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DKTI Development of a Sustainable Bioenergy Market in Serbia

Sustainable business models for bioenergy projects

Renewable Energy Coordination Group meeting, November 6, 2018




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- **Structure of the programme – former and current**
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- **Lessons learned and recommendations**

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Facts about the GIZ DKTI programme

Objective: To strengthen capacities and create an enabling environment for sustainable use of bioenergy in Serbia

Funded by: German Federal Ministry for Economic Cooperation and Development (BMZ) under the German Climate Technology Initiative (DKTI)

In Cooperation with:

Public Investment Management Office

Ministry of Agriculture, Forestry and Water Management

Ministry of Mining and Energy

Ministry of Environmental Protection

Duration: January 2018 – December 2020 (2nd phase)

(1st phase from mid-2013 untill the end of 2017)

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Structure of the programme – phase I

Policy advice

GIZ – TA:

Support to harmonization of laws and regulations to EU standards; institutional strengthening

- ✓ Amendments to the law on agricultural land
- ✓ Harmonisation of VAT for wood fuels

Biomass supply

KfW – FA:

Financing district heating companies (DHCs) able to switch to use of biomass

GIZ - TA:

Support to creation of sustainable biomass supply chains for DHCs:

- ✓ 12 supply chains
- ✓ 5 mini-grids for delivering biomass based heat

Efficient use of firewood in HH

GIZ - TA:

Promotion of efficient utilisation of wood fuels in households in pilot regions:

- ✓ From 1 to 22% of HH using wood fuels efficiently

Standardization of wood fuels and combustion devices:

- ✓ 2 laboratories accredited

Project development

GIZ - TA:

Advisory to private and public sector partners to implementation of sustainable, innovative and replicable bioenergy projects:

- ✓ 2 implemented fuel switching projects
- ✓ 25 in different phases of implementation
- ✓ 10 innovative biogas concepts

BioRES

GIZ - TA:

Support to creation of regional Biomass Trade and Logistic centers in Serbia, Croatia and Bulgaria

⇧ ⇧ ⇧ ⇧

Cross-cutting theme: sustainability

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Structure of the programme – phase II

Policy advice

GIZ:

Support to harmonization of laws and regulations to EU standards

Support to policy definition and strategy implementation

Biomass supply

KfW:

Advise to investments in district heating companies.

GIZ:

Support to the creation of a sustainable supply with bio-resources

Project development

GIZ:

Advise to the implementation of cost efficient and innovative bioenergy projects

Technology and knowlege transfer

KeepWarm

GIZ:

Improvement of efficiency in district heating systems

co-financed by EU under Horizon 2020 programme

⇧ ⇧ ⇧ ⇧

Cross-cutting theme: Sustainability

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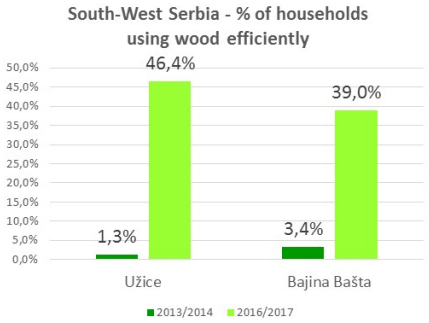
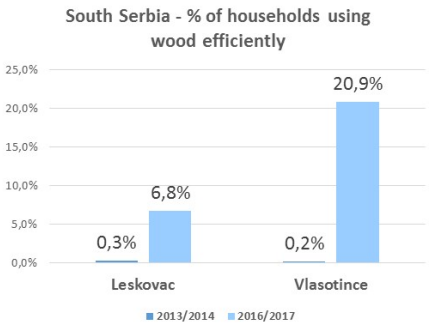
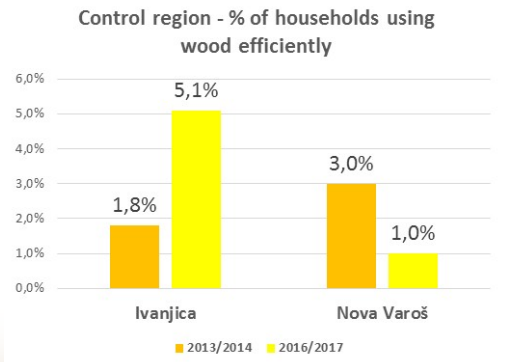
Two pilot regions: South Serbia and South-West Serbia

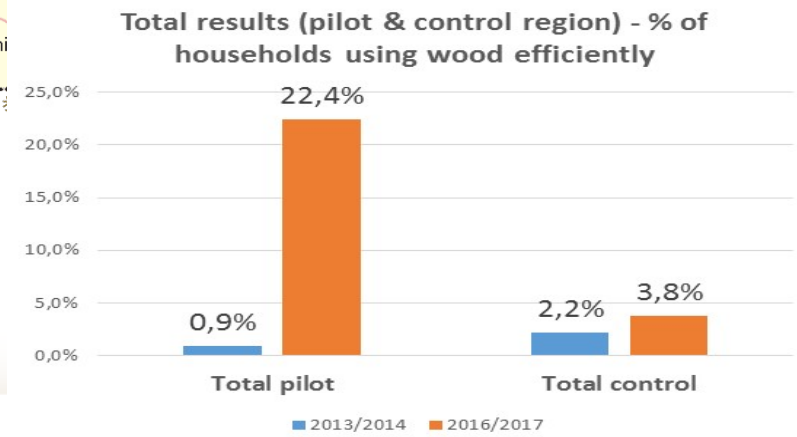




One control region:



Total (pilot and control regions):



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GIZ contribution to the development of the bioenergy market in Serbia in the medium term

- **Supporting political partners** in realization of additional biomass utilization projects as best practice examples
- **Building capacities to implement bioenergy projects** at different levels from implementing institutions to operators
- **Developing sustainable biomass utilization concepts customized to the Serbian context**, like BLTCs, utilization of roadside vegetation, wood processing residues, animal by-products for energy purposes etc.
- **Environmental aspects** (reduction of GHG emissions and ground water pollution)
- **Rural economic development** by creation of new local jobs along the supply chains, in the biogas sector and supporting services
- **Macroeconomic effects** on local income and trade balance

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Development of sustainable supply chains

for district heating companies (DHC) to switch from fossil fuel to biomass

- more than 15 active municipalities
  - first projects are going into realization in 2019
  - combined heat and power projects and heat only boilers
  - financed by KfW, commercial banks or private/PPP
  - utilisation of woody and agricultural biomass
- Public Investment Management Office is requesting support for additional DHCs
- KfW offers 2nd tranche of credit for additional 15-20 DHCs
  - negotiations ongoing
  - additional pre-feasibility studies are planned

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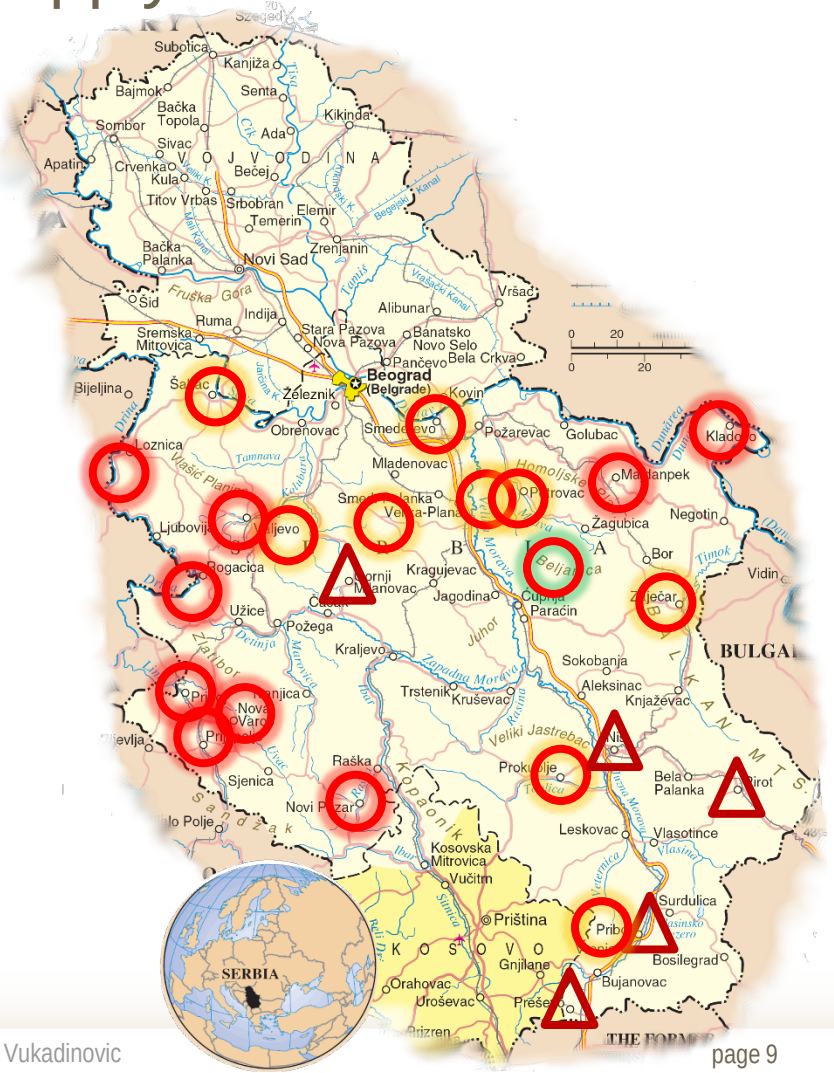
Developing sustainable supply chains

location and development status of DHCs to switch to biomass

- KfW financed
  Valjevo, Mali Zvornik, Bajina Bašta, Priboj, Prijepolje, Nova Varoš, Novi Pazar, Majdanpek, Kladovo
- PPP financing
  Boljevac
- other sources of finance
  commercial credit, state funds?
  Šabac, Zaječar, Mionica, Lajkovac, Svilajnac, Despotovac, Medvedja, Prokuplje, Smederevo ….
- next potential DHCs
  Vranje, Pirot, Niš, Gornji Milanovac, Preševo



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concrete example: Toplana Novi Pazar

T: 1 x 5.4 MW woodchip boiler at a new location, 2 mazut boilers at current location serve as backup
F: approx. 3.66 Mio EUR

- counselling, technical consultation, on site discussion
- study trip to biomass DHC Gradiška
- study trip to biomass production sites, fairs, BLTCs
- logistic concept of supply chain
- trainings on biomass mobilization
- potential analysis of secondary sources (NP Tara and sawmills)
- Letter of Commitment signed
- decision making on project financing PPP, KfW, comm. bank
- Assembly adopted decision to opt for KfW credit line
- decision to rely on biomass market instead of own production
- decision on modification of project concept
- KfW-pre-feasibility study developed
- macroeconomic study showing positive impact on the local economy
- 2nd KfW-pre-feasibility study developed
- supporting RDA Zlatibor creating green council & biomass working group

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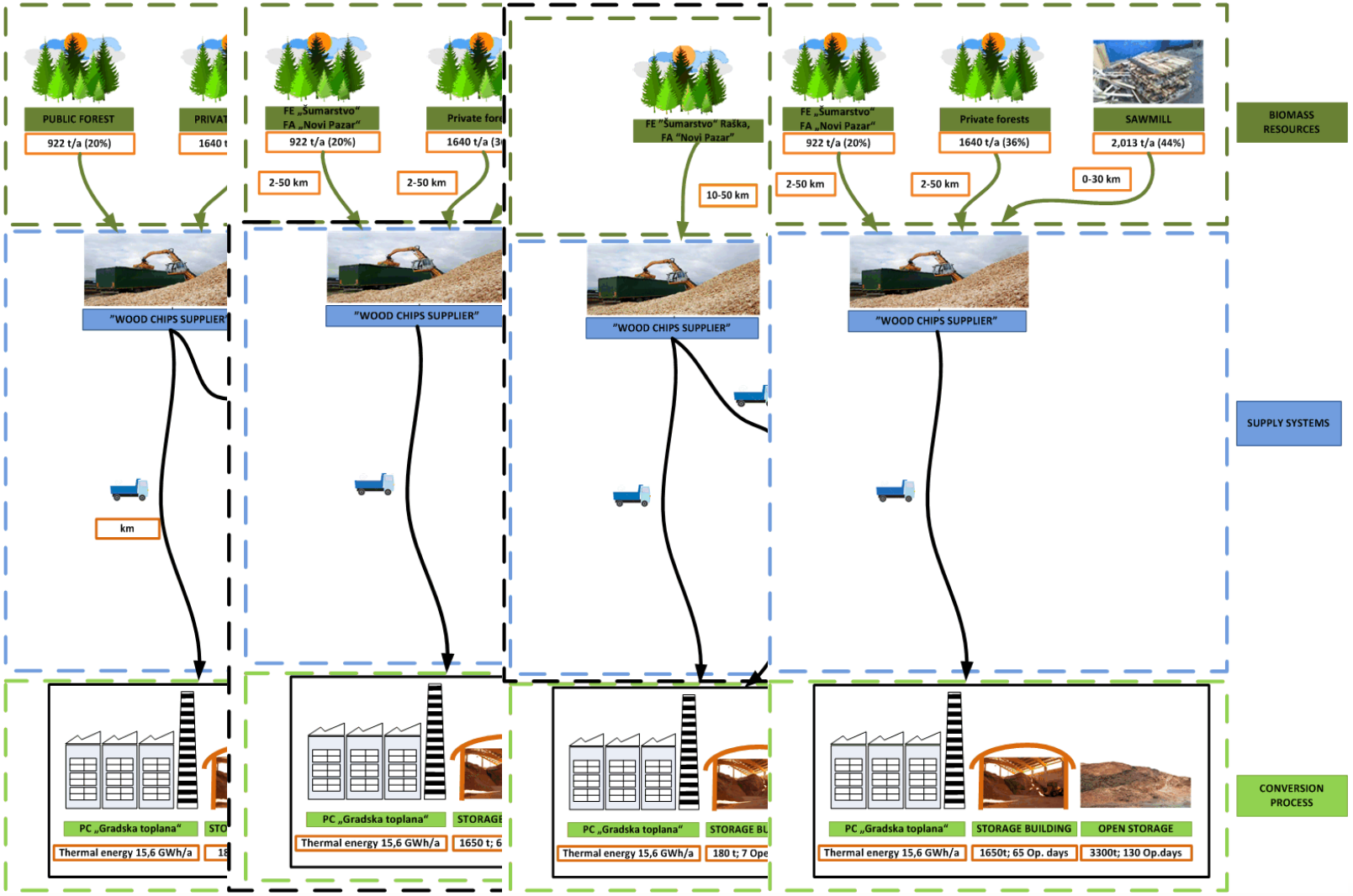

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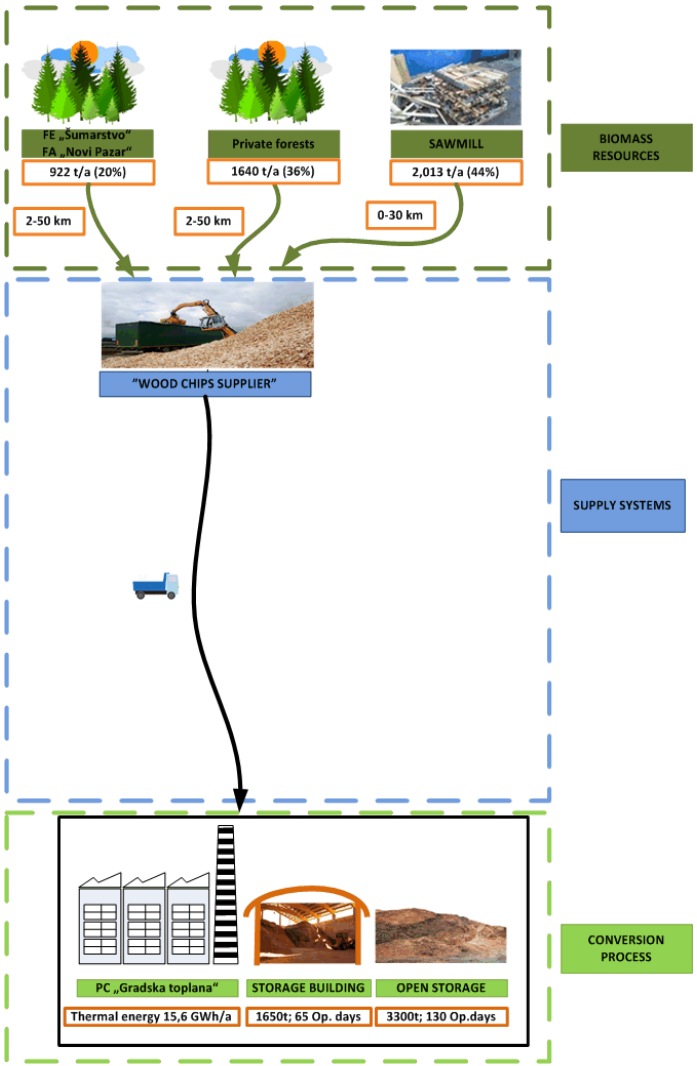
Proposed optimal model

Based on:

- estimated investment value
- cost of working phase
- legal framework
- possible period of project implementation
- opinion and plans of the authorities of municipalities

NOVI PAZAR
Model NP-1a



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Macroeconomic study on net effects of import substitution of fossil fuels with biomass

Substitution of fossil fuels with biomass in district heating systems would have the effects on:

- district heating system (cost of heating energy production and price of heating energy),
- local and regional economy (new jobs and income),
- national economy (trade deficit and import dependency reduction).

Total effect of such fuel switch could be observed from:

- financial,
- social,
- macroeconomic and
- environmental perspective.

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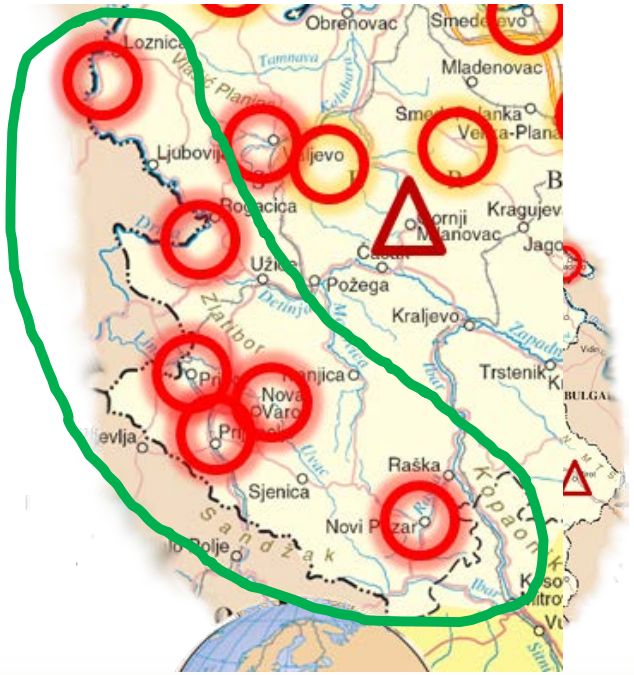
Macroeconomic study on net effects of import substitution of fossil fuels with biomass

To estimate the impact of substitution of fossil fuels with biomass in district heating systems (DHS) on regional economy (income and employment) in municipalities of:

- Novi Pazar,
- Prijepolje,
- Nova Varoš,
- Priboj,
- Bajina Bašta and
- Mali Zvornik



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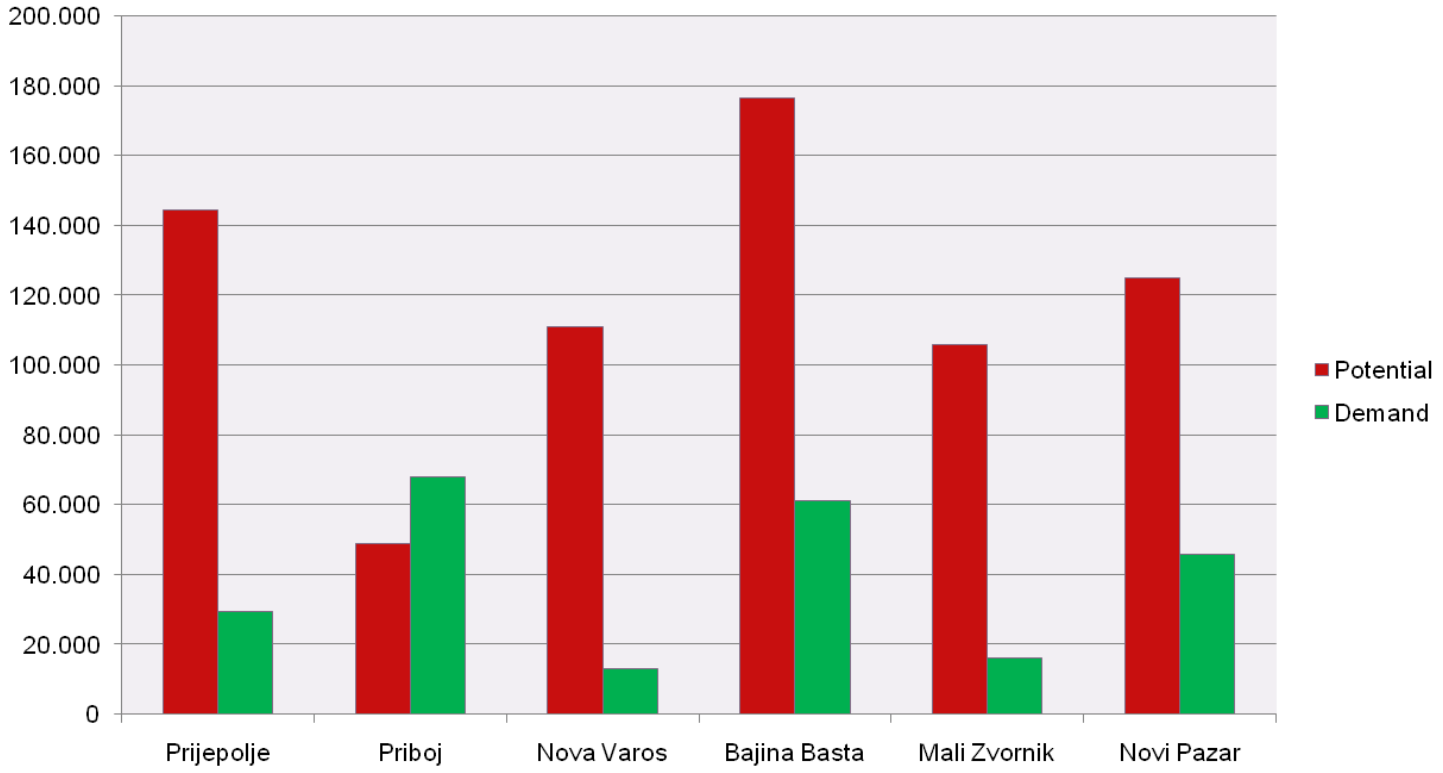
Woody biomass potential vs. demand



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Conclusion - district heating systems

- There are enough woody biomass resources to be used for district heating – regional biomass potential studies
- Several potential models of woody biomass supply chain are possible to be made – based on the regional biomass SC assessment
- For each municipality an optimal model is suggested according to financial setting, sustainability, accessibility and other criteria
- Stakeholder workshops, trainings and consultation sessions are organized
- Overall impact of job creation and import substitution assessed
- Supportive measures implemented

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Fuel switch in public buildings

for municipalities, schools and hospitals, partly with local heat networks

- 35 active municipalities
  - first projects are going into realization in 2018
  - most cases wood chip boilers
  - financed by state funds
- Technical concepts published
- The first ESCO-PPP heat delivery project realized

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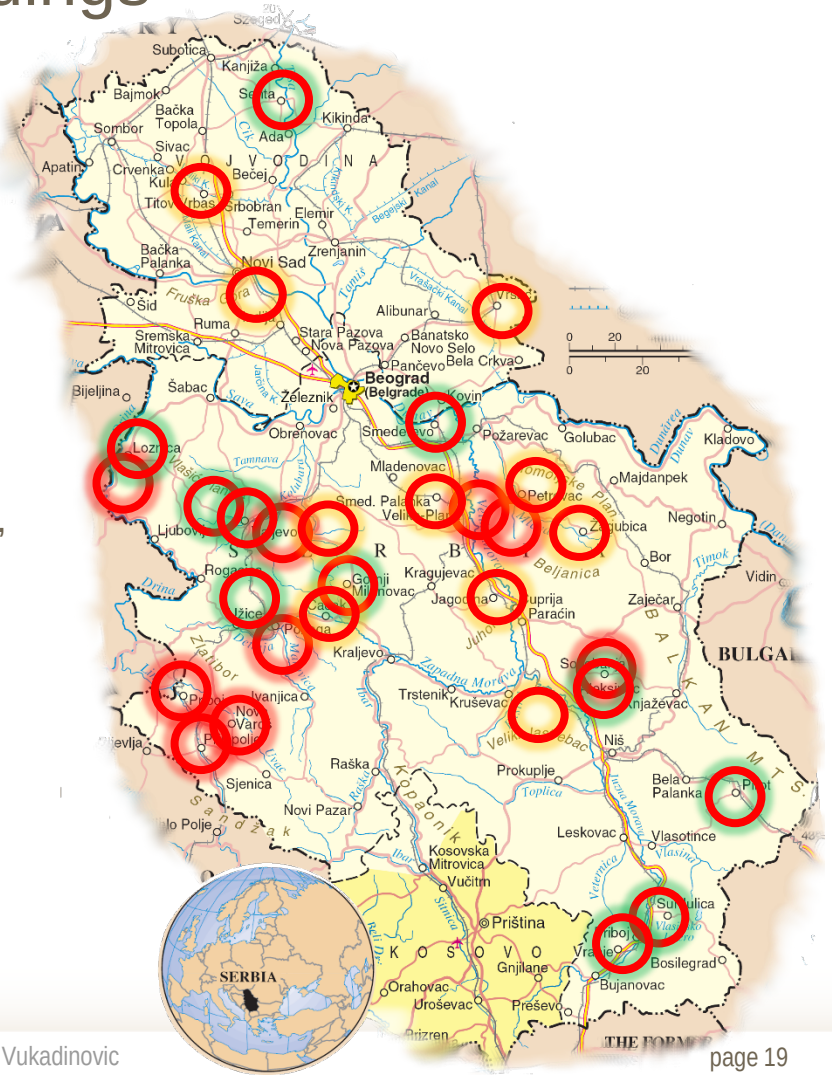
Fuel switch in public buildings

location and development status
financed by state funds

- start of construction in 2018 ?
  Svilajnac, Despotovac, Mionica, Arilje, Prijepolje, Nova Varos, Sokobanja
- start of construction in 2019
  Osečina, Pirot, Kosjeric, Losnica, Smederevo, Aleksinac, Senta, Valjevo, Surdulica, Vranje, Gornji Milanovac
- start of construction in 2020
  Lajkovac, Vrbas, Sremska Kamenica, Žagubina, Jagodina, Čačak, Vršac, Razanj, Velika Plana, Petrovac na Mlavi ….



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Development of biogas projects

- for farmers and cooperatives / financed by commercial banks

- 12 projects
  - 3 in operation (Sombor, Stara Pazova, Čestereg)
  - 9 in different phases of implementation Verušić, Selenča, Botoš (extension and heat usage), Stara Moravica (heat usage), Zabalj (pig manure), Novo Orahovo (small, manure-based biogas plant), Pojate (chicken dung), Padinska Skela etc.
- Technical concepts published
- Sustainable business models developed
- Serbian Biogas Association heavily supported
- Customized trainings developed and delivered to different target groups

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Biogas projects

location and development status
financed by commercial banks

- in operation
  Sombor, Čestereg, Stara Pazova
- start of operation 2019
  Verušić, Selenča, Botoš (extension and heat usage), Gornje Suhotno, Pojate, Stara Moravica, Novo Orahovo, Padinska skela

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National objectives

- Reaching renewable energy targets in 2020
- Reducing GHG emissions from agriculture and energy sectors
- Stabilizing electricity supply in rural areas
- Do not jeopardize the developed trust in the RES framework from the aspect of predictability, credibility and transparency

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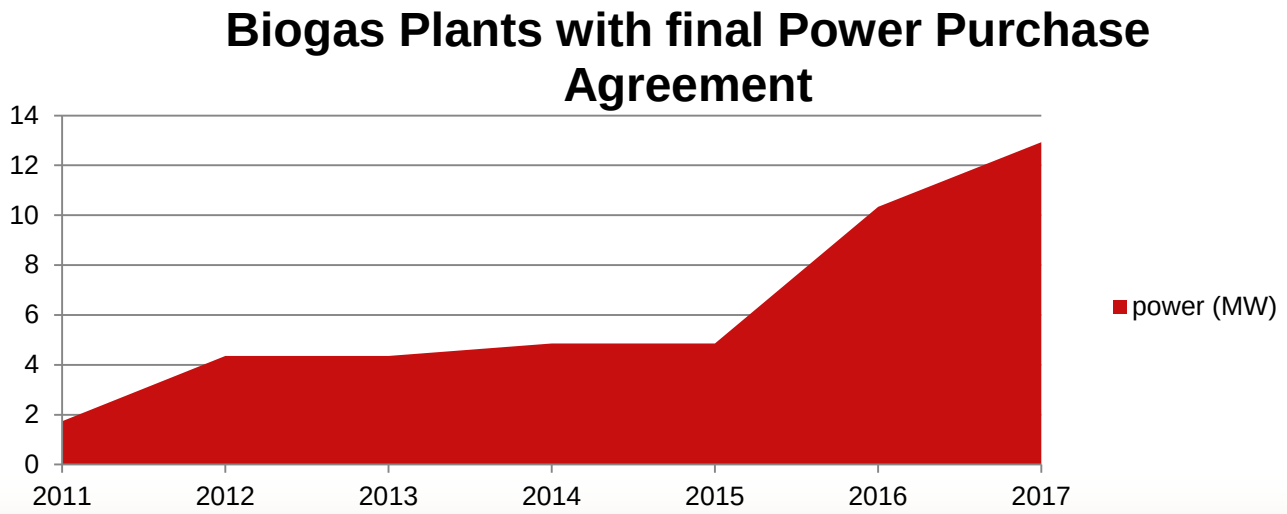
Biogas market development

- Bevore 2016: 3 biogas plants reaching 4.8 MW in installed capacity
- Since 2016 FiT very effective and incentivizing
- Currently: 13 BGP with operating permits – 14.2 MWel
- Additionally, 11 BGP with 9.4 MW in different stages of contruction



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Current challenges for development of the biogas sector

- Development of the biogas sector:
  - Large biogas plants driven by economy of scale and intensive sales by technology providers
  - Dominant use of energy crops
  - Low amnout of manure used in current plants
- Unused manure potential on small and medium-size farms
- Unused heat from biogas
- Limitation of maize silage did not limit the use of energy crops

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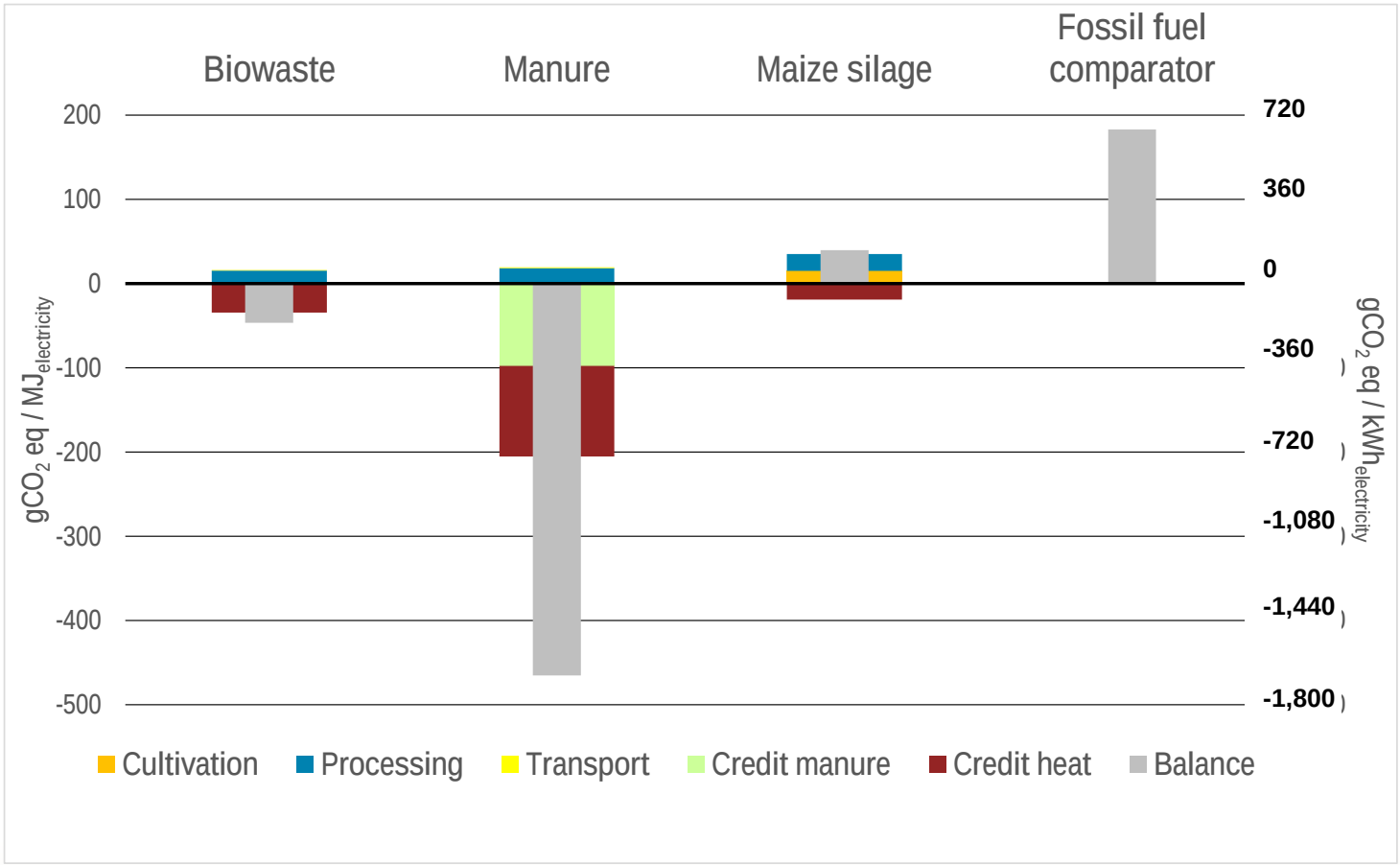
Advantages of sustainable development of biogas (source FvB)



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Key challenges facing the bioenergy market development

- Undeveloped financing mechanisms for financing bioenergy projects, as well as lack of customized business models
  - Biogas projects – debt financing
  - Bioenergy projects – state budget financing (grants) and debt financing
  - High up-front costs (cost of capital) increasing the risk for commercial banks, thus, making debt financing difficult for investors/farmers
- Security of adequate quality of biomass supply – small farms, unused manure potential, quality of woody biomass supply
- Technology and knowledge
- Quality infrastructure

Model projects critical for sustainable development of the bioenergy market

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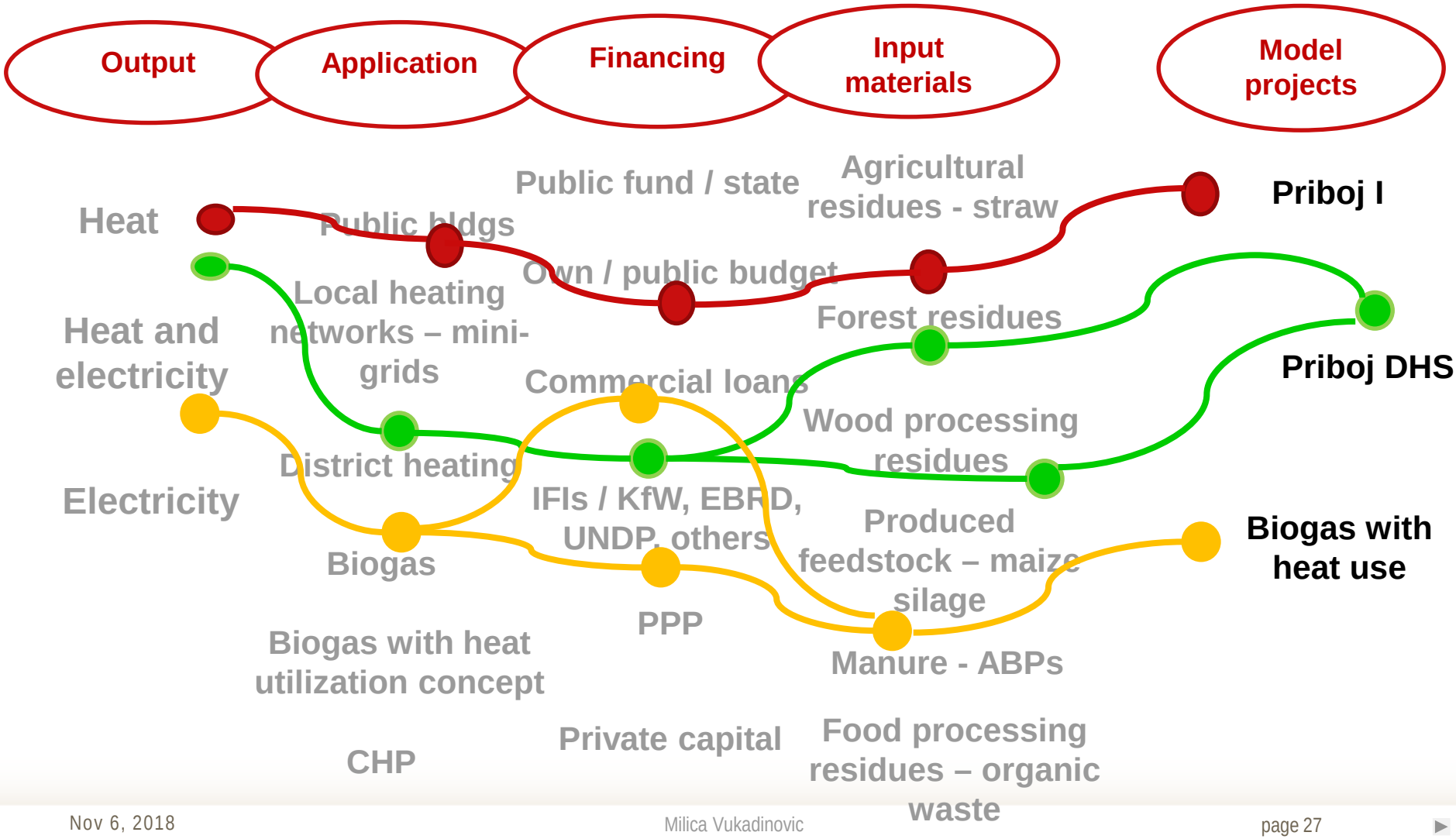
Variety of model projects



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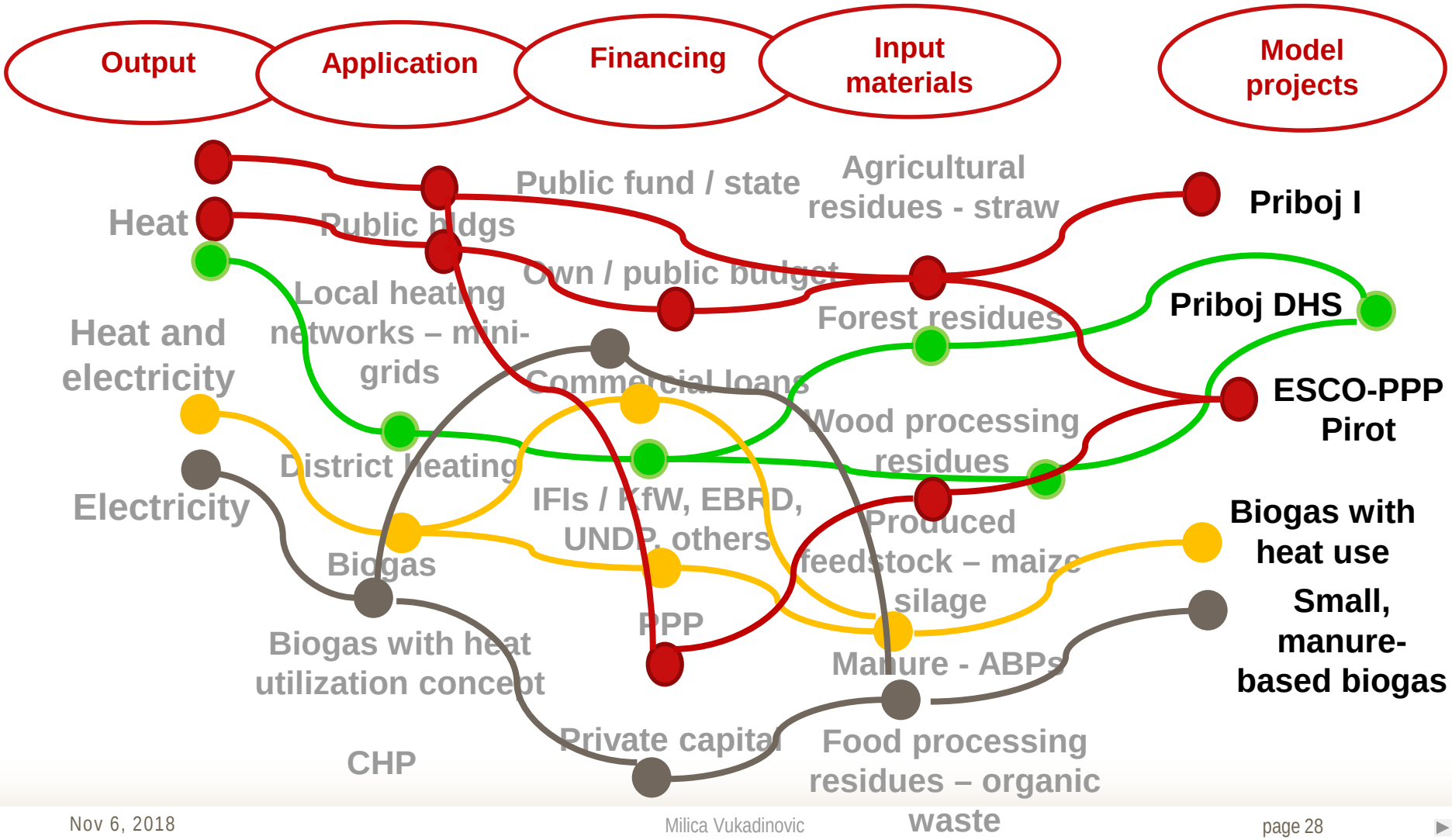
Variety of model projects



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City of Pirot

- Replacement of LFO boilers with biomass based ones in 4 schools (2.310 kW)
- Model contract for heat delivery developed including retroactive EE measures implementation
- Public call for search of the private partner completed
- First PPP-ESCO business model for delivery of heat in Serbia
- Total contract value around EUR 3.2 M
- From the idea to heating with biomass – 3 years
- Official opening in November 2017

Source: GIZ, 2015 - 2017

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City of Pirot – lessons learned

- Success factors – fulfilled or achieved through project implementation
- Strong commitment of the project team essential
- Multidisciplinary project team critical for achieving objectives
- Clear understanding of project contribution to sustainable development at the local level
- PPP-ESCO biz model doable within the existing regulative framework
- Enourmous potential for replication

Legal Framework for PPP established and doable!

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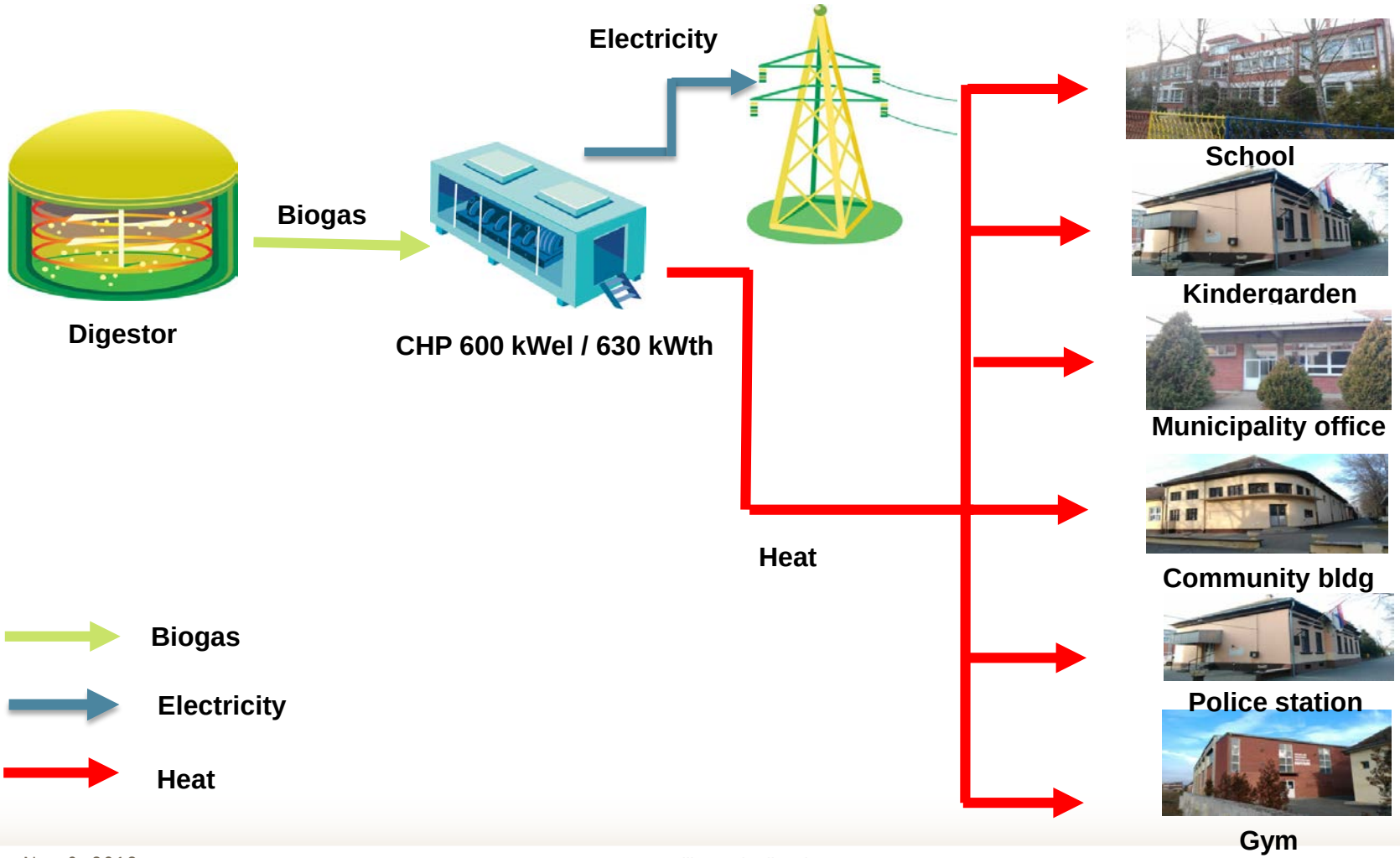
Innovative biogas concepts: heat usage



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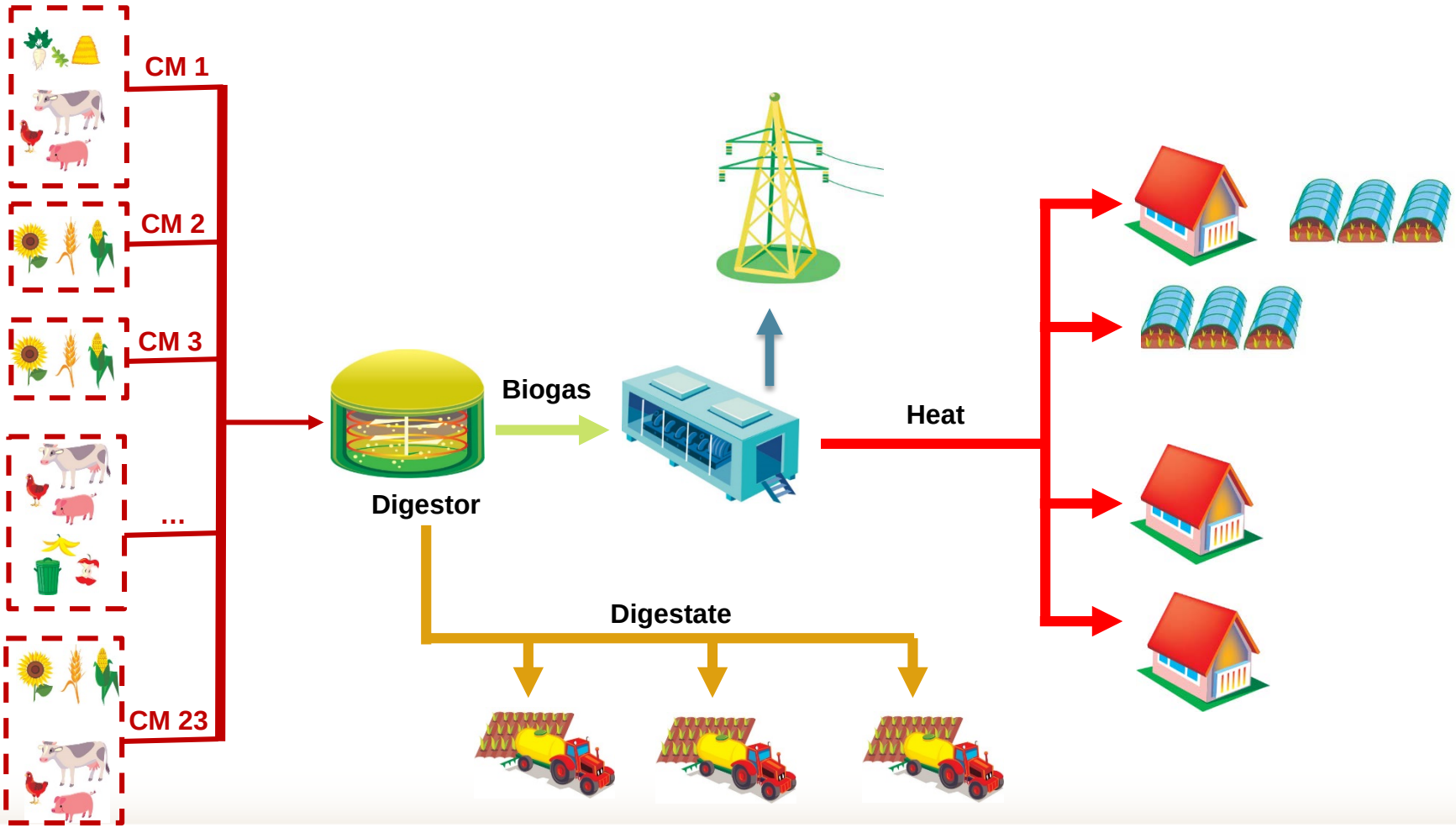
Innovative biogas concepts: energy cooperative model



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Conclusions

- **Saving energy costs** is a key driver and motivational factor for project implementation
- **Strong commitment** of the project team on the ground essential for project implementation
- **Pioneering efforts** (PPP-ESCO) empower LSGs to engage in other challenging projects and position themselves as visionaries
- Formation of **temporary cooperation systems** helps identify deficits and leads to improvements
- **CoP Municipalities** ensures replication and builds capacities for project implementation

Source: GIZ, 2015 - 2017

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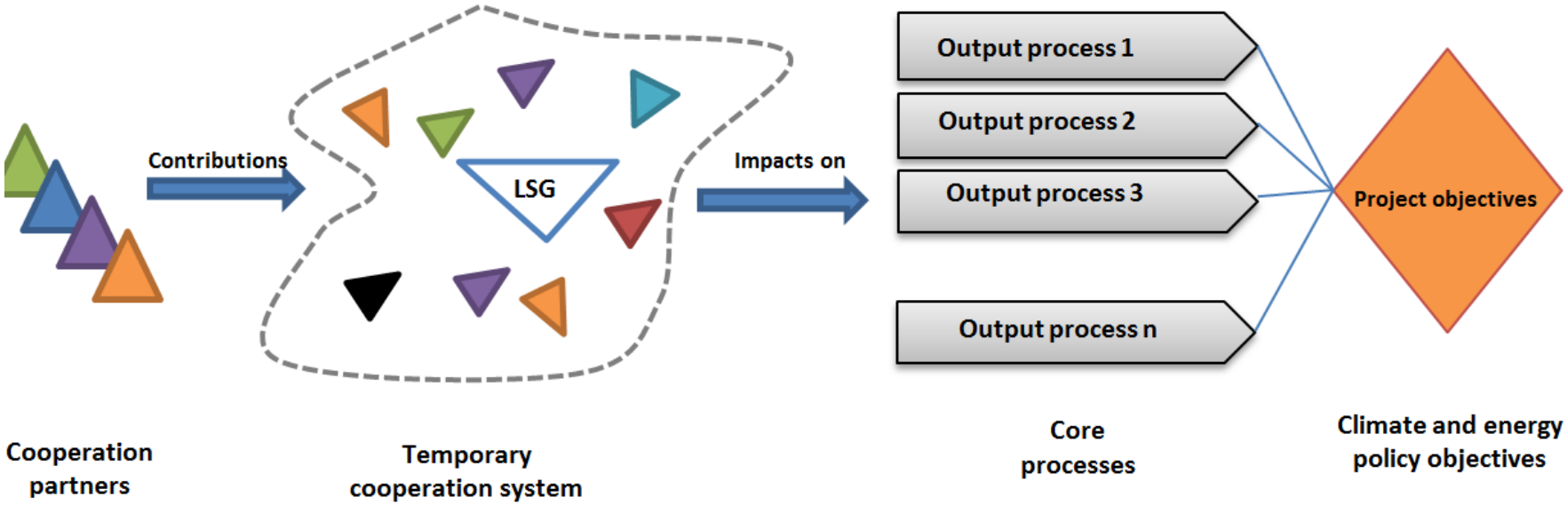
Local self-governments as cooperation systems driving energy transition



3. Define contributions of organizations involved
2. Agree on the strategy in the project
1. Understand the area of social concerns at the local level

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Recommendations

- Assist LSGs to steer temporary cooperation systems for bioenergy project development in order to:
  - ✓ Harmonisation of RE and EE measures at the decision making level
  - ✓ Synchronise core processes within the system
  - ✓ Work toward reaching set objectives
  - ✓ Persist through implementation

- Continue with supporting development and implementation of innovative and sustainable business models – pioneering efforts trigger action by others

- Strengthen the formed Community of Practice for Municipalities and use it as:
  - o Dialog platform
  - o Promotion of bioenergy
  - o Continuous knowledge and technology transfer

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Development of sustainable bioenergy market contributes to national policies targets

Energy policy perspective

- Supply reliability
- Needs for infrastructure development and operation
- Increased use of RES in final energy consumption

Climate policy perspective

- GHG emission reduction
- Conservation of resources
- Prevention of water pollution

Socio-political perspective

- Focus on citizens
- Behavioral changes
- Distribution issues
- Job creation in rural areas

Industrial policy perspective

- Stimulation of innovations
- Job security
- Competitiveness...

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Ministry of Mining and Energy
Ministry of Environmental Protection