Belgium
- Leoni, www.leoni.com, Germany
- Nexans, www.nexans.com, France
- Nkt cables, www.nktcables.com, Denmark
- Prysmian Group, www.prysmiangroup.com, Italy
- Reka Cables, www.reka.fi, Finland
- SKB Gruppe, www.skb-gruppe.at, Austria
- TELE-FONIKA Kable, www.tfkable.com, Poland
- TKF, www.tkf.nl, Netherlands
- Tratos Cavi, www.tratos.eu, Italy
- Waskönig+Walter, www.waskoenig.de, Germany
  TBC

Aluminium conductors are still used for bulk power distribution and large feeder circuits, but not as such in buildings. They are seldom used indoor, because connections are more difficult to avoid cold-flow under pressure which causes screw clamped connections may get loose over time. Also aluminium forms an insulating oxide layer on the surface and therefore needs a an antioxidant paste at joints.

Depending on their final application, the power cables are sold to the end user through variety of channels such as directly from manufacturers, via wholesalers, via distributors or via installer. The product distribution channels of power cables are mostly business-to-business, as these products usually need professional installation (safety hazards,…). Cables are installed by electrical contractors, e.g. those represented by European Association of Electrical Contractors (www.aie.org). A fraction of the sales is distributed via retail and is mainly installed in the residential sector.

2.3.2 General trends in product design and product features; feedback from consumer associations

Power cables are a mature product and available in standardized sizes.
There is a trend to use low smoke halogen free cables in buildings.

2.4 Consumer expenditure base data

The cable price is proportional to the copper price and therefore the cable price can be expressed in €/ (CSA [mm²] x l [m] x N) wherein CSA means Cross-Sectional-Area,l means Length and N means number of cores. Hence, the product unit is (CSA [mm²] x l [m] x N).

2.4.1 Purchase price

The average user price for Copper wire (PVC insulated) - VAT exclusive - fluctuates nowadays around 0.075€/ (mm²x m x 1 core). Copper is becoming a scarce resource and an increased demand caused by the use of wires with an increased cross-sectional area may result in even higher market prices.

2.4.2 Product cost

An average value of 5.3 €/kg (see Table 2-3) is equivalent to 5.3 €/112,4 m for a CSA of 1mm² (copper), or **0.047** €/ mm² x m.

Table 2-20: product cost per production unit based upon copper price

LME	€/100kg	Csa(mm²)	length(m)	ρ (kg/m³)	V(m³)	Kg	€/mm².m
okt/13	535	1	1	8900	0,000001	0,0089	0,047615

Note that the average ProdCom product cost in Table 2-3,i.e. 0.047 is almost the same as the value in Table 2-20, i.e. 0.047615.

Copper prices are very volatile[23], therefore it is common to correct cable prices with a surcharge[24] depending on the market price.

2.4.3 Installation costs

TBC
Stakeholders are invited to provide input on an approach, e.g. labour hours per m and labour cost per hour? Per categories of CSA?

2.4.4 Repair and Maintenance costs

No repair, nor maintenance costs are applicable to power cables. Once installed a power cable is unlikely to become faulty, unless inappropriate use or damage by external factors (third party damages the cable) is the cause.

2.4.5 Disposal costs/benefits

For methods on recycling see task 3.

As power cables have positive scrap value, it is an advantage for a company to send the old power cables for scrap and avoid disposal costs. It is assumed that there is no disposal cost required for the handling of power cables at their end-of-life.

The positive scrap value for the owner of the cable should be about 70% of the copper price.

2.4.6 Energy rates

Table 2-21 presents the average financial rates in the EU-27 suggested in the MEErP 2011 Methodology.

[23] http://www.ems-power.com/ems-metallkurse/ems-metallkurse.de.shtml
[24] http://www.igus.de/_Product_Files/Download/pdf/copper_en.pdf

Table 2-21 Generic energy rates in EU-27[25]

	Unit	domestic incl.VAT	Long term growth per yr	non-domestic excl. VAT
Electricity	€ / kWh	0.18	5%	0.11
Energy escalation rate*	%	4%		
*= real (inflation-corrected) increase				

2.4.7 Financial rates

Table 2-22 presents the average financial rates in the EU-27 suggested in the MEErP 2011 Methodology.

Table 2-22 Generic financial rates in EU-27[26]

	Unit	domestic incl.VAT	non-domestic excl. VAT
Interest	%	7.7%	6.5%
Inflation rate	%	2.1%	
Discount rate (EU default)	%	4%	
VAT	%	20%	

2.5 Recommendations

TBC

[25] VHK, MEErP 2011 METHODOLOGY PART 1.
[26] VHK, MEErP 2011 METHODOLOGY PART 1.