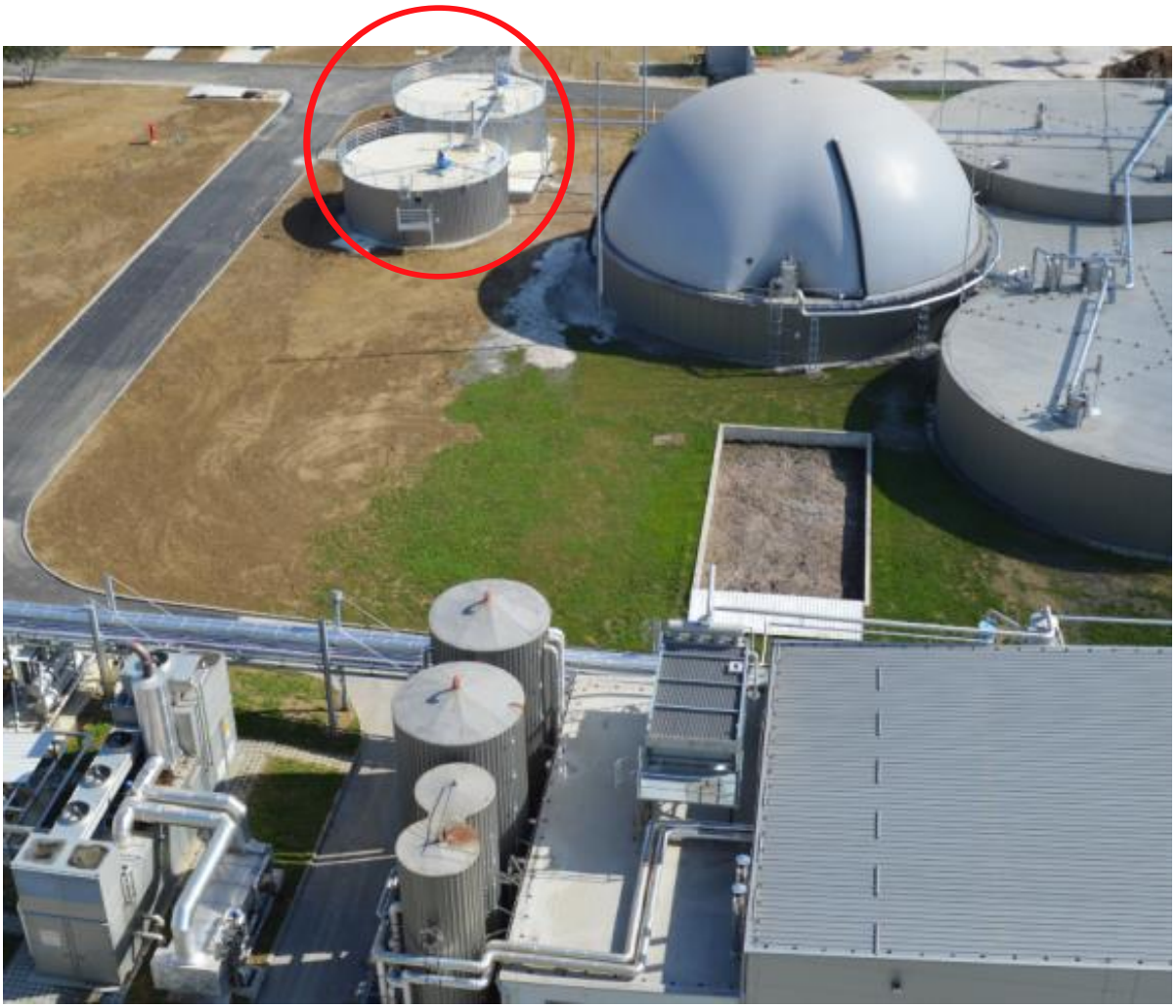
SNOWLEOPARD

A little difference makes the big difference

Increasing the biogas plant performance by 2.8 times in Gradec/Croatia

with an SLP Batch Hydrolysis



Electrical capacity from 1 MW to 2.1 MW

Feedstock from 100 % to 160% - a saving of 24% ((210–160)/210)

2.8 times (1*2.1 /(100-24)) total performance with the same digester volume

Revenue increase (1,1 MW): 1.4 Mio €/ $1.7 Mio

Feedstock costs saving per year: 350,000 €/$425,000

Payback: <1 year

Repowering
ADP Gradec / Kroatien

From 1 MW_{el} to 2,1 MW_{el} without additional digester tanks

AD-Plant Agrokor Energija
Gradec, Croatia

Initial situation and implementation

The AD plant of Agrokor Energija in Gradec / Croatia runs on food industry and retail waste, pig slurry and energy crops. The plant with its digester volume of 5.700 m³ was commissioned in 2014 and has a CHP-capacity of 1 MW_{el}. The aim was to increase the plant's capacity to 2,1 MW_{el}. There were two options, to either build an additional digester, or add a hydrolysis. The decision was taken in favour of the SLP-Hydrolysis.

Advantages of a Batch-Hydrolysis-Repowering

- More flexibility while feeding alternating feedstock
- Reducing feedstock cost through replacement of maize silage with sorghum silage (rich in fibre)
- Stable biogas production in spite of changing feedstock input quantities
- Higher methane yield from feedstock
- lower construction costs than additional digester tanks

Results

Today the AD plant runs with a performance of 2,1 MW_{el}. Therefore it produces twice the biogas per cubicmeter digester volume then the single-stage biogas plant before. Despite the higher volumetric load of ca. 7 kg organic dry matter per cubicmeter and day, the biology is stable. The FOS/TAC-value is by default at 0,3. That means, the biology is hungry and could be fed more anytime. With an added batch-hydrolysis, higher volumetric loads can be run and gas production can be sped up and increased.
The waste composition changes frequently. This doesn't have any negative influences on the biogas yield, unlike in a single-stage biogas plant. the hydrolysis and acidification bacteria in the first stage are robust and break down every organic material.
The "sensitive" methane bacteria in the second stage are supplied with a fatty acids mixture from the hydrolysis and are therefore optimally fed.

Snow Leopard Projects GmbH
Marktplatz 23· D-94419 Reisbach
Fon: +49-(0)8734-93977-0
Mail: info@snow-leopard-projects.com
www.snow-leopard-projects.com

SNOWLEOPARD

Repowering
ADP Gradec / Kroatien

From 1 MW_{el} to 2,1 MW_{el} without additional digester tanks

SLP-Batch-Hydrolysis:
Doubling of the biogas production with unchanged digester capacity

Industry Standard

The AD-plant was constructed with industry standard technology; fully process automated, and equipped with stainless-steel pipes and industrial pumps.
The expected lifecycle of this AD-plant is 50 years.

Project Data/Key Figures

Commissioning of the SLP Batch Hydrolysis

Start of construction	February	2015
Commissioning	June	2015

AD-Plant Data

AD-Plant	
Digester (existing)	2x 2.850 m³
Post Digester (existing)	2.470 m³
Hydrolysis	2x 588 m³
Final Storage (existing)	Laguna 100.000 m³

CHP Data	
1. Stage	1.060 kW (Nov 2013)
2. Stage	2x 1.060 kW (Juni 2015)

Inputmaterial

Pig slurry
Cow dung,
Slaughterhouse waste, Bakery waste
Material from fat separators. Glycerin
Molasses
Sorghum, maize silage

Investor and operator

Agrokor Energija d.o.o.
Zagreb/Kroatien

2,1 MW electric with only 2.850 m³ digester volume, that works only with a SLP Batch-Hydrolysis.
Velimir Varljen (Project manager)

Stand 28.06.16

Snow Leopard Projects GmbH
Marktplatz 23· D-94419 Reisbach
Fon: +49-(0)8734-93977-0
Mail: info@snow-leopard-projects.com
www.snow-leopard-projects.com

SNOWLEOPARD

ENERGIJA GRADEC d.o.o.
Trg Dražena Petrovića 3
HR - 10000 Zagreb

Zagreb, 01.03.2020

To whom it may concern

Company Energija Gradec d.o.o. runs at the moment 5 biogas plants in Croatia 2 MWel each. Biogas plant Gradec was initially built as standard type AD biogas plant with 1 MWel.

Nearly 8.000 m3 digester volume was installed in order to run at 1 MW with standard feedstock (mostly maize silage with pig manure) In order to increase electrical power on 2 MW we selected inventive SLP Batch Hydrolysis. We only had to add 2 smaller hydrolysis tanks without increasing digester volume.

Now plant runs at 2 MW with more diverse and at the end reduced feedstock. Investment cost was reduced compared to standard volume increasement and the plant is more flexible in feedstock input.

Director:

Nikola Nastav

Energija Gradec
d.o.o.
ZAGREB, Trg Dražena Petrovića 3