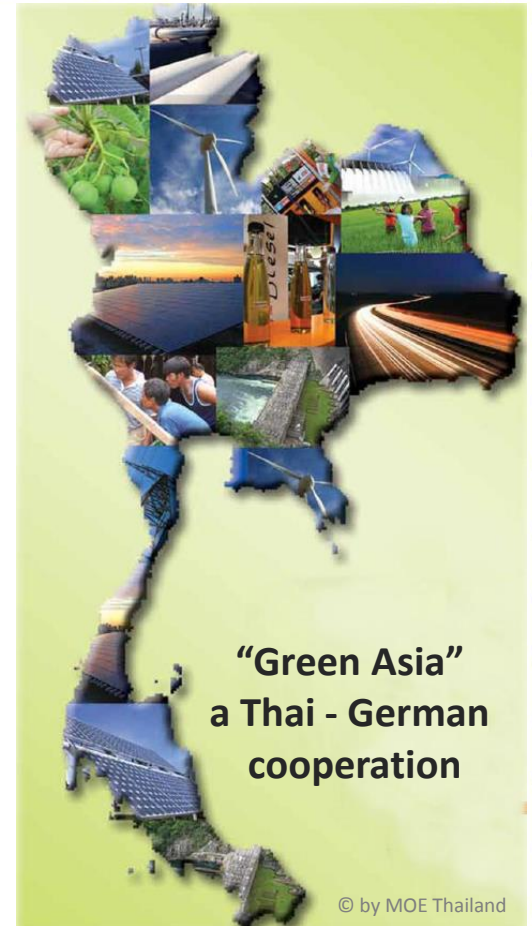


German-Thai technology conference
"Biogas in Thailand"
8th of June 2558 B.E.

presented by Dr. Nils Rottmann,
CEO of
BioEnergy Germany Co. Ltd
and
NORTH TEC BIOGAS THAILAND Co. Ltd.



Our general aims:

turnaround in energy policy, from fossil-fuel to renewable energy

- ✓ fair and suitable prices
- ✓ ecological, economical and social sustainable
- ✓ inspiring of the people

development, installation and operation of biogas plants/projects

- ✓ best and latest technology
- ✓ social and ecological responsibility
- ✓ agricultural, MSW and industrial waste biogas plants

cooperation with local partners

- ✓ rural development
- ✓ research and development of new suitable products
- ✓ cooperation with subcontractors and deliverer

“green Asia made in Thailand”

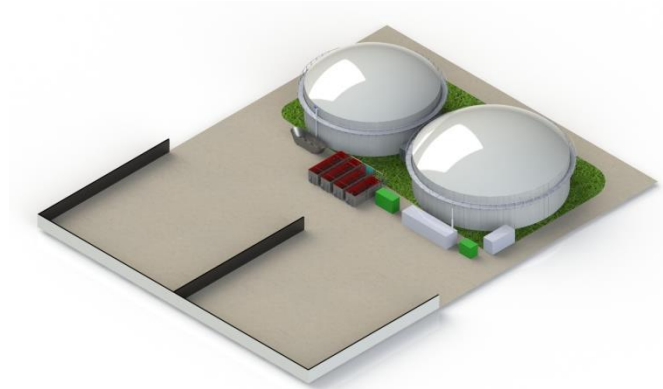
- ✓ 1st biogas in Thailand and at 2nd biogas in south-east Asia made in Thailand

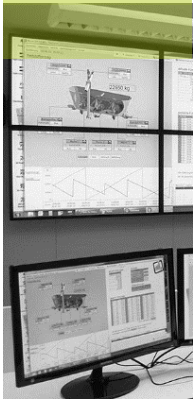
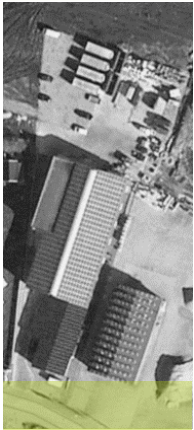


Looking for partner:

- ✓ sales / project development
(agriculture, industry, fertilizer production)
 - of machinery/technology or whole projects
- ✓ engineering offices/company
 - use of our technology
- ✓ construction companies
 - earth- and concrete foundation work
 - steel construction, pipeline construction
- ✓ fertilizer production / sales
- ✓ investors or investment consultancy

... open for further ideas ...





The NORTH-TEC Group

The steadily growing NORTH-TEC GROUP consists of several companies which operate in various branches:



- ✓ turnkey biogas systems
- ✓ BTO and BOO Model systems
- ✓ plant management
- ✓ optimization and expansion
- ✓ delivery of components
- ✓ service & maintenance
- ✓ control room monitoring (24/7)
- ✓ biological (laboratory) services
- ✓ consulting & financing
- ✓ automation
- ✓ control systems
- ✓ cabinet construction
- ✓ software and database development
- ✓ power solutions
- ✓ robotic technology
- ✓ special purpose machinery



Experiences > 12 years:

- ✓ installation of biogas plants i.e. in Germany, Italy, Latvia and Croatia
- ✓ biological support/monitoring of more than 300 international biogas plants
- ✓ service and maintenance of more than 600 biogas plants p.a
- ✓ repowering and optimization of existing plants
- ✓ optimization of plant biology and substrate use
- ✓ consequent development of technology, concepts and biology
- ✓ connecting of economy, ecology and social factors/society



headquarter of NORTH-TEC Maschinenbau GmbH, Bredstedt, Germany

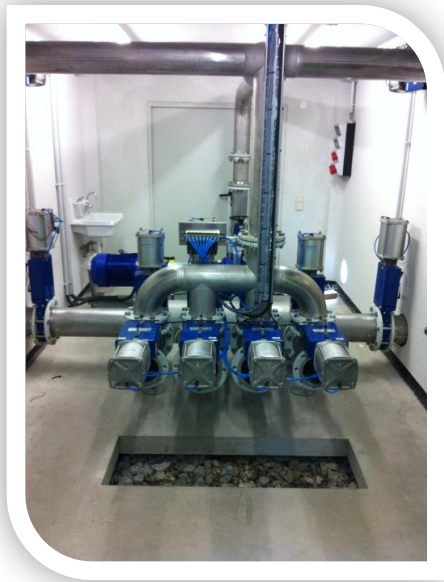


control room of NORTH-TEC Maschinenbau GmbH (24/7, live control of biogas plants)



Special features:

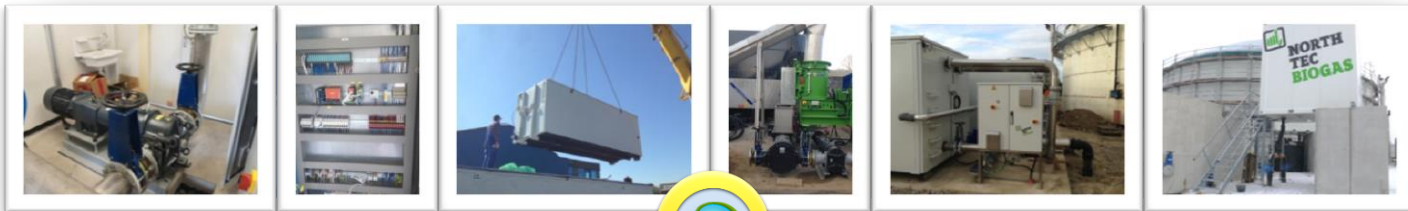
- ✓ located in Nakhon Ratchasima (German and Thai staff)
- ✓ service and contact in Thailand as well as in different languages
- ✓ full service during the whole project, all from one source
- ✓ laboratory service & service and maintenance of all our products
- ✓ different plant models (turnkey, BTO, BOO, up to 20 Years guaranty)
- ✓ latest German technology and practice proofed equipment
- ✓ special products (made in Germany)
 - technical building NT 9000
 - plant control system
 - NT power Pro software
 - online data base (ODB)
 - 24/7 control room
 - separation unit NT1000 V2
- ✓ high efficient process biology: thermophilic process



pump distributor inside of the technical building NT9000

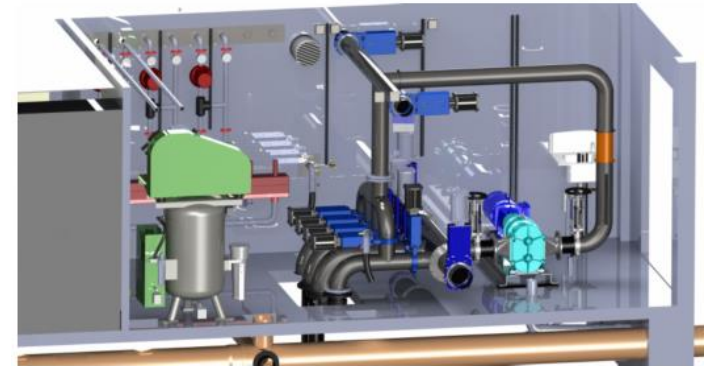
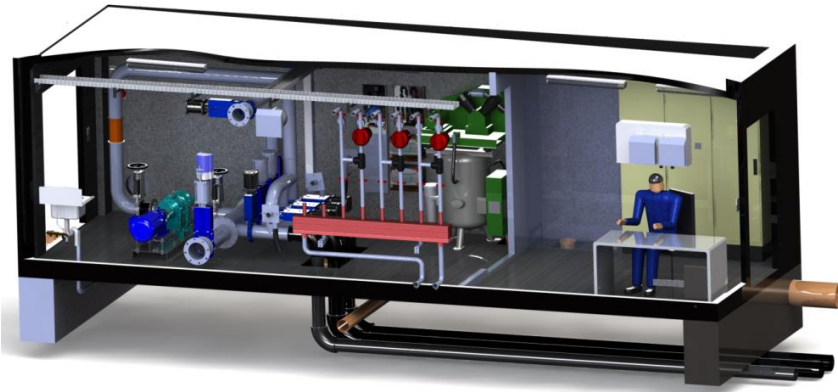
Monitoring and engineering services

- ✓ feasibility studies, project development, complete licensing process
- ✓ plant engineering and plant construction
- ✓ monitoring and controlling of the of test run
- ✓ plant monitoring: continuously monitoring of all important parameters of the biogas plant
- ✓ 24/7 monitoring via NT/BEG control room
- ✓ plant management
- ✓ financial monitoring and accounting
- ✓ laboratory services for biogas plants
- ✓ system design, input material and energy calculation
- ✓ consultancy for biogas plant operation, manufacturing/installation, use of input materials (organic waste, organic byproducts, energy crops or organic waste water)
- ✓ financing service



Technical building NT9000 *“plug and play”*

- ✓ technical heart of the biogas plant
- ✓ approx. 9 m long, 2.70 m tall and 3 m wide
- ✓ a fire-resistant partition wall divides the building
- ✓ central control station for the plant
- ✓ pre-commissioned in Germany and shipped to wherever needed
- ✓ placed between two tanks (incl. i.e. switching cabinets, desulphurization unit, heating circuit distributor, compressed air supply, compact distributor with a substrate rotary lobe pump)



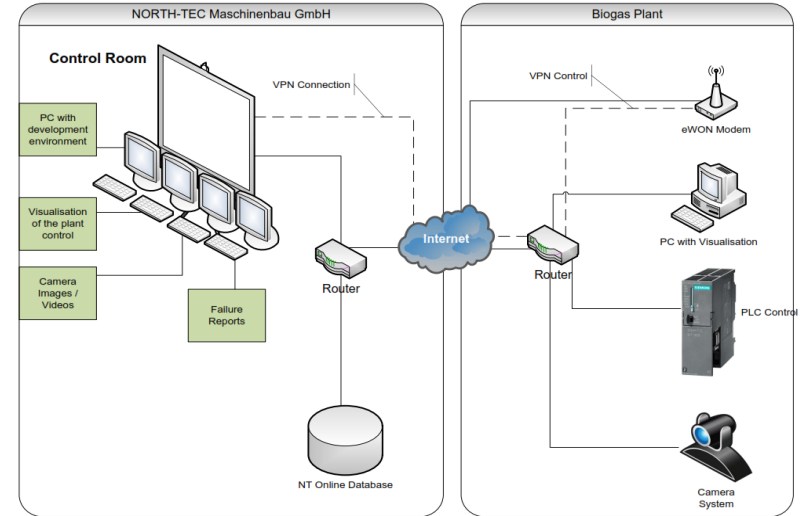
Plant control system with NT power Pro software

- ✓ user-friendly and intuitive design
- ✓ extremely high degree of automation:
keep control of every drive and sensor in the plant
- ✓ detailed failure reports: prioritization of alarms and forward to mobile phone
- ✓ helpful diagrams visualize plant parameters
- ✓ reduced energy consumption through the Energy management
- ✓ recipe management
- ✓ all data is stored in the online data base

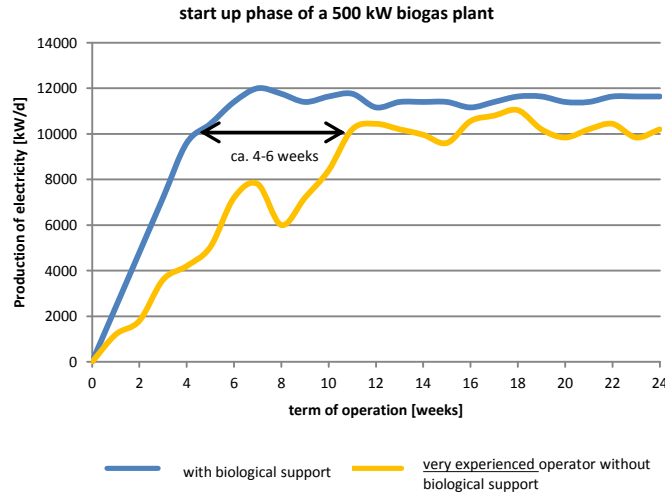


24/7 Control room

- ✓ a team of technicians offer 24/7 plant control surveillance
- ✓ guarantees optimal servicing of the biogas plant at any time
- ✓ further, we analyze plant system failure reports and give advice on how to solve them
- ✓ the NORTH-TEC BIOGAS THAILAND service team is available 24 hours a day, 7 days a week to move out to the biogas plant

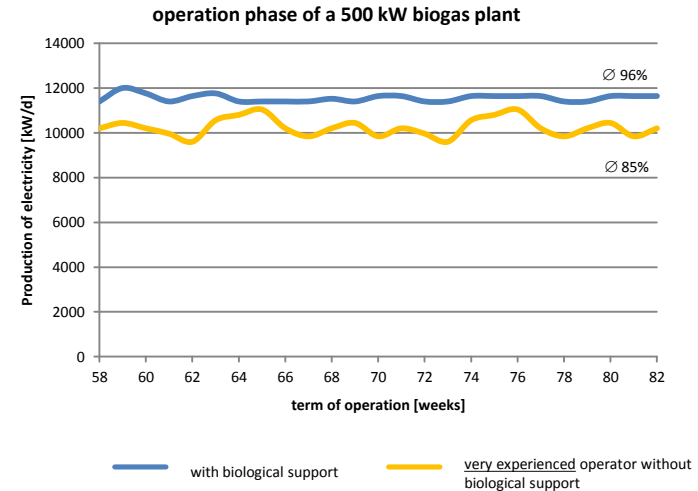


Biological support



difference in start up phase (week 0-10):
ca. 250.000 kWh (1,460,000 THB)
(for 1 MW plant = 2,920,000 THB)

- ✓ safe and fast start up
- ✓ less stress
- ✓ rapidly revenue



difference in operation phase:
ca. 8,000 THB per day
(for 1 MW plant = 16,000 THB)

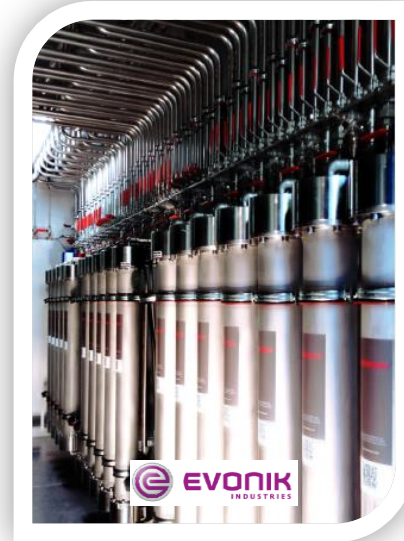
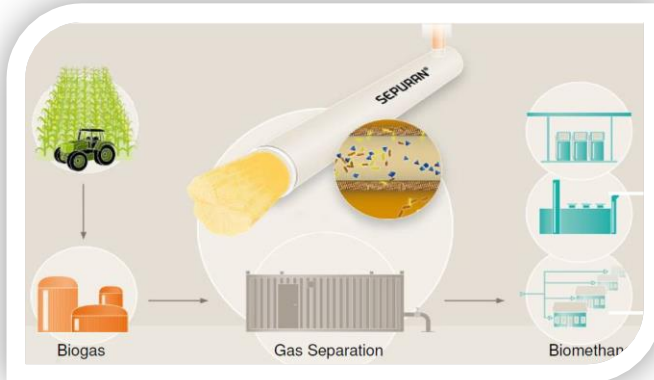
- ✓ less fluctuation in operation and higher operation level



Gas conditioning via membrane technology

Upgrade to a gas quality up to natural gas (methane >99,5%)

- ✓ no waste water treatment
- ✓ easy process, little maintenance
- ✓ no chemicals involved
- ✓ fits into a standard container
- ✓ flexible operation
- ✓ easy to scale-up
- ✓ high methane yield
- ✓ high product gas quality



- ✓ natural gas substitute
- ✓ simple, robust and efficient technology
- ✓ e.g. for industrial processes, households as well as fuel for natural gas cars



contact:

Dr. rer. nat. Nils Rottmann
graduate environmental scientist
CEO – BioEnergy Germany Co., Ltd.
CEO – NORTH TEC BIOGAS THAILAND Co., Ltd

nils.rottmann@bioenergy-germany.com
www.bioenergy-germany.com

nrottmann@north-tec.de
www.north-tec.de

references and further information on request

