



Aleksandro
Stulginskio
Universitetas

THE BIOMASS ENGINEERING DEGREE PROGRAMMES FOR A SUSTAINABLE INNOVATION PARTNERSHIP IN LITHUANIA

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**ALEKSANDRAS STULGINSKIS
UNIVERSITY (ASU),
*LITHUANIA***

AGRICULTURE, FORESTRY, NATURAL RESOURCES

KEY FACTS



- **5 Faculties** (*Agronomy, Forestry and ecology, Agriculture engineering, Water and land management, Economics and management*)
- **BSc programmes/students- 22/ 3700**
- **MSc programmes/students- 21/800**
- **PhD programmes/students – 8/120**
- **International regular students-140**
- **Programmes available in English -18**



Create



TO BE DYNAMIC AND ATTRACTIVE

- Clear strategy and *mission (bio-economy a horizontal issue)*
- Strong *research* and research based *studies*
- *Quality and availability* of study programmes on demand
- Ability to attract young *talented people*
- Graduates closer to *business*
- *Knowledge* available for *transfer* and dissemination
- Entrepreneurship and **leadership**
- Sustainable *partnership*
- *Open* internationally

ASU RESEARCH PROFILE

- Bio-resources and biotechnologies for safe food production
- Forestry resources for wood and environment
- Environment quality, water resources and climate change
- Bio-resources and renewable energy
- Bio - engineering for production and environment
- Bio-economy and sustainable rural development



STRATEGIC ROLE OF RESEARCH AND INNOVATION

- Europe *2020 Strategy*: Crucial *role of research and innovation*
- The Europe 2020 flagship initiative "Innovation Union" specifies *European Innovation Partnerships (EIP)* as a new *tool for fostering innovation*
- Europe 2020 foresees *4.5 billion* Euros *for research and innovation* in the field of *food security, bio-economy and sustainable agriculture*
- *innovation* is assigned a key role for sustainable agriculture and rural development *in CAP reform package*



TO BENEFIT FROM INNOVATION MODEL OF EIP

- *bottom-up* approach
- forming *partnerships (i.e. research)*
- *linking* farmers, advisors, researchers, businesses, and other actors in *operational groups*.
- *For generating new* ideas and *integrating existing* knowledge
- *targeting* practice *needs (good for innovative technologies and products)*
- *Thematic networking(international scale opportunities).*



MEANS

Rural Development Programmes:

- Setting up "operational groups" involving farmers, advisor, agribusiness, research, and NGOs
- Combining the setting up of operational groups with project funding (investment, knowledge transfer, advisory services)
- Establishing "innovation brokers"

European Union Research Policy (Horizon 2020)

- ***Research projects***, including on-farm experiments to provide the knowledge base for innovative actions
- Interactive formats such as multi-actor projects and thematic networks

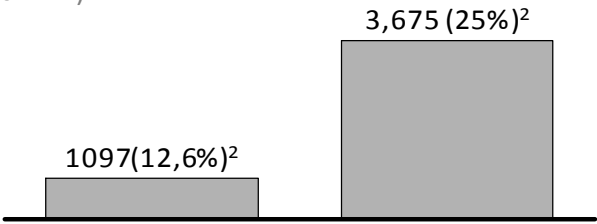
ENERGY POLICY OF LITHUANIA






- ***Most of energy resources used in Lithuania are imported.*** After the shutdown of Ignalina Nuclear Power Plant, the country is not able to satisfy its internal electricity demand at competitive prices.
- Lithuania will progressively increase the use of **renewable energy(RE) sources** in the production of ***electricity, heating, transport.***
- The target for 2020:
 - -23 % of RE in final energy consumption (*current state 20%*), including 20 % of RE in the ***electricity*** sector,
 - 60 % of RE in district ***heating*** sector
 - 10 % in the ***transport*** sector.

BIOMASS FOR ELECTRICITY

Increased electricity production from renewables is produced by combination of wind and biomass

GWh production (net MW)



| RES technology | 2011 | 2020 | Additional capacity in 2020 MW | Investment costs (capex) LTL billion |
|--|--------------|-----------------|--------------------------------|--------------------------------------|
|  Hydro ¹ | 480 (128 MW) | 470 (141 MW) | 13 | 0,1-0,2 |
|  Wind | 470 (205 MW) | 1 250 (500 MW) | 295 | 1,0-1,4 |
|  Biomass | 204 (49 MW) | 1 940 (355 MW) | 306 | 1,9-2,3 |
|  Solar | 1 MW | 15 (10 MW) | 9 | 0,2-0,3 |
|  Geothermal | N/A | N/A | N/A | N/A |
| | | 1 006 MW | 623 MW | 3,2-4,2 |

1 Excluding Kruonis Hydro Pumping Power Plant

2 Of total electricity consumption

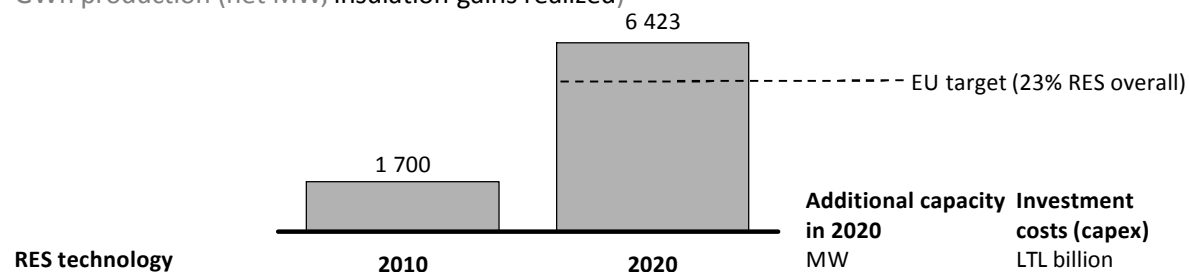
3 Mainly private investment

National Energy Strategy, 2012

BIOMASS FOR HEATING

Increased heat production from renewables is mainly from biomass in district heating sector

GWh production (net MW, insulation gains realized)



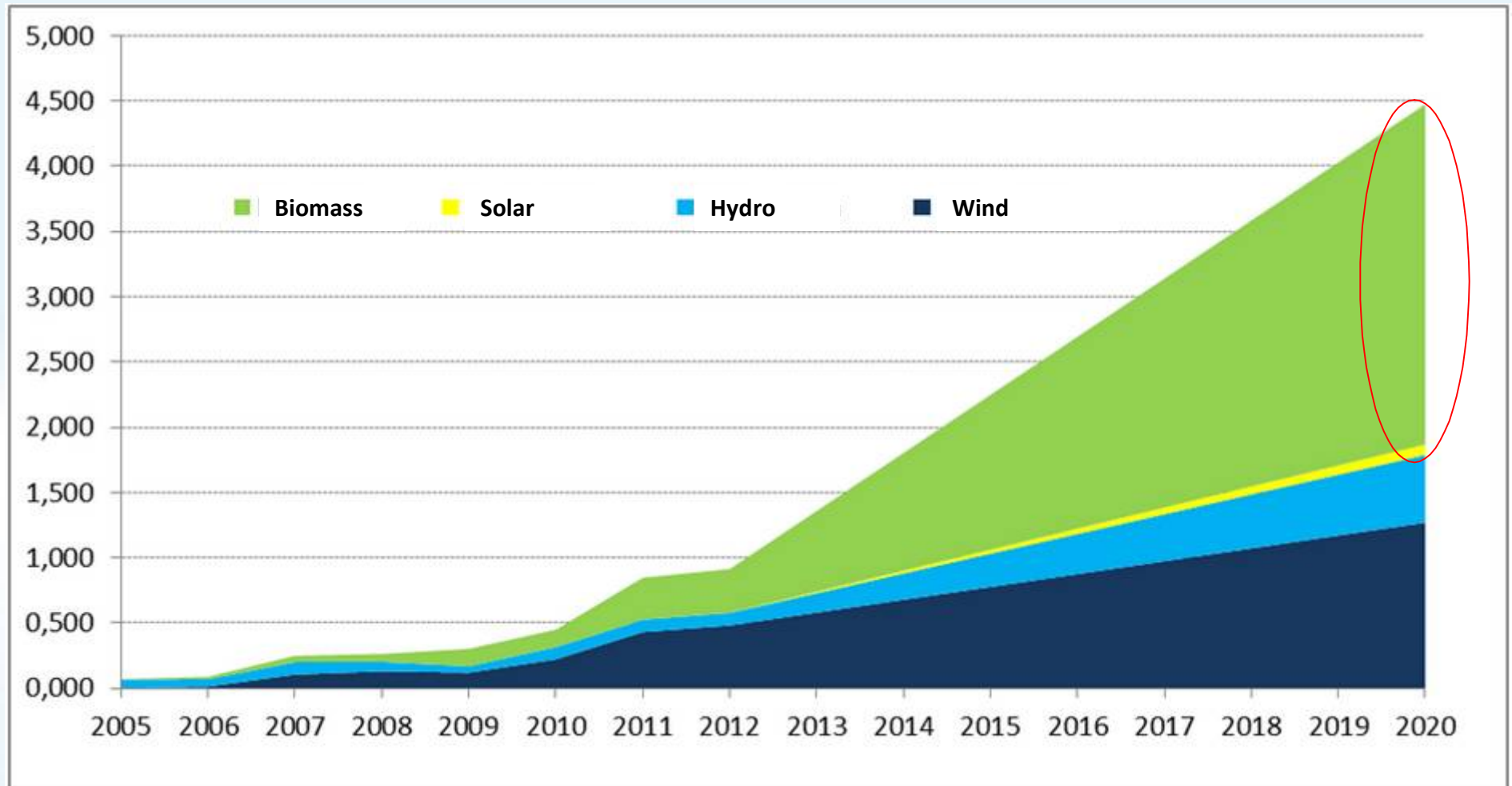
| RES technology | 2010 | 2020 | Additional capacity in 2020 MW | Investment costs (capex) LTL billion |
|--------------------------|----------------|------------------|--------------------------------|--------------------------------------|
| Biomass | 1 700 (390 MW) | 6 083 (1 425 MW) | 1 035 | 2,05 |
| CHP | 441 (80 MW) | 2 741 (600 MW) | 520 | 1,41 |
| Boilers | 1 259 (310 MW) | 2 342 (525 MW) | 215 | 0,24 |
| Boilers (support needed) | | 1 000 (300 MW) | 300 | 0,40 |
| Waste ¹ | 0 (0 MW) | 340 (60 MW) | 60 | 0,50 |

1 40% of energy production is considered renewable

National Energy Strategy, 2012

FORECAST OF RENEWABLE ELECTRICITY GENERATION FOR 2020

TWh



PARTNERSHIP WITH BIOENERGY INDUSTRIES

University is active member of bioenergy associations:

- Lithuanian Biomass Energy Association
LITBIOMA



- Lithuanian Biogas Association LBA



Main fields of collaboration :

- participation of representatives of industries *in the committees of the study programmes* and commissions of defense final thesis;
 - student's practical *training places and workplaces* in enterprises;
 - bilateral participation in seminars, conferences, courses and exhibitions and other *events relating to biomass* energy area;
 - partnership in a common *research projects*;
 - analysis and promotion of *technological innovations* in biomass energy sector.

ASOCIATION VALLEY „NEMUNAS“ MEMBERS

1. Aleksandras Stulginskis University (ASU),
2. Lithuania Health University (Vet. Academy),
3. Kaunas Technological University (KTU)
4. LAMMC
5. Koncernas "Achemos grupė",
6. UAB "Arvi" ir ko,
7. AB "Kauno grūdai",
8. Lietuvos biomass energy asociation LITBIOMA,
9. Baltijos agroverslo institutas,
10. UAB "Mestilla",
11. Farm Advisory Service
12. Lietuvos agrarinės ekonomikos institutas,
13. Mykolas Romeris University,
14. Vytautas Magnus University
15. UAB "Elinta VS",
16. UAB „Euromedienos grupė“,
17. UAB "Visalaukės technologijų parkas“.



PARTNERSHIP AND INTEGRATION

THE NEMUNAS VALLEY FOR THE LITHUANIAN AGRI-FOOD SECTOR ON ASU CAMPUS

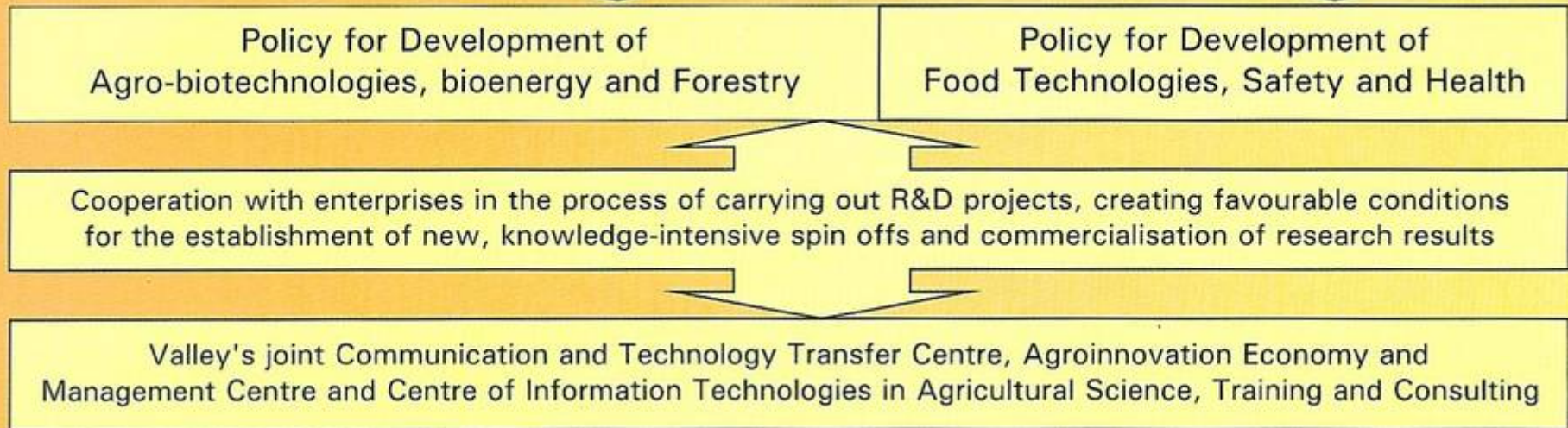
- Developing competitive *technologies* for plant and animal husbandry;
- Genetics, *biotechnology* and selection for plants and animals;
- Modern technologies and products for *food quality and safety*;
- Sustainable development of *renewable energy* i.e. biomass based.
- ***TRIANGLE OF RESEARCH-BUSINESS AND STUDIES***
- ***ADVANCED LABORATORIES***
- ***TECHNOLOGY TRANSFER***
- ***BUSINESS INCUBATION***

Organisation of the Valley "Nemunas"



R&D infrastructure of the Valley "Nemunas"

| | | | | | | | |
|--|---|---|--|---|--|------------------------------------|--|
| Centre of Agrarian and Forestry Sciences | Research, Study and Development Centre of the Forestry Sector | Plant Genetics and Biotechnology Centre | Science and Study Centre of Agroecology and Plant Biopotential | Animal Nutrition and Biotechnology Centre | Biosystem Engineering, Biomass Energy and Water Engineering Centre | Food Science and Technology Centre | Centre for Animal Health and Quality of Raw Materials of Animal Origin |
|--|---|---|--|---|--|------------------------------------|--|



**JOINT RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY
(Partners ASU and LAMMC) and
BIOSYSTEMS ENGINEERING, BIOMASS ENERGY AND WATER
ENGINEERING CENTRE**



Premises— 6332 sq.m; i.e.phytotronic greenhouse— 465 sq.m.

Total 56 modern laboratories.

✚ **ASU** has *potential* (scientists, facilities and extensive experience) in biomass resources and bio-energy production in the fields of biology and microbiology, *biomass production, processing and application technologies*.



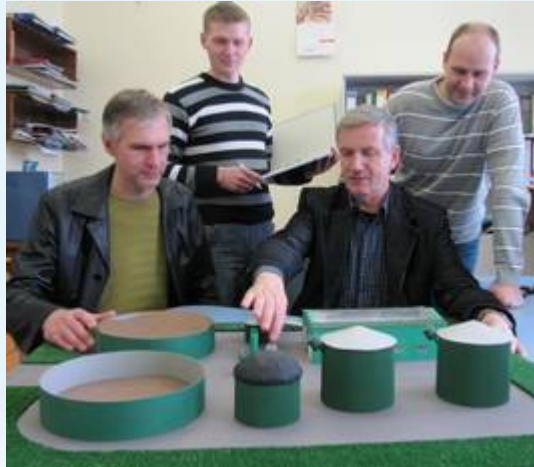
BIOGAS LABORATORY



- ✚ Tests of raw materials for biogas production;
- ✚ Process control and optimisation;
- ✚ Biogas energy conversion;
- ✚ Life cycle assessment.



BIOGAS LABORATORY



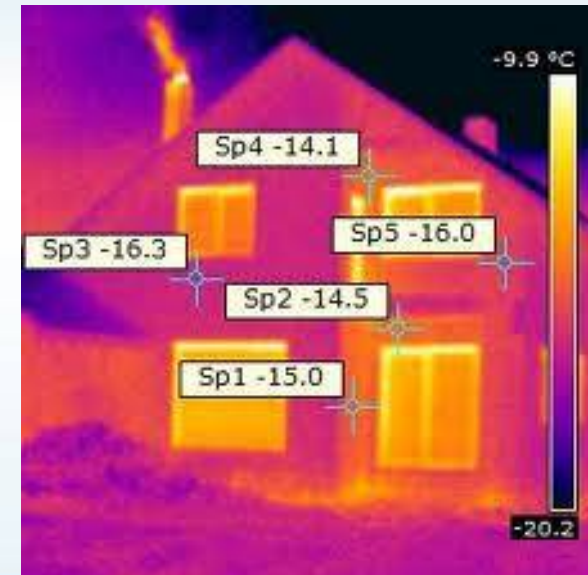
- Feasibility studies;
- Biogas technology design;
- Biogas plant monitoring;
- Consultations



LABORATORY OF BIOMASS TREATMENT AND SOLID BIOFUEL PROCESSES



- + *Application* of Renewable Energy Sources in Agriculture and Food Industries;
- + *Properties* of Biomass;
- + *Logistics* of Biomass and Biofuels;
- + Technologies of Solid Biofuel *production* and Energy *conversion*;



LABORATORY OF CHEMICAL AND BIOCHEMICAL RESEARCH FOR ENVIRONMENTAL TECHNOLOGY

Production of biofuel from MICROALGAE

- Usage of liquid waste for microalgae cultivation;
- Production of biodiesel fuel form algae oil;
- Production of biogas from algae biomass;
- Application of algae for CO₂ sorption from gases.



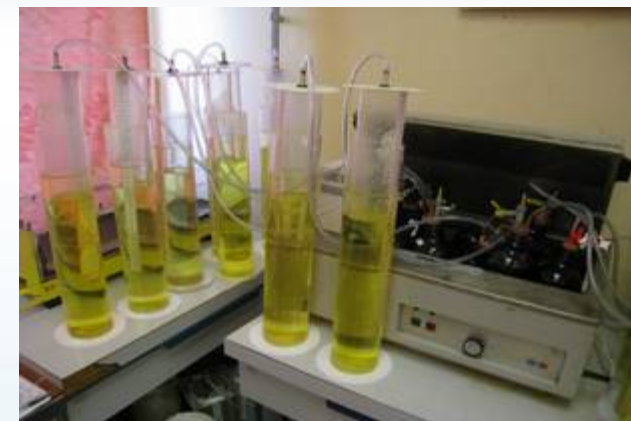
LABORATORY OF CHEMICAL AND BIOCHEMICAL RESEARCH FOR ENVIRONMENTAL TECHNOLOGY

New non-food raw materials for biodiesel fuel production:

- fatty waste of animal and vegetable origin;
- non-food oil crops.


Biogas cleaning and preparation for usage in transport sector:

- biogas production from different raw materials including waste;
- application of natural sorbents for CO₂ and H₂S removal.






BIOENERGY STUDIES

- Aleksandras Stulginskis University is ***the only*** institution in Lithuania providing studies in:
 - ***first cycle programme “Renewable Energy Resources Engineering”***
 - ***second cycle programme “Biomass Engineering”***
 - ***Programmes*** were registered and ***started in the 2011.***
 - ***Programmes, focusing on*** the main source of RE in temperate latitudes – ***biomass***, namely biomass ***growth, processing, conversion and exploitation technologies.***
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BIOENERGY STUDIES

- The 1-st cycle study programme ***Renewable Energy Resources Engineering*** is oriented towards graduates to work in the fields of:
 - production, storage and treatment of renewable energy resources (biofuels, biogas and bio-petrol) and biomass,
 - companies dealing in heat and electricity production and supply,
 - In consulting and design activities,
 - suppliers of equipment.
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BIOENERGY STUDIES

- **The aim of the 2-nd cycle study programme *Biomass Engineering*** is to expand qualification acquired in the first study cycle, to educate creative, innovative and entrepreneurial graduates, for the engineering-technological and/or scientific activity , for the application of advanced technologies in the field of biomass engineering.
- ***Graduates are ready to:*** create and improve production and conversion technologies and equipment of biomass materials, as well as to evaluate energy resources of biomass and their integration into conventional energy systems;
- ***They are able to:*** deliver consultations, coordinate projects of biomass engineering, implement innovations, as well as continue their studies in the ***third cycle***.

PHD STUDY PROGRAMMES


- Agricultural Sciences:
 - Agronomy
 - Forestry
- Biomedical Sciences:
 - ***Ecology and environment***
- Technological Sciences:
 - ***Mechanical engineering***
 - Transport engineering
 - ***Environmental engineering***
- Social Sciences:
 - Economics
 - Management and administration



ASU – Will Change Power to
Create HERE YOU CAN ACTUALLY
CHANGE THE WORLD



ACHIEVED DURING LAST YEARS

- **We have renovated laboratories and new equipment;**
 - **Expanded relationships with industries;**
 - **More research projects and high level scientific papers related with Bioenergy;**
 - **High demand of graduates;**
 - **Active collaborations with foreign universities.**
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TODAY WE ARE PROUD OF

- **MODERN RESEARCH, STUDY AND BUSINESS VALEY ON OUR CAMPUS (*including world class laboratories*)**
- **NATIONAL SCIENCE PRIZE WINNERS 2012 IN TECHNOLOGICAL SCIENCES (*BIOFUELS*)**
- **NATIONAL AWARD FOR THE BEST PhD DISSERTATION IN ENVIRONMENTAL SCIENCES 2012**

THANK YOU FOR ATTENTION
Ačiū už dėmesį

