

# NEWSLETTER 05

JANUARY 2019

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The main outcomes and results of the first half of the third year of the MEDEAS project are briefly presented below.

# SECOND BOARD OF STAKEHOLDERS MEETING IN BARCELONA

**The 2nd Board of Stakeholders meeting of the MEDEAS project – “Demonstration of the MEDEAS models system” – was held on 16 November 2018 in the premises of CSIC in Barcelona. Nine stakeholders attended the event, a diverse group of modellers and academics proposed by project partners.**

The stakeholders had the opportunity to download and install the last version of the MEDEAS\_w model in python programming language (pymedeas\_w), which is available for download on the [project website](#). During the meeting, the stakeholders were introduced to the MEDEAS project, and provided with an overview of the Model structure and scenarios; while the main focus was on the demonstration of the MEDEAS model and the presentation of the model results. A large part of the meeting was devoted to the discussion with the stakeholders and to exchanging and receiving their feedback, guidance and insight regarding MEDEAS\_w.

The meeting was a success, as participants

expressed their impressions and great interest in the model, its use and the concepts behind the model development. Significant feedback was received in relation to the positive aspects of the MEDEAS model, such as the fact that it allows the contribution of several scientific communities from different disciplines, the level of reflection of the model assumptions, and the fact that most of the disputed parameters and impacts can be activated, deactivated or elaborated by the user. Additionally, the opinion that the model is a good basis to open this class of integrated assessment models to better understand how assumptions impact results and experiment with these dynamics was expressed. The stakeholders also conveyed the need to further develop the model interfaces especially in interaction with policy makers and the civil society; while further communicating the model to policy makers and stakeholders.

Overall, the MEDEAS project team would like to thank all the nine stakeholders (Gilbert Ahamer, Jofre Carnicer, Raúl Velasco Fernández, Wander Jager, Kurt Kratena, Luca Pardi, Stefan Pfenninger, Sylvain Quoilin and Ferran Puig Vilar) for their participation in the 2<sup>nd</sup> Board of Stakeholders meeting and for all their valuable feedback.

The next and final Board of Stakeholders meeting of the project will be held in the last months of 2019.



# MEDEAS\_W MODEL

The python version of the model comes with a manual and documentation on how to use and install the software, explains the main capabilities and structure of the model and includes a Visual User interface which enables a quick visualization of the outputs.

MEDEAS\_w model has been designed applying System Dynamics, which facilitates the integration of knowledge from different perspectives, as well as the feedbacks from different subsystems. The model, originally built in the Vensim DSS software for Windows Version 6.4E (x32), was translated to the Python programming language (open source).

Pymedeas\_w model provides a step-by-step development of the code using the python freeware tool. It also defines the general terms for testing and logging of the testing information and contains information on key programming elements of the code. The pymedeas\_eu model for the European Union countries is under construction and will be available from March 2019.

Pymedeas\_w is available for downloading [here](#).

## MEDEAS WEB DATABASE MANAGEMENT SYSTEM AND ONLINE FORUM

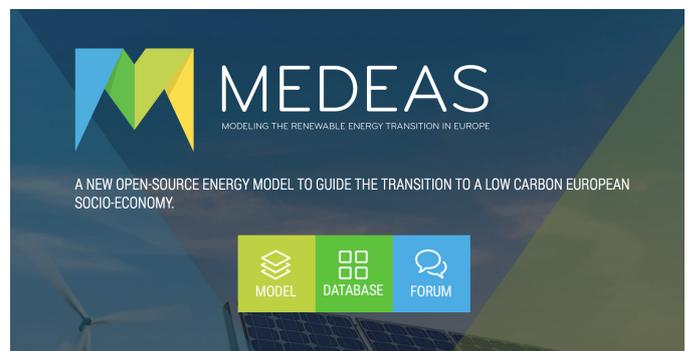
All users can store, retrieve and manage the data generated within the MEDEAS project in our MEDEAS Web Database Management System supported by the online forum for model users.

The data are stored in a database management system web application that includes two sections: The public section of the application allows open access to view and download the data of the MEDEAS project and to generate graphs; while the administrative section is a restricted area, where

authorised users can manage the database entities and upload new data using excel files.

Additionally, the MEDEAS forum is a support tool designed to help MEDEAS and pymedeas\_models' users and to receive feedback. The aim of the forum is to exchange information with users on applications/improvements and with developers on general issues and questions. The forum can be accessed for free after registration.

MEDEAS Web Database Management System is available [here](#), while the online forum can be found [here](#).



## MEDEAS PUBLICATIONS

# RENEWABLE ENERGY COOPERATIVES AS AN INSTRUMENT TOWARDS THE ENERGY TRANSITION IN SPAIN

Iñigo Capellán-Pérez, MEDEAS partner from the University of Valladolid (UVa), in collaboration with Álvaro Campos-Celador and Jon Terés-Zubiaga from the University of the Basque Country, have published a scientific article in Energy Policy, entitled: "Renewable Energy Cooperatives as an Instrument towards the Energy Transition in Spain".

The transition to Renewable Energy Sources (RES) is an essential element towards sustainability. RES

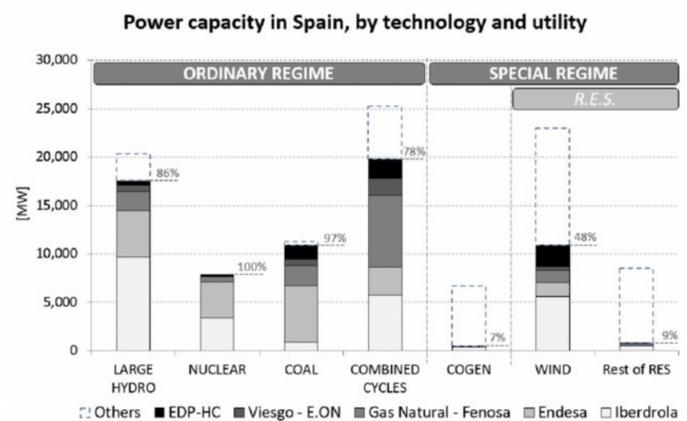
also offer a key transformative potential from a social point of view due to their modularity and capacity to generate energy at the local level, allowing for the development of democratic and participative bottom-up initiatives. Thousands of RES cooperatives currently exist in Europe. However, Spanish RES cooperatives are few in number and have recently come up against a hostile regulatory and economic context, which has induced specific organizational and operating structures such as the application of innovative participation methods and investment tools. RES cooperatives regularly collaborate in sharing learning processes and experience, having also demonstrated their capacity to spread new ideas at both social and political levels. However, despite their growth and territorial spread over the last few years, RES cooperatives still have a minor presence in the Spanish energy system. Although some internal factors may limit their potential as an active instrument towards the transition to RES in the country, the regime's resistance is found to be the main barrier.

The globally interconnected challenges of the sustainability crisis (e.g. climate change) and fossil fuel depletion require active policies towards a fast RES transition in all countries around the globe in the coming decades. Given that the sustainability crisis is both a technical and social challenge, the

cooperative model presents clear advantages in relation to the technocratic approach based on centralized ownership and electricity generation. However, in most countries, the energy regime is reluctant to welcome the RES transition based on democratic, sustainable and decentralized production. Hence, the case of RES cooperatives in Spain can serve as inspiration to other countries where the RES cooperatives are currently not firmly established or the model does not exist at all.

The paper concludes with some recommendations for policy makers and Spanish RES cooperatives to enhance its potential role in the forthcoming energy transition process.

The complete article can be found [here](#).



## CONCENTRATED SOLAR POWER: ACTUAL PERFORMANCE AND FORESEEABLE FUTURE IN HIGH PENETRATION SCENARIOS OF RENEWABLE ENERGIES

**Carlos de Castro and Iñigo Capellán-Pérez, MEDEAS partners from the University of Valladolid (UVA) have published a scientific article in BioPhysical Economics and Resource Quality Journal, entitled: "Concentrated Solar Power: Actual Performance and Foreseeable Future in High Penetration Scenarios of Renewable Energies".**

CSP is an electricity generation technology that uses heat provided by solar irradiation concentrated on a

small area. Using mirrors, sunlight is reflected to a receiver where heat is collected by a thermal energy carrier (primary circuit), and subsequently used directly (in the case of water/steam), or via a secondary circuit to power a turbine and generate electricity. Analyses proposing a high share of concentrated solar power (CSP) in future 100% renewable energy scenarios rely on the ability of this technology, through storage and/or hybridization, to partially

avoid the problems associated with the hourly/daily (short-term) variability of other variable renewable sources such as wind or solar photovoltaic.

However, data used in the scientific literature are mainly theoretical values. In this work, the actual performance of CSP plants in operation from publicly available data from four countries (Spain, the USA, India, and United Arab Emirates) has been estimated for three dimensions: capacity factor (CF), seasonal variability, and energy return on energy invested (EROI).

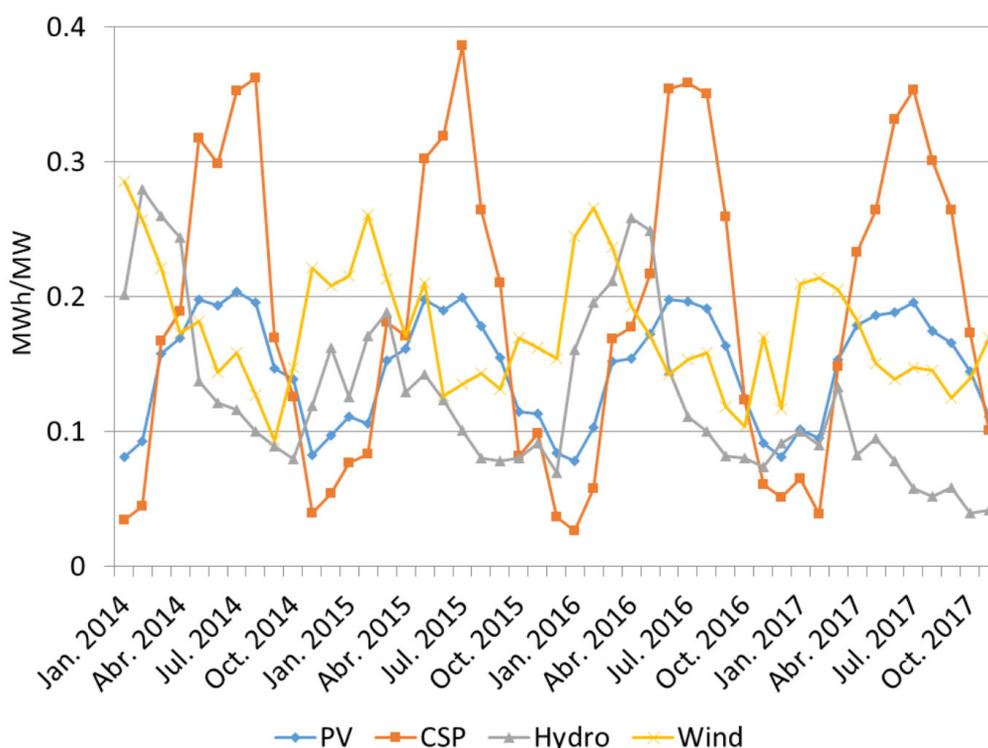
The obtained results show that the actual performance of CSP plants is shown to be significantly worse than projected by constructors and considered by the scientific literature in the theoretical studies: capacity factors in the same order as wind and PV, low EROI, intensive use of materials – some scarce – and significant seasonal intermittence. Low latitude locations with high irradiances, such as hot deserts, are more difficult to colonize (wind, dust/sand, extreme temperatures, water scarcity, etc.) and are found to be subject to seasonal fluctuations of the same order of magnitude as for other RES, such as wind and PV (in desert areas, dust storms can also cover large

regions during several days). In relation to EROIst (standard), the values obtained from applying a conservative methodology are significantly lower than for other RES systems, in the order of 2.4:1 for current systems, decreasing to 1.7:1 using common materials and reaching 1.3:1 when considering common materials and transcontinental exports from deserts to high consumption areas (such as those proposed by the DESERTEC project).

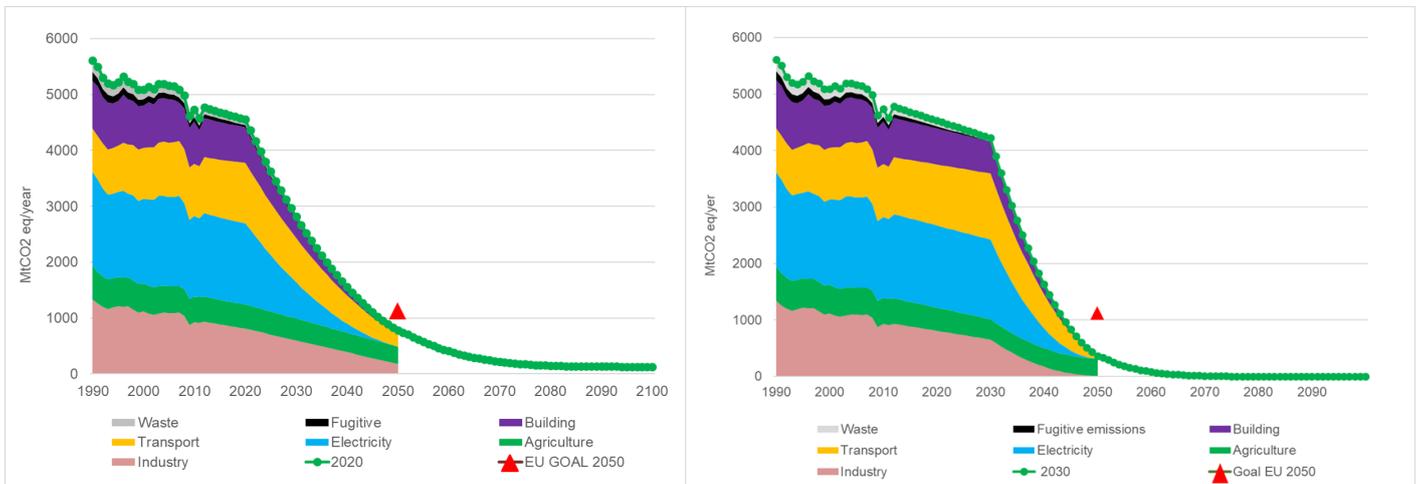
In the light of the obtained results, the potential contribution of current CSP technologies in a future 100% RES system seems very limited. The literature analysing real power plants and national systems of renewable power technologies show that a bias towards overestimation of the performance of these technologies generally exists in the scientific literature. However, it is crucial to correctly inform the society about the decisions to be taken in order to make a rapid transition to a renewable global energy system to avoid climate change and other environmental impacts, as well as the physical limitation of fossil and nuclear resources, remaining critical of the self-advocated solutions and avoiding wishful thinking.

The complete article can be found [here](#).

**Spanish monthly electricity production per installed power**



# POTENTIAL EUROPEAN EMISSIONS TRAJECTORIES WITHIN THE GLOBAL CARBON BUDGET



Picture: EU 28 emission scenarios split by economic sectors, from 2020 (left) and from 2030 (right) until 2100.

**Ilaria Perissi, Sara Falsini and Ugo Bardi, MEDEAS partners from the National Interuniversity Consortium of Materials Science and Technology (INSTM) in collaboration with Davide Natalini, Michael Green and Aled Jones, MEDEAS partners from the Global Sustainability Institute (GSI) at the Anglia Ruskin University (ARU) and Jordi Solé Ollé, MEDEAS coordinator from the Institute of Marine Sciences – Spanish National Research Council (ICM-CSIC), have published a scientific article in the Sustainability journal, entitled: "Potential European Emissions Trajectories within the Global Carbon Budget".**

The Paris Agreement, ratified in 2015, pledged to reduce greenhouse gas emissions within a Global Carbon Budget that limits the global temperature increase to less than 2°C. With the Roadmap 2050 mitigation measures, the European Union has a target to reduce emissions by 80% of their 1990

value by 2050 but without giving an estimation or a maximum ceiling for the total amount of cumulative greenhouse gases emissions over that period. Thus, the impact of the EU regulations on global warming remains unestimated. The aim and the novelty of this study are to develop a set of potential European emissions trajectories, within the Global Carbon Budget and at the same time satisfy the Roadmap 2050 goals. The results of the study highlight the urgency to reinforce the mitigation measures for Europe. Due to the very limited carbon budget still available to stay within the maximum 2°C temperature increase, any delay in the implementation of the mitigation policies can result in the Roadmap 2050 mitigation package being insufficient to achieve the objectives of the Paris Agreement.

The complete article open access can be found [here](#).

# CLIMATTERS 2018 – ENVIRONMENTAL SCARCITY AND SUSTAINABLE SOLUTIONS CONFERENCE IN BUDAPEST



On Thursday 24 May 2018, Ilaria Perissi from INSTM, member of the MEDEAS project, participated in Climatters 2018 – Environmental Scarcity and Sustainable Solutions Conference in Budapest. The Conference was organised by the National University of Public Service, when Budapest celebrated the Sustainability Day 2018.

Dr. Ilaria Perissi was a keynote speaker on ‘Natural resource crisis and the planetary boundaries’. Her presentation examined mainly the theme of sustainability

and its relation to the use of system dynamics modelling. She also presented the models developed within the project as some of the most powerful tools available today in order to explore sustainability and energy transition.

More information on the Conference (invited speakers, outline of the sessions, scientific committee and programme) is available [here](#) and [here](#) (in Hungarian only).

# 3<sup>RD</sup> SOUTH-EAST EUROPEAN CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS IN NOVI SAD

On 3 June 2018, Iñigo Capellán-Pérez from the University of Valladolid (UVA), member of the MEDEAS project, participated in the 3<sup>rd</sup> South-East European Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES) held between 30 June and 4 July 2018 in Novi Sad, Serbia.

The work “Dynamic EROI of the global energy system

in future scenarios of transition to renewable energies”, describing the methodology applied in MEDEAS models for dynamically endogenising the estimation of the energy return on energy investment (EROI) of the individual technologies and for the whole system, together with some experimental results, was presented. More information on the conference (invited speakers, outline of the sessions, scientific committee and programme) is available [here](#). The Conference paper is available [here](#).

# EUROPEAN FORUM IN ALPBACH

On 30 August Professor Ugo Bardi from INSTM, a MEDEAS partner and member of Club of Rome, participated as a keynote speaker at the Economic Symposium organized between August 28 and 30, in Alpbach, Austria.

Prof. Ugo Bardi gave his presentation in the plenary session “Shock resistance: Downfall, intervention, resurrection?” Resilience for businesses means being able to adapt to crises, to unpredictability and to increasing complexity. How do businesses, the financial sector and politics deal with these factors? What learnings can you take home for your business?

More information can be found [here](#).



# 20<sup>TH</sup> ANNIVERSARY CONFERENCE OF THE ASSOCIATION OF HETERODOX ECONOMICS IN LEICESTER

The 20<sup>th</sup> Anniversary Conference of the AHE (Association of Heterodox Economics) was held at De Montfort University, Leicester (UK) between 5 and 7 July 2018.

Jaime Nieto from the University of Valladolid (UVA), MEDEAS partner, presented the work

“Macroeconomic modelling under biophysical constraints: are models overestimating growth?” describing the MEDEAS Economy module and relevant implications of economy-related preliminary results. The energy-economy feedback as the keystone contribution within the Economy module was outlined in the ‘Modelling’ session of the conference..

More information about the conference (programme, invited speakers and presentations’ abstracts) can be found [here](#).

# ENERGY MODELLING PLATFORM FOR EUROPE (EMP-E) 2018 IN BRUSSELS

MEDEAS, as part of the cluster of the four Horizon 2020 projects (SET-NAV, MEDEAS, REEEM, REFLEX) working on “Modelling and analysing the energy system, its transformation and impacts”, participated in the successful organisation of the second conference of the Energy Modelling Platform for Europe (EMP-E) 2018 Modelling clean energy pathways, hosted by the European Commission DG Research & Innovation in Brussels on 25 and 26 September 2018.

On the first day, 25 September, MEDEAS organised the “Plenary session III: Modelling of behavioural aspects”. The session chairs were Dr. Davide Natalini and Dr. Kat Buchmann from the Global Sustainability Institute, Anglia Ruskin University, MEDEAS partners.

The panellists who were invited to speak were:

- Professor Wander Jager, Associate Professor and Managing Director of the Groningen Center for Social Complexity Studies.
- Dr. Nicole Zimmermann, lecturer in System Dynamics in University College London.
- Dr. Martin Baumann, senior expert in energy economics at the Austrian Energy Agency and partner in the MEDEAS project.



Picture: The session chairs and panellists of plenary session III on the Modelling of behavioural aspects

The format of the session was a debate during which the three modellers defended their specific modelling approaches. Wander Jager made a case for agent-based modelling, Nici Zimmermann argued for system dynamics modelling and Martin Baumann debated in favour of linear optimization modelling. Overall, the session was very successful with the active participation of the audience during the question and answer session.

On the second day, 26 September, MEDEAS co-organised the “Focus group – Parallel session 1A: Open databases” and the “Focus group – Parallel session 2A: Open energy system models” with the REEEM project (a joint effort with Berit Müller and Ludwig Hülk). The 2A session chair was Jordi Solé from the Institute of Marine Sciences

CSIC, coordinator of the MEDEAS project. Both sessions were very successful.

The session on open energy system models attracted approximately 32 participants with active participation and interaction throughout the event. The session was in the format of a panel discussion. The panellists were:

- Robbie Morrison, Independent researcher
- Dr. Sylvain Quoilin, assistant professor at the KU Leuven and at the University of Liège
- Ludwig Hülk, Researcher at the Reiner Lemoine Institut
- Prof. Dr. Jürgen Kropp, Head of Climate Change & Development Group at the Potsdam Institute for Climate Impact Research.

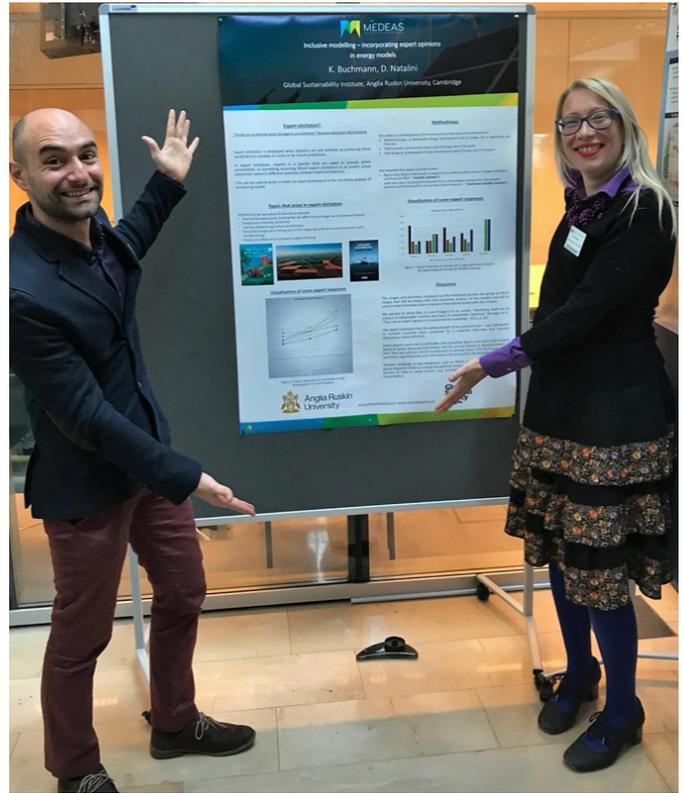


Picture. Jordi Solé chaired the 2A focus group on open energy system models

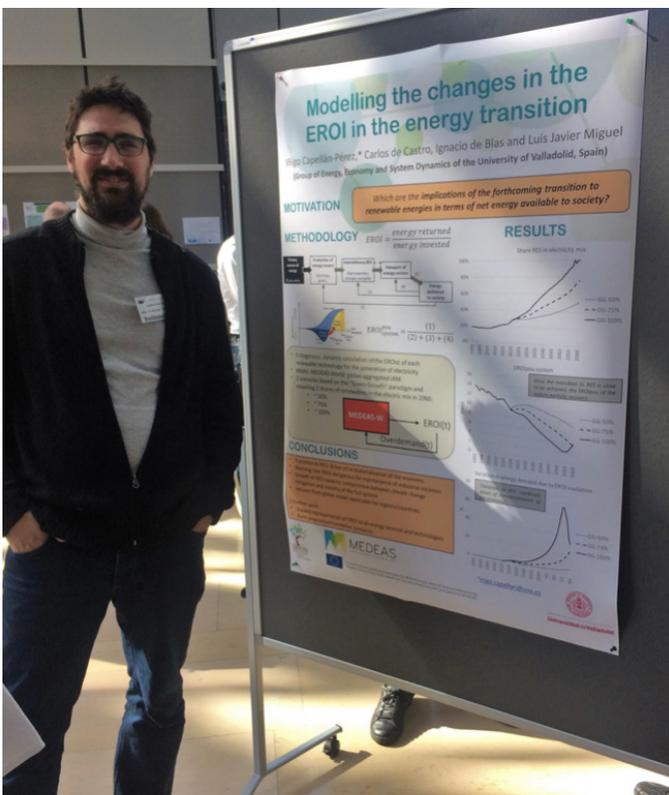
Apart from the sessions, MEDEAS also presented several posters in the EMP-E 2018. All the posters can be found in readable form on our [website](#).



Picture: Sara Falsini from INSTM presented a poster on "European carbon budget for greenhouse gas emissions: filling the trajectory gap"



Picture: Kat Buchmann and Davide Natalini from ARU presented a poster on "Inclusive modelling - incorporating expert opinions in energy models"



Picture: Iñigo Capellán Pérez from UVA presented a poster on "Modelling the changes in the EROI in the energy transition"



Picture: Stavroula Papagianni from CRES presented a poster on the "MEDEAS web database management system"

# CONCIENCIA SEMINAR IN ARRECIFE

Jordi Solé Ollé from ICM-CSIC, MEDEAS coordinator, participated in the conCiencia seminar “We breathe without realizing it” with a presentation on “Energy transition and sustainability within the limits of the planet” on 16 October.

The Cabildo of Lanzarote, through the Biosphere Reserve Office, organized the celebration of the seminar within the framework of the 25th anniversary of the declaration of the Island as a Biosphere Reserve. The seminar was held between 15 and 19 October.

More information on the event can be found [here](#). The presentation on “Energy transition and sustainability within the limits of the planet” in Spanish is available [here](#).

# 11<sup>TH</sup> ANNUAL MEETING OF THE INTEGRATED ASSESSMENT MODELLING CONSORTIUM IN SEVILLE

The 11<sup>th</sup> Annual Meeting of the IAMC (Integrated Assessment Modelling Consortium) was held in Seville, Spain between 13 and 15 November 2018.

Ignacio de Blas, Iñigo Capellán-Pérez, Luis Javier Miguel and Gonzalo Parrado from the University of Valladolid (UVa), MEDEAS partner, presented the main assumptions underlying MEDEAS-World model to the IAM community in the speech “MEDEAS-World: a new IAM framework integrating biophysical and socioeconomic constraints” during the session on “Methodological issues in the field of integrated assessment”.

The conference provided the opportunity to exchange knowledge and connect with other research teams facing the common challenge of

modelling complex systems with different dimensions related to sustainability.

More information about the conference (programme, invited speakers and presentations’ abstracts) can be found [here](#).

# WORKSHOP ON CROSS-BORDER ELECTRICITY INFRASTRUCTURE FINANCE IN LONDON

A workshop on Cross-border electricity infrastructure finance took place in London on 30 November 2018.

The workshop was organized by the Anglia Ruskin University, MEDEAS partner. Approximately 25 companies and organisations participated in order to discuss existing finance models, optimising solutions and innovations and political pathways forward to address infrastructure investment failure; as well as additional transmission infrastructure and storage required for a large scale shift to renewable energy and how this additional infrastructure can be financed. The experts came from electricity companies, banks, investment funds, consultancies and TSOs on the interconnectors.



## UPCOMING EVENTS

# THIRD GENERAL ASSEMBLY IN CAMBRIDGE, UK

The 3<sup>rd</sup> General Assembly of the MEDEAS project will be held in Cambridge on 4-8 February 2019.



The General Assembly is an opportunity for the whole MEDEAS team to come together, review progress and discuss next steps. This year, the meeting will be hosted by the Anglia Ruskin University (ARU) in Cambridge, UK. The project is reaching the end of its third year and as the scenarios work package draws to a close, the work packages

on modelling and comparison continue, alongside work packages on challenges and policies. A large part of the meeting will be spent presenting the latest results from the models and analysis and planning for the next EMP-E event, which MEDEAS will organise in 2019.

## MISCELLANEOUS

# MEDEAS NOMINATION FOR THE CLIMATE REALITY AWARDS 2018

**MEDEAS was among the nominated projects for the Climate reality awards 2018, under the category Research Projects in recognition of the work that has been done to tackle climate change.**

The [Climate Reality Project](#) is a non-profit organisation involved in education and advocacy related to climate change, founded and chaired by Al Gore. The award ceremony took place on 7 November, where an

important number of entities, companies and prominent personalities in the field of the environment gathered. For the first time, the Climate Change Reality Project organized the event in Spain and awarded the personalities, companies and Spanish institutions that have contributed most in 2018 to the fight against climate change in nine categories.

# "LATITUDS" TV PROGRAMME FEATURING MEDEAS AVAILABLE WITH ENGLISH SUBTITLES

On 18 December 2017, a special program devoted to MEDEAS was broadcast in the Catalan "Latituds" TV3 program.

The program is now available online with English subtitles. The program can be viewed [here](#).

## NEW MEDEAS PROJECT FACEBOOK PAGE

In November 2018, a new Facebook page has been launched to bring information about the project to Facebook users and enlarge the community around the MEDEAS project.

The page is accessible to the public [here](#). News, interesting facts and events from the project are posted weekly.

**Project Medeas**  
@ProjectMedeas

Home  
Posts  
Reviews  
Photos  
Events  
About

**Project Medeas**  
19 November at 17:18 · 🌐

Project Medeas is on the way to develop an advanced modelling tool to create, modify and test new and existing policies which could support the transition to a more sustainable European Energy system, based on renewable energy sources. Read more about the project [➔](https://www.medeas.eu/project/overview)

**MEDEAS**  
MODELLING THE RENEWABLE ENERGY TRANSITION IN EUROPE

**A NEW OPEN-SOURCE ENERGY MODELLING SYSTEM TO GUIDE THE TRANSITION TOWARD A LOW CARBON EUROPE**

ABOUT PROJECT MEDEAS

"Modelling the Energy Development under Environmental ...

MEDEAS aims to create a new computational model that will define the future of the energy system in...

[See more](#)

**Community** 104 people like this

