



TEMPLATE FOR PROPOSAL UNDER DERRI

User-Project Proposal:

User-Project Acronym	Interaktif
User-Project Title	Multi – source Inverter
Main-scientific field	Power Electronics
Specific-Discipline	Grid – tied PV and Wind Inverter with storage

Lead User of the Proposing Team:

Name	Esref Deniz, MSc.
Phone	+905335776487
E-mail	esref.deniz@interaktifenerji.com
Nationality	Turkish
Organization name, web site and address	Interaktif Enerji Elektrik Elektronik Ltd. KOSGEB TEKMER Bornova / IZMIR
Activity type and legal status* of Organization	(3)
Position in Organization	Project Director

* Higher Education Institution (1) – Public research organization (2) – Private not-for-profit research organization (3) – Small or Medium size private enterprise (4) – Large private enterprise (5) – other (specify)

Additional Users in the Proposing Team:

Name	İlker Ongun, MSc
Phone	+905356823689
E-mail	Ilker.ongun@gmail.com
Nationality	TR
Organization name, web site and address	Ege University Ege Meslek Yuksekokulu, www.egemyo.ege.edu.tr, Kampus Bornova Izmir #35100
Activity type and legal status* of Organization	(1)
Position in Organization	Head of Dept.

* Higher Education Institution (1) – Public research organization (2) – Private not-for-profit research organization (3) – Small or Medium size private enterprise (4) – Large private enterprise (5) – other (specify)

(Repeat for all Users)

Date of submission	29.02.2012
Re-submission	YES _____ NO <u>X</u> _____
Proposed Host TA Facility	IWES
Starting date (proposed)	30.09.2012

Summary of proposed research

Established in 2009 and since then has been carrying on its activities at KOSGEB TEKMER building in Ege University Campus Interaktif Enerji designs power electronic interfaces to [be](#) used in renewable energy systems. R&D department of the enterprise has been working on inverter designs for wind and solar energy systems which will have high efficiency with small sizes. Besides, design and installation of solar, wind and hybrid energy systems are the other areas of activity of Interaktif.

Interaktif Enerji has been designing a multi – source inverter to integrate the wind and PV systems with storage systems and grid. This inverter has been designed to feed sources with wind and solar especially in remote sites with problematic grid conditions. The inverter has a modular design. It has PFC module for grid input, PV module with MPPT, wind turbine module, grid feeding module and load feeding module. Each module has a power rating of 10 kW.

In our laboratory we are lacking the non – linear loads and grid simulator for testing our modules. And the PV simulator that we have has an input of only 600 VDC.

Eliminato:

State-of-the-Art

Describe in brief (in about 1½ pages) the current knowledge on the subject, citing recent relevant references. Identify any knowledge gaps and their relevance.

We have designed this inverter for the energy needs of consumers integrated to low quality grids which usually have voltage fluctuation and blackout problems. By using our inverters it will be possible to energize systems as connected or not to grid with wind and solar energy sources and back – up systems. The inverter can feed motor loads like actuator or pumping systems efficiently. The PFC unit will be able to operate in extreme grid conditions. It will also be possible to feed grid with wind and PV sources, also from batteries.

We need to test the modules of our inverter with extreme grid conditions and variable loads.

References

1. Solar Energy Grid Integration Systems “SEGIS”: Concept Paper, October 2007, Sandia National Laboratories, <http://www.sandia.gov/SAI/files/SEGIS%20Concept%20Paper-071025.pdf> .
2. The Smart Grid: An Introduction; prepared for the U.S. Department of Energy by Litos Strategic Communication under contract No. DE-AC26-04NT41817, Subtask 560.01.04, 2008.
3. IEEE Standard 1547.1 for “Conformance Tests Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems,” IEEE, NY, 2009.
4. Hoff, T., Perez, R., Margolis, R., “Maximizing the Value of Customer-sited PV Systems using Storage,” Solar Energy, 2007.

Detailed Description of proposed project :

Objectives

In this research we want to test the PFC and variable load feeding units of our inverter. Three phase 380 VAC grid input (PFC) module can be able to operate at 600 VAC and even if two phases of three are not feeding. Motor feeding unit will be able to make frequency and amplitude control.

We also want to test the MPPT algorithm and grid synchronization of the related modules.



Formattato: Francese
(Francia)

Eliminato:

Eliminato:

Eliminato:

Expected Outcome

By testing our modules we will have the opportunity of obtaining reliable test reports. So we can have an opinion on the expected behavior of our modules in different grid conditions.

Fundamental Scientific and Technical value and interest

The testing and evaluation of PFC, motor load and grid modules will produce the opportunity of developing of a more reliable inverter which can handle severe grid and variable load conditions. In consideration of results, hardware and software of the modules will be evaluated and required provisions will be made with new versions.

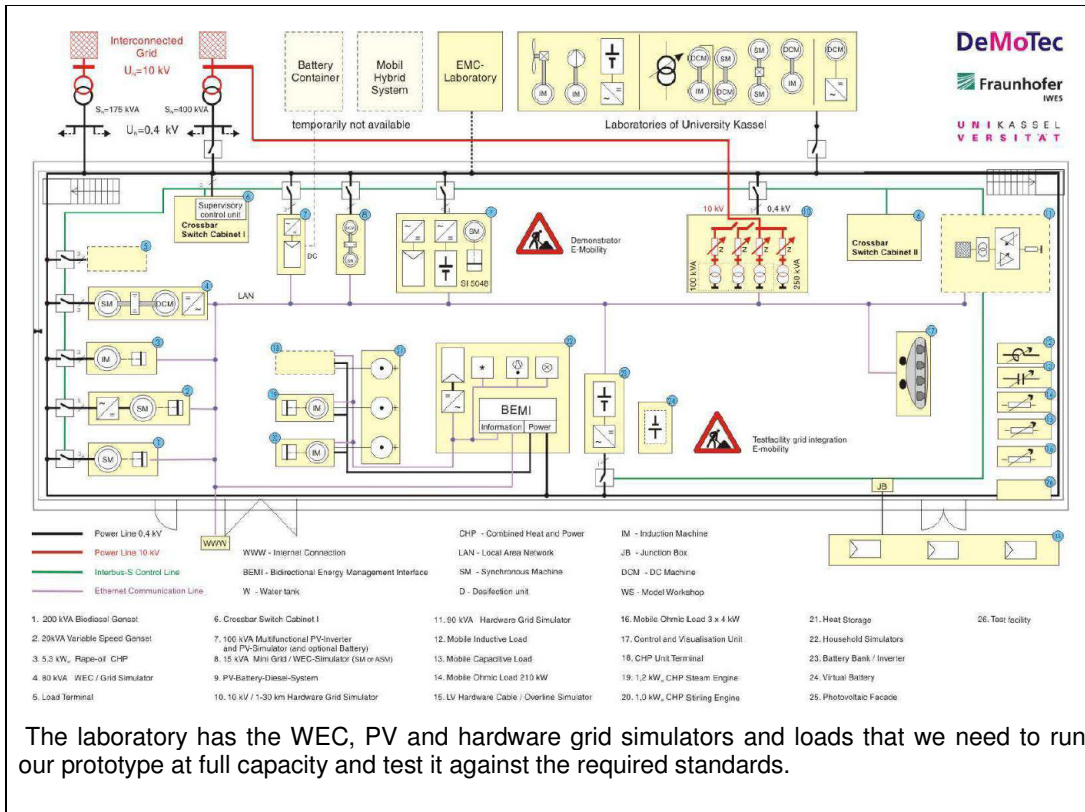
Originality and Innovation of proposed research – Broader Impact

Multi source inverter design of Interaktif Enerji is aimed to find solution of grid connected and grid supported wind and solar systems especially in low quality grids. It has design specification to feed loads connected to grid which has frequent and prolonged blackouts and severe fluctuations.

The inverter has a modular design. Each module has a power capability of 10 kW and 256 pieces of modules can be paralleled to have greater power capacities. This product is being developed with the support of SME Development Organization of Turkey and is the first domestic hybrid product in Turkey. Test results and corresponding commercialization endeavors of the product will pave the way for us to become new competitors in renewable energy inverter market.

Proposed Host TA Infrastructure/Installation – Justification

Due to the wide range of grid simulation and testing options presented, Fraunhofer IWES, Germany would be suitable for our testing and reporting needs. This facility has the below laboratory substructure:



The laboratory has the WEC, PV and hardware grid simulators and loads that we need to run our prototype at full capacity and test it against the required standards.

Synergy with ongoing research

Interaktif Enerji has been carrying out different projects about power electronics for renewable energy systems. Battery inverter with high power rating with small size is one of the innovative project outputs of the firm.

Dissemination – Exploitation of results

Interaktif Enerji is a member of Turkish Photovoltaic Technology Platform – UFTP, the largest PV network in Turkey, with a variety of enabling and powerful members like governmental institutions, local authorities, universities, transmission/ distribution companies, commerce/ trade unions. Our transnational access and its results would enable us to report our product through this network. The MPPT efficiency and their evaluation under ETAlzmir will be used in a doctorate study and be published as a part of the thesis..

Eliminato: ¶

Eliminato: .¶

¶
¶
¶

Time schedule

We envisage a 3-week study in AIT premises with a week of laboratory access:
Week 1: Orientation and preparation of the experiment procedures.
Week 2: Testing of the PFC and MPPT modules prototypes



Week 3: Testing of variable load modules prototype

Description of the proposing team (as long as needed)

The lead user of the proposing team is Eşref Deniz. He is an experienced researcher focusing especially on renewable energy power electronics R&D. Interaktif Enerji Technology Ltd. which he is a founder and shareholder works on inverters for renewable energy systems.

Eşref Deniz graduated from DEU Electric and Electronics Engineering Faculty and received MSc. degree at the same. He is working on his Phd in Ege University

The other user Gungor Agbaba is a founder and shareholder of Interaktif Enerji. Before Interaktif he worked as an R&D engineer in the leading electronics firms of Turkey.

The additional user is, Ilker Ongun M.Sc., Ege University Ege Higher Vocational School Electronics Technology, Chief of Department.

Ilker Ongun is also coordinator of Turkish Photovoltaic Technology Platform – UFTP, Education and Standards Workgroup.

Eliminato: