Type of measure	Area	Measure	Criterion 1: Emission reduction potential (max. %) (not cumulative)	Criterion 2a: Applicability on share of the European fleet 1: > 50% 2: 10-50% 3: <10%	Criterion 2b: Economic potential payback period (years)	Criterion 3a: Technological Maturity (TRL) 1: basic R&D needed till 9: full commercial application	Criterion 3b: Non-technical Maturity & other hindrances exclusion if overcapacity	Technology added by PROMINENT (marked x)
Infrastructure	Ports & mooring places	Shore side power	5%	1	n.a.	5	reg. & fin.support	
		Optimisation of locking procedure/ traffic mgt.	5%	1	n.a.	6		
	Waterway information	Better pred. of av. water depth (c.f. load factor)	10%	1	n.a.	4		
		Electronic ECDIS charts with actual depth information	5%	1	n.a.	7		
		Real time info on fairw. data (link to energy.eff.nav.)	10%	1	n.a.	5		
	Waterway Infrastructure	Improve fairway conditions (upgrading)	65%	1	n.a.	9		
		Technologies for waterway maintenance	n.a.	1	n.a.	4		
Ship-related technical measures	Fleet structure	Use larger vessel units	75%	2	n.a.	9	overcapacity	
		Use more coupled convoys	20%	2	7	9	overcapacity	
		Lengthening (+25%; Europe type vessel) + nozzle	15%	2	2	9	overcapacity	
		Lengthening (+10%; smaller than Europe type vessel)	5%	2	26	9	overcapacity	
	Fuels, standardised solutions	Use LNG (Liquefied Natural Gas) (PM reduction)	90%	2	n.a.	6	reg. & fin.support	
		Apply dual fuel (LNG and diesel) (PM reduction)	90%	1	n.a.	6	reg. & fin.support	
		Apply GTL fuel (PM reduction)	60%	1	n.a.	9	reg. & fin.support	x
		Apply CNG (PM reduction)	95%	3	n.a.	5	reg. & fin.support	x
		Apply Methanol (PM Reduction)	95%	1	n.a.	3	reg. & fin.support	x
		Use hydrogen / fuel cells	100%	1	n.a.	2	reg. & fin.support	
	Propulsion system, standardised solutions	Right sizing	10%	1	n.a.	9		x
		ReDeNox (NOx reduction)	95%	1	n.a.	4	fin.support	x
		NoNox Engine air control by addional valve per cilinder in inlet manifold)	50%	1	n.a.	3	reg. & fin.support	x
		Use waste heat energy recovery (from exhaust gas, by Rankine cycle)	5%	2	25	4		
		Apply SCR (selective catalytic reduction) (NOx red.)	90%	1	n.a.	8	reg. & fin.support	
		Use emulsified fuels (PM reduction)	20%	3	6	7	reg. & fin.support	
		Hydrogen injection (NOx, CxHy)	0%	1	n.a.	4		x
		Apply diesel particulate filters (PM reduction) Wall flow DPF	90%	2	n.a.	7	reg. & fin.support	
		Partial flow DPF	70%	n.a.	n.a.	n.a.	reg. & fin.support	x
		Combine SCR and DPF (Nox+PM reduction)	90%	1	n.a.	7	reg. & fin.support	
		Exchange of main diesel engine (red. of NOx & PM)	90%	1	4	9		x
		Overhaul of existing engines	10%	1	n.a.	9		x
		Diesel-electric prop. (truck engines; no buffer batt.)	10%	2	n.a.	7	fin.support	
		Hybrid prop. (diesel [or gas]-electric + buffer batt.)	10%	1	n.a.	9	fin.support	x

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Ship-related technical measures	Propulsion system, propeller	Improved propeller systems	30%	3	5	9		
		Pre Swirl stator	5%	3	n.a.	5		
		Improved wake field	5%	1	n.a.	7		
		Pump propeller	10%	2	6	8		x
		Applying nozzle	25%	2	n.a.	8		
		Propelling bow thruster	0%	3	n.a.	8		
		Multiple propeller propulsion	10%	2	n.a.	4		
	Hydro-dynamics	Apply air lubrication	10%	2	n.a.	6		
		Apply wake field separation plate	25%	3	n.a.	8		
		Apply adjustable tunnel apron	10%	2	4	6		
		Apply coupling point optimisation	20%	2	5	7		
		Optimise hull dimension and form	15%	3	n.a.	8		
		Nozzle strut removal	5%	2	11	8		
		Remove flanking rudders	5%	3	4	8		
		Alternative rudder concepts	5%	2	25	7		
		Improved aft-ship gondolas	3%	3	25	7		
		Coatings	0%	1	n.a.	9		
		Bow thruster valve	5%	3	n.a.	7		
		Adjustable bulbous bow	0%	3	n.a.	3		
		Optimise trim and heel	5%	1	n.a.	8		
	Ship structures & weight	ADN double steel hull	0%	3	7	9		
		λ-shaped steel double hull	0%	3	8	8		
		Steel-Foam-Steel double hull	0%	3	10	4		
		Lengthening with composite mat. (instead of steel)	1%	2	5	3	overcapacity	
		Reduce vessel weight	5%	3	n.a.	4		

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Ship-operational	Sailing behaviour	Smart and energy-eff.nav. (speed adaption)	10%	1	n.a.	5		
		Automation	10%	1	n.a.	1		x
		Smart and energy-eff.nav. (optimised track choice)	5%	1	n.a.	5		
	Maintenance	Clean underwater bodies/ hull/ ballast/ bilges	5%	3	n.a.	8		
		Clean and undamaged propellers	10%	3	n.a.	9		
		Engine system condition monitoring	n.a.	1	n.a.	8		x
Education & Qualification		Mobile Learning	0%	1	n.a.	5		
		Integration of IWT into logistics education	n.a.	1	n.a.	5		
		Simulator training (related to energy eff. nav.)	10%	1	n.a.	5		
Logistics		Organise downstream navigation in formations	10%	3	n.a.	n.a.		
		Best practices in collaboration (e.g. hub & spoke)	15%	2	n.a.	9		
		Gain sharing models (increased payload)	15%	2	n.a.	8		
		Collaborative planning (red. of empty km)	15%	2	n.a.	9		
		Info exch.syst. betw. operators (red. of empty km)	5%	3	n.a.	8		
		Innov. transhipm. & transp. systems & load units	10%	3	n.a.	2		
		New log. concepts incl. vessels & ports (Q-barge)	10%	2	n.a.	4		

Table 1 PROMINENT long list of promising technologies

Technologies marked **blue** in the longlist are selected due to reaching the thresholds defined by PROMINENT and will be further elaborated in the project ("Short list of promising technologies" in chapter 3.3 and the related "Description of Best Available Technologies" in chapter 0).

Technologies marked **grey** in the longlist also reach the threshold of the criteria. However, they will not be further elaborated within PROMINENT, as they **are not within the focus of the project** (see following pages).