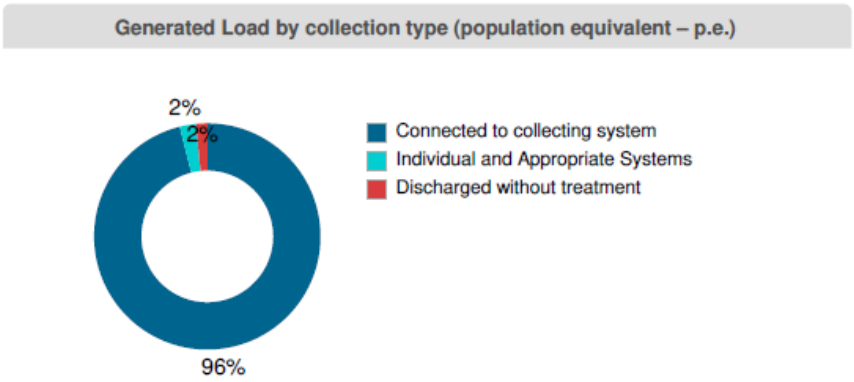
The Urban Waste Water Treatment Directive Dissemination Platform

1.1. The Urban Waste Water Treatment Directive Dissemination Platform

The Urban Waste Water Treatment Directive Dissemination Platform is a map of of EU-27 Urban WW streams. After a rapid web-based survey, one can verify the steps towards the registration of WW in EU-27. Although EU-27 is still in a transitional phase regarding this matter, it was possible to collect valuable information on the mapping of EU-27 Urban WW streams. On the Beta edition of the dissemination platform of the 'Urban WW Treatment Directive, UWWTD)' (Urban Waste Water Treatment Directive: dissemination platform, 2022) one can have access to graphs for European statistics generated from the 10th reporting of the countries (2016). The graphs depicted in Figure 1, Figure 2 and Figure 3 are interactive and can be accessed in full definition here.

According to Figure 1, only 1.6 % of the generated load (9,661,451 pe) was discharged without treatment in 2016. 96.1 % is connected to a collecting system and the rest 2.3 % is collected in individual and appropriate systems.



Collection type	2016
Connected to collecting system	583,935,547 pe (96.1%)
Individual and Appropriate Systems	14,015,026 pe (2.3%)

Figure 1: Graph of EU-MS generated load of urban WW by collection type in 2016.

In Figure 2 an attempt to specify the destination of urban WW in each of the 28 EU-MS was made. Differentiation of the load not connected to a collecting system but reported to the Internal Audit Service (IAS) was made to showcase that in 2016, Romania (7,434 kpe) < Italy (565 kpe) < Hungary (552 kpe) < Bulgaria (412 kpe) < Spain (305 kpe) < Cyprus (175 kpe) < Poland (108 kpe) were the EU –MS with the highest loads not destined neither at a collecting system nor at a system reported in the IAS.

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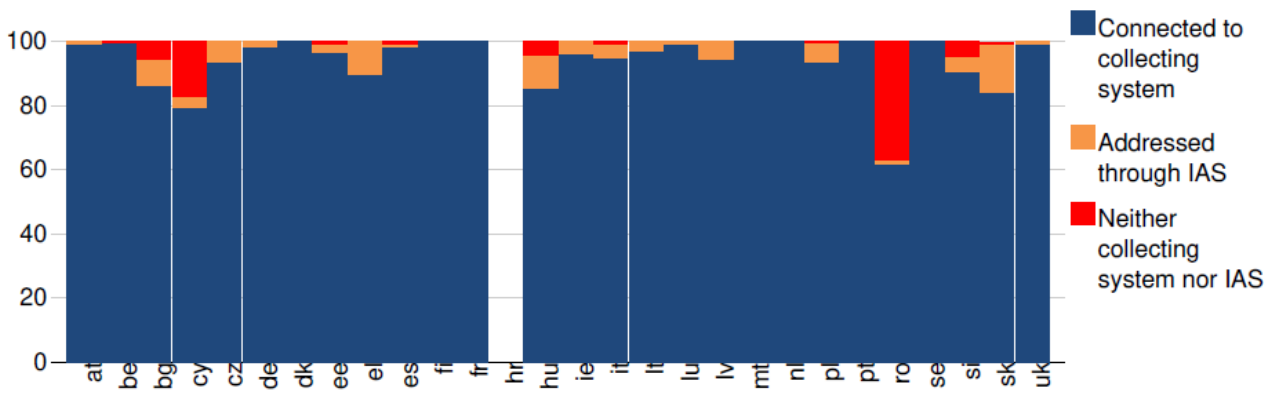

Figure 2: Graph of EU-MS evolution of the urban WW load destination in Kilo population equivalent (kpe)

In Figure 3, a 'MS level: Sewage Sludge production and destination' graph is included, describing the sewage sludge production in T DS/year and its destination. The creators decided to include the % sewage sludge.

- re-used in 'soil and agriculture'
- re-used in 'other practices'

'Other practices' of sewage sludge refers to recycling routes applied in Europe in the present. Such routes include the use of sludge in forestry and silviculture as well as in land reclamation.

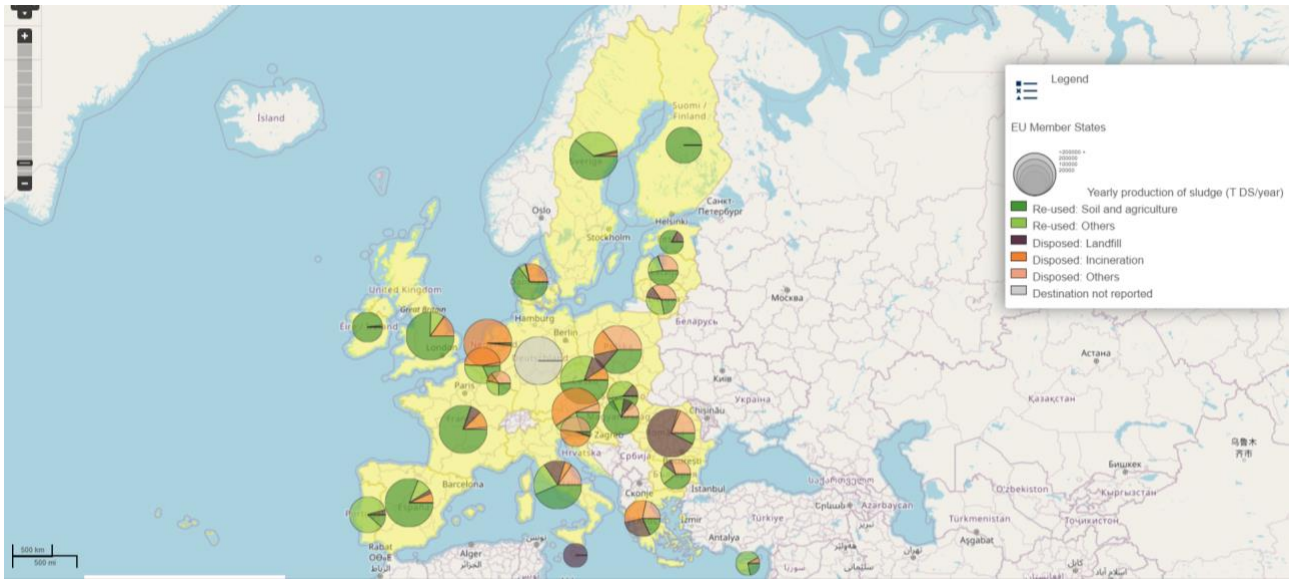

Figure 3: Map and accompanying graph of EU-MS sewage sludge production and destination

Storage of sewage sludge fulfils two main purposes: regulation of the flows to be re-used in 'soil and agriculture' and homogenisation of its composition. 'Long-term storage of sewage sludge has a disinfecting property, reducing the number of viruses and bacteria in sludge. Its efficiency depends on the duration of the storage. However parasites are the most resistant pathogens and it has been reported that long term storage would not affect their infectious potential. In cold climates, this process does not enable to reach a sufficient level of disinfection' (European Commission, 2022).

- disposed of in landfills

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Landfill operation generates emissions into the air (mainly greenhouse gases like methane and carbon dioxide, reduced when biogases are collected and burnt), and into the soil and water at dumpsites (various compounds such as ions, heavy metals, organic compounds and microorganisms in leachate). The operation of a landfill also generates other impacts in terms of noise and dust from the delivery vehicles, as well as odours, land use, disturbance of vegetation and the landscape (European Commission, 2022).

In waste water treatment (both urban and industrial), energy requirements are of great importance. In some cases, the utilisation of produced on-site biogases and steam as energy sources (i.e. in boilers to maintain a temperature around 35 ˚C or for the production of electricity on the plant) can reduce them to a great extent.

- disposed of for incineration
- disposed of in 'other practices'

WalNUT targets the inclusion in 'other practices' of valorisation of waste water – based products as fertilisers.

- with not sorted destination

'Not sorted destination' refers to the quantity of sewage sludge whose destination has not been reported in the Urban Waste Water Treatment Directive dissemination platform. According to Table 3-1, the origin of such sewage sludge is in Denmark, Poland, Italy and Portugal.

According to the information provided by EU-MS to the EU-COM (European Commission, 2022)

· In Luxembourg, sludge is digestible then conditioned with lime or iron salts. Mechanical processes are used for dewatering. Polyelectrolytes are added to sludge that has not been conditioned so as to facilitate dewatering.

· Within the Walloon region of Belgium, sludge is digestible, aerobically stable, automatically or thermally dried, or conditioned with lime or polyelectrolytes.

· In Denmark, sludge is digested in a heat digestion chamber or a bioreactor, stabilised by aeration, composted (in controlled conditions for two weeks at a temperature of 55 ˚C), conditioned with lime or pasteurised at a temperature of 70 ˚C for one hour.

· In France, sludge is subjected to prolonged aeration, aerobic or anaerobic stabilisation, lime conditioning, thermal drying or composting.

· In Portuguese Republic, the technologies used are drying beds (drainage on sand bed and evaporation of humidity), thickening, mechanical dewatering (band filters, filter presses, vacuum filters or centrifuge) and numerous stabilisation processes.

In the accompanying data listed in Table 1 one can see that utilisation of sewage sludge in agriculture is the first choice for the majority of EU-MS (Bulgaria, Czech Republic, Denmark, Spain, Finland, France, Hungary, Italy, Latvia, Poland, Sweden, Slovakia and the UK). The second most common option for sewage sludge treatment is incineration. Austria, Belgium, Cyprus, Greece, the Netherlands and Slovakia have adopted incineration as the first destination of sewage sludge. The third destination of sewage sludge is landfill disposal with Malta, Romania and Slovenia following this path as the first option for sewage sludge treatment. Other destinations are targeted for the re-use of the majority of produced sewage sludge in Portugal and the Republic of Ireland. On

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the other hand, Lithuania and Luxembourg follow other paths of sewage sludge disposal. As one can see in Table 1, although disposal is the first destination for the sewage sludge produced in Lithuania (15.47 t DS/year) and Luxembourg (3.15 t DS/year), the quantity is very low when compared to the quantity of sewage sludge disposal from Poland (214.78 t DS/year – 2nd sewage sludge destination), Italy (86,087 t DS/year - 3rd sewage sludge destination), Romania (44,5 t DS/year - 2nd sewage sludge destination), Greece (25.85 t DS/year - 3rd sewage sludge destination), Hungary (22,737 t DS/year – 2nd sewage sludge destination) and Bulgaria (20.34 t DS/year – 2nd sewage sludge destination).

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Table 1: Accompanying data of **Error! Reference source not found.** in T DS/year of produced sewage sludge in EU-MS

	at	be	bg	cy	cz	de	dk	ee	el	es
Re-used: Soil and agriculture	48,313	30,254	26,230	1,613	98,506	0	85	15,526	21,528	664,205
Re-used: Others	47,942	53,502	14,228	5,187	67,736	0	8	0	0	82,492
Disposed: Landfill	63	0	6,124	0	21,558	0	1	3,164	34,030	18,693
Disposed: Incineration	127,248	76,270	0	608	18,914	0	37	0	38,366	54,111
Disposed: Others	14,372	4,782	20,339	0	0	0	0	0	25,853	0
Destination not sorted	0	0	0	0	0	1,531,310	0	0	0	0

Destination	fr	hr	hu	lt	lu	lv	mt	nl	pl
Re-used: Soil and agriculture	754,967	0	108,008	9,702	2,229	11,961	0	0	218,599

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Re-used: Others	4,491	0	15,993	13,629	2,528	5,339	0	4,184	0
Disposed: Landfill	64,290	0	12,378	5,624	0	145	10,571	1,103	61,990
Disposed: Incineration	104,527	0	861	0	1,007	0	0	319,846	108,937
Disposed: Others	13,606	0	22,737	15,466	3,154	7,669	0	0	214,783
Destination not sorted	0	0	0	0	0	0	0	0	1
Destination	se	si	sk	uk	ie	it	pt	ro	fi
Re-used: Soil and agriculture	125,297	1,471	24,53	845,257	55	245,616	13,890	17,569	146,050
Re-used: Others	71,742	0	20,079	107,094	962	124,573	100,148	0	0
Disposed: Landfill	3,060	242	6,96	842	102	80,771	5,137	174,448	0

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Disposed: Incineration	4,154	14,479	68	169,085	0	27,720	0	3,900	0
Disposed: Others	0	14,961	0	0	0	86,087	0	44,500	0
Destination not sorted	0	0	0	2	0	1	1	0	0

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Municipal WW stream outputs are certainly not bio-fertilising products. They are however bio-based input streams and from their valorisation via Nutrient Recovery practices, economically prime important nutrient resource-based products can derive to be used as bio-based fertilisers.The latest update on the 'Urban WW Treatment map' (European Environment Agency, 2022a) was published on January 12, 2022, and presents the data collected from 2018 in EU-28 countries plus Iceland and Norway. The information on the implementation of the 'Urban WW Treatment Directive UWWTD)' was reported by the countries in 2020.

An initiative for the systematic registration of urban WW treatment plants in the EU targets the organisation and the easier access to the reported data to handle the information and export significant conclusions.

By clicking on the blue circle of each country in Figure 4, you can have access to the national UWWTD Structured Implementation and Information Framework (SIIF) node of each EU-MS. As an example, by clicking on Greece one is welcomed to the UWWTD website for Greece accompanied by the following description: 'In 2018, Greece had 464 urban WW agglomerations of more than 2 000 population equivalent (p.e). These agglomerations generated a total load of 11 870 177 p.e.. 91% of this load is connected to a collecting system and 9 % is addressed through Individual and Appropriate Systems (storage or septic tanks, micro-stations). These agglomerations are connected to 6 secondary treatment plants and 226 more stringent treatment plants. All these treatment plants have a total design capacity of 13 982 461 p.e..'

By clicking on each agglomeration point on the map Figure 5 you get access to pieces of information regarding the:

- Generated load in p.e.
- Compliance
- Connection compliance
- 2nd treatment compliance
- 3rd treatment compliance

It is important to map the degree of treatment compliance to be able to locate the potential candidates for Nutrient Recovery practices.

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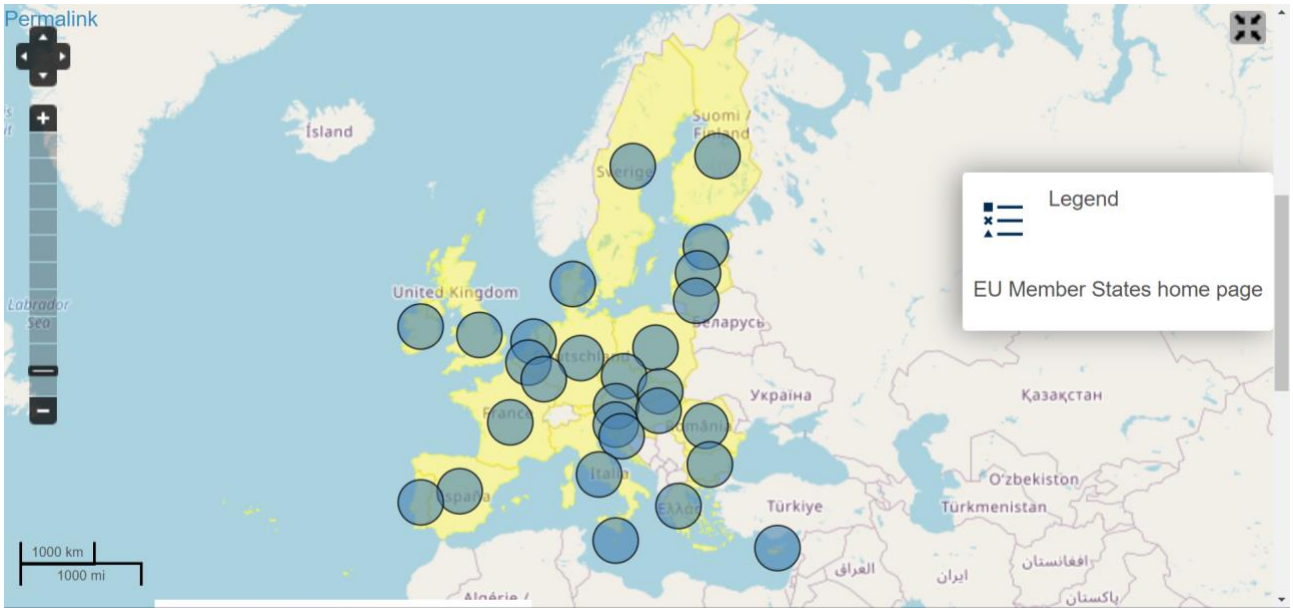

Figure 4: Map of EU-MS urban WW home pages (Urban Waste Water Treatment Directive: Dissemination, 2022)

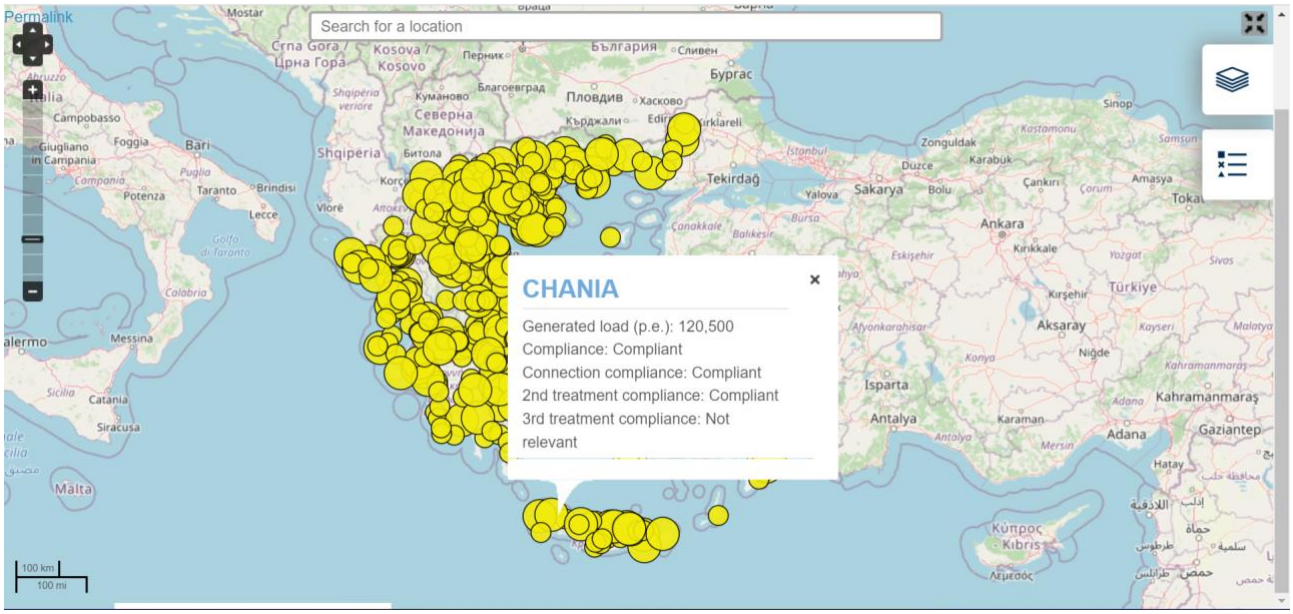

Figure 5: Map of urban WW agglomerations in Greece (Urban Waste Water Treatment Directive: Dissemination, 2022)

Regarding compliance, one can access the list of available maps in the UWWTD: dissemination platform to verify the compliance of each region with the directive. The degree of treatment compliance indicates the potential of an EU-MS as a candidate for Nutrient recovery practices. Moreover, the higher valorisation capacity is indicative of a higher potential of the country. The accompanying data of Figure 6 are presented in Table 2. The EU-MS with the least percentages of compliance (< 50%) are Italy (48 %) > Ireland (42 %) > Slovenia (33 %) > Bulgaria (22 %) > Romania (6 %).

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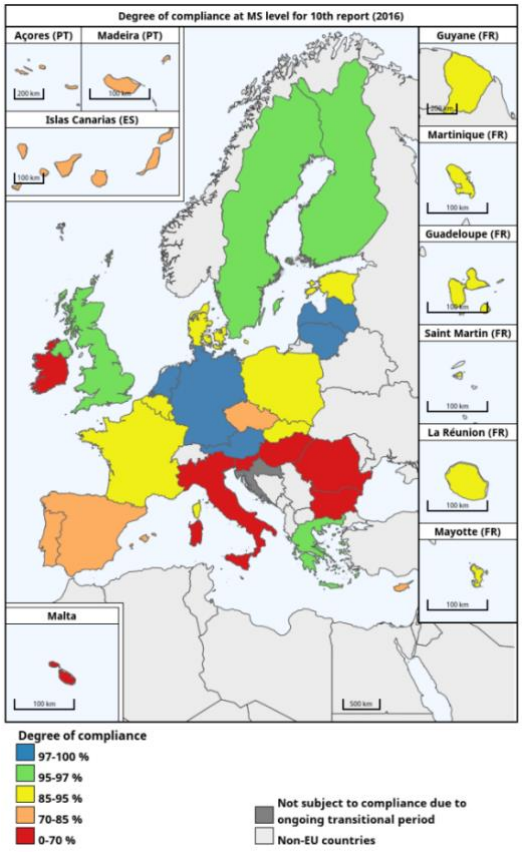

Figure 6: Degree of compliance at a MS level for the10th report (2016) (Degree of compliance at MS level for 10th report (2016), 2022)

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Table 2: Accompanying data of **Error! Reference source not found.** for the degree of compliance at a MS level for the 10th report (2016)

Country	Total generated load (kg)	Targeted load (kg)	Compliant load (kg)	Rate
AT	20,667,206	20,667,206	20,667,206	100%
BE	9,211,400	9,211,400	8,699,100	94%
BG	7,442,699	7,433,306	1,728,506	23%
CY	1,029,000	1,029,000	780,000	76%
CZ	9,355,394	9,355,394	6,706,464	72%
DE	111,906,058	111,906,058	111,807,101	100%
DK	11,598,945	11,598,945	10,350,645	89%
EE	1,589,716	1,589,716	1,429,566	90%
EL	11,803,450	11,794,658	11,314,410	96%
ES	64,819,277	64,819,277	50,651,183	78%
FI	5,057,300	5,057,300	4,861,950	96%
FR	71,732,929	71,732,929	61,112,455	85%
HR	4,999,712	0	0	Pending deadline
HU	13,588,976	13,588,976	9,063,583	67%
IE	5,080,615	5,080,615	2,136,939	42%
IT	76,682,102	76,682,102	36,724,723	48%
LT	2,905,700	2,905,700	2,905,700	100%
LU	637,438	637,438	602,380	95%
LV	1,588,668	1,588,668	1,564,977	99%
MT	789,039	789,039	0	0%
NL	19,440,165	19,440,165	19,440,165	100%
PL	38,542,418	38,542,418	33,084,486	86%
PT	12,237,640	12,237,640	9,839,040	80%

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RO	20,142,050	16,831,883	1,046,986	6%
SE	12,509,265	12,509,265	11,942,365	96%
SI	1,462,223	1,462,223	476,610	33%
SK	4,225,468	4,225,468	3,623,403	86%
UK	71,093,713	71,093,713	68,555,940	96%

12 MS in the EU-28 in 2016 achieved a higher than 90% degree of compliance according to the 10th report in 2016. The publicly accessible representative data have not been renewed so far.

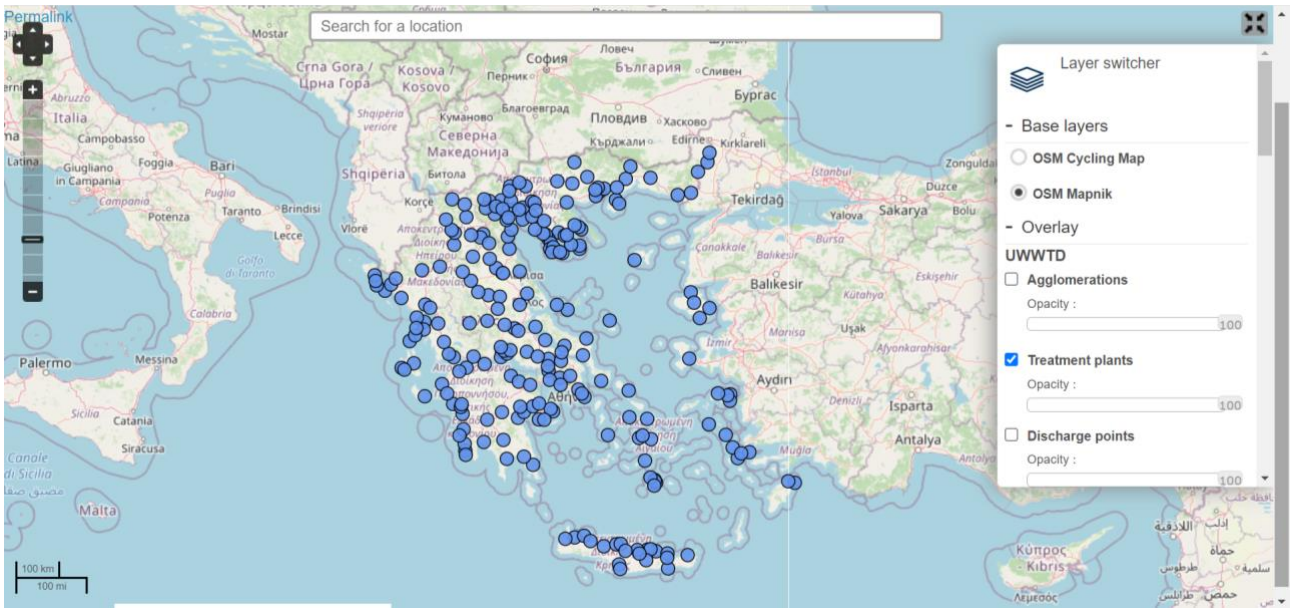

Figure 7: Map of urban WW treatment plants in Greece (Urban Waste Water Treatment Directive: Dissemination, 2022)

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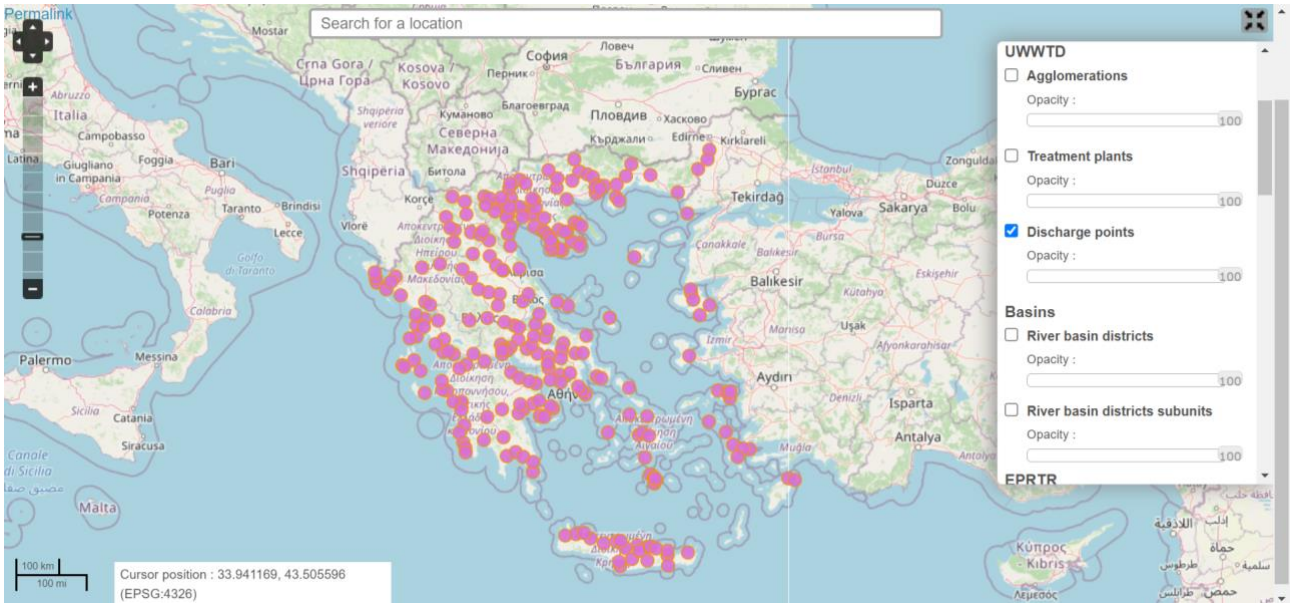

Figure 8: Map of discharge points in Greece (Urban Waste Water Treatment Directive: Dissemination, 2022)

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1.2. References

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