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ON THE BIOECONOMY
AND THE CIRCULAR ECONOMY

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- Ellen MacArthur: We Must Network with Universities
- Dossier France: 50 Measures for Circularity

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- Mines: When There is Nothing Left to Extract
- Cobalt Shortages Ahead

Greece Dossier/Bioeconomy: A Way Out of the Crisis

- Sustainable and Circular: The Bioeconomy According to Brussels
- Solaris Tobacco: A New Hope for Aviation Biofuel

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Dossier Greece

A Way Out of the Crisis

With a €27 billion turnover and employing 500,000 people, the bioeconomy in Greece can represent a key factor for economic growth without neglecting sustainability and the fight against climate change. Urban, agricultural and food waste as well as marine biomass are the sectors with the greatest potential.

by Mario Bonaccorso

Greece's rescue package amounts to €290 billion over the last eight years. However, for Athens it mainly boils down to blood and tears. According to the Organisation for Economic Cooperation and Development, public spending cuts and higher taxation have come hand in hand with poverty for over one-third of the population. Household income has dropped by over 30%, 25% of GDP has vanished and unemployment reached a record high of 27% in 2013.

Today, things seem to be getting better: GDP is once again growing, thanks mainly to the tourist industry, and unemployment has dropped to 19.5% (although it is still the highest in the Eurozone). However, the light at the end of the crisis tunnel is still quite far off in the distance. Against this backdrop the development of a Greek circular bioeconomy could become a key factor in combining a return to economic growth with environmental sustainability and the fight against climate change. Businesses, researchers and all stakeholders are very much persuaded and are requesting an action plan to bolster this meta-sector that the European Union continues to support vigorously with measures such as the recent

update of the Bioeconomy Strategy, launched in 2012.

A National Strategy

Although there is still no Greek national strategy on the bioeconomy, in May 2018, the Mediterranean country set up an early strategy for the circular economy, thanks to the Ministry for the Environment and Energy.

SEV Business Council for Sustainable Development, a non-profit association created by SEV (Hellenic Federation of Enterprises), reckons that at least €100 billion investment is needed by 2020 to close the gap of disinvestments that occurred between 2010 and 2016 in Greece. Together with the on-going brain drain that has affected human capital and innovation potential; prolonged disinvestments represent a huge hurdle to Greece's future growth opportunities.

"The circular economy model – as stated in a study on the circular economy in Greece carried out by EY in May 2016 and commissioned by SEV – could promote a leap forward for an ensuing transformation phase, allowing Greece to go back to sustainable growth. By tackling technological and biological product lifecycles, both upstream and downstream through key

industrial sectors, the circular economy could contribute to change the way the entire economy works, spur the creation of jobs and promote investments.”

“Meanwhile – continues the EY report – in Greece, the circular economy could promote the necessary dialogue for the resolution of chronic conflicts such as in waste management, including issues of reuse, stocking and treatment. A dialogue with national, regional and local authorities as well as businesses, industries and civil society is necessary for mindset changing on the issue of waste, both urban and industrial, on its treatment and landfill locations, in order to avoid EU sanctions due to either inadmissible or dysfunctional deposit or landfill facilities.”

The Bioeconomy in Numbers

According to the Greek Ministry for Rural Development & Food the bioeconomy generates approximately €27 billion in turnover and employs 500,000 people in the country. 80% of such figures are directly or indirectly connected to agriculture, which alone contributes 4.1% of GDP. Currently, only part of agricultural waste is used as raw material to develop bioproducts or bioenergy. This is why insiders believe its potential could be really interesting, together with marine biomass, urban and food waste.

A detailed analysis is outlined in the paper published in July in *The EuroBiotech Journal* entitled “Bio-economy in Greece: Current Trends and the Road Ahead,” underlining how in Greece almost 500 kilograms of waste per capita are produced every year, with an annual cost for collection standing at one billion euros. Most of such waste (81%) ends up in legal or illegal landfills, 17% is recycled and only 2% is composted. Illegal landfills – fully in line with the EY study – are regarded

as an economic scourge for the Country, which from 2014 to 2018 was forced to pay €48 million in fines.

In Greece, food waste amounts to 80 kilograms per capita per year over the entire supply chain. The food industry is one of the most developed sectors, representing over one quarter of Greece’s industrial system. The study reminds us that, to assess the possible use of food waste as raw material for new bioproducts, the Municipality of Halandri in Athens is implementing a project funded by the Horizon 2020 Programme (Waste4Think) to develop the necessary infrastructure for efficient waste management.

A Bioeconomy Forum

To encourage widespread debate and pressure on the government, in order to set up an early national strategy on the bioeconomy, a Forum on the Bioeconomy has been created and acts as a sort of think tank providing all Greek stakeholders with the chance to meet up, share information and network. One of the Forum’s key objectives is to raise public and legislator awareness with regards to the huge opportunities offered by the bioeconomy and the circular economy. The Forum singled out a few barriers hindering the spread of a Greek bioeconomy, namely: excessive fragmentation of agricultural estates that in turn leads to the absence of a reliable logistical network and long-term supply of raw materials; the high price of raw materials; and the low-level education of farmers and their advanced age (60% of farmers are over 45). Furthermore, there is the instability of environmental taxation, excessive red tape, absence of appropriate financing mechanisms and incentives to create a green market, and most notably poor citizen awareness of the economic and environmental benefits of the bioeconomy.

EY Study on the Circular Economy in Greece, May 2016;
[www.ey.com/Publication/vwLUAssets/EY-study-on-the-circular-economy-in-greece/\\$FILE/EY-study-on-the-circular-economy-in-greece.pdf](http://www.ey.com/Publication/vwLUAssets/EY-study-on-the-circular-economy-in-greece/$FILE/EY-study-on-the-circular-economy-in-greece.pdf)



The Prime Minister of Greece Mr. Alexis Tsipras is informed by Ms Electra Papadopoulou / CHIMAR HELLAS SA on hemp and kenaf particle boards and Mr. Panagiotis Stathopoulos / University of Athens on oils and cosmetics made from hemp oil, at the 82nd Thessaloniki International Fair (2017)

Items made with dead leaf from the vascular sea plant “Posidonia Oceanica”
by PHEE/Greece



The Role of the Sea

Greece boasts over 13,000 kilometres of coastline. Mediterranean waters can thus represent a massive resource for the Hellenic bioeconomy. According to a survey carried out in September 2017 by ELSTAT (Hellenic Statistical Authority), in 2016 the volume of fishing and aquaculture reached about 198,000 tonnes, thus generating an income in excess of €780 million. Greece possesses the largest fishing fleet in Europe (18% of the total) and fish processing creates up to 70% of liquid and solid waste. Pelagic fish filleting alone generates 44% of solid waste, which has great potential since the biomass is extremely rich in components with high biological added value.

One of Europe's leading marine centres is the Hellenic Centre for Marine Research. It is a government research centre dating back to 1912 that is supported by the Ministry for Research and Education and supervised by the General Secretariat for Research and Technology. It also includes the Institute of Marine Biology, Biotechnology and Aquaculture – one of the partners of the BlueMed Initiative – coordinated by the CNR (Italian Research Council). BlueMed is a research and innovation initiative for the promotion of the blue economy in the Mediterranean area, through cooperation and a framework strategy for Mediterranean Countries to work together for a healthy, safe and productive Mediterranean. BlueMed aims to create new “blue” jobs, social wellbeing and sustainable growth in the marine and maritime sectors through the implementation of its strategic agenda for research and innovation, BlueMed Sria.

“Amongst Europe's seas – as the project's

partners write in the first update of the strategic agenda in April 2017 – the Mediterranean is unrivalled with regards to biodiversity and links between human activities and environmental characteristics. It is rapidly reacting to both natural and anthropogenic pressures. Climate change, growing maritime traffic and pollution, overexploitation of fish stocks and invasion of exotic species are amongst the stress factors undermining the region. Meanwhile, the Mediterranean's unique characteristics offer important local opportunities for blue growth and employment, from fishing to tourism.”

Towards a Greek Bioeconomy

George Sakellaris founded the “Bioeconomy in Greece” initiative in 2012 with the aim to map out the Greek bioeconomy players and promote their collaboration, he is also currently a consultant for the bioeconomy at the University of South Bohemia in the Czech Republic. He highlights a few simple measures that Greece should adopt so as to become a competitive player in Europe's bioeconomy: “First of all, it is necessary to carry out a systematic analysis of the existing potential in terms of resources and processes and to be able to transform these in economic terms, starting from the energy, agribusiness production and waste exploration sectors.”

According to Sakellaris, to achieve a full development of the bioeconomy in Greece, education and raising public awareness are key factors. “Greece is already involved in actions regarding bioeconomy education on a European level.” However, without a national strategy and a relevant action plan it will be tricky to go down the right path.

“Bio-economy in Greece: Current trends and the road ahead,”
The EuroBiotech Journal,
v. 2, n. 3, July 2018;
<https://content.sciendo.com/view/journals/ebtj/2/3/article-p137.xml>

Interview

by M. B.

Agriculture is the Main Actor

Constantinos Vorgias, University of Athens



Constantinos Vorgias is a Biochemistry Professor at the National and Kapodistrian University of Athens. He is one of the main players in the Greek Bioeconomy Forum.

One of the protagonists of the Greek Bioeconomy Forum, Constantinos Vorgias, tells us about the great potential for a Greek bioeconomy; whilst not shying away from its weaknesses and describing the need for increased public awareness.

What are the strengths of the Greek Bioeconomy?

"Greece is slowly recovering from a financial, political and structural crisis. My personal impression is that 2019 will be a very positive and important year, even if by mid 2019 we have an election at the National and European level. Many people in Greece facilitate the bioeconomy concept, however they have not yet defined themselves as part of the Greek bioeconomy operational network. This is because they are overwhelmed by terms such as sustainability, circular economy, environmental protection and waste recycling. From my perspective, the strengths of the Greek bioeconomy can be briefly described as: (a) unexplored potential at all levels, with plenty of room for new activities; (b) very low exploitation of our natural resources, particularly due to the high biodiversity in the terrestrial and marine environments; (c) manpower: many well educated young people are unemployed and probably ready to reconsider their professional profiles; (d) structures in primary production and related industries exist either at a family or small operational level, therefore a clustering initiative is more than essential; (e) the geographical location of Greece is of particular interest since Greece is a stable and safe country with good access to the Middle East and the Arab World and can therefore become the natural gateway to these markets; and (f) the mild climate and existing infrastructure are major economic assets."

What about the weaknesses?

"The weaknesses are also worth considering: lack of political willingness; lack of specific education at all levels; very weak participation in major European networks; absence of feasibility studies; low perception of the sustainability potential; lack of public awareness; lack of substantial efforts to create a framework for the marketability of 'green' innovations; instability in the institutional and taxation environments; disorganised and costly supply chain of raw materials; bureaucratic licensing difficulties; low technical training of farmers; and reduction of employment in the primary sector.

Converting this information into numbers, the Greek bioeconomy sector has a turnover of around 27 billion euros and half a million employees of

which around 80% work in the agricultural sector. Only around 3% of the currently available biomass is being exploited (mostly as fuel), whereas unexploited agro-industrial residues can yield about 10.2 PJ (Petajoule). It is estimated that waste generation in Greece is 57,983,751 tonnes per year, including agricultural and industrial waste (53%) and livestock manure (47%). Based on an anaerobic treatment scenario, 21.9 TWh of electricity could be generated, accounting for 39% of the gross electricity consumption in Greece."

Who are the major Bioeconomy players in Greece?

"The major bioeconomy player, in terms of production, is the dispersed agricultural sector. In 2017 the agricultural sector contributed to 4.1% of GDP, of which 70% was constituted by agricultural products and 30% animal products. On top of the 25-biogas plants, 12 biodiesel plants are operating in Greece producing around 130,000 m³, which accounts for 93% of the biodiesel consumed in the country's transport sector. At the academic and research levels, besides the agricultural universities, several research organisations prevail, such as: the Hellenic Centre for Marine Research; Centre for Renewable Energy; Hellenic Agricultural Organisation (HAO) DIMITER; Centre for Research and Technology-Hellas (CERTH); and The Agricultural University of Athens.

In terms of higher education, over the last few years 2 Master's degree courses have been established. The International Hellenic University (web based education) with an MSc in Bioeconomy: Biotechnology and Law; and the Master's in Bioeconomics, which is established as a collaboration between the National and Kapodistrian University of Athens (Biology Department) and the Piraeus University (Department of Economics). The Bioeconomy Laboratory is linked to the Master's in Bioeconomics and is the instrument for academia and bioindustry cooperation. Two major think tanks/clusters are active: the Greek Bioeconomy Forum, the Greek platform where individuals and stakeholders interested in bioeconomy and circular economy come together; and the cluster of Bioenergy and Environment of Western Macedonia."

Greece is still without a national bioeconomy strategy. Are there plans to implement a strategy in the short term?

"Unfortunately, Greek politicians, just like many European ones, are not familiar with the bioeconomy concept and its potential. They mostly care for waste recycling and therefore about the circular

economy. However, there are some developments: this year Greece has established a National Strategy for forests and the circular economy, and many new initiatives are on the way. Generally, we have the impression of unwillingness of the government to adopt a national strategy, although the country has signed the UN sustainability protocol launched in 2015. Therefore, it should be a mandatory bottom-up initiative. A group of experts must convene and draft a report on the potentialities and their impact on the national economy. This would be an essential step towards persuading decision makers to formulate a national strategy. To my knowledge, other EU countries are facing the same problem. In fact, so far only a few countries in Europe have a concrete National Strategy. We are considering undertaking that initiative soon, since the general picture is still blurred.”

You claim there is a lack of public awareness in Greece. What exactly is the public perception of the bioeconomy in your country?

“The general public is mainly unaware and uninformed. Furthermore, there is a negative public perception that is based on a bad precedent created by a combination of lack of accurate information and activist propaganda (e.g. the GMO issue). This pressure has forced the government to adopt extreme measures against modern biotechnology that in turn has had fatal effects on Greek agriculture and the economy.

The Greek Bioeconomy Forum is a private initiative, that started about 2 years ago, their scope is to inform the general public about the bioeconomy and to support public authorities in its dissemination and establishment throughout the country. From public response we see that participation is increasing constantly and more and more people want to learn and contribute to the various aspects of the bioeconomy. A comprehensive action plan could

include: design and organise more awareness raising activities and events around the bioeconomy; inform people about the issues that they are interested in regarding the bioeconomy; showcase examples of bio-based products, to offer a hands on experience of the bioeconomy concept; use appropriate tools for each target group exploiting knowledge assets already developed such as the Bioways toolkit; target children and young people by involving education providers in the communication loop; facilitate people in voicing their views and interests; and increase the impact of public-funded projects through collaboration among projects and active involvement of all possible stakeholders.”

You are a professor. What role does the education system play in the Greek Bioeconomy?

“At the secondary school level, a lot of work has been done over the last 20 years and the attitude of young people with regards to environmental issues has changed positively. At the University level, the Technical Universities and the Agricultural Universities are relatively active in their syllabi. However, the bioeconomy does not yet exist as a standalone course, although there are some post-graduated programmes (Master’s degrees), which I mentioned earlier. I think the critical mass point has been reached and needs to be organised under a national strategic body. I am very glad that next semester I will start the first pre-graduate course in Bioeconomy at the Piraeus University. It is also essential to have some educational material. The European initiative for Bioeconomy Education, proposed last year in Lodz, needs to gain ground so that a European Educational Consortium can provide a solid and conceptual education programme for the coming generation. The major bottle-neck for the bioeconomy at the moment is the lack of young bioeconomists. We have to work on this aspect together with the stakeholders.” ●

Bioeconomy Laboratory,
www.bioeconomylab.gr

Greek Bioeconomy
Forum,
bioeconomyforum.gr

Bioways,
www.bioways.eu

Bioeconomy Photo
Competition organised by
the Bioeconomy Forum.
First prize Mrs Ermioni
Raftopoulou

