

WAVECO

PROJECT SUBWAVE - AUTOMAR

Business Proposal

Waveco AS in collaboration with **Stadt Towing Tank AS & Måløy Verft AS**

HIGHLIGHTS

4000 M: AVERAGE DEPTH IN THE WORLD'S OCEANS

WAVECO



Patented

Wave power technology



Subwave

Energy supply from wave energy



Automar

Unmanned DP surface vessel



2021-30

UN Decade of Ocean Science for Sustainable Development

NEW INVESTOR & PARTNER

Groundbreaking product that will help solve critical global problems related to the ocean

Supported by analyzes from high-profile research environments

60% stake in Waveco AS

Join now

OCEAN OBSERVATION IS URGENTLY NEEDED

TO SUPPORT EFFORTS TO REVERSE THE CYCLE OF DECLINE IN OCEAN HEALTH

PROBLEM

The Global Ocean Observing System (GOOS)



Drifting observation buoys spread in the oceans

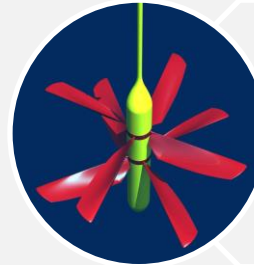
- 1 Continuous observation from a network of buoys in *fixed positions* in the deep seas is badly needed to understand what is happening to the ocean.
- 2 Satellite communication for autonomous underwater vehicles (AUVs) and seabed installations is not possible without a steady presence on the sea surface.

SOLUTION



Automar

Autonomous un-moored stationary presence in deep-sea regions powered by waves



Subwave

Renewable energy supply for any floating object that is affected by surface waves

MARKET OPPORTUNITIES

A MISSING OPTION TO THE OCEAN OBSERVATION SECTOR

[Read more about ocean observation](#)

Autonomous observation devices today

The ARGO Subsurface Drifter Program

3800 floats. Costs: € 400K/float + 600 new floats/yr¹

The Global Surface Drifting Buoy Array

1250 buoys. Unit cost: € 10K - 1000K incl sensors²

Surface Drones

Unknown number. Wave Glider: € 250K + sensors³

Subsurface Gliders

Unknown number. Typical unit cost > € 100K⁴

Moored Buoys

400 in program. APEX € 300K / unit, OPEX € 20K / yr²

What can Automar do?

Unmoored wave powered platform in fixed position in deep oceans for unlimited time

Oceanographic and meteorological measurements from atmosphere to 90 m depth

Subsea-to-satellite communication link for subsea vehicles and seabed installations

Listening and sounding station for underwater monitoring and navigation

Battery charging for all kinds of autonomous ocean observation vehicles

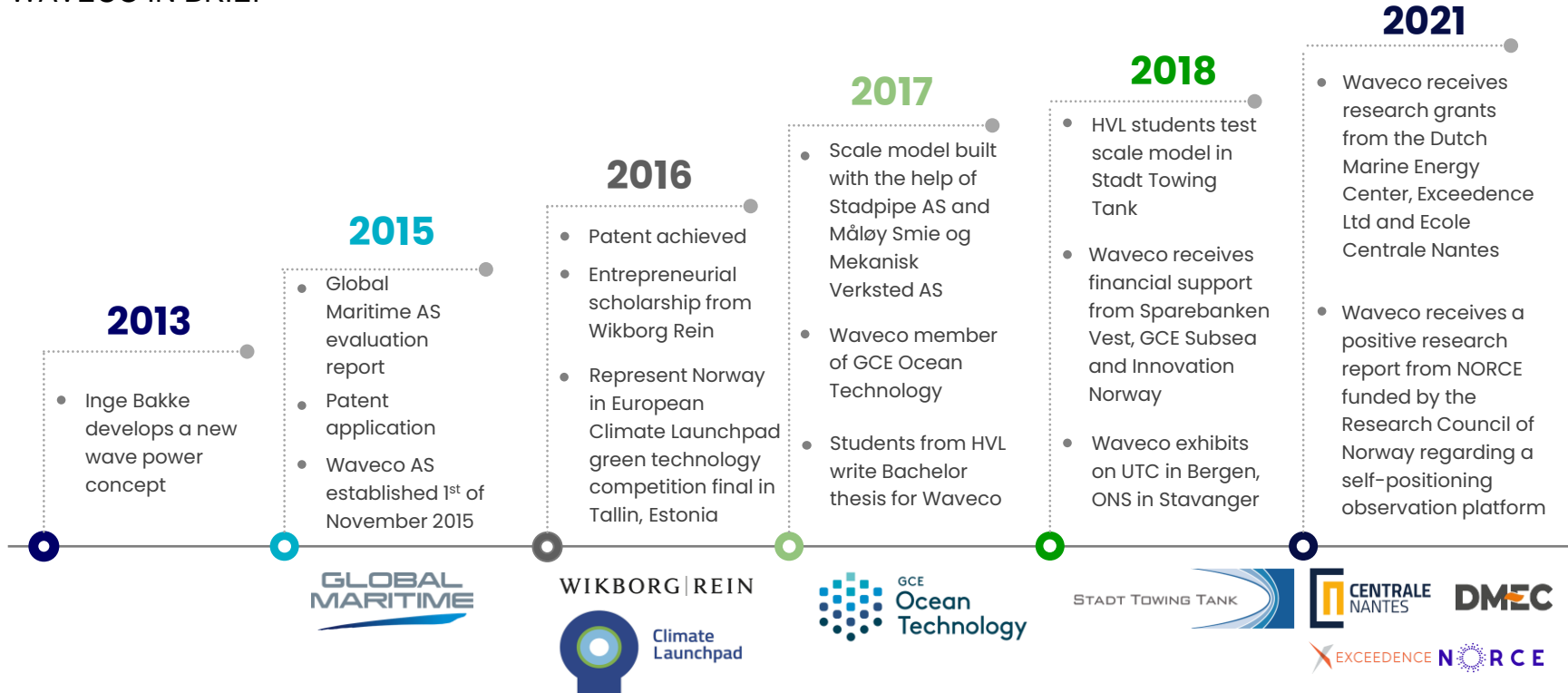
¹ Argo website ([Argo \(ucsd.edu\)](http://Argo.ucsd.edu))

² Personnel from Norwegian Marine Research Institute

³ Defence News ⁴ Website WikiMilli

DRIVEN BY THE DESIRE TO CONTRIBUTE TO THE GREEN SHIFT

WAVECO IN BRIEF



TECHNOLOGY

Technical description

Waves

Automar

Waveco's unmanned dynamically positioned surface vessel.

kW

If the **Subwave** turbine hangs from a moored buoy, all the energy will be available for the payload.

Subwave

Patented counter-rotating double turbine with unidirectional blades.



FEASIBILITY STUDIES

SUBWAVE:

Exceedence Ltd

Environmental Research Institute,
Lee Road, Cork, Ireland

Lidar buoys currently require between 1-5 kW and are run on a hybrid of solar, diesel and battery. The Waveco turbine is very interesting as it can provide renewable power to drive the equipment on the lidar buoy and support the growing offshore wind industry imperative to fully decarbonize the supply chain.

Market Research Report for Waveco on Ocean Observation, November 2021.

AUTOMAR:



NORCE Norwegian Research Centre AS

Autonomous Observation Buoy: Evaluation of Concept

«The analysis shows that the proposed concept is physically feasible and harvesting of the wave energy should be enough to maintain the position and provide excessive energy for powering additional services.»

Leonid Vasilyev, PhD, March 2021.

ENVIRONMENTAL IMPACT

TWO SHIPS IN ROTATION WOULD BE NEEDED TO REPLACE AN AUTOMAR



LESS



Energy



Emissions and pollution



Resources



Waste



Underwater noise



Stress for wildlife

COMPETITIVE ADVANTAGES

NO EXISTING OPTIONS

Maintenance

Every three years to remove marine growth.

Market position

Only option for long duration unanchored stationary presence.

Survivability

The turbine is protected against stresses on the surface.



Energy Supply

10 kW North Atlantic average sea condition, 500W for payload.

Ability

1. In situ measurements from atmosphere to 100 meters.
2. Unobstructed view towards the seabed from the turbine.

Duration

Measurements from fixed positions indefinitely without refueling.

FINANCIALS

FINANCIAL PERSPECTIVE EXAMPLE

		MARKET / SIZE	SALES	PROFIT	YEAR 5
Financing: Private: € 980 000 Public*: € 520 000 *Assumed	SUBWAVE	Offshore Wind /200	5 / yr	€ 20 000 /unit	Profit / year € 840 000
		Maritime /5000	2 / yr	€ 20 000 /unit	
	AUTOMAR	MetOcean /4000	5 / yr	€ 100 000 /unit	
		Seabed Exploration /500	2 / yr	€ 100 000 /unit	

PROJECT

A RESEARCH AND DEVELOPMENT PROJECT

	SUBWAVE			AUTOMAR			WAVECO
	Phase 1			Phase 2			Total
Duration	6 months	2 months	2 months	6 months	12 months	6 months	2 y 10 m
Action	Prototype	Sea test	Marketing and sales	Prototype	Sea test	Marketing, sales and recruitment	Business
Cost	€ 100 000	€ 20 000	€ 60 000	€ 300 000	€ 20 000	€ 1 000 000	€ 1 500 000
- Public	€ 70 000*			€ 120 000*			€ 400 000*
= Private	€ 110 000*			€ 200 000*			€ 600 000*
Output	2.4 m turbine prototype	Test results	Product: Subwave	4 m turbine and Automar	Test results	Product: Automar	Products, premises and staff

*Assumed

RISK ASSESSMENT

RISKS RELATED TO TECHNICAL ISSUES, MARKET ACCEPTANCE AND COMPETITION

	SUBWAVE			AUTOMAR		
	Phase 1			Phase 2		
Duration	6 months	2 months	2 months	6 months	12 months	6 months
Action	Prototype	Sea test	Marketing and sales	Prototype	Sea test	Marketing, sales and recruitment
Technical	Low	Low		Low	High*	
Market			Medium			Medium
Competition			Medium			Medium
Accum. cost	€ 100 000	€ 120 000	€ 180 000	€ 480 000	€ 500 000	€ 1 500 000

* Automar's ability to stay in position under all weather and sea conditions is at the heart of this concept. The risk has been reduced through the hydrodynamic analysis and positive conclusion from NORCE 2021 ([slide 7](#)). But the ultimate test is that it works in the intended environment.

TRANSACTION

PROJECT IMPLEMENTATION AND COMPANY DEVELOPMENT

Read the business plan

PROJECT	
When	2022 – 2024
Management	Waveco AS
Research & development	Stadt Towing Tank AS
Production	Måløy Verft AS
Accounting	Project Accounting
Auditor	External

WAVECO AS				
When	2022	2023	2024	
Total input	€ 180 000	€ 320 000	€ 1 000 000	
Staff	Project Manager	Project Manager Sales	CEO, Engineer, Sales, SCM	
Premises	Home Office	Home Office	Offices	
New Investor(s) / Partner(s)	20%	40%	60%	
Existing shareholders	80%	60%	40%	

TEAM

JOINT FORCES PROVIDE A STRONG TEAM

Read about the team



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