

Nordic Biogas Conference
Oslo, April 9 2019

The future of biogas

Biogas production and potential in the Nordics

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Foreningen Biogasbranchen/Danish Biogas Association



Brief overview

- **Country by country**
 - ◆ Production
 - ◆ Origin
 - ◆ Use
 - ◆ Development
 - ◆ Major challenges / drivers
- Data generally 2017
- By help of organising committee NBC

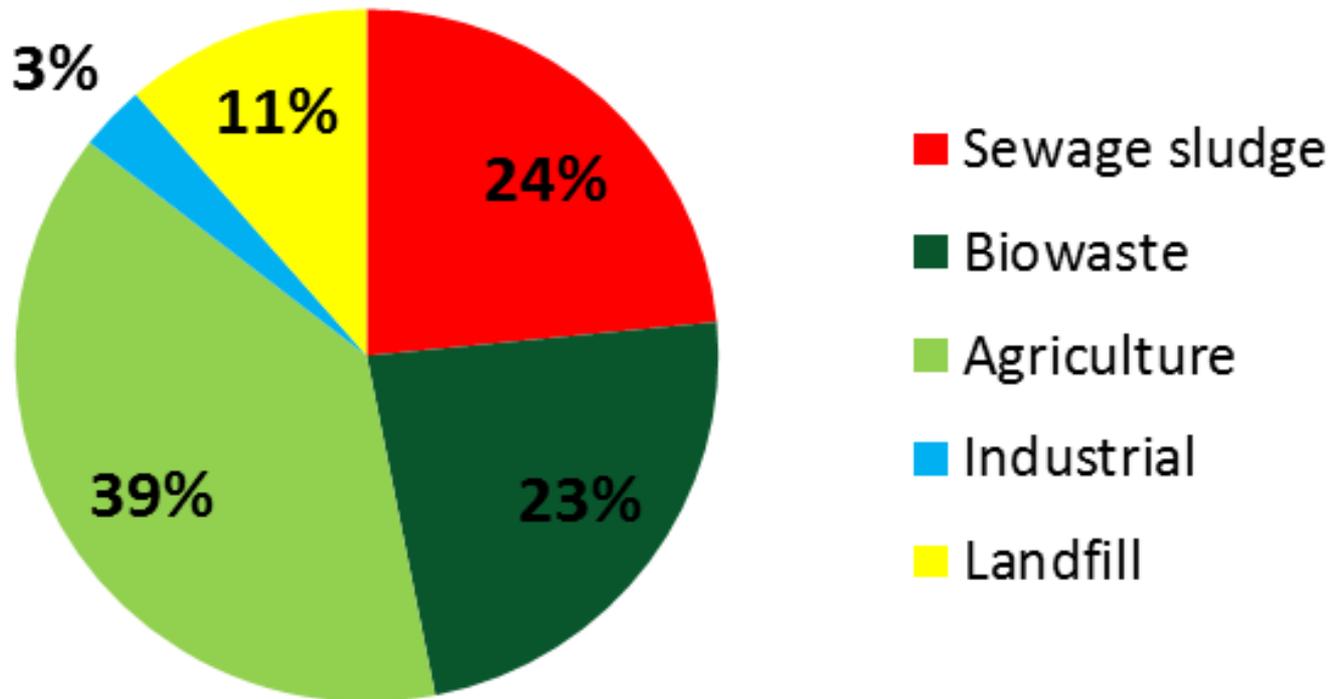
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Nordic biogas production

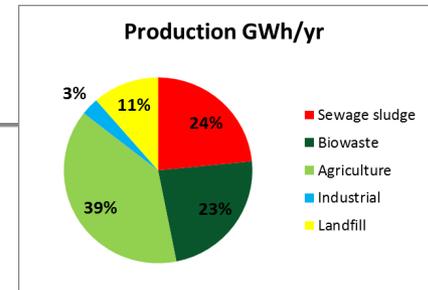
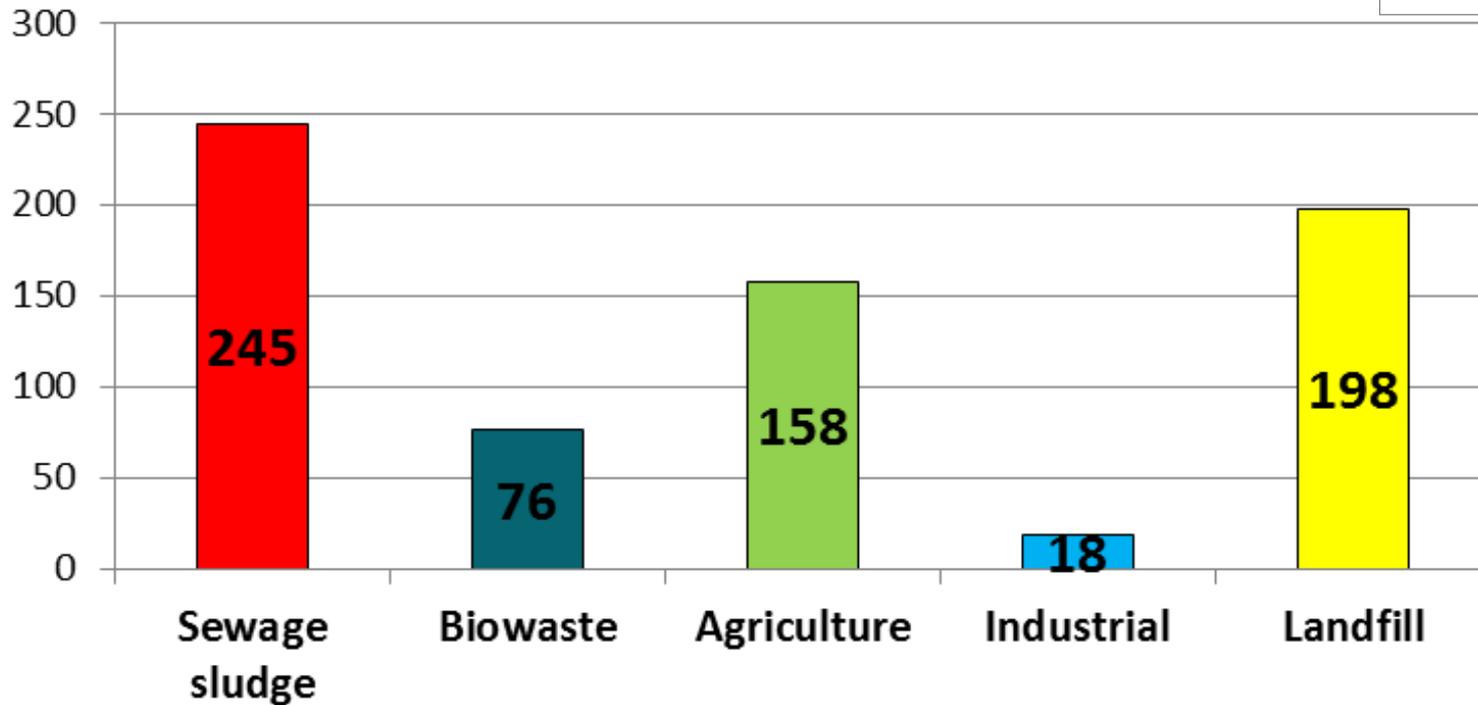
Production GWh/yr

7 155 GWh / 25.8 PJ



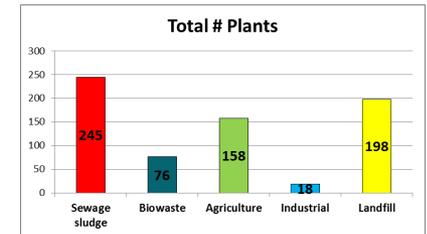
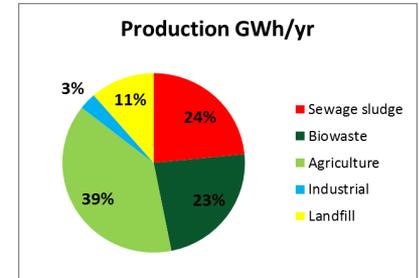
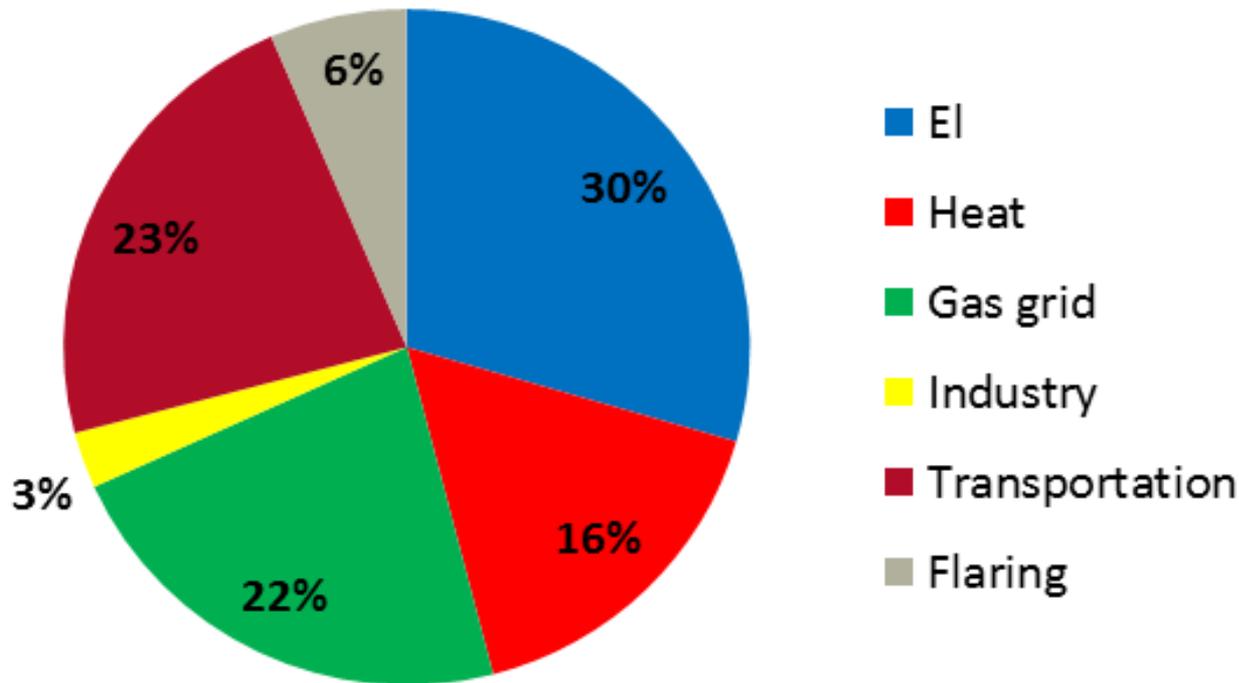
Nordic biogas production

Total # Plants



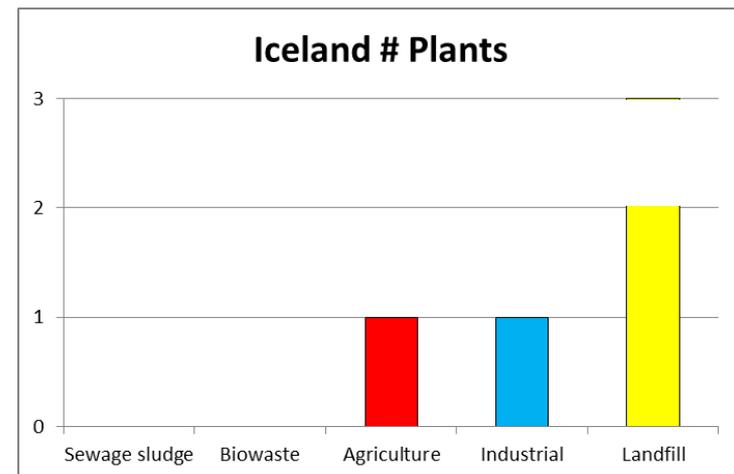
Nordic biogas production

Utilisation total



Iceland

- **Biogas comes predominantly from landfill**
 - ◆ Reykjavik (2001), Akureyri (2014)
 - ◆ Only one farm and one industrial biogas plant
- **>95 pct. for transportation (2.1 mill. Nm³)**
 - ◆ Gas/bifuel cars exempted from excise taxes
 - ◆ Biogas/methane exempted from road taxes (not VAT)
- **Electric cars has the stage now**
 - ◆ Interest for biogas as fuel has dropped
 - ◆ Competition authorities ruled SORPA out of small sale market
- **Current and future development**
 - ◆ **SORPA is constructing plant**
 - ☞ Household waste from capital area
 - ☞ In operation in February 2020
 - ◆ **New plant considered in Akureyri**
 - ☞ Manure and household waste



Iceland

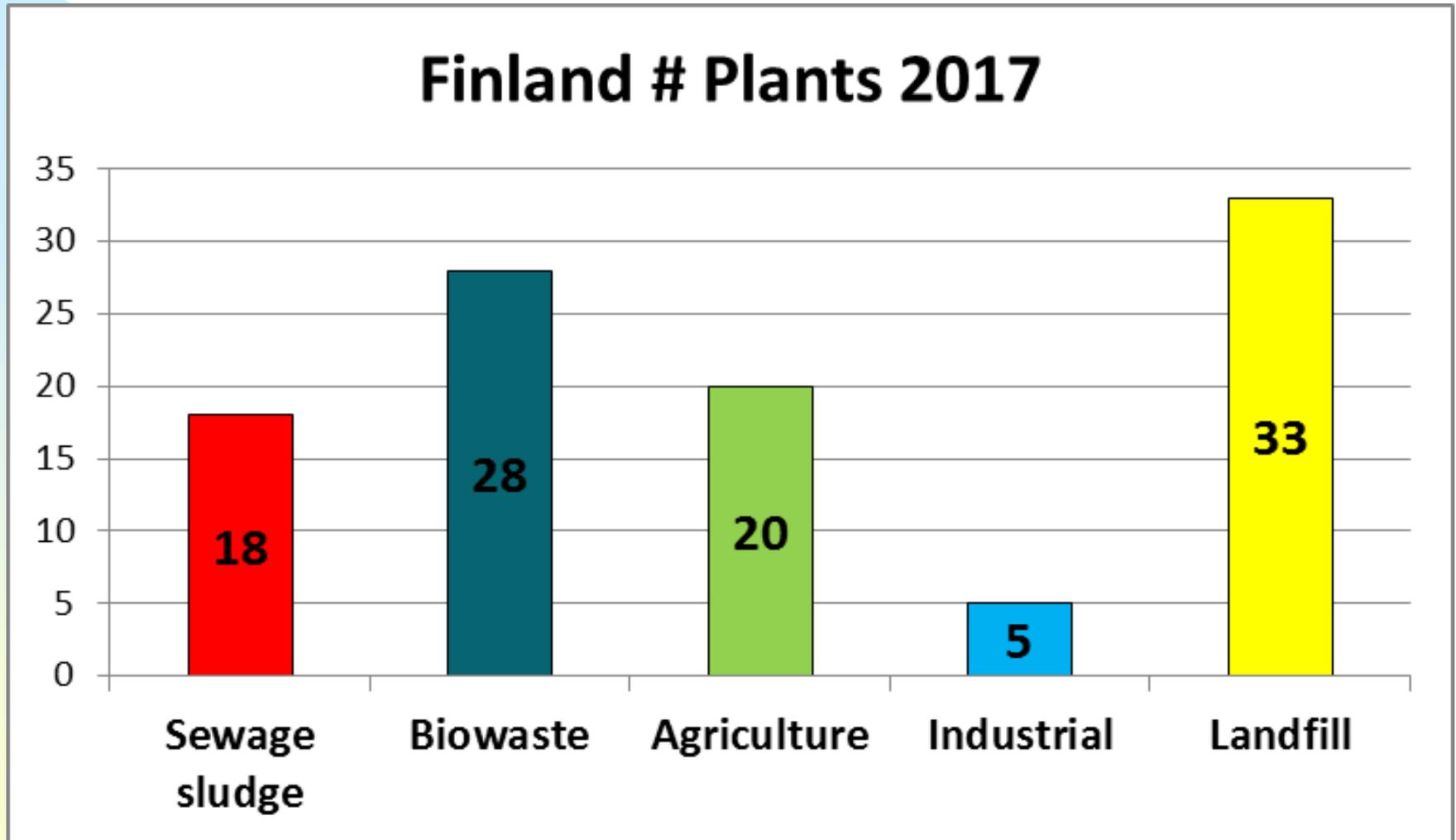
■ Utilisation

- ◆ 1400 gas vehicles (pure biomethane)
- ◆ 25 trucks (waste)
- ◆ 5 buses (2 in Reykjavik, 3 in Akureyri)

■ Challenges

- ◆ Geothermal heat and hydropower
- ◆ Biogas not competitive
- ◆ Electric cars (government believes they solve all)
- ◆ More filling stations needed for further development
 - ☞ No government money for infrastructure investments

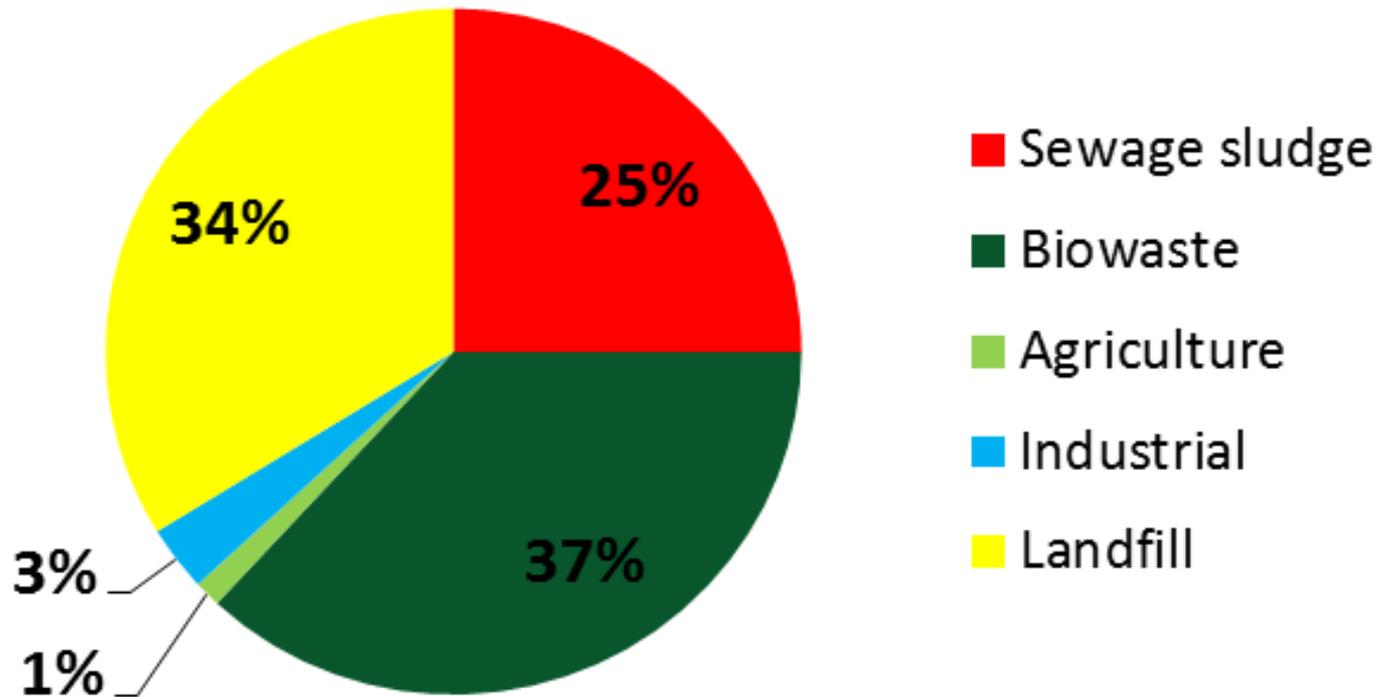
Finland



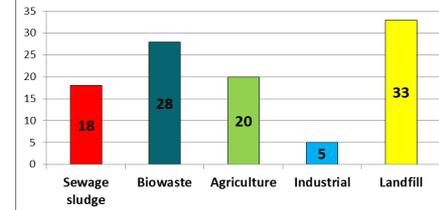
Finland

Finland production 2017

971 GWh / 3.5 PJ

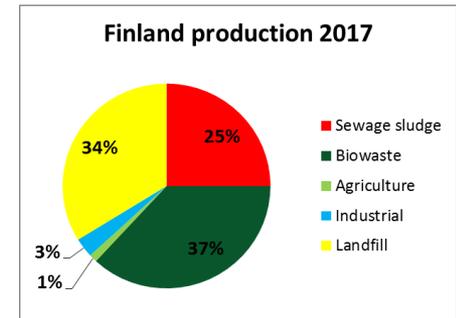
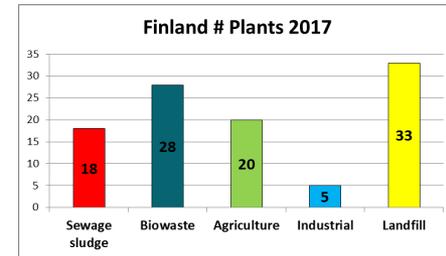
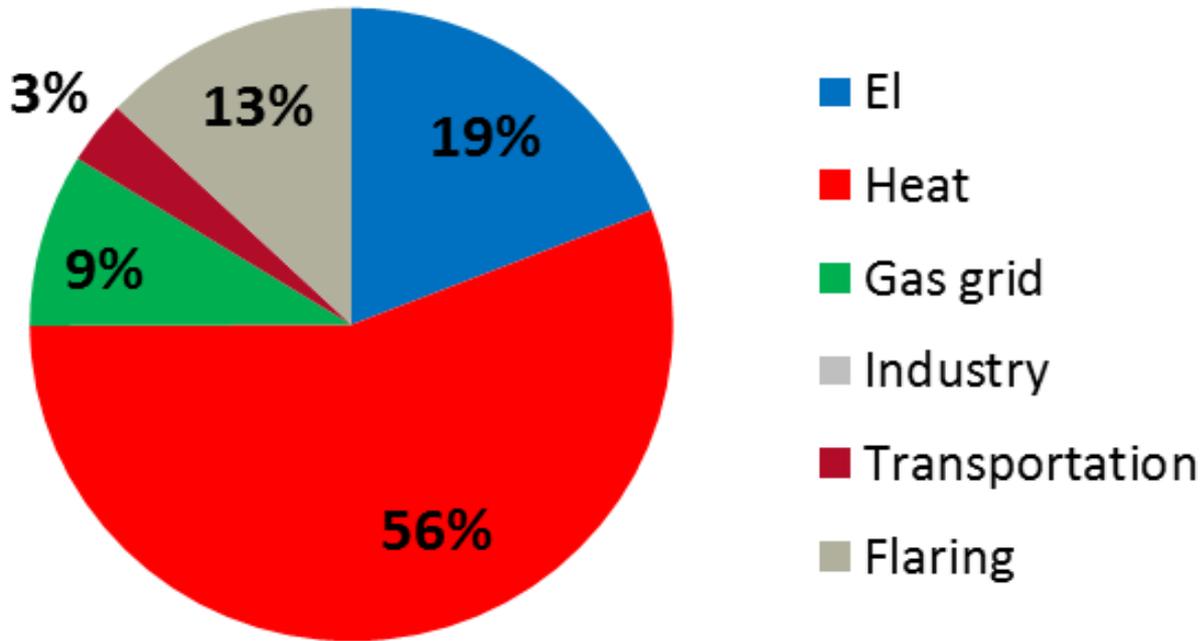


Finland # Plants 2017



Finland

Finland Utilisation 2017



Finland

■ No political targets

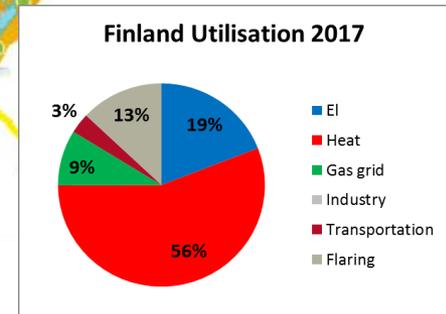
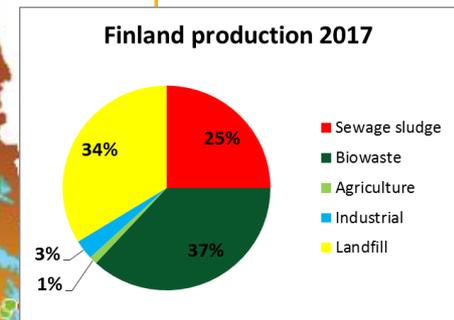
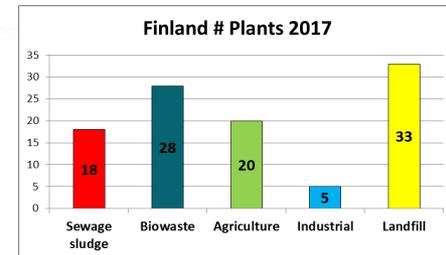
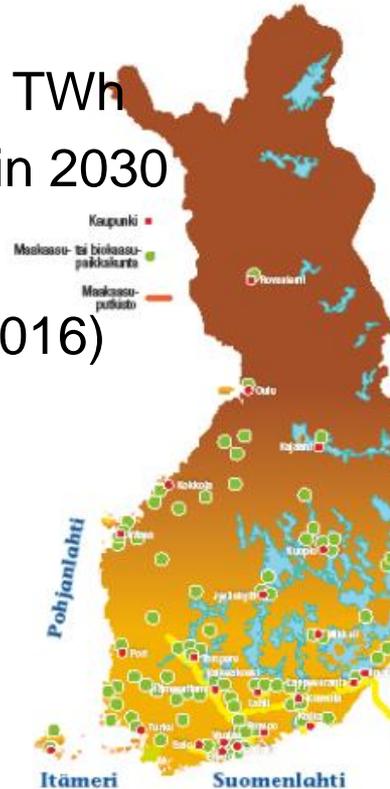
- ◆ Potential (manure & waste) min. 4-6 TWh
- ◆ Government expects > 50,000 cars in 2030

■ Status

- ◆ 14 upgrading plants in 2017 (10 in 2016)
 - ☞ 10 waste, 2 agri, 1 sewage
- ◆ 40 filling stations, 4 for trucks
- ◆ 7000 vehicles in 2018
 - ☞ Gas vehicles doubled in 2017
 - ☞ Expected to continue at same pace

■ Current trends

- ◆ Gasum campaign: Free fuel fixed price 65 €/month
- ◆ Several new biogas plants in planning/construction
 - ☞ Particularly in agriculture and food industry

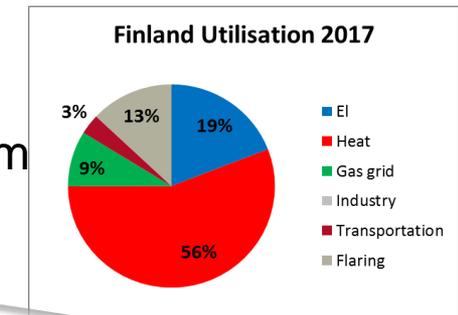
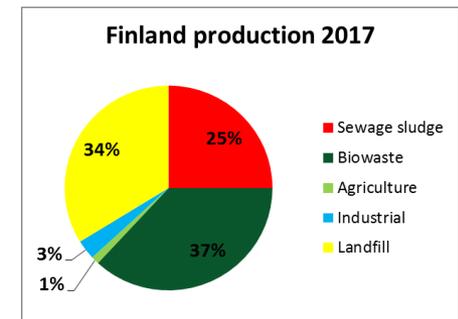
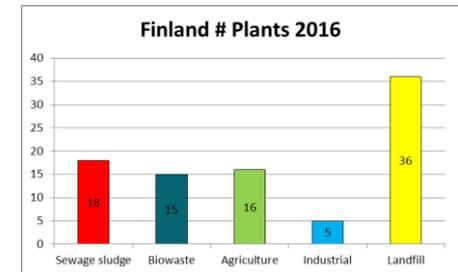


Finland

Support schemes

- **Feed in tariff** since 2011 – up to 12 years / plant
 - ◆ >100 kW: min. price 83.5 €/MWh (up to 19 MW)
 - ◆ If heat utilised additional 50 €/MWh heat
 - ☞ If > 50 % efficiency or >75 % efficiency (above 1 MW)
 - ◆ Regulated: electricity price / emission allowances
 - ◆ No subsidies at negative electricity prices
- **Biomethane exempt from excise duties**
- **Alternatively**
 - ◆ for farm scale plants not receiving above subsidies
 - ☞ 30 % investment grant if > 50 % of energy used on farm
- **Investment grants for**
 - ◆ new biogas plants (2018 – 2022)
 - ◆ filling stations (2018 – 2021)
 - ◆ converting cars to gas (1000 €)

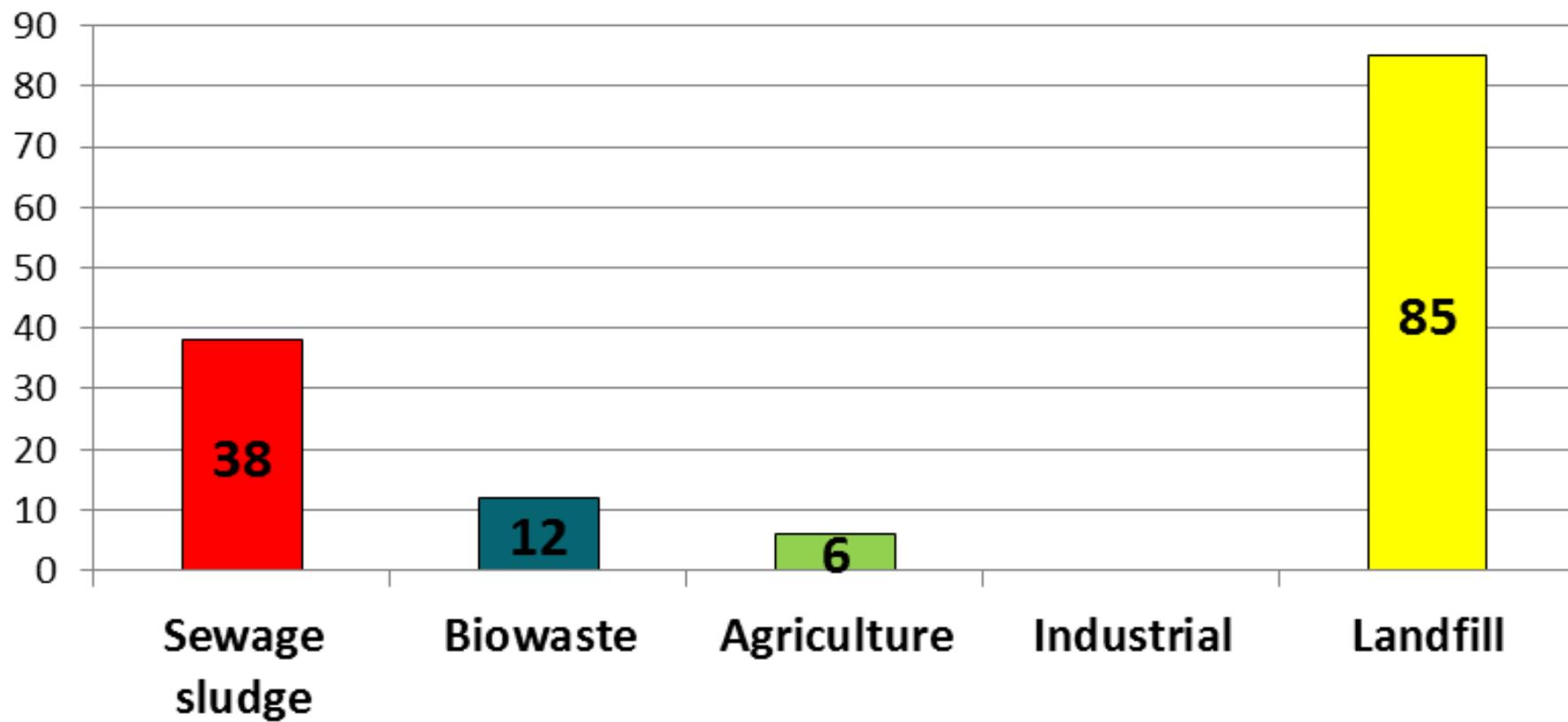
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Subsidy package under reconsideration up to election in April 2019 – such as for manure

Norway

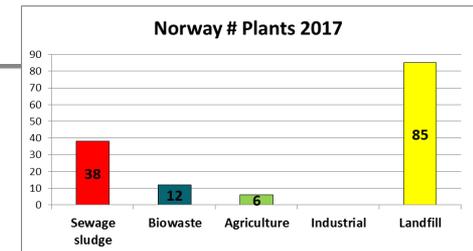
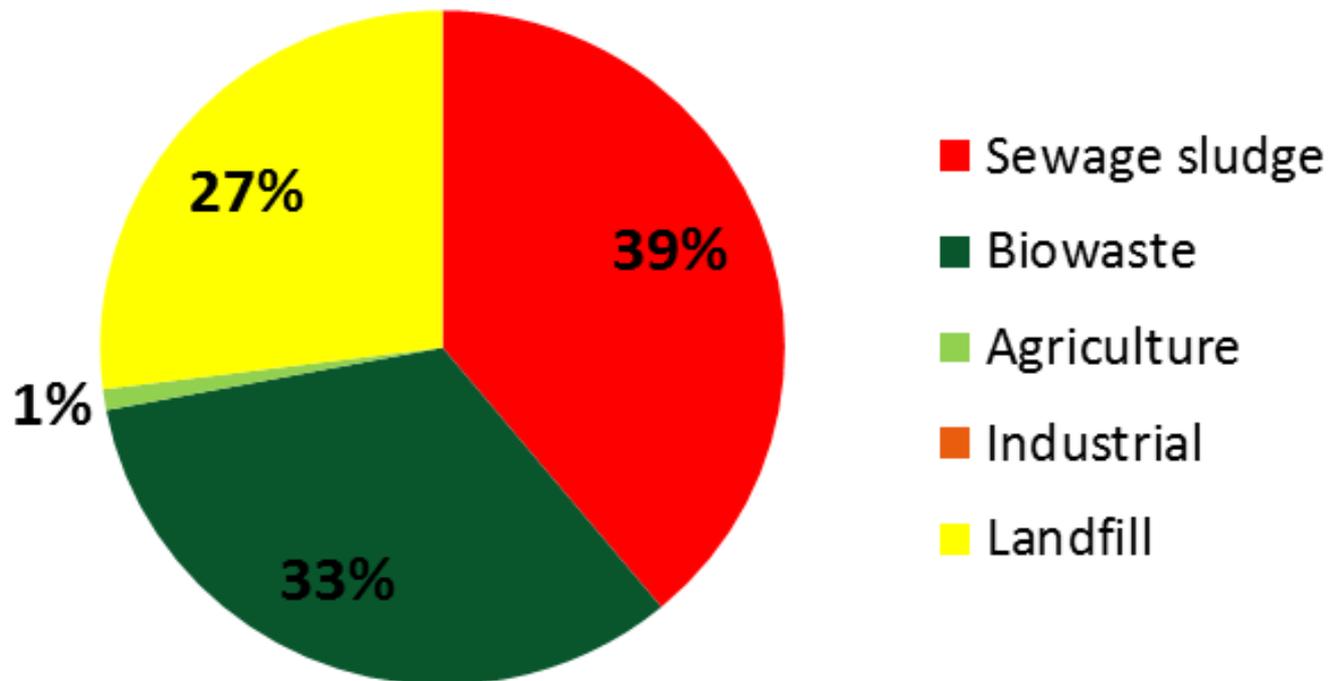
Norway # Plants 2017



Norway

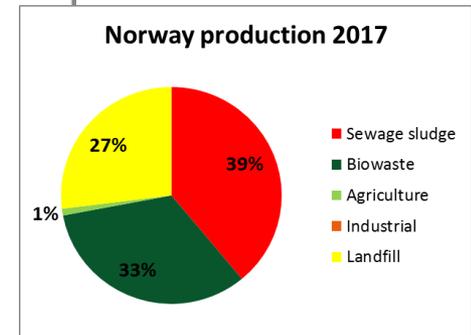
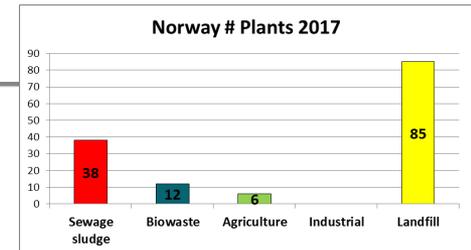
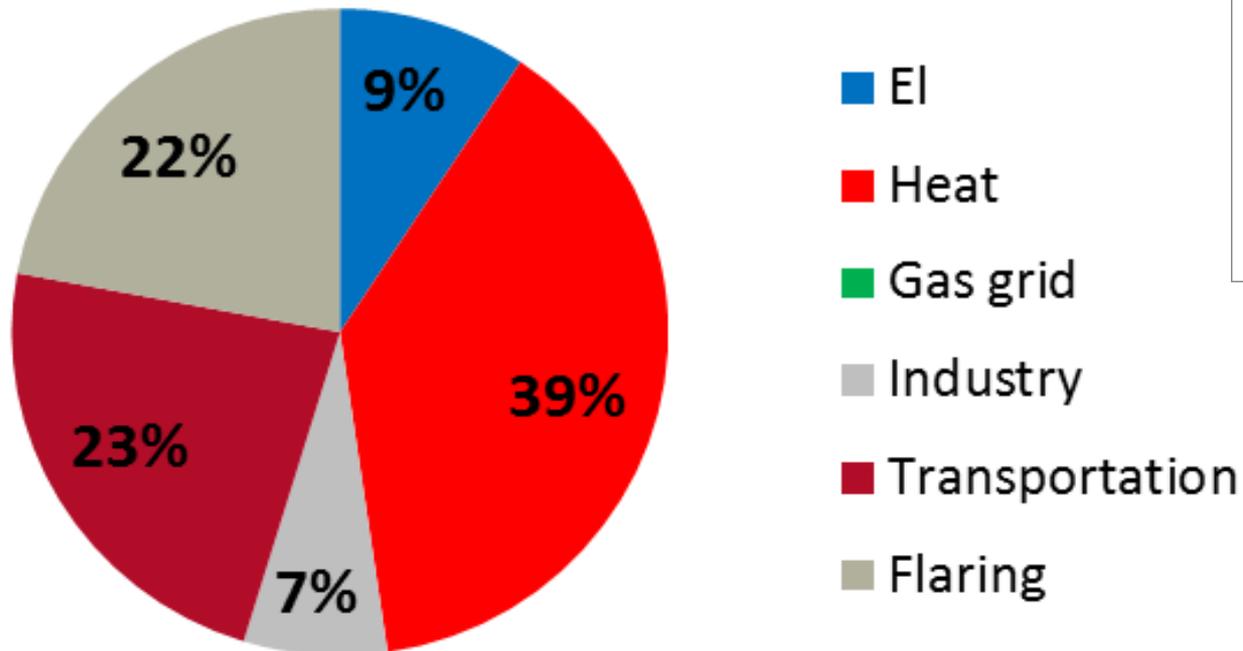
Norway production 2017

1001 GWh / 3.6 PJ



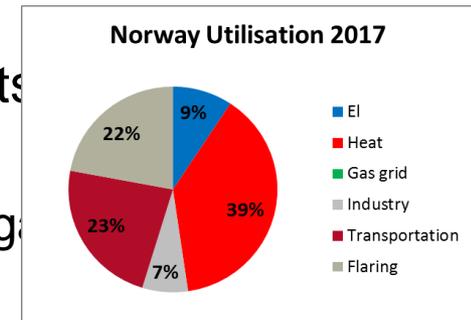
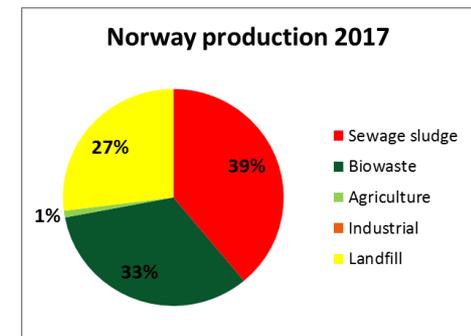
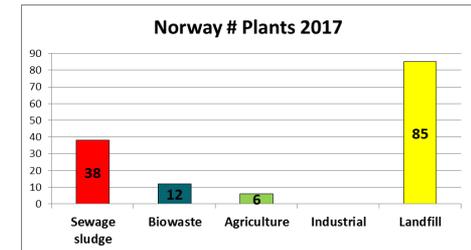
Norway

Norway Utilisation 2017



Norway

- **2009: Target for biogas in 2020**
 - ◆ 30 % of livestock manure (4-5 mill. tonnes)
 - ◆ 60 % of food waste (600,000 tonnes)
 - ◆ To reduce GHG emissions from agriculture
- **2014: National biogas strategy**
 - ◆ Biogas as instrument to cut GHG emissions
 - ◆ Considerable technical potential (2.3 TWh)
 - ◆ Stimulate technical development and reduce costs
 - ☞ Research and development & pilot plants
 - ☞ Incentives for increased production and use of biogas
 - ☞ Incentives to increase supply of feedstocks
 - ☞ Incentives to ensure information dissemination



Norway

■ Drivers

- ◆ 60 NOK (6.50 €) per tonne digested manure
- ◆ Investment aid dependent on plant size – generally 30 % (up to 50%)
- ◆ Investment aid for heavy duty vehicles
- ◆ Green certificate for electricity – but of limited value (low price)
- ◆ Tax exemption for transportation (natural gas taxed from 2016)

■ Challenges

- ◆ Electricity prices low (hydropower) – biogas from landfill goes to heat
- ◆ Competition from electric cars and other biofuels
- ◆ Tenders for public transportation goes for imported biodiesel & el.

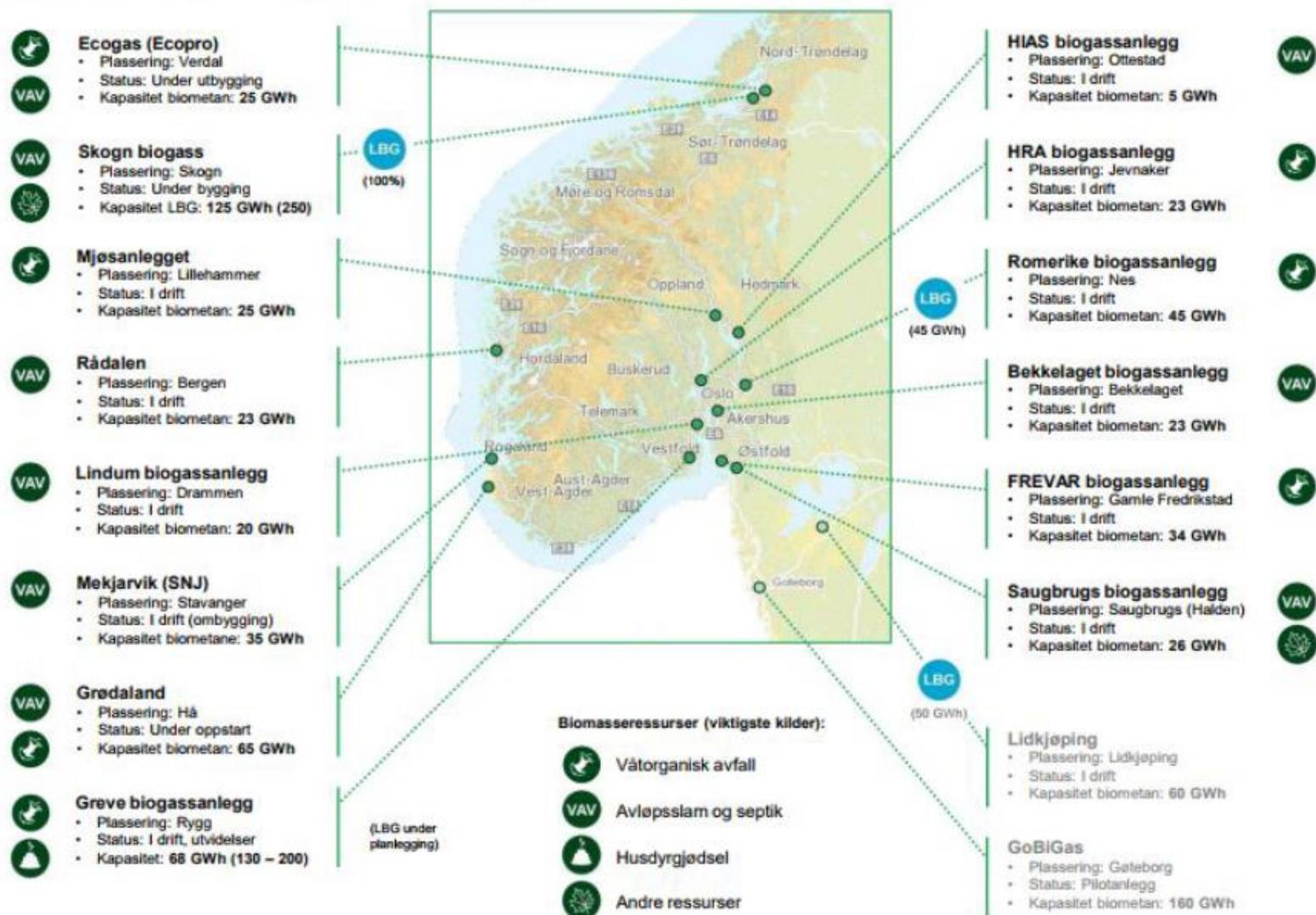
Norway

■ Current issues

- ◆ Mandatory **source separation** of food waste from 2023
- ◆ More landbased **fishfarming**
- ◆ The industry and the government works on
 - ☞ **industry norm and reporting** system for monitoring production, climate impact and feedstock origin
- ◆ Opposition in Parliament (Socialdemokratiet and Green) propose
 - ☞ to **equate biogas vehicles** with hydrogen and electric cars
- ◆ **Transportation strategy** adopted:
 - ☞ city buses zero emission or biogas by 2025
- ◆ To be decided
 - ☞ **Exemption for city tolls** of biogas vehicles

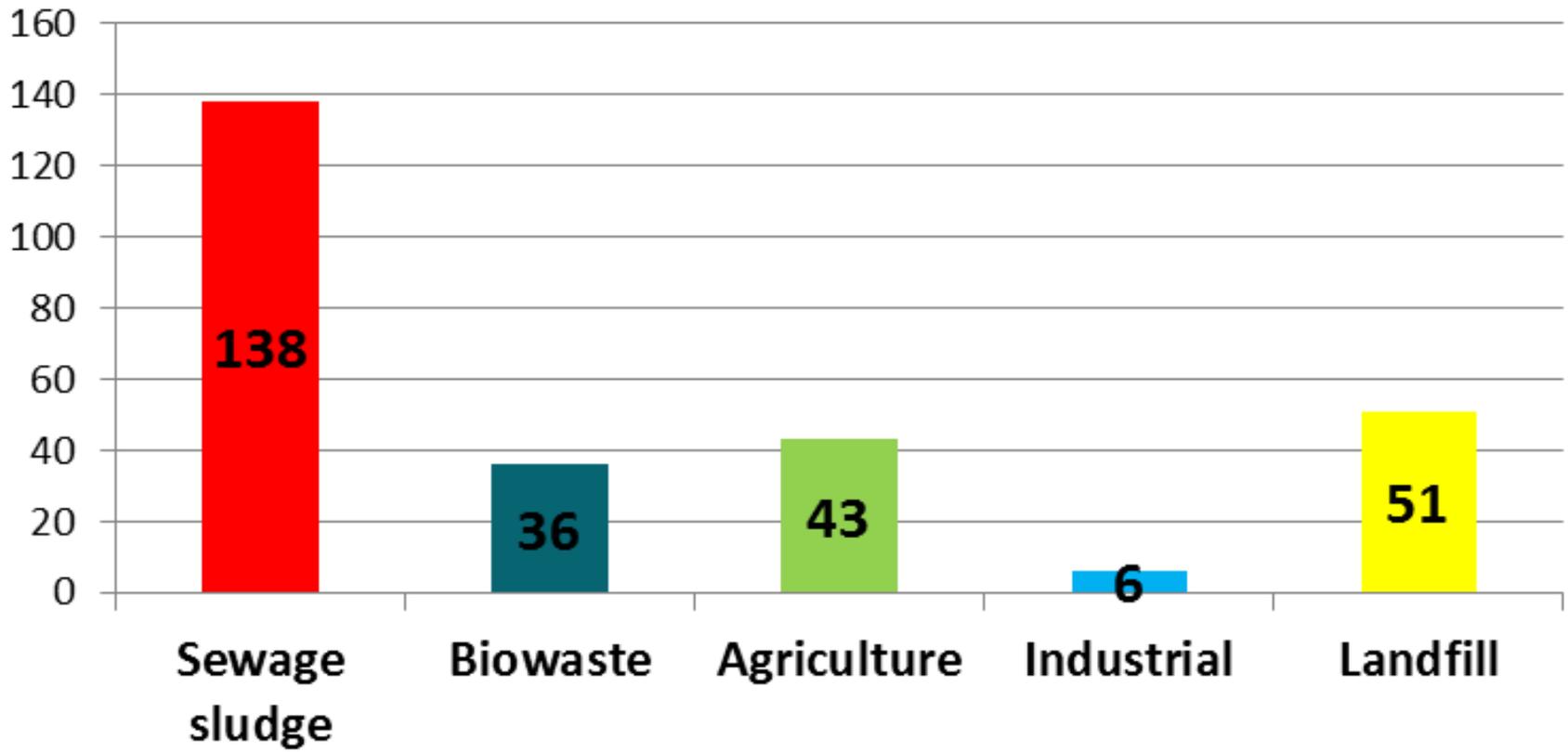


Norway



Sweden

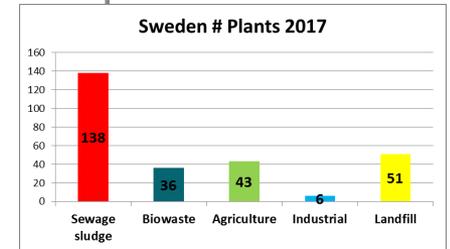
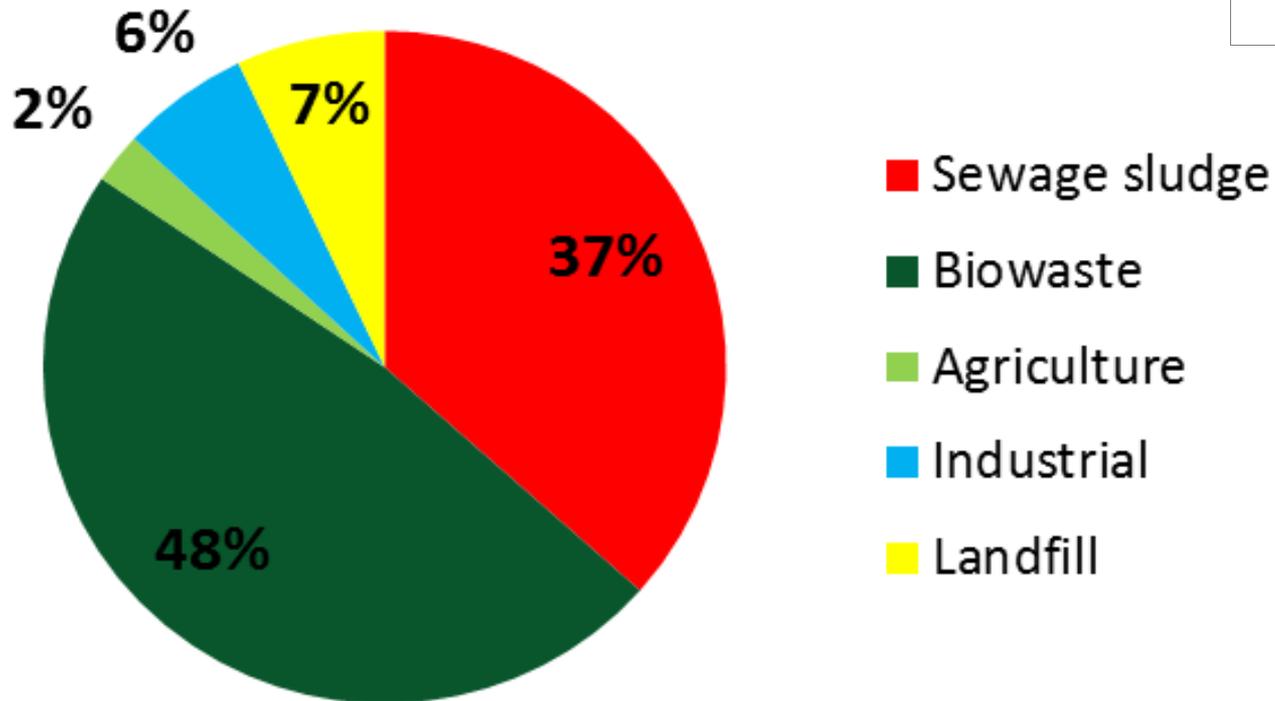
Sweden # Plants 2017



Sweden

Sweden production 2017

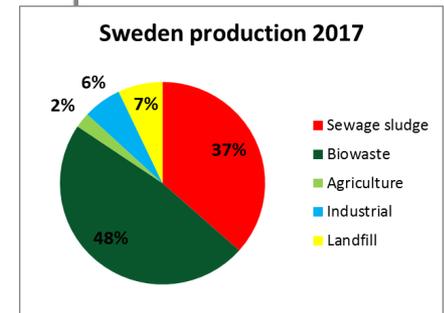
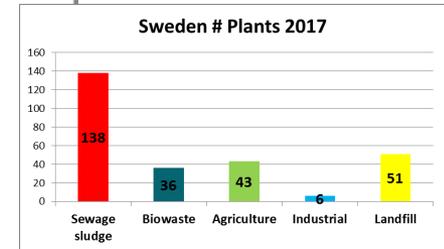
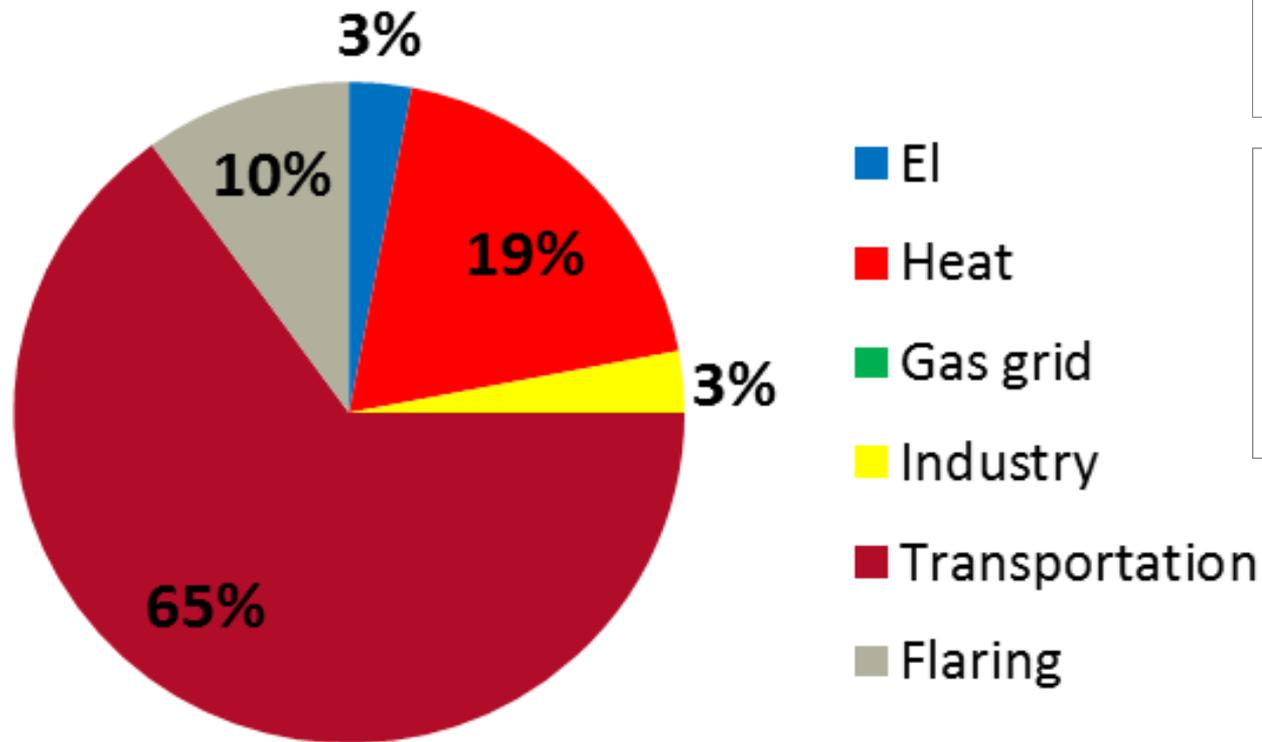
2060 GWh / 7.4 PJ



Biowaste is actually co-digestion
(biowaste, manure, ABP)

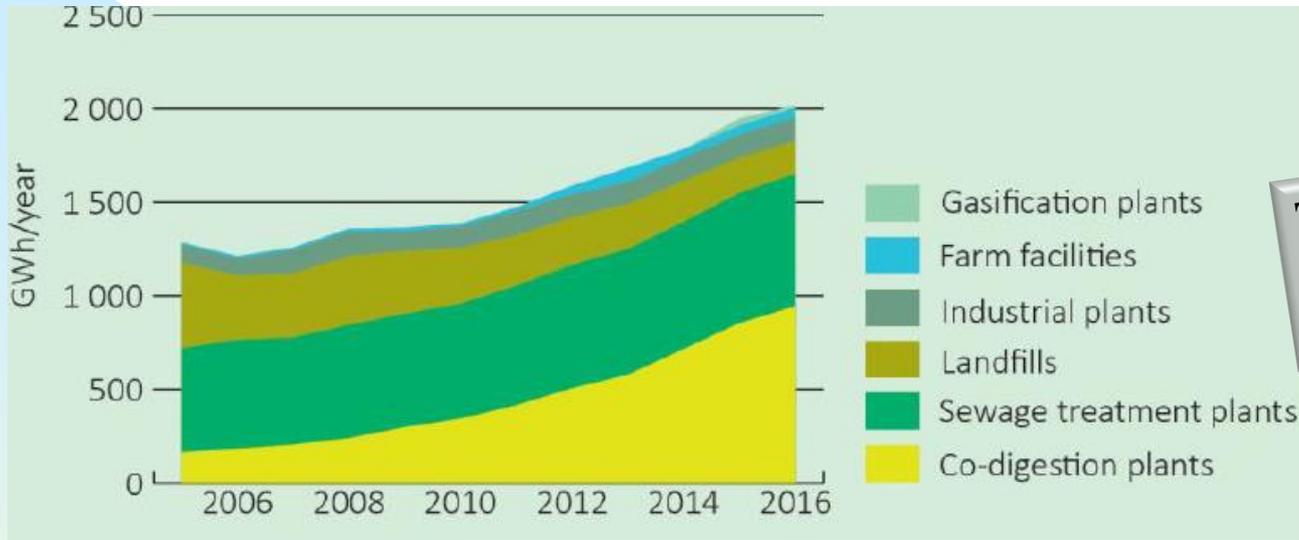
Sweden

Sweden Utilisation 2017

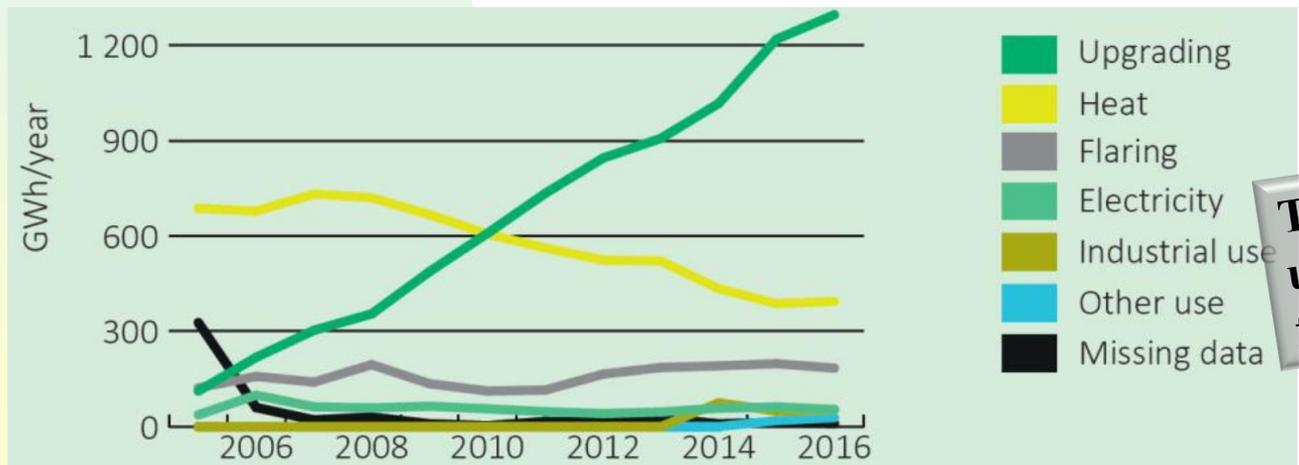


In addition to the domestic produced biogas (2060 GWh) app. 800 GWh is imported

Sweden



The Swedish biogas development is in co-digestion plants



Potential/ambition: 15 TWh in 2030

The Swedish biogas is upgraded – and used for transportation

Sweden

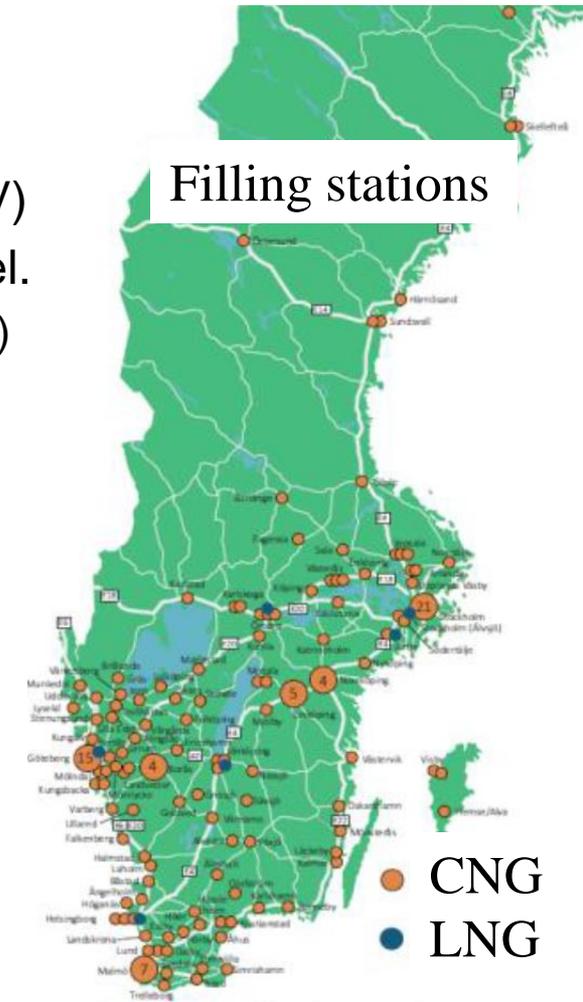
Biogas for transportation

- ◆ 65 upgrading plants
- ◆ >240 filling stations
- ◆ > 55,000 vehicles (52,000 LDV, 2500 buses, 850 HDV)
- ◆ Stagnation in biomethane sale – focus on biodiesel / el.
 - 21 % biofuel (81 % biodiesel, 11 % bioethanol, 8 % CH₄)
- ◆ However biomethane content still increasing (>90 %)

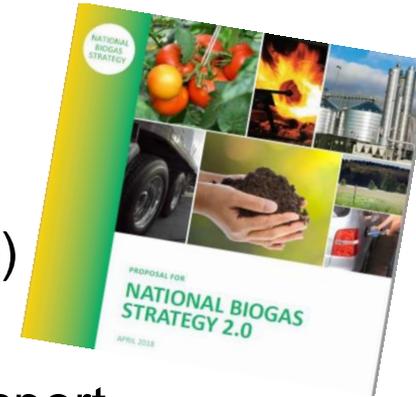
Support schemes

- ◆ No CO₂ or energy tax (until 2020)
- ◆ 40 % less income tax for company car (until 2020)
- ◆ Bonus-malus for new cars (bonus 10,000 SEK)
- ◆ Climate investment grants for local initiatives
- ◆ Incentives for "innovative" biogas technique
- ◆ (electricity certificates 15-20 €/MWh)
- ◆ 0.04 €/kWh for manure based biogas

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Sweden



Current challenge

- ◆ Swedish biogas promoted by market pull (tax exemption)
- ◆ Market (industry) goes for imported (supported) biogas
- ◆ Public procurement goes for electrification in public transport
- ◆ Swedish biogas producers challenged with decreasing price

Reaction:

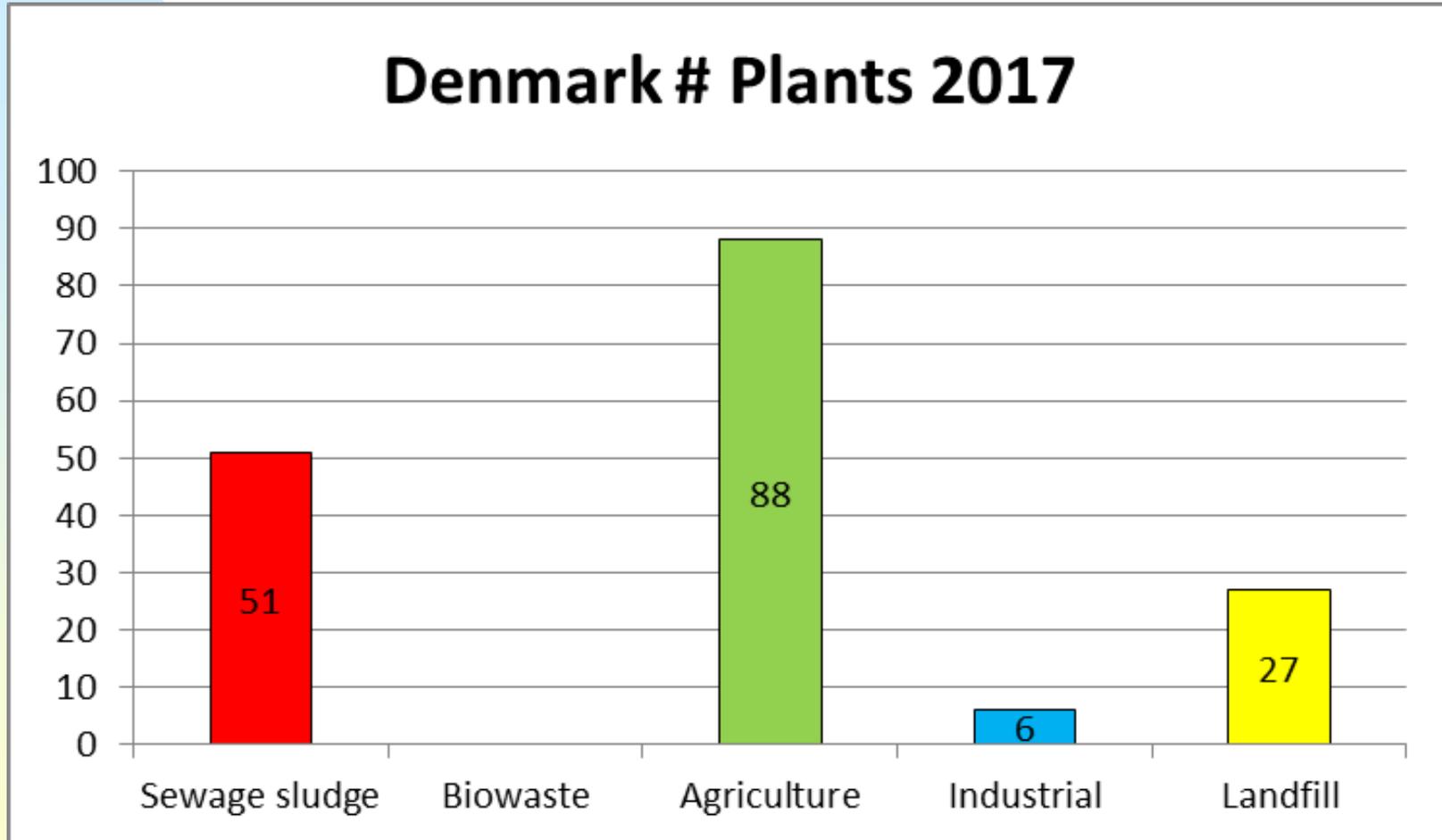
- ◆ **Biogas support** increased 270 million SEK in 2018
- ◆ **Production aid** extended from manure to also food waste
- ◆ **Analysis of biogas market** (Biogasmarknadsutredningen)
 - ☞ How to secure long and short term **competitiveness**
 - ☞ Identify and evaluate the benefits of **domestic** biogas production
 - ☞ Analyse the **role** of biogas linked to the energy and climate goals
 - ☞ If necessary submit **proposals** for new policy instruments

Deadline June 3 2019

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Seemingly considering proposals for subsidies for production instead of or in combination with current tax exemption

Denmark

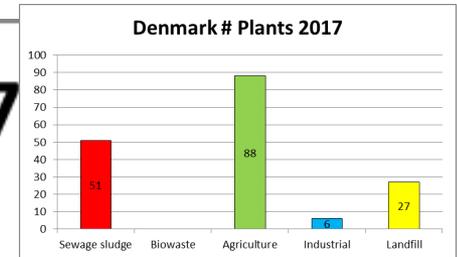
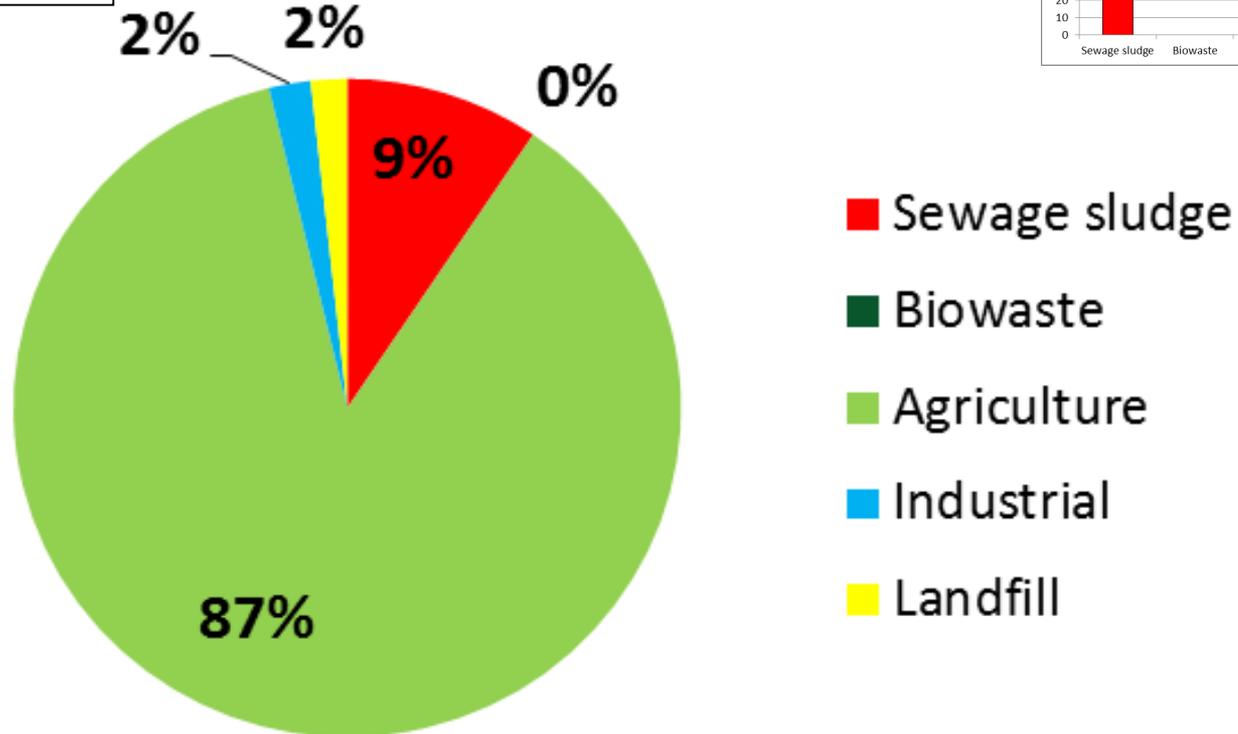


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Denmark

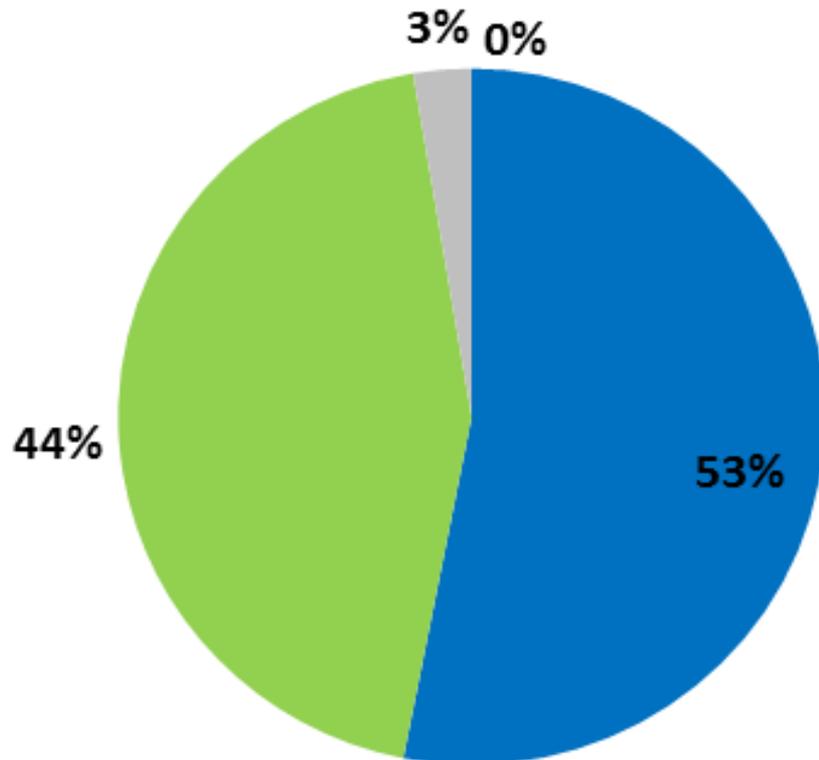
3103 GWh / 11.2 PJ

Denmark production 2017

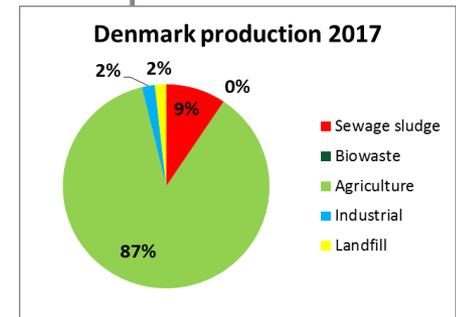
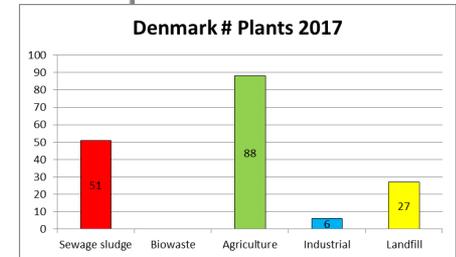


Denmark

Denmark 2017

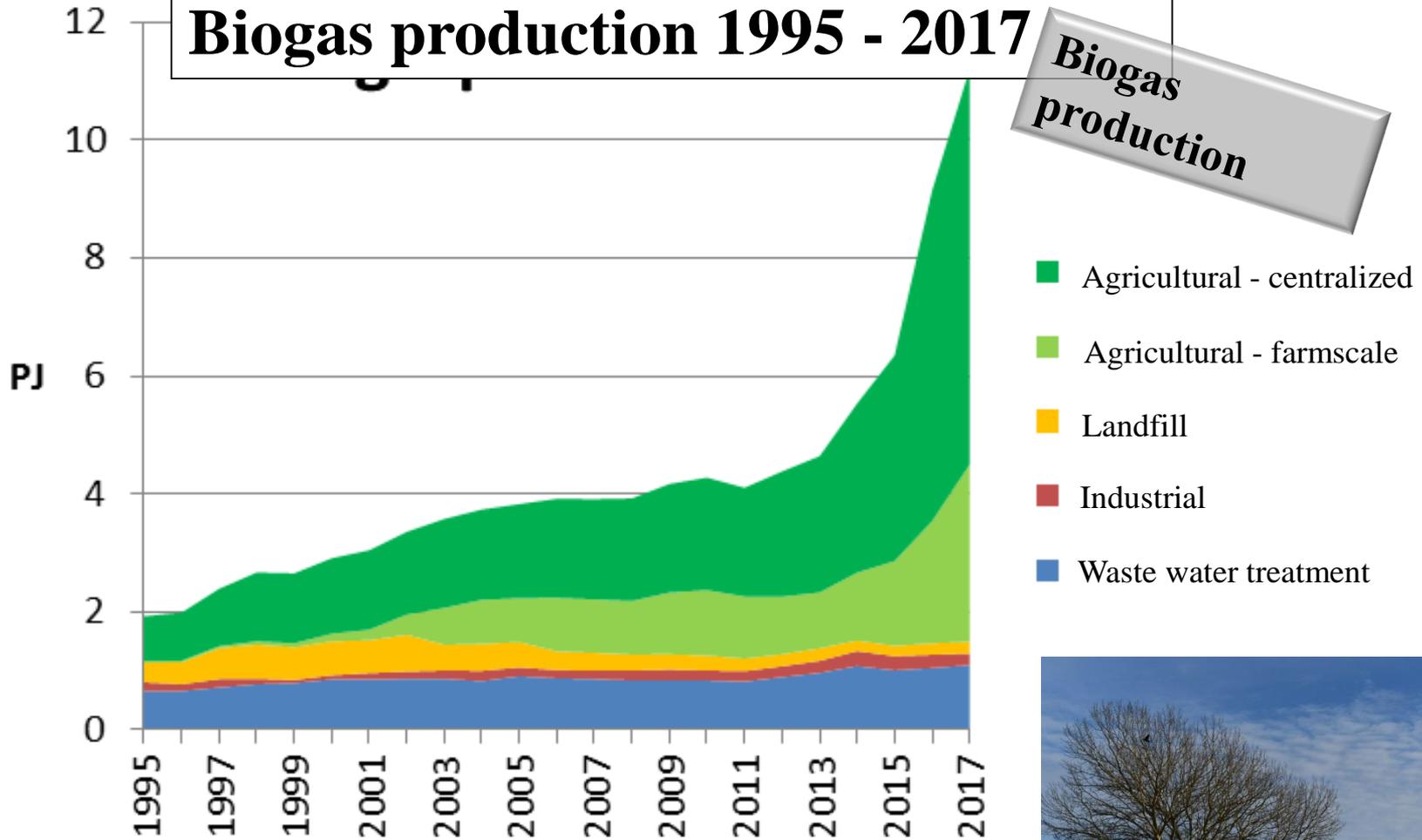


- El
- Heat
- Gas grid
- Industry
- Transportation
- Flaring



Denmark

Biogas production 1995 - 2017



Biogas production

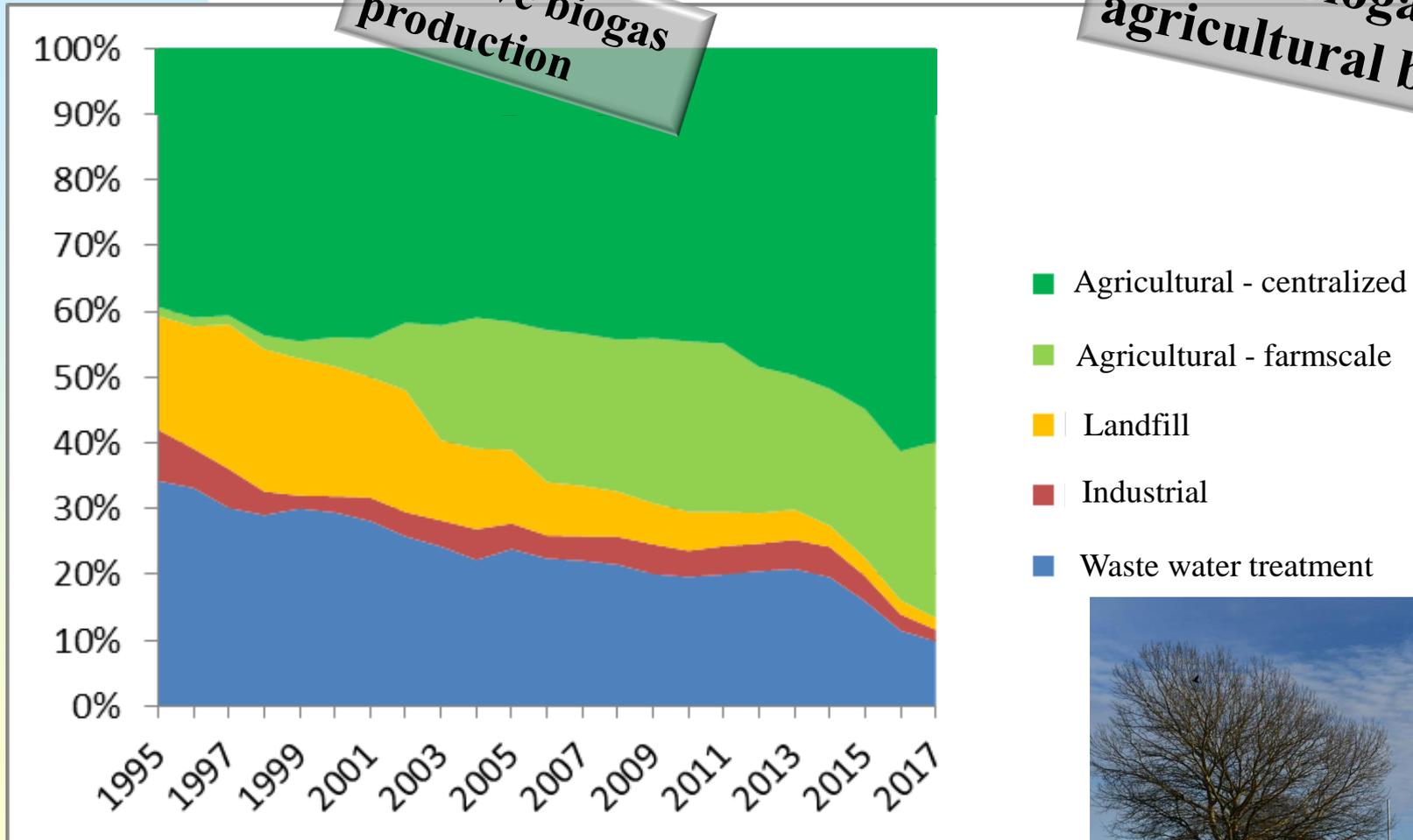
- Agricultural - centralized
- Agricultural - farmscale
- Landfill
- Industrial
- Waste water treatment



Denmark

Relative biogas production

Danish biogas is agricultural based

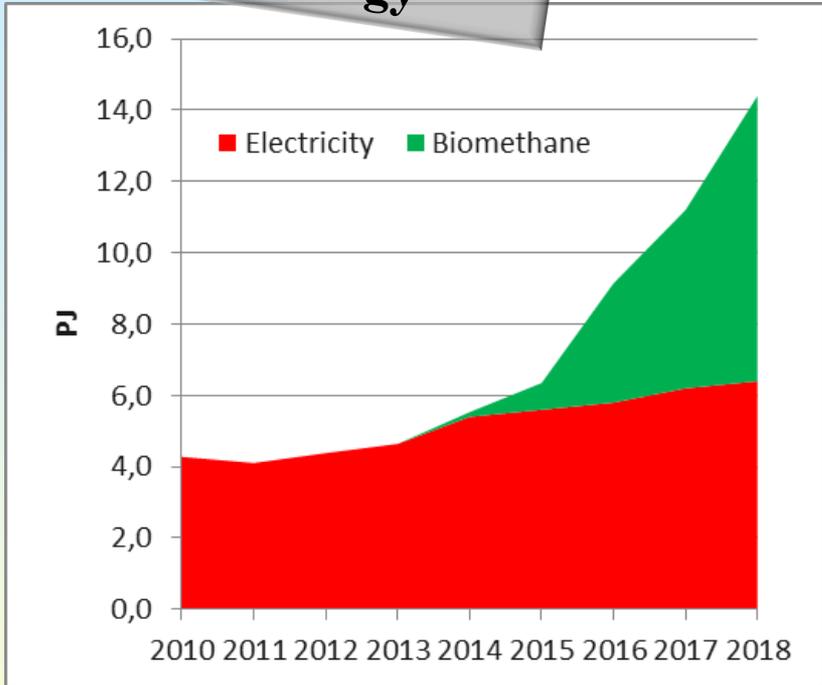


- Agricultural - centralized
- Agricultural - farmscale
- Landfill
- Industrial
- Waste water treatment

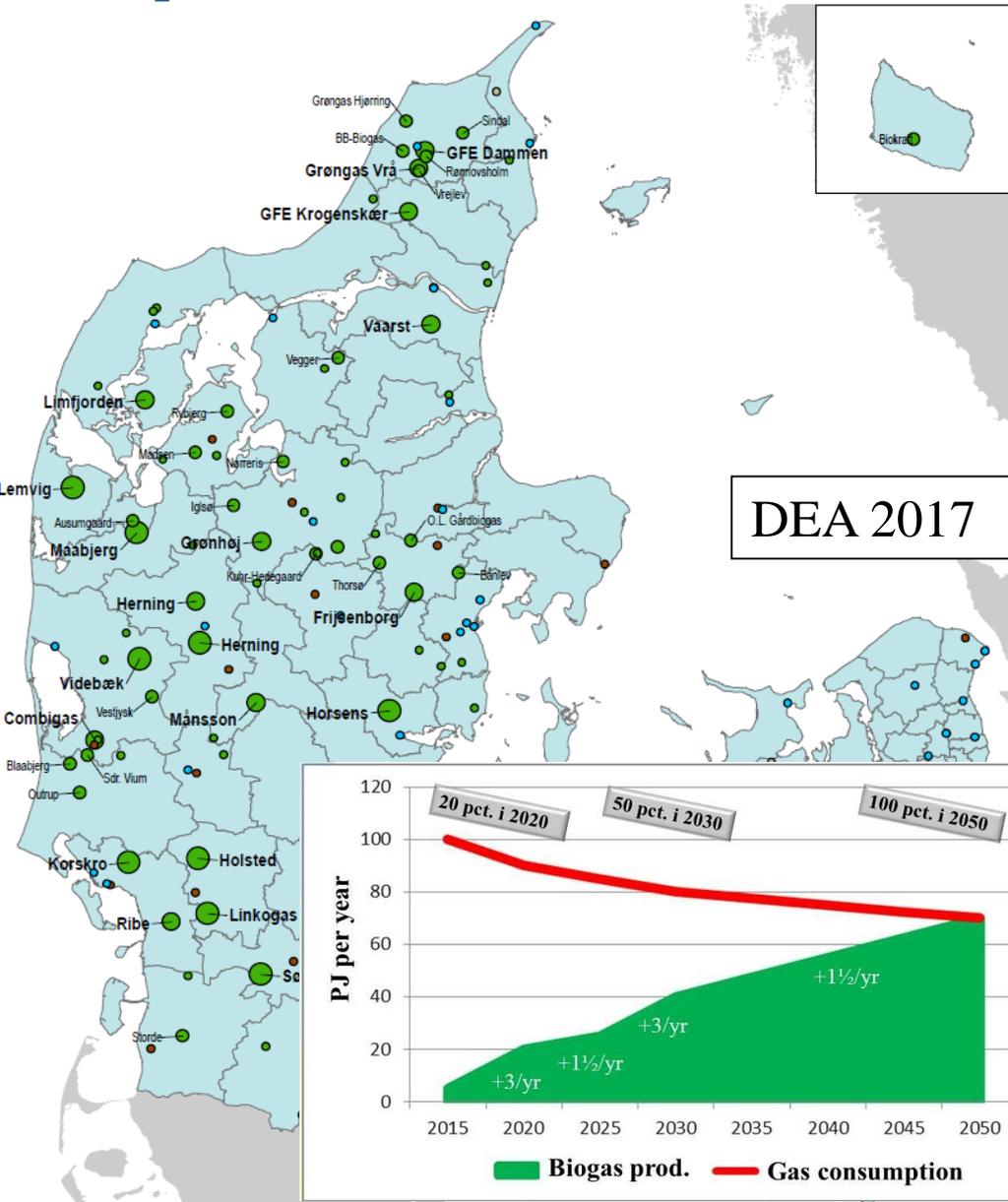


Biogas plants

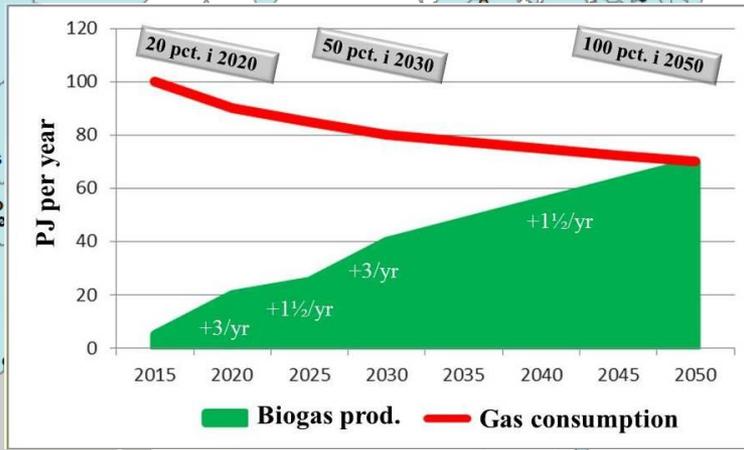
The development is in upgrading as storable renewable energy



- Waste water treatment
- Industrial
- Landfill
- Agricultural - centralized
- Agricultural - farmscale



DEA 2017



Denmark

- **New investors:**

- ◆ Energy- and gas companies

- **New plants are upgrading to gas grid**

- ◆ 12 upgrading plants in 2016, now 30+
- ◆ 17 filling stations, vehicles increasing (busses, garbage trucks)



- **Current issues**

- ◆ New biomasses: Deep litter, straw
- ◆ Climate: Transportation and agriculture
- ◆ Circular economy: Source separated household waste



- **Support schemes (Energy agreement 2012):**

1. *Improved:* electricity from 79 to 115 DKK/GJ
2. **New: biomethane in grid:** 115 DKK/GJ (56€/MWh)
3. *New:* transport and industry: 75 DKK/GJ (37€/MWh)

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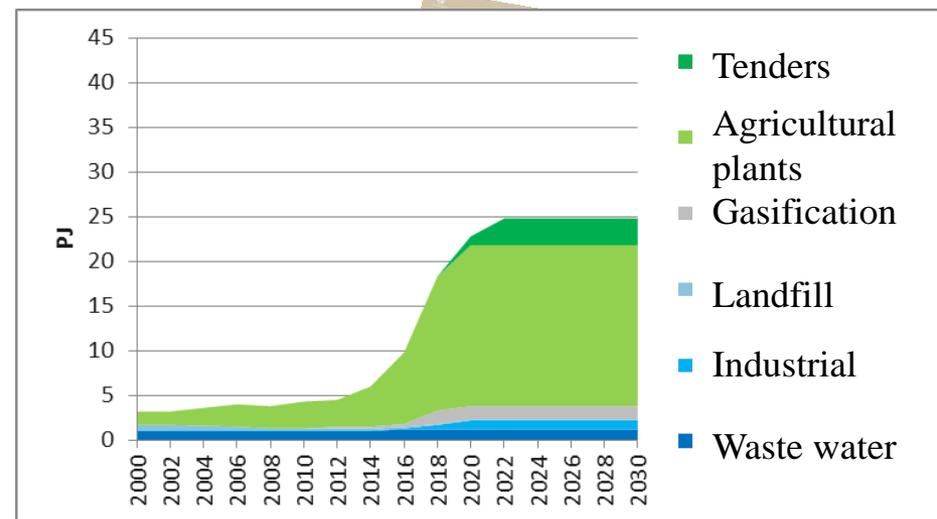


Denmark

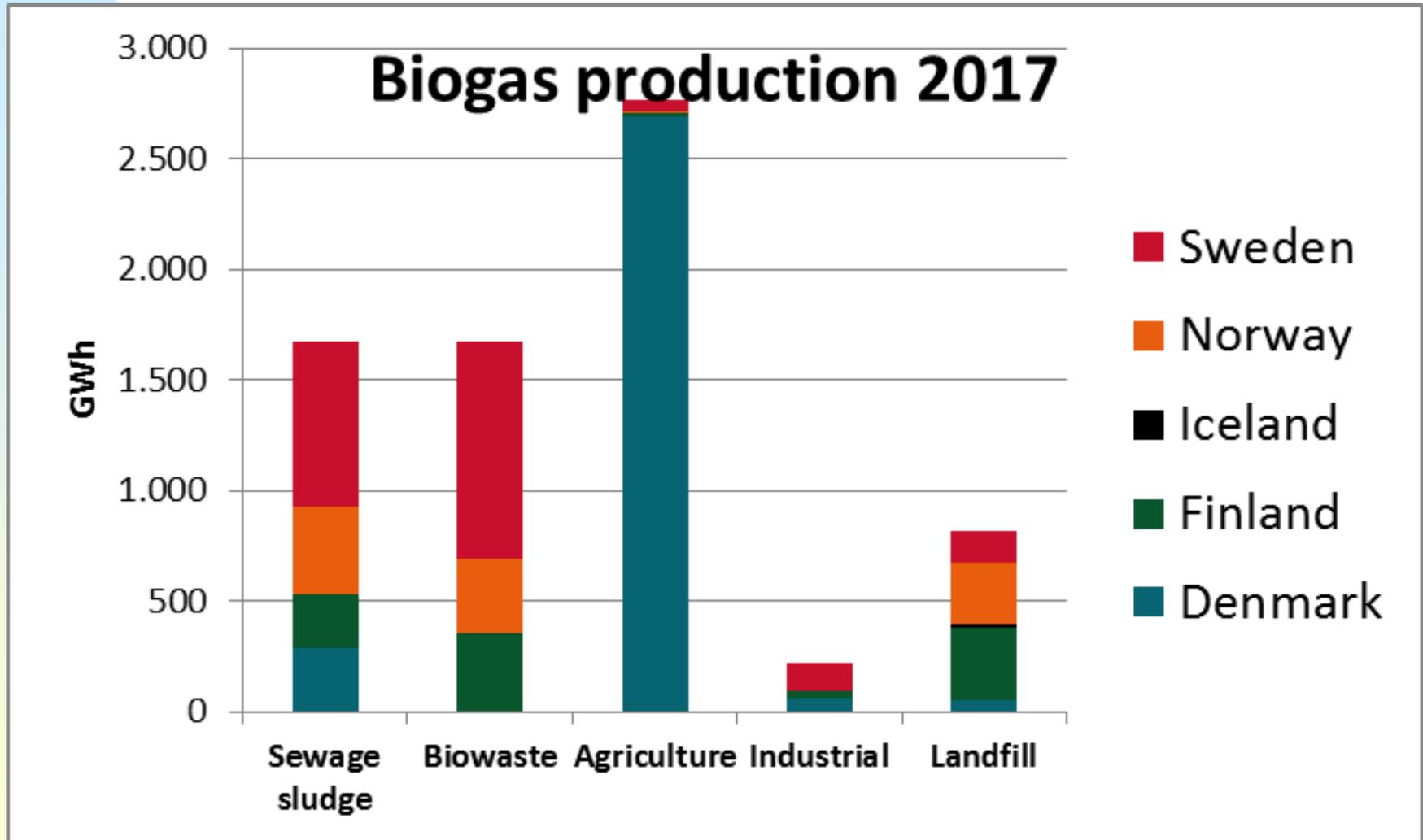
- **Existing biogas plants guaranteed current tariffs**
 - ◆ Until 2032 or at least 20 years for each plant
 - ◆ Projects in progress may be established until end of 2019
 - ☞ With certain waivers (investment before february 8 2019)
 - ◆ Existing plants will get a ceiling for support from 2020
- **A new system will be phased in after 2020**
 - ◆ Biogas for electricity: as solar and wind power (tenders)
 - ◆ Biogas into gasgrid: tender for green gases

**Energy Agreement 29 June 2018
concretized February 2019 –
adjusted April 5 2019**

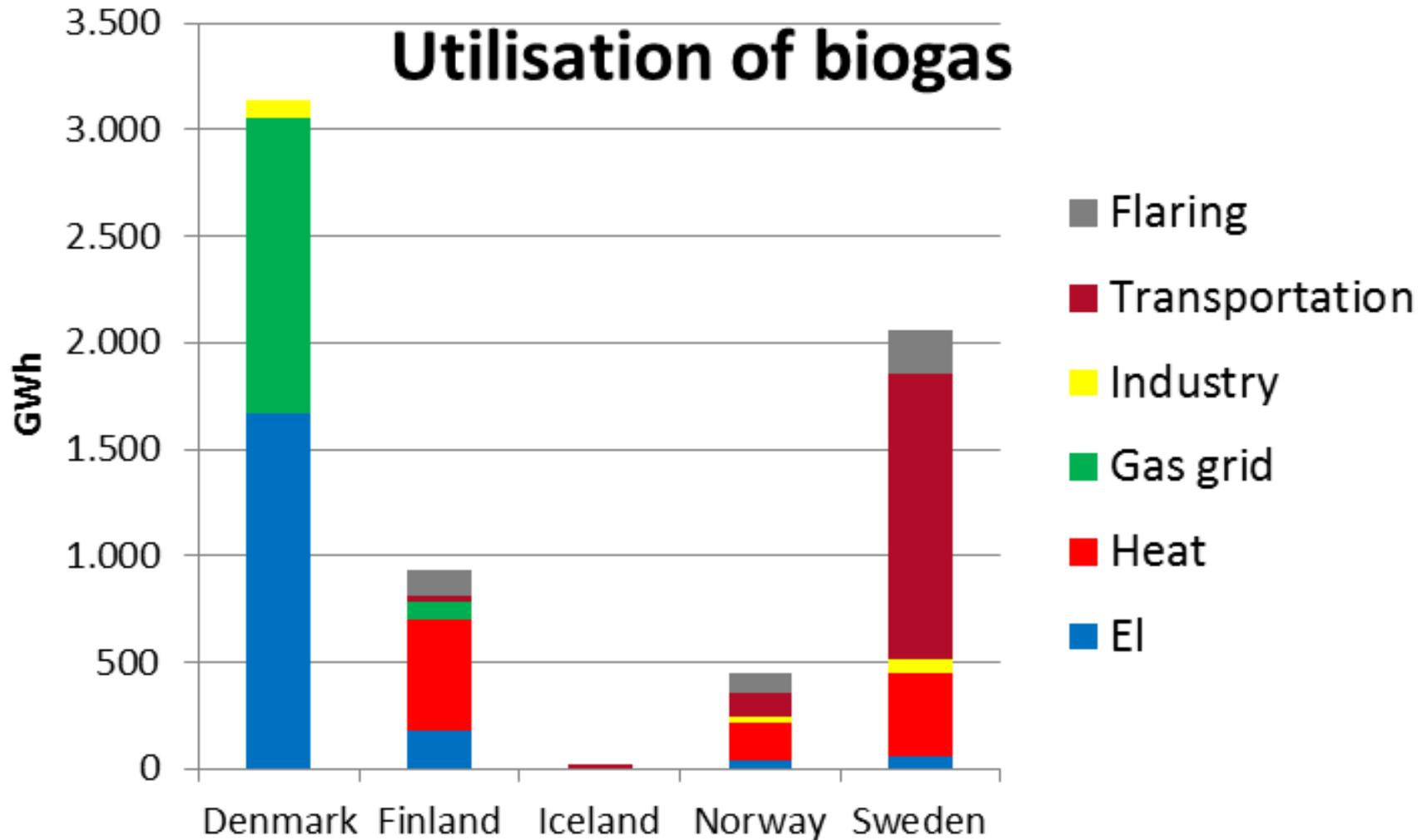
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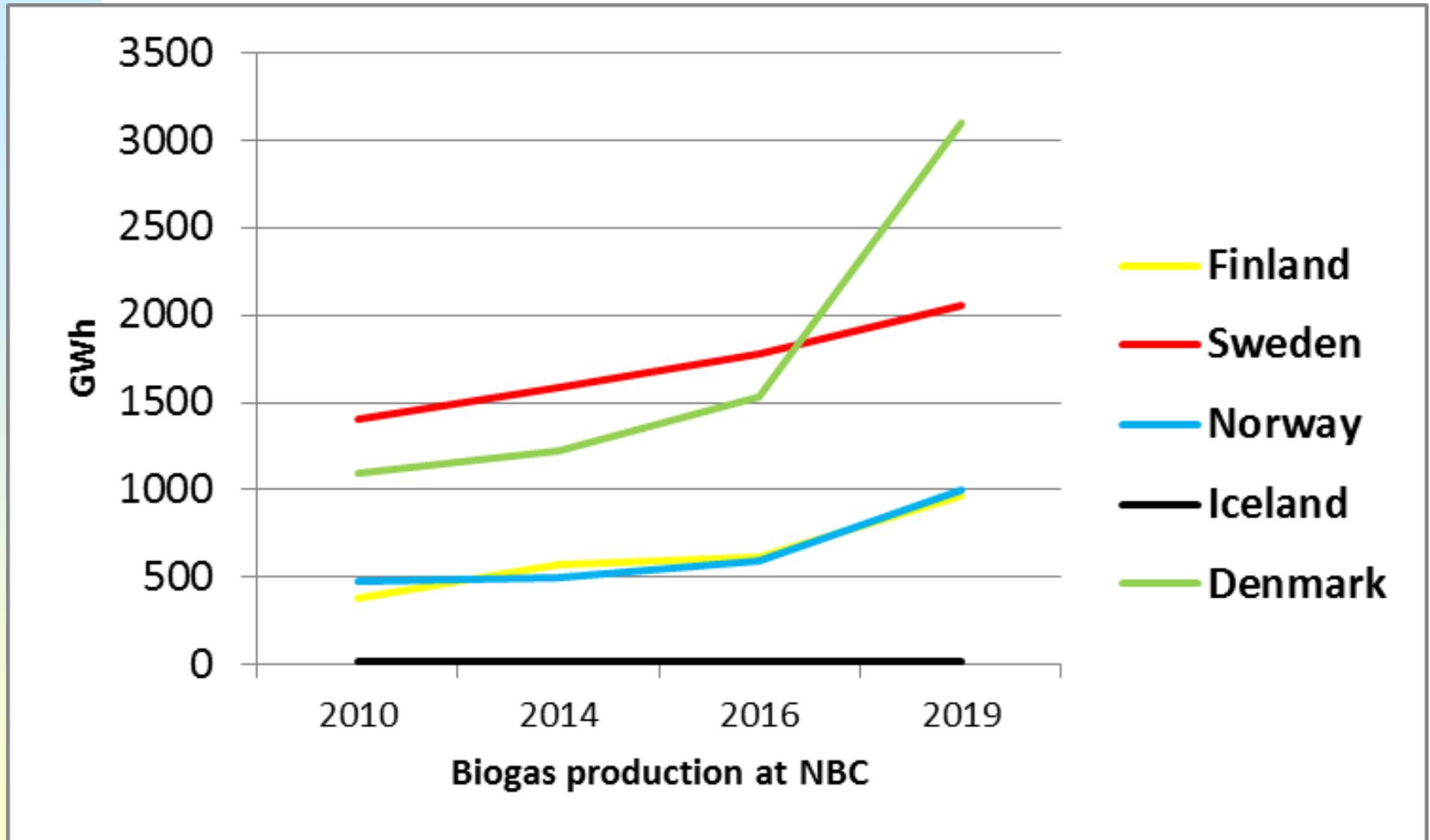
Nordic countries



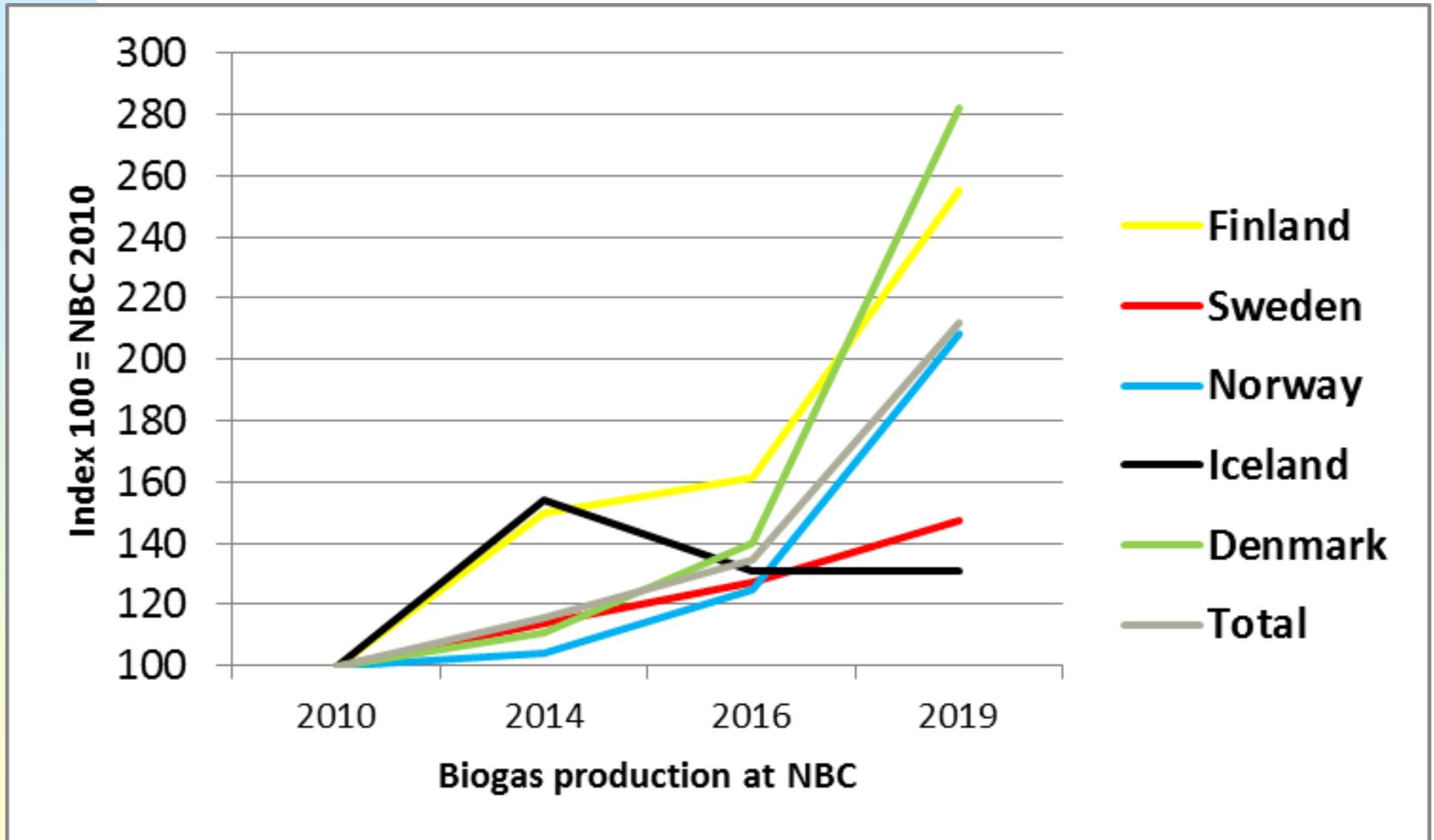
Nordic countries



Nordic countries

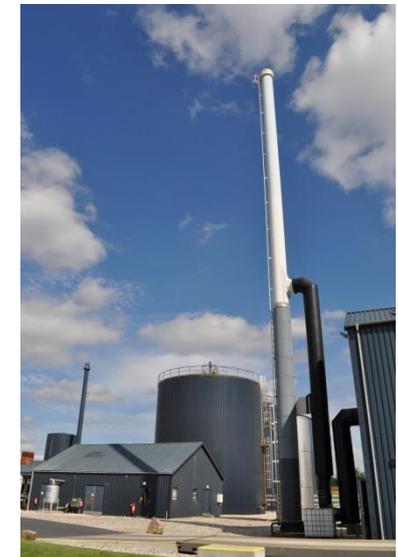


Nordic countries



General trends

- **Increasing biogas production**
 - ◆ Still huge potential
- **Towards upgrading and transportation fuel**
- **New biomasses**
 - ◆ Source separation of household waste
 - ◆ Solid residues from agriculture, fish etc.
- **Challenges and possibilities**
 - ◆ Electrical cars / other biofuels
 - ◆ International trade with biomethane
 - ◆ Political interest (+/-)



Thanks for listening!

Thanks to Organizing committee NBC for most valuable contributions!

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