

RENEWABLE ENERGY AND ENERGY EFFICIENCY

**PROCEEDINGS OF THE INTERNATIONAL SCIENTIFIC
CONFERENCE**

Jelgava, 2012

CONFERENCE ORGANISATIONAL COMMITTEE

Pēteris Rivža, Latvia University of Agriculture /Latvia/
Aleksandrs Adamovičs, Latvia University of Agriculture /Latvia/
Vilis Dubrovs̄kis, Latvia University of Agriculture /Latvia/
Imants Ziemelis, Latvia University of Agriculture /Latvia/
Ēriks Kronbergs, Latvia University of Agriculture /Latvia/
Modrīte Pelše, Latvia University of Agriculture /Latvia/
Sandija Rivža, Latvia University of Agriculture /Latvia/
Agnese Olševska, Latvia University of Agriculture /Latvia/
Evija Plone, Latvia University of Agriculture /Latvia/

CONFERENCE SCIENTIFIC ADVISORY COMMITTEE

Aleksandrs Adamovičs, Latvia University of Agriculture /Latvia/
Pēteris Rivža, Latvia University of Agriculture /Latvia/
Ole Green, Aarhus University /Denmark/
Kestutis Navickas, Aleksandras Stulginskis University /Lithuania/
Svein Skoien, Bioforsk, Norwegian Institute for Agricultural and Environmental Research /Norway/
John Morken, Norwegian University of Life Sciences /Norway/
Gints Birzietis, Latvia University of Agriculture /Latvia/
Jonas Šlepety, Lithuanian Agricultural institute /Lithuania/
Zdzislaw Wyszynski, Warsaw University of Life Sciences /Poland/
Vilis Dubrovs̄kis, Latvia University of Agriculture /Latvia/
Imants Ziemelis, Latvia University of Agriculture /Latvia/
Ēriks Kronbergs, Latvia University of Agriculture /Latvia/
Modrīte Pelše, Latvia University of Agriculture /Latvia/
Voldemārs Strīķis, Latvia University of Agriculture /Latvia/
Arnis Kalniņš, Latvia University of Agriculture /Latvia/
Zinta Gaile, Latvia University of Agriculture /Latvia/

Chief editor: **Pēteris Rivža**

Responsible compiler of the proceedings: **Sandija Rivža**

Language editors: **Inga Skuja, Sandris Ancāns**

Layout design: **Agnese Radžele-Šulce**

Cover design: **Atis Luguzs**

Acknowledgement

These proceedings are prepared within the framework of the ESF Project „Attraction of human resources to the research of the renewable energy sources”, Contract No. 2009/0225/1DP/1.1.2.0/09/APIA/VIAA/ 129.

When quoted, source reference to this issue is obligatory.

Latvia University of Agriculture, 2012

ISBN 978-9984-48-070-1

REVIEWERS

All articles included into the Proceedings were subjected to a anonymous scientific review, done by the following 26 reviewers from five countries (Germany, Latvia, Lithuania, Norway and Poland).

Aigars Indriksons	Latvia University of Agriculture /Latvia/
Ainārs Galīņš	Latvia University of Agriculture /Latvia/
Aivars Āboltiņš	Latvia University of Agriculture /Latvia/
Aivars Kakītis	Latvia University of Agriculture /Latvia/
Aldis Jansons	Latvia University of Agriculture /Latvia/
Aleksandrs Adamovičs	Latvia University of Agriculture /Latvia/
Arnis Kalnīņš	Latvia University of Agriculture /Latvia/
Biruta Jansone	Latvia University of Agriculture /Latvia/
Egīls Dzelzītis	Riga Technical University /Latvia/
Ēriks Kronbergs	Latvia University of Agriculture /Latvia/
Gotfrīds Noviks	Rezekne Higher Education Institution /Latvia/
Ilze Pelēce	Latvia University of Agriculture /Latvia/
Imants Nulle	Latvia University of Agriculture /Latvia/
Imants Ziemelis	Latvia University of Agriculture /Latvia/
John Morken	Norwegian University of Life Sciences /Norway/
Jonas Slepety	Lithuanian Agricultural institute /Lithuania/
Kestutis Navickas	Aleksandras Stulginskis University /Lithuania/
Michael Krug	Freie Universität Berlin /Germany/
Modrīte Peļše	Latvia University of Agriculture /Latvia/
Pēteris Rivža	Latvia University of Agriculture /Latvia/
Raimunds Šelegovskis	Latvia University of Agriculture /Latvia/
Vilis Dubrovskis	Latvia University of Agriculture /Latvia/
Voldemārs Strīķis	Latvia University of Agriculture /Latvia/
Zdzisław Wyszynski	Warsaw University of Life Sciences /Poland/
Zinta Gaile	Latvia University of Agriculture /Latvia/
Zofija Jankauskienė	Upytė Research Station of the Lithuanian Research Centre for Agriculture and Forestry /Lithuania/

Table of contents
Proceedings of the international scientific conference
``Renewable Energy and Energy Efficiency``

Growing and processing technologies of energy crops

Fibre crops for energy production and energy saving Winfried Schäfer	7
Industrial hemp – a promising source for biomass production Zofija Jankauskienė, Elvyra Gruzdevienė	13
Evaluation of reed resources in Kurzeme region in Latvia Edgars Čubars, Gotfrīds Noviks	19
The evaluation of dry mass yield of new energy crops and their energetic parameters Gintaras Šiaudiniš, Alvyra Šlepetiš, Danutė Karčauskienė	24
Inoculation as an element of energy saving in the cultivation technology of grain legumes under conditions of the forest-steppe of Ukraine Serhiy Kolisnyk, Svitlana Kobak	29
Cereal grain as alternative fuel in Latvia Inga Jansone, Zinta Gaile	33
Oilseed rape (<i>Brassica napus</i> ssp. <i>oleifera</i>) seed yield depending on several agro-ecological factors Oskars Balodis, Zinta Gaile	39
Comparison of different energy crops for solid fuel production in Latvia Łubova Komlajeva, Aleksandrs Adamovičs, Liena Poiša	45
Maize production for biogas in Latvia Janis Bartusevics, Zinta Gaile	51
The estimation of energy efficiency of crop rotation in long –term trials Janis Vigovskis, Daina Sarkanbarde, Agrita Svarta, Aivars Jermuss, Ludmila Agafonova	57
Reed canary grass (<i>Phalaris arundinacea</i> L.) in natural biocenosis of Latvia, research experiments and production fields Biruta Jansone, Sarmite Rancane, Peteris Berzins, Vija Stesele	61
Biomass potential of plants grown for bioenergy production Jonas Slepetyš, Zydre Kadziuliene, Lina Sarunaite, Vita Tilvikiene, Aldona Kryzeviciene	66
Oil-flax variety ‘Scorpion’ suitability of assessment for biofuels production. Liena Poiša, Aleksandrs Adamovičs	73
Energy-saving technology of maize grain conservation in big-bags Oleksandr Kurnaev	79
Effect of soil tillage and herbicides on the grain maize yield under conditions of the forest-steppe zone of Ukraine Vasyl Petrichenko, Viktor Zadorozhnyi, Olexandr Kornychuk, Volodymyr Borona	80

Biogas and biofuel production technologies

Policies and measures to promote sustainable bioenergy production and use in the Baltic Sea region Michael Krug	81
Bio-fuel from anaerobic co-digestion of the macro-algae <i>Ulva lactuca</i> and <i>Laminaria digitata</i> Shiplu Sarker, Anette Bruhn, Alastair James Ward, Henrik Bjarne Møller	86
Biomass as the main source of renewable energy in Poland Wyszyński Zdzisław, Michalska-Klimczak Beata, Pągowski Krzysztof, Kamińska Sonia	91
Small CHP plants in Latvia: reality and possibilities Tatjana Odineca	97

Specified evaluation of manure resources for production of biogas in planning region Latgale Imants Plūme, Vilis Dubrovskis, Benita Plūme	103
Analytical model and simulation of oxygen solubility in wastewater Aigars Laizāns, Andris Šnīders	109
Biogas production potential from agricultural biomass and organic residues in Latvia Vilis Dubrovskis, Vladimirs Kotelenechs, Eduards Zabarovskis , Arvids Celms, Imants Plume	115
Co-fermentation of biomass with high content of lignocelluloses for biogas producing Vilis Dubrovskis, Vladimirs Kotelenechs, Arvīds Celms, Eduards Zabarovskis	121
The Investigation of Biogas Potential in the Vidzeme Region Indulis Straume	127
The Investigation of Biogas Potential in the Pieriga Region Indulis Straume	133
GHG emissions from the usage of energy crops for biogas production. Imants Plūme, Vilis Dubrovskis, Benita Plūme	139
<i>Conditioning of the energy crop biomass compositions</i>	
Cutting properties of arranged stalk biomass Andris Kronbergs, Eriks Kronbergs, Elgars Siraks, Janis Dalbins	145
Preliminary data on the productivity of stump lifting head MCR-500 Andis Lazdiņš, Agris Zimelis, Igors Gusarevs	150
Preliminary results of estimation of forest biomass for energy potentials in final felling using a system analysis model Andis Lazdiņš, Dagnija Lazdiņa, Gaidis Klāvs	156
Heat of Combustion of Hemp and Briquettes Made of Hemp Shives Jacek Kolodziej, Maria Wladyka - Przybylak, Jerzy Mankowski, Lidia Grabowska	163
Regionally Specific Harvesting Residue Yield and Recovery Rates Used for Energy Policy Development Arnis Jurevics, Dennis Hazel, Robert Abt, Mark Megalos, Ola Sallnas	167
Influence of the particle parameters on the properties of biomass briquettes Dainis Ancāns, Aivars Kaķītis, Imants Nulle	173
Evaluation of biomass compacting mechanisms Edgars Repsa, Eriks Kronbergs, Mareks Smits	179
<i>Solar energy applications and energy efficiency technologies in buildings</i>	
Water heating effectiveness of semi-spherical solar collector Ilze Pelece, Imants Ziemelis	185
The tracking system for solar collectors with reflectors Liene Kancevica, Henriks Putans, Imants Ziemelis	189
Criteria of effectiveness evaluation of variable speed centrifugal pumps in heating and cooling systems Deniss Pilscikovs, Egils Dzelzitis	196
Experimental investigation of heat carrier flow efficiency Viktorija Zagorska, Henriks Putans, Imants Ziemelis	201
Impact of indoor temperature on energy efficiency in office buildings Galina Stankevica, Andris Kreslins	207
Air heated solar collectors and their applicability Aivars Aboltins, Guntis Rušķis, Janis Palabinskis	212
Heat transfer in external walls made from autoclaved aerated concrete Martins Vilnitis, Baiba Gaujena	218
Evaluation of parameters of radiant heating systems Jelena Psenicnaja	224

Economic and legislative aspects of the renewable energy production

Policy of the European Union in the Field of Renewable Energy Resources in the Context of Common Power Industry Policy Artis Broņka, Andra Zvirbule-Bērziņa	225
Possibilities for renewable energy production on farms Voldemārs Strīķis, Arnis Kalniņš, Arnis Lēnerts	231
Development of institutional environment to promote the usage of renewable energy resources in Latvia. Jānis Leikučs	235
Global and local challenges in the cultivation of food and energy crops Modrīte Pelše, Kaspars Naglis-Liepa	242
Risk management in renewable energy production Sandija Rivža, Pēteris Rivža	249
Learning and innovation in networks: the case of biogas production in Latvia Talis Tisenkopfs, Sandra Šūmane, Ilona Kunda	255
Possibilities for biogas production development on the LLU Training and Research farm „Vecauce” Jolanta Klāviņa, Voldemārs Strīķis	256