



# Energy Efficient Safe SHip OPERAtion

## Manoeuvrability Criteria

WP1 – Task 1.3. EEDI and safety criteria  
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### Work contents:

- ▶ Critical analysis of the existing regulatory framework to identify safety issues:
  - EEDI documents regarding minimum propulsion power
  - submissions to IMO
- ▶ Operational experience from ship operators and other project partners

### Results:

- ▶ Safety criteria for manoeuvrability in adverse conditions
- ▶ Safety criteria for intact stability (capsize, excessive roll, excessive lateral accelerations, water on deck etc.)
- ▶ Preliminary suggestions for the limits for these criteria
- ▶ Requirements to the enhancement and validation of the numerical tools
- ▶ Specification for the work to be carried out in the project to verify (and revise) the identified safety criteria and standards



# Task 1.3: EEDI and safety criteria

## Deliverables & Resources



SHOPERA Break-Down			Year 1												Year 2											
	Leader	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
<b>WP1</b>	<b>Environmental conditions and requirements for different ships</b>	<b>DNV</b>																								
1.1	Met-ocean description	DNV								D1.1																D1.2
1.2	Identification of ships and risk analysis of relevant marine accidents	NTUA					D1.3						D1.4													
→ 1.3	EEDI and safety criteria	GL								D1.5																

### ▶ D 1.5. Report on EEDI and safety criteria (M9)

WP/Tas k No	1	2	3	4	6	7	8	19	20	21	22	Total
	NTUA	GL	DNV	LR	IST	UDE	RINA	DAN	CLST	FNK	CAL	
Task 1.3	0.70	2.50	1.50	1.00	1.00	1.00	0.50	0.50	0.50	0.25	0.50	9.95

# Task 1.3: EEDI and safety criteria

## Running Action Plan

- ▶ **Analysis of the existing regulations & proposals to define**
  - safety criteria & standards for manoeuvrability in adverse conditions (GL, DNV, RINA): M4 (end of January)
  - intact stability criteria & standards (GL, LR, IST): M4
- ▶ **Analysis of operational experience from ship operators and other project partners**
  - safety criteria & standards for manoeuvrability in adverse conditions (NTUA, DAN, CLST, FNK, CAL): M4
  - intact stability criteria & standards (DAN, CLST, FNK, CAL): M4
- ▶ **Proposal for safety criteria & standards**
  - First draft (GL -> to all partners for feedback): M6
  - Feedback from all partners (ALL): M7
  - Final proposal for safety criteria & standards (GL): M8
- ▶ **Requirements to the enhancement and validation of the numerical tools:**
  - Proposals (GL, NTUA, DNV, LR, IST, UDE, RINA): M6
  - First draft (GL): M7
  - Feedback (ALL): M8
  - Final (GL): M9
- ▶ **Specification for the work to be carried out in the project to verify and (if necessary) revise the identified safety criteria and standards:**
  - Preliminary for feedback (GL): M8
  - Final (GL): M9
- ▶ **D 1.5. Report on EEDI and safety criteria (GL): M9**

1. Advance speed criterion (from IACS studies): *“The vessel should be able to keep a minimum advance speed of [4.0 knots] in waves and wind from any direction”*
2. Course-keeping criterion (from IACS studies): *“The vessel should demonstrate the ability to keep a prescribed course in waves and wind from any direction”*
3. [Turning] ability (discussions during Kick-Off meeting):
  - Dynamic criterion, which should address **timing** of manoeuvres
  - Something like “The vessel should be able to perform [full turning] in wind and waves from any direction in [X minutes]”
  - Should be used at least to check whether criteria (1) & (2) are always sufficient
  - Doubts:
    - Full turning circle is rarely required in real life, especially in adverse conditions
    - Turning in adverse conditions does not look like a circle – how to evaluate?
    - Complexity
  - Alternative: Z-manoeuve or X°- (e.g. 90°-) course changing (relevant for avoidance of grounding/collision, weather-veering)
4. Criteria for restricted water: Course-keeping during overtaking or in strong wind:
  - Reduced speed from navigational reasons (frequent practical situation) => rudder becomes inefficient
  - External moment is imposed by overtaking ship or by strong wind (container ships)
  - Possible criterion: *“The rudder should provide yaw moment defined as  $f(L_{pp}, B_{ww}, A_{ww}, \dots)$  at forward speed of [X knots] in calm water of depth [X m]”*
  - Doubts: these criteria will not lead to the restriction of the minimum installed power, only to rudder efficiency requirements

- ▶ Questionnaire
  - Developed in a national research project (GL, UDE, TUB, ...)
  - Distributed to several shipping companies
  - Very insightful results for
    - Manoeuvrability criteria
    - Environmental conditions
    - Specific problems for specific ship types
  - But: response rate is rather low => some efficient ways to get response are to be found

- ▶ Provide input to the running actions by end of January (GL, DNV, RINA, LR, IST, NTUA, DAN, CLST, FNK, CAL, DAN, CLST, FNK, CAL):
  - Analysis of the existing regulations & proposals to define
    - safety criteria & standards for manoeuvrability in adverse conditions (GL, DNV, RINA): M4 (end of January)
    - intact stability criteria & standards (GL, LR, IST): M4
  - Analysis of operational experience from ship operators and other project partners
    - safety criteria & standards for manoeuvrability in adverse conditions (NTUA, DAN, CLST, FNK, CAL): M4
    - intact stability criteria & standards (DAN, CLST, FNK, CAL): M4
- ▶ Next actions:
  - Proposal for safety criteria & standards: First draft (GL) -> all partners for feedback: **M6**
  - Requirements to the enhancement and validation of the numerical tools: Proposals (GL, NTUA, DNV, LR, IST, UDE, RINA): **M6**
  - Specification for the work to be carried out in the project to verify and (if necessary) revise the identified safety criteria and standards: Preliminary for feedback (GL): M8