

Sustainable Green Technologies & Innovations

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Valerio Recagno

Main Activities

- **Identification of Green Technologies** suitable to a set of applications.
- **Definition of the application areas for Green Technologies** with the creation of a web based repository to store all the information collected.
- **Benchmarking of Green Corridors with Green Technologies** to estimate the impact with respect to the baseline.

Identification of Green Technologies

The first activity is the identification of Green Technologies to be applied in the selected SuperGreen corridors to solve the bottlenecks and to support the greening of transport.

Main steps performed:

- Definition of the template to collect information on technologies. A set of indicators (polluting emissions, energy consumption, life cycle cost, etc.) and information (time to market, supporting measures, manufacturer, etc.) have been defined.
- Collection of information on technologies
- Analysis of the technologies and selection of the most promising

Collection of technologies (1/2)

The following categories have been taken into account:

- Engines and Propulsion Systems;
- Fuels and sources of energy;
- Cargo Handling and Transfer;
- Cargo Preparation;
- Heating and Cooling;
- Innovative units and treatment;
- Vehicles;
- Navigation technologies;
- Best practices.

with reference to the following transport modes:

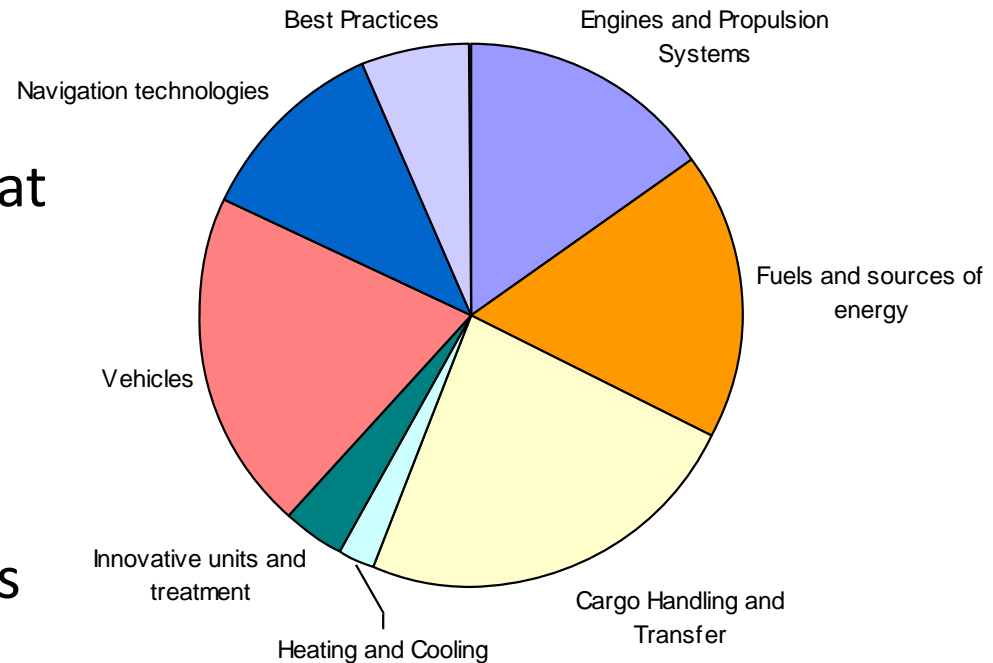
- Waterborne transport (inland waterway and maritime)
- Railway transport
- Road transport
- Multimodal transport

Collection of technologies (2/2)

An extensive collection has been carried out and many innovative technologies have been identified through:

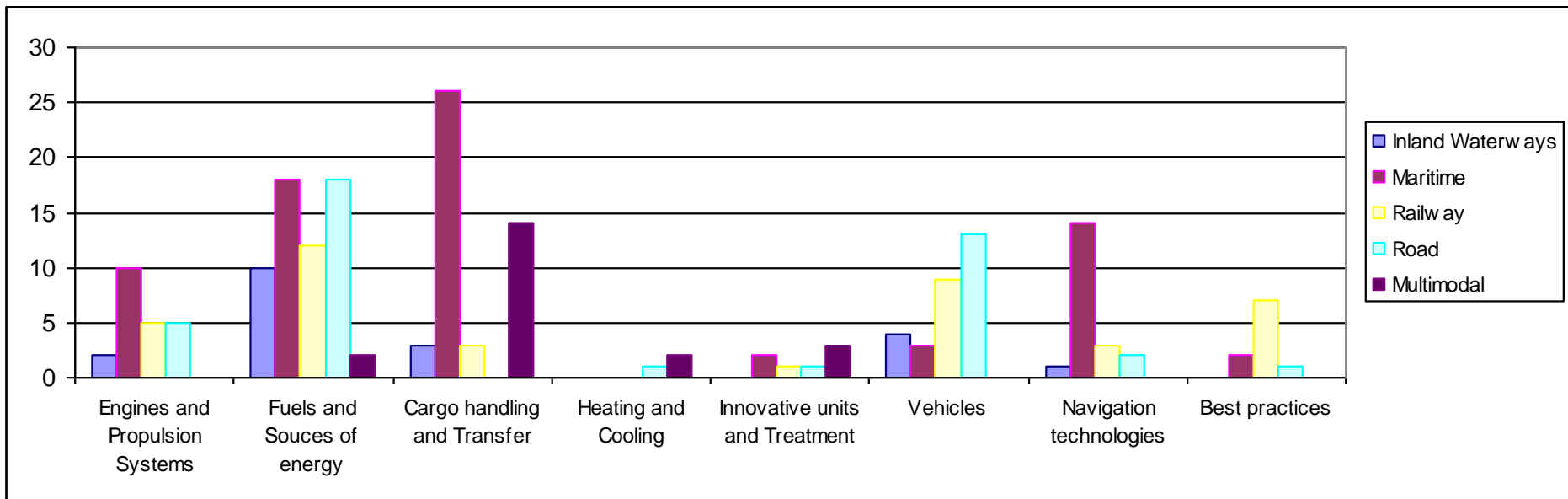
- literature review;
- past and current research projects (both national and at European level);
- personal know-how of partners.

The result of this activity consists in 138 technologies identified.



Collection of Application

Considering the technologies associated to the Transport mode, the total number of applications grows up to 197, as some technologies are applicable to more than a single transport mode.

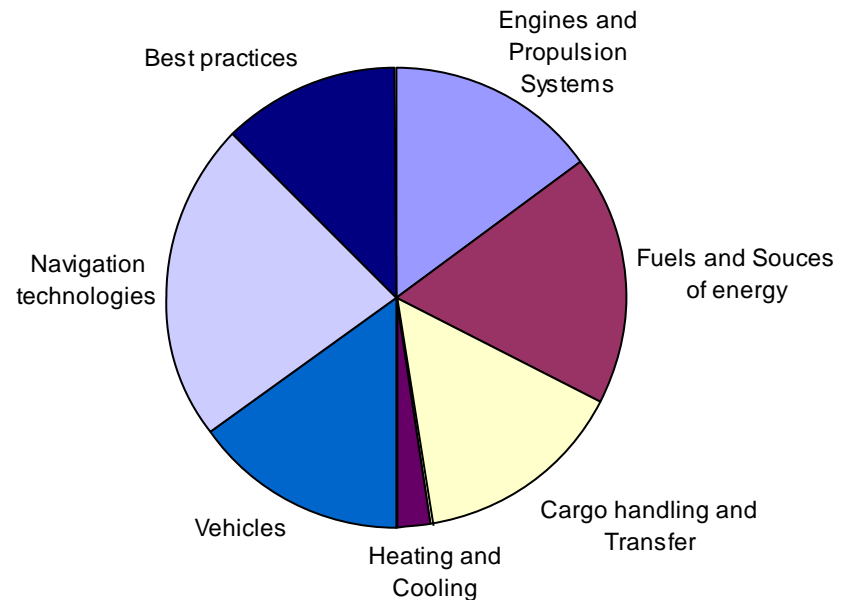


Analysis of technologies

The collected technologies have been analyzed in order to identify the most promising in terms of greening potential, which could be applied in the Green Corridors identified in the scope of SuperGreen project.

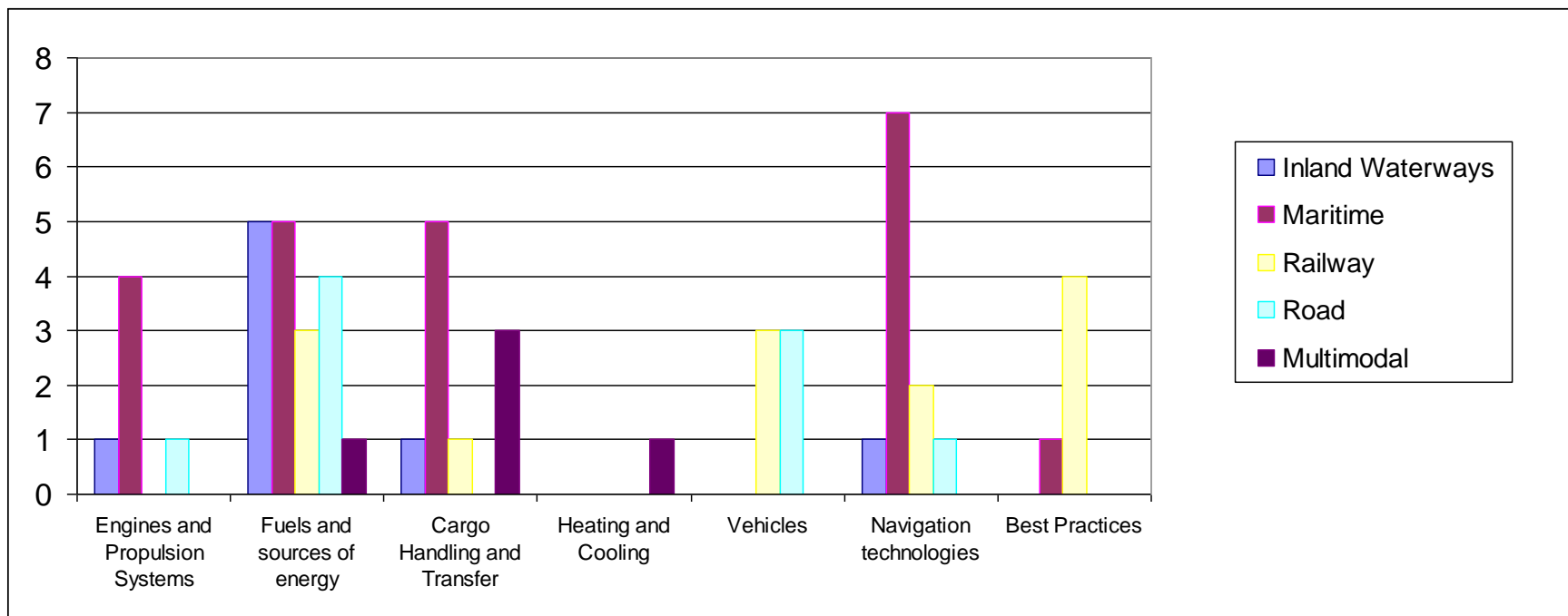
The technologies have been divided into 6 different categories from very important to low importance, needing of information or not relevant for project.

40 technologies belong to the first two categories “very important” and “important” (30%).



Analysis of the applications

Considering the “very important “ and “important” technologies associated to the Transport mode, the total number of applications grows up to 57, as some technologies are applicable to more than a single transport mode.



“Very Important” Technologies (1/2)

	Technology name	Transport mode	Short Description
Engines and Propulsion Systems	Directly driven propeller	Maritime	Slow speed engine directly connected to propeller shaft, 20 year life time, running 5500 h/a.
	Mechanically connected propeller	Maritime	Medium speed engine connected by a reduction gear to the propeller shaft, 20 year life time, running 5500 h/a
	Diesel-mechanic propulsion with high speed engine	Maritime	High speed engine connected by a reduction gear to the propeller shaft, 20 year life time, running 5500 h/a.
	Full/parallel hybrid	Road	Electrical support of engine power by saving and re-use of break-energy; combination of 6 cylinder engine plus electrical engine
	Nauticlean S System	Inland Waterways	It consists of two reactors with a selective-catalyticreduction
Fuels and sources of energy	Ethanol and bio-diesel	Maritime, Inland waterways, Road	Investigation about using alternative fuels.
	CGN (compressed natural gas)	Multimodal, Inland Waterways	Cleaner fuel for yard handling equipment (Prime movers)
	LNG	Maritime, Railway, Road, Inland Waterways	Liquefied natural gas
	Biogas	Road, Railway, Maritime, Inland Waterways	Biogas is mainly produced from bio-wast, agricultural recidues and residues from sewage treatment plants
Cargo Handling and Transfer	Conversion of RTGs from diesel to electric power	Maritime, Multimodal	RTGs fitted with electrical components in place of traditional hydraulic parts. Conversion will eliminate black emissions and lower noise levels of engines
	Hybrid hydraulic drive for Terminal tractors	Maritime, Inland waterways	Storing braking energy into hydraulic system for accelration and system
	Metrocarg	Railway	Metrocarg is an innovative solution for containers cargo handling in overhead electrified railways, it's a containers horizontal movement system from an automated platform to train wagons. This technology is ready to experimentation. Metrocarg will be tested on new Maersk's Platform in Vado Ligure (SV), Italy.
	Low emission engines	Maritime, Multimodal	Replacement of old handling equipment by new machines fitted with Euro III/ IV ccompliant engines. While the upfront capital cost is higher in abt 15K euros/unit, these engines burn diesel more efficiently, give the engine more power while reducing emission of CO2 and providing up to 5% reduction on fuel consumption

“Very Important” Technologies (2/2)

	Technology name	Transport mode	Short Description
Vehicles	NS 999 Electric Locomotive	Railway	NS 999 is an entirely electric locomotive that uses a lead-acid energy storage system without the use of a diesel engine and with zero exhaust emissions.
	M2eHybrid Freightliner	Road	Support engine plus auxiliary drive to operate an elevating platform of the truck; combination of 6 cylinder engine plus electrical engine
	Battery-electric vehicles	Road	Battery-electric vehicles
	Euro VI vehicles	Road	Euro VI is compulsory for new trucks from 2013, replacing Euro V
Navigation technologies	Automatic Identification System (AIS)	Maritime	Ship-to-ship, ship-to-shore and shore-to-ship system. Main purpose is collision avoidance, ship tracking and tracing. Works on VHF (Very high frequency, 30–300 MHz) radio frequency.
	WiMax - Worldwide Interoperability for Microwave Access	Maritime, Railway, Road	Long range, high bandwidth wireless Internet
Best Practices	Traffic Flow Management	Railway	A system for online optimisation of rail traffic flow to have minimum delays and minimum energy consumption, developed by emkamatik on behalf of SBB
	Carbon-free rail freight transport	Railway	Now you can have your goods transported carbon-free on all European rail freight transport routes. DB Schenker Rail replaces the electricity required for your freight transport with regenerative energy that comes 100% from renewable sources in Germany. This helps to avoid carbon emissions right from the outset. Even the smallest quantities can be transported in this way without carbon emissions, on a national and international scale.

Definition of the Application Areas for Green Technologies

The main objective of this activity is the definition of a matrix Technology vs. Application in order to give an indication of the importance of the technology for each application/part of the corridor.

Main steps performed and in progress

- Preparation and reply to questionnaires (one questionnaire per technology)
- Definition of the Technology vs. Application matrix in order to give a primary indication on the possible application of each technology or category and to assess the greening potential.
- Implementation of the web based repository
- Population of the web based repository



Benchmarking of Green Corridors with Green Technologies

The main objective of the activity is the benchmarking of Green Corridors through the preparation of the baseline (current standard performance on corridors with conventional technologies) and estimation of the impacts with respect to the Green Technologies.

The baseline will be defined on the basis of:

- technologies currently used in some segments of the corridors
- KPI characterizing the corridors
- indicators describing the technologies

Creation of the benchmark

The benchmark of the corridors with technologies will be done assuming that some specific technologies will be applied in specific segments of the corridors.

Estimation of the impacts of green technologies with respect to the baseline in order to create the benchmark.

Results of the Baseline and the Benchmark will be stored in the web based repository.

Thank you for your attention

Contact Details

Valerio Recagno – D'Appolonia S.p.A.

Phone: +39 010 3628148

valerio.recagno@dappolonia.it