Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

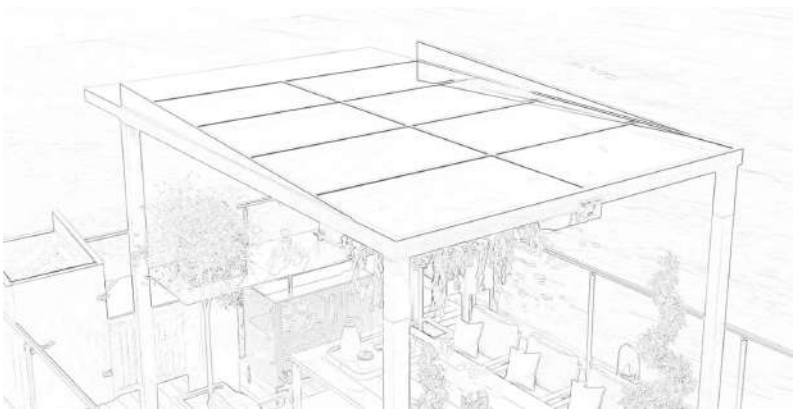
CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

Contents

	Page(s)
Objectives	2
Parameters	3
Assumptions	4
Sample BIPV set-up	5
0.8 KW trial results	6 - 10
Table	6 - 7
Summary	8
Model routes	9– 10
1.2 KW trial results	11 - 16
Table	11 - 13
Summary	14
Model routes	15 - 16
2.0 KW trial results	17 - 22
Table	17 - 19
Summary	20
Model Routes	21 - 22
Results summary	23
Design Notes	24
Health & Safety Notes	25



Objectives

1. Testing performance to failure of integrated transparent photovoltaic solar glass with Boon Boat concept hull and superstructure to achieve continuous powered motion at 2.6 kts SOG.

1a Testing performance is based on the parameters detailed on page 3 and the test assumptions detailed on page 4.

1b Testing will measure performance of three transparent photovoltaic power set-ups, optimised with AI. A sample set-up is shown on page 5.

0.8KW | 1,2KW | 2 KW |

1c Testing will measure a 14-day trial period for each power set-up in part 1b. If failure is not observed during the trial period, the mean time to failure (MTTF) will be provided based on 14-day results.

1d Phase 1 has incorporated three phases of development work and testing to inform on final trial results.

Phase 1a: Sample transparent solar PV offshore test + hull design update

Phase 1b: 0.8KW and 1.2KW

Phase 1c: 2KW and final results

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

Parameters

BIPV Power (Watts)	Time to full charge + additional absorption charge state (hrs)	Time to full charge based on charge efficiency (200H * (1/95%)= 210 AH (hrs)	Output with losses (Ah)	51.2V max charge output (Ah)	Solar charge rate per hour (%)	Solar charge at 6.25 peak hrs (%) *a)	Battery Capacity after 6.25 hrs peak without solar (%)	Battery Capacity after 6.25 hrs peak with solar (%)*b)	Battery Life runtime gain from peak solar charge (hrs) *c)	AI Optimised Battery life runtime gain from peak solar charge (hrs)
800	18.8	16.8	12.5	15.6	5.3	33.2	84.4	117.6	13.3	15.8
1200	13.2	11.2	18.75	23.4	7.6	47.3	84.4	131.7	18.9	22.5
2000	8.72	6.72	31.25	39.1	11.5	71.7	84.4	156.0	28.7	34.0

Test parameters are based on the Boon Boat concept hull

Battery set-up options	X1 10 KW 200Ah 51.2V Lithium Ion Battery 200A BMS	X2 25.6V in series
Model test launch location	Weymouth & Portland Marinas
Hull type & size	Concept Hybrid Tritoon	6000mm length	4000mm beam	24sqm deck
Hull construction	Marine grade aluminium superstructure
Immersion at weight:	40% at 3T (including 800kg Live load)
Fluid Type:	Sea Water
Fluid Density (p)	1025 kg/m3
Volume (V)	1.05m3
Buoyant force (B)	10,554 N
Mass of displaced fluid	1076.3 kg
Electric Motor	propeller diameter	6KW max output outboard	350mm
Transparent BIPV power	0.8 to 2.0 KW
BIPV placement	Vertical + horizontal superstructure	transparent solar glass
Weather conditions	Variable: overcast	partly cloudy	rain	clear	
Beaufort Wind Scale	1 to 5
Launch conditions	Sheltered CAT D, Coastal waters. Variable tide 0.2 to 1.2 kts
Test objective	24/7 powered motion with transparent BIPV to failure
Optimisation	AI assisted power management	2.6 kts SOG
Test models consolidated	to-scale model + equipment offshore + computational live forecast simulation

a * Peak hours set from UK mean average across the four months of June to September

b * > 100% represents power gain in excess of test 10KW lithium Ion capacity

c * Added to battery remaining life (hrs) after duration of peak solar charge

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

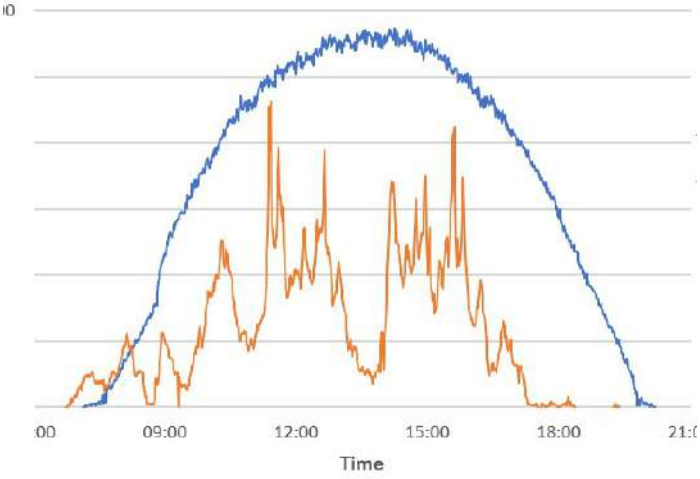
Assumptions | solar power, conditions & runtime

1) Peak solar

A peak sun hour is defined as intensity of solar irradiance at an average of 1,000 watts of energy per square metre. Figure 1 on the right shows parts of the country which have higher levels of solar radiation. Our model launch location at Weymouth and Portland features the highest band output.

The solar array will generate more electricity when the sun shines directly on the solar panels. Figure 2 shows PV power for a day in July with clear skies (blue) compared to another day in July with partly cloudy conditions (red).

Figure 2 Source: nea.org



2) Battery & Solar Power Assumptions

A) No physical obstructions cause shading losses at sea

B) The solar array is in motion at 2.6 kts SOG

C) Changes in boat direction result in a variable inclination

D) All model tests assume a conservative 6.25 hrs peak

E) Battery charge state accounts for real-time data for solar power output at different times of the day (as in the example shown in figure 2)

F) Test results show average solar power output in 3 hour segments.

G) Lithium Battery power to 10KW is tested in series with optimisation for resting and active states. Trial will test variables for greater efficiency in 24/7 operation.

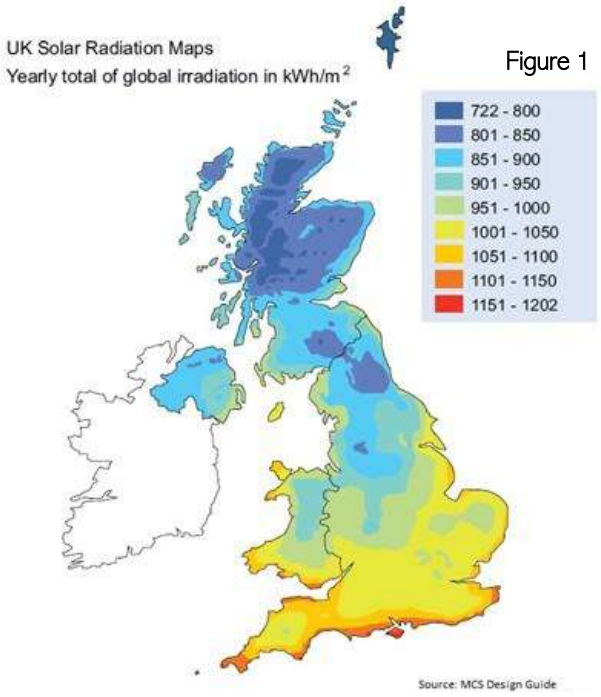


Figure 1

3) Test Condition Assumptions

A) Trials commence with 100% Battery capacity at 10KW (2X 25.6V 200A BMS). The 2KW BIPV set-up accounts for an additional 10KW power shown with capacity readings over 100%.

B) Trials commence with a conservative 40 hours runtime based on 250 Watts motor output for concept hull design

C) Weather conditions are variable and based on historic and real-time data for launch location.

D) Wind does not exceed 5 on the Beaufort scale.

E) Model testing at the Weymouth & Portland launch location is based on a summer temperature range of 12 degrees C (night) to 24 degrees C (daytime)

F) Runtime calculations account for tidal variation throughout the test with SOG speed correction.

4) Weather definitions

A) Clear: Blue skies 0% to 10% cloud cover B) Partly cloudy: 10% to 50% cloud cover C) Cloudy: 50% to 90% cloud cover. D) Overcast: Cloud obscuring over 90% E) Rain indicated, e.g. Partly cloudy/rain

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

Sample BIPV set-up

Tempered 6mm transparent solar glass ceiling on isolator damper shock absorber mount connecting steel frame structure.. Tempered 8mm transparent vertical placement solar glass | optional motorised rotating clamp for angle efficiency adjustment.

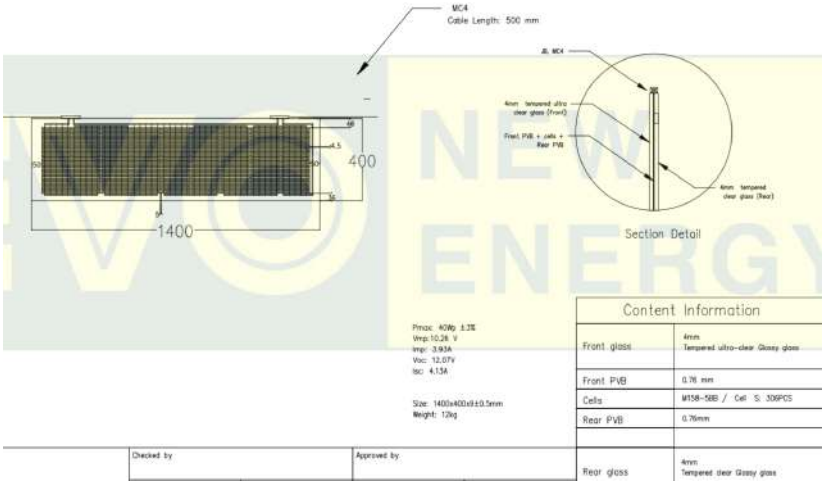
1.2 KW model example

Solar canopy

X4 1200mm * 1500mm 160 Watts | 640 Watts

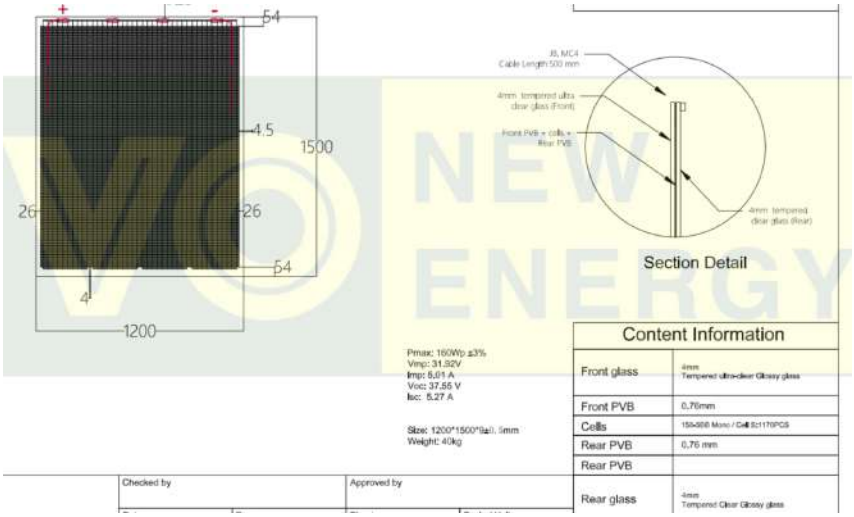
Vertical solar balustrade

X8 700mm * 1400mm 70 Watts | 560 Watts



Testing with 60% to 70% light transmission

Above example shows a 400mm * 1400mm balustrade panel suitable for a 0.96 KW set-up



For full specification, please refer to the *Boon Boat handbook.*

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

0.8 KW TRIAL RESULTS

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
Day 1	09:00:00	40.0	100.0	40.0	100.0	Clear	1	75
	12:00:00	40.0	100.0	43.2	108.0	Clear	2	100
	15:00:00	40.0	100.0	44.3	110.8	Clear	1	90
	18:00:00	40.0	100.0	46.8	117.0	Clear	1	45
	21:00:00	37.0	92.5	44.3	110.8	Clear	2	0
Day 2	00:00:00	34.0	85.0	41.7	104.3	Partly cloudy	2	0
	03:00:00	31.0	77.5	39.1	97.8	Partly cloudy	1	0
	06:00:00	28.0	70.0	36.5	91.3	Partly cloudy	1	35
	09:00:00	26.0	65.0	34.1	85.3	Overcast	2	25
	12:00:00	27.0	67.5	36.0	90.0	Partly cloudy	3	70
	15:00:00	29.0	72.5	38.0	95.0	Clear	2	100
	18:00:00	30.3	75.8	40.9	102.3	Clear	2	65
	21:00:00	27.3	68.3	38.9	97.3	Clear	2	0
Day 3	00:00:00	24.3	60.8	36.3	90.8	Partly cloudy	3	0
	03:00:00	21.3	53.3	33.7	84.3	Partly cloudy	2	0
	06:00:00	18.3	45.8	31.1	77.8	Partly cloudy	2	40
	09:00:00	17.8	44.5	29.3	73.3	Clear	2	75
	12:00:00	19.5	46.3	31.6	79.0	Partly cloudy/rain	3	60
	15:00:00	20.0	50.0	34.1	85.3	Clear	2	100
	18:00:00	22.1	55.3	36.1	90.3	Clear	1	55
	21:00:00	19.1	47.8	34.2	85.5	Clear	1	0
Day 4	00:00:00	16.1	40.3	31.6	79.0	Clear	2	0
	03:00:00	13.1	32.8	29.0	72.5	Cloudy/rain	1	0
	06:00:00	10.1	25.3	26.4	66.0	Partly cloudy	1	25
	09:00:00	8.1	20.3	24.9	62.3	Partly cloudy	2	60
	12:00:00	11.0	27.5	25.2	63.0	Cloudy	1	35
	15:00:00	12.5	31.3	26.1	65.3	Partly cloudy	2	65
	18:00:00	10.4	26.0	27.7	69.3	Clear	1	50
	21:00:00	7.4	18.5	26.4	66.0	Partly cloudy	4	0
Day 5	00:00:00	4.4	11.0	23.1	57.8	Cloudy	4	0
	03:00:00	1.4	3.5	19.8	49.5	Partly cloudy	5	0
FAIL	06:00:00	0.0	0.0	16.5	41.3	Clear	3	45
	09:00:00			15.2	38.0	Clear	3	70
	12:00:00			17.2	43.0	Clear	2	100
	15:00:00			19.7	49.3	Clear	3	100

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

BOON BOAT

CONTINUOUS MOTION

NET ZERO CONCEPT

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
	18:00:00			22.0	55.0	Partly cloudy	3	35
	21:00:00			19.9	49.8	Overcast	4	0
Day 6	00:00:00			17.3	43.3	Clear	3	0
	03:00:00			14.7	36.8	Partly cloudy	3	0
	06:00:00			12.1	30.3	Overcast	2	15
	09:00:00			9.9	24.8	Partly cloudy	1	65
	12:00:00			11.9	29.8	Clear	1	95
	15:00:00			14.3	35.8	Clear	2	100
	18:00:00			16.7	41.8	Partly cloudy	2	40
	21:00:00			14.6	36.5	Partly cloudy	3	0
Day 7	00:00:00			12.0	30.0	Clear	2	0
	03:00:00			9.4	23.5	Clear	2	0
	06:00:00			6.8	17.0	Clear	3	45
	09:00:00			5.1	12.8	Clear	4	75
	12:00:00			6.2	15.5	Partly cloudy	5	65
	15:00:00			8.6	21.5	Clear	4	90
	18:00:00			9.9	24.8	Partly cloudy	3	30
	21:00:00			7.8	19.5	Overcast/rain	3	0
Day 8	00:00:00			5.2	13.0	Overcast/rain	4	0
	03:00:00			2.6	6.5	Overcast	4	0
FAIL	06:00:00			0.0	0.0	Partly cloudy	4	25

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

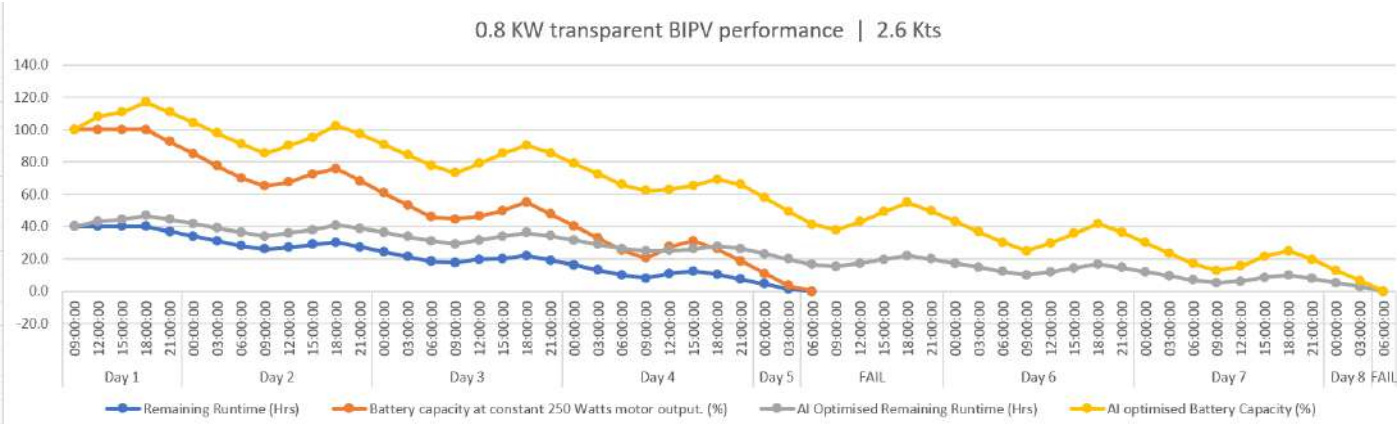
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

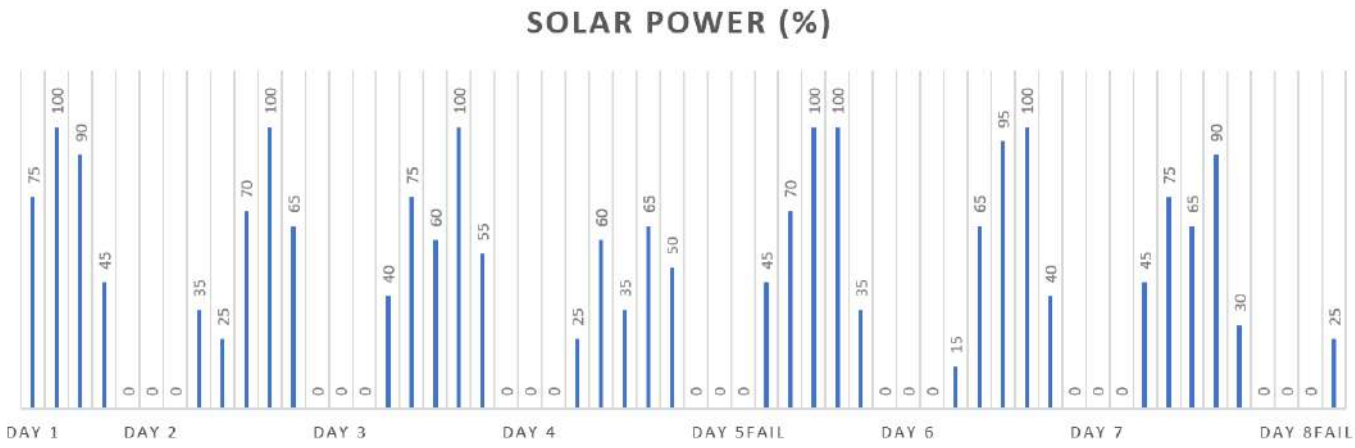
NET ZERO CONCEPT

0.8KW results summary



0.8 KW	Continuous Motion	AI optimised
Lowest speed (Kts)	2.1	2.4
Highest speed (kts)	4.0	2.9
Mean average (kts)	2.6	2.6
Duration to Failure (hrs)	93	165
Range to Failure (nm)	242	429

Model route	Portland Marina to Seaport Scheveningen	Portland Marina to port San Sebastian
Model distance (nm)	302	554
Tide (kts)	Varied 0.2 - 2.1	Fair tide 0.1 - 1.8
SOG speed (kts)	2.5 to 4.2	2.5 to 3.9
Arrival time	1w 21h 43 mins	1w 4d 4h 27mins



Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

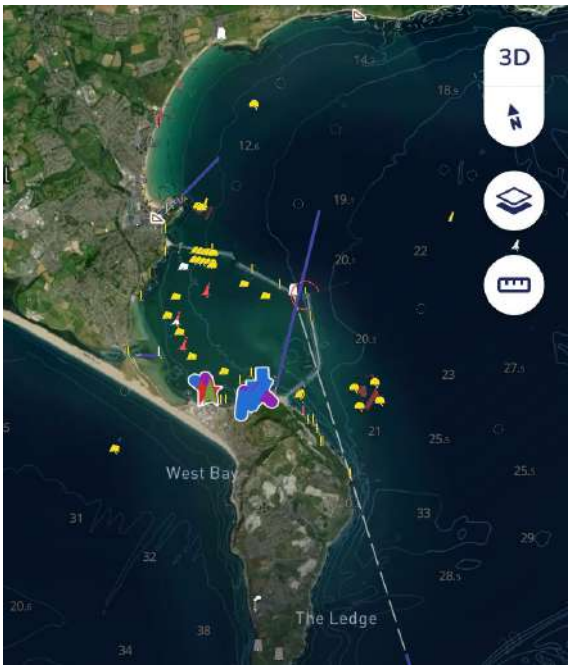
CONTINUOUS MOTION

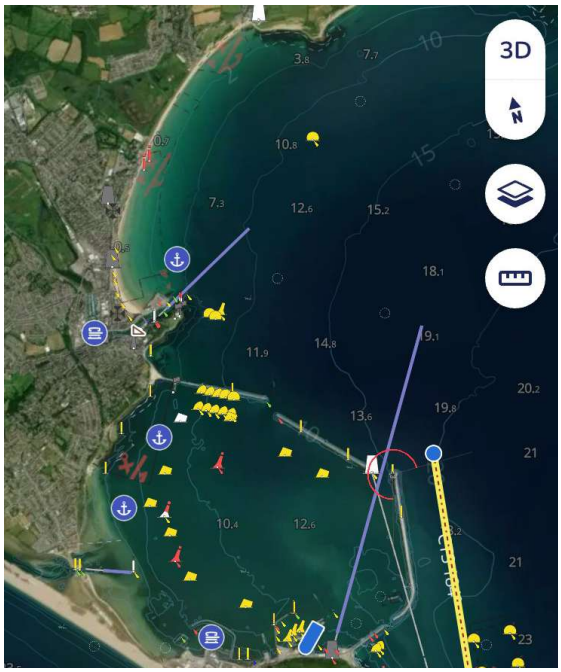
BOON BOAT

NET ZERO CONCEPT

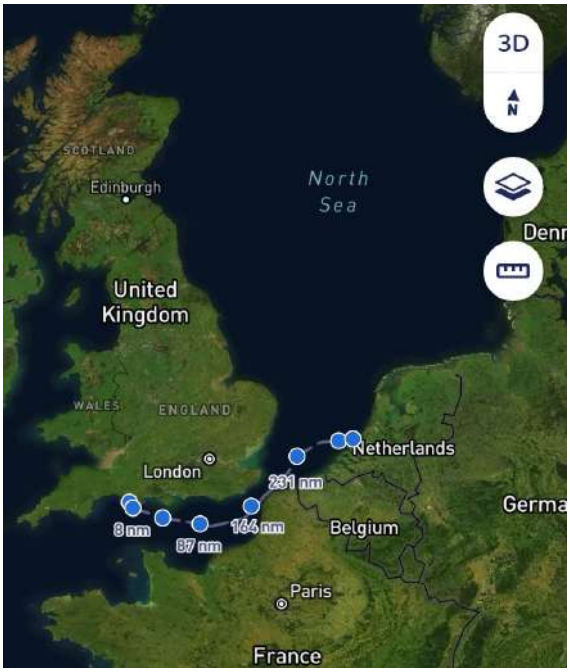
0.8KW performance model routes

Model Launch location: Portland Marina UK





Continuous SOG 2.4—4.2 kts | Varied tide 0.2—2.1 kts | 302 nm | Portland Marina to Seaport Scheveningen



Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

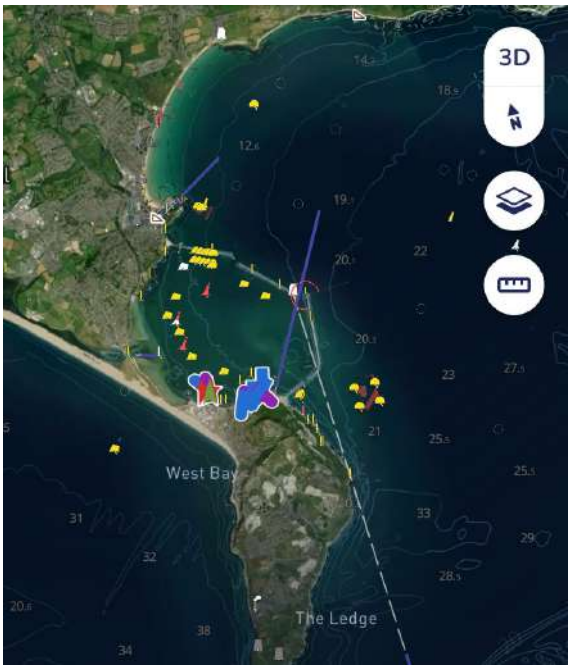
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

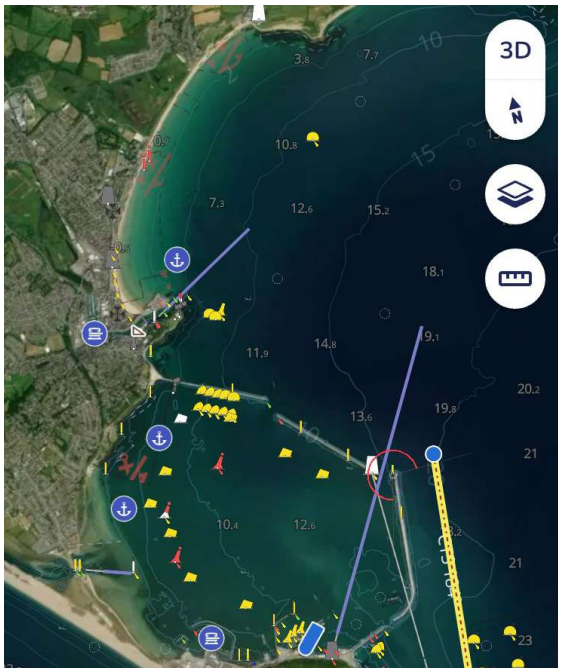
CONTINUOUS MOTION

BOON BOAT

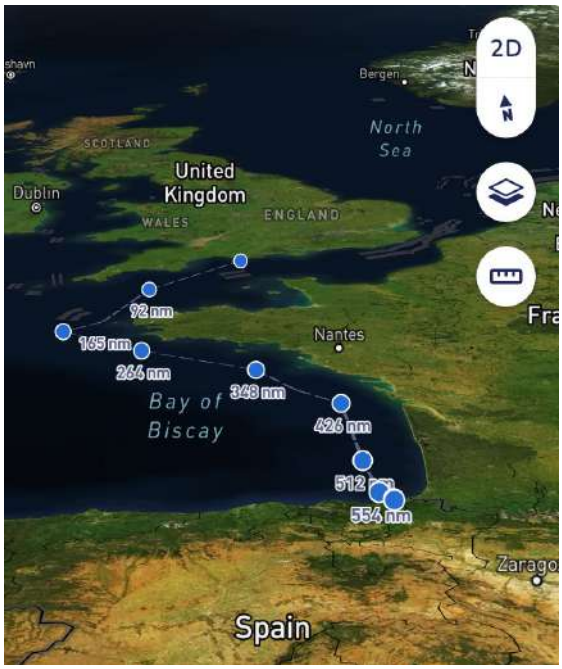
NET ZERO CONCEPT

Model Launch location: Portland Marina UK





AI Continuous SOG 2.5—3.9 kts | Fair tide 0.1—1.8 kts | 554 nm | Portland Marina to Port San Sebastian



Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

1.2 KW TRIAL RESULTS

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
Day 1	09:00:00	40.0	100.0	40.0	100.0	Clear	1	75
	12:00:00	38.5	96.3	42.0	105.0	Clear	2	100
	15:00:00	40.0	100.0	44.0	110.0	Partly cloudy	1	65
	18:00:00	40.0	100.0	53.5	133.8	Clear	1	45
	21:00:00	37.5	93.8	50.8	127.0	Clear	2	0
Day 2	00:00:00	34.5	86.3	48.1	120.3	Rain	2	0
	03:00:00	31.5	78.8	45.4	113.5	Partly cloudy	1	0
	06:00:00	28.5	71.3	42.7	106.8	Partly cloudy	1	34
	09:00:00	26.0	65.0	40.0	100.0	Clear	2	70
	12:00:00	27.0	67.5	46.0	115.0	Clear	3	100
	15:00:00	29.0	72.5	48.0	120.0	Clear	2	100
	18:00:00	35.9	89.8	53.5	133.8	Clear	2	45
	21:00:00	33.0	82.5	50.8	127.0	Clear	2	0
Day 3	00:00:00	30.0	75.0	48.1	120.3	Partly cloudy	3	0
	03:00:00	27.0	67.5	45.4	113.5	Partly cloudy	2	0
	06:00:00	20.5	51.3	42.7	106.8	Partly cloudy	2	40
	09:00:00	17.5	43.8	40.0	100.0	Partly cloudy	2	65
	12:00:00	22.0	55.0	44.5	111.3	Partly cloudy/rain	3	60
	15:00:00	24.5	61.3	49.0	122.5	Clear	2	100
	18:00:00	27.4	68.5	53.5	133.8	Clear	1	55
	21:00:00	25.6	64.0	50.8	127.0	Clear	1	0
Day 4	00:00:00	22.6	56.5	48.1	120.3	Clear	2	0
	03:00:00	19.6	49.0	45.4	113.5	Overcast	2	0
	06:00:00	17.3	43.3	42.7	106.8	Overcast	3	25
	09:00:00	14.3	35.8	40.0	100.0	Cloudy	4	40
	12:00:00	16.0	40.0	39.0	97.5	Overcast	5	15
	15:00:00	18.0	45.0	37.0	92.5	Overcast	5	10
	18:00:00	19.5	48.7	37.5	93.6	Clear	4	45
	21:00:00	17.6	44.0	34.2	85.4	Partly cloudy	4	0
Day 5	00:00:00	14.6	36.5	30.9	77.1	Partly cloudy	5	0
	03:00:00	11.6	29.0	27.6	68.9	Partly cloudy	5	0
	06:00:00	8.6	21.5	24.3	60.6	Clear	3	40
	09:00:00	7.3	18.3	21.0	52.4	Clear	3	75
	12:00:00	11.0	27.5	25.5	63.6	Clear	2	95
	15:00:00	15.0	37.5	30.0	74.9	Clear	3	100
	18:00:00	17.2	43.0	34.5	86.1	Overcast/rain	3	20
	21:00:00	15.7	39.3	31.8	79.4	Overcast	4	0

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
Day 6	00:00:00	12.7	31.8	29.1	72.6	Clear	3	0
	03:00:00	9.7	24.3	26.4	65.9	Partly cloudy	3	0
	06:00:00	6.7	16.8	23.7	59.1	Cloudy	2	20
	09:00:00	4.6	11.5	21.0	52.4	Partly cloudy	1	70
	12:00:00	7.0	17.5	25.5	63.6	Clear	1	95
	15:00:00	12.0	30.0	30.0	74.9	Clear	2	100
	18:00:00	14.5	36.3	34.5	86.1	Clear	2	55
	21:00:00	12.9	32.3	31.8	79.4	Clear	3	0
Day 7	00:00:00	9.9	24.8	29.1	72.6	Clear	2	0
	03:00:00	6.9	17.3	26.4	65.9	Clear	2	0
	06:00:00	3.9	9.8	23.7	59.1	Clear	3	45
	09:00:00	2.8	7.0	21.0	52.4	Partly cloudy	4	65
	12:00:00	4.0	10.0	25.5	63.6	Partly cloudy	5	65
	15:00:00	8.0	20.0	30.0	74.9	Clear	4	90
	18:00:00	12.7	31.8	34.5	86.1	Partly cloudy	3	30
	21:00:00	10.9	27.3	31.8	79.4	Overcast/rain	3	0
Day 8	00:00:00	7.9	19.8	29.1	72.6	Overcast/rain	4	0
	03:00:00	4.9	12.3	26.4	65.9	Overcast	4	0
	06:00:00	1.9	4.8	23.7	59.1	Cloudy	4	15
	09:00:00	0.2	0.5	21.0	52.4	Partly cloudy	3	75
	12:00:00	4.5	11.3	25.5	63.6	Partly cloudy	2	75
	15:00:00	8.4	21.0	30.0	74.9	Clear	2	100
	18:00:00	10.1	25.3	30.9	77.1	Clear	3	55
	21:00:00	9.0	22.5	28.2	70.4	Overcast/rain	3	0
Day 9	00:00:00	6.0	15.0	25.5	63.6	Overcast/rain	4	0
	03:00:00	3.0	7.5	22.8	56.9	Cloudy	4	0
FAIL	06:00:00	0.0	0.0	20.1	50.1	Partly cloudy	2	25
	09:00:00			17.4	43.4	Clear	4	70
	12:00:00			21.9	54.6	Clear	5	95
	15:00:00			26.4	65.9	Clear	4	100
	18:00:00			30.9	77.1	Partly cloudy	3	30
	21:00:00			28.2	70.4	Overcast/rain	3	0
Day 10	00:00:00			25.5	63.6	Overcast/rain	4	0
	03:00:00			22.8	56.9	Overcast	4	0
	06:00:00			20.1	50.1	Overcast/rain	2	10
	09:00:00			17.4	43.4	Cloudy	4	35

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
	12:00:00			21.9	54.6	Clear	3	95
	15:00:00			26.4	65.9	Clear	2	100
	18:00:00			30.9	77.1	Clear	2	45
	21:00:00			28.2	70.4	Clear	2	0
Day 11	00:00:00			25.5	63.6	Partly cloudy	3	0
	03:00:00			22.8	56.9	Partly cloudy	2	0
	06:00:00			20.1	50.1	Partly cloudy	2	40
	09:00:00			17.4	43.4	Partly cloudy/rain	2	65
	12:00:00			19.0	47.5	Cloudy	3	20
	15:00:00			20.0	50.0	Partly cloudy	2	35
	18:00:00			21.6	54.0	Clear	1	55
	21:00:00			18.9	47.2	Clear	1	0
Day 12	00:00:00			16.2	40.5	Clear	2	0
	03:00:00			13.5	33.7	Overcast	1	0
	06:00:00			10.8	27.0	Overcast	1	25
	09:00:00			8.1	20.2	Partly cloudy	2	60
	12:00:00			12.6	31.5	Clear	3	100
	15:00:00			17.1	42.7	Partly cloudy	3	65
	18:00:00			21.6	54.0	Clear	4	45
	21:00:00			18.3	45.7	Partly cloudy	4	0
Day 13	00:00:00			15.0	37.5	Partly cloudy	5	0
	03:00:00			11.7	29.2	Partly cloudy	5	0
	06:00:00			8.4	21.0	Partly cloudy	3	45
	09:00:00			5.7	14.2	Clear	3	75
	12:00:00			10.2	25.5	Clear	2	100
	15:00:00			14.7	36.7	Clear	3	100
	18:00:00			19.2	48.0	Cloudy	3	25
	21:00:00			16.5	41.2	Overcast/rain	4	0
Day 14	00:00:00			13.8	34.5	Clear	3	0
	03:00:00			11.1	27.7	Partly cloudy	3	0
	06:00:00			8.4	21.0	Cloudy	2	15
	09:00:00			5.7	14.2	Partly cloudy	1	70
	12:00:00			10.2	25.5	Clear	1	100
	15:00:00			14.7	36.7	Clear	2	100
	18:00:00			19.2	48.0	Clear	2	50
	21:00:00			17.1	42.7	Clear	3	0

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

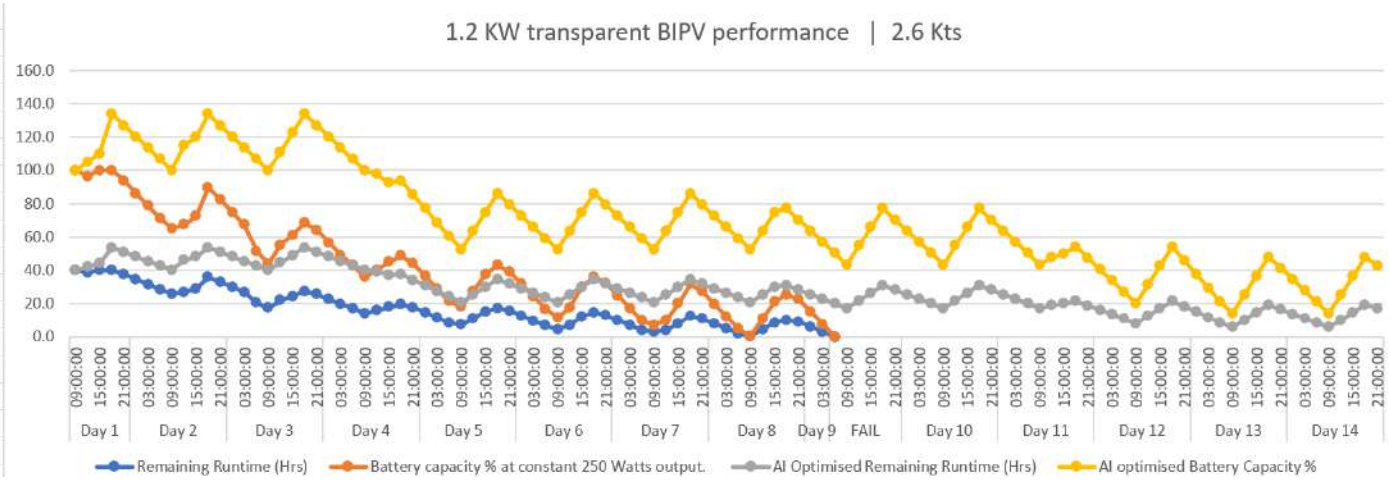
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

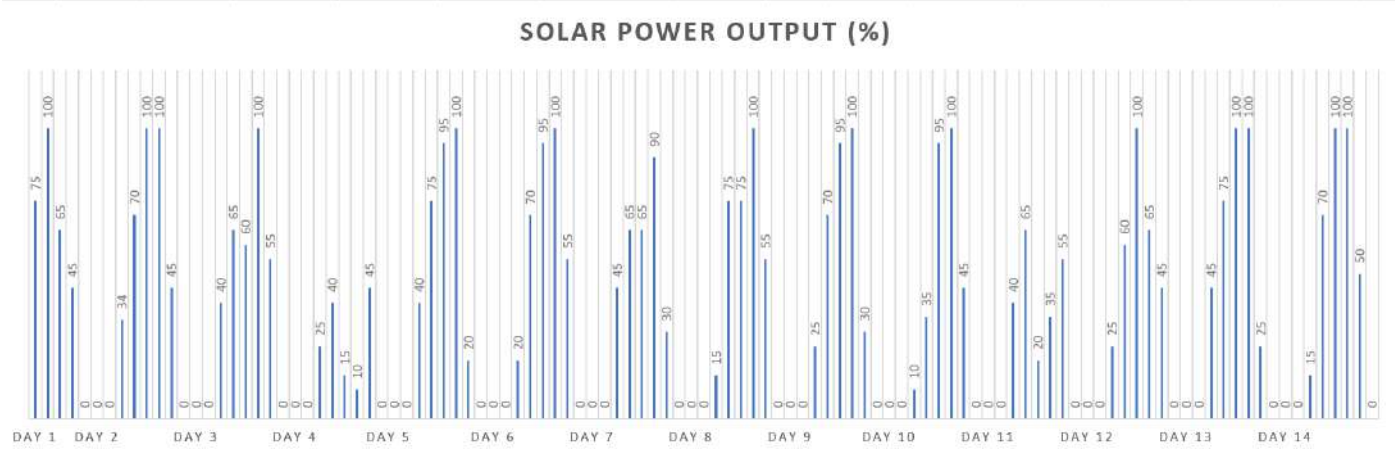
BOON BOAT

NET ZERO CONCEPT

1.2KW results summary



1.2 KW	Continuous Motion	AI optimised	
Lowest speed (Kts)		2.1	2.4
Highest speed (kts)		3.8	2.8
Mean average (kts)		2.6	2.6
Duration to Failure (hrs)		189	no failure observed in trial conditions
Range to Failure (nm)		491	no failure observed in trial conditions
Projected range to failure (nm)			(MTTF) 893
Model route	Portland Marina to Port of Gijon via Santander Port	Portland Marina to Port of Lisbon	
Model distance (nm)		585	864
Tide (kts)	Varied 0.2 - 2.1	Fair tide 0.1 - 1.8	
SOG speed (kts)	2.5 to 4.1	2.5 to 4.1	
Arrival time	1w 21h 43 mins	1w 4d 4h 27mins	



Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

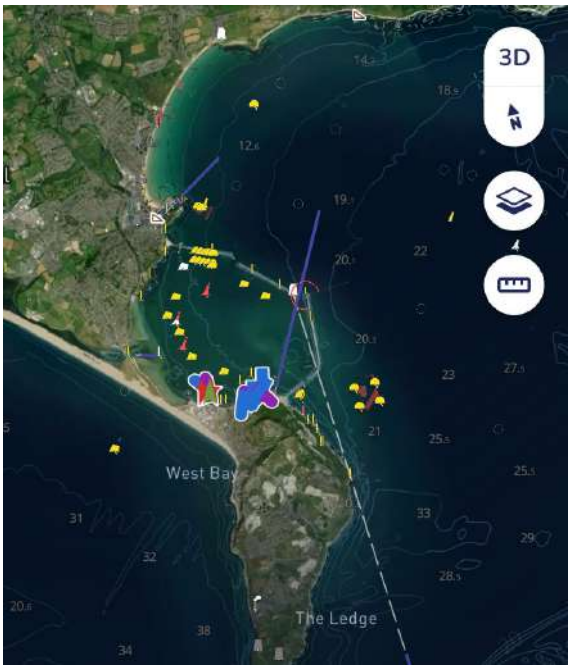
CONTINUOUS MOTION

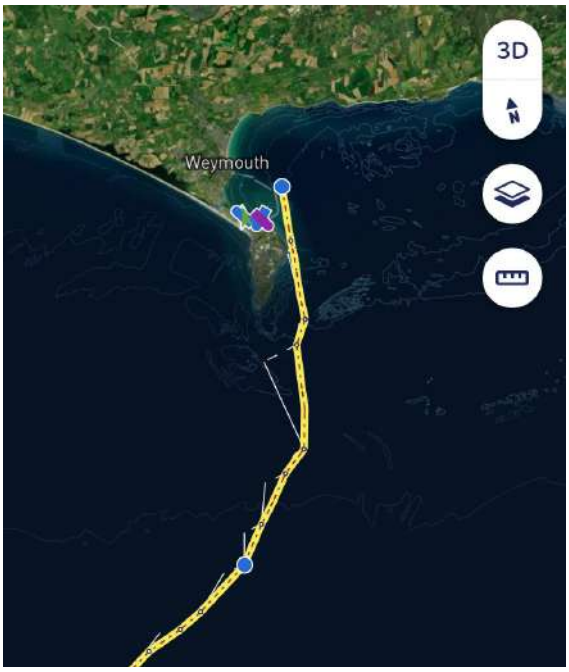
BOON BOAT

NET ZERO CONCEPT

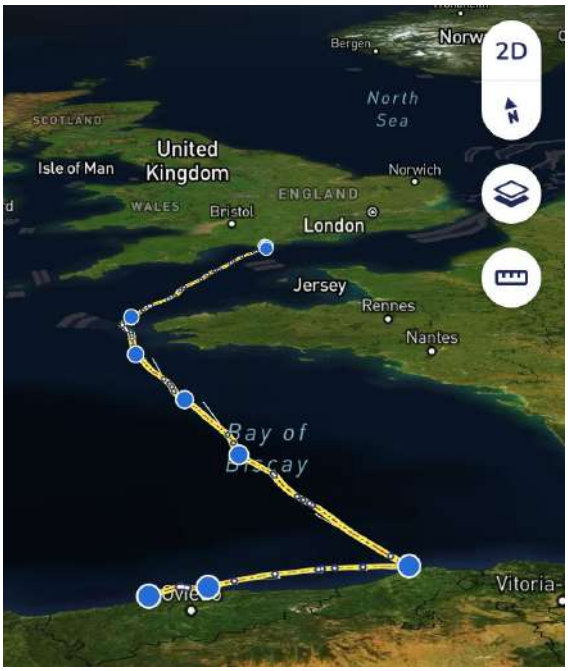
1.2KW performance model routes

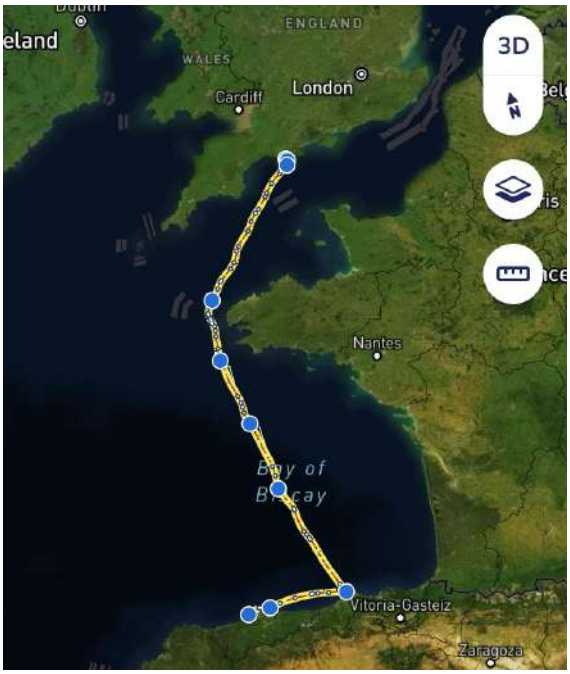
Model Launch location: Portland Marina UK





Continuous SOG 2.5—4.1 kts | Varied tide 0.2—2.1 kts | 585 nm | Portland Marina to Gijon via Santander





Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

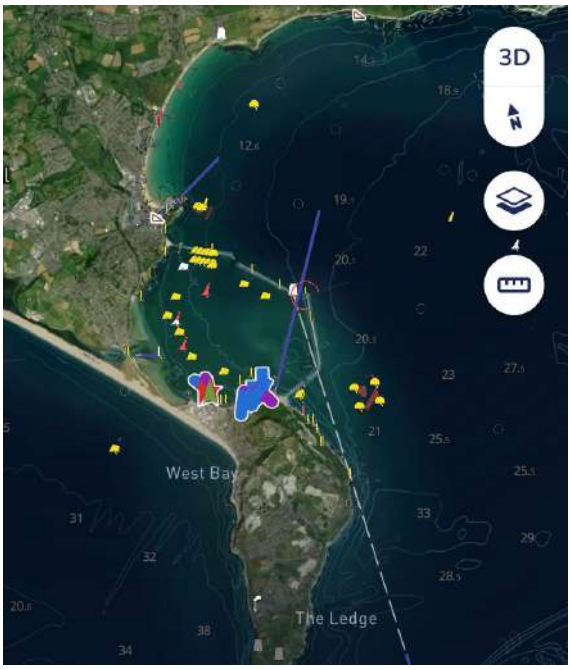
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

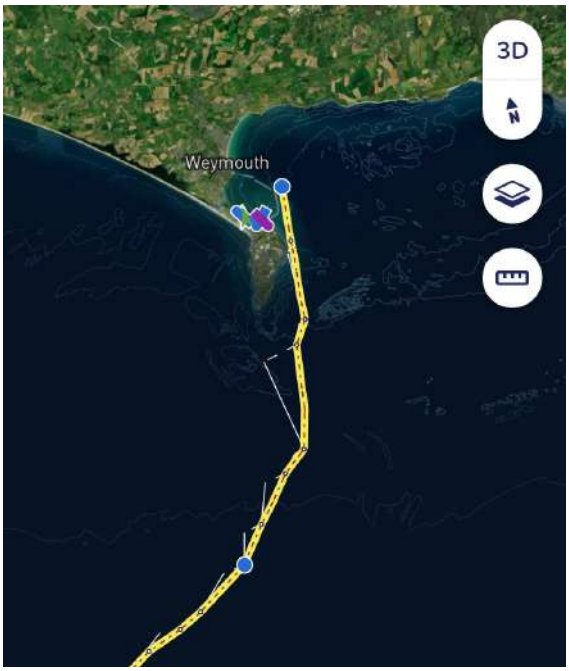
CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

Model Launch location: Portland Marina UK





AI Continuous SOG 2.5—4.1 kts | Fair tide 0.1—1.8 kts | 864 nm | Portland Marina to Port of Lisbon

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

2.0 KW TRIAL RESULTS

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
Day 1	09:00:00	40.0	100.0	40.0	100.0	Clear	1	65
	12:00:00	38.5	96.3	42.0	105.0	Clear	2	100
	15:00:00	40.0	100.0	44.0	110.0	Partly cloudy	1	55
	18:00:00	40.0	100.0	65.0	162.5	Clear	1	40
	21:00:00	37.0	92.5	62.0	155.0	Clear	2	0
	00:00:00	34.0	85.0	59.0	147.5	Overcast/rain	2	0
Day 2	03:00:00	31.0	77.5	56.0	140.0	Partly cloudy	1	0
	06:00:00	28.0	70.0	53.0	132.5	Partly cloudy	1	40
	09:00:00	25.0	62.5	50.0	125.0	Clear	2	75
	12:00:00	33.0	82.5	58.3	145.8	Clear	3	100
	15:00:00	39.0	97.5	66.7	166.7	Clear	2	100
	18:00:00	44.7	111.8	75.0	187.5	Clear	2	45
	21:00:00	41.7	104.3	72.0	180.0	Clear	2	0
Day 3	00:00:00	38.7	96.8	69.0	172.5	Partly cloudy	3	0
	03:00:00	35.7	89.3	66.0	165.0	Partly cloudy	2	0
	06:00:00	32.7	81.8	63.0	157.5	Partly cloudy	2	40
	09:00:00	29.7	74.3	60.0	150.0	Partly cloudy	2	60
	12:00:00	32.0	80.0	68.3	170.8	Partly cloudy/rain	3	60
	15:00:00	38.0	95.0	76.7	191.7	Clear	2	100
	18:00:00	49.4	123.5	85.0	212.5	Clear	1	55
	21:00:00	46.4	116.0	82.0	205.0	Clear	1	0
Day 4	00:00:00	43.4	108.5	79.0	197.5	Clear	2	0
	03:00:00	40.4	101.0	76.0	190.0	Overcast	1	0
	06:00:00	37.4	93.5	73.0	182.5	Overcast	1	25
	09:00:00	34.4	86.0	70.0	175.0	Partly cloudy	2	50
	12:00:00	32.0	80.0	69.0	172.5	Overcast	4	20
	15:00:00	35.0	87.5	67.0	167.5	Partly cloudy	5	45
	18:00:00	41.6	104.0	76.0	190.0	Clear	4	45
	21:00:00	38.6	96.5	73.0	182.5	Partly cloudy	4	0
Day 5	00:00:00	35.6	89.0	70.0	175.0	Partly cloudy/rain	5	0
	03:00:00	32.6	81.5	67.0	167.5	Partly cloudy/rain	5	0
	06:00:00	29.6	74.0	64.0	160.0	Partly cloudy	3	45
	09:00:00	26.6	66.5	61.0	152.5	Clear	3	75
	12:00:00	27.0	67.5	69.3	173.3	Clear	2	95
	15:00:00	36.0	90.0	77.7	194.2	Clear	3	100

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

NET ZERO CONCEPT

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
	18:00:00	46.3	115.7	86.0	215.0	Cloudy/rain	3	25
	21:00:00	43.3	108.2	83.0	207.5	Overcast	4	0
Day 6	00:00:00	40.3	100.7	80.0	200.0	Clear	3	0
	03:00:00	37.3	93.2	77.0	192.5	Partly cloudy	3	0
	06:00:00	34.3	85.7	74.0	185.0	Overcast	2	20
	09:00:00	31.3	78.2	71.0	177.5	Partly cloudy	1	65
	12:00:00	39.0	97.5	79.3	198.3	Clear	1	95
	15:00:00	46.0	115.0	87.7	219.2	Clear	2	100
	18:00:00	51.0	127.5	96.0	240.0	Clear	2	30
	21:00:00	48.0	120.0	93.0	232.5	Clear	3	0
Day 7	00:00:00	45.0	112.5	90.0	225.0	Clear	2	0
	03:00:00	42.0	105.0	87.0	217.5	Clear	2	0
	06:00:00	39.0	97.5	84.0	210.0	Clear	3	45
	09:00:00	36.0	90.0	81.0	202.5	Partly cloudy	4	60
	12:00:00	44.0	110.0	89.3	223.3	Partly cloudy	5	65
	15:00:00	51.0	127.5	97.7	244.2	Clear	4	90
	18:00:00	55.7	139.2	106.0	265.0	Partly cloudy	3	30
	21:00:00	52.7	131.7	103.0	257.5	Overcast/rain	3	0
Day 8	00:00:00	49.7	124.2	100.0	250.0	Overcast/rain	4	0
	03:00:00	46.7	116.7	97.0	242.5	Overcast	4	0
	06:00:00	43.7	109.2	94.0	235.0	Overcast	4	25
	09:00:00	40.7	101.7	91.0	227.5	Partly cloudy	3	60
	12:00:00	49.0	122.5	99.3	248.3	Partly cloudy	2	75
	15:00:00	53.0	132.5	107.7	269.2	Clear	2	100
	18:00:00	60.4	151.0	110.7	276.8	Clear	3	55
	21:00:00	57.4	143.5	107.7	269.3	Overcast/rain	3	0
Day 9	00:00:00	54.4	136.0	104.7	261.8	Overcast	4	0
	03:00:00	51.4	128.5	101.7	254.3	Overcast	4	0
	06:00:00	48.4	121.0	98.7	246.8	Overcast/rain	2	25
	09:00:00	45.4	113.5	95.7	239.3	Partly cloudy	4	65
	12:00:00	52.0	130.0	104.0	260.1	Clear	5	95
	15:00:00	59.0	147.5	112.4	280.9	Clear	4	100
	18:00:00	65.1	162.7	120.7	301.8	Partly cloudy	3	30
	21:00:00	62.1	155.2	117.7	294.3	Overcast/rain	3	0
Day 10	00:00:00	59.1	147.7	114.7	286.8	Overcast/rain	4	0
	03:00:00	56.1	140.2	111.7	279.3	Overcast	4	0

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

BOON BOAT

CONTINUOUS MOTION

NET ZERO CONCEPT

24 hours continuous motion	Time (24 hrs)	Remaining Runtime (hrs)	Battery capacity 250 Watts output (%)	AI Optimised Remaining Runtime (Hrs)	AI optimised Battery Capacity (%)	Weather	Beaufort wind force	Solar power (%)
	06:00:00	53.1	132.7	108.7	271.8	Overcast/rain	2	25
	09:00:00	50.1	125.2	105.7	264.3	Overcast/rain	4	15
	12:00:00	49.0	122.5	104.5	261.3	Cloudy/rain	5	45
	15:00:00	49.7	124.3	108.5	271.3	Cloudy/rain	5	50
	18:00:00	48.8	122.1	112.9	282.2	Overcast	5	20
	21:00:00	45.8	114.6	109.9	274.7	Partly cloudy	4	0
Day 11	00:00:00	42.8	107.1	106.9	267.2	Partly cloudy	3	0
	03:00:00	39.8	99.6	103.9	259.7	Partly cloudy	2	0
	06:00:00	36.8	92.1	100.9	252.2	Partly cloudy	2	40
	09:00:00	33.8	84.6	97.9	244.7	Partly cloudy/rain	2	55
	12:00:00	41.0	102.5	106.2	265.5	Partly cloudy	3	80
	15:00:00	49.0	122.5	114.5	286.3	Clear	2	100
	18:00:00	53.5	133.9	122.9	307.2	Clear	1	55
	21:00:00	50.5	126.4	119.9	299.7	Clear	1	0
Day 12	00:00:00	47.5	118.9	116.9	292.2	Clear	2	0
	03:00:00	44.5	111.4	113.9	284.7	Overcast	1	0
	06:00:00	41.5	103.9	110.9	277.2	Overcast	1	25
	09:00:00	38.5	96.4	107.9	269.7	Partly cloudy	2	60
	12:00:00	47.0	117.5	116.2	290.5	Clear	3	100
	15:00:00	53.0	132.5	124.5	311.3	Partly cloudy	3	65
	18:00:00	58.2	145.6	132.9	332.2	Clear	4	45
	21:00:00	55.2	138.1	129.9	324.7	Partly cloudy	4	0
Day 13	00:00:00	52.2	130.6	126.9	317.2	Partly cloudy	5	0
	03:00:00	49.2	123.1	123.9	309.7	Partly cloudy	5	0
	06:00:00	46.2	115.6	120.9	302.2	Partly cloudy	3	45
	09:00:00	43.2	108.1	117.9	294.7	Clear	3	75
	12:00:00	51.0	127.5	126.2	315.5	Clear	2	100
	15:00:00	57.5	143.8	134.5	336.3	Clear	3	100
	18:00:00	62.9	157.4	142.9	357.2	Cloudy/rain	3	25
	21:00:00	59.9	149.9	139.9	349.7	Overcast	4	0
Day 14	00:00:00	56.9	142.4	136.9	342.2	Clear	3	0
	03:00:00	53.9	134.9	133.9	334.7	Partly cloudy	3	0
	06:00:00	50.9	127.4	130.9	327.2	Overcast	2	20
	09:00:00	47.9	119.9	127.9	319.7	Partly cloudy	1	70
	12:00:00	53.0	132.5	136.2	340.5	Clear	1	95
	15:00:00	61.0	152.5	144.5	361.3	Clear	2	100
	18:00:00	67.6	169.1	152.9	382.2	Clear	2	30
	21:00:00	64.6	161.6	149.9	374.7	Clear	3	0

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

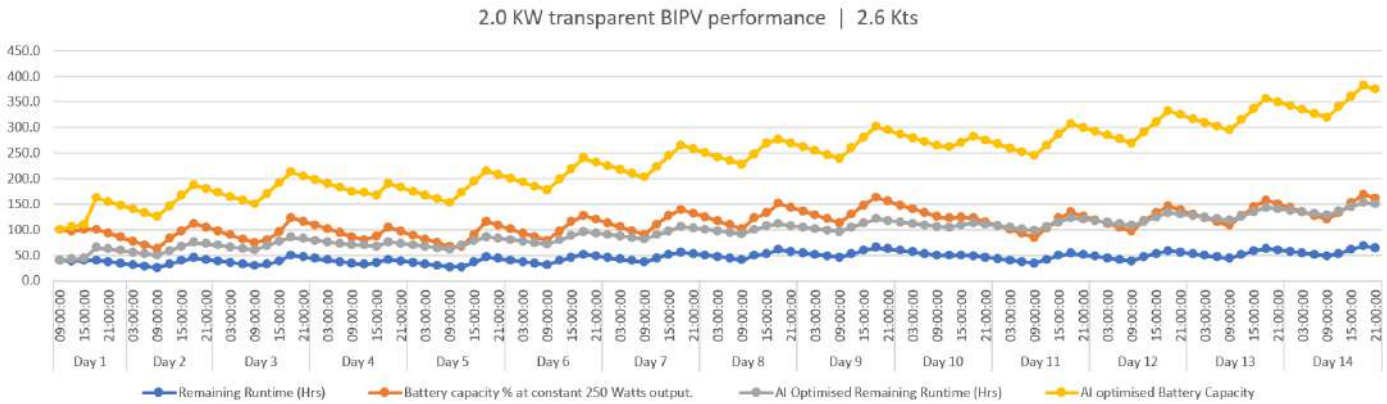
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

CONTINUOUS MOTION

BOON BOAT

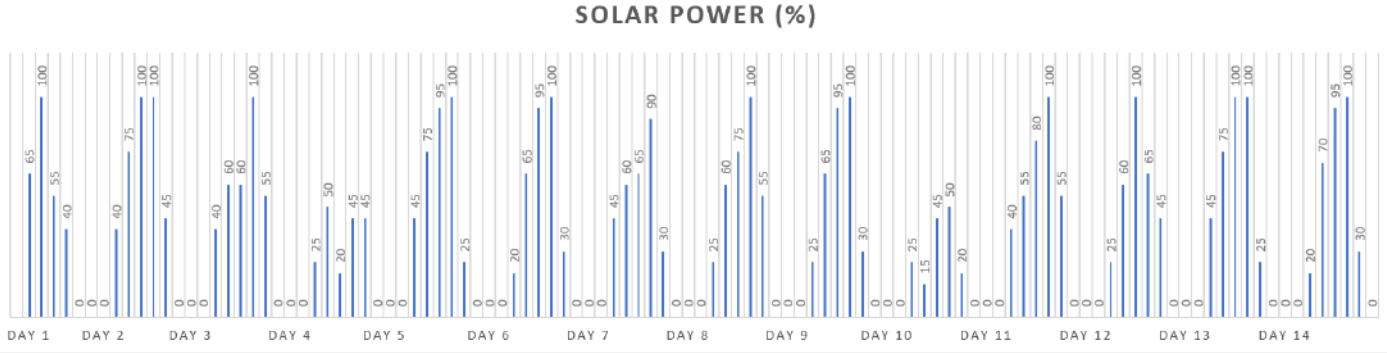
NET ZERO CONCEPT

2.0KW results summary



2.0 KW	Continuous Motion	AI optimised
Lowest speed (Kts)	2.0	2.4
Highest speed (kts)	4.3	3.5
Mean average target (kts)	2.6	2.6
Duration to Failure (hrs)	111	216
Range to Failure (nm)	No failure observed in trial conditions	No failure observed in trial conditions
Projected range to failure (nm)	(MTTF) 1349	(MTTF) 4762

Model route	Portland Marina to Port of Gibraltar	Portland Marina to Port Miami
Model distance (nm)	1133	4074
Tide (kts)	Varied 0.2 - 2.1	Varied tide 0.1 - 2.5
SOG speed (kts)	2.4 to 4.2	0.3 to 4.6
Arrival time	2W 4d 18h 42 mins	8W 2d 18h 33mins



Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

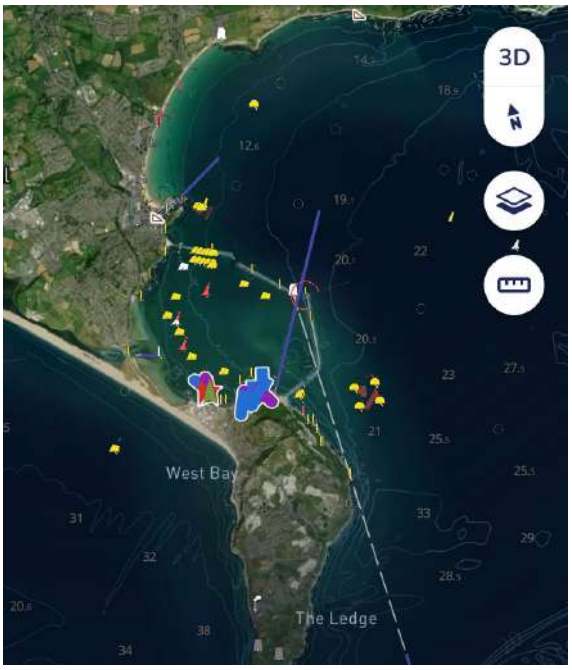
CONTINUOUS MOTION

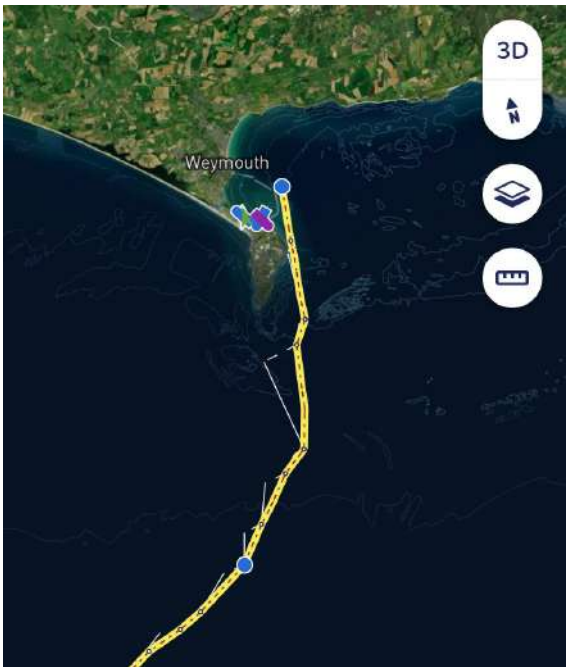
BOON BOAT

NET ZERO CONCEPT

2.0KW performance model routes

Model Launch location: Portland Marina UK





AI Continuous SOG 2.4—4.2 kts | Varied tide 0.2—2.1 kts | 1133 nm | Portland Marina to Port of Gibraltar

Phase 1 TRIALS

Weymouth & Portland

Continuous Powered Motion | test to failure | X3 variations of transparent BIPV | 0.8KW | 1.2KW | 2KW | AI optimised power management | Hybrid concept hull

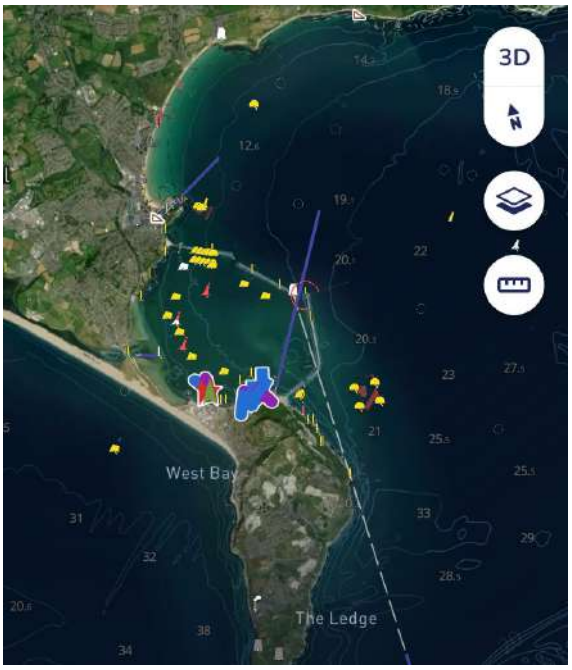
Phase 1a November 2023
Phase 1b January 2024
Phase 1c February 2024

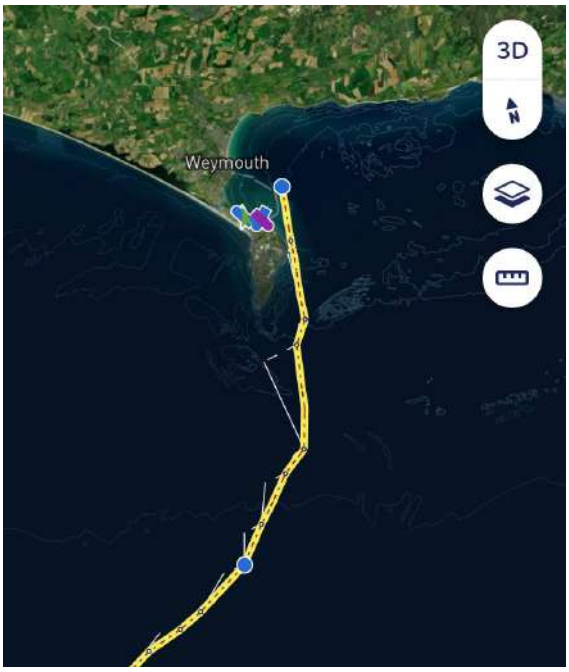
CONTINUOUS MOTION

BOON BOAT

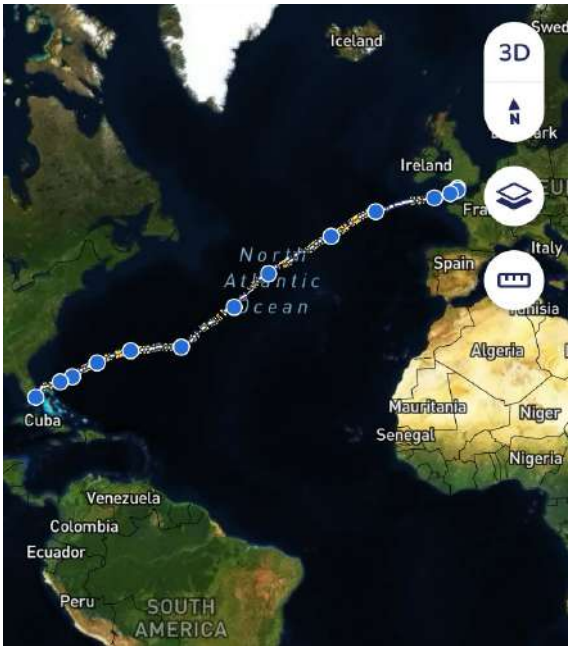
NET ZERO CONCEPT

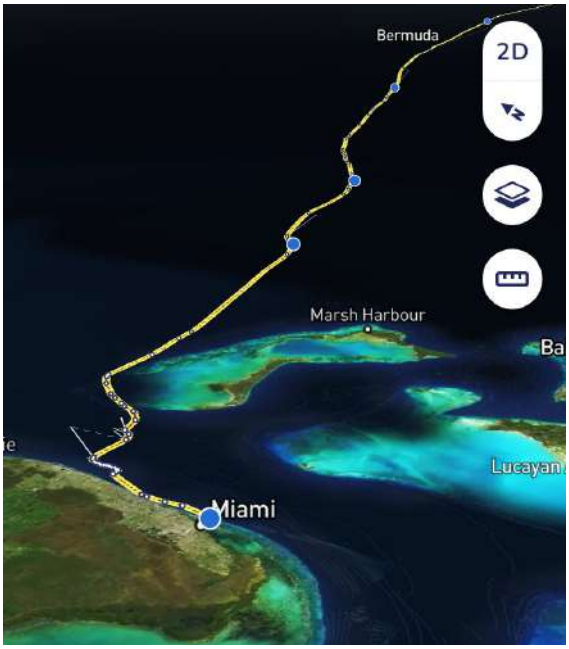
Model Launch location: Portland Marina UK



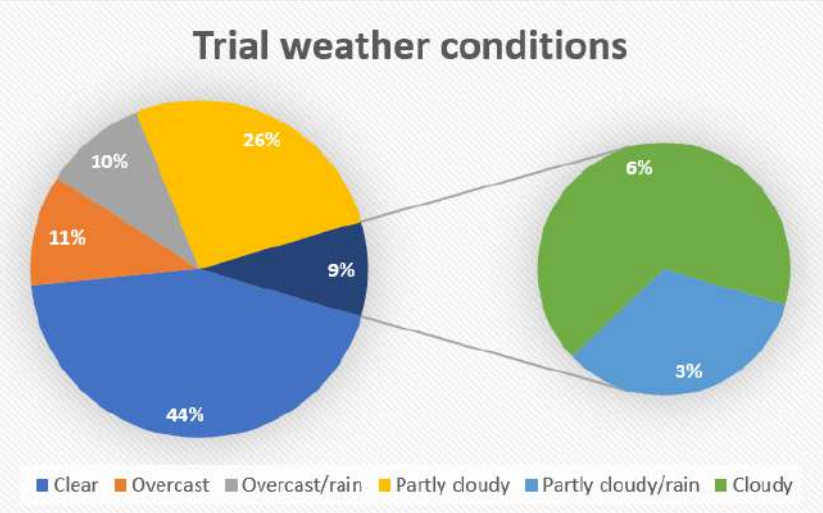


AI Continuous SOG 0.3—4.6 kts | Varied tide 0.1—2.5 kts | 4074nm | Portland Marina to Port Miami





Results Summary



Notes

75% of weather classified as *Partly cloudy (observed with 26% of trial conditions)* has featured cloud cover ranging from 15% to 35%.

- **0.8 KW trials** show *failure* on day 5 with standard set-up and *failure* on day 8 with AI optimised power management.
- **1.2 KW trials** show *failure* on day 9 with standard set-up and *no failure observed* across 14 continuous runtime days with AI optimised power management. A slowing trend based on variable summer weather indicates likely failure between a 702nm and 893nm range with a variable tide and SOG speed averaging 2.6 kts.
- **2.0 KW trials** show *no failure observed* with standard set-up or AI optimised power management across 14 continuous runtime days, with a strong trend indicating high efficiency and excess power generation during summer test conditions. Testing indicates a good efficiency ratio suited to a 20 KW lithium ion battery at 160 kg of battery payload on the 6m vessel. The rapid solar charge rate demonstrates excellent performance at 250 Watts motor output, not diminishing and trending upwards. This was observed with two particularly weak solar output days during testing.
- **Model routes** provide a graphic representation of continuous runtime capability at the respective *failure* distances (nm) achieved for each trial. They are not representative of actual cruising given the significant risk involved on a small electric powered vessel. Each route is calculated using a real-time forecast in variable weather conditions with SOG correction for tide data.
- **All set-ups** demonstrate extremely encouraging results to be optimised further with final sea trials.

Design Notes

Design advantages

- **Aesthetic and functional** transparent power generation | bright and spacious deck
- **Zero emissions | Net Zero** whole life-cycle carbon (WLC)
- **Highly stable continuous motion** Research & Development (R&D) platform with wide beam open deck facilitating sensor equipment set-up
- **Structural** element of BIPV tempered glass
- **Non-intrusive design** with the structure also being the source of power, transparent PV glass balustrade, PV canopy post and transparent glass ceiling.
- **Bifacial** solar glass **efficiency**

Design challenges

- **Structural integrity** of glass in motion | vibration | lateral and axial load with frame movement
- **Weight** of tempered BIPV glass
- **Optimisation** required for continuous powered motion

Design solutions

- Structural glass panel connection method | rubber expansion bellow connections allowing **controlled lateral and axial movement** | joint compression profiles | shock absorbers | shock mounts | shock absorbing clamps and nut/bolt connectors
- Highly rigid steel frame superstructure limiting structural movement in motion
- **Hybrid hull** designed for enhanced stability at low speeds while supporting a variety of frame structures for R&D or recreational use decks.

Health & Safety Notes

Lithium Ion Battery use and storage

Risk assessment considerations

- Continuous motion and heat management Risk: LOW

Mitigation:

1. temperature sensor, ensuring operation in storage area below 40 Degrees Celsius. Well below thermal runaway between 60 and 70 Degrees Celsius.

2. Battery use option with alternate power sources for night and day use.

- Vibration and stability Risk: LOW

Mitigation:

1. Boon Boat does not operate at speeds above 8 kts, highly stable platform.

- Fire Safety in battery storage area Risk: LOW

Mitigation:

1. Storage area is self-contained, can be flooding with water with almost instant draining at deck level. For size of battery and with mitigations in place, a water based fire extinguisher is recommended.