

Experiences of combining bioenergy production, rural development and environmental aspects in Croatia

Biljana Kulišić

Energy Institute Hrvoje Požar, Croatia



**ENRD Thematic Group on
'Bioeconomy and Climate Action in rural
areas'**

Brussels, 19 February 2020

Biljana Kulišić, PhD

Position: senior biomass researcher at the Department of Renewable Energy Sources, Energy Efficiency and Environmental Protection

- 1. IEA Bioenergy Task 43** Sustainable Biomass Supply Integration for Bioeconomy within the Broader Bioeconomy
 1. National Task Leader for Croatia
 2. WP1 leader: Biomass production systems for sustainable bioenergy within bioeconomy
- 2. BioEast Initiative:** Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy
 1. Evidence-based policy support to the Ministry of Agriculture, Croatia
 2. Thematic Working Group on Bioenergy and New Value-added Products – chair

Current assignments:

- bioenergy within the National Energy Sector Development Strategy by 2030 with the view on 2050
- NECP Croatia: bioenergy and bioeconomy (synergy between post-2020 CAP and RED II)
- Facilitating bioeconomy strategy development

Background

- PhD Agronomic Faculty, Univ. Zagreb, Croatia
 - Assessment of agricultural biomass energy potential for Croatia - fAHP
- MSc Mediterranean Agronomic Institute Chania, Greece
 - Input-output tables for building a FAME biodiesel production block for Croatia
- IFOAM – AgriBioMediterraneo
- BSc Faculty of Tourism and Hotel Management, Univ. Rijeka, Croatia
 - Sustainable Development of Primorsko-goranska county; Croatia

European Court of Auditors (1/3/2018)



- Using more RES is crucial to reduce the EU GHG emissions and its dependence on fossil fuels and imported energy and thus contribute to the security of its energy supply.
- RES can play an important role as a driver of sustainable development in rural areas.
- **In our audit, we found that there are potential synergies between RES policy and funds designated to facilitate sustainable development, but that these synergies remain mostly unrealised.**
- The EU's RES policy is not explicit enough in establishing the conditions for linking RES to rural development successfully.
- The specific funding available for rural development could play a role in achieving EU and national RES targets, but Member States did not always prioritize RES projects that could make a contribution to sustainable rural development.

same goals, different means...

	CAP/post-2020 CAP	RED I/II
Energy	Supply side: CAP with investment support	Demand side: RED II with energy “special” price
Focus	Food production, farmer’s wellbeing, vibrant rural communities	GHG reduction by maximising energy production to reach the mandated share, bioenergy bounded with sustainability issues
Players	Farmers, land owners	Investors
Scale of renewable energy plants	Micro (<50 kW) – S (<1MW)	S (<1MW) - M <6 MW) – L (>6 MW)
Location	Rural area	All options
Market interventions	Reducing but available	Phasing out

Current EAFRD:

- **Measure 4.1, Investment** farmers due to Annex I provisions may produce energy “for own use”, but not to sell to the grid;
- **Measure 6.4 Diversification**, farmers or other legal entities may receive support to produce energy to sell to the grid;
- **Measure 7, Basic services and village renewal in rural areas** public entities may produce energy as common public good, in order to heat, for instance, public buildings and/or to sell to the market under the “income generating principle”.

Based on the **post-2020 CAP proposal**, all these eligibilities are also possible under the provisions of **paragraphs 1 - 4 of Art. 68 - Investments**.

Focus on bioenergy = energy from biogas, solid biomass and biofuels for transport

- **Measure 4.1, Investment** farmers due to Annex I provisions may produce energy “for own use”, but not to sell to the grid;
- **Measure 6.4 Diversification**, farmers or other legal entities may receive support to produce energy to sell to the grid;
- **Measure 7, Basic services and village renewal in rural areas** public entities may produce energy as common public good, in order to heat, for instance, public buildings and/or to sell to the market under the “income generating principle”.

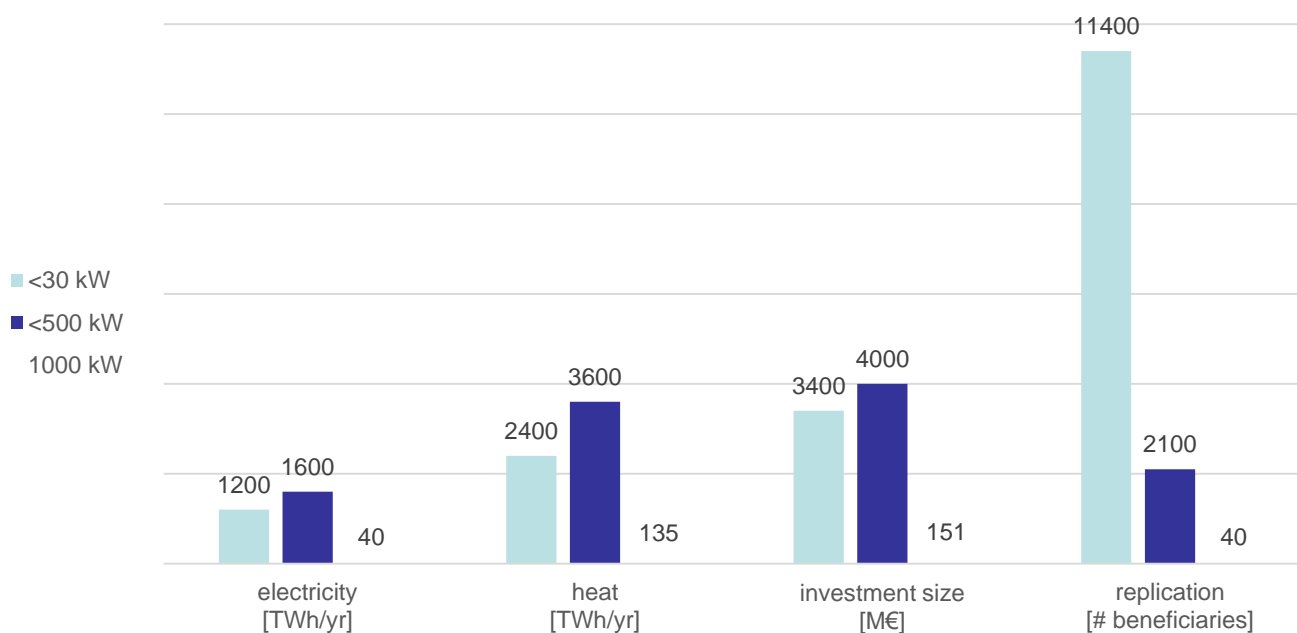
Sizing energy plants for rural area:

- average household electricity consumption in the EU: 4,000 kWh/yr
- ~4 kW or 28 m² (7x4m roof) in PV
- 11 kW plant = (8000/2) working hours = 44,000 kWh/yr
- ~100 LU = ~30 kW biogas
- Investment costs:
 - 10-30 kW → 12 - 10 k€/kW
 - 30-100 kW → 10 - 8 k€/kW
 - 100-250 kW → 8 - 6 k€/kW
 - 250- 500 kW → 6 - 4.5 k€/kW
 - 1,000 kW → 3.5 - 4 k€/kW
- Energy efficiency directive (2012/27/EU)
 - Small-scale cogeneration unit: <1,000 kW
 - Micro-cogeneration unit: <50 kW
- RED II : Bioenergy plants subdue to sustainability criteria: < ~600 kW biogas and < ~6,000 kW solid biomass
- Prosumers

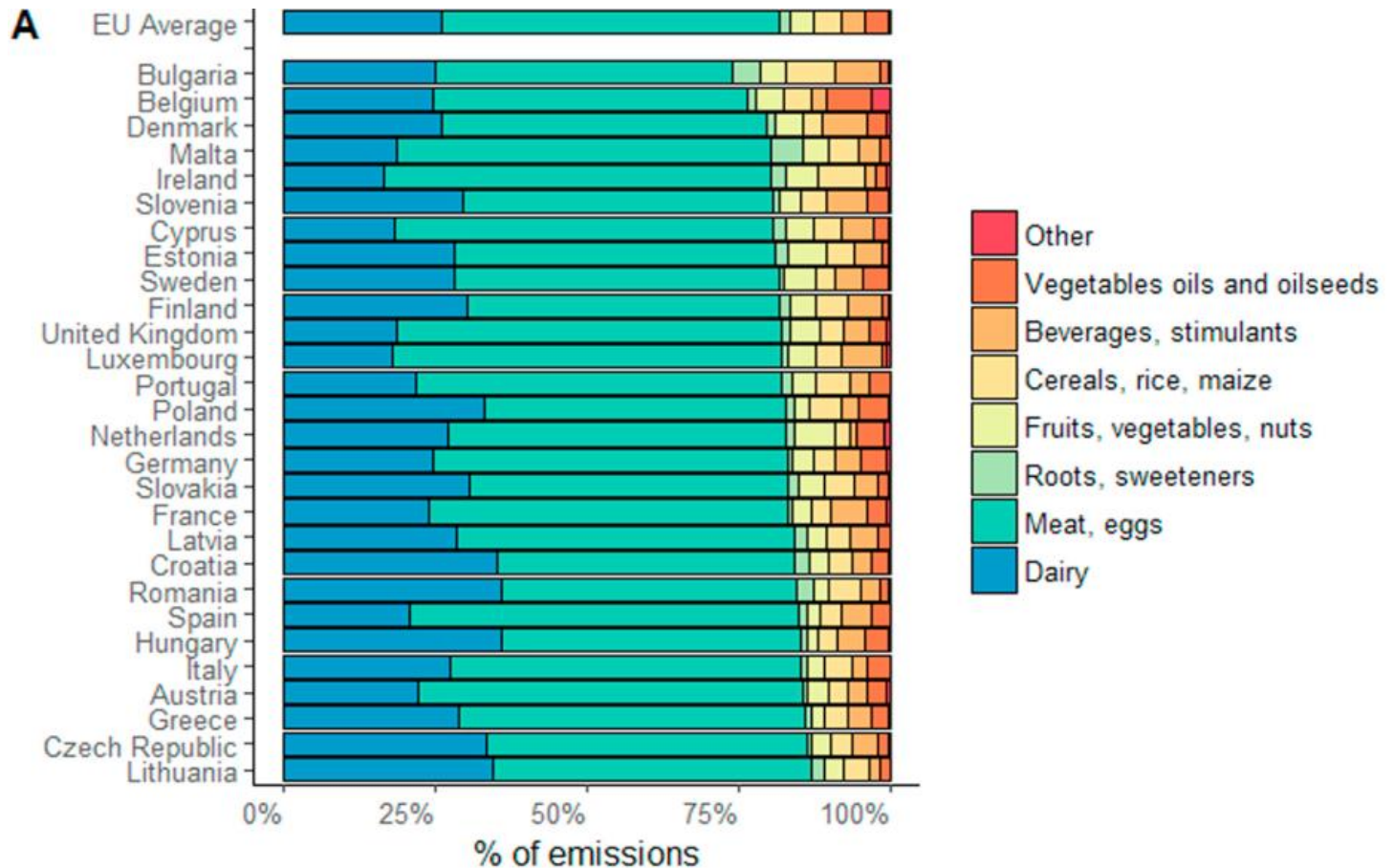
What is the future biogas market in Croatia?

size of the plant	<30 kW		<500 kW				1 000 kW	500 m3/h	
potential users	11 400		2 100				40	25	
sector	cattle&pig	poultry	cattle&pig	poultry	tourism-coast	tourism-islands	industry	industry	WWTP
replication potential	4895	6468	1234	809	20	20	40	20	5
biogas	541	715	982	644	16	10	135	67	17
electricity	1 028	1 358	2 160	1 416	18	11	280	-	-
heat	1 028	1 358	2 160	1 416	18	11	280	-	-
CO2	536	709	973	644	9	9	133	67	17
digestate									

BIOECONOMY



How data and monitoring systems could support the development of a sustainable rural bioenergy sector?



The future dairy farm will produce dairy products with less GHG emissions per kg.

MANURE → AD → biogas + digestate

BIOGAS → HEAT + ELECTRICITY + CO₂

heat for farm use & electricity for own use and excess for sales & CO₂ to be used for product shelf - life extension, quality¹

DIGESTATE → liquid & solid, excess heat for digestate processing to improve its quality and handling properties → replacement of fossil fertilizers

**INTERCROPPING for AD substrates or feed or both²:
CO₂ reduction, less LUC and CO₂ for feed**

¹ Hotchkiss J.H. et al. (2006): Addition of Carbon Dioxide to Dairy Products to Improve Quality: A Comprehensive Review. *Comprehensive Reviews in Food Science and Food Safety*.

² Dale E.B. et al: Biogasdoneright™ (2016): An innovative new system is commercialized in Italy. *Biofuels Bioproducts and Biorefining* 10(4):341-345

Lessons learned from the previous policy framing

- It's all about the policy. Bioenergy is always a concerted policy.
- If bioenergy policy is focused too narrow, it will very likely backfire¹.
- The question “how much bioenergy a project could produce?” is obsolete.
- **Ask what a bioenergy project can do to mitigate the climate change. Who can participate?**
- To do: how to reward a farmer for CO₂ savings?

¹Oliveira G de L.T. et al. (2017) How biofuel policies backfire: Misguided goals, inefficient mechanisms, and political-ecological blind spots, Energy Policy 108:765-775

Biljana Kulišić
bkulistic@eihp.hr