operation of a novel sofc-battery integrated hybrid system for telecommunication energy systems ONSITE
(325325)

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PROJECT OVERVIEW

- SP1-JTI-FCH.2012.3.5
- System level proof of concept for stationary power and CHP fuel cell systems at a representative scale fuelled by natural gas or LPG
- Duration: 01 July 2013 - 30 June 2016
- Budget: 5,525,540 (FCH JU contribution 3,012,038)

The overall objective of ONSITE is the construction and operation of a containerized system comprising a sofc/NaNiCl battery hybrid that generates more than 20 kW at high efficiency and economically competitive costs.

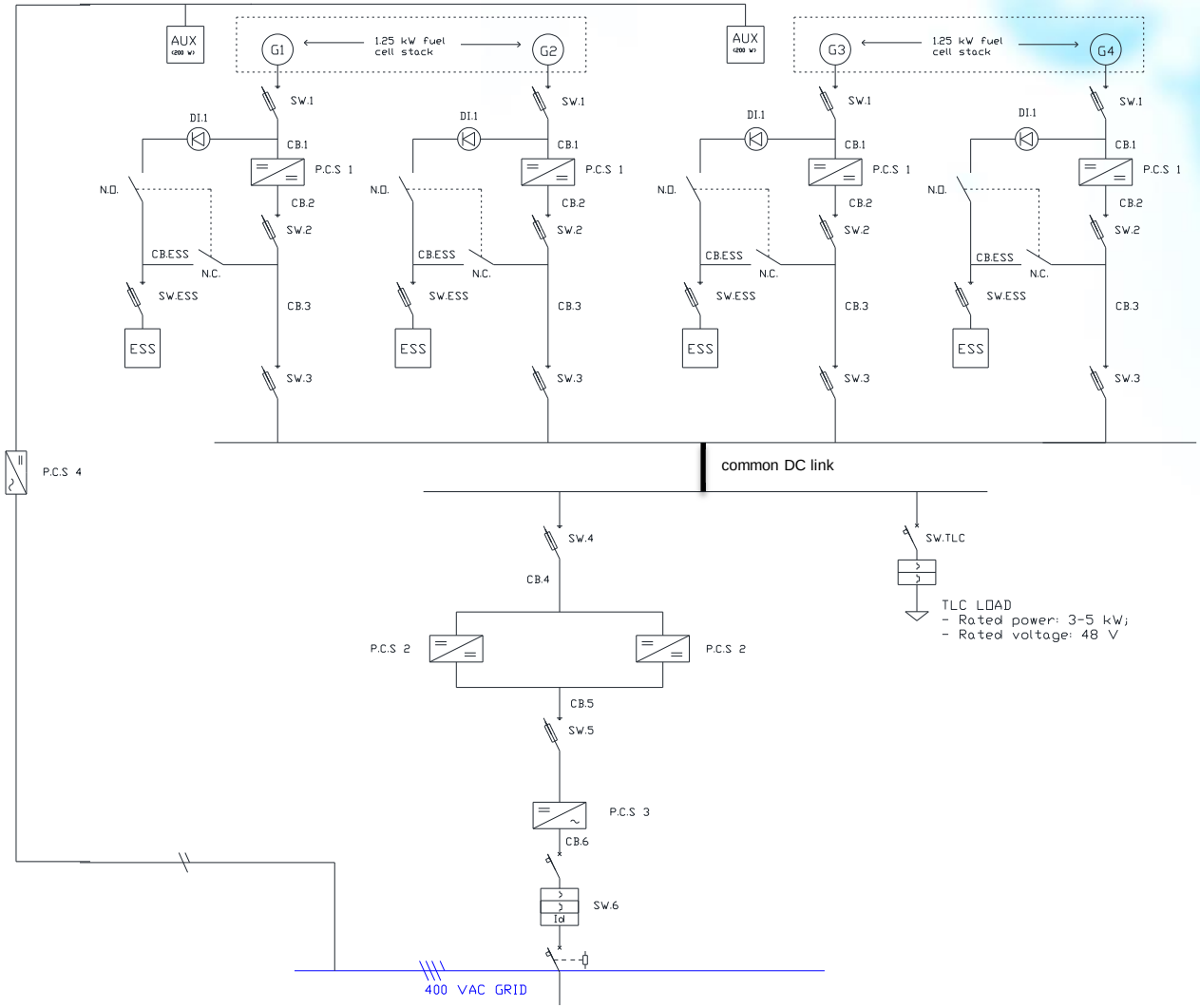
Stage of implementation 78% at present

PROJECT TARGETS AND ACHIEVEMENTS (1)

Programme objective/target	Project objective/target	Project achievements to-date	Expected final achievement
MAIP			
system efficiency 55%+ (el.) or 85%+ (total)	system efficiency 55%+ (el.) or 85%+ (total)	system efficiency ~40% (el.); 86% (total)	system efficiency > 40% (el.); > 86% (total)
system cost 4,000 €/kW	< 4,000 €/kW	cost evaluation not yet finalized	< 4,000 €/kW
	AIP		
n.a.	test of subsystems, P&ID, el. architecture	- system design - sofc sub-system tested - hybrid opera-tion shown	proof of concept of sofc/NaNiCl battery hybrid for radio base stations and datacenters

PROJECT TARGETS AND ACHIEVEMENTS (2)

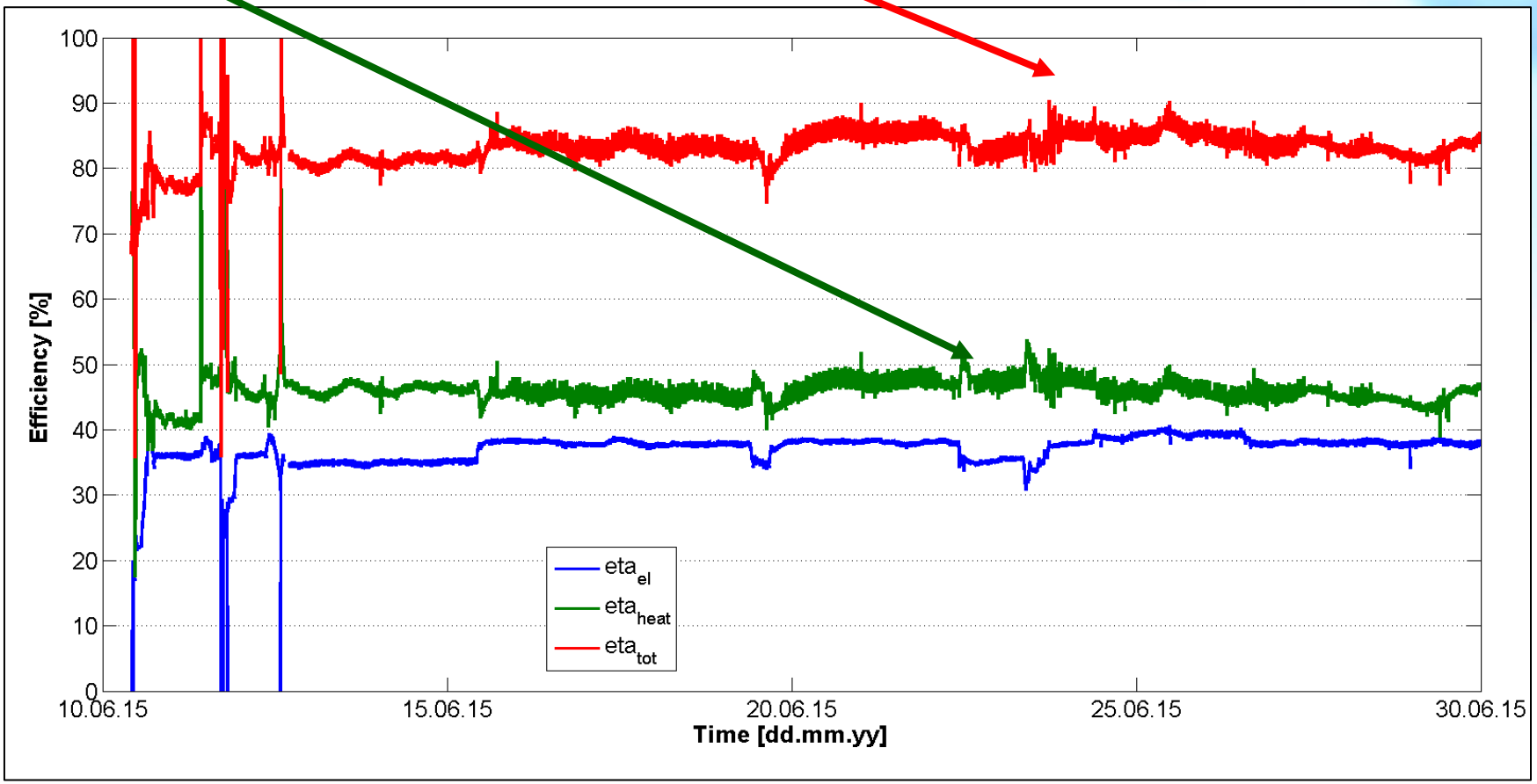
example of achievements: electrical architecture of system



PROJECT TARGETS AND ACHIEVEMENTS (3)

example of achievements: 500 hour long term test of a 2.5 kW sofc system

- total efficiency above 85%
- el. efficiency approaching 40%

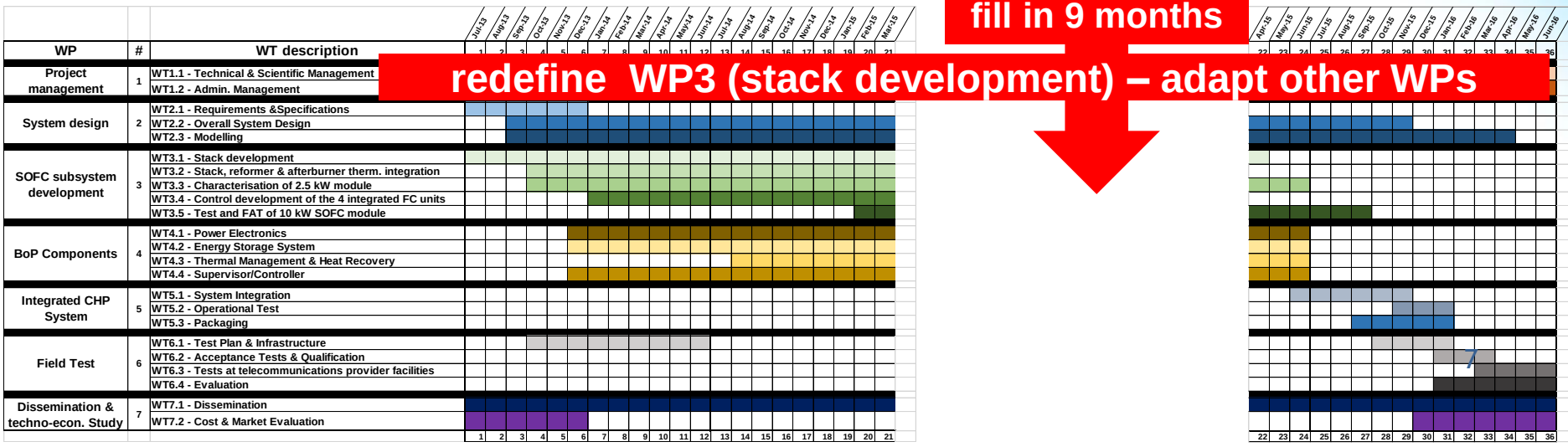


RISKS AND MITIGATION (1)

- HTC abandoned the development of a (large cell area) 2.5 kW sofc stack development aiming at 10 kW stacks now
- HTC's CE-certification (outside of ONSITE) of the HoTboxTM system with 2 stacks of 1.25 kW each plus entire balance of plant took much longer and required more staff effort than anticipated; consequence: shortcomings for the R&D-activities in ONSITE
- the stack test and delivery of sofc-subsystems were substantially delayed
- mitigation:
  the project had to engage the "fall back" strategy already defined in the DoW, i.e. to use 1.25 kW stacks (8 instead 4 with 2.5 kW)

RISKS AND MITIGATION (2)

- Ericsson (ERC) can no more provide the test laboratory site for testing resulting in another delay
- mitigation:
  - some ERC activities were transferred to CNR
  - CNR managed to engage a new Telecom operator (H3g) for tests under real world conditions
- due to this shortcomings a new objective (10 kW instead of 20 kW while keeping the system complexity [4 stacks] and a project extension by 9 months became necessary



SYNERGIES WITH OTHER PROJECTS AND INITIATIVES

- ONSITE is informally in contact with the ene.field project via partner HTC
- efceco is a member of the advisory board of the stage sofc project
- IEN has collaboration with sunfire company
- CNR, efceco are collaborating on small microtubular sofc in SUAV project
- some partners (e.g. efceco) have broad and long ranging international contacts , primarily in the US

HORIZONTAL ACTIVITIES

- n.a.

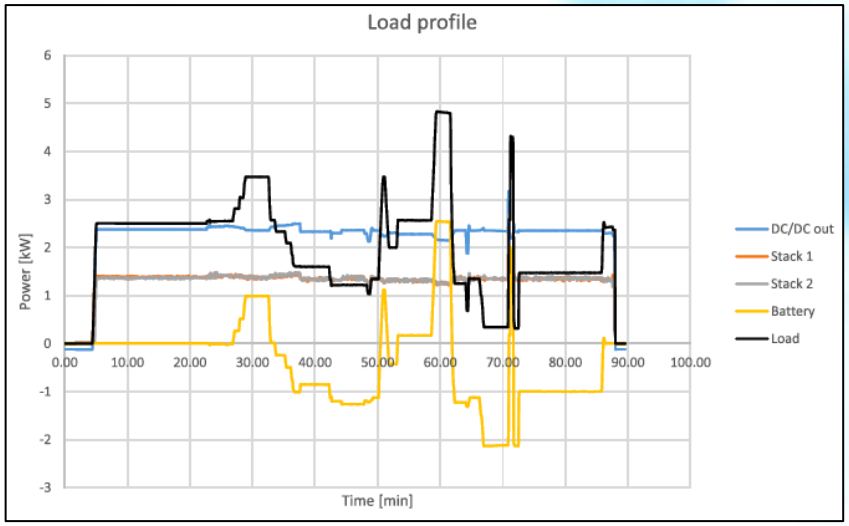
DISSEMINATION ACTIVITIES

some papers, a magazine article, a website and a Twitter account so far

- A magazine article published on International Innovation issue N. 173 both electronically and on hard copies
- Project website (www.onsite-project.eu)
- Twitter ONSITE project account
- “Multi-parametric model of a solid oxide fuel cell stack for plant-level simulations”, J. Kupecki, M. Błesznowski, Institute of Power Engineering, Warsaw, Poland, 11th Symposium on Fuel Cell and Battery Modeling and Experimental Validation, Winterthur, Switzerland
- “Investigation of thermal cycling of a 1 kW-class planar sofc stack using fully physical quasi 1D model”, Jakub Kupecki, Konrad Motylinski, Jaroslaw Milewski, Arkadiusz Szczesniak, Rafal Bernat &
- “Modeling of transitional states of a Molten salt battery as a part of cogenerative power system with solid oxide fuel cells”, Jakub Kupecki, Konrad Motylinski, Nicola Zanon, Irene Dona, World Hydrogen Technologies Convention (WHTC2015), Sydney, October 11-14, 2015

EXPLOITATION PLAN/EXPECTED IMPACT

- ONSITE's system is the first of its kind taking advantage of the thermal coupling of an sofc and a NaNiCl battery (SNC battery)



- if successful ONSITE will widen the product range of FIAMM which is already cooperating the telecom industry
- the feature of energy storage (battery) might have impact on residential cogeneration systems