Work on Preparatory studies for implementing measures of the Ecodesign Directive 2009/125/EC

ENER Lot 28 – Pumps for Private and Public Wastewater and for Fluids with High Solids Content – Task 2: Economic and Market Analysis Working Document

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Task 2: Economic and market analysis

This chapter presents the economic and market analysis of the products covered in the scope of ENER Lot 28 preparatory study on pumps for private and public wastewater (all stages including buildings, networks and treatment facilities) and for fluids with high solids content. There are four main objectives of this chapter, which include:

1. To place the ENER Lot 28 product groups within the overall context of EU industry and trade.
2. To provide market (sales and installed stock) for the assessment of EU-wide environmental impacts of the ENER Lot 28 products.
3. To provide insights into the latest market trends to indicate the market structures and ongoing trends in product design. This will serve as an input for the subsequent tasks such as improvement potentials.
4. To provide the data on consumer prices and rates that will be used later in the study for Life Cycle Cost (LCC) calculations.

From Task 1 of this study it could be seen that wastewater pumps cover a broad range of applications and power capacities.

This report sets out the structure for gathering further information for the products considered in the scope of this study based on the screening exercise, as well as providing stakeholders an opportunity to review and comment on the data collected so far.

2.1 Generic economic data

The PRODCOM[1] 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 between Member States. 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.

PRODCOM classifies numerous wastewater pump products in the category NACE 28.13 "manufacture of other pumps and compressors". The pumps covered under this category (relevant for this study) are presented below:

- 28.13.12.80 Positive displacement reciprocating pumps, diaphragm
- 28.13.13.20 Positive displacement pumps, rotary, gear
- 28.13.13.40 Positive displacement pumps, rotary, vane
- 28.13.13.60 Positive displacement pumps, rotary, screw
- 28.13.13.80 Positive displacement pumps, rotary including peristaltic, rotary lobe and helical rotor pumps and excluding hydraulic units, gear pumps, vane pumps, and screw pumps
- 28.13.14.13 Submersible motor, single-stage rotodynamic drainage and sewage pumps
- 28.13.14.15 Submersible motor, multi-stage rotodynamic pumps
- 28.13.14.30 Centrifugal pumps with a discharge outlet diameter > 15 mm, channel impeller pumps, side channel pumps, peripheral pumps, and regenerative pumps
- 28.13.14.51 Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with a single entry impeller, close coupled
- 28.13.14.53 Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with a single entry impeller, long coupled
- 28.13.14.55 Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with double entry impeller
- 28.13.14.60 Centrifugal pumps with a discharge outlet diameter > 15 mm, multi-stage including self-priming
- 28.13.14.71 Rotodynamic single-stage mixed flow or axial pumps
- 28.13.14.75 Rotodynamic multi-stage mixed flow or axial pumps
- 28.13.14.80 Other liquid pumps, liquid elevators

[1] Available at: epp.eurostat.ec.europa.eu/portal/page/portal/prodcom/data/database

These categories include a wide range of pump products, but it is not clear which applications each category covers, e.g. clean water or wastewater applications, power capacities, etc. Hence, PRODCOM can only serve as a broad overview of the market size. The table below shows the summary of import, export, production and apparent EU consumption for pumps, derived from the PRODCOM data[2].

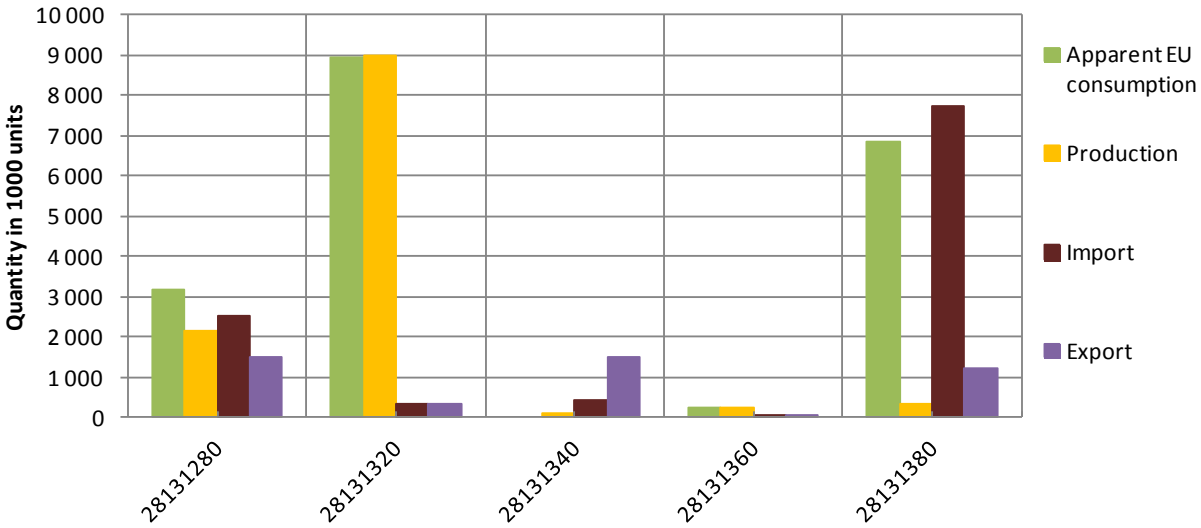
Please Note: The reliability and usability of PRODCOM statistics was questioned by Europump, as they provide no differentiation of pump types by application. **The PRODCOM data presented only serve informational purposes and will not be considered in the environmental and life cycle cost analyses during this study**.

Table 1: Market data from PRODCOM for Wastewater treatment pumps in 2010

PRODCOM Nace code	Quantity in 1000 units				Value in million €			
	Production	Import	Export	Apparent EU consumption	Production	Import	Export	Apparent EU consumption
28131280	2 141	2 544	1 516	3 169	238	69	140	167
28131320	9 000	313	351	8 962	370	33	72	332
28131340	120	420	1 499	-	26	15	69	-
28131360	262	21	48	235	246	7	112	142
28131380	313	7 734	1 200	6 847	422	46	151	316
28131413	1 515	3 629	891	4 253	632	80	361	351
28131415	1 830	554	477	1 906	552	33	157	428
28131430	364	414	151	627	385	6	40	350
28131451	544	368	1 143	-	397	13	134	277
28131453	1 809	616	1 076	1 350	950	11	230	730
28131455	5	7	21	-	120	1	62	59
28131460	1 500	11	298	1 213	863	5	221	647
28131471	3 187	3 769	2 678	4 279	530	68	378	220
28131475	703	459	2 500	-	549	44	1	221
28131480	27 892	30 144	45 342	12 693	991	362	2	400
TOTAL	**51 185**	**51 003**	**59 191**	**45 534**	**7 271**	**793**	**2 130**	**4 640**

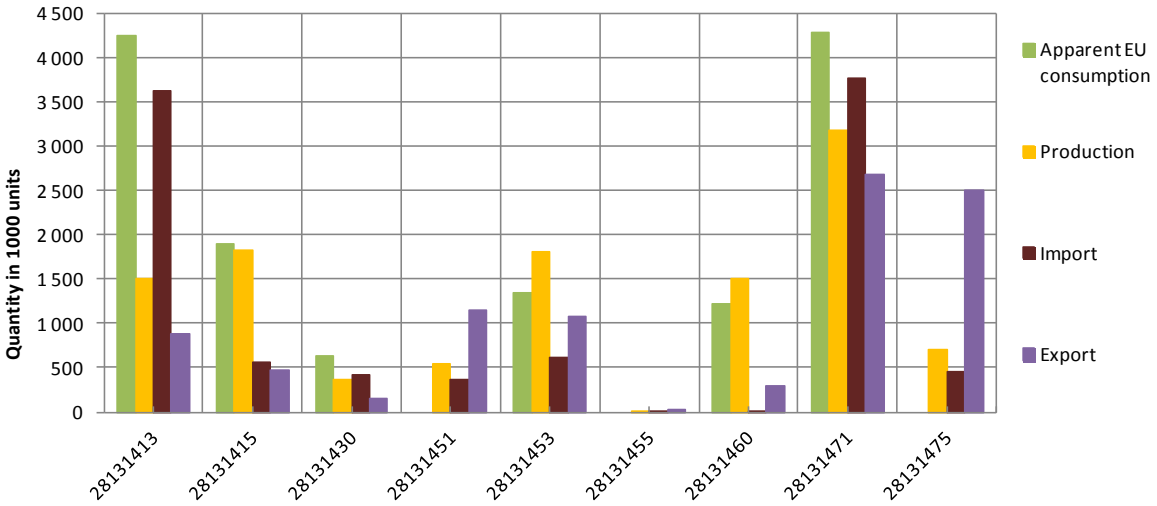
[2] The detailed data for import, export, production and apparent EU consumption for each of the PRODCOM NACE Codes is provided in Annex to this report.

Figure 1 and Figure 2 present the share of different positive displacement and possible submersible, centrifugal, and rotodynamic pump products respectively in the overall EU production, trade, and apparent consumption in 2010 according to PRODCOM categories.



PRODCOM CODE	DESCRIPTION
28131280	Reciprocating pumps, diaphragm
28131320	Rotary, gear
28131340	Rotary, vane
28131360	Rotary, screw
28131380	Rotary including peristaltic, rotary lobe and helical rotor pumps and excluding hydraulic units, gear pumps, vane pumps, and screw pumps

Figure 1: Market size of possible positive displacement pump products in the EU in 2010, PRODCOM (in number of units)

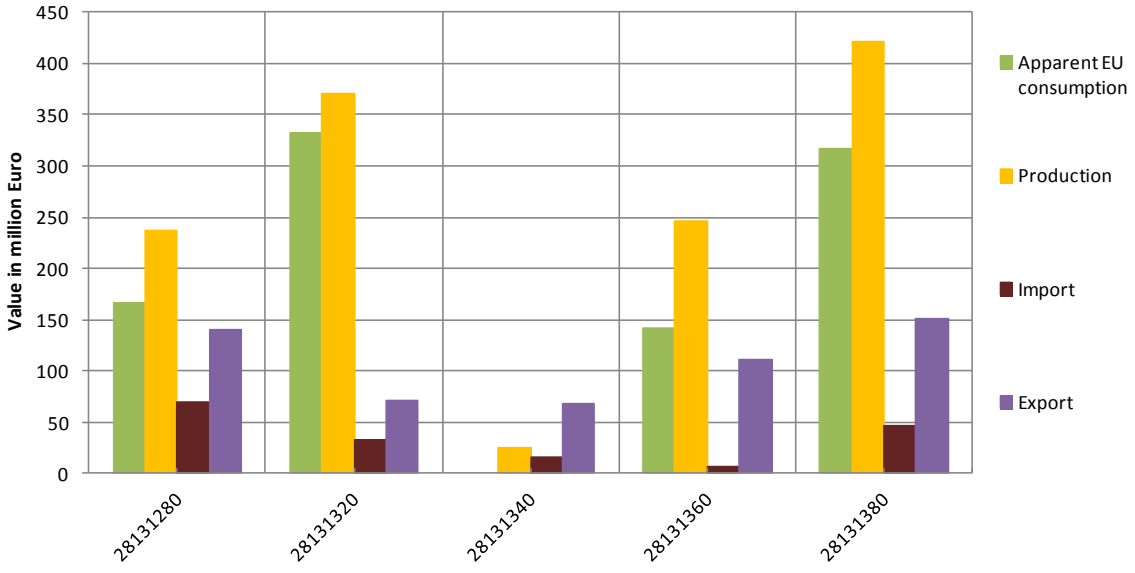


PRODCOM CODE	DESCRIPTION
28131413	Submersible motor, single-stage rotodynamic drainage and sewage pumps
28131415	Submersible motor, multistage rotodynamic pumps
28131430	Centrifugal pumps with a discharge outlet diameter >15mm, channel impeller pumps, side channel pumps, peripheral pumps, and regenerative pumps
28131451	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with a single entry impeller, close coupled
28131453	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with a single entry impeller, long coupled
28131455	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with double entry impeller
28131460	Centrifugal pumps with a discharge outlet diameter >15mm, multi-stage including self-priming
28131471	Rotodynamic single-stage mixed flow or axial pumps
28131475	Rotodynamic multi-stage mixed flow or axial pumps

Figure 2: Market size of possible submersible, centrifugal, and rotodynamic pump products in the EU in 2010, PRODCOM (in number of units)

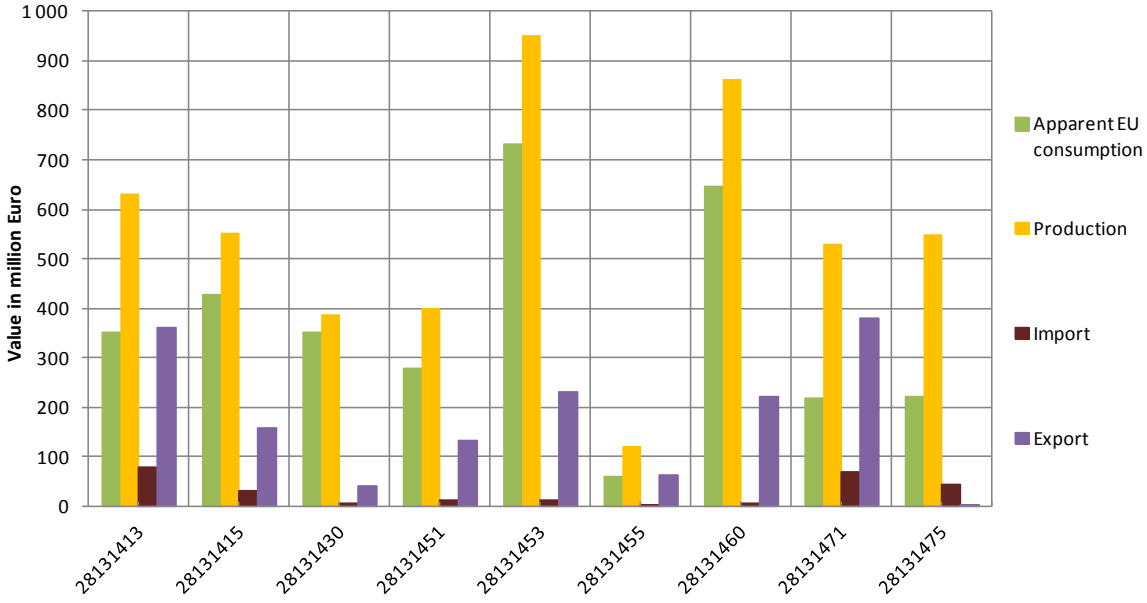
From Figure 1 and Figure 2, it would seem that of the wastewater treatment pumps, rotary gear positive displacement pumps form the majority of apparent consumption of pumps in the EU. Submersible motor single-stage rotodynamic drainage and sewage pumps, rotodynamic single-stage mixed flow or axial pumps, and rotary pumps (including peristaltic, rotary lobe and helical rotor pumps and excluding hydraulic units, gear pumps, vane pumps, and screw pumps) also represent a large share of apparent consumption of pumps in the EU. However, the apparent consumption of centrifugal pumps with a discharge outlet diameter >15mm (channel impeller pumps, side channel pumps, peripheral pumps, and regenerative pumps) and rotary screw positive displacement pumps is relatively small.

Figure 3 and Figure 4 show the market value of different positive displacement and possible submersible, centrifugal, and rotodynamic pump products respectively in the in the EU in 2010 for each PRODCOM category.



PRODCOM CODE	DESCRIPTION
28131280	Reciprocating pumps, diaphragm
28131320	Rotary, gear
28131340	Rotary, vane
28131360	Rotary, screw
28131380	Rotary including peristaltic, rotary lobe and helical rotor pumps and excluding hydraulic units, gear

Figure 3: Market value of possible positive displacement pump products in the EU in 2010, PRODCOM (in market value)



PRODCOM CODE	DESCRIPTION
28131413	Submersible motor, single-stage rotodynamic drainage and sewage pumps
28131415	Submersible motor, multistage rotodynamic pumps
28131430	Centrifugal pumps with a discharge outlet diameter >15mm, channel impeller pumps, side channel pumps, peripheral pumps, and regenerative pumps
28131451	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with a single entry impeller, close coupled
28131453	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with a single entry impeller, long coupled
28131455	Centrifugal pumps with a discharge outlet diameter >15mm, single-stage with double entry impeller
28131460	Centrifugal pumps with a discharge outlet diameter >15mm, multi-stage including self-priming
28131471	Rotodynamic single-stage mixed flow or axial pumps
28131475	Rotodynamic multi-stage mixed flow or axial pumps

Figure 4: Market value of possible submersible, centrifugal, and rotodynamic pump products in the EU in 2010, PRODCOM (in market value)

From Figure 3 and Figure 4, it is evident that rotary screw positive displacement pumps have relatively low apparent consumption but have a high value indicating that rotary screw positive displacement pump are expensive to manufacture. The apparent consumption/market value ratio of centrifugal pumps with a discharge outlet diameter >15mm, single-stage with a single entry impeller, long-coupled and centrifugal pumps with a discharge outlet diameter >15mm, multi-stage including self-priming is high reflecting high manufacturing costs for these wastewater pumps. Reciprocally, high apparent consumption of submersible motor, single-stage rotodynamic drainage and sewage pumps and rotodynamic single-stage mixed flow or axial pumps translate in low market value.

2.2 Market and stock data

The aim of this subtask is to provide market and stock data (i.e. number of units sold and installed in the EU) for wastewater pumps covered in ENER Lot 28 study. The market of products within this lot is in general characterised by its diversity. As seen in Task 1, the classification of product groups proposed does not match with the official NACE codes used in PRODCOM. Therefore, the data presented in this section relies mostly on information provided directly by the stakeholders (primarily the manufacturers and users of ENER Lot 28 pumps) and literature review.

2.2.1 Sales data at EU level

Table 2 provides market data for the ENER Lot 28 pumps sold in 2005 and 2011.

Table 2: Total pump sales in EU by number of units sold

Pump Type		Estimate of sales in (units)		Source
		2005[3]	2011[4]	
Centrifugal submersible pump				
	Radial sewage pumps 1 to 10 kW	129 206	160 000	Europump
	Radial sewage pumps >10 to 25 kW	9 690	12 000	Europump
	Radial sewage pumps >25 to 160 kW	4 038	5 000	Europump
	Mixed flow & axial pumps	565	700	Europump
Centrifugal submersible pump – once a day operation				
	Shredding, grinding pumps	40 377	50 000	Europump
	Radial sewage pumps 1 to 10 kW	104 980	130 000	Europump

[3] The values for 2005 pump sales in EU are provided by Europump based on an average annual growth in sales of 3.5% per year between 2005 and 2011.

Europump is the European Association of Pump Manufacturers. It represents 18 National Associations in 15 EU Member States, Turkey, Russia & Switzerland. Europump members represent more than 450 companies with a collective production worth more than €10 billion and employing 100 000 people in Europe. Website: www.europump.org/

[4] These sales figures are provided by Europump based on their best estimates without counteracting any law or Directive.

Please Note: The figures (particularly the market data in Task 2 report) provided by Europump for this preparatory study can be considered representative of the EU market as Europump represents the majority of pump manufacturers as well as the pump market within Europe. The population outside the Europump membership countries in EU is about 21 %. However, the countries represent only approximately 7.6 % of the pump market in EU. When Europump preformed the data collection for providing inputs to this preparatory study, their member companies had the total European market in view and reported accordingly.

Pump Type		Estimate of sales in (units)		Source
		2005[3]	2011[4]	
	Where volute is part of a tank	44 415	55 000	Europump
Centrifugal submersible domestic drainage pump < 40 mm passage		1 211 310	1 500 000	Europump
Submersible dewatering pumps		32 302	40 000	Europump
Centrifugal dry well pump				
	Radial sewage pumps 1 to 10 kW	16 151	20 000	Europump
	Radial sewage pumps >10 to 25 kW	4 038	5 000	Europump
	Radial sewage pumps >25 to 160 kW	808	1 000	Europump
	Mixed flow & axial pumps	81	100	Europump
Slurry Pumps				Europump
	Light Duty	1211	1500	Europump
	Heavy Duty	242	300	Europump
TOTAL		**1 599 413**	**1 980 600**	Europump

From Table 1 and Table 2, it is apparent that there is a large discrepancy between pump sales, or apparent EU consumption in 2010 from PRODCOM statistics and 2011 sales of ENER Lot 28 pumps in EU from Europump data.

The sales of the following pumps (presented in the table above) can be further split based on the type of impeller used:

- **Centrifugal submersible and dry well pumps[5]:**
  - Radial sewage pumps 1 to 10 kW: Vortex and Channel impellers, each represent 50% share of the total sales;
  - Radial sewage pumps >10 to 25 kW: Vortex and Channel impellers, have 20% and 80% share of the total sales, respectively;
- **Submersible dewatering pumps**
  - Radial sewage pumps 1 to 10 kW: Vortex and Channel impellers, each represent 50% share of the total sales;
  - Radial sewage pumps >10 to 25 kW: Vortex and Channel impellers, have 20% and 80% share of the total sales, respectively;

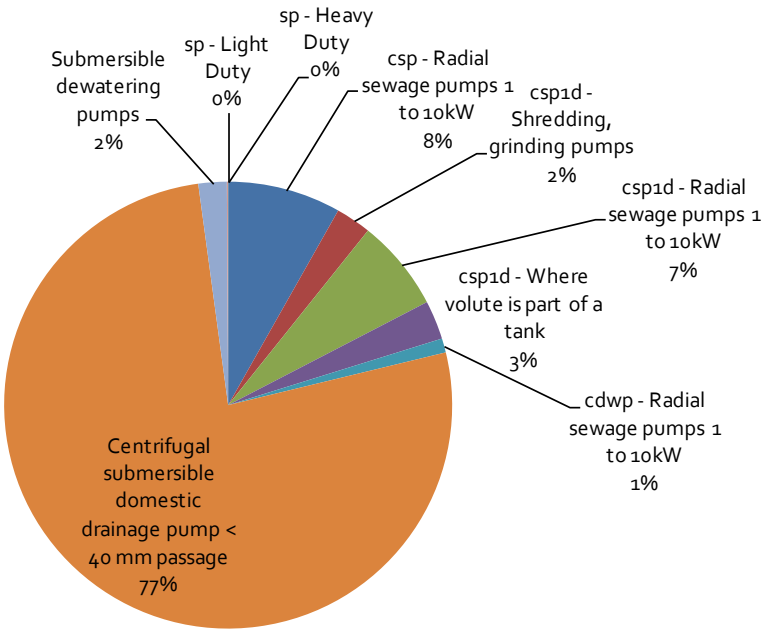
Centrifugal submersibles mixed flow & axial pumps used for storm-water, effluent and recirculation purposes. The sales of these pumps can be split based on these applications,

[5] The percentage split is reflecting the Installed base, however there may be a trend in the future to use more channel type hydraulics

60% for activated sludge recirculation and remaining 40% for storm water and effluent pumping[6].

Figure 5 to Figure 6 presents the share of different pump types in the overall EU sales of ENER Lot 28 pumps in 2011:

- "Centrifugal submersible domestic drainage pump < 40 mm passage pumps" dominates the pump market (market share of 75%), then;
- "Centrifugal submersible pumps – radial sewage pumps 1 to 10 kW" (market share of 8%);
- "Centrifugal submersible pumps – once a day operation – radial sewage pumps 1 to 10 kW" (market share of 6.5%);
- "Centrifugal submersible pumps – once a day operation – where volute is part of a tank " (market share of 3%) respectively; and
- "Centrifugal submersible pumps – once a day operation – shredding, grinding pumps" (market share of 2.5%).
- "Slurry Pumps – Light and Heavy duty" (market share of 0.1%)



[6] The percentage split is reflecting the actual status of installed base and annual sales in 2011, however there may be a future trend for a higher annual sales in activated sludge recirculation, as still more sewage treatment works are refurbished in comparison to newly built or refurbished storm-water pumping stations

Figure 5: Sales distribution of ENER Lot 28 pumps in EU in 2011.

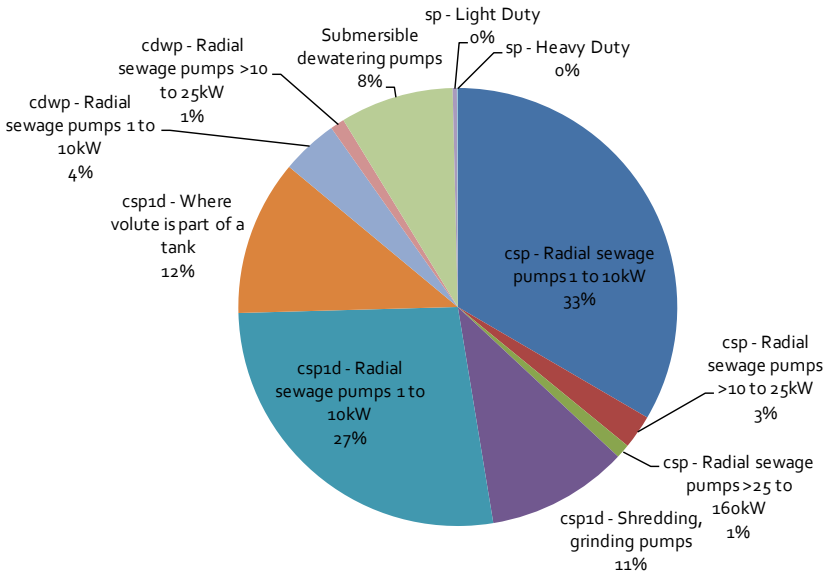


Figure 6: Sales distribution of ENER Lot 28 pumps in EU in 2011 (excluding "Centrifugal submersible domestic drainage < 40 mm passage pumps ")

2.2.2 Stock data at EU level

Stock is the installed base of existing appliances, i.e. the number of units in operation in EU-27. However, the shortage of data availability on pump systems in the EU poses a challenge as it makes the market evaluation of these products difficult. For the purpose of this preparatory study, the stock data has been gathered directly from the industry and is based upon previous work done on the methodology of stock models (see e.g. VHK 2005[7], Lane 2000[8]).

Table 3 presents the installed stock (in 2005 and 2011) of ENER Lot 28 pumps.

Table 3: Estimated installed stock of pumps in the EU-27[9]

Pump Type	Estimate of installed stock in (units)		Source
	2005[10]	2011	
Centrifugal submersible pump			

[7] Kemna, R., van Elburg, M., Li, W., van Holsteijn, R. Ecodesign of Energy-using Products. A methodology study, final-report. Appendix 2: Product Cases. P. 7.1-7.30. 2005

[8] Lane, K. Appendix O: Modelling Approach. In: Fawcett, T.; Lane, K.; Boardman, B. et al. Lower Carbon Futures. Environmental Change Institute, University of Oxford, UK. 2000

[9] The forecasts of installed stock used for scenario development in Task 8 will be based on the installed stock in 2011 and taking into account the population growth rates and/or building growth rates.

[10] The pump installed stock in 2005 in EU are estimated by Europump based on an average annual growth in stock of 1.75% per year between 2005 and 2011. Thereby the figures for 2005 can be calculated backwards from figures 2011 by multiplying by 0.9825^7 = 0.884

Pump Type		Estimate of installed stock in (units)		Source
		2005[10]	20114	
	Radial sewage pumps 1 to 10 kW	1 007 427	1 120 000	Europump
	Radial sewage pumps >10 to 25 kW	107 939	120 000	Europump
	Radial sewage pumps >25 to 160 kW	62 964	70 000	Europump
	Mixed flow & axial pumps	4 407	4900	Europump
Centrifugal submersible pump – once a day operation				
	Shredding, grinding pumps	251 857	280 000	Europump
	Radial sewage pumps 1 to 10 kW	818 534	910 000	Europump
	Where volute is part of a tank	346 303	385 000	Europump
Centrifugal submersible domestic drainage pump < 40 mm passage		11 018 728	12 250 000	Europump
Submersible dewatering pumps		251 857	280 000	Europump
Centrifugal dry well pump				
	Radial sewage pumps 1 to 10 kW	134 923	150 000	Europump
	Radial sewage pumps >10 to 25 kW	33 731	37 500	Europump
	Radial sewage pumps >25 to 160 kW	12 593	14 000	Europump
	Mixed flow & axial pumps	1 799	2000	Europump
Slurry Pumps				
	Light Duty	53 969	60 000	Europump
	Heavy Duty	13 492	15000	Europump
Total		14 120 522	15 698 400	

The stock, similar to the sales of the pumps (presented in the table above) can be further split based on the type of impeller used. The percentage split of share of installed stocks of pump by impeller type is same as the split for sales.

Figure 7 to Figure 8 present the share of different pump types in the overall EU installed stock of ENER Lot 28 pumps in 2011:

- "Centrifugal submersible domestic drainage pump < 40 mm passage pumps" dominates (market share of around 78%), followed by;
- "Centrifugal submersible pumps – radial sewage pumps 1 to 10 kW" (market share of 7%);
- "Centrifugal submersible pumps – once a day operation – radial sewage pumps 1 to 10 kW" (market share of 6%); and
- "Centrifugal submersible pumps – once a day operation – where volute is part of a tank " (market share of 2.5%) respectively; and

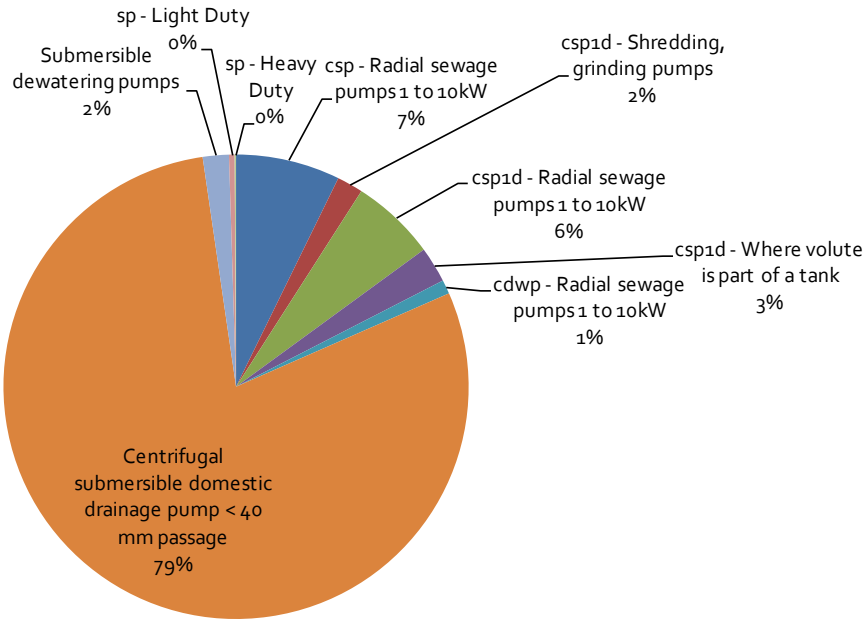


Figure 7: Stock distribution of ENER Lot 28 pumps in EU in 2011

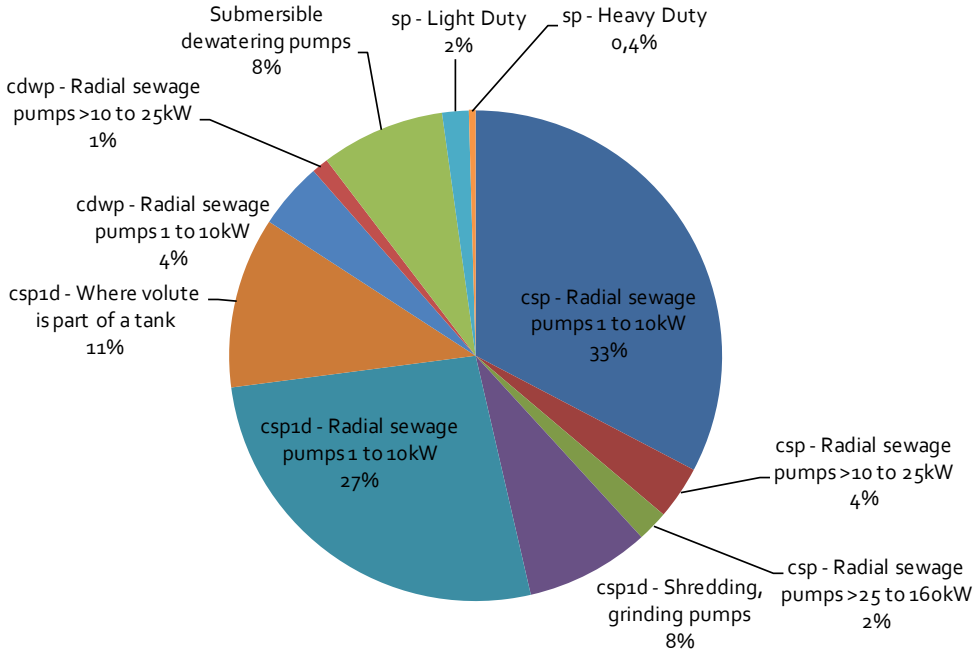


Figure 8: Stock distribution of ENER Lot 28 pumps in EU in 2011 (excluding "Centrifugal submersible domestic drainage < 40 mm passage pumps")

2.2.3 Sales growth rate

In terms of recent market trends in the 'old' Member States, the conversion of a large number of basements to living areas or for laundry rooms has led to increased use of small submersible pumps to pump water back up to drain level. There is little knowledge on the market for small (domestic) sewage pumps in 'new' Member States, although there is anecdotal evidence that it is in some cases significant.

In general, the market trend is estimated with smaller than the average growth in the last years due to the influences of all uncertainties as a result of the current European economic crisis. For year 2012 to 2015, the growth rate of pump sales is estimated to be 2 to 3%. The growth for the following years, from 2015 to 2017, is expected to improve slightly with the growth rate of 4 to 5%[11]. The insights into long term market trends of ENER Lot 28 pumps are not available as it depends on many factors, thus an estimation of the growth rate beyond 2017 is difficult.

2.2.4 Product lifetime

The lifetime of the appliances is of interest in this study as a key parameter in assessing the Life Cycle Costs of the appliances in the later stages of the study (Tasks 5 and 7). The focus is on 'average time to disposal or economic lifetime', i.e. the time in service. Parameters that have the greatest influence on the lifetime of pumps are quality of material, frequency of use, and maintenance. Average economical product life of the ENER Lot 28 pumps is estimated to be the same as technical life (time until which a pump functions sustaining minimum acceptable performance criteria). Pump economic life may vary across products and Member States and is highly depending on how the appliance was used, so should be seen with caution. However, some preliminary estimates on average economic product life are presented in Table 4. The lifetime of the appliances is of interest as a key parameter in assessing the following parameters during the later stages of the study:

- Life Cycle Costs of the Base-Case (BC) and improvement options
- Life cycle environmental impacts of the BC and improvement options
- To compare the impacts of a BC and the improvement options, if some options extend only the lifetime without enhancing the energy efficiency

Table 4: Product technical life and average economical lifetime of pumps in the EU-27[12]

Pump Type	Technical life (in years)	Average time to disposal (economical lifetime in years)	Source
Centrifugal submersible pump			
Radial sewage pumps 1 to 10 kW	10	10	Europump
Radial sewage pumps >10 to 25 kW	10	10	Europump
Radial sewage pumps >25 to 160 kW	15	15	Europump
Mixed flow & axial pumps	10	10	Europump
Centrifugal submersible pump – once a day operation			
Shredding, grinding pumps	7	7	Europump

[11] The growth rate figures for 2012-2017 are provided by Europump

[12] The "Range of Economical Lifetime" depends massively on operational conditions, pumped liquid, maintenance and surrounding conditions thus reliable estimate cannot be given and is excluded in the table.

Pump Type	Technical life (in years)	Average time to disposal (economical lifetime in years)	Source
Radial sewage pumps 1 to 10 kW	8	8	Europump
Where volute is part of a tank	10	10	Europump
Centrifugal submersible domestic drainage pump < 40 mm passage	7	7	Europump
Submersible dewatering pumps	10	10	Europump
Centrifugal dry well pump			
Radial sewage pumps 1 to 10 kW	15	15	Europump
Radial sewage pumps >10 to 25 kW	15	15	Europump
Radial sewage pumps >25 to 160 kW	15	15	Europump
Mixed flow & axial pumps	20	20	Europump
Slurry Pumps			
Light Duty	25	25	Europump
Heavy Duty	25	25	Europump

2.2.5 Replacement sales and new sales

In order to estimate the future installed stock of pumps covered in ENER Lot 28 study, a distinction between replacement and new (non-replacement) sales is needed. Overall sales of products are combinations of new sales, which increase the installed stock, and replacement sales.

The pumps sales in the EU-27 market are mainly for the replacement of old units. On average, 30% of the sales in EU market are for new installations and 70% are for the replacement. In those EU countries which have a mature wastewater infrastructure, the sales for new installation and replacement are 10% and 90% respectively. The wastewater pump market for new installation is higher in those EU countries that have high need for improvement in their wastewater systems. In such countries, the share of sales is 50% for new sales and the other half constitutes replacement sales.

2.3 Market trends

2.3.1 Market production structures

The ENER Lot 28 pumps market in EU is mainly comprised of few large manufacturers. These manufacturers are well represented by industry associations at Member State and EU level. These mainly include Europump[13]. Some of the main manufacturers of ENER Lot 28 pumps are listed by alphabetical order:

- Andritz Ritz
- Ebara
- Grundfos
- Hidrostal
- KSB
- Tsurumi
- Sulzer (ABS)
- Wilo
- Xylem

Very large pumps tend to be engineered and mostly produced in the EU. These pumps are mainly sold overseas in locations of mining activity (Africa, China, Australia, etc). Small/low cost pumps (such as centrifugal submersible domestic drainage pump < 40 mm passage) situated outside the building are used in southern Europe as a 'cheap' option for domestic drainage.

Sewage pumps are supplied through 3 main channels:

- Direct to users
- To framework contract operators
- Through external designers and contractors.

Depending on their final application, the WW pumps 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 non-domestic applications of ENER Lot 28 pumps are mostly business-to-business, as these products usually require experience and engineering knowledge for proper mounting of the pump, and therefore need professional installation. Pump manufacturers develop the business strategies with well managed supply chains to ensure customer satisfaction. Majority of the pumps for non-domestic applications such as centrifugal submersible pumps, dry well pumps and positive displacement pumps are likely to be installed by

[13] Europump is the European Association of Pump Manufacturers. It represents 18 National Associations in 15 EU Member States, Turkey, Russia & Switzerland. Europump members represent more than 450 companies with a collective production worth more than €10 billion and employing 100 000 people in Europe. Website: www.europump.org/

a contractor or installer accompanied by manufacturers supervision, if required. Smaller domestic drainage pumps, < 40 mm passage, that do not require installation might be directly purchased from the retailers.

2.3.2 Trends in product design and features

The main developments in this area concern advances in impeller design. Additional developments concern the use of VSD (Variable Speed Drive) controls for both flow regulation, where this is possible, and de-ragging initiated by a sequence of forward and counter rotations.

Sewage varies hugely in terms of its solid content, particularly when comparing domestic to industrial discharges. The greater number of products (that do not disintegrate adequately in water) flushed into the sewage system is also requiring the use of pumps with a higher solid handling capacity. Higher effluent charges are also encouraging more companies to undertake initial screening and de-watering themselves, so discharging a lower volume but with higher solid content.

2.3.3 Re-design cycle of wastewater pumps

Many of the worst performing pumps may need to be re-designed in order to meet any potential implementing measures proposed later in Task 8. It is therefore of interest to know the typical duration of the re-design cycle of pumps covered in ENER Lot 28 study.

Manufacturers of low-efficient pumps will therefore have to re-design their pump models and make necessary adaptation to the established production lines. Since the current technology used in ENER Lot 28 pumps has already been on the market for many years, and as many pump manufacturers already produce high efficient pumps, a consideration of around 2 – 4 years timeframe for the manufacturers is considered to be enough[14].

The duration of the re-design cycle will be taken into account in the potential implementing measures in Task 8 in order to give manufacturers adequate time to re-design pumps to replace those that may be non-compliant.

2.4 Consumer expenditure base data

Based on the categories defined in subtask 1.6, average EU consumer prices, incl. VAT (in €), as well as applicable rates for running costs (e.g. electricity, water) and other financial parameters (e.g. taxes, rates of interest, inflation rates) are presented in this section. These data will form an input for subtasks 5.3where both LCC for new products and annual cost will be calculated.

2.4.1 Purchase cost

[14] This timeframe is also in line with the observation made in the Impact Assessment concerning Commissions proposal for a regulation **with regard to Ecodesign requirements for water pumps.**
http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2012/swd_2012_178_en.pdf

Table 5 presents the range and average purchase price of wastewater pumps in Euros/unit.

Table 5: Purchase price (including VAT) of the average wastewater pumps in Euros/unit

Pump type	Range of purchase price (€/unit)	Average purchase price (€/unit)	Source
Centrifugal Submersible pump			
Radial sewage pumps 1 to 10 kW	600-5 000	2 500	Estimate
Radial sewage pumps >10 to 25 kW	3 400-7 500	6 000	Estimate
Radial sewage pumps >25 to 160 kW	5 500 – 125 000	25 000	Estimate
Mixed flow & axial pumps	2 500 – 50 000	15000	Estimate
Submersible pump – once a day operation			
Shredding, grinding pumps	1 000-8 000	3 000	Estimate
Radial sewage pumps 1 to 10 kW	300-5 000	1 500	Estimate
Where volute is part of a tank	500-5 000	2 000	Estimate
Centrifugal submersible domestic drainage pump < 40 mm passage	50 – 1 000	300	Estimate
Submersible dewatering pumps	1 400 – 12 750	5 000	Estimate
Centrifugal dry well pump			
Radial sewage pumps 1 to 10 kW	600 – 5 000	2 125	Estimate
Radial sewage pumps >10 to 25 kW	1 400 – 12 750	5 100	Estimate
Radial sewage pumps >25 to 160 kW	5 500 – 125 000	21 250	Estimate
Mixed flow & axial pumps	5 500 – 125 000	25 000	Estimate
Slurry Pumps			
Light Duty	7 650 – 75 000	20 000	Estimate
Heavy Duty	7 650 – 75 000	20 000	Estimate

2.4.2 Installation cost

The installation costs of ENER Lot 28 pumps can vary significantly depending on their technology, size, site and application type. For example, the cost of a dry well installation can be around 2 times that of an equivalent submersible installation (as dry well pumps require the construction of a machine room around it, etc.). In northern Europe, dry wells are sometimes preferred where the low temperatures may cause problems (as these can be heated). The scope of installation costs presented in this section mainly concerns expenses related to:

- Pump base plate
- Controls for system feedback
- Labour expenses (e.g. man-hours related to lifting equipment)
- Commissioning of the pump

According to one of rough estimates from industry, "the installation cost is equal to the purchase cost of the pump."[15] Table 6 presents the range and average installation costs of ENER Lot 28 pumps in Euros/unit.

Table 6: Average installation cost (including VAT) for wastewater pumps in Euros/unit

Pump type	Range of installation cost (€)	Average installation cost (€)	Source
Centrifugal submersible pump			
Radial sewage pumps 1 to 10 kW	375 – 3 750	1 250	Estimate
Radial sewage pumps >10 to 25 kW	625 – 4 500	1875	Estimate
Radial sewage pumps >25 to 160 kW	2 500 – 30 000	6 250	Estimate
Mixed flow & axial pumps	1 250 – 10 000	3 750	Estimate
Centrifugal submersible pump – once a day operation			
Shredding, grinding pumps	500 – 2 000	1 250	Estimate
Radial sewage pumps 1 to 10 kW	625 – 4 500	1 250	Estimate
Where volute is part of a tank	400 – 2 500	750	Estimate
Centrifugal submersible domestic drainage pump < 40 mm passage	75 – 250	150	Estimate
Submersible dewatering pumps	150 – 750	250	Estimate
Centrifugal dry well pump			
Radial sewage pumps 1 to 10 kW	375 – 3 750	1 250	Estimate
Radial sewage pumps >10 to 25 kW	625 – 4 500	1 875	Estimate
Radial sewage pumps >25 to 160 kW	2 500 – 3 000	6 250	Estimate
Mixed flow & axial pumps	1 250 – 10 000	3 750	Estimate
Slurry Pumps			
Light Duty	1 875 – 20 000	5000	Estimate
Heavy Duty	1 875 – 20 000	5000	Estimate

2.4.3 Energy and water costs

Electricity and water prices as listed in the new ErP methodology[16] will be used in this subsection.

Table 7 presents the generic electricity and water prices, the discount rate and VAT values in the EU-27.

[15] AEA Energy & Environment (2008) ENER Lot 11 Pumps: (in commercial buildings, drinking water pumping, food industry, agriculture).

[16] Source: http://www.meerp.eu/downloads/MEErP%20Methodology%20Part%201%20Final.pdf

Table 7: Generic electricity and water prices in the EU-27

	Unit	Domestic incl. VAT	Long term growth per year	Non-domestic excl. VAT
Electricity	€/ kWh	0.18	5%	0.11
Water	€/m^3	3.70	2.5%	
Energy escalation rate	%	4%		
VAT	%	20%		

2.4.4 Maintenance and repair cost

Maintenance and repair costs of ENER Lot 28 pumps can be very significant depending upon the type of impellers used and the composition of wastewater being handled. If the type of selected impeller is not appropriate for the composition of the wastewater handled, then the maintenance and repair costs can be far higher than the cost of energy consumption. A particular challenge in this regards is the changing composition of the wastewater. For example, during 'real-life' use, new types of hygiene products with tear-proof components are causing an issue by clogging impellers[17]. Some basic information concerning the maintenance and repair costs for the ENER Lot 28 pumps is presented below:

- The maintenance and repair costs for centrifugal solids handling pump is usually in the range of 17% of total Life Cycle Cost[18]
- Submersible pumps require maintenance checks every 2-4 years to have them inspected and/or replaced of worn hydraulic parts and shaft seals. This type of pump has a high potential of having its impellers clogged with rags. This clogging potential is also valid for dry well pumps in the same way. A screening system should therefore be installed ahead of the pumps[19].
- Using the distribution of costs over 20 years used in LCC for different pump categories it is possible to estimate the average maintenance cost from the purchase cost.[20]
- Slurry pump: Need annual maintenance that concerns the replacing of bladder, coating on valve balls and seats, and service exchange on water valves. Every 5 years, they also require replacement of water valve actuators and replacement of pressure vessels every 20 years[21].

[17] Rough estimates of efficiencies for different impellers are as follows: vortex type 40-50% (this type rarely requires maintenance), highest achieved is 62%; channel type 70-75% (needs more maintenance – often use chopping in advance to avoid blockage); closed type have highest efficiency, around 85% (but high risk of blockage).

[18] Flowserve (2011) MPT. Self-Priming, Solids-Handling Pump

[19] Behnke, P. Bosserman, B. (1998), Selection Criteria for Wastewater Pumps

[20] Pump Center Newsletter (2003) Pump life Cycle Costing: Breaking the barriers to implementation

[21] INTSPS (2012) ISPS Phoenix Slurry Pump Technical Overview

- Progressive cavity pumps – wetted end replacement parts cost around 75 % of the pump's price[22].

Table 8 shows the average maintenance and repair costs of wastewater pumps in the EU-27.

Table 8: Average annual maintenance and repair cost wastewater pumps (in Euros/year)

Pump type	Range of repair cost (€/year)	Average repair cost (€/year)	Range of maintenance cost (€/year)	Average maintenance cost (€/year)	Source
Centrifugal Submersible pump					
Radial sewage pumps 1 to 10 kW	125 – 625	375	250 – 1 000	375	Estimate
Radial sewage pumps >10 to 25 kW	375 – 750	438	313 – 1 125	438	Estimate
Radial sewage pumps >25 to 160 kW	500 – 2 000	750	375 – 2 500	850	Estimate
Mixed flow & axial pumps	375 – 1 125	500	313 – 1 125	450	Estimate
Submersible pump – once a day operation					
Shredding, grinding pumps	58 – 173	86	58 – 575	144	Estimate
Radial sewage pumps 1 to 10 kW	58 – 230	86	29 – 173	46	Estimate
Where volute is part of a tank	58 – 288	115	35 – 173	58	Estimate
Centrifugal submersible domestic drainage pump < 40 mm passage	0	0	0	0	Estimate
Submersible dewatering pumps	125 – 500	312.5	100 – 500	150	Estimate
Centrifugal dry well pump					
Radial sewage pumps 1 to 10 kW	125 - 625	375	250 – 1 000	375	Estimate
Radial sewage pumps >10 to 25 kW	375 – 750	438	313 – 1 125	438	Estimate
Radial sewage pumps >25 to 160 kW	500 – 2 000	750	375 – 2 500	850	Estimate
Mixed flow & axial pumps	375 – 1 125	500	313 – 1 125	450	Estimate
Slurry Pumps					
Light Duty	438 – 1 563	625	344 – 1 813	650	Estimate
Heavy Duty	438 – 1 563	625	344 – 1 813	650	Estimate

2.4.5 Disposal cost

ENER Lot 28 pumps are normally replaced when they fail or when there is a significant irreversible drop in pump performance. As these pumps are mainly constructed of metals, they are likely to be sold for scrap at the end of their life. Cleaning and removal of pathogens is required prior to their delivery to the scrap yard.

[22] Treutel , Chuck (2009) Hose Pumps : Ideal for Abrasive Applications

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

2.4.6 Interest and inflation rates

A default value of 4% is suggested as the EU average discount rate in the new ErP methodology which is proposed to be used in this subsection. Table 9 presents the generic interest and inflation rates in the EU-27.

Table 9: Generic interest and inflation rates in the EU-27[23]

	Unit	Domestic incl. VAT	Long term growth per year	Non-domestic excl. VAT
Interest	%	7.7%		6.5%
Inflation rate	%	2.1%		
Discount rate (EU default)	%	4%		

[23] VHK, MEErP 2011 METHODOLOGY PART 1

2.5 Conclusions

The data presented in Task 2 will form the basis for selecting the most representative products on the European market and eventually formulating the base-case(s) in Task 5. However, estimating sales and establishing the stock of pumps covered by ENER Lot 28 study in sufficient detail to allow base-case selection through existing data sources represents a challenge.

This report represents the best estimates based on a number of individual sources. One of these sources is PRODCOM, however the classification of product groups proposed in Task 1 does not match with the official NACE codes used in PRODCOM. Hence, PRODCOM only serve as a broad overview of the market size and the data presented in this report relies mostly on information provided directly by the industry.

Currently the data suggests that centrifugal submersible domestic drainage pump < 40 mm passage and Centrifugal submersible pump – once a day operation account for the highest sales in EU amongst all the pumps covered in ENER Lot 28 study.

As presented in Table 10, regarding the stock numbers of ENER Lot 28 products when compared to other pumps and motors covered in ENER Lot 29 and ENER Lot 11, it can be said that they represent less than 1/3 of the market (in units), with around 16.0 million units installed in the EU in 2011.

Table 10: EU installed stock of pumps

Study	Stock (million units)	Year	Geographical scope
ENER Lot 11[24]	17.1	2007	EU-25
ENER Lot 28	15.7	2011	EU-27
ENER Lot 29[25]	16.6	2011	EU-27

It is also important to note that it is likely to be differences in market size, production and distribution structures, and product trends between different Member States. As large pumps are mostly engineered for industrial applications, they are likely to be part of smaller-scale markets, and production centred within the EU. On the other hand, smaller pumps are more homogeneous, "mass-produced" in a more global market.

The following tasks of this preparatory study will determine the energy consumption, the environmental impacts and the potential for improvement of this product sector.

[24] Only refers to pumps covered within ENER Lot 11

[25] Swimming pool pumps, pond pumps, aquarium pumps, submersible multistage pumps >6" and vertical multistage pumps >25bar and/or 100m3/hr.

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Annex 1: PRODCOM data

The tables below present the detailed import, export, production and EU apparent consumption (both number of units and by value in million Euros) for the years 2008-2010 for the Nace Codes concerning pumps covered in ENER lot 28 study as reported by PRODCOM.

Please note: The PRODCOM data presented only serve informational purposes and will not be considered in the environmental and life cycle cost analyses during this study.

Table 11: Market data from PRODCOM for positive displacement reciprocating pumps, diaphragm (PRODCOM code: 28131280)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	6 000	6 000	2 141	*-40.3%*
Import	888	1 092	2 544	*69.2%*
Export	1 521	541	1 516	*-0.2%*
Apparent EU consumption	**5 368**	**6 551**	**3 169**	***-23.2%***
Value in million €				
Production	317	260	238	*-13.3%*
Import	69	61	69	*0.4%*
Export	155	103	140	*-4.7%*
Apparent EU consumption	**231**	**218**	**167**	***-15.0%***
Average price in €				
Production	53	43	111	*45.1%*
Import	77	56	27	*-40.7%*
Export	102	190	93	*-4.6%*
Apparent EU consumption	**43**	**33**	**53**	***10.7%***

The unit sales, EU-27 production, and market value for diaphragm positive displacement reciprocating pumps have been decreasing over the past few years. Sales in 2010 were around 3.1 million units compared to 5.3 million units in 2008.

Table 12: Market data from PRODCOM for Positive displacement pumps, rotary, gear (PRODCOM code: 28131320)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	8 000	7 642	9 000	6.1%

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Import	222	142	313	18.7%
Export	467	291	351	-13.3%
Apparent EU consumption	**7 755**	**7 493**	**8 962**	***7.5%***
Value in million €				
Production	365	299	370	*0.7%*
Import	42	28	33	*-10.8%*
Export	62	56	72	*7.7%*
Apparent EU consumption	**345**	**271**	**332**	***-1.9%***
Average price in €				
Production	46	39	41	*-5.0%*
Import	188	197	106	*-24.9%*
Export	132	193	204	*24.2%*
Apparent EU consumption	**44**	**36**	**37**	***-8.8%***

The market value for rotary gear positive displacement pumps has remained fairly constant since 2008. Sales in 2010 were 8.9 million units, mostly EU-27 produced goods. There has been a slight increase in imported goods from 222,000 units in 2008 to 313,000 units in 2010 as well as a slight decrease in exported goods.

Table 13: Market Data from PRODCOM for Positive displacement pumps, rotary, vane (PRODCOM code: 28131340)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	200	120	120	*-22.5%*
Import	253	106	420	*28.9%*
Export	904	1 129	1 499	*28.8%*
Apparent EU consumption [26]	-	-	-	-
Value in million €				
Production	36	20	26	*-15.0%*
Import	12	8	15	*13.7%*
Export	54	55	69	*12.9%*
Apparent EU consumption	-	-	-	-

[26] No values are listed for sales in units or value in million Euro because there seems to be an issue with estimates for the year.

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Average price in €				
Production	180	167	217	*9.7%*
Import	47	76	37	*-11.7%*
Export	60	48	46	*-12.3%*
Apparent EU consumption	**13**	**29**	**29**	***45.5%***

Since 2008 there has been a steady increase in the quantity of rotary vane positive displacement pumps exported of around 1.5 million units in 2010 compared to 904,000 units in 2008, as well as an increase in quantity imported and decrease in production of 120,000 units in 2010 compared to 200,000 in 2008.

Table 14: Market data from PRODCOM for Positive displacement pumps, rotary, screw (PRODCOM code: 28131360)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	417	250	262	*-20.7%*
Import	21	7	21	*1.0%*
Export	45	94	48	*3.4%*
Apparent EU consumption	**393**	**163**	**235**	***-22.6%***
Value in million €				
Production	309	246	246	*-10.6%*
Import	7	7	7	*0.5%*
Export	106	125	112	*2.5%*
Apparent EU consumption	**210**	**128**	**142**	***-17.7%***
Average price in €				
Production	740	981	941	*12.7%*
Import	355	1069	352	*-0.5%*
Export	2377	1334	2337	*-0.8%*
Apparent EU consumption	**534**	**782**	**604**	***6.4%***

The overall unit sales, domestic production, and market value show have decreased over the past few years for rotary screw positive displacement pumps. Sales in 2010 were 235,000 units, mostly EU-27 produced goods.

Table 15: Market data from PRODCOM for Positive displacement pumps, rotary (including peristaltic, rotary lobe and helical rotor pumps) (excluding hydraulic units, gear pumps, vane pumps, screw pumps) (PRODCOM code: 28131380)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	2 863	857	313	*Chapter 3: -66.9%*
Import	850	3 367	7 734	*Chapter 4: 201.7%*
Export	1 533	1 429	1 200	*Chapter 5: -11.5%*
Apparent EU consumption	**2 179**	**2 795**	**6 847**	***Chapter 6: 77.3%***
Value in million €				
Production	455	436	422	*-3.8%*
Import	51	41	46	*-4.5%*
Export	148	128	151	*1.0%*
Apparent EU consumption	**357**	**349**	**316**	***-5.9%***
Average price in €				
Production	159	509	1345	*190.9%*
Import	59	12	6	*-68.4%*
Export	97	89	126	*14.2%*
Apparent EU consumption	**164**	**125**	**46**	***-46.9%***

The unit sales and import quantity for positive displacement pumps are increasing rapidly whereas EU-27 production is decreasing rapidly for rotary positive displacement pumps (including peristaltic, rotary lobe and helical rotor pumps and excluding hydraulic units, gear pumps, vane pumps, and screw pumps). Annual imports have increased by more than a factor of nine between 2008 and 2010. Sales in 2010 were 6.8 million units, mostly imported goods.

Table 16: Market data from PRODCOM for Submersible motor, single-stage rotodynamic drainage and sewage pumps (PRODCOM code: 28131413)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	1 655	1 353	1 515	*Chapter 7: -4.3%*
Import	2 769	2 742	3 629	*Chapter 8: 14.5%*
Export	993	778	891	*Chapter 9: -5.3%*
Apparent EU consumption	**3 431**	**3 316**	**4 253**	***Chapter 10: 11.3%***
Value in million €				
Production	672	570	632	*-3.0%*
Import	66	65	80	*10.3%*

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Export	405	358	361	*-5.6%*
Apparent EU consumption	**333**	**277**	**351**	***2.7%***
Average price in €				
Production	406	421	417	*1.4%*
Import	24	24	22	*-3.6%*
Export	408	460	405	*-0.3%*
Apparent EU consumption	**97**	**84**	**83**	***-7.7%***

The market value for submersible motor, single-stage rotodynamic drainage and sewage pumps has remained fairly constant. There has been a slight increase in the total number of units sold, with an increase in imports to 3,629,000 units and a slight decrease in EU-27 production compared to 2008.

Table 17: Market data from PRODCOM for Positive displacement pumps, rotary, vane Submersible motor, mutli-stage rotodynamic pumps (PRODCOM code: 28131415)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	1 920	1 500	1 830	*-2.4%*
Import	343	212	554	*27.0%*
Export	265	260	477	*34.1%*
Apparent EU consumption	**1 998**	**1 452**	**1 906**	***-2.3%***
Value in million €				
Production	477	436	552	*7.5%*
Import	27	23	33	*9.3%*
Export	141	132	157	*5.4%*
Apparent EU consumption	**363**	**328**	**428**	***8.5%***
Average price in €				
Production	249	291	302	*10.2%*
Import	80	109	59	*-13.9%*
Export	532	506	329	*-21.4%*
Apparent EU consumption	**182**	**226**	**224**	***11.1%***

The market value and imported quantity for positive displacement pumps (rotary, vane, submersible motor, multi-stage rotodynamic pumps) have slightly increased in 2010 compared to previous years. Additionally, the EU-27 quantity produced has slightly decreased.

Table 18: Market data from PRODCOM for Centrifugal pumps with discharge outlet diameter > 15 mm, channel impeller pumps, side channel pumps, peripheral pumps and regenerative pumps (PRODCOM code: 28131430)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	363	329	364	*Chapter 11: 0.1%*
Import	112	102	414	*Chapter 12: 91.9%*
Export	51	27	151	*Chapter 13: 72.9%*
Apparent EU consumption	**425**	**404**	**627**	***Chapter 14: 21.4%***
Value in million €				
Production	238	300	385	*27.3%*
Import	3	5	6	*28.6%*
Export	36	27	40	*6.3%*
Apparent EU consumption	**205**	**277**	**350**	***30.7%***
Average price in €				
Production	655	912	1059	*27.2%*
Import	31	47	14	*-33.0%*
Export	708	996	267	*-38.5%*
Apparent EU consumption	**483**	**687**	**559**	***7.6%***

The EU-27 production of centrifugal pumps with discharge outlet diameter >15mm (channel impeller pumps, side channel pumps, peripheral pumps, and regenerative pumps) has remained constant whilst the quantity imported, exported, and sold sharply increased in 2010. The market value for rotodynamic single-stage mixed flow or axial pumps has steadily increased.

Table 19: Market data from PRODCOM for Centrifugal pumps with a discharge outlet diameter >15 mm, single-stage with a single entry impeller, close coupled (PRODCOM code: 28131451)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	816	577	544	*Chapter 15: -18.3%*
Import	211	522	368	*Chapter 16: 31.9%*
Export	842	949	1 143	*Chapter 17: 16.5%*
Apparent EU consumption [27]	**185**	**150**	**-**	

[27] No values are listed for sales in units or value in million Euro because there seems to be an issue with estimates for the year.

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Value in million €				
Production	462	386	397	*Chapter 18: -7.3%*
Import	8	15	13	*Chapter 19: 26.9%*
Export	119	114	134	*Chapter 20: 6.1%*
Apparent EU consumption	**352**	**288**	**277**	***Chapter 21: -11.3%***
Average price in €				
Production	567	670	730	*13.5%*
Import	39	29	36	*-3.8%*
Export	141	120	117	*-8.9%*
Apparent EU consumption	**1 904**	**1 917**	**-**	

There has been a decrease in production but increase in imports in centrifugal pumps with a discharge outlet diameter >15mm (single-stage with a single entry impeller, close coupled) in 2010 compared to 2008. The market value for these pumps has steadily decreased across the years.

Table 20: Market data from PRODCOM for Centrifugal pumps with a discharge outlet diameter > 15 mm, single-stage with a single entry impeller, long coupled (PRODCOM code: 28131453)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	1 385	1 058	1 809	*Chapter 22: 14.3%*
Import	166	124	616	*Chapter 23: 92.4%*
Export	787	619	1 076	*Chapter 24: 16.9%*
Apparent EU consumption	**764**	**563**	**1 350**	***Chapter 25: 32.9%***
Value in million €				
Production	938	822	950	*0.6%*
Import	11	17	11	*-1.5%*
Export	242	204	230	*-2.4%*
Apparent EU consumption	**707**	**635**	**730**	***1.6%***
Average price in €				
Production	677	777	525	*-12.0%*
Import	66	135	17	*-48.8%*
Export	307	330	214	*-16.5%*
Apparent EU consumption	**926**	**1 127**	**541**	***-23.6%***

There has been a slight increase in production of these pumps in the EU over the past few years. Additionally, there has been a sharp increase in pumps imported by a factor of six in 2010 of 616,000 units and a double in unit sales for 2010 of 1,350,000 units compared to 2008. The market value for centrifugal pumps with a discharge outlet diameter >15 mm (single-stage with a single entry impeller, long coupled) has remained fairly constant.

Table 21: Market data from PRODCOM for Centrifugal pumps with a discharge outlet diameter >15 mm, single-stage with double entry impeller (PRODCOM code: 28131455)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	4	5	5	*16.0%*
Import	10	6	7	*-16.5%*
Export	51	23	21	*-35.5%*
Apparent EU consumption [28]	-	-	-	-
Value in million €				
Production	145	126	120	*-9.2%*
Import	1,4	1,3	1,2	*-8.3%*
Export	63	100	62	*-1.3%*
Apparent EU consumption	**83**	**27**	**59**	***-15.7%***
Average price in €				
Production	39519	24506	24186	*-21.8%*
Import	147	226	177	*9.8%*
Export	1255	4426	2937	*53.0%*
Apparent EU consumption	-	-	-	-

The market value for centrifugal pumps with a discharge outlet diameter >15mm (single-stage with double entry impeller has decreased by one-fourth from 2008 to 2010. Additionally, the majority of these pumps are imported.

Table 22: Market data from PRODCOM for Centrifugal pumps with a discharge outlet diameter >15 mm, multi-stage (including self-priming) (PRODCOM code: 28131460)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	1 600	1 500	1 500	*Chapter 26: -3.2%*
Import	63	5	11	*Chapter 27: -58.8%*
Export	1 024	903	298	*Chapter 28: -46.1%*

[28] No values are listed for sales in units or value in million Euro because there seems to be an issue with estimates for the year.

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Apparent EU consumption	**639**	**602**	**1 213**	*Chapter 29:* ***37.8%***
Value in million €				
Production	957	879	863	*-5.0%*
Import	5	7	5	*-4.1%*
Export	200	200	221	*5.0%*
Apparent EU consumption	**762**	**685**	**647**	***-7.9%***
Average price in €				
Production	598	586	575	*-1.9%*
Import	87	1347	471	*132.6%*
Export	196	222	742	*94.6%*
Apparent EU consumption	**1 193**	**1 139**	**534**	***-33.1%***

There has been an increase in annual production in the EU for centrifugal pumps with a discharge outlet diameter >15mm (multi-stage including self-priming) to 1,213,000 units in 2010, almost double of that in 2008 with the majority of pumps being produced in the EU. There has also been a slight decrease in the market value as well as a sharp decrease of sales in average price from 2008 to 2010.

Table 23: Market data from PRODCOM for Rotodynamic single-stage mixed flow or axial pumps (PRODCOM code: 28131471)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	2 100	2 718	3 187	*23.2%*
Import	3 875	3 350	3 769	*-1.4%*
Export	1 062	783	2 678	*58.8%*
Apparent EU consumption	**4 913**	**5 284**	**4 279**	***-6.7%***
Value in million €				
Production	639	532	530	*-9.0%*
Import	61	58	68	*6.3%*
Export	407	330	378	*-3.6%*
Apparent EU consumption	**293**	**259**	**220**	***-13.4%***
Average price in €				
Production	304	196	166	*-26.1%*
Import	16	17	18	*7.8%*
Export	383	422	141	*-39.3%*

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Apparent EU consumption	**60**	**49**	**51**	***-7.2%***

The market value for rotodynamic single-stage mixed flow or axial pumps has remained fairly constant.

Table 24: Market data from PRODCOM for Rotodynamic multi-stage mixed flow or axial pumps (PRODCOM code: 28131475)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	720	991	703	*-1.2%*
Import	534	391	459	*-7.3%*
Export	1 714	1 710	2 500	*20.8%*
Apparent EU consumption [29]	-	-	-	-
Value in million €				
Production	568	587	549	*-1.7%*
Import	53	47	44	*-9.2%*
Export	0,8	0,6	0,5	*-18.3%*
Apparent EU consumption	**68**	**121**	**221**	***80.7%***
Average price in €				
Production	789	592	780	*-0.6%*
Import	99	120	95	*-2.1%*
Export	323	300	148	*-32.2%*
Sales	-	-	-	-

For rotodynamic multi-stage mixed flow or axial pumps, the market value has doubled annually with a resulting value of 221 million Euro for 2010.

Table 25: Market data from PRODCOM for Other liquid pumps, liquid elevators (PRODCOM code: 28131480)

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Quantity in 1000 units				
Production	63 516	24 911	27 892	*-33.7%*
Import	31 543	19 097	30 144	*-2.2%*

[29] No values are listed for sales in units or value in million Euro because there seems to be an issue with estimates for the year.

EU-27	2008	2009	2010	Annual average increase or decrease (%)
Export	32 822	39 720	45 342	*17.5%*
Apparent EU consumption	62 237	4 288	12 693	*-54.8%*
Value in million €				
Production	1 221	840	991	*-9.9%*
Import	392	334	362	*-3.8%*
Export	1,4	1,1	1,8	*14.3%*
Apparent EU consumption	**615**	**255**	**400**	***-19.3%***
Average price in €				
Production	19	34	36	*36.0%*
Import	12	17	12	*-1.6%*
Export	30	23	21	*-16.8%*
Apparent EU consumption	**10**	**60**	**32**	***78.6%***

The sales of other liquid pumps and liquid elevators are decreasing rapidly, showing trends towards decreased production and increased imports and exports. Sales in 2010 were around 12.7 million units, which is around one-fifth of sales in 2008.

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Annex 2: Data of pumps excluded from ENER Lot 28 study

As explained in Task 1, the positive displacement pumps are excluded from the ENER Lot 28 study. Nevertheless, the data collected during the study for positive displacement pumps is compiled in this section for the reference of related work in the future. Table 26 to Table 31 provide the data from the market analysis for positive displacement pumps in wastewater industries. The pumps that had been studied are Archimedean screw pump, progressing cavity pump and Peristaltic pump.

Table 26: Pump sales in EU by number of units sold

Pump Type	Estimate of sales in (units)		Source
	2005[30]	2011[31]	
Archimedean screw pump	390	500	Europump
Progressing cavity pump	19 482	25 000	Europump
Peristaltic pump	3 273	4 200	Europump

Table 27: Estimated installed stock of pumps in the EU-27

Pump Type	Estimate of installed stock in (units)		Source
	2005[32]	20114	
Archimedean screw pump	50 000	12500	Europump
Progressing cavity pump	220 937	250 000	Europump
Peristaltic pump	30 489	34 500	Europump

[30] The values for 2005 pump sales in EU are provided by Europump based on an average annual growth in sales of 3.5% per year between 2005 and 2011.

Europump is the European Association of Pump Manufacturers. It represents 18 National Associations in 15 EU Member States, Turkey, Russia & Switzerland. Europump members represent more than 450 companies with a collective production worth more than €10 billion and employing 100 000 people in Europe. Website: www.europump.org/

[31] These sales figures are provided by Europump based on their best estimates without counteracting any law or Directive.

[32] The pump installed stock in 2005 in EU are estimated by Europump based on an average annual growth in stock of 1.75% per year between 2005 and 2011. Thereby the figures for 2005 can be calculated backwards from figures 2011 by multiplying by 0.9825^7 = 0.884

Table 28: Product technical life and average economical lifetime of pumps in the EU-27[33]

Pump Type	Technical life (in years)	Average time to disposal (economical lifetime in years)	Source
Archimedean screw pump	25	25	Europump
Progressing cavity pump	10	10	Europump
Peristaltic pump	10	10	Europump

Table 29: Purchase price (including VAT) of the average wastewater pumps in Euros/unit

Pump type	Range of purchase price (€/unit)	Average purchase price (€/unit)	Source
Archimedean screw pump	15 000-20 0000	65 000	Estimate
Progressing cavity pump	3 000 – 12 000	6 000	Estimate
Peristaltic pump	100 – 1 000	2 500	Estimate

Table 30: Average installation cost (including VAT) for wastewater pumps in Euros/unit

Pump type	Range of installation cost (€)	Average installation cost (€)	Source
Archimedean screw pump	4 000 – 20 000	15 000	Estimate
Progressing cavity pump	250 – 1 200	800	Estimate
Peristaltic pump	200 – 1 500	800	Estimate

Table 31: Average annual maintenance and repair cost wastewater pumps (in Euros/year)

Pump type	Range of repair cost (€/year)	Average repair cost (€/year)	Range of maintenance cost (€/year)	Average maintenance cost (€/year)	Source
Archimedean screw pump	150 - 500	200	500 - 2000	900	Estimate
Progressing cavity pump	50 - 250	150	100 - 400	200	Estimate
Peristaltic pump	100 - 300	175	100 - 250	175	Estimate

[33] The "Range of Economical Lifetime" depends massively on operational conditions, pumped liquid, maintenance and surrounding conditions thus reliable estimate cannot be given and is excluded in the table.

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