

TRANSNATIONAL ACCESS USER PROJECT FACT SHEET

USER PROJECT

Acronym	SPEARHEAD
Title	Study of modular power electronics architectures as an enabler for multi-tier oriented rural electrification
ERIGrid Reference	03.006-2017
TA Call No.	3

HOST RESEARCH INFRASTRUCTURE

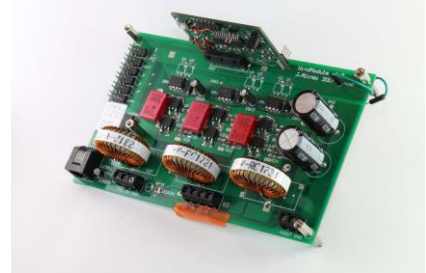
Name	ICCS – NTUA		
Country	Greece		
Start date	30/04/2018	N° of Access days	9
End date	12/05/2018	N° of Stay days	13

USER GROUP

Name (Leader)	Luiz Fernando Lavado Villa
Organization (Leader)	LAAS-CNRS
Country (Leader)	France
Name	Jean Alinei
Organization	ACE
Country	France
Name	Rafael Beltran Oliva
Organization	L&R – UNPA
Country	Argentina
Name	Ronan Blanchard
Organization	ENSE3
Country	France

1. USER PROJECT SUMMARY (objectives, set-up, methodology, approach, motivation)

Rural electrification is achieved through energy tiers. As users consolidate their energy use, they tend to need more energy and upgrade their system. When migrating from one tier to another, it becomes necessary to acquire new equipment, since the former solutions are rarely compatible with the new needs. This situation has drawn the attention of Wind Empowerment practitioners who have come together to create open-source power electronic converter systems. The partners in this Transnational Access project are part of this initiative, and they have developed three blocks, namely, DC-DC converter (red board on the left), AC-DC converter (green board on the right) and motherboard.



During this project, the team worked simultaneously on hardware, firmware and software aspects of these three blocks with the objective of providing short-term, medium-term and long-term actions for maximizing their potential field deployment and technological transfer to the Wind Empowerment community.

2. MAIN ACHIEVEMENTS (results, conclusions, lessons learned)



The hardware work focused on cross-comparison of hardware designs and topology choices. The firmware objective of this proposal was to determine the best method to control the power converters in order to achieve multi-tier expansion. The software objectives of this proposal focused on high-level system control needs and implementation.

The hardware work resulted in the integration of all the working parts of the power converters into a single design, capable of handling a large range of functions within a microgrid. The firmware work led to the adoption of a scheduler architecture for the future single design. The software work resulted to the thorough design and implementation of a human to machine interface.

3. PLANNED DISSEMINATION OF RESULTS (journals, conferences, others)

All of the data and the results will be shared as open-access material through a dedicated online repository. The final version of the power converter and any related documentation, such as schematics, routing, bill of materials, software and construction manual will be shared freely through open-source licenses. Future developments will be presented in the Wind Empowerment biannual conference in India in December 2018

