Current status of Bioenergy in Portugal
Portugal National Day Conference
Lisbon, 27 May 2019
Current status of Bioenergy in Portugal

Portugal National Day Conference, 27th May 2019

Book of Abstracts
Foreword by the EUBCE National Supporter

Recognizing the importance of the adoption of renewable energy and particularly, of Biomass, in its contribution to the path for energy transition of our society, whose goals are well established in the PNEC 2030 - National Plan for Energy and Climate 2030, the National Committee of EUBCE that I have had the pleasure to chair, has organized a perfect forum to display the excellence of the Portuguese players in the domain of biomass technology and development. We are speaking of the Portugal National Day Conference, held on the afternoon of 27th May 2019, with the venue on the Lisbon Congress Centre, Praça das Indústrias in Lisbon. With the topic of “Current status of Bioenergy in Portugal” (http://www.eubce.com/portugal-national-day.html), this event was a hosted parallel symposium of the 27th European Biomass Conference & Exhibition, EUBCE 2019 http://www.eubce.com, the leading international conference in the biomass sector and the annual meeting point for biomass experts from all over the world, coming from research, development and industry.

The Portugal National Day Conference gathered more than 250 experts from the government, industry, academia and research. Three sessions explored biomass, a natural energy resource of the country, namely, for heat and power applications, biomass markets, that included a keynote presentation and a roundtable that discussed the challenges and solutions of creating biomass markets associated to forest and land management in Portugal and finally, forest biorefineries and emerging technologies.

Miguel Sales Dias
Member of the Board of Directors, ADENE
EUBCE National Supporter
Preface by the Portugal National Day Conference Chair

Biomass in Portugal represents about 13% of the total primary energy consumption, which accounts to about 50% of total Renewable Energy Source - RES share. Portugal’s Southern European geographical location, in the cross of the Atlantic and Mediterranean climate zones, enables a diversified agricultural and forest production leading to a diverse biomass feedstock for bioenergy and bioproducts production.

Currently, a major issue in the country is the prevention of forest fires through a sustainable forest management taking into consideration economic, environmental, and social dimensions. In this framework, the promotion of decentralized small-scale heat-producing biomass plants dimensioned for the locally identified heat needs (industrial heat networks, services or municipal equipment), is a strategy endeavor for the 2020 timeframe.

The installation of advanced biorefineries is also being considered to fully deploy a fully sustainable bioenergy-based system towards the circular bio economy goal. In this area, the National Plan for Promotion of Biorefineries (RCM nº 163/2017) is the national guideline for promoting next-generation biomass-based industries for 2030.
The Portugal National Day Conference agenda included presentations on the following topics:

- Role of biomass in the Portuguese energy system.
- Thermal energy solutions for domestic uses.
- Forest fuels for production of thermal energy for industrial applications.
- Power production from residues using a rotary kiln.
- Emerging technologies for biorefineries.
- Biomethane for use in vehicles.
- Kraft pulp and paper mills biorefineries.
- Biorefining forest biomass towards a sustainable thinking about forest, natural resources and bioenergy.

The program included a keynote speaker from Lithuania, which presented the “BALTPPOOL experience – Biomass traded as commodity”, followed by a roundtable that discussed the topic of creating biomass markets linked to forest and land management and its applicability to Portugal.

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Jorge Leite da Cunha, INESCTEC
Current status of Bioenergy in Portugal

Portugal National Day Conference, 27th May 2019

Agenda

14:30 – 14:45 | Opening Session
João Galamba, Secretary of State for Energy
Maria da Graça Carvalho, European Commission, Directorate-General Research and Innovation Member Scientific Advice Mechanism Unit, EUBCE Conference General Chair

14:45 – 16:00 | SESSION 1 – Biomass for heat and power in Portugal
Chair: Clemente Pedro Nunes, IST/University of Lisbon

14:45 – 15:00 | The role of biomass in the Portuguese energy system
João Bernardo, Director General of Energy and Geology, DGEG

14:45 – 15:10 | Biomass as a viable and cheap way to produce thermal energy for domestic heating
Nuno Sequeira, Solzaima

14:50 – 15:00 | Production of thermal energy for industrial applications
Fernando Monteiro, Ecotoro Energia

15:00 – 15:10 | The rotary kiln as a new way to produce power from bio-residues
Paulo Preto dos Santos, Termogreen
15:30 – 16:00 | Biomass traded as commodity: BALTPOOL experience

**Keynote speaker:** Nemunas Biknius, BaltPool

16:00 – 16:20 | Coffee-Break

16:20 – 17:20 | SESSION 2 – Roundtable – How to create biomass markets linked to forest/land management

Chair: Helena Freitas, University of Coimbra
Participants:
- Carlos Alegria, Portuguese Association of Energy and Biomass Producers, APEB
- Américo Mendes, Forestry Association of Vale do Sousa
- Leonel Marto, Martos, Paletes e Pellets
- Gonçalo Alves, SmartForest

17:20 – 18:20 | SESSION 3 – New biomass value chains through emerging biorefineries

Chair: Ana Luisa Fernando, New University of Lisbon

17:20 – 17:40 | Emerging technologies: An option for Portugal?
Francisco Gírio, National Laboratory for Energy and Geology LNEG

17:40 – 17:50 | Emerging technologies for effective biomass fractionation for bioliquids and biofuels
João Carlos Bordado, IST/University of Lisbon

17:50 – 18:00 | Biomethane for vehicles from MSW
Nuno Moreira, Dourogas

18:00 – 18:10 | Kraft pulp and paper mill biorefineries
Carlos Pascoal Neto, RAIZ - Forest and Paper Research Institute

18:10 – 18:20 | Biorefining forest biomass towards a sustainable thinking about forest, natural resources and bioenergy
Rui Carreira, CMC Biomassa

18:20 – 18:30 | Closing remarks
Short biographical note

Américo Carvalho Mendes holds a PhD in the field of Economics by University of Arizona (USA) (1986-1995) and has a postgraduation on economy and strategy for rural development and master course on urban and regional economy and planification by Université d’Aix-Marseille II (France) (1978-1980). He is graduated in Economic Sciences by Université des Sciences Sociales (Toulouse I).

Associate Professor of Economics, Director of the Master's Programme in Social Economics and Head of ATES - the Transversal Area of Social Economy of Católica Porto Business School. Currently, he is Director of the Post-Graduate Programme in Management of Social Economy Organizations and President of the Board of Directors of Associação para a Certificação Florestal do Tâmega.

Short abstract

1) The rupture in the integration of the removal of bushes and firewood with their traditional agrarian and domestic uses aggravating the risk of forest fires since the 50’s

2) The major barriers to the reconstruction of new forms for the removal and economic valorisation of bushes and firewood that are one of the main "public goods" which are priority to promote and to finance in order to defend forest areas with the support of public money
3) Barriers on the supply side of biomass resulting from preventive forestry works:
   (a) the public underfunding of the forest sapper program;
   b) the public underfunding of Forest Intervention Areas

4) Barriers on the demand side of biomass resulting from preventive forestry:
   (a) public underfunding of forms of integrated agricultural and livestock production with the sustainable use of forest areas;
   (b) the public underfunding of the fight against regional asymmetries.
Short biographical note

Ana Luísa Fernando, is an Associate Professor at Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Portugal. Researcher at MEtRiCs, Mechanical Engineering and Resource Sustainability Center, hosted by Universidade do Minho and Universidade NOVA de Lisboa. Graduated in Applied Chemistry, with a MSc in Food Technology, holds a PhD in Environmental Sciences.

She has been working with energy crops for more than 25 years, with special interest on studies related with the sustainability of energy crops production (use of marginal/contaminated land; efficient use of water and mineral resources; environmental impact assessment studies to detect options for systems improvement).
Short biographical note

Carlos Amaral Alegria holds a PhD and a Msc. Former Professor at Instituto Superior Técnico of Lisbon. Current Chairman of an Enterprise Industrial Group related with renewable energies. The Group has in its portfolio 3 Biomass Power Plants totalizing 40 MW electrical output and 5 cogeneration units also totalizing around 20 MW electrical output. The Group is also the owner of the first ECO hotel in Portugal where one can find all type of renewable energies: hydric, biomass, photovoltaic, thermal panels and a small cogeneration unit using vegetable oil as fuel from the restaurant. He is also President of APEB, the Association of Producers of Energy and Biomass. Simultaneous is also administrator of CBE – Biomass and Energy Center

Short abstract

The purpose of this communication is to indicate how forest ecopoints can be set up at town councils. The first step is the existence of ecopoints that are used for the populations to deposit leftovers and forest residues that they collect in their areas of residence. This solution should lead, on the one hand, to a significant reduction of fires, because it results in the cleaning of the land and, on the other hand, solves the problem of putting an end to these surpluses. The biomass deposited will then be sent for burning in biomass power stations that pay to the town councils this supply of raw material. Ultimately, this circuit gives rise to an economic use of this waste that benefits all parties: the citizens, the town councils and the biomass plants.
CARLOS PASCOAL NETO

Short biographical note

Carlos Pascoal Neto is Full Professor (“Professor Catedrático”) of the University of Aveiro (UA), Portugal, where he started his academic career in 1992. On October 2015, he left the University of Aveiro to join The Navigator Company (former Portucel Soporcel Group), as General Director of RAIZ – Forest and Paper Research Institute, the R&D Centre of the Company.

He has been Vice-Rector of the University of Aveiro for Cooperation with Society, Innovation, Technology Transfer and Entrepreneurship (2010-2015). Formerly, he has been Director of the Chemistry Department of UA (2007-2010). Carlos teaching and research activities at UA have been focused on Forest Products Chemistry and Technology. He is graduated in Chemistry by UA, “Docteur” (PhD) by the Institut National Polytechnique de Grenoble (INPG), France, and has the “Agregação” degree in Chemistry by UA.

Short abstract

Pulp and paper mills transform wood into cellulose fibres (pulp) and paper (including fine papers, tissue papers, packaging materials, among others). Wood logs are collected from plantation forests (mainly eucalyptus in the Portuguese pulp and paper industry context), debarked and converted into wood chips, thus generating forest (branches, leaves) and industrial (bark, sawdust) biomass residues. During the pulping process, roughly 50% of wood solid material (composed mainly by lignin, hemicelluloses and minor amounts of cellulose) are dissolved in the so-called black liquor, which is burnt in a boiler, aiming to recover chemicals and to produce steam. Steam is used in the industrial process or converted into electricity.
Modern kraft pulp and paper mills are evolving to integrated forest-based biorefineries where wood and biomass residues are completely converted, not only into fibres and paper products, but also generating new bioproducts, biochemicals and biofuels, some of them functionally analogues to products nowadays produced from fossil resources. These includes, among others, essential oils extracted from leaves, bioactive compounds from barks and woody residues, nanocelluloses, thermoplastic fibre-based biocomposite materials, polymers from lignin and bioethanol and other biofuels from woody residues.

The talk will be focused on the emerging opportunities for the development of kraft pulp and paper biorefineries and will be illustrated by some ongoing R&D projects at RAIZ, as well as by potential new bio-based businesses under development at The Navigator Company.
Clemente Pedro Nunes, holds an Engineering degree in 1971 and “Habilitation” in 2003, both in Chemical-Industrial Engineering by Instituto Superior Técnico (Technical University of Lisbon), and PhD in 1975 in Chemical Engineering by University of Birmingham.

Full Professor at Instituto Superior Técnico from 2004 and presently CEO of Clemente Nunes – Gestão Empresarial, Lda., Senior Researcher in CERENA and Vice Chairman of the IETS TCP in the International Energy Agency.

Member of the Board of Directors and the Executive Committee of CUF, CEO of Quimigal (1989-2007), and Director General of Higher Education at the Ministry of Education (1986-1989).
Short biographical note

Since 2002 Fernando Monteiro has focused his professional experience in maximizing the valorization of the energy content of Portuguese forest fuels for business purposes in an open market and competing, without any subsidies, with fossil fuels. He has been working in a close cooperation with local forest companies which gives him a strong practical knowledge about the real specifications and SWOTs of these fuels and biomass equipments. Ecotoro Energia is a private micro company owning three demonstration units refining forest wastes and producing MWhthermal, working 24h/day, 365 days/year, where the forests wastes are technically and economically valorized with a real energy performance of 95%, 4,06MWhthermal/ton of biomass. Fernando Monteiro has a pharmaceutical sciences degree, an MBA and is the owner of Ecotoro Energia.

Short abstract

With two demonstration units working 24h/day, 365 days/year, and a refining unit to improve the burning performance of forest fuels and improve the reliability of the biomass burning equipments, the operational experience of Ecotoro Energia demonstrates that from heterogeneous forest materials and forest wastes, thermal energy (steam & hot water) is produced at a real output of 4,06 MWh/ton of biomass forest fuel, at the top of the best examples & best practices in Europe, with 95% efficiency, up to 6.7% ash content, price competitive with natural gas in a open & free market, don’t requiring public subventions per MWhthermal produced, not competing with premium forest products for particle board, wood pellet and paper pulp industries, with strong positive impact to the reduction of carbon footprint and strong positive impact in national balance of payments.
Short biographical note

Francisco Gírio, PhD, is a Principal Researcher and Head of Bioenergy Department of LNEG-National Laboratory of Energy and Geology, Lisbon, Portugal. In his research career participated as researcher in more than 47 research projects on lignocellulose bioconversion being coordinator of 14. He is currently member of the Management Board of Bioenergy Joint Program of the European Energy Research Alliance (EERA-Bioenergy), member of the Steering Committee of the European Technology and Innovation Platform on Bioenergy (ETIP-Bioenergy), member of the Scientific Council and Board of Trustees of IMDEA Energy (Spain) and President of SIADEB - Iberoamerican Society for the Development of Biorefineries. He represents Portugal in the European Committee on Biofuels Sustainability and was the main author of the current Portuguese Plan for Promotion of Biorefineries published last Oct 25th (RCM nº63/2017). He did publish over than 90 peer-review papers and more than 200 papers and lectures in international conferences.

Short abstract

Fossil fuels depletion and climate change, in addition to the current global energy demands require the search for suitable bioenergy carriers and biofuels from renewable sources.

Both thermochemical and biochemical conversion routes are expected to be deployed in Portugal in the coming decade to produce biofuels, such as advanced ethanol, biomethane, biohydrogen, methanol and FT-diesel. Also, thermochemically produced intermediates, bio-oils, will be produced by processes such as e.g. pyrolysis and, for high moisture content feedstocks hydrothermal liquefaction is a better option. Such intermediates will predominantly be
upgraded to drop-in biofuels by refinery-like processes, either as an integrated biofuel value chain or as a co-feed to a fossil refinery value chain.

This talk shall focus on the current status of thermochemical- and biochemical-based technologies for lignocellulosic biomass (LCB) conversion in World keeping in mind both the specific biomass availabilities at national level and the foreseen new investments in Portugal as consequence of the new legislative EU framework for the next 10 years (REDII).

Acknowledgement: The author acknowledges Lars Waldheim, Waldheim Consulting, for joint contribution to some part of this work.
GONÇALO ALVES

Short biographical note

Gonçalo Alves has a degree on forestry engineering by Instituto Superior de Agronomia (1989–1996).

He has 23 years of experience in several areas of the forestry sector, having served as Chief of Staff of the Minister of Agriculture, Forestry and Rural Development, National Director of the National Forestry Authority, Member of the Board of Directors of the Biomass Energy Center, Deputy Command of the National Civil Protection Authority, and positions of management and consultant in several companies of the forestry sector.

Short abstract

The importance of the investment on the production of energy from forest biomass;
The structural constraints of the forestry sector that condition this investment;
Short, medium and long term measures to overcome these constraints.
Helena Freitas is graduated on Biology and has a PhD in Ecology, in the field of Ecology/Environmental Sciences by University of Coimbra (1989 – 1993).

Full Professor at University of Coimbra (November 2003 to present) and UNESCO Chair in Biodiversity Safeguard for Sustainable Development. From March 2011 to August 2015 was Vice-Rector of University of Coimbra.

Currently, is responsible for the coordination of the Centre for Functional Ecology at the University of Coimbra, Portugal.
FRANCISCO GÍRIO

Short biographical note

Francisco Gírio, PhD, is a Principal Researcher and Head of Bioenergy Department of LNEG—National Laboratory of Energy and Geology, Lisbon, Portugal. In his research career participated as researcher in more than 47 research projects on lignocellulose bioconversion being coordinator of 14. He is currently member of the Management Board of Bioenergy Joint Program of the European Energy Research Alliance (EERA-Bioenergy), member of the Steering Committee of the European Technology and Innovation Platform on Bioenergy (ETIP-Bioenergy), member of the Scientific Council and Board of Trustees of IMDEA Energy (Spain) and President of SIADEB—Iberoamerican Society for the Development of Biorefineries. He represents Portugal in the European Committee on Biofuels Sustainability and was the main author of the current Portuguese Plan for Promotion of Biorefineries published last Oct 25th (RCM nº63/2017). He did publish over than 90 peer-review papers and more than 200 papers and lectures in international conferences.

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JOÃO BERNARDO

Short biographical note

João Pedro Costa Correia Bernardo, born in 1965, is currently Director General of Energy and Geology (DGEG). At the same time, he is also chairman of the Executive Committee of the Innovation Support Fund (FAI) and the Executive Committee of the National Action Plan for Energy Efficiency. Since the beginning of the year, he has also assumed the chairmanship of the Board of Directors of the Center for Biomass Energy (CBE). Among other duties, he chairs the General Assembly Board of the Portuguese Energy Association (APE) and represents the energy guardianship of the Energy Regulatory Entity (ERSE) Advisory Board.

He is the national representative on the Governing Board of the International Energy Agency (IEA) in Paris and was the representative of Portugal in the Committee to support the implementation of Directive 2012/27/EU on Energy Efficiency 2012-2018 in Brussels.

He was a member of the Board of Directors of the Portuguese Energy Agency (ADENE), as a member between 2012 and 2016 and as vice-president between 2005 and 2008.

He presided over the 15 Contests for the attribution of power injection capacity and associated reception point for electric power produced in forest biomass power stations.

He has been a member of the DGEG since 1991, where he held positions of Directorate of services in the area of renewable energy, energy efficiency, transport and sustainable mobility and innovation, between 2004 and 2008. Between 2001 and 2004, had functions as Head of Division of Renewable Energies and Head of Direction of Services of Rational Use of Energy.
The forestry sector in Portugal occupies a prominent place in the national economy, contributing to about 2% of national GDP and 8% of industrial GDP. Thus, it is responsible for a volume of exports in the order of 10% of the totality of the goods of our economy, with a very high incorporation of national added value. The dynamics of this sector is based on a productive forest that occupies about 25% of the continental territory.

In spite of this wealth and importance, the territory is subject to annual cycles of forest fires, some of them large, which have jeopardized the sustainability of almost two-thirds of the continental forest area, with an average annual burned area in the last 10 years, of the order of 105 thousand hectares, an amount that is unparalleled in Europe when compared with the total area of their respective national territories.

Portugal has made a very strong commitment, both in terms of human and financial resources, to fight forest fires but whose results, in terms of reduction of burned area, do not justify the means available for this purpose and point clearly to other solutions and measures that are upstream of this problem.

Many of the countries that have similar problems have focused their efforts on forest prevention, monitoring and surveillance, including the registration, inventory and quantification of residual biomass, associated with the creation of value chains that allow the integration of their value and, consequently, the valorisation of the rural spaces and the forest. This aspect is essential for the creation of more predictable and constant revenues of the forest activity, which will permit to ensure more sustainability and security to forest owners and producers, as well as to create on them interest for investment in the forest.

Energy valorisation is one of the solutions that can contribute to create value in the forestry sector. The industries of the sector had been take advantage of the surplus of their activity in their factories, but its scope can be extended to other situations, in a decentralized way, focused on solutions of proximity that better involve local agents, municipalities, producers and populations in projects identified by them and from which they can obtain income, services or products that allow them to improve local economies and their quality of life.
Typically, the valorisation of biomass for energy, outside the context of the forest industry, was based on models of promotion of thermoelectric power plants, most of them exclusively dedicated to the production of electricity. This model, based on very low-yield power plants, around 25%, and with too high feed-in tariffs, has become unsustainable. The need to gain scale to compensate for low yields requires a high installed capacity, which necessarily leads to strong constraints associated with the availability of biomass near the powerplants.

The promotion and support to the installation of small biomass decentralized thermal power plants, which do not put much pressure on the availability of biomass and on the energy system, are more adequate to forest management. This solution, together with the creation of biorefineries that allow an integrated and total use of resources, seem to us to be better adjusted to reduce locally the fuel load in the forests, without further burdening the national tariff deficit.

Consequently, and with reference to Decree-Law no. 64/2017 of 12 June, which approves a special and extraordinary regime for the installation and operation of new forest biomass power stations, we have no doubt that it should be revised to include and prioritize these proximity solutions for the management and use of forest residues, as well as to the effective thermal needs of the consumers located on that specific territory. Within the various stages to be developed, underlying this legislative review, we highlight, for its importance:

1. Gathering of information, sources and data for the quantification of the forest biomass resource;
2. Identification and study of methodologies for the quantification of the biomass resource;
3. Mapping of the availability of the various types of biomass;
4. Technological solutions for biomass valorization;
Short biographical note

Prof Dr-Ing. Joao Bordado (Male), is Full Professor of Chemical Engineering since 2000, and now Head of the Scientific area Process and Project Engineering. He holds a MSc degree in Chemistry of Catalytic Process and PhD in Chemical Engineering. He was the first Portuguese Scientist to be distinguished with the EURCHEM Honor. After a Pos-Doc in Chemical Organic Synthesis, he ingresses in the Industrial Engineering activity as Process Engineer at Quimigal. The success on the development of new products induced an invitation to coordinate the R&D activities at Hoechst Portugal where later on became Research Director and President of the Board of Hoechst Ambiente. (25 Years of Industrial Experience). He is Author of over 250 peer reviewed articles, and Author of 52 Patents (Most of them implemented as industrial processes). In the last 20 Years all the research conducted in this group is done in close cooperation with industrial organizations and within the range TRL3 to TRL7.

Short abstract

Lignocellulosic biomass liquefaction by simultaneous depolymerization of the main components seems a promising technology due to the high process yields and mild operating conditions.

This new process was developed within a R&D Project coordinated by SECIL, involving the Scale-up and validation test run.

A summary of the main results obtained in the 3 Ton/day Liquefaction Pilot Plant are presented.
João Saldanha de Azevedo Galamba was born in Lisbon, on August 4, 1976.

Holds a degree in Economics (Universidade Nova de Lisboa), took the doctoral program in Political Science at the London School of Economics and taught Political Philosophy.

Worked at Banco Santander de Negócios, at DiamondCluster International, at the Portuguese Presidency of the Council of the European Union and at the Integrated Continuing Care Mission Unit.

Member of the Portuguese Parliament since 2019, being a member of XI, XII and XIII Legislatures. Coordinated the Members of Parliament of the Socialist Party in the Budget and Finance Committee and was Vice-President of the Socialist Party Parliamentary Group. Is currently the Secretary of State for Energy.
Short biographical note

Degree in Business Administration and postgraduate in Corporate Finance.

I worked in several credit institutions: Caixa Geral de Depósitos, Banco Pinto & Sotto Mayor, Central Banco de Investimento.

Currently and since 2008, I am Financial Director at Martos.

Short abstract

Circular Economy is the key to the success of business development in a sustainable way.

Martos, a company specialized in the production of pallets, pellets and in the valorization of pine by-products, has been implementing in its processes the concept of the Circular Economy with excellent results.

Sharing the strategic and operational approach of Martos, how it values all the raw materials it receives and how it adds value to the products it develops, is undoubtedly an added value for the scientific and business community.

The sustainability of the business goes through the practice of the Circular Economy and Martos is undoubtedly a good example of this application.
Maria da Graça Carvalho is currently a member of the Scientific Advice Mechanism Unit of the Directorate-General Research and Innovation of the European Commission. She was a senior advisor of Commissioner for Research, Science and Innovation from November 2014 to December 2015. She was a member of the European Parliament in the EPP group since July 2009 to May 2014. In this capacity she was one of the rapporteurs of Horizon 2020. She was Principal Adviser of President of the European Commission in the areas of Science, Innovation, Energy, Environment and Climate Change from 2006 to 2009. She was Minister of Science and Higher Education of the XV Constitutional Government and Minister of Science, Innovation and Higher Education of the XVI Constitutional Government of Portugal. She is a Full Professor at Instituto Superior Técnico (University of Lisbon) and she has acquired 30 years of experience in research in the areas of energy, climate change and science, technology and innovation policy. She has published 130 papers in international scientific journals and more than 300 papers in books and conference proceedings. She is, herself, the author of 2 books and the editor of 15 books and special editions of international scientific journals in the field of energy.
Short biographical note

Nemunas Biknius is the Director for Strategy & Development of holding company of energy transmission and energy exchanges - EPSO-G UAB. He is a Chairman of biomass exchange Baltpool UAB and Chairman of gas transmission system operator Amber Grid AB.

He is also on the board of electricity transmission system operator Litgrid AB.

Mr. Biknius has 20 years technological and managerial experience in energy business.

Nemunas Biknius received an undergraduate degree and an energy management graduate degree from Vilniaus Gedimino Technikos Universitetas.

Short abstract

Implementing ambitious environmental and reduction of dependency on imported fuel goals, Lithuania has dramatically changed its fuel resources composition, especially in district heating sector. From 10% of district heat produced from biomass in 2004 it reached to more than 70% in 2019 with 2,5 mln. tonnes of wood chips consumed yearly. Disruptive changes created managerial, trade and quality challenges for biomass producers, heating companies and energy regulator. In 2012 Baltpool UAB (www.baltpool.eu), part of state owned energy transmission and exchanges group EPSO-G, created and developed innovative biomass trading system offering unified biomass quality requirements, effective and transparent SPOT and long term trade, risk management, easy access to the market for the new participants and wood chip SPOT index. Now Baltpool is providing services in northern part of Europe with open worldwide opportunities.
Short biographical note

Nuno Matos Sequeira studied Business Management in Catholic University in Lisbon, from 1990-96. He has an Executive MBA in AESE/IESE, from 2004-05.

From 2004 to 2008 he was appointed Executive Director at a real estate business, managing 80,000 sqm of offices and apartments in the city of Lisbon. Since 2008, he manages Solzaima, a biomass domestic heating solutions manufacturer who has a relevant market share in Iberia, as investor and CEO.

Since 2018 he is also Founding Partner at Singularity Capital - a venture capital that invests mostly in sustainable well-being related businesses.
Short biographical note

Nuno Moreira holds a Bsc on Mechanical Engineering, a Msc in Computer Integrated Manufacturing and PhD in Industrial Management. Energy Expert (Portuguese Engineering Association)

CEO BioDourogás – Renewable gases, Chairman on International Gas Union on natural gas utilization, CEO Dourogás Gas Network Operator, NGV and LNG business

He is working on Energy Management Systems: bio-energy systems, focusing his work on the biogas purification and injection on Natural Gas pipelines. He is also working on NGV and LNG business.

Technical and economic viability of the new and clean forms of energy production and utilization. In this field, he published several papers in international conferences and in cited journals.

He is interested on the development of new technological solutions for bio-hydrogen production and use on vehicles.

Short abstract

Natural Gas on the Climate and Energy Agenda

1) The production of biogas as an enhancement of endogenous resources and their use in the energy mix, towards the climate and energy agenda.
Case study: Biogasmove-Urjais, Portugal.
The Biogasmove demonstration project represented a technological evolution in the use of biogas in Portugal. Biogas from an organic recovery plant was converted into biomethane to be used as a transport fuel. For this purpose, the project was based on the comparison of the performance of the engines of trucks of collection of urban solid waste moved to Compressed Natural Gas (CNG) and to biomethane. The main objective was to demonstrate that bio-methane, besides being a renewable, storable, clean, eco-sustainable and economically profitable resource, is also a possible and strong substitute for natural gas. This project also came to value the importance of circular economy projects, as a way of proving that it is possible to take advantage of all available resources in the production chain.

2) The use of biomethane in mobility, a factor of extreme relevance, in economies dependent on imports of fossil fuels.

3) The future of renewable gases, such as biogas, biomethane and hydrogen, in the context of a sustainable use of existing infrastructures.
Short biographical note

Preto dos Santos is a Mechanical Engineer graduated by Instituto Superior Técnico (Portugal), specialist in oil&gas, Power and Renewable Energy, with a post-graduation in Business Administration and Management by AESE/IESE - Business School from Navarra University. He has 30 years of experience in the energy sector, in areas such as Oil&Gas, Natural Gas-to-power, Biomass-to-power, and energy advisory. He worked for SHELL OIL, GALPENERGIA, WINPOWER and GESTO ENERGY.

Presently he is General Manager of TERMOGREEN, Secretary-General of APEB, the Portuguese Biomass-to-power Association, Deputy Coordinator of Energy Commission of OE - Ordem dos Engenheiros and Partner at Enertask.

Short abstract

The biomass for the production of electric energy used in central and northern Europe is usually made up of woodchips with exclusive origin in the wood.

On the contrary, biomass for the production of electricity in Portugal is very different from the biomass used in central and northern Europe and is characterized by being "residual" and almost always very contaminated with inert and other materials. The term "residual" may associate with a biomass as having little or no commercial value. In some cases, the residual biomass even has a "negative commercial value" because it represents a cost to its owners of its removal or elimination.
Examples of this biomass, also classified as bio-waste, are as follows:

- **Forest Residual Biomass** - plant material derived from forestry and forestry captivity, including only the material resulting from operations such as thinning and pruning, fuel management and the exploitation of forest stands, such as branches, pecking, stumps, leaves, roots and barks. This type of biomass usually reaches thermal power stations heavily contaminated with aggregates and other materials.

- **Agricultural Residual Biomass** - vegetable matter from agricultural captivity, namely pruning of arboreal-shrubby formations, the main agricultural residues having an energy value derived from pruning of vines, olive trees and fruit trees and the maintenance of temporary crops, such as example wheat straw, oats, barley, rice, among others.

- **Municipal Residual Biomass** - vegetable matter (usually referred to as "greens") from the captivity of maintenance of municipal gardens and the municipal collection of private gardening plant materials.

The Termogreen project is already under construction and will be a pioneer since it will be prepared to burn all types of bio-waste contaminated with high contents of aggregates and other materials.

For this reason, its first combustion chamber consists of a rotary kiln in which a pyrolysis followed by a second combustion chamber in which combustion and steam production will be completed.
RUI CARREIRA

Short biographical note

Rui Carreira is a Project Manager at WTS Portugal Lda. (engineering and conversion projects from fossil fuels to wood flour) and General Manager of RESIPIN CAMEROUN SA (production and export of pin resin) and of Techno Bois SA (forest exploration and sawmill of tropical wood).

Since 2007, CEO of CMC Biomassa (extraction plant, agripellet and wood powder producers).
Miguel Sales Dias holds a BSc (1985) in Electrical Engineering, a MSc (1989) in Electrical and Computer Engineering (Técnico IST-UTL) and a PhD (1998) in Information Sciences and Technology, in the specialty Computer Graphics and Multimedia (ISCTE-IUL), where he was an Associated Professor until 2005, holding currently an Invited Associate Professor position, teaching and conducting research in Computer Graphics - CG, Virtual and Augmented Reality – VR, AR, Ambient Assisted Living - AAL and Human-Computer Interaction - HCI. Invited Associate Professor at NOVA IMS, teaching HCI in the Information Systems degree. Coordinates the Digital Living Spaces group of ISTAR-IUL, a R&D unit of ISCTE-IUL. Member of the Board of Directors of ADENE the Portuguese Energy Agency, since early 2017, overseeing the Innovation Group, the ICT Unit, the Quality Control Unit and the Institutional and International Relations Unit. Member of the Board of Directors of MEDENER, the Mediterranean Association of National Agencies for Energy Management. Has been involved in entrepreneurship initiatives. Past Director, since 2005 and during 11 years of the first European R&D Centre in Speech and natural HCI technologies of Microsoft Corporation, in Portugal (Microsoft Language Development Center, MLDC), where, he collaborated closely with global Microsoft software product groups (in USA, China and Europe) and local teams of marketing, finance, human resources, IT, sales and services. Author of 1 patent, author, co-author or editor of 12 scientific books or journal editions, 12 indexed papers in international journals, 26 chapters in indexed international books, 144 other publications, workshops or keynotes in international conferences. Since 1992 participated or participates in 33 International R&D projects and 15 Portuguese. Project Manager of 14 R&D projects. Obtained 5 scientific prizes. Member of ACM SIGGRAPH, Eurographics, ISCA and IEEE, of editorial boards of several journals and of several IPCs of National and International conferences in CG, VR, AR, AAL. Past President of ADETTI - ISCTE-IUL R&D
PAULO PRETO DOS SANTOS

Short biographical note

Preto dos Santos is a Mechanical Engineer graduated by Instituto Superior Técnico (Portugal), specialist in oil&gas, Power and Renewable Energy, with a post-graduation in Business Administration and Management by AESE/IESE - Business School from Navarra University. He has 30 years of experience in the energy sector, in areas such as Oil&Gas, Natural Gas-to-power, Biomass-to-power, and energy advisory. He worked for SHELL OIL, GALPENERGIA, WINPOWER and GESTO ENERGY. Presently he is General Manager of TERMOGREEN, Secretary-General of APEB, the Portuguese Biomass-to-power Association, Deputy Coordinator of Energy Commission of OE - Ordem dos Engenheiros and Partner at Enertask.

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As National Supporter of the EUBCE 2019, Miguel Sales Dias coordinated the activities of the National Committee including the organization of the Portugal National day Conference, “Current status of Bioenergy in Portugal” (http://www.eubce.com/portugal-national-day.html), the Welcome Reception (http://www.eubce.com/networking/welcome-reception.html), the National Technical Tours to innovative Biomass industrial installations in Portugal (http://www.eubce.com/technical-tours.html) and the Portuguese Pavilion (http://www.eubce.com/exhibition/exhibition-layout.html) located in the industrial exhibition.

ADENE www.adene.pt, the Portuguese Energy Agency is a private non-profit association, recognized as a public interest institution, with the mission to develop and enforce activities under public policies, to promote the efficient use of energy and water, by all and every day, contributing to a more sustainable society. ADENE’s vision is to be the centre of excellence for the energy transition, mobilizer of citizens and institutions, towards a more competitive, sustainable and low-carbon economy.