Brunel University London | Business School

MSCA-RISE Information Event
BEIS conference centre

GREENDC – Sustainable Energy Demand Side Management for Green Data Centres

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Agenda

GREENDC Project

Application Process

General Tips and Recommendations

Reflection from Implementation Phase

GREENDC Project - Motivation

My third knowledge-transfer projects since 2009

- CEES (FP7 IAPP): 2009 – 2013
- MINI-CHIP (FP7 IAPP): 2013 – 2017
- GREENDC (H2020 RISE): 2017 – 2020

Bottom-up approach: Flexibility in research topics

REF 2014, 2020: Direct impacts to industry

Keeping industrial links

Societal challenges

Data Centre as a global energy consumers

Google (≈1 million), Microsoft (>1 million), Akamai (≈127K), INTEL (≈100K), facebook (>300K), ebay(≈60K), Rackspace (≈100K)

DCs consuming 120 billion KWh globally equivalent to average electricity consumption of a city of 11.6 million households

Huge potential for saving energy via active intervention

Changing human behavior of households is difficult

Changing DC configuration is relatively easier

State of the art

Studies on the estimation of energy consumption of individual components of data centres

CPU, VM, Server, data centre

No study on identifying managerial strategies for the operation of data centres

Temperatures & humidity, number of active servers, dynamic VM management, combination of coolers in certain area

GREENDC Approach & Novelty

Non-linear modeling of the relationships between heats, loss and work loads

Simulation based approach for intervention by DC managers

Knowledge exchange between academics and industry

Industry partners: provision of data from data centres

Academic partners: optimization methods, simulation model

GREENDC Project Facts

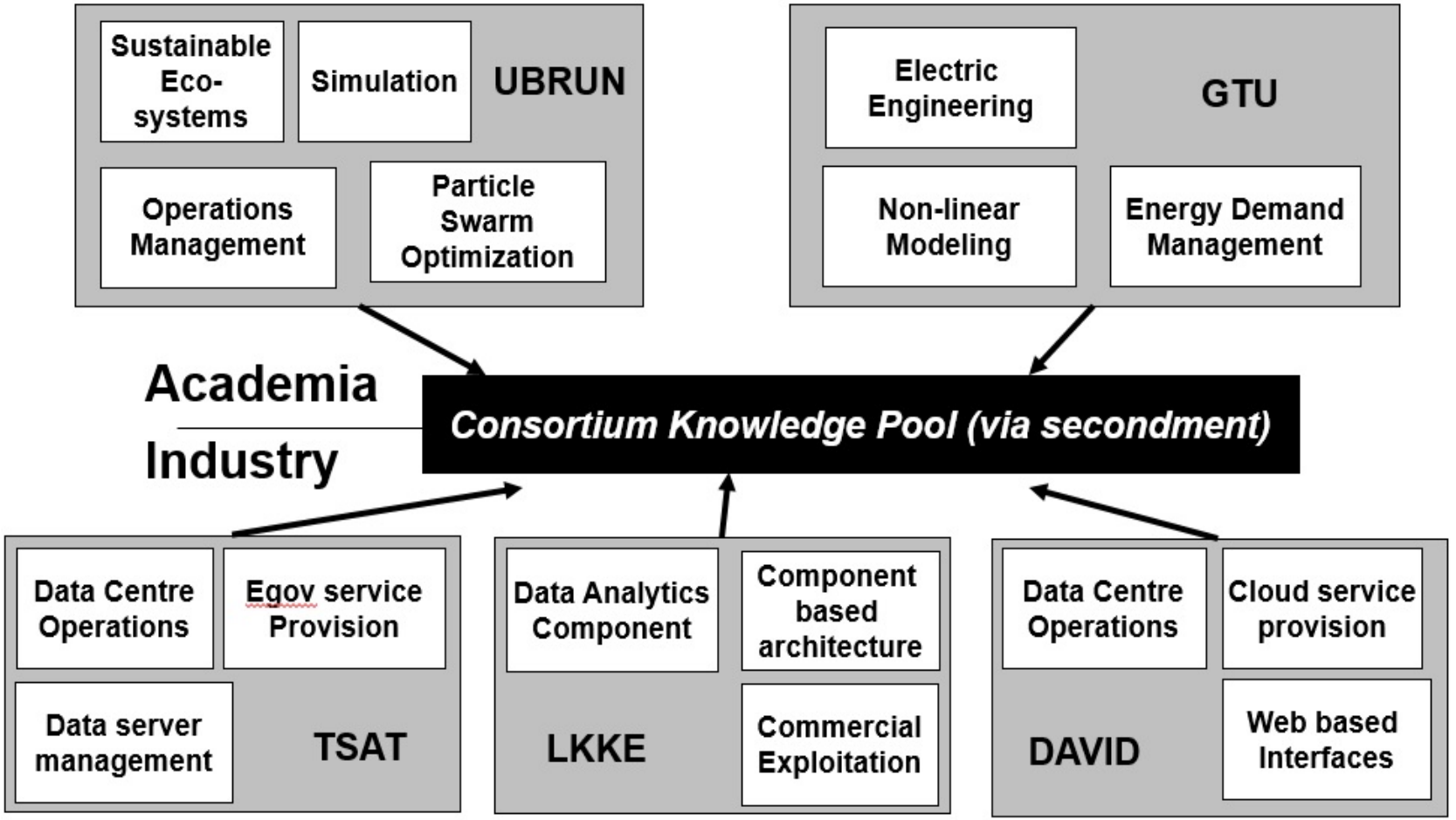
Funding program: EU H2020 Marie Sklodowska Curie Action – RISE (Research and Innovation Staff Exchange) Project

GREENDC Consortium: Two academic (Brunel University London & Gebze Technical University) and Three industrial institutes (Turksat, David Holding, and LKKE).

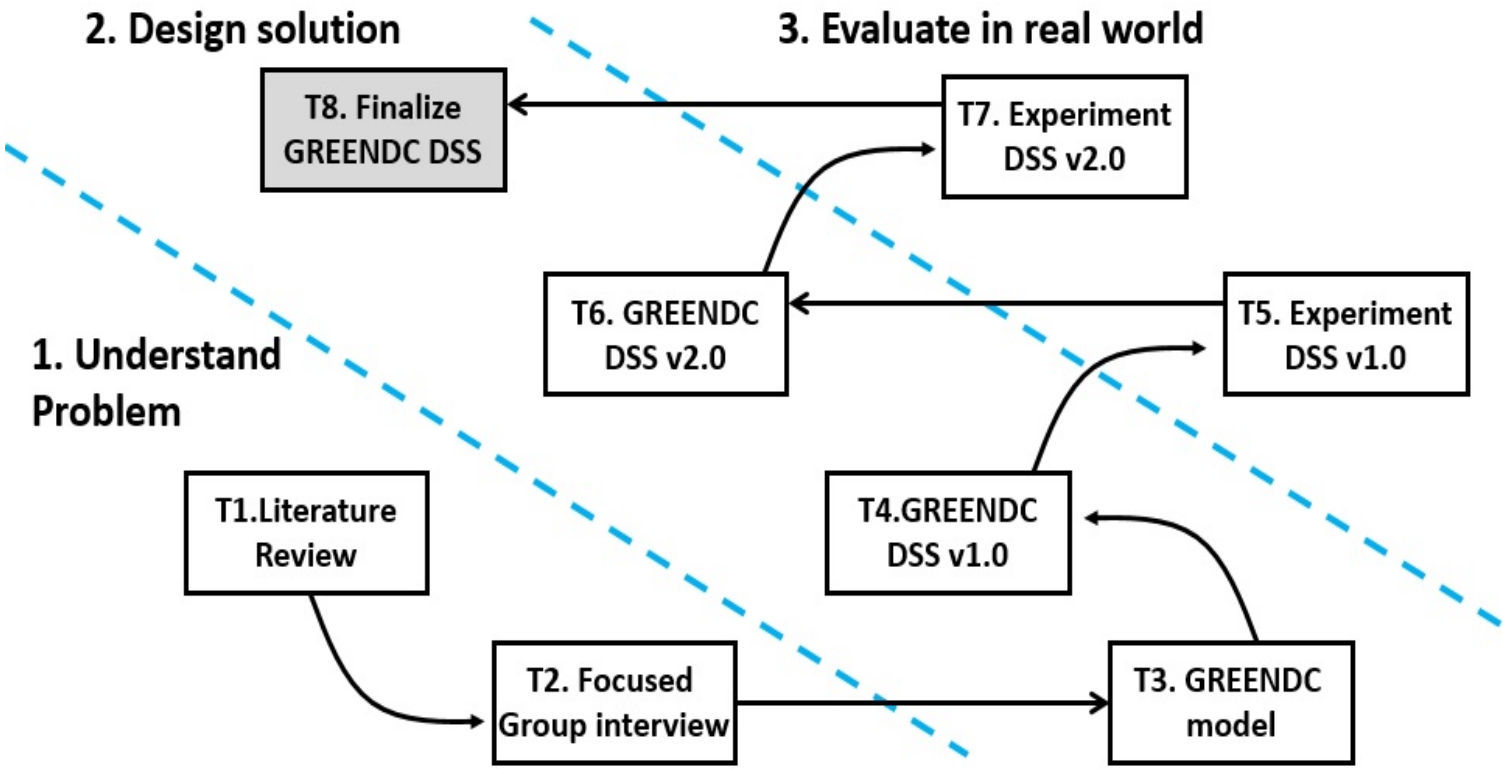
Project Periods: Jan 2017 – Dec 2020

215 Person Months of staff exchange between two sectors

GREENDC Consortium



Methodological Approach



Work package structure

WP No	WP title	Activity Type	PMs	Start month	End month
1	Energy efficient data centres	Research	41	1	48
2	GREENDC DSS	Research	103	3	42
3	Energy management training	Training	35	1	4
4	Dissemination and exploitation	Dissemination	36	1	48
5	Management	management		1	48
			215		

Knowledge transfer activities

Use of diverse KT mechanisms including workshop, seminars, group exercises

Identification of knowledge & skills needed / provided by partners

Quantification of target numbers of activities

Monitoring system for the progress of KT activities

Application Process

Initiated by the needs of industrial partner (TURKSAT) as a result of long-lasting collaboration

The first proposal was coordinated by an industrial partner and submitted in 2015 to be rejected

The second proposal was coordinated by academic partner and submitted in 2016 to be accepted after refurbishing the research topic

ESR (1st submission) - Excellence

Score: **3.00** (Threshold: 0/5.00 , Weight: 50.00%)

Strengths:

- The research topic is relevant to the Call and is of good quality with clearly described objectives.

- The programme of research, to create technology to test and validate a small-scale prototype by simulation in a near-to-operational environment, is timely and innovative. The review of the international state-of-the-art demonstrates an accurate knowledge of the literature in the field and contributes to the proposed methodology. The multidisciplinary aspects of the proposal are appropriately demonstrated.

- The development of tailored training and education packages supported by simulators combines research with knowledge sharing in a credible manner.

Weaknesses:

- Some participants' contribution and knowledge sharing is insufficiently detailed. The contributions of most partners in the project activities for the development and delivery of the educational package is not clearly documented.

- The networking activities and participants' interactions in terms of content and expertise to reach the project's objectives are vaguely addressed.

ESR (1st submission) - Impact

Score: **3.00** (Threshold: 0/5.00 , Weight: 30.00%)

Strengths:

- Development of new research collaborations and their self-sustainability based on existing cooperation between some members of the consortium is convincingly demonstrated.

- The communication strategy, which is based on expansion of existing partner activities together with new means based on contemporary media, is clearly presented along with the expected impact of the proposed measures.

Weaknesses:

- ERs will benefit with new skills and career perspectives but the acquisition of competencies by ESRs and industrial partners is insufficiently addressed in the proposal.

- Transfer of knowledge between research institutions is planned by staff transfer but it is not sufficiently developed. Improvement of the European research and innovation potential is described using metrics for industry and academia but is limited since it only recalls the importance of electricity consumption by data centers.

- The dissemination strategy is addressed only in general terms without specifying any targeted journals and conferences. Strategies for exploitation of results and IPR management have no clear advance plan and poor detail on the role of most partners.

ESR (1st submission) - Implementation

Score: **3.80** (Threshold: 0/5.00 , Weight: 20.00%)

Strengths:

- The work plan is well structured into WPs, takes into account the training activities, and personnel exchange is very well balanced between sectors. The work packages are appropriately organized and integrate satisfactorily objectives, task description, activities to be performed and deliverables.

- The management structure is appropriately described with clear objectives and a task description that is consistent and adequate with respect to the project objectives.

- The competences, synergies and complementarities of the project partners are sufficiently evidenced.

Weaknesses:

- The individual responsibilities for the list of deliverables are not sufficiently presented. The ER and ESR secondments are not fully specified.

- Quality management and financial management are not sufficiently addressed.

- The institutional environment in terms of expertise and human resources is not clearly depicted in the case of the academic institution of the third country.

Refurbishment of the proposal

Change of the coordinator

> Industrial partner -> Academic partners

Change of research topic (more specific)

> From Educational tool for the use of renewable energy in DCs to simulation based optimization of energy consumption in DC

Consortium reshuffle (reducing complexity)

> From 8 partners to 5 partners

Proposal led by two academic partners

ESR (2nd submission) - Excellence

Score: **4.30** (Threshold: 0/5.00 , Weight: 50.00%)

Strengths:

- The general and specific objectives of the project are analytically explained and appropriate. The methodology of the research work, the state of the art and the inter/ multidisciplinarity of the project are well described and are sound.

- Gender aspects are sufficiently discussed.

- The interaction between the participating organisations is well described; this will be done with secondments, seminars, workshops, and other activities.

Weaknesses:

- The project's level of innovation is not made sufficiently clear.

- Information provided for the transfer of knowledge between partners is not always clear, and requires a more specific description.

ESR(2nd submission) - Impact

Score: **4.00** (Threshold: 0/5.00 , Weight: 30.00%)

Strengths:

- The self-sustainability of the project is well formulated and sound, and the partner organisations have plans for new and lasting collaborations at the EU level. The consortium plans to create a Technical Committee to ensure future collaboration among partners and possibly others, for continuation of the research work and improvement of project results.

- The dissemination strategy is analytically described and is sound - project results will be disseminated through well selected channels and tools.

- Many interesting activities for communication of project activities to different target audiences are proposed, and all partners make a contribution to these activities.

- The exploitation policy is explained and is appropriate.

Weaknesses:

- The career enhancement opportunities for the involved staff are not fully demonstrated.

- The proposal does not adequately consider contributions and collaborations at the broader global level.

- IPR aspects are not clearly described.

ESR (2nd submission) - Implementation

Score: **4.20** (Threshold: 0/5.00 , Weight: 30.00%)

Strengths:

- The work plan and the activities proposed are consistent and adequate to reach project objectives, and include an appropriate allocation of tasks.

- The management structure and organisation are clearly defined and include administration and financial management.

- A risk management plan is in place with some appropriate mitigation measures.

- The institutional environment in all partner organisations is appropriate. The infrastructure available is suitable for the project's requirements.

- The participating organisations are experienced and competent. They all have staff with the necessary expertise to carry out the project. The competencies of all partners are complementary and all involved areas are well covered.

Weaknesses:

- The contribution of the partners in project activities is not satisfactorily well balanced.

- There is insufficient information regarding the monitoring of the project. It is not clear what specific mechanisms will be put into place. Quality assurance processes are not sufficiently detailed; and quality control methods and indicators have not been adequately presented.

General Tips & Recommendations

Be project specific (particularly in Impact & implementation)

Use of figures and tables are essential for the clarity and page limits

Draw a table or a figure for each sub-section and write to describe it

Balance between scientific novelty, knowledge transfer, and training (career development)

Addressing how the projects will help ER/ESRs develop their career is key

Reflection from Implementation

Ensuring the continuity of the project

- The project tasks are implemented when staffs are seconded
- Organizational changes
- Recruitment of full-time staffs is essential for the continuity

Monitoring secondments and scientific tasks

- Clear linkage between secondments and deliverables
- Secondment report

Implementation of researcher unit cost

- As expenses, salary top-up, or both
- Discuss with your institute before the project starts