

# Smart Energy Materials: The Sustainability Challenge

Bucharest, Romania, 14 June 2019

eseia Director Brigitte Hasewend





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- 1. Climate-neutral Europe by 2050
- 2. Major Challenges to Achieve the Transition
- 3. R&I Needs
- 4. Human and Social Dimensions
- 5. The Role of eseia
- 6. Proposal





# 1. Grand Vision: Climate-neutral Europe by 2050



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# **Climate-neutral Europe by 2050**

Our civilisation faces a complete transition to a responsible societal welfare society built on solidarity, inclusion, diversity, and sustainable action.







# 2. Major Challenges to Achieve the Transition



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# Major challenges to achieve the transition

EU decarbonisation and reindustrialisation policies

- Develop world-class technologies in Europe for clean energy, clean mobility and clean buildings
- Reindustrialization and digitalization in EU (20% GDP from manufacturing) for sustainable energy systems
- Business impact leading to creation of up to 700,000 jobs in advanced materials (ref. EMIRI)
- Engaging European Citizens in the sustainability challenge





# Major challenges to achieve the transition

Four ambitious strategic priorities of EU's Strategic Energy Technology Plan:

- 1. Strengthening EU leadership in renewables;
- 2. Developing affordable and integrated energy storage solutions;
- 3. Enabling electro-mobility and a more integrated urban transport system;

Figure 1. Gross Inland consumption of energy

4. Decarbonizing EU building stock by 2050.

non-energy fossil fuels use 100% 90% solids 80% fossil liquids 70% matural gas 60% muclear nuclear 50% e-liquids 40% 30% e-gas 20% renewables 10% 2016 2030 Average of Baseline Intermediary Average of

1395 Mtoe

1639 Mtoe

1255 Mtoe

1178 Mtoe

1192 Mtoe

'1.5°C' scenarios

(net-zero

emissions)

1 239 Mtoe

level of

ambition

Going climate-neutral by 2050: a strategic long-term vision for a prosperous, modern, competitive and climate-neutral EU economy, European Commission (2019)



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2°C' scenarios

(-80% emissions)



# 3. R&I Needs



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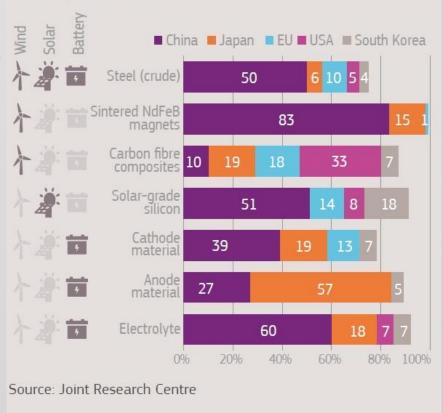


#### **R&I Needs**

Perform of R&I on advanced materials:

- to reduce their intrinsic cost (euro/kg),
- to improve their performance (energy unit/kg),
- to increase their lifetime and stability,
- to reduce raw material & energy consumption in line with circular economy,
- to ensure their competitive manufacturing,
- to efficiently integrate them into technologies, and
- to facilitate their recycling.

Share of global production of different processed and finished materials used in wind turbines, solar photovoltaic panels and batteries, in % of total



Currently, many of the intermediary components required to produce renewable energy products require resources from outside the EU.





# 4. Human and Social Dimensions





#### **Human and social dimensions**

**Europe largely depends on consumer choices** for how fast energy transition will move forward and for what kind of materials will be produced in Europe:

- 1. **Energy Efficiency and savings:** Much of the waste of rare materials today can be avoided. It takes vigilant consumers to make the right choices.
- 2. **Public responsibility:** Consumer choices can be directed by new smart governance giving legal and financial incentives to smart urban mobility and smart housing.
- 3. **Sustainable business:** develop consciousness in businesses for sustainable products and services for an increasingly responsible consumer generation.
- 4. **Education and Training:** much needed to involve young people in the use and the development of advanced materials.
- 5. **Unconventional business and employment models:** rise of social innovation and new business models involving public-private partnerships.



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#### eseia main focus areas:

- **1. EC Policy contribution**: involvement of eseia experts in EC policy groupings such as for the new SET Plan; eseia presence in Brussels
- 2. eseia Working Group Smart Energy Materials: develop new joint proposals with industry for Horizon Europe involving the societal impact dimension, especially in the CEE
- **3. eseia Education and Training Programme:** develop practical training courses with industry for new labour; support capacity-building and staff exchanges
- **4. eseia Media fostering dissemination and communication:** channel relevant information to public decision-makers, raise awareness and enter into a permanent dialogue
- **5. eseia Exploitation**: engage in international partnerships such as with European neighbourhood countries to exploit the benefits of cross-sector interdisciplinary cooperation.



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eseia Working Groups:

eseia has five Working Groups including around 400 experts across the eseia membership which focus their actions on agenda-setting and project generation activities under Horizon 2020.

# 1. Governance, Business Models and 2. Bioresource Utilization **Legal Framework**

Dealing with governance challenges on the national, subnational and community expertise for the role of bio-energy levels arising from the profound change systems in the energy transition as well of direction instigated by the energy as for bioeconomy, linking these two transition. Study of new social and crucial fields. business models and assess how new governance and business can be framed legally. SHH in regions will play an important part in this group.

Providing a framewok for contextualized and rational use of bio resources,





eseia Working Groups:

#### 3. Energy Transition in Urban Regions

innovative technologies based renewable resources but also radically these new ways to integrate technologies into the energy system. Four focus groups: Smart Mobility, Smart Grids, Smart Energy Efficient Buildings, and the Focus Group on Advanced Computing for Energy Transition.

#### 4. Education and Training

Energy transition does not only mean Conceives and implements innovative on training courses for the brightest students, for young scientists and for professionals. WG4 exploits the full potential of its members for establishing training formats that benefit students, young scientists and professionals already active in the field by linking practice and educations. In addition, eseia organizes staff exchanges among members.





eseia Working Groups:

#### **5. Smart Energy Materials**

Created in 2016, the WG 5 addresses the synthesis, processing and application of smart energy materials to be used for improving the energy efficiency of renewable energy systems, e-vehicles, energy generators and buildings. An important part of this WG is dedicated to energy storage.

#### Coordinators:



Katarzyna Siuzdak, IMP PAN ksiuzdak@imp.gda.pl



Spomenka Kobe, JSI spomenka.kobe@ijs.si

#### Selected WG members:



Anca Duta, UTBv a.duta@unitbv.ro



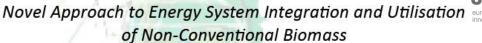
Tina Zuzek,
JSI
tina.zuzek@ijs.si

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#### eseia International Summer School







1 - 12 July 2019 Zagreb, Croatia University of Zagreb

→ integration of products and processes based on non-conventional bio-resources into buildings and smart cities, identification of optimal bio-fuel integration into sustainable mobility systems, and policy and economic instruments for mobilising non-conventional bio-resources. Additional focus on implementation of the research knowledge will be given.

The event combines lectures and workshops, group tasks, supervised group work with consultations, presentation of ideas with feedback from the lecturers, final presentation, site visits, and networking events.

- Organiser: UNIZAG-FSB, asst. Prof. Goran Krajačić
- Target: Ph.D., master student or young professionals in the field of energy, process, electrical, and environmental engineering
- **Deadline:** 15 June 2019



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# Thank you!

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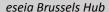
















# The European Sustainable Energy Innovation Alliance - eseia 2019



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eseia Team 20



#### The Alliance

#### The European Sustainable Energy Innovation Alliance - eseia

European non-profit association of leading research and innovation organisations in sustainable energy.

The eseia umbrella covers the full value chain of energy intelligence and integration across research, academia, industry, and government.

eseia fosters international cooperation, manages sustainable energy innovation projects, organizes expert panels, designs entrepreneurial education programmes, and promotes dialogue with European citizens.

eseia has currently 33 members from 13 countries, among which 17 Higher Education Institutions (HEIs), 12 businesses and 4 research organizations.



































































#### Organisation

#### eseia GENERAL ASSEMBLY

The GA is eseia's highest decision making body consisting of eseia members.

The GA votes on decisions proposed by the GC twice a year.

#### eseia GOVERNING COUNCIL



Harald Kainz TU Graz, AT

President



Teresa Ponce de Leão LNEG, PT Vice-President, Record Keeper



Brian Norton DIT, IE

Vice-President, Treasurer



Jan Kiciński IMP-PAN, PL

Vice-President



Ion Visa UTBv, RO

Vice-President



Josef Fürlinger RIC GmbH, AT

Vice-President



Brigitte Hasewend eseia, AT

Director



# **Vision and Strategy**

- eseia strives to become the first European address for renewable energy systems innovation by 2030, and supports the European Union in taking the leading role to make Europe the most innovative energy region in the world.
- eseia's expertise and activities focus on the creation of international full value chain partnerships, management of EC projects, organizations of interdisciplinary expert panels, entrepreneurial education and training, and awareness raising among European citizens.

Three major **strategic challenges** on which eseia works:

- 1. Setting the Agenda for RES on the European market;
- 2. Capacity Building both for people and institutions;
- 3. Forging International Partnerships.





# Setting the Agenda for RES on the European market

With its interdisciplinary and trans-sectorial expert membership of currently 400 experts from all sectors of renewable energy systems, the eseia Working Groups are particularly equipped to advise EC decision-makers on the key issues, existing knowledge gaps and necessary implementation instruments. This expert knowledge helps to bring about the necessary change to achieve a sustainable and highly competitive energy system in Europe by 2050.

#### WG 1 on Bioresources

In this thematic area the main challenge is to provide a framework for contextualised and rational use of bioresources.

These resources are the most contested input to renewable energy systems as the food sector, the energy sector, and, increasingly, the industrial sector all compete for these resources.

# WG 2 on Smart Urban Regions

The challenge in this area is the integrated utilisation of efficiency technologies, grid overarching optimisation of energy systems, and the societal challenges of implementing complex energy solutions utilising all available resources.

Within WG 2, eseia developed two Focus Groups on Smart Grids and Smart Mobility.

# WG 3 on Education and Training

WG 3 conceives and implements innovative training courses for the brightest students and for professionals. WG exploits the full potential of eseia members for linking practice and education and providing the best training opportunities for the brightest young scientists and professionals.

# WG 4 on Smart Energy Materials

WG4 addresses the synthesis, processing and application of materials chemicals and (e.g. nanomaterials, energy carriers, etc.) to be used for improving the energy efficiency of e-vehicles, generators, energy buildings. WG 4 supports the new EC Cluster on Materials and Nanotechnologies for Energy Applications.

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#### Setting the Agenda for RES on the European market

#### **Strategic Energy Technology Plan**

The European Strategic Energy Technology (SET)-Plan was launched in 2007 as the technology pillar of the EU energy and climate policy in order to address the energy innovation challenge. It aims to transform energy production and energy use in the EU with the goal of achieving EU worldwide leadership and cost reduction in the production of energy technological solutions capable of delivering EU 2020 and 2050 targets.

The SET Plan identifies 10 actions for research and innovation, based on an assessment of the energy system needs and on their importance for the energy system transformation and their potential to create growth and jobs in the EU.

In moving forward energy technology innovation, the SET Plan has recognised that one of the key elements for successful implementation at EU level is the availability and mobilisation of appropriately skilled human resources.

In 2019 eseia will engage in particular in identifying research and innovation gaps in the following four thematic areas:

- Smart urban regions, smart grids;
- Energy efficiency, new energy materials;
- Low-carbon economy;
- Bio-resource utilization.



#### **Setting the Agenda for RES on the European market**

The newly created eseia Working Group on Smart Energy Materials will be involved in supporting the European Commission to develop a new European Cluster on materials and nanotechnologies for energy applications (NAMEC). This cluster will support the development of the new Working Programme 2018/2019.

#### **SET Plan Roadmap on Education and Training**

The SET Plan Roadmap on Education and Training addresses the human resource challenge in the low carbon energy field by proposing a comprehensive European programme on energy education and training. It provides a strategic framework and specifying concrete measures needed for addressing emerging energy challenges.

eseia and its experts were actively involved in the development of the SET Plan Road Map on Education and Training. eseia is also responding on the SET Plan Roadmap with its own Education and Training Programme.





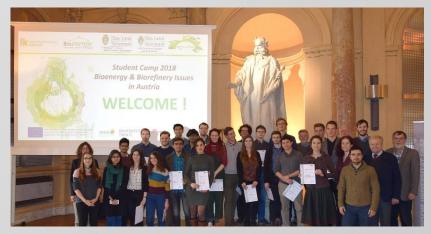
#### **Capacity Building both for people and institutions**

*eseia* is striving to become the **premier provider of practice-oriented education and training** in renewable energies. ETP has trained some **600 students and professionals** over the past six years.

The different professional education formats within the *eseia* Education and Training Programme (ETP) include:

#### 1. Postgraduate students

- Interdisciplinary Student Camps (ISC)
- 2. Postgraduate students and professionals
  - eseia International Summer Schools (ISS)
  - Pilot Plant Courses (PPC)
- 3. Policy makers, experts and professionals
  - Professional Training Course (PTC);



eseia Student Camp on "Regional Challenges of Bio-Based Economy" 26 February- 2 March 2018 at Energy Agency Styria, in Graz, Austria

The ETP has its own unique learning platform with its

#### Best Lecture Library.

Additionally, eseia regularly offers **other activities** such as twining exercises, brokerage events, the eseia biannual International Conference, two European Masters, as well as the H2020 MSCA Phoenix project and Career Development Programme for staff exchanges.

www.etp.eseia.eu

#### **Forging International Partnerships**

The EU has a strategic approach to international cooperation in research and innovation. It includes openness in international cooperation, meaning that the Horizon 2020 is fully open to participation from all over the world. Some calls are targeted specifically to include third countries.

eseia is cooperating with major international groups according to the EU approach fostering international cooperation in research and innovation.

- Planned project proposals for 2019 are open for relevant partners from countries outside the EU.
- All ETP training activities are open for participants from all over the world.

#### **Eastern Partnership Countries**

Under the project Ener2i, eseia was involved in knowledge transfer and innovation of renewable energies and energy efficiency processes to support to Eastern Partnership countries, including Armenia, Belarus, Georgia and Moldova. Alongside its 10 partners, coordinated by the Centre for Social Innovation (ZSI), eseia cooperated to align energy research and energy innovation to respond to the socio-economic needs of 4 out of 6 ENP Countries.





#### **Forging International Partnerships**

#### **Africa**

The National laboratory of Energy and Geology (LNEG), member of the eseia umbrella, was one of the three party's consortium that signed a 115 € million contract with the Geological Institute of Angola (IGEO) to implement the National Plan of Geology (PLANAGEO) in the capital City of Luanda.

#### **Latin America**

The University of Twente, longstanding eseia member, signed a Memorandum of Understanding with several parties, including the Brazilian city of Curitiba. The 5-year collaboration will focus on transforming the green city into a full functioning Smart City.

In 2017 eseia arranged the exchange of researchers with China and Brazil in the proposal Green City IE.

#### China

eseia is cooperating with Chinese partners in order to set up a to the USEP Platform for Knowledge and Innovation. The platform will build up a common Urban R&I Agenda, promoting research and innovation projects, and providing knowledge for EU and Chinese policy makers and city planners.





#### eseia Projects

eseia is currently involved in 3 European projects, two of which are coordinated by eseia, namely the BioEnergyTrain and the Phoenix projects









Recently, eseia completed the EU Project ener2i and SuPREM (2013-2018)











# **BioEnergyTrain**

# European cooperation for higher education

**Period:** 48 months, 2015 – 2019

**Funding:** 3.7 Mio EUR (H2020-LCE-2014-2) **Coordinator:** Brigitte Hasewend, *eseia* 

Partners: 15 partners from 6 EU Countries (Austria, Germany, The Netherlands, Portugal, Romania, Slovenia)

#### **Objective:**

Set and scale up two European Master Programmes integrating professional education formats in cooperation with industrial and regional players.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°656760





# **BET Consortium**



Coordinator: eseia

**Partners:** 

#### Austria:

- Green Tech Cluster
- **Energy Agency Styria**
- BRP-Powertrain GmbH & Co. KG
- Wood K plus Kompetenzzentrum Holz GmbH
- Graz University of Technology

#### **Germany:**

- Bergische Waste Management Association
- **TUHH Hamburg University of Technology**

#### **Netherlands:**

- KIC InnoEnergy
- University of Twente

#### **Portugal:**

National Laboratory of Energy and Geology

#### Romania:

- Green Energy Innovative Biomass Cluster
- Transilvania University Brasov

#### Slovenia:

- ELES d.o.o.
- University of Ljubljana





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**ENERGIEAGENTUR** 

























# **BET Approach**



The BioEnergyTrain focuses on four core activities:

- 1. Education and curriculum development at the post-graduate level (degree MScs), and vocational training (through flexible access to accredited courses, though no degree will necessarily be awarded through vocational channels).
- 2. Engagement with industry through the mechanisms of industry placements/exchanges, internships (for example industrially sponsored MSc projects and project-oriented learning in collaboration with industry). Industry will also be interacting with the curriculum development team to ensure that professional needs gaps are met and long-term collaborations are developed.
- 3. Engagement with regional stakeholders and EU decision bodies.
- 4. Engagement with standards and curricula organisations.



# **BET Approach**



Two new master programmes:

- Biorefinery Engineer (BRE) at Graz University of Technology, Austria.
- Bioresource Value Chain Manager (BVM) at the University of Twente in the Netherlands.

The two pilot programmes started in the Winter semester 2017/2018.

Watch the promotional video of the BRE and BVM Master Programmes



Available in 15 languages on the eseia Team YouTube Channel

Would you like more information on how to get involved in the BET educational formats?

Please, send an email to office@eseia.eu



# **Phoenix**

# People for tHe eurOpean bio-ENergy mIX

**Period:** 4 years, 2015-2019

Funding: € 1.4 Mio EUR (H2020-MSCA-RISE-2015)

Coordinator: Brigitte Hasewend, eseia

Partners: 15 partners from 9 EU and 2 EaP Countries

#### **Objectives:**

Research collaboration to bridge the gap between industrial innovation and education for market up-take of innovative solutions for SET-Plan measures.

Secondments of a total of 62 (early stage and experienced) researchers from 15 countries for **a total of 306 PM** will be realised within the project.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement N° 690925





# **Phoenix Consortium**



Coordinator: eseia

**Partners:** 

#### **Armenia:**

Armenian National Academy of Sciences

#### Austria:

- Energy Agency Styria
- BRP-Powertrain GmbH & Co. KG
- Graz University of Technology

#### **Belarus:**

Belarusian National Technical University

#### Belgium:

University of Liege

#### Croatia:

University of Zagreb

#### Finland:

Lapenraanta University of Technology

#### **Germany:**

Bergische Waste Management Association

#### **Netherlands:**

University of Twente

#### **Portugal:**

- National Laboratory of Energy and Geology
- TORRES & BELO SA

#### Romania:

Green Energy Innovative Biomass Cluster









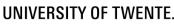






















# **Phoenix**

# Methodological approach



#### **Secondments**

Secondments of a total of 62 (early stage and experienced) researchers from 15 countries for a total of 306 PM will be realised with the project. They are cross-sectorial and interdisciplinary.

#### Research training

eseia will set up, together with the other partners in the project, tailored training and capacity-building events for research and innovation staff members in the framework of the eseia Education and Training Programme (ETP) in order to increase their competences and know-how.

Training formats will include International Summer Schools, Interdisciplinary On-site Camps, Pilot Plant Courses and EU Conferences.



# **CESEPS**

# Co-Evolution of Smart Energy Products and Services

**Period:** 38 months, 2016-2019

Volume: 1.9 Mio EUR

Coordinators: Angele Reinders, University of Twente

Partners: 5 partners from the Netherlands and 3 partners from Austria

Objective: to support the development of smart energy products and services for local smart grids that better respond to the demands and concerns of all stakeholders in terms of performance, cost, reliability, safety and robustness, sustainability and energy-efficiency, and end-users' comfort

Research focused on comparative validation of technologies and concepts of existing demonstrations and the further development of new innovative energy products and services











#### **CESEPS Consortium**

**Coordinator:** University of Twente

#### **Partners:**

#### Austria:

- Graz University of Technology (TUG)
- Austrian Institute of Technology (AIT)
- European Sustainable Energy Innovation Alliance (eseia)

#### **Netherlands:**

- Delft University of Technology (TU Delft)
- Utrecht University (UU)
- Wageningen University (WUR)
- DNV GL

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innovation alliance



#### Energy pilots on Smart Grids in residential areas in the Netherlands and Austria



(12) (15) Graz – Smart City (1) Lungau - ZUQDE Carinthia (state) -ProAktivNetz Projekt Graz Mitte (2) Köstendorf – DG-DemoNet – Graz – ECR Energy Smart LV Grid South Styria - Hybrid-City Graz Reininghaus VPP4DSO in South Styria Salzburg Taxham – SGMS-HIT (Austria) and Bela Krajina Styria - iEnergy Weiz-Upper Austria - AMIS in Steyr, (Slovenia) (17) Gleisdorf 2.0 in Weiz Attnang Puchheim, Gmunden, (Slovenia) (Vöcklabruck, Ried-Raab-Ranna, (10) Salzburg – Smart District Gnigl and Gleisdorf in Salzburg City Gundertshausen and Strobl Hartberg - Città Slow Plesching-Steyregg -(1) Reggau – Smart Village Reggau (18) Hartberg demonstrates Smart City Energiepark Plesching (6) Eberstalzell – DG-DemoNet Aspern – Smart Cities Aspern 

Bartberg – Hybrid 

Control of the Smart LV Grid (13) Rheintal - Smart City Rheintal (20) Leoben - STELLA Großes Walsertal – DG-DemoNetz (14) Villach – Realising Villach's (21) Großschönau – GAVE Smart City Vision in (Carinthia)

Map of the Netherlands with various locations of smart grid pilots



Map of Austria with various locations of smart grid pilots



#### **Completed Projects**

# **Supreme**

# Twinning for a Sustainable, Proactive Research partnership in distributed Energy systems

Period: 36 months, 2016-2018 (Project completed)

Volume: 1 Mio EUR (H2020-TWINN-2015)

Coordinator: Ewa Domke, IMP PAN

**Objective**: Twinning for knowledge transfer in integrating energy technologies to create a long lasting and effective partnership with a very significant impact on Poland's energy systems infrastructure.

The project twined polish energy research center IMP PAN with needed expertise from Aalborg University, University of Twente and eseia to reach research and innovation excellence in modelling, planning, integrating and managing large-scale RES systems.

Partners: Aalborg University (Denmark), eseia (Austria), University of Twente (Netherlands)



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement N° 692197





# **Completed Projects**

# **Supreme**





Polish Academy of Sciences Research Centre – KEZO, Poland

In Horizon 2020 funded SuPREME project, eseia supported the Institute of Fluid-Machinery of the Polish Academy of Sciences (IMP-PAN), setting up twinning and training together with eseia member University of Twente in the Netherlands and Aalborg University in Denmark.

The aim was to develop the necessary resources to foster the advancement of the KEZO Research Centre *in Jabłonna, Poland.* 



#### **Completed Projects**



# **SuPREME Project Achievements**

- eseia finalised dissemination and exploitation work by **forging of long-lasting relationships** between the consortium and the polish national energy sector.
- The project was presented at a total of 10 conferences and other events such as the SuPREME Summer Course at Alborg University (Denamark) and the Summer School 2017 on Micro-scale Energy Systems at the University of Twente (Netherlands).
- 14 articles were printed or published online at SuPREME's website (http://www.h2020-supreme.eu)
- Involvement of the Institute of Fluid-Flow Machinery of the Polish Academy of Sciences IMP PAN in two new proposals for 2019



# Completed Project Ener2i

# **ENErgy Research to Innovation**

**Period:** 36 Months, 2013 –2016 (Project completed)

Volume: 1 Mio. EUR

Coordinator: Centre For Social Innovation (ZSI, Austria)

Partners: 11 partners from 3 EU and 4 EaP Countries

**Objective:** Reinforcing cooperation with Eastern Partnership countries and bridging the gap between research and innovation in renewable and sustainable energy by aligning better research objectives to socio-economic needs.

The Ener2i project focused on the need to find innovative and sustainable solutions to challenges addressing the gap between new energy research and European industry.

Existing research results are not being sufficiently transferred into innovative processes and products, and in Eastern Partnership (EaP) countries (Armenia, Belarus, Georgia, Moldova) cooperation among research institutes, universities, and the business sector are at an early stage of development.









# **Completed Project**

### **Ener2i Consortium**



**Coordinator:** Centre For Social Innovation

**Partners:** 

#### Armenia:

- Armenian National Academy of Sciences
- Technology Transfer Association Union of Juridical Persons

#### Austria:

eseia

#### **Belarus:**

- Belarusian Institute of System Analysis and Information Support of Scientific and Technical Sphere
- Belarusian Innovative Fund

#### Georgia:

- Registered Union Energy Efficiency Centre Georgia
   Germany:
- EE Energy Engineers GmbH

#### **Hungary:**

 The Regional Centre for Information and Scientific Development

#### Moldova:

- Agency for Innovation and Technology Transfer
- Organization for the Development of Small and Medium Enterprises





















#### **Completed Project**



# **Ener2i Project Achievements**

- With 8 workshops on innovative EE/RES technologies and innovation policies ener2i enhanced the innovation capacity and improved the innovation performance of manufacturers, energy service companies and industry in the field of energy efficiency (EE) and renewable energy sources (RES). More than 300 colleagues participated in the workshops.
- With study visits and staff exchanges ener2i mobilized 47 experts for improved knowledge transfer and innovation support in the field of EE/RES through a comprehensive trans-national cooperation.
- Roadmap on EE/ RES in business & Policy Brief on Recommendations to reinforce cooperation with EaP countries; Joint publication: "Reinforcing Cooperation with Eastern Partnership Countries on Bridging the Gap between Energy Research and Energy Innovation", ener2i (2016), pages 1-171;
- With **30 innovation vouchers** (€ 4000 each for a **total of €120,000 invested**) to start-ups and businesses in the participating EaP countries ener2i strengthened cooperation between research and business actors in EE/RES.





# Thank you!

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