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Expert symposium agenda

Welcome. BiogasMax and WP 7	PD & PH	09.00-09.30
Lessons learned	SM	09.30-09.45
Plenary presentation & expert feedback - The 3 step decision model	PB & OB	09.45-10.15
Breakout sessions		10.15-11.15
A: The biomethane pathway - From feedstock to fuelling infrastructure	PB	
B: The biomethane business – Creating and sustaining the market	OB	
Coffee break		11.15-11.30
Continued break-out sessions		11.30-12.30
Lunch		12.30-13.30
Continued break-out session		13.30-15.00
Coffe break (preparation of feedback by session leaders and secretaries)		15.00-15.30
Plenary reports on break-out sessions	OB, PB	15.30-16.30
Close of symposium	JS	16.30-16.45

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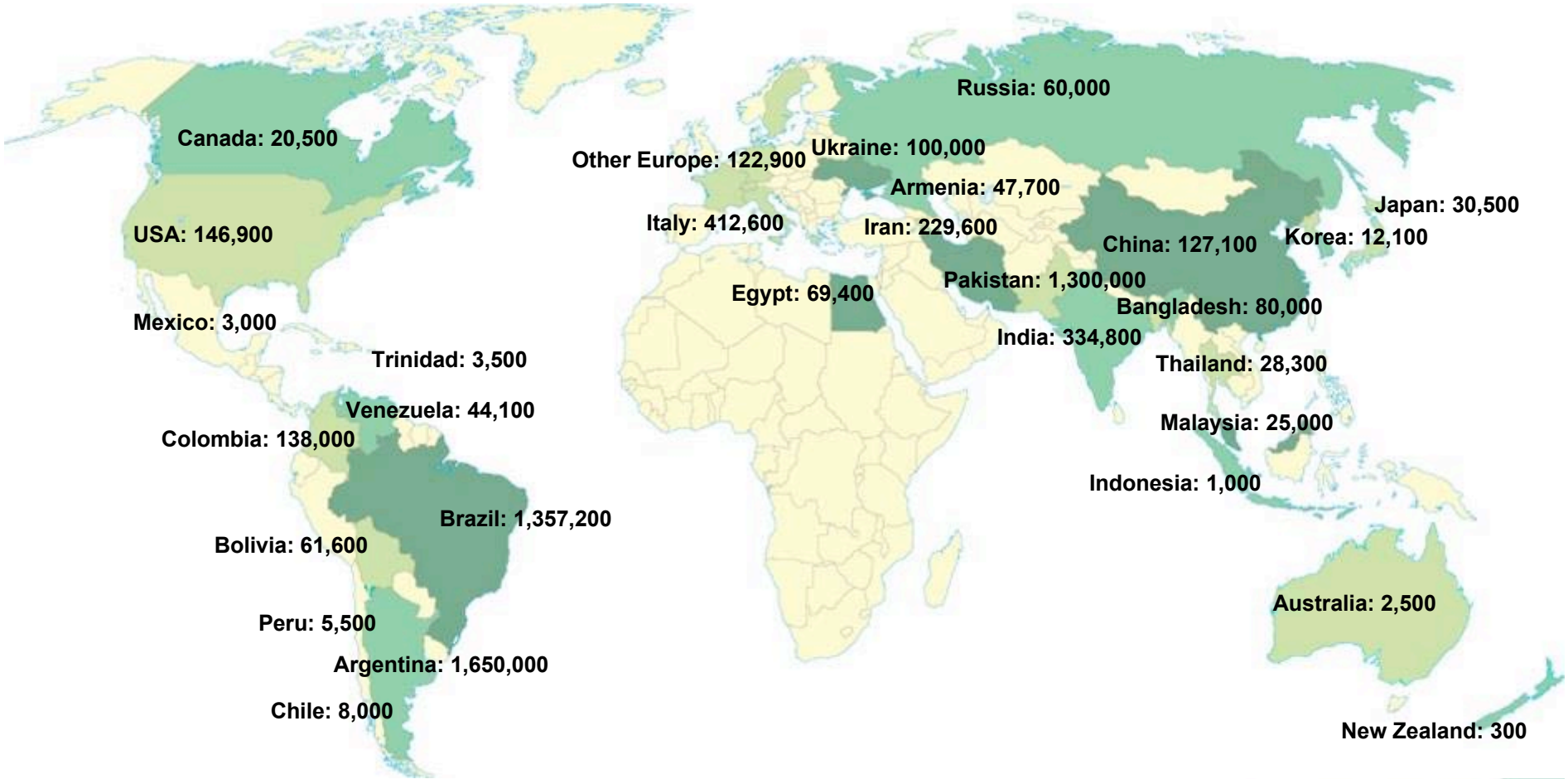
6.4 million methane powered vehicles



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Source: The GVR, March 2007 adjusted

127,000 buses, 113,000 trucks, and 6,200,000 cars now running on natural gas or biomethane

Leading European countries

Italy	412,600	France	10,100
Ukraine	100,000	Belarus	5,500
Russia	60,000	Moldova	5,000
Germany	54,800	Switzerland	3,600
Armenia	47,700	Spain	1,400
Bulgaria	25,200	Austria	1,000
Sweden	11,500	Poland	800

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Biomass and biomethane potentials

EU 25 PJ potential	Concawe alt 1	Concawe alt 2	Concawe alt 3	Concawe alt 4	EEA 50 % yield 2020	BIOFRAC 50 % yield 2020	IE 2020
Ethanol	914	113	113	113			
Syn-diesel		750					
Naphtha		250					
DME			1226				
Hydrogen				1495			
CH4 waste	200	200	200	200	2089	2094	806
CH4 crops					2005	1968	5013
CH4 wood					821	942	3513
Total	1114	1313	1539	1808	4915	5004	9332

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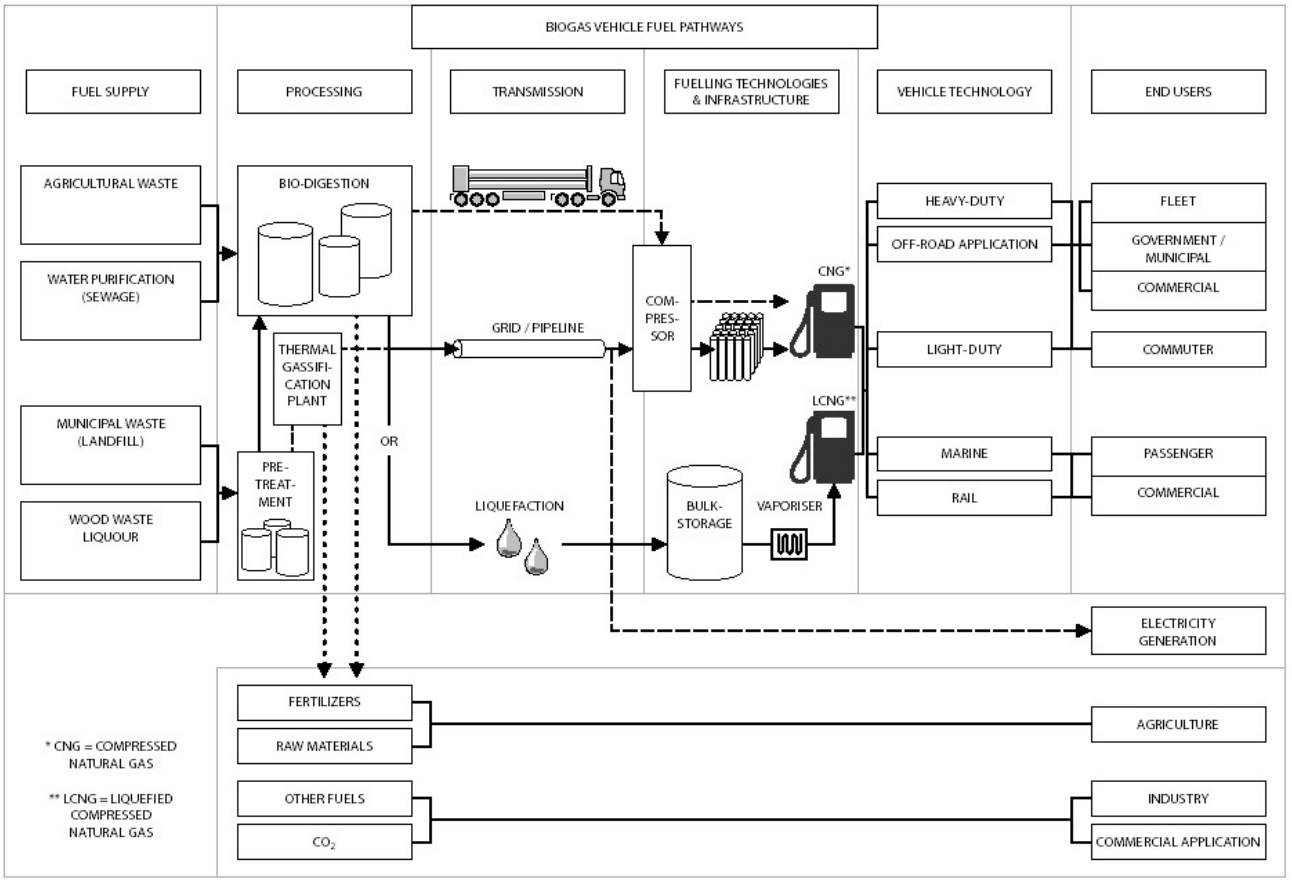
EEA/BIOFRAC estimate biomass primary energy

Concawe/Eucar/JRC study assumes CH4 not cost competetive (except manure)

Total EU25 road fuel demand about 12900 PJ in 2010

The business system



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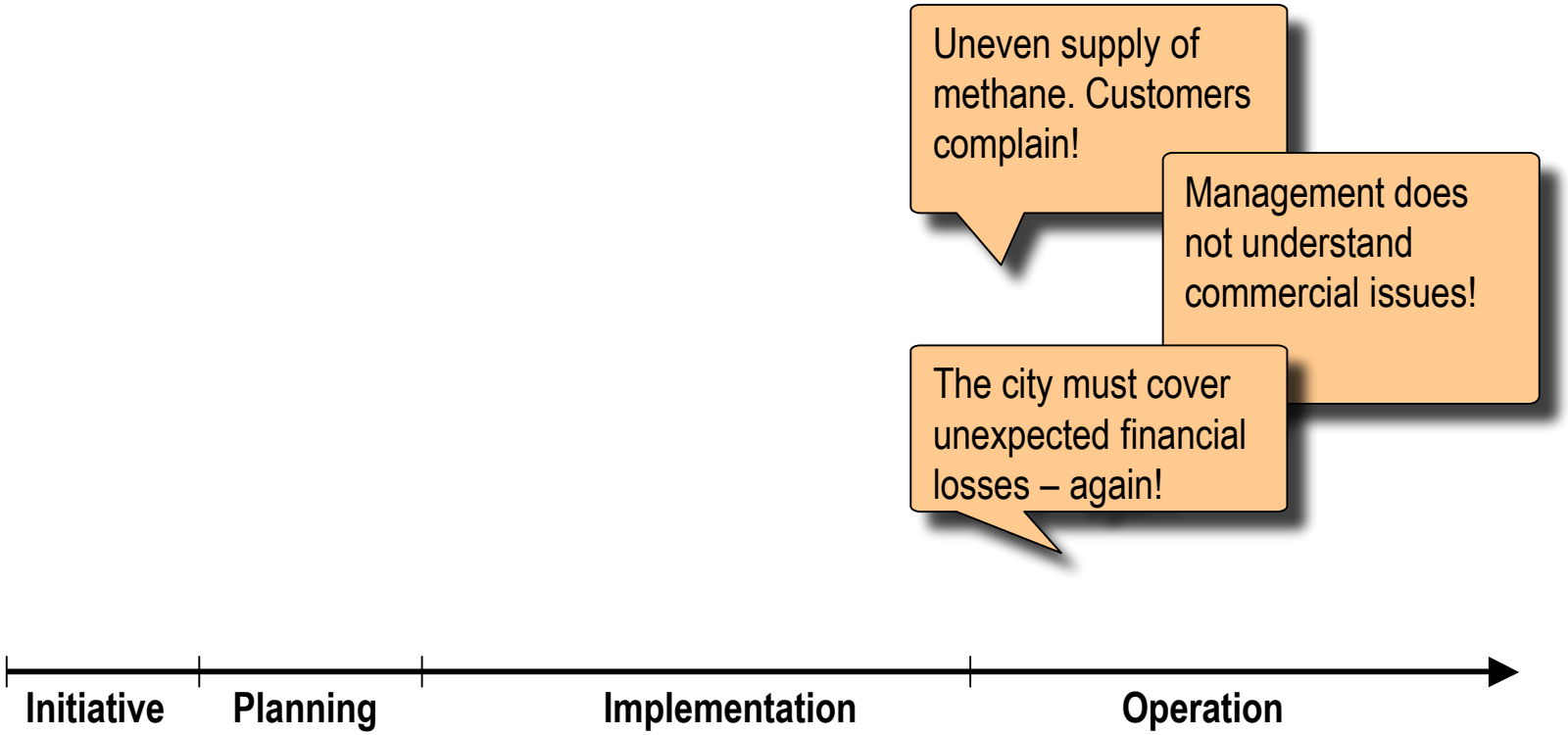
Learning from experience



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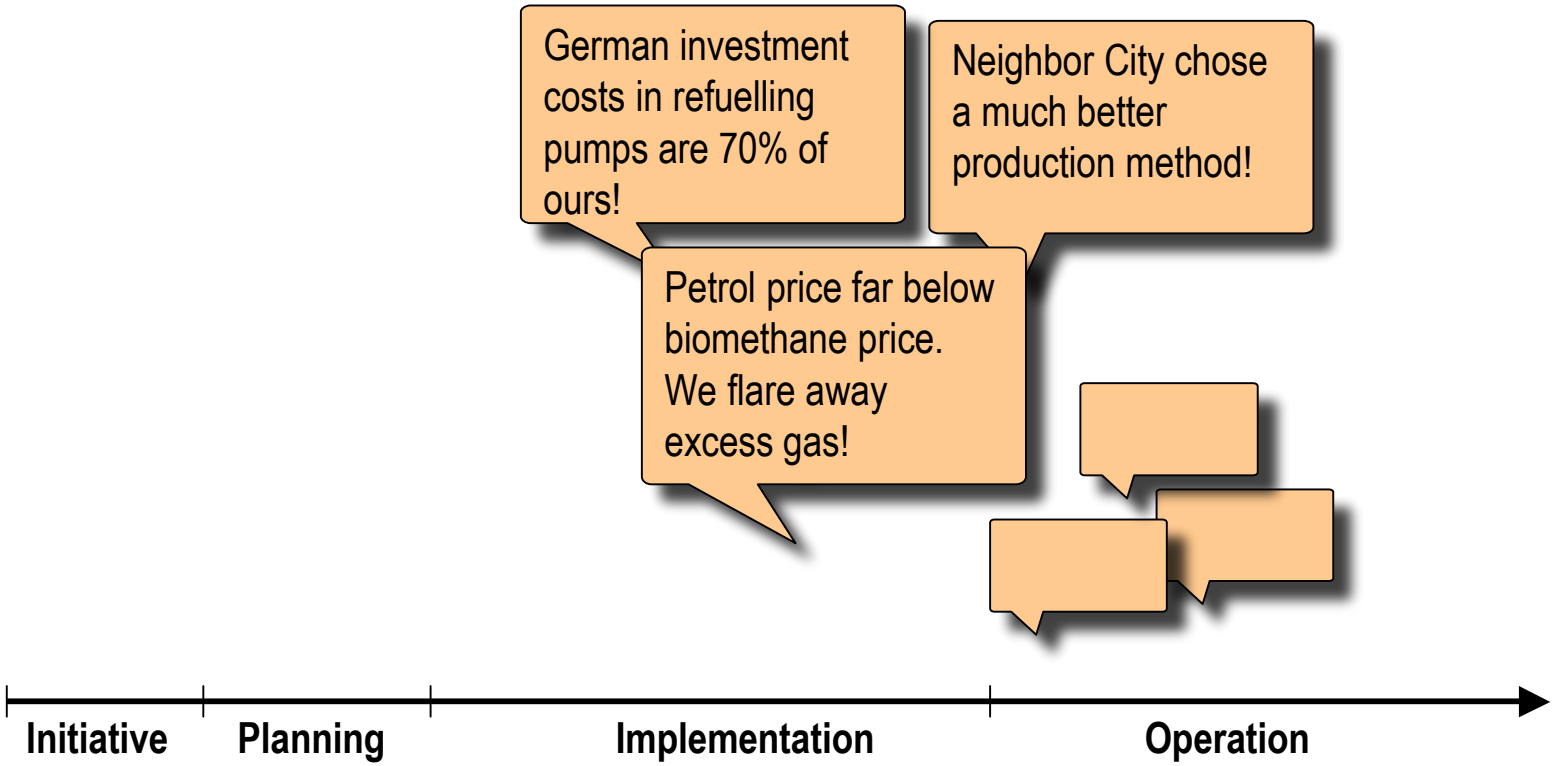
Learning from experience



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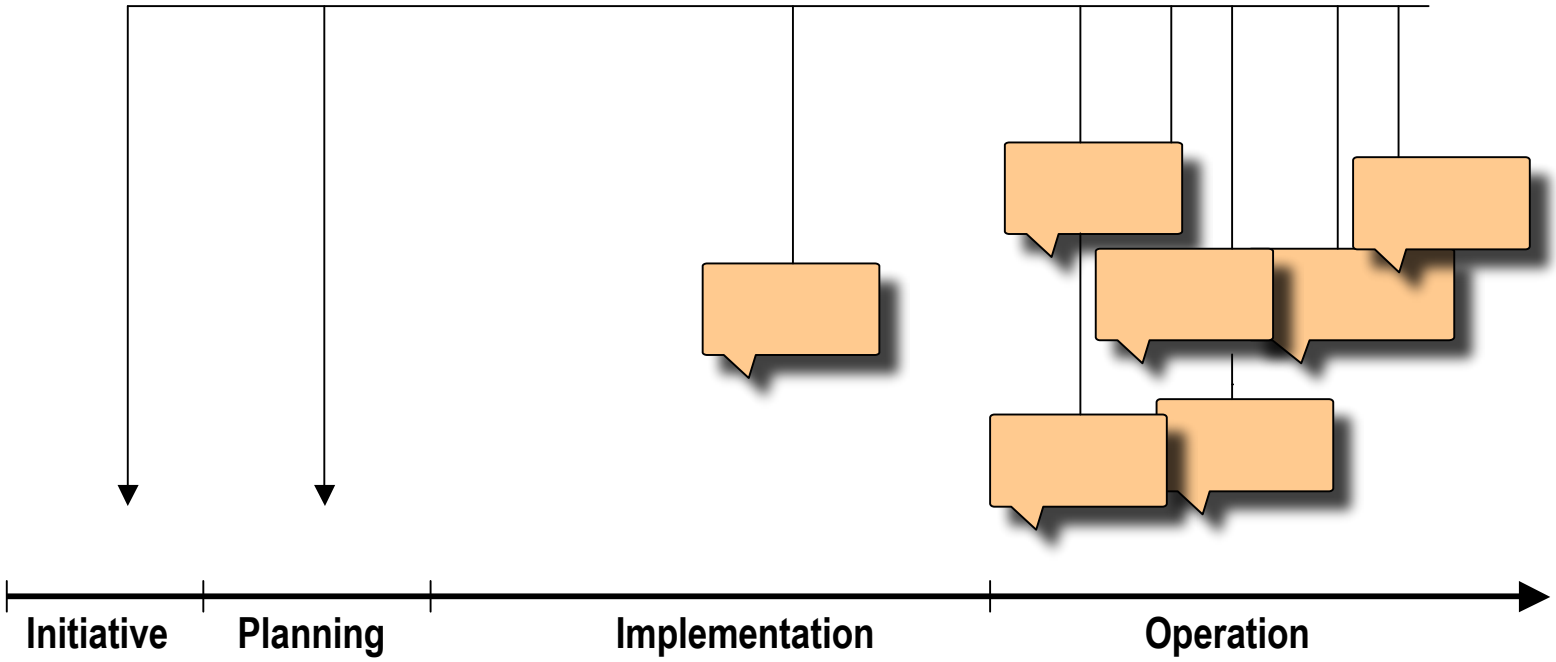
Learning from experience

… we are able to foresee and plan!

Learning from experiences….



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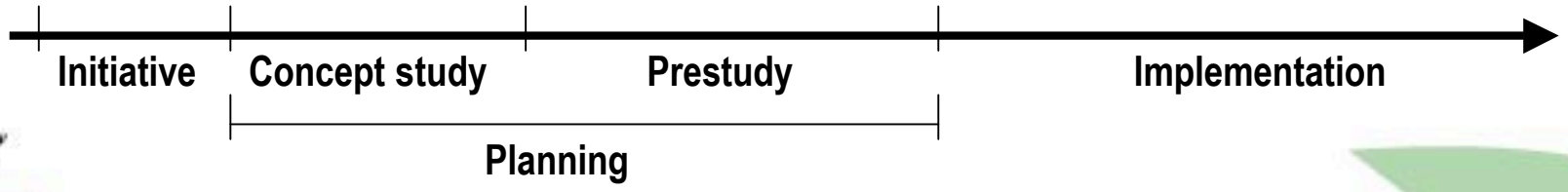
The biomethane decision process

1. One or several interested parties take the initiative to make a concept study.

2. The concept study is made. Potential stakeholders are invited to a presentation of the results of the concept study. Possible decision to make a prestudy.

3. The prestudy is completed, resulting in a complete business plan. Stakeholders meet to assess the business plan, and decide whether or not to start a project implementation phase

4. The implementation phase starts



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Biomethane Decision Process

1. The Initiative

- 1.1 Driving forces for change
- 1.2 Setting up the initial stakeholder group
- 1.3The decision to make a concept study

2. The Concept study

- 2.1 Market: Is there a market for biomethane? - is there a sustainable supply of raw materials? Are there other competitive uses for the raw material?
- 2.2 Are there interested stakeholders?
- 2.3 What are the visions/objectives in a five and ten year perspective
- 2.4 The first outline of an operational structure
- 2.5 Economy:
- 2.6 The decision to proceed. Outline of a Prestudy

3. The Prestudy

- 3.1 Executive summary
- 3.2 Business idea
- 3.3 Required core management competences
- 3.4 A market development plan
- 3.5 The Biomethane Pathway (a description of the business system)
- 3.6 A detailed critical path implementation plan
- 3.7 Economy (Investments, profit & loss, cash flow projections)

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Biomethane Decision Process

Focus in today's session

1. **The Initiative**
   - 1.1 Driving forces for change
   - 1.2 Setting up the initial stakeholder group
   - 1.3The decision to make a concept study

2. **The Concept study**
   - 2.1 The Market – an overview:
   - 2.2 Are there interested stakeholders?
   - 2.3 What are the visions/objectives in a five and ten year perspective
   - 2.4 The first outline of an operational structure
   - 2.5 Economy:
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Learning from experience

…gives us, with your help

1. Planning process
2. Check lists
3. Poor, Good and Best practice
4. Key performance indicators

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What is Marketing in a Biomethane context?

Who is the customer? What are the customer benefits?

Who is the seller? Several sellers in the business chain?

Which products are marketed in the business chain:
Substrates, raw gas, biomethane, by-products, what else?

How do we argue for biomethane as a road fuel?

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What is Marketing in a Biomethane context?

Inventory of our potential customers – short and long run?

What targets do we set?

How do we safeguard that supply meets demand?

How do we price the product?

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What is Marketing in a Biomethane context?

How do we plan a refuelling structure?

Available subsidies and incentives?

Communication – Why? With whom? How?

If you can't identify the customer benefit, forget the project!

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Economics

Can you image the size of a biomethane operation replacing ten per cent of petrol and diesel?

Hundreds (thousands) of production units and sales points!

How do similar business trades plan and monitor?

Voluntary or HQ-monitored systems with accounting standards, KPIs, Best practice system!

A healthy challenge for the biomethane trade!

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Economics

Let's discuss:

The information required from the accounts

Financing investments

The cash flow

Key data from

- –Raw gas production
- –Upgrading and back-up operations
- –Distribution to end customers

Calculation guidelines

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Break-out Session
The Biomethane Pathway

Leader Peter Boisen

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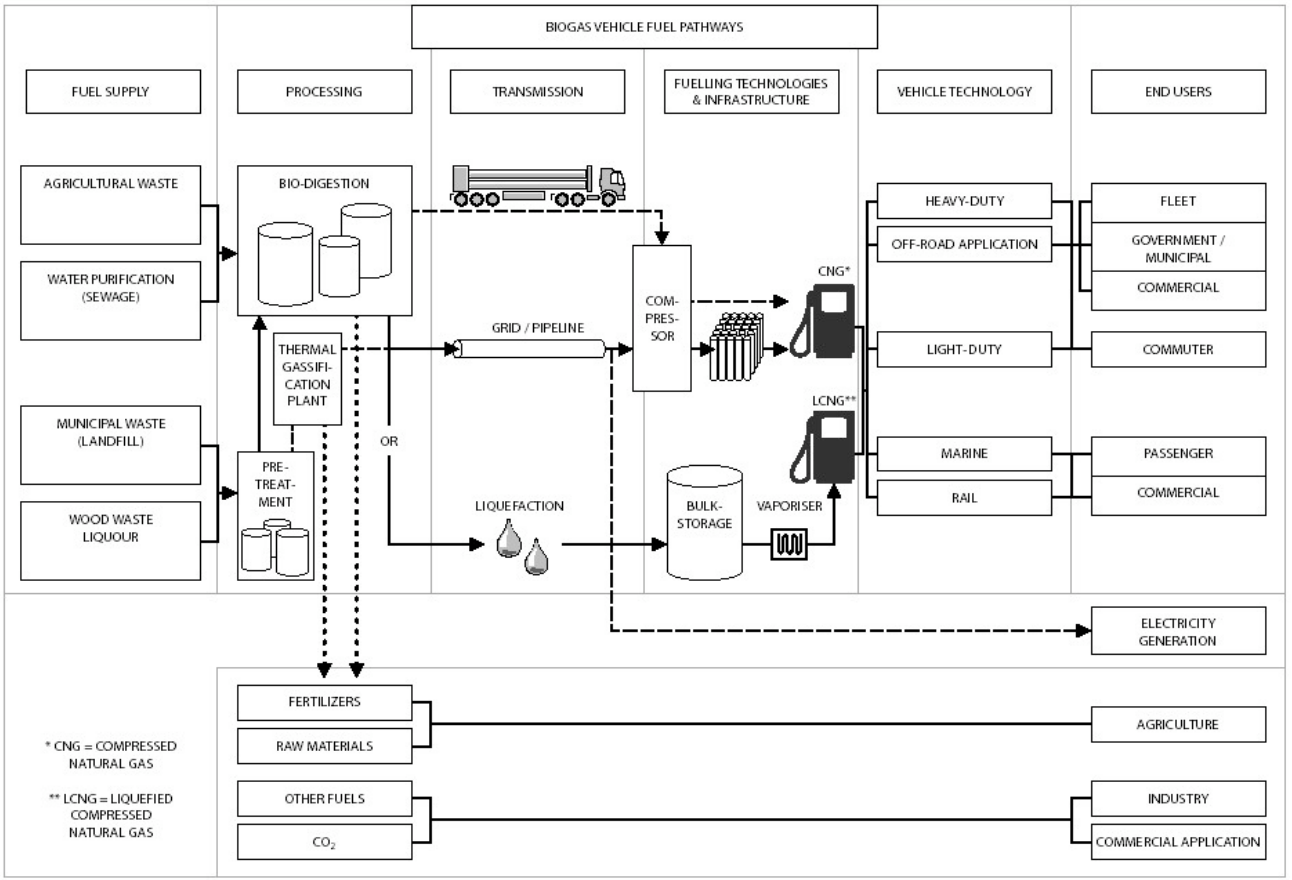
3.5 Business plan

The business system – the biomethane pathway



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3.5.1 Tons of feedstock, collection radius (km), methane output million Nm3

- Sewage sludge – separate digestion and residual use
- MSW and solid industrial biowaste – source sorting, inspection, sorting, fragmentation, hygienisation
- Industrial biowaste slurries – hygienisation
- Manure - hygienisation
- Park and garden waste - fragmentation
- Other agricultural waste - fragmentation
- Crops – fragmentation
- Use of residuals from bioethanol or biodiesel plants

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3.5.2 Plant design criteria, correct dimensioning also considering future potentials

- Number, size (m3), and type of reactors (mesophilic/termophilic)
- Design of waste inspection and sorting facilities
- Required fragmentation capacity (tons/hour)
- Required hygienisation capacity (tons/hour)
- Gas purification equipment design and capacity (m3/hour)
- Need for other gas use than direct supply to refuelling stations (will apply without grid injection possibilities, or without alternative gas supply at the refuelling stations)
- Back up if purification unit is temporarily out of service
- Required buffer storage (m3) for raw biogas
- Emergency flaring equipment

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3.5.2.1 Technology issues – gas yield, feedstock processing capacity, efficient purification

- Hygienised feedstocks (70 degrees C) makes choice of termophilic technology less energy demanding
- Mesophilic operations may be more stable and easy to control
- Different 'recipies' give different yields . Buying know-how and initial reactor charge may be a very good investment
- Many different technologies suggested in order to maximize the conversion of feedstock into methane
- Methane leakages must be minimized (to maximize GHG benefits)
- Pros and cons with different upgrading technologies (important to prove that gas injected into the NG grid is at least as 'clean' as NG). Cryogenic technology may offer significant advantages if separated CO2 can generate a side income, and if the gas has to be transported to remote refuelling stations.
- Gas streams used for heating purposes or for power generation need not necessarily be fully cleaned (but important to remove corrosive matter)
- No short cuts concerning quality of gas delivered directly to vehicle refuelling stations (no sulphur, siloxanes, or impurities accepted). Very high methane content is preferred due to improved range on a full tank.

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3.5.2.2 Technology issues – economy of scale via one common upgrading unit for several plants

- Farm scale production of raw biogas minimizes transportation of feedstock and residual used as fertilizer
- In rural areas the cost of laying low pressure plastic pipelines for raw gas may be rather limited
- Processing raw biogas from many farms in one common upgrading unit may provide significant economy of scale advantages, and also very substantial environmental benefits
- Also in urban areas significant economic advantages may be achieved when processing raw biogas from several different plants in one common upgrading unit, a factor which should be considered when deciding the localization of sewage treatment facilities and other potential biogas production sites.
- Small scale upgrading might cost more than € 0.30 per Nm3, but large scale upgrading costs may be as low as € 0.10 per Nm3.

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3.5.2.3 Technology issues – new technology for upgrading of landfill gas

- Although landfilling of biowaste is now being phased out across the EU existing landfill sites will over the next 20-30 years continue to produce very large volumes of methane rich landfill gas.
- The landfill gas is often just flared away, sometimes used for heating purposes and, at best, somewhat purified to allow use in CHP plants.
- The often high levels of nitrogen makes the gas less well suited for conventional upgrading technologies.
- With cryogenic upgrading technology it is, however, possible to recover 100 % pure biomethane and at the same time produce solid CO2 which could be used for various commercial applications. The biomethane produced could be stored and transported in liquefied state to refuelling sites without close access to the NG grid. In this manner the landfill gas could with very low initial investments support an L-CNG station network at suitable locations along the major European highways.
- If we are serious about oil replacement in the transportation sector this option should be of high interest.
- An additional benefit with L-CNG stations is that they need no compressors and thus have maintenance and energy costs on a third of the level applicable for conventional CNG stations.

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3.5.3 Plant gas distribution facilities, need for additional equipment and storage facilities

- Ability to add (if required) propane or nitrogen to correct gas heating value
- Ability to odorise the gas
- Ability to compress gas to pressure required ín NG pipelines
- Ability to boost pressure in local biomethane grid
- Ability to fill high pressure gas into containerised CNG cylinders for supply to daughter stations
- Ability to store liquefied gas and load LNG tank trailers

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3.5.4 Plant by-products, need for storage and distribution facilities

- Need to separate residuals into wet or solid (pumpable slurry) fractions, and storage requirements for these fractions – how to avoid unwanted bacteria growth, and how to transport efficiently
- Value of further refining of residuals
- Need for composting of solid fractions
- Handling of CO2 separated in plants using cryogenic upgrading technologies
- Laboratory supervision of quality of residuals (heavy metals, patogenic matter)
- Possible separation of residuals only fit for use as landfill, those which may be used as fertilizers, and those which may be only be used as fertilizers on land set aside for energy crops

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3.5.5 Refuelling technologies - CNG stations, LNG stations, or L-CNG stations

- Peak hourly compression capacity and cascade storage requirements at fastfill CNG stations
- Peak hourly compression capacity and cascade storage requirements at slowfill CNG stations
- Differences in land requirements for fastfill and slowfill facilities
- Possibility for indoor, possibly underground, refuelling facilities
- Dimensioning of pumping capacity at LNG stations and consideration of potential need to handle boil-off
- Dimensioning of pumping capacity, size of vapouriser, and size of cascade storage at L-CNG stations (also odorisation of CNG)

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3.5.5.1 Refuelling station supervision - automatic supervision, service, regular maintenance

- Economy of scale advantages if many stations are remote controlled and connected to a round the clock service organization (customers will not tolerate extended downtime)
- Keep tabs on filling times and available filling pressures (normal customers will not accept only partially filled tanks, or very long filling times)
- Use sophisticated temperature compensation to ensure properly filled tanks
- Round the clock service and payment via standard credit cards a must at public refuelling stations
- Preventive maintenance necessity for CNG stations (check oil consumption and refuelling nozzle wear, replace filters regularly)

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3.5.6 Vehicle fuel consumption – some typical data for use when estimating gas sales potentials

- A 2-axle 15 ton city bus with a dedicated EEV classed NG engine may in a year drive up to say 100,000 km with a total consumption of 55,000 Nm3 of methane.
- A 44 ton long haulage truck with a dual fuel Euro 4 engine may in a year drive up to say 200,000 km with a total consumption of 14,000 litres of diesel and 56,000 Nm3 of methane.
- A bi-fuel/mono-fuel Euro 4 NG taxi cab may in a year drive up to 100,000km with a total consumption of 1,100 litres of petrol and 10,000 Nm3 of methane
- A bi-fuel/mono-fuel NG passenger car may in a year drive some 20,000 km with a total consumption of 200 litres of petrol and 1,100 Nm3 of methane.
- A bi-fuel/mono-fuel LD NG van used in commercial traffic may in a year drive some 30,000 km with a total consumption of 300 litres of petrol and 3,000 Nm3 of methane
- A garbage truck with a dedicated EEV classed NG engine may in a year drive up to some 25,000 km with a total consumption of 17,500 Nm3 of methane.
- If the annual mileages indicated above do not conform with typical data in your country – adjust the total fuel consumption accordingly.

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3.5.6.1 Vehicle fuel consumption – How many vehicles could be operated on 1 millon Nm3 of methane?

- 18 city buses (annual mileage of 100,000 km)
- 18 long haulage trucks (annual mileage 200,000 km)
- 100 taxi cabs (annual mileage 100,000 km)
- 900 passenger cars (annual mileage 20,000 km)
- 330 LD vans (annual mileage 30,000 km)
- 60 garbage trucks (annual mileage 25,000 km)
- If the annual mileages indicated above do not conform with typical data in your country – adjust vehicle numbers accordingly. The data should be interpreted as 18 buses, or 18 trucks, or 100 taxi cabs etc.

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Break-out Session
Marketing issues and Economy

Leader Olle Boëthius

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The Biomethane decision process

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1.1 The Initiative - Driving forces for Biomethane

Driving force	Political priorities		
	High	Medium	Low
Closed loop waste management			
Less pollution and noise from city traffic			
Less greenhouse gas emissions			
Creation of new business			
Progressive environmental profile			

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1.2 The Initiative - Essential stakeholders

Driving force	Stakeholders (e.g. city management, energy authority, energy companies, waste handling authority, waste handling contractors, food industry, farmers, public transport authority and contractors, city traffic authority, vehicle fuel distributors)
Need for cleaner city air (also less noise and vibrations)	
Reduced greenhouse gas emissions	
Reduced oil dependance	
Cost efficient handling of increasing waste volumes, without landfilling	
Improved city and region environmental image	

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1.3 The Initiative - First meeting with initial stakeholders

- Set up the meeting
- Discuss driving forces and priorities
- Present an outline of a Concept Study for biomethane production
- Expected length of Concept Study (1 – 2 months)
- Assign Concept Study leader
- Agree on cost sharing – if applicable – for the study

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2. The Concept Study

Content:

2.1 Is there a market for biomethane?

2.2 Is there a sustainable supply of feedstocks? Are there other competitive uses for the these feedstocks? Why biomethane for vehicles? Does potential biomethane supply match demand?

2.3 What are the visions/objectives in a five and ten year perspective?

2.4 The first outline of an operational structure

2.5 Economics: Define business centers. Estimated investments. Sources of finance. Estimate of viability

2.6 The decision to proceed. Outline of a Prestudy

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2.1 Is there a market for biomethane?

Is Biomethane as a transport fuel a superior solution compared to the alternatives?

- Consider for example electric drive, hydrogen, ethanol, biodiesel.
- Assess performance, availablity, investments, price, and environmental effects.

Do we have initial customers under municipal control?

- Public transport buses
- Other vehicles in the municipal fleet

Other potential customers already in the start-up phase?

- Taxi companies
- Private companies seeking an environmental profile.
- Private pioneers

Do we have means to incentivise private customers in the start-up phase?

- Free parking, priority taxi lanes, exemption from congestion fees, etc.

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2.2 Is there a sustainable supply of feedstock?

Readily available feedstock or raw gas	**Present use** such as land filling,composting, flaring, heating, electric power generation etc.	**Present raw gas output**	**Potential biomethane output** for direct use as vehicle fuel, or for grid injection
Existing municipal landfills			
Sewage sludge			
Biowaste needing hygienization			
Other biowaste			
Grass and crops			

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2.2 Alternative uses of biogas

- Flaring (to avoid methane emissions)
- Minor cleaning to allow use as fuel in CHP units
- Complete cleaning to allow direct use of biomethane as a vehicle fuel (distribution to filling stations via local biomethane grids, or via truck deliveries)
- Injection into natural gas grid (possibly with additions of propane to adjust the calorific value)
- The green gas principle: Biomethane is injected into the grid at one point and a similar volume of gas is subsequently withdrawn for use as vehicle fuel at another point of the grid. Accounts are kept of volumes injected and withdrawn.

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2.2 Why biomethane for vehicles?

- Biomethane maximizes the biofuel output from available biomass resources and, thus, also maximises potential oil replacement and CO2 reductions. Having to replace 10% of the fossil road fuels by 2020, it would seem clever to choose the biofuel with the highest fuel output.
- Biomethane for vehicles has an even demand over the year. Alternative use for heating purposes may lead to wasteful flaring of gas during the warm season.
- If you already have CNG vehicles and filling stations - no need for new standards or technology
- There is only one bio-fuel that you can make from all sorts of waste –Biomethane!
- AD process returns nutrients as fertilisers

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2.2 Does potential biomethane supply match demand?

	Initial phase (year 5)			Expansion phase (year 10)		
	Fuel/vehicle	No of vehicles	Total demand	Fuel/vehicle	No of vehicles	Total demand
Buses						
Garbage trucks						
Municipal LD vehicles						
Taxi fleet						
Other private fleets						
Private cars						
Long haulage trucks						
Total demand						
Biomethane supply						
Demand NG						

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2.2.1 Vehicle fuel consumption – some typical data for use when estimating gas sales potentials

- A 2-axle 15 ton city bus with a dedicated EEV classed NG engine may in a year drive up to e.g. 100,000 km with a total consumption of 55,000 Nm3 of methane.
- A 44 ton long haulage truck with a dual fuel Euro 4 engine may in a year drive up to e.g. 200,000 km with a total consumption of 14,000 litres of diesel and 56,000 Nm3 of methane.
- A bi-fuel/mono-fuel Euro 4 NG taxi cab may in a year drive up to 100,000km with a total consumption of 1,100 litres of petrol and 10,000 Nm3 of methane
- A bi-fuel/mono-fuel NG passenger car may in a year drive some 20,000 km with a total consumption of 200 litres of petrol and 1,100 Nm3 of methane.
- A bi-fuel/mono-fuel LD NG van used in commercial traffic may in a year drive some 30,000 km with a total consumption of 300 litres of petrol and 3,000 Nm3 of methane
- A garbage truck with a dedicated EEV classed NG engine may in a year drive up to 25,000 km with a total consumption of 17,500 Nm3 of methane.
- If the annual mileages indicated above do not conform with typical data in your country – adjust the total fuel consumption accordingly.

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2.2.2 Vehicle fuel consumption – how many vehicles could be operated on 1 millon Nm3 of methane?

- 18 city buses (annual mileage of 100,000 km)
- 18 long haulage trucks (annual mileage 200,000 km)
- 100 taxi cabs (annual mileage 100,000 km)
- 900 passenger cars (annual mileage 20,000 km)
- 330 LD vans (annual mileage 30,000 km)
- 60 garbage trucks (annual mileage 25,000 km)
- If the annual mileages indicated above do not conform with typical data in your country – adjust vehicle numbers accordingly. The data should be interpreted as 18 buses, or 18 trucks, or 100 taxi cabs etc.

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2.3. Visions and objectives in a 5-10 year perspective

Describe the desired achievements

- Size of fleet fuelled by biomethane
- Share of waste volumes used for biomethane production
- Reduction of road traffic fossil based CO2 emissions
- Additional methane refuelling stations
- City reputation
- New business and employment

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2.4 A first outline of an operational structure, yr 5

1. Select a suitable map over the city/region
2. Mark the position of the:
   - Biogas production units
   - Upgrading facility
   - Existing CNG grid, if any
   - Additional pipelines required
   - Positions of refuelling facilities – for city use and for public use
   - LMG (liquified methane gas) storage required, if any
   - Other methane gas back-up facilities
3. Check the optimal position of filling stations with regard to customer convenience

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2.5 Economy - Define business centres

- A Business Centre should be defined by its tangible products/services and its ability to generate sustainable growth and profitabililty on its own.

- The total Biomethane Pathway concists of a number of business elements that should be combined into Business Centres in the most efficient manner:
    1. Supplies of substrates
    2. Sales of by-products from biogas production
    3. Gate collection fees
    4. Production and delivery of raw biogas
    5. Supplies of propane
    6. Upgrading of biogas to biomethane
    7. Deliveries of solid CO2 separated in a cryogenic upgrading facility
    8. Supply backup via LNG storage, or double upgrading units
    9. Methane distribution via local low pressure biomethane grid
    10. Compressed methane,possibly with propane added,,injected into NG grid
    11. Compressed methane collected by trucks carrying high preasure cylinders
    12. Liquefied methane collected by tank trailers for delivery to LCMG refuelling stations
    13. Filling facilities for municipal fleets and contractors
    14. Public filling facilities

- Items 1-4, 5-10, and 11-14 respectively may logically be grouped as different Business Centres.

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2.5. Economy - Estimated investments

Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Example – 2 million Nm3 annual biomethane made from MSW
Biogas pro-duction facility	2	3	1			€ 6.0 million (for a plant using only crops perhaps as low as € 2.0 million)
Upgrading facility		1				€ 1.0 million
Local pipelines		1				€ 1 million (large variations depending upon local conditions/distances)
Bus refuelling station		0.6				€ 0.6 million
Car refuelling station		0.4				€ 0.4 million
Back-up faclities						€ 1.0 million (not required if NG grid access is available)
Total	2	7	1			€ 10 million

All amounts expressed in million €

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2.5 Economy - Sources of finance

Sources	Total	Financed by		
		Stakeholders	Creditors	Grants
Yr 1 Investments	2	0.4	1.0	0.6
Yr 2 Investments	7	1.4	3.5	2.1
Yr 3 Investments	1	0.2	0.5	0.3
Yr 4 Investments				
Yr 5 Investments				
Total	10	2	5	3

All amounts expressed in million €

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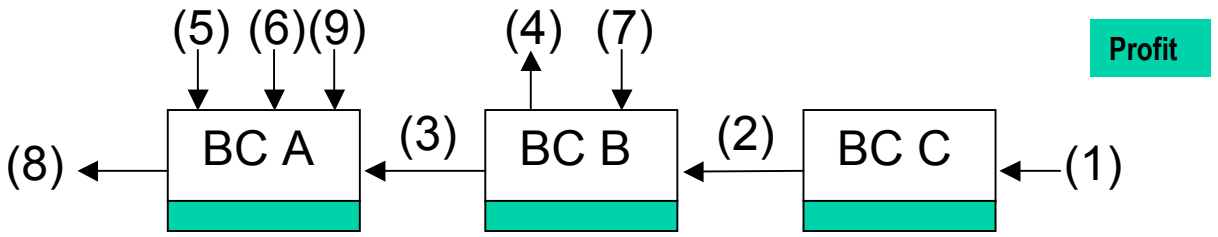
2.5 Economy - Estimate of viability

- General prerequisite: Each Business center (BC) must have the potential to be profitable

- Factors determining profitability
  1. How much is the end consumer of gas willing to pay (fuel cost reduction must compensate additional vehicle costs and inconveniences)?
  2. How much is the fuel distributor willing to pay (NG price plus fuel tax difference)?
  3. What transfer price is acceptable to the upgrading unit?
  4. What is the price of propane?
  5. How much are other users of raw biogas willing to pay (district heating, electricity production)?
  6. How much are the buyers of by-products from biogas production willing to pay (biofertiliser,)?
  7. How much are the buyers of by-products from biogas upgrading willing to pay (carbon dioxide)?
  8. What are the market prices for different biomass substrates?
  9. What are the gate collection fees?



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2.6 The decision to proceed

- Call important potential stakeholders to a meeting
- Present the findings of the concept study
- What further information is neccessary? Present outline of Prestudy/Business Plan
- Time and cost required to make a Prestudy. Propose a fair cost split
- Select a project manager for the Prestudy. Assign a steering group to assist
- Joint decision to continue

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2.6.1 Outline of the Prestudy

Purpose

The Prestudy shall end up as a Business Plan. It is a tool to help developing your concept further and make it ready for presentation to stakeholders and investors for a start-up decision

Content of the Business Plan

- Executive summary
- Business idea
- Core management competences
- The market
- The business system/ The Biomethane Pathway
- Implementation plan
- Economy

A proper prestudy takes at least three months.

It is normal that the prestudy manager acquires outside assistance for the analyses of special technical issues

Support to finance the prestudy could be sought from national authorities, or via EU programs

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3. Biomethane Prestudy

Purpose

The Prestudy can become a Business Plan. It is a tool to help develop your concept further, and to make it ready for presentations to stakeholders and investors, with the target to achieve a start-up decision

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3. Biomethane Prestudy

Business plan content

3.1 Executive summary

3.2 Business idea

3.3 Required core management competences

3.4 A market development plan

3.5 The Biomethane Pathway (a description of the business system)

3.6 A detailed critical path implementation plan

3.7 Economy (Investents, profit & loss, cash flow projections)

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Executive summary

… gives a sense of why this is an interesting venture

- A very clear statement of the long-term mission
- An overview of the people involved
- The technology
- The fit to the market

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Business idea

.. What makes your idea an attractive offer to the market?

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3.3 Core management competences

”Professional investors invest in management, not ideas”

Ideas of required compentences?

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3.4 The market

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3.4.1 The market - Targets

Target areas	Short term yr 5	Longer term yr 10	Comments When setting targets, consider factors like: Being visible, Making a real change,,Your ability to cope with or improve on national targets and requirements
No of methane fuelled vehicles			City buses, municipal vehicles, goods haulage trucks,taxi cars, company cars, private passenger cars
Methane fuelled cars - % of total no of sold cars			
Mix - % biomethane and NG respectively			Consider to develop your biomethane capacity using a "green gas concept"
Avoided CO2 emissons, regulated emissions, reduced noise and vibrations			Volume based conversion tables provided as an appendix?

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Issues to adress in a Market strategy

- Who will own/control the methane distribution network?
  Who are the stakeholders? Who has got the best competence? Who disposes of the most attractive filling stations sites? Who controls the natural gas grid? Who is most willing to provide venture capital?
- Which customers should have our first approach?
  Should municipal customers, e.g. Public bus transporters, municipal fleets have priority? How important are, from a health perspective, clean trucks distributing goods within the city? How important are ”green” taxis for the city profile? How eager would private business be to achieve a greener image through its company fleet? And what about the private car drivers?
- Pricing policy for methane?
  Maximizing profits through pricing or volumes? Same price to everybody or discounts to special customers? Price tied to diesel and petrol? Fixed price for a longer period, or fluctuating with diesel and petrol?

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Issues to adress in a Market strategy (cont.)

- Payment and service facilities?

  Equal to existing petrol and diesel fuelling stations? Or different? Existing companies which may be interested in a partnership?
- Reliable supply of fuel, indicate your standard!

  Do you foresee back-up distribution of any kind? Is there an official certified standard to follow?
- What principle means of marketing and image-building communication do you consider?

  From ”word of mouth” to PR, Sales Promotion and Advertising?

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Marketing plan

3.4.3.1 Inventory of potential customers

3.4.3.2 Planning a filling station net

3.4.3.3 Pricing of the fuel

3.4.3.4 Available subsidies and incentives

3.4.3.5 Communication

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3.4.3.1 Inventory of potential customers

Identify potential customers, Estimate no of vehicles, Consider order of approach	Buses Owner No Prior.	Light duty Owner No Prior.	Heavy duty Owner No Prior.	Pass. Cars Owner No Prior.
Under dir.City control -Authority… -Authority…. -Authority…				
Transporters com-missioned by City -Transporter … -Transporter … -Transporter …				
Taxi & Company fleets -…..				
Private cars				
Total				

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3.4.3.2 Planning a filling station net

Matching supply and demand (1000 Nm3)

Year	1	2	3	4	5	6	7	8	9	10
Demand of Methane										
Supply of Biomethane										
Supply of NG via the grid										
Supply of LNG										
Excess biomethane for other use										
No of methane filling stations										

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Checklist for location

- Availability and service up to the standards of a normal commercial filling station? Conveniently located filling stations?
- Location in a secure neighbourhood (not a remote industrial area)
- Proximity to a gas pipeline
- Proximity to important strategic customers
- Synergies from locating a public gas dispenser close to a bus fuelling site
- A reasonable coverage of the main routes
- Check possible partnership with oil companies
- When procuring filling station equipment, investigate existing best practice. Allow one standard specification only, and stick to it. Coordinated bargaining gives the best price.
- Etc.

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3.4.3.3 Pricing of gas

Some experiences made

- To compensate the higher price of a methane fuelled vehicle, and the initial inconveniences caused by a yet-incomplete refuelling infrastructure, the after tax price for the methane gas must always be less than for gasoline and diesel oil.
- Fuel related differences in road tax, and levies for parking or city access, are examples of other factors which influence the overall vehicle ownership economy.
- Gas prices in different European countries vary between 40 and 90 % of the price for a similar amount of energy in gasoline. The variations reflect different conditions, taxes and support schemes.

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3.4.3.3 Pricing of gas

Analyse the price structure of Biomethane, Natural gas, Petrol and Diesel with respect to

- Vehicle purchase subsidies
- Annual road tax
- Vehicle purchase tax
- Fuel taxation
- Milage based taxation
- Value of exemptions from city access fees
- Value of improved access to inner city areas
- Value of parking benefits
- Value of time savings via use of priority lanes

What will the total effect on the Biometane price for the consumer?

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3.4.3.4 Available subsidies and incentives

Priortized target groups should be kept in focus when evaluating the need for activities aiming to provide financial support or other incentives (see 3.4.2 Market strategy).

Actions:

- Investigate existing support measures

- Lobby for additional support measures at government level
  - National definition of environmentally compatible vehicles to include methane fuelled vehicles
  - Reduced vehicle taxes for environmentally compatible vehicles
  - Reduced fuel taxes for environmentally compatible vehicles
  - Grants for buyers of environmentally compatible vehicles
  -

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3.4.3.4 Available subsidies and incentives

Actions cont.:

- Seek support measures at regional or city level
- Grants for buyers of environmentally compatible vehicles
- Free city parking
- Priority lanes for environmentally compatibles vehicles
- Entrance to environmental zones
- Priorities for environmentally compatible taxi cars

– Investigate possibilities for EU support
  - e.g. FP7

– Study support schemes which have worked well in other countries – pros and cons

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3.4.3.5 Communication

Look at the Biomethane Pathway - Which Business Centres require communication? For what purpose?

- The complete Business Chain
  - City/regional profiling
  - Trigger the responsible individual to participate
  - Seek national funding or possible participation in EU projects
  - Seek involvement from vehicle suppliers and transportation companies

- Production of Biomethane
  - Involve biomass substrate suppliers
  - Educate the general public concerning biowaste sorting
  - Communicate new job opportunities (particularly within the agricultural sector)

- Distribution of Biomethane
  - Cost saving for the different consumer groups
  - Environmental advantages for society
  - Reduced oil dependence
  - Clean, simple and safe filling…

List selected communication needs, means of communication, and expected annual budgets

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3.4.3.5 Communication

Examples of ”good practice” Communication plans:

1. BioGas West, Sweden
2. Lille?
3. Bern?
4. Others?

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3.4.3.5 Communication

Communication plan 2007 – 2010 Biogas West, Sweden				
Focus areas / Planning elements	Support new biomethane investments	Sharing knowlege and experiences	Promote use of biomethane vehicles	Sharing know-ledge of new technologies
Target groups				
Information content				
Objectives				
Method				
Costs and financing				
Evaluation				

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3.7. Economy

This part of your business plan should analyse the economics in each of your selected Business Areas.

Refine the estimates made in the Concept Study (chapter2.5)

- How big are the revenues and costs in the initial 5-year period?
- What surplus or loss could you expect?
- Can you finance the daily operations from revenues?
- What does the total cash flow look like?
- Which are the sources of finance for the period?
- What is our offer to a potential investor?

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3.7 Economy

When analysing the economics use key data, drawn from other operators, suppliers and others, such as

For Raw gas production

- Energy conversion factors – from substrates to methane
- Volume of sellable by-products per volume of substrate input
- Economic life time for investments
- Investment cost per million of Nm3 raw gas annual capacity
- Pros and cons of mixing different kinds of substrates in the same reactor

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3.7 Economy (cont.)

For Upgrading of methane and methane back-up supplies

- Conversion factors - Raw gas to methane - per technology
- Upgrading costs per volume of upgraded methane
- Volume of selllable by-products per volume of upgraded methane
- Investment cost per million of Nm3 upgraded methane
- Economical life time of investments
- Investment cost per million of Nm3 raw gas annual capacity
- Data comparing upgrading back-up via double upgrading units, NG via grid or LNG storage
- Income from sales of CO2 separated when using cryogenic upgrading technlogy

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3.7 Economy (cont.)

Distribution to end consumers

- Dimensioning considering daily peak demand
- For bus fleets choice of fast or slow fill
- Costs for laying of pipe lines
- Costs for trucking of compressed gas
- Costs for trucking of liquefied gas
- Costs for compression – operation and maintenance
- Costs for pumping of liquefied gas –operation and maintenance
- Costs for lumping and gasification of liquefied gas –operation and maintenance
- Installation cost for card payment system
- Legal requirements – self service allowed?
- Best practice costs for refuelling stations, supervision and maintenance (seek economy of scale!)
- Investments per refuelling stations (standardisation gives economy of scale advantages)

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When estimating profitability

- Always use the market price of inputs to the operations (for example heat) even if they, by tradition, are supplied at a lower price internally.
- Always calculate your investment cost with market adapted interest rates.
- Always calculate the share of general expenses relevant to the operation.
- Be realistic when assessing the economic life of investments in equipment, buildings and systems – examine experiences made e.g. 15 yrs!
- Anticipate an increase over time of the price of oil when forecasting market prices of substrates, raw gas and methane

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4. Implementation

- Stakeholder consortium agreement
- Arrangements concerning permits and financing
- Project leader and steering group
- Detailed time plan
- Clear time plan related targets
- Agreement with contractor, and contracts concerning know-how support (final payments only when agreed targets have been achieved)
- Preliminary plans concerning potential future expansion

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