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WP5.2. Identification of Risk Activities in the Harbor Area of Genoa



Identification of Risk Activities in the Harbor Area of Genoa ⁽¹⁾

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1.1 Identification of the present time risk activities and vulnerability systems

1.1 Description of the docks in Genoa Port



1. PORTO DI VOLTRI
2. FINCANTIERI
3. PORTO PETROLI
4. PORTO DI SAMPIERDARENA
5. PORTO STORICO
6. RIPARAZIONI NAVALI

1. PORTO DI VOLTRI

Terminal VTE



It's the most important container terminal in the Port of Genoa and one of the most efficient in the Mediterranean, with a current capacity of 1.5 million TEUs per year and trades that, to date, are about 1 million TEUs (over 50 % of total handled the entire port of Genoa). Currently occupies approximately 110 hectares of square meters of yards.

With a quay length of 1,200 metres along 5 modules and a draft of 15 metres, the terminal is equipped to accommodate simultaneously four last generation full-container vessels and three ro-ro ships.

Another important feature of Voltri is the brand new distripark, it incorporates a modern office tower of 7,200 sqm, 20,000 sqm of warehouses, and an integrated centre dedicated to the provision of value-added services to logistics and distribution companies.

Location

- Port of Prà Voltri

Area

- Terminal 1,000,000 sqm (5 modules)
- Distripark 20,000 sqm of covered warehouses

Equipment

- 8 post-panamax cranes
- 2 post-panamax cranes on order
- 20 RTGs
- 3 RMGs

Quay

- 1,200 m. (5 modules)

Berths

- 4 large full container ships can be berthed simultaneously
- 3 ro-ro berths

Draft

- 15 m.

Rail facilities

- 8 rail tracks 650 m.

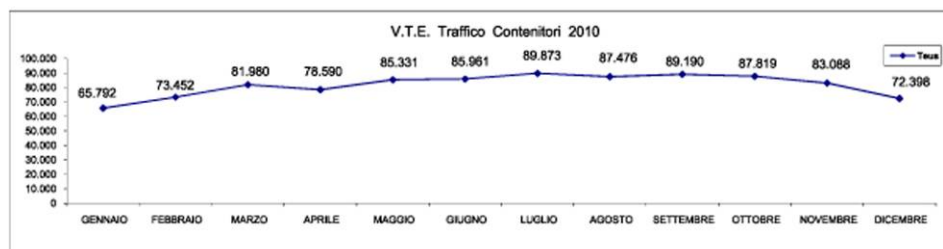
Additional facilities

- 600 reefer contplugs

V.T.E.

Traffico contenitori 2010

MESE	SBARCO CONTENITORI		IMBARCO CONTENITORI		TOTALE SBA/IMB	SBARCO CONTENITORI		IMBARCO CONTENITORI		TOTALE SBA/IMB	TOTALE GENERALE	
	P. 20	P. 40	P. 20	P. 40	CONT. P.	V. 20	V. 40	V. 20	V. 40	CONT. V.	CONT.P/V	CONT.P/V
	Num.		Num.		Num.	Num.		Num.		Num.	Num.	Teus
GENNAIO	8.892	10.786	6.639	9.519	35.836	1.504	2.225	1.089	1.304	6.122	41.958	65.792
FEBBRAIO	8.973	11.334	8.173	11.882	40.362	539	1.419	2.369	2.064	6.391	46.753	73.452
MARZO	9.787	11.918	8.989	12.437	43.131	1.212	2.735	2.534	2.639	9.120	52.251	81.980
APRILE	10.222	10.940	9.470	12.131	42.763	1.530	3.155	1.150	1.883	7.718	50.481	78.590
MAGGIO	10.417	11.754	9.817	13.045	45.033	1.667	2.979	1.002	3.436	9.084	54.117	85.331
GIUGNO	10.277	12.466	9.456	12.855	45.054	1.262	3.128	1.748	3.160	9.298	54.352	85.961
LUGLIO	11.056	12.127	10.190	13.495	46.868	1.678	4.811	1.827	2.128	10.444	57.312	89.873
AGOSTO	10.009	13.499	9.779	14.984	48.271	1.241	2.721	951	1.544	6.457	54.728	87.476
SETTEMBRE	11.852	13.339	8.474	12.065	45.730	1.528	2.909	2.156	4.277	10.870	56.600	89.190
OTTOBRE	9.651	10.745	10.464	14.908	45.768	1.437	3.864	1.957	2.638	9.896	55.664	87.819
NOVEMBRE	9.624	11.100	9.099	14.408	44.231	933	4.714	934	1.027	7.608	51.839	83.088
DICEMBRE	8.795	9.317	8.505	12.729	39.346	648	3.372	1.286	1.164	6.470	45.816	72.398
TOTALE	119.555	139.325	109.055	154.458	522.393	15.179	38.032	19.003	27.264	99.478	621.871	980.950



2. FINCANTIERI

Fincantieri Shipyard



Area PMS7 actual PRP (Port Authority Plan)

Designed to allocate the construction of cruise ships from Fincantieri SPA occupies 435,700 square meters and has a covered area equal to 67,800 square meters.

3. PORTO PETROLI



Oil Terminal of Genoa S.p.A.

it covers an area of 123,000 square meters excluding the lakes, consists of a quay, wharf West, and four piers: Alpha, Beta, Gamma and Delta. Certifications ISO 9001:2208, ISO 14001:2004, SA8000: 2008. To these berths are added a buoy monormeggio ("Monoboa") and an unloading platform offshore ("Island"), currently not operational. The operations are prevalent exhaust: the current trend is around an annual handling about 20 million tons of oil products transported an average of 550 vessels of different.

The terminal, thanks to a complex network of pipelines, serves several refineries in northern Italy and the refinery Aigle in Switzerland. Within the oil port no operations are performed for the treatment of products or storage activities. Tanks located in the port area are used exclusively for the storage of water, and recycle oil from the foam to the fire alarm system.

Currently the maximum size of ships are:

- draft : 14.10 m
- LOA: 330
- SDWT: 260,000 tons

4. PORTO DI SAMPIERDARENA



Terminal San Giorgio (TSG)

Terminal San Giorgio (TSG), in which Gavio Spa has a majority stake, with the remainder held by Finterminal Srl, ranks as one of Genoa's premier multipurpose terminals.

The company has been operating in the port since April 2006 and is equipped to handle the full range of commodities, namely, container, breakbulk, project cargo, steel products, yachts and ro-ro.

TSG covers a total surface area of 80,000 sqm, featuring 2 on-terminal rail tracks.

Backed by its major investment programme in modern handling equipment and skilled staff, TSG has succeeded in rapidly boosting its throughput, both in terms of lo-lo traffic, –

specifically full-container and breakbulk – and ro-ro traffic, thereby firmly establishing the company as one of the premier terminal operators of the Motorways of the Sea in the Port of Genoa.

Location

- Port of Genoa - Ponte Libia

Area

- 80.000 sqm. fully fenced as per ISPS compliance

Equipment

- Mobile crane Fantuzzi 130 tons with twin lift
- Mobile crane Fantuzzi 120 tons with twin lift
- Mobile crane Gottwald 100 tons
- Mobile crane Gottwald 80 tons
- N. 3 Full Reach Stackers Fantuzzi 45 tons
- N. 3 Full Reach Stackers CVS 45 tons
- N. 4 Front stacker CVS 32 tons
- N. 3 Front stacker CVS 16 tons
- N. 3 Front stacker CVS 4 tons
- 8 Tugmaster Terberg
- 50 MAFI from 80 to 120 tons
- All equipment required for the handling of containers, machinery, project cargo, yachts, etc..

Quay

- 600 m.

Berths

- 4 lo-lo and 1 ro-ro berths

Draft

- 11/12 m.

Rail facilities

2 on-terminal railway lines, 350 m. each

Terminal Rinfuse Italia

Terminal Rinfuse Italia, one of the leading companies in the dry bulk port business, operates four port terminals in Genoa, Savona – Vado, and Marghera-Venice, with a total throughput in excess of 7 million tons.

The major commodities handled are coal, minerals, scrap, rock salt, fertilisers, kaolin, special sands, bauxite and white powders.

In agreement with the Port Authority, the company has installed along Calata Giaccone a new modern warehouse of 40,000 m³, split into separate areas, equipped for the unloading and storage of soya flour.

This facility is connected direct to Ponte Rubattino with a 600 m-conveyor rail-loading system.

Idroscalo Quay is dedicated, in addition to dry bulk, to steel products and is equipped with an 80 ton-Fantuzzi rubber-tyred mobile harbour crane.

The site offers a range of back-up services.

Location

- Ponte Rubattino
- Ponte San Giorgio
- Ponte Idroscalo

Area

- 154,520 sqm.

Equipment

- 8 cranes capacity 12/80 tons
- 3,000 m. fully automated and integrated conveyor stacking and reclaimer system for coal and minerals
- Trailers
- Skid-steer loaders
- Warehouse with a storage capacity of 40,000 m³ for animal feed
- Warehouse with a storage capacity of 30,000 m³ for powders

Quay

- 1,522 m.

Depth

- 12 m. max

Rail tracks

3,900 m.

Terminal Frutta Genova (TFG)

It's the only terminal operator in the Port of Genoa equipped to offer the full range of services regarding loading, unloading, storage and handling of fruit and perishable goods. TFG is located along Ponte Somalia in an area of approximately 70,000 sqm, with 14,000 sqm of cold storage space and a 10,000 sqm dry LIFFE/LME certified warehouse.

Location

- Ponte Somalia

Area

- 70,000 sqm., 24,000 sqm of which are covered ware houses (14,000 sqm. cold storage area)

Equipment

- 14 cold storage rooms (cold storage capacity: 13,400 pallets)
- 5 cranes capacity 6 tons.
- 1 mobile crane capacity 80 t.
- 1 contstacker
- 24 electric transpallets
- 24 cwt fork-lift 16/25 q.
- 10 double fork lift diesel trucks
- 1 fork-lift with clamp
- 1 fork-lift truck CVS
- 5 catalytic ethilene absorbers
- 90 reefer container plugs

Quay

- 700 m.

Berths

- 4

Depth

- 11/2 m.

Rail facilities

- 1 dedicated railway track

Additional facilities

- 25 loading stations
- 4 ripening rooms for bananas with 48 pallets capacity each

II Terminal Silomar

The Silomar Terminal is equipped for the handling and storage of vegetable oils and fats, mineral oils and bulk chemical products with a flash point superior to 65 degrees.

Silomar has recently installed new steel tanks, boosting storage capacity to today's 78,000 m³. In addition, the construction of a second rail link is underway.

Silomar was the first terminal in the Port of Genoa to have received ISO9001 and ISO14001 certification.

In 2010 were handled more than 550,000 tons of products, with a significant increase over the previous year, of which the most important are caustic soda, biodiesel and additives for lubricating oils and reaching the remarkable average turnover rate of the tanks equal to 7.0

Location

- Ponte Etiopia

Area

- 19,969 sqm.
- 83 tanks capacity 78,000 m³

Equipment

- 12 oil pipelines from warehouse to berths
- 12 loading stations with 77 pumps
- 1 nitrogen distribution plant
- 3 steam generators with a total capacity of 7,200,000 kcal

Quay

- 695 m.

Berths

- Ponte Etiopia Levante 210 m.
- Ponte Etiopia Testata 145 m.
- Ponte Etiopia Ponente 210 m.
- Calata Massaua 130 m.

Depth

10 m.

Terminal Sampierdarena Olli

This coastal tank deposit, which covers an area of 11,000 sqm, is located along Calata Mogadiscio in Sampierdarena.

Sampierdarena Olli offers the following services:

- Loading/unloading and reloading on tank trucks
- Logistic support for both transport by sea and by land on board tankers, tank cars and tank trucks
- Assistance to ships through ship agencies
- Quantity/quality controls of the cargo handled
- Quotations for transport by land, by sea, by tankcontainer and by rail car.

Location

- Calata Mogadiscio
- Ponte Etiopia

Area

- 11,000 sqm.
- 35,000 m³

Equipment

- vitrified stainless steel tanks
- 1 reinforced concrete cellar composed of vitrified tanks for a total capacity of 3,000 m³
- Positive-displacement pumps of the leading manufacturing firms for product loading on board ships or tank trucks
- 1 hot water-powered central heating composed of three boilers for products requiring controlled temperature
- 6 pipelines connecting the deposit to the 4 berths
- 3 electronic weighing bridges capacity 80 tons
- 1 rail link

Quay

- Calata Mogadiscio 110 m.
- Head of Ponte Somalia 170 m.
- Ponte Somalia Radice 200 m.
- Ponte Eritrea 200 m. (planning stage)

Depth

9.5 m.

SAAR Depositi Portuali S.p.A.

The group is one of the leading companies in the Mediterranean dedicated to the discharging, storage and handling of liquid bulk. SAAR covers 75% of vegetable oil trade, and works with some of the largest and most important Italian and European operators in the liquid food bulk market.

Offers two different types of landings, a dedicated dock for vessels over 190 meters long with a draft of over 12 meters and another for smaller ships (120 meters long and 9 meters of draft), in addition to seven lines of landing independent controls allow to run simultaneously on different products, three trucks electronics, and a railway siding.

The terminal operator has invested heavily in the facility to build on its strong performance.

The handling process is fully automated, including temperature control, pump operation and unloading. SAAR is equipped to offer a full logistics service to its national and international clients through links with shipping agents, freight-forwarders, carriers and road-hauliers for a total of approximately 11,000 trucks and 1,500 railways trucks per year.

The terminal gained ISO 9001 certification for quality service management and ISO 14001 certification for environmental protection

II Genoa Port Terminal (GPT)

Its business is terminal operator in the port of Genoa covers an area of 115,000 square meters jointed rail and a total of 1056 m. of operating docks. Service Center Derna with its area of 48,000 square meters, the Service Center Derna conducts storage, consolidation, filling and emptying, including packaging and palletizing of bulk cargo. Consortium Genoa Distripark It 'an area of 45,000 square meters adjacent to the port of Genoa Voltri intended primarily to perform the consolidation, filling and emptying and stock for each type of goods, in containers or in bulk.

Terminal Messina

Messina has invested substantially to improve the 167,000 sqm. concession at the Nino Ronco location (main hub of all its shipping services) - in 2004 extended to Molo Canepa, a portion of Calata Bengasi and the areas lying behind for a total area of 253,000 sqm. - furnishing the terminal with equipment and infrastructure needed for rapid and efficient cargo handling including warehousing and consolidation (a covered area extending over 18,000 sqm.).

At the terminal containers, general and rolling cargo, special equipment as well as awkward cargo with excess weight and measurements can be handled.

There are berthing facilities for 5/6 vessels, 4 Ro-Ro ramp facilities, easy and exclusive road-rail connections, full dedicated Customs attendance, a 6,500 sqm. multi-storey car park and a marine and vehicle workshop providing year-round technical assistance and maintenance for landside handling equipment and vessels alike. A further four ship-to-shore container cranes have already been acquired to complement the existing three; the reachstackers and the forklifts will also be increased.

Messina's Nino Ronco facility was the first terminal in Europe to obtain: RINA 18.001:2007 - OHSAS Occupational Health & Safety Management System (first issue 25/10/2001) as well as ISO 14001:2004 – Environmental Management System (first issue 25/11/2004) and ISPS Code security approval issued by Genoa Harbour Office.

TECHNICAL CHARACTERISTICS

Location

- Ponti Nino Ronco and Canepa

Area

- 253,355 sqm.
- Storage capacity full containers: 6,579 teus
- Storage capacity empty containers: 3,077 teus
- Reefer contplugs: 24
- Storage capacity hazardous cargo: 305 conatiners
- Warehouses/distripark: 11,000 sqm.
- Car park area: 6,524 sqm
- Ro-ro storage area: 30,792 sqm.

Equipment

- 7 ship-shore container gantries
- 4 yard gantries (rail -mounted)
- 54 front-end handlers 2-42 t.
- 9 reachstackers
- 20 tractors
- 59 20'/40' trailers and roll trailers
- 1 diesel-hydraulic locomotive

Workshops

- 10,000 sqm dedicated to lift trucks and port tractors, carpentry, mechanical and electrical, automation, engine maintenance, woodwork

Quay

- 1,687 m. with 3 ro-ro berths

Berths

- 5/6

Depth

- 10/12.5 m.

Rail facilities

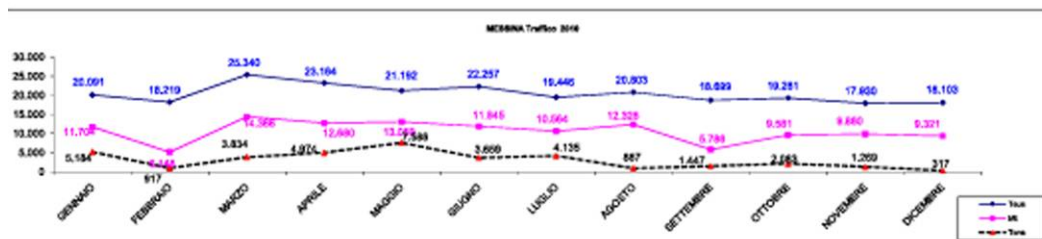
- 5 on-terminal railway lines, 440 m. each

MESSINA
Traffico container 2010

MESE	SBARCO CONTENITORI		IMBARCO CONTENITORI		SBARCO CONTENITORI		IMBARCO CONTENITORI		TOTALE SBA/IMB			TOTALE SBA/IMB
	P. 30	P. 40	P. 20	P. 40	V. 20	V. 40	V. 20	V. 40	CONT. P.	CONT. V.	CONT. PV	CONT. PV
	Num		Num		Num		Num		Num			Teas
GENNAIO	2.263	1.073	3.752	2.770	1.784	1.958	398	146	9.858	4.286	14.144	20.091
FEBBRAIO	1.805	871	2.781	2.442	1.790	2.253	40	335	7.900	4.418	12.318	18.219
MARZO	3.410	1.272	5.393	3.589	2.159	1.866	434	245	13.664	4.704	18.368	25.340
APRILE	3.257	1.026	5.290	3.423	1.846	1.716	411	115	12.996	3.888	16.884	23.194
MAGGIO	3.071	1.156	4.209	2.592	1.885	2.029	85	204	11.028	4.183	15.211	21.192
GIUGNO	2.902	1.285	4.347	3.210	1.878	1.753	318	259	11.744	4.008	15.752	22.257
LUGLIO	2.300	918	4.187	2.895	1.544	2.077	35	42	10.048	3.898	13.946	19.446
AGOSTO	1.985	787	4.027	3.138	1.564	2.171	276	389	9.918	4.400	14.318	20.803
SETTEMBRE	2.457	771	3.310	1.835	1.872	2.741	194	186	8.373	4.793	13.166	18.699
OTTOBRE	2.442	741	3.482	2.378	1.999	2.199	208	267	9.043	4.663	13.706	19.281
NOVEMBRE	1.737	1.055	2.938	2.602	2.117	1.637	250	150	8.332	4.154	12.486	17.930
DICEMBRE	1.500	1.080	3.102	2.376	2.123	1.840	352	217	8.458	4.332	12.790	18.103
TOTALE	29.511	12.033	48.798	33.020	21.969	24.040	2.981	2.545	121.362	61.525	172.887	244.525

Traffico rotabili e merci varie 2010

MESE	SBARCO		TOTALE	SBARCO		TOTALE	AVANZAMENTI COMPAGNIA UNICA
	ROTABILI		ROTABILI	M.V.		M.V.	
	Mf		Mf	Tons		Tons	
GENNAIO	3.195	8.909	11.704	5.135	49	5.184	2.701
FEBBRAIO	1.863	3.285	5.148	917	0	917	2.002
MARZO	3.895	10.471	14.366	3.779	55	3.834	3.365
APRILE	3.480	9.220	12.690	4.989	5	4.974	3.309
MAGGIO	4.554	8.505	13.059	7.582	4	7.586	3.002
GIUGNO	4.198	7.849	11.845	3.586	73	3.859	3.127
LUGLIO	1.911	8.653	10.564	4.130	5	4.135	2.887
AGOSTO	3.819	8.709	12.328	886	1	887	3.251
SETTEMBRE	985	4.800	5.785	1.447	0	1.447	2.257
OTTOBRE	2.209	7.372	9.581	1.883	200	2.083	2.715
NOVEMBRE	2.915	8.945	9.860	1.285	4	1.289	2.182
DICEMBRE	3.051	6.270	9.321	292	25	317	2.819
TOTALE	35.854	98.588	128.242	35.871	421	36.292	33.497



La G.M.T. Genoa Metal Terminal

The company is highly specialised in the handling, storage and transport of non-ferrous metals, metal scrap, alloy steel, chemical products, soft commodities and break bulk.

TECHNICAL CHARACTERISTICS

Location

- Ponte Eritrea
- Calata Mogadiscio
- Warehouses located at CSM and Parodi SpA

Area

- 100,000 sqm., including 40,000 sqm. of covered warehouses

Equipment

- 4 quayside cranes (80, 80, 36, 20 tons)
- 2 reach stackers (45 tons)
- Forklifts: 4 x 32 tons, 1 x 25 tons, 2 x 16 tons, 1 x 18 tons, 25 from 2.5 to 5 tons

- 2 tractor units
- 14 trailers Specialised equipment
- 4 weighing scales 20/40' for containers; 2 automatic swivel hooks for steel coils 30 tons; 8 clamps for cellulose and reels of paper; 1 weighing bridge 60 tons; 2 stationary electronic scales 4 tons; 5 mobile stainless steel scales 4 tons

Quay

- 925 m.

Depth

- Up to 11 m.

Rail facilities

- 1 main railway line at the centre which splits into 2 parallel lines

Other services

- LME warehouse
- LIFFE warehouse
- VAT warehouse (VAT deposit)
- Customs attendance
- Repair of containers
- Land transportation and handling operations
- Equipped to handle yachts

traffic 2009

General Cargo: 500,000 tons of Genoa in the various terminal

II Terminal Forest

FOREST Terminal at Ponte Somalia is the only dedicated forest products facility in the port, handling pulp for paper production, kraft liner board, kib reels, newsprint and timber.

Since January 1, 2010, the company has been implementing a diversification strategy within its Genoa port terminal to comply with the Group's requirements.

Therefore, the terminal now also handles iron and steel products and yachts, whilst the range of stuffing and emptying container services has been boosted to incorporate general cargo.

The company, established in 1992, is owned by the Campostano Group and took over the Svenska Terminal in Genoa.

The group also has forest products terminals in Savona, and handles a total of about 500,000 tonnes per annum, ranking as one of the leading forest products handling companies in the North Tyrrheanian Sea.

The terminal has ISO 9001/2000 and OHSAS 18001 certification.

Other services provided include cargo surveying, inland distribution, consulting, shipping agency, forwarding and insurance broker.

TECHNICAL CHARACTERISTICS

Location

- Extension of Ponte Somalia Ponente

Area

- 15,500 sqm. (covered 7,000 sqm.)

Equipment

- 7 forklift trucks capacity 8 tons
- 2 forklift trucks capacity 4 tons

Quay

- 193 m.

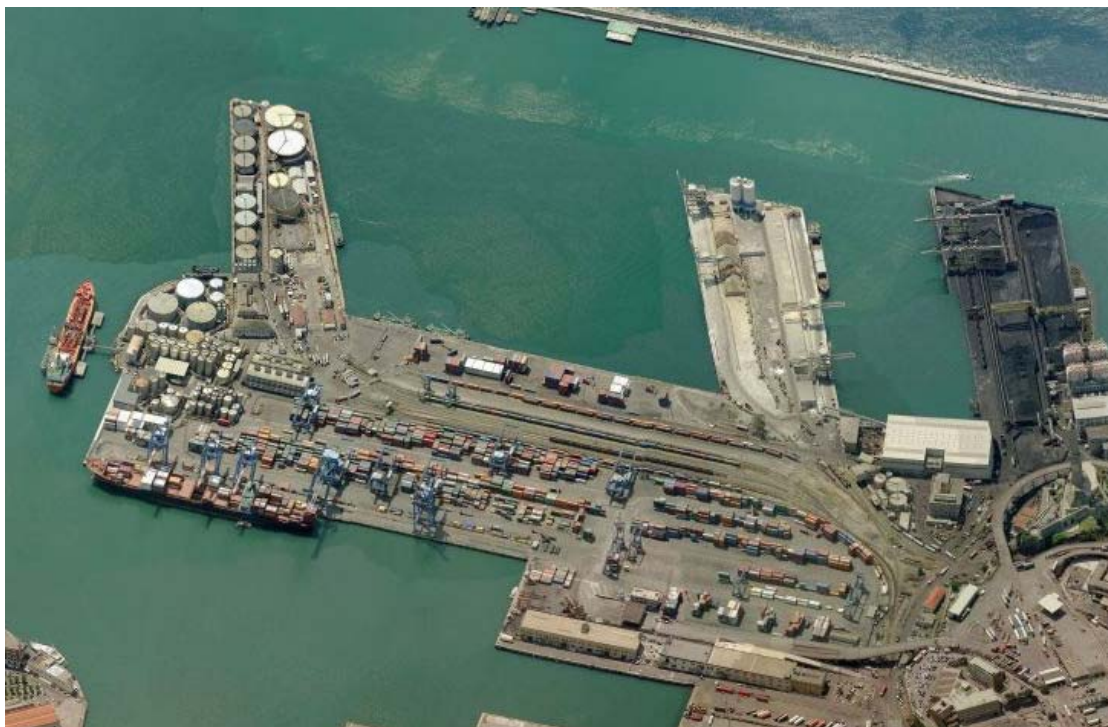
Dept

- 10 m

5. PORTO STORICO



Terminal SECH



SECH has been managing the container terminal at Calata Sanità since 1993, as a consequence of the privatization of what used to be a public company managing various port areas. Since then the company has successfully fought to keep operating with every right in such a competitive market as the one of the North Tyrrhenian Sea.

The terminal location is absolutely favourable if related to access ways both by sea and by land. Indeed it takes less than an hour to go in and out of Calata Sanità owing to closeness to the pilots station.

Moreover, the facility is strategically connected to the main traffic routes (rail transport and road haulage) and is only a few hundred metres from the nearest motorway gate and from the port rail ramp, to which it is connected by means of a dedicated tunnel.

SECH makes use of a communication and data filing system embracing all operations (ship and yard). Navis "SPARCS" is the system employed for both yard planning and ship operations.

It is seamlessly connected with the file system serving as starting data base for SPARCS. The terminal deals with its clients through a messaging system in line with EDIFACT communication standards (BAPLIE, COARRI, CODECO, CODENO, COPARN, COPRAR, TPFREP are the standard messages in use). The communication with other entities is arranged through "E-port", which is a system allowing the sharing of selected information useful to the terminal, to port users and to the Authorities dealing with the terminal.

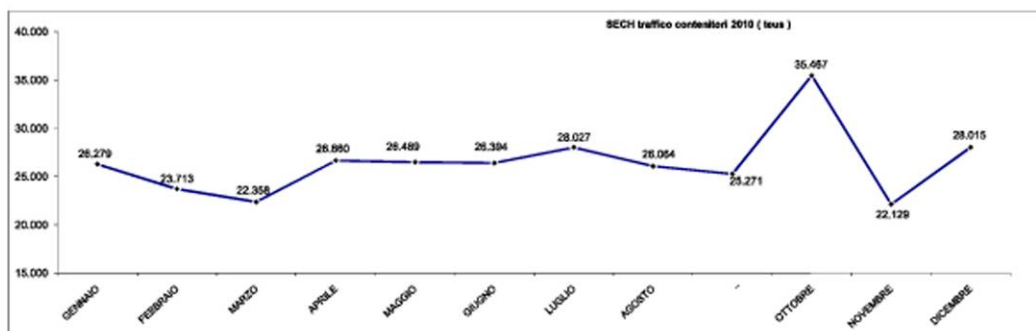
With the aim of keeping up with market developments, with always bigger vessels deployed in the services, the Company has launched an important program of works involving the ship-to-shore gantry cranes.

The program provides that the cranes are revamped and improved in order to enable them to handle 8.500 TEU vessels, thanks to the increase of their outreach (up to 18 rows of containers) as well as of their height under spreader (up to 38 m). The works started at the beginning of 2010 and are expected to be completed in 15 months (with three cranes ready within the end of 2010), during which the cranes will be removed and revamped one by one in order to always have four of them available.

In order to pursue the goal of constant improving, SECH makes use of a management system for quality – based on UNI EN ISO 9001:2008 regulations – which the company has complied with since 2001.

TERMINAL SECH TRAFFICO 2010

MESE	SBARCO CONT.		IMBARCO CONT.		SBARCO CONT.		IMBARCO CONT.		TOTALE			TOTALE		AVVIAMENTI COMPAGNIA UNICA	
	P. 20'	P. 40'	P. 20'	P. 40'	V. 20'	V. 40'	V. 20'	V. 40'	CONT. P.	CONT. V.	CONT. PV.	TEUS	SBA/IMB		SBA/IMB
	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	NUMERO	M.V.		ROTAB.
GENNAIO	4.943	4.609	2.390	3.766	57	307	1.197	164	15.708	1.725	17.433	26.279	32	0	2.161
FEBBRAIO	3.629	3.998	2.335	3.189	15	152	1.350	853	13.151	2.370	15.521	23.713	222	0	2.279
MARZO	4.129	3.819	2.087	2.858	27	88	875	855	12.893	1.845	14.738	22.358	0	0	1.644
APRILE	4.396	4.471	2.611	3.546	300	166	885	1.049	15.026	2.400	17.426	26.860	127	0	1.706
MAGGIO	4.250	4.676	2.255	3.033	83	52	997	1.691	14.214	2.823	17.037	26.489	0	0	1.530
GIUGNO	4.328	5.008	2.245	2.686	101	50	944	1.646	14.265	2.741	17.006	26.394	265	0	1.595
LUGLIO	4.517	5.009	2.430	3.429	320	81	1.062	1.335	15.385	2.788	18.173	28.027	20	0	1.952
AGOSTO	4.234	4.910	2.000	3.105	60	158	1.184	1.120	14.249	2.522	16.771	26.064	171	0	1.709
SETTEMBRE	4.039	4.702	1.710	2.180	100	91	1.388	2.045	12.631	3.622	16.253	25.271	0	0	2.112
OTTOBRE	5.122	5.711	2.813	4.088	91	191	2.395	2.533	17.734	5.210	22.944	35.467	103	0	2.568
NOVEMBRE	3.500	3.782	1.880	3.091	32	486	891	574	12.233	1.983	14.216	22.129	39	0	1.478
DICEMBRE	4.615	4.534	2.264	3.937	209	528	1.211	859	15.350	2.807	18.157	28.015	147	0	1.968
TOTALE	51.702	55.207	27.020	38.910	1.395	2.350	14.367	14.724	172.839	32.836	205.675	316.866	1.126	0	22.702



Stazioni Marittime s.p.a.



It 'was founded with the purpose of dealing with the planning, construction and operation of the ferry terminal and the cruise terminal in the Port of Genoa. The company has terminals in the State concession until 2040. Maritime Station spa-recently certified BS OHSAS 18001:2007

TECHNICAL CHARACTERISTICS

Location

- From Ponte dei Mille to Ponte Caracciolo

Area

- 290.000 mq.

Facilities

- 5 passengers terminal

Moorings

- 12

Seabeds

- Max 10,5 m.

Terminal Crociere Ponte dei Mille

The terminal, which extends for a total of 16,350 square meters can accommodate in its berths at the same time, with no limits in terms of draught and depending on the length of vessels, up to three cruise ships, with very limited passengers and baggage handling times and high security standards.

Terminal Crociere Ponte Andrea Doria

The total area of the Crociere Ponte Andrea Doria Terminal is about 9,400 square meters with large check-in halls, large areas intended for customs and baggage reclaim, dedicated and separate paths for boarding and disembarking flows, mobile walkways for ship connections. ☐

Its two berths to the west and east can simultaneously host cruise ships of unlimited length and draught, with a total handling up to 10,000 passengers.

Terminal Crociere Ponte Parodi

Within the requalification project of the city waterfront, it is worth mentioning the creation of a completely redesigned area for Ponte Parodi, only a few years ago dedicated to grain traffic and currently location intended for various port activities.

☐☐Within this major project the construction of a new Cruise Terminal has been envisaged, which will be built on the pier overlooking the Ponte dei Mille and which will serve a berth about 300 meters long covering an area of about 2,500 square meters developed all along one single floor/level.

Terminal Traghetti

Inaugurated in 1999, the Ferry Terminal of Calata Chiappella is undoubtedly one of the most modern and technologically advanced European ferry terminals. ☐This structure is designed to meet the growing traffic of ferries that connect the city with the largest islands in the Mediterranean, with Spain (Barcelona), and the North African coast, traffic which has registered a 10% increase on a each year.

Located in an area of over 160,000 square meters with 12 berths dedicated to the ferry traffic, the building itself is spread over 12,000 square meters (the total area is 26,000 square meters) and consists of several floors connected to each other by means of escalators and lifts.

6. RIPARAZIONI NAVALI



RFK board of PRP force, divides the arc port that is located between Calata Gadda, to the west, near the area she Cotone, and east to the area of the Fair. Within the sector there are, and the areas for dry docks, both occupied Mariotti shipyards, as well as the port of the Italian Yacht Club which is enclosed by these two sectors.

For the area of the docks you have over a total area equal to 191,700 sqm which consist on covered areas totaling 28,400 sqm.

The wharf area Cagni was identified as the specific area to be devoted to the activity of repair, maintenance, conversion and shipbuilding. The total area is 181,800 sqm scope.

1.2 Risk activities in terms of air emissions

ACTIVITIES OF SHIPS AND VESSELS

In 2010, the passenger traffic of Genoa Port was about 3.6 million units (+4.4%), of which 2.8 million in the ferry sector (-1.3%) and 860.000 in the cruises one (+28.1%).

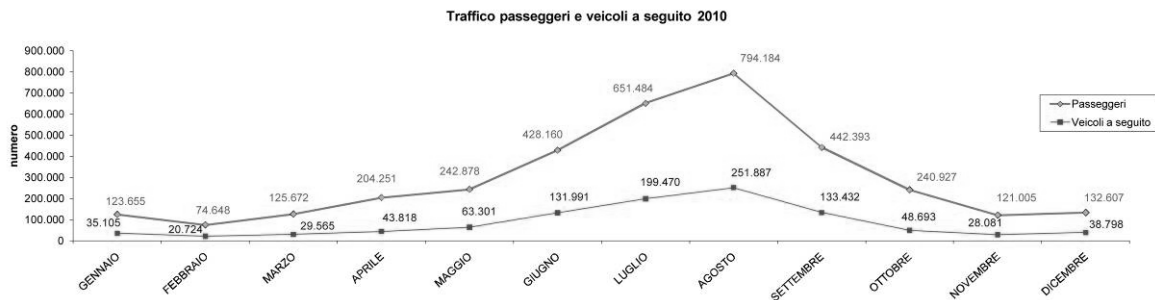
Although the cruise begin to have the characteristics of a mature market, thanks to the moderate growing rate the demand of cruises continues to be strong, as well as the confidence of industries which works for the development of this sector.

Looking to a final balance of 2010, there were 3,581,864 passengers compared to 3,471,724 in 2009 (+110,140 passengers of + 3.17%). This fact makes the 2010 a record year ever in the history of Genoa Port for the passengers handling, overcoming the record of 2009. These data are the results from continuous and significant growing trend of MSC Cruises, which distributes in the whole terminals about 661,500 passengers compared to about 518,000 in 2009 (+143,500 passengers, up to +27.7%). Also important is the increase of passengers traffic by Louis Cruise Line, which nearly doubled their cruises in Genoa, going from 65,000 units in 2009 to over 123,000 in 2010.

The same results has been fulfilled by the Royal Caribbean, which increased about 41,000 passengers in 2009 to about 44,000 passengers in 2010. About ferry traffic, the 2010 closed with a slight decrease over the previous year, with the following volumes: 2,721,574 passengers (-2.8%), Auto 975,698 (+2.2%). Analyzing individual routes, virtually unchanged from 2009, the number of passengers on North Africa (over 458,000 units) and Corsica (245,700 units).

Passengers and Vehicles Traffic _ Cruise/Ferry Terminals 2010

MONTHS	PASSENGERS cruises	PASSENGERS ferries	TOTAL PASSENGERS	VEHICLES	VEHICLES industrial
January	42.499	81.156	123.655	35.105	130.941
February	28.497	46.151	74.648	20.724	140.211
March	50.225	75.417	125.672	29.565	176.164
April	74.280	129.971	204.251	43.818	157.339
May	83.950	158.928	242.878	63.301	167.772
June	79.982	348.178	428.160	131.991	162.124
July	93.142	558.342	651.484	199.470	153.730
August	101.748	692.436	794.184	251.887	84.952
September	93.442	348.951	442.393	133.432	144.928
October	111.108	129.819	240.927	48.693	153.694
November	58.925	62.080	121.005	28.081	160.925
Dicember	42.462	90.145	132.607	38.798	152.074
TOTAL	860.290	2.721.574	3.581.864	1.024.865	1.784.854



The methodology behind the estimation of emissions due to maritime transports in Genoa port was developed by **Techne Consulting**, originally included in the project MEET (*Methodology for Estimate Air Pollutant Emissions from Transport*), funded by the European Commission within the transportation axis of the IV Framework Programme. More recently, the methodology has been updated, specifically on the fuel consumption based on the installed capacity as well as the calculation of emissions, and included in 1.A.3. Chapter of the '*International navigation, national navigation, national fishing and military shipping*' of 'EMEP/EEA air pollutant emission inventory guidebook 2009: update for the month of March 2011.

The main pollutants considered are:

- Carbon Monoxide (CO)
- Volatile Organic Compounds (VOC)
- Nitrogen Oxides (NOx)
- Sulphur oxides (SOx)
- suspended particles with a diameter less than 10 microns (PM10)
- suspended particles less than 2.5 microns in diameter (PM2, 5)

Referring to activities of vessels it's necessary to distinguish between the following phases:

- a) approach and mooring in ports;
- b) hotelling time in port;
- c) departure from the port
- d) navigation.

In particular, the a) phase begins when the ship starts to decelerate and ends when moored, while the c) phase begins when the ship free from its moorings and ends when it has reached cruising speed. After his arrival in port, the ship continues its emissions at the dock (when stationary).

In fact, energy has to be produced for the auxiliary services (lighting, heating or air conditioning, pumps, refrigeration, etc.). To meet this demand for energy, usually diesel auxiliary engines are used to power ancillary services. From the point of view of

consumption and emissions can be identified two phases of maneuvering (a and c), stationing (b) and a cruising speed (d).

For the application of the methodology are necessary an estimate of the number of days spent in the different phases of navigation: (a) Cruising (b) Maneuvering (c) Stationing (d) Loading and unloading of tanks, for the following classes of ships :

- Transport in solid bulks
- Transport of liquid bulks
- Generic loads
- Cargo Ship
- Ferry ships
- Cruises
- Fast ferries
- In-port navigation load
- Sailing boats
- Tug boats
- Fishing boats
- Others

The emission estimation was drawn up on the basis of data collected through a questionnaire sent at the Genoa Port Authority, with reference to the year 2010. The collected information was also included in the program *E²Ships*.

The following table shows the number of vessels involved in the study, divided into classes. To obtain the number of vessels stationed in the port of Genoa during the year 2010 was done by a comparison of the number of ships arriving and games during the year. To get the class ship you used the product category of cargo as well as from data obtained from the Port of Genoa.

Number of ships per classes considered in the study

SHIPS CLASS	NUMBER OF SHIPS
Solid Bulk Cargo	13
Petrolers / Liquid Bulk Cargo	875
Generic loads	2528
Cargo Lo-Lo	435
Ferry (passengers)	2581
Cruises (passengers)	240
Fast ferries	5
In-port navigation load	50
Sailing boats	10
Tug boats	69
Fishing boats	15
Others	667

Data of the ships movement were used to obtain the characteristic times during the stationary phase, making the difference between date and time of departure / arrival of each ship, and mediating these differences by classes of ships. The characteristic times of operation were taken from a previous study carried out always by Genoa Port Authority. Please note that for dwell time is the time spent by a ship in port and the auxiliary engine when they're running.

Maneuvering and Stationing times per ships classes

SHIPS CLASS	Maneuvering time (min)	Stationing time (min)
Solid Bulk Cargo	90	3387
Petrolers / Liquid Bulk Cargo	100	2124
Generic loads	100	1522
Cargo Lo-Lo	75	2349
Ferry (passengers)	50	720
Cruises (passengers)	50	720
Fast ferries	30	720
In-port navigation load	15	0
Sailing boats	10	0
Tug boats	140	0
Fishing boats	30	0
Others	40	2120

The distribution of the various classes of ships in their respective classes of gross tonnage was carried out by calculations based on data supplied by Genoa Port for the year 2010, the following table shows the percentage of membership for each class size. This figure is used for the distribution of power installed on the calculation of fuel consumption.

Percentage distribution of tonnage per ships classes

SHIPS CLASS	TONNAGE							
	0 - 500	500 - 1000	1000 - 5000	5000 - 10000	10000 - 20000	20000 - 30000	30000 - 40000	40000 - 50000
Solid Bulk Cargo	-	-	-	100	-	-	-	-
Petrolers / Liquid Bulk Cargo	-	-	1	-	99	-	-	-
Generic loads	-	-	-	-	6	-	-	-
Cargo Lo-Lo	-	-	-	-	-	100	-	-
Ferry (passengers)	-	-	-	-	12	84	3	1
Cruises (passengers)	-	-	-	-	1	-	99	-
Fast ferries	-	-	-	-	1	-	99	-
In-port navigation load	30	10	10	-	-	5	-	-
Sailing boats	10	-	-	-	-	-	-	-
Tug boats	100	-	-	-	-	-	-	-
Fishing boats	100	-	-	-	-	-	-	-
Others	1	11	17	-	2	69	-	-

The model *EShips*, with the data described above, was applied on Genoa Port and has produced the following results for the pollutants considered. Below are the emissions class ship in Table 4 for the main pollutants considered in the study.

Principal pollutant emissions per ships classes (Tons)

SHIPS CLASS	POLLUTANT EMISSIONS (year 2010)					
	CO	NMVOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
Solid Bulk Cargo	68,63	27,32	612,01	20,45	21,35	18,33
Petrolers / Liquid Bulk Cargo	92,49	31,35	769,64	24,91	21,62	19,32
Generic loads	139,21	51,66	1155,70	37,62	34,63	32,53
Cargo Lo-Lo	122,73	37,30	961,19	33,17	27,93	25,72
Ferry (passengers)	181,09	62,95	1453,70	48,94	44,37	41,84
Cruises (passengers)	43,98	15,72	453,31	12,18	11,92	8,99
Fast ferries	12,48	1,72	123,31	2,21	3,92	3,11
In-port navigation load	58,25	18,97	489,63	15,74	13,13	13,13
Tug Boats	182,14	21,23	428,31	84,53	23,70	19,37
Fishing Boats	0,48	0,47	3,34	0,13	0,27	0,27
Others	1,68	0,49	14,09	0,45	0,35	0,33
TOTAL	903,16	269,18	6464,23	280,33	203,19	182,94

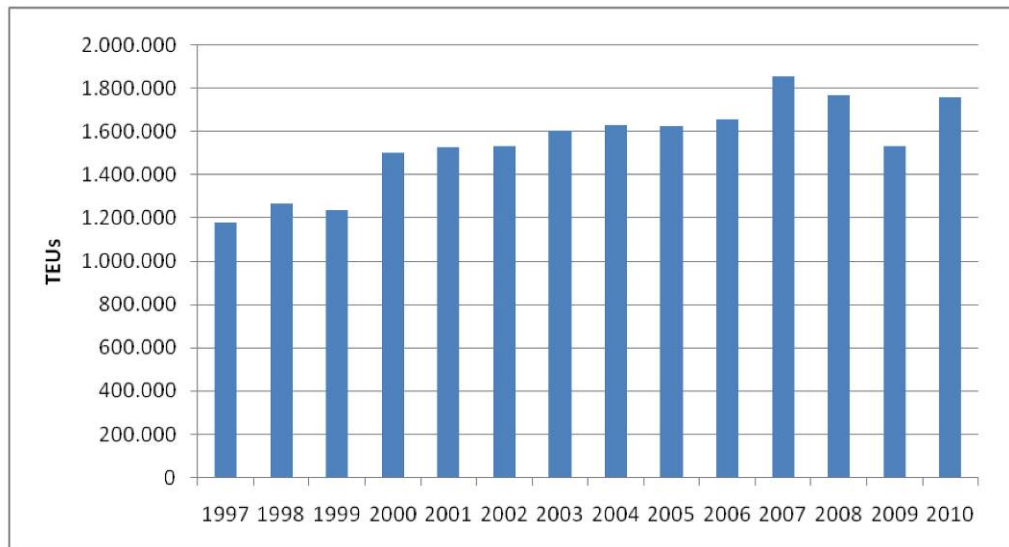
TERMINAL EQUIPMENTS: CARGO HANDLING

In 2010, the Genoa Port has handled a total of over 51.9 million tons of cargo, equal to an increase of 6.6% compared to 48.7 million tons in 2009 added up.

In the field of cargo traffic was 26.4 million tons (+12.5% on 2009), of which 17.7 million tons of containerized cargo (+16.3%) and 8.7 million tons of conventional cargo (+5.6%). Container handling counted in 20-foot container was 1,758,858 TEUs (+14.7%). It can also be observed that the container traffic represents a large part of the total volume of the Genoa port. It appears that the weight of the container transport stood at 34% of the total, exceeded only by the petroleum products sector, with 36% of the total movement.

The chart and table below show respectively the traffic of containerized cargo in the port of Genoa from 1997 to 2010, and the volumes of interchange in TEUs from / to the port of Genoa with the main geographical areas worldwide.

Containers traffic series in Genoa Port (1997-2010)



Source: Genoa Port Authority

TEU Traffic subdivided per countries and geographical areas

COUNTRY	UNLOAD (TEU)	LOAD (TEU)	TOTAL (TEU)
ITALY	73.760	47.942	121.702
EUROPE	44.097	72.710	116.807
RUSSIA	119	2.379	2.498
NORTH AMERICA	52.620	120.175	172.795
CENTRAL AMERICA	21.870	22.350	44.220
SOUTH AMERICA	19.400	36.978	56.378
NORTH AFRICA	89.801	79.133	168.934
EASTERN AFRICA	16.997	31.748	48.745
WESTERN AFRICA	19.064	32.882	51.946
MIDDLE EAST	93.224	122.182	215.406
INDIA	23.227	30.977	54.204
FAR EAST	339.268	247.067	646.335
OCEANIA	148	10.081	10.229
TOTAL TEU	884.498	874.360	1.758.858

Source: Genoa Port Authority

The area in which there is the highest level of interchange of containerized cargo is in the Far East, which last year saw an increase in traffic of about 23% to about 646 000 TEUs (load and unload).

Follow the trade with the Middle East, for a total of about 215,000 TEUs in 2010, an increase over 2009 of 26.5%. Strong growth rates, albeit related to lower volumes in absolute terms, there were also areas of Center (+65.2%) and South America (+38.2%) and India Pakistan (+29.3). The trade with North America, after two years of decline, reported an increase of about 22%.

Influence of Genoa Port within Italian Ports

TEUs	2005	2006	2007	2008	2009	2010
Italian Ports	9.702.708	9.864.375	10.609.108	10.549.886	9.514.891	9.755.694
Genoa Port	1.624.964	1.657.113	1.855.026	1.766.605	1.533.627	1.758.858
% total	16.7%	16.8%	17.5%	16.7%	16.1%	18.0%

Source: Assoportti

The operation of a container terminal is dependent on the amount of land the terminal has to operate on. There are three basic types of operations that can be found in Port container terminals: *wheeled*, *grounded*, and *combination*. These represent how the containers are physically stored and kept on a terminal.

Wheeled operations are generally the most efficient operations as all the containers are kept on chassis and can be moved anywhere on or off the terminal by the use of a yard tractor or HDV.

Grounded operations are where containers are stored onsite in “stacks” that can be several containers wide by two to four containers high, thus requiring the use of RTG, top handlers and side handlers to move the containers to/from and within the stacks. RTG cranes are cranes that can move about the stacks and straddle the containers to lift them up and move them around. Top and side handlers are equipment used to pick up the full and empty containers. Most terminals employ a mix of wheeled and grounded operations as land permits.

Wheeled operations have low container per acre densities and thus require significantly more land than grounded operations, which have high container densities, however they are the most efficient and require less CHE than a grounded operations. This use a mixture of RTG cranes, top handlers, side handlers and yard tractors versus just yard tractors for wheeled operations and therefore the emissions per container generally increase. The type of operation at any specific terminal is generally dictated by the amount of land available and the number of containers that the terminal processes per year.

The equipment inventoried for the container terminals are *mostly diesel-powered* landside equipment. The major types of cargo handling equipment found at the container terminals (Such as Sampierdarena port and VTE Terminal) include:

- Yard tractors
- Top handlers
- Side handlers
- RTG cranes
- Forklifts

The equipment used directly in handling cargo at container terminals consists mainly of yard tractors, top handlers, and forklifts. Yard tractors accounted for two-thirds of the equipment inventoried. Top handlers were the next largest category with 13%, followed by forklifts at 10%, side handlers at 7% and RTG cranes at 5%, and other 5% of various equipments.

Approximately **60%** of the equipment inventoried are **Yard Tractors** are to move containers to and from the ship, move containers within the terminal, move reefer containers into position, and move containers to RTGs for placement or removal from the stacks. Yard tractors are used throughout the terminal and the majority of their hours are worked when a ship is at dock being loaded/unloaded. When a vessel is at dock, the yard tractors line up next to the vessel and a crane places an unloaded container on the yard tractor while another crane lifts a container from another yard tractor to load the vessel. The yard tractors are in constant motion from the dock to the container storage area. Engine power ranged from 172 hp to 220 hp, with an average of 186 hp. Annual operating time ranged from zero to 6,593 hours, with an average of 2,200 hours.

Approximately **13%** of the equipment inventoried are diesel powered **Top Loaders**, also known as top handlers by the terminal operators. Top loaders move, stack and load containers using an overhead telescopic boom. They can be used in place of or in conjunction with RTGs to lift heavy containers within a terminal. Engine power ranged from 164 hp to 300 hp, with an average of 258 hp. Annual operating time ranged from zero to 4,500 hours, with an average of 1,834 hours.

Approximately **10%** of the equipment inventoried are diesel powered **Forklift**. The forklifts at the container facilities may be used for cargo and non-cargo handling activities. Forklifts use an under lift principle to move loads of varying sizes depending on their capacity. Engine power ranged from 55 hp to 200 hp, with an average of 150 hp. Annual operating hours ranged from zero to 3,000 hours, with an average of 1,081 hours.

Approximately **7%** of the equipment inventoried are diesel powered **Side Handlers**. Side picks, side handlers and side loaders are the various names of the cargo handling equipment that typically move and stack the empty containers at a terminal and therefore do not have horsepower comparable to a top handler. Engine power ranged from 150 hp to 300 hp, with an average of 193 hp. Annual operating time ranged from zero to 2,400 hours, with an average of 1,604 hours.

Approximately 5% of the equipment inventoried are **Rail Gantry Cranes**. The RTG crane moves containers to and from the container stacks in a grounded operation; it is designed like a ship-loading crane without the horizontal extended boom. Engine power ranged from 230 hp to 650 hp, with an average of 390 hp. The annual operating hours ranged from 1 hour to 2,500 hours, with an average of 1,670 hours.

For this study, *Cargo Handling Equipment* emissions would be estimated using the following equation. This equation is consistent with the publicly available model-related data that has been reviewed. The basic equation is:

$$E = (EF_{\text{base}} + DF) * HP * LF * Act * FCF$$

Where:

- E** = Emissions, in short tons
- EF_{base}** = Emission Base Factor, grams of pollutant per horsepower-hour (g/hp-hr)
- DF** = Deterioration Factor (emissions increase as an engine ages, g/hp-hr)
- HP** = Average rated horsepower for the equipment type and horsepower category
- LF** = Load Factor (assumed average percentage of full load)
- Act** = Equipment activity, hours of use per year
- FCF** = Fuel Correction Factor (if applicable, *Clean Diesel Fuel*)

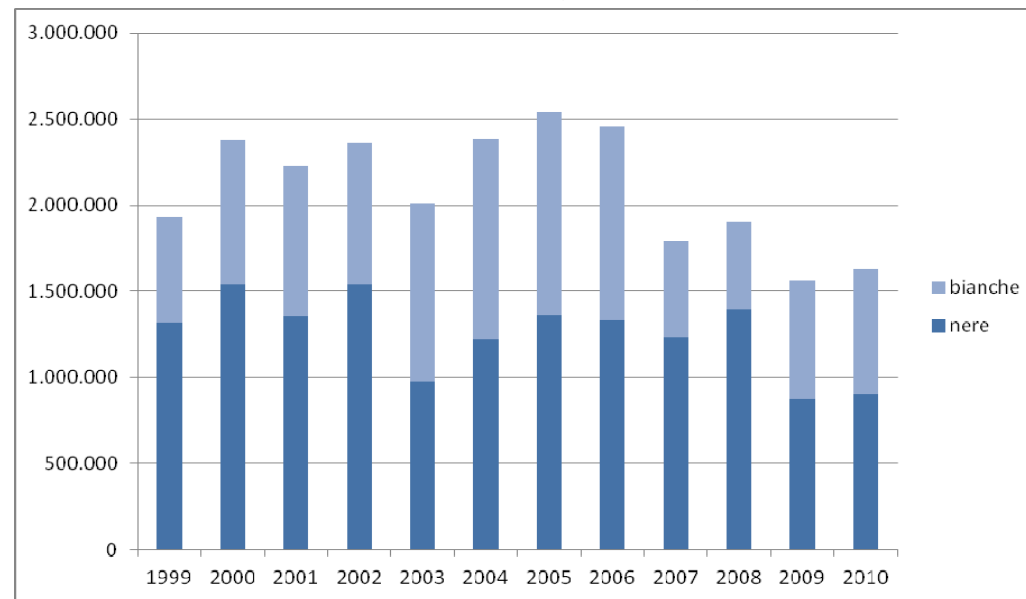
Emissions produced by cargo handling in Genoa Port (year 2010)

2010	Emission factors	Tons/year
CO	0,0462 kg/TEU	81,26 tons
NMVOG	0,0097 kg/TEU	17,60 tons
NO_x	0,0871 kg/TEU	188,37 tons
SO_x	0,0126 kg /TEU	22,16 tons
PM₁₀	0,0203 kg /TEU	35,70 tons
PM_{2.5}	0,0154 kg /TEU	27,09 tons

SOLID AND LIQUID BULKS

Considering the movement of the main **solid bulk traffics** in Genoa Port, the data represent a strong diversification related to the "commercial" nature this harbour, distinguishing from other Italian Ports related to "industrial" activities (*captive market*). The graph below shows the commercial component of the cargo in its historical trend. In particular, compared with a decline of some types of goods such as coal and clinker, representing the core business, there has been a corresponding increase in other bulk consist of cement, sand, salt, iron and manganese.

Solid Bulk traffics series from/to Genoa Port (1999-2010)



Source: Genoa Port Authority

In 2010, the solid bulk cargo handled at the terminal of Ponte San Giorgio amounted to 1.6 million tons (+2.6%) and handled in the industrial sector to 2.9 million tons (+42.4%). Mineral oils amounted to 18.8 million tons (-2.9%) and other bulk liquids to 866.000 tons (-6.2%).

With regard to other types of conventional cargo, after a decline in 2009, for the year 2010 big increases are registered in specialized activities related to forestry, fruit/vegetables and metals/steel products traffics, with annual changes between 30% and 50%.

Moreover, It's necessary to underline a specific reference to coal's trading market, used for ENEL SpA power plant and that, until 2008, were more than 50% of the total traffic handled. With the start of power plant decommissioning process we can register a significant decrease of coal related traffic which are, nowadays, partially compensated by an increase of the commercial component of the traffic.

Coal traffics series to Genoa Port (2006-2010)

	2006	2007	2008	2009	2010
Coal for industrial use (ENEL)	722.909	637.403	783.816	478.322	256.214
Coal for commercial use	609.869	596.902	604.615	451.130	667.974
TOTAL	1.322.778	1.234.305	1.388.431	929.452	924.188

Source: Genoa Port Authority

Principal Solid Bulk traffics from/to Genoa Port

Tons	2005	2006	2007	2008	2009	2010
Cereals	126.230	114.620	113.751	93.429	103.429	73.055
Food	93.860	88.231	73.186	86.541	83.860	88.278
Coal	1.486.472	1.322.778	1.234.305	1.388.431	929.452	924.188
Steel products	1.783.930	2.035.010	1.841.498	1.356.539	2.183.930	3.113.169
Minerals, cements	232.461	289.673	315.286	331.621	377.453	402.097
Chemicals	4.529	5.220	4.532	5.321	6.220	7.302
TOTAL	3.727.482	3.855.532	3.582.558	3.261.882	3.684.344	4.608.089

Source: Assoportti

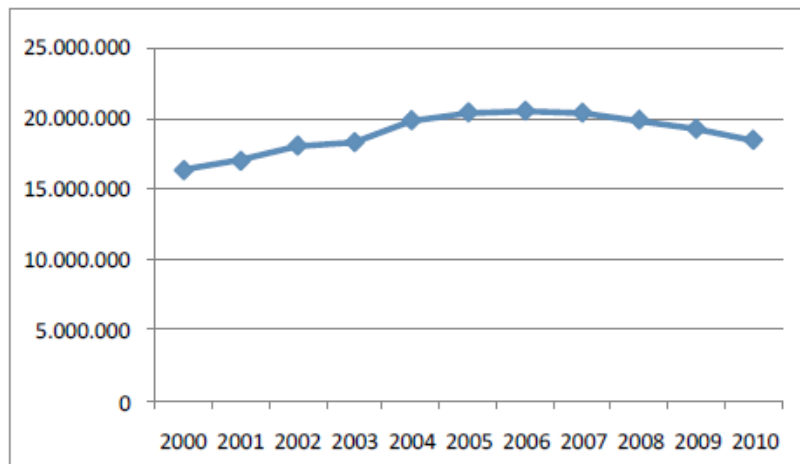
Emissions produced by Solid bulks operations in Genoa Port (year 2010)

2010	Emission factors	Tons/year
CO	0,0249 g /km	115,10 tons
NMVO	0,0111 g /km	51,51 tons
NO_x	0,0937 g /km	432,20 tons
SO_x	0,0078 g /km	32,65 tons
PM₁₀	0,0473 g /km	218,20 tons
PM_{2.5}	0,0431 g /km	198,76 tons

In 2010, the trend of **liquid bulks traffic** show a volume of about 19.7 million tons, with a decrease of 3% compared to 2009. This reflects in part the economical crisis that affects the international market, in particular related to chemicals, food liquids and biodiesel sectors. Considering the main origins and destinations of traffic, compared to 2009 the largest increases were recorded in imports from Georgia, Russia and Ukraine (+33.5% for a total of 5.1 million tons of goods unloaded, reaching the highest volume recorded in the last decade), followed by those from the Middle East (+20.2%), Far East and North America. Have also increased imports from South America and India-Pakistan although due to much lower volumes.

Analyzing the individual segments of liquid bulks traffic from/to Genoa Port, there is a further decline of oil and refinery activities in 2010 (-5.3%). At the same time there has been an increase of 4.4% of the movement of petroleum products, for a total traffic of 5.1 million tons, among the highest values recorded in the last decade.

Liquid Bulk traffics series from/to Genoa Port (2000-2010)



Source: Genoa Port Authority

Principal Liquid Bulk traffics from/to Genoa Port

Tons	2005	2006	2007	2008	2009	2010
Crude Oil	15.256.260	16.387.528	15.882.358	15.271.560	14.471.560	13.699.551
Refined products	5.231.575	5.725.542	5.650.301	4.875.402	4.915.575	5.131.288
Chemicals	583.020	564.794	568.329	492.437	469.526	335.695
Biodiesel	13.948	22.398	53.951	89.813	98.868	199.811
Vegetable oils	351.821	464.934	396.065	472.659	329.924	286.783
Wine	54.615	43.696	47.271	34.850	24.890	43.580
TOTAL	21.491.239	23.208.892	22.598.275	21.236.721	20.310.343	19.696.708

Fonte: Assoport

Emissions produced by Liquid bulks operations in Genoa Port (year 2010)

2010	Emission factors	Tons/year
CO	0,0046 g /km	92,49 tons
NM VOC	0,0015 g /km	31,35 tons
NO_x	0,0391 g /km	769,64 tons
SO_x	0,0016 g /km	24,91 tons
PM₁₀	0,0012 g /km	21,62 tons
PM_{2.5}	0,0010 g /km	19,32 tons

LAND TRAFFIC: HEAVY-DUTY VEHICLES

This section provides estimates of the emissions from heavy-duty vehicles (HDVs) almost exclusively diesel-fueled that transport Port-related cargo, particularly containerized, to and from the terminals that serve as the bridge between land and sea transportation.

Trucks deliver cargo to national and main European destinations, transferring containers between terminals and off-port railcar loading facilities, an activity known as draying. In the course of their daily operations, trucks are driven onto and through the terminals, where they deliver and/or pick up cargo. They are also driven on the infrastructures within Genoa Port boundaries, and on the main public roads in the city.

To develop the emissions' estimation, truck activities have been evaluated taking into account three different components:

- **On-terminal operations**, which include waiting for terminal entry, transiting the terminal to drop off and/or pick up cargo, and departing the terminals.
- **Gate in operations**, consisting of enter and travel on public roads within the Port jurisdictional boundaries.
- **Gate out operations**, consisting of exit and access the main highways outside the Port boundaries.

This report deals exclusively with diesel-fueled HDVs, as there are few, gasoline-fueled counterparts. The most common configuration of HDV is the articulated tractor-trailer (truck and semi-trailer) having five axles, including the trailer axles. The most common type of trailer in Genoa Port is the container trailer, built to accommodate standard-sized cargo containers.

Data for the HDV emission estimates came from two basic sources: terminal interviews and Regione Liguria traffic database on-road HDV volumes. This information included Genoa Port gates operating schedules, on-terminal speeds, time and distance traveled while dropping off and/or picking up loads, and time spent idling at the entry and exit gates.

Summary of Reported HDVs Operating Characteristics for year 2010

2010	Minimum	Average	Maximum
Operation	8 hours/day	12 hours/day	24 hours/day
Speed	20 Km/h	30 Km/h	40 Km/h
Distance	5 Km	15 Km	30 Km
Movements	921.743	1.281.669	632.825
Gate In	12 min	18 min	20 min
On - Terminal	45 min	55 min	70 min
Gate Out	8 min	10 min	15 min

For this study, *Heavy Duty Vehicles* emissions would be estimated using the following equation. This equation is consistent with the publicly available model-related data that has been reviewed. The basic equation is:

$$E = EF * LF * Act * FCF$$

Where:

- E** = Emissions, in short tons
- EF_{base}** = Emission Base Factor, grams of pollutant per horsepower-hour (g/hp-hr)
- LF** = Load Factor (assumed average percentage of full load)
- Act** = Equipment activity, hours of use per year
- FCF** = Fuel Correction Factor (if applicable, *Clean Diesel Fuel*)

Emissions produced by HDVs vehicles from/to Genoa Port (year 2010)

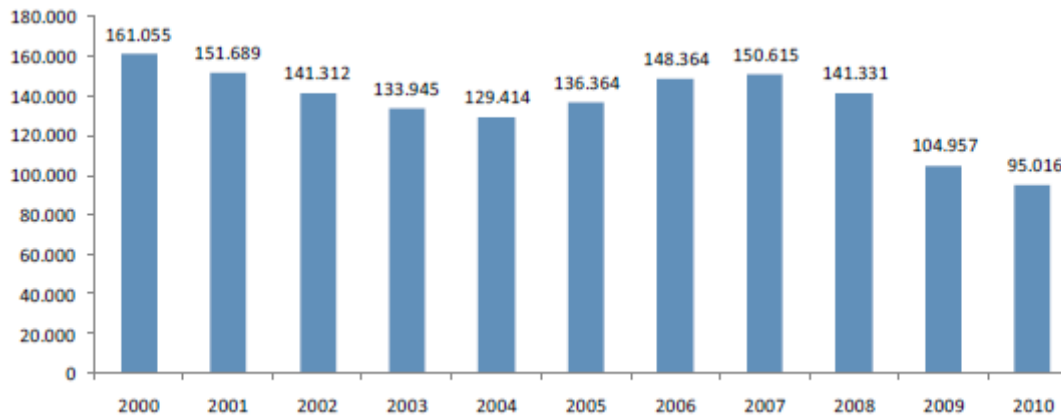
2010	Emission factors	Tons/year
CO	2,23 g /km	125,36 tons
NMVOG	0,31 g /km	42,35 tons
NO _x	12,23 g /km	1.083,64 tons
SO _x	0,09 g /km	19,90 tons
PM ₁₀	0,51 g /km	59,41 tons
PM _{2.5}	0,42 g /km	50,36 tons

LAND TRAFFIC: RAILROAD LOCOMOTIVES

The rail traffic trends, as shown in the following table, represent a strong contraction of movements in 2009-2010, which amounted to a loss of 33% compared to the previous biennium. In other words, for the year 2010 are counted 95,016 wagons transported from/to Genoa Port, equivalent to 7,308 trains.

This component is part of a more complex traffic trend related to railways system handled from/to the port of Genoa (excluding the sector of oil and refined products). In particular, taking into account the economical crisis, the reflections of the same and the difficulties that affects the local level, have amplified the contraction of the use of the rail system, despite the potential of an easy connection with the principal cities over the Apennines.

Railroad traffics series from/to Genoa Port (2000-2010)



Source: Genoa Port Authority

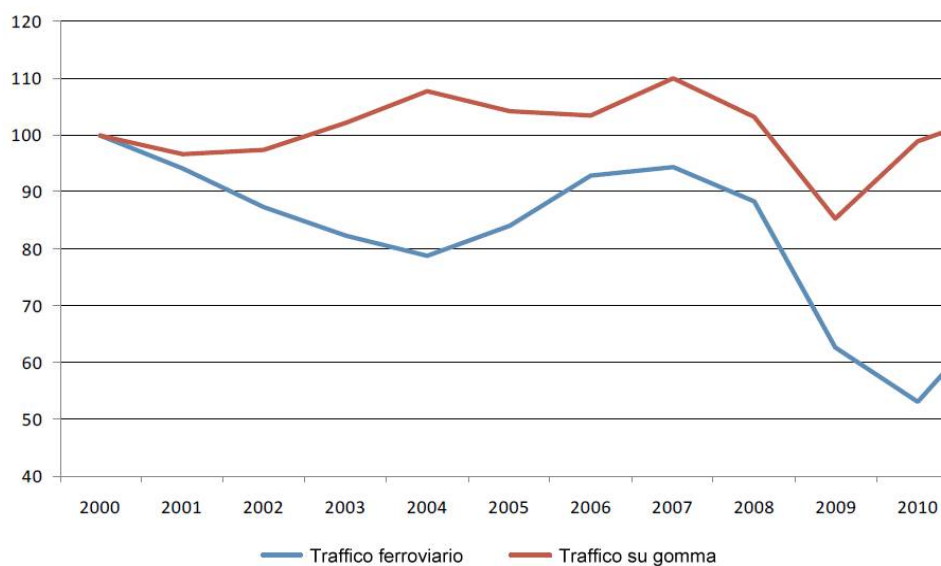
Freight wagons traffics in the principal nodes within Genoa Port

N° Vagoni	2005	2006	2007	2008	2009	2010
Old Harbour (S. Benigno)	60.528	65.817	61.863	58.369	45.279	45.153
VTE Terminal (Voltri)	75.836	82.547	88.752	82.962	59.678	49.863
TOTAL	136.364	148.364	150.615	141.331	104.957	95.016

Source: Genoa Port Authority

Comparison between rail and trucks traffic from/to Genoa Port (2000-2011)

index n. 100=2000



A recent study by RFI (Italian Railway Network), has quantified the spare capacity of the existing rail connections between Genoa Port and the main railway nodes on interregional scale. These are assumed, after the renovation and upgrading works in progress and expected on the railway system connected to Genoa Port.

These interventions will increase the rail traffic to the Port to a number of 92 per day (48 from / to Voltri VTE Terminal and 44 from/ to Sampierdarena - S. Benigno Port) compared to the actual 37, with the use of one locomotive of 1000 tonnes, driving 13 freight wagons of 39 TEU each.

More in detail, the interventions connected also to Port railway infrastructures are:

- reshaping of the galleries along all the line Ovada-Alessandria
- finishing the rail junction between Voltri - Borzoli line
- strengthening the technological systems related to Giovi's lines and the centralized management system Genoa node
- reuse of Campasso and Sampierdarena rail deposits

Railroad operations connected to Genoa Port activities are essentially of two types:

Line haul refers to the movement of cargo over long distances and occurs within the Port (in particular in VTE Voltri Terminal) as the initiation or termination of a line haul trip, as cargo is either picked up for transport to destinations across the country or is dropped off for shipment overseas.

Switching refers to the assembling and disassembling of trains at various locations in and around the Port, sorting of the cars of inbound cargo trains into contiguous "fragments" for subsequent delivery to terminals, and the short distance hauling of rail cargo within the Port. Locomotives used for line haul operations are typically large, powerful engines of 3,000 hp or more, while switch engines are smaller, typically having 1,200 to 3,000 hp.

Emissions have been estimated using the information provided by the main railroad terminal (VTE Voltri and Sampierdarena - S. Benigno) and from information sources such as the EPA's *Regulatory Support Document* (RSD) published as background to EPA's locomotive rule-making process.

For this study, *Railroad locomotives* emissions would be estimated using the following equation. This equation is consistent with the publicly available model-related data that has been reviewed. The basic equation is:

$$E = EF * HP * LF * Act$$

Where:

- E** = Emissions, in short tons
- EF** = Emission Base Factor, grams of pollutant per horsepower-hour (g/hp-hr)
- HP** = Average rated horsepower for the equipment type and horsepower category
- LF** = Load Factor (assumed average percentage of full load)
- Act** = Equipment activity, hours of use per year

Emissions produced by Freight trains from/to Genoa Port (year 2010)

2010	Emission factors	Tons/year
CO	12,8 g/kW	76,98 tons
NMVO	7,5 g/kW	22,81 tons
NO _x	121,4 g/kW	657,76 tons
SO _x	0,7 g/kW	8,52 tons
PM ₁₀	3,1 g/kW	22,78 tons
PM _{2.5}	2,8 g/kW	18,21 tons

ENLARGEMENT AND MAINTENANCE WORKS

In the last years, the port has gone through an enlargement process which has involved a great amount of construction material movements, as well as trucks traffic. Besides, maintenance works at dock is done regularly. Related emissions have not been estimated but they should be considered in future APICE activities and emissions abatement plan, particularly regarding PM10.

Summary table 2010 emissions:

ACTIVITIES OF SHIPS AND VESSELS						
	CO	NMVOC	NO_x	SO_x	PM₁₀	PM_{2.5}
Solid Bulk Cargo	68,63	27,32	612,01	20,45	21,35	18,33
Petrolers / Liquid Bulk Cargo	92,49	31,35	769,64	24,91	21,62	19,32
Generic loads	139,21	51,66	1155,70	37,62	34,63	32,53
Cargo Lo-Lo	122,73	37,30	961,19	33,17	27,93	25,72
Ferry (passengers)	181,09	62,95	1453,70	48,94	44,37	41,84
Cruises (passengers)	43,98	15,72	453,31	12,18	11,92	8,99
Fast ferries	12,48	1,72	123,31	2,21	3,92	3,11
In-port navigation load	58,25	18,97	489,63	15,74	13,13	13,13
Tug Boats	182,14	21,23	428,31	84,53	23,70	19,37
Fishing Boats	0,48	0,47	3,34	0,13	0,27	0,27
Others	1,68	0,49	14,09	0,45	0,35	0,33
TOTAL	903,16	269,18	6464,23	280,33	203,19	182,94
IN-PORT STORAGE						
	CO	NMVOC	NO_x	SO_x	PM₁₀	PM_{2.5}
Cargo handling	81,26	17,60	188,37	22,16	35,70	27,09
Solid bulk operations	115,10	51,51	432,20	32,65	218,20	198,76
Liquid bulk operations	92,49	31,35	769,64	24,91	21,62	19,32
TOTAL	288,85	100,46	1390,21	79,72	275,52	245,17
IN-PORT TRAFFIC LOAD INDUCED BY PORT ACTIVITIES						
	CO	NMVOC	NO_x	SO_x	PM₁₀	PM_{2.5}
Heavy-duty vehicles	125,36	42,35	1083,64	19,90	59,41	50,36
Railroad Locomotives	76,98	22,81	657,76	8,52	22,78	18,21
TOTAL	202,34	65,16	1741,4	28,42	82,19	68,57
2010	CO	NVOC	NO_x	SO_x	PM₁₀	PM_{2.5}
TOTAL EMISSIONS	1.394,35	434,8	9.595,84	388,47	560,9	496,68

2. Identification of the future time risk activities and vulnerability systems

In this chapter, the **reference scenario to 2015** has been built taking into account:

- Socio-economical trends developed within the project APICE
- The official documents of Genoa Port considering the goods and passengers estimated as described in the Three-Year Operational Plan 2012 - 2015
- The modification in the current and / or planned interventions about the infrastructure and renewal strategy of Genoa Port

Are therefore given for each category described above, specific information on emission sources.

ACTIVITIES OF SHIPS AND VESSELS

The trend scenario 2015 have been considered by evolution of type of merchandise/passengers, which has been provided by the new PRP of Genoa Port. These provisional data have been translated into vessels types and number of calls per vessel type, considering also the increased ratio of merchandise/passengers can be transported by modern ships. The following table shows the forecast of Ships and Vessels activities in Genoa Port.

Forecast of Ships and Vessels activities in Genoa Port

	2011	2012	2013	2014	2015	CAGR
Ships (units)	8000	8400	8800	9400	10000	6.2%

Source: Genoa Port Authority

Future Emissions forecast produced by Ships and Vessels in Genoa Port (year 2015)

	2010	Forecast 2015
Ships	7.488	10.000
CO	903,16 tons	1.201,03 tons
NM VOC	269,18 tons	328,82 tons
NO_x	6.464,23 tons	8.546,47 tons
SO_x	280,33 tons	334,51 tons
PM₁₀	203,19 tons	255,95 tons
PM_{2.5}	182,94 tons	227,45 tons

TERMINAL EQUIPMENTS: CARGO HANDLING

About the development of container traffic in the short term, the forecasts of economic operators, despite the uncertainty of the markets described above, show a growth in volumes greater than expected, with an average annual growth of about 7% (2011 - 2015). That prospect seems even more positive compared to that estimated from the Ocean Shippin Consultants in 2009, where it was expected, at best, to reach the pre-crisis traffic levels only in 2012, as shown in the following table.

Forecast of traffic development in Genoa Port

	2011	2012	2013	2014	2015	CAGR
Cargo Handling (Mln TEUs)	1.84	1.96	2.08	2.26	2.32	7.1%

Source: Genoa Port Authority

Future Emissions forecast produced by cargo handling in Genoa Port (year 2015)

	2010	Forecast 2015
TEUs	1.758.858	2.320.000
CO	81,26 tons	107,19 tons
NMVOG	17,60 tons	23,22 tons
NO_x	188,37 tons	248,47 tons
SO_x	22,16 tons	29,23 tons
PM₁₀	35,70 tons	47,09 tons
PM_{2.5}	27,09 tons	35,73 tons

SOLID AND LIQUID BULKS

After a decline in 2009-2010, Solid bulks traffic forecasts shown an further increase on specialized goods such as forestry, fruit and vegetables and metals / steel products, with variations year on year between 4.2%. The projections made by the operators of the various commodity sectors of various goods are briefly shown in the table below.

Considering the rapid and almost complete saturation of the infrastructure and facilities dedicated to these types of products, the forecasts provided by the terminal operators take into account provisionally the measures aimed to expand the supply of production, which, however, represent an essential to ensure the consolidation and strengthening of the position of the port of Genoa and the corresponding increase in traffic.

Forecast of Solid bulks future operations in Genoa Port

	2011	2012	2013	2014	2015	CAGR
Solid Bulks (Mln tons)	4.78	4.95	5.08	5.22	5.35	3.6%

Source: Genoa Port Authority

Future Emissions forecast produced by Solid bulks operations in Genoa Port (year 2015)

	2010	Forecast 2015
Tons	4.608.089	5.350.000
CO	115,10 tons	133,63 tons
NMVOG	51,51 tons	59,80 tons
NO_x	432,20 tons	501,78 tons
SO_x	32,65 tons	37,90 tons
PM₁₀	218,20 tons	253,33 tons
PM_{2.5}	198,76 tons	230,76 tons

Regarding the liquid bulks forecast traffic trends, especially that related to crude oil, an increase is expected till 2015, as a continuation of the current movements of refined products into the Mediterranean market.

About the chemicals products, the overall forecasts show an increase from year 2011, as a starting phase of recovery (+14%) till 2015, primarily due to the specialized terminals in Sampierdarena Port. About other liquid bulks, projections shows an expansion in the traffic of "emerging" goods, such as biofuels and vegetable oils, underlining the important role played by Genoa Port for new sustainable and less pollutant connections to Central Europe principle nodes.

Forecast of Liquid bulks future operations in Genoa Port

	2011	2012	2013	2014	2015	CAGR
Liquid Bulks (Mln Tons)	19.69	20.45	22.23	23.18	23.86	4.8%

Source: Genoa Port Authority

Future Emissions forecast produced by Liquid bulks operations in Genoa Port (year 2015)

	2010	Forecast 2015
Tons	19.696.708	23.860.000
CO	92,49 tons	107,19 tons
NMVOG	31,35 tons	37,97 tons
NO_x	769,64 tons	932,32 tons
SO_x	24,91 tons	29,23 tons
PM₁₀	21,62 tons	47,09 tons
PM_{2.5}	19,32 tons	35,73 tons

LAND TRAFFIC: HEAVY-DUTY VEHICLES

Taking into account the future scenarios represented in the New Port Authority Plan for 2015, the role of Heavy Duty vehicles for intermodal transportations result significant, especially considering the augmented TEU's capacity of Voltri VTE Terminal, in order to hotel post-Panamax cargo-ships. The following table shows the forecast of future operations:

Forecast of HDVs future operations in Genoa Port

	2011	2012	2013	2014	2015	CAGR
HDV's operations (Mln movements)	2.83	2.98	3.07	3.15	3.35	6.4%

Source: Genoa Port Authority

Future Emissions forecast produced by HDVs in Genoa Port (year 2015)

	2010	Forecast 2015
Movements	2.836.237	3.350.000
CO	125,36 tons	148,06 tons
NMVOG	42,35 tons	50,02 tons
NO_x	1.083,64 tons	1.279,93 tons
SO_x	19,90 tons	23,50 tons
PM₁₀	59,41 tons	70,17 tons
PM_{2.5}	50,36 tons	59,48 tons

LAND TRAFFIC: RAILROAD LOCOMOTIVES

In order to overcome and mitigate possible/future risk situations of Port expansions and taking into account the strong relationship between Genoa and its Port (in terms also of environmental control), the railroads commercial sector will play an import role in future years. As underlined in the new Genoa PRP it's necessary to improve the infrastructural interconnection reconsidering also the dry port area (Catchment Area), with particular reference to the new railway line over the Apennines. The following table shows the forecast of future freight trains connections from/to Genoa area.

Forecast of Freight trains from/to Genoa Port

	2011	2012	2013	2014	2015	CAGR
Wagons (Mln units)	0.099	0.108	0.116	0.121	0.125	4.2%

Source: Genoa Port Authority

Future Emissions forecast produced by Freight trains in Genoa Port (year 2015)

	2010	Forecast 2015
Wagons	95.016	125.000
CO	76,98 tons	101,27 tons
NMVOC	22,81 tons	30,02 tons
NO_x	657,76 tons	865,33 tons
SO_x	8,52 tons	11,20 tons
PM₁₀	22,78 tons	29,97 tons
PM_{2.5}	18,21 tons	23,95 tons

Summary table future emissions:

ACTIVITIES OF SHIPS AND VESSELS						
	CO	NMVOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
TOTAL	1201,03	328,82	8546,47	334,51	255,95	227,45
IN-PORT STORAGE						
	CO	NMVOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
Cargo handling	107,19	23,22	248,47	29,23	47,09	35,73
Solid bulk operations	133,63	59,80	501,78	37,90	253,33	230,76
Liquid bulk operations	107,19	37,97	932,32	29,23	47,09	35,73
TOTAL	348,01	120,99	1682,57	96,36	347,51	302,22
IN-PORT TRAFFIC LOAD INDUCED BY PORT ACTIVITIES						
	CO	NMVOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
Heavy-duty vehicles	148,06	50,02	1279,93	23,50	70,17	59,48
Railroad Locomotives	101,27	30,02	865,33	11,20	29,97	23,95
TOTAL	249,33	80,04	2145,26	34,7	100,14	83,43
2010	CO	NVOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
TOTAL EMISSIONS	1.798,37	529,85	12.374,3	465,57	703,6	613,1