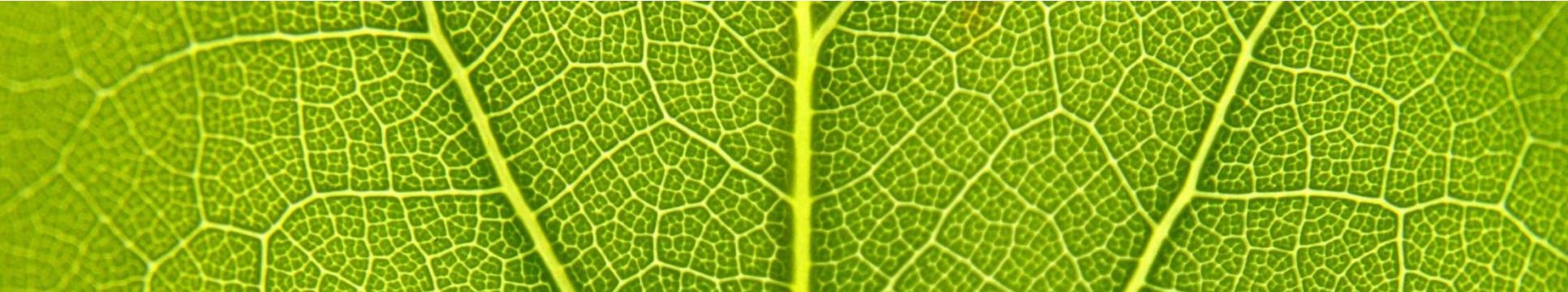




sustainable energy for everyone



Assessing sequential cropping to produce truly sustainable biomethane

08/02/2017

Daan Peters at EBA workshop in Brussels

All pictures in this presentation are © CIB



Ecofys – A Navigant company



Global consulting company founded in 1984 with the **mission** to enable **sustainable energy for everyone** – since 2016, Ecofys is part of **Navigant** to help our clients navigate the energy transition



As part of Navigant we have over **600 people** skilled in energy, climate, environment, economy, communication, legal, and psychology. Industry, policy & regulatory operations and technology areas of expertise combined in unique ways



Global footprint with offices in the **Americas, Asia, Europe, Middle East.** Ecofys operates from five offices in **Europe** (London, Utrecht, Cologne, Berlin, and Brussels)



Ecofys has over **30 years of experience** in developing and evaluating policies, sustainability strategies, and scenarios for companies and sectors provides us with deep knowledge of markets and consumer behaviour



Our strength lies in our strategic understanding of complex energy and climate transition issues: Ecofys **connects the dots** within the triangle between **governments, energy players, and (energy-intensive) end-users**

Making the agricultural system fit for the future

Solving global challenges requires innovative agriculture

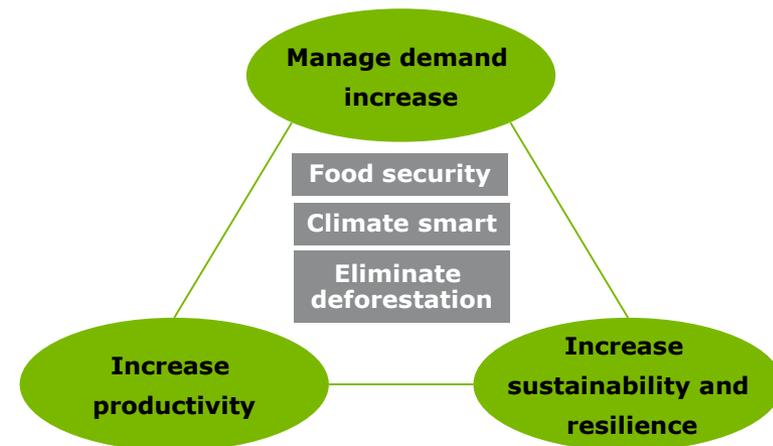
Challenges

1. Growth in global population and wealth increases demand for food, feed and fibre with 70% by 2050.
2. Full transport decarbonization impossible without biofuels (aviation, shipping, trucks)
3. Agricultural expansion is the main driver for deforestation and biodiversity losses
4. Agriculture is large contributor to carbon emissions, while climate change impacts productivity



Solution

- > Increase of **productivity** and **resilience** combined with **limiting** of **environmental impacts** (GHG, land and water)
- > Requires innovation and creativity



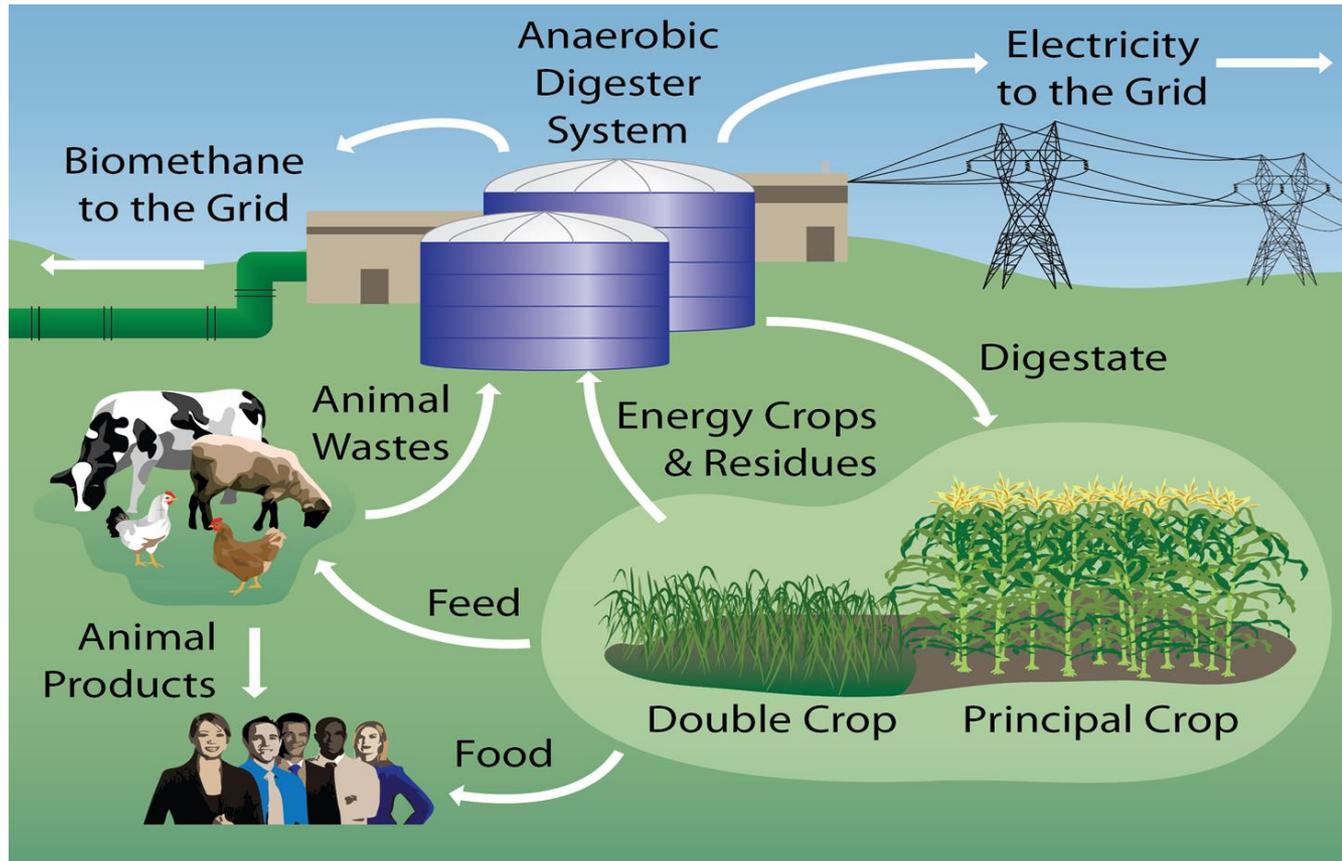
Ecofys assessment of innovative biogas production concept

1. The Italian Biogas Consortium (CIB) developed a platform of technologies aimed at achieving ecological agricultural intensification and called it Biogasdoneright™ (BDR)
2. CIB asked Ecofys to assess their concept
3. Ecofys visited farms in northern Italy, collected data on one specific farm
4. We found that BRD offers significant advantages over conventional biogas
5. BDR biogas achieves high carbon savings and positive environmental externalities, e.g. increased carbon content of soils, increased soil fertility and lower input of chemical fertilizers
6. BDR allows Italian farmers to produce biogas from additional biomass while maintaining their existing food and animal feed production, thus avoiding indirect land use change risks



Biogasdoneright: producing feed and biogas feedstock through sequential cropping

- > Sequential cropping: harvesting two crops instead of one on the same field in a single year
- > Nutrients being recycled back to the field through biogas digestate



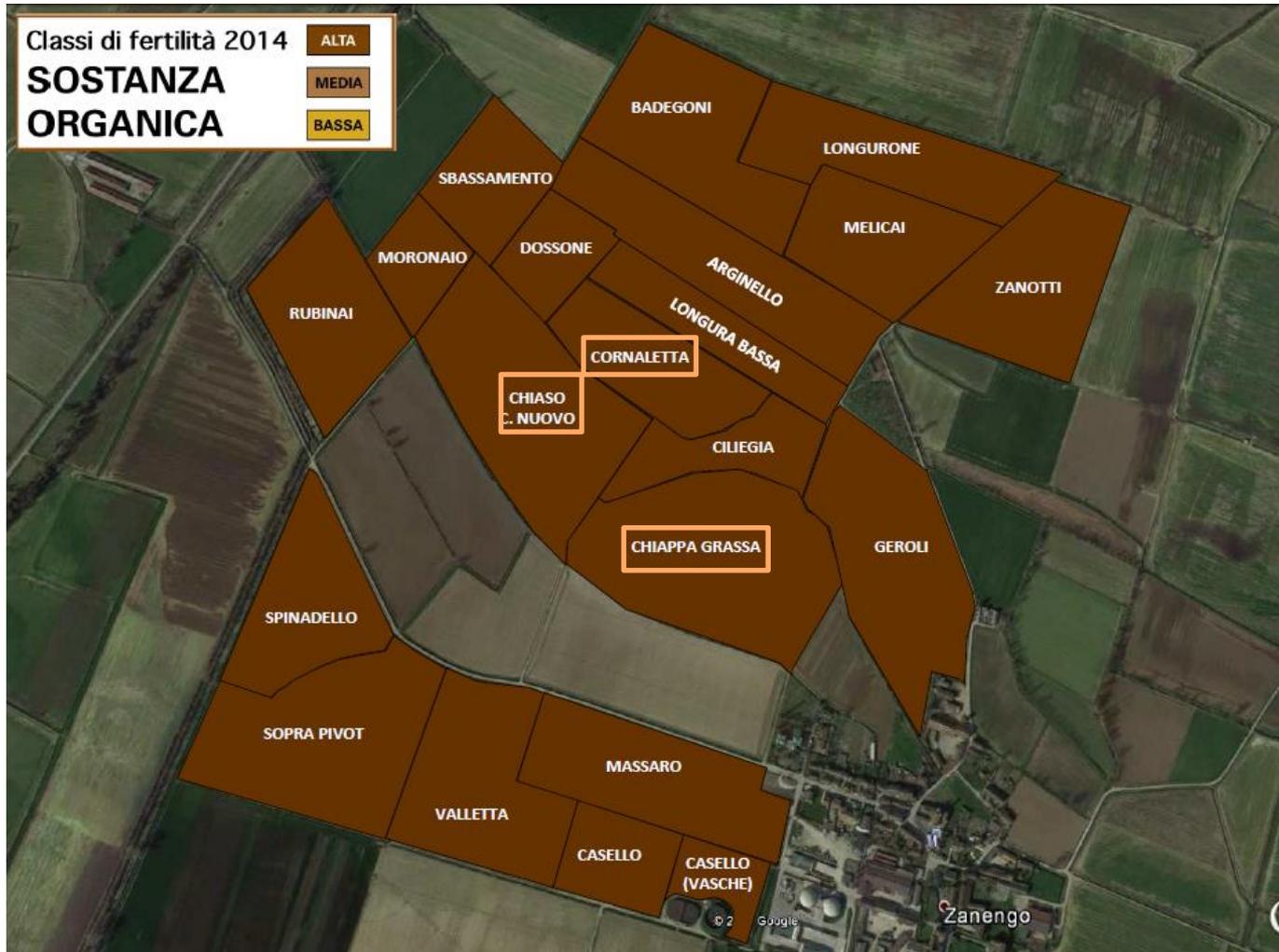
Scope of Ecofys assessment for CIB

We assessed the following claims:

- > Sequential cropping leads to **additional, low ILUC risk** biogas feedstocks
- > This additional production can be achieved while maintaining and enhancing **soil quality**, with low impact on **water availability** and no negative impact on **on-farm biodiversity**.
- > Producing additional biomass for biomethane contributes positively to the **decarbonisation of transport emissions**.
- > A **positive business case** exists for farmers to introduce sequential cropping for biofuel
- > Sequential cropping for sustainable biofuels is **scalable**

Ecofys assessment report

We focus on one farm: Palazzetto farm in the Po-valley



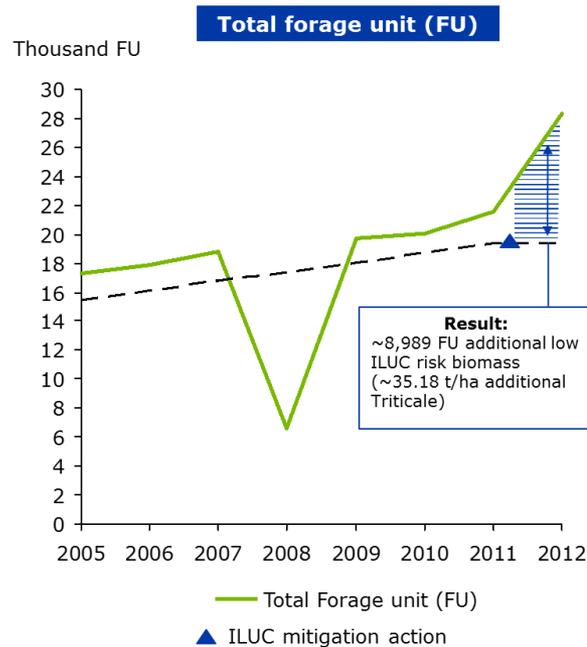
Summer maize silage plus winter triticale silage



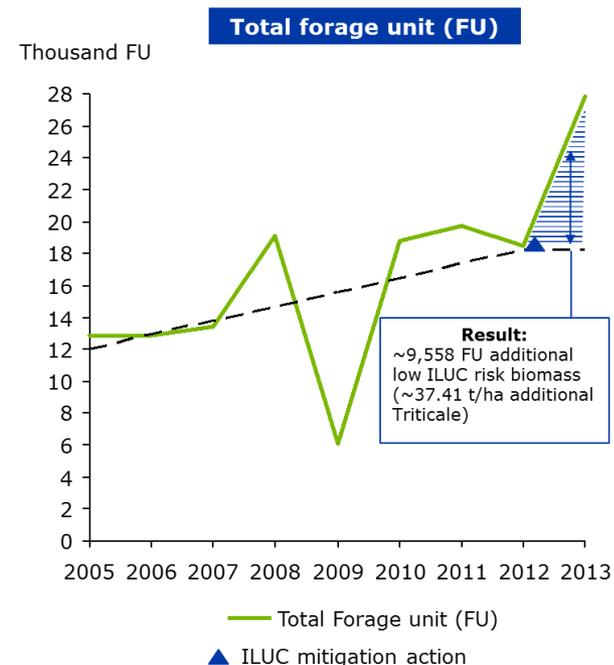
1 Large quantities of additional, low ILUC risk biomass

- > We calculated historical yields in the 'summer crop only' situation
- > Compared this with the new yields in the sequential cropping situation
- > Different feed and biogas crops are compared by using 'Forage units'
- > Results show large quantities of additional biomass that are produced without ILUC risk and not displacing existing feed production.

Reference and above-reference biomass on C. Grassa field



Reference and above-reference biomass on C. Cornaletta field



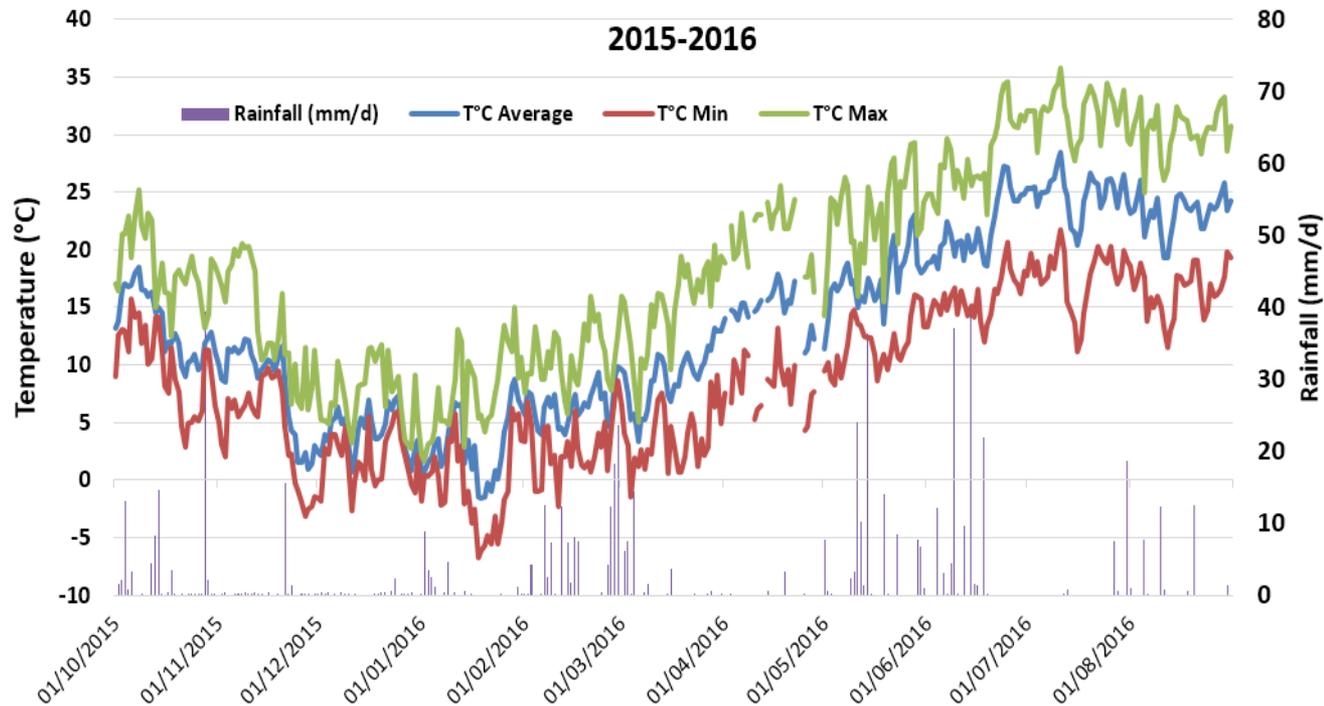
2 Positive impacts on soil quality

- > We observe a substantial increase in soil organic carbon and soil nutrients
- > Land is covered all-year round, which reduces soil erosion risks
- > Sequential cropping probably increases soil life
- > Soil compaction avoided by using a tube to apply digestate to field (see below)
- > We recommend further research, first observations look positive



2 No negative impact on water availability

- > Northern Italy is an area with abundant rainfall and moist air
- > No irrigation is used for the additional winter crop
- > Summer crop irrigation is limited by investment in a drip-feed system



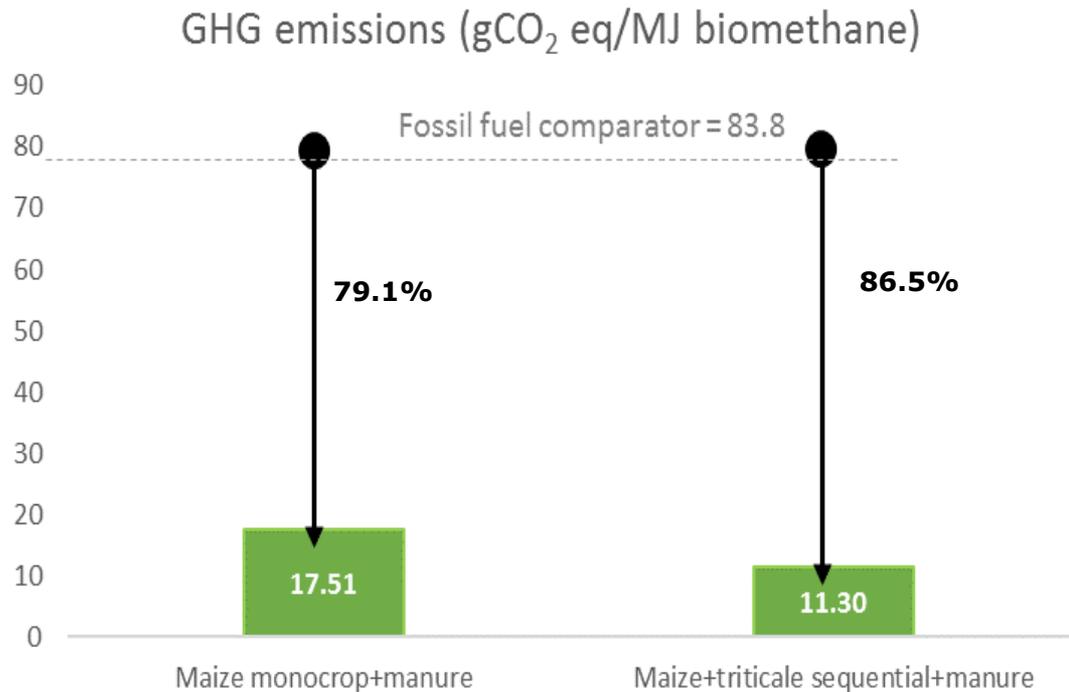
2 Small positive impact on on-farm biodiversity

- > Small positive on-farm biodiversity impacts are expected after replacing monocropping with sequential cropping combined with nutrient recovery via biogas digestate
- > We found small positive impacts of the sequential cropping in terms of crop density and additional shelter for species and below-ground biodiversity

Assessment approach	Indicator	Sequential cropping reference compared to monocrop reference
Management changes	Changes in the management practices occur that have a negative effect on biodiversity?	No
	Changes in cover crop density, providing a change in shelter for small animals and insects?	Yes
	Changes in the risks of floods and related impact on natural habitat?	Yes, the likelihood of erosion is decreased
	The possible effects on belowground biodiversity level, e.g. worms, insects and bacteria in the soil due to differences in root systems?	Yes
Observed changes	Occurrence of animals on the fields	Slight increase
	Occurrence of birds on the land in the spring	Slight increase

3 Positive impact on GHG saving of biomethane

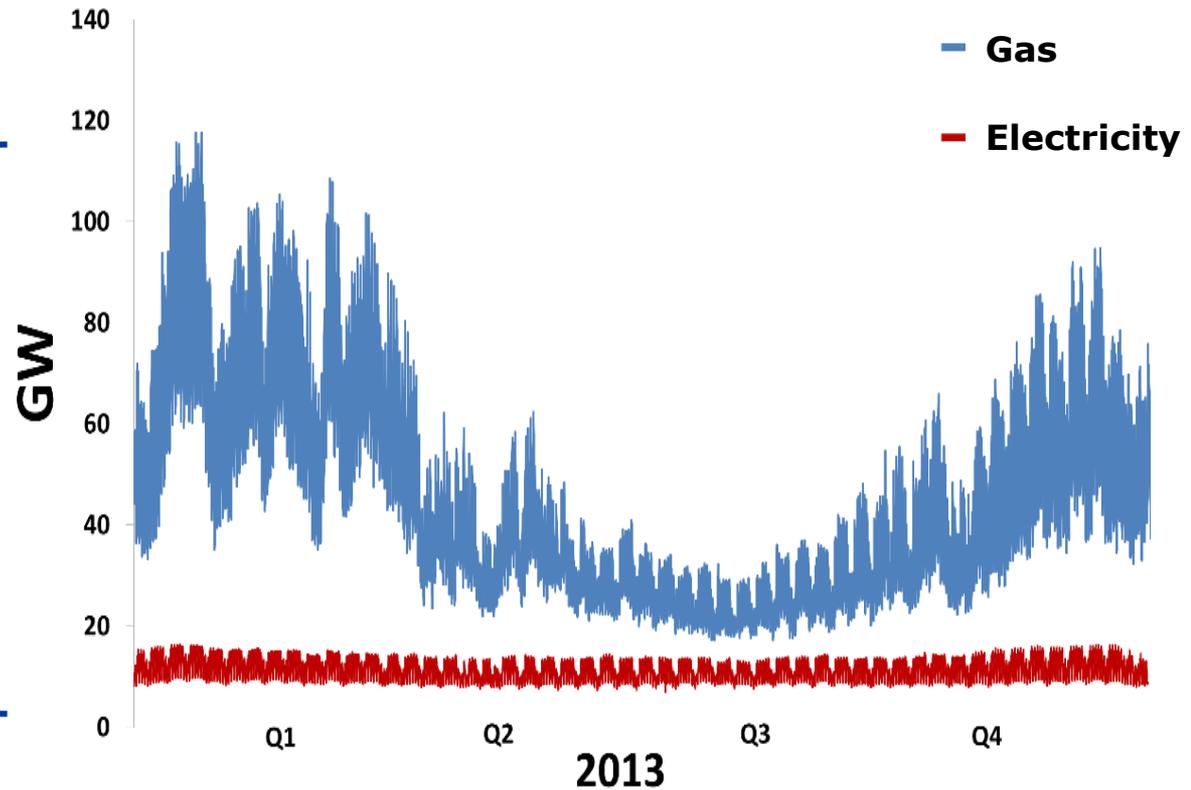
- > GHG calculations show high savings that increase after the introduction of sequential cropping compared to 'summer crop only', less mineral fertilizer per tonne of biomass
- > Positive effect of soil organic carbon increases not yet taken into account



- > Additional biomass production does not increase fixed costs, small increase of operational costs
- > Compared to the conventional cultivation of maize silage the sequential cropping of maize silage and triticale silage leads to a reduction of both biogas feedstock costs and animal feed costs. We note a **21% decrease in feed costs and a 43% decrease in biogas feedstock costs.**
- > In a conservative estimate, we assume that **at least 1 million of hectares can be used to introduce maize and triticale sequential cropping without displacing other crops in Italy and France alone.** A much **larger potential** is expected if other crop combinations suitable for sequential cropping are taken into account and if the potential in other countries is taken into account.
- > We recommend further research into the scalability of sequential cropping, especially in northern Europe.

Future role for biomethane: balancing the energy system and reducing total energy system costs

Demand pattern for gas and electricity



Capacity of the gas transportation infrastructure is much higher than electricity

Gas infrastructure (including storage) is designed to handle seasonal fluctuations

Find us

Project team: d.peters@ecofys.com +31 30 6623710

Offices:

Ecofys Group
Kanaalweg 15-G
3526 KL Utrecht – The Netherlands

Ecofys Germany (Cologne)
Am Wassermann 36
50829 Cologne – Germany

Ecofys Germany (Berlin)
Albrechtstraße 10 c
10117 Berlin – Germany

Ecofys UK
1 Alie Street
London E1 8DE – United Kingdom

Ecofys Belgium
Pericles Building
23, Rue de la Science
Wetenschapsstraat 23
1040 Brussels – Belgium

Virtually:



SlideShare

sustainable energy for everyone