Final pilot action report

Ports of TRIESTE and MONFALCONE

LP, deliverable no. D.4.2.1

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EX-ANTE SITUATION

Over the past few years, the Port Network Authority of the Eastern Adriatic Sea (PNAEAS), following a logic of integrated development and considering current and future needs, has worked hard to identify both infrastructural and organisational-managerial solutions that favour a more efficient transport system. Actions and strategies have thus been adopted to strengthen both the ability to monitor and manage the complex of port operations in a sustainable manner. The importance of monitoring activities is therefore the foundation of the work to identify corrective and improvement solutions for environmental protection actions.

In the TNA analysis of WP3, in the chapter concerning the "SWOT ANALYSIS/ internal/negative" the "Impact of the port on air pollution and GHG" was identified. In particular, the CO2 emissions produced by the port activities of Trieste and Monfalcone are on both maritime and terrestrial sides. This demonstrates that the Port System of the Eastern Adriatic Sea is, by the very nature of the activities that take place in it, a complex area, in which activities pertaining to the industrial, civil and transport sectors coexist and interact, that entails the need for an integrated approach that takes into account current and future needs related to the different involved areas.

With reference to the CO2 reduction targets, this deliverable refers to the following components of the pilot action :

1) EAS MONITORING : *Implementation of the Integrated Monitoring Plan in the framework of the Port Regulatory Plan for the Port of Trieste - ante operam*
2) COLD IRONING OF THE QUAYS OF PIER VII IN THE PORT OF TRIESTE
3) REPLACING OF THE LIGHTING SYSTEM WITH LED LIGHT BULBS
4) E-CARS

Furthermore, the Best Practices Analysis (D.3.2.13) identified best practices that contributed to the implementation of all the following pilot actions, that were realized within SUSPORT by PNAEAS.

Pilot action no. 1 : EAS MONITORING

IMPLEMENTATION OF THE INTEGRATED MONITORING PLAN IN THE FRAMEWORK OF THE PORT REGULATORY PLAN FOR THE PORT OF TRIESTE - ante operam

1.1. Pilot action description

PNAEAS has prepared the launch of the Integrated Monitoring Plan (IMP) produced within the framework of the Integrated Environmental Study (SAI) of the 2014 Update of the Trieste Port Regulatory Plan (PRP), approved by the Autonomous Region of Friuli Venezia Giulia with Council Resolution no. 524 of 1st April 2016.
Environmental monitoring includes activities concerning the environmental components covered by the IMP (Atmosphere; Water Environment - Coastal Marine Waters and Marine Biocenosis; Terrestrial Fauna Environment; Noise; Landscape; Energy; Waste). PNAEAS implemented EAS ante operam monitoring of the environmental component 'atmosphere'.
Environmental monitoring was arranged through two seasonal measurement campaigns (a summer campaign and a winter campaign) lasting no less than 30 effective days each.

Air quality measurements were performed through the use of a moving laboratory placed at Porto San Rocco in Muggia (near Trieste), in addition to the stations belonging to the ARPA FVG (Regional Agency for Environmental Protection of Friuli Venezia Giulia) air quality monitoring network.
At the same time, the data acquired by the ARPA FVG station network were collected for analysis and comparison. In particular, data recorded during the monitoring period were acquired from the stations in Piazza Volontari Giuliani, P.le Rosmini, P.le Carlo Alberto, Via Carpineto, Via del Ponticello and Via Pitacco, in addition to the weather data from the OSMER (Regional Meteorological Observatory) stations in Molo Fratelli Bandiera and Muggia.

Sampling point. Photo taken from Google Earth

The environmental indicators involved in the monitoring are essentially those related to the significant environmental impacts of sources such as: vehicle traffic, ship traffic, shipbuilding activities, paying attention to the area's meteo-climatic parameters, which are fundamental for the diffusion of the pollutants themselves. In particular, the parameters relating to the atmospheric component, that are indicators of air quality, analysed during this monitoring campaign were:

- Sulphur dioxide (SO2);
- Nitrogen dioxide (NO2);
- Carbon monoxide (CO);
- Ozone (O3);
- Benzene (C6H6);
- Benzo(a)pyrene (C20H12);
- Fine particles (PM10 and PM2.5).

The limits defined by Legislative Decree 155 of 13/08/2010 ('Implementation of Directive 2008/50/EC on ambient air quality and cleaner air for Europe, which identifies air quality limit values for pollutants in the atmosphere') were considered as reference values for the above-mentioned parameters.

POLLUTION	LIMIT	PERIOD OF AVERAGE	LIMIT	EXCEEDINGS / YEAR
	Human health	1 hour	350 µg/m³	24 / Calendar year

SO_2 (µg/m³)	Human health	1 day	125 µg/m³	3 / Calendar year
NO_2 (µg/m³)	Human health	1 hour	200 µg/m³	18 / Calendar year
	Human health	Calendar year	40 µg/m³	-
	Alert threshold	1 hour for 3 consecutive hours	400 µg/m³	-
CO (mg/m³)	Human health	Moving average 8 hours	10 mg/m³	-
O_3 (µg/m³)	Human health	Moving average 8 hours	120 µg/m³	25 / Calendar year
	Alert threshold	1 hour	240 µg/m³	-
C_6H_6 (µg/m³)	Human health	Calendar year	5 µg/m³	-
$C_{20}H_{12}$ (µg/m³)	Target value	Calendar year	1 ng/m³	-
PM10 (µg/m³)	Human health	1 day	50 µg/m³	35 / Calendar year
	Human health	Calendar year	40 µg/m³	-
PM2,5 (µg/m³)	Human health	Calendar year	25 µg/m³	-

Table 1: Limits for each monitored pollutant according to Legislative Decree 155/2010

Given the importance of meteorology on the dispersion of pollutants in the air, measurements of pollutants were recorded with data on wind speed and direction, temperature and relative air humidity, atmospheric pressure, solar radiation and precipitation in order to collect representative data.

EQUIPMENT

Analysers and samplers mounted inside the specifically prepared moving vehicle were used for the measurements; the instrumentation, listed below, complied with the standards prescribed by the regulations, in particular Ministerial Decree n.60 of 02/04/2002 (Transposition of Council Directive 1999/3 DICE of 22 April 1999). In fact, before starting monitoring, the correct functioning of the instruments was verified and the appropriate calibration checks were carried out with LAT certified cylinders.

EQUIPMENT – MOVING LABORATORY MOLO VI	
SEQUENTIAL GRAVIMETRIC SAMPLER FOR PM10 PARTICLES ON FILTER: Dadolab GIANO	S/N SQ112A120210059
AUTOMATIC SAMPLER FOR PARTICLES PM2.5 24H ON FILTRATING MEMBRANE: Envea MP101M	S/N 9512

AUTOMATIC NITROGEN OXIDE ANALYSER NOX: Envea AC32E	S/N 1405
AUTOMATIC SULPHUR DIOXIDE ANALYSER SO2: Envea AF22E	S/N 1564
AUTOMATIC CARBON MONOXIDE ANALYSER CO: Envea CO12E	S/N 1172
AUTOMATIC OZONE ANALYSER O3: Envea O342E	S/N 1087
AUTOMATIC BENZENE ANALYSER C6H6: Envea VOC72E	S/N 448

Table 2: List of equipment installed on the moving laboratory used for monitoring

Both the monitoring point and the way in which the moving laboratory was installed were checked and approved by ARPA FVG during the start-up phase of the measurement campaigns, during which compliance and proper functioning and calibration of the instrumentation were also checked.

Location of the moving laboratory at Porto San Rocco during the summer campaign

POLLUTION SOURCES

With regard to the atmospheric component, the possible 'pollution sources' can be numerous and highly variable. Industrial, commercial, but also domestic and vehicular activities contribute to determining and/or varying air quality.
In this case, since we do not have to assess and describe a single point, but have to describe and analyse air quality over a very large area, we can only define in a general way the aspects that could somehow positively or negatively affect the quality.

In the area closest to the monitoring point chosen at Porto San Rocco, the only activities that may have partly contributed to altering air quality can be restricted to vehicular movements that may have taken place at the nearby car park during the monitoring period, or the movements of motor boats.

RESULTS

The ante operam atmospheric monitoring, aimed at controlling the impact of diffuse emissions generated on the areas outside the future construction site, in the two seasonal campaigns carried out, made it possible to record the state of air quality by integrating the moving laboratory installed at Porto San Rocco in Muggia with the existing stations of the ARPA FVG monitoring network.

In general, this activity made it possible to verify that the state of air quality at the point chosen at Porto San Rocco is in line with that recorded by the ARPA FVG stations taken as reference. In fact, during both the summer and winter campaigns, values were recorded that were absolutely in line (if not even lower on some occasions).

Pilot action no. 2 : COLD IRONING OF THE QUAYS OF PIER VII IN THE PORT OF TRIESTE

2.1. Pilot action description

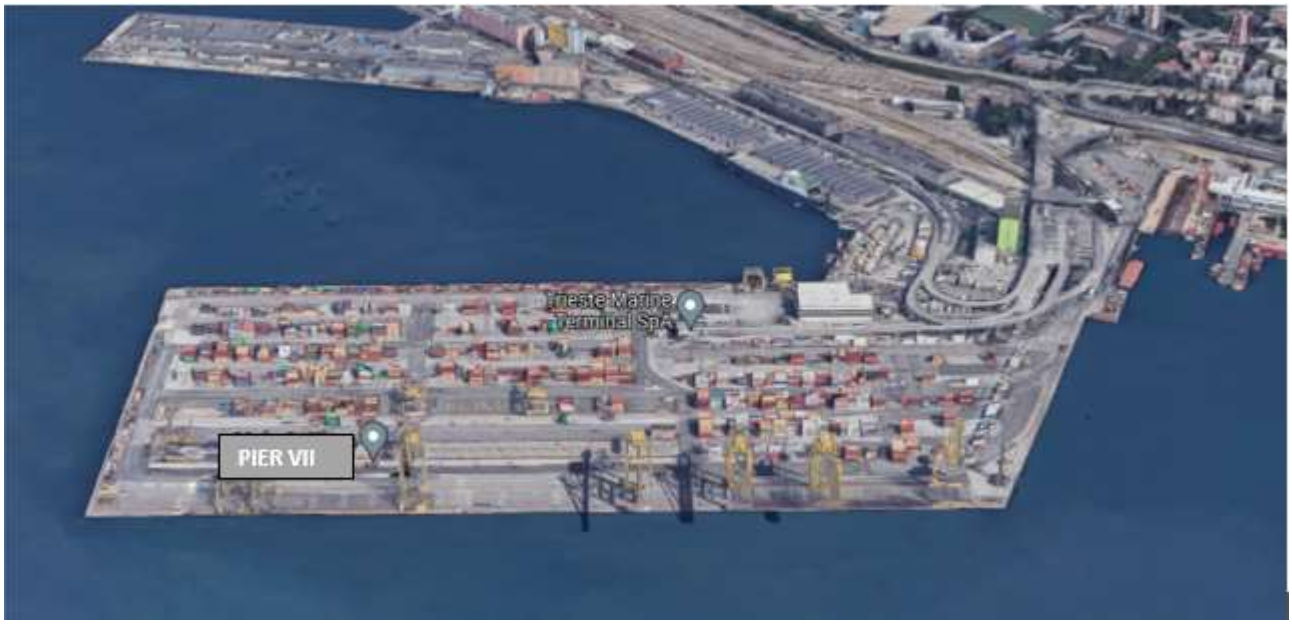
Cold Ironing is a particularly valid technological solution for the purpose of reducing emissions and pollutants generated in the port and contributes to the improvement of air quality, not only in the port areas directly affected by maritime operations, but also in the rear-port and urban ones. This is particularly true in the case of port nodes located close to city area.
Cold Ironing, in fact, was created above all to facilitate the abatement of pollutants in the port, allowing moored ships to turn off the auxiliary engines to connect to the electricity grid present on land. In this way, the loading/unloading operations of the ship can continue and all the services for passengers can be kept on board, despite the unit being moored with the engines off. This system takes the form of connecting the ship to the quay by means of a cable, comparable to an extension from the ground, in order to supply it with all the energy necessary to stop its engines and therefore to significantly improve the quality of the air in port.

The pilot action is part of a very broad context of initiatives promoted by the European Commission in the context of interventions aimed at ensuring "Clean Energy in Transport". Cold Ironing

represents a very important intervention for the reduction of local emissions during the mooring of ships and is therefore particularly interesting for ports such as Trieste, which is an integral part of the urban context.

SPECIFIC CONTEXT ANALYSIS

The design concerns a Cold Ironing system to be dedicated to Pier VII of the Port of Trieste. The preliminary project drawn up by the Port Network Authority of the Eastern Adriatic Sea (PNAEAS) envisaged the realisation of three connection points along the south quay.



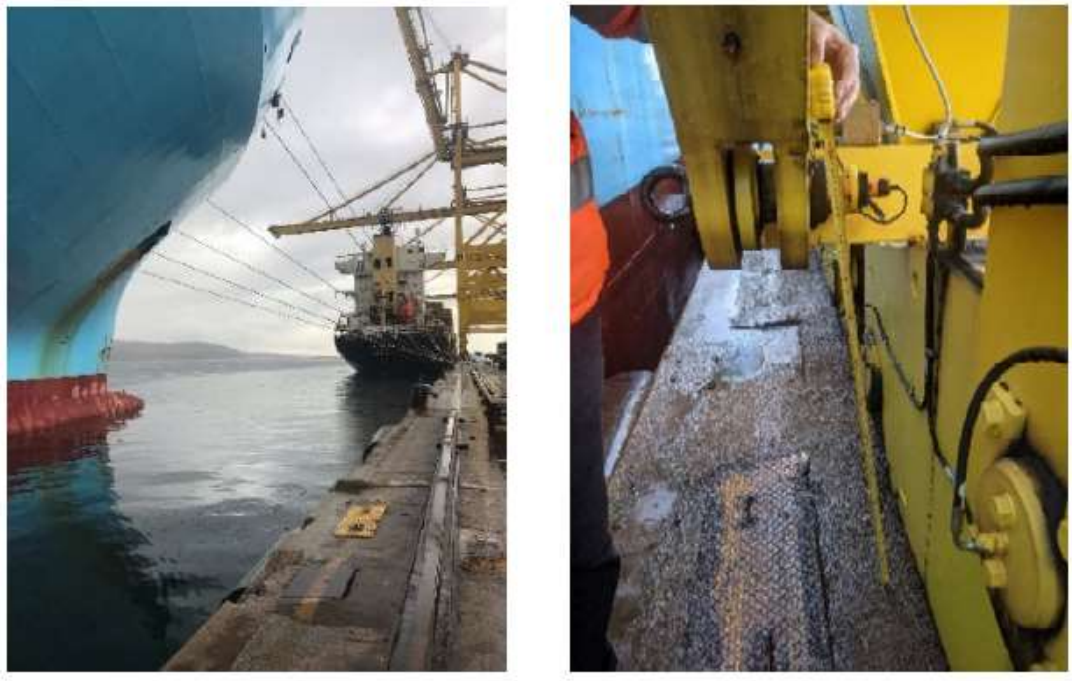
Pier VII – Port of Trieste

The docking ships are container-cargo ships and, as foreseen by the project, the cold ironing systems serving these ships must meet the specific regulatory standard IEC 80005-1 "Utility connections in port - Part 1: High voltage shore connection (HVSC) systems - General requirements".

GENERAL PROJECT FEATURES

The area for the realisation of the Cold Ironing system consists of a small portion of Pier VII of the Port of Trieste. In particular, it is the area close to the root and facing the south quay.
The area is supported by a deck system, consisting of piers on which pre-stressed reinforced concrete plates rest and on which the foundation of the roadway for the handling vehicles is built,

having a thickness of 40 cm. Within this thickness are all the sub-services (cables, water network, etc.) as well as the foundations of the tracks for the railway wagons and the beams that support the two runways for the movement of the seven STS (Ship-to-Shore) cranes that cover the entire current length of the Pier (approx. 770m).
On the quay, where the connection systems for cold ironing are located, the space available is limited by the presence of the bollards and the ground anchoring systems of the STS cranes in cases of strong winds (tie-down systems).



Quay edge with slot for tie-down connection

Near the identified area there is an electrical cabin called Cabin A, connected to the port's 6.6kV inner ring and supplying power to some low voltage service stations and a 6.6kV quay crane. Around the cabin there is an internal road system for the circulation of the terminal operator's work vehicles, a system of tracks for the circulation of cargo wagons, several places for the container storage and the quay cranes travelling on rails parallel to the south quay.
The electrification of docks in existing ports is an intervention strongly conditioned: by the general lack of space; by the need to combine the operator's needs, both in terms of minimising operational limitations during implementation, and in terms of minimising impacts during normal terminal operation, once integration has taken place.
The project involves the electrification of a portion of the quay using a moving connection system. Considering a future development in which additional moving systems are added, it has been considered that, both due to contemporaneity factors seen so far for ships equipped with the HVSC

system, and due to limits of power available from the distributor, there will not be a demand exceeding two units of 7.5MVA each.
The planned cold ironing system will be powered by a 27.5kV line, which will be installed in a new electrical cabin named CEB1 and located approximately 35m to the right of the existing Cabin A. Inside the new cabin there will be space for the transformation and energy conversion equipment for adaptation to the voltage and frequency levels required by the standard IEC 80005-1 which, for the specific case of container ships, requires vessels to be powered at 6.6kV and 60Hz.
From the CEB1 cabin, a cable will be laid to reach the root of the Pier. Here will be positioned a technical room provided with the necessary equipment for the sectioning of the MT line and for the interconnection with the moving socket system.

Project scheme

The planned moving system will be of rail-type, with a moving capacity of up to 400m. The rail will be fixed to the on-board beam, will support the movable part of the system and will provide space for housing the power circuits of the system itself.

In the event of future extensions of the quay, which is planned to be extended in a westerly direction by approximately 100 m, on the basis of the pilot action implemented during SUSPORT, the use of a second moving system to cover the second half of the quay is envisaged in order to continue the process towards increasingly green and sustainable ports.

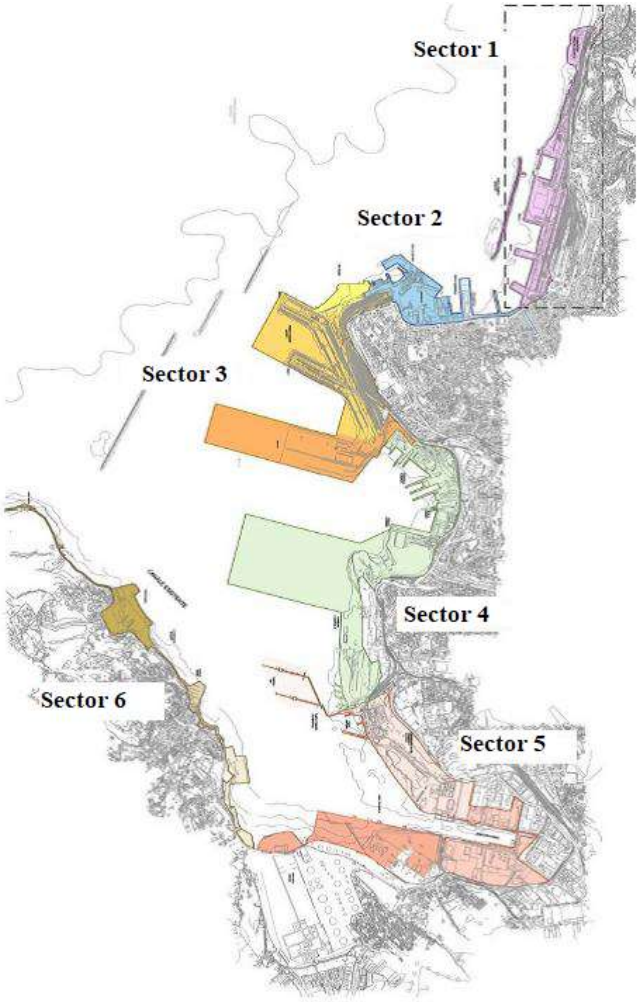
Pilot action no. 3 : REPLACING OF THE LIGHTING SYSTEM WITH LED LIGHT BULBS

3.1.Pilot action description

Relamping is one of the key interventions when it comes to energy efficiency. As the word itself suggests, relamping consists of replacing traditional luminaires, such as halogen, incandescent or fluorescent lamps, with modern LED (Light Emitting Diode) lamps, in order to achieve a reduction in energy consumption.
Perhaps the most important advantage of LEDs is their control, i.e. the ability to control their brightness and colour temperature remotely. All aspects of smart lighting make this technology even more interesting with a view to using it only when and where it is really needed.
Finally, the reduction of environmental impact should not be overlooked, as LED lamps are non-toxic and do not contain mercury.
PNAEAS has therefore carried out replacement of existing luminaires with new LED technology units.

A total of **523 traditional lightings** were replaced with LED technology. The area was divided into sectors as specified in the Master Plan of the Port of Trieste, with a progressive number per sector:

- Sector 1 - “Barcola Bovedo” and “Porto Franco Vecchio”
- Sector 2 - “Porto doganale” and “Rive”
- Sector 3 - “Riva Traiana” and “Porto Franco Nuovo”
- Sector 4 - “Arsenale San Marco”, Timber Yard, Logistics Platform and Pier VIII
- Sector 5 - Mineral Oil Free Point and “Esso” area, Industrial Canal and “Valle delle Noghere”
- Sector 6 - Muggia coastline



Below is a legend of the LED bulbs installed and a complete list with the number and type of bulb corresponding to each sector.

L2	Armature stradale LED 3833 lm, 4000 K, 141 lm/W Ottica Narrow Road, CRI 70, Classe 2 THORN 96275842 IP 12L70-740 NR BPS CL2 M60 ANT	L12	Proiettore LED 11425 lm, 4000 K, 148 lm/W Ottica 60°, CRI 70, Classe 2 Alimentatore DALI THORN 96644650 AFP S 36L70-740 A6 HFX CL2 GY
L3	Armature stradale LED 3833 lm, 4000 K, 141 lm/W Ottica Narrow Road, CRI 70, Classe 2 Alimentatore DALI THORN 92949075 IP 12L70-740 NR BP 2550 HFX CL2 T60F ANT	L13	Proiettore LED 11589 lm, 4000 K, 151 lm/W Ottica 40°, CRI 70, Classe 2 Alimentatore DALI THORN 96644648 AFP S 36L70-740 A4 HFX CL2 GY
L4	Armature stradale LED 9618 lm, 4000 K, 148 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 THORN 96275993 IP 24L50-740 EWR BPS CL2 T60F ANT W8	L14	Proiettore LED 23039 lm, 4000 K, 158 lm/W Ottica 40°, CRI 70, Classe 2 Alimentatore DALI THORN 96645016 AFP M 72L70-740 A4 HFX CL2 GY
L5	Armature stradale LED 8484 lm, 4000 K, 154 lm/W Ottica Narrow Road, CRI 70, Classe 2 THORN 96276040 IP 36L50-740 NR BPS CL2 M60 ANT	L15	Proiettore LED 23125 lm, 4000 K, 154 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 Alimentatore Stradale THORN 96644995 AFP M 72L70-740 EWR BPS CL2 GY
L6	Armature stradale LED 13325 lm, 4000 K, 142 lm/W Ottica Narrow Road, CRI 70, Classe 2 THORN 96276042 IP 36L85-740 NR BPS CL2 M60 ANT	L16	Proiettore LED 51325 lm, 4000 K, 143 lm/W Ottica 40°, CRI 70, Classe 2 Alimentatore DALI THORN 96632240 AFP L 144L85-740 A4 HFX CL2 GY
L8	Armature stradale LED 22068 lm, 4000 K, 147 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 THORN 92904809 IP 72L70-740 NR BPS CL2 M60 ANT	L17	Proiettore LED alto flusso 168302 lm, 4000 K, 143 lm/W Ottica 60°, CRI 70, Classe 1 Alimentatore DALI THORN 96659204 + 96531414 ALTISLED03 396L A6-I 740+ ALTISLED03 GB 396L105 200-440 DA
L9	Proiettore LED 4237 lm, 4000 K, 151 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 Alimentatore DALI THORN 96644723 AFP S 24L35-740 EWR HFX CL2 GY	P2	Proiettore LED architetturale 3885 lm, 2200-4000 K, 39 W Ottica 60°, CRI 80, Classe 2 Alimentatore DALI THORN 96635026 + 96635056 CONT3 12L70 722-840 NB HFX SP ANT + CONT3 12L DIFFUSER EB 10X40° ANT
L10	Proiettore LED 8321 lm, 4000 K, 152 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 Alimentatore DALI THORN 96644783 AFP S 36L35-740 EWR HFX CL2 GY	L18	Apparecchio LED alto flusso 4209 lm, 4000 K, 107 lm/W Ottica simmetrica, CRI 70, Classe 2 THORN 96630868 FEROZ LED4200-840 OP HF L1200 TW
L11	Proiettore LED 7796 lm, 4000 K, 150 lm/W Ottica Extra Wide Road, CRI 70, Classe 2 Alimentatore DALI THORN 96644763 AFP S 24L70-740 EWR HFX CL2 GY	PIR	Rilevatore radar veicoli 4 -150 km/h THORN 96628011 RF CONTROLLER PIR E
	Illuminazione punto luce su etichetta ocsie	RF	Controller RF THORN 96628009 RF CONTROLLER E
		GW	Gateway sistema controllo illuminazione THORN 96628013 GATEWAY SIMC ETH E

NUMBERING OF INDIVIDUAL LIGHTINGS - PORT OF TRIESTE			
SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
1	QE ILLUMINAZIONE MOLO III	1	L8
		2	L8
		3	L8
		4	L8
		5	L8
		6	L8
		7	L8
		8	L8
		9	L8
		10	L8
		11	L8
		12	L8
		13	L8
		14	L8
		15	L8
		16	L8
		17	L8
		18	L8
		19	L8
		20	L8
		21	L8
		22	L8
	QE ILLUMINAZIONE MOLO 0	23	L8
		24	L8
		25	L8
		26	L8
		27	L8
		28	L8
2	QE CAPITANERIA	1	L4
		2	L4
	QE ILLUMINAZIONE MOLO BANDIERA	3	L4
		4	L4
		5	L4
		6	L4
	QE SCALE	7	P2
		8	P2
		9	P2
		10	P2
		11	P2
		12	P2
		13	P2
		14	P2
4	CABINA TORRE LLOYD	1	L15
		2	L15
	QE TORRE OROLOGIO	3	P2
		4	P2
		5	P2
	QE VARCO SCALO LEGNAMI	6	L11
		7	L11
		8	L11
		9	L11
		10	L11
		11	L11
		12	L11
		13	L11
		14	L11
		15	L11
	QE PARTI COMUNI VIA SVEVO	16	L6
		17	L6
		18	L6
		19	L6
		20	L6
		21	L6
5	QE VARCO PFOM	1	L9
		2	L9
		3	L9
		4	L9
		5	L9
		6	L9
		7	L9
		8	L9
		9	L9
	QE FINANZA PFMO	10	L18
		11	L18
		12	L18
		13	L18

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	CABINA VARCO 1	1	L2
		2	L2
		3	L2
		4	L2
		5	L2
		6	L2
		7	L2
		8	L2
		9	L2
		10	L2
		11	L2
		12	L2
		13	L2
		14	L2
		15	L14
		16	L14
		17	L14
		18	L14
		19	L14
		20	L14
		21	L14
		22	L14
		23	L2
		24	L2
		25	L3
		26	L2
		27	L3
		28	L2
		29	L3
		30	L2
		31	L3
		32	L2
		33	L3
		34	L2
		35	L3
		36	L3
		37	L3
		38	L3
		39	L3
		40	L3
		41	L3
		42	L3
		43	L16
		44	L3
		45	L12
		46	L3
		47	L16
		48	L3
		49	L3
		50	L3
		51	L3
		52	L3
		53	L3
		54	L3
		55	L3
		56	L12
		57	L12
		58	L13
		59	L13
		60	L13
		61	L13
		62	L2
		63	L2
		64	L2
		65	L2
		66	L2
		67	L2
		68	L2
		69	L2
		70	L2
		71	L6
		72	L2
		73	L6
		74	L6
		75	L5
		76	L2
		77	L2
		78	L2
		79	L2
		80	L2
		81	L2

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	QEG VARCO 1	82	L2
		83	L2
		84	L2
		85	L10
		86	L10
		87	L10
		88	L10
		89	L10
		90	L10
		91	L10
		92	L10
		93	L10
		94	L10
		95	L10
		96	L10
		97	L10
		98	L10
		99	L10
		100	L10
		101	L10
		101/1	L10
		101/2	L10
		101/3	L10
	CABINA 57	102	L5
		103	L5
		104	L5
		105	L5
		106	L5
		107	L4
		108	L4
		109	L4
		110	L4
		111	L4
		112	L4
		113	L4
		114	L4
		115	L4
		116	L10
		117	L10
		118	L6
		119	L6
		120	L4
		121	L4
		122	L14
		123	L14
		124	L14
		125	L14
		126	L14
		127	L10
		128	SPARE
		129	SPARE
		130	SPARE
		131	SPARE
		132	SPARE
3	QEG SCANNER	133	L9
		134	L10
		135	L9
		136	L9
		137	L10
		138	L9
		139	L9
		140	L10
		141	L9
		142	L9
		143	L9
		144	L10
		145	L10
		146	L9
		147	L9
		148	L9
		149	L9
		150	L10
		151	L10
		152	L9
		153	L9
		154	L9
		155	L9
		156	L10
		157	L10
		158	L9
		159	L9
		160	L9
		161	L10
		162	L9
		163	L9

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	QEG SCANNER	164	L10
		165	L9
		166	L9
		167	L9
		168	L9
		169	L10
		170	L9
		171	L9
		172	L10
		173	L9
		174	L9
		175	L10
		176	L9
		177	L9
		178	L10
		179	L9
		180	L9
		181	L10
		182	L9
		183	SPARE
		184	SPARE
3	CABINA 58	185	L13
		186	L13
		187	L13
		188	L13
		189	L13
		190	L13
		191	L13
		192	L13
		193	L13
		194	L13
		195	L13
		196	L13
		197	L13
		198	L13
		199	L13
		200	L13
		201	L13
	CABINA 65	202	L17
		203	L17
		204	L17
		205	L17
		206	L17
		207	L16
		208	L16
	CABINA 71	209	L13
		210	L13
		211	L13
		212	L13
		213	L13
		214	L13
		215	L13
		216	L13
		217	L13
		218	L13
		219	L13
		220	L13
		221	L13
	QEG VARCO 4	223	L13
		224	L13
		225	L13
		226	L13
		227	L13
		228	L13
		229	L13
		230	L13
		231	L13
		232	L13
	QE RAMPA	233	L5
		234	L5
		235	L5
		236	L5
		237	L5
		238	L5
		239	L5

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	CABINA 60	240	L5
		241	L5
		242	L5
		243	L5
		244	L5
		245	L5
		246	L5
		247	L5
		248	L5
		249	L5
		250	L5
		251	L5
		252	L3
		253	L3
		254	L3
		255	L3
		256	L3
		257	L3
		258	L3
		259	L3
		260	L3
		261	L3
		262	L3
		263	L3
		264	L3
		265	L3
		266	L3
		267	L3
		268	L3
		269	L3
		270	L3
		271	L3
		272	L3
		273	L3
		274	L3
		275	L3
		276	L3
		277	L3
		278	L2
		279	L2
		280	L2
		281	L2
		282	L2
		283	L2
		284	L2
		285	L2
		286	L2
		287	L2
		288	L2
		289	L2
		290	L2
		291	L2
		292	L2
		293	L2
		294	L2
		295	L2
		296	L2
		297	L2
		298	L2
		299	L2
		300	L2
		301	L2
		302	L2
		303	L2
		304	L2
		305	L2
		306	L2
		307	L16
		308	L2
		309	L6
		310	L2
		311	L16
		312	L6
		313	L2
		314	L2
		315	L2
		316	SPARE
		317	SPARE
		318	SPARE
		319	SPARE

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	CABINA 72	320	L3
		321	L3
		322	L3
		323	L3
		324	L3
		325	L3
		326	L3
		327	L3
		328	L3
		329	L3
		330	L3
		331	L3
		332	L3
		333	L3
		334	L3
		335	L3
		336	L3
		337	L3
		338	L3
		339	L2
		340	L3
		341	L2
		342	L2
		343	L2
		344	L2
		345	L2
		346	L2
		347	L2
		348	L2
		349	L2
		350	L2
		351	L2
		352	L2
		353	L2
		354	L2
		355	L2
		356	L2
		357	L2
		358	L2
		359	L2
		360	L2
		361	L2
		362	L2
		363	L2
		364	L2
		365	L2
		366	L2
		367	L2
		368	L2
		369	L2
		370	L2
		371	L2
		372	L2
		373	SPARE
		374	SPARE
		375	SPARE
		376	SPARE
		377	SPARE
3	CABINA SSP	378	L5
		379	L5
		380	L5
		381	L5
		382	L5
		383	L5
		384	L5
		385	L4
		386	L5
		387	L4
		388	L4
		389	L4
		390	L3
		391	L4
		392	L4
		393	L4
		394	L4
		395	L4
		396	L4
		397	L4
		398	L4
		399	L4
		400	L4
		401	L4

SECTOR	POWER SUPPLY	LIGHT NUMBER	BULB TYPE
3	CABINA SSP	402	L4
		403	L3
		404	L3
		405	L3
		406	L3
		407	L3
		408	L3
		409	L3
		410	L3
		411	L3
		412	L3
		413	L3
		414	L3
		415	L3
		416	L3
		417	L3
		418	L3
		419	L3
		420	L3
		421	L3
		422	L3
		423	L3
		424	L3
		425	L3
		426	L3
		427	L3
		428	L3
		429	L3
		430	L3
		431	L3
		432	L3
		433	L3
		434	L3
		435	L3
		436	L3
		437	L3
		438	L3
		439	L3
		440	L3
		441	L3
		442	L3
		443	L3
		444	SPARE
		445	SPARE
		446	SPARE
		447	SPARE

Pilot action no. 4 : E - CARS

4.1.Pilot action description

According to Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014, ports are incentivised to consider, for internal mobility, the transition to the electric vehicle. This will allow ports to benefit in terms of energy efficiency and air quality (no on-site emissions of pollutants and fine dust). The focus is therefore on investment in electric vehicles and the construction of electric charging points to promote their use.
Currently, PNAEAS has two hybrid cars used by the inspection team for service in the port areas, while the 'in house' service company Porto di Trieste Servizi S.r.l. has an electric car, also used for service in the port areas.

Thanks to SUSPORT, the Port of Trieste has purchased **2 electric vehicles** to serve its employees and implemented the number of environmentally friendly vehicles. The two purchased cars, which will further reduce pollution, are the following:

RENAULT MEGANE E-TECH 100% ELECTRIC
TECHNO EV60 220CV OPTIMUM CHARGE

In this regard, we would like to emphasise the complementarity with the pilot action envisaged in the CLEAN BERTH project, *Cross-border Institutional Cooperation for Environmental Sustainability and Energy Efficiency in Ports*, co-financed by the Interreg Italy-Slovenia Programme, which envisages in 2022 the construction of three electric vehicle recharging stations, located at the Port's premises. Furthermore, PNAEAS also participates to the European Project "NOEMIX" (Project for the promotion of electric mobility in the Public Administration - Horizon 2020 Programme), which envisages the complete replacement of the current car fleet (with conventional engines), through the "leasing" formula, with "full electric" cars and the simultaneous installation of additional charging stations.

CONCLUSIONS

The realisation of the pilot actions within the SUSPORT project allowed PNAEAS to achieve significant green targets in terms of CO2 emission reduction.
As indicated in all the documents mentioned in the introduction, TNA Analysis and Best Practice Analysis, to achieve energy and operational sustainability of ports it is necessary for them to implement a mix of actions by exploiting new technologies and new sources of renewable energy, from cold ironing, to the purchase of electric vehicles, to the replacement of lighting systems with LED technology.
Although the monitoring, described in Pilot Action 1, as a mere monitoring activity, it does not lead to a direct reduction of CO2 emissions, but thanks to it, monitoring data will be used to validate implemented activities and improve planned ones, providing useful information to identify and enhance the most effective measures to consolidate the best short-, medium- and long-term strategies for environmental sustainability.

The following table summarises the results achieved for each pilot action in reducing CO2 emissions (with the exception of pilot action no.1 as specified above):

CO2 REDUCTION EXPECTED FROM PILOT ACTIONS		
	PILOT ACTION	**EXPECTED CO2 EMISSION REDUCTION [T/YEAR].**
2	*COLD IRONING OF THE QUAYS OF PIER VII IN THE PORT OF TRIESTE*	12.398,13
3	*REPLACING OF THE LIGHTING SYSTEM WITH LED LIGHT BULBS*	134,12
4	*E-CARS*	16,09
	TOTAL	**12.548,34**

Thanks to SUSPORT the Port of Trieste will be able to reduce CO2 emissions by a total of **12.548,34** t/year. This result together with those obtained by the other Ports in the Programme area will strengthen environmental protection and decreasing GHG emissions of the cross-border maritime transport**.**