

A blurred image of a large truck with a multi-colored trailer (red, blue, yellow, and white) moving quickly on a highway. The background shows a clear blue sky and a concrete overpass structure.

# Let's go!

This BioGaC Guide is for anyone who wants to start a natural gas or biomethane filling station. Maybe you are currently selling fuel for vehicles. Or you work in a municipality or a company that wants to convert its vehicle fleet. Or you are a motivated entrepreneur looking for new opportunities.



Co-financed by the European Union  
Trans-European Transport Network (TEN-T)

## GLOSSARY

### Biogas

Methane from renewable sources, such as from a digester. It contains methane, carbon dioxide and steam.

### Biomethane

Biogas cleaned (upgraded) from carbon dioxide and steam. It contains 97 per cent methane and can be compressed or liquefied.

### CNG

Abbreviation for Compressed Natural Gas. Methane that is compressed at pressures of 250-300 bars. In this guide the CNG abbreviation applies to both natural gas and biomethane for vehicle use.

### Cryotank

A cryogenic "thermos" that stores liquefied methane (LNG or LBG) in refrigerated form.

### LBE

The Swedish Inflammable and Explosive Goods Act.

### LNG/LBG

Abbreviation for Liquefied Natural Gas and Liquefied Biomethane, respectively. Methane that is cooled to liquefied form (about -163 degrees Celsius). In this guide the LNG abbreviation applies to both natural gas and biomethane for vehicle use.

### LPG

Abbreviation for Liquefied Petroleum Gas. LPG is a low pressure gas fuel used in some countries. Do not confuse it with CNG/LNG.

### Methane

The most basic hydrocarbon as well as a source of energy in biogas, biomethane and natural gas.

### Natural gas

Methane of fossil origin.

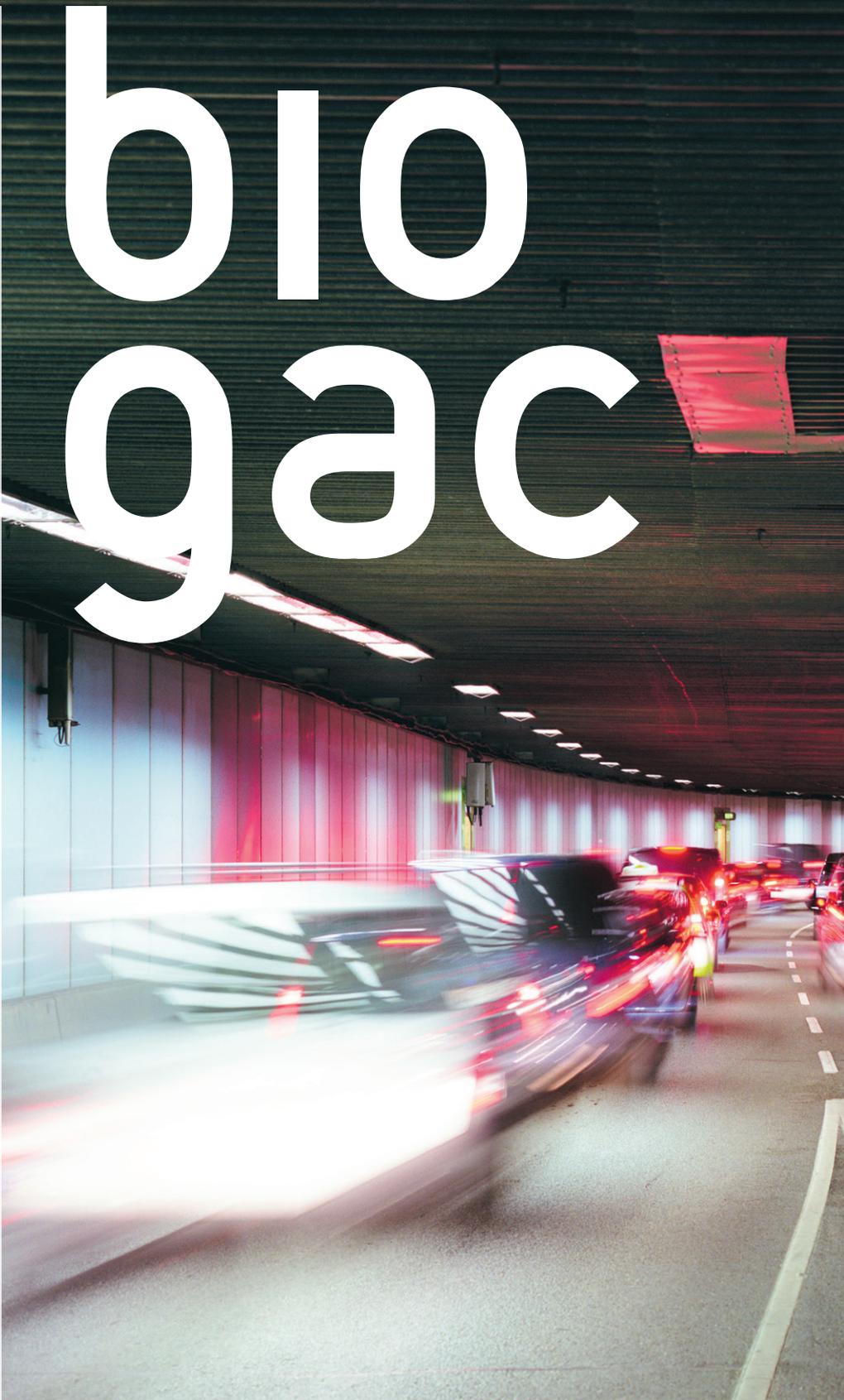
### TSA 2015

Swedish regulations for methane filling stations. Instructions for designing and constructing filling stations to conform to safety requirements.

### Upgrading

The process that refines biogas from a digester into biomethane.

# bio gac





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#### **WHAT MOTIVATES YOU?**

There are many different motivations for building a CNG or LNG filling station, such as to:

- ▶ Protect the climate
- ▶ Improve city air quality
- ▶ Enable local residents and visitors to refuel with CNG
- ▶ Power your own vehicles with CNG or LNG
- ▶ Earn money
- ▶ Increase sales in an existing shop/petrol station
- ▶ Be a first mover

# Inspiration on the way

This guide provides anyone interested in starting a methane filling station with suggestions, good examples useful facts and checklists.

Methane is a better vehicle fuel than petrol and diesel for both the climate and local air quality. Choosing CNG vehicles can also be a financially rewarding investment since it may increase chances of qualifying for procurement processes. A filling station for CNG or LNG is an investment that provides dividends in the form of cleaner air, better service in your municipality and new business opportunities.

This guide has been produced within the framework of the BioGaC project and has been financed by the project partners: Trans-European Transport Network (TEN-T), Region Västerbotten and the Västernorrland County Administrative Board.

*Carina Aschan, project manager*



## **BIOGAC.EU**

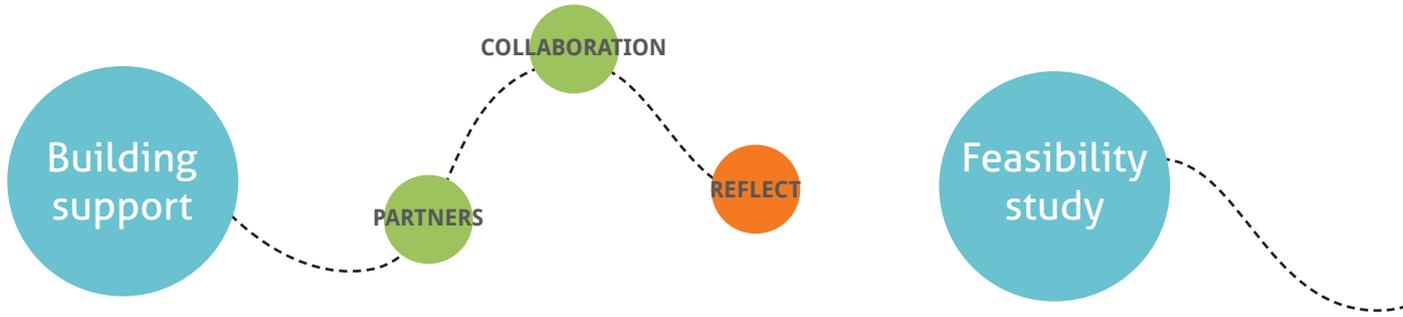
▶ A digital version of this guide with links to more information is available at [biogac.eu](http://biogac.eu).



*I know why I want to  
build a CNG/LNG filling  
station!*

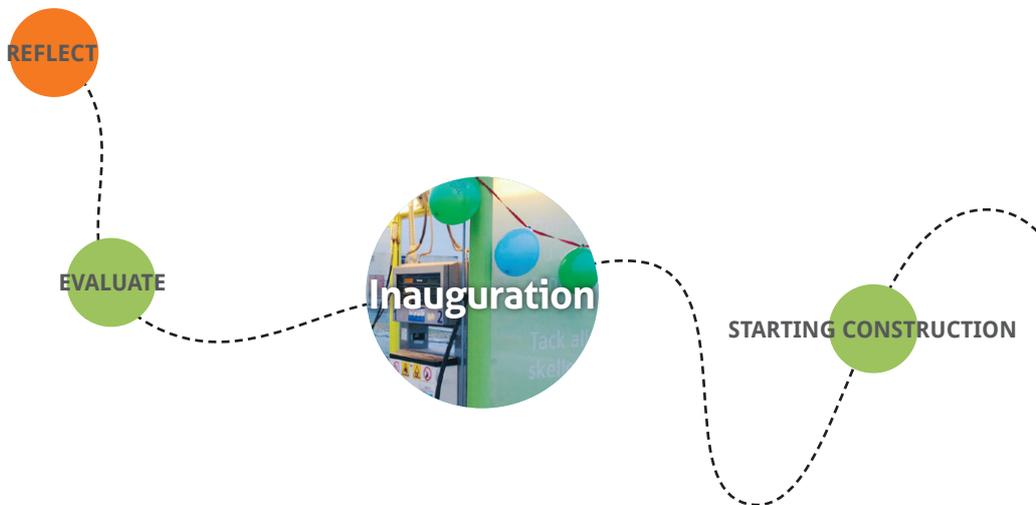
GETTING  
IT DONE

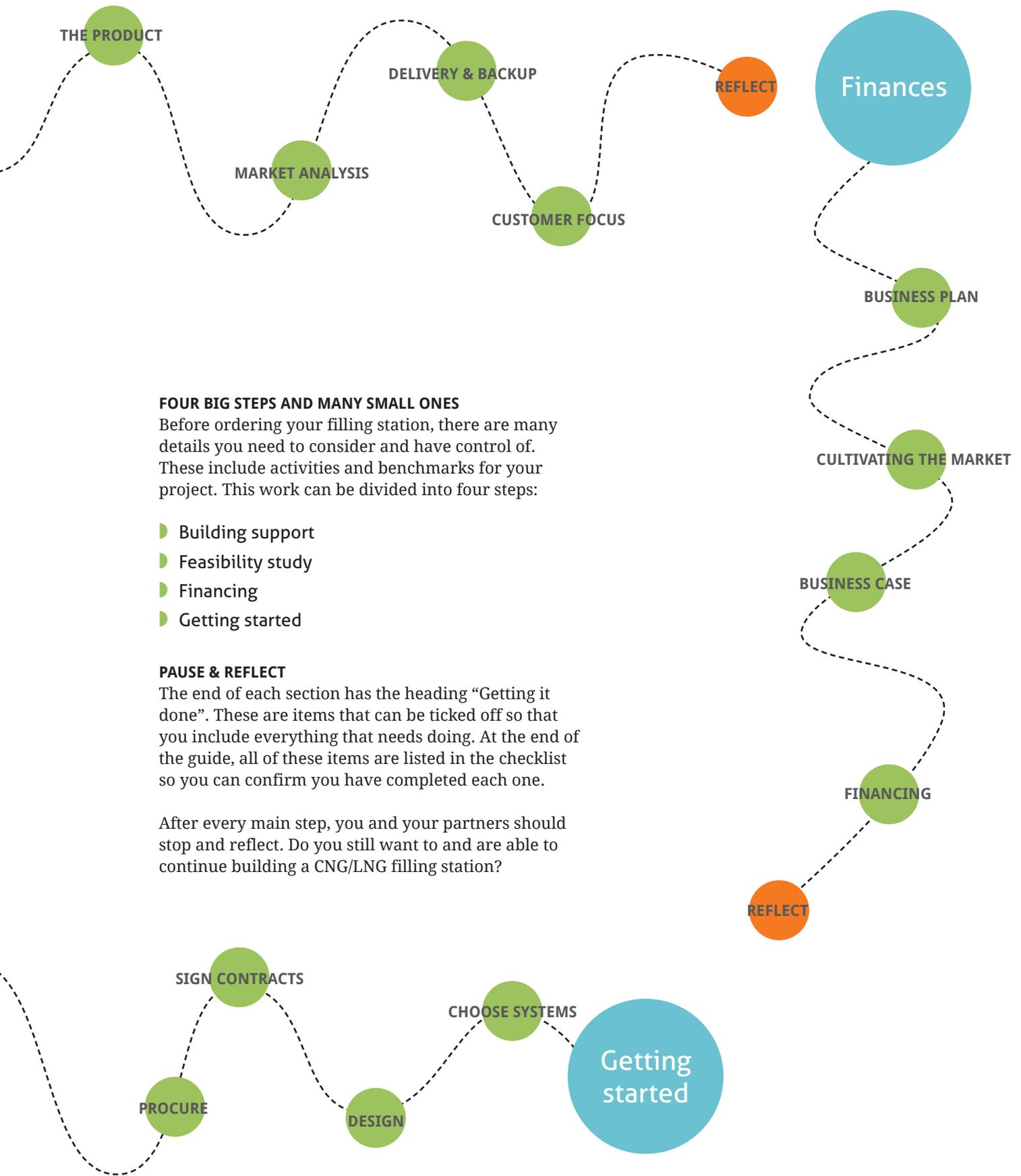
Then let's  
get started!



# Step by step

The process of building a filling station for CNG and LNG can be more daunting than you might think at the outset. Several steps have to occur in parallel — and those involved who have the most to gain need to take the first step. In addition to the purely technical aspects, many pieces also have to fall into place. Our “game plan” provides an overview of the entire process for opening a CNG or LNG filling station, though there is no absolute timeline for or order in which things should be done.





**FOUR BIG STEPS AND MANY SMALL ONES**

Before ordering your filling station, there are many details you need to consider and have control of. These include activities and benchmarks for your project. This work can be divided into four steps:

- ▶ Building support
- ▶ Feasibility study
- ▶ Financing
- ▶ Getting started

**PAUSE & REFLECT**

The end of each section has the heading “Getting it done”. These are items that can be ticked off so that you include everything that needs doing. At the end of the guide, all of these items are listed in the checklist so you can confirm you have completed each one.

After every main step, you and your partners should stop and reflect. Do you still want to and are able to continue building a CNG/LNG filling station?



BUILDING  
SUPPORT



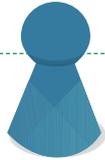


# Building support for the project

Interest in building a filling station often comes from highly motivated individuals or committed politicians. However, it is seldom possible to implement a filling station project without collaborating with others, from politicians and decision makers to vehicles dealers and the general public.

## PARTNERS

It is important to define  
your partners



# Your partners

There are lots of partners involved who must be in agreement. These partners have different kinds of expertise and need to make various decisions. These decisions also need to be in sync with one another.

- ▶ **ENTREPRENEUR** who builds the filling station
- ▶ **COORDINATOR** who makes sure all the pieces fall into place
- ▶ **CUSTOMERS** who are ready to drive with CNG or LNG
- ▶ **GAS SUPPLIER** who ensures that gas is always available when customers want to fill up
- ▶ **SUPPLIER** of equipment
- ▶ **VEHICLE DEALERS** who sell CNG and LNG-powered vehicles
- ▶ **REGIONAL POLITICIANS** and authorities that initiate and support the project

### OTHER PARTICIPANTS WHO CAN INFLUENCE DEVELOPMENT

- ▶ **NATIONAL POLITICIANS** who define terms in laws and taxes
- ▶ **MEDIA** that control flows of information and influence public opinion
- ▶ **SPECIAL INTEREST GROUPS** that support or oppose your initiative
- ▶ **SCHOOLS** that train (operating) technicians, designers, economists, marketers etc.

Involve partners and any possible opponents to ensure progress along the game board.





## COLLABORATION

This section examines the importance of local and regional collaboration and political support



# Collaboration is key

Politicians and highly motivated individuals often initiate filling station projects. However, they are seldom able to complete such a project on their own. They have to collaborate with others.

The four most important collaborators are customers, gas suppliers, vehicle dealers and, naturally, there also needs to be an entrepreneur interested in actually bring the filling station to fruition.

How do politicians in your region view a CNG filling station project? In our experience, without the backing of local politicians, it can be difficult to carry out the project, so make sure that this point really can be ticked off.

### WHO SHOULD COORDINATE?

Someone is also needed to have an overview of the process — a person we call the coordinator. It is important that this person has the resources and time to deal with the issues involved.

If you cannot assume the role of coordinator yourself, you need to find someone who can. Perhaps someone who works for the municipality?

### WHAT IS THE SITUATION IN YOUR REGION?

The regional context is also important. You need to find out how regional and local strategies for such areas as environmental objectives, renewable fuels, waste disposal and socio-economic development.

Are there CNG/LNG filling stations nearby and in adjacent cities? Is there regional production of biomethane? Are there potential customers



*The biomethane project in Skellefteå already had broad political support from the beginning. Thanks to political will and clear decisions, we are as far ahead as we are today.*

STEFAN JOHANSSON, HEAD OF WATER AND WASTE DEPARTMENT, SKELLEFTEÅ MUNICIPALITY

## BUILDING SUPPORT

## COLLABORATION



### THIS STRENGTHENS YOUR PROJECT:

- ▶ The coordinator has accepted the role and has necessary resources.
- ▶ Establish personal contacts in the municipality that allow you to understand the decision-making process in the municipality.
- ▶ Broad political support ensures stability for your project, even when political winds shift.
- ▶ Biogas and biomethane production is included in local and regional objectives and action plans.
- ▶ You have a productive collaboration in which all parties know why they should be involved and they deliver as agreed.
- ▶ You see the establishment of other alternative fuels as complementary — not competitive.
- ▶ You have involved vehicle dealers in the area at an early stage.
- ▶ You have been in contact with several users, such as taxi companies and hauliers, so that not all of your customers are in the public sector.



▶ eager to buy CNG or LNG? Who will be selling vehicles to your customers?

Several filling stations in close proximity to one another are important if customers are to feel secure about always being able to refuel with CNG.

### KEEP EVERYONE IN THE LOOP

A dialogue with filling station partners can yield synergies, such as shared swap bodies and common warehouses for replacement parts. You might also be able to share the cost of a coordinator.

Communication about how the

project's progress should take be structured and regular, especially internally among partners. It is easy to believe that others know what you know, but that is seldom the case.

OUR EXPERIENCES



Building a multi-fuel filling station for renewables was really a team effort. Thanks to the involvement and extensive knowledge of team members and a large amount of daring, we turned challenges into solutions.  
KARIN DEGERFELDT, PROJECT MANAGER, SKELLEFTEÅ MUNICIPALITY



GETTING IT DONE

WHAT CAN GO WRONG:

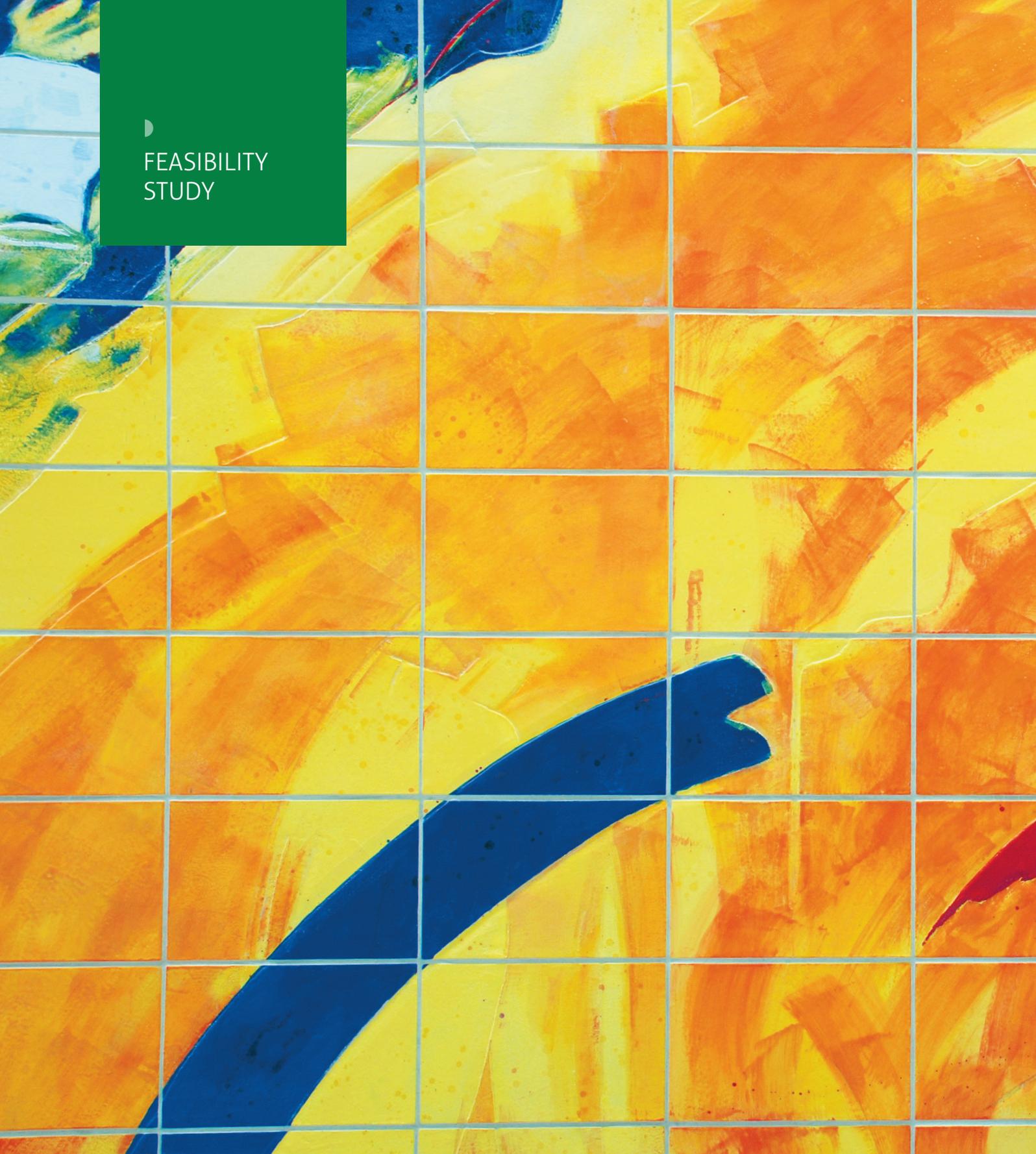
- ▶ You involve local politicians too late and they do not participate enough to move the issue forward politically.
- ▶ There are individual politicians and officials who oppose introduction of CNG and LNG.
- ▶ You regard alternative renewable fuels as competitive — instead of complementary.
- ▶ Some participants take on excessive responsibility, which makes others passive. This can result in conflicts.
- ▶ Some participants tire or change focus, such as to a new, “more trendy” fuel.
- ▶ Everything takes longer than you expect.

- I have a coordinator with resources.
- My partners are identified and my contacts are established.
- I have built support for the project from local and regional politicians across party lines and from officials.
- I have a continual exchange of information among partners.

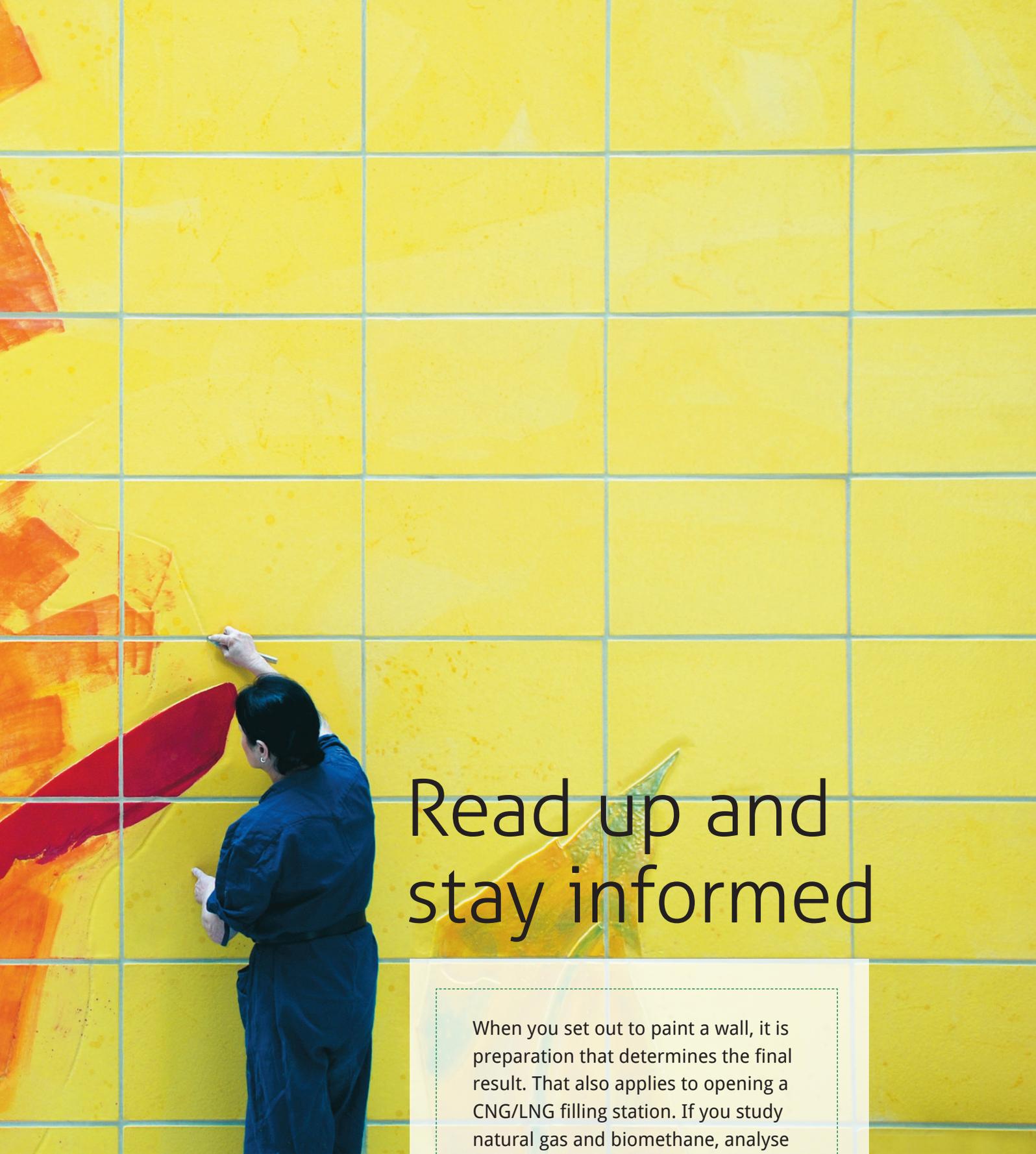
OUR EXPERIENCES



We thought we would be able to build a filling station for CNG on the basis of marketing alone. If I had known then what I know now, I would have put a lot more effort into gaining political support in Umeå to have the municipality on board at the planning stage.  
ROLF RYDHOLM, FORMER MANAGING DIRECTOR OF OK VÄSTERBOTTEN, UMEÅ



FEASIBILITY  
STUDY

A woman in a blue uniform is painting a wall with yellow tiles. She is using a brush to apply red paint to the tiles. The wall is covered in yellow tiles, and there are some red and orange paint splatters on the left side. The woman is standing on the left side of the frame, facing right.

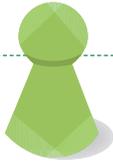
# Read up and stay informed

When you set out to paint a wall, it is preparation that determines the final result. That also applies to opening a CNG/LNG filling station. If you study natural gas and biomethane, analyse the market and get to know your future customers, the result will be considerably better.

## FEASIBILITY STUDY

### THE PRODUCT

Learn more about biogas, biomethane and natural gas as well as gas vehicles.



# Become familiar with your product

There are several well-functioning networks in Europe, and a good way to keep informed is to take part in their seminars and talks.

Your first step — regardless of whether you are a coordinator, entrepreneur, motivated individual or politician — is to study the topic so that you have sufficient knowledge to be able to motivate others to become involved.

While working to establish a filling station, you need to share knowledge about the advantages of compressed gas with the public, decision-makers and future users. That is why it is important that you can truthfully and correctly answer all questions that arise.

### WHAT ARE BIOGAS, BIOMETHANE AND NATURAL GAS?

Biogas is usually produced through decomposition of material, such as sludge from sewage treatment plants, manure or food waste. What previously was a problem to dispose of or manage can now also be a valuable resource for production of fuel. Biogas is purified and then refined into biomethane through upgrading, making it one of the world's best fuels.

When biomethane is sold as a fuel, it is called by different names used in different countries. Some exam-

ples are bio-CNG, compressed biogas (CBG), liquefied biogas (LBG), biomethano and renewable compressed gas (RNG). The vehicles can also use natural gas, a fossil fuel. Natural gas is also sold under different names, for example compressed natural gas (CNG), liquefied natural gas (LNG), metano, Erdgas and Ardgas.

Natural gas and biomethane can be mixed at any proportion from 0 to 100 per cent without affecting their suitability as a vehicle fuel. Natural gas is the most common alternative for CNG vehicles worldwide, but the

## WHAT DISTINGUISHES A CNG CAR FROM OTHER PASSENGER CARS?

The main difference between CNG cars and other passenger cars is in the engine's injection system, which is optimised for CNG.

Most models start using petrol and automatically switch over to CNG operation after a few seconds.

Today's cars have an engine capacity that is as great when operating with CNG as when operating with petrol.

CNG is a very clean fuel. Consequently, there is less wear and tear on the engine. This is clearly visible on the oil dipstick, which is only slightly discoloured when it is time for service, and the inside of the exhaust pipe remains free of carbon particles after several thousand kilometres.

In the great majority of newer CNG cars, the tanks are placed under the baggage compartment floor so no interior space is lost.

Refilling with CNG is just as simple as refilling with petrol. You attach a nozzle to the car and fill the tank in two to four minutes.

You can drive 300-500 kilometres on one gas tank, depending on the car and driving style. If the CNG runs out, you can drive an additional 200-500 kilometres on petrol. The car automatically switches to petrol operation when the CNG runs out.



Germany has five times more gas filling stations than Sweden, and I'm not aware if either my family or my friends are driving CNG powered vehicles. I believe that it is critical for success to inform the general public about the benefits of biogas and biomethane. We need to promote biomethane in the transport sector if we want to increase CNG powered vehicles in cities to reduce emissions.

CHRISTIAN JENNE, PHD, BIOGAS RESEARCHER AT UNIVERSITY DUISBURG-ESSEN, GERMANY

share of biomethane is increasing. More than half of the CNG/LNG sold in Sweden originates from biomethane. In this guide we use the abbreviations CNG and LNG for both natural gas and biomethane.

### WHAT CNG AND LNG VEHICLES ARE AVAILABLE?

Today there are CNG and LNG-powered vehicles for the vast majority of needs and the number of filling stations is increasing in Sweden, Europe and the world. The selection of available vehicles is constantly

changing, and it is important to keep up to date. Pay special attention to the vehicles sold in your area.

### WE ALL BENEFIT FROM IT

Biogas produces a number of social benefits that outweigh the additional cost of introduction. Besides reduced climate emissions and improved air quality in cities, regionally produced biogas provides new jobs, regional growth and access to domestic fuel, helping to ensure more stable fuel prices.

The many social benefits explain why politicians recommend biogas as

one of the solutions to future challenges in both the European Union and in Sweden. On the other hand, it is difficult to agree on what form support systems should take so that entrepreneurs do not have to pay the entire cost of the added value on their own.

### KEEP UP TO DATE

Support systems are developing rapidly, and we recommend that you try to keep up to date on your national policies and incentives, for example, through networks and industry organisations.

# FEASIBILITY STUDY

## THE PRODUCT



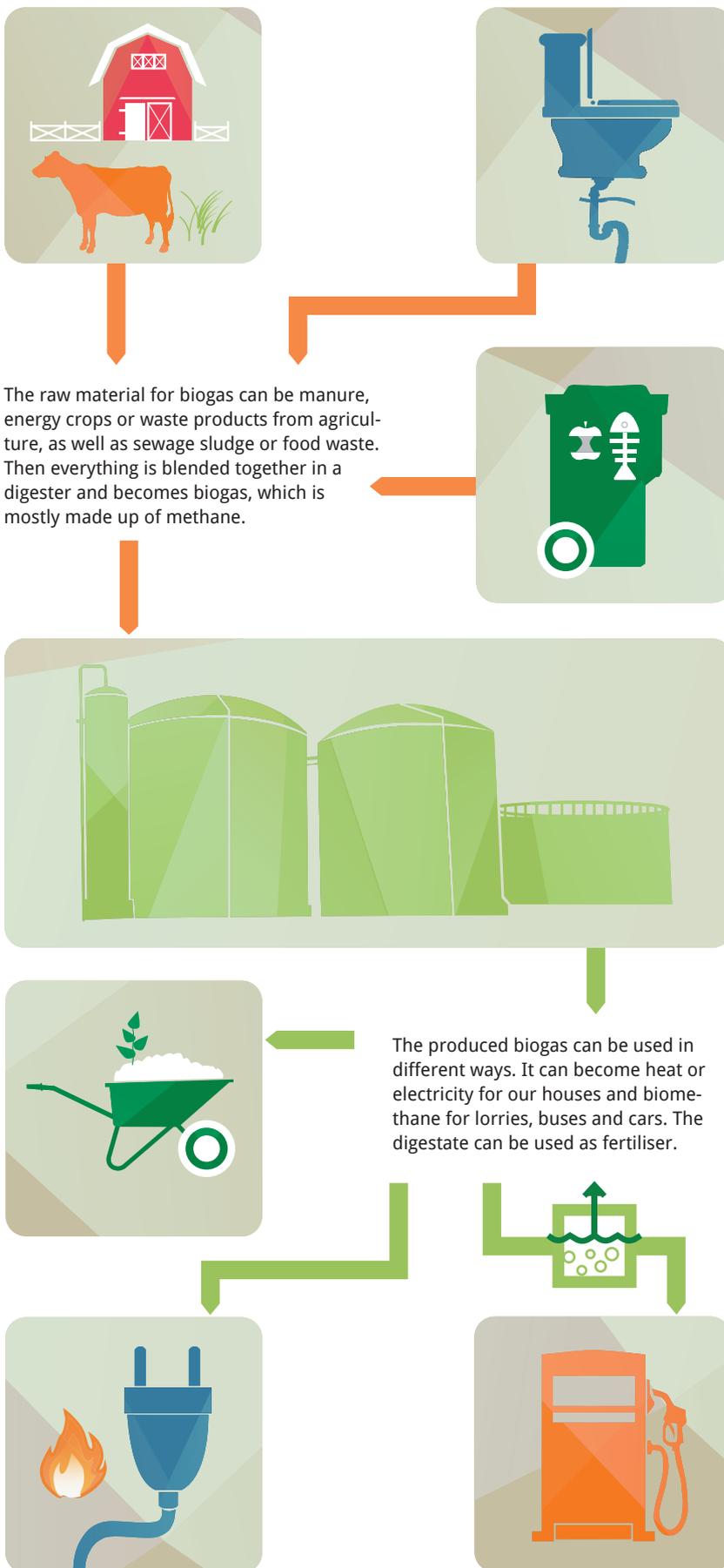
► The digital version of this guide at [biogac.eu](http://biogac.eu) has links to more information and facts about biogas, biomethane, natural gas, gas vehicles and government policies and incentives.

## OUR EXPERIENCES



” Here in Vasa most people do not know much about biogas cars. They believe they are a new and unproven technology, but in reality the fuel injection is the primary difference. In other respects, it is a regular car with one tank for petrol and one for gas. The public needs to be informed about biomethane as a fuel in the coming years.

NINA LINDMAN, DIRECTOR OF COMMUNICATIONS, AB STORMOSSEN OY, VASA, FINLAND



### THIS STRENGTHENS YOUR PROJECT:

- ▶ You have expertise and a strategy for providing customers, media and others in a position of power with the correct information and for correcting any inaccuracies that arise.
- ▶ The credibility of your communication increases if you can bring out both the strengths and weaknesses in your project.
- ▶ Your local stakeholders and partners are well-informed.

### WHAT CAN GO WRONG:

- ▶ A lack of information can create misunderstandings.
- ▶ Individuals or groups can circulate disinformation that gains traction with the public and decision-makers.
- ▶ There is a change in policy instruments and support systems, which creates uncertainty in your business.



### ENERGY KEY FIGURES

Shown below are the energy content and conversion factors for some common fuels and compressed gas.

- ▶ 1 kg CNG\* = 13 kWh
- ▶ 1 l petrol = 8.94 kWh
- ▶ 1 l diesel = 9.80 kWh
- ▶ 1 kg CNG = ca 1.5 l petrol
- ▶ 1 kg CNG = ca 1.3 l diesel
- ▶ 1 normal cubic metre of biogas weighs about 0.75 kg
- ▶ 1 normal cubic metre of natural gas weighs about 0.83 kg
- ▶ Nm<sup>3</sup> = normal cubic metre = 1 m<sup>3</sup> gas at 1.01325 bar and 0 °C

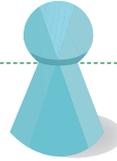
\* May vary depending on share of biomethane/natural gas  
Source: gasbilien.se

GETTING IT DONE

- I have a good understanding of biogas, biomethane, natural gas, CNG vehicles and policy instruments.
- I know how I am going to communicate my project externally.
- I know where to find more information if I receive a question I cannot answer.

## MARKET ANALYSIS

A sufficiently large market is the basis for your project.



# Analyse the market

Starting a filling station for compressed gas is a question of collaboration. To know how you should begin, you need to know your market — which consists of more than customers!

### CUSTOMER GROUPS THAT SHOULD BE ANALYSED:

- ▶ public vehicles
- ▶ transport services
- ▶ buses
- ▶ shops
- ▶ wholesalers
- ▶ taxis
- ▶ hauliers
- ▶ craftsmen
- ▶ local transport companies
- ▶ private motorists

The market analysis is one of the most important elements before you decide to invest in a filling station. You should be able to describe the current market and how it will evolve in the future.

What is the market and how will it be affected? The market can be slow-moving, and it can take longer than you expect for investments in vehicles or replacement of vehicles to occur.

### WORK IN CLOSE CONTACT WITH YOUR CUSTOMERS

Once the decision has indeed been made, you need to continue to actively work at cultivating the market, because it will not change on its own.

This is a case where collaboration with your local municipality, hauliers and industry organisations is of prime importance. Through an intimate dialogue with your intended market, you will also gain a



” It took much longer than we expected to reach the sales volume that we had counted on. Even though we devoted a lot of time to cultivating the market, we underestimated the importance of doing so. Not all vehicles are exchanged simultaneously either. It first occurs “when it is time” — a process that takes several years. In addition, we had only one filling station, which created uncertainty in the market.

TORBJÖRN STARK, BIOGAS PROJECT MANAGER IN SUNDSVALL MUNICIPALITY



good understanding of its needs and motivations and be able to adjust your location and technology accordingly. The market analysis should be placed in a context and relationship with your own motivations for the project.

#### **A VIBRANT MARKET**

The potential of a market can vary from one area to another, within a region and over a period of time. Its

development depends a great deal on local confidence in CNG/LNG. The market can develop rapidly if one or more major parties decides to use CNG/LNG as fuel, such as in buses or taxis.

One of the most important factors is for a public or private transport buyer to want or need renewable fuel. When they begin to make these demands in their procurements, the market also will change.

#### **NOT JUST VEHICLES**

In your market analysis you should survey and analyse several different customer groups. Look at a broader market than just the vehicle sector in your analysis. The energy needs of industry and shipping often can be solved with the help of biogas or (liquefied) natural gas. Even though natural gas is not fossil-free, there are synergy effects.

## FEASIBILITY STUDY

## MARKET ANALYSIS



OUR EXPERIENCES



” Piteå Municipality has worked in several ways to support development of and access to biogas. We have actively supported the project, both regionally and locally, adjusted the length of our contract for public transport to more quickly convert to biogas if and when the opportunity arises and investigated possible locations for filling stations. We regard it as part of our efforts to be an attractive and sustainable municipality.

HELENA STENBERG, MAYOR,  
PITEÅ MUNICIPALITY

### THIS STRENGTHENS YOUR PROJECT:

- ▶ You contact the officials and politicians responsible at an early stage and have a dialogue about the opportunities for gas to solve their needs.
- ▶ You survey both public and private procurements that involve transports in your area and make a volume estimate for them.
- ▶ You identify your most important customer and its needs for technology, location and volume through a close dialogue with this customer.
- ▶ A timely customer dialogue improves your opportunities for a sales contract later.

### WHAT CAN GO WRONG:

- ▶ You overestimate sales trends.
- ▶ Tax regulations and policy instruments change the potential.
- ▶ Dissatisfied users of CNG, including those in other areas, can influence your potential customers.
- ▶ If opinions about CNG/ LNG as fuel shift and you are heavily dependent on private motorists, this can quickly affect your sales — positively or negatively.



### OUR EXPERIENCES

” We had already begun a dialogue with the market in the analysis phase. As a result, we had good relations with the most important customers when the municipality was going to make a decision. This has been a success factor for us.

GABRIELLA ELIASSON, HEAD OF THE WASTE AND RECYCLING DEPARTMENT, TRELLEBORG MUNICIPALITY

### GETTING IT DONE

- I have a documented market analysis.
- I know my main customer and how decisions about new vehicles are made.
- My analysis and estimates show that a critical market volume can be attained within my established time frame.
- I have statements of intent from one or more customers that want to purchase CNG/LNG from my company.

## FEASIBILITY STUDY

### DELIVERY & BACKUP



Where can you purchase your gas and secure deliveries?

# Who is my supplier?

To operate a filling station, you need to buy CNG/LNG at a reasonable price for your business to be viable. It is, of course, advantageous to buy it locally to reduce transport costs.

If a local gas grid exists, it is simple to connect a filling station to it, but in areas lacking a grid, methane (compressed or liquefied) must be bought and transported in other ways.

Regardless of whether you prefer purchasing biomethane or natural gas, you need to determine potential suppliers and where they are located in relation to your intended customers.

Biomethane is an excellent choice from an environmental standpoint, and in areas with limited access to natural gas, biomethane also is a strong alternative from a financial perspective. It is also easier to promote locally produced fuel such as biomethane, both to politicians and to customers.

#### MINIMISE TRANSPORTS

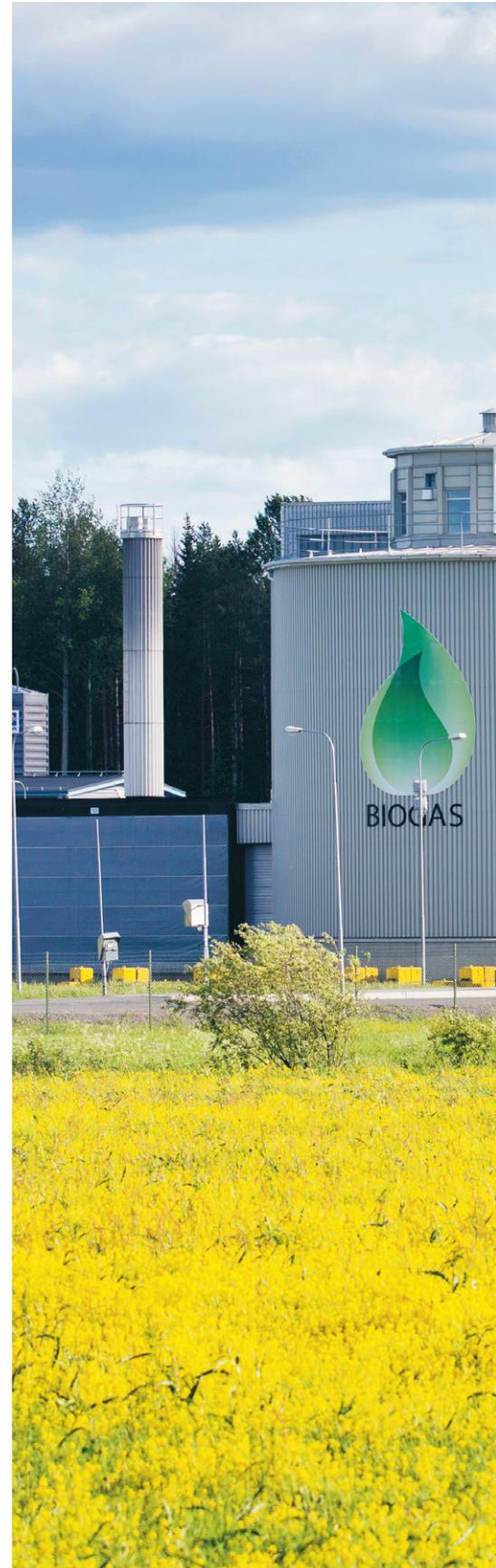
Transport and financial considerations also vary, depending on the distance between production or supplier and filling station, as well as the volume to be transported and whether it is compressed (CNG) or liquefied gas (LNG).

- ▶ Swap bodies (gas containers) are often a good alternative when smaller volumes and shorter distances are involved.
- ▶ Local gas grids are good with short distances and somewhat larger volumes.
- ▶ Liquefied gas is more economical with longer distances and large volumes.

#### MAKE SURE THAT YOU HAVE BACKUP!

In addition to a reliable supplier at the right price, you need to consider how you are going to ensure the filling station is up and running. After all, your customers always need to be able to refuel with compressed gas.

Having several filling stations in the same area naturally helps during maintenance of a filling station or if something goes wrong. You also need to have an alternative if your regular supplier of CNG drops out or has an insufficient supply. This could involve a joint solution with the region's production facilities for biomethane, for example, or a backup of liquefied natural gas in a cryogenic tank.





Europe's natural gas network in 2015

OUR EXPERIENCES



*The first years we were worried about not having enough biomethane production or that there might be interruptions in production. All of the buses and refuse lorries in the city centre operate with biomethane and there are no other alternatives.*

*When production fell off for a short time, we chose to buy gas from Boden Municipality's cryogenic tank. But Boden is 160 kilometres from Skellefteå, so that became rather expensive. Since the end of 2015, we have had our own backup system through a cryogenic tank with LNG.*

PETER EDLUND, HEAD OF THE WATER AND WASTE UNIT,  
TUVAN AND BIOGAS, SKELLEFTEÅ MUNICIPALITY

DELIVERY  
& BACKUP



#### THIS STRENGTHENS YOUR PROJECT:

- ▶ When you choose gas suppliers, it is important that they can deliver according to the demands of your main customer.
- ▶ Many customers want CNG that contains biomethane, which preferably is produced locally.
- ▶ It is crucial for your credibility in the market that customers can always refuel. So make sure that you have backup sources for your gas supplies.
- ▶ Several filling stations in the same city reduce your vulnerability.
- ▶ Ideally, coordinate your gas deliveries with another filling station or industry.
- ▶ A local gas grid allows short transports, which can lower your costs.
- ▶ Be clear/straightforward about the proportions of biomethane and natural gas you sell.



OUR EXPERIENCES

” We wanted to fill our tanks with 100 per cent pure biomethane, but it was impossible to obtain it at public filling stations. Therefore, we made the drastic decision to build our own filling station and purchase biomethane directly from the producer.

KENNETH MILANDER, MANAGING DIRECTOR OF WIDRIKSSONS ÅKERI, STOCKHOLM



### WHAT CAN GO WRONG:

- ▶ Your intended distributor cannot deliver at the right price. The cost for purchases rises, which has a negative effect on margins and payback period.
- ▶ Your transport costs become higher than calculated.
- ▶ Biogas is available, but there is no facility for upgrading it to biomethane, or else the gas is not for sale/accessible because biogas is used for something else (such as electricity and heat).
- ▶ Demand for CNG increases faster than production, resulting in a gas shortage.
- ▶ Operations are interrupted because of re-vamping or a breakdown at the local biomethane facility.
- ▶ If there is only one filling station and it is inoperable, vehicles that operate only on CNG cannot be refuelled. You must have a reserve plan, especially for transport services vital to society such as refuse lorries and buses.

JAG HAR KOLL!

- I have a statement of intent from a possible major supplier of CNG or LNG.
- My choice of gas supply and the system I have chosen work together. Read more under “Choose systems”.
- I have identified a backup solution.

### OUR EXPERIENCES



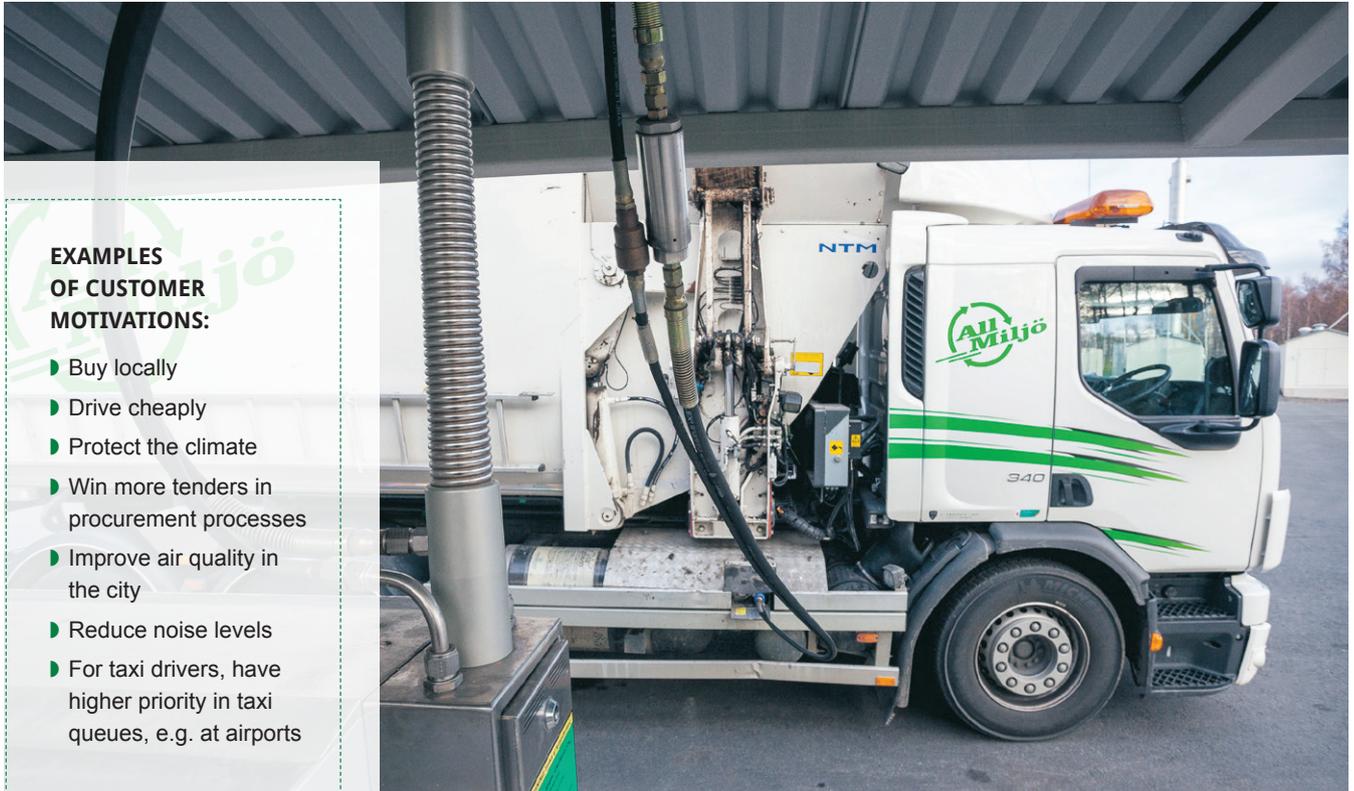
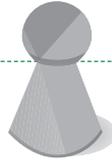
*It's important to us that the CNG contains biomethane. Even though biogas is produced in Umeå, we were unable to purchase it — and because distances in northern Sweden are so great, transport becomes prohibitively expensive. As things stand today, we simply cannot compete with diesel prices.*

NILS-GUNNAR MATTSSON, BOARD MEMBER OF AC FORDONSGAS AB, UMEÅ

## FEASIBILITY STUDY

### CUSTOMER FOCUS

First you have to know who your customers are.



#### EXAMPLES OF CUSTOMER MOTIVATIONS:

- ▶ Buy locally
- ▶ Drive cheaply
- ▶ Protect the climate
- ▶ Win more tenders in procurement processes
- ▶ Improve air quality in the city
- ▶ Reduce noise levels
- ▶ For taxi drivers, have higher priority in taxi queues, e.g. at airports

# Consider your customers

Your customers are the lifeblood of your project, so research their needs thoroughly before you begin and don't forget to consider future customers.

What motivates customers to use CNG/LNG, and what type of vehicle do they drive? As we pointed out earlier, the ability of customers to always be able to refuel their vehicles is crucial for your success. Always try to see your project in a somewhat larger, regional context and avoid build-

ing isolated stations, far away from others.

#### WHERE DO CUSTOMERS WANT TO FILL UP NOW ...

Where you locate your filling station is important. It affects the permits required for construction, but above



CNG is compressed methane, which is used mostly in passenger cars, small lorries and buses.

LNG is liquefied methane, which is used primarily by heavy vehicles.

Focus on providing clear information and signs so that it is easy to find the filling station.

Do not forget to request permission for the signs from the municipality or road authorities.

all how you meet your customer's wishes.

For commercial traffic and taxis, location can be decisive in choosing fuel. With a tight driving schedule, having to take a detour to fill up does not work. Locating the filling station on these drivers' routes or where

vehicles often are to be found increases the chance of winning them as customers.

#### ... AND IN THE FUTURE

For heavy-duty vehicles, LNG can be a future fuel. This type a filling station should be located along transport

corridors and logistical hubs so that heavy long-distance traffic will not be directed unnecessarily to the central areas.

#### MORE THAN JUST CNG?

Passenger cars operating on CNG also need refuelling with 



petrol, and it can be troublesome to fill up in two places. Can you offer petrol at your filling station or choose a location close to an existing petrol station?

Motorists also are accustomed to being able to buy accessories, car washes, food, magazines and such, which may already be available in an existing and manned station.

#### INFORMATION & EDUCATION

A new user of compressed gas does not always know how to refuel his or her vehicle. Make sure that you have good, informative instructions, preferably with illustrations.

Information about environmental benefits, prices and payment meth-

ods is important. If your customers are driving company cars or cars for official use, it is good to work with the company or agency to plan informational meetings and training for personnel.

#### REINFORCE THE CUSTOMER'S CHOICE

Your filling station does not have to look like “classic” stations. A modern design can be the best marketing.

For many motorists, a gas car is a conscious environmental choice. Reinforcing this choice when they are refuelling strengthens their loyalty. For example, let customers see how much carbon dioxide they saved thanks to their fill-up.

#### OUR EXPERIENCES



*When the first filling station was built, it was located by the municipality bus depot, since at that time only buses and other municipal vehicles were to fill up there. It was functional, considering the need.*

*When the market later grew to include more and more private customers, the only place they could refuel was at this filling station. That led to queues, and the pressure in the compressor was not always adequate.*

*Now we are glad that an additional filling station is being built that was planned from the beginning for other types of customer needs. It is in a good location by the main motorway for both residents of our municipality and motorists passing through.*

GÖSTA WESTIN, HEAD OF HARBOUR AND LOGISTICS DEPARTMENT,  
SKELLEFTEÅ MUNICIPALITY

#### THIS STRENGTHENS YOUR PROJECT:

- ▶ You constantly focus on the customer and work to improve.
- ▶ You have a sense of customers' needs and their motivations.
- ▶ You focus on clear information and signs so that customers find the filling station.
- ▶ You have information available in multiple languages.
- ▶ You provide the customer clear feedback on every refuelling occasion, preferably in the form of measurable values, such as reduced carbon dioxide emissions.
- ▶ Customers (particularly new ones) continually need information and training on how to refuel. You also need to train employees at the filling station.



Residents of Sundsvall and Härnösand previously only had one filling station, which wasn't always operational. Thanks to the BioGaC project, there are now three stations and the owners have also begun to cooperate and help each other. This has ensured much better delivery reliability and also means customers do not need to drive far to fill up.

ANNA SÄFVESTAD ALBINSSON, PROJECT MANAGER BIOFUEL REGION, UMEÅ



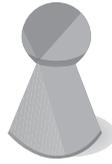
**WHAT CAN GO WRONG:**

- ▶ The customer group changes and your design or location no longer suits the new customer base.
- ▶ You have located the filling station too far from the largest customers' driving route.
- ▶ You have an undersized compressor so that it takes a long time to fill up, which also can lead to long queues.
- ▶ When refuse lorries and buses are to coexist with private motorists, there is a greater need for logistics and signs, among other things.

- I know who my customers will be and those I want to have eventually.
- I have investigated customer needs for other products and services at the filling station.
- I have a plan for how customers can obtain information and instructions.
- I have found the best location based on customers' needs.

FEASIBILITY  
STUDY

CUSTOMER  
FOCUS



# Dare to be creative!

It's not always obvious to motorists how they should go about refueling with CNG. Consequently, the project has turned to the Institute of Industrial Design in Umeå and the Department of Industrial Design in Sundsvall.

The design students have presented proposals for filling stations that are inviting, easy to understand and instructive. They have looked at both the filling station and the information as an all-inclusive experience.

This is how industrial design stu-

dent Sebastian Hägelstam thinks that future filling stations for CNG should look. This work already has attracted the attention of both organisations and companies within the CNG industry.

► Both welcoming and exciting. Is this the future filling station for CNG?





➤ Above: today's filling station.



➤ Right: Sebastian's suggestion for a new filling station — with a clear focus on the user already evident in the heading: What to think about while refuelling.



*Sebastian Hägelstam*

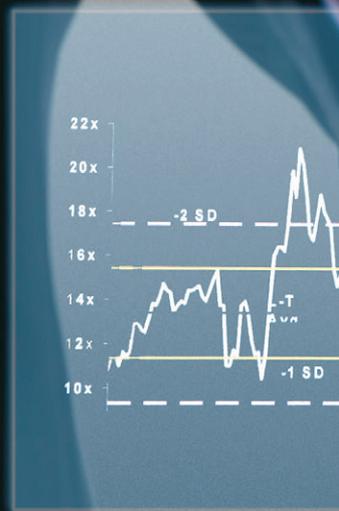
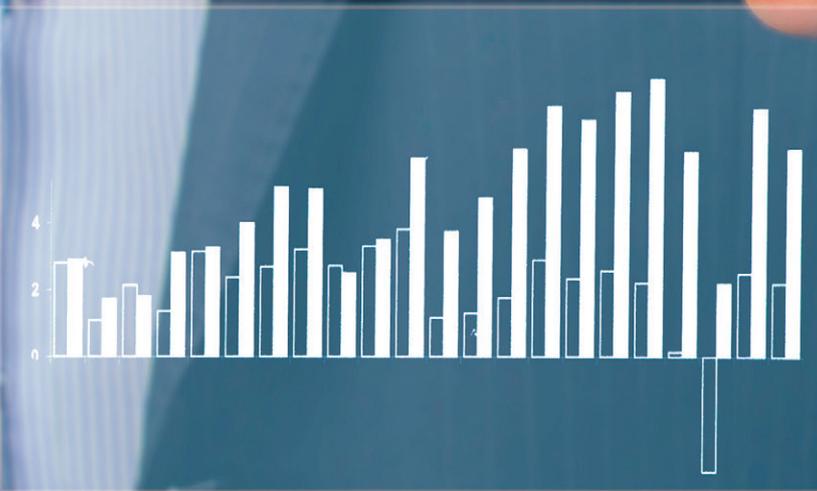


OUR EXPERIENCES

“ If biomethane is going to be able to seriously compete with fossil fuels, more than environmental enthusiasts will have to use the fuel. No one else is likely to switch to biomethane until something is done about the shortcomings in availability and design in today's filling stations.

SEBASTIAN HÄGELSTAM, INDUSTRIAL DESIGN STUDENT, SUNDSVALL

FINANCES



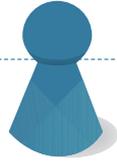


# From vision to profit

An idea or vision seldom becomes reality if you cannot tell its story in a way that others understand. In a proper, well-prepared business plan, the vision becomes clear for all the partners and financiers. In the financial estimates, everyone can see if the project is feasible and profitable. Feel free to use the business calculation tool at [biogac.eu](http://biogac.eu).

BUSINESS PLAN

The basis for your communication with investors.



# The business plan rules!

The business plan is the basis for your communication with investors. You have to be able to describe what investing in your filling station will look like. The business plan should encompass your entire operation, both short-term and long-term.

Your business plan should extend over at least five years and present a picture of what you believe the business will look like as time goes on.

A well-prepared business plan provides a clear picture of the course of events and can more easily attract investors. Strengths and weaknesses become apparent, which makes it simpler to be-

come actively engaged in both strengthening your project and minimising its weaknesses.

Banks and credit institutions normally count on a duration of five years. If you want a longer time span, additional guarantees will be required. This is one area where good relations with your bank or investors are so important.

## EXAMPLES OF WHAT YOUR BUSINESS PLAN CAN INCLUDE:

### ► VISION, BUSINESS CONCEPT & OBJECTIVES

Describe your vision and motivations. Also describe your business concept and how it will look in practice, and the objectives you have for the investment and what objectives you expect to achieve.

### ► PARTNERS AND OPPONENTS

Describe what your game plan looks like and who you are interacting with. Also include your competition and other kinds of opponents.

### ► PURCHASING

Describe how the CNG/LNG will be purchased and delivered to the filling station, as well as who is responsible for backup.

What will the business deal with pricing and discounts look like? What payment terms apply and how much working capital is needed?

If you can show a gas supplier your purchasing pattern, it has a positive effect. If you have a number of large customers, such as local public transport, it can be easier to produce these figures.

### ► THE VALUE CHAIN

Present an overview of the value chain for biomethane and natural gas, if any. Clearly identify where your own business begins and ends in this chain.

### ► BUSINESS CASE & SENSITIVITY ANALYSIS

Your fundamental motivation for building a filling station for CNG/LNG determines how much weight you need to give to a business case.

In the estimates you should at least have figured out your internal rate of return and payback period and estimated your cash flow. Use the estimates to also identify factors that will have the greatest impact on profitability.

### ► FINANCING

Describe how you plan to finance your installation, for example, with your own capital, loans and/or support from investors.

Different solutions entail very different costs, and getting favourable terms from the bank or investors depends on how well you describe your business.

### ► CONTRACTS

Describe which contracts are important if you are going to invest. Also note other contracts that are important for you and your investment.

In the digital version of this guide on [biogac.eu](http://biogac.eu), we have a business calculation tool you can use to test your own investment.



**MARKET & CUSTOMERS**

Describe your market segment, how it will be affected and how you believe the market will evolve as time goes on.

Depending on the customers and customer segment, you may need different information channels and different ways of reaching customers.

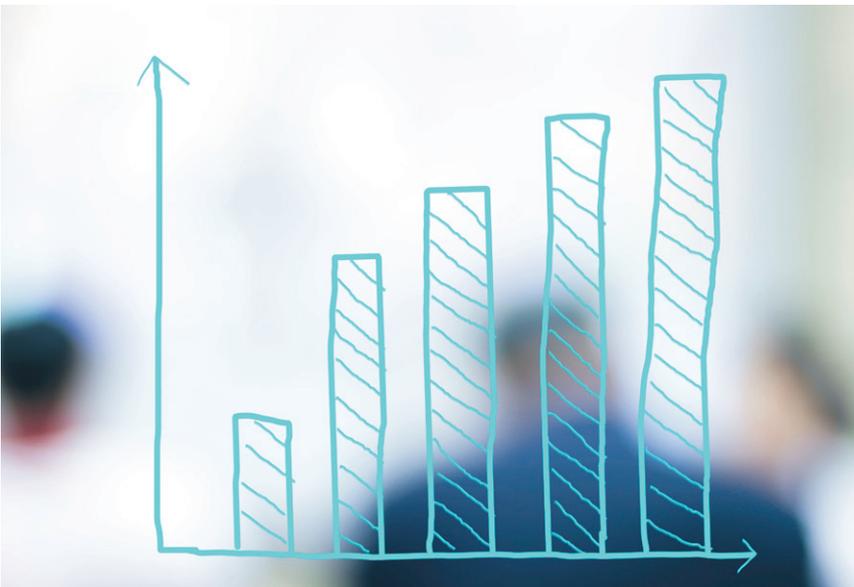
**PERSONNEL REQUIREMENTS**

Describe whether sales will take place with or without people on site. Personnel cost money, but can also be a success factor, especially in the beginning when customers might need practical assistance.

**RISK ANALYSIS**

Prepare a straightforward risk analysis to minimise the chances that the risks will have major consequences for your business. There are both business and technical risks. In Sweden the technical risks can be most readily managed by following the directions in the TSA 2015 filling station instructions.

Describe your project's strengths and weaknesses as well as opportunities and threats in a SWOT analysis. Often risks can be managed if you have analysed and evaluated their likelihood and consequences. Focus in particular on factors that (quickly) change your business plan and invalidate your calculations, the sort of thing that might make you terminate your investment.



OUR EXPERIENCES



” Many biomethane projects have devoted a great deal of time to technological issues, while market issues have come second. My advice is to try to achieve a balance between marketing and technology. It’s important to conduct market research at an early stage.

Along with this, you should establish relationships with potential major customers. By “tying up” these customers even before the filling station is in operation, you ensure your project is on sound financial footing.

MARIA POHJONEN, CNG AND LNG/LBG MANAGER, ENERGIGAS SVERIGE

**THIS STRENGTHENS YOUR PROJECT:**

- ▶ You have a well-prepared business plan with a clear customer focus that makes things easier for investors and creditors.
- ▶ You have a sense of your project’s strengths and weaknesses and a plan of action for minimizing risks.
- ▶ Your business plan and calculations are functional tools that you keep up to date.

**WHAT CAN GO WRONG:**

- ▶ You have put too much focus on theory and calculations in the business plan. There’s not enough concrete action.
- ▶ The investors do not believe in your business plan.
- ▶ You have underestimated the consequences of national and international trends and decisions.

GETTING IT DONE

- I have a documented business plan.
- I have calculated my business case and performed a sensitivity analysis — and understand the results.
- I have done a risk analysis, including a SWOT analysis.
- At least one qualified person has read my business plan and provided feedback.

### CULTIVATING THE MARKET



If you are going to build a filling station, you need a concrete action plan for how you will cultivate the local market.

Draw up your plan for cultivating the market in three steps:

**CONSTRUCTION**

The first five years

**PLATEAU**

The level you want to reach with your current solution

**GROWTH**

The next phase, after a thorough evaluation



# Cultivate your market

People are not going to buy CNG cars on their own. In your market analysis you have identified the customers on which you are going to focus. Start there and make an action plan for how you are going to get them to understand that your offer of CNG or LNG is irresistible.

During the market analysis, you already should have created relations with important customers. Now you should work with them further to ultimately arrive at signed contracts.

It is not just your customers that you need to cultivate. Your other partners also need to be included in the list.

**DIALOGUE WITH VEHICLE DEALERS**

Especially important partners are vehicle dealers, who have a major influence on which vehicles come out on the market. It is important to educate them about biomethane and natural gas and whatever other CNG/LNG vehicles are available. Early on, you also should be aware that service



*It is easy to find fault with freight transport's role in the traffic environment. At the same time, goods have to arrive. If local transport takes place with CNG-powered vehicles, then we are solving part of the air quality problem in cities.*

MÄRTA BROLINSON, TRAFFIC PLANNER, STOCKHOLM TRAFFIC ADMINISTRATION OFFICE

**▶ HAULIERS, CRAFTSMEN AND LOCAL TRANSPORT COMPANIES**

There are a great many private parties that want to drive in an environmentally sound way and who want to make this known to their customers.

For this customer category, it is important to include environmental advantages in purchasing, but having a competitive price still is the most important factor.

**▶ TAXIS**

In larger cities taxis can be a sufficiently large customer base for building a filling station. A taxi travels about 100,000 kilometres a year.

For taxis it is vital that they can always refuel, that the price is competitive, that they can be classified as an environmental taxi according to current tendering process and that they can drive as far as they need to go.

**▶ BUSES**

Buses use a lot of fuel, and in many areas they are the foundation of CNG sales. Bus traffic matters are often handled by regional public transport agencies, with contract periods of more than seven years.

For buses, delivery reliability is especially important because they operate only on CNG and have no alternative fuel. Above all, buses can increase the visibility of CNG for the public in a positive way.

**▶ PRIVATE MOTORISTS**

Private motorists are a varied customer segment that is influenced to a large extent by the prevailing media image. They can also be promoters and moulders of public opinion and can quickly create political pressure.

**▶ PUBLIC TRANSPORTS**

Public organisations, such as municipalities and county councils, are a good initial contact because they are major transport purchasers of bus service, refuse lorries, taxis and transport services for disabled persons, and they can have a large number of passenger cars in their vehicle fleets.

Politicians and officials can establish requirements for the type of fuel that is to be used, both for their own vehicles and for the transport services they purchase.

**▶ GOODS OWNERS (SHOPS AND WHOLESALERS)**

Large companies that buy many transport services usually have an environmental policy. Many private transport buyers also are also assuming great responsibility in the changeover to a fossil-free vehicle fleet. Identify these companies and establish contact early.

personnel at CNG vehicle dealers need special training.

In contacts with your future customers, you will be regarded as an authority in the area, and it is important that you do your homework.

Remember that you must repeat your information many times — but in different ways — for your message to pay off. Continue the dialogue with your customers even after the contract is signed.

In other words, an ongoing dialogue with all of your partners is necessary so that everyone moves forward.

CULTIVATING THE MARKET



**THIS STRENGTHENS YOUR PROJECT:**

- ▶ You make sure that CNG-powered vehicles have sufficient signage. It can inspire others to follow your lead.
- ▶ You line up famous personalities or companies with high credibility in the region, which become your ambassadors by driving CNG vehicles.
- ▶ You convert your own company's vehicles to CNG and offer your employees CNG-powered cars as a fringe benefit.
- ▶ You sign statements of intent with your customers (before you draw up final contracts) as soon as you dare and concurrently with your project's progress.
- ▶ You convince public organisations that they should serve as a good example by both converting parts of their vehicle fleets and buying transport services that operate with CNG. This can quickly create a critical mass and a stable market.
- ▶ You convince airports, train stations and hotels to give priority to environmentally-classified vehicles in car parks and taxi queues.

**WHAT CAN GO WRONG:**

- ▶ You believe that the market will develop on its own.
- ▶ You misjudge the pace at which vehicles are replaced.
- ▶ You communicate the project to a customer circle that is too narrow.
- ▶ Your plan for cultivating the market includes only your intended customers, not your other partners.





*In the initial stage of the project, we already had developed a concrete action plan with clear objectives for what we wanted to achieve and how we were going to cultivate the market. We also have a clear, graphic image so that nobody would miss the biomethane project in Härnösand.*

*It has turned out well, and I believe that we will exceed the objective by a good margin. Already, before the project is completed, companies and private individuals have purchased about twenty CNG-powered vehicles. All are extremely eager to get going and begin filling up.*

ANDREAS EINARSSON, HEAD OF MARKETING AND COMMUNICATION FOR HÄRNÖSAND ENERGI & MILJÖ AB

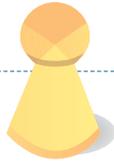


An example of how Härnösand Energi & Miljö illustrates its biomethane project.

- I know who my main customer is and what the volume trend looks like.
- I have one or more contracts with a sufficiently large volume of pre-sold gas.
- I know what the replacement plan for the larger vehicle fleets in my area looks like.
- My plan for cultivating the market is complete. There are concrete activities that are being carried out.

GETTING IT DONE

BUSINESS CASE



The business case are your basis for keeping track of how profitable your project is.



# Do you have a solid business case?

Whether you are applying for a loan at the bank, contacting financiers or investing your own capital, you always have to know what the outcome will be.

Regardless of whether your motivation is to earn money or save the environment, you need to stay on top of how your investment is doing. That applies whether your need for a return is high or low.

**TRY OUR BUSINESS CALCULATION TOOL**

In the digital version of this guide, there is calculation tool you can use to test your values. Enter your investment, operating costs, financing model and interest calculated for costing



**HERE'S AN EXAMPLE:** Here we have chosen an example with CNG (biomethane) and a double dispenser with high-pressure compressor. The example is based on conditions in Sweden and is stated in euro.

**INVESTMENT IN FILLING STATION**

Equipment	€555,000
Land preparation and peripheral equipment	€222,000

**OPERATING COSTS**

Fixed	€22,000
Variable	€11,000

**FINANCING**

Own capital	40%
Loan	30%
Investment support	30%

**MARKET DEVELOPMENT**

Year 1	200,000 kg
Year 2	250,000 kg
Year 3	300,000 kg
Year 4	500,000 kg
Year 5 — X	500,000 kg

**BIOGAS-BASED CNG (BIOMETHANE)**

Purchase price, free delivery excl. VAT	€1.11/kg
Excise tax (CO2 tax/energy tax)	€0.0/kg
Selling price excl. VAT and tax	€1.33/kg
Real price trend	0.5%

**OTHER PARAMETERS**

Interest calculated for costing purposes	5.0%
Depreciation time, land and buildings	20 years
Depreciation time, equipment	10 years
Depreciation time, bank loan	15 years
Inflation	2.0%
Working capital	€22,000
Company tax	22.0%
Bank interest rate	5.0%

purposes, and the result will show your internal rate of return, payback period and cash flow.

**PREPARE A SENSITIVITY ANALYSIS**

The tool also includes a built-in sensitivity analysis that allows you to see in a diagram how a change in volume and selling price affects your payback period. In addition to this, you should vary your parameters and see which affect profitability most.



*To be able to invest in a filling station for biomethane, you have to be farsighted, as do politicians and public authorities. Society must demand that transport suppliers use renewable fuels, which makes possible a large number of CNG-powered vehicles. Then there always will be a market for biomethane, even if oil prices are low. Our time horizon, however, is at least 10 years — how will things look then?*

JOERI JACOBS, BUSINESS DEVELOPMENT CLEAN ENERGY – AGA GAS AB, STOCKHOLM



**THIS STRENGTHENS YOUR PROJECT:**

- ▶ You know which parameters affect your business case. As a result, you can focus your inputs on the right things so that you get a robust and profitable facility.
- ▶ You have a credible estimate that is backed up by contracts. This increases your chances for a good form of financing.
- ▶ You know the investment grant you can apply for.
- ▶ At least one person with a good finance background has reviewed your business case.



**WHAT CAN GO WRONG:**

- ▶ You have unrealistic and unsupported starting data, which results in a business case that is too optimistic.
- ▶ You do not get promised grants or tax subsidies.
- ▶ The rules change so you do not get the grants that you had counted on.
- ▶ You have not made your own assessment of your business case — is it reasonable?

**COMPILATION OF BUSINESS CASE**

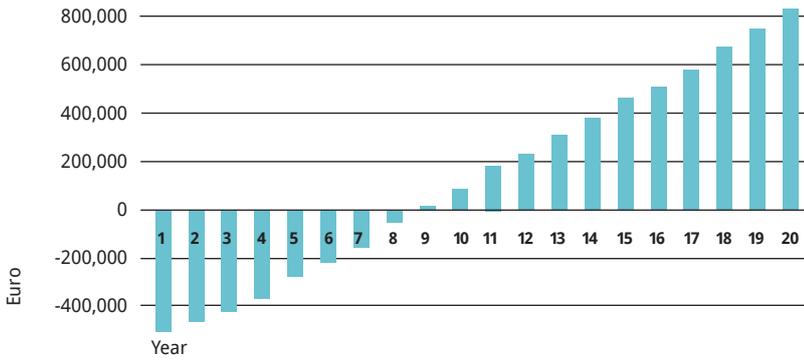
**PRECONDITIONS**

Sales volume, year 5	500,000 kg/year	Total investment	€777,000
Selling price CNG, excl. VAT	€1.33/kg	Investment grant	€233,100
		Own capital	€310,800
		Loan	€233,100

**KEY NUMBERS**

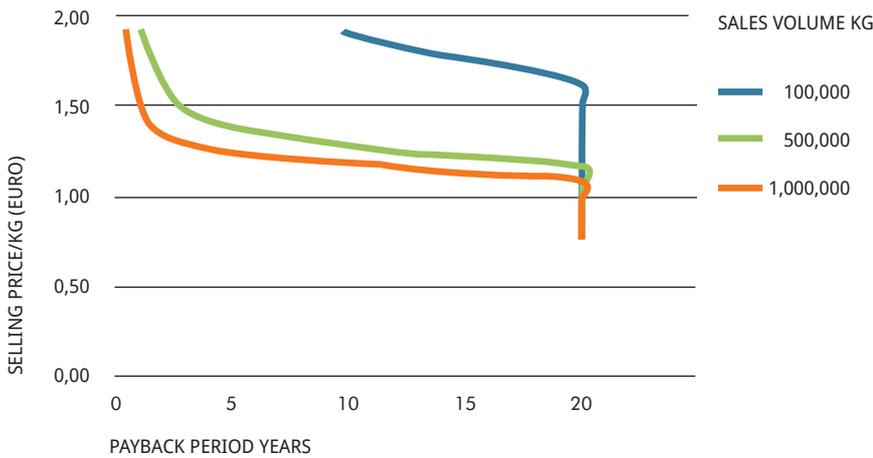
	Own capital	Project
Average yield, own capital	10.9%	
Internal rate of return	14.6%	9.8%
Payback period	8.0 years	8.9 years

### CASH FLOW



### UNDERSTAND YOUR BREAKEVEN POINTS

#### SENSITIVITY ANALYSIS ON THE PAYBACK PERIOD; CHANGED SELLING PRICE OF CNG AT DIFFERENT VOLUMES



#### OUR EXPERIENCES



“Here in Tartu, our experience has shown that the most important things are support from the political level and having at least one key customer (with buses, lorries, or vans). This ensures a steady turnover for filling stations.

JAAANUS TAMM, PROJECT MANAGER AT TARTU CITY GOVERNMENT, ESTONIA

#### GETTING IT DONE

- I know what the profitability of my intended investment looks like.
- I know which parameters in my business case affect profitability most - and consequently my sensitivity analysis.
- The business case fulfil both my own and the investors' requirements for profitability.

## FINANCING

A filling station is such a large investment that you might need several sources of financing.



# Who provides financing?

There are different ways to finance a large investment. Often you will need several sources of financing and perhaps invest a portion yourself. There are also various investment grants and other subsidies for which you can apply.

Large companies normally have a professional organisation that arranges financing. To obtain approval for your proposal, you often need to be able to show that it is very profitable — that is, generates a high internal rate of return. The advantage, of course, is that self-financing can cover 100 per cent of the investment.

## OBTAINING CAPITAL

If you are going to arrange the capital yourself, you can also define your own requirements for profitability. In this case, there are some things that you should keep in mind. To obtain outside capital, almost all creditors require that you put up a portion of the investment, where the initial investment is yourself and your well-developed plan. Nobody is going to lend money to you if you are not credible or if your plan has gaps that are too large. The estimates need to be well thought-out. In other words, conservative while being reasonable.

Even so, your credibility is still the most decisive factor in being able to get your foot in the door.

## CALCULATE YOUR OWN INVESTMENT

Bank financing usually involves borrowing half of the total amount. You have to arrange for the remainder yourself or have collateral for it. Don't forget that as part of your own investment, you can count building on your own land, producing your own design or other services that otherwise would have to be purchased.

If you have good contacts in the banking world and have other business relationships with bankers, you can likely arrange a somewhat higher share of the financing from them. Assume that they will want to have the loan paid back within five years. The interest is often five percentage points above a regular mortgage loan.

## THIS STRENGTHENS YOUR PROJECT:

▶ You apply for an investment grant that wholly or partly can eliminate your own share of the financing. Ensure that you know what possibilities are available.

▶ The municipality sometimes can put up collateral that make sources of financing willing to assume a little higher share of the financing.

▶ Your auditor can help you with financing strategies.

## WHAT CAN GO WRONG:

▶ Your business case omits important information, such as your own salary.

▶ Your estimates have no leeway for changes and setbacks. In other words, your sensitivity analysis is too narrow.

▶ Your estimates look good, but support for crucial numbers is lacking.

▶ Some of your sources of funding jump ship. Do you have a backup plan?

## GETTING IT DONE

- My financing is 100 per cent solved — with capital of my own, loans and grants.
- I have applied for and received any investment grants needed.



# GETTING STARTED





# Time for action

If you have come this far, it's time to go from words and numbers to action. But before starting construction, you have to make some strategic decisions — such as choice of system, site, permits and contracts.

## GETTING STARTED

### CHOOSE A SYSTEM

You have to choose a system that suits both you and your customers.

### THIS STRENGTHENS YOUR PROJECT:

- ▶ You select a proven and robust system.
- ▶ You have conducted study visits and seen several other solutions. You also have talked with people who have already taken the same journey and have operating experience.
- ▶ You make a choice that is appropriate for both the customer and the methane that you will be able to buy.



# Choose a system

By system, we mean the solution you need to choose — compressed or liquefied methane, rapid or slow filling — or a combination of these.

The technology that is appropriate for your filling station depends, first of all, on:

- ▶ your main customer and its needs
- ▶ if there already is an established system at another filling station in the region
- ▶ which type of methane you can buy.

### COMPRESSED METHANE

It is most common to offer customers compressed methane (CNG)

with rapid filling. Slow filling is a cheaper solution and can work for customers that have vehicles that remain stationary for a period every 24 hours, such as buses in public transport and refuse lorries. The technology for CNG is familiar and works well for light lorries, buses and passenger cars. Filling stations can be supplied by gas containers, gas pipeline or a cryogenic tank with evaporator.

OUR EXPERIENCES



” We came out too early with new technology. We tried to add a cryogenic upgrading of biogas from our sewage treatment plan by which the biogas was to be refined into biomethane and simultaneously cooled down to liquefied form, LBG. We were going to be the first in the world with such a facility.

But the cryogenic facility was delayed significantly and did not function as planned. It was simply too difficult to be a first mover. Now the facility has been removed.

BERTIL CARLSSON, PROJECT MANAAGER, SUNDSVALL MUNICIPALITY



**WHAT CAN GO WRONG:**

- ▶ You choose a system with a focus on getting innovation support instead of reliable operation.
- ▶ The system you have chosen cannot be used for both biomethane and natural gas, which can limit your market and affect delivery reliability.

**LIQUEFIED METHANE**

Liquefied natural gas (LNG) in a cryogenic tank is becoming increasingly common as a backup solution to improve delivery reliability, even when CNG is the main product.

**KEEP ABREAST OF DEVELOPMENTS**

The technology is advancing quickly and new products are constantly being launched. It is important to follow developments to know what

the best solutions for your particular needs are.

Also make sure that there is service at a reasonable cost for your technology. Avoid getting locked into a limited solution. Give some thought now to what will happen in the next step:

- ▶ To expand capacity, for example, which technology will you choose?
- ▶ If you choose CNG in the first step, can the next step be to complement this with an LNG backup?

- ▶ If the backup is located in the right place, it can be expanded to also sell LNG to long-distance traffic.

# GETTING STARTED

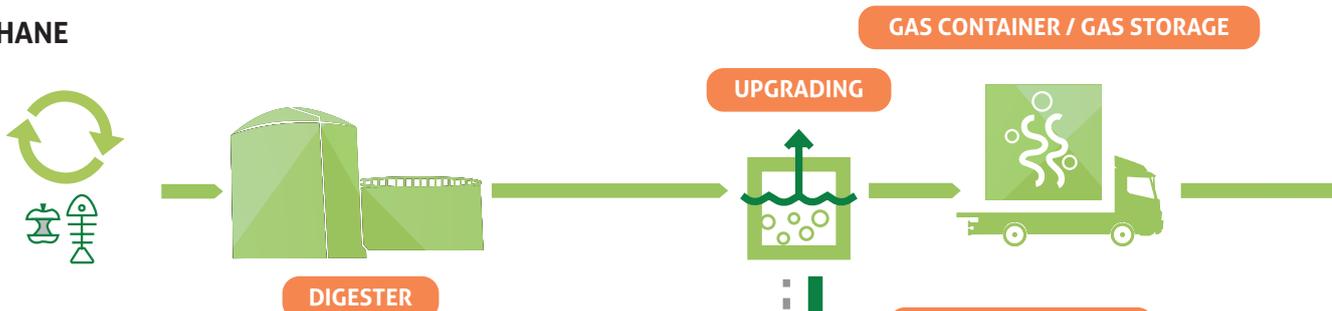
## CHOOSE A SYSTEM



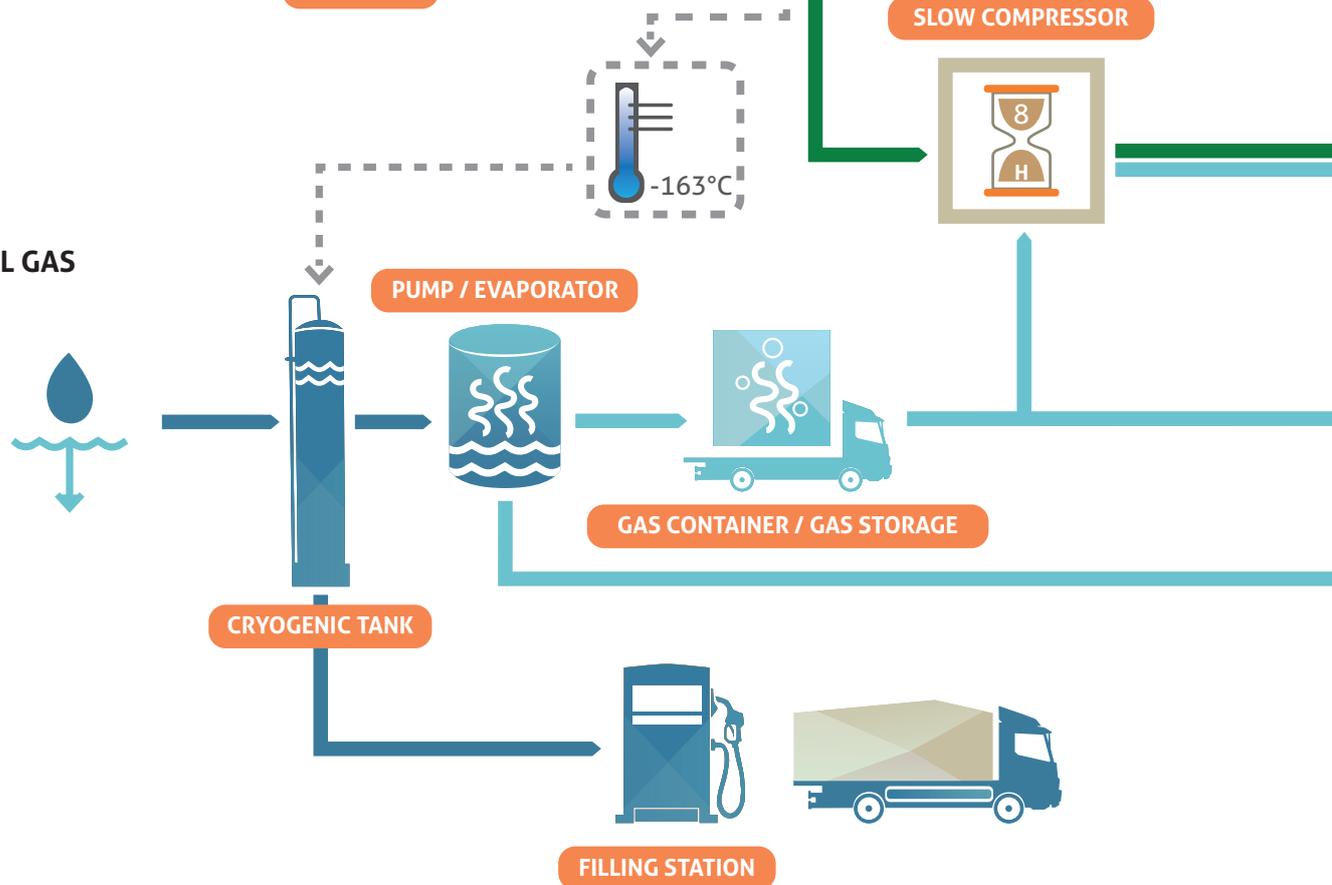
This illustration shows the various parts included in a CNG/LNG refueling system and how they work together. You can choose one of the systems or a combination of several. The light green line shows compressed biome-

thane for rapid refuelling. The dark green shows compressed biomethane for slow refuelling. The light blue line shows how to create a backup using liquefied natural gas, while the dark blue line shows how to use liquefied

### BIOMETHANE



### NATURAL GAS

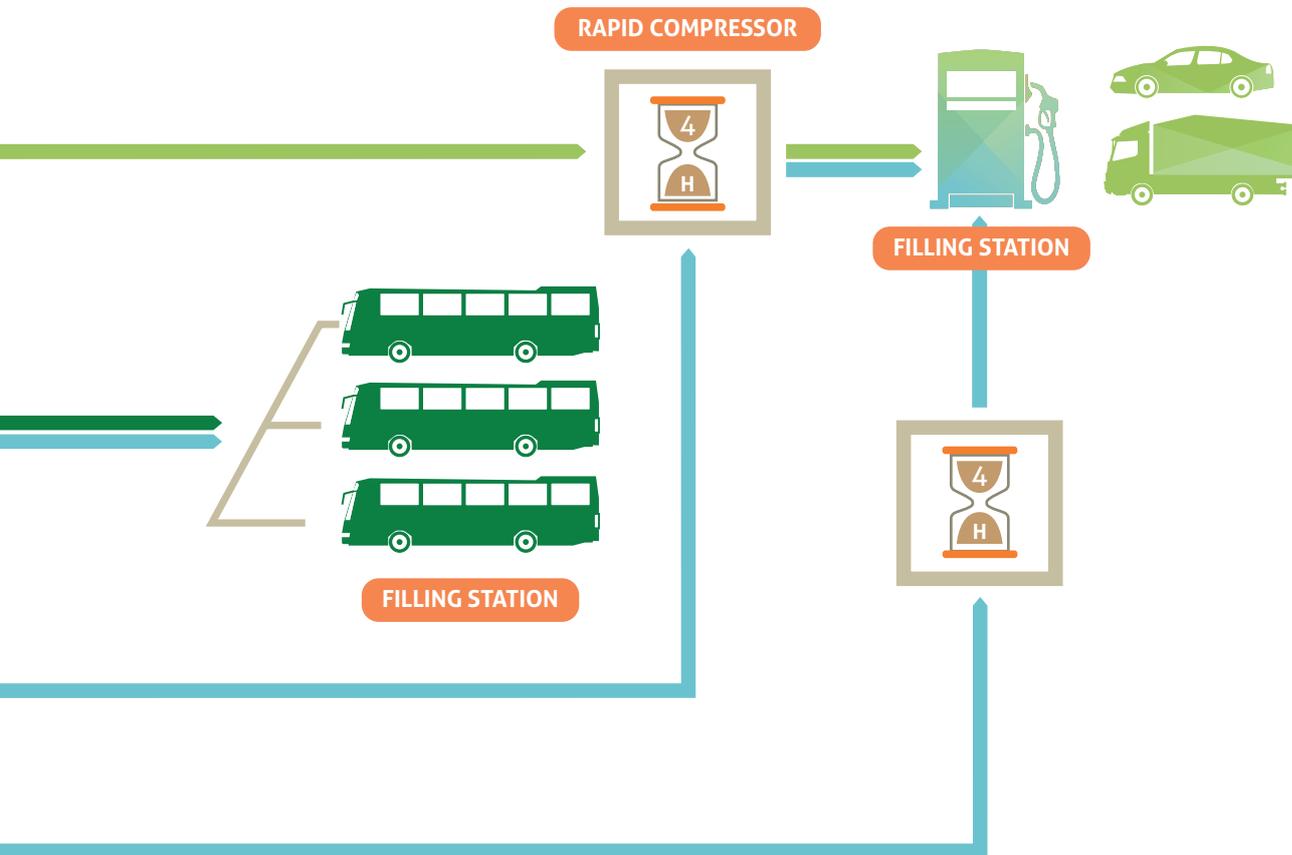


natural gas for refuelling for heavy vehicles. The dashed grey line shows a future vision that provides renewable fuel, liquefied biomethane, in the backup system as well.



” The LNG backup allows us to achieve higher supply reliability for our CNG customers. It also allows us to better meet a larger market, while also working to increase the production capacity of the biomethane plant.

HELENA JONSSON, HEAD OF PRODUCTION, WATER, WASTE AND BIOGAS, SKELLEFTEÅ MUNICIPALITY



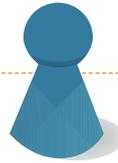
GETTING IT DONE

- I have investigated the systems available today.
- I know which system suits me and my customers.

## GETTING STARTED

### PLANNING

Naturally the filling station should be in a good location for customers, but there are several other things to consider.



# Planning and design



The location of the filling station depends on your main customer's needs, but also on planning by the municipality and road authority. In applying for your permit, you need to describe how the station will be configured.

At an early stage, you should confirm your chosen location and blueprints with the municipality and road authority. What do the local plan and future plans for the area look like? Is there enough space? Find this out at an early stage so that you do not do unnecessary work.

#### **WHAT IS NEEDED?**

You need to describe the conceptual design, volumes and traffic flows. This might involve facade drawings, exits, distances from neighbours and positioning on the lot. You also need to be able to indicate how much CNG or LNG you expect to sell



per month and how many vehicles will be able to refuel per hour and day, respectively. This information is used both when you apply for a permit and when you are buying equipment.

In the next step you can choose if you want to do detailed planning yourself or let a supplier deliver a turnkey facility. Read more in the section “Purchasing wisely”.

#### **BOTH CONVENIENT AND SAFE**

Your station should be designed so that customers feel welcome and safe. Pay special attention to traffic flows, lighting, groundcover and rain

shelter. Remember that an exciting design can reinforce and strengthen the customer’s choice.

Mixing passenger cars with buses and heavy traffic often leads to queues, unnecessary waiting time and the risk of collisions. If possible, you should separate passenger cars and heavy traffic at the refuelling point. For example, many choose to allow buses in public transport to fill up at a separate bus depot.

Replacing or filling gas storage should also take place with traffic safety in mind and be separated from the flow of traffic at the filling station itself.

#### **WHAT PERMITS ARE REQUIRED?**

The permits required depend on your location and the country in which you will be operating. In Sweden there are two overarching permits:

- ▶ Building permits
- ▶ Permits for handling inflammable and explosive goods (LBE), which includes a risk analysis

In addition, there can be other permits and requirements for training, which you need to check on with your local or national authority. In Sweden, for example, a trained gas manager is required. ----->

## GETTING STARTED

### PLANNING



#### THIS STRENGTHENS YOUR PROJECT:

- ▶ You have received help from someone familiar with gas safety and regulations.
- ▶ You have started early and made contact with all the authorities that are involved in permit applications.
- ▶ You have a thought-out design that can reduce costs for safety measures and paved areas.

#### FIND THE RIGHT EXPERTISE

This is a new area for many people, including yourself and perhaps even those who will grant the permits. Consequently, it is important to create a common understanding of what is involved, the existing regulations and what regulations will be applied. Try to find people with expertise in gas safety and regulations in your country.

#### OUR EXPERIENCES



*I'm glad that we got help with building permit documents. It involved more than just permits for handling of inflammable and explosive goods, of course.*

*It's important to find out about the local plan for the area. For us, the land was "dotted", which means that nothing should be built on it. But thanks to an early dialogue with the building permit office, we solved that problem.*

JAN NYMAN, ECONOMIC DEVELOPMENT MANAGER,  
ÖRNSKÖLDSVIK MUNICIPALITY





### WHAT CAN GO WRONG:

- ▶ The location of the filling station that you propose does not conform to the local plan.
- ▶ You have unclear documents that delay processing and permits.
- ▶ You have given nearby residents too little information and they feel excluded from the process, which can lead to time-consuming appeals.
- ▶ Your filling station is not suited for the volume you are going to sell. Capacity that is too low creates queues and dissatisfaction. Overcapacity reduces profitability.

### OUR EXPERIENCES



Here in Piteå there are future plans to build a railway straight through the city. Even though we do not know if or when it will be built, a national law stipulates that the municipality may not grant any building permits in the area. That makes it difficult, to say the least.

As a result we have looked at a mobile filling station as a solution.

ERIK PERSSON, BUSINESS DEVELOPMENT MANAGER,  
PITEÅ MUNICIPALITY

### GETTING IT DONE

#### TIP FOR SWEDES!

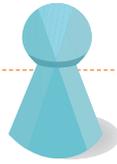
If you order, build and operate your filling station according to the TSA 2015 filling station instructions, this qualifies as a risk analysis (for the permit for inflammable and explosive goods, LBE). However, you must report this in your permit application.

- My planning is complete.
- There is plenty of room for replacing or filling gas storage without compromising traffic safety.
- Traffic will flow freely without a problem.
- I have identified all permits that are required and they have been granted.

## GETTING STARTED

### SIGN CONTRACTS

Make sure that you have signed contracts before buying your equipment.



#### THIS STRENGTHENS YOUR PROJECT:

- ▶ You are a pro at contracts or have enlisted experts to draw up your contracts.
- ▶ Early on, you have outlined contract structures or have received help from professionals on this.
- ▶ You have a laser focus on the contents of your contracts and understand which parameters affect your operations and profitability.

# Signed contracts

A well-formulated contract provides a framework to fall back on in case something unexpected occurs.

Before you buy equipment and contracting, you should have signed contracts for the purchase of CNG/LNG, gas sales and any leases required.

You need at least one purchase contract with a serious gas supplier. How the contract is drawn up is matter of negotiation, but it's important that the contract be clearly formulated and easy for the parties to understand what they have agreed to.

#### FLEXIBILITY IS AN ADVANTAGE

If you are a filling station owner, it is good idea to be flexible with respect to volumes and delivery times in case

the market does not evolve as you expected.

Moreover, the contract should have a provision for price adjustments as time passes, often tied to an index for fuels and inflation.

You also ought to have an agreement to buy gas from another source if your regular deliveries fail to arrive for some reason.

#### SALES CONTRACTS

You should have contracts with customers that ensure sales of a base level of volume from day one. This can involve one large customer or several



” We are going to produce biomethane from food waste and have also built a filling station in Härnösand. To develop a market in the area before deliveries of biomethane begin, we need a contract with a CNG distributor. That will also help us to ensure uninterrupted supply of CNG at the station in the future. Accordingly, we have signed a contract with AGA for delivery of CNG from Sundsvall.

PÄR MARKLUND, ENERGY TECHNOLOGY PROJECT MANAGER,  
HÄRNÖSAND ENERGI & MILJÖ

**WHAT CAN GO WRONG:**

- ▶ You do not have signed contracts or your contracts are too short-term.
- ▶ You have not accounted for price increases and consequently are selling at a price that is too low in a long-term contract.  
Remember to always set a time limit on discounts.
- ▶ You have unclear and incomplete contracts that can lead to conflicts because they can be interpreted in different ways.

**GETTING IT DONE**

small ones, and the volume depends on your targets, motivations behind the investment and possible requirements of creditors.

Pricing should not depend solely on the volume the customer buys. There are several factors that are important for both you and your customer.

**SEVERAL CONTRACTS TO MONITOR CLOSELY**

It is a good idea to also closely monitor contracts that concern:

- ▶ Leases
- ▶ Services for gas technology and payment systems
- ▶ Daily inspection (own personnel or another person)
- ▶ Signage

- I have a signed, long-term contract for purchases of CNG/LNG at the right price.
- I have signed, long-term contracts with at least one customer for CNG sales at the right price — which is price-indexed.
- I have a contract for backup in case problems with regular deliveries arise.

## GETTING STARTED

### THIS STRENGTHENS YOUR PROJECT:

- ▶ You select a supplier with good references.
- ▶ You spend a little more money on well-known technology if it can reduce your operating costs.
- ▶ You build your station so that it can be expanded if sales increase.
- ▶ You have chosen a system for which service and replacement parts are available on short notice.



# Purchasing wisely

## PURCHASING A FILLING STATION

You should not just purchase a filling station, but also operational reliability, access and service.

It is important to make purchases that provide reliable operation with few interruptions and high accessibility. Make quality and service contracts a priority.

It takes both time and great technical knowhow to purchase a filling station. Planning ensures a good basis for your inquiry.

Then you can choose if you or the supplier will have overall responsibility. There are advantages and disadvantages to both approaches. Regardless of which you choose, all safety regulations for filling stations must be followed.

### WITH A FUNCTIONAL PROCUREMENT ...

... the supplier handles the entire assignment and delivers a turnkey facility that can be put into operation immediately. It can be a little more expensive and you lose a certain amount of control over what is actually delivered.

### WITH A DIRECTED PROCUREMENT ...

... you are responsible for the facil-

ity's functions and for everything working together. This places tremendous demands on your technical expertise and knowledge. But if you do it right, the project can be cheaper and the components you get will be exactly what you want.

### QUALITY, SERVICE & GUARANTEES

You get what you pay for. The quality of equipment and the availability of service for it are more important than price. Equipment that does not work or requires time for repairs reduces customers' confidence in you.

To ensure reliable operation, your service and guarantee commitments must be clearly stated in the contracts. If crucial components are far away or have long delivery times, it can be worthwhile to consider having your own supply of them.

You should also give some thought to whether your equipment and its placement permit a future increase in capacity.

#### WHAT CAN GO WRONG:

- ▶ You do not have the high level of technical expertise and extensive experience that a directed procurement requires.
- ▶ The systems you have purchased do not work together, as in the case of a payment terminal and dispenser that do not work with common payment cards.
- ▶ Your filling station is not functional. If there often are interruptions in deliveries, the willingness to invest in CNG vehicles and confidence in CNG/LNG will decrease.
- ▶ The configuration of the gas containers (swap bodies) differs from that of nearby filling stations, which means that you cannot exchange gas containers.

#### OUR EXPERIENCES



” Our biggest slip was having a call for tenders document that was too comprehensive, with several appendices and references. A clear call for tenders document is needed, preferably one that could be displayed as a table. The tender form also must contain all of the necessary information so that it can be evaluated and include sections in which the supplier certifies that all requirements will be fulfilled.

Allow more time than you expect. Read the call for tenders document and tender document from the supplier's point of view to discover weaknesses that can be used against you. Even if you follow applicable laws to the letter as a public purchaser, dissatisfied tenderers can appeal and considerably delay the start of the project.

JOHAN SAARELA, PROJECT MANAGER, STORMOSSEN OY IN VASA, FINLAND

#### OUR EXPERIENCES



” The BioGaC project has brought a whole new business into our company, and we underestimated the need for internal resources to organise it. We also should have evaluated alternative payment systems/services offered by the market. If we had devoted more time to preparation and planning, we also would have been able to make more clearly defined demands for functionality, such as how dispensers and payment terminals should communicate with each other.

PÄR MARKLUND, ENERGY TECHNOLOGY PROJECT MANAGER, HÄRNÖSAND ENERGI & MILJÖ AB

#### GETTING IT DONE

- I know whether I should use a functional or directed procurement.
- I have made a procurement/purchase based on a choice of a system and safety regulations.
- It is possible to get service for my station, with a response time that I am prepared to pay for.

**NOTE:** If you are a public entity, you are subject to the public procurement regulations specific for your country. In that case, special regulations apply, and we recommend that you contact your purchasing department for assistance with your procuring procedure.

## GETTING STARTED

### START CONSTRUCTION

There are many ways to build well as long as you follow the safety regulations.



#### THIS STRENGTHENS YOUR PROJECT:

- ▶ You have competent construction/project management.
- ▶ You have a thought-out media strategy with an experienced media person who answers questions.
- ▶ You have tested your filling station by refuelling several vehicles in a row. Initial moisture in the system may cause ice plugs. Ensure this moisture has disappeared before opening your station.

#### WHAT CAN GO WRONG:

- ▶ Your schedule is too tight or is thrown off by construction delays.
- ▶ You encounter a combative journalist who has another agenda.

# Breaking ground

When it comes to the contracting and construction work itself, we believe that you are the person who knows best how things should proceed.

Even so, we want to emphasise that collaboration is important. With competent construction management, the land preparation and delivery of process equipment take place at the right time to avoid having to wait for a delivery to move forward.

A good construction manager also provides assurance that the work will be done based on the requirements specified in the contract and the rules found in relevant legislation.

especially when it comes to biomethane. As a result, construction of a filling station can attract a lot of attention in the media.

Make sure that there is someone who can answer all questions in the most simple, comprehensible way possible. The construction period can be your best opportunity to talk about CNG for both the general public and new customers.

#### MEDIA ATTENTION

Many people are interested in CNG,



## OPENING



### OUR EXPERIENCES



*We are working in a structured and purposeful way to achieve a sustainable society. By producing and selling biomethane from the food waste of Härnösand residents, access to renewable fuel increases, which of course promotes renewable transports in the region. In November 2015 we opened our first entirely new and modern filling station for CNG. This is an important and successful project.*

LINDA JOHANSSON, ADMINISTRATIVE MANAGER,  
HÄRNÖSAND ENERIG & MILJÖ

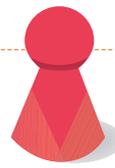
### GETTING IT DONE

- The construction of my filling station follows all safety regulations.
- I have bought a shovel for the ground-breaking ceremony.
- I have lined up a well-known and popular person to formally open my filling station.

## GETTING STARTED

### EVALUATE

A good evaluation can give you more customers, new business opportunities and increased profits.



#### WHAT DO YOUR CUSTOMERS LIKE?

- ▶ The hoses and nozzles are clean and easy to handle.
- ▶ The customer steps out of the car onto a dry and clean surface, without water puddles.
- ▶ There is seldom a line and refuelling is fast.
- ▶ The filling station is located in a place where customers pass by.
- ▶ The payment system accepts a range of cards and works without a problem.
- ▶ The entire area is clean and tidy.
- ▶ Signs and instructions are easy to understand.

# Look in the rear-view mirror

When the new filling station is built and you have operated for a while, you need to evaluate your efforts and, above all, your customer relations.

A common mistake is to think that your business can run on its own. It cannot.

#### WHAT DO THE CUSTOMERS THINK?

Ensure that you know how your customers are experiencing your services. You can do so through formal customer surveys, but above all

make sure that you have an ongoing dialogue, at least with your main customers. Do you know their opinion about how the filling station works? Is there anything that bothers them? Are there enough side services? Some things can be easy to correct or improve if only you know what they are.



Our customer survey showed that the information at the filling station was inadequate. There were labels everywhere, and nobody had thought about the overall impression. It's easy to describe what customers should NOT do instead of what they SHOULD do. That approach is not seen as welcoming.

ANNA FROM, VEHICLE MANAGER, SUNDSVALL MUNICIPALITY



The customer survey showed that having several filling stations in the same area is crucial if private motorists are going to buy a CNG car. We have taken that seriously and established an additional filling station along the road most people travel.

OLA BURSTRÖM, CHAIRMAN OF TECHNICAL SERVICES COMMITTEE

#### DET HÄR KAN GÅ FEL

- ▶ Your filling station has technical shortcomings or recurring malfunctions.
- ▶ Your customers' vehicles have shortcomings that are not attended to, so he or she becomes dissatisfied.
- ▶ You don't know what customers think and consequently attend to the wrong things or nothing at all.

#### GETTING IT DONE

- I know how my customers perceive my services.
- I have updated my business plan.
- I have conducted a financial follow-up.

#### IS THE BUSINESS PLAN VALID?

You should also revise your business plan after a while. How are the finances? Is it time to consider an expansion? In that case, you naturally need to get come to an agreement with everyone involved. Do they want to be included in a new round or do you need to find a new participant?

READ OUR CUSTOMER SURVEY AT [BIOGAC.EU](http://BIOGAC.EU) (IN SWEDISH ONLY)



# Checklist

We have assembled all of the “Getting it done’s”, which you should tick off as you work toward your grand opening.

## BUILDING SUPPORT

### COLLABORATION IS THE KEY

- I have a good understanding of biogas, biomethane, natural gas, gas vehicles and policy instruments.
- I know how I am going to communicate my project externally.
- I know where to find more information if I receive a question I cannot answer.

## FEASIBILITY STUDY

### STAY INFORMED

- I have a good understanding of biogas, biomethane, natural gas, gas vehicles and policy instruments.
- I know how I am going to communicate my project externally.
- I know where to find more information if I receive a question I cannot answer.

### ANALYSE THE MARKET

- I have a documented market analysis. I know my main customer and how decisions about new vehicles are made.
- My analysis and estimates show that a critical market volume can be attained within my established time frame.
- I have statements of intent from one or more customers that want to purchase CNG/LNG from my company

### DELIVERY & BACKUP

- I have a statement of intent from a possible major supplier of CNG or LNG.
- My choice of gas supply and the system I have chosen work together. I have identified a backup solution.

### CUSTOMER FOCUS

- I know who my customers will be and those I want to have eventually.
- I have investigated customer needs for other products and services at the filling station.
- I have a plan for how customers can obtain information and instructions.
- I have found the best location based on customers’ needs.

## FINANCES

### THE BUSINESS PLAN RULES

- I have a documented business plan.
- I have calculated my business case and performed a sensitivity analysis — and understand the results.
- I have done a risk analysis, including a SWOT analysis.
- At least one qualified person has read my business plan and provided feedback.

### CULTIVATING THE MARKET

- I know who my main customer is and what the volume trend looks like.
- I have one or more contracts with a sufficiently large volume of pre-sold gas.
- I know what the replacement plan for the larger vehicle fleets in my area looks like.
- My plan for cultivating the market is complete. There are concrete activities that are being carried out.

### BUSINESS CASE

- I know what the profitability of my intended investment looks like.
- I know which parameters in my business case affect profitability most - and consequently my sensitivity analysis.
- The business case fulfil both my own and the investors' requirements for profitability.

### FINANCING

- My financing is 100 per cent solved — with capital of my own, loans and grants.
- I have applied for and received any investment grants needed.

## GETTING STARTED

### CHOOSE A SYSTEM

- I have investigated the systems available today.
- I know which system suits me and my customers.

### PLANNING AND DESIGN

- My planning is complete.
- There is plenty of room for replacing or filling gas storage without compromising traffic safety.
- Traffic will flow freely without a problem.
- I have identified all permits that are required and they have been granted.

### SIGN CONTRACTS

- I have a signed, long-term contract for purchases of CNG/LNG at the right price.
- I have signed, long-term contracts with at least one customer for CNG sales at the right price — which is price-indexed.
- I have a contract for backup in case problems with regular deliveries arise.

### PURCHASING WISELY

- I know whether I should use a functional or directed procurement.
- I have made a procurement/purchase based on a choice of a system and safety regulations.
- It is possible to get service for my station, with a response time that I am prepared to pay for.

### START CONSTRUCTION

- The construction of my filling station follows all safety regulations.
- I have bought a shovel for the ground-breaking ceremony.
- I have lined up a well-known and popular person to formally open my filling station.

### EVALUATE

- I know how my customers perceive my services.
- I have updated my business plan.
- I have conducted a financial follow-up.



# BioGaC – Refuelling the Future

The expansion of CNG and LNG in northern Sweden is limited by several important factors. There is no natural gas network for easy distribution, and in 2014 there were only five filling stations for CNG. These are difficult challenges that the BioGaC project has chosen to tackle.

The BioGaC project has supported the development of biomethane as a fuel throughout Europe. We have improved the infrastructure and increased the number of filling stations for CNG in northern Sweden. This helps increase the market for CNG-powered vehicles and CNG.

In this innovative guide we have summarised both our own experience and that of others with the process of opening filling stations for CNG and LNG.

The BioGaC guide, project report and contact information are available at [biogac.eu](http://biogac.eu).

## COLLABORATION & FUNDING

The BioGaC project has been run by Skellefteå Municipality along with seven partners. The project has been funded by Trans-European Transport Network (TEN-T), Region Västerbotten and the Västernorrland County Administrative Board.



COLLABORATION

### PARTNERS



Piteå kommun



ÖRNSKÖLDSVIK  
KOMMUN



Sundsvalls  
kommun



HÄRNÖSAND  
ENERGI & MILJÖ  
*– Du kan lita på oss!*

AC Fordonsgas

A Member of  
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BioFuel Region™

### LEAD PARTNER



Skellefteå  
kommun

### FUNDING



REGION  
VÄSTERBOTTEN



Länsstyrelsen  
Västernorrland



Co-financed by the European Union  
Trans-European Transport Network (TEN-T)

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REGION  
VÄSTERBOTTEN



Länstyrelsen  
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[www.biogac.eu](http://www.biogac.eu)