

**Decentralized innovative treatment of ammonium-rich urban wastewater**

# THE CASE OF THE COMO SILK AND TEXTILE DISTRICT

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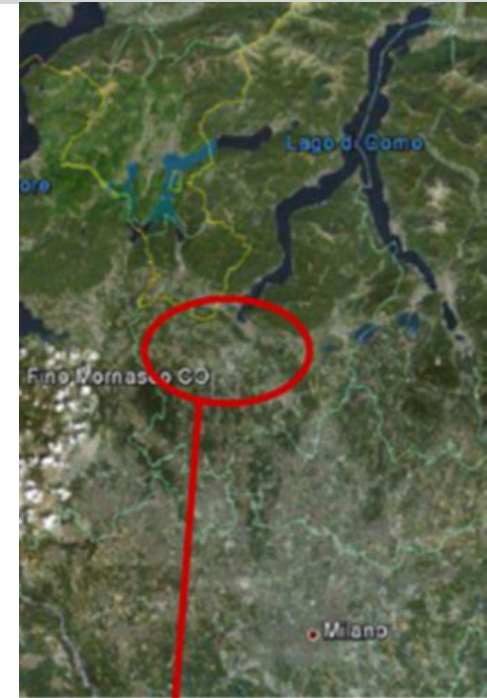
The project has received funding from European Union 's LIFE Programme under Grant Agreement LIFE16 ENV/IT/000345

# The Como Textile District

In the Como area there is an important textile district with several small or medium textile firms.

The fibres processed are mainly synthetic, silk and cotton. Typical of Como area are textile finishing processes.

This area is served by centralised wastewater treatment plants treating domestic and industrial wastewater. Most of the pollution load is industrial.



# WATER: a competitiveness and sustainability factor

For the **textile finishing sector**, the **water** resource is a **competitive factor** and a **strategic resource** and is therefore the object of particular attention.





# Short story

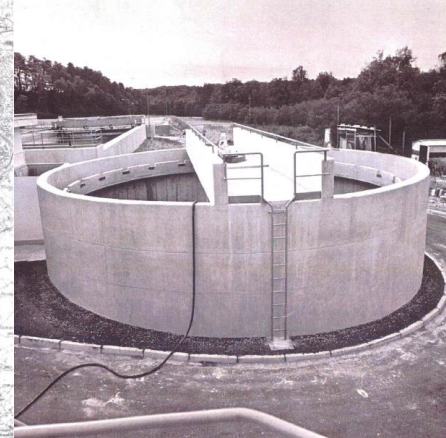
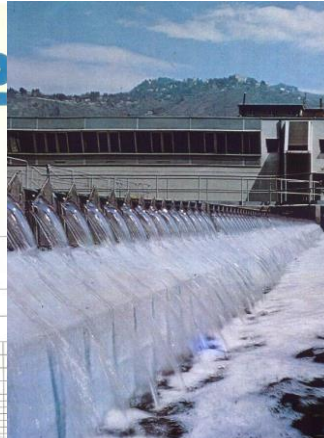
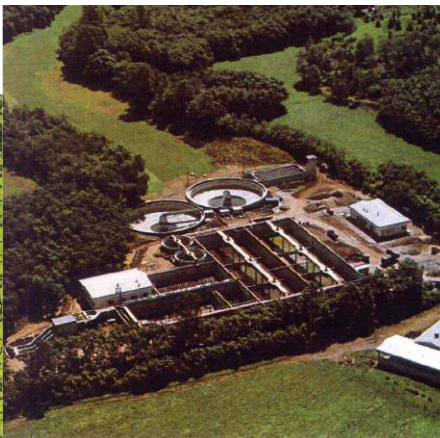
## In the mid-1970s

to face the problem of water pollution, the public bodies and industrial associations of Como sign an agreement for the construction and management of the wastewater treatment system: private companies for WWTPs and public consortia for sewerage, are established;

## At the end of the 1970s

the WWTPs come into operation to treat domestic and industrial wastewater;

IL RISANAMENTO IDRICO  
DEL BACINO IMBRIFERO  
ALTOLURA





# Discharge limits regulation

Italian national legislation on water is **Decree 152/06** which also defines the discharge limits to the environment and to the sewer system.

The regulation issued by the Region Lombardy (**Regulation n°. 6/2019**) specifies these limits considering the entire regional territory as sensitive area.

Discharge limit into	Decree 152/06 Sewer	Como Textile District Water service regulation Sewer	D.lgs 152/06 + RR 06/19 River
<b>N total mg/l</b>	<b>54</b>	<b>100</b>	<b>10 - 15</b>

**Derogation** to the limit of 100 mg/l granted by the Province of Como in case of need for the production process.

**Possible limitations** in case of non-compliance with the discharge limits from centralized WWTP or from the sewer network in rainy periods.



# What has been guaranteed

In the Como textile district, the development of water services in agreement between the companies and public bodies with attention to the needs of production activities, has allowed:

- **preservation** of natural resources and the environment;
- **optimization** in the use of the natural and economic resources of the area;
- **development** of productive activities and economic growth;
- **access** to the water service at an affordable cost for the companies.



# DIGITAL TEXTILE PRINTING IN COMO TEXTILE DISTRICT

In about ten years, digital printing has gone from 2% of total production to the current **60-65%** (estimated to reach 85% within five years).

In the Como district, the adoption of digital printing is one of the responses to the difficulties in the textile sector linked to the global crisis.

In the district there are not only textile printing companies, but also **manufacturers of digital printing machines and inks.**

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# DIGITAL TEXTILE PRINTING IN COMO TEXTILE DISTRICT

- **158** textile finishing (dyeing and printing) factories;
- the discharged volume from the textile finishing factories exceeds **7.8 million m<sup>3</sup>/year**, discharging about **525 tN/year**, and **80%** of the total amount of nitrogen discharged by industrial activities in the district;
- **49** printing and finishing factories which adopt or partially adopt DTP, discharge their wastewater in public sewers, containing nitrogen compounds at a concentration exceeding 50 mgN/l;
- the discharged volume from these 49 factories (less than one third of textile finishing factories) exceeds **3 million m<sup>3</sup>/year**, accounting for about **412 tN/year**, and about **63%** of the nitrogen from the total industrial discharges;

# COMO TEXTILE DISTRICT

## Potential users of Life DeNTreat technology

	Firms n°	V <sub>i</sub> m <sup>3</sup>	COD <sub>i</sub> mg/l	N <sub>i</sub> mg/l	COD kg/a	N kg/a
TOT.Textile N>200	8	541.184	577	276	312.374	149.450
TOT.Textile N>150	15	956.410	680	233	649.967	222.721
TOT.Textile. N>100	28	1.686.503	634	184	1.070.003	310.712
TOT.Textile N>50	49	3.104.039	640	133	1.985.343	412.717
TOTAL Textile	158	7.884.049	609	67	4.803.214	524.768
TOTAL	514	10.831.823	646	60	6.993.976	653.168

28 Users  
16% of  
Volume  
47.6% of N

	Firms n°	V <sub>i</sub> m <sup>3</sup>	COD <sub>i</sub> mg/l	N <sub>i</sub> mg/l	COD kg/a	N kg/a
TOT.Textile N>100 + V>100.000 m <sup>3</sup> /y	6	925.879	636	197	588.429	182.447
TOT.Textile N>100 + V>50.000 m <sup>3</sup> /y	14	1.450.919	575	186	833.878	270.353
TOT.Textile N>100 + V>15.000 m <sup>3</sup> /y	22	1.661.690	633	185	1.052.200	307.069
TOT.Textile N>100	28	1.686.503	634	184	1.070.003	310.712
TOTAL Textile	158	7.884.049	609	67	4.803.214	524.768
TOTAL	514	10.831.823	646	60	6.993.976	653.168

14 Users  
13% of  
Volume  
41.3% of N

**22 Users**  
**15% of**  
**Volume**  
**47.0% of N**

# COMO TEXTILE DISTRICT

## Potential consequences

Hypothesis:

**75% N removal**

30% COD removal

Treating **15%** of the total **volume** of the companies wastewater over 15000 m<sup>3</sup>/y (22 firms; **47%** of the **N pollution load**) by using the Life DeNTreat technology, **it's possible to remove 230 t/y of N (35%** of the total industrial N pollution load).

	Firms n°	V <sub>i</sub> m <sup>3</sup>	COD <sub>i</sub> mg/l	N <sub>i</sub> mg/l	COD kg/a	N kg/a
<b>current state</b>						
TOT.Textile N>100 + V>15.000 m <sup>3</sup> /y	22	1.661.690	633	185	1.052.200	307.069
TOTAL Textile	158	7.884.049	609	67	4.803.214	524.768
TOTAL	514	10.831.823	646	60	6.993.976	653.168
<b>application of Life DeNTreat technology</b>						
TOT.Textile N>100 + V>15.000 m <sup>3</sup> /y	22	1.661.690	443	46	736.540	76.767
TOTAL Textile	158	7.884.049	569	37	4.487.554	294.466
TOTAL	514	10.831.823	617	39	6.678.316	422.866

-230  
t/y

-44%

-35%



# COMO TEXTILE DISTRICT

## Potential consequences

Hypothesis: conventional treatment requires about 4.47 kWh/kgN<sub>removed</sub>  
 Life DeNTreat technology can reduce it to 1.8 kWh/kgN<sub>removed</sub>

Consequences: **reduction of 615 MWh/y**

Hypothesis: conventional treatment produces 1,8 kg sludge/kg N<sub>removed</sub>  
 Life DeNTreat technology produces 0,2 kg sludge/kgN<sub>removed</sub>

Consequences: **reduction of 368 t sludge/y (dry matter)**

Hypothesis: conventional treatment produces 15 kgCO<sub>2equivalent</sub> /kgN<sub>removed</sub>  
 Life DeNTreat technology produces 10 kgCO<sub>2equivalent</sub> /kgN<sub>removed</sub>

Consequences: **Green-House-Gases emissions reduction of 1150 tCO<sub>2</sub>/y**

# Thank you

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