



From Value stacking to Tool stacking in Renewable Gas Regulation

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From Value stacking to Tool stacking in Renewable Gas Regulation

Sdewes, Palermo October 2018



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Questions

- How should future RE-gas support models be designed?
 - Should they differ from wind- and solar support models?
- What could we expect from such models?

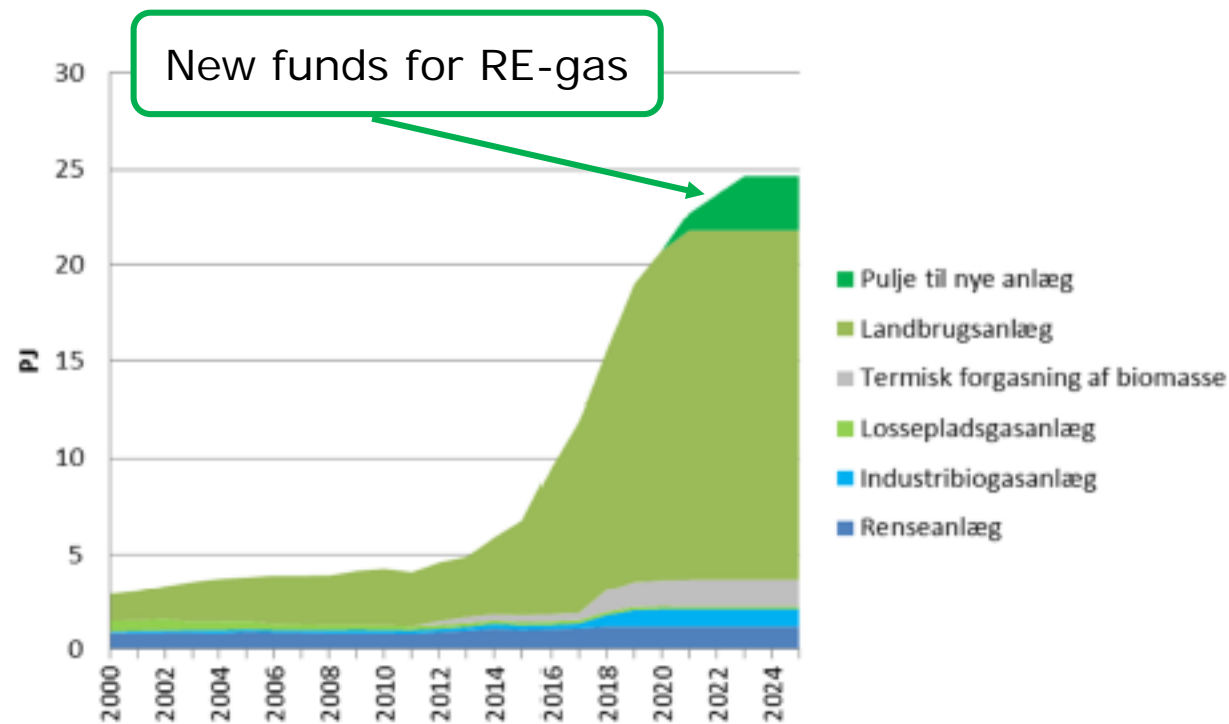
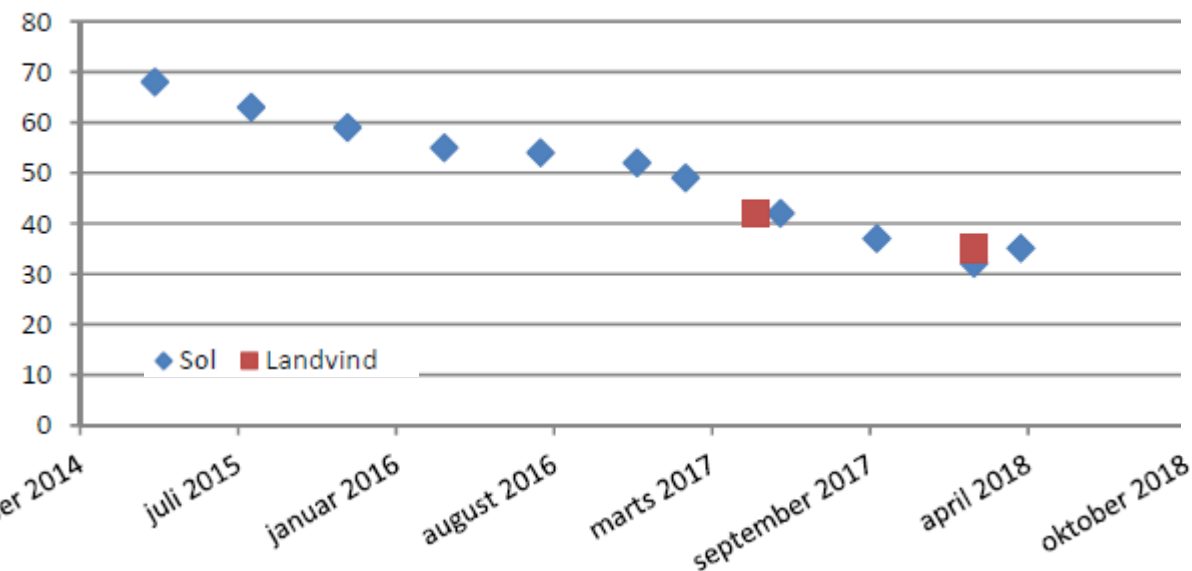
New Energy Agreement with low cost focus



Overall principles

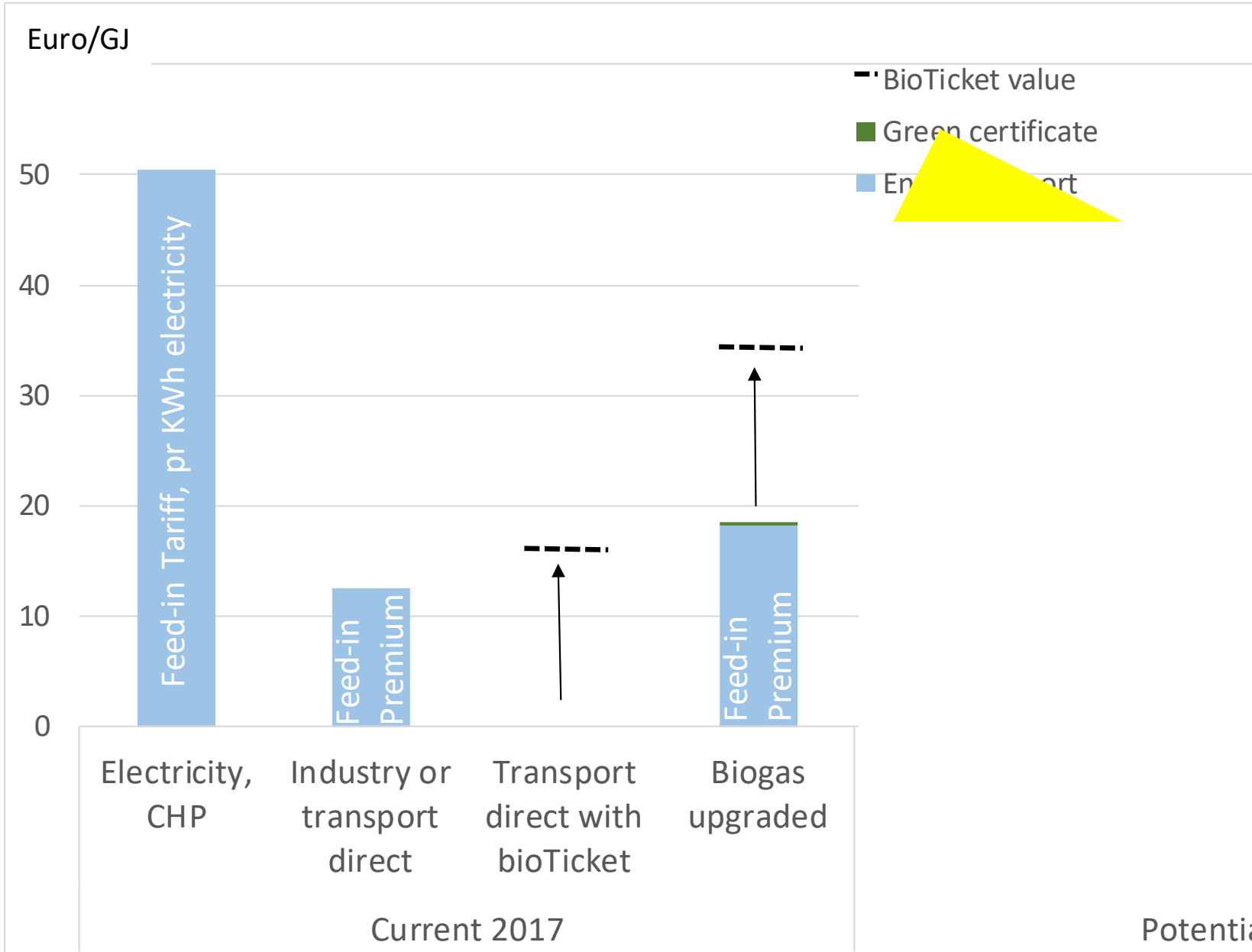
- Ambitious green transition – but at low costs
- Focus on harmonization of support

Øre /kWh Decreasing prices for wind and Solar



Source: Danish Energy. Results from tenders for RE-technologies in Germany (used as background info by the Danish government in suggestion for new energy agreement)

Current support and Agreement

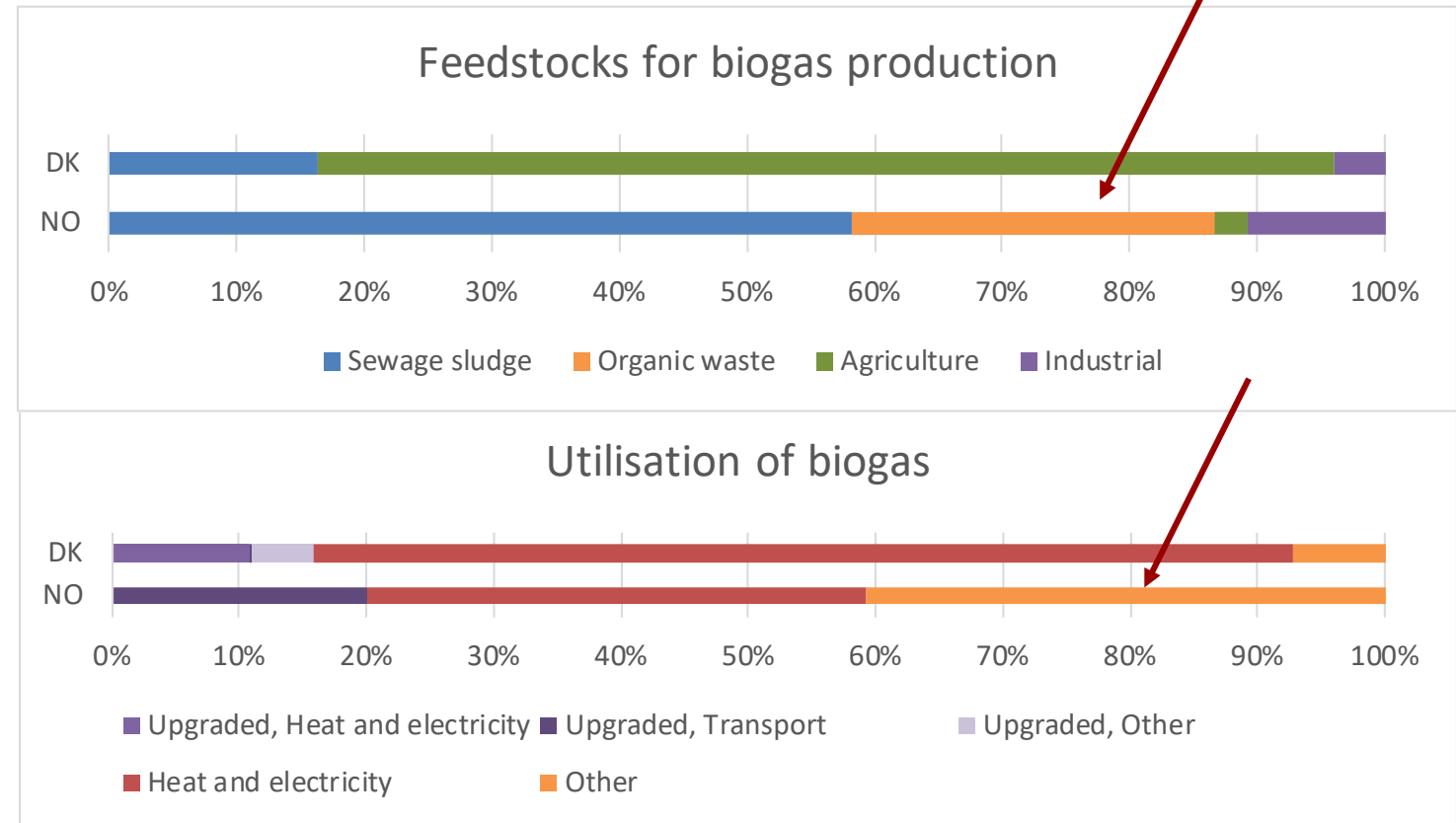


- CHP: in competition with wind and solar
- Others: reduced support
- Type of tender
- Cap on support

Potential new

Inspiration from our neighbours

- **Norway**: Primary income: input side (waste treatment)
- Support focus:
 - input side (degasification of manure) => inspiration
 - Output side (no tax on transport)
- Notice: Risk of flaring



Inspiration from **Germany** and **Sweden**

- **Sweden**: Biomethane on the grid + biogas certificate => reduced carbon tax
- **Germany**: RE-gas on the grid + RE-certificate => support to electricity based on RE-gas

Green certificates
represents a "support" or
"tax reduction"
=> price add-on

What should the Danish model do?

- Be cost-efficient
 - Not too high cost =>
 - Minimize regulators risk **and** investors risk
 - Be generic (not pick the winners)
 - Transparent and last long (reducing investors risk)
 - Cross borders?

 - Address values from a given technology
- =>=> Value stacking

RE-gas can provide

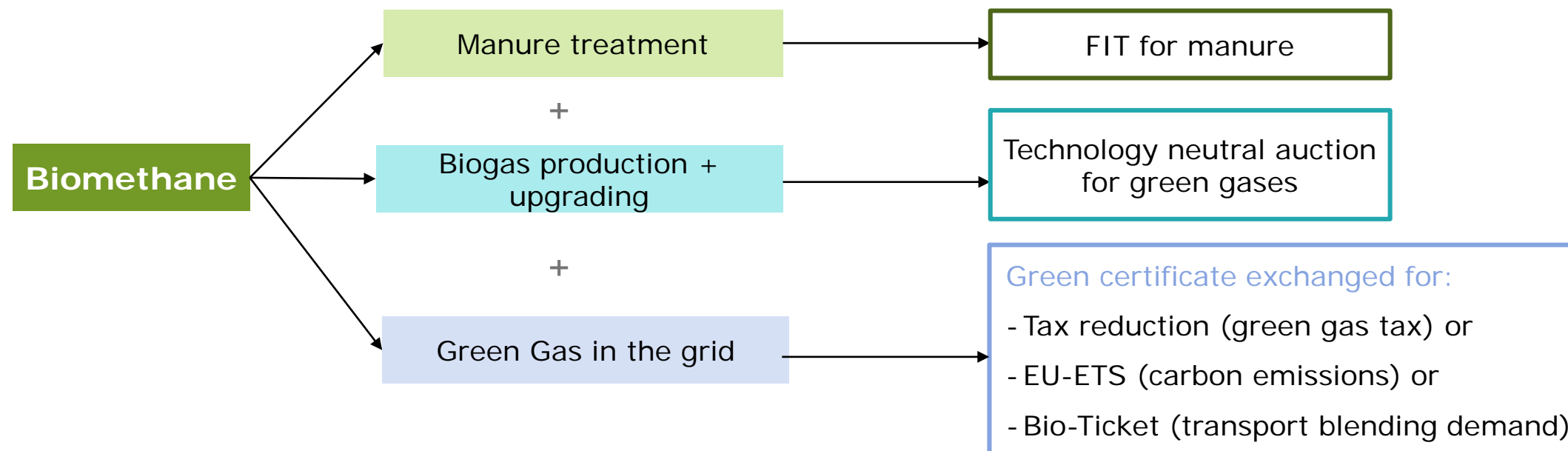
- Energy
 - flexible and storable
 - for transport
 - for high temperature
- Environmental
 - smell
 - nutrients
 - GHG

Model: Tool Stacking

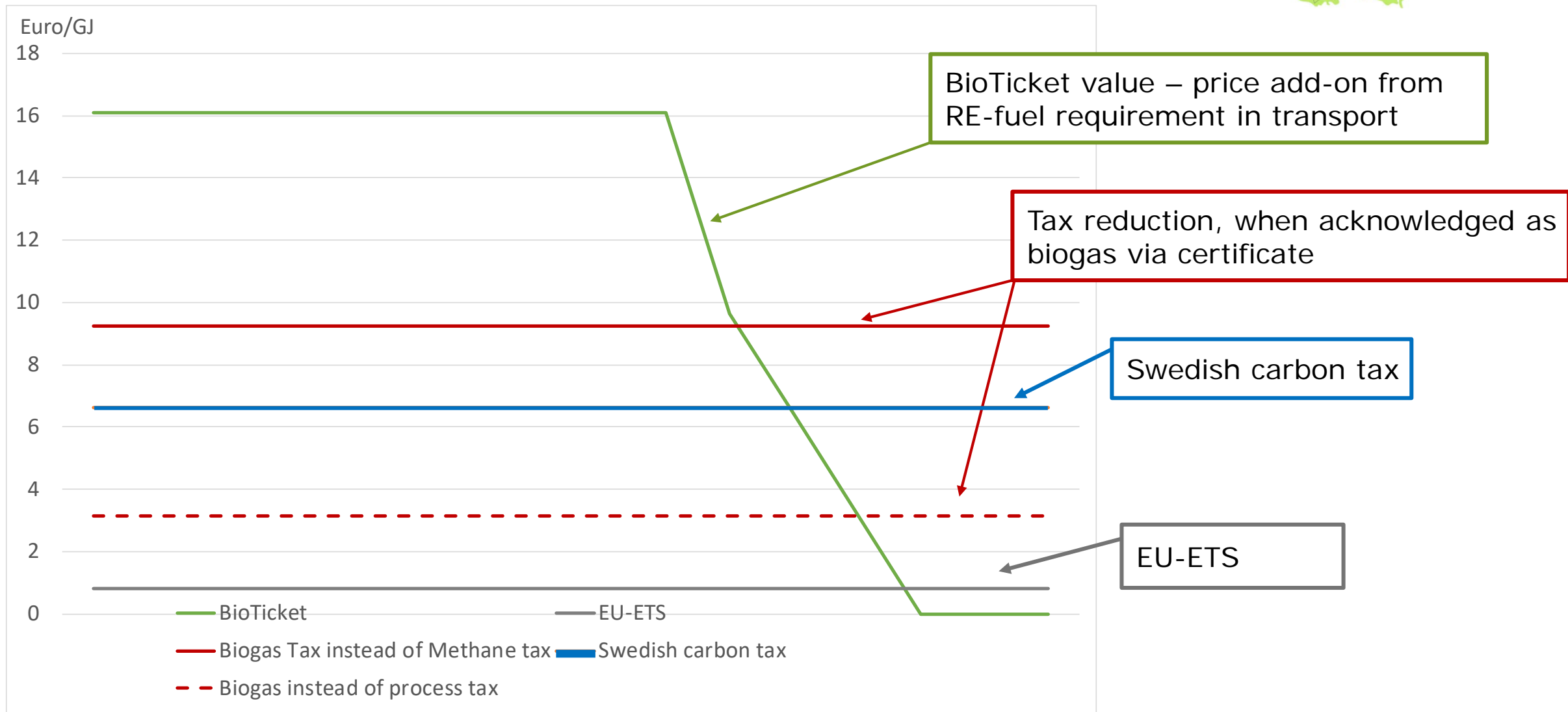
Several values:

- Energy (flexible, storable, high temperature and for transport)
 - Environmental (GHG, nutrients, smell)
- } => several tools

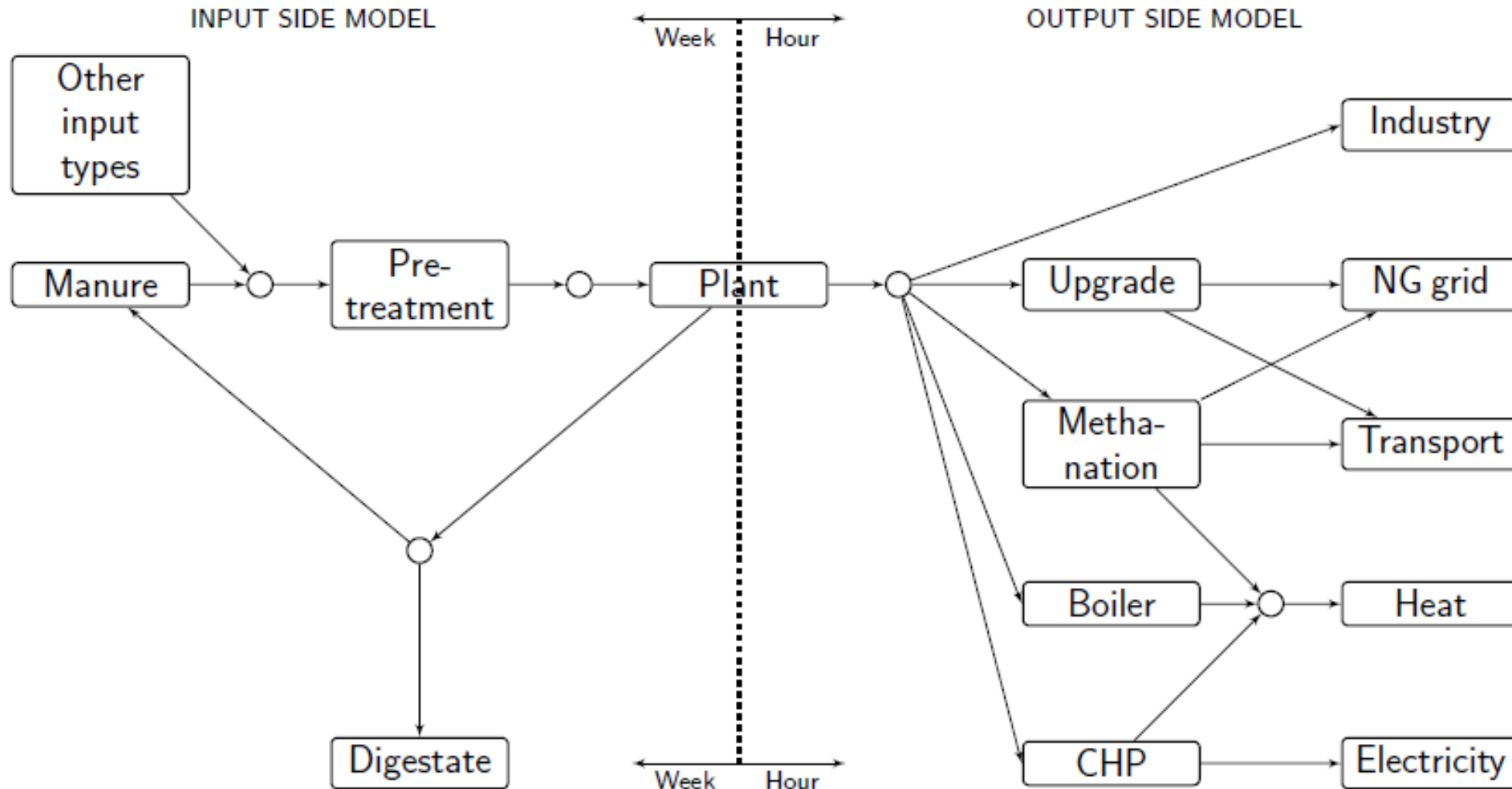
Example: Combination of semi-technology neutral auctions with other support tools



What is the Certificate value?

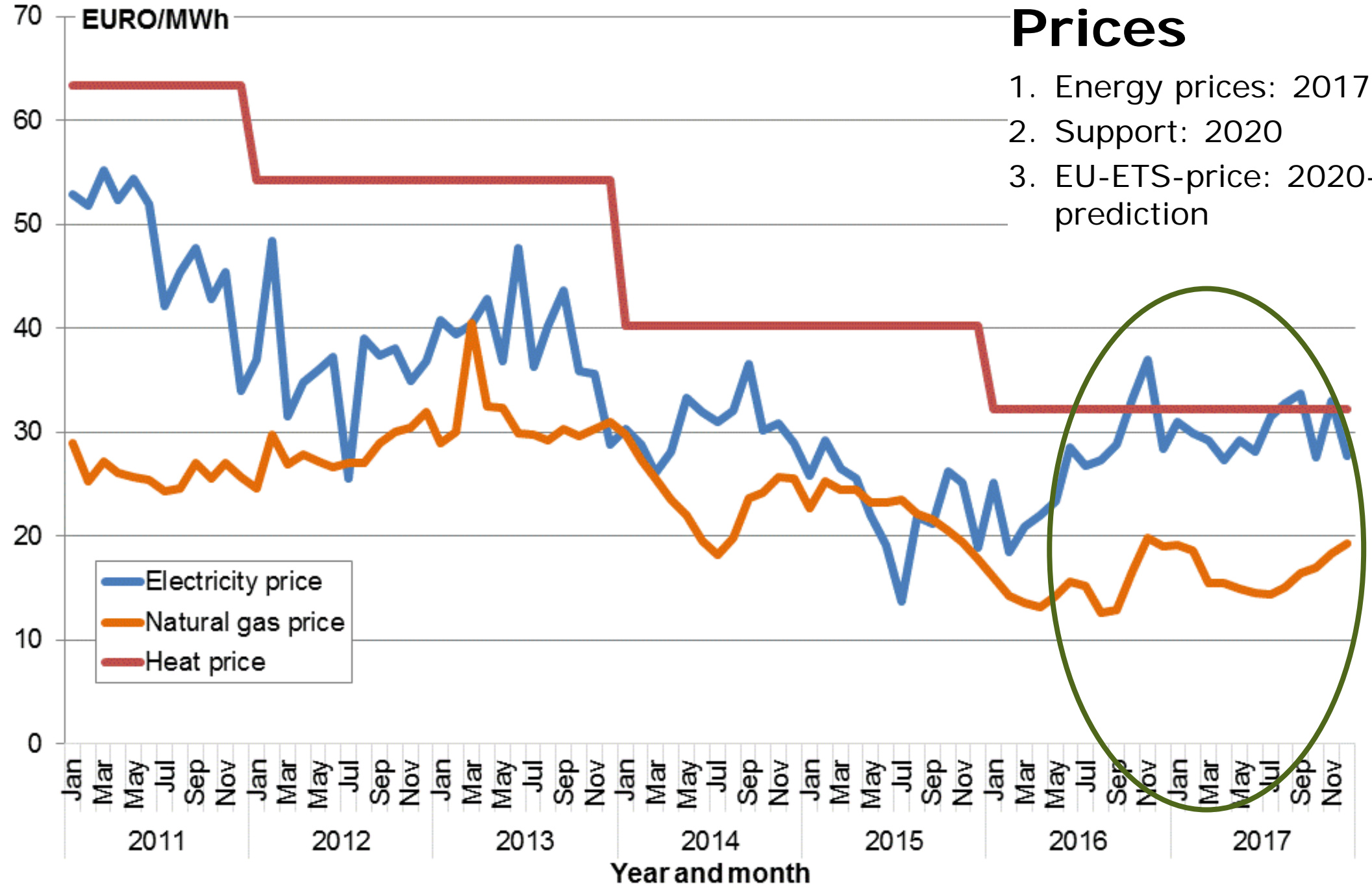


Model: Biogas value chain

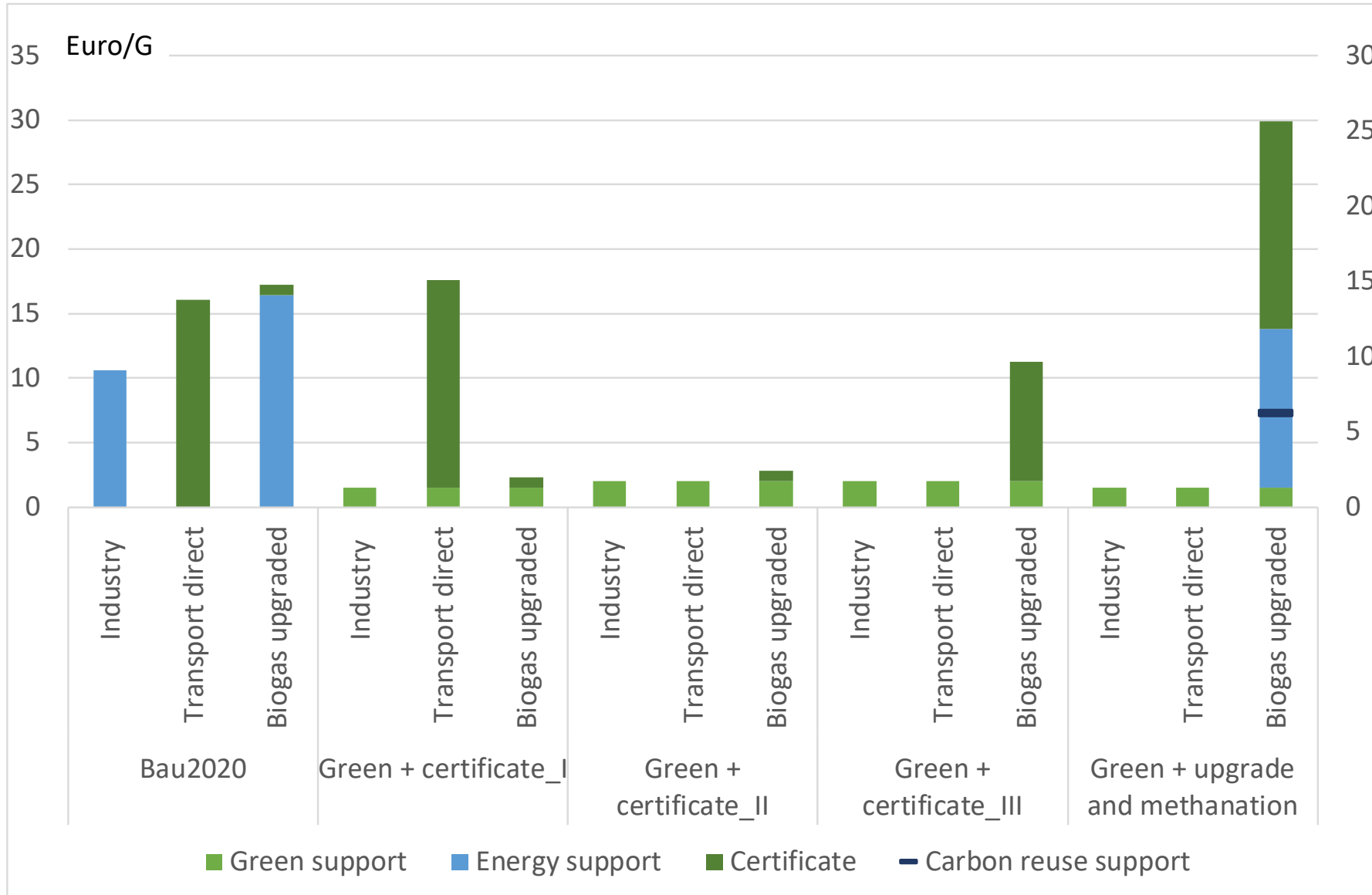


Prices

- 1. Energy prices: 2017
- 2. Support: 2020
- 3. EU-ETS-price: 2020-prediction

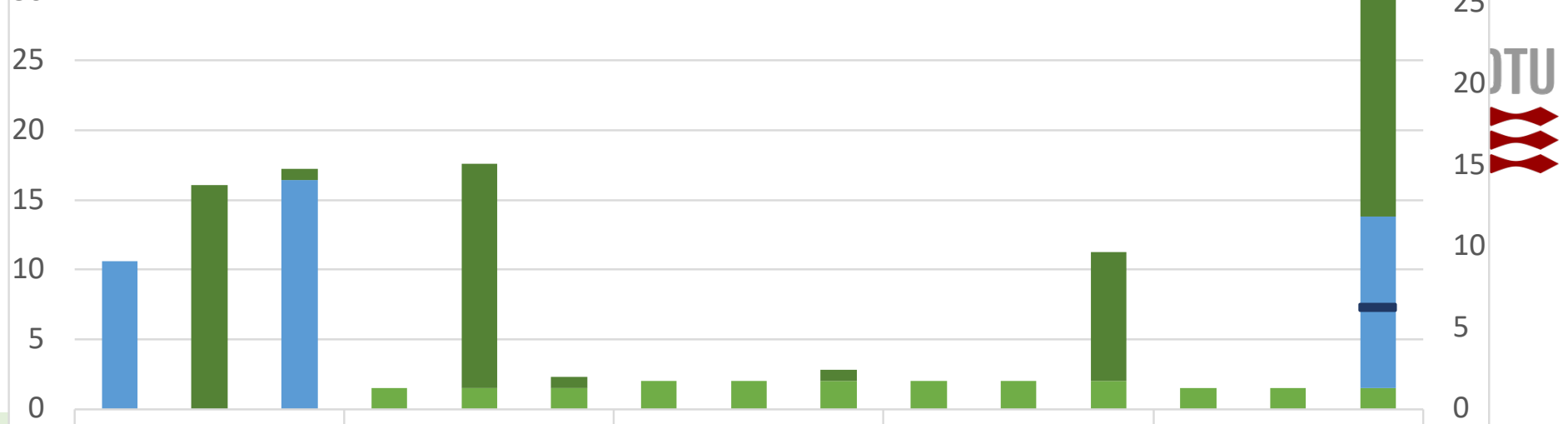


The significance of the green tariff



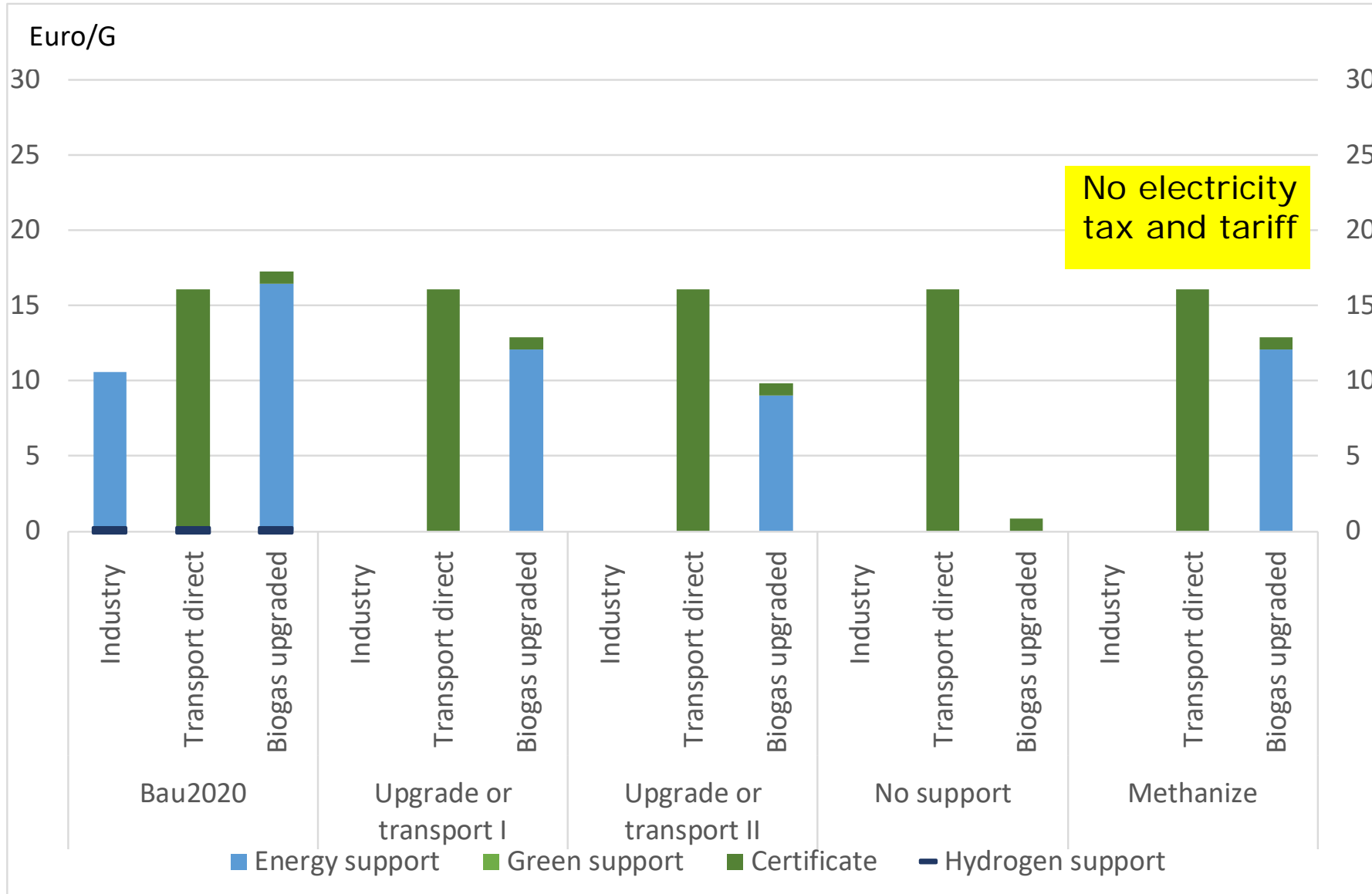
Will the green tariff dictate inputs?

Results



	Bau2020	Green + certificate_I	Green + certificate_II	Green + certificate_III	Green + upgrade and methanation
Manure treated, t tonnes	416,3	421,6	544,2	421,6	416,3
biomethane, GJ	524.046	552.361	323.246	516.872	524.046
Technology	Upgrading	Transport	Upgrading	Upgrading	Methanation
Profit, Mio. Euro	7,9	7,7	4,3	8,3	12,5
Net-support, Euro/GJ	16,4	6,4	18,7	9,1	14,8
Net-support, Euro/t. tonnes	20,7	8,3	11,1	11,1	23,8

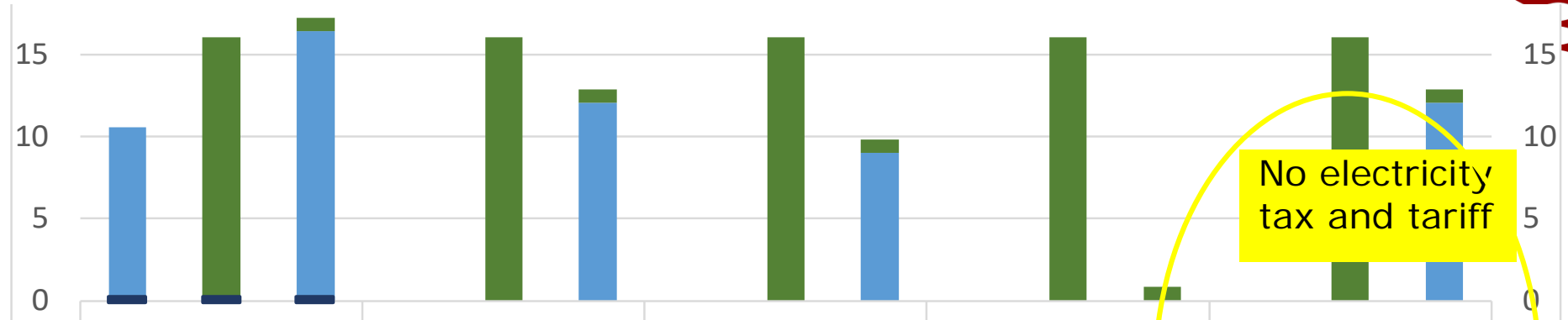
Upgrade or transport?



No electricity tax and tariff

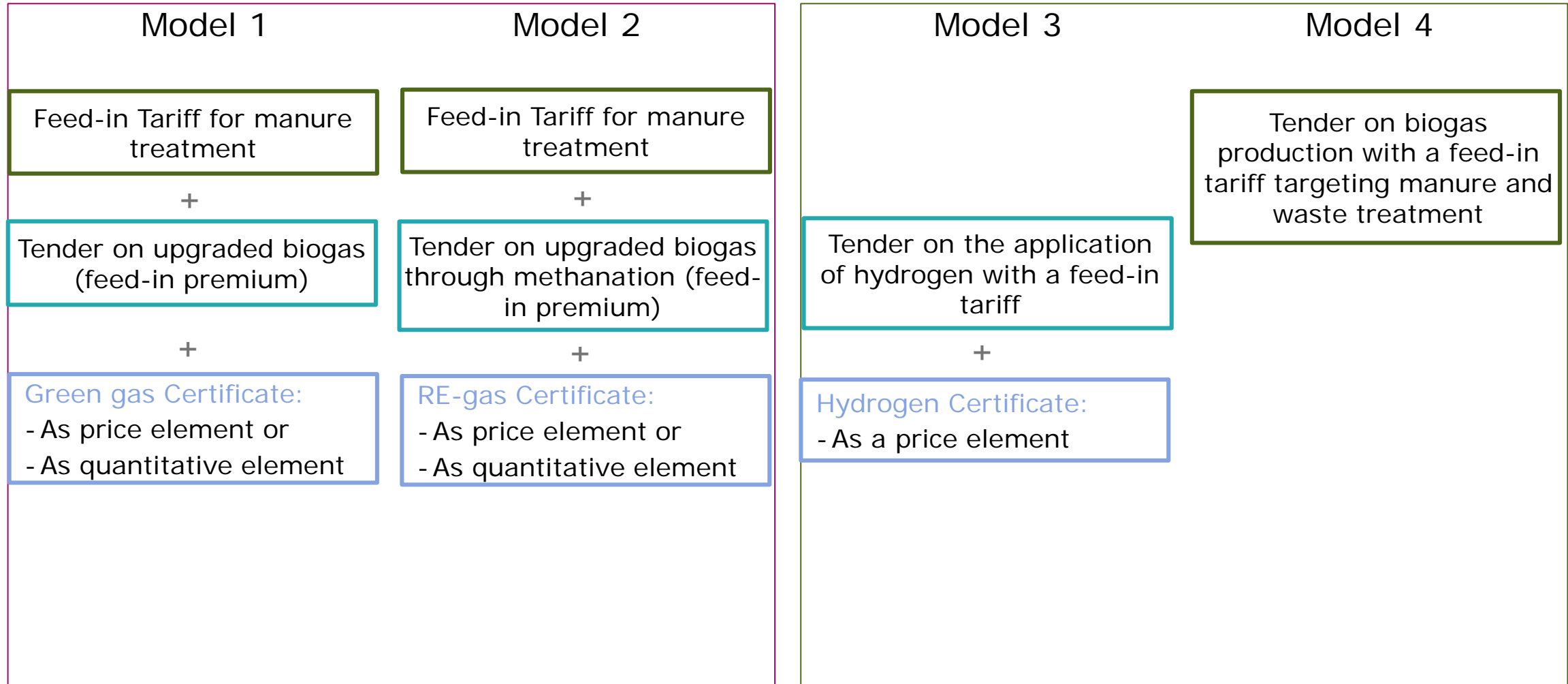
Do we have to pay support at all?

Results



	Bau2020	Upgrade or transport I	Upgrade or transport II	No support	Methanize
Biomethane, GJ	524.046	524.046	560.028	560.028	524.046
Technology	Upgrading	Upgrading	Transport	Transport	Upgrading
Profit, Mio. Euro	7,9	5,6	4,2	4,2	5,6
Total cost, Mio. Euro	8,6	8,6	8,7	8,7	8,6
Total income, Mio. Euro	16,4	14,1	12,9	12,9	14,1
Net-support, Euro/GJ	16,4	12,1	0,0	0,0	12,1

Regulatory models: Tool stacking



Questions

and

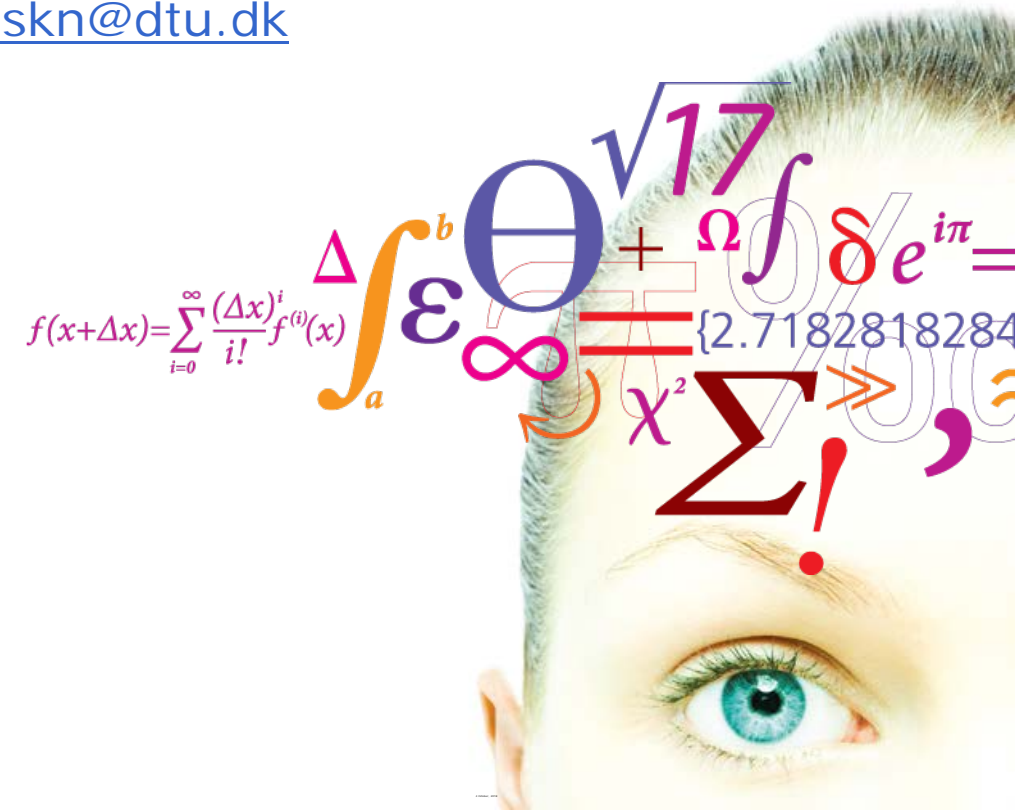
Conclusions

1. How should future RE-gas support models be designed?
2. Will the green tariff dictate inputs?
3. Do we have to pay support for upgraded biogas?
4. What will it take to get the model to methanize?

1. We suggest tool-stacking
 - Targeting each value in the stack
2. Green tariff may affect – not dictate
3. Not always, if there is another value from other regulation
4. Targeted support for reuse of carbon maybe combined with other factors

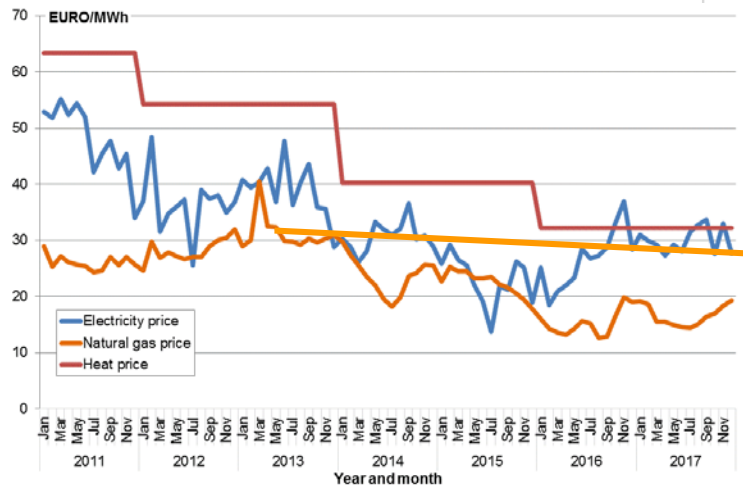
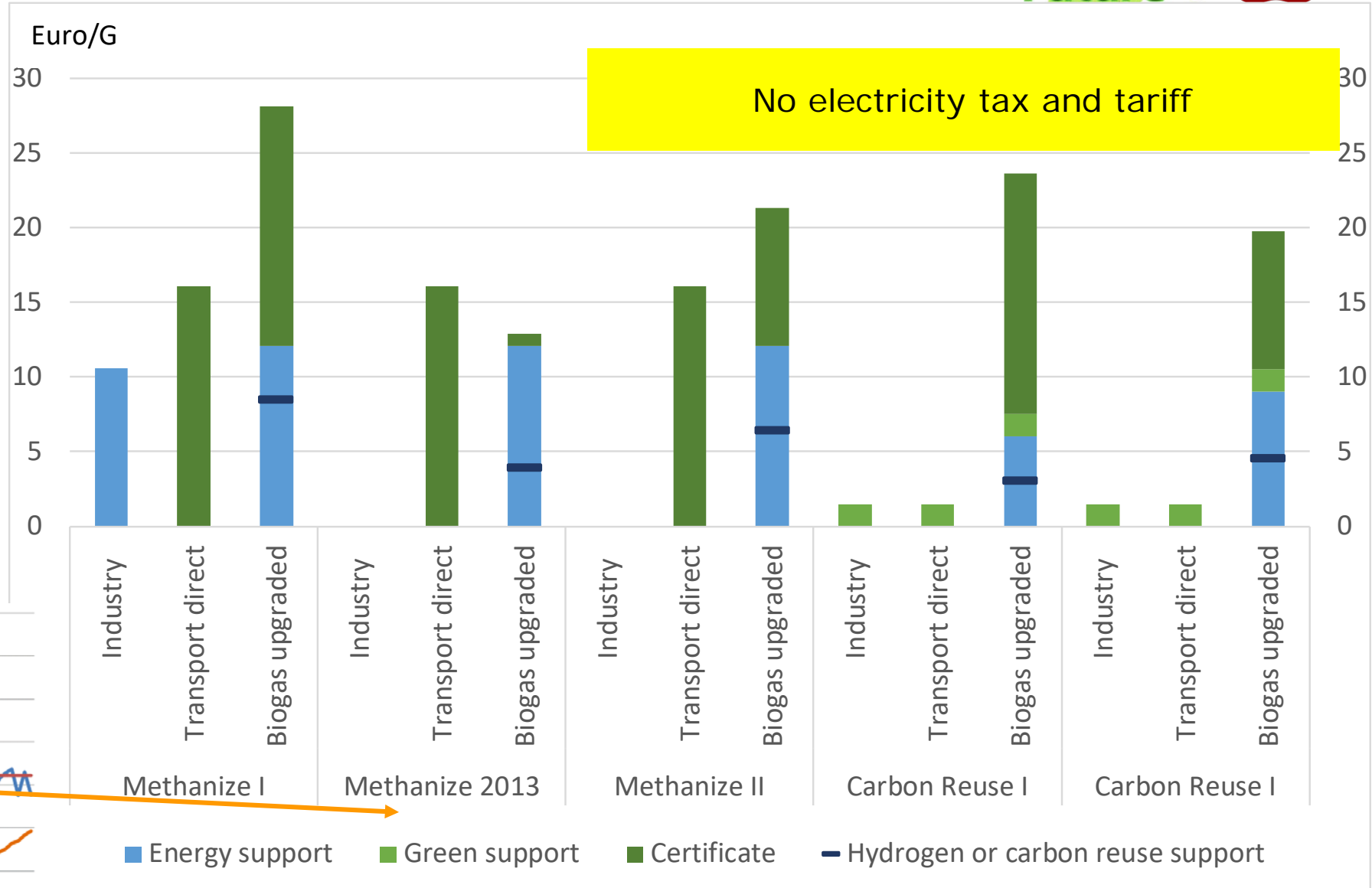
Thank you for your attention

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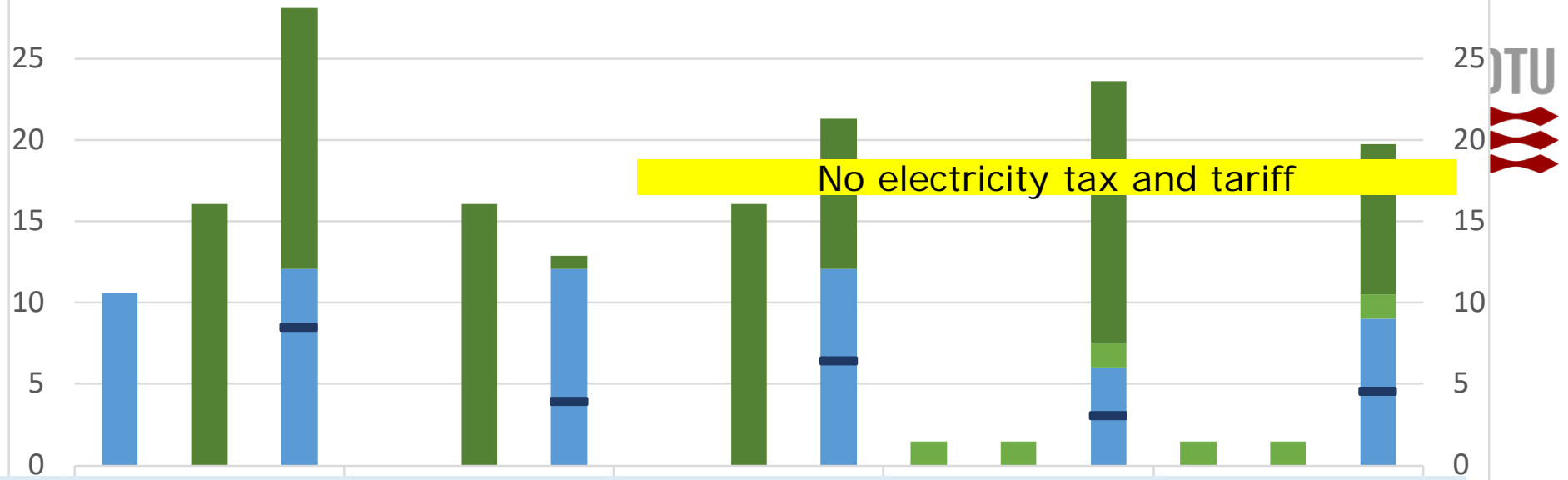


Upgrade or methanization

What will it take to get the model to methanize?



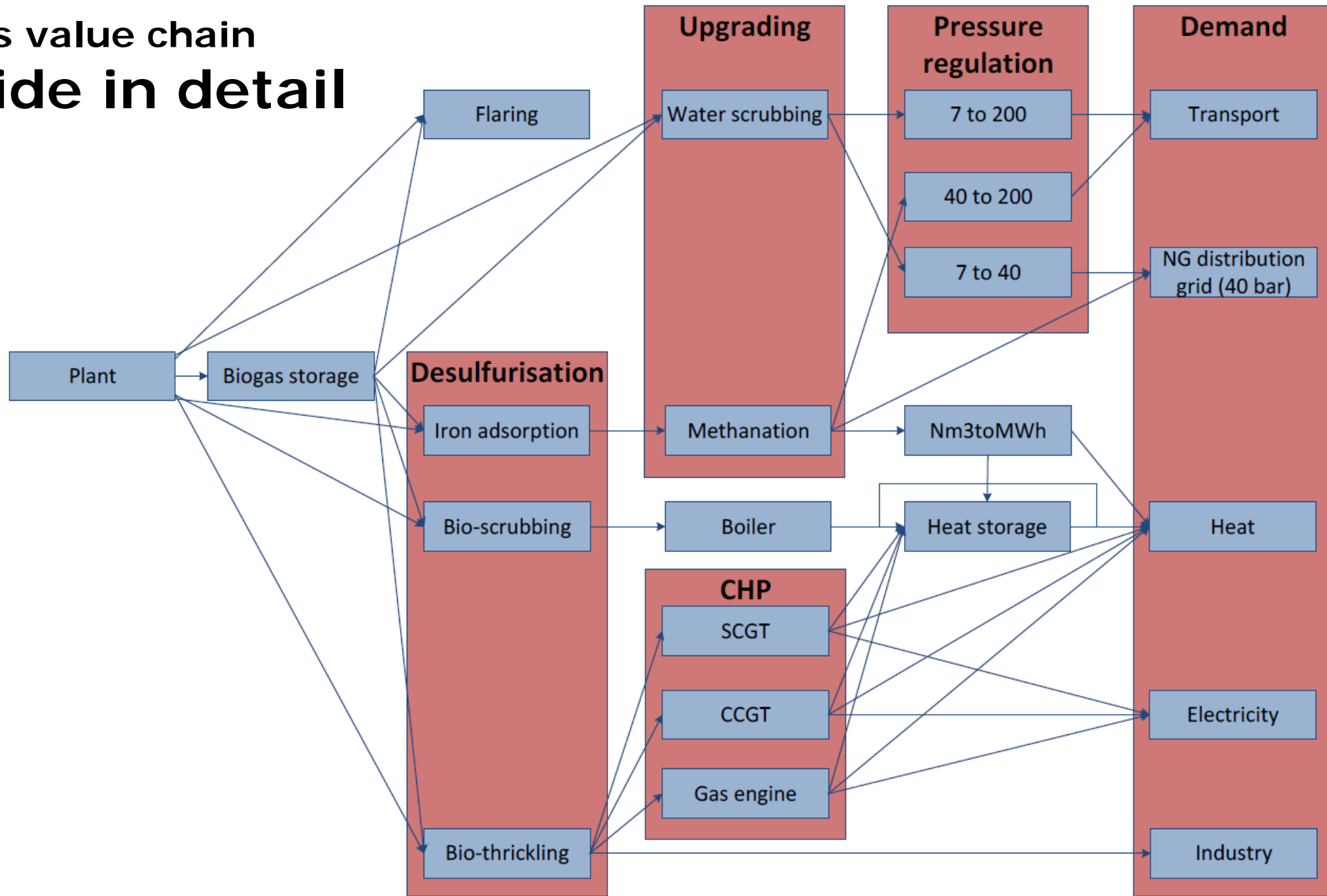
Results



	Methanize		Carbon		
	Methanize I	2013	Methanize II	Reuse I	Carbon Reuse I
Biomethane, GJ	679.003	524.046	801.260	524.046	666.446
Technology	Upgrading Methanation	Upgrading	Upgrading Methanation	Upgrading	Upgrading Methanation
Profit, Mio. Euro	13,6	9,7	10,6	13,9	12,5
Total cost, Mio. Euro	13,4	8,6	15,2	8,6	12,0
Total income, Mio. Euro	27,1	18,3	25,8	22,5	24,5
Net-support, Euro/GJ	9,4	12,1	9,9	12,7	14,8

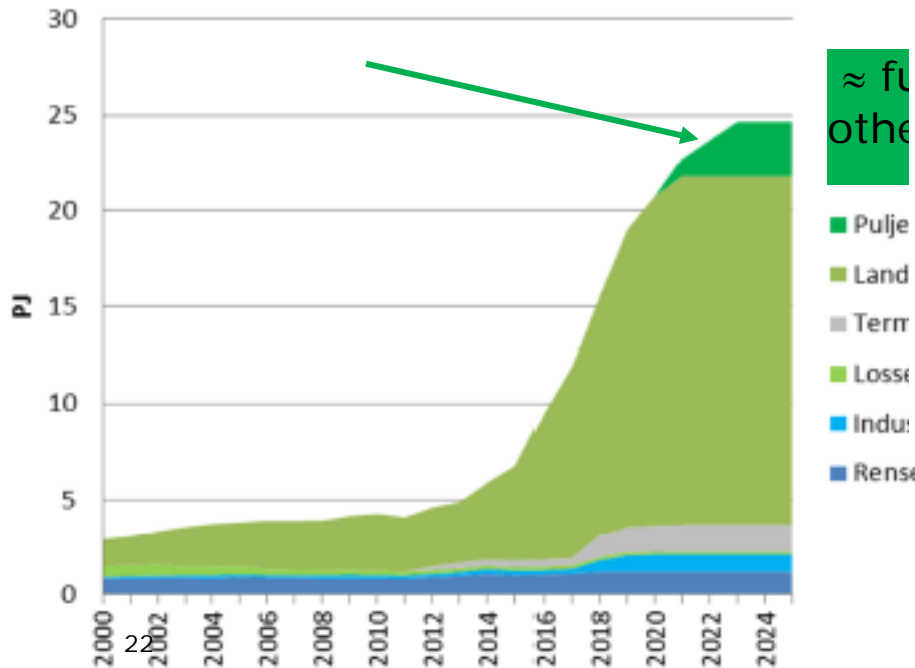
Model: Biogas value chain

Output side in detail

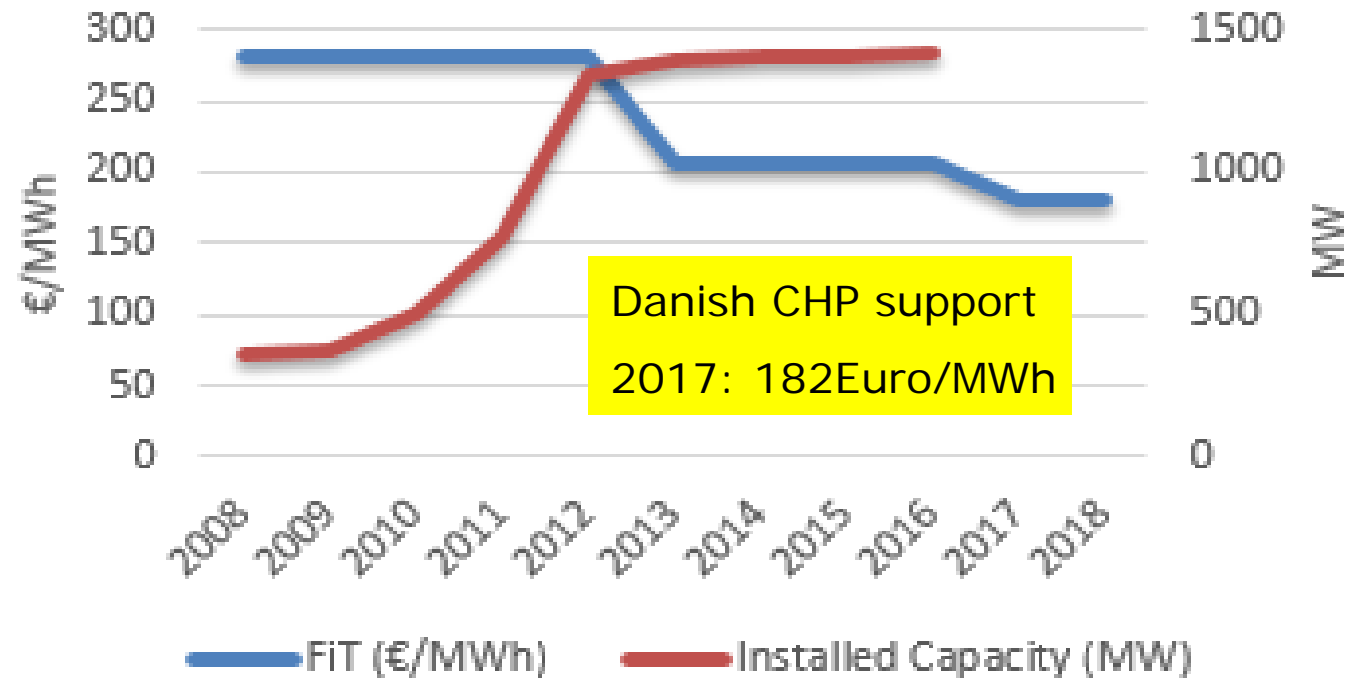


Boom vs cost efficiency

Example:
Italian development



Biogas plants: basic FIT⁵⁹ and installed capacity 2008-2017



Source: M.D. 18.12.08, M.D. 06.07.2012, M.D. 23.06.2016 and Gestore dei Servizi Energetici S.p.A. (GSE), Annual statistical reports on renewable energy, www.gse.it

Price tool vs quantity tools

What determines....

- Marginal Benefit?
- Marginal Cost?

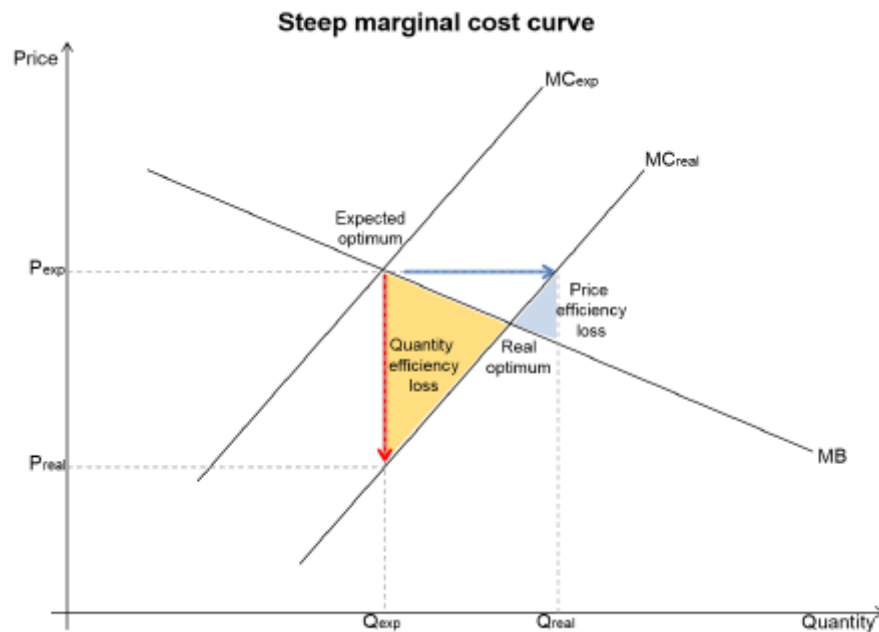
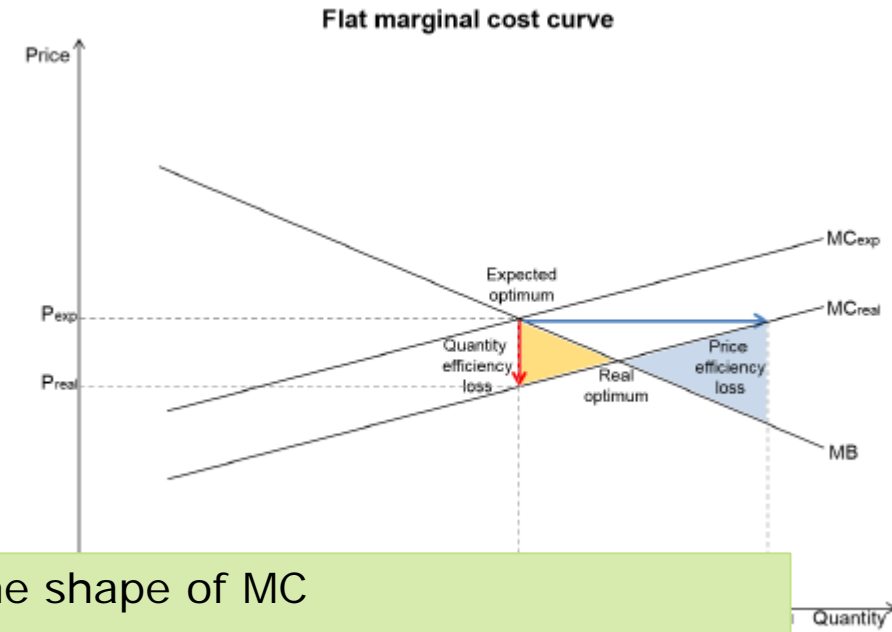


Figure 2: Prices vs quantities with a steep marginal cost curve

Source: Aures project, Report D6.2



What is the shape of MC

- Regarding upgrading of biogas?
- Manure treatment?
- Power to Biomethane (PtBM)?