L'EUROPA OLTRE IL CARBONE

IL FUTURO PER TARANTO

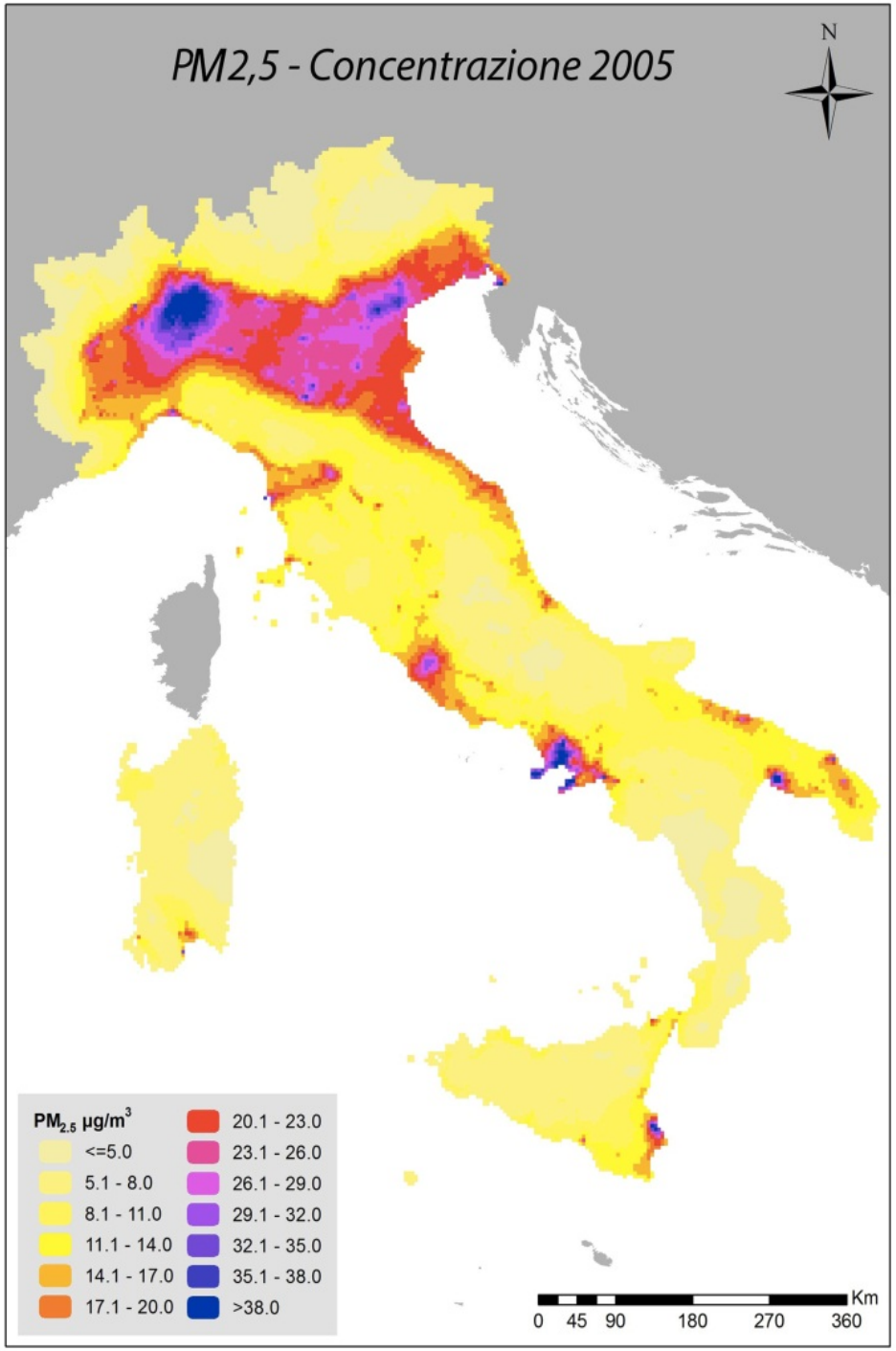
Decarbonization scenarios of the industrial asset: a necessary vision for Taranto

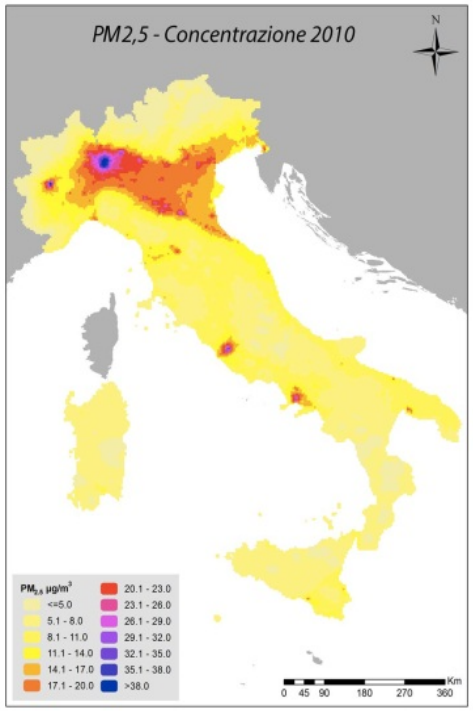
Ing. Barbara Valenzano, Regione Puglia

20 Giugno 2018 ore 18:00
Sala A3H1 | Parlamento Europeo

Figures relevant to Cancer in Italy

- National Cancer Registries estimate about **363.000** <u>new cases of cancer every year in Italy:</u>
  - 194.000 as to men (seven men out of 1000)
  - 169.000 as to women (five women out of 1000)
- *In addition to that, one child out of 600 suffers from cancer, which is the first cause of death among children!*
- ***In Italy, Southern Puglia has the top effect rate for pulmunary and bladder cancer !***


PM2,5 - Concentrazione 2005
N
PM2,5 µg/m3
<=5.0
5.1 - 8.0
8.1 - 11.0
11.1 - 14.0
14.1 - 17.0
17.1 - 20.0
20.1 - 23.0
23.1 - 26.0
26.1 - 29.0
29.1 - 32.0
32.1 - 35.0
35.1 - 38.0
>38.0
0 45 90 180 270 360
Km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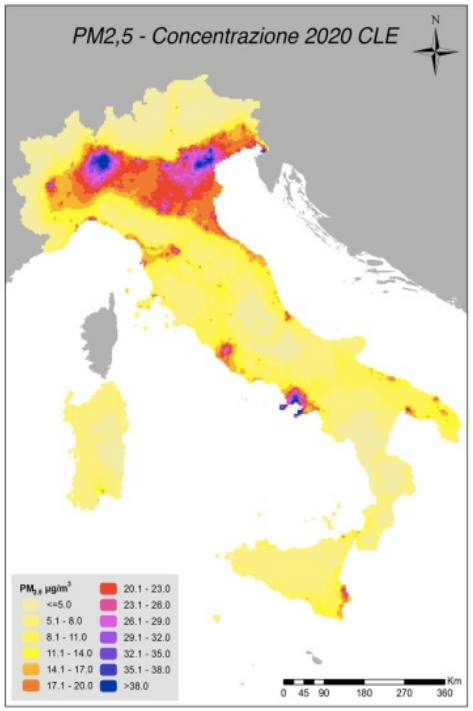
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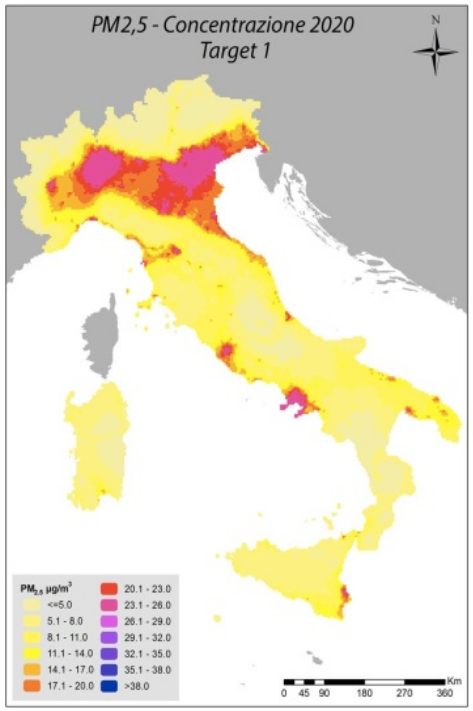
PM2,5 - Concentrazione 2020
Target 1
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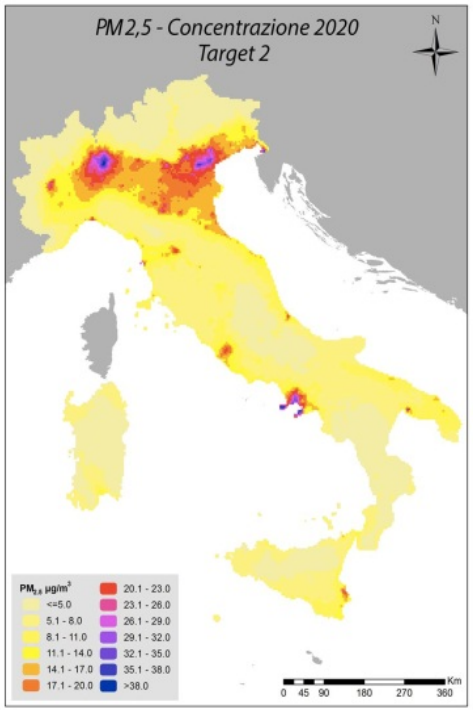
PM2,5 - Concentrazione 2020
Target 2
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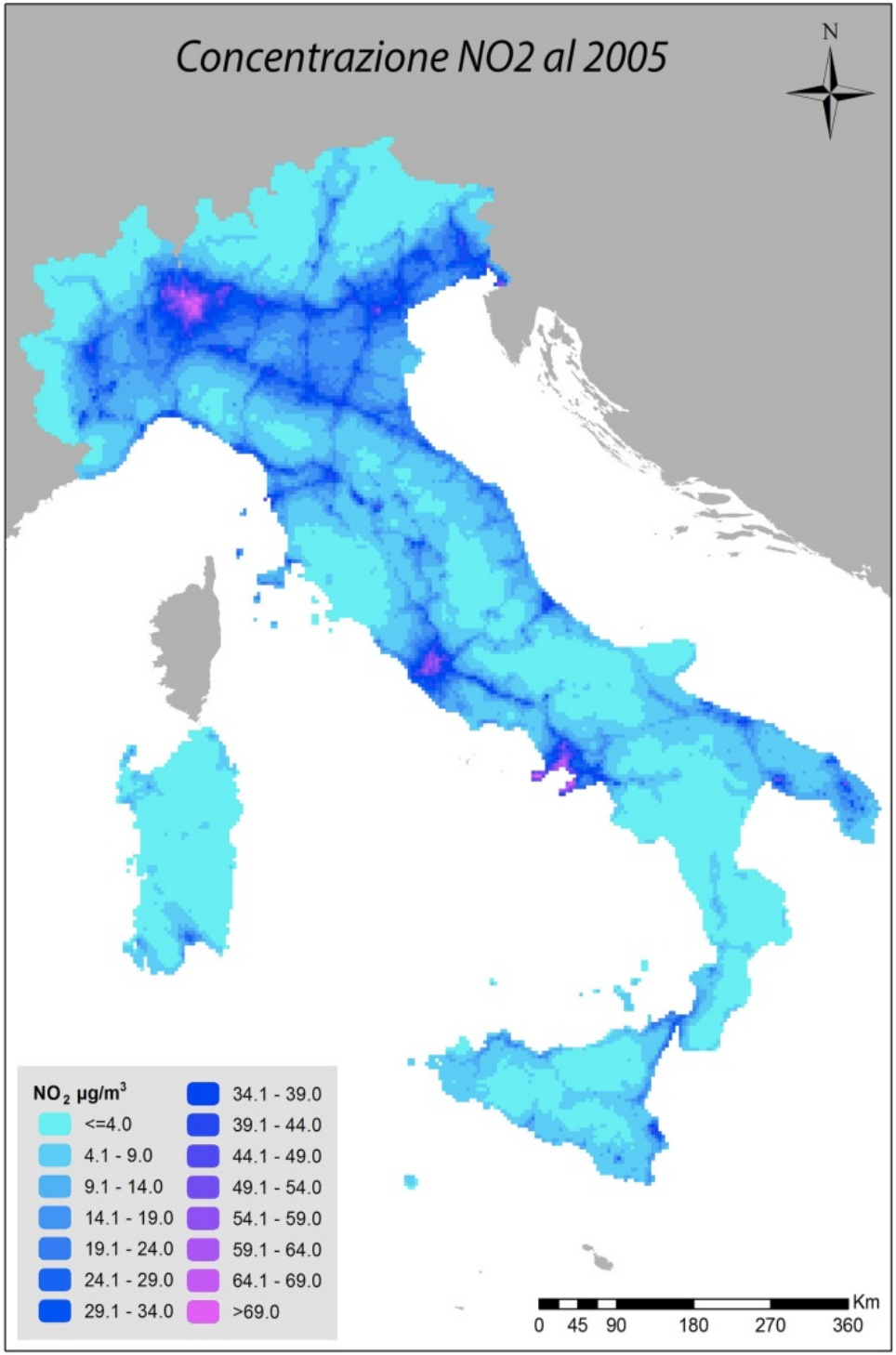
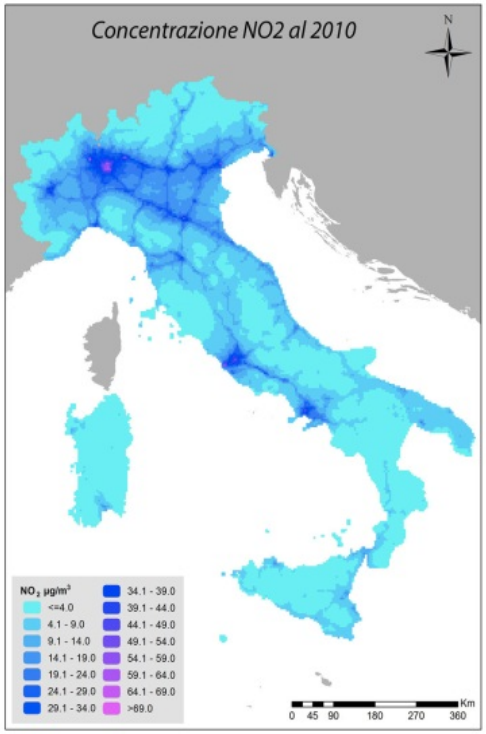
Km


Concentrazione NO2 al 2005
N
NO2 µg/m3
<=4.0
4.1 - 9.0
9.1 - 14.0
14.1 - 19.0
19.1 - 24.0
24.1 - 29.0
29.1 - 34.0
34.1 - 39.0
39.1 - 44.0
44.1 - 49.0
49.1 - 54.0
54.1 - 59.0
59.1 - 64.0
64.1 - 69.0
>69.0
0 45 90 180 270 360
Km


Concentrazione NO2 al 2010
N
NO2 µg/m3
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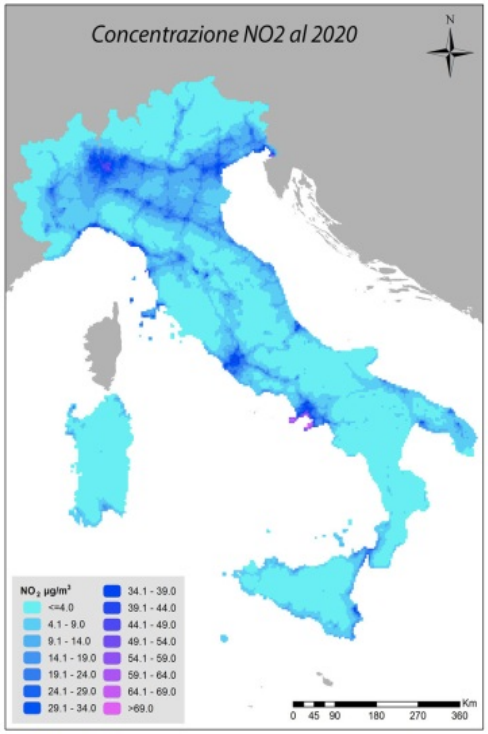
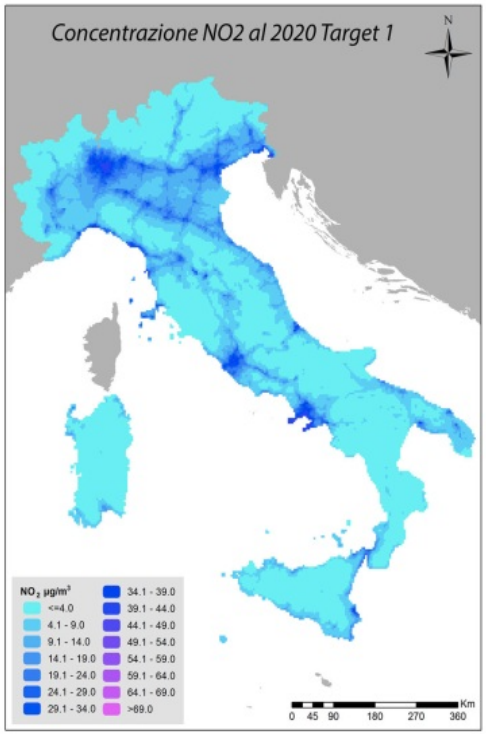
9.1 - 14.0
14.1 - 19.0
19.1 - 24.0
24.1 - 29.0
29.1 - 34.0
34.1 - 39.0
39.1 - 44.0
44.1 - 49.0
49.1 - 54.0
54.1 - 59.0
59.1 - 64.0
64.1 - 69.0
>69.0
0 45 90 180 270 360
Km


Concentrazione NO2 al 2020
N
NO2 µg/m3
<=4.0
4.1 - 9.0
9.1 - 14.0
14.1 - 19.0
19.1 - 24.0
24.1 - 29.0
29.1 - 34.0
34.1 - 39.0
39.1 - 44.0
44.1 - 49.0
49.1 - 54.0
54.1 - 59.0
59.1 - 64.0
64.1 - 69.0
>69.0
0 45 90 180 270 360
Km


Concentrazione NO2 al 2020 Target 1
N
NO2 µg/m3
<=4.0
4.1 - 9.0
9.1 - 14.0
14.1 - 19.0
19.1 - 24.0
24.1 - 29.0
29.1 - 34.0
34.1 - 39.0
39.1 - 44.0
44.1 - 49.0
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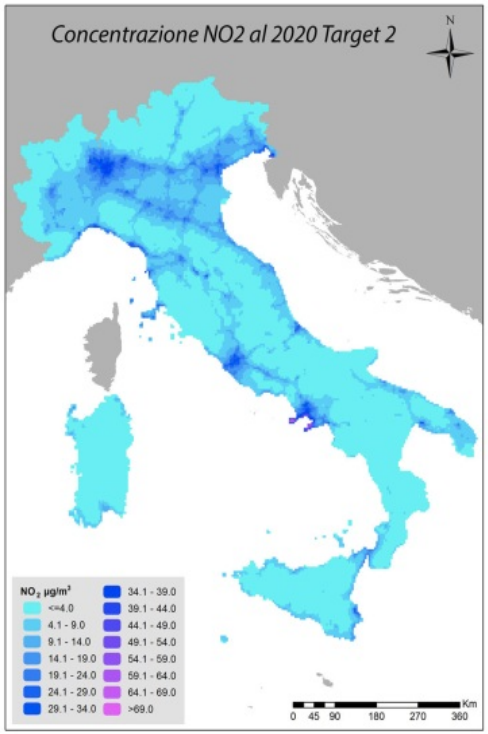
54.1 - 59.0
59.1 - 64.0
64.1 - 69.0
>69.0
0 45 90 180 270 360
Km


Concentrazione NO2 al 2020 Target 2
N
NO2 µg/m3
<=4.0
4.1 - 9.0
9.1 - 14.0
14.1 - 19.0
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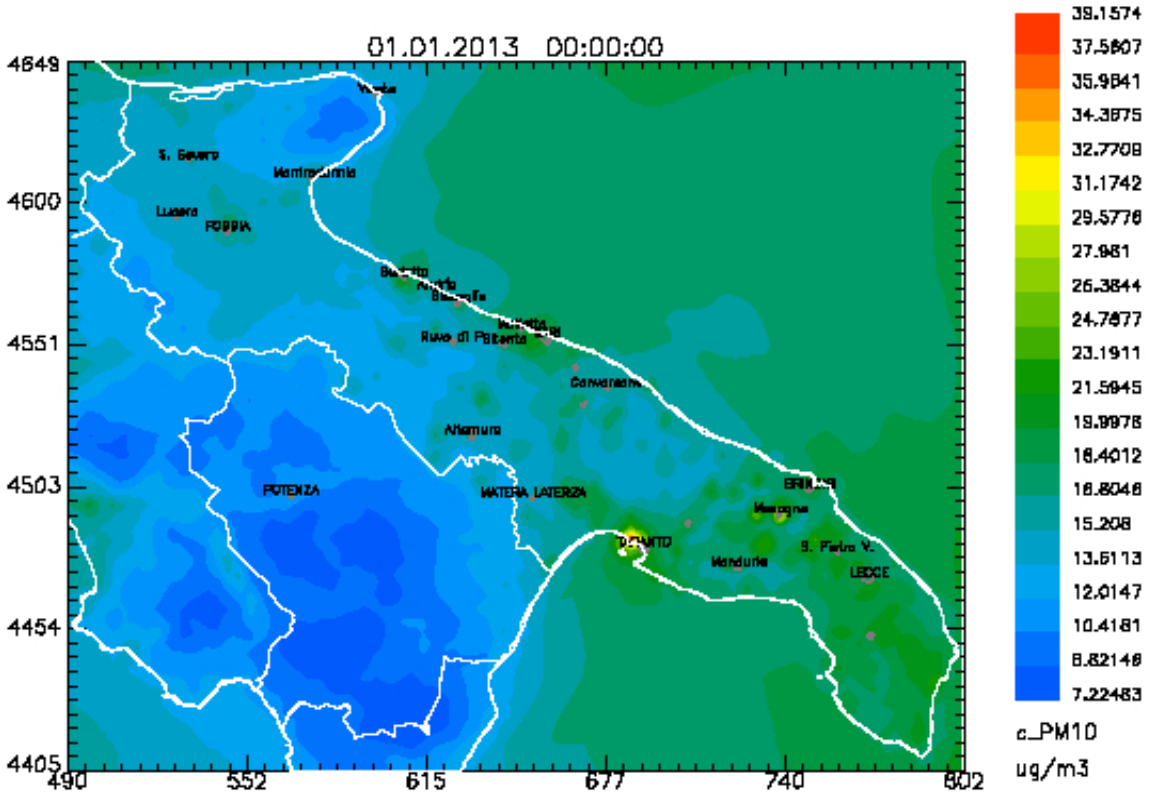
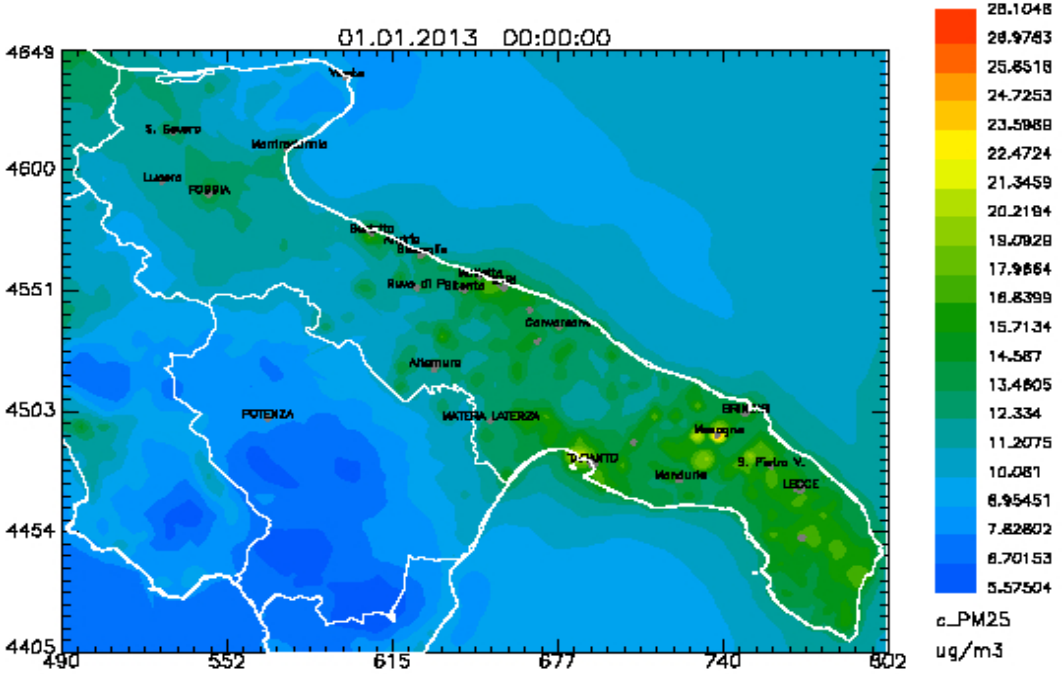
24.1 - 29.0
29.1 - 34.0
34.1 - 39.0
39.1 - 44.0
44.1 - 49.0
49.1 - 54.0
54.1 - 59.0
59.1 - 64.0
64.1 - 69.0
>69.0
0 45 90 180 270 360
Km



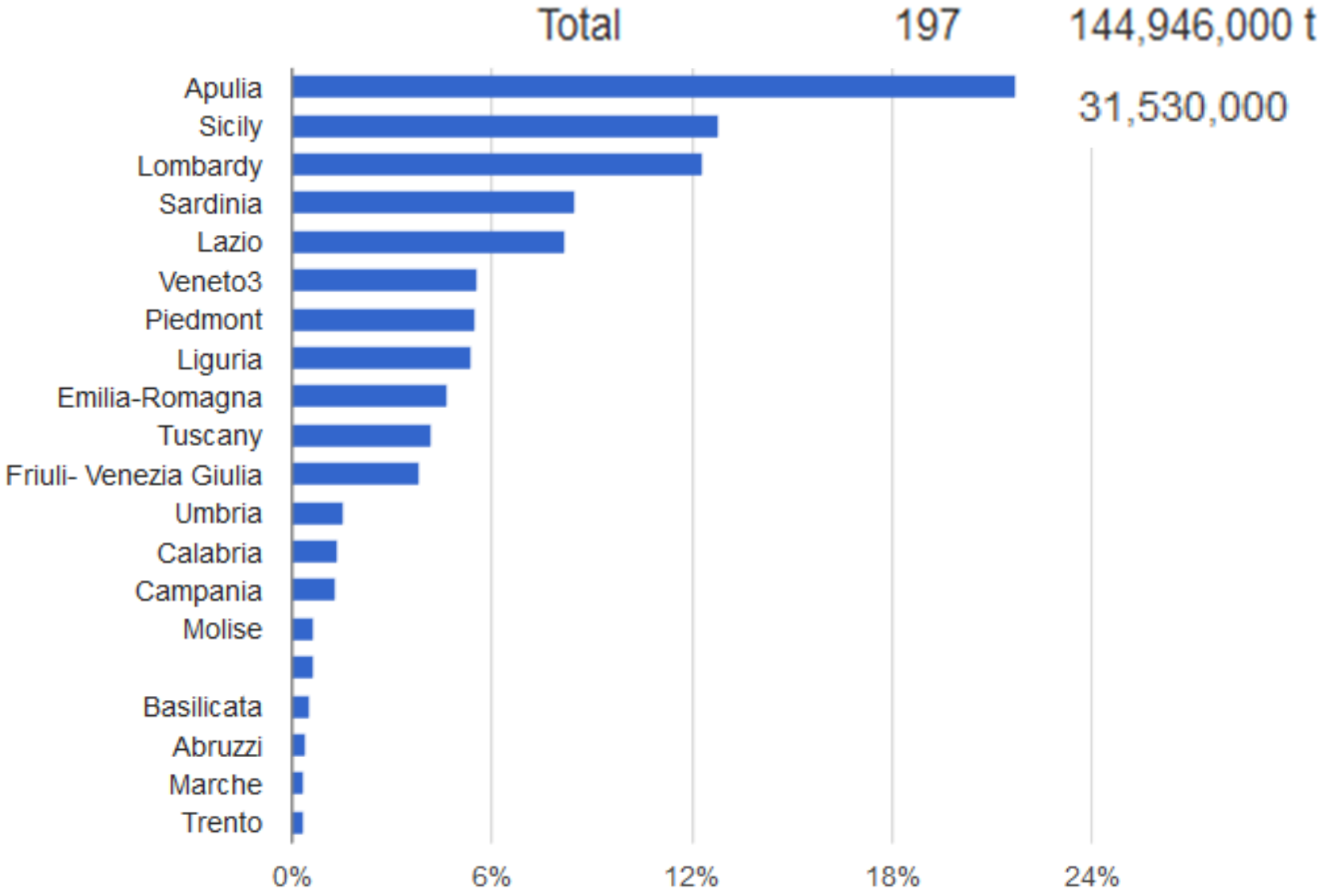
PM 10 Annaul Average is ALWAYS over the WHO 2005 limits set for protecting health

PM 2.5 Annual Average is ALWAYS over the WHO 2005 limits set for protecting health

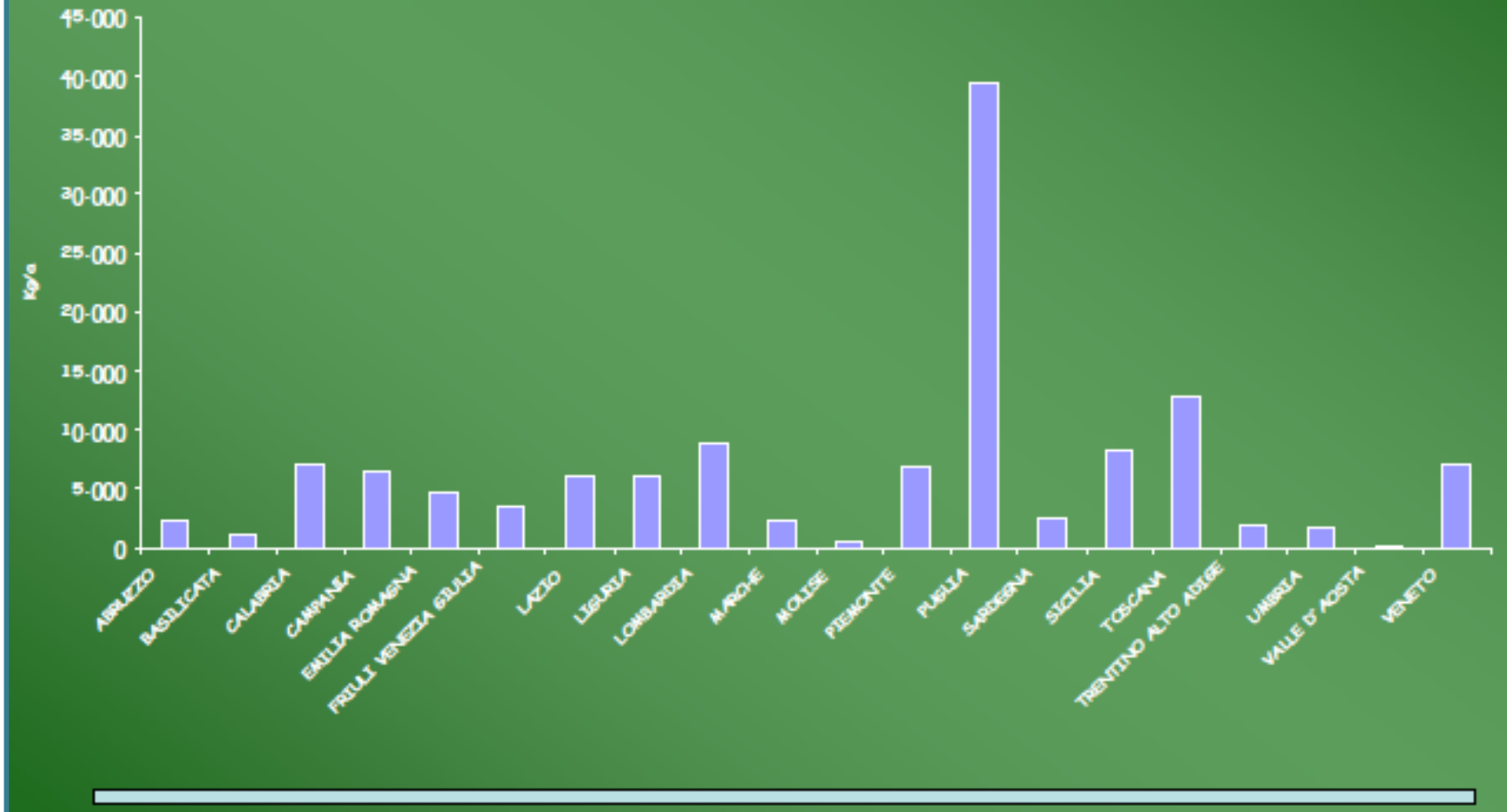


ARPA MODEL

European Pollutant Release and Transfer Register (E-PRTR) ***CO*** *2014*



Aromatic Polycyclic Hidrocarbons



Puglia is N.1 as to emissions in Italy

Summary

The precautionary principle is detailed in Article 191 of the Treaty on the Functioning of the European Union (EU).

It aims at ensuring a higher level of environmental protection through preventive decision-taking in the case of risk.

In practice, however, the scope of this principle is far wider and also covers consumer policy, and the European legislation concerning food, as well as human, animal and plant health.

Communication C.E. 2 Feb 2000

This Communication does establish common guidelines on the application of the precautionary principle.

EVIDENCE BASED PUBLIC HEALTH POLICY AND PRACTICE

Childhood cancers and atmospheric carcinogens

E G Knox

J Epidemiol Community Health 2005;59:101–105. doi: 10.1136/jech.2004.021675

Main results: Significant birth proximity relative risks were found within 1.0 km of hotspots for carbon monoxide, PM10 particles, VOCs, nitrogen oxides, benzene, dioxins, 1,3-butadiene, and benz(a)pyrene. Calculated attributable risks showed that most child cancers and leukaemias are probably initiated by such exposures.

Conclusions: Reported associations of cancer birth places with sites of industrial combustion, VOCs uses, and associated engine exhausts, are confirmed. Newly identified specific hazards include the known carcinogens 1,3-butadiene, dioxins, and benz(a)pyrene. The mother probably inhales these or related materials and passes them to the fetus across the placenta.

Exposition to "hotspots" of PM10, Dioxin, Benzopyrene, CO, VOCs within 1 km causes leukemias and cancers in adults & children

Key points

Childhood cancer/leukaemia births are closely associated with high atmospheric emissions from combustion processes, mainly oil based, and from organic evaporation. Demonstrated associations with 1–3,butadiene, dioxins, and benz(a)pyrene, but possibly others as well, are probably causal. Such toxic emissions may account for a majority of all cases.

DECARBONIZATION

ONLY DECARBONIZATION is the most EFFECTIVE PREVENTIVE MEASURE, with NO IMPACT, TO IMPROVE PEOPLE'S HEALTH, inasmuch IT DOES REDUCE the POLLUTION in the ENVIRONMENT.

2015 *Lancet* Commission: recommendations on energy (electricity)

- Rapid phase out of coal from the global energy mix
- A cautious transitional role for natural gas
- Need for a decisive policy package which targets transport, agriculture, and energy sectors in particular
- Expected immediate gains from reduced particle pollution and short-lived climate pollutants

Climate change: the mitigation goal

- A global average temperature rise <2°C to avoid the risk of potentially catastrophic climate change
- It implies a total anthropogenic carbon dioxide (CO_2) emission, by the end of the century, of <2900 billion tonnes ($GtCO_2$)
- Total emissions, from 1870 to 2011, a little over half of this: expecting to exceed of 2900 $GtCO_2$ in the next 15–30 years
- High-end emissions projection scenarios show a global average warming of 2·6–4·8°C by the end of the century, with all its regional amplification and attendant impacts

EUROPE'S DARK CLOUD

HOW COAL-BURNING COUNTRIES ARE MAKING THEIR NEIGHBOURS SICK

CAN Europe

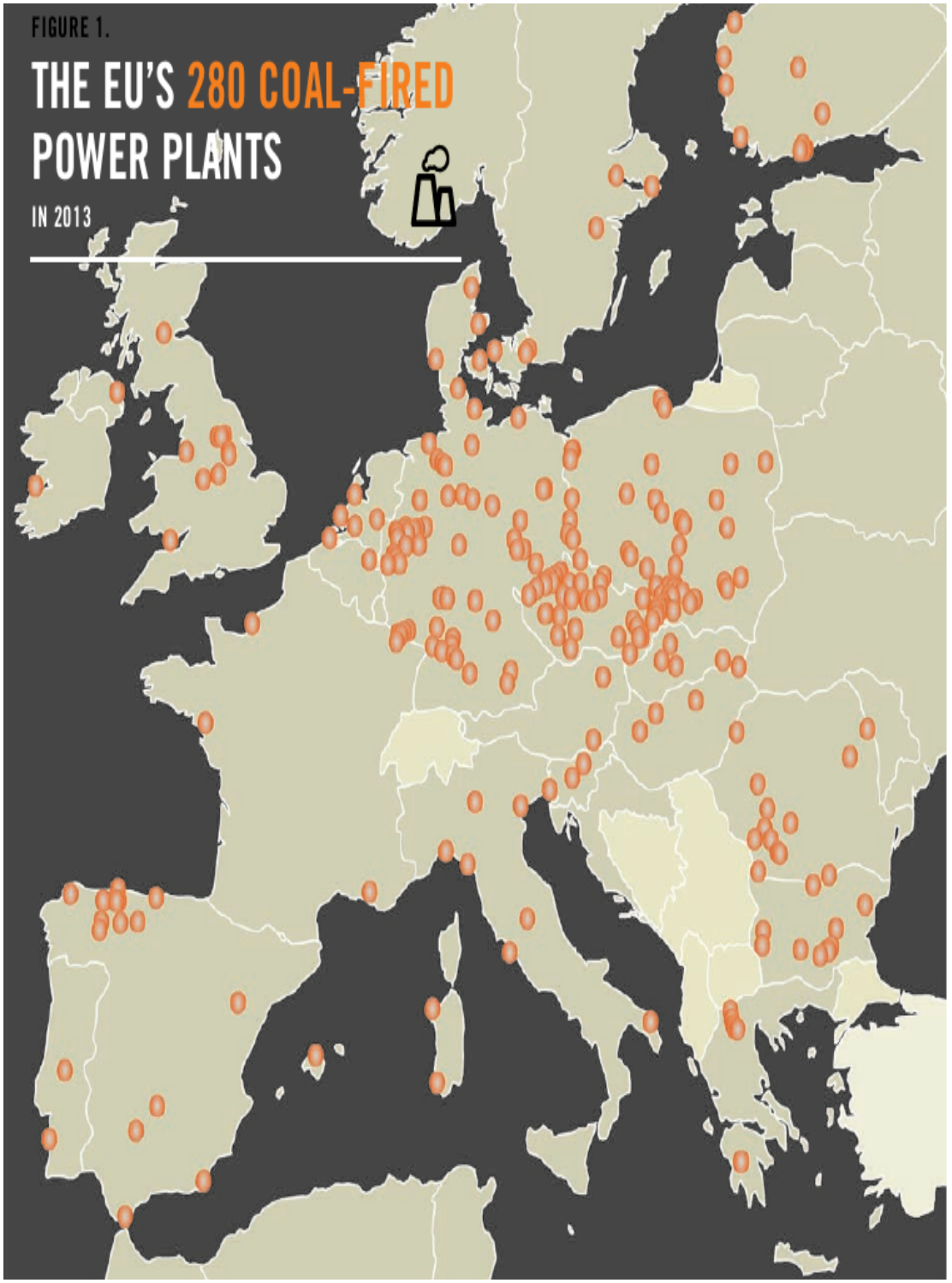
HEAL

sandbag

WWF

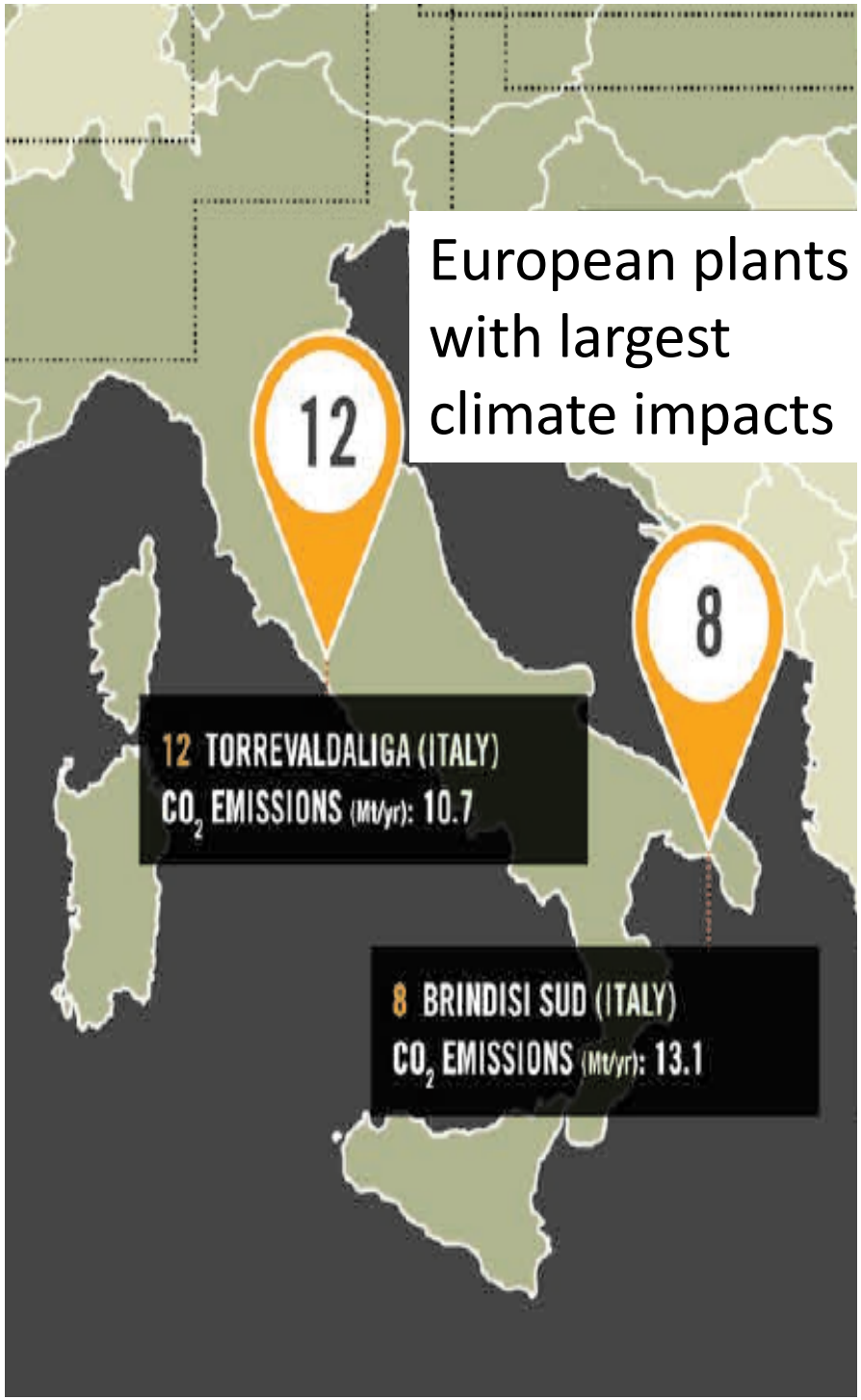
FIGURE 1.

THE EU'S 280 COAL-FIRED POWER PLANTS IN 2013

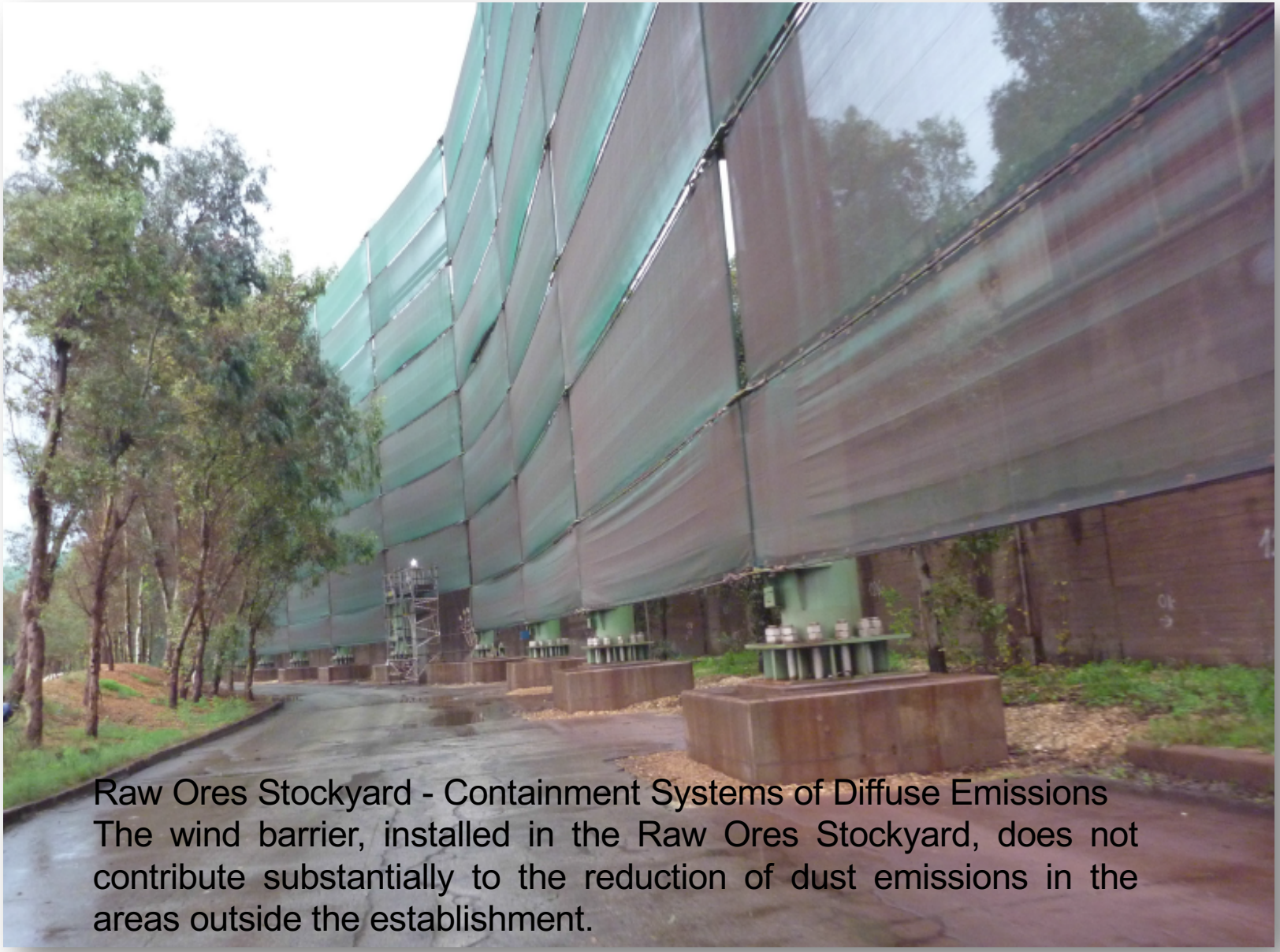


Impact

- Brindisi: number 8 in Europe as to climate impact
- But not in top 30 as to health impact (largely because of dispersion patterns with regard to population)



TARANTO Steel Plant



Raw Ores Stockyard - Containment Systems of Diffuse Emissions
The wind barrier, installed in the Raw Ores Stockyard, does not contribute substantially to the reduction of dust emissions in the areas outside the establishment.

Raw Ores Stockyard: drenching of fog cannons.

Storage areas for raw materials are located in exposed, and not shielded, areas because of delays in implementing the protection part of raw ores stockyards.
The stocks of raw materials in non-shielded areas are a source of contamination of soil, subsoil and underground water.Therefore, the works for shielding the Raw Ores Stockyards cannot ignore the preliminary remediation and the waterproofing of the relevant soils.

OPEN AIR CARBON DEPOSITS

Raw Ores Stockyard: drenching of fog cannons.

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The stocks of raw materials in non-shielded areas are a source of contamination of soil, subsoil and underground water.Therefore, the works for shielding the Raw Ores Stockyards cannot ignore the preliminary remediation and the waterproofing of the relevant soils.

Slop and Toxic Releases

Steel Plant Area: Interventions that have been carried out

Frequent events of slop continue to occur, despite the successful implementation of the interventions in the Steel Plant and the introduction of the ISDS Control System, with a RAMS type procedure.

Toxic dumping and emissions just nearby the city of Taranto

ILVA Dumping Grounds
Law Decree no. 1/15 approves the methods of construction and operation of landfills for non-hazardous and hazardous waste, submitted on 19 December 2014 by the sub-commissioner, referred to in Article 1, paragraph 1, of the Law Decree 4 June 2013, n. 61, converted with amendments by Law 3 of August 2013, n. 89.

THE SOLUTION PROPOSED BY PUGLIA REGION IN ITALY

PUGLIA AIMS TO BECOME A META MODEL FOR THE OTHER EUROPEAN REGIONS ON THE PATHWAY TOWARD DECARBONIZATION.

IN FACT, HEALTH SCIENTISTS HAVE PROVIDED THE RATIONALE BASES TO ADOPT INNOVATIVE TECHNOLOGICAL SOLUTIONS WHICH ARE, INDEED, MORE ENVIRONMENTALLY FRIENDLY.

THE FACT

Numerous legislative interventions (13 legislative decrees), laws and decrees, following the two AIA decrees of 2011 and its 2012 review,

have built a

Complex authorization framework and *sui generis* for the Ilva in Taranto

which, as a whole and despite internal inconsistencies (especially on the continuously postponed deadlines of the IPPC provisions), allowed the operation of the steel plant also in derogation of the main environmental and health requirements, enshrined in the Environmental Code,
with negative consequences for public health, as well as in terms of workers and employees safety and public health

❖The Scenario "Zero +" **under the IPPC decrees, it is possible to propose supplementary measures, mitigations and offsets**, as is considered to be short-term

❖The Scenario "1st": **if the Government decides to repeal the 13 existing decrees** : allow and push decarbonisation with the use of gas, maintaining the production volumes as they are

❖The Scenario "2nd": **if the Government decides to affect even the current production structure, in favour of a complete reconversion of the cycle**, where all the public subjects involved were in agreement, in one with the various stakeholders and Puglia citizens (not only of Taranto), could easily be implemented in a reasonable time of at least 5 years

❖**The "*Desiderata*" scenario**, on the other hand, is simply descriptive of general needs concerning the Ionian context as a whole, framed as a *vast area* and as a nerve center and propeller of a new model of development.

The scenarios, from "Zero +" to "2ND", presented below, therefore, suggest actions aimed at a progressive improvement of the environmental health conditions of a large area and at a graduality, in terms of importance actions, public politics that we intend to be implemented.

Zero + Scenario:

- **under the AIA decrees, it is possible to propose supplementary measures, mitigations and offsets, as well as decarbonization under a transitional regime**
- **authorization framework as such, integrated with additional prescriptive measures, such as not necessarily involving an annulment of the measures so far already achieved**

The measures have been summarized in a proposal for a multi-sectoral and multi-institutional Accordo di Programma (Memorandum of Understanding)

- A partial reconversion of the production cycle in substitution of the restoration of the blast furnace 5 and a reduction, of 50%, of the current production structure authorized by AIA
- Establishment of a permanent Observatory for monitoring the implementation of the Environmental Plan, further guarantees of AMI to the ASVA for the certain implementation of environmental measures in compliance with the established schedules
- Carrying out the Integrated Environmental Impact Assessment, including Health Impact Assessment and Health Damage Assessment of the agglomeration and landfills
- Ensure compliance with the BAT limit value set for the iron and steel production (Commission Decision 2012/135/EU of 28/02/2012) also for the parameter powders in the Cokeries
- Evidence of the path of possible micro (organic and metal) and macro (suspended solids) contaminants within the aquifer towards the points of collection for multiple uses, including drinking and irrigation in agriculture

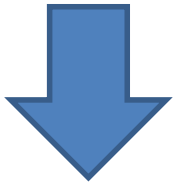
"Scenario Zero Plus "

authorizations as done with more constraints

1ST Scenario:

if it's instead possible:

- to question about general authorization framework of ILVA (Abrogation of the 13 Legislative decrees issued by the previous Governments)
- to NOT question a "quantitative" production structure and industrial business plan, in terms of volumes produced, to the detriment of the quality of the product
- envisage the use of different fuels, as well as the concrete introduction of the decarbonisation hypothesis
- allowing a substantial technological revamping and plant engineering

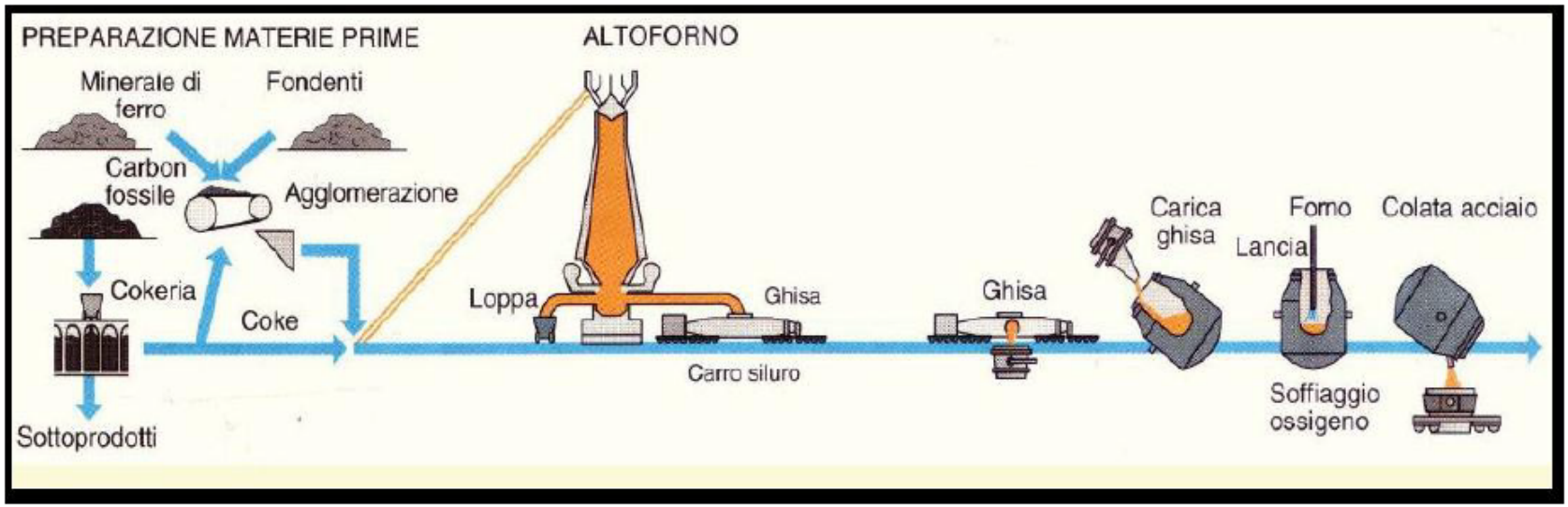


"Scenario 1st "

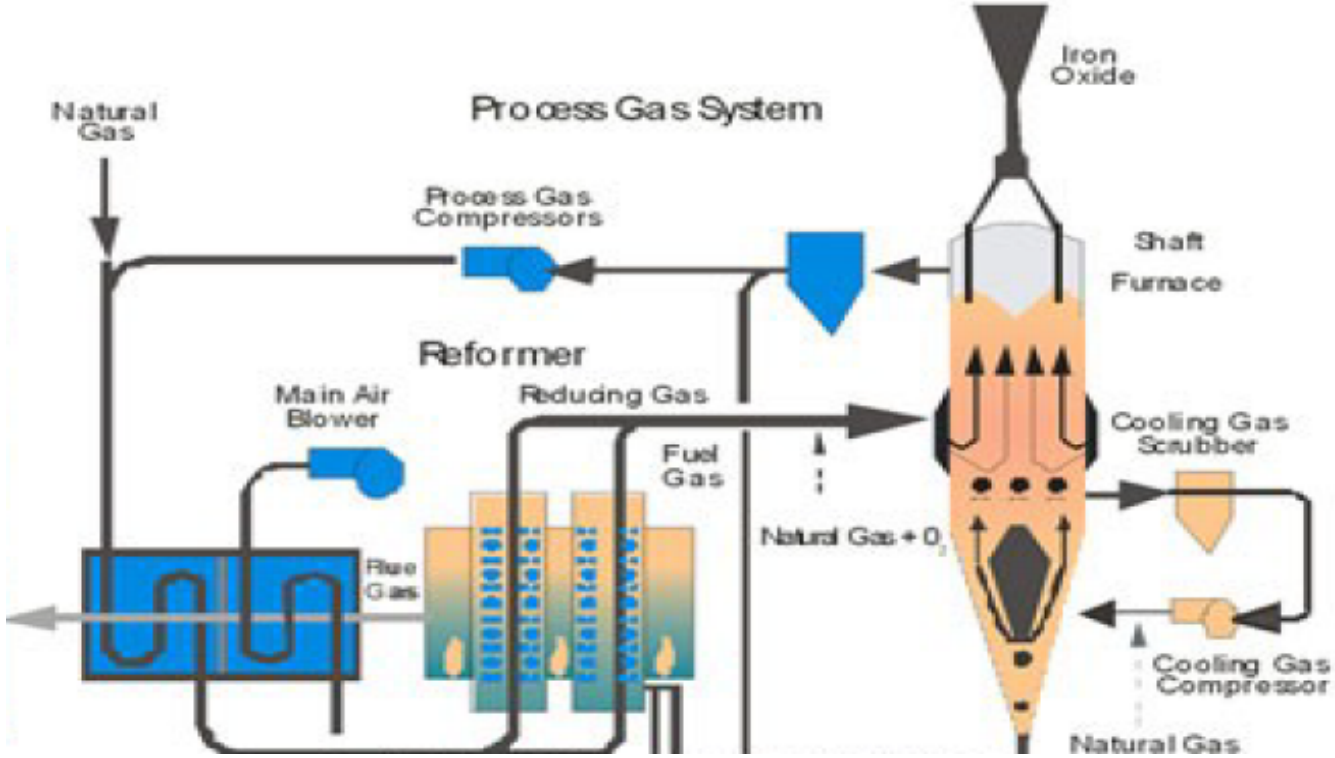
(transitory: decarbonization with usual quantity type)

TRADITIONAL TECHNOLOGY FOR STEEL PRODUCTION

WHAT MAKES THE CONVENTIONAL TECHNOLOGIES POLLUTING



Nowadays, mining parks continue airborne dust source, as well as cokeries : carcinogens, mutagens and teratogens such as benzo (a) pyrene, and the agglomerate of dioxins and furans (PCDD / PCDF) which are formed in the sintering process, the GRF (Management of Scrap Ferrous) of powders containing heavy metals (carcinogens) directly introduced into the atmosphere in the phase of landfill in the area «paiole» (spot ladles).
Immissions of persistent carcinogens in the water-soil sector.

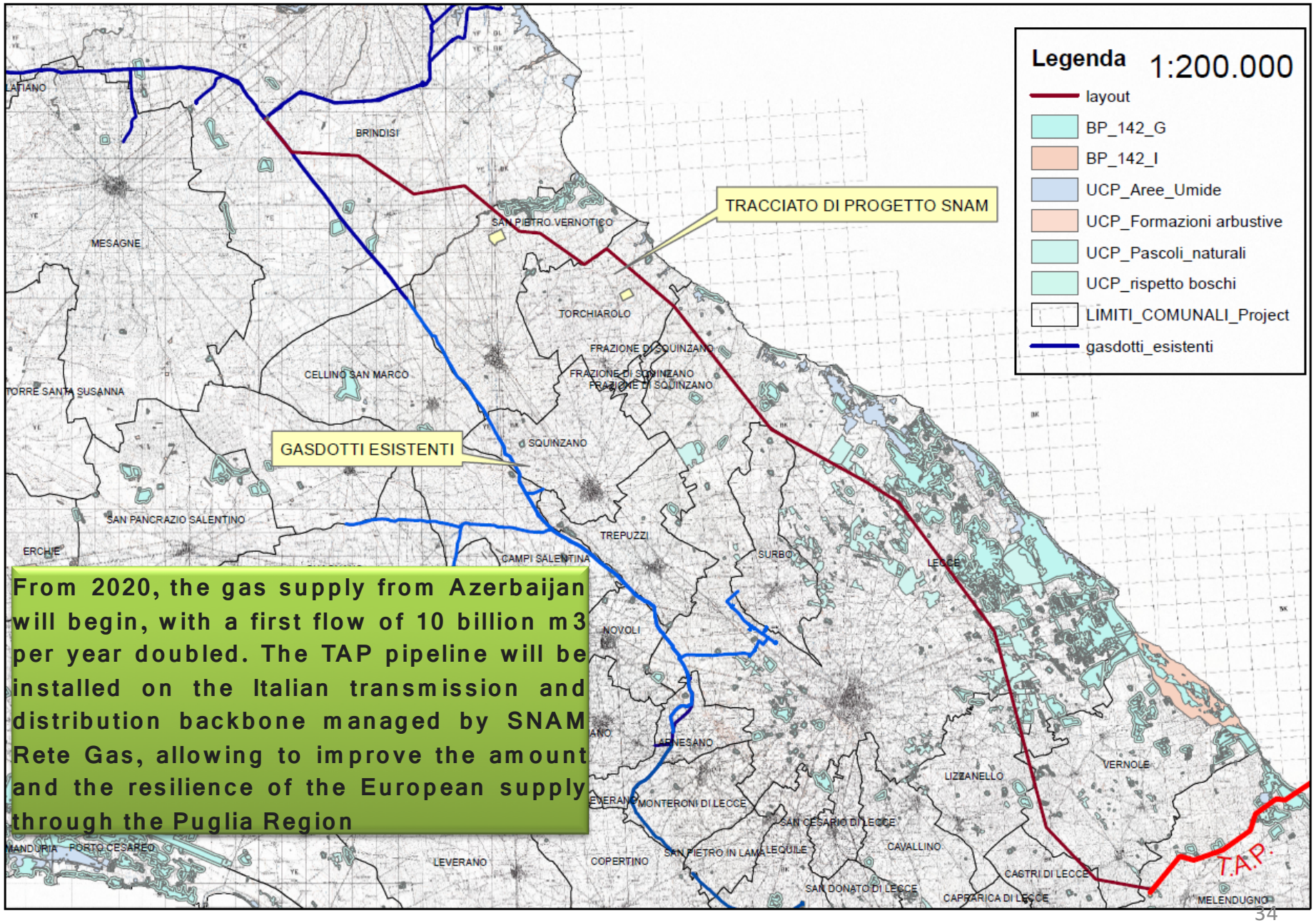


New technologies «*Energiron*» and «*Midrex*» use DRI (Direct Reduced Iron) by adopting GAS and Gas with CCS (Carbon Capture and Storage) as a temporary solution to exit rapidly from carbon based technology.

Gas may be provided by TAP (Trans Adriatic Pipeline).

The Southern Corridor

TAP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UCP_Pascoli_naturali
UCP_rispetto boschi
LIMITI_COMUNALI_Project
gasdotti_esistenti
TRACCIATO DI PROGETTO SNAM
GASDOTTI ESISTENTI
From 2020, the gas supply from Azerbaijan will begin, with a first flow of 10 billion m3 per year doubled. The TAP pipeline will be installed on the Italian transmission and distribution backbone managed by SNAM Rete Gas, allowing to improve the amount and the resilience of the European supply through the Puglia Region
BRINDISI
MESAGNE
SAN PIETRO VERNOTICO
TORCHIAROLO
FRAZIONE DI SQUINZANO
CELLINO SAN MARCO
TORRE SANTA SUSANNA
SQUINZANO
SAN PANCRAZIO SALENTINO
TREPUZZI
CAMPI SALENTINA
SURBO
LECCE
NOVOLI
LIZZANELLO
VERNOLE
MONTERONI DI LECCE
SAN CESARIO DI LECCE
LEVERANO
COPERTINO
SAN PIETRO IN LAMA
LEQUILE
CAVALLINO
CASTRI DI LECCE
SAN DONATO DI LECCE
CAPRARICA DI LECCE
MELENDUGNO
T.A.P.

Market assessment of iron ore

Trend of the cost of scrap iron (€ / t), in strong recovery since 2016.
Source: *siderweb*

Natural Gas (€/Nm3)	DRI (€/t)	HBI (€/t)
0.12	228	233
0.18	245	250
0.24	262	267
0.30	279	284
0.36	296	301

ILVA production capacity:	10 million tonnes of steel (authorized IPPC 2012: 9 million tons / year
Initial TAP pipeline capacity	10 billion cubic meters / year of natural gas
Project flow rate under the TAP gas pipeline:	20 billion cubic meters / year of natural gas
Gas requirements for 100% production capacity ILVA	2.95 billion cubic meters / year
Total Electricity produced in Puglia (2016):	35,278 GWh
Electricity from renewables produced in Puglia (2016):	8,262 GWh
Electricity consumed in Puglia (2016)	16,931 GWh
EE requirement for 100% ILVA production capacity with electric ovens:	3,500 - 5,000 GWh

SYNTHETIC TABLE OF POLLUTING EMISSIONS

	CO_2		
Ciclo tradizionale (atteso secondo AIA di ILVA Taranto)	Configurazione Ibrida (20% preridotto in altoforno +10% nel convertitore)	100% Preridotto e Forno elettrico**	Corex/Finex
0%	-17%	-60%	+15%
	Polveri fini dalla cokerie		
Ciclo tradizionale (atteso secondo AIA di ILVA Taranto)	Configurazione Ibrida (20% preridotto in altoforno +10% nel convertitore)	100% Preridotto e Forno elettrico**	Corex/Finex
-56%	-100%	-100%	-20%
	PCCD/PCFD (diossine) generati dall'impianto di agglomerazione del minerale		
Ciclo tradizionale (atteso secondo AIA di ILVA Taranto)	Configurazione Ibrida (20% preridotto in altoforno +10% nel convertitore)	100% Preridotto e Forno elettrico**	Corex/Finex
-50%	-65%	-98%	-40%
	SOx		
Ciclo tradizionale (atteso secondo AIA di ILVA Taranto)	Configurazione Ibrida (20% preridotto in altoforno +10% nel convertitore)	100% Preridotto e Forno elettrico**	Corex/Finex
-68%	-77%	-88%	-40%
	NOx		
Ciclo tradizionale (atteso secondo AIA di ILVA Taranto)	Configurazione Ibrida (20% preridotto in altoforno +10% nel convertitore)	100% Preridotto e Forno elettrico**	Corex/Finex
-42%	-59%	-81%	-42%

Particulate matter from coke ovens

Source: Milan Polithecnic; 2014

In this regard, it should be noted that, compared to an annual limit of **35 overcomings** of the concentration value equal to 50 ug/m^3 for PM10 set in air-environment by Legislative Decree no. 155/2010, a comparison for indicative purposes with the overcomings recorded by the stations within the Ilva area throughout December 2017, even if not subject to the aforementioned legislation, it seems worrying:

Part of Ilva Plant	Nb. of overcomings
Mineral Parks Area	67 !!
Direction	77 !!
coking oven plant	325 !!!

Although the exceedances limit value referred to above is not applicable in the area of establishment, due to the "strategic nature" of the ILVA production, there are more than ten thousand employees in permanent numbers, as an entire municipal population.
For its extension, the establishment exceeds twice the Taranto city area

The World Health Organization emission limits measure the real health impact on the exposed population, are far more restrictive than those adopted by the Italian legislation and therefore, consequently, implemented in the IPPC procedure

The Puglia Region proposal of the Program Agreement was rejected by the italian Government, with arguments concerning the issue of the Health Damage Assessment:
the Italian Ministry of the Environment intends to subtract from the domain of the Health Damage Assessment the aspects concerning the IPPC, because of their implicit consideration of the BATs

2ND Scenario:

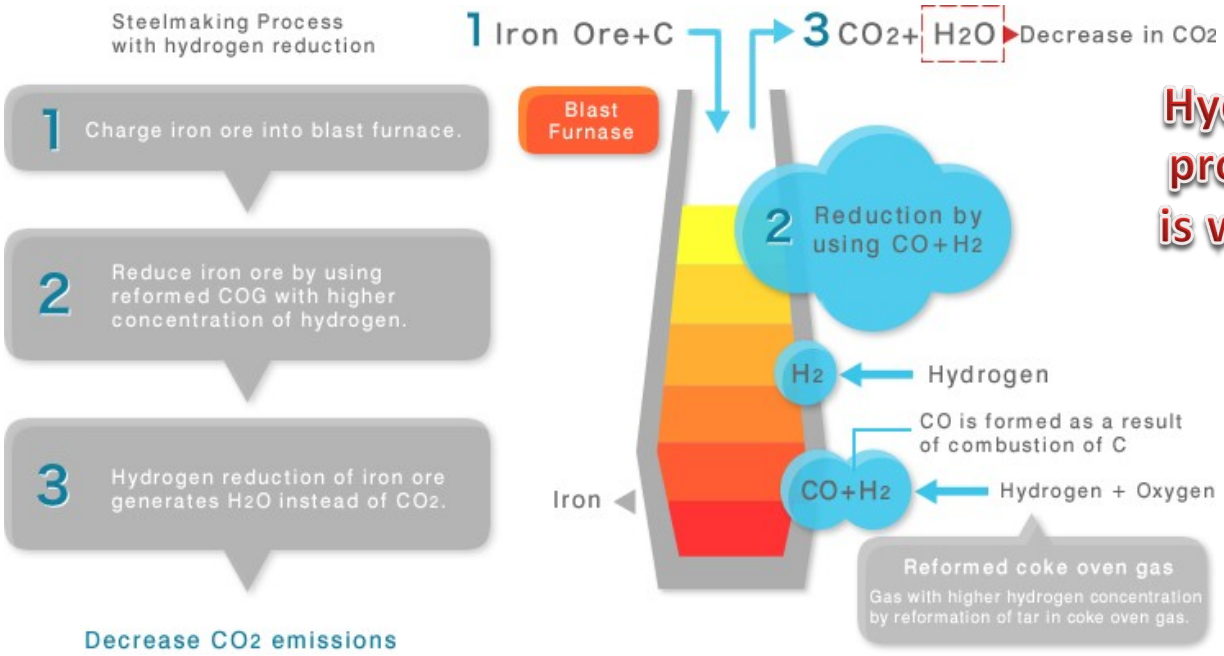
- Abrogation of the 13 legislative decrees issued and substantial modification of the production structure with a transition to quality steels: **if it is possible to question not only the regulatory and prescriptive framework but also to envisage a "green-oriented" production method**, so as to generate different expectations also on the quality of the product due to a different production logic

"Scenario 2ND"

Green Process and High Quality Steel

Technologies to reduce CO_2 emissions

The Puglia Region intends to foster hydrogen technologies: this reconversion is designed as a long-term scenario, with drastic reduction of environmental and health impact, as well as the reduction of CO_2, known as climate-altering emissions



Hydrogen as a reducing agent in a process where the main emission is water vapor, rather than carbon dioxide

HYBRIT (***Hydrogen Breakthrough Ironmaking Technology***) is a plant for using hydrogen as a reduction agent in steelmaking instead of coke, resulting in water vapour as main emissions rather than CO_2

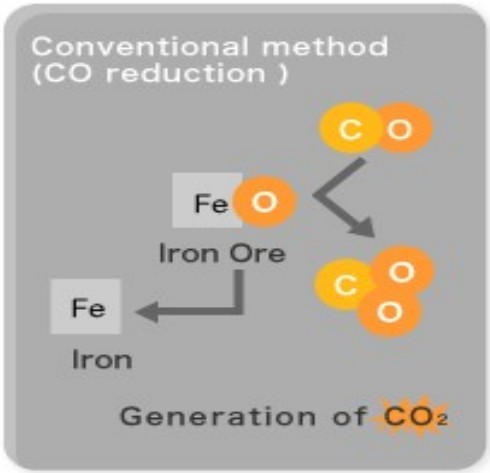
The project has been proposed by Hybrit Development AB

The reduction process is contributing over 80% of the overall greenhouse gas emissions of steel-making

Sorce: ***Technologies to reduce CO2 emissions; COURSE 50; European Commission; RTD***

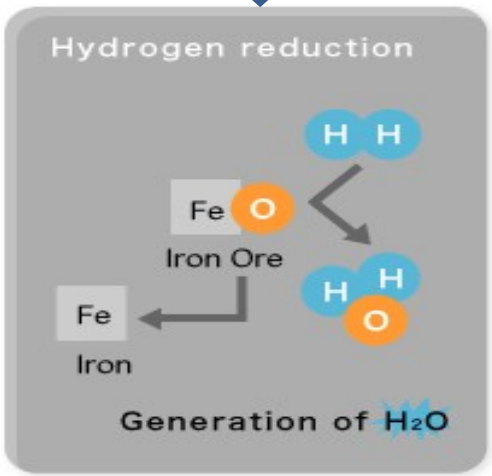
NOW

In conventional steelmaking processes, CO_2 gas is generated when iron ore is reduced with CO gas

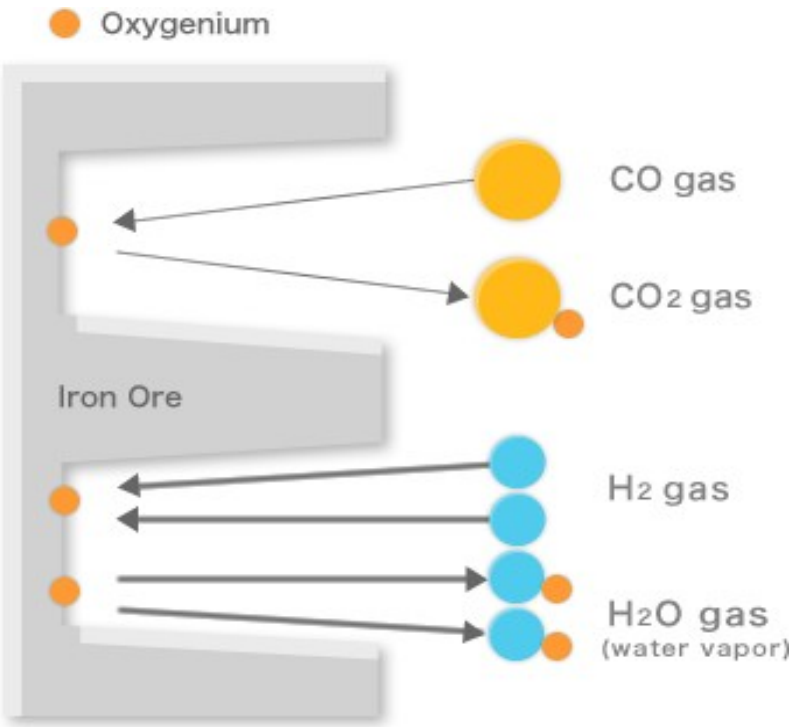


LONG-TERM

On the other hand, with hydrogen reduction H_2O gas is generated instead of CO_2, and therefore this method can be regarded as an environmentally - friendly steelmaking process



The H2 gas, with a much smaller molecular size, can easily penetrate into the iron ore with a rate five times higher than that of CO, obtaining a rapid iron ore reduction in a blast furnace

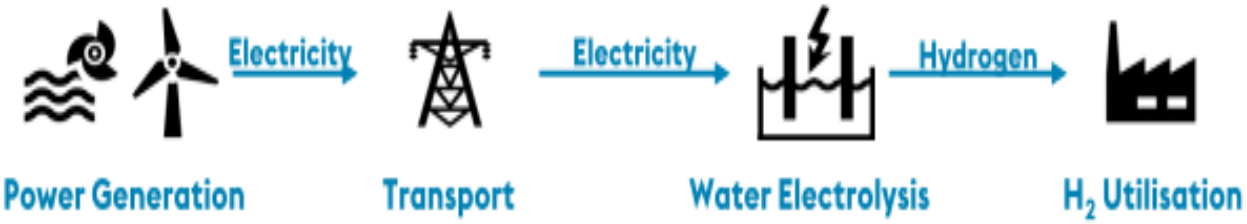


Interface of chemical reaction

Sorce: ***Technologies to reduce CO2 emissions; COURSE 50; European Commission; RTD***

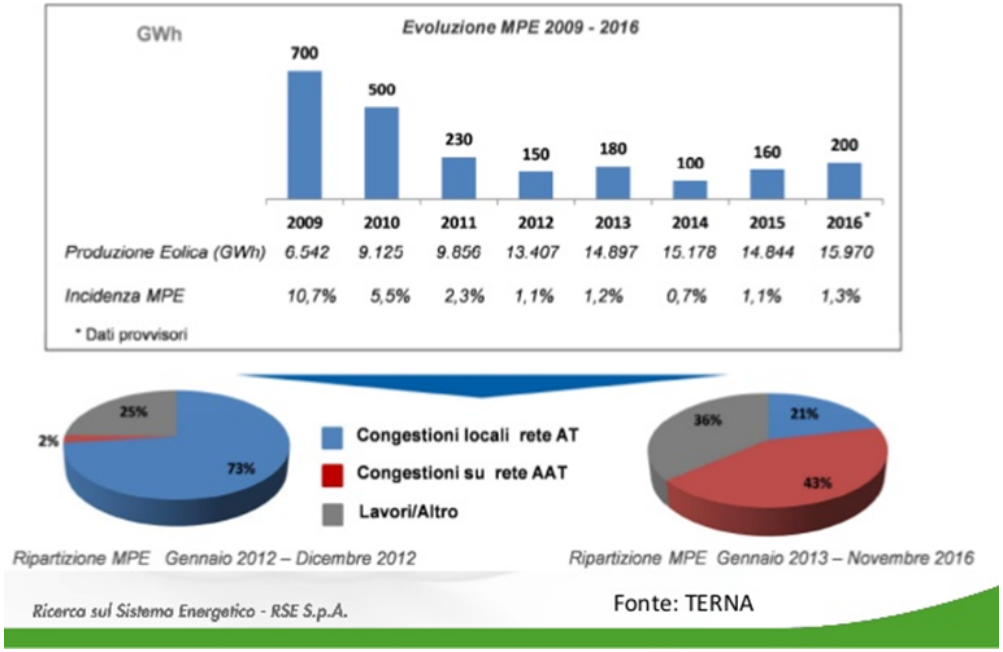
HYDROGEN ECONOMY

Hydrogen will be produced from renewable energy sources



In Apulia the consequence of huge renewable energies development, with the electricity production exceeding the double of its consumption thanks to industrial wind and photovoltaics plants, leads to an unvehiculable part through the National Transmission Network, that normally gets lost

Wind Farm Energy Loss (WEL- MPE)



PUGLIA REGION'S CHALLENGE

The renewable energy electricity can be used on demand for the hydrogen and oxygen production, starting from water, using electrolytic cell or electrolyzer

By means of fuel cells, it will be possible using hydrogen previously produced and stored from Wind Energy Lost, converting chemical energy into electrical energy through reverse electrolysis with conversion efficiency much better than conventional thermal machines

LONG-TERM DECARBONISATION

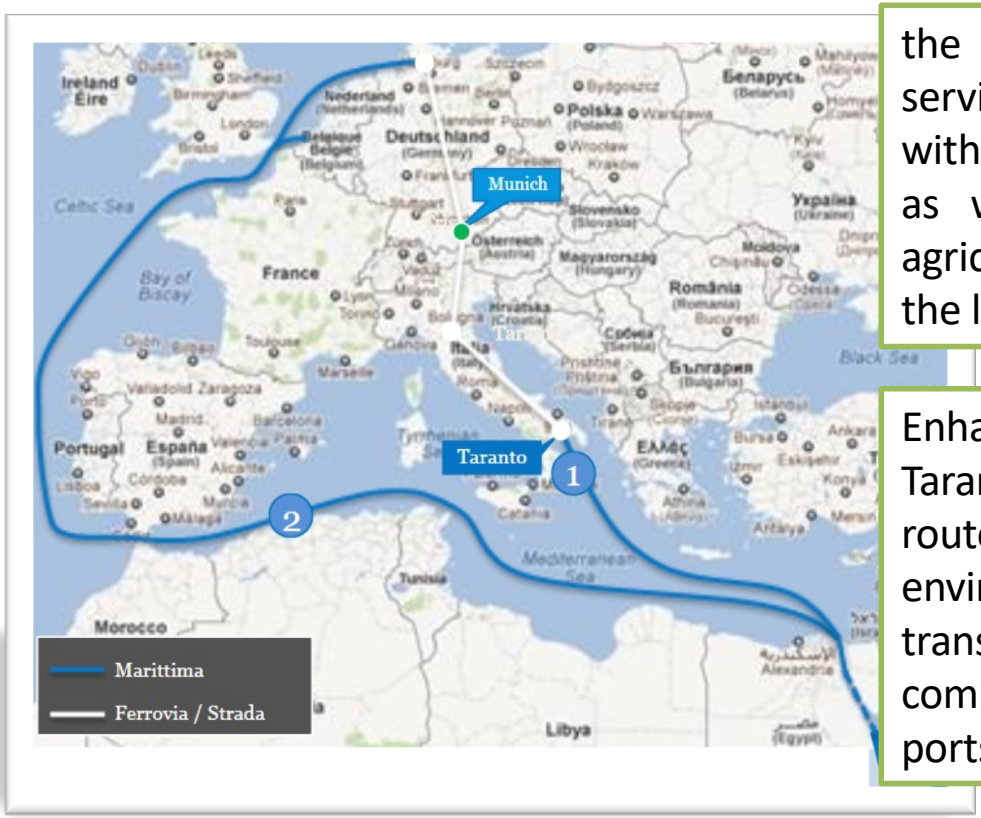
Reduction of the current production of the steel up to 1/3 of the current one

Only one module of 2.5 million T/y privileging precisely the high quality production, "smart" and special steels and structures

“Desiderata” scenario:

industrial reconversion and Taranto area development as a whole

- Starting eco-sustainable environmental remediation processes, such as phyto-remediation and recovery of heavy metals
- securing the 7 Ilva landfills and adjusting them to Legislative Decree 36/2003 (italian regulation for landfills) in order to avoid, however, further sanctions by the European Union
- biomonitoring activities (heavy metals on blood samples) for the exposed population, in order to establish protocols for prevention and reduction of the causes of exposure);
- the conversion of the Taranto iron and steel pole into a technological center for innovation for ever-increasing quality production at European and international level
- safeguarding jobs not only in the short term, but also in the medium and long term, guaranteeing for industrial asset new life in a full sustainability perspective;
- the restitution, in favor of the citizens of Taranto, of the identity value of the places through participatory paths for a productive, artisanal, industrial, tertiary vision starting from SME



the reorganization of industrial activities and services, whether in port areas or inland together with a definition of a large area for the fish market, as well as the strengthening of the food and agriculture sector of the hinterland, integrated with the logistics supply chain;

Enhance of the commercial vocation of the Port of Taranto It is highlighted below that the logistics-port route via Taranto is also more advantageous in environmental terms as the external costs of transport via Taranto are lower than those that the community sustains in case of travel through the ports of northern Europe

Route	Description	Unit of measure	Calculation formula	Value (€)
Via Taranto (1)	Maritime route distance (Shanghai - Taranto)	Km	E	8.090
	Rail route distance (Taranto - Monaco)	km	F	1.320
	External costs of maritime transport	€ / FEU-km	G	0,064
	External costs of rail transport	€ / FEU-km	H	0,102
	External costs via Taranto	€ / FEU	II=ExG+FxH	652
Savings in external costs		**€ / FEU**	**II – I**	**-108,1**

With reference to greenhouse gases (CO2) alone, moving 1 million TEU from Northern European ports to Taranto would mean reducing CO2 emissions by about 60,000 tonnes per year, equivalent to an economic saving for the community of 1.8 millions of euros a year.

“Desiderata” scenario:

industrial reconversion and Taranto area development as a whole

- the new industry policy could finance a range of activities, possibly in combination with private investment, including R&D in universities, public and private institutions
- innovation and its diffusion in private and public organisations
- procurement programmes for innovative products relevant for public services
- **opening up a debate on industrial policy is an urgent task.**

A wide range of ideas and proposals have to be shared and discussed.

The political obstacles for such a new industrial policy are indeed huge, and major changes would be required in order to implement it

L'EUROPA OLTRE IL CARBONE

IL FUTURO PER TARANTO

Thans for the kind attention

Decarbonization scenarios of the industrial asset:
a necessary vision for Taranto

Ing. Barbara Valenzano, Regione Puglia