EXPERTISE
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INVESTMENT

IESBIOGAS
a Snam company

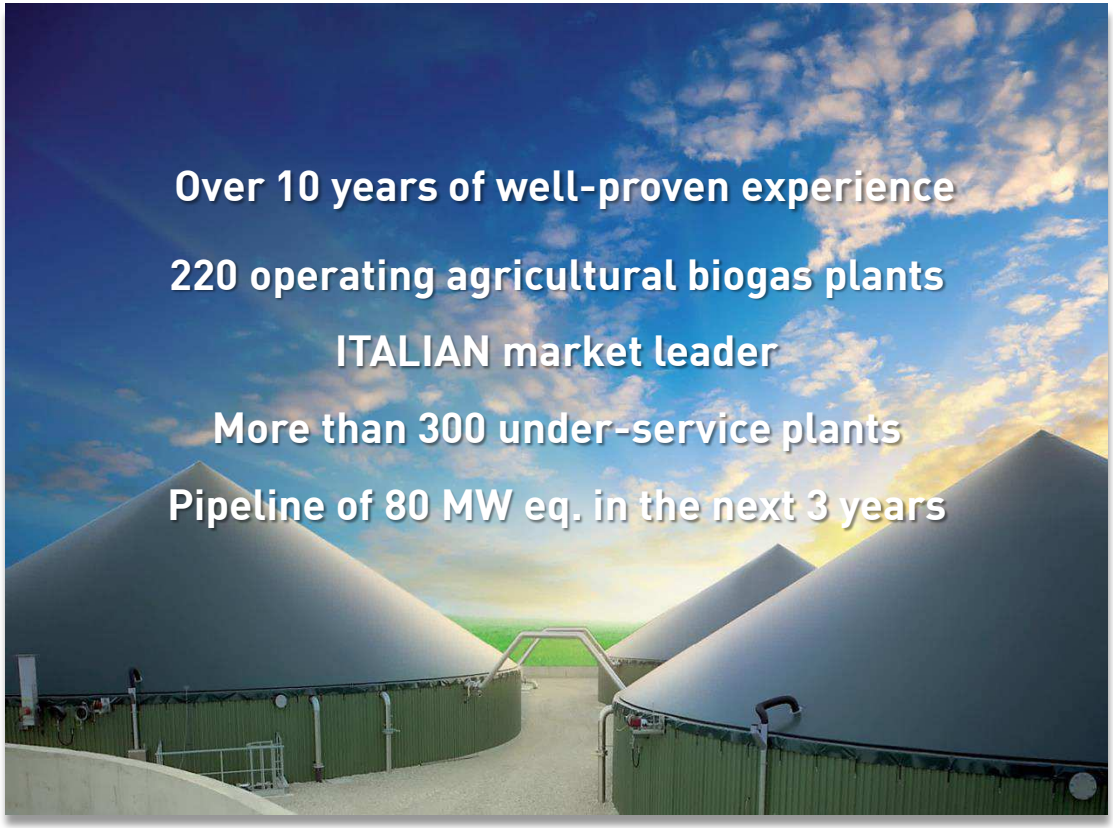
Pre-treatment technology: Steam Explosion

Dipl.Ing.(FH) Hermann Dauser

PROFILE

IES BIOGAS SRL was founded in 2008 by Marco Mazzero (current CEO) and Marzio Ottone

NOW
Leading biogas technology provider (general contractor) specializes in the design, construction ,management and maintenance of biogas and bio-methane plants



On 5th July 2018, SNAM, Europe's leading gas utility, has entered into IES Biogas

WORLDWIDE MARKETS

MAIN SALES & MARKETING OFFICE:
HQ in PORDENONE (ITALY)

SALES OFFICE:
IESBIOGAS SRL in BUENOS AIRES (ARGENTINA)

Thanks to our internal team and a wide network of partners we are able to cover all the main and emerging waste to energy markets.

iesbiogas.it

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BUSINESS LINES

IES AGRO&INDUSTRY
New Energy from Nature

Liquid manure
Solid manure
Energy crops
By-products
Agro-industrial waste

IES WASTE
Compost & Recycling

Kitchen/domestic waste
OMSW
Unsorted waste

IES SERVICE
Assistance & Maintenance

Division dedicated to plant facility management and O&M

Biomethane from Straw - the Revolution

with the patented

ECONOMIZER SE

Steam Explosion

Hermann Dauser, DI(FH)
CTO **ECO**NOMIZER **GmbH**
Designer of the ECONOMIZER SE Technology

Replace Energy Crops by Alternative Feedstock:

cereal straw	wheat, rye, barley, rice, etc.	***any quality!***
maize stalks	dry plant residues from corn harvest	
other „straw“	soya bean straw, dry reed, old hay, etc.	
manure	cattle and horse manure, pig and chicken muck	
industrial	sugar cane bagasse, green waste, clippings separated digestate (from manure, energy crops, dry fermentation)	
key point	*high content of* ***ligno-cellulose***	

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Straw and the Lignocellulose-Complex

Straw Characteristics

- framework: Hemicellulose and Cellulose
- incrustinated by Lignin inclusion

Effect

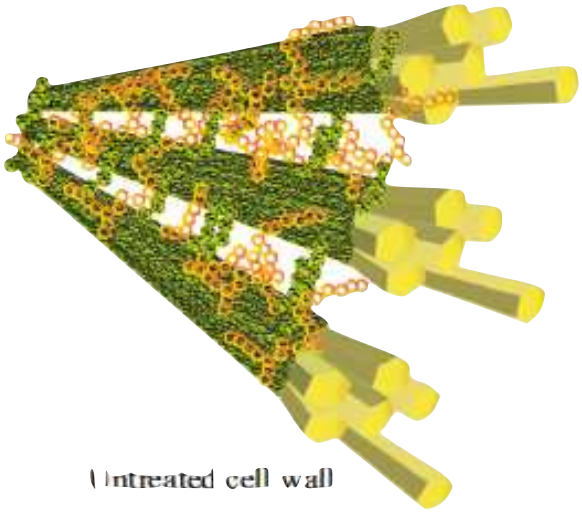
- mechanical stability
- resistance against biological (enzymatical) influence

Ingredients

• Cellulose	(pure sugar)	35 - 55 %
• Hemicellulose	(pure sugar)	22 - 28 %
• Lignin	(glue)	10 - 16 %

Conclusion

- ca. **70 % of straw compounds are highly valuable sugars**
- high potential energy yield by anaerobic digestion
- undigestable without **strong pre-treatment**



(picture: Biswas et al., 2015)

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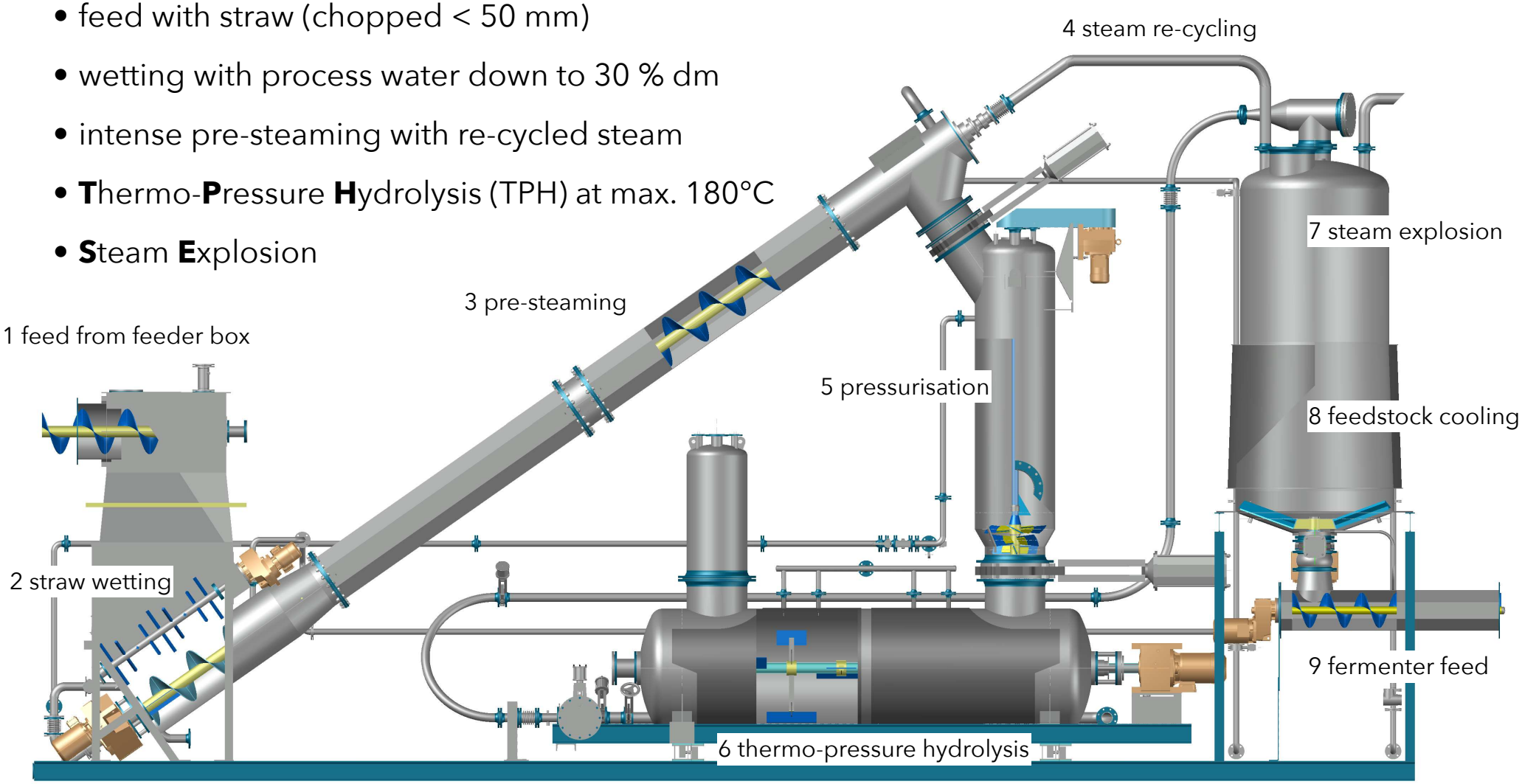
The **ECO**NOMIZER SE Technology

- feed with straw (chopped < 50 mm)
- wetting with process water down to 30 % dm
- intense pre-steaming with re-cycled steam
- **T**hermo-**P**ressure **H**ydrolysis (TPH) at max. 180°C
- **S**team **E**xplosion



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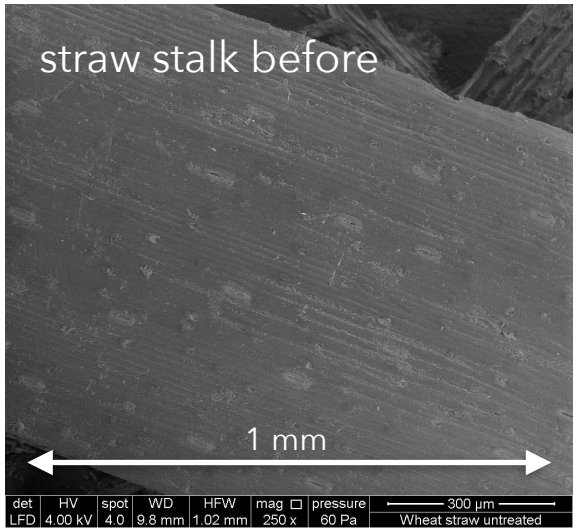
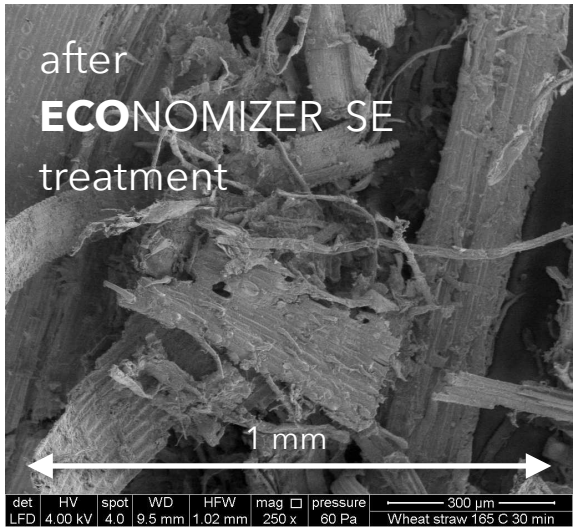
ECONOMIZER - the Treatment Impact

- high grade disintegration of straw stalks
- dissolution hemicellulose *short term available food*
- release of cellulose *mid term available food*
- product is a thick slurry with soft fibres and sweet smell
- easy digestible feedstock, fibers disappear during digestion





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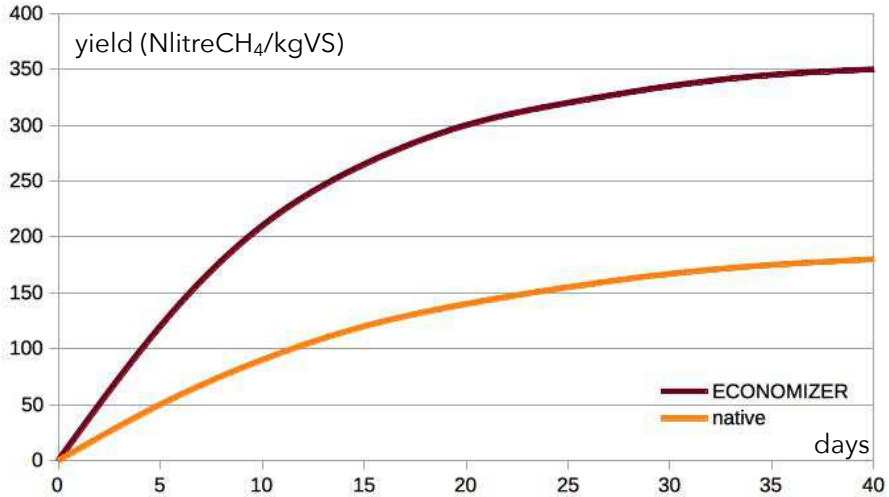
ECONOMIZER - Feedstock Value

Example feedstock processed so far and achieved biomethane yields:

	$NlCH_4$/kgVS
wheat straw (A-quality)	**300 - 350**
maize straw (dry stalk)	300 - 340
rice straw	300 - 330
soja straw	300 - 325
benchmark:	
maize silage (conventional)	*300 - 340*



increased and accelerated methane yield

- **ECO**NOMIZER SE gives **highest methane yields** - higher than any other pre-treatment
- **ECO**NOMIZER-treated straw has **same energetic value as maize silage**
- results approved by independent laboratories
  (e.g. University of Natural Resources and Life Sciences, Vienna)

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ECONOMIZER SE 2.5 - the Balance

Feedstock Capacity		20 tons straw/day (18 tons dry matter/day)	**7.000 tons straw/year**
Energy Balance			
	CHP	thermal power	electric power
	output	900 kW	**900 kW**
	own demand	*250 kW (28 %)*	*25 kW (2,8 %)*
or	**Gas2Grid**	biomethane	electric power
	output	**225 m³CH_4/h**	
	own demand	*32 m³CH_4/h (14 %)*	*25 kW*

- **outstanding energy balance** due to patented heat recovery system:
  50 % of process heat recycled from waste steam

- high reliability due to heavy duty machinery and high material quality
- high tolerance for stones and other waste - simple pre-separation only

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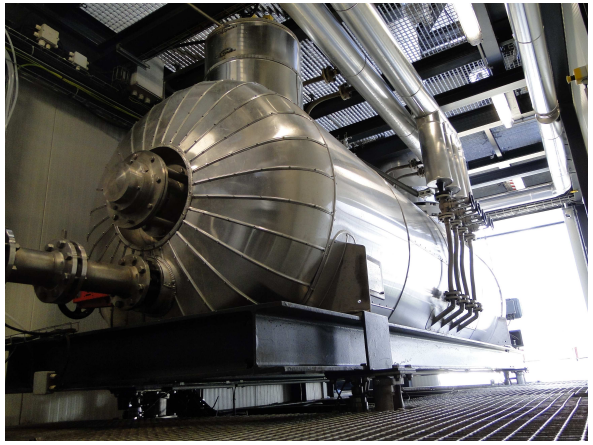
ECONOMIZER - the Milestones

ECONOMIZER SE technology **patents granted** in Europe, USA, Canada, Brasil, Russia, China a.o.

Pilot Plant (scale 1:10) operated since 2011
Demo Plant (scale 1:1) operated since 2014 (*Proof of Concept)*

First Project Sales 2016 (UK)
First **ECO**NOMIZER SE commissioned March 2017
Three **ECO**NOMIZER SE units finished, two more under commissioning in the UK
Five new **ECO**NOMIZER SE contracts in Europe for 2019



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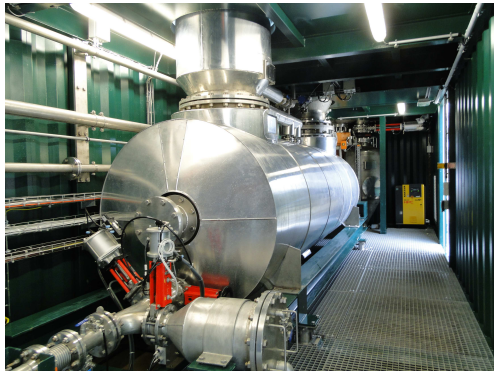
ECONOMIZER SE 2.5 - Reference Plant Example

Client	**Rainworth Energy** / Future Biogas (UK)
General Information	AD plant with a total capacity of ca. 2,5 MW electric power
	Feedstock mix with **wheat straw**, maize/rye silage, dry chicken manure
Installation	1 **ECO**NOMIZER SE 2.5
	Automatic crane system with 2 shredders
Feedstock:	A/B/C-Quality wheat straw
Start of Operation	March 2017
Special Information	**ECO**NOMIZER heating with biogas



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ECONOMIZER - the Conclusion

- **ECO**NOMIZER SE technology

  - worldwide **only proven solution for straw** pre-treatment before digestion

  - internationally **patented process**

  - proof of concept since 2014, confirmed by independent expertise

  - **reference installations** exist

- **ECO**NOMIZER GmbH

  - the technological specialists with **> 10 years Steam Explosion** experience & know how

  - the exclusive designer and producer of the **ECO**NOMIZER SE

  - *strategic partnership planned with* **iES** BIOGAS *for the Italian market*

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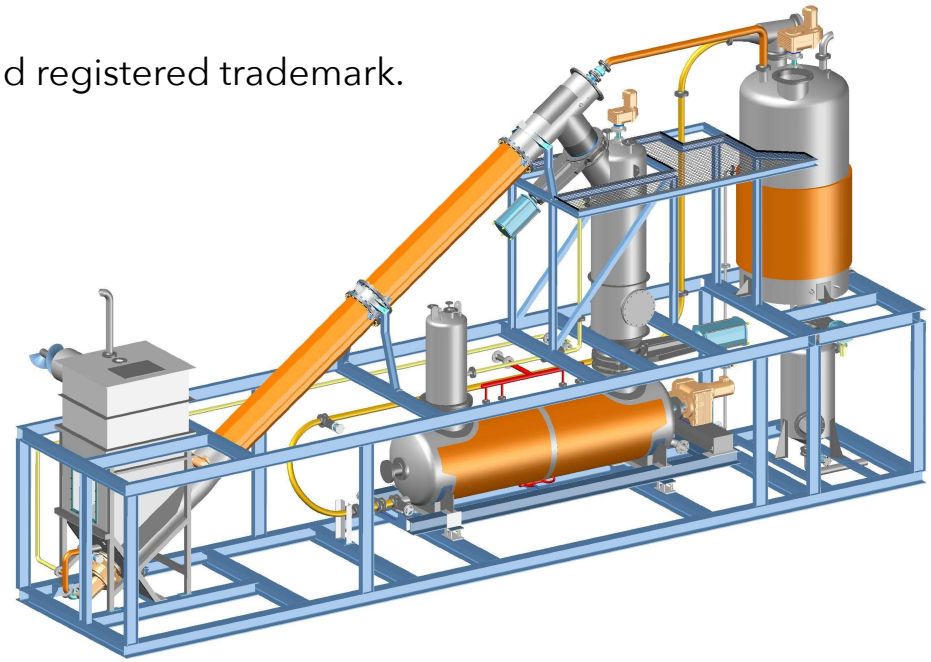
Thank you for your attention - now come to visit us at **stand 115** in **hall D5**

The ECONOMIZER SE technology is a patented technology and registered trademark.



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