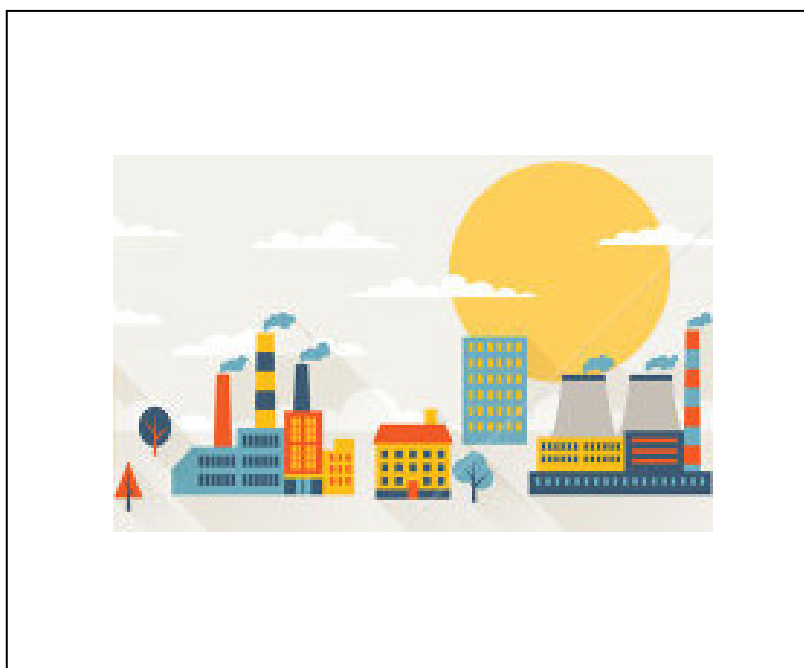


Analysis of the noise pollution from industrial sources inside agglomerations



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Contents

1	Key messages	4
2	Objective.....	4
3	Justification of the task.....	5
4	Methodology and analysis undertaken.....	7
4.1	Methodology.....	7
4.2	Data being used for the analysis	8
4.3	Limitations of the methodology being used	9
5	Results and discussion.....	10
5.1	Results and discussion concerning ports	33
6	Conclusions	38
7	Recommendations for future analysis.....	39
	References	40
	Annex 1. E-PRTR facilities in agglomerations' noise contour maps (2012).....	41

1 Key messages

Industrial noise exposure is by far the noise sources causing the lowest number of people exposed, as reported by the EEA member countries. This is the official data reported answering the requirements of the of Environmental Noise Directive (END), both in 2007 and in 2012.

The majority of people exposed to industrial noise is exposed in fact to the lower noise bands, both in 2007 and in 2012, and also per L_{den} and per L_{night} .

Correlations between total number of inhabitants in the urban areas and the number of people exposed to industrial noise have not been found, and capital city is not systematically the agglomeration having the largest number of people exposed to industrial noise.

The number of agglomerations providing 0 as number of people exposed to industrial noise does not explain the low number of people exposed to industrial noise with the current data available.

The majority of urban areas included in the END have E-PRTR facilities inside city borders and for the majority of those urban areas, exposure numbers have been reported or should be reported.

No pattern exist that could allow us to determine a specific type of industry that is included or that it is not included in the results being provided by the Member states.

Although the port areas have a high concentration of industries, noise regulations besides noise mitigation efforts and localization in areas far from residential sites do not show significant impacts on the urban population.

European industry has changed in the past decades due to several reasons. There is a general tendency of industrial areas being moved away from city centres due to stricter environmental regulations. Nevertheless, industry tertiarisation, deindustrialization and industrial relocation have been quite similar in most of urban areas in Europe, so it does not explain completely the current differences in exposure data reported due to industrial noise.

2 Objective

The main objective of this task is to evaluate the low numbers of people reported as exposed to industrial noise under the END requests.

Industrial noise exposure is by far the noise sources causing the lowest number of people exposed, as reported by the EEA member countries.

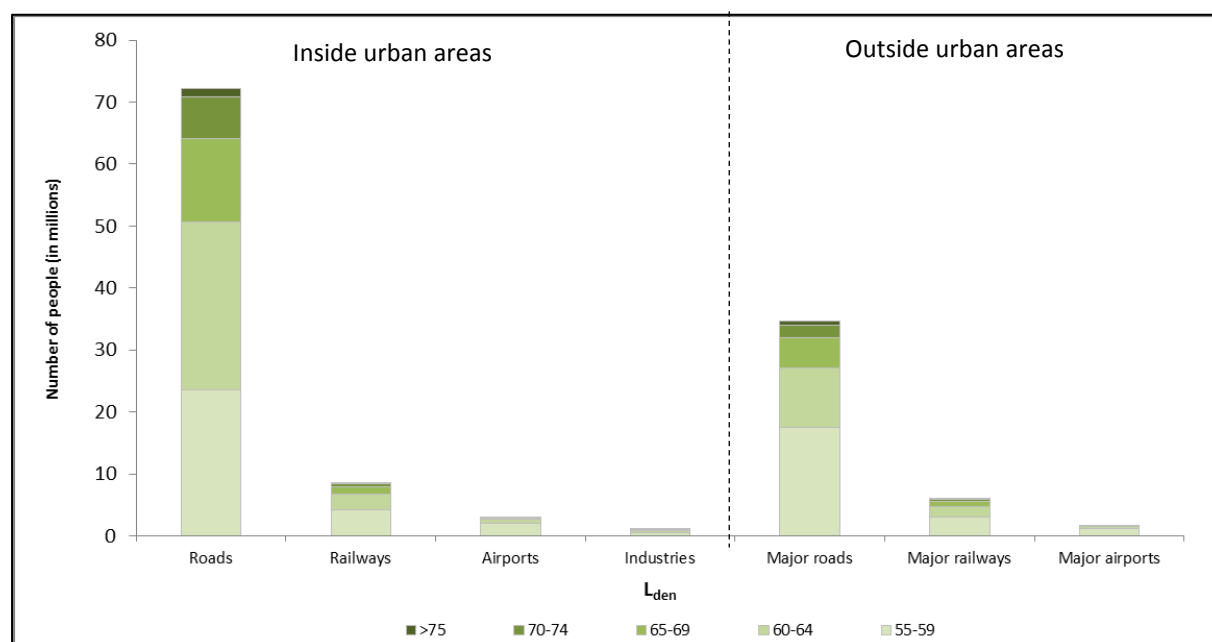
Data provided under END requests will be compared with other databases available at European level, with the objective to find potential missing data concerning this noise source.

To be taken into account that industrial noise exposure that should be included in the strategic noise maps for agglomerations should include ports' areas as well (END Annex IV – Minimum requirements for strategic noise mapping). Therefore, a specific section dealing with ports have been included in the report.

3 Justification of the task

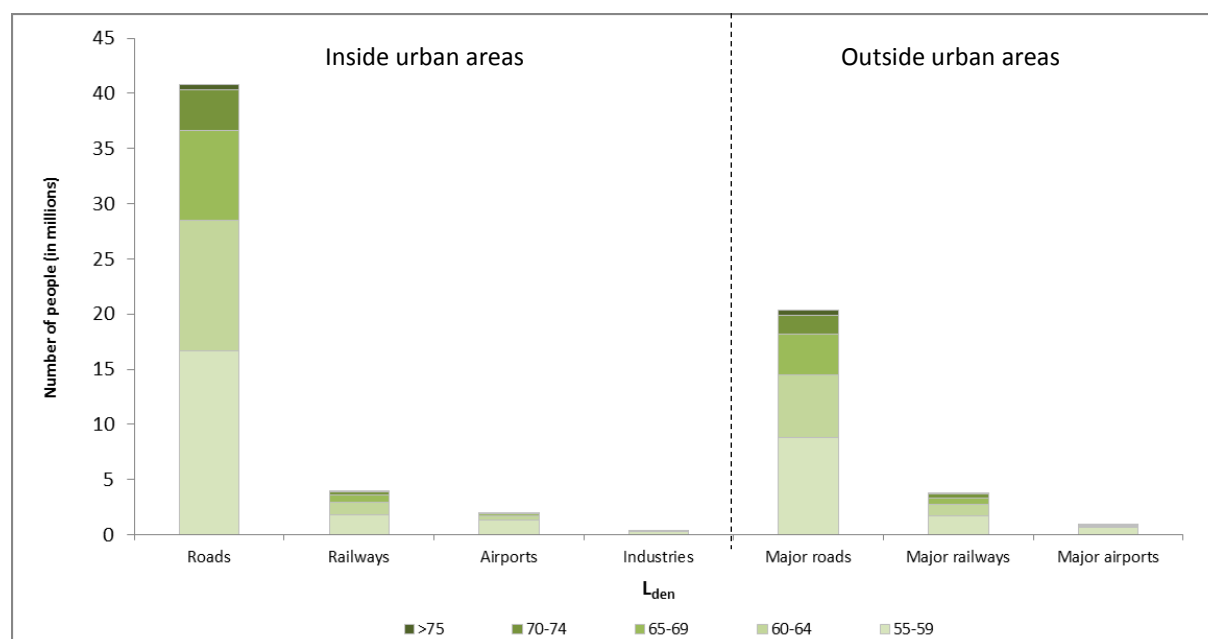
By observing the exposure data reported by Member States under the requests of the Environmental Noise Directive (END), it can be seen that industrial noise exposure is by far the noise source presenting the lower values on population exposed compared with the rest of noise sources being reported inside and outside urban areas (see Figure 3.1 and Figure 3.2). As it can be seen, industrial noise exposure is only reported inside urban areas, so the comparison will be done with the rest of noise sources inside agglomerations solely.

Figure 3.1. Number of people exposed to noise in Europe, L_{den} (2007)



Source: Noise database, June 2014.

Figure 3.2. Number of people exposed to noise in Europe, L_{den} (2012)



Source: Noise database, June 2014.

Data from both figures correspond to the most updated information provided by all EEA Member Countries up to 10th of June 2014, corresponding to first and second END reporting rounds respectively.

Nevertheless, completeness and coverage of both datasets is not comparable at this stage, as for the first round (strategic noise maps reported in 2007) the completeness can be estimated up to nearly 90% while in the case of second reporting round (strategic noise maps reported in 2012), completeness figure ranges from 50 to 60% depending on the noise source that is being considered, in the case of industrial noise exposure is 59%.

Coverage is also an issue to take into consideration, as second round should calculate noise maps in agglomerations with more than 100.000 inhabitants (counting up to 472 urban areas in all Europe) while first round only took into account urban areas with more than 250.000 inhabitants (in total, 163 agglomerations declared by Member States in Europe).

Provided these two aspects, coverage and completeness, the figure on the number of people exposed to industrial noise inside agglomerations reaches more than 1 million people to $L_{den} > 55\text{dB}$ in 2007 (representing nearly 1% of the total number of inhabitants living in cities being mapped in the first round), with the 89% of the expected data being reported. In 2012, with 59% of the expected data being reported, the figure on exposure solely reaches 344.400 people exposed to $L_{den} > 55\text{dB}$ (representing in this case, around 0,4% of the total number of inhabitants living in cities being mapped in the second round). Both in 2007 and in 2012, around half of the people is exposed to industrial noise to more than 50 dB L_{night} .

So, comparing exposure values between first and second round shown in Figure 3.1 and in Figure 3.2 will result in a misinterpretation of the information considering both the completeness and the coverage differences, among other issues such the methods used to estimate the data reported.

Nevertheless, very similar distribution of people exposed to the different noise sources inside agglomerations can be observed between both years, enabling the first conclusion that industrial noise is by far, the noise sources presenting the lower values on population exposed.

Why this is happening? Is the END clear enough concerning the industrial areas to be mapped? Which is the information really reported under industrial noise exposure? Is it true that industrial noise is the one with lowest exposure? Do we have a systematic lack of data in this noise source?

Those questions are the ones that bring us to study specifically the case of industrial noise inside urban areas being reported for the END.

Industrial areas located outside urban areas are not under the scope of the END and therefore, will not be analysed in this task.

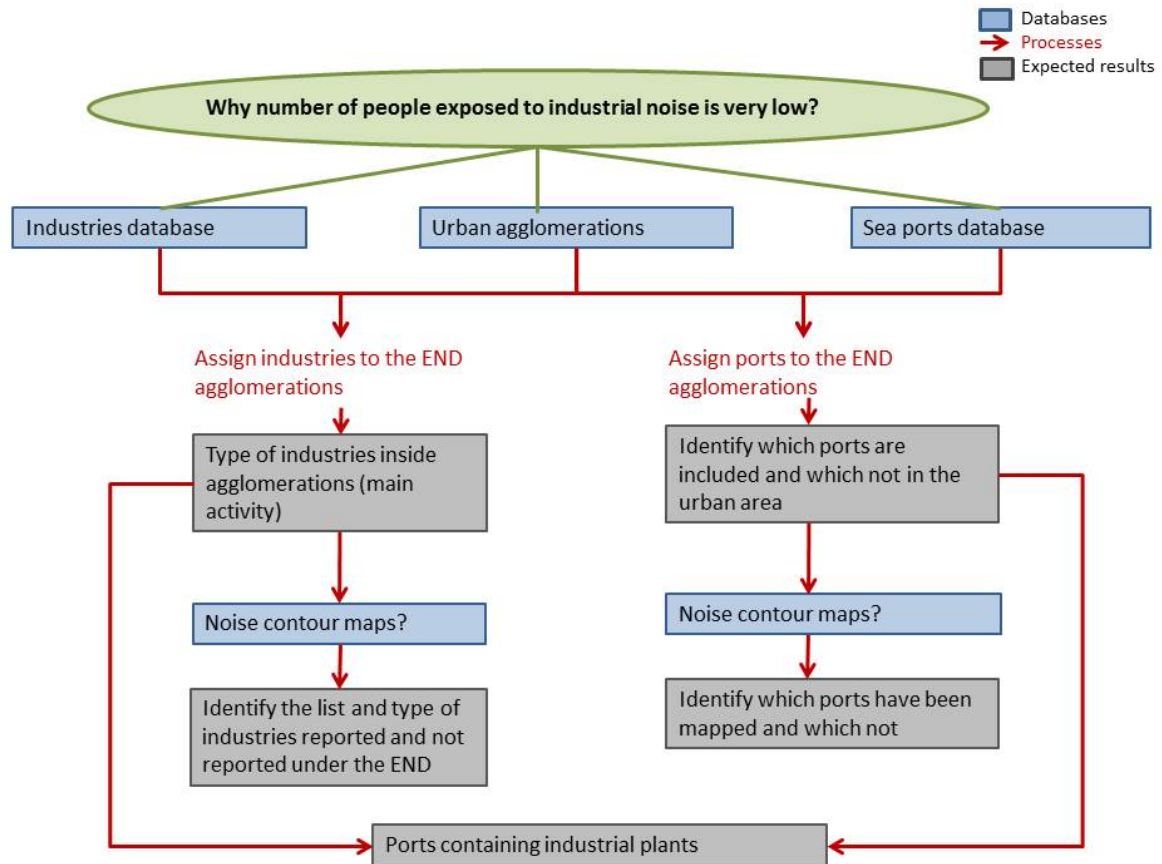
4 Methodology and analysis undertaken

4.1 Methodology

Figure 4.1 describes the workflow being implemented to answer the following questions:

- Which industrial plants have been taken into account to undertake the strategic noise mapping of the END agglomerations?
- Which type of industrial plants has been mapped?
- Which ports have been taken into account to undertake the strategic noise mapping of the END agglomerations?
- Are the ports containing industrial plants to be mapped?

Figure 4.1. Schema of the analysis done



The methodology consists in overlaying the data selected (see section 4.2) with the END agglomerations. This process allows (1) assigning the industries and port areas to the agglomeration and (2) performing statistics and classifications according to the objective of the task. Moreover, the noise contour maps for industrial noise reported under the END in an appropriate GIS format has help to identify and categorise the E-PRTR industries reported. The spatial analysis allow identifying those agglomerations that report no people exposed to industrial noise but includes some industries inside agglomeration.

Following the hypothesis that perhaps the agglomerations avoid the ports areas in the delineation of the urban area, a specific analysis has been done in order to zoom into these areas and extract the corresponding conclusions.

4.2 Data being used for the analysis

Selection criteria of the END baseline data that is going to be used for the analysis:

- All urban agglomerations reported under the END in 2005 first and secondly in 2010 (2008) will be selected
- Industrial noise exposure data inside agglomerations that have been reported in 2007 and in 2012.
- Noise contour maps in urban areas: selection of industrial noise contour maps in spatial format (for 2007 and 2012).

Selection criteria of END industrial sources (IED plants and sea ports) that will be taken into consideration:

- For industrial plants: E-PRTR will be used as a proxy for IED plants (Industrial Emissions Directive)¹: Database that provides easy access to key environmental data from industrial facilities in European Union Member States and in Iceland, Liechtenstein, Norway, Serbia and Switzerland.
- Ports:
 - o Eurostat data on the top twenty ports in Europe. Top 20 ports - Volume (in TEUs) of containers handled in each port, by loading status. (Eurostat, 2015)
 - o Corine Land Cover database: Port areas: Infrastructure of port areas, including quays, dockyards and marinas (CLC code level 3, 123 Port areas)
 - o Urban Atlas: to be checked if the information is available for selected / suspicious ports (Urban Atlas 2006).
 - o WPI World Port Index publication gives the location, characteristics, known facilities, and available services of a great many ports and shipping facilities and oil terminals throughout the world. Used as a support database.

4.3 Limitations of the methodology being used

The limitations already encountered in the analysis developed are the following ones:

- Delineation of the END urban agglomeration: provision of LAU2 information versus detailed delineation of the urban agglomeration in GIS format.
- Use of European datasets to undertake the analysis specified above (for industrial areas: E-PRTR, and for ports areas: CORINE Land Cover) that may differ from the input data considered for the development of the strategic noise maps.
- Noise contour maps being provided in non-spatial format cannot be considered in this analysis.
- European Pollutant Release and Transfer Register (E-PRTR): All facilities have to report their geographical co-ordinates, which are shown on the maps. However, in a small number of cases, the reported coordinate of a particular facility might not be correct.
- E-PRTR-facilities with a low noise emission will not be represented in the spatial data even if they have been taken into account.

¹ IED first reporting is foreseen by September 2017. There is no one-to-one relationship between the sectoral scope of the IED and the E-PRTR, although it is very similar and therefore, being decided to use as a proxy. To be noticed that some industrial activities should be submitted following one or the other directive but taking into account different thresholds.

5 Results and discussion

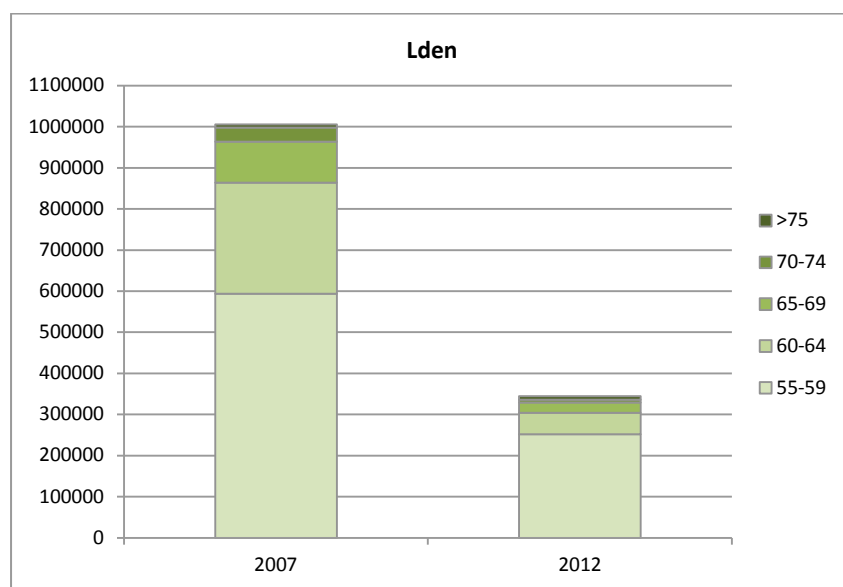
In 2007, 163 urban areas with more than 250.000 inhabitants provided information on exposure to different noise sources, industrial noise exposure among them. EEA member countries declared only 159 agglomerations with people exposed to industrial noise.

90% of the expected urban areas reported information on industrial noise exposure, although remarkably, 16% had reported 0 people exposed per all noise bands per L_{den} and L_{night} indicators. The 16% corresponds to 26 agglomerations that count for 15.183.387 total inhabitants with 0 people declared as exposed to industrial noise.

In 2012, 472 urban areas with more than 100.000 inhabitants should deliver information on exposure to different noise sources. Currently, only 60% of the expected information has been received (up to June 2014) concerning industrial noise exposure in urban areas. This 60% means that a higher number of urban areas have been reported compared to 2007 data (275 urban areas already reported industrial noise exposure information) but at the same time, still around 80 million people can still be potentially exposed to industrial noise in Europe.

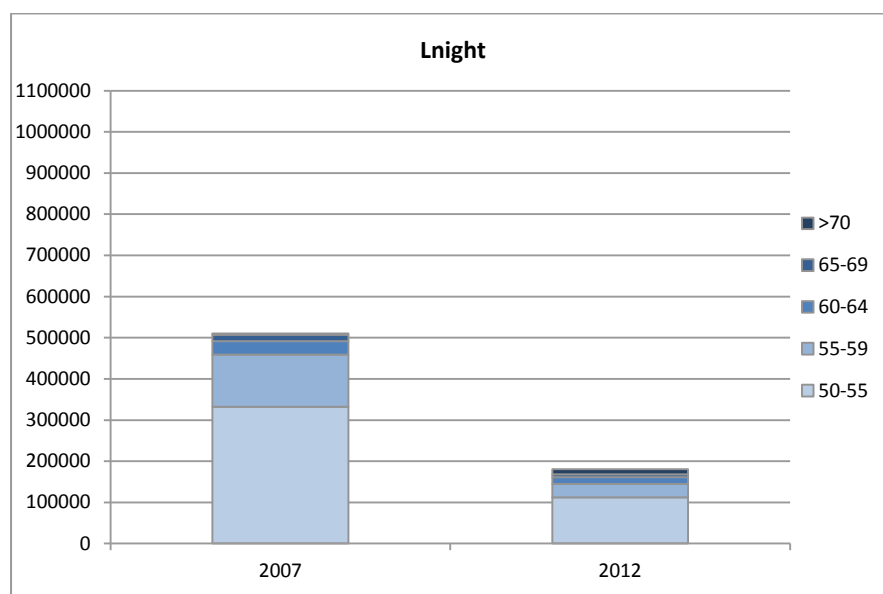
Total exposure figures updated up to 10th of June 2014, give a total of 1005500 people exposed to $L_{den} > 55$ dB and 509400 people exposed to $L_{night} > 50$ dB considering all EEA Member countries for 2007. Figures per 2012 are quite lower for the moment, but still 40% of the dataset should be delivered: 344400 people exposed to $L_{den} > 55$ dB and 180600 people exposed to $L_{night} > 50$ dB. (See Figure 5.1 and Figure 5.2)

Figure 5.1. Total number of people exposed to industrial noise in urban areas in Europe, L_{den} (2007 and 2012)



Source: ETC/ACM, 2015

Figure 5.2. Total number of people exposed to industrial noise in urban areas in Europe, L_{night} (2007 and 2012)



Source: ETC/ACM, 2015

Although both reporting years cannot be compared, it can be seen from the figures above (Figure 5.1 and Figure 5.2) that the majority of people exposed to industrial noise is exposed in fact to the lower noise bands, both in 2007 and in 2012, and also per L_{den} and per L_{night} .

Nevertheless, if the percentage of people exposed to the highest bands both per L_{den} and L_{night} is compared between noise sources inside agglomerations, the results are higher for exposure to industrial noise. This distribution has already been observed in the analysis undertaken in the “Exposure to environmental noise in Europe” report (EEA, 2014), and it is maintained when including new data delivered until June 2014.

These results are found at European level, but both number and percentage of people exposed to industrial noise presents a broad range of variation when data is aggregated at country level.

Correlations between total number of inhabitants in the urban areas and the number of people exposed to industrial noise have not been found, and capital city is not systematically the agglomeration having the largest number of people exposed to industrial noise, as happens with the rest of noise sources being calculated inside urban areas.

Differences intra country are also observed. This lack of correlation seems logical since the presence of industries is more related to the regional and local specificities, and the tendency occurring in the past decades on moving away from urban areas polluting types of manufacture due to stricter environmental regulations.

So the subsequent analysis evaluates the amount of E-PRTR facilities that are located inside urban areas with more than 250.000 and 100.000 inhabitants and the data on exposure to industrial noise being submitted by Member States for those urban areas.

Next tables (Table 5.1 for 2007 and Table 5.2 for 2012) contain the total number of agglomerations to be reported per each EEA member country under the END requirements and from this total, it is analysed:

- How many of those agglomerations have E-PRTR facilities inside the city borders and which are the ones that do not have an E-PRTR facility inside the city borders
- How many of those agglomerations have not reported any information yet (-2)
- How many of those agglomerations declared that there is not any industrial area to be mapped inside the city borders and which are those cities
- How many of those agglomerations declared 0 people exposed to industrial noise (representing from 0 to 49 people exposed in that urban area)
- How many of those agglomerations reported exposure numbers related to industrial noise

As it can be observed in both tables, a large number of urban areas declared as 0 the number of people exposed to industrial noise: 26 urban areas out of 163 for the first round (representing the 16% of the complete dataset) and 101 urban areas out of 472 for the second round (which represent the 21% of the complete dataset). Considering that 40% of the information corresponding to the second reporting round is still missing the share of urban areas declaring 0 people exposed to industrial noise can be expected to be higher.

One may think that the 0 reported figure in quite a large number of urban areas could answer the fact that industrial noise is the noise source with less number of people exposed. Nevertheless, this percentage of urban areas reporting 0 people exposed is quite similar and even lower to the number reported under aircraft noise exposure inside urban areas, which is the next noise source with fewer number of people exposed. In this case, 50 urban areas out of 163 for the first round (30% of the complete dataset) and 106 urban areas out of 472 for the second round (22% of the complete dataset) have reported 0 inhabitants.

Therefore, although these similarities on the percentages of urban areas reporting 0 people exposed both to aircraft noise and to industrial noise, aircraft noise exposure is 3 times higher and more than 5 times higher than exposure to industrial noise for 2007 and 2012 respectively. So, the number of agglomerations providing 0 as number of people exposed to industrial noise does not explain the low number of people exposed to industrial noise with the current data available.

Table 5.1. Overview of the information reported on exposure to industrial noise by EEA country (2007) (Source: Noise database, June 2014)

Country	Total number of END agglomerations	Total number of END agglomerations containing E-PRTR facilities inside the city borders	END agglomerations not containing E-PRTR facilities inside the city borders	Number of agglomerations with information not available (-2)	Number of agglomerations with information not applicable (-1)	END agglomerations declaring industrial noise exposure as not applicable inside the city borders	Number of agglomerations reporting 0 people exposed to industrial noise	Number of agglomerations reporting exposure to industrial noise
Austria	1	1		0	0		1	0
Belgium	3	3		1	0		0	2
Bulgaria	3	3		0	0		1	2
Croatia	Croatia became member of the EU the 1 July 2013							
Cyprus	No aggl > 250 000							
Czech Republic	3	3		0	0		2	1
Denmark	1	1		0	0		0	1
Estonia	1	1		0	0		0	1
Finland	1	1		0	1	Helsinki	0	0
France	24	24		2	0		1	21
Germany	27	27		0	1	Wiesbaden	6	20
Greece	2	2		2	0		0	0
Hungary	1	1		0	0		0	1
Iceland	No aggl > 250 000							
Ireland	1	1		0	0		1	0
Italy	11	10	Cagliari	5	0		1	5
Latvia	1	1		0	0		0	1
Liechtenstein	No aggl > 250 000							
Lithuania	2	2		0	0		0	2
Luxembourg	No aggl > 250 000							
Macedonia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	No aggl > 250 000							
Netherlands	6	6		0	0		0	6
Norway	1	1		0	0		1	0
Poland	12	12		0	0		2	10
Portugal	2	2		2	0		0	0
Romania	9	9		0	0		1	8
Slovakia	1	1		0	0		0	1
Slovenia	1	1		0	0		0	1
Spain	19	19		4	2	Madrid, Murcia	6	7
Sweden	3	3		0	0		3	0
Switzerland	N/A	N/A	N/A	Not provided	Not provided	Not provided	Not provided	Not provided
Turkey	Not provided	N/A	N/A	Not provided	Not provided	Not provided	Not provided	Not provided
United Kingdom	28	28		0	0		0	28

Table 5.2. Overview of the information reported on exposure to industrial noise by EEA country (2012), (Source: Noise database, June 2014)

Country	Total number of END agglomerations	Total number of END agglomerations containing E-PRTR facilities inside the city borders	END agglomerations not containing E-PRTR facilities inside the city borders	Number of agglomerations with information not available (-2)	Number of agglomerations with information not applicable (-1)	END agglomerations declaring industrial noise exposure as not applicable inside the city borders	Number of agglomerations reporting 0 people exposed to industrial noise	Number of agglomerations reporting exposure to industrial noise
Austria	5	5		1	0		3	1
Belgium	4	4		3	0		0	1
Bulgaria	7	7		1	0		2	4
Croatia	4	N/A	N/A	3	0		0	1
Cyprus	2	1	Nicosia	2	0		0	0
Czech Republic	7	7		2	0		2	3
Denmark	4	4		0	0		2	2
Estonia	2	2		0	0		1	1
Finland	8	7	Kauniainen	0	0		5	3
France	58	58		46	0		1	11
Germany	71	71		12	2	Heidelberg, Reutlingen	28	29
Greece	8	6	Ioannina, Volos	8	0		0	0
Hungary	9	9		9	0		0	0
Iceland	1	1		0	0		0	1
Ireland	2	2		0	2	Dublin, Cork	0	0
Italy	11	10	Cagliari	11	0		0	0
Latvia	2	2		2	0		0	0
Liechtenstein	No aggl > 100.000 inhab							
Lithuania	5	5		0	0		1	4
Luxembourg	1	1		1	0		0	0
Macedonia	4	N/A	N/A	4	0		0	0
Malta	1	1		0	0		1	0
Netherlands	21	6	For 15 agglomerations, NL has not provided DF1_5, so the analysis is not possible	0	0		7	14
Norway	5	5		0	0		4	1
Poland	38	38		3	0		9	26
Portugal	6	5	Odivelas	6	0		0	0
Romania	19	19		16	0		3	0
Slovakia	2	2		2	0		0	0
Slovenia	2	2		2	0		0	0
Spain	63	61	Alcorcon, San Cristóbal de la Laguna	41	2	Cartagena, Elche	7	13
Sweden	13	13		0	2	Örebro, Uppsala	11	0
Switzerland	13	9	Baden-Brugge, Geneva, Lugano, Zug	13	0		0	0
Turkey	Not provided	N/A	N/A	Not provided	Not provided	Not provided	Not provided	Not provided
United Kingdom	74	74		1	0		14	59

By observing the tables above, and already mentioned in the beginning of the discussion, particular cases can be observed:

- urban areas that do not have an E-PRTR facility inside the city borders or
- urban areas declaring no industrial areas inside the city borders.

Both cases would be good for justifying the low number of people exposed to industrial noise, although the number of agglomerations falling in both situations is rather small compared with the complete urban areas dataset for 2007 and for 2012.

The analysis showed that the majority of urban areas included in the END have E-PRTR facilities inside city borders, and for the majority of those urban areas, exposure numbers have been reported or should be reported.

Nevertheless, 4 urban areas in 2007 (Helsinki, Wiesbaden, Madrid and Murcia) and 8 urban areas in 2012 (Heidelberg, Reutlingen, Dublin, Cork, Cartagena, Elche, Örebro and Uppsala) declared no affectation by industrial noise. Specific analysis has been undertaken in those 12 cases, evaluating how many industries and the type of industries that are found from the E-PRTR database inside the city borders.

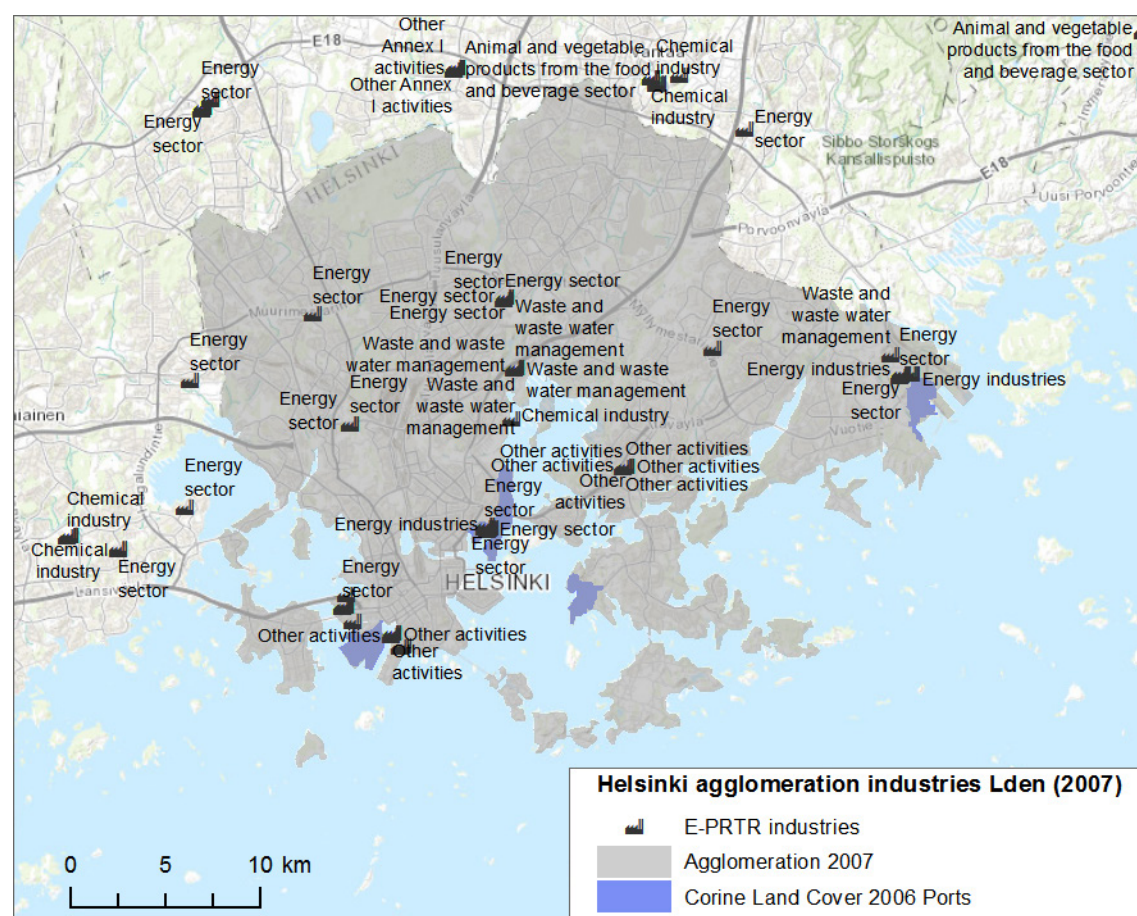
The case of agglomerations declaring affectation by industrial noise but providing 0 people exposed would be relevant to be analysed, as it may also explain the low number of people reported as exposed to industrial noise. At least two situations could explain the reported exposure as 0:

- 1) industrial areas located inside agglomerations but not responsible for any noise emissions
- 2) industrial areas located inside agglomerations but with noise contours below 55 dB L_{den}

We can consider both two cases not different from the 12 agglomerations declaring no affectation by industrial noise, but with the data reported under the END requirements, the situations 1) and 2) cannot be checked. A consultation with Member States in order to ask how many industrial plans they have looked up inside city borders respond to situation 1 and how many respond to situation 2 would be a very interesting piece of information to get, which can help in answering the question on the low number of people exposed to industrial noise.

Nevertheless, as the checking can only be done for the moment with the 12 agglomerations declaring no affectation by industrial noise, below there are the results encountered at city level, including a map and a summary table with information about the type and number of industries found inside the city borders (see Results from 5.1 to 5.12).

Result 5.1. Helsinki

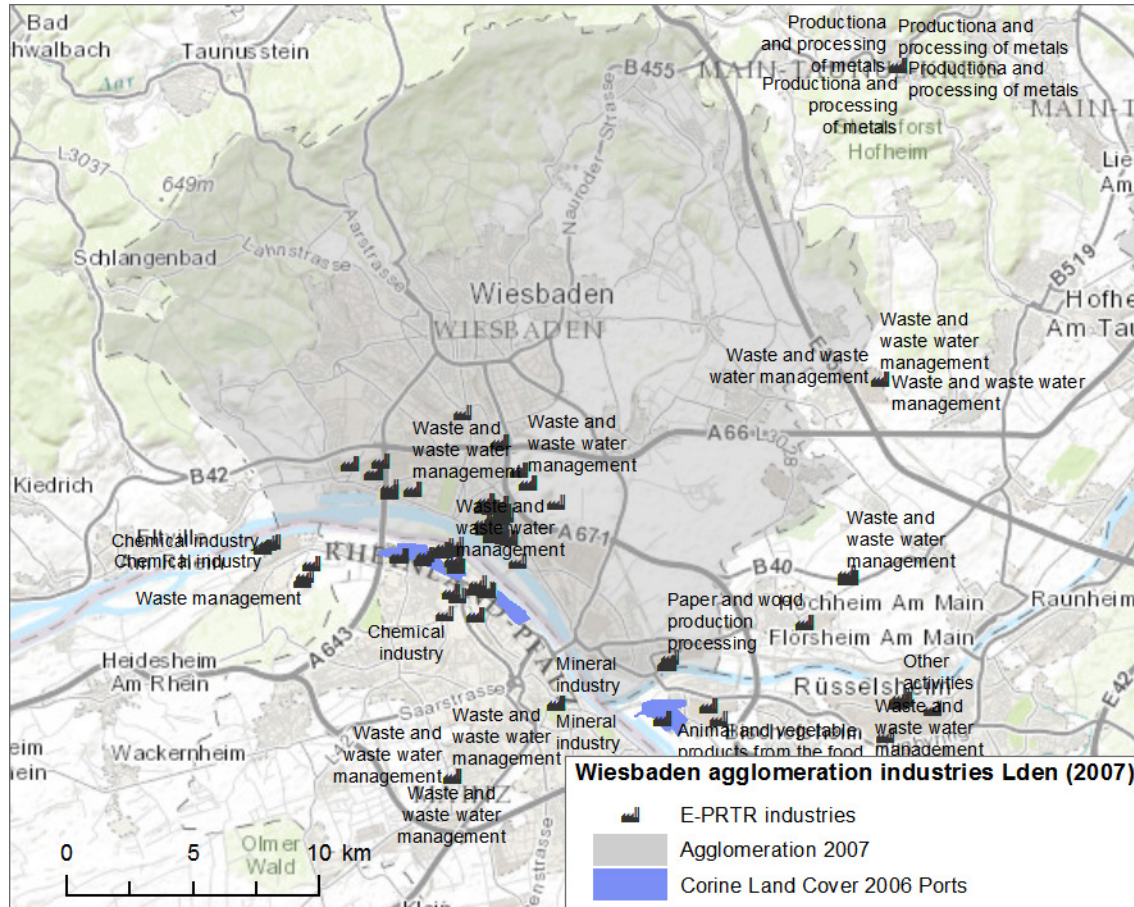


Agglomeration	E-PRTR activities ²	Industry typology	Description
Helsinki	1	Chemical industry	Basic organic chemicals
	29	Energy sector	Thermal power stations and other combustion installations
	8	Energy industries	Combustion installations > 50 MW
	12	Other activities	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating. Installations for the building of, and painting or removal of paint from ships
	7	Waste and waste water management	Urban waste-water treatment plants Landfills
	CLC Port areas		

² If one operator carries out several activities falling under the same Annex I activity of the same facility at the same site, the capacities of such activities (e.g. the treatment volume of vats) are added together. This explains why there are more activities than total industries.

	4	Port	
TOTAL industries	23		

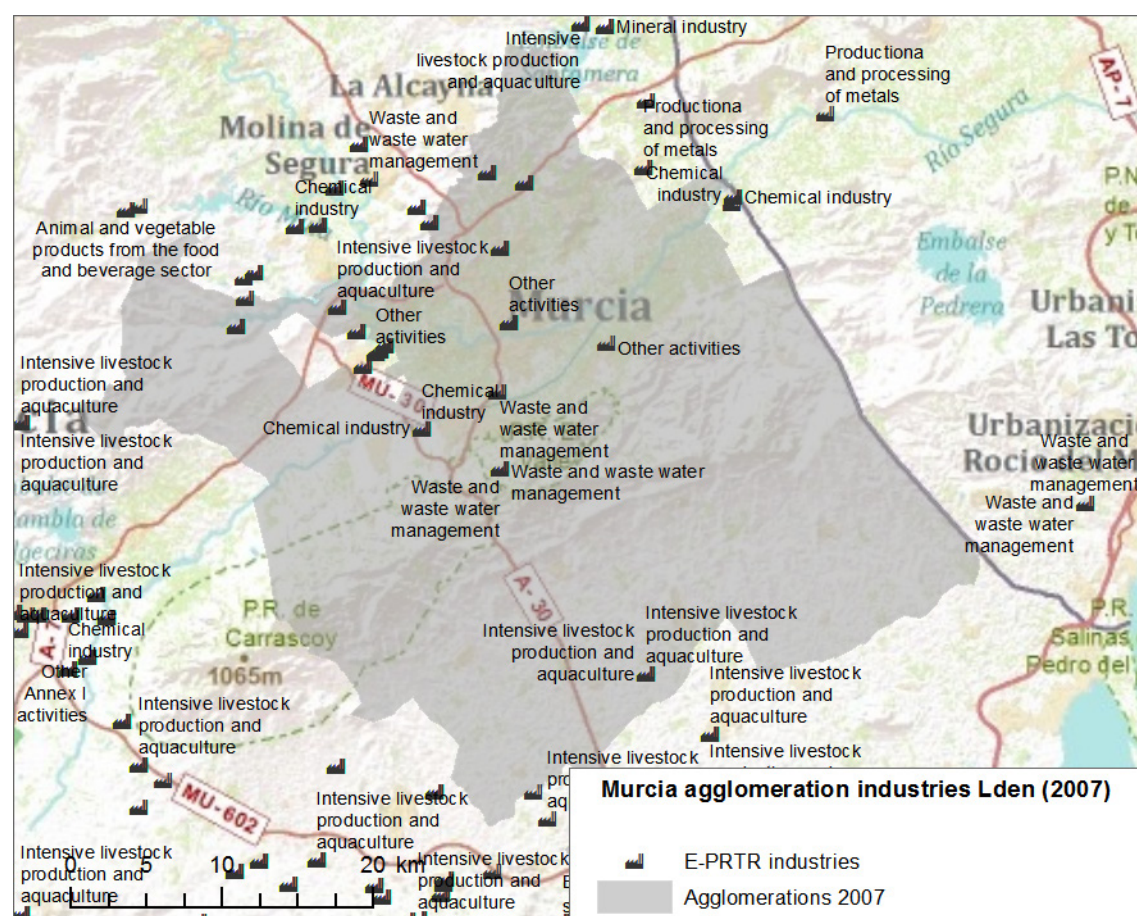
Result 5.2. Wiesbaden



Agglomeration	E-PRTR activities	Industry typology	Description
Wiesbaden (DE)	6	Chemical industry	Basic organic chemicals
	30	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals
	5	Chemical industry	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	1	Chemical industry	Pharmaceutical products
	3	Energy industries	Combustion installations > 50 MW
	6	Energy sector	Thermal power stations and other combustion installations
	6	Mineral industry	Installations for the manufacture of glass, including glass fibre
	6	Mineral industry	Installations for the production of:
	3	Mineral Industry	Cement, lime, glass, mineral substances or ceramic products
	10	Other activities	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing,

Agglomeration	E-PRTR activities	Industry typology	Description
Madrid (ES)	3	Animal and vegetable products from the food and beverage sector	Slaughterhouses
	5	Animal and vegetable products from the food and beverage sector	Treatment and processing intended for the production of food and beverage products from:
	6	Chemical industry	Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as:
	6	Chemical industry	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	11	Energy sector	Thermal power stations and other combustion installations
	3	Other Annex I activities	Slaughterhouses, milk, animal and vegetable raw materials
	2	Other Annex I activities	Surface treatment or products using organic solvents
	6	Production and processing of metals	Metal industry
	24	Production and processing of metals	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
	5	Production and processing of metals	Installations for the processing of ferrous metals
	5	Production and processing of metals	Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting
	5	Production and processing of metals	Installations:
	6	Waste and waste water management	Installations for the incineration of non-hazardous waste in the scope of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste
	10	Waste and waste water management	Installations for the recovery or disposal of hazardous waste
	6	Waste and waste water management	Landfills (see note in Guidance Document)
	34	Waste and waste water management	Urban waste-water treatment plants
	1	Waste management	Disposal of non-hazardous waste and landfills
	3	Waste management	Disposal/recovery of hazardous or municipal waste
	CLC Port areas		
	0	Ports	
TOTAL industries	34		

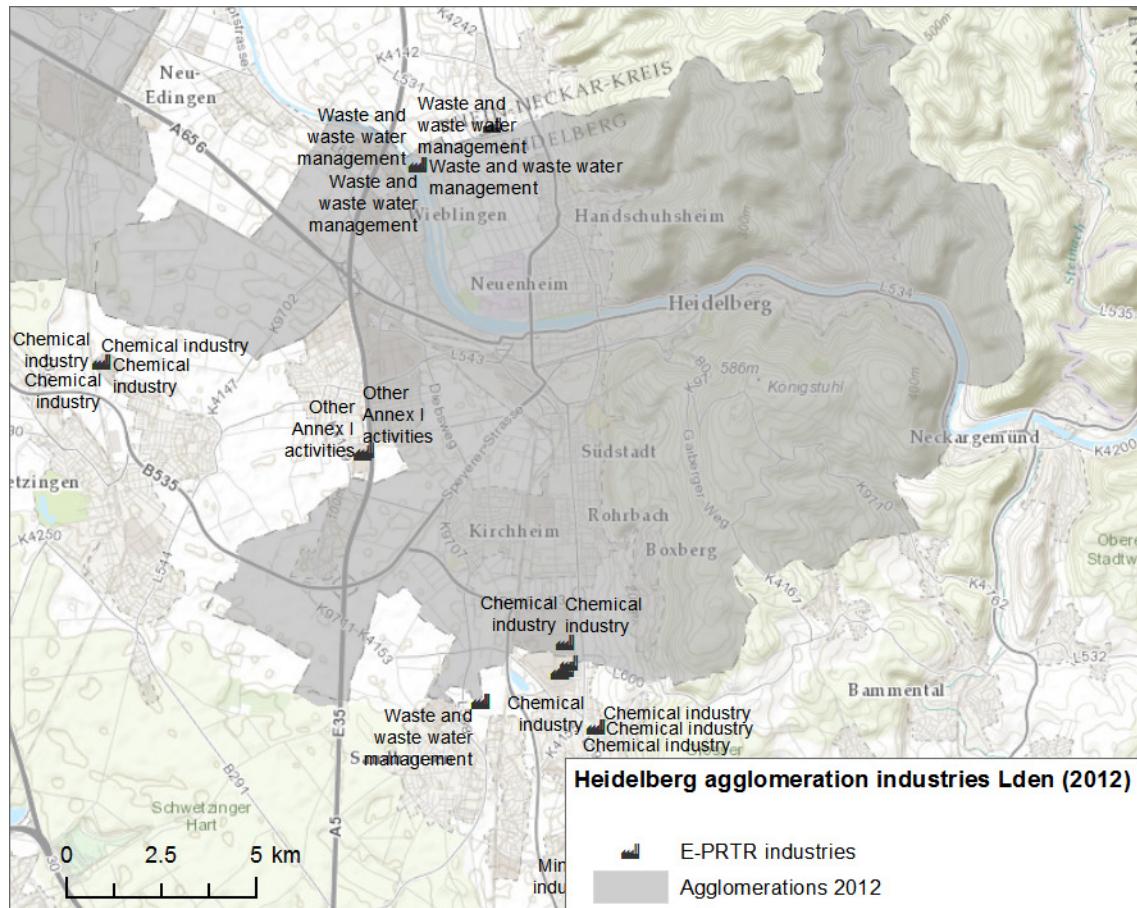
Result 5.4. Murcia



Agglomeration	E-PRTR activities	Industry typology	Description
Murcia (ES)	18	Animal and vegetable products from the food and beverage sector	Treatment and processing intended for the production of food and beverage products from:
	10	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals, such as:
	6	Chemical industry	Installations for the production on an industrial scale of explosives and pyrotechnic products
	6	Chemical industry	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	1	Chemical industry	Pharmaceutical products
	11	Other activities	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating
	6	Waste and waste water management	Landfills
	6	Waste and waste water management	Urban waste-water treatment plants

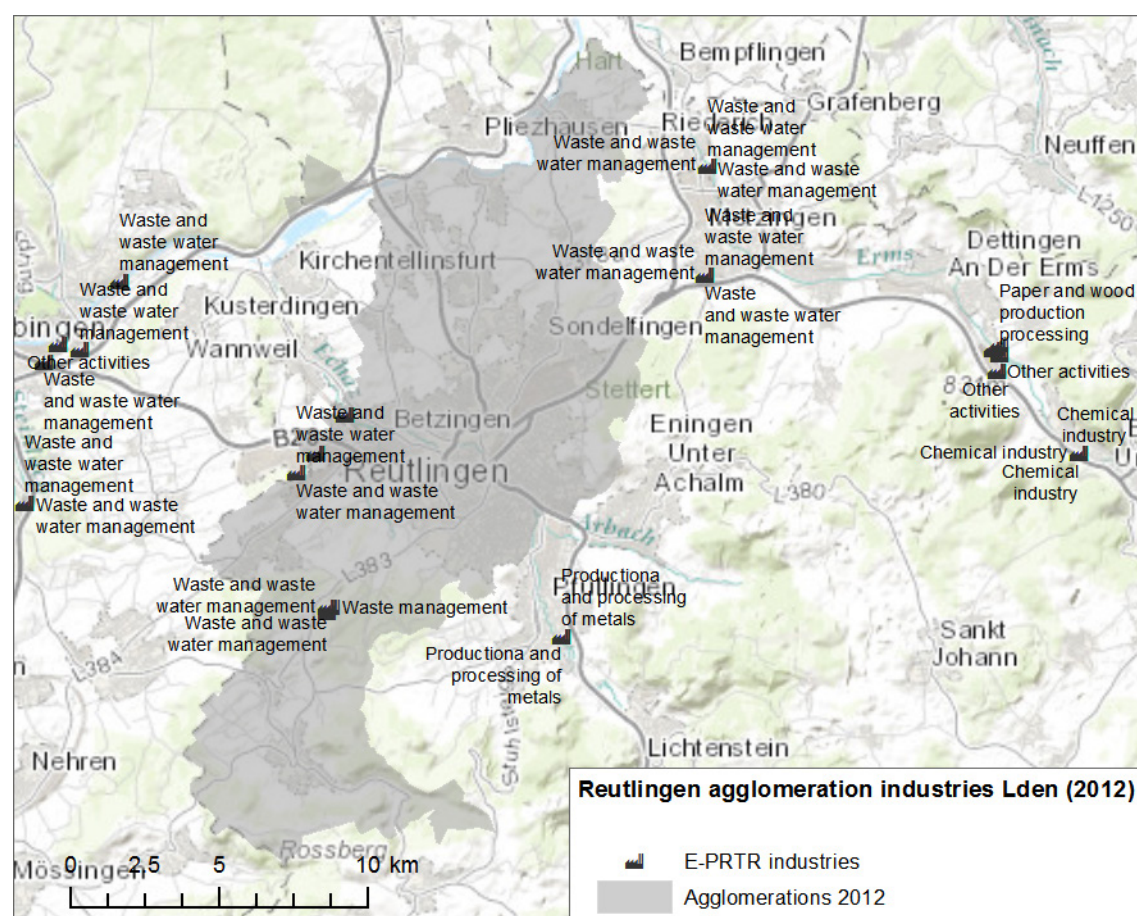
	1	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	0	Port	
TOTAL industries	9		

Result 5.5. Heidelberg



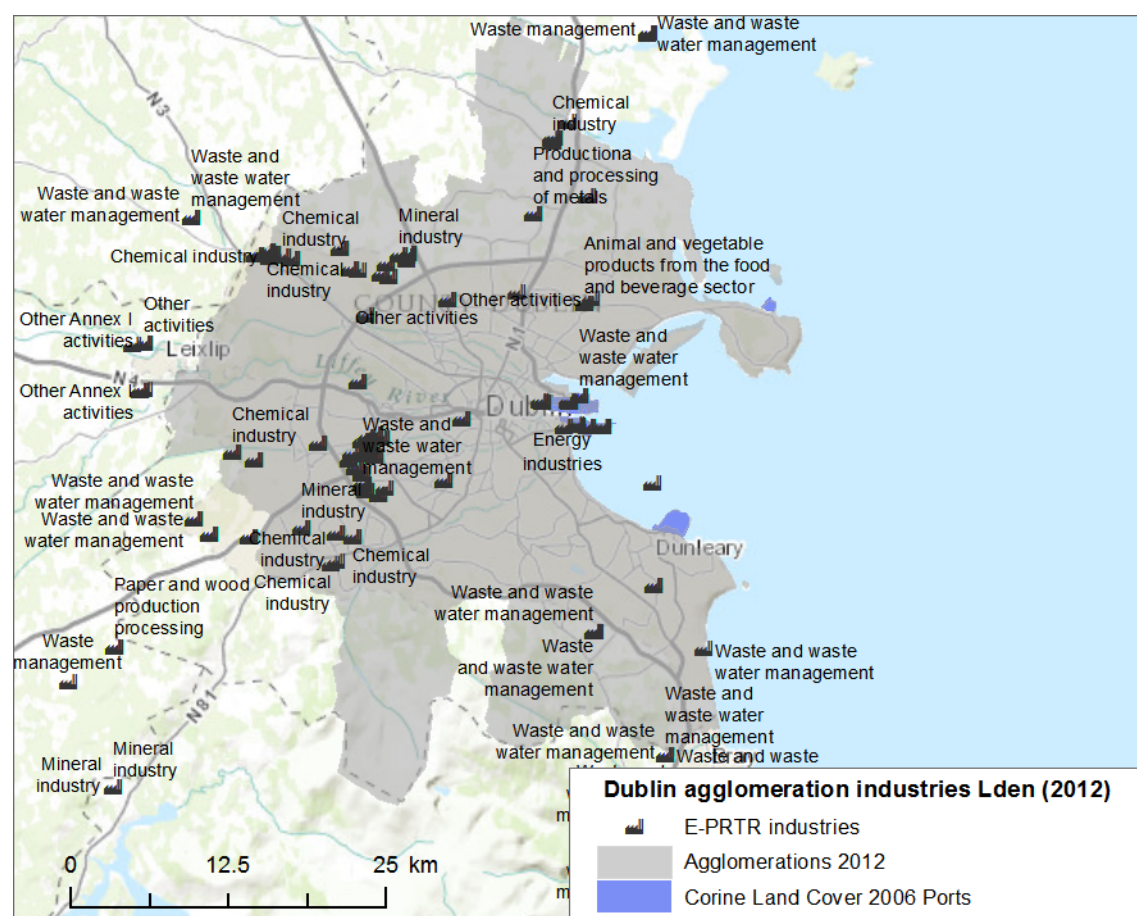
Agglomeration	E-PRTR activities	Industry typology	Description
Heidelberg (DE)	2	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals.
	6	Waste and waste water management	Urban waste-water treatment plants
	CLC Port areas		
	0	Port	
TOTAL industries	2		

Result 5.6. Reutlingen



Agglomeration	E-PRTR activities	Industry typology	Description
Reutlingen (DE)	6	Production and processing of metals	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
	5	Waste and waste water management	Landfills
	6	Waste and waste water management	Waste and waste water management
	2	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	0	Port	
TOTAL industries	5		

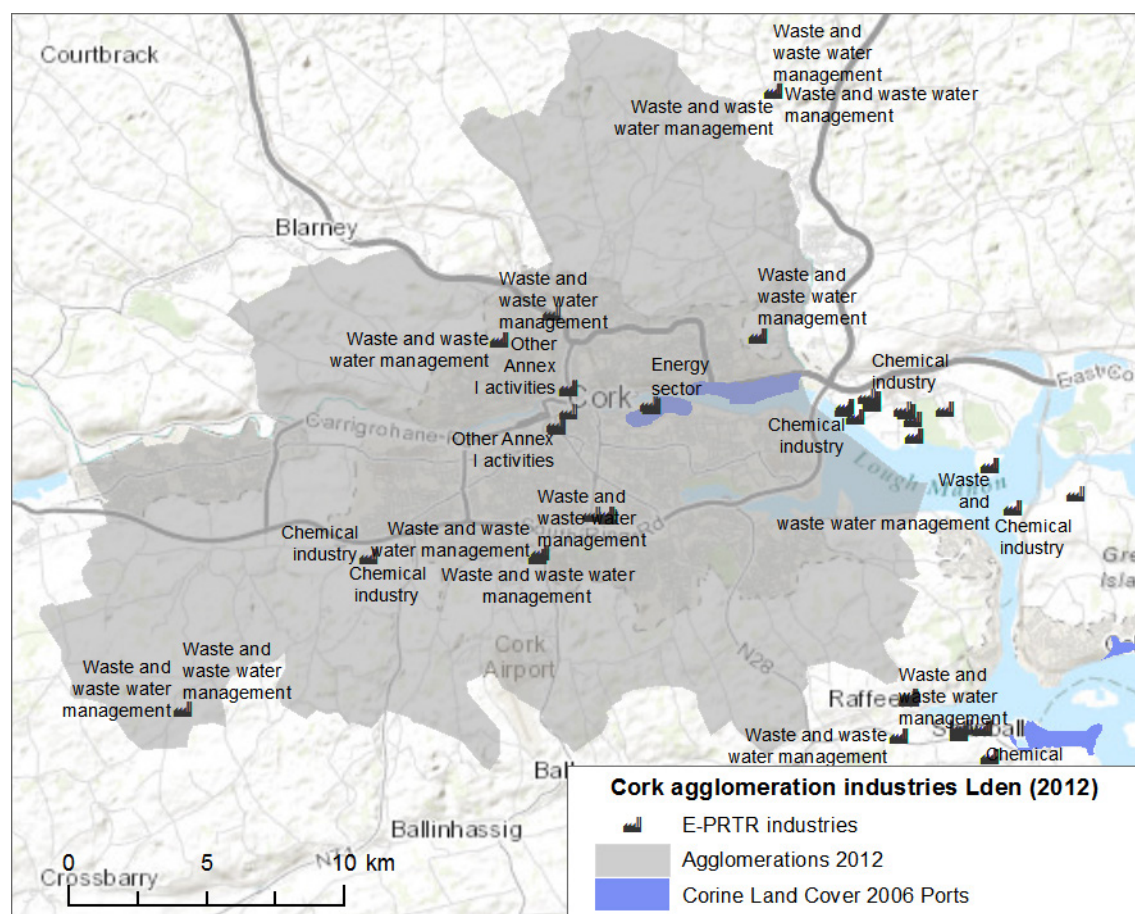
Result 5.7. Dublin



Agglomeration	E-PRTR activities	Industry typology	Description
Dublin (IE)	6	Animal and vegetable products from the food and beverage sector	Slaughterhouses
	15	Animal and vegetable products from the food and beverage sector	Treatment and processing intended for the production of food and beverage products from:
	5	Chemical industry	Basic organic chemicals
	38	Chemical industry	Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as
	6	Chemical industry	Chemical installations for the production on an industrial scale of basic plant health products and of biocides
	66	Chemical industry	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	4	Chemical industry	Pharmaceutical products
	8	Energy industries	Combustion installations > 50 MW
	30	Energy sector	Thermal power stations and other combustion installations

	2	Mineral industry	Installations for the manufacture of glass, including glass fibre
	11	Mineral industry	Opencast mining and quarrying
	6	Other activities	Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating
	1	Production and processing of metals	Metal industry
	8	Production and processing of metals	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
	64	Waste and waste water management	Installations for the disposal of non-hazardous waste
	26	Waste and waste water management	Installations for the recovery or disposal of hazardous waste
	12	Waste and waste water management	Landfills
	7	Waste and waste water management	Urban waste-water treatment plants
	4	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	4	Port	
TOTAL industries	80		

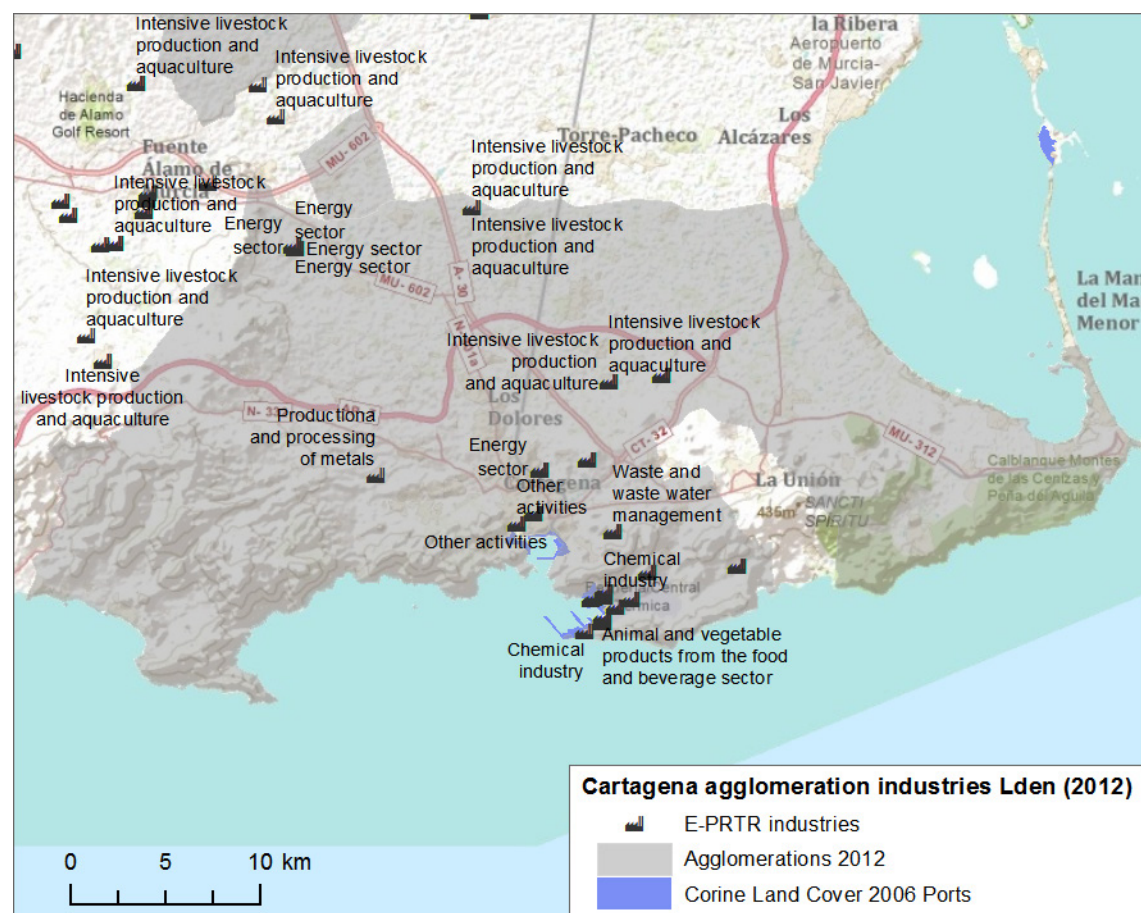
Result 5.8. Cork



Agglomeration	E-PRTR activities	Industry typology	Description
Cork (IE)	6	Animal and vegetable products from the food and beverage sector	Treatment and processing intended for the production of food and beverage products.
	3	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals, such as:
	2	Energy industries	Combustion installations > 50 MW
	6	Energy sector	Thermal power stations and other combustion installations
	4	Other Annex I activities	Slaughterhouses, milk, animal and vegetable raw materials
	17	Waste and waste water management	Installations for the disposal of non-hazardous waste
	6	Waste and waste water management	Installations for the recovery or disposal of hazardous waste
	6	Waste and waste water management	Landfills
	2	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	2	Port	

TOTAL industries	16		
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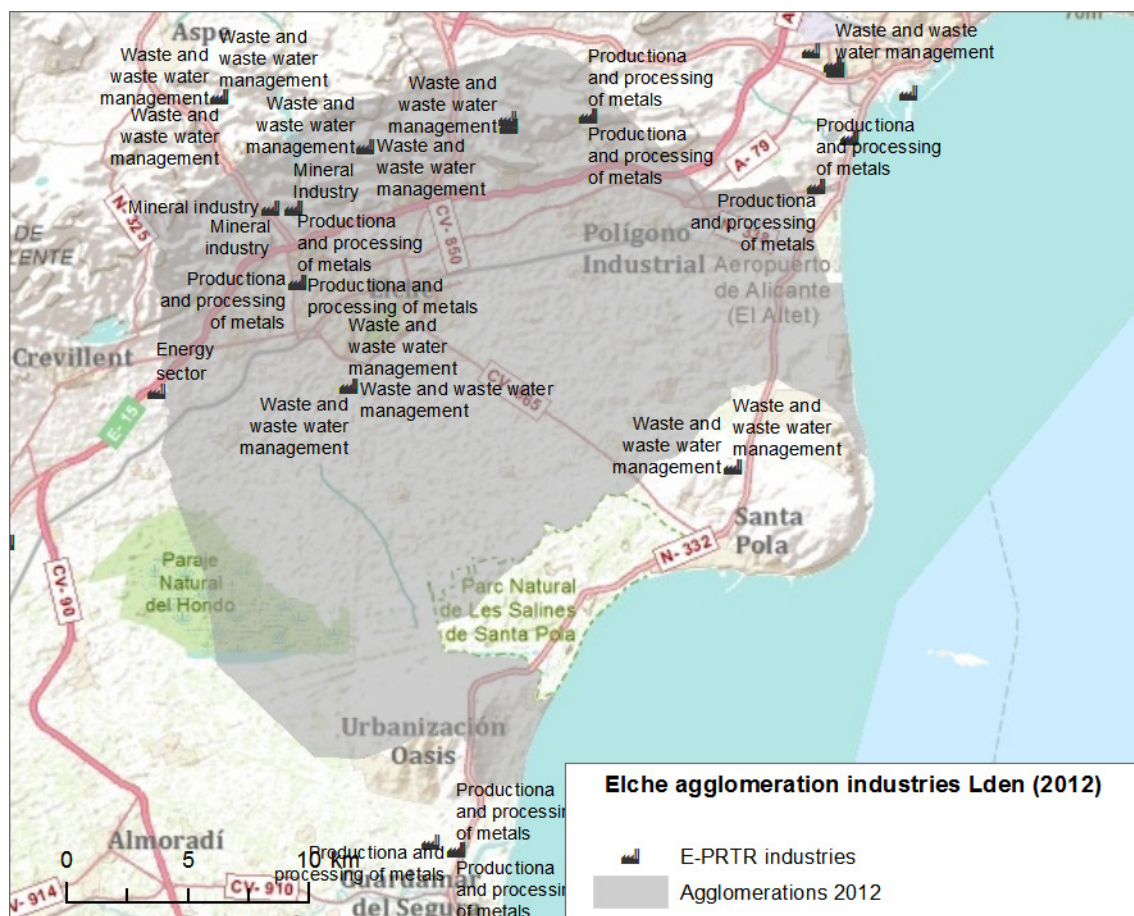
Result 5.9. Cartagena



Agglomeration	E-PRTR activities	Industry typology	Description
Cartagena (ES)	30	Energy sector	Thermal power stations and other combustion installations
	19	Waste and waste water management	Installations for the recovery or disposal of hazardous waste
	12	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals, such as:
	12	Waste and waste water management	Landfills
	11	Chemical industry	Chemical installations for the production on an industrial scale of basic inorganic chemicals, such as:
	6	Energy sector	Mineral oil and gas refineries
	5	Animal and vegetable products from the food and beverage sector	Treatment and processing intended for the production of food and beverage products from:
	5	Other activities	Installations for the building of, and painting or removal of paint from ships
	3	Chemical industry	Chemical industry

	3	Energy industries	Combustion installations > 50 MW
	2	Energy industries	Mineral oil and gas refineries
	1	Chemical industry	Basic inorganic chemicals or fertilisers
	1	Production and processing of metals	Installations
	1	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	4	Port	
TOTAL industries	29		

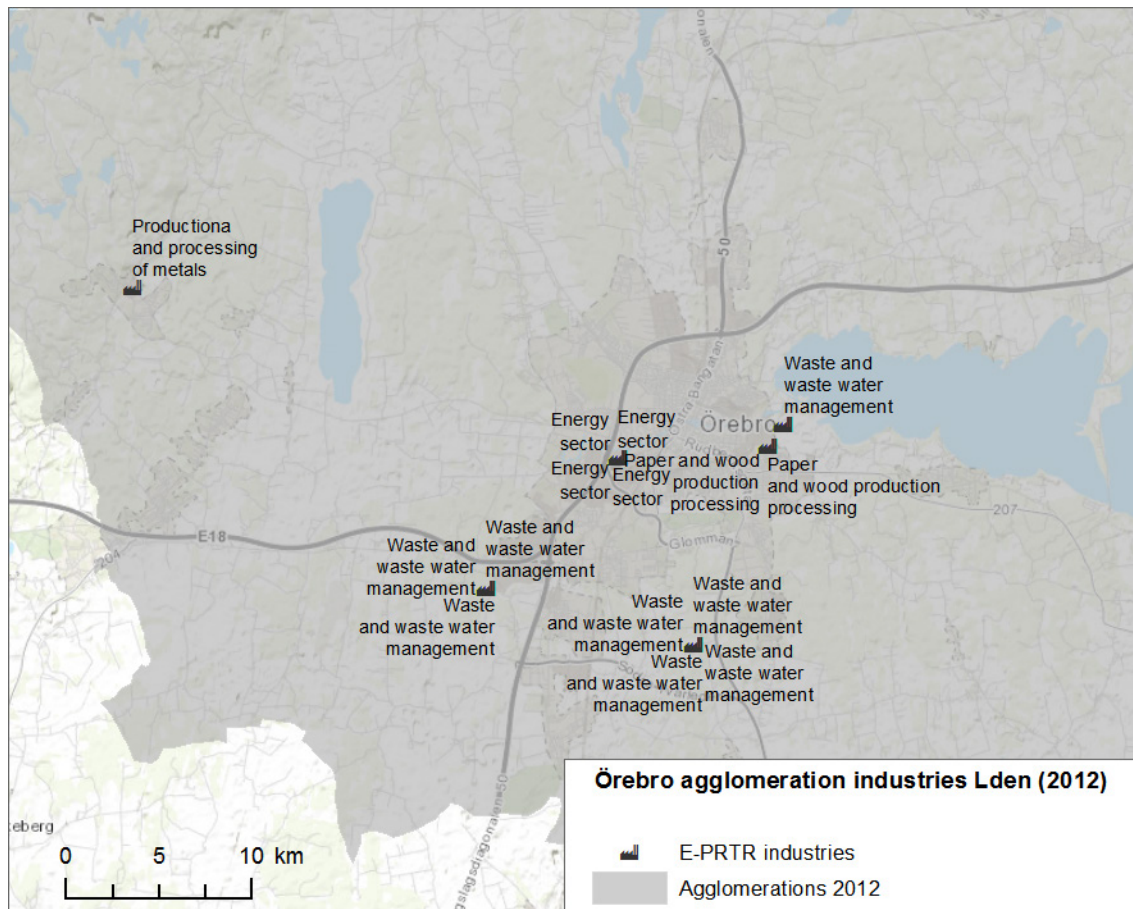
Result 5.10. Elche



Agglomeration	E-PRTR activities	Industry typology	Description
Elche (ES)	11	Production and processing of metals	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
	8	Waste and waste water management	Landfills
	5	Waste and waste water management	Urban waste-water treatment plants
	4	Mineral industry	Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or

			porcelain
	1	Mineral Industry	Cement, lime, glass, mineral substances or ceramic products
	1	Waste management	Disposal of non-hazardous waste and landfills
	CLC Port areas		
	0	Port	
TOTAL industries	8		

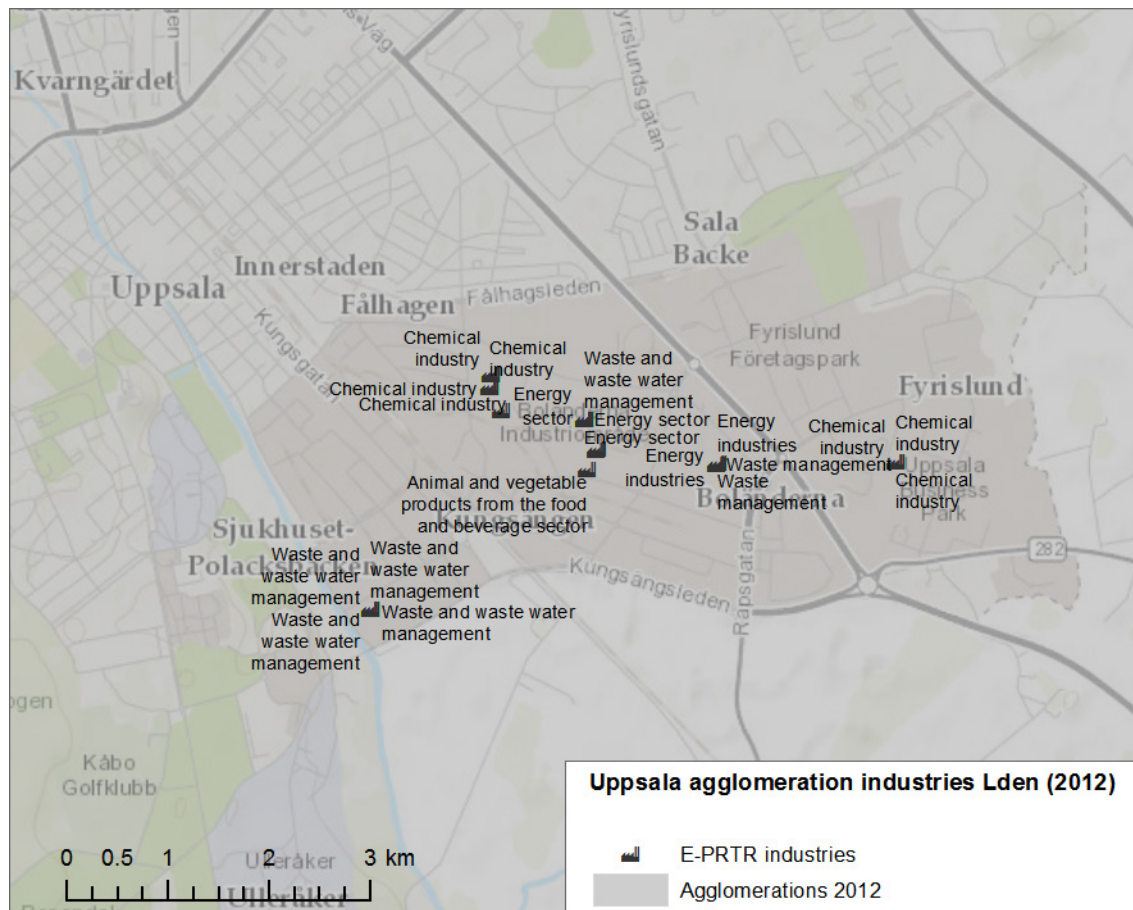
Result 5.11. Örebro



Agglomeration	E-PRTR activities	Industry typology	Description
Örebro (SE)	12	Waste and waste water management	Landfills
	6	Energy sector	Thermal power stations and other combustion installations
	6	Waste and waste water management	Urban waste-water treatment plants
	3	Paper and wood production processing	Industrial plants for the production of pulp from timber or similar fibrous materials
	1	Energy industries	Combustion installations > 50 MW
	1	Other Annex I activities	Pulp, paper or board production
	1	Paper and wood	Industrial plants for the production of paper

		production processing	and board and other primary wood products
	1	Production and processing of metals	Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process
	CLC Port areas		
	0	Port	
TOTAL industries	8		

Result 5.12. Uppsala



Agglomeration	E-PRTR activities	Industry typology	Description
Uppsala (SE)	9	Chemical industry	Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products
	6	Chemical industry	Chemical installations for the production on an industrial scale of basic organic chemicals, such as:
	6	Energy sector	Thermal power stations and other combustion installations
	6	Waste and waste water management	Urban waste-water treatment plants
	5	Waste and waste water management	Installations for the incineration of non-hazardous waste in the scope of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the

			incineration of waste
	2	Energy industries	Combustion installations > 50 MW
	2	Other Annex I activities	Slaughterhouses, milk, animal and vegetable raw materials
	2	Waste management	Disposal/recovery of hazardous or municipal waste
	1	Animal and vegetable products from the food and beverage sector	Slaughterhouses
	1	Chemical industry	Basic organic chemicals
	1	Waste and waste water management	Landfills
	CLC Port areas		
	0	Port	
TOTAL industries	9		

Remarkably, the 4 urban areas declaring no affectation by industrial noise in 2007 provided exposure values in 2012 (except Madrid, that has not delivered any information yet concerning 2012 strategic noise maps). This situation may be explained by:

- increase of the area occupied by the urban area
- change of the urban agglomeration delineation: new limits
- new industrial developments occurred from 2007 to 2012
- new residential areas being built in the vicinity of the industries declared in 2007
- data in 2007 was not submitted following the END specifications
- input data for noise mapping (e.g. emissions) have been updated

Nevertheless, those possible explanations cannot be verified for the moment, considering how data is submitted and which type of information is requested.

As observed in the results above, waste and waste water management are E-PRTR facilities that are found in all the urban areas studied. Chemical industries and waste management industries are found in 9 out of 12 urban areas, followed by energy industries and the production and processing of metals. On the other side, the E-PRTR type of industries with less representation in urban areas declaring that exposure to industrial noise is not applicable in their urban area are 1) paper and wood production processing and 2) mineral industries.

Provided the results observed in those specific 12 urban areas, the following 2 analysis have been undertaken considering all the information being reported until June 2014:

- types of industries being currently mapped in the END noise contour maps
- which kind of industries are located inside urban areas delivering a number of people related to industrial noise exposure

This analysis has been done with data provided in 2007 and in 2012, but the number of countries providing noise contour maps inside urban areas in 2007 was only four, while in 2012, 7 countries (CZ, DE, DK, ES, LT, MT, UK) covering 66 agglomerations with a total of 553 contour maps have been provided. The analysis undertaken consists in checking which

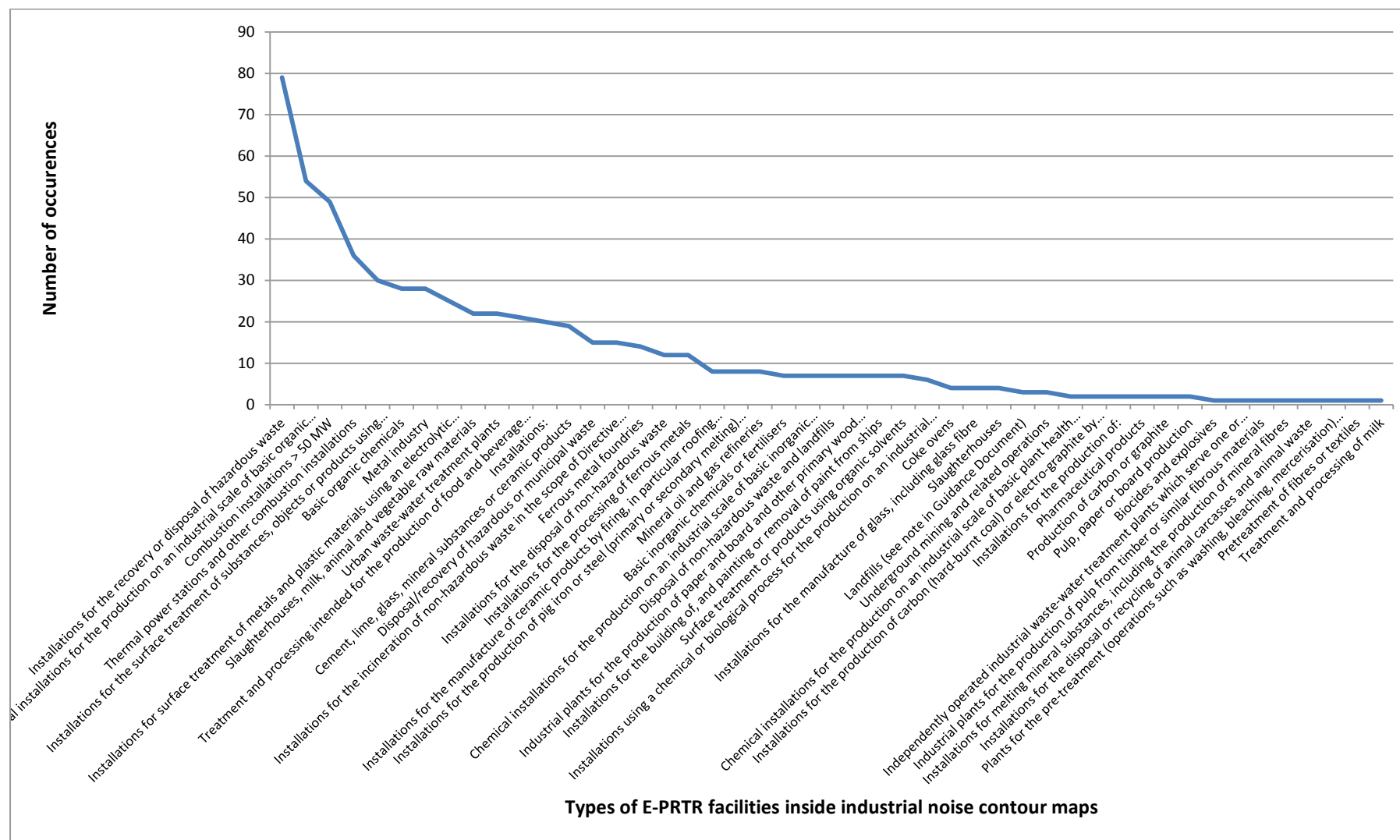
types of industries are located completely inside the noise contour maps above 55 dB L_{den} and which type of industries are located completely inside the limits of the urban areas. Data used for the analysis corresponds to 2012 delivery.

To be highlighted that 50% of the agglomerations reporting noise contour maps for industrial noise reported at the same time, 0 people exposed to industrial noise. This should be further studied or consulted with the corresponding Member State, in order to be able to provide an explanation of what is currently being mapped as strategic noise maps concerning industrial noise.

From the analysis of the types of industries located completely inside the noise contour maps above 55 dB L_{den} , 47 different types of industries from the E-PRTR database have been found as covered by the contour maps being delivered, out of the 61 different types that can be encountered in the E-PRTR database. In Figure 5.3 can be seen the distribution of the different types of E-PRTR industries encountered completely inside the industrial noise contour maps reported, going from nearly 80 occurrences in the case of “Installations for the recovery or disposal of hazardous waste” down to 1 occurrence in cases such as: biocides and explosives, independently operated industrial waste-water treatment plants, pre-treatment of fibres or textiles or treatment and processing of milk.

There is one type of installation found in all the industrial noise contour maps available, which is “Chemical installations for the production on an industrial scale of basic organic chemicals”. As soon as more noise contour maps related to industrial noise would be available, it can be analysed how many E-PRTR facilities are encountered in all industrial noise contour maps or if there exist any pattern between cities or Member States. Further details at country level can be found in Annex 1.

Figure 5.3. Distribution of the number of E-PRTR facilities completely inside the industrial noise contour maps analysed



Moreover, from the analysis of the types of industries located inside urban areas where noise contour maps have not been delivered but data on industrial noise exposure has been provided, 59 out of the 61 different types have been encountered, in a total of 275 agglomerations.

In the case of those agglomerations that still needs to report industrial noise exposure data for the 2012 delivery (190 urban areas in total), the resulting numbers are 2569 industries to be evaluated and determine the number of people exposed grouped into 57 different types of E-PRTR industries.

With the encountered results, it would be expected to receive noise contour maps and exposure information for all missing agglomerations, although it should be also highlighted that a direct connection between noise emitted and E-PRTR plants has not been yet demonstrated. It would be interesting to know why industrial noise have been included in the END and discuss if it should still be mapped or not, provided the fact that E-PRTR plants are included in the database due to their treatment of dangerous substances, so maybe the industrial noise source come from other industrial areas not considered in the E-PRTR.

5.1 Results and discussion concerning ports

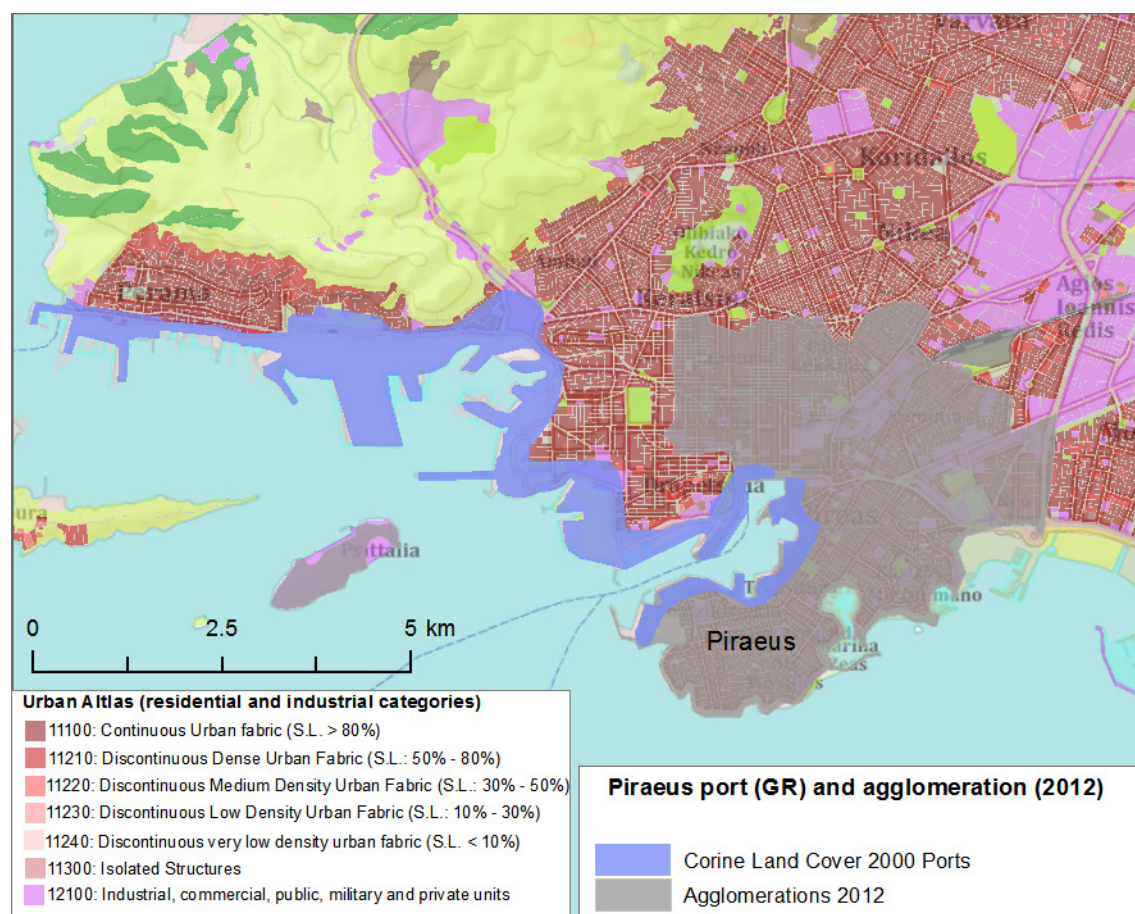
The hypothesis that wants to be answered by undertaking this analysis is the possibility that agglomerations leave outside their limits the ports areas, when delineating the urban area that will be mapped under the END requests.

As it is known, information on exposure to industrial noise should be provided at agglomeration level, including all the industrial areas as well as the ports areas, if any. So, the fact that Member States do not have to provide specifically exposure to ports' areas or to industries located into ports' areas separately from the industrial noise exposure information provided at agglomeration level, makes the analysis of the current situation a bit difficult.

All the agglomerations included in the END that contain a port area have been checked, and all of them have, inside the city limits, the complete port area or part of it. Therefore, it could be assumed that if those ports or the industrial facilities located in those ports produce some noise, they should be included in the strategic noise maps being delivered.

For example the port in Athens, the Piraeus port, where part of the port is included in the Piraeus agglomeration but there is another port area polygon in contact with residential areas (continuous urban fabric) that is not included in the urban area limits (see Map 5.1).

Map 5.1 Piraeus port and agglomeration.



Provided that all the END agglomerations containing a port have the port polygon completely or partially inside the city limits, it can be concluded that the situation concerning ports not differ from the situation concerning general industrial facilities inside the city borders. Looking at the maps, it can only be ensured that potentially there are ports and industrial facilities in those ports areas that could (or also could not) imply a number of people exposed to industrial noise.

The unique specific case that may have some relevance to be further studied are the urban areas declaring no industrial areas inside the city borders but having a port inside city limits. In this case, from the agglomerations dealt in section 5, it has been checked that Helsinki and Wiesbaden (2007) and Dublin, Cork and Cartagena (2012) have a port area inside the city borders and therefore, the provision of -1 value is not correct and calculation of the number of people exposed would be needed.

So, provided the limitations on the analysis due to how the information is being requested and delivered by the END, further assessment has been undertaken considering the ports presenting the highest activity in Europe, and potentially being noisier than the rest of ports.

Table 5.3 Top 20 ports - Volume (in TEUs) of containers handled in each port, by loading status.

Entity/Time	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU ports	68,921	73,834	83,255	82,325	69,841	77,705	83,232	85,278	86,893
Top 20 ports	53,032	57,003	64,491	64,495	54,312	63,097	67,264	69,509	70,430
Rotterdam	9,195	9,575	10,773	10,631	9,579	11,017	11,340	11,372	10,938
Hamburg	8,084	8,878	9,914	9,767	7,031	7,906	9,035	8,891	9,302
Antwerpen	6,221	6,718	7,879	8,379	7,014	8,144	8,317	8,174	8,256
Bremerhaven	3,696	4,479	4,884	5,451	4,552	4,858	5,911	6,111	5,822
Valencia	2,415	2,615	3,049	3,606	3,654	4,211	4,338	4,471	4,339
Algeciras	3,184	3,262	3,420	3,298	2,953	2,777	3,584	4,099	4,332
Gioia Tauro	3,123	2,835	3,464	3,165	2,725	3,897	3,307	3,725	3,652
Felixstowe	2,760	3,030	3,342	3,131	3,021	3,415	3,249	3,368	3,434
Ambarli	:	:	:	:	:	2,464	2,625	3,024	3,318
Peiraia	1,401	1,413	1,384	437	667	850	1,681	2,815	3,199
Le Havre	2,144	2,119	2,685	2,512	2,257	2,369	2,222	1,997	2,186
Barcelona	2,071	2,315	2,606	2,565	1,846	1,928	2,006	1,745	1,697
Genova	1,038	1,146	1,230	1,462	1,311	1,020	1,277	1,578	1,546
Southampton	1,384	1,502	1,905	1,617	1,385	1,567	1,591	1,489	1,489
Mersin	:	:	:	:	:	1,016	1,127	1,251	1,367
La Spezia	916	1,086	1,130	1,186	840	1,181	1,205	1,181	1,207
Marseille	911	950	1,058	901	943	1,031	1,095	1,147	1,197
Gdansk	63	76	95	183	233	510	685	933	1,189
Las Palmas	1,222	1,303	1,319	1,312	1,006	1,118	1,284	1,208	1,016
London	765	743	858	983	646	733	737	687	944

Last update, 03.07.15, Extracted on 07.07.15, Source of data Eurostat (Eurostat,2015)

LOADSTAT: Total loaded and empty

UNIT: Thousand TEU (Twenty-foot equivalent unit)

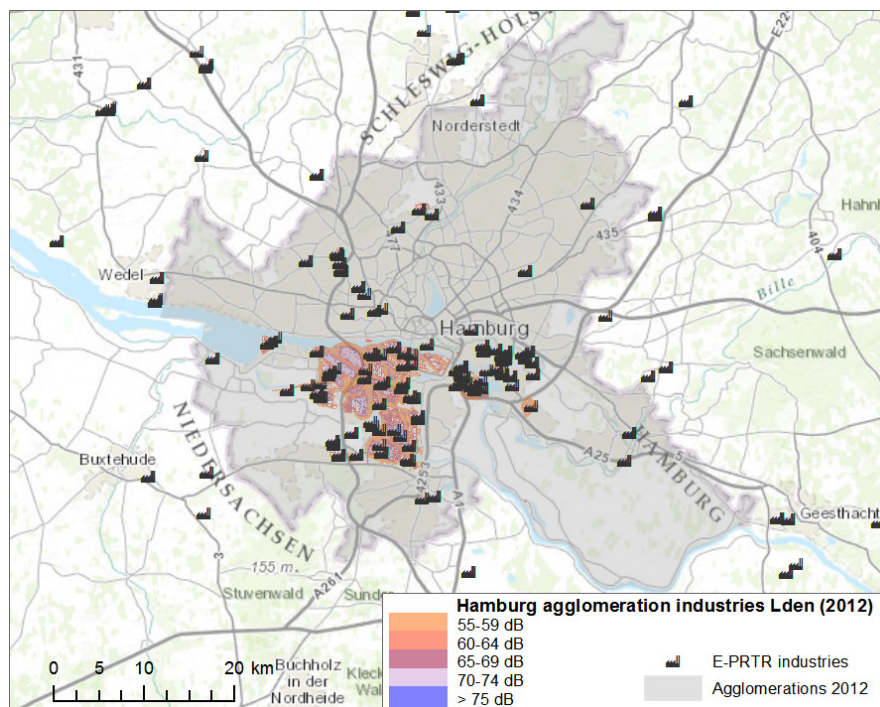
From the list above (see Table 5.3), 15 ports are located inside END agglomerations while there are 5 ports located outside END agglomerations: Felixstowe near Ipswich, La Spezia located south of Genoa, Gioia Tauro in Reggio Calabria (IT) and Ambarli (near Istanbul) and Mersin in Turkey.

Have those 15 agglomerations provided data concerning industrial noise exposure? Checking 2012 data reported until June 2014, only 7 agglomerations have reported industrial noise exposure data: Rotterdam, London, Hamburg, Gdansk, Bremerhaven, Southampton and Valencia. And the first three (Rotterdam, London and Hamburg) are among the top 20 agglomerations reporting the highest values of exposure to industrial noise. Nevertheless, data should still be provided for 40% of the agglomerations, where the missing 8 main ports out of the 15 encountered as part of an agglomeration are in.

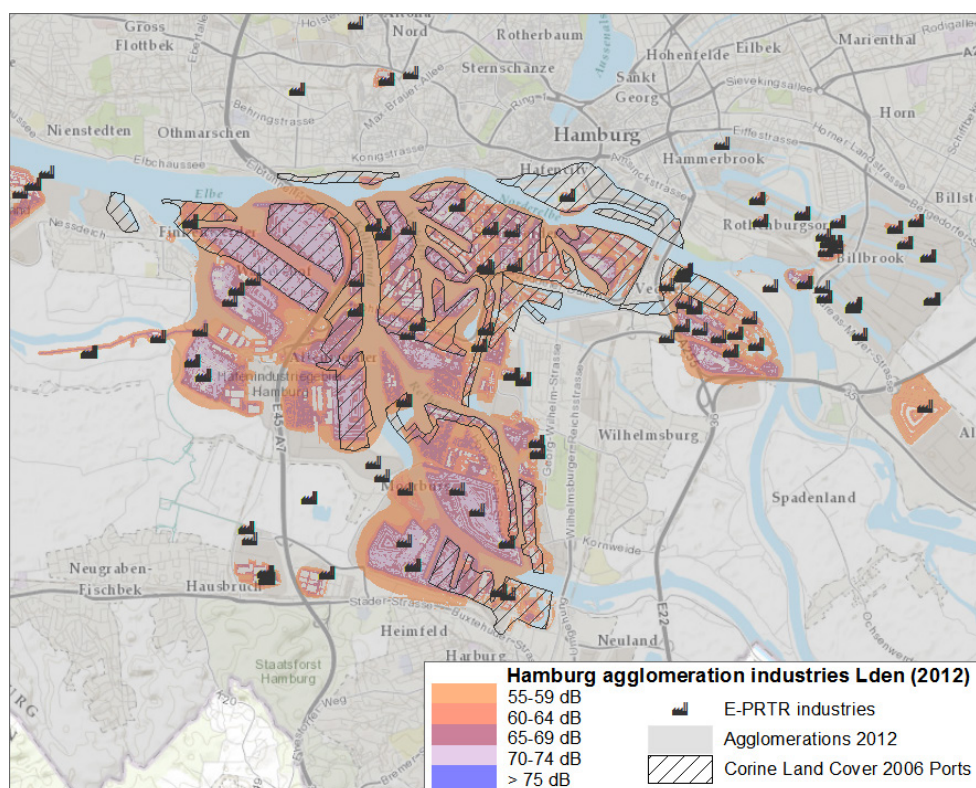
To identify which ports have been mapped and which not is only possible using the noise contour maps related to industries being provided by agglomerations on voluntary basis.

Noise contour maps for industrial noise in the Hamburg agglomeration show that quite a lot of industries are being mapped (Map 5.2). By zooming into the port area (Map 5.3) it can be clearly seen that some industrial facilities are located inside the CLC port polygons and contour maps have been calculated and presumable, people living in those areas have been counted as exposed to industrial noise, if applicable. To be noted that in the last decade there have been a project in Hamburg focused in developing the former port area into a new part of the city: HafenCity. Hamburg has been the Germany's main dynamic port city and this project ("Urban Industry") is considered the Europe's largest regeneration site that will be completed in the coming years. The redevelopment is very innovative, with great examples of user-led urban development, and lots of attention for quality of public space and public life (HPA, 2013).

Map 5.2 Hamburg agglomeration.



Map 5.3 Hamburg agglomeration detail.

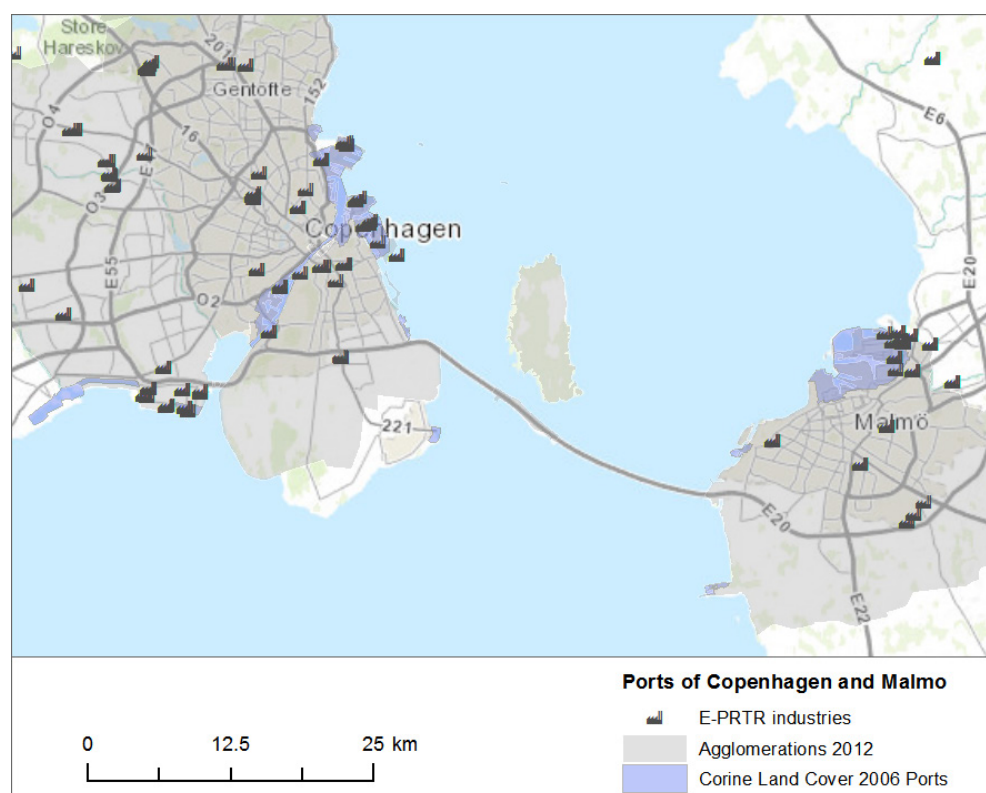


The port of Hamburg has also participated in the NoMEPorts³ project, together with a number of European ports and universities. The objective of the project was to develop a common good practice guide, from which ports and local authorities through noise mapping and noise management can become inspired to reduce noise, noise-related annoyance and health problems of people living around port industrial areas.

The port of Copenhagen Malmö also participated in this project, and it grasped our attention due to the fact that although presenting a big port area, the number of people reported as exposed to industrial noise is very low (100 people exposed to 55-59 dB L_{den} , and 100 people exposed to 50-54 dB L_{night}).

The noise mapping of the port area in Copenhagen demonstrates that there is no noise problem from the port activities, as the noise level does not exceed noise limit values at residential areas. In this case, noise management of seaport areas is part of the integrated noise management efforts in urban and industrial areas and it contributes to the reduction of noise annoyance and exposure of the population to noise levels and related impacts to human health and quality of life (see Map 5.4 and Map 5.5).

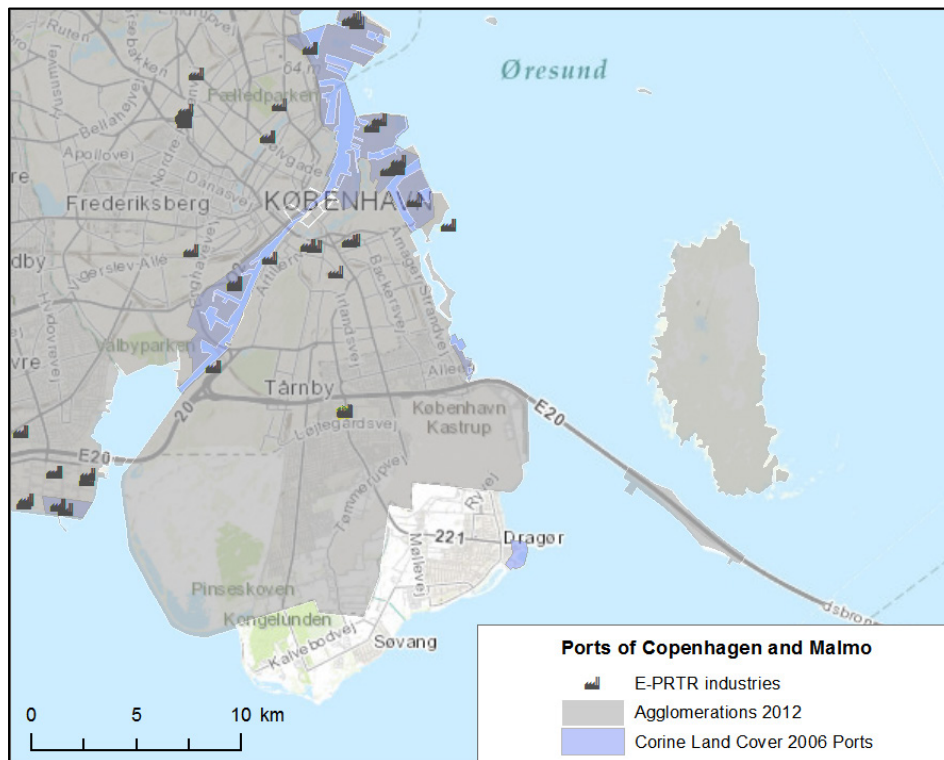
Map 5.4 Ports of Copenhagen and Malmö.



³ Noise Management in European Ports (NoMEPorts) funded by the European Commission LIFE-Environment Programme.

<http://www.cmpport.com/~media/docs/corporate%205/csr/environment/nomeports/good%20practice%20guide%20nomeports.ashx>

Map 5.5 Port of Copenhagen (detail)



So, as a conclusion, most coastal agglomerations have an industrial port and recent trends show that people do live in them or close to them in urban regeneration projects. Nevertheless, the level of noise in the different port areas and the number of people exposed to those areas is not being provided in a way that further conclusions concerning inclusion of data could be done, or questions concerning how people exposed is calculated could be answered.

6 Conclusions

From the analysis above, statements such as 1) the agglomerations are not reporting all the expected data concerning industrial noise exposure or 2) agglomerations containing ports are not taking ports areas into account when calculating strategic noise maps cannot be said.

Possibly, rules and regulations applied specifically for industrial areas and for ports areas have an influence on the sources to be considered for calculating the noise maps. If noise limits are not exceeded or there is not a specific regulated list of industrial facilities that should be mapped, a country or an agglomeration could be in the position that no noise map should be calculated for industrial noise.

Therefore, with the method and data being used for the analysis, there are not strong arguments confirming that there is a lack of information at European level for industrial noise exposure inside agglomerations or that the data on noise exposure being reported is not correct or is very low.

The isolation that industrial facilities has and its location in specific areas of the cities, most commonly far away from residential areas, could be factors influencing the results obtained at agglomeration and at country level, differing from the results obtained for other noise sources in agglomerations much spread in the territory (e.g. road network in a city)

Finally, it should be taken into account that European industry has changed in the past decades due to several reasons. There is a general tendency of industrial areas being moved away from city centres due to stricter environmental regulations. Nevertheless, industry tertiarisation, deindustrialization and industrial relocation have been quite similar in most of urban areas in Europe, so it does not explain completely the current differences in exposure data reported due to industrial noise.

Barcelona is an example of this specific characteristic of urban economic specialisation that is called tertiarisation. “As many other European cities, Barcelona has a weak industrial sector in the inner city, where services are the main economic activity, but a stronger one in the outer region.” (Pareja Eastaway et al, 2007). Although the Barcelona Metropolitan Region is still one of the main industrial agglomerations in the EU, the tertiarization process underway since the beginning of the nineties has gone hand in hand with a significant increase in knowledge intensive activities and with a relocation of manufacturing activities from Barcelona to the rest of the region.

7 Recommendations for future analysis

It will be interesting to check the following items as continuation of the current exercise:

- Appropriateness of including under the END, the E-PRTR plants as industrial noise sources
 - o Problem of the definition of the industrial plants and activities that should be considered in the END
 - o Check why industrial noise has been included in the END and discuss if this noise source should still be mapped or not in this context.
- Consultation with Member States reporting information on industrial noise exposure concerning:
 - o Number of industrial noise maps and action plans being studied inside city limits that respond to:
 - Industrial areas located inside agglomerations but not responsible for any noise emissions
 - Industrial areas located inside agglomerations but with noise contours below 55 dB L_{den}
 - o Further details concerning the agglomerations reporting 0 people exposed to industrial noise (per L_{den} and L_{night}), to try to better understand the current data being reported for this noise source

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Annex 1. E-PRTR facilities in agglomerations' noise contour maps (2012)

E-PRTR facilities included in the agglomerations' noise contour maps delivered (2012)							
Type of E-PRTR industrial activity	CZ	DE	DK	ES	LT	MT	UK
Basic inorganic chemicals or fertilisers		3		4			
Basic organic chemicals	2	25		1			
Biocides and explosives		1					
Cement, lime, glass, mineral substances or ceramic products	3	6	1	7	2		
Chemical installations for the production on an industrial scale of basic inorganic chemicals	1	6					
Chemical installations for the production on an industrial scale of basic organic chemicals	5	42	1	1	2	2	1
Chemical installations for the production on an industrial scale of basic plant health products and of biocides	1	1					
Coke ovens	2	2					
Combustion installations > 50 MW	9	34			4	1	1
Disposal of non-hazardous waste and landfills		7					
Disposal/recovery of hazardous or municipal waste		14					1
Ferrous metal foundries	6	8					
Independently operated industrial waste-water treatment plants which serve one or more activities of this annex	1						
Industrial plants for the production of paper and board and other primary wood products		4			3		
Industrial plants for the production of pulp from timber or similar fibrous materials			1				
Installations for melting mineral substances, including the production of mineral fibres					1		
Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process	10	12		2			1
Installations for the building of, and painting or removal of paint from ships		7					
Installations for the disposal of non-hazardous waste		11					1
Installations for the disposal or recycling of animal carcasses and animal waste							1
Installations for the incineration of non-hazardous waste in the scope of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste	1	14					
Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	1	3		3	1		
Installations for the manufacture of glass, including glass fibre		3			1		
Installations for the processing of ferrous metals	3	9					

E-PRTR facilities included in the agglomerations' noise contour maps delivered (2012)							
Type of E-PRTR industrial activity	CZ	DE	DK	ES	LT	MT	UK
Installations for the production of carbon (hard-burnt coal) or electro-graphite by means of incineration or graphitisation		2					
Installations for the production of pig iron or steel (primary or secondary melting) including continuous casting	1	6			1		
Installations for production		2					
Installations for the recovery or disposal of hazardous waste	11	57			6		5
Installations for the surface treatment of substances, objects or products using organic solvents, in particular for dressing, printing, coating, degreasing, waterproofing, sizing, painting, cleaning or impregnating	3	20			6		1
Installations using a chemical or biological process for the production on an industrial scale of basic pharmaceutical products	1	5					
Installations	3	13		2			2
Landfills (see note in Guidance Document)	1	2					
Metal industry	3	21		1	1		2
Mineral oil and gas refineries		7		1			
Pharmaceutical products		2					
Plants for the pre-treatment (operations such as washing, bleaching, mercerisation) or dyeing of fibres or textiles		1					
Pretreatment of fibres or textiles		1					
Production of carbon or graphite		2					
Pulp, paper or board production		2					
Slaughterhouses		3		1			
Slaughterhouses, milk, animal and vegetable raw materials	2	19		1			
Surface treatment or products using organic solvents		7					
Thermal power stations and other combustion installations	2	29			4		1
Treatment and processing intended for the production of food and beverage products		15		1	1		4
Treatment and processing of milk	1						
Underground mining and related operations	1	1					1
Urban waste-water treatment plants	1	11		1	3		6