Félix Marín

Responsible for Development
IMDEA Energy
http://www.energy.imdea.org

Bilateral Meetings

- Wednesday (10:00am - 12:00pm)
- Wednesday (12:00pm - 2:00pm)
- Wednesday (2:00pm - 4:00pm)
- Wednesday (4:00pm - 6:00pm)

Description
The IMDEA Energy Institute is a Research Centre which operates as a non-profit foundation. The ultimate goal of the IMDEA Energy Institute is to achieve outstanding scientific and technological contributions for reaching a sustainable energy system working in close collaboration with the industrial sector. Research topics addressed at the Institute are concentrated within the following six areas: Solar energy systems and technologies, with special emphasis in concentrating solar power. Production of sustainable fuels: hydrogen, biofuels and wastederived fuels. Energy storage. Smart management of electricity demand. Energy systems with enhanced efficiency. Confinement and valorization of CO2 emissions. Process simulation and energy-economic modelling. Management and life cycle analysis.
Organization Type
Research Center
Organization Size
Yes, I need an Exhibition Visitor Pass Discount Code
Areas of Activities

ENERGY

1. renewables
2. storage
3. zero carbon
4. efficiency
5. management
6. electricity

MOBILITY

1. electric vehicle

2. alternatives energy sources

SUSTAINABLE CITY

1. green building
2. water & waste management
3. product cycle
4. sustainability

Offer

Real-Time Emulation of Electrical Power Networks

IMDEA Energy has created a test environment specifically designed for research, development and testing of control algorithms in energy systems. This environment is named “Smart Energy Integration Lab, SEIL” for accelerating the process of control design development necessary for connecting energy resources to electricity networks. The approximate lab capacity for power processing is 210kVA and it is formed by a set of power electronics converters, resistive loadbanks, 47kWh battery system, distribution panels and monitoring and control systems. This platform allows analysis, development and testing of realistic scenarios for energy integration in both AC and DC networks and also operation of distribution power networks, islanded networks and microgrids.
The results obtained from this test environment are more reliable and accurate than any model based computer simulation.
What distinguishes this laboratory is its flexibility in implementation of control algorithms and simple access to all test and management data from any part of the network. The lab microgrid is capable of recreating a large number of different events that occur in real power networks and, therefore, represents a useful tool when it comes to research, development and implementation of energy management algorithms. For example, the lab network is capable of emulating at the same time a generation and load mix consisting of various wind, photovoltaic and conventional generators and passive and active loads all together connected to a wide area network whose dynamic is emulated in real-time. The role for the power converters acting as energy resources in such network is simply defined by assigning a different control block to each one of them. In addition to this, the battery system installation offers all the flexibility needed for the development of management algorithms for future power network.
The Smart Energy Integration Lab consists of:
• 4 x 15kVA three-phase power inverters
• 2 x 75kVA three-phase power inverters
• 4 industrial PCs with RT operating systems
• 2 x 30kW balanced and unbalanced, programmable resistive loadbanks
• 47.5kWh Li-Ion battery system with BMS
• 90KW Bidirectional, wide bandwidth, programmable battery charger
• Distribution panels with 5 independent busbars and contactor control
• Independent monitoring and control system
Control algorithms for power inverters are programmed via Matlab Simulink and code generation tools and are then

executed in real-time on industrial PCs. Real-time data exchange provides Access to all control variables and parameters during the test. In this way the desired flexibility in reproducing real dynamic characteristics of any energy source, generator or load it is achieved.
The monitoring and control system allows an independent, remote, real-time access to laboratory resources including the network reconfiguration, control of contactors and connection to the external power grid. Moreover, by harnessing the potential of the communication network installations any centralised or decentralised management control algorithm can be achieved.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

• Real-time emulation of power network operation
• Flexible, model-based approach in forming energy systems and their components
• Test environment for integration of renewable and storage technologies
• Facilitates implementation of energy management scenarios
• Grid connected or islanded operation
• Full access to control algorithms for power electronics interfaces
• Easy access to all the configuration, test and control data

MARKET APPLICATION

• Grid integration of renewable technologies, distributed generation and energy storage
• Energy management for small power systems and buildings
• Stability and power flow analysis for power networks and microgrids
• Development of control algorithms for power electronics interfaces
• Power quality improvement
• Power electronics applications FACTS, HVDC, Active filters etc.

TYPE OF PARTNER SOUGHT

• Companies interested in grid integration of renewable and storage technologies.
• Distribution network operators and energy retailers interested in development and testing active network and demand management algorithms.
• Companies from home and building automation sector interested in development and testing of next generation active management systems.
• Companies developing power electronics equipment interested in research, development and implementation of converter control strategies.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Hydrogen and graphene or carbon nanotubes production

IMDEA Energy has design and developed novel synthetic procedures that lead to a fine selection of the textural and structural properties of transition metal based catalysts, which are active in De-CH4 (methane decomposition) reaction. Using these catalysts a higher H2 production is obtained at relatively low temperature (<700 oC) and simultaneously carbon materials are obtained.

Hydrogen has been considered as a convenient clean energy vector; therefore great efforts have been dedicated to develop efficient methods for both production and storage of hydrogen. Methane, either from fossil fuels or biomass (Biogas), is the main and more convenient source of H2 due to its high H/C ratio. Currently, natural gas steam reforming (SMR) is the most widely used technology to produce hydrogen. However, an important drawback of this process is the formation of CO2 as reaction product, which is the principal responsible of anthropogenic greenhouse emissions. Consequently, capture and storage of the CO2 produced in each stage has been proposed in order to reduce the release of this gas, but the development of new routes for an efficient production of hydrogen are still required. Among the alternative hydrogen generation technologies, the catalytic methane decomposition (DeCH4) fulfils those requirements, not accomplished by SMR, as it results in carbon fixation according to the following scheme: CH4 (g) 2 H2 (g) + C(s)

Therefore, this reaction generates high purity H2 (optimal for fuel cells devices) and, at the same time, CO2 emissions are avoided. Moreover, high yields of carbon are also obtained, and this material can be very valuable for different energetic applications. However, the challenge is the design of catalysts that controls the carbon formation mechanism and its physical properties. This is relevant not only because deactivation of the catalysts must be limited in order to increase the hydrogen production, but also because the valorization of the carbonaceous solid is crucial for achieving an economically feasibility process. The investigations carried out by the IMDEA Energy have revealed that tuning the catalyst properties and the operation conditions, methane decomposition can yield graphene, carbon nanotubes or graphite. These advances open up a very attractive way for the simultaneous generation of hydrogen and functional carbon.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

- Co-production of H2 and high added valued carbon based products such as graphene or carbón nanotubes.
- High purity H2 production without CO2 formation.
- Developments of cobalt magnetic nanoparticles that facilitate the catalyst separation form the carbon products.

MARKET APPLICATION

- Hydrogen production
- Graphene and carbon nanotube synthesis

TYPE OF PARTNER SOUGHT

The partner sought would be a Company- enterprise with capacity to obtain shale gas or biogas.

IMDEA Energy is open to further development and collaboration so the role and collaboration will be defined with the company.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Wastewater bioremediation coupled with energy production via photosynthetic microorganisms

The process presented herein is designed for a dual purpose: wastewater nutrients recovery and production of energy as biogas. On one hand, nutrients required for microalgae cultivation have been identified as a major non-energetic cost of the global process to produce microalgae biomass.
Microalgae production as a by-product of wastewater treatment is a promising option to significantly improve economics and reduce the environmental footprint of the process, avoiding freshwater and fertilisers consumption. In this manner, the ability of microalgae for nutrients uptake and hence nutrients recovery is forseen as a potential strategy to decrease energetic costs involved in other conventional aerobic treatments such as activated sludge. Additionally, the conversión of inorganic wastewater nutrients into organic matter through photosynthesis results in a microalgae biomass that can be used for energy purposes.
IMDEA Energy has the facilities to scale up the best strategies elucidated in lab-scale. Best case scenarios can be implemented in two different photobioreactors configuration at pilot plant scale.
The pilot plant consists of two types of photobioreactors, namely open (raceways) and closed to the atmosphere (bubbled-columns). The working volume of the raceways is 0.3 m3 each. In the case of the closed photobioreactor, it consists of three modules of 4 columns each module. Each column has a working volume of 0.76 m3, thus each module present the same volume as the raceway reactors. The pilot plant is highly versatile since the reactors may be operated independently or in sequential mode. The photobioreactors are fully equipped to monitor the microalgae cultivation online. The pilot plant that is located in the headquarters of IMDEA Energy. This singular infrastructure has been designed in order to compare and optimise two of the most common algae cultivation systems. Performance, productivity and associated costs of different algae cultivation systems will be compared at pilot scale.
Once the biomass is concentrated, this organic substrate can be used for biogas production (heat and power generation). Biogas is a mixture of gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from organic available raw materials. The anaerobic digestion by which biogas is produced is a well stablished technology with a very small carbon footprint.
If this integrated approach proposed is fully exploited, this would have an immediate economic impact reducing operation costs and payback time of a hypothetical plant investment as well as contributing to the European and Spanish greenhouse gas emission reduction targets.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
IMDEA Energy offers research and development services on biogas production, bioremediation of wastewater. The biotechnology laboratory of IMDEA is fully equipped to conduct chemical and biochemical characterization of organic substrates and wastewater streams. Togther with taht, the laboratory has the knowledge to conduct and evaluate, biomethane production potential assays (batch and continuos) as well as photosynthetic growht of microorganisms in aquatic systems. For such an approach, IMDEA counts with a singular infrastructure that has been designed in order to

compare and optimise two of the most common algae cultivation systems. This facility is available to up-scale processes already proven succesful at laboratory scale.
MARKET APPLICATION
• Wastewater treatment plants
• Biogas production
• Biorefinery plants
TYPE OF PARTNER SOUGHT
The partner would be a company with interest in valorization of a wastewater stream or an organic residue suitable for biogas production.
IMDEA Energy is open to further development and collaboration so the role and collaboration will be defined with the company.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Conferring robustness to fermentative microorganisms for the biotransformation of cellulosic sugars

Lignocellulose hydrolysates constitute exceptionally difficult substrates for biotechnological conversión to biofuels or biochemicals. Since an intermediate purification step of the hydrolysate is usually not a viable process option, a key requirement for efficient biotransformation of cellulosic sugars is a microbial strain that combines good fermentation capabilities with high robustness to the complex conditions of the hydrolysate.
Under ideal conditions, fermenting microorganisms are capable to consume sugars and produce ethanol and other high value products. Conditions in the biotransformation process of lignocellulosic sugars, however, are anything but ideal. The hydrolysate generated after pretreatment and hydrolysis contains not only fermentable sugars, but also several compounds (such as acetic acid, furans and phenols) that are toxic for the microorganisms. Furthermore, high-solids concentration during the biotransformation process is needed to increase the profitability of the process. These high-loadings exert stress on the cell affecting its tolerance to inhibitors. So, studies to understand how the mechanical stress affects yeast cells in ethanol production processes at high substrate loading are crucial.
Because current microorganisms used in ethanol industry do not function well in this hostile environment, IMDEA Energy is working on developing adapted microorganisms that can efficiently convert lignocellulosic hydrolisates in presence of inhibitors.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
• Development of new commercial yeast strains via directed evolution, genetic engineering, and/or adaptation for

converting lignocellulose hydrolyzates into ethanol or other high value products.
• Determination of the key metabolic, physiologic, genetic, and regulatory mechanisms underlying stress tolerance and adaptation.
MARKET APPLICATION
• Lignocellulosic biorefinery plants.
• Companies producing biofuels and biochemicals (bio-surfactants, bio-lubricants, etc.) from sugars.
TYPE OF PARTNER SOUGHT
Company with expertise and facilities to produce biofuels and/or bioproducts from lignocellulosic sugars. Its main role would be to check the performance of fermenting microorganisms.
As they are open to further development and collaboration, the role and collaboration will be defined with the company.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Electrochemical Devices Test Plant EDTL

In contrast to traditional uses of batteries, where the cycles consisted of mostly full charge and discharge cycles, new applications have different requirements for more frequent, high pulse power discharging and recharging. At present, typical testing protocols include cycle testing that is usually carried out in banks of cells using multichannel testers which can create different charge and discharge profiles including pulsed inputs and loads. At the same time, performance parameters such as capacity, power output, internal resistance, impedance, open circuit voltage, and discharge time must be monitored and recorded. New battery applications need new battery test systems capable of reproducing safe, continuous and pulsed battery charge/discharge in which more flexibility and intelligence is required to generate the test signal profiles, measure and process the responses of main system parameters like voltage, current, temperature, etc. Additionally, very flexible configurations are needed to test very different devices and chemistries. For example, the characteristics of the testing equipment for supercapacitors (high power and low capacity), flow batteries (with recirculation of electrolytes with low power and very high capacity) and Liion batteries (with intermediate power and capacity values) are totally different. The Electrochemical Devices Test Plant installed at IMDEA Energy pilot premises gives a solution to those requirements by implementing a variety of equipment:
– Bench test unit for flow batteries
• Specifically designed for flow batteries or other electrochemical devices in which the electrolyte must be recirculated.
• 2 independent circuits of electrolytes with their respective storage tanks, pumps, valves, piping and instruments for

measuring and controlling temperature, flow rates, pressure, pH, conductivity and redox potential.
• 2 x 20 L electrolyte tanks and 2 x 1 m3/h recirculation pumps.
• LabView environment for programming, control and communication with the battery cyclers.
– Climatic chamber
• Internal net volume over 200 litres, with useful internal dimensions 60 x 54 x 69 cm.
• Operating temperature limits -40oC to +180oC.
• Humidity range: 10 - 98%.
• LabView environment for programming, control and communication with the battery cyclers.
– Battery cyclers
• Two battery cyclers: one for higher power devices (up to 24 kW) and the other for lower power (up to 1 kW).
• Higher power cycler includes 3 channels of 40 V - 200 A or 120 V - 66 A each. It has the possibility for parallel connection of channels up to 40 V - 600 A or 120 V - 200 A.
• Lower power cycler includes 3 channels of 10 V - 50 A. It has the possibility for parallel connection of channels up to 10 V - 150 A.
• Experiments at controlled voltage, current, resistance and power.
• Thermal stress control by thermocouple probes installation.
• LabView environment for programming, control and communication with the climatic chamber and the flow battery test unit.
– Potentiostat
• Electrochemical techniques at controlled voltage and controlled current.
• Electrochemical impedance spectroscopy with frequencies from 0.001 to 1000000 Hz.
• Booster up to ± 10 V and 10 A.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
• High flexibility of configuration for different chemistries: from devices with conventional stationary electrolytes to recirculating electrolytes, with controlled temperature, flow rate, pressures, humidity, pH, ORP
• High flexibility in programming complex duty cycles, type of input signals, frequency domain analysis.
• High power for measuring and processing the responses of the tested devices. Normal and transient measurements.
MARKET APPLICATION
1) Battery testing equipment.
2) Batteries or other electrochemical devices for stationary applications.
3) Batteries or other electrochemical devices for transport applications, particularly Electric Vehicles.
TYPE OF PARTNER SOUGHT
1) Companies interested in smart testing of electrochemical cells or modules for energy storage applications of stationary and transport.
2) Companies interested in developing and commercializing advanced testing equipment or willing to enter this market.

Cooperation Offered

1. License agreement
2. Technical co-operation

Cooperation Requested

1. Investment/Financing
2. License agreement
3. Technical co-operation

Offer

Technical and sustainability assessments of energy systems

Technical and sustainability assessments of energy systems are based on process simulation and optimization, exergetic optimization, tecno- and socio-economics studies and life cycle sustainability assessment (LCSA), that includes life cycle assessment (LCA), life cycle costing (LCC) and social life cycle analysis (SLCA).
• In biofuels production, tools have developed for:
- Biodiesel production by esterification of non-conventional raw materials: oily wastes, sewage sludge
- Pyrolysis processes for lignocellulosic feedstocks: novel model based on kinetic reaction mechanisms, the simulation calculates product yields and composition depending on reactor conditions (temperature, residence time, flue gas flow rate) and feedstock composition (cellulose, hemicellulose and lignin fraction, atomic composition, ash and alkali metal content). The produced bio-oil is modelled with a high level of detail (33 compounds including organic acids, aldehydes, alcohols, ketenes, phenols, sugar derivatives and degraded lignin), and the char product shows realistic atomic compositions. N, S and Cl trace element release is taken into account and the corresponding emissions caused by the process can be determined.
- Biorefinery of microalgae: coproduction of liquid biofuels (biodiesel, bioethanol), biogas, biohydrogen and high added-value compounds.
- Fischer-Tropsch processes.
- Bioethanol from lignocellulosic materials
• For hydrogen production:
- Steam-methane reforming coupled to CCS
- Reforming of other fossil hydrocarbons
- Coal gasification
- Electrolysis, coupled to grid, wind or PV
- Hybridization of PV and biomass plants to ensure permanent hydrogen supply through high temperature electrolyser.
- Methane and hydrocarbons cracking
- Water photo-splitting
- Thermochemical cycles
- Biomass gasification (see below)
- Reforming of glycerol from biodiesel production
- Iron-steam process
Specifically, for gasification processes the systems studied are:
• Model of gasification plants: it allows studying different raw materials, operation conditions and process layouts.
• Coupling with electricity generation (bio-IGCC)
• Coupling with biofuels production through Fischer-Tropsch processes. For both couplings, they are optimized by

exergetic studies and with the aim to minimize environmental footprints.

INNOVATIVE ASPECTS AND MAIN ADVANTAGES

The methodology proposed is based on:

• Development of simulation models based on Aspen Plus®, Ebsilon® or own developed software.

• Environmental inventories. The research group can develop environmental inventories for industrial process and also for lab- or pilot-scale processes through simulation and optimization. These inventories can be made for full value chains or specific stages of the life cycle.

• Life cycle assessments. They are carried out according to ISO 14040:2006 and 14044:2006. Definition of the most adequate functional units, systems and impact assessment methodologies. Interpretation of results to find bottlenecks out and solutions proposal in combination with process simulation and optimization. Also, carbon footprint can be estimated according to standards. The research group has also a methodology based in the coupling of LCA and DEA (data evolvement analysis) to determine efficiency of systems.

• Economic estimations sheet. Excel-based sheet to perform economic assessments: CAPEX, OPEX, IRR, NPV, payback Life Cycle Costing (LCC) studies are also developed.

• Development of social indicators. Particular social indicators are developed for each system taking into account the geographical and social scope of each life cycle.

This combination of tools allows determining the technical and economic feasibility, and sustainability of industrial energy systems as well as those at lab or pilot plant scales. Therefore, the posible bottlenecks of technologies under development can be foreseen and solutions can be proposed in advance.

Other important aspect is that energy systems are optimized with a multicriteria approach (technical, economic, environmental and social ones). Different weights foe each factor can be assigned to fit the requirements of each system.

MARKET APPLICATION

• Conventional and new renewables.

• Biomass.

• Biofuels.

• Hydrogen and fuel cells.

TYPE OF PARTNER SOUGHT

Companies developing new energy systems.

Partners in domestic and international projects.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Testing materials, solar concentrators, receivers, PV modules and daylighting devices

High temperature solar thermal and thermochemical technologies require concentrated sunlight to achieve temperatures in the range of 300-2000oC to produce fuels, commodities and electricity while high-concentration photovoltaic systems operate above 100 kW/m2 of irradiance. High solar flux is also required to conduct research on synthesis and surface treatment of new materials.
High-flux solar simulators are designed to recreate the high radiation intensity distribution usually met in concentrating solar systems. Compared with real solar concentrators, the high-flux solar simulators provide controlled conditions and allow conducting high-temperature thermal and thermochemical research without perturbations due to solar resource intermittency.
A new 42 kWe high-flux solar simulator used for high-temperature solar thermal and thermochemical research has been built in IMDEA Energy, Spain. The elliptical reflector can provide a highly efficient transfer of radiation with radiation source located at the first focus and the target located at the second focus of the reflector. Thus, the ellipsoidal mirror is usually used to reflect and concéntrate the light rays for high-flux solar simulator. The solar simulator with a big single elipsoidal mirror is difficult to be fabricated and has limitations to adjust the source power output and distribution.
The simulator with multi truncated ellipsoidal reflectors is flexible to adjust. In this facility,
we adopt an array of seven lamp-reflector modules.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
The alignment of seven lamps of the high-flux solar simulator can be adjusted in order to use different pointing strategies. The flux distribution is axisymmetric with 3,600 kW/m2 of peak flux and a circular area of 20-mm-diameter in which the flux exceeds 3,000 kW/m2. The power density within a focal area with diameter of 30 mm is about 2,700 kW/m2, and the cumulative power is about 2,000 W. For the diameter of 60 mm, the cumulative power is 5,300 W, and the power density is about 1,860 kW/m2, which correspond to stagnation temperature achieving 2,400 K. Within the focal area of 200-mm-diameter, the cumulative power can reach 14,000 W.
MARKET APPLICATION
- Testing materials performance at high flux/high temperatures.
- Testing solar reactors and receivers up to 14kW incident solar power.
- Research on solar driven hydrogen production by thermochemical cycles.
- Solar fuels and chemicals production.
- Testing concentrating PV compact modules.
- Testing advanced thermal fluids for heat transfer and thermal storage.
- Testing daylighting devices for high flux collectors.
- Synthesis and surface modification of materials.

TYPE OF PARTNER SOUGHT
The partner sought should be active in developing new markets for solar fuels, daylighting, concentrating PV and concentrating solar power materials and components.
IMDEA Energy is open to further development and collaboration so the role and collaboration will be defined with the company.

Cooperation Offered

1. License agreement
2. Technical co-operation

Cooperation Requested

1. Investment/Financing
2. License agreement
3. Technical co-operation

Offer

Advanced services for power networks operation

Further deployment of renewable energy technologies and decarbonisation of energy supply mix in electricity networks are both pending on a consensual solution for a series of complex legal, economic and technical issues. This fact underlines the importance of introduction of novel flexible power network architectures and development of new network management algorithms. The core R&D lines and topics of the IMDEA Energy Institute in regard to the smart management techniques for future electricity networks are as follows:
• Energy management algorithms for introducing more flexibility in achieving energy balance in all principal subsystems forming electricity networks - generation, distribution and consumption.
Centralised and decentralised control architectures, real-time measurement and control, more intensive use of energy storage systems are some of the solutions proposed and implemented.
• Creation of new energy demand-aware services and demand response schemes for final energy users, network operators and energy providers. Development of new power network models that include both dynamic and stochastic properties for the connected network devices is one of the principal tasks.
• Integration of energy storage to electricity networks. Various scenarios on how distributed energy storage devices (including electric vehicle battery storage) can be used to contribute to network control, increase capture from intermittent energy sources and provide vehicle charging are investigated.
• Electrical energy conversion and power interfaces. Power electronics converters emulating operation and dynamics of real distribution feeders, generators and load profiles provide the testing environment for development and implementation of algorithms for future power networks. The system optimisation targets can be then flexibly changed to match any power network scenario and verify the control criteria set.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
• Real-time proactive algorithms for energy management both for distribution power networks and final consumers.
• Energy-aware services for DNOs and final energy users offering state of the art estimation of distribution power networks, power flow analysis and demand response schemes.
• Demand-aware services for final energy users offering closer link with energy retailers and achieving energy and cost reduction.
• Advanced control algorithms for power electronic interfaces.
• Possibility to test management algorithms in real-time and by using real power.
MARKET APPLICATION
• New demand-aware services for DNOs, retailers and final users.

• Demand response schemes for industrial and residential sector.
• Proactive management of distribution networks.
• Power electronics applications FACTS, HVDC, Active filters, Energy storage etc.
TYPE OF PARTNER SOUGHT
• Distribution network operators and energy retailers interested in development and testing active network and demand management algorithms.
• Companies interested in integration of renewable and storage technologies.
• Companies developing power electronics equipment interested in research, development and implementation of converter control strategies.

Cooperation Offered

1. Technical co-operation
2. License agreement

Cooperation Requested

1. Technical co-operation
2. License agreement
3. Investment/Financing

Offer

Energy management for smart buildings

Term “Smart Buildings” normally refers to various control techniques used for integration of renewable energy sources to buildings, energy efficiency improvement, reduction of greenhouse emissions and application of demand side management. In addition to a single building, new terms such as “Smart Neighbourhoods” and “Smart Blocks of Buildings” have been recently introduced and refer to integrated management of energy generation, storage and demand on a district or neighbourhood level.
However, results of various studies on incorporation of renewable energy technologies into buildings reveal in many cases lack of a holistic approach to investigation and optimisation of small energy supply systems. The two main drawbacks are absence of analysis of end-use energy demand and pre-definition of energy system structure in initial phases of building design.
Incorporation of hybrid energy systems consisting of renewable energy sources is seen as a way to reduce the carbon footprint of a building (or a neighbourhood) and potentially provide its self-sustainability.
Such mixed designs are encouraged by recent advances in energy technologies and also by the fact that the end-use energy demand in buildings is not homogeneous and comprises
thermal and electrical loads.
INNOVATIVE ASPECTS AND MAIN ADVANTAGES
• Advanced energy demand modelling techniques for the building and residential sectors
• Optimisation of the local energy resources for energy efficiency improvement
• Real-time proactive algorithms for energy management of Smart Buildings and Smart Homes

• Demand-aware services for final energy users offering closer links with energy retailers and benefiting from reduced energy consumption and costs
• Possibility to test management algorithms in real-time and by using real power processing

MARKET APPLICATION

• Detailed building energy demand modelling
• Energy efficiency assessment
• Improving energy efficiency in building sector
• Real-time optimal management of buildings

TYPE OF PARTNER SOUGHT

• Companies from home and building automation sector interested in development and testing of next generation active management systems.
• Energy retailers offering services to the building sector.
• Companies in charge of energy efficiency in the building sector.
• Companies interested in integration of renewable and storage technologies.

Cooperation Offered

1. License agreement
2. Technical co-operation

Cooperation Requested

1. Investment/Financing
2. License agreement
3. Technical co-operation