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European Commission

CORDIS Results Pack on

# accelerating clean energy uptake

A thematic collection of innovative EU-funded research results

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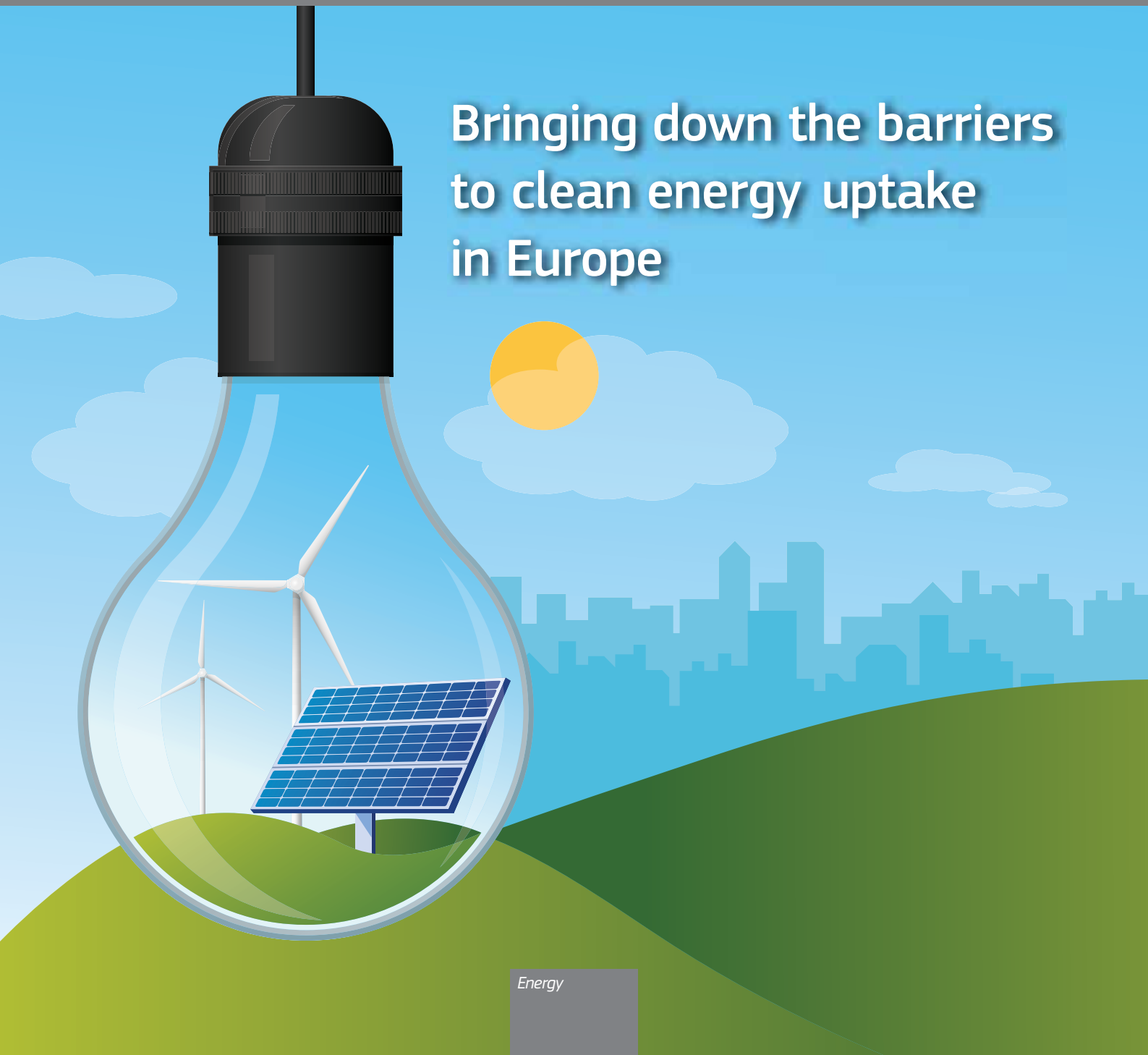

## Bringing down the barriers to clean energy uptake in Europe

*Energy*

# Contents



# Editorial

Wind, sun, hydro, tidal, geothermal and biomass are all renewable energy sources (RESs). By using renewable resources to meet energy needs, the EU can reduce its dependence on imported fossil fuels while increasing energy production sustainability. Accelerating the uptake of renewable energies represents a key solution to decarbonisation and climate change mitigation.

This CORDIS Results Pack features ten EU-funded projects that have been working to promote market uptake of renewable energies and reduce barriers and resistance to use of more sustainable energy sources.

## Consistent achievements of the last decade

Thanks to the adoption of specific EU legislation, such as the Renewable Energy Sources Directives and the adoption of more efficient, cost-effective technologies, the production of energy based on renewable sources is steadily increasing.

The EU's Renewable Energy Sources directive (2009/28/EC) published in 2009 set an overall binding target of 20 % final energy consumption from renewable sources by 2020. Each EU country has set its own individual goals – from 10 % in Malta to 49 % in Sweden.

RES share in the EU energy mix reached 17.5 % in 2017, up from 11.3 % in 2008, before the RES Directive entered into force. 2020 renewable energy targets have played a very important role in that and the EU is on track to achieve them, but now Europe has developed and is challenged to implement a new agenda to take it through another decade of renewable energy production.

Based on the latest biennial report published in 2019, Eurostat data confirms the vast majority of EU countries are well on track to reach their 2020 binding targets for renewable energy. EU Climate Action and Energy Commissioner Miguel Arias Cañete in February 2019 said: "... 11 Member States [are] already above their national targets.... . In a climate-neutral Europe, power generation should be fully decarbonised by 2050, more than 80 % of the EU's electricity will be produced by RESs." However, he stressed, countries will have to continue their efforts to meet these targets.

## Ambitious targets for 2030

In December 2018, the revised Renewable Energy Sources directive (2018/2001/EU) entered into force. The challenging goals established for 2030 (a binding renewable energy target of at least 32 % at EU level) require an uptake and acceleration of the market of renewable energy technologies. Besides further technological development, which is supported by the cost reduction and improvement of performance goals as outlined in the SET Plan, it is essential to tackle a number of non-technological issues still hindering large-scale uptake of RES technologies. These include enabling policies Europe-wide, capacity-building initiatives, raising awareness, improvements of regulatory and financial frameworks, and empowering energy communities, consumers as well as prosumers.

The EU, through its Horizon 2020 programme, is devoted to finding and supporting new and innovative solutions that will help Europe to successfully address these goals – ranging from light and heat from the Sun to the Earth's depths with geothermal and all nature's energy sources captured in between.

## Hurdles to renewable energy uptake can be removed

The projects presented in this brochure are a selection of initiatives funded by the EU within H2020, specifically aimed at addressing market barriers and accelerating the uptake of renewable energy technologies. They include financial instruments such as auctions that are becoming a mainstay in the drive to support policies for renewable energy: **AURES and AURES II** have identified and evaluated suitable auction design options and their effects on energy policy mechanisms and markets under a range of conditions. On a regional basis, **CoolHeating** supported the implementation of small modular heating and cooling grids in south-eastern Europe using improved business strategy and innovative financing schemes. The impact of energy users who both produce and consume electricity, prosumers, is addressed in **PV-Prosumers4Grid**. The **BestRES** project explored aggregation of various distributed renewable energy sources.

Development of 'bioenergy villages' requires bioenergy concepts to be at the investment stage. **BioVill** developed these villages in Croatia, Serbia, Slovenia, North Macedonia and Romania to a point where they could cooperate with established markets in Austria and Germany. Lastly, **WinWind** project partners elaborated a number of good practice measures from their own countries to improve social acceptance of wind energy in the target regions.

Biomass is also a valuable source of renewable energy. **SECURECHAIN** ensured optimal management of Europe's woody biomass supply chain. High energy yield from marginal land was the goal of the **SEEMLA** project, and bioenergy from tree pruning is the focus of the **uP_running** initiative.

# Sustainable regional supply chains for bioenergy

**Woody biomass is a valuable energy source that can fuel a giant leap forward in European rural regions. Sharing good business practices and innovative tools should further promote sustainable use of this biomass type.**

© SecureChain

Bioenergy currently represents almost 60 % of renewable energy consumption in the EU and 10 % of its total energy mix. Representing 70 % (95.3 ktoe) of the total gross inland consumption of biomass for energy, solid biomass clearly appears as the main source of consumed fuel in the EU.

## Seeing the wood for the trees

Wood use for renewable energy production is both an opportunity and a challenge. The opportunity lies in the economic growth and development of countries, new employment, reduced oil dependency and decreased greenhouse gas emissions. The challenge is that if exploitation of woody biomass does not go hand in hand with sustainable forest management, forests can be damaged and livelihoods endangered.

It is therefore important to use wood as efficiently as possible throughout the entire value chain with a double aim in mind: to protect the environment and economic interests. The EU-funded project SECURECHAIN adopted this as its goal.

SECURECHAIN was organised around the concept of maximising the amount of renewable energy that can be produced and supplied to the European market by using the same amount

of wood. "Our main objective was to promote sustainable supply chain management practices that meet the highest environmental quality and financial standards," notes Patrick Reumerman, senior consultant of project coordinator BTG Biomass Technology Group BV in the Netherlands.

## A guide to innovation mentoring for SMEs

Project researchers recognised that SMEs are important key actors in developing local value chains for the efficient production of solid bioenergy. "Local companies may lack knowledge on specific aspects of biomass technologies – how to access feedstock, integrate efficient value chains, and ensure long-term planning and quality control," explains Reumerman.

To further unlock their potential and increase market uptake of bioenergy, SECURECHAIN developed a new innovation mentoring package. This mainly comprised innovation vouchers and tailored technical support for the selected projects. It also included life-cycle assessment, financial analyses and professional training for sustainability certification of the chosen solutions.

## Highlights of successful pilot projects

Throughout SECURECHAIN, an international team of specialists cooperated with regional companies to promote sustainable bioenergy supply chains in six selected model rural regions in Europe. These pilot projects covered the entire bioenergy supply chain, from biomass harvesting and fuel production to energy conversion and recycling. Electric utility company Värnamo Energi AB replaced 14 small oil boilers with 4 new biofuel boilers in 4 villages in Sweden.

Sweden-based district heat company Lessebo Fjärrvärme invested in an innovative flue gas condenser implemented in biomass-fired boilers. Novalia Sinergie, a company based in Spain, enlarged its production by adding an extra pellet line for industrial pellets. Communal waste management company AVEA improved its biomass recovery from waste. Lastly, BKgroen in the Netherlands developed a pelleting plant with an innovative dryer that runs on woody biomass from landscape maintenance activities.

*Our main objective was to promote sustainable supply chain management practices that meet the highest environmental quality and financial standards.*

By making investments in local value chains, SECURECHAIN improved the know-how, international positioning and mutual outreach of the selected model regions. The demonstrated solutions from the successful pilot projects help boost competitiveness and sustainability of bioenergy, and also serve as recommendable, transferable practices for other regions.

**PROJECT**
**SECURECHAIN – Securing future-proof environmentally compatible bioenergy chains**

**COORDINATED BY**
BTG Biomass Technology Group BV in the Netherlands

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/194442

**PROJECT WEBSITE**
securechain.eu/

# South-eastern European communities investing in small, renewable district heating and cooling systems

The heating and cooling demand in Europe represents about half of the EU's final energy consumption. An EU initiative has supported the implementation of small modular renewable district heating and cooling (DHC) grids in south-east Europe.

Small modular DHC grids have several benefits, from contributing to regional economies through local biomass supply value chains to mitigating environmental impacts. The comfort for connected households improves simply by only using a heat exchanger.

Knowledge and experience in small modular renewable DHC systems have already been created in Denmark, Germany and Austria, among other countries. Progress is much slower in Croatia, Slovenia, Bosnia and Herzegovina, the Republic of North Macedonia and Serbia. "CoolHeating supported the market uptake of small modular renewable DHC systems in these countries by transferring know-how and best practices from Austria, Denmark and Germany," says Dominik Rutz, coordinator of the EU-funded CoolHeating project.

## Supporting and promoting renewable HC concepts

Project partners developed 7 technical concepts for small modular DHC grids with a total estimated annual use of 202 GWh/a. In summer 2018, they started constructing the first phase of the concept in Sabac, Serbia. They have also signed a letter of commitment for the second phase. According to Rutz, local politicians and potential investors report that grids will be built in Karposh (the Republic of North Macedonia) and Visoko (Bosnia and Herzegovina) within the next three years. Grids in Ljutomer (Slovenia) and Ozalj (Croatia) are planned over a 5-year period.

© Dominik Rutz

A compilation of 18 small modular renewable DHC best practice examples presented technical, economic and organisational parameters. Denmark, Germany and Austria hosted 3 study tours on small renewable DHC projects that attracted nearly 80 participants, including mayors, representatives of city assemblies and relevant authorities of the target municipalities.

The CoolHeating team examined and described the non-technical framework conditions for establishing small renewable DHC grids in Denmark, Germany and Austria, as well as in the target municipalities. They also provided input on district heating to national policies.

*From government officials to consumers and businesses, CoolHeating stimulated the interest of local communities in setting up renewable DHC systems.*

## Knowledge transfer and capacity building

CoolHeating delivered guidelines to support different actors and target groups with low awareness and limited knowledge on how to set up DHC systems. A user-friendly handbook on small modular renewable DHC grids provides the necessary background for stakeholders in national languages. Potential investors received support in developing business models and financing schemes of small renewable DHC grids. A new tool assisted in calculating the financials of small modular DHC projects.

About 380 people participated in DHC training courses. In total, 242 investors, finance sector representatives, project developers and other stakeholders received training to facilitate the deployment of improved business models and innovative financing schemes for mobilising investments in small modular renewable DHC systems.

Surveys gauged public perception of DHC grids and heat consumption patterns, and info campaigns informed citizens about CoolHeating. Meetings held with national regulators, heating and cooling utilities, authorities and politicians discussed small DHC grid implementation.

"From government officials to consumers and businesses, CoolHeating stimulated the interest of local communities in setting up renewable DHC systems," concludes Rutz. "Until now, the image of large district heating was poor and many people were very sceptical." Thanks to this increased public acceptance, at least 3 550 households (10 650 inhabitants) will directly benefit. Once fully implemented, the small renewable DHC initiatives will serve as lighthouse projects throughout the Balkans.

**PROJECT**
**CoolHeating – Market uptake of small modular renewable district heating and cooling grids for communities**

**COORDINATED BY**
WIP Renewable Energies in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/20084

**PROJECT WEBSITE**
coolheating.eu/en/

# Methods and tools to exploit the high potential of renewable resources from marginal lands in Europe

Underused land with low soil quality can be exploited for biomass production. An EU-funded project has introduced new approaches to identify sustainable ways to use bioenergy from marginal lands (MagLs), thereby minimising potential conflicts with food production or biodiversity conservation.

© Werner Gerwin

MagLs show great potential for producing bioenergy from biomass and for minimising food versus fuel competition in agriculture. However, clear definitions and assessment methods for selecting MagLs for biomass production and for calculating their potential are still widely missing.

The EU-funded SEEMLA project set out to establish suitable innovative land use strategies for sustainable production of plant-based energy on MagLs while improving general ecosystem services. "Our goal was the sustainable exploitation of biomass from MagLs that aren't used for food or feed production and don't pose an environmental threat," says coordinator Diego Piedra-Garcia.

## Novel approach to exploiting MagLs for biomass production

SEEMLA applied an approach consisting of an integrated set of biophysical criteria to define land marginality and assess their potential for biomass production for bioenergy. The approach was pilot tested in Germany, Greece and the Ukraine where different bioenergy crops were cultivated under marginal site

*SEEMLA successfully demonstrated the sustainable exploitation of biomass production and convinced key stakeholders of MagL potential by providing land use tools and raising awareness of this widely neglected option.*

conditions. Proposals and feedback from regional stakeholders like farmers and foresters helped to refine the approach and increased awareness of local supply chains.

Project partners assessed the availability and suitability of MagLs as alternative production sites for renewable resources. They also evaluated the degree of marginality using the Muencheberg soil quality rating (SQR tool) to assess soil fertility as a key factor in determining marginality. This method led to the development of a geographic information system (GIS) tool that maps MagLs across Europe and a web-based application that assists in identifying and exploiting MagLs for biomass production.

Researchers devised marginality criteria and indicators based on the SQR index, and applied SQR methods to the GIS tool to assess MagL availability in Europe. To propose suitable crop species, they produced a catalogue of bioenergy crops appropriate for growing on MagLs and incorporated it into the tool. A web-based SQR calculator consisting of the criteria and indicators measures land marginality of a given land parcel.

## Guaranteeing environmental and socioeconomic viability

To ensure the sustainability of current practices, the SEEMLA partners performed a comprehensive environmental assessment and a socioeconomic assessment. The obtained assessments were performed on pilot cases in Lusatia (Germany), East Macedonia and Thrace (Greece), and Vinnitsa, Poltava, Volyn and Lviv (Ukraine). They revealed clear advantages and disadvantages of using MagLs for bioenergy production.

The team also identified, implemented and evaluated best practices for biomass production on MagLs. They then transferred these good practice scenarios to underused MagL stakeholders via events like workshops and conferences.

Lastly, evaluation of EU and national policies of the three target countries led to recommendations for direct policy changes. These specific proposals are considered necessary for development of a consistent EU policy regarding bioenergy production from MagLs. A guidebook for farmers presents directions for sustainable exploitation of MagLs for bioenergy production.

"SEEMLA successfully demonstrated the sustainable exploitation of biomass production and convinced key stakeholders of MagL potential by providing land use tools and raising awareness of this widely neglected option," concludes Piedra-Garcia. "Landowners and farmers will have the opportunity to develop a new branch for their local economies because the produced energy resulting from the exploitation of MagLs will be used at regional level."

**PROJECT**
**SEEMLA – Sustainable exploitation of biomass for bioenergy from marginal lands in Europe**

**COORDINATED BY**
Agency for Renewable Resources (FNR) in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/199961

**PROJECT WEBSITE**
seemla.eu/en/home/

# A new era in sustainable energy

The energy landscape is shifting away from fossil fuels towards more sustainable electricity sources, and from vertically integrated monopolies to unbundled and competitive markets. Energy markets have been historically designed around centralised sources, however renewable energy generation requires a different approach – integrating different decentralised sources, energy storage and strengthening linkages with the demand side.

Electricity market liberalisation has increased competitiveness and cost-efficiency in energy production in several EU countries, thereby decreasing electricity prices. Renewable energy aggregators act as facilitators between supply and demand in the electricity market bringing small-scale production and consumption to the wholesale market, conventionally only accessible for very large producers and consumers. They do this by aggregating small generation and production units and developing energy services for industrial, commercial or domestic purposes. Aggregation of distributed electricity sources contributes to a more competitive renewable energy sector.

## Renewable energy business models

The EU-funded BestRES project investigated current market barriers and suggested ways of improving the role of renewable energy aggregators for the future. The project involved 11 partner organisations that are active in 9 European countries. Project coordinator Silvia Caneva explains: "We wished to implement best practices already tested in various European countries to boost the integration of renewable energy into the market."

For this purpose, partners identified, reviewed and optimised 13 pioneering business models, 8 of which were implemented in real-life conditions in Austria, Belgium, Germany, Italy, Portugal and the United Kingdom (UK). These models enable energy aggregators to successfully participate in the market by combining renewable energy supply, energy storage, flexible demand and ICT technologies into a commercially viable product. At the same time, the project identified technical, market, environmental and social benefits as well as legal and regulatory barriers preventing their successful implementation.

*... renewable energy aggregation defines new opportunities for the active participation of European consumers in energy matters.*

The UK model shifted the behaviour of domestic electricity consumption through a smart home device connected to a mobile application that shows the energy consumption and cost of each appliance. The implementation led to a 2 % profit in energy bills, and the model also demonstrated the potential engagement and direct interaction of the customers through a mobile application.

In Austria, BestRES investigated the energy potential of operating photovoltaic plants on residential multi-dwelling buildings and how they can be exploited to the fullest. Photovoltaic plants presented increased economic value and offered the possibility of exchanging solar energy between the apartments further reducing energy supply costs and charges.

In Belgium, trading of weather-dependent electricity sources such as solar PV and wind power in the different power markets was very successful. Renewable energy sources proved to be competitive alternatives leading to significant capacity expansion. The accuracy of wind and solar forecasts also improved increasing the confidence of clients.

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## Towards a sustainable energy future

"The main message we would like to put across is that renewable energy aggregation defines new opportunities for the active participation of European consumers in electricity matters," emphasises Caneva. BestRES raised energy awareness through models implementing special tariffs and also promoted the implementation of virtual power plants from 100 % renewable energy units.

Aggregators define a new era for renewable energy sources, opening avenues to new markets and services for decentralised renewable energy. Importantly, flexibility is the key to ensuring adaptation of the energy system to decentralised power production and regionalisation of the electricity sector.

Using the experience gained during the project, BestRES partners drafted a set of recommendations to support future strategies and ease the transition towards cleaner sources of energy. Caneva also highlights the importance of "the current and future European legislation on the seamless implementation of renewable energy aggregation across Europe." Undoubtedly, we should continue to encourage investments in the renewable energy sector as a more environmentally friendly approach.

**PROJECT**
**BestRES - Best practices and implementation of innovative business models for Renewable Energy aggregatorS**

**COORDINATED BY**
WIP – Renewable Energies in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/200557

**PROJECT WEBSITE**
bestres.eu/

# Sustainable bioenergy for local communities in south-east Europe

Even though south-east Europe offers enormous potential for renewable energy development, it still heavily relies on coal and other fossil energy sources. An EU initiative has introduced the bioenergy village concept that enables rural communities to efficiently meet their energy demands from their own renewable resources while integrating local citizens, stakeholders and decision-makers.

*BioVill has initiated many changes towards the implementation of bioenergy projects and the establishment of bioenergy villages, thus boosting market uptake of sustainable bioenergy.*

In south-eastern Europe, pollution rates are unnecessarily high because of outdated technologies. Traditional bioenergy is still a crucial source of energy, but greater uptake of modern bioenergy technologies is needed. The countries lack financial schemes and experience in this area. Moreover, alternative energy projects often meet resistance, and investment confidence is rather low.

"Bioenergy villages offer great promise in meeting these challenges," says Jens Adler, coordinator of the EU-funded BioVill project. "Bioenergy villages have successfully emerged in Austria and Germany, combining market orientation and sustainable energy supply at the municipal level by involving all societal stakeholders. BioVill transferred and adapted these experiences to Croatia, the Republic of North Macedonia, Romania, Serbia and Slovenia, and developed regional bioenergy concepts up to the investment stage."

## Fostering the development of regional bioenergy

BioVill began by selecting seven target villages based on criteria like motivation, available bioenergy resources and infrastructure. Together with the local partners, the team analysed national and local frameworks, and obtained data on existing infrastructure, local energy potential and demands. The results were used to plan local bioenergy projects.

© BioVill

The consortium provided modern planning and calculation tools and strengthened partners' capacities for assessing technological and economic viability of development options. As a result, suitable technical solutions and business models have been elaborated for each of the target villages. Furthermore, BioVill supported dialogue with local and national politicians and cooperation between different policy areas to optimise the regulatory framework and better implement EU legislation. Since the implementation processes will continue after the project's end, decision-makers in all villages signed a letter of commitment demonstrating their willingness to continue the bioenergy projects and secure necessary investments.

## Knowledge transfer and stakeholder involvement

BioVill trained more than 550 key stakeholders to implement the bioenergy village concept, exploit its commercial opportunities, and develop economic assessments and viable business models. Information and training events included a best-practice examples catalogue, 3 study tours to Germany and Austria, and 10 training measures on management and financing of bioenergy villages.

Information points and 28 information events organised for 2 200 citizens increased awareness, knowledge and confidence. Local bioenergy working groups helped to elaborate local bioenergy concepts and strategic bioenergy goals for the villages. Government officials participated in project efforts to ensure the necessary political commitment. In addition, seminars and outreach events attracted the interest of stakeholders from other communities.

"BioVill has initiated many changes towards the implementation of bioenergy projects and the establishment of bioenergy villages, thus boosting market uptake of sustainable bioenergy," concludes Adler. "The concept is now much better known, public acceptance is higher and heat consumers are much more willing to connect to a modern biomass-based district heating system."

When fully implemented in the next few years, the planned investments in modern bioenergy district heating systems will mobilise around 83 GWh heat and 16 GWh electricity per year. More than 110 new jobs will be created and $CO_2$ emissions will be reduced substantially, fostering local economic development and decarbonisation of the energy sector in the partner countries.

**PROJECT**
**Bioenergy Villages (BioVill) – Increasing the Market Uptake of Sustainable Bioenergy**

**COORDINATED BY**
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (German Society for International Cooperation) in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/199956

**PROJECT WEBSITE**
biovill.eu/

# Wood from pruning and plantation removal for energy production

The biomass potential of agricultural woody residues as an energy source in Europe is huge, yet actual utilisation is very low. An EU-funded project is working to promote its future growth so it gains the market acceptance enjoyed by other types of solid biofuels.

Amongst the different types of agricultural biomass, crop residues are those that remain in the field after harvesting and are comprised of different parts of plants or trees. These are very useful energy sources whose potential, at the moment, is quite neglected in Europe.

## Breaking the vicious circle

The EU-funded project uP_running has been established to unlock the potential of biomass from agrarian pruning and plantation removal (APPR), especially those obtained from vineyards, olive groves and fruit tree plantations. Project partners figured out that the main barriers for increasing the utilisation share of APPR biomass are non-technical.

"Farmers are not interested in changing the pruning management model to use these woody residues as an energy source. Being unaware of its potential, they usually dispose of such waste by burning it at the field side or shredding it on the soil," notes project coordinator Dr Adeline Rezeau. To this end, uP_running has implemented a series of actions to counter the misconception in the agricultural and energy sectors that this type of woody residue has little or no value.

*Farmers are not interested in changing the pruning management model to use these woody residues as an energy source. Being unaware of its potential, they usually dispose of such waste by burning it at field side or shredding it on the soil.*

## Demonstration activities

A major project activity was the organisation of 20 demonstrations of APPR biomass value chain operations – 5 in each of the 4 uP_running demonstration countries (Greece, Spain, Italy and the Ukraine). The demonstrations were performed by the agrarian and technical partners who have helped new entrepreneurs interested in initiating value chains draft appropriate business models, overcome technical issues related to harvesting equipment and check the sustainability of their value chains. "These so-called uP_running 'prime movers' are considered the seeds in materialising the uP_running's motto: 'APPR biomass is possible'," adds Dr Rezeau. The prime movers' profile is diverse, including farmers, cooperatives, agro-industries, residue managers, service companies and city councils.

One entrepreneur per demonstration country received further support by uP_running partners to initiate the value chain based on APPR biomass.

In western Greece, partners will support a biomass power plant in organising its logistic operations for the residual biomass from olive and kiwi pruning. In the Vinnitsa region of the Ukraine, a farm that has signed a contract with a utility company plans to produce more than 2 500 tonnes per year of pellets from the removal of apple tree pruning residues. Furthermore, an Italy-based farm is providing a new service to local farmers that covers the whole spectrum of agripellet production: pruning shredding, collection, storage and transport, and agripellet making.

## Sharing APPR biomass experiences

The newly released uP_running Observatory is an online platform in eight languages that records and displays 'experiences' related to APPR biomass from around the world. It includes field measurements of biomass potential from APPR biomass, mechanised pruning collection examples and existing commercial value chains.

Interested users can learn more about how much APPR biomass (tonnes per hectare) was produced in specific locations for different crop species; the performance of harvesting machines (how many tonnes per hour were collected); and existing APPR value chains in Europe. Ten of the existing APPR value chains have been selected as flagship cases – success factors and experiences will serve as a valuable lesson for imitation or improvement.

**PROJECT**
**uP_running - Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal**

**COORDINATED BY**
CIRCE Foundation (Research Centre for Energy Resources and Consumption) in Spain

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/199958

**PROJECT WEBSITE**
up-running.eu/

# Prosumers in the changing energy grid

The number of prosumers – energy users who both produce and consume electricity – is gradually increasing. An EU-funded project seeks to track their impact on a smart-grid–based energy market to help inform national policies.

*We want to demonstrate that prosumers are not troublemakers for grid operators, but they can add value to the grid instead.*

Europe's electricity sector is in the midst of a major transformation, shifting from public monopolies into a liberalised, competitive market. This is especially true for the photovoltaic sector; its current growth trajectory, which has been accompanied by impressive drops in installation costs, led to new schemes that strongly compete with current electricity from the grid. Self-consumption and energy communities are prime paradigms of how electricity can be produced, managed and stored nowadays.

## A modern European village

The EU-funded project PV-Prosumers4Grid differentiates between three prosumer concepts: individual self-consumption, collective use of a photovoltaic system in one place, and district power models. According to a project study, individual self-consumption is legally possible in all of the eight European countries examined (Austria, Belgium, France, Germany, Italy, Portugal, Netherlands, Spain). This means that individual solar panel users can produce their own electricity and get paid for the excess electricity they export to the grid.

However, excess solar energy can also be shared within the same building or sold to households nearby that purchase electricity from conventional energy suppliers. Or it can even be stored in a battery system for later use or for charging an electric vehicle.

"We have coined the 'European village' term to better reflect the advantages of the energy sharing economy. We aim to show, for example, how shared electricity or shared use of a district battery affect grid capacity and average electricity market price," notes Georg Lettner of project partner Vienna University of Technology.

The project team is defining use cases involving different types of buildings, loads and energy processes. Simulation results are being compared to real-life use cases to assess the impact of a European village on the grid and pricing mechanisms in different European countries.

## Prosumers and the grid

The ability of an energy system to quickly react and adapt to changes in energy supply and demand is an important aspect of self-consumption. Therefore, prosumer presence is not always deemed an advantage for grid management.

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"Grid operators view prosumers as a challenge especially when peak load is high," notes project coordinator Luz Alicia Aguilar, from the German Solar Association. "We want to demonstrate that prosumers are not troublemakers for grid operators, but they can add value to the grid instead. Collaboration with grid operators is possible if self- and shared consumption are legally possible in a country." Eventually, smart solutions should enable prosumers to efficiently manage energy demand during peak usage times.

Currently, the regulatory framework does not allow shared use of a photovoltaic system in many countries. "Paying charges for self-consumption constrains collaborative energy consumption in buildings. And even if energy storage is feasible, prosumers risk incurring fees. From a regulatory standpoint, batteries are often treated as additional devices rather than part of self-consumption. Sometimes it is unclear if charges are levied on stored electricity," explains Aguilar.

Analysing existing framework conditions in the individual countries formed a significant basis of project work. But the most important part is to 'quantify' the impact of prosumers – how photovoltaic panels, energy storage devices (batteries) and electric vehicles will interact with the energy market.

**PROJECT**

**PV-Prosumers4Grid - Development of innovative self-consumption and aggregation concepts for PV Prosumers to improve grid load and increase market value of PV**

**COORDINATED BY**

German Solar Association (BSW-Solar)

**FUNDED UNDER**

H2020

**CORDIS FACTSHEET**

cordis.europa.eu/project/rcn/211874

**PROJECT WEBSITE**

pvp4grid.eu/

# Increasing social acceptance of wind energy in Europe

**Having evolved from a niche area into a leading renewable energy technology, wind energy is the driving force of the EU energy transition. Despite its huge potential, lack of social acceptance is slowing down deployment of wind energy projects.**

Social acceptance of wind energy projects can ultimately affect the extent to which EU climate and energy policy targets are met. With this in mind, the EU-funded project WinWind seeks to increase public acceptance of wind energy in Europe. The project objective is to analyse, test and disseminate feasible solutions for increasing social support of wind energy. The focus is on selected regions in Europe where wind energy is abundant yet market penetration is scarce.

## Stakeholder regional desks

"The debates on wind energy projects demonstrate that stakeholder involvement (including public actors from national and local administration) is essential to drive the clean energy agenda forward. Stakeholder active engagement and fair participation procedures are arguably the most important ingredients for working out a successful strategy to overcome barriers to wind energy acceptance," notes project coordinator Dr Maria Rosaria Di Nucci.

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Project partners strengthened their relationships with stakeholders in different countries through dialogues and workshops with focus on the barriers and drivers for socially inclusive wind energy deployment. The selected regions included Saxony and Thuringia in Germany, Latium and Abruzzo in Italy, the Warmia-Masuria province in Poland, the Balearic Islands in Spain, mid-Norway and Latvia. Each region hosts a stakeholder desk responsible for the project's operational tasks.

Together, local project partners, selected stakeholders and market actors identified critical factors that hold back social acceptance of wind energy in the target regions. These pertained not only to the technical sphere, such as the visual intrusion and size of the turbines, but also the environmental impact and perceived fairness of the participation procedures in project planning and implementation.

## Tailor-made solutions

Throughout WinWind, project partners elaborated a number of good practice measures from their own countries to improve social acceptance of wind energy in the target regions. They developed a portfolio containing a total of 30 good practice portraits that are specific to each region, considering the socioeconomic, spatial and environmental characteristics from a multilevel perspective. These can also serve as valuable examples for replication in other areas at regional or even national levels.

*Stakeholder active engagement and fair participation procedures are arguably the most important ingredients for working out a successful strategy to overcome barriers to wind energy acceptance.*

The good practice measures are grouped under five main categories, of which one includes novel participatory models that ensure transparency and encourage involvement of the entire community in the planning process of wind projects. Another two have to do with measures that address the direct and indirect financial participation of communities and citizens and measures that assess the environmental impact of wind farms. A fourth category covers benefit sharing and distributive justice measures to promote fair distribution of costs of renewable energy production, and the last comprises effective communication strategies.

## Next steps

"WinWind has enjoyed considerable political recognition in all participating countries," notes Michael Krug, coordinator of the German country desk. "In some cases, partners were invited by national or regional policymakers to provide recommendations to ongoing policy formulation processes."

Over the coming months, project partners will develop guiding principles and criteria for fair and acceptable wind energy development that should serve as a compass for policy development at regional, national and even European levels. Furthermore, 10 transferable best practice measures and a transfer guide will be complemented by a series of activities with mentor teams in the so-called learning regions.

**PROJECT**
**WinWind - Winning social acceptance for wind energy in wind energy scarce regions**

**COORDINATED BY**
Free University of Berlin in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/211548

**PROJECT WEBSITE**
winwind-project.eu/

# Implementing auctions for renewable energy support

**Auctions are a competitive and market-based mechanism in energy policies across Europe. The AURES II consortium is investigating the potential of auctions to significantly improve the performance of renewable electricity support in Europe and provide suitable design options to harness this potential.**

The technological maturity of many renewable energy sources (RESs) which resulted a significant cost reduction necessitates successful schemes for rationalising the overall support provided to them. Financial schemes such as auctions have the capacity to bring down support levels, drive down RES costs to levels close to fossil fuel-based electricity and increase the planning capability for RES deployment. However, cases of delay or non-realisation highlight the need for effective design tailored to different market conditions.

*In AURES II, we monitor the effects of RES auction implementation in detail and study more innovative auction approaches.*

## Evaluating RES auction challenges

The EU-funded AURES II project comes as a continuation of the AURES initiative aiming to promote efficient implementation of auctions to improve the performance of support for electricity from RESs in Europe. AURES ran from 2015-2017 and focused on the theoretical foundation of RES auctions, studying applications and providing activities for policymakers and other stakeholders. "In AURES II, we are monitoring the effects of RES auction implementation in detail and studying more innovative auction approaches, such as cross-border or technology-neutral auction formats," explains project coordinator Vasilios Anatolitis.

Considering the variety of auction designs being introduced and tested in the EU market, there is a need to assess and improve their future applications. AURES II aims to communicate new insights on the applicability, performance and effects of specific auction designs, and to provide tailor-made policy support for different applications. Challenges such as the cross-border openings of auctions and the combination of several RES technologies in one auction are also being addressed.

Partners follow a multi-methodological approach that includes literature review, theoretical analysis, case studies, interviews, surveys, and empirical and quantitative methods. Central to the AURES II approach is the strong involvement of relevant stakeholders, including policymakers and industry representatives.

## Development of auction tools

AURES II monitors EU auctions in a continuous manner and results appear in a holistic database on the project website. Among the project achievements so far is the auction designer, the first interactive tool that answers the most important questions on auction scheme design. In addition, quantification of the impact of different auction designs on the business case of a single project is possible through the cash flow model.

AURES II aims to provide more empirical evidence on auctions and identify best practices by conducting case studies in 12 EU and non-EU countries. Through practical cooperation with relevant institutions in several countries, AURES II will help implement and monitor the respective RES auctions.

## Impact on RES

Project partners will produce both theoretical and empirical evidence on the effects of auctions on innovation, financing costs and on RES value chains, and help comprehend the impact of the competitive pressure. The initiative will support countries in conducting joint RES auctions, such as in the case of Denmark and Germany, as well as evaluate the feasibility of multi-technology auctions.



The AURES project demonstrated that for auctions to successfully contribute to achieving effective and efficient RES deployment, they have to be specifically designed to match the market environment and take into account a multitude of parameters. As Mr Anatolitis emphasises, "stakeholders must make sure to adapt auctions to the specific situation, secure sufficient competition and provide abundant information to maintain investor certainty."

**PROJECT**
**AURES II - Auctions for Renewable Energy Support II**

**COORDINATED BY**
Fraunhofer Institute for Systems and Innovation Research ISI in Germany

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/218271

**PROJECT WEBSITE**
aures2project.eu/

# Biogas in Italy: From a marginal option to a mainstream energy source

Italy is the second largest European biogas producer but biogas has not yet gained the market acceptance enjoyed by other renewable energy sources. An EU-funded project worked to promote the future growth and sustainability of the country's biogas sector.




Biogas and its purified version, the biomethane are a source of carbon-neutral energy for electricity generation, heating and transport that is an ally in the decarbonisation of the European economy. Italy has more than 1 500 operational anaerobic digestion plants, highlighting the promising prospects offered by biogas. However, the fragmented landscape amongst main industries, stakeholders and biomass producers coupled with the lack of social awareness of the economic and environmental benefits of biogas means that currently its full potential has not been fully developed.

The EU-funded project ISAAC was established to remove a formidable stack of obstacles and render biogas a mainstream renewable energy source from a boutique alternative in Italy. Project partners identified different types of barriers that hinder market penetration and classified them into social, economic and legislative.

## Increasing social acceptance

"The organisation of participatory processes in two pilot regions interested in implementing biomethane plants was the starting point to build a common decision-making paradigm and prevent social conflicts," notes Serena Drigo who has been in charge of ISAAC. The participatory processes took place in Andria and Arborea. It involved more than 170 inhabitants in the decision-making process for the establishment of a biomethane plant. The options included using the organic fraction of municipal solid waste and a liquefied biomethane plant utilising cattle manure respectively.

The participatory processes also involved members of the municipal council, whereas a Citizens' Jury produced a list of requests and expressed recommendations to the stakeholders of the prospective biomethane plants in the regions. "Furthermore, several visits to biogas plants in other regions were planned to show citizens a real demonstration of biogas production and avoid unfounded rumours by local residents about potential dangers, smells or noise" adds Drigo.

## Reducing fragmentation

ISAAC has also placed strong focus on boosting collaboration between farmers, foresters and other stakeholders. This enabled them to optimise plant size and technical characteristics to reduce costs (both realisation and maintenance ones), transports and space requirements for a biomethane plant. "To help with this, we have designed a new tool that assesses biomass availability and explores the possibility of using several types of residual biomass from farms and food industries. The tool, which is available on the project website, also allowed us to elaborate and provide data on the economic and environmental impact of biogas/biomethane production on the selected regions" notes Drigo.

## Education and training focus

The project has planned training courses tailored to regional and municipal administrations on biogas using substrates from agricultural and urban spheres. A systematic approach was adopted in each topic to provide an exhaustive overview of factors that contribute to the successful implementation of entrepreneurial initiatives. The topics ranged from purely technical information to regulatory and authoritative procedures, which according to the latest guidelines, should always consider the principles of environmental, economic and social sustainability.

Project partners have also targeted the young generation by organising an educational tour that involved more than 850 students in seven Italian regions. Besides the use of an anaerobic digestion prototype, a new application called the Buck Bradley Comic Adventure – available on Google Play and Apple Store – aimed to raise awareness amongst young people on biogas and biomethane. It is an interactive video game in the form of comic strips, designed to address in a new and exciting way several topics related to environmental sustainability.



*The organisation of participatory processes in two pilot regions interested in implementing biomethane plants was the starting point to build a common decision-making paradigm and prevent social conflicts.*

**PROJECT**
**ISAAC – Increasing Social Awareness and ACceptance of biogas and biomethane**

**COORDINATED BY**
AZZERO CO2 SRL in Italy

**FUNDED UNDER**
H2020

**CORDIS FACTSHEET**
cordis.europa.eu/project/rcn/199962

**PROJECT WEBSITE**
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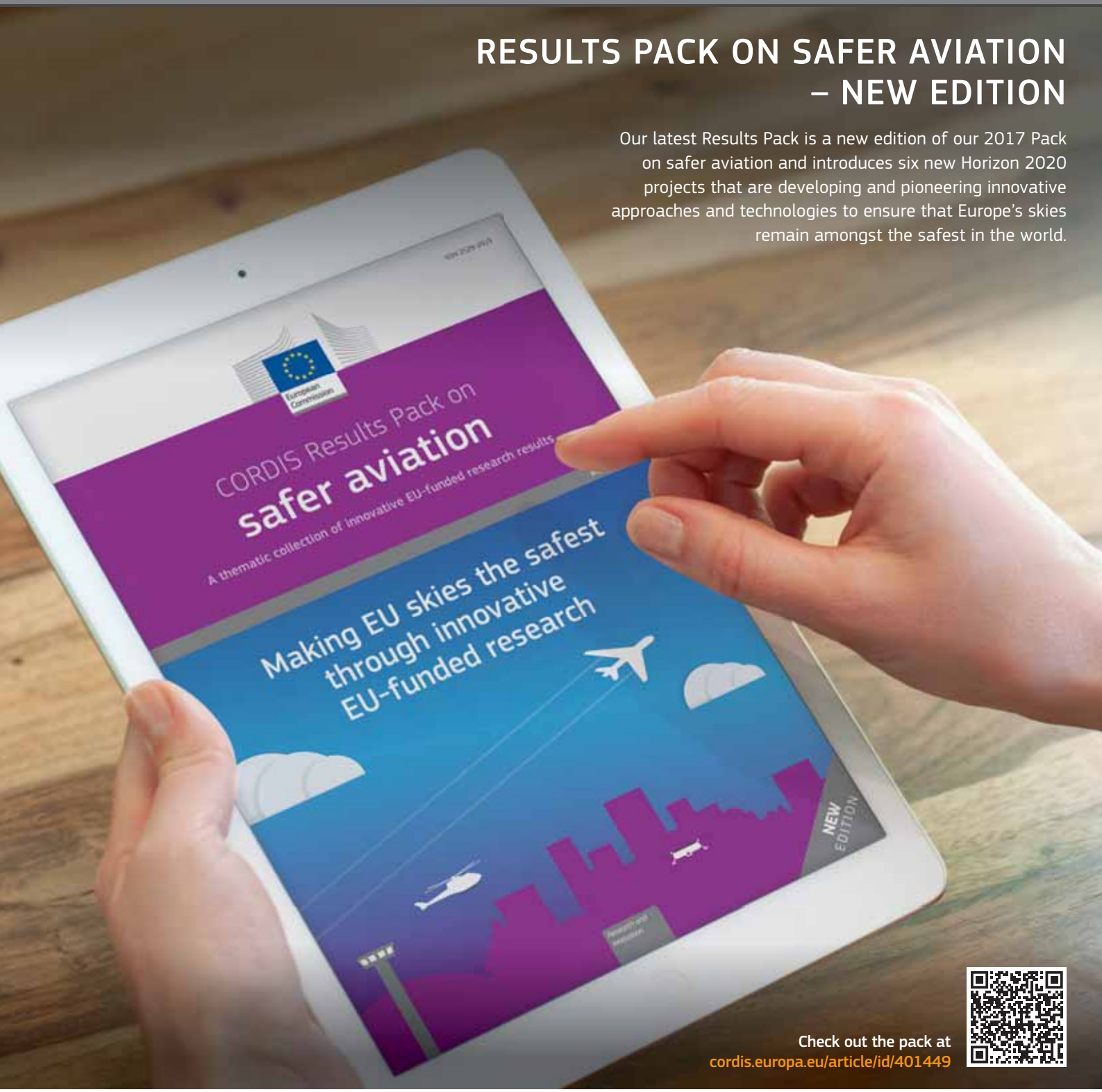


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