PURE
Development of Auxiliary Power Unit for Recreational Yachts

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PROJECT OVERVIEW

pure
auxiliary power unit for recreational yachts

Project Information	
Call topic	SP1-JTI-FCH.2011.4.4
Grant agreement number	303457
Application area (FP7) or Pillar (Horizon 2020)	Early markets
Start date	
End date	30/06/2016
Total budget (€)	2,884,875
FCH JU contribution (€)	1,641,194
Other contribution (€, source)	-
Stage of implementation	100% project months elapsed vs total project duration, at date of November 1, 2016
Partners	HFCS, DTU, APTL/CERTH, JRC, DAMEN

PROJECT SUMMARY

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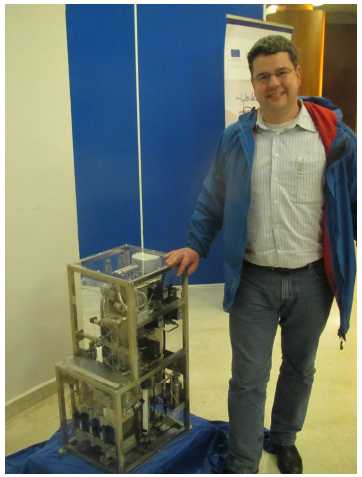
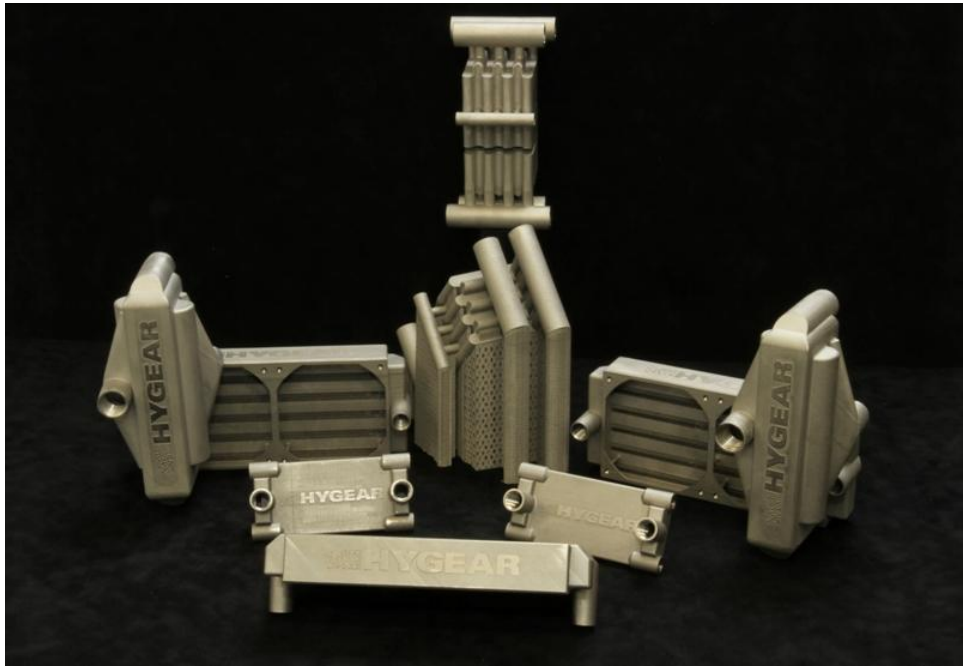
Design, construct and testing of a LPG fueled 500We fuel cell system

- Small size
- 1000 hrs operating time



Technical Choices

- Small size
  - ATR + HT PEM fuel cell
- Combining functions: complex shapes
  - 3D printed Heat exchangers



PROJECT PROGRESS - Power

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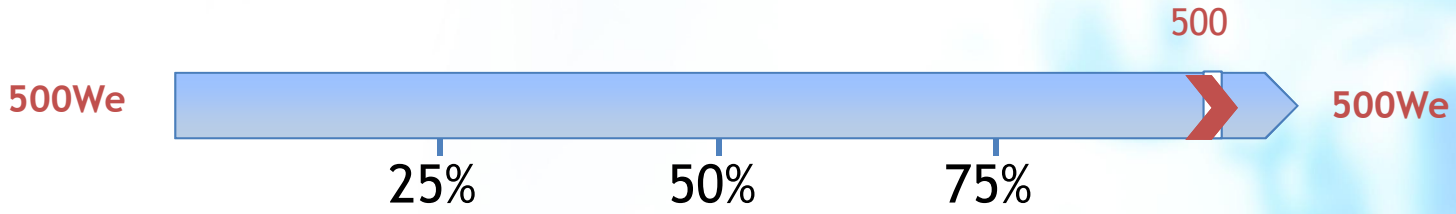
Achievement to-date

% stage of implement.

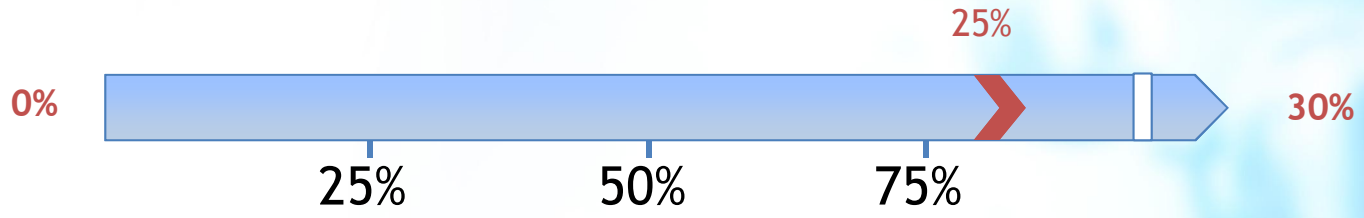


Aspect addressed	Parameter (KPI)	Unit	SoA 2016	FCH JU Targets		
				Call topic	2017	2020
System operation	Electrical power on board	We	500	500	500	500

PROJECT PROGRESS - efficiency

Achievement to-date

% stage of implement.



Aspect addressed	Parameter (KPI)	Unit	SoA 2016	FCH JU Targets		
				Call topic	2017	2020
System efficieny	Electrical power on board	%	11-15%	30	30	30

Future steps:

- Increase overall efficiency by increasing power level
  - Maritime market changed upon financial crisis.
- Entry-level market for small units low.
  - New customer base require 10-20kWe APU units.

PROJECT PROGRESS/ACTIONS - Size

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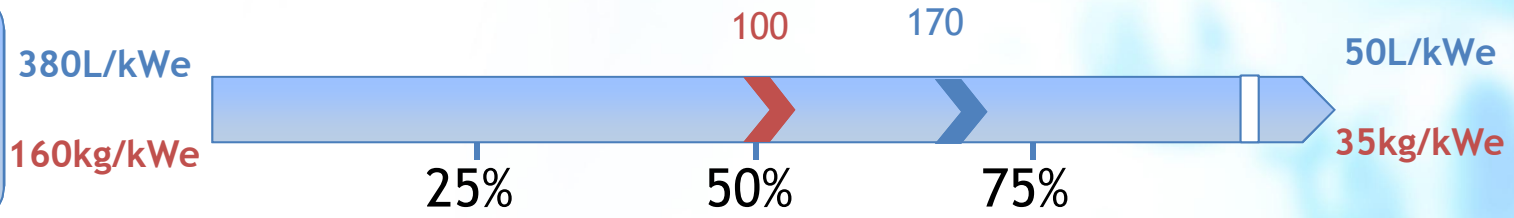
Achievement to-date

% stage of implement.



Aspect addressed	Parameter (KPI)	Unit	SoA 2016	FCH JU Targets		
				Call topic	2017	2020
System size	Volume	L/kWe	170	50	50	50
	Weight	kg/kWe	100	35	35	35

PROJECT PROGRESS/ACTIONS - Size

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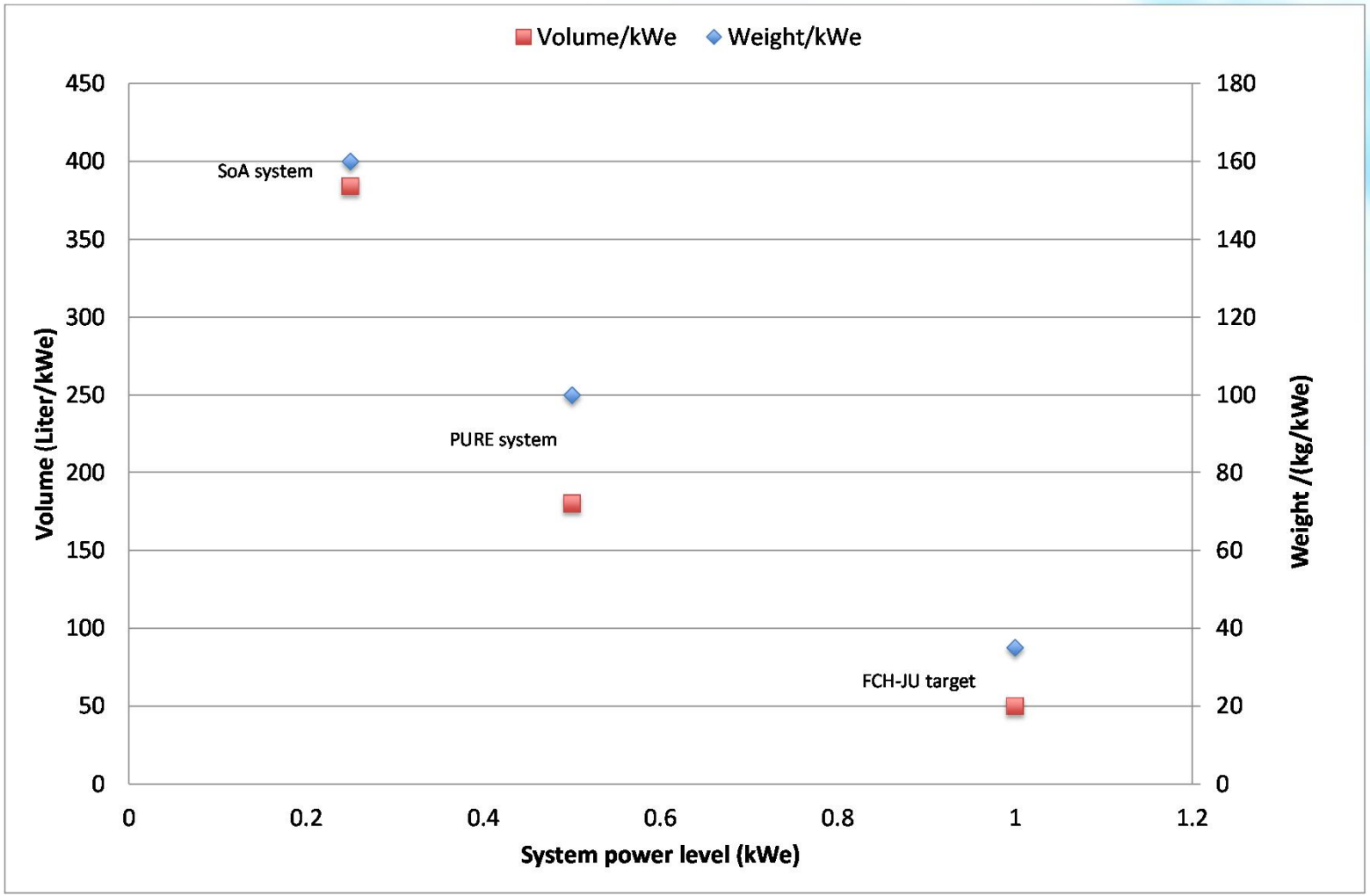
- In perspective, where we are:



PROJECT PROGRESS/ACTIONS - Size

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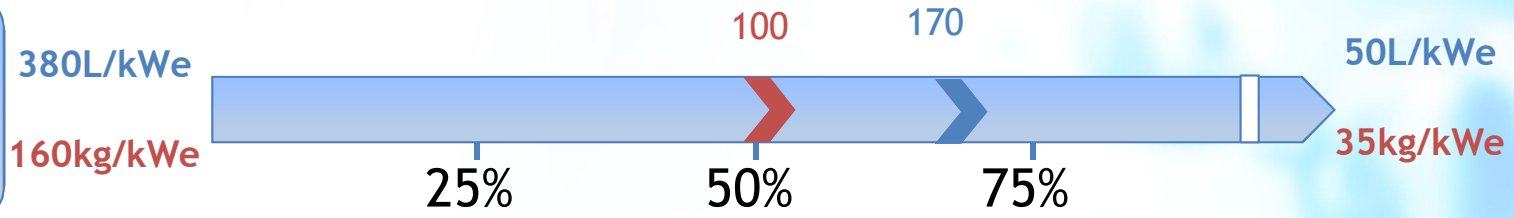
Achievement to-date

% stage of implement.



Further developments needed

- Improved MEA's for ATR reformate → reduce reformate conditioning system
- Improved MEA's for air cooled stacks → eliminate cooling circuit

Species	WGS out	FCS in
H2	33.9%	45.4%
H2O	32.4%	9.6%
CO	0.9%	1.2%
CO2	12.8%	17.0%
CH4	0.1%	0.2%
N2	19.9%	26.7%
Total	100.0%	100.0%

- Maturization of 3D metal printing industry
  - Opportunities for reducing size by using novel complicated designs
  - Improve gas thightness

SYNERGIES WITH OTHER PROJECTS AND PROGRAMMES

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Interactions with projects funded under EU programmes	
Joules	Definition of technologies on low emissions in the maritime sector.
SUAV	Sourcing of components for small fuel cell systems
FERRET	Development of ATR based fuel processing technology
Nemesis2+	Development of desulphurization (APTL/CERTH)
Interactions with national and international-level projects and initiatives	
HySeas (NL)	Development of 5kW fuel cell system for maritime sector
IEA Task 39	Hydrogen in the maritime Industry

DISSEMINATION ACTIVITIES

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Public deliverables

- D 1.1 Website
- D 1.3 Dissemination workshop
- D 6.1 BOM ready

Conferences/Workshops

- 1 Workshop organised in Napels (2015)
- 11 in which the project has participated

Social media

N.A.

Publications: 7 (e.g.)

- Martin, S et al. (2014) Binderless Electrodes for High-Temperature Polymer Electrolyte Membrane Fuel Cells. J Power Sources 272 (559-566)
- Mandilas, C. et al. (2016) Zinc-copper oxide coated monolithic reactors for high capacity hydrogen sulphide removal from gaseous streams International Journal of Hydrogen Energy (submitted)

Patents: 0

DISSEMINATION ACTIVITIES

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Dissemination workshop and exhibition on the European fuel cell conference in Naples, Italy (dec 2015)

Thank You!

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