- Chemical processes for producing methane from carbon dioxide and hydrogen have been commercially available for many years, normally the Sabatier Process (SP).
- Krajete GmbH has developed a new sustainable and flexible process using methane producing archaea (microorganisms).

The Process

$$CO_2 + 4\,H_2 \rightarrow CH_4\,(g) + 2\,H_2O$$

Advantages

- The methane producing archaea have been on this planet for ~4,000,000,000 years
- The equipment is simple and easy to maintain
- A methane reactor with a pressure of only 1 barg is required, (SP ~ 5 – 50 barg)
- A temperature of only 30 – 75 deg C is required, (SP ~ 200 – 400 deg. C)
- Plant standby time is extremely flexible; the microorganisms can go into hibernation!
- Full production from standby in approximately only 2 minutes
- A wide range of carbon dioxide gas sources can be used, thus dispensing with costly purifying systems such as;
    - Biogas, typically containing methane, carbon dioxide and hydrogen sulphide
    - Pure carbon dioxide

Project Evaluation

- Krajete GmbH would be pleased to assist in the assessment of the potential value of your gas emissions and can offer;
  - Gas emission suitability study with archaea reactor test, either from
    - 2 – 6 weeks site sampling and collection.
    - Synthetic gas produced from your emission analysis.
  - A Conceptual Engineering Study (±50%) can also be undertaken.

- **Projects**
  - Krajete GmbH has in recent months assisted many companies in evaluating gas emissions and project evaluation.
  - They also have on-going discussions with major industrial companies including.

    - Automobile Manufacturer
    - Steel Production
    - Energy Supply Companies
    - I.C. Machine Manufacturers

Applications

- **Energy Balancing**
  - Synthetic methane can be fed directly into natural gas grids with only small amounts of propane and odorant added to comply with legislation.
  - There is considerably more natural gas storage than pumped hydro storage (PHS) in most countries e.g.

	c. **Existing Pumped Hydro Storage (PHS) (Gw)**	d. **Existing Natural Gas Network & Storage (Gw)**
United Kingdom	2,76	47 000
Germany	40	226 000
Austria	<2,0	56,5
Sweden	Nil	Nil
Norway	< 5,0	Nil
Finland	Nil	Nil
Denmark	Nil	11,3
Switzerland	<2,0	Nil

c. & d. The values in the table have either been provided by the author's professional network or from papers on the internet and the author accepts no responsibility for the accuracy of this information.

- **Transport**
  - Many of the major automobile manufacturers today produce natural gas (NG) Vehicles.
  - By 2020 there will be 20,000 compressed natural gas (CNG) filling stations in Europe [c].
  - By replacing the fossil fuel gas supplies with green synthetic methane, carbon emissions from road transport can be eliminated.
  - Electric vehicles (EV)s can have their range extended by installing a NG storage tank and fuel cell.
- **Towngas Supplies**
  - Methane from the archaea reactor can be fed directly into the town's "gas holder" without compressors to supply the "town's gas network"

[c] In 2001 in the White Paper of the European Union on Common Policy in Transport there was approved the intention that by 2020 there will be replaced with alternative motor fuels up to 23% of liquid fossil fuels in transport, from that 10% of diesel and petrol consumption will be substituted by natural gas – CNG.

www.russell.no
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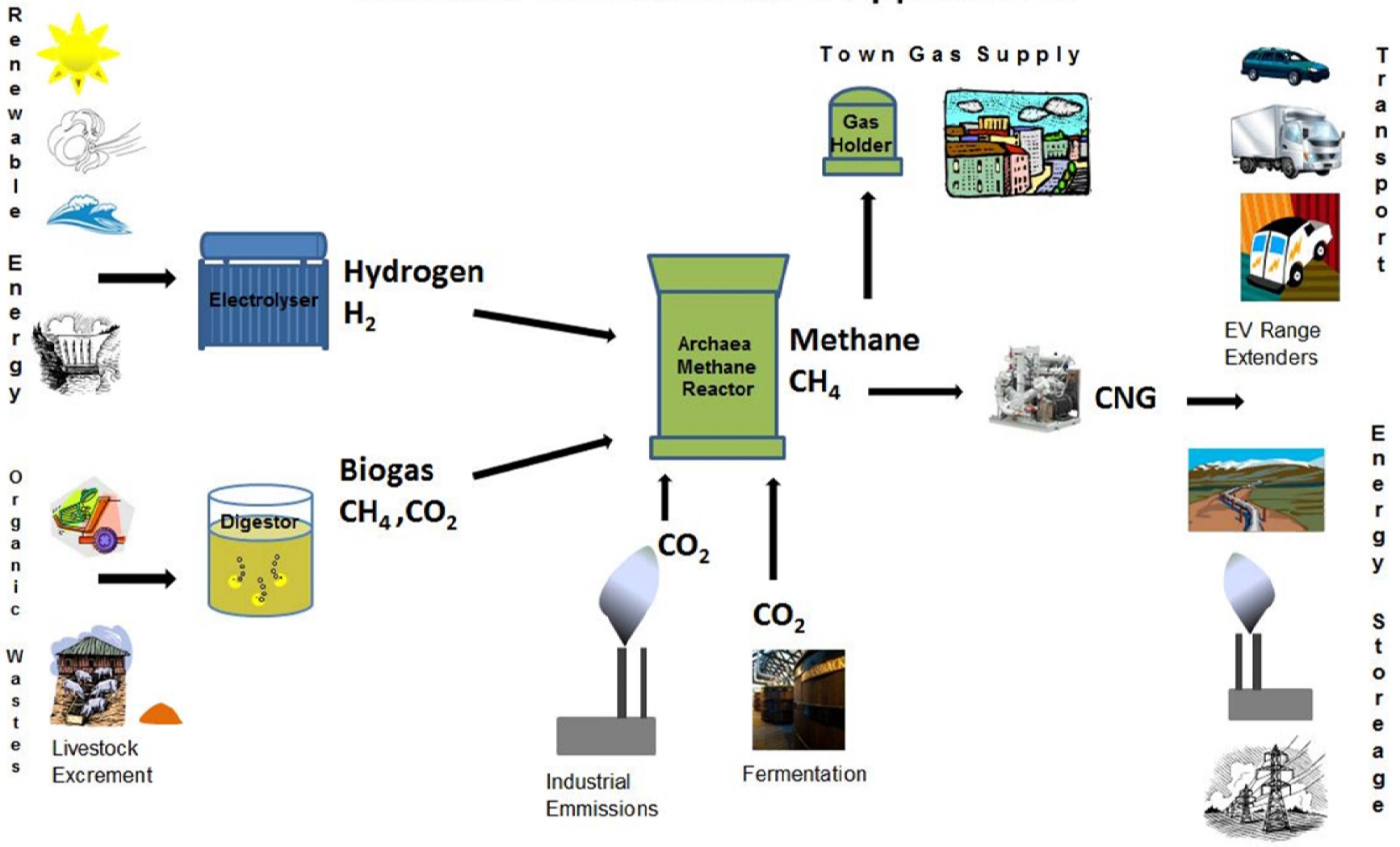
Methane Gas Sources and Applications



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