



Biogas plant – rural energy source

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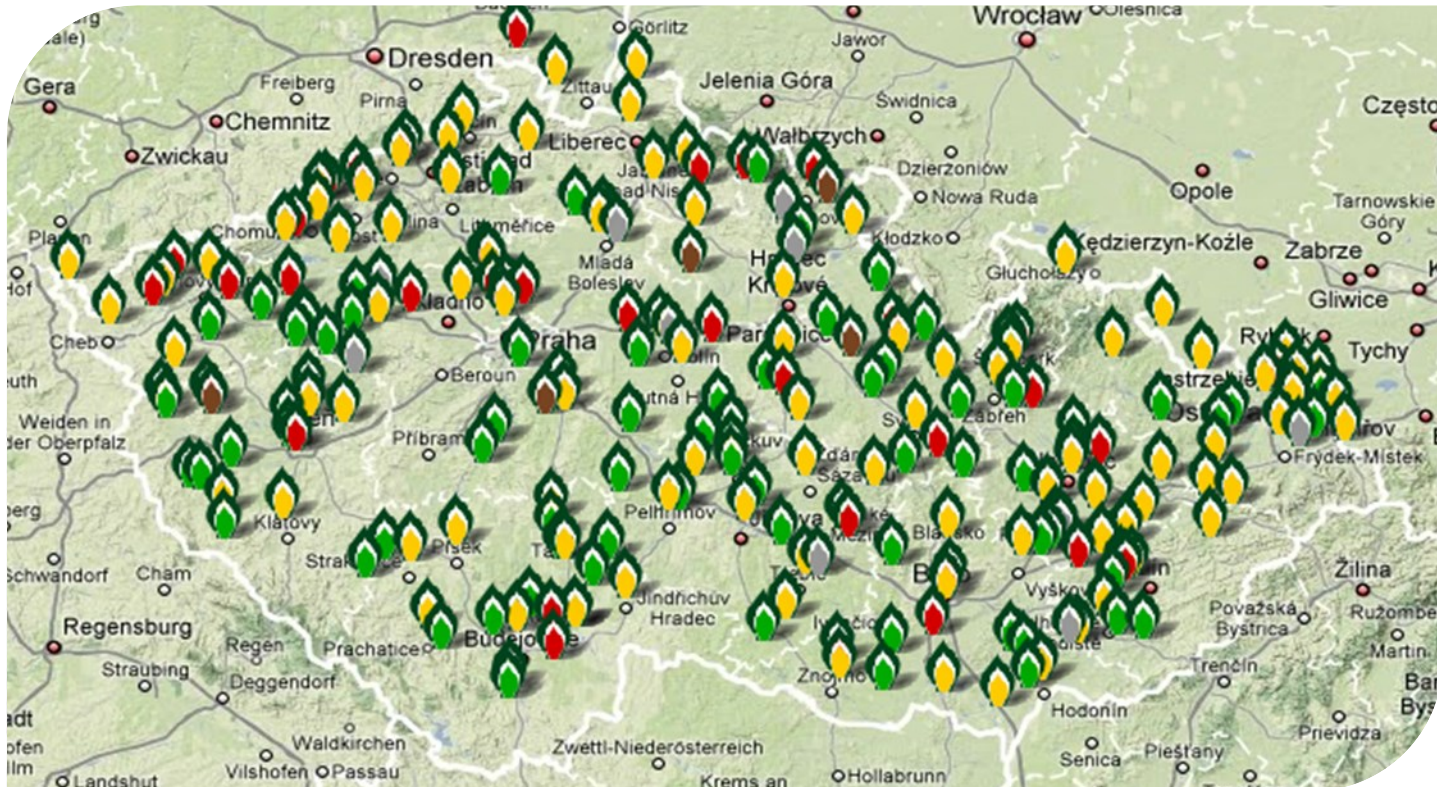
Czech Biogas Association

- national technology platform in the field of biogas production and utilization. CzBA currently associates biogas industry members and leading R&D institutions as well as engineers, biogas plant operators, project specialists and other experts not only from the Czech Republic.
- **Our service offer to foreign investors, researches and other interested parties:**
 - *specialized biogas / biomethane market research on national / regional level*
 - *industry data collection, assessment and interpretation*
 - *direct intermediation of contacts - industry, R&D, public authorities, decision makers*
 - *education, training, study tours*
 - *If you want to get in touch with us or are interested in our services do not hesitate to contact us!*

Biogas plants in the Czech Republic

www.czba.cz

576 BGP, 360 MW inst. EE, 25 % EE from RES
= 3 % of total EE



Biogas = basic product of BGP
gas or mixture of gases produced by biological
way (*microorganisms*) – H_2 , CO_2 , H_2S ...

- Biogas = CH_4 , CO_2 , ...



- Biogas (Sewage gas) = CH_4 , CO_2 , ...



- Biogas (Landfill gas) = CH_4 , CO_2 , ...



Why Biogas

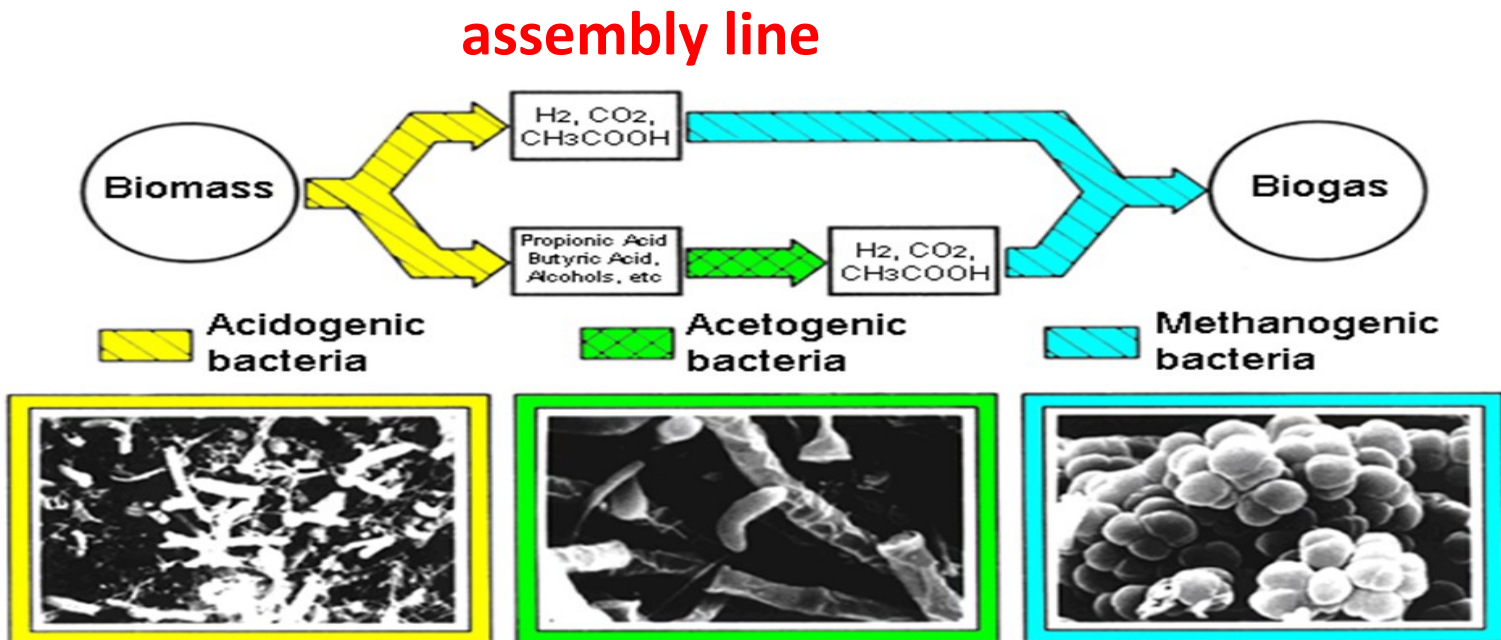
- Energy source
- Own „natural gas“

Compound	Biogas	Natural gas
<u>Methane</u> (CH ₄)	50 - 75 %	80 - 90 %
Carbon Dioxide (CO ₂)	25 - 50 %	0,5 – 2,5
<u>Nitrogen</u> (N ₂)	1 to 2 %	1 – 5 %
Hydrogen sulphide (H ₂ S)	traces	0 – 5 %

Utilization for heat, electricity, biomethane

How is biogas produced ?

- Process in which microorganisms step by step break down **biodegradable material in anaerobic condition** .
- The final products of this are **biogas** (*a mixture of carbon dioxide and methane*) and **digestate** (*a nitrogen-rich fertiliser*).



BIO = microorganisms + biosubstrates

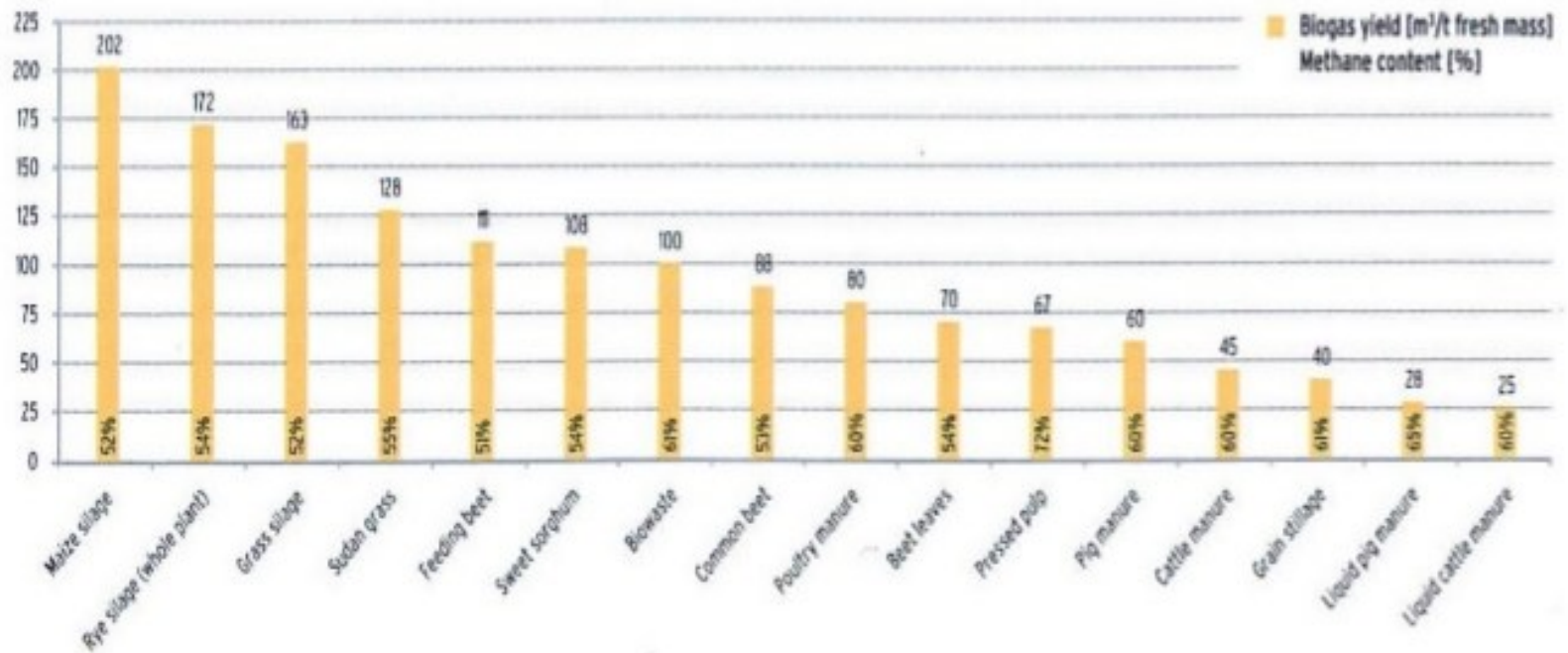


- „gratis“ workers - no salary, no holidays, no labor union – work only for food and suitable accommodation (conditions)
- Food = substrates (organic materials)
- Suitable work conditions = temperature, pH, etc.

Substrates for AD – biogas yield

Organic input substrates can vary greatly and result in different gas qualities and quantities. Substrates have an important influence on plant technology selected for anaerobic digestion systems.

Biogas yields⁴



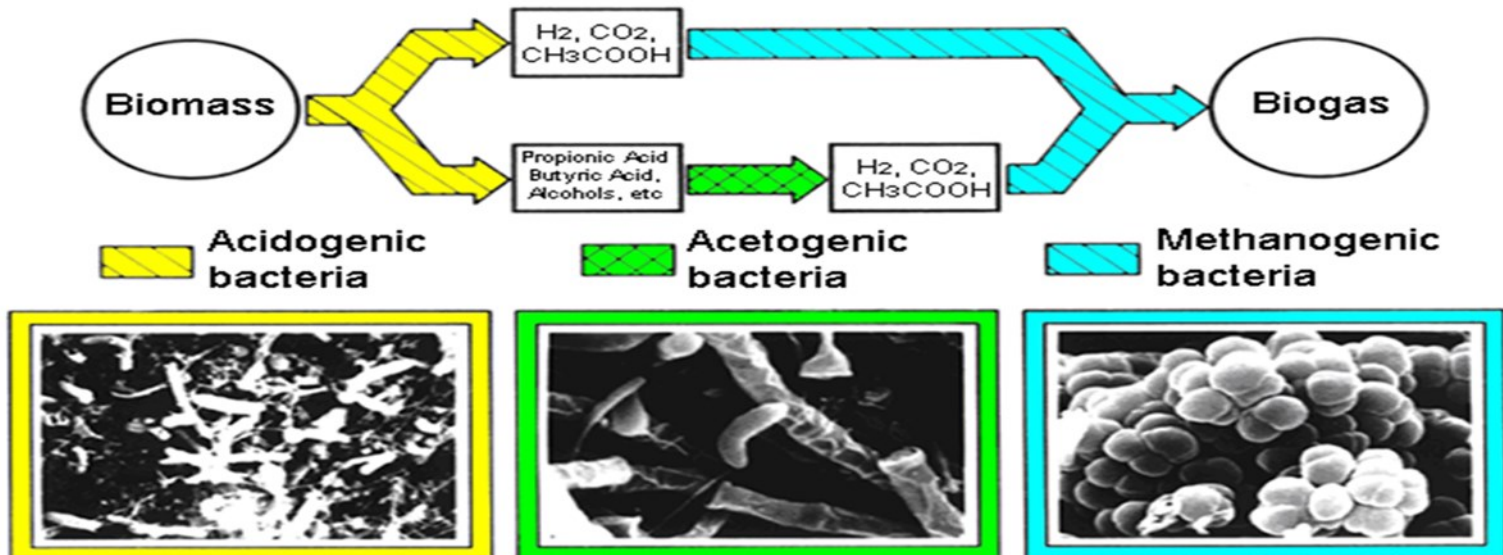
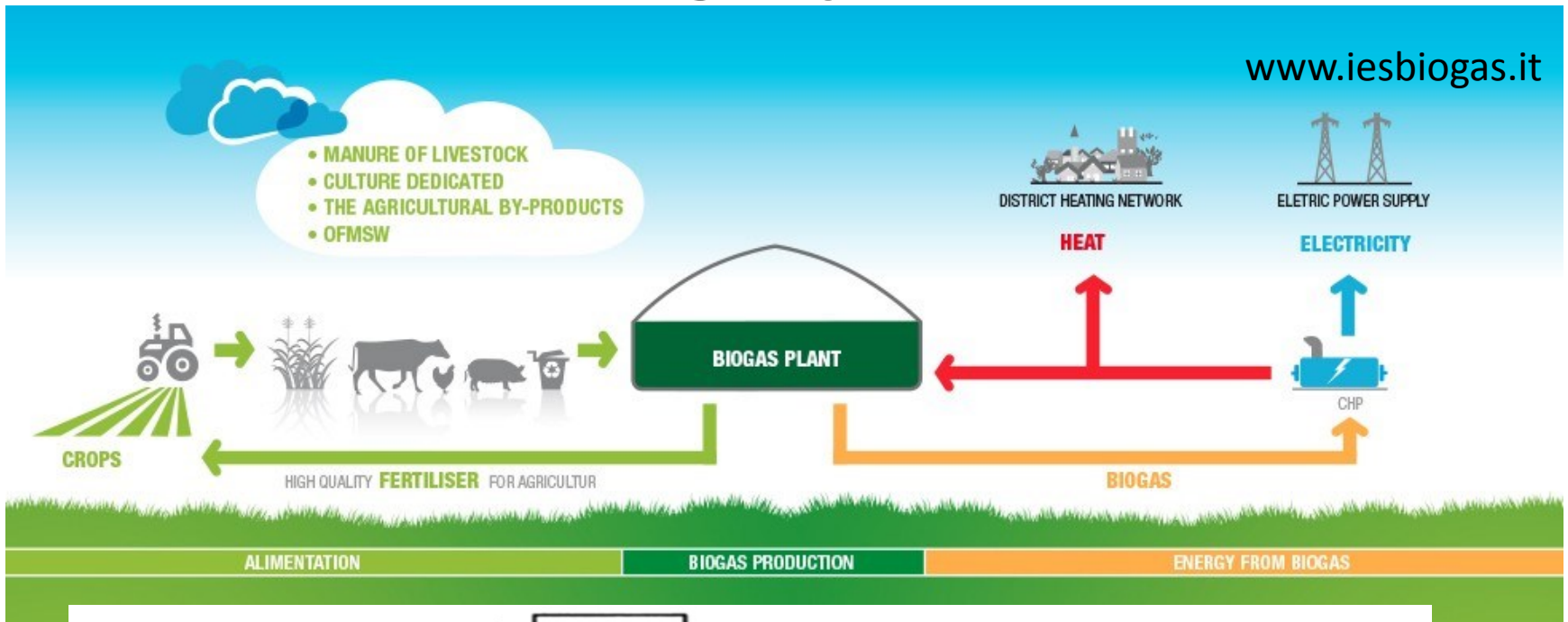
Source: AEBIOM Roadmap to Biogas

2010

10

Biogas plant

www.iesbiogas.it



Economy (bio): 1 MWe. BGP

Investment cost - 5 mil EUR

Income

Electricity: 1 MW x 8 000 hrs = 8 000 MWh

8000 MWh x (40+120) EUR/MWh = **1 280 000 EUR**

Heat: 4000MWh x 10EUR/MWh = **40 000 EUR**

Digestate (fertilizer): aprox **0 EUR**

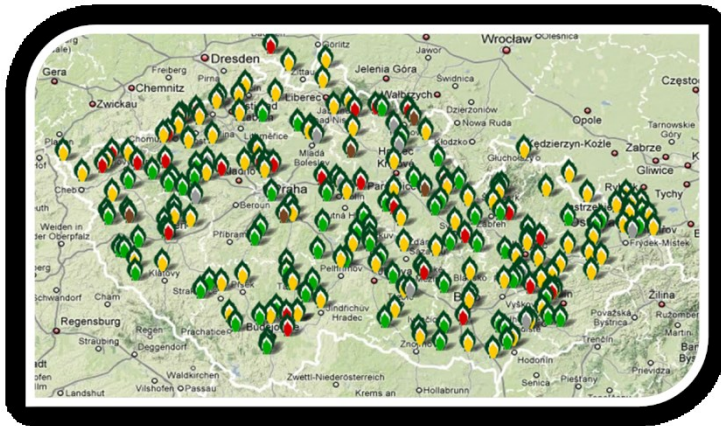
Costs

substrates 700 000 EUR

Service, wages, analysis, oil, etc...

Payback time: cca 10 - 15 years

Biogas plant – rural energy source



Biogas projects in Třeboň



BGP

- In operation from 2009
- **Reason of construction:**
 1. production of electricity and **heat**
 2. to stabilize agricultural activities in region, because:
 - *dramatic decline in cattle and pigs production after accession to the EU*
 - *relatively low prices of plant products*
 - *decline in milk production (cash flow)*
 3. processing of grass from floodplains



BGP

- Substrates: maize, grass, GPS
- Installed el. power 1 015 kW
- Heat utilization – spa, block of flats

175 kW el./ 210 kW heat

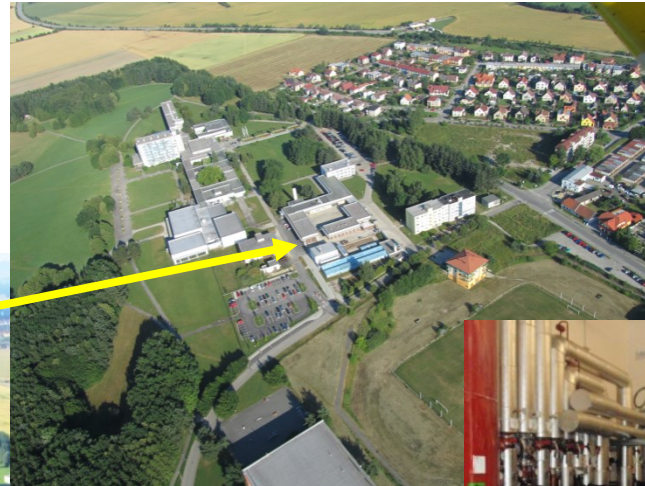


840 kW el./ 840 kW heat

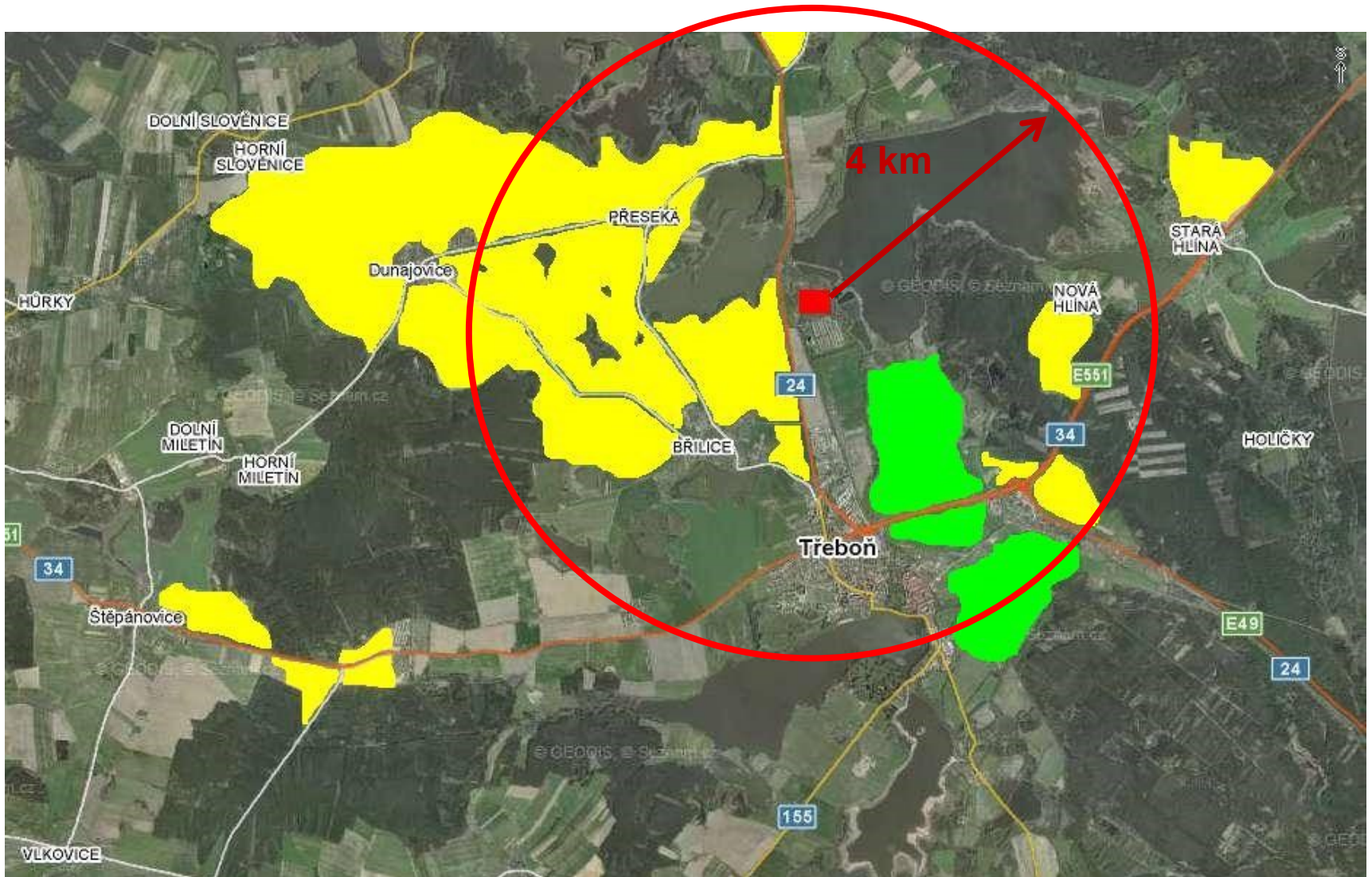


BGP

4.3 km of the biogas pipeline to the heat consumption point
(Municipal Spa)



Substrates from region can cover demand of BGP



Energy consumption in Třeboň

7000 inhabitants

	Natural gas <i>MWh/year</i>	Electricity <i>MWh/year</i>
Household	25 000	7 000
Other	30 000	13 000
Total	55 000	20 000
BGP #2 production	6 000 Heat equivalent	8 000
Share	11 %	40 %

Distribution of population by size of population centre in the Czech Republic

Size of popul. centre	Number of popul. centres	Total population (mil)		
< 1 000	5 000	1,7	Lower salaries	Higher investment cost for infrastructure
1 000 – 10 000	1 100	4,5		
10 000 – 100 000	130	2		
> 100 000	5	2		

Annual consumption in CZ	
Electricity	1,5 MWh/p/y
Heat	3,0 MWh/p/y

Biogas plant can be an excellent decentralized source of energy for human settlements (villages, towns) in rural districts

Radius	Area	20 % of area for biogas	Biomass production (30 t/ha)	Biogas production (170 m ³ /t)	Electricity	Heat	Electricity 1,5 MWh/ p./year	Heat 3 MWh/ p./year
km	ha	ha	FM tons	mil. m ³ /y	MWh/y	MWh/y	people	people
1	314	63	1890	0,3	643	643	426	107
3	2 826	565	16 956	2,9	5 044	5 044	3 400	1 681
4	5 024	1005	30 144	5,1	8 968	8 968	6 000	3 000



Biogas in developing rural areas



Advantages of using biogas as fuel for cooking?

- Biogas burns very cleanly, and produces less pollutants during cooking than any other fuel except electricity
- Depending on the type of gas stove used, the handling of biogas for cooking is easy and allows for strong heat as well as for small simmering heat
- It can decrease the workload of women as it is often they who are responsible for collecting firewood for cooking
- Deforestation, land degrade and greenhouse gases
- The using of firewood for energy needs has a severe impact on the worlds forests (*it accounts for 54% of the worlds deforestation in developing countries*).





GBA
Czech Biogas Association

***Biogas: The all-rounder
good for the environment
and good for people in rural areas***

**Thank you
for your attention!**

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