

# Company Overview: Issues and Opportunities

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# Introduction

- Albatern and the WaveNET
- Loch Kishorn & Mingary Bay
  - Kishorn Project Overview
  - Mingary Project Overview
- Offshore Survey
  - Operational footage
  - Results
  - Growth comparison
- Marine Growth
  - Issues and Opportunities

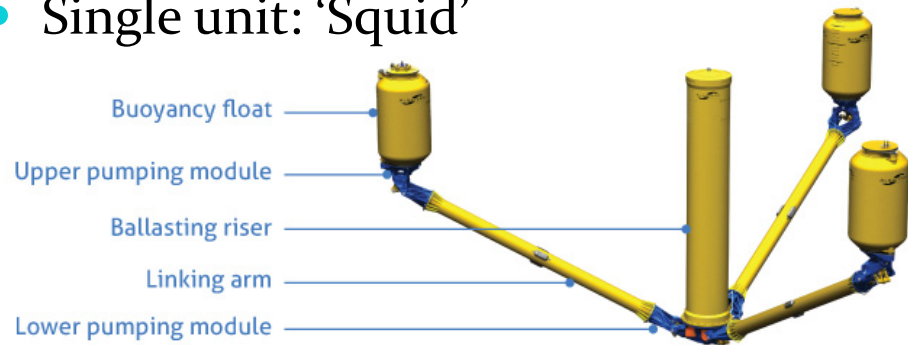


# Albatern and the WaveNET

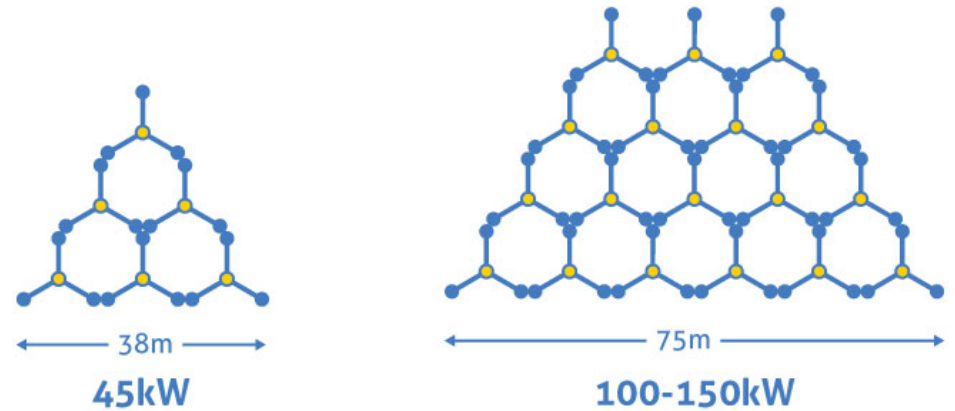
- Wave Energy Developer
  - Founded 2007, focused on developing modular, scalable WEC concept



- Single unit: 'Squid'



- Multiple units: 'WaveNET'

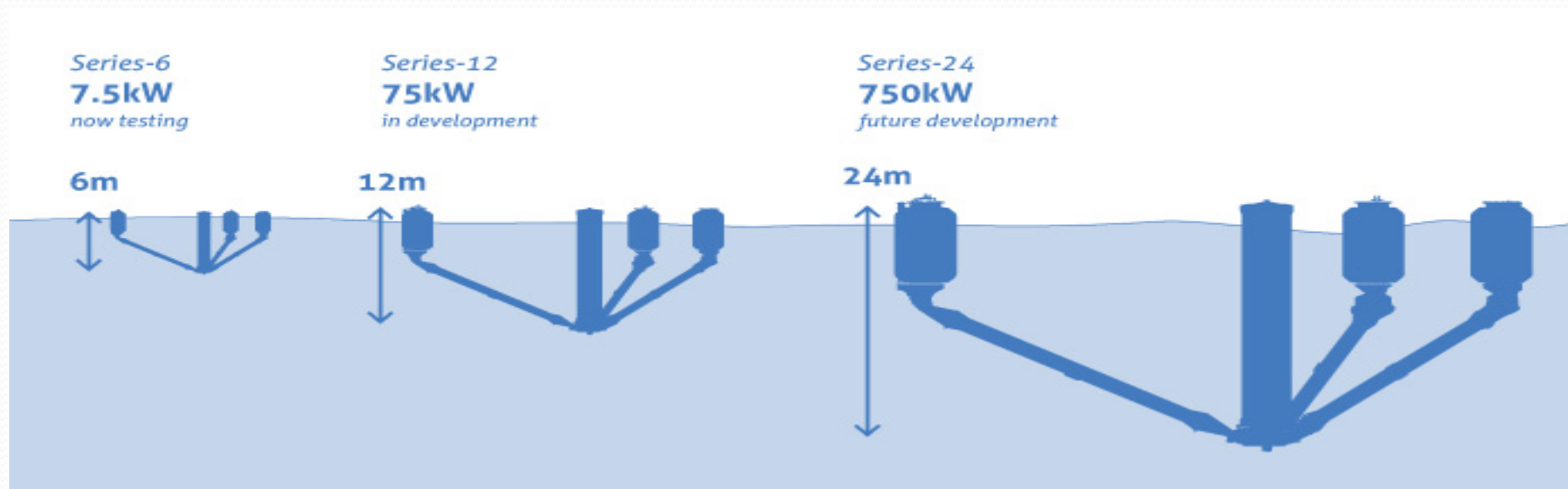


- Operating principle: Attenuator



# Development Roadmap

- Current design: 6 Series (6S) – 7.5kW
- In development: 12 Series (12S) – 75kW
- Future work: 24 Series (24S) – 750kW





# Kishorn Project Overview

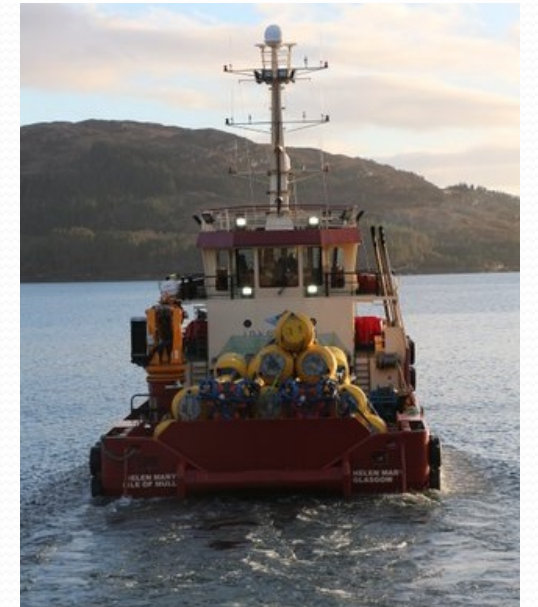
- Location: Loch Kishorn, NW Highlands. Sheltered sea loch with access to Port Kishorn dry dock.



- Deployment: 6 Squids deployed in triangular mooring grid
- Horse Box converted to mobile power station with dump resistor
- Tidal range: ~6m, Wave Conditions: typically 0-0.5m Significant Wave Height



# Kishorn Project Overview – Deploy & Retrieval



# Mingary Project Overview



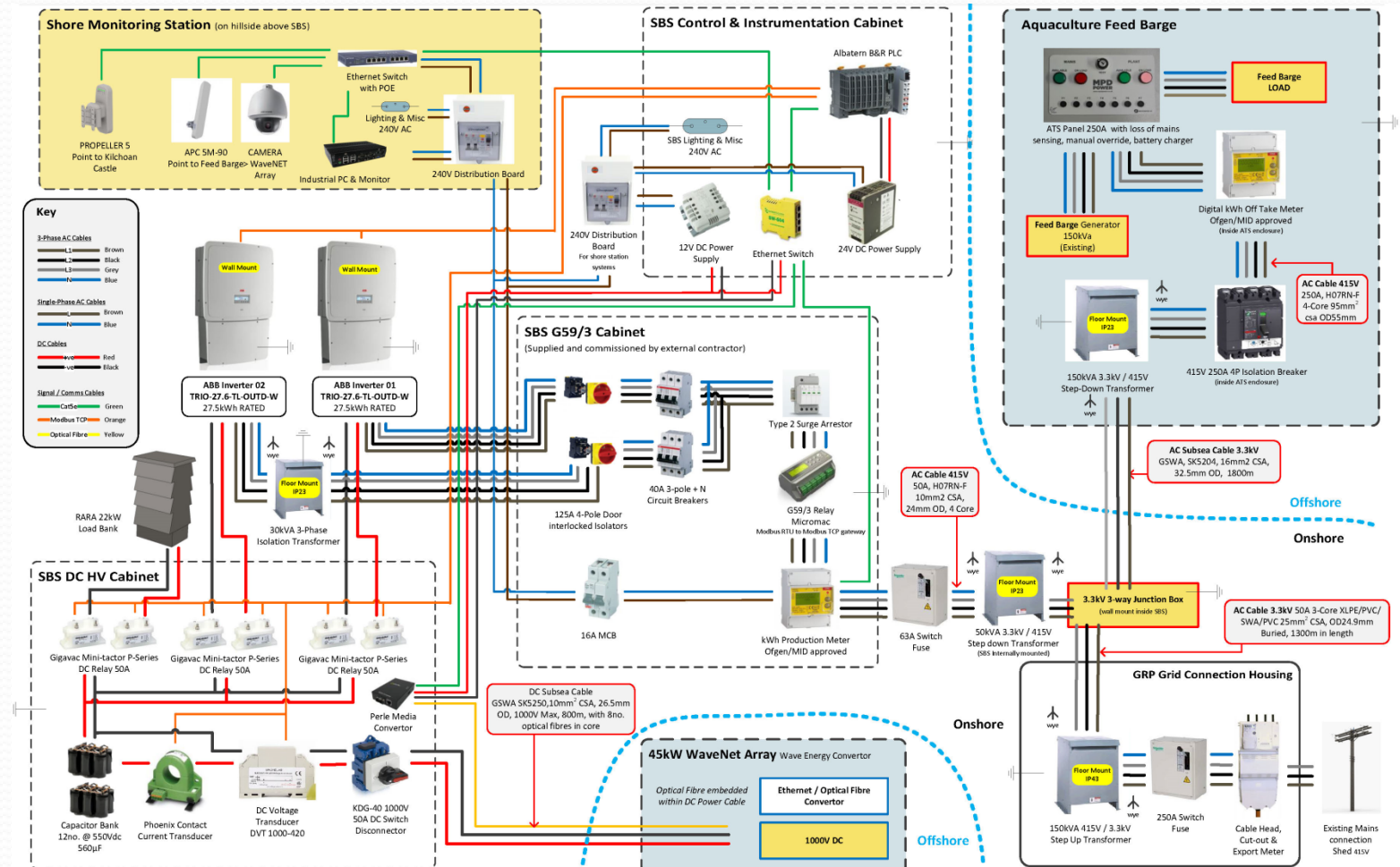
- Partner: Marine Harvest Offshore Fish Farm
- Location: 52 Miles from Fort William, 2 Hours driving
- Deployment: 6 Squids deployed in triangular mooring grid
- Power transmission: 800m from SQUID to onshore station, 1800m from onshore station to feed barge, 1300m from onshore station to utility grid
- Power range: 50kVA, 3.3kV





# Mingary Project Overview

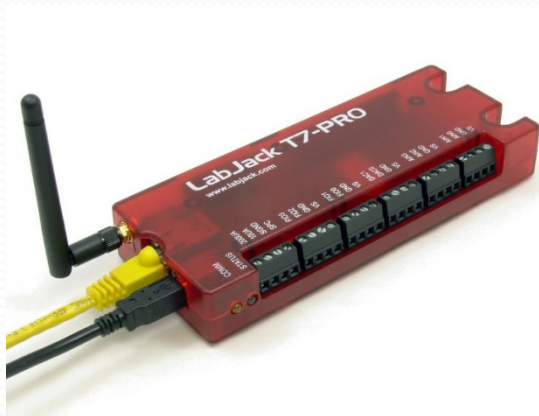
- PLC is used for control and instrumentation
- Fibre Optic is used for communication
- 25kW dump load is integrated to maintain hydraulic pressure
- Isolation transformer is used for power converter protection





# Mingary Project Overview - Instrumentation

- Each Power Take Off system has:
  - Generator RPM, temperature and current
  - High and Low pressure sensors in accumulators
  - Mooring Loads at each PTO node
  - Contactor switches to control hydraulic circuit



*12Te Load Cell*



*0-16 bar Pressure Gauge*



*0-250 bar Pressure Gauge*



*DC Motor*



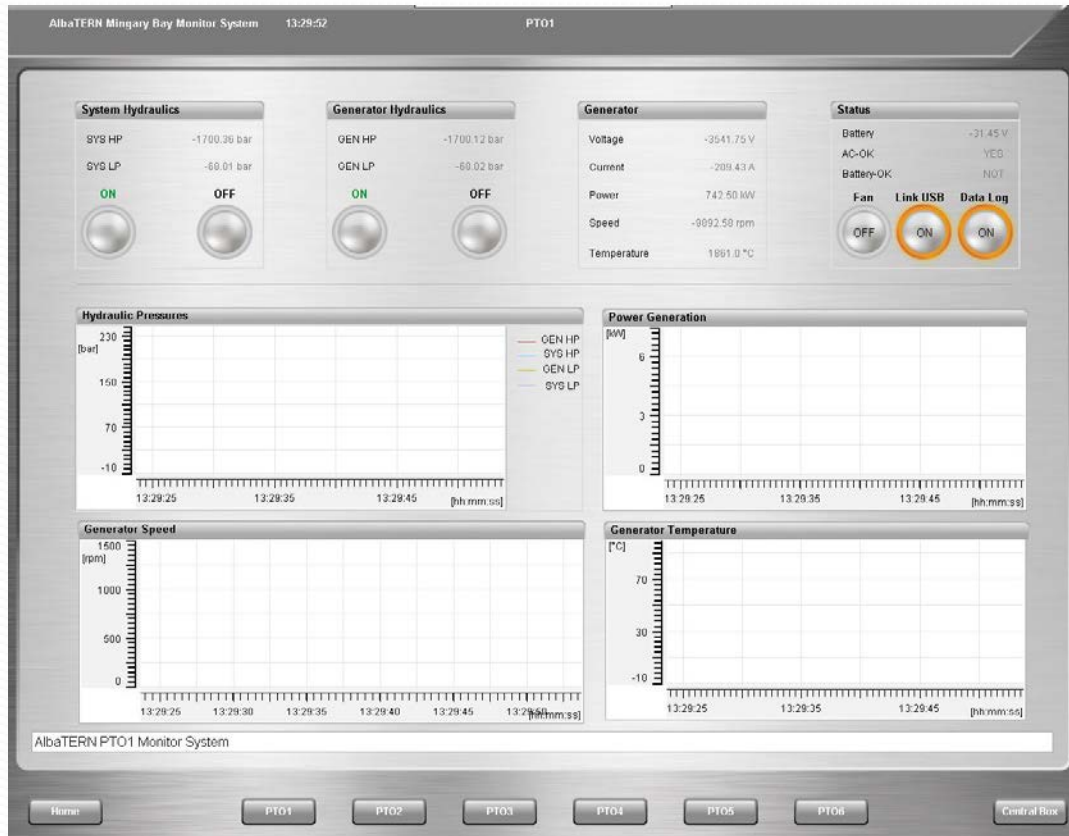
*Contactor*



*Current Sensor*

# Mingary Project Overview - SCADA

## Monitor System



## Control System



# Offshore Survey Footage



Kishorn Offshore Survey  
30<sup>th</sup> September 2015



# Offshore Survey Footage



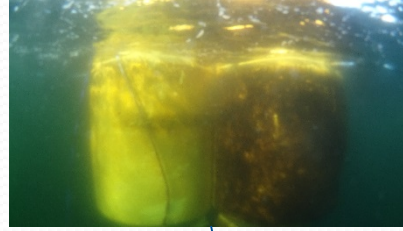
# Offshore Survey Results

## Key: Operational History

Squid	Status	Weeks at Kishorn	Weeks of Service History
1	Hairy	8	13
2	Hairy	7	8 + 5
3	Clean	8	18 + 5
4	Clean	4	
5	Dirty	7	27
6	Beardy	8	



Array View



#3: Clean Squid  
#2: Hairy Squid

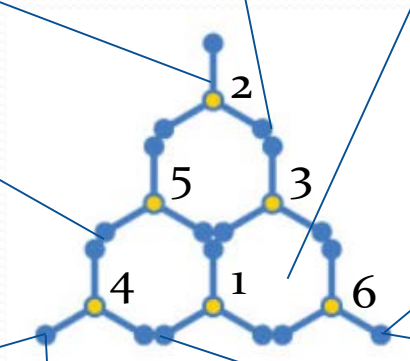
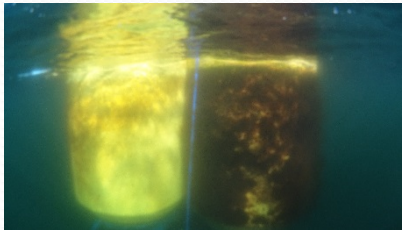


Waverider Buoy



#6: Beardy Squid

#4: Clean Squid  
#5: Dirty Squid



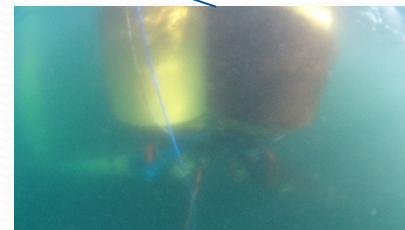
#4 Buoyancy Module



#6: Buoyancy Module



#4 Pumping Module



#4: Clean Squid  
#1: Hairy Squid



# Marine Growth Comparison

- Squids 2 and 3 retrieval from Isle of Muck test site (service 13 weeks)



- Squid 5 retrieval from Loch Kishorn test site (service 27 weeks)





# 'Dirty Squid'

- Retrieval after 6 months service. Mid-January to Mid-July 2015.





*Interaction with Marine Mammals...*



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# End of Presentation

Thank You.