

FOOD AND BIOENERGY – EVIDENCE FROM POLAND

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Plan of the presentation

1. Introduction
2. Energy – Food production competition
3. Aim and methods
4. Land used for biofuels production in Poland
5. Conclusions

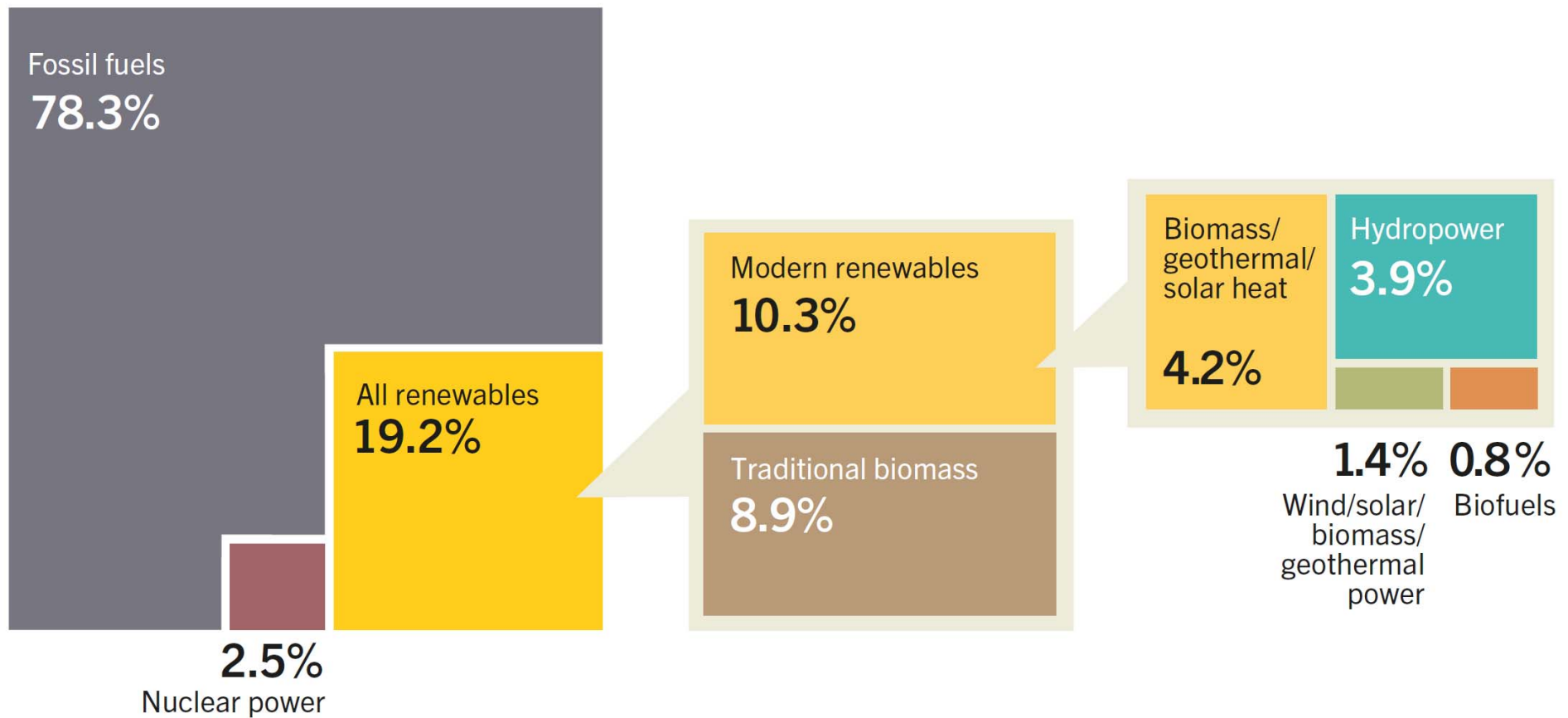


Sources of bioenergy

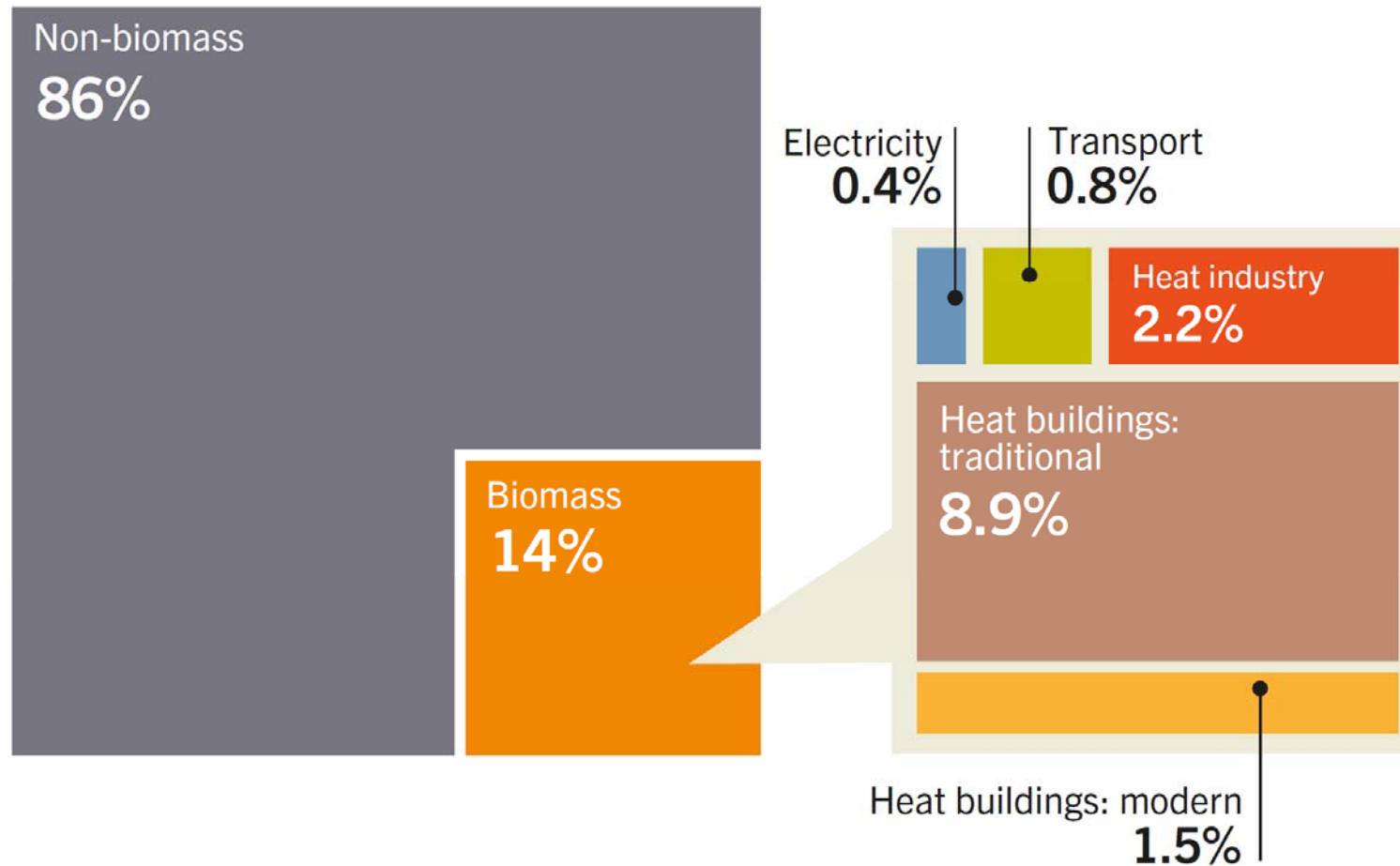
- Bioenergy draws on a **wide range** of potential feedstock materials: forestry and agricultural residues and wastes, as well as **material grown specifically for energy purposes**.
- The raw materials can be converted to **heat** for use in buildings and industry, to **electricity**, or into gaseous or liquid **fuels**, which can be used in transport, for example.



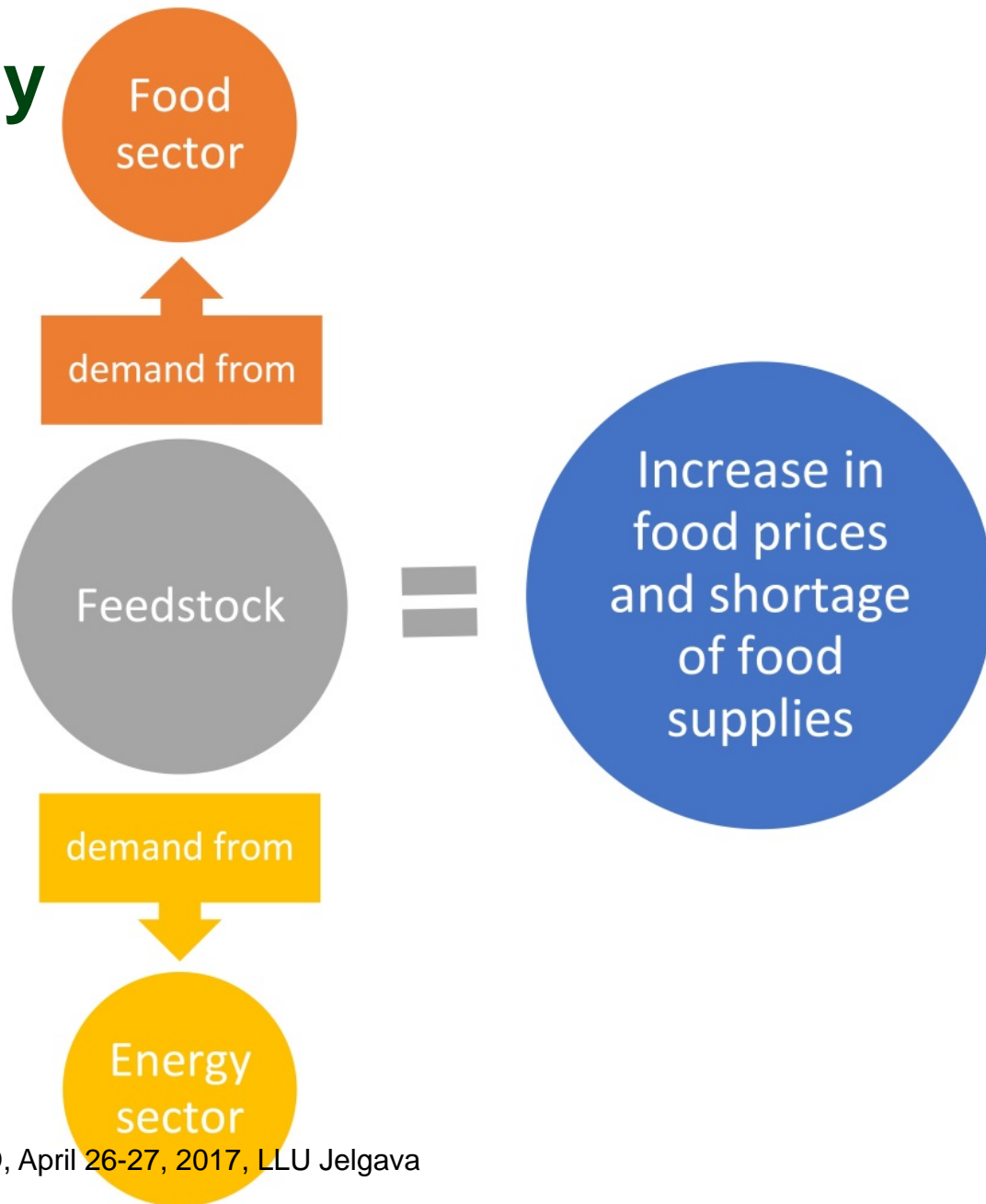
Estimated Renewable Energy Share of Global Final Energy Consumption, 2014



Share of Biomass in Total Final Energy Consumption, 2014

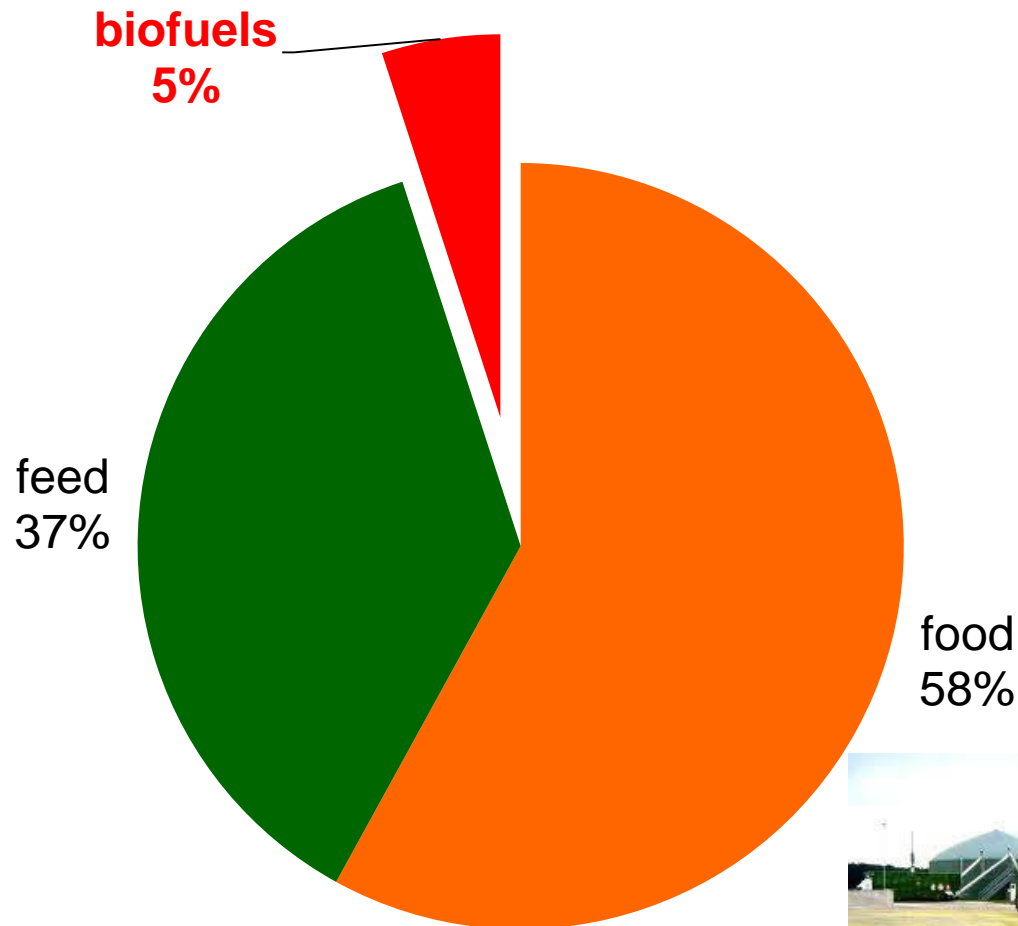


Food vs bioenergy



Structure of agriculture biomass use

Global Agrosience Market 2015-2019



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Food vs bioenergy

- Production of *primary bioenergy* from agricultural resources is closely related to food demand and supply because both energy and food crops are produced **using the same agricultural land resources**.
- The food and energy demand-supply cycles send signals to the markets to **change their prices accordingly**.



Food or biofuels

- Because agricultural land is used for production of biofuels, it is expected that **it would cause food shortages**, leading to food insecurity and **increase in food prices**.
- Proper balance **between the feedstock for energy and food production** without affecting the environment is very important.

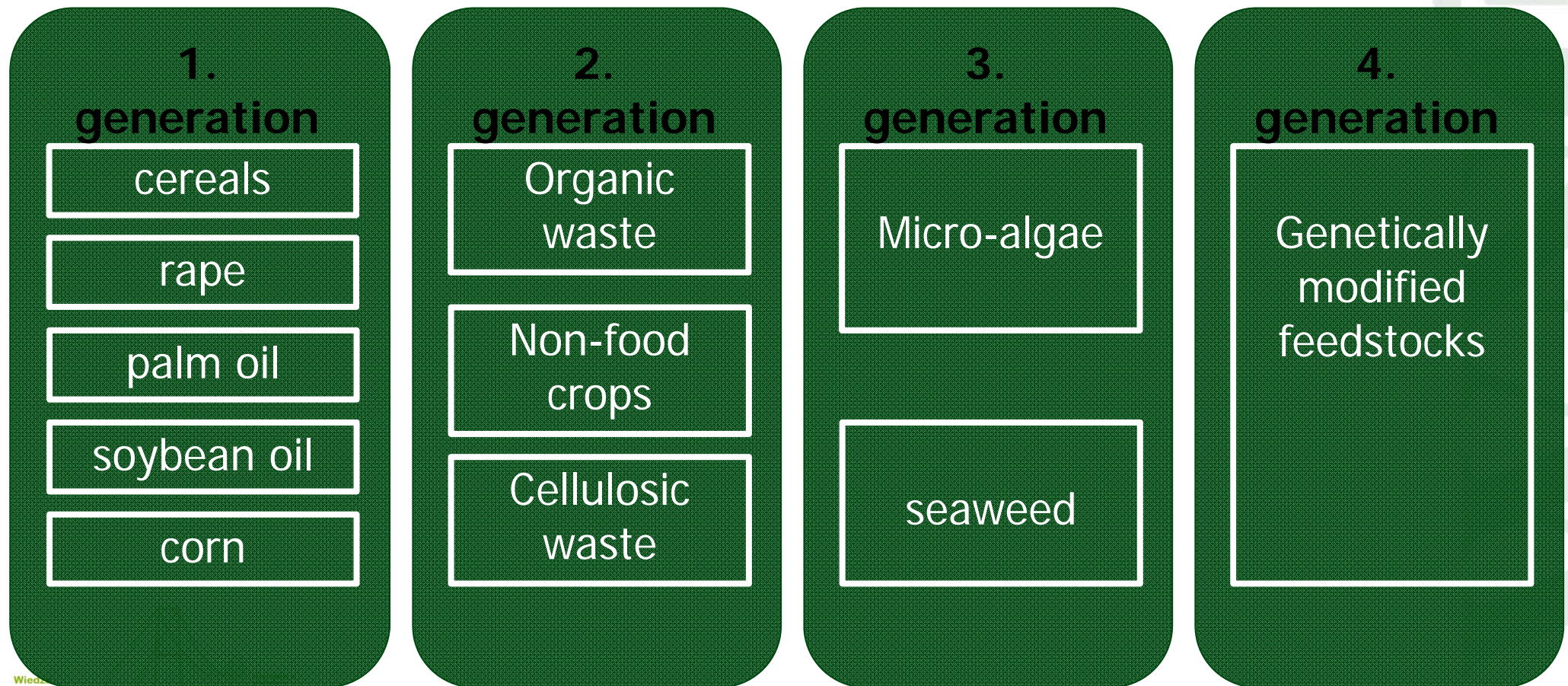


Cascading approach

- The principle of cascading use of biomass is important.
- It means that there should be an ‘**order of using**’ the varieties of biomass streams,
 - such as **food**, feed, sawnwood,
 - and then the **side streams** and residues are used for low value added products
 - (typically thought to be **energy**).



Generation of feedstocks for biorefining



Market challenges - food insecurity

- Two most popular biofuels globally are:
- **bioethanol** and
- **biodiesel**.
- Bioethanol is made from **wheat, corn, sugarcane**, etc., and
- biodiesel is made from oil seeds such as **soybeans, rape seed, and palm oil**.



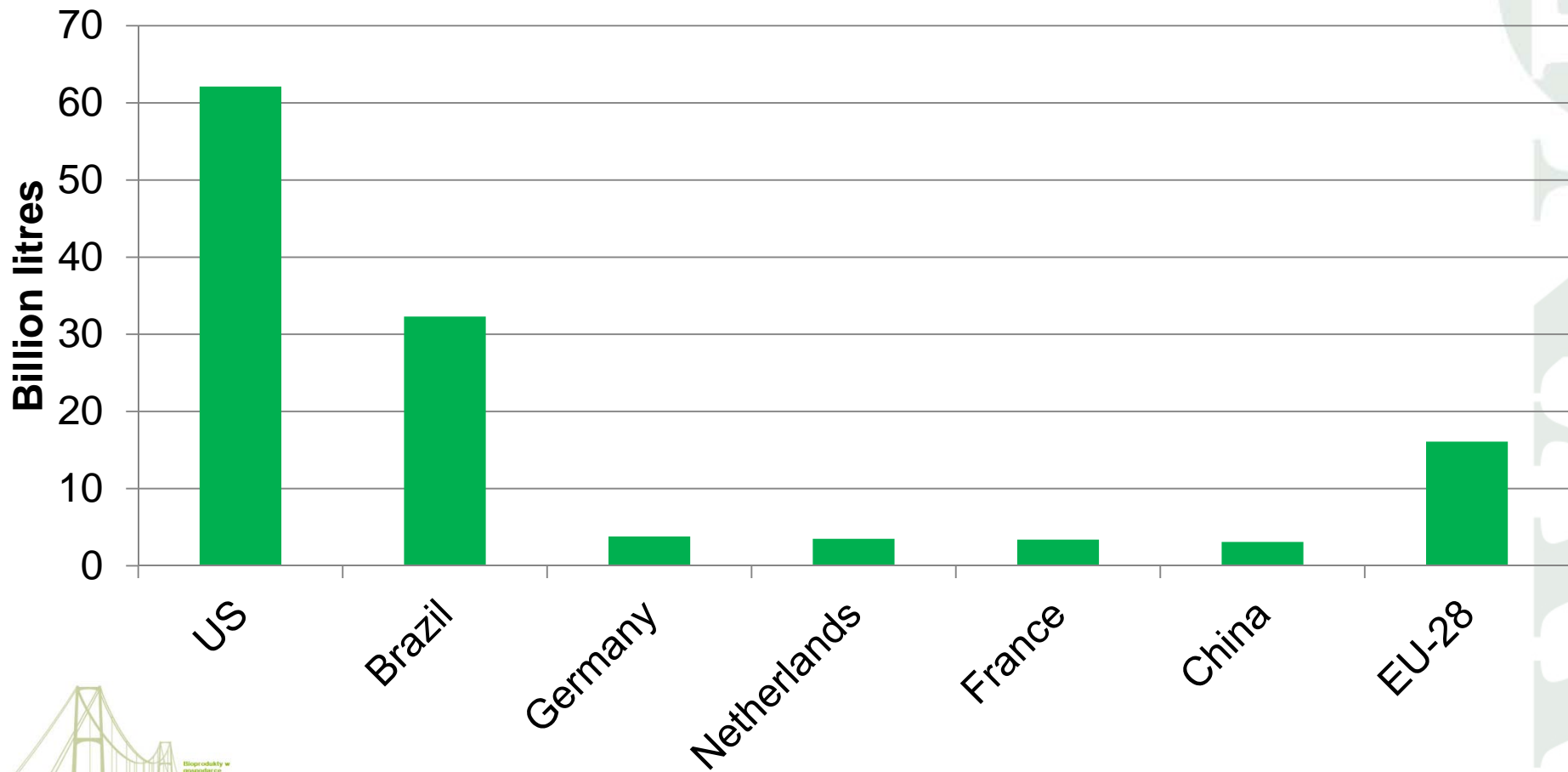
Biofuels

- Worldwide, in 2016, some **120 million tonnes of conventional biofuels** based on:
 - crops containing:
 - starch,
 - sugar or
 - vegetable oil
- were delivered, representing some 151 billion litres (**118 billion** litres of fuel ethanol and **33 billion** litres of biodiesel) – enough to cover ca **3% of the global transportation fuel demand.**

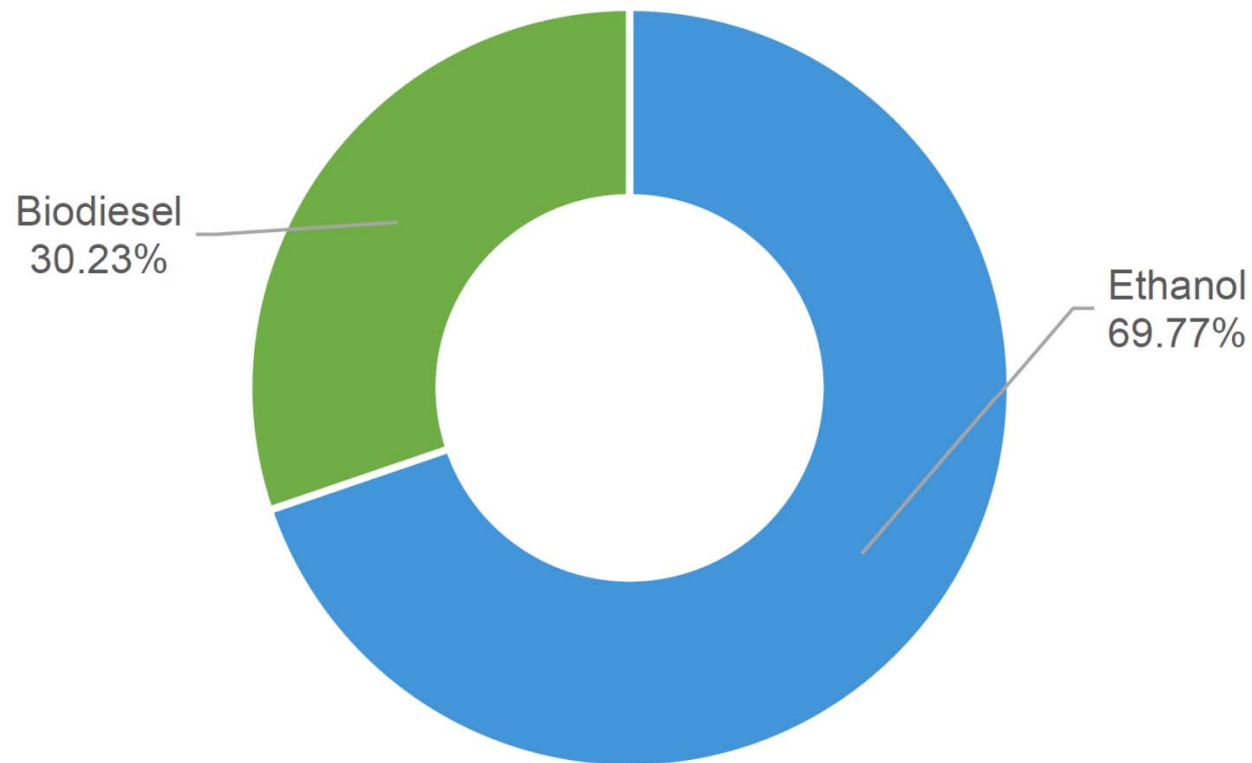


Biofuels Global Production (2015)

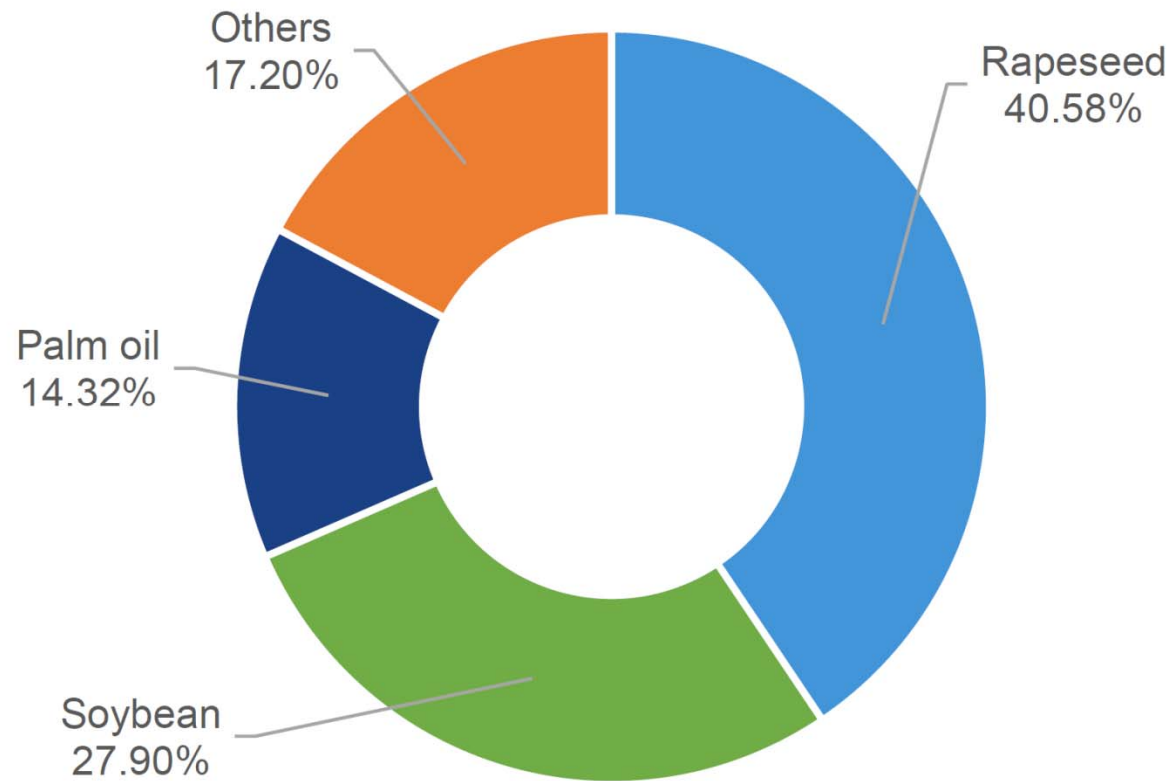
REN21. 2016.



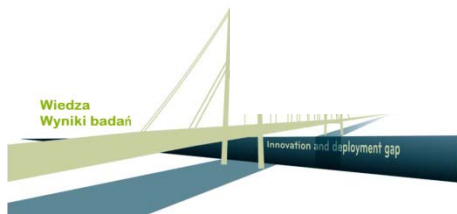
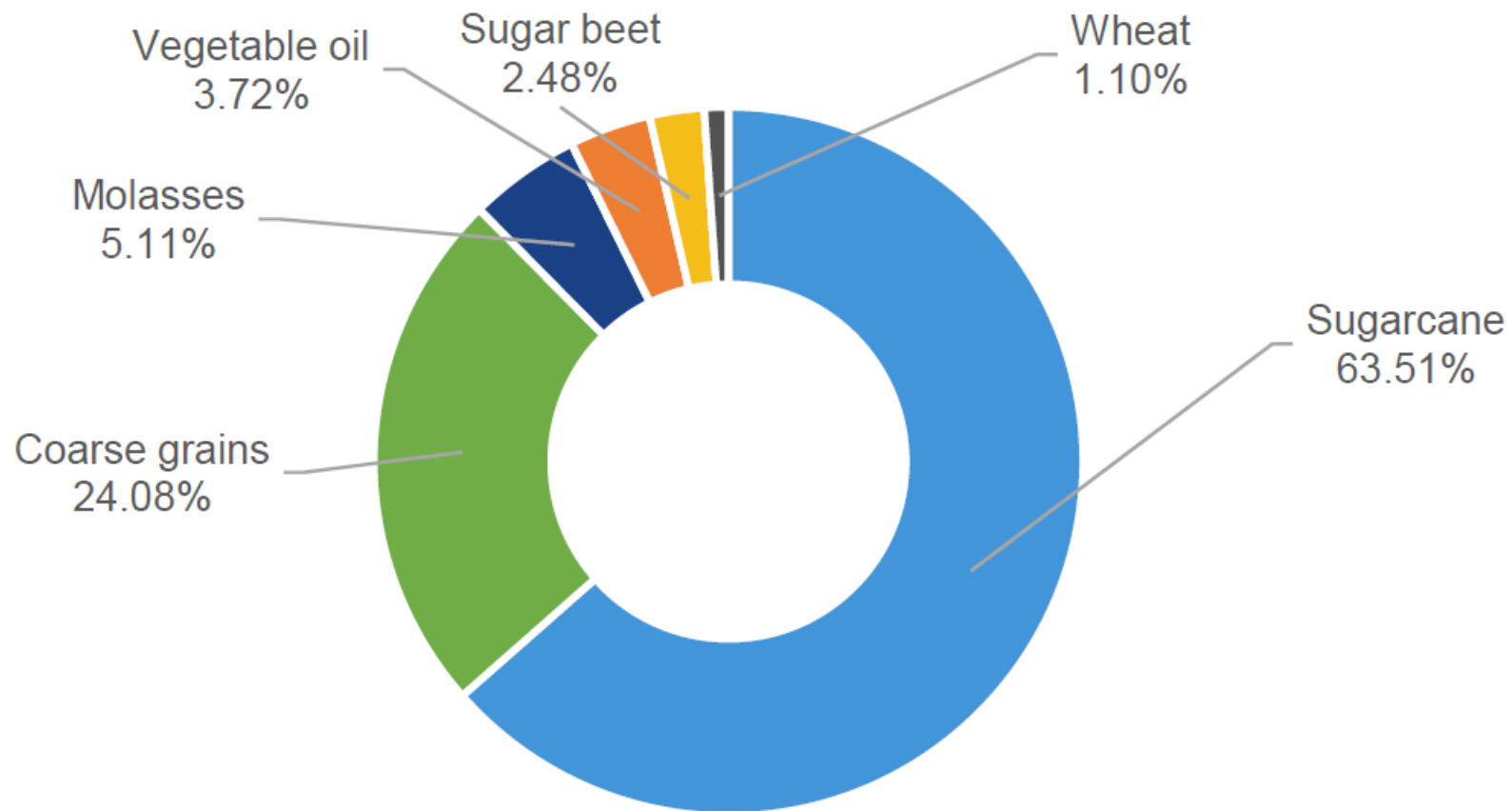
Global biofuels market by fuel type 2015



Global biofuels market by biodiesel feedstock 2015

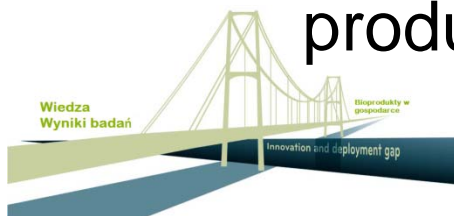


Global biofuels market by ethanol feedstock 2015



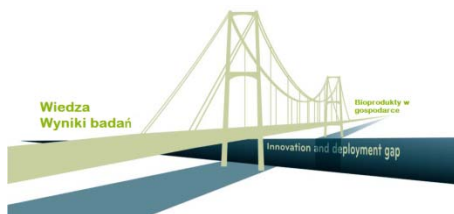
Aim

- The goal of the study is to evaluate whether production of modern biofuels competes with food production in Poland.
- Tasks:
 - 1) determination of raw materials quantities of agricultural origin used for production of biofuels;
 - 2) determination of the agricultural crops area where production is used to produce biofuels;
 - 3) determination of the agricultural area share used to produce biofuels.



Data

- The analysis covered the years 2005-2015.
- Statistical data used in this study was obtained from Central Statistical Office of Poland (GUS) and Agricultural Market Agency

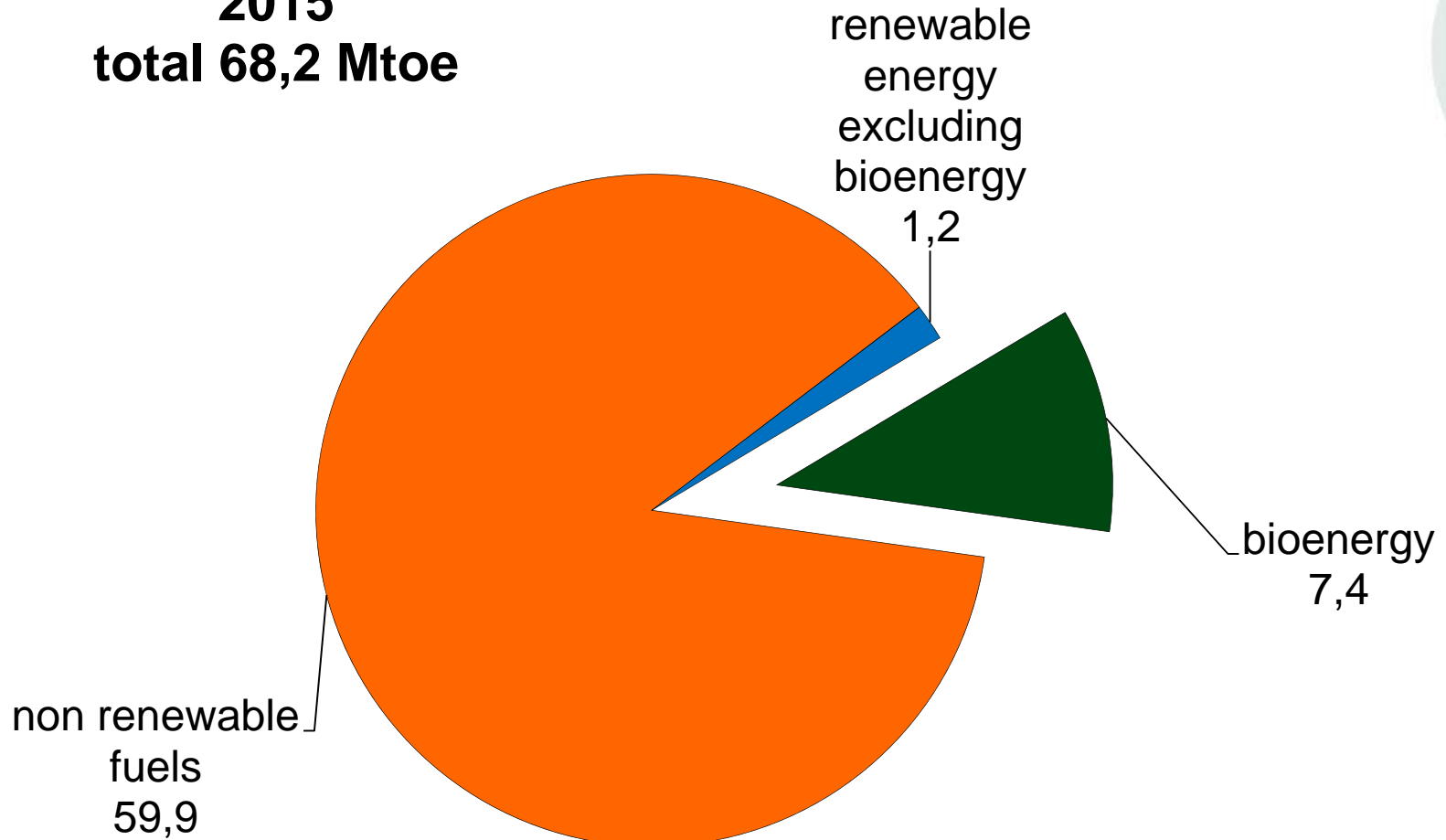


- It has been assumed that from oilseed rape we obtain on average **40% of oil** and from 1 ton of cereal grains we obtain **340 l** of ethyl alcohol.



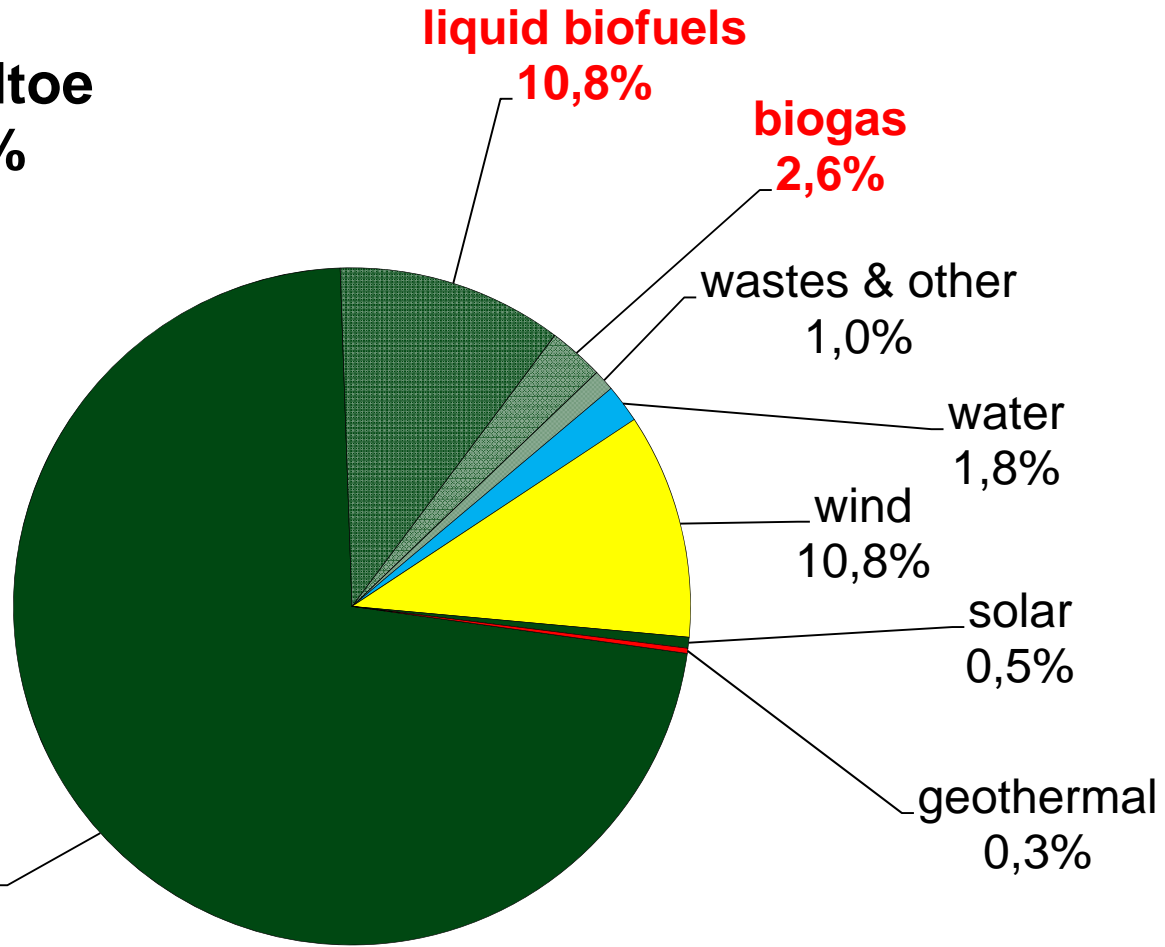
Structure of energy production in Poland

2015
total 68,2 Mtoe



Structure of renewable energy production in Poland

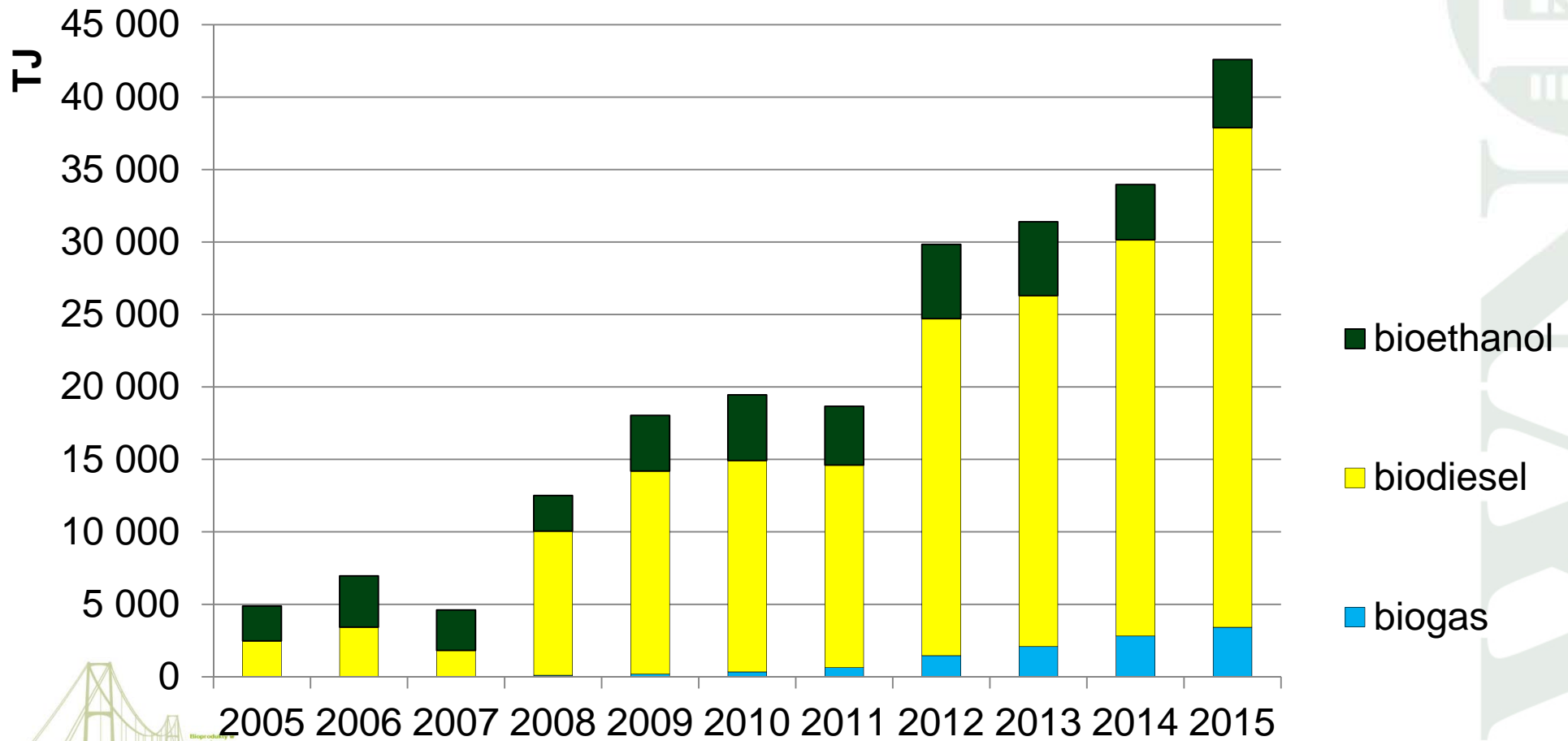
2015
Renewable – 8.7 Mtoe
Bioenergy – 86%



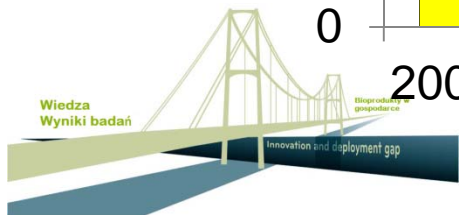
solid biofuels
72,2%



Structure of biobased energy production

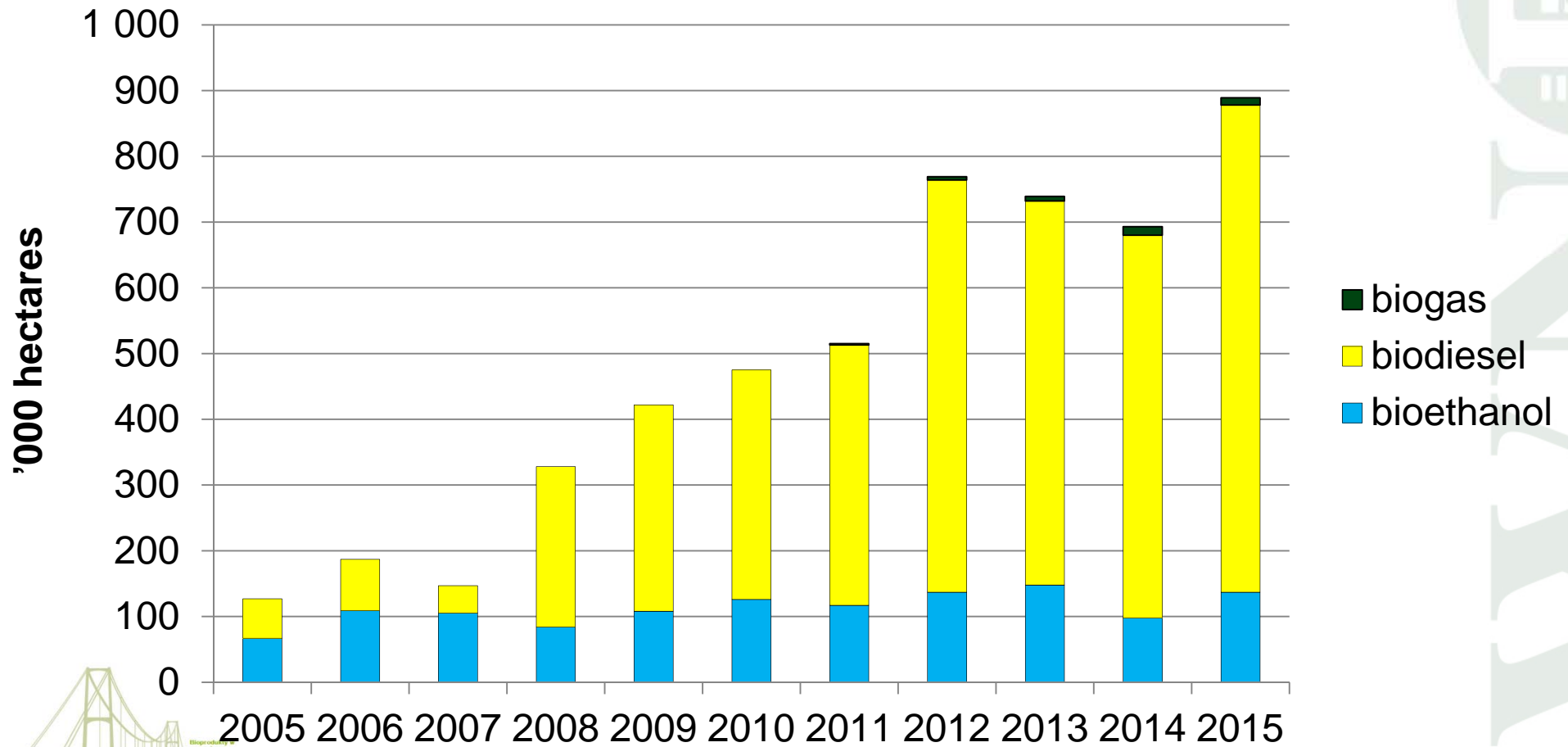


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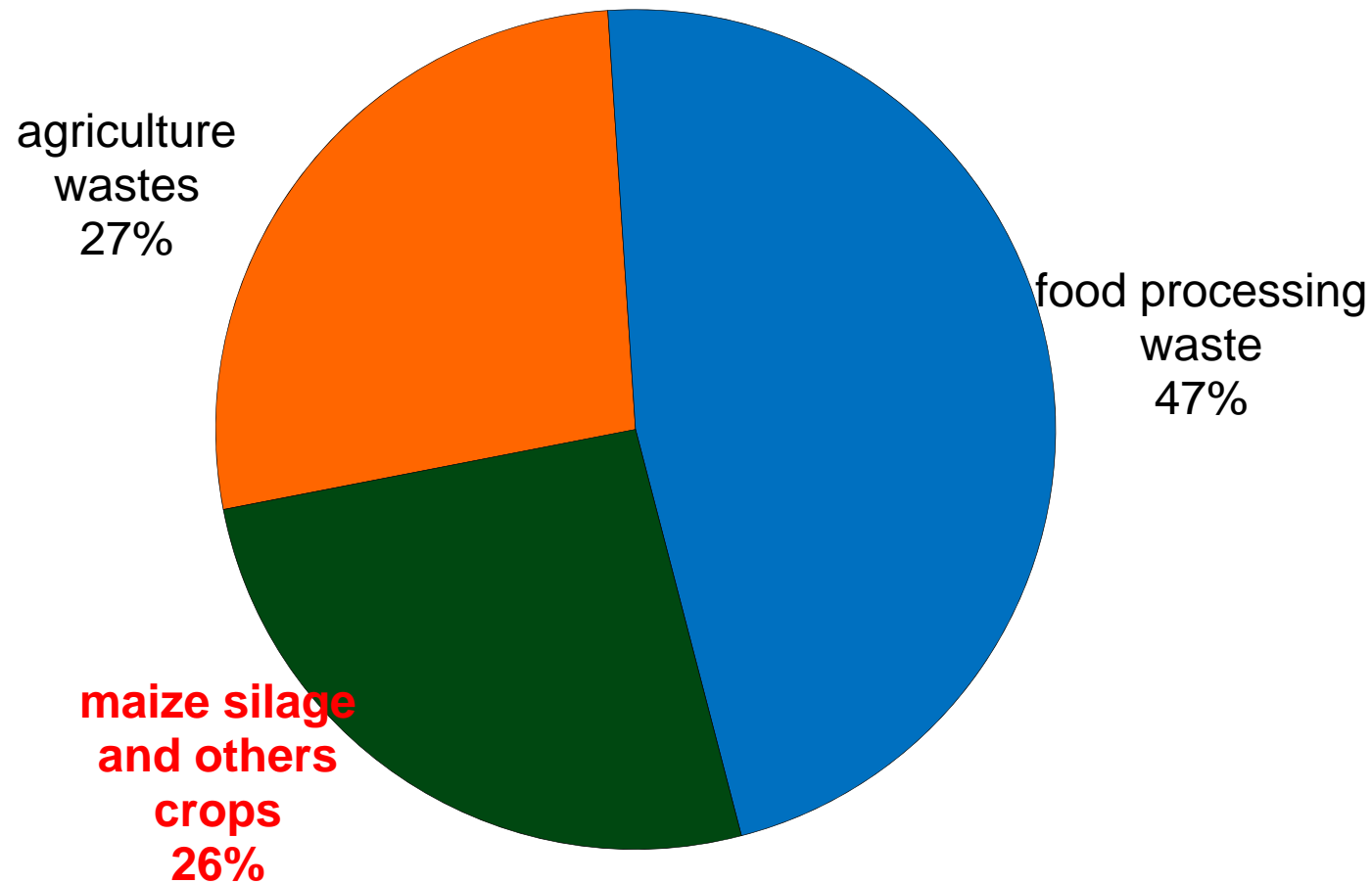


Area of crop for biofuels production in Poland

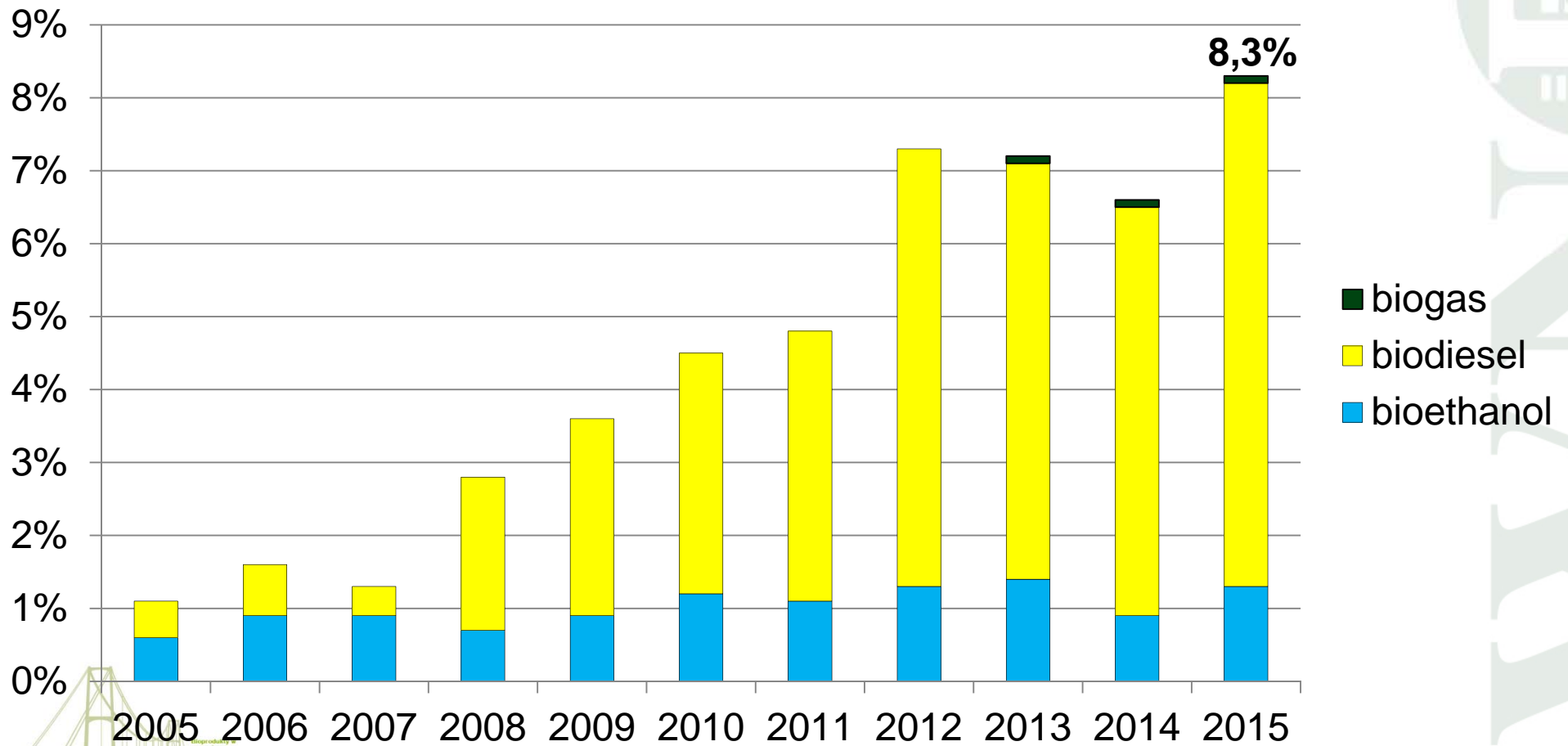
Total area of arable land – 11 mln ha



Structure of feedstock in agricultural biogas production in Poland (2015)



Share of arable land allocated for energy crops



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Conclusions

1. Renewable energy production grows all over the world. Energy from biomass has 14% in total energy consumption.
2. Modern biofuels are **still produced mainly from agricultural raw materials** (crops).
3. Production of **energy from agricultural raw materials competes with food and feed production.**



Conclusions

3. In Poland, the renewable energy constitutes 12% of energy consumption and **agricultural bioenergy constitutes only 1.5%** of total energy consumption.
4. Agricultural raw materials for production of biofuels (mainly biodiesel and bioethanol) are **produced on 8% of the arable land**.
5. Bioenergy production in Poland competes with food production; yet, **it does not limit food availability** but reduces forage production capacity .



Thank You for Your Attention

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