



nijhuis
INDUSTRIES

FAT RECOVERY FROM DAF SLUDGE AS BIOFUEL

*Resource Recovery | Presented by Wilbert Menkveld
Wilbert.Menkveld@nijhuisindustries.com*

SOLID SOLUTIONS IN A FLUID WORLD

ABOUT n i j h u i s



OUR VISION:
SOLID SOLUTIONS IN A FLUID WORLD

OUR MISSION:
*“ We turn your cost center into a **PROFIT** center! ”*

OUR STRATEGY:
Sustainable Water Use & Resource Recovery



Nijhuis Industries

- Total solution provider offering own innovative industrial solutions
- Long history : > 2400 reference plants, > 50 countries worldwide
- High level of process and application knowledge of many industries
- From products to total solutions, including re-use and recovery
- Global presence with Sales & Service Centres and Certified agents / partners.
- Nijhuis Industries: 60 million Euro turnover / 240 employees
- Industrial (85%) and municipal (15%)
- Business units:
 - > Nijhuis Water Technology, NL.
 - > Nijhuis Ozone Solutions, NL.
 - > Nijhuis H2OK, UK



Nijhuis Industries



Waste Water | Primary, secondary and tertiary treatment

- Removal of coarse solids, suspended solids and dissolved matters



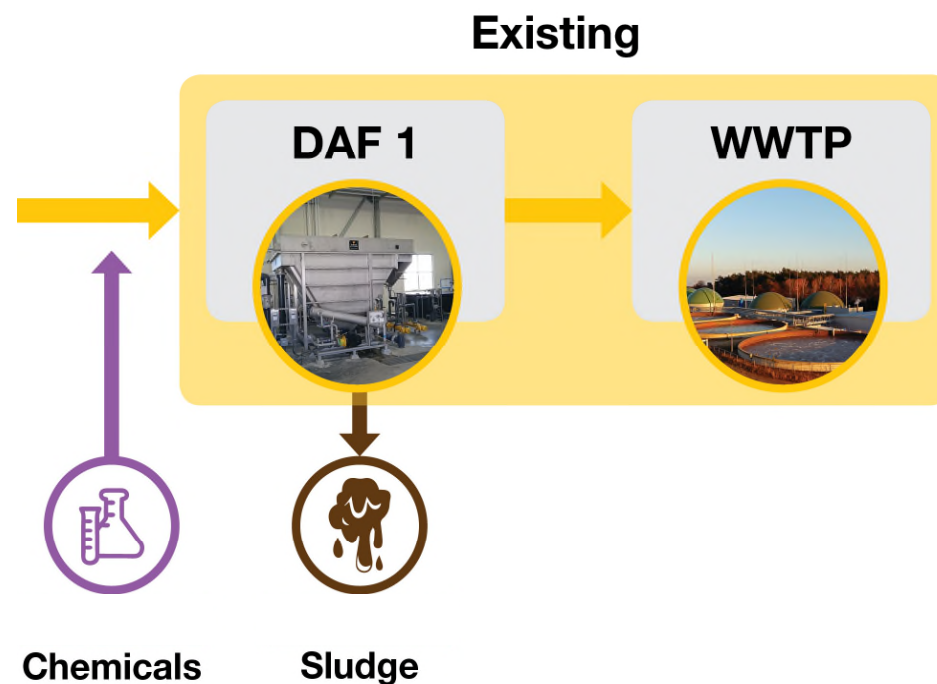
Waste to Valuable | Energy from organics | Recovery of valuable resources

- Transform organics to energy
- Extract valuable substances , Fats/Oils, Starch, Ammonia, Phosphor, Fertilizer



WHY RECOVERING FAT?

TRADITIONAL PROCESS



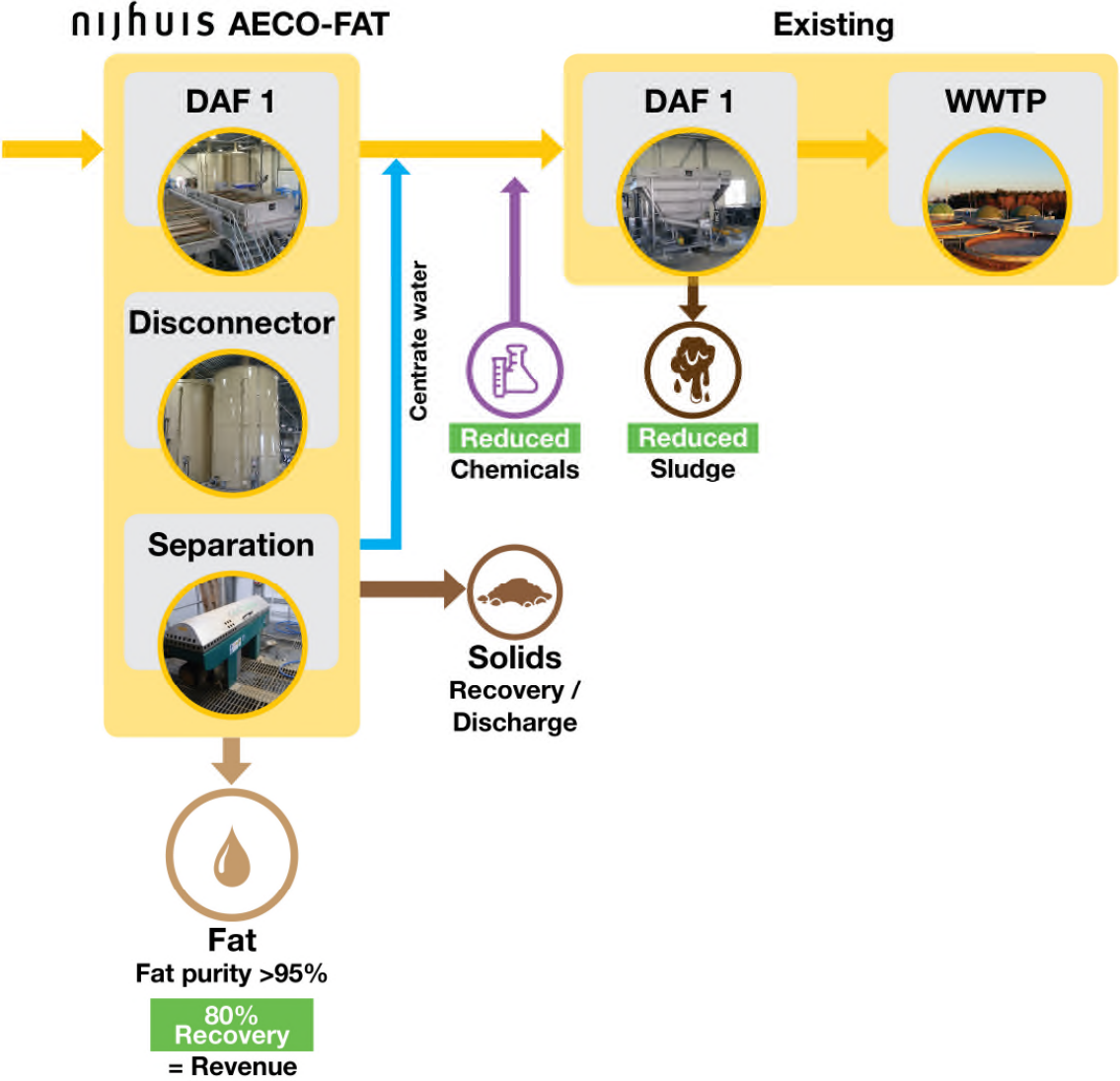
- High chemicals costs

- High disposal cost

- Can contain high potential → wasted!

WHY RECOVERING FAT?

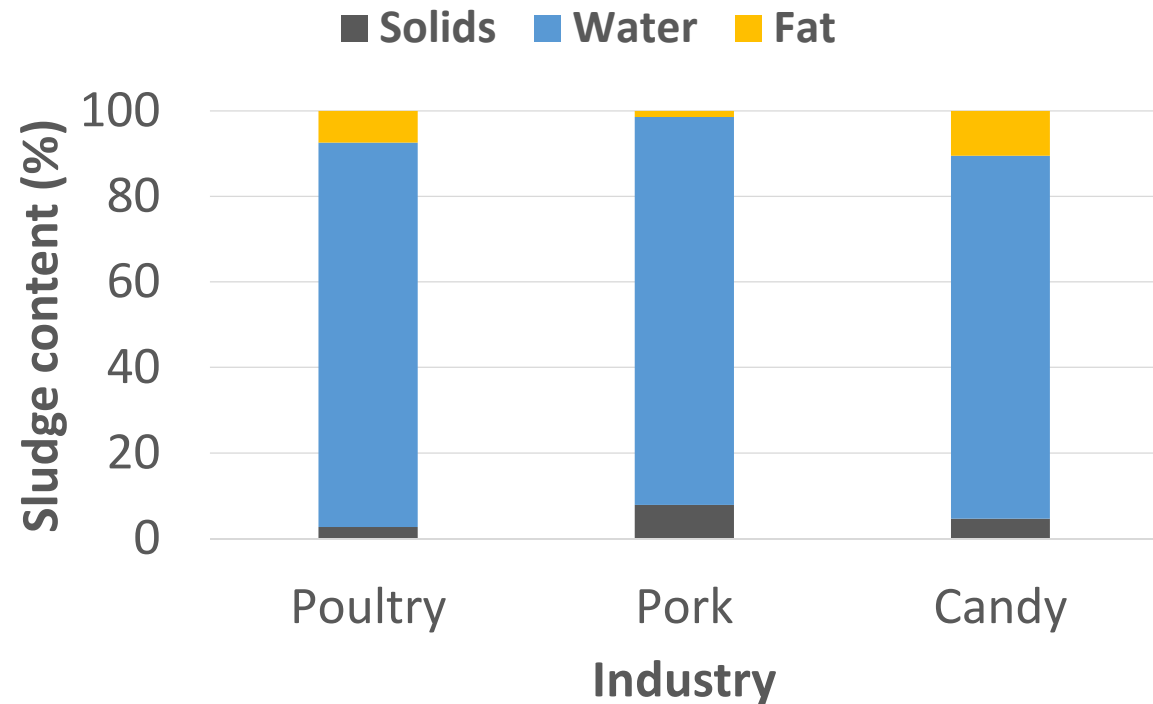
INTENDED PROCESS



TYPES OF WASTEWATER

Industries with **high fat content:**

- Meat industry: poultry and red meat
- Food industry e.g. candy, sauces, ice cream and bacon processing
- Fat industry, palm oil and edible oil industry



EXPERIMENTAL WORKS AND RESULTS

Location A

- Fresh wastewater
- Only slaughtering

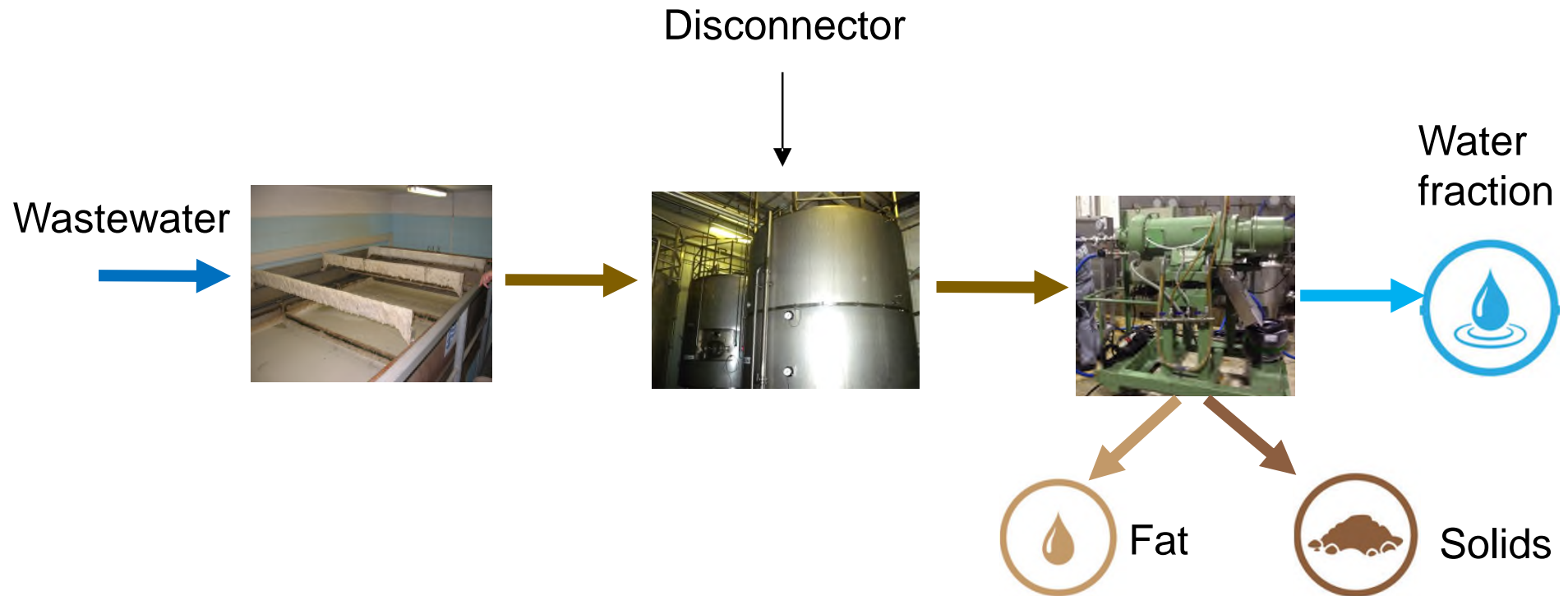


Location B

- One/more days old water
- Including further processing

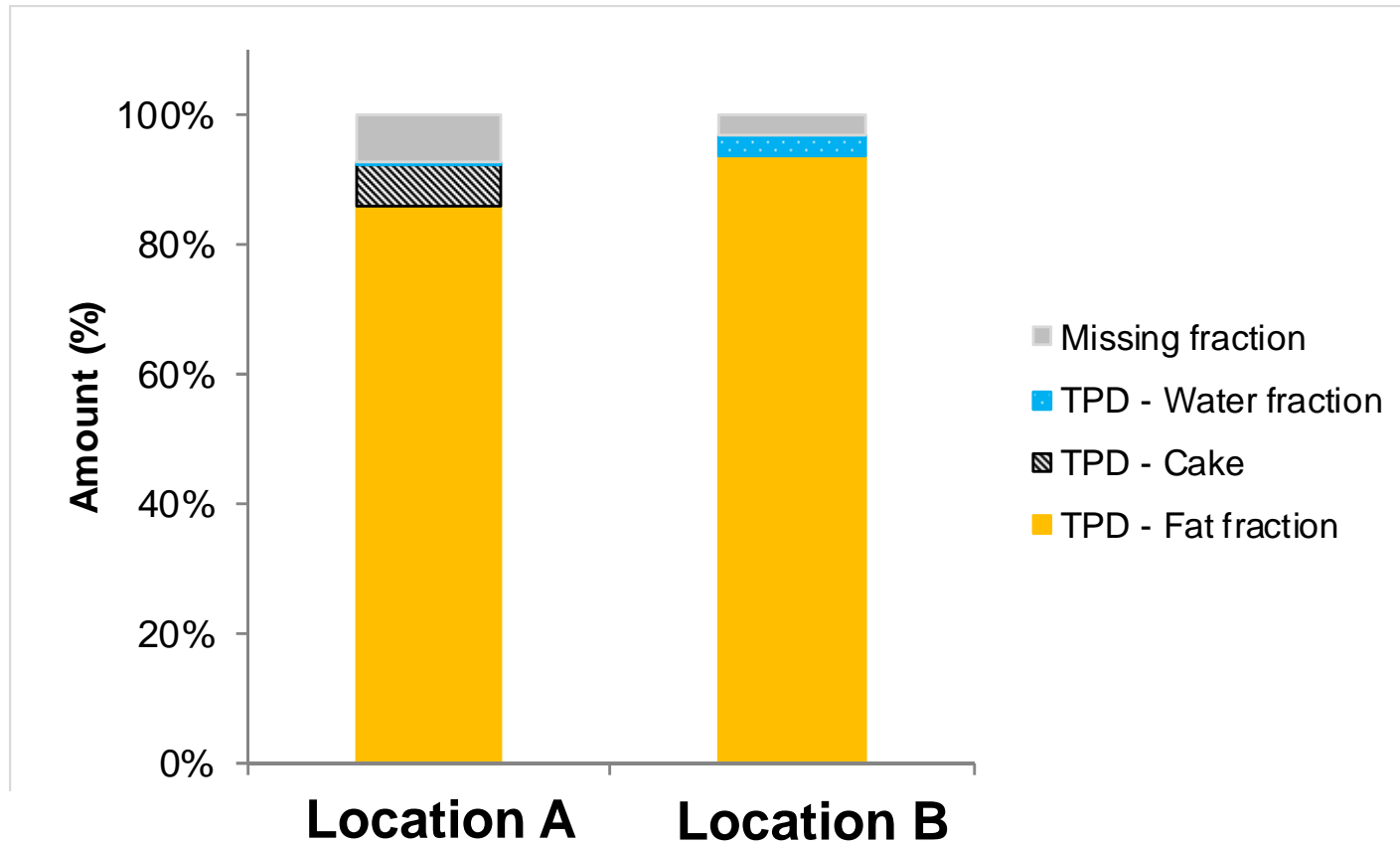


EXPERIMENTAL WORKS AND RESULTS



Experiment	Fat Recovery (%)	Fat Purity (% w/w)	Solids Removal (%)
Location A	86	96,3	79
Location B	94	97,1	66

EXPERIMENTAL WORKS AND RESULTS



RECOVERED FAT QUALITY

Parameter	Unit	Location A	Location B	Limit Biodiesel
Water content	%	3.03*	1.31*	0.5*
Free fatty acids	%	5.08	50.2	20
Insoluble impurities	%	0.75	0.01	0.2
Total Sulfur	mg/kg	31	178	100
Unsaponifiable matter	%	1.15	1.41	2.5

*can be achieved by different settings of separator



BUSINESS CASE

EXAMPLE LOCATION A

- Type : poultry slaughterhouse
- Slaughter capacity : 6250 birds/h
- Wastewater flow : 1500 m³/day
- Operation : 16 h/day, 6 days/week
- Location : the Netherlands



BUSINESS CASE

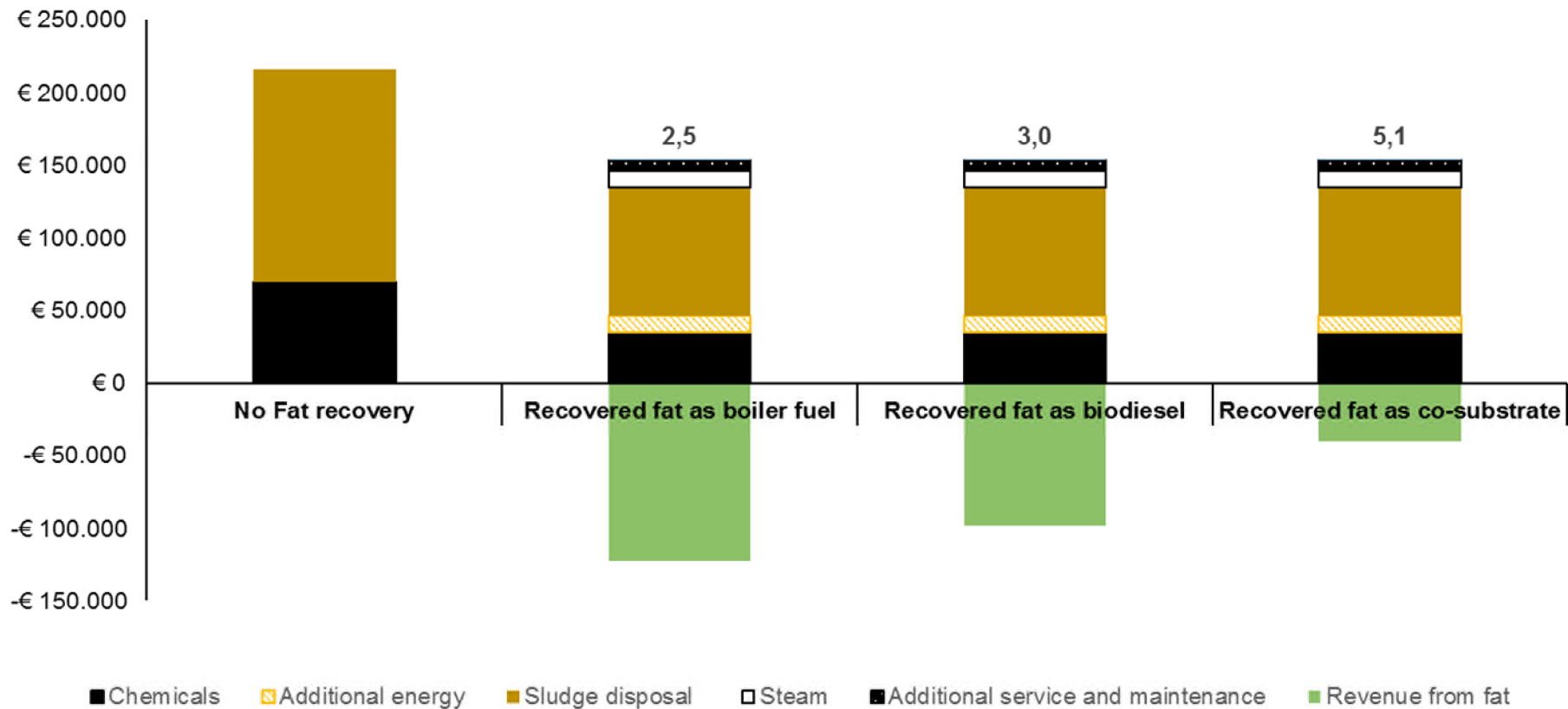
EXAMPLE LOCATION A

Parameter	Unit	Value/assumption
Solids content of DAF sludge	% w/w	4,0
Fat content of DAF sludge	% w/w	7,0
Sludge disposal	EUR/ton	15
Fat as co-substrate anaerobic digestion	EUR/ton	165
Fat as biodiesel	EUR/ton	400
Fat as heavy fuel oil	EUR/kg	0,50
Electricity	EUR/kWh	0,08
Investment AECO-FAT	EUR/year	89.000

BUSINESS CASE

EXAMPLE LOCATION A

Payback Period (year)

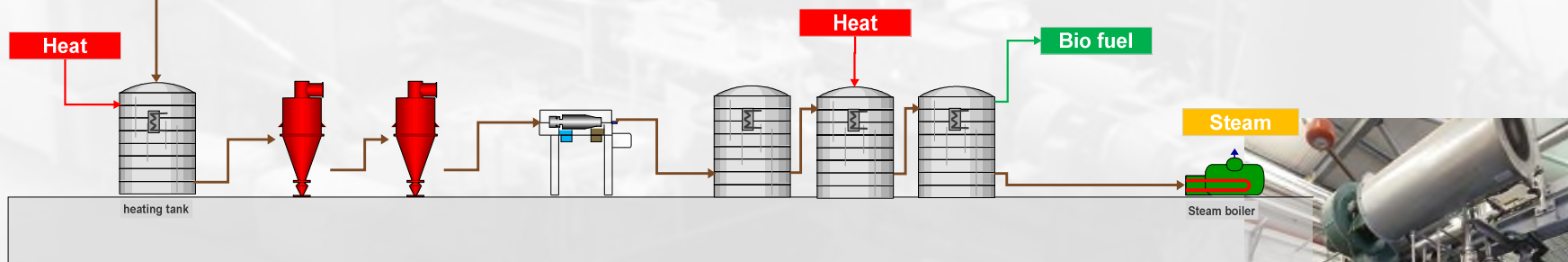




Dew Valley

FAT RECOVERY AT FULL-SCALE

FAT RECOVERY AT FULL SCALE



FAT RECOVERY

AT FULL SCALE

Cooked bacon production

- 600 m³/d wastewater with
 - 30 000 mg/l COD
 - 500 mg/L free O&G

30 m³/d (fat) DAF sludge

Recovery of 6 m³/day of > 99% pure fat

Energy production:

- 3 m³/d fed to steam boiler (2 ton/h)
Supplies whole factory thermal energy
- 3 m³/d sold for biodiesel production
at €300/ton gives €900 per day

CAPEX/OPEX:

- Return of investment < 1.5 year (excluding reduction sludge disposal and chemicals)



TAKE HOME MESSAGES

1

Good example of **resource recovery** innovation towards circular economy

- Reduce chemicals
- Reduce sludge
- Generate revenue

(38-66% lower OPEX)

2

High quality fat can be used for **own thermal energy**, sold for **biodiesel** production and sometimes used for the production of pet food

3

Depending on local situation, generally payback period of **1-2 years** can be achieved in poultry & meat processing

Questions



wilbert.menkveld@nijhuisindustries.com

www.nijhuisindustries.com

*“Turning your (waste)water
into **PROFIT**”*





SOLID SOLUTIONS IN A FLUID WORLD