A3.3 - INTERREGIONAL WORKSHOP ON

"INDUSTRIAL SYMBIOSIS DEMONSTRATION PROJECTS"

SUMMARY REPORT

DATE: The 19th and 20th of June 2018

VENUE: Monasterio de la Cartuja
Avda- Américo Vespucio, 2
Seville (SPAIN)

Project name: Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy

Project code: PGI00291

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Version 1.0	10.09.2018	Initial Document		**CMAOT**

1. INTRODUCTION

The Regional Ministry of Environment and Spatial Planning of Andalusia organized and hosted the 4rd SYMBI Project Interregional Workshop. Entitled "Industrial symbiosis demonstration projects", the workshop took place on the 19th and 20th of June 2018 in Seville (Spain).

It was realized within the A3.3 activity, as foreseen in the Application Form. In detail, the document stated that “Andalusia will host a 2 day policy workshop on how to launch industrial symbiosis demonstration projects. It will be based on an input study that will detail priority areas, examples, and the funding mechanisms to realise such initiatives at regional level. All partners will participate, with members of their stakeholder groups & external experts. Andalusia will draft a workshop summary report; partners will organise internal reporting meetings”.

2. THEME AND OBJECTIVES

The mission of the workshop was to facilitate the exchange of ideas and experiences, acquisition of knowledge and inspiration on how to steer policy implementation in creating an enabling atmosphere for the initiation of industrial symbiosis projects, as drawn from current implementation and best practices. The interregional workshop pursued the following particular objectives:

1. Highlight the most relevant needs and challenges (associated with the deployment of synergetic schemes in different economic activities and sectors) to be addressed through regional policies.

2. Inform regional authorities about the factors determining the feasibility of an industrial symbiosis project and affecting businesses’ willingness to participate in synergetic schemes.

3. Gather experience and insights from existing industrial symbiosis projects implemented in different regions and countries across the EU, to assess their effectiveness in promoting

resource efficiency and sustainable growth, identify key drivers and problems, and highlight transferability elements that will allow to adopt similar approaches in own region.

4. Bring together elected representatives of regional public administrations and members of stakeholders' groups, to enable them benefit from a structured interaction, revolving around a specific thematic area.

3. WORKSHOP AGENDA

Workshop tasks were organized in two topics:

Topic 1. Political and financial instruments to launch industrial symbiosis and circular economy projects

Topic 2 – Industrial symbiosis projects in action.

Below is the Workshop agenda in detail:

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SYMBI
Interreg Europe
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4TH WORKSHOP
19/20 June 2018
Seville (Spain)

"HOW TO LAUNCH INDUSTRIAL SYMBIOSIS DEMONSTRATION PROJECTS"

AGENDA

Tuesday, 19 June 2018

Venue: Centro Andaluz de Arte Contemporáneo (Monasterio de la Cartuja)

8h30 – 9h00	**Registration**
9h00 – 9h30	**Welcome remarks**
	• Fernando Martínez. Director of Prevention and Environmental Quality • Esperanza Caro. The Seville City Council
Topic 1. Political and Financial instruments to launch IS and CE projects.	
9h30 – 10h30	**Political and Financial instruments**
	• Lucia Yllescas. Administrator of Planning and Analysis. Andalusian Strategy 2020 and Energetic Andalusian Strategy 2020 • Judit Anda Ugarte. Coordinator of the Andalusian Strategy of Circular Bioeconomic 2030 • Esperanza Caro. The Seville City Council
10h30 – 11h00	**Coffee break**
Topic 2. Industrial Symbiosis Projects	
11h00 – 13h00	**Good practices in IS and CE**
	• Benigno López. Pedro J. Lanagran. Fausto Rancaño Emasesa-Portland-ASIDAN • Mauricio Dominguez-Adame Lanuza. Director of corporate social responsibility. Heineken • Lorena García, Director of Legal Services and Institutional Relations. FQML
13h00 – 14h30	**Networking Lunch**
14h30 – 19h00	**Explaining Symbiosis industrial Projects *in situ***
	• Olive pomace refinery, Puente Genil (Córdoba)
21h00	**Dinner In "El Corral del Agua" Restaurant** (*The cost is not in charge of the organizer. Please we need confirmation of assistance)*

Avda. Manuel Siurot, nº 50. 41071 SEVILLA
Telef. 95 500 34 00. Fax: 95 500 36 01

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Wednesday, 20 June 2018

Venue: Centro Andaluz de Arte Contemporáneo (Monasterio de la Cartuja)

Topic 1. Political and Financial instruments to launch IS and CE projects	
9h15 – 10h30	**Political and Financial instruments** • Alfred Vara. Director of the prevention and resource efficiency. Agency of Waste of Catalonia. Financial instrument in Catalonia • Lydia González Fernández. CDTI Centre for Technological Industrial Developing
10h30 – 11h00	**Coffee break**
Topic 2. Industrial Symbiosis Projects	
11h00h-12h00	**Visit to CAAC**
12h00 – 13h00	**Good practices in IS and CE** • Verónica Kuchinow. Director of Simbiosys. Industrial symbiosis in Catalonia • Joaquin Lopez. Olive pomace industries in Spain • Anna Bochynek. Can-Pack Group. Poland
13h00 – 14h30	**Networking Lunch**
14h30-18h00	**Steering Group Meeting**

With the aim of developing a carbon neutral event, the carbon footprint will be calculated and the emissions will be compensated in a local reforest project.

4. PARTICIPANTS

The first workshop day was attended by 49 participants. In the specific: n. 16 Partners, n. 24 Stakeholders, n. 1 Moderator, n. 8 Speakers**.** Below is the attendance list.

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19/06/2018
SEVILLE (SPAIN)

JUNTA DE ANDALUCIA
CONSEJERIA DE MEDIO AMBIENTE Y ORDENACIÓN DEL TERRITORIO

Nº	NAME	ORGANIZATION	PARTNER/ STAKEHOLDER	SIGNATURE
1	Alfonso Cárdenas Domínguez	EMASESA	Stakeholder	
2	Alfred Vara	Agència de Residus de Catalunya	Stakeholder	
3	Aline Daniel	Paque tecnológico de Andalucía	Stakeholder	
4	Ana E. Pérez Aguilar	FQML	Stakeholder	
5	Ana Isabel Mesas Robles	Agencia Medio Ambiente y Agua	Stakeholder	
6	Anna Bochynek	Canpack Group	Stakeholder	
7	Barbara Muir	PGE Energia Ciepła	Stakeholder	
8	Benigno López	EMASESA	Stakeholder	
9	Carmen Arnaiz Franco	UNIVERSIDAD DE SEVILLA	Stakeholder	
10	Carmen Sánchez	TYPMA	Stakeholder	
11	Concha Ortiz	Concha Ortiz	Stakeholder	
12	Cuna Francesca	Chamber of Commerce of Molise	Partner	

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Nº	NAME	ORGANIZATION	PARTNER/ STAKEHOLDER	SIGNATURE
13	Cutillo Giuseppe	Chamber of Commerce of Molise	Partner	
14	Dejan Hribar	Government office for Development and European Cohesion Policy	Partner	
15	Dimitris kakoulidis	Municipality of Kozani	Partner	
16	Enrique Toro Baptista	EMASESA	Stakeholder	
17	Esperanza Caro	Ayuntamiento de Sevilla	Stakeholder	
18	Fausto Rancaño Lejarraga	ASIDAN	Stakeholder	
19	Felipe Jose Sancho Vazque	CMAOT. Junta de Andalucía. Spain	Stakeholder	
20	Fernando Martínez Vidal	CMAOT. JUNTA DE ANDALUCÍA	Stakeholder	
21	Francisco Cobos Ruíz	Agencia Medio Ambiente y Agua	Stakeholder	
22	Harri Mattila	HAMK Häme University of Applied Sciences	Partner	
23	Ignacio Cortés Moro	Balneario El Raposo	Stakeholder	
24	Iida Holck	HAMK Häme University of Applied Sciences	Partner	

SYMBI PROJECT – WORKHSHOP
19/06/2018
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Nº	NAME	ORGANIZATION	PARTNER/ STAKEHOLDER	SIGNATURE
25	Joaquín López	ANEO	Stakeholder	
26	Judit Anda Ugarte	Consejería de Agricultura, Pesca y Desarrollo Rural	Stakeholder	
27	Jyri Maunuksela	LUKE Natural Research Institute Finland	Stakeholder	
28	Kinga Dulemba	Malopolska Region	Partner	
29	Lorena García de Izarra	FQML	Stakeholder	
30	Lorenzo Chacón Ladrón de Guevara	GESPI (Consultor Independiente)	Stakeholder	
31	Lucía Yllescas Villalonga	JUNTA DE ANDALUCÍA-CEEC	Stakeholder	
32	Lydia González Fernández	CDTI	Stakeholder	
33	Maciej Biernacki	Zabierzow Municipality	Stakeholder	
34	Maika Diaz Aguilar	FUNDECYT PCTEX	Partner	
35	María Gracia Benitez	FUNDECYT PCTEX	Partner	
36	María Tarancón	CMAOT. JUNTA DE ANDALUCÍA	Partner	

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37	María Victoria Dávila	CMAOT. JUNTA DE ANDALUCÍA	Stakeholder	
38	Mauricio Domínguez-adame Lanuza	HEINEKEN España	Stakeholder	
39	Michał Preisner	Malopolska Region. Poland	Partner	
40	Miguel Angel Martínez Infante	Cementos Portland Valderrivas	Stakeholder	
41	Nataša Kobe Logonder	Government office for Development and European Cohesion Policy	Partner	
42	Pedro Jesus Lanagrán	Cementos Portland Valderrivas	Stakeholder	
43	Raúl E. Vega Otero	CMAOT. JUNTA DE ANDALUCÍA	Partner	
44	Robert Musits	Association for Sustainable Future	Stakeholder	
45	Santos Jorna	Junta de Extremadura	Stakeholder	
46	Sol Cuenca Martín	Tragsatec Andalucía	Stakeholder	
47	Sonia Palomo	Paque tecnológico de Andalucía	Stakeholder	
48	Tjaša Gorjanc	Chamber of Commerce and Industry of Slovenia	Stakeholder	

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49	Vasilis Korkas	Municipality of Kozani	Partner	
50	Vasilis Papathanasiou	Municipality of Kozani	Partner	
51	Verónica Kuchinow	Simbiosy	Stakeholder	
52	Víctor Vázquez Calvo	ECOEMBES	Stakeholder	
53	Zoltan Kalcsu	Pannon Novum	Partner	
55	Camilo Navarro, María	Cámara de Comercio de Sevilla	Stakeholder	
56	BENITEZ REAL	Circular Economy Club	Stakeholder	
57				
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The second day was attended by 43 participants. In the specific: n. 17 Partners, n. 18 stakeholders, n. 5 Speakers, n. 1 Moderator, shown below The attendance list is shown below.

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53	Zoltan Kalcsu	Pannon Novum	Partner	
55	Francisco Pizarro	Fundecyt - Pctex	Partner	
56	Antonio Recio	Fundecyt - Pctex	Partner	
57	Antonio Lora Donoso	Ecoembes	Stakeholder	
58				
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SOME PICTURES


4TH WORKSHOP
About us
SSE – ASIDAN Relationship
An example of circular economy
Rebuilding of Tabasta and Armas
(Port of Seville)
SYMBI
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4th workshop
SYMBI
Interreg Europe


HOW TO LAUNCH INDUSTRIAL SYMBIOSIS DEMONSTRATION PROJECTS
Sevilla, 20 junio 2018
Research and Innovation
Instrument and opportunity
ESHORIZONTE2020
SYMBI
Interreg Europe


Sacyr
industrial
Complejo Industrial
" Secaderos de Biomasa "

5. PARTICIPANTS AND WORKS DESCRIPTION

Fernando Martínez Vidal, Director of the Prevention and Environmental Quality Department **Fernando Martínez Vidal,** as the head of the Directorate General of Prevention and Environmental Quality, opened the workshop with welcome greetings. Below there are the relevant points of his speech:

The Andalusian Government, by means of its various agencies, is promoting sustainable development in the economy, as a driver of economic growth and competitiveness. This idea has been transferred embodied in their policies and, as a consequence, the "*Andalusian Sustainable Development Strategy 2030"* has been approved. This strategy establishes the bases to guide public policies, which must be aimed at harmonizing economic growth with environment protection, by promoting the transition to the green and circular economy.

Additionally, Andalusia currently has a leadership role in processing its Bio-economy Strategy, which will be soon consolidated under its new innovative and sustainable circular economy processes. This strategy is one of the subjects to be deeply described and treated in this event.

The Industrial Strategy of Andalusia 2020 and the Energy Strategy of Andalusia 2020 are underway, which include measures clearly aligned with circular economy.

The economic growth and the ephemeral use of resources and products have resulted in a growing trend of environmental degradation and waste generation in Andalusia. Therefore, in order to achieve sustainable growth, it has been explicitly established that there is a clear need for better management of resources, among other policies, through the promotion of the circular economy and industrial symbiosis.

On the other hand, It is necessary to intensify the institutional cooperation with other European and border regions that share similarities in matters concerning the circular economy and industrial symbiosis.

Exposition of the Works were moderated by **Concha Ortiz** who coordinated interventions and managed interactive sessions, ensuring the respect for timing according to the agenda and the adequate overall workshop performance. Ms. Ortiz has worked as a Master of Ceremonies since 2003. She has presented a wide variety of sports events such as football ones (UEFA championship held in Seville, Madrid and Monaco in 2003, 2006, 2010, 2015); tennis ones (Davis Cup held in Seville in 2004 and 2011); and basketball ones (Eurobasket championship 2007 and FIBA Basketball World Cup 2014). Ms. Ortiz has a long standing link with the cultural scene in general and with the film industry in particular and has worked in events such as the World Music

Expo (Womex) and the 14 editions of Seville European Film Festival, so far. Ms. Ortiz has chaired several international conferences for public institutions such as the Spanish Ministry of Culture and the Andalusian Government. She has also conducted conventions for multinational companies such as Orange and Schweppes.

TOPIC 1. POLITICAL AND FINANCIAL INSTRUMENTS TO LAUNCH INDUSTRIAL SYMBIOSIS AND CIRCULAR ECONOMY PROJECTS

The topic was worked in two days. The first day the present experts presented some of the existing instruments in the region of Andalusia. The second day we had the opportunity of learning about how Catalonia is leading the implementation of industrial symbiosis in Spain and some of its programs about circular economy. In addition, the Centre for Development of Industrial Technology's representative exposed the programs and action lines of funding for the R&D projects.

The experts who spoke about on this topic were as follows: **Lucia Yllescas** is the Regional Administrator of Planning and Analysis in Andalusia; **Judit Anda Ugarte** is the Coordinator of the Andalusian Strategy of Circular Bio-economy 2030; **Esperanza Caro** is the CEO of the Economy and Commerce City Council in Seville; **Alfred Vara** is the CEO of Prevention and Resource Efficiency City Council in Seville and **Lydia González Fernández** works for the Centre for the Development of Industrial Technology (CDTI).

LUCIA YLLESCAS. The Industrial Strategy of Andalusia 2020 and the Energy Strategy of Andalusia 2020

Ms. Yllescas made an introduction to the general strategic framework of Andalusia on the issue, starting with the Employment Agenda 2014-2020 and the Innovation Strategy of Andalusia 2014-2020 (RIS3). This context is need to be known in order to understand the importance of the Industrial Strategy of Andalusia 2020 and the Energy Strategy of Andalusia 2020.

The Industrial Strategy of Andalusia 2020 aims to turn industry into the driving force of a new economy and production model in Andalusia, contributing to create stable employment and that

of good quality, and making Andalusia a more attractive region to investors to perform industrial activities. In this model, knowledge and innovation shall be the grounds for accomplishing a competitive Andalusian industrial sector, consisting of companies that make an efficient use of the territory, be integrated into the Global Value Chains, and behave socially and environmentally responsible.

The strategy contains the following 5 main objectives:

1,- Industrialise Andalusia (more and better companies) by increasing the industrial Gross Asset Value (GAV) to 18 % and reducing energy intensity to 3%.

2,-Increase employment rate and offer jobs of better quality in the industrial sector.

3,- Bring innovation to prominence in the industrial sector by doubling the number of manufacturing plants that innovate and the number of national patent applications.

4,- Expand Internationalisation rate: by creating more exporting companies and making more foreign investment.

5,- Extend company relationship within the industrial network by fostering more collaboration and cooperation.

In the strategy there are 75 horizontal actions grouped in 8 lines. It includes 3 specific environmental actions about sustainable industry, which are the following:

Action 1.7 Efficient management of natural resources. It aims at reducing the consumption of natural resources per unit of product by introducing an improvement in the processes and products of the Andalusian industrial companies.

This action is being carried out by means of:

- Informing and training companies
- Giving support to the incorporation of processes, technologies, equipment and more efficient materials concerning the consumption of natural resources
- Promoting and boosting the implementation of renewable energy systems
- Enhancing business development involved with the energy services supply.

Action 1.8 Industrial waste management optimization. It focus on reducing waste generation in the Andalusian industry and obtaining a higher waste recycling and reuse rate by means of:

- Counselling service for companies
- Training service for employees
- Recovering industrial estates

Action 1.9 Industy's environmental sustainability. Its purpose is to minimize the negative impact of industrial polluting emissions on the environment, by means of:

- The Environmentally-friendly adaptation from industrial processes
- The development of environmental quality management plans
- The implementation of environmental management systems in companies, such as EMAS, and the increase of the number of companies holding environmentally-friendly labels for their products such as ECOLABEL
- Financing the replacement of equipment and facilities with less polluting ones

Working groups are made of experts from the private and public sector, with technical qualification and background in areas like mining, water management, circular economy, bio-economy, renewables and internationalization.

There are several R&D grants available:

- " R&D Business Support": it is addressed to improve the participation of Andalusian companies in total Andalusian R&D expenditure, increasing the intensity of innovation as well as the results coming from the innovative efforts, especially those from SMEs.
- "Promotion Program for International R&D". This incentive line includes a pilot program with the Seal of Excellence. It provides the opportunity to support access to Seal of Excellence Holders from regional level with ERDF funds.
- "Open, Strategic and Singular Innovation Leadership": it aims at increasing the number and quality of collaborative Business R&D projects in Andalusia.

The Energy Strategy of Andalusia 2020 pursues a quality low-carbon sustainable system, in which the use of local energy sources along with highly efficient technologies are its cornerstones.

This strategy has 5 objectives:

- 25 % Reduction of the primary energy consumption trend
- 25 % Provision of final gross energy consumption with renewable energy

- 5 % Self-consumption of the power generated with renewable energy sources
- 30 % Decarbonisation of the energy consumption regarding 2007 levels
- 15 % Improvement of the quality of the energy supply

The Energy Strategy of Andalusia 2020 consists of 5 Programs containing 56 measures and 2 Action Plans containing 117 actions.

The Andalusian regional government gives financial support through the Programme for a Sustainable Energy Development of Andalusia. It comprises the following 3 aid lines:

- Sustainable Construction: 172 M euros
- Sustainable SMEs: 41 M euros
- Smart Grid: 27 M euros.

JUDIT ANDA UGARTE. Andalusian Circular Bioeconomy Strategy 2030

Judit expose in the first place the capacities in production and availability of biomass resources, industrial capacities and knowledge network of Andalusia.

A huge potential of use of biomass exits in Andalusia due to the importance of the agriculture in the region. Olive groves, cereal, greenhouses, fruit trees and seaweed production are the main sources of biomass. Another regional capacities are: good infrastructures, public support sources through various EU funded regional programmes, high qualified workforce, supporting institutions or a high level of entrepreneurship. However, several barriers to investments have been identified: Improvement of chemical industry commitment to bioproducts development, need to develop financial instruments better oriented to the complexity of these projects, market volatility due to petroleum products, the need to adapt regulatory frameworks that promote bio-based products, coordination or regulatory frameworks, and communication and dissemination to increase the awareness of citizens about values and principles of bio based business models.

But What is Bio economy?: Economical model based on use and production of biological, renewable resources and its sustainable and efficient transformation into bioproducts, bioenergy and services for the society.

The Andalusian Circular Bioeconomy Strategy mains to contribute to growth and sustainable development by fostering actions to promote resource production and biological processes.

The strategic objectives are:

- Increase the availability of sustainable biomass for its use through innovative treatments
- Raise the volume of bioindustries and biorrefineries in Andalusia
- Boost markets and consumption of bioproducts and bioenergy in Andalusia

A group of 54 experts were working in the strategy. 4 strategic lines y 4 transversal programmes were designed with a total of 39 actions and an estimated budget of 1.478 M euros.

Strategic Lines

- SL1: Sustainable biomass production and availability of resources
- SL2: Infrastructures and logistics management
- SL3: Industrial transformation processes of biomass and industrial
- capabilities for bioproducts and bioenergy production
- SL4: Market development for bioproducts and bioenergy

Transversal Programmes

- TPA: Communication and dissemination
- TPB: Education and R&D&i
- TPC: Access to funding
- TPD: Cooperation, coordination and strategy monitoring

Some actions to highlight:

- Create an inter-administrative Commission for strategy promotion and follow-up.
- Constitute the Andalusian Bioeconomy Cluster
- Develop a website
- Create a Bioeconomy Regional Observatory
- Develop a metholodology to quantify and qualify biomass resources
- Create a seal to identify bioproducts and bioprocesses

ALFRED VARA. Circular Economy in Catalonia. Financial Instruments.

Alfred's presentation started with an introduction to industrial symbiosis and circular economy. He introduced the Catalan Waste Agency (CWA). CWA is a public company within the Ministry of Territory and Sustainability of the Government of Catalonia, it has own competences on waste generated in Catalonia an also on all waste managed within Catalonia.

He spoked about some of the priorities in the actions of the ARC: Plastic bags, food waste, reuse and preparation for reuse, eco-design and industrial symbiosis.

Firstly, Catalonia has reached an 52 % of reduction from 2007 to 2012 of the consumption of plastic carrier bags by means of the Bag Agreement.

CWA has been working in food waste since 2007, with technical and economic support to the Fundación Banc dels Aliments of Barcelona, local councils and non-profit organisations. There are work groups about prevention of food waste, and It has been partner in some European projects about this. An important work in communication has been done using websites, instagram, apps, video clips, workshop for schools, adverts, etc.

He introduced reWine, a project whose main objective is to demonstrate the viability of a sustainable system for the collection, cleaning, and reuse of glass bottles in the Catalan wine industry. In addition, a brief mention to the European Week of Waste Reduction was made.

The main characteristics of the Catalunya Eco-desing Award ware mentioned.

Finally he made a presentation of the grants for circular economy projects in Catalonia in 2016 and 2017 with a total of 117 granted projects and a budget of 2,7 M euros.

LYDIA GONZÁLEZ FERNÁNDEZ. Research and Innovation. Instrument and opportunity.

Her presentation started with an introduction to the Spain's National Innovation Agency and the Center for Industrial Technological Development (CDTI in Spanish). CDTI is a public entity of the Ministry of Economy, Industry and Competitiveness created in 1977 with a focal point for the promotion of technological innovation. Its main objective is to foster Spanish companies' competitiveness and internationalization through innovation. In its 40 years, CDTI has supported more than 12.400 companies with 23.500 M euros for innovative companies and research entities.

She presented CDTI activity in R&D&I funding, the participation in international technological cooperation programmes,

She made an in depth analysis of Horizon 2020, EU Research and Innovation Framework Programme 2014-2020. She spent a special focus in some of the cross-cutting issues of H2020:

- At least, 60% of overall Horizon 2020 budget should be related to sustainable development
- 35 % to climate-related expenditure
- 20 % Industrial leadership and Societal Challenges budget should go to SMEs.

She describe the role of circular economy in H2020 making an analysis of what's been funded. She spoke about the RESLAG project. This project face the environmental problem of the byproduct called slag by providing 4 eco-innovative industrial alternative applications to valorise the steel slag. REMEB, whose main objective is to develop a competitive and sustainable MBR (Membrana bioreactor) based on recycled agricultural and industrial wastes for waste water reuse.

The focus area Connecting economic and environmental gains-the circular economy (940 M euros) of the work programme 2018-2020 H2020 was introduced.

A brief speech was made about the future scenario after 2020.

Lastly She show where to find orientation & services about H2020 funding.

TOPIC 2. GOOD PRACTICES IN INDUSTRIAL SYMBIOSIS AND CIRCULAR ECONOMY

In the first day of the workshop, experts exposed projects of industrial symbiosis and circular economy in action in Andalusia whereas good practices in other regions were shown in the second day.

The experts who participated in the second topic were:

Benigno López Villa is head of Environmental Management at wastewater treatment plant at Emasesa in Seville; **Pedro J. Lanagran** is head of Environmental Management at the Grupo Cementos Portland Vaderrivas; **Fausto Rancaño Lejarraga** works at Áridos Siderúrgicos Andaluces; **Muricio Dominguez-Adame Lanuza** is Director of Corporate social responsibility at Heineken; **Lorena García** is Director of Legal Services and Institutional Relations at FQML; **Verónica Kuchinow**

is founder and CEO at SIMBIOSY; **Joaquin López** is CEO at ANEO (National Association of Olive Pomace Oil Companies) and **Anna Bochynek** is Specialist in Environmental Campaigns at Canpack Group.

BENIGNO LÓPEZ VILLA. Co-digestion of WWTP sludge and non non-hazardous residues.

Benigno's presentation started with a general presentation of Emasesa activities. Emasesa is the Seville Municipal Water Supply and Sanitation Company. It is a public company which serve to more than a million of people. In Seville, people have reached a unitary household consumption of 112 litre per inhabitant and day. Emasesa has 6 treatment plants with 494.648 m3/day treatment capacity and 1 composting plant with 8 Tn of composted sludge and 674 tons of sludge composted with biomass.

He remarked that waste water treatment plant (WWTP) are the main environmental operators of the cities, recovering water and resources (energy and nutrients). In addition, this kind of installations have a huge energy consumption, in the case of EMASESA, it is about 50.000 Mwh that could be obtained with co-digestion.

Co-digestion means to joint digestion of two of more substrates of different origin, in anaerobic conditions. In Emasesa case, WWTP sludge is always one of the substrates.

He explained the objectives of codigestion:

- Taking advantage of the synergy of the mixtures
- Compensation of nutrients balance
- Contribution of easily biodegradabe organic matter
- Increase in biogas production (65 % CH4)

Emasesa only use non-hazardous residues and by-products whose origin in the agri-food industry and biofuel production industry. These resources have a high content in organic matter, are in a liquid-pasty state with a low sulphate concentration and have a high COD.

He gave details about the authorizations needed in order to develop the management of residues, a complex and exhausting process. However it has several benefits:

- Optimization of the WWTP
- Energy efficiency
- Environmental benefits
- Economic savings in waste management for the producer

On the other hand, it has some disadvantages too:

- Incorrect management puts mud management into risk
- Investment the facilities
- Difficulties in exploitation
- More time dedicates to media and personnel

In 2017 78.444 Tn of wet matter (2.104 of dry matter) were treated with an electricity production of 11052 kWh. EMASESA hope to reach the self-supply of electricity energy in the next years.

The co-digestion of WWTP sludge and residues is an example of symbiosis industrial that contribute to energy efficiency, the transition to a circular economy and to prevent the climate change.

He ended his speech presenting another good practise in circular economy that has been developed in their installations: The use of de-sanding waste generated in the waste water treatment. They clean the sand and it is used like a bed of sand where water pipeline are installed.

PEDRO J. LANAGRAN. Slag in Cement Manufacture

He presented Cementos Portland Vaderrivas Group activity as a company that works throughout the cement business cycle, with presence in Spain, United States, Tunisia, United Kingdom and Netherlands.

Firstly, he explained the manufacturing process of cement: Quarrying raw materilas, crushing, grinding, preheating, pre-calcining, clinker production, cement grinding and storing.

Secondly he spoke about how the cement industry is one of the best examples of application of the circular economy due to the use of different waste in several process.

Material	Origin	Waste hierarchy	Process
Gypsum	Electric power station	Recycling	Cement grinding
Fly ash	Coal power plant	Recycling	Cement grinding
Water sludge	Wastewater treatment	Recovery	Kiln and preheating
Carbonated sludge	Paper industry	Recycling	Kiln and preheating
Slag	Steel industry	Recycling	Crushing/ Cement grinding
Tyres	Waste management	Recovery	Kiln and preheating
RDF (refuse derived fuel)	Waste management	Recovery	Kiln and preheating
Non-recyclable plastics	Waste management	Recovery	Kiln and preheating

The benefits of this circular economy include:

- Increasing resource efficiency
- Avoiding the mining of natural resources such as limestone or bauxite
- Reduce the dependence on virgin fossil fuels
- Reducing CO2 emissions from cement klins
- Avoiding less favourable waste treatment solution such as landfill

Pedro remarked the permissions a cement factory need, in accordance with the IPPC law and subsequent modifications and Directive on industrial emissions.

The use of waste and by products replacing primary raw and as an alternative fuel is some of the Best available techniques in cement plants.

Then he spoke about the use of slag in cement manufacture like a case of circular economy and industrial symbiosis. In the Alcalá de Guadaira plant, Slag is used from Siderúrgica Sevillana (a metallurgic plant site at 2 km of the cement plant in Seville). The use of slag offers CaO and Al2O3,

elements that is needed in the process. A previous treatment is necessary, a screened and scrap removed which, if not removed from the slag, causes loss of efficiency in the raw mill.

Lastly, He presented the benefits of the use of slag in cement manufacture:

- Increasing resource efficiency
- Avoiding the mining of natural resources such as limestone or bauxite
- Reduction of CO2 emissions per ton of clinker, by the incorporation of CaO descarbonated
- Avoiding less favorable waste treatment solutions such as landfill.

FAUSTO RANCAÑO LEJARRAGA. A real experience of valorization of black slag in the construction sector, two needs and a successful solution

His speech began with a brief introduction to the history of Siderúrgica Sevillana (a metallurgical company) and ASIDAN (company which use the by-product called slag).

He described the process needed for recovery slag. Firstly, slag is cooled and it pass to crushing process. After that, a screening process is made.

ASIDAN use the slag in civil works like construction of docks, in landfill, sport facilities or bike lane.

He spoke about some of the characteristics of steel slag.

Lastly he showed some examples of use of steel slag like aggregates in civil work like the rebuilding of some docks in the port of Seville. He show a very special picture, where people could see an example of real circular economy. The picture shows Tablada dock in Seville. The scrap imported like raw material can be seen at the background. On the right of the picture a shipment of steel rod, made with scrap, is waiting for being exported, whereas at the bottom of the picture, we see the rebuilding of the dock with steel slag, a by-product of the metallurgical plant.

MAURICIO DOMÍNGUEZ-ADAME LANUZA. Circular economy & Heineken

Mauricio stars his presentation speaking about Heineken, with brands presented in more than 170 countries. In Spain Heineken has 4 production centres with a produced volume of 10,5 MHL.

He briefly spoke about the sustainability strategy of Heineken: Brewing a better world. It has en economy business model with a global strategy and a zero waste progamme.

There are 4 key activities of Heineken's circular aproach:

1 Recycle: By-products reintegration for their use in other industries and packaging materials recycled.

2 Reduce: Water and energy use across the entire organization. In Spain, it has reduced the water consumption versus 2008 a 29 % and the energy consumption a 20 %.

3 Renew: Increase share of renewable energy in production (from 14 to 70 %)

4. Reuse: Promoting returnable packaging use among on-trade clients.

He explained the by-products produced in Heineken:

- Spent grain: used for animal feeding
- Carbon dioxide: used in greenhouses
- Leftover yeast: used for animal feeding
- Alcohol: used to make hydro alcoholic mix as vinegar

As result, Heineken recover 99,41 % of its waste. The sewage sludge (WWTP) is use to make compost (0,45 %) and only the 0,14 % end in landfills.

Researching is an important matter in Heineken and they invest in several researching projects in universities in order to discover new uses for by-product such as spent grain and yeast in the aquaculture or beer yeast as bio stimulant for plants.

He finished his speech with several videos of different ways of use of by-products in other countries: Biofuel, sustainable granola and edible six pack rings.

LORENA GARCÍA Industrial symbiosis and circular economy in 21st century mining

She presented Cobre las Cruces as one of the mine of First Quantum Minerals Group, a company that operates in the field of mining based in Canada, with 6 mining operations in production. This is one of the most important industrial projects in Seville province with a capital investment of over 1000 million euros.

One of the symbiosis industrial good practices that has been developed in the mine, is the reuse of the San Jerónimo sewage treatment plant in Seville. The environmental reuse of regenerated waste water consist in its reinjection into aquifer in order to balance the extractions needed to maintain dry the mine, which is under the groundwater level.

Lorena spoke about another good practice consisted in the use of gallery backfill made with mine waste, cement and additives. It is considered a best available technique (minig waste brief) and an example of circular economy.

The future of the complex is based in the polymetallic refinery, recuperation of mineral and waste management and energetic efficiency.

VERÓNICA KUCHINOW. Industrial symbiosis or how to apply Circular economy concepts in a Municipality (through it's industrial sector)

Verónica started with an introduction to the different projects developed in Catalonia.

One of the most important and innovator projects has been Manresa in symbiosis. A project implemented by Simbiosy company with cooperation of the Generalitat de Catalonia, Manresa

Council and a consortium for waste management. 28 Companies have participated, 8 synergies have been identified, 4 implementing and 4 in study.

Some environmental potentialities were commented, such as 11.000 T of improved organic waste management, 750 T of improved plastic waste management, 256 T of avoided ordinary waste (plastics, wood, paper, etc) and the generation of local energy, 12 Gwh thermal plus 7 Gwh electric.

The potential of savings has been estimated in 135.000 €/year due to improved waste management, whereas it could be generated energy for 1.200.000 €/year (4 M euros would be need in investment)

Secondly, it was shown the industrial symbiosis offices of the industrial site of Bufalvent, where companies can be informed about industrial symbiosis and they can use a service for looking for synergies with other companies

The pilot project of Manresa has been spread to another municipalities such as Sabadell, Barberá, or Sant Quirze del Vallés.

Ecoindustria, is a platform thought for help companies to begin a transformation process with the target of circular economy and industrial symbiosis.

She enumerated another examples of the implantation of industrial symbiosis in Catalonia are: Bergueda, the free trade zone of Barcelona, Badalona and L´Empordá.

Once she ended of showing the different projects existing in Catalonia, Verónica stars to explain how they foster symbiosis industrial in her community.

Firstly a recompilation of information of many companies is key. After that, The identification of opportunities stars and contacts between companies are made. Lastly the do an evalutiaon of the synergies that could be developed.

It is need to group companies generating the same waste, companies that could use waste as raw materials and companies with the same resources

Some of conclusions about symbiosis industrial that she commented are:

- Symbiosis collaboration is not spontaneous nor immediate. It need a FACILITATOR, proactive, results oriented

- Industrial symbiosis projects are economically sustainable, but the need an initial investment period
- It is important to collect and concentrate data from industry to start and manage the project
- Industrial symbiosis projects have important collateral benefits: environmental, social
- Promotes industrial association (relationship between companies) and its relationship with the Public Administration
- Industrial symbiosis projects save money to the administration

Lastly She spoke about FISSAC, Fostering industrial symbiosis for a sustainable resource-intensive industry across the extended construction value chain, a Horizon 2020 project. In this projects were identified 61 cases of good practices. Some of the learnt lessons can be resumed in the next paragraph:

Driver for industrial symbiosis

- Leadership skills & commitment to sustainable development
- Full engagement & vision of a leader (public or private)
- Information, awareness, training, facilitator (tools)
- Cooperation, trust
- R&D innovation, reverse logistics, trials
- Stable regulatory frameworks, support schemes
- Energy savings, economic viability

Barriers to industrial symbiosis

- Social aspects, internal communication, organisation
- Lack of access to financing
- Community engagement
- Lack of information, sharing knowledge
- Culture for cooperation, the role of moderators
- Technical feasibility

- Regulatory inconsistencies

She give some recommendations in order to foster successful industrial symbiosis networks:

- Develop soft skills: Collaboration instead of competition, build synergies, promoter vs facilitator
- Map concrete needs: identify partners, build trust
- Impact assessment: Evaluation tools, involve actors in the long term, business models
- To have a long-term vision: stable regulatory framework, LRAS to concretely support IS development
- Support SMEs

JOAQUIN E. LÓPEZ LÓPEZ. Olive pomace industries

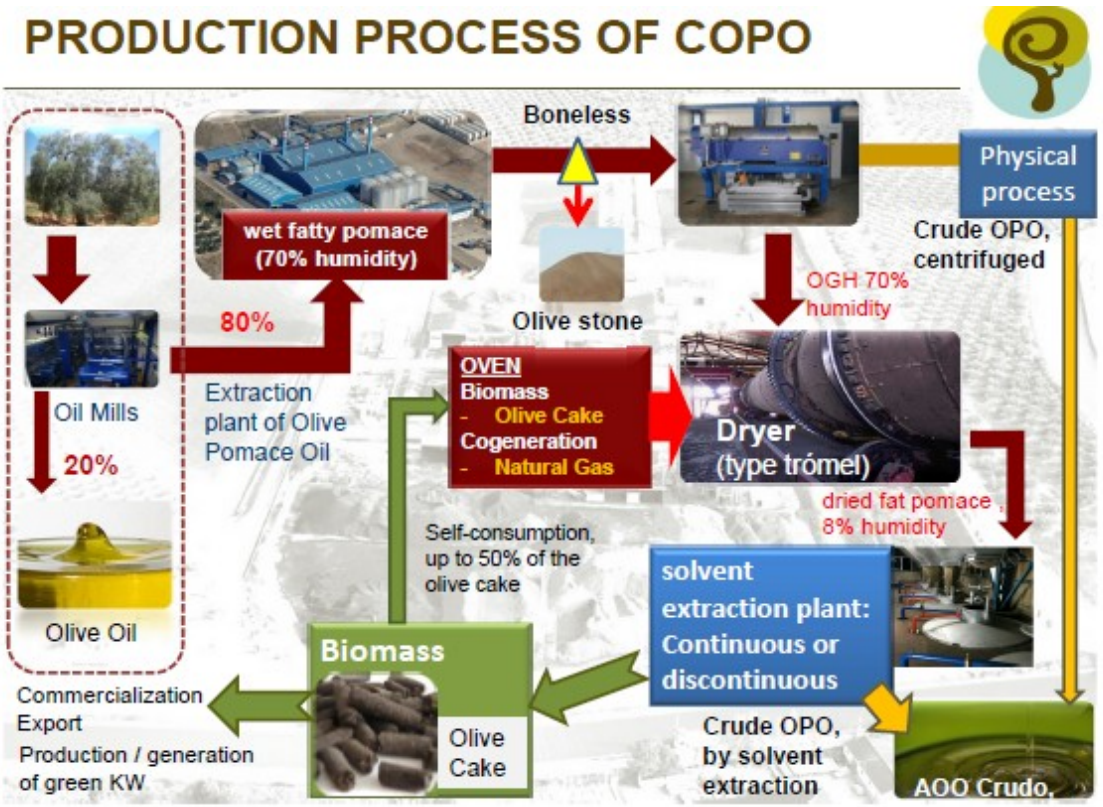
Joaquin introduced the National Association of Olive Pomace Oil Companies (ANEO), founded in 1977, founder member of the European Federation of Olive Pomace Oil and Olive Biomass (EUROLIVEPOMACE).

As introduction Joaquin exposed some numbers of the actual Spanish oil sector.

Secondly He spoke about the technological evolution of the olive oil production process.

At present, the most common process is named: Olive oil extraction system in two phases. This system can recover olive oil for 20 % of the original olive weight. The remaining 80 % is olive pomace. Olive pomace is the by-product obtained in the production of olive oil.

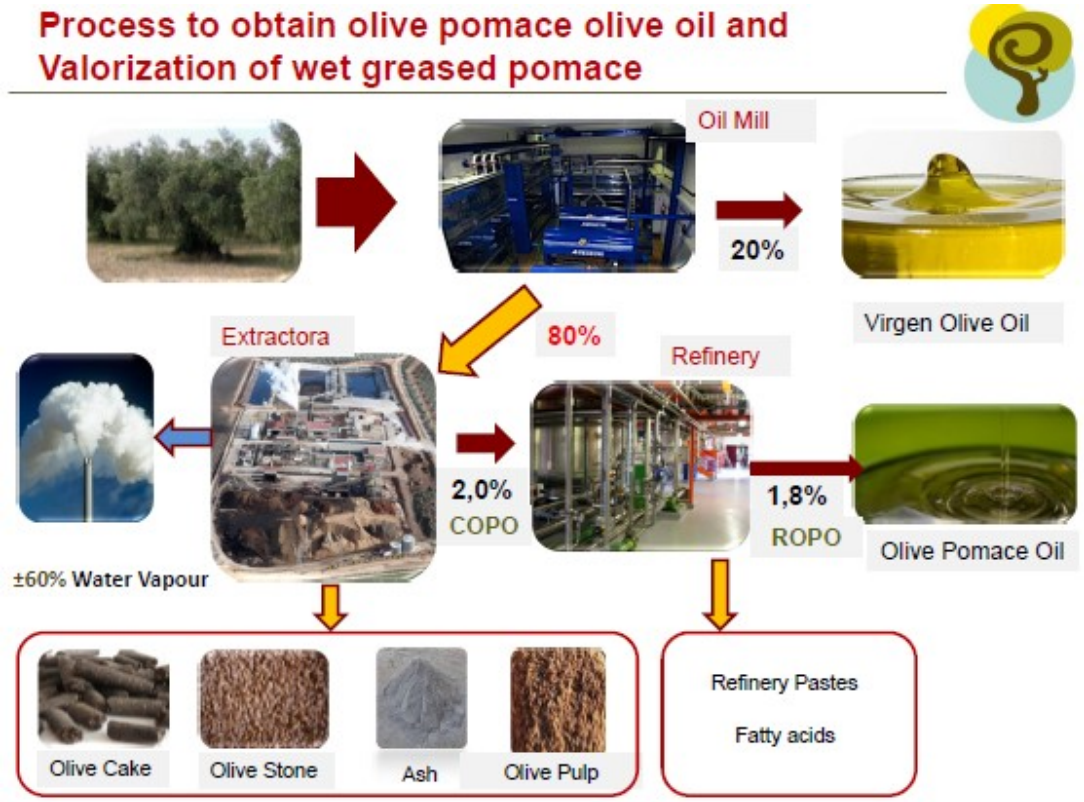
The next figure shows the production process of Crude Olive Pomace Oil and some by-products.



Firstly the olive pomace go to an olive pomace oil extractor factory, where after some physical processes, crude olive pomace oil is obtained. In this process some by-products are produced: Olive stone, used as biomass, and olive cake, used in co-generation, to make compost and as biomass, olive pulp, is a perfect protein complement for animal feed, ash, rich in potassium is ideal for the formulation of fertilizers. Another by-products obtained are: biogas, through the use of digester, and compost. It would be possible to make biofuel by means of refining crude olive pomace, but it is not economically viable.

The crude olive pomace oil has to pass a refining process in order to produce olive pomace oil. In this refining two by-products are produced: Refinery pastes, used for animal feed or cosmetics, and fatty acids, used for processed animal feed.

The next figure resume all the process and by products obtained.



After speak about the healthy properties, Joaquin remarked that the olive pomace oil sector is an example of authentic circular economy since any residue is left. He warned that everything could come down if the Spanish Government does not develop the corresponding Ministerial order of by-products.

ANNA BOCHYNEK. Can-Pack Group. Circular Economy

Anna started her presentation with an introduction to the Can-Pack Group. She spoke about the aluminium cans in the context of circular economy, focused in the ecodesign, easy to recycle and Aluminium is a permanent material.

She remarked the savings of energy achieved thanks to the recycling of aluminium cans.

Lastly she presented some communication campaigns done by the Group.

After every speech or presentation an interactive session of discussion and consultation was held. This was a good occasion for participants that had the opportunity to take part to the discussion on topics presented.

EXPLAINING SYMBIOSIS INDUSTRIAL PROJECTS IN SITU. A visit to the olive pomace refinery site in Puente Genil (Córdoba)

In the afternoon of the first day, participants in the workshop had the opportunity of learning about a successful example of industrial symbiosis demonstration project. We visited an industrial complex sited in Puente Genil (Cordoba). This complex, extending over 16 Ha, is operated by a consortium of 3 companies, which carry out separate activities.

Secaderos de Biomasa S.A. (SEDEBISA) is in charge of all processes for obtaining olive kernel oil. This includes storing the pomace (crushed pits and flesh) in basins and obtaining 2 types of olive pomace oil.

Compañía Energética Pata de Mulo, S.A. (CEPALO) operates the olive waste treatment and reduction plant. For this function, a combined-cycle cogeneration plant was built. The flue gas from the gas turbine is employed in the pomace dryers, which also form part of the complex.

Biomasas de Puente Genil, S.A. operates the biomass waste-to-energy plant which is fuelled with the remains of the olive pulp after the pomace oil has been obtained.