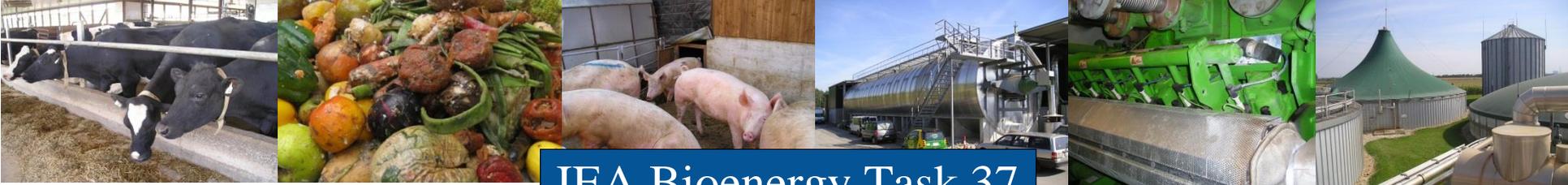


## IEA Bioenergy Task 37

IEA Bioenergy- Task 37: 2018-8

# THE ROLE OF ANAEROBIC DIGESTION AND BIOGAS IN THE CIRCULAR ECONOMY





## IEA Bioenergy Task 37

# The role of Anaerobic Digestion and Biogas in the Circular Economy

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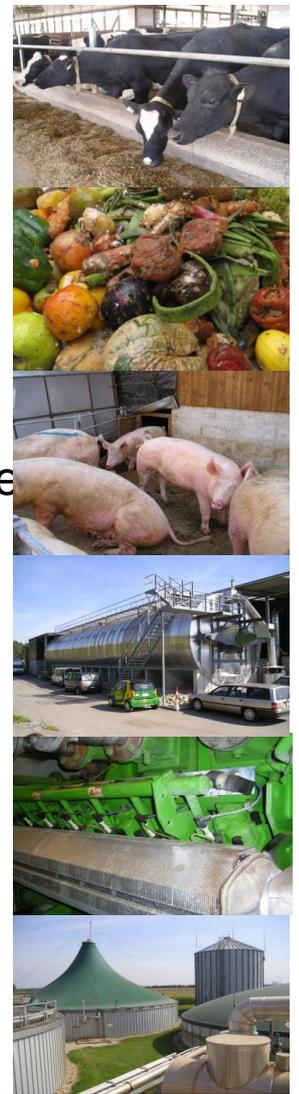
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# Aim

*To highlight the diversity of benefits from anaerobic digestion and biogas systems.*

- The multifunctionality is its clearest strength.
- Sustainable biogas systems include processes for:
  - treatment of waste,
  - protection of the environment,
  - conversion of low-value material to higher-value material,
  - the production of electricity, heat and of advanced gaseous biofuel.
- Biogas and anaerobic digestion systems are dispatchable and as such can facilitate intermittent renewable electricity.
- The target group for the report:
  - Biogas stakeholders in general,
  - Decision makers,
  - Biogas business actors.

# Scope

*Create a narrative of how AD and biogas fit into the concept of the circular economy.*

- The biogas plant and its basic functions are described, as are the concept of biorefineries and how they interlink to biogas production.
- The multiple functions of BG in CE are discussed under the following headings:
  - Biogas as an energy carrier;
  - Reduction of GHG emissions;
  - Energy security;
  - Biogas as raw material – further use of carbon dioxide and methane;
  - Biogas from AD as a scavenger for organic waste streams;
  - Biogas treatment for better water quality;
  - Awareness tool on circular thinking;
  - Biogas in agriculture;
  - Balancing income for rural areas;
  - Challenges in using waste as raw-material.
- The intimate relation between AD and CE is exemplified through four case-studies.
  - To show how simple it can be to take a significant step towards circular economy concepts with the aid of biogas and anaerobic digestion.

## Linear economy

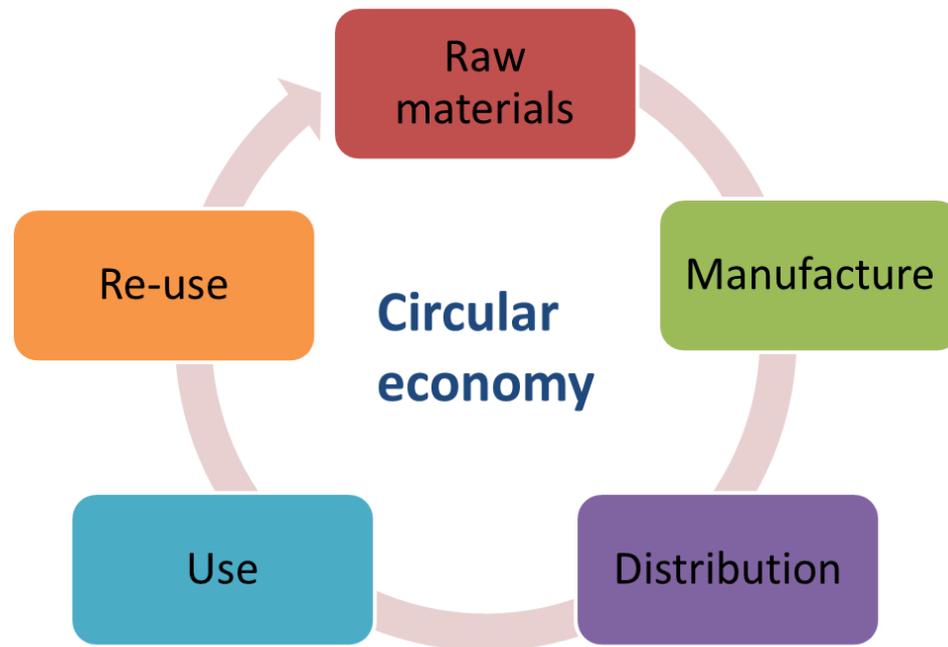


Figure 1. Differences between the linear and the circular economy.

# The biogas plant – the hub in the bio-economy

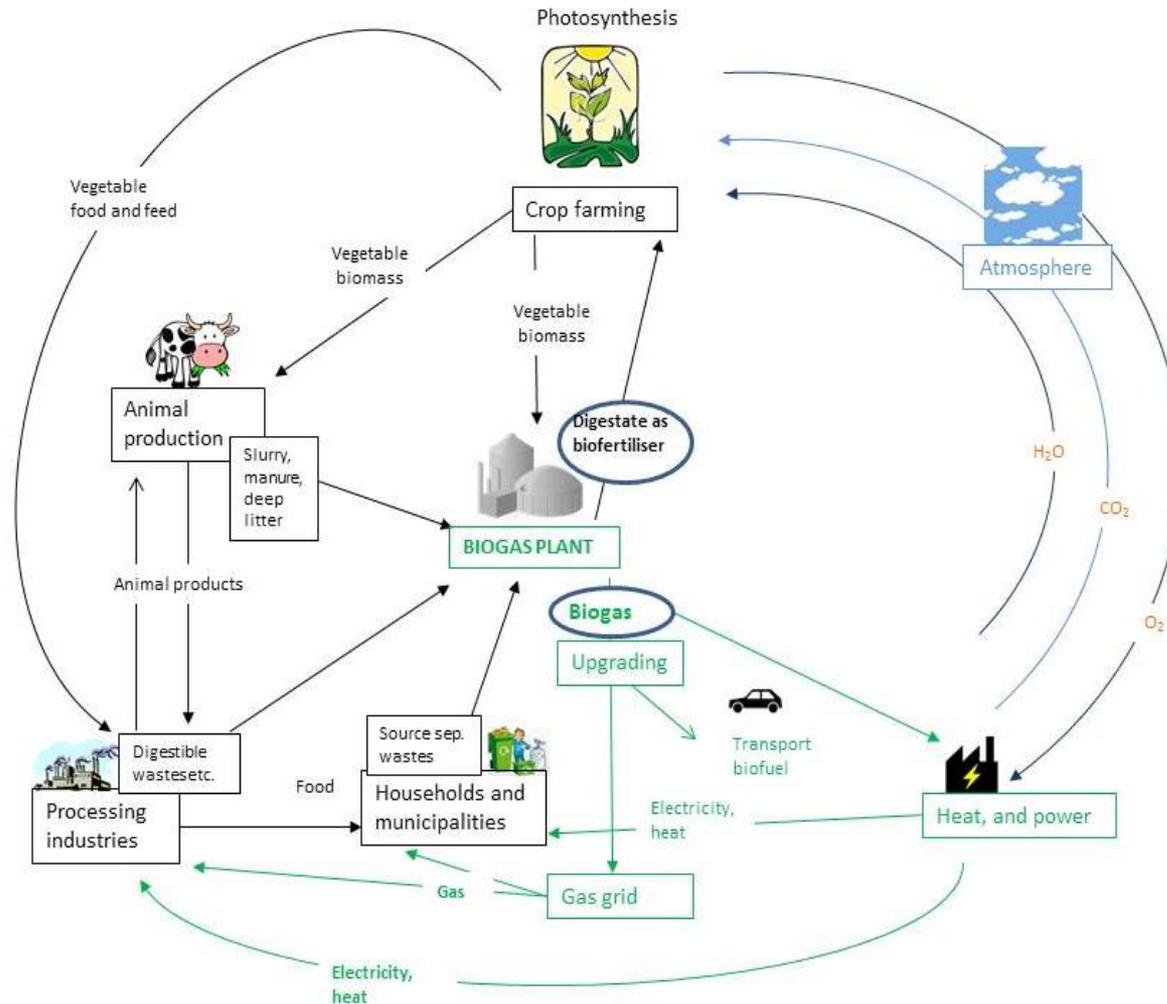


Figure 2. An example of how a modern co-digestion biogas plant fits into the circular economy (Source: Al Seadi et al, 2018)

# The multiple functions of biogas in circular economy and its challenges

The report contains discussions in the areas of:

- Biogas as an energy carrier
  - Biogas - a part of the modern society's energy supply system
  - Biogas used for heat and electricity production
  - Upgraded biogas (biomethane) used as vehicle fuel
  - Upgraded biogas (biomethane) injection into the gas grid
- Reduction of GHG emissions
  - Improved nutrient up-take efficiency in agriculture
- Energy security
- Biogas as raw material – further use of carbon dioxide and methane
- Biogas from AD as a scavenger for organic waste streams
  - Biogas from food waste
- Biogas treatment for better water quality
- Awareness tool on circular thinking
- Biogas in agriculture
  - Centralised manure co-digestion is circular economy in practice
  - Using digestate as fertilizer
  - AD of animal slurries improves air quality
- Balancing income for rural areas
- Challenges in using waste as raw-material

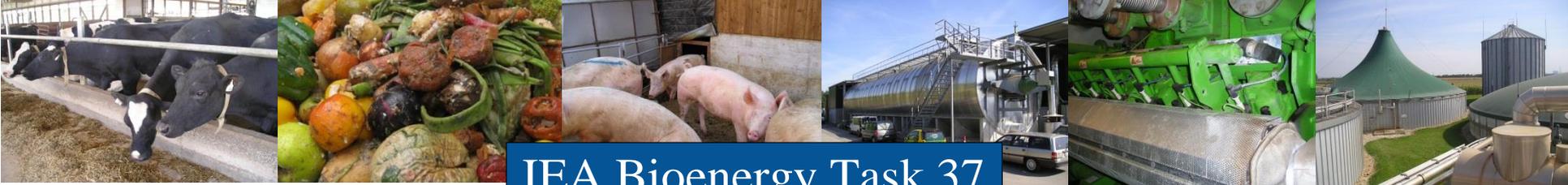
The report is available at: <http://task37.ieabioenergy.com/>



# Conclusions from the report

- Circular economy is still in the early stages.
- Production from bio-based resources will grow.
- Wastes will be transformed to high-value products.
- Biogas facilities has a vital role.
- Sustainability and potential for financial gain.





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**Thank you!**



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