



Energy for Peace & Prosperity

**SAARC
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**Online Capacity Building of SAARC Professionals on
Commercial Scale Biogas Plants
August 23-27, 2021**



Feasibility and scalability of biogas plants I: concepts and methods

Aug. 26, 2021, 2:30 – 3:25 pm

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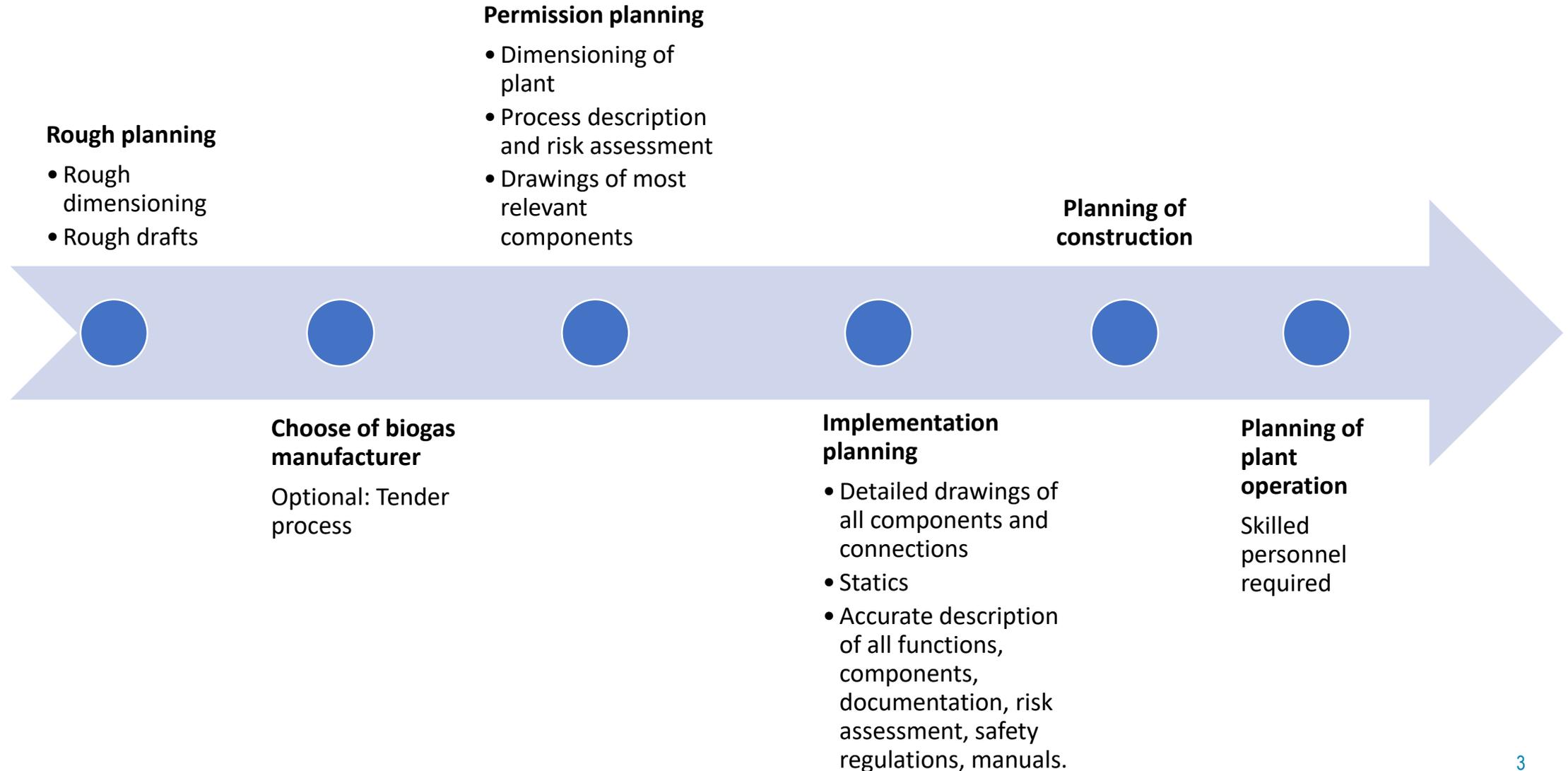
Contents

- Steps
- Planning
- Prefeasibility Study
- Due Diligence
- Permissions and Stake Holders

Learning objectives:

- Participants will learn about how the feasibility of the overall biogas project is performed
- Important factors to be considered during a feasibility study
- Participants will learn difference between the plant and a project

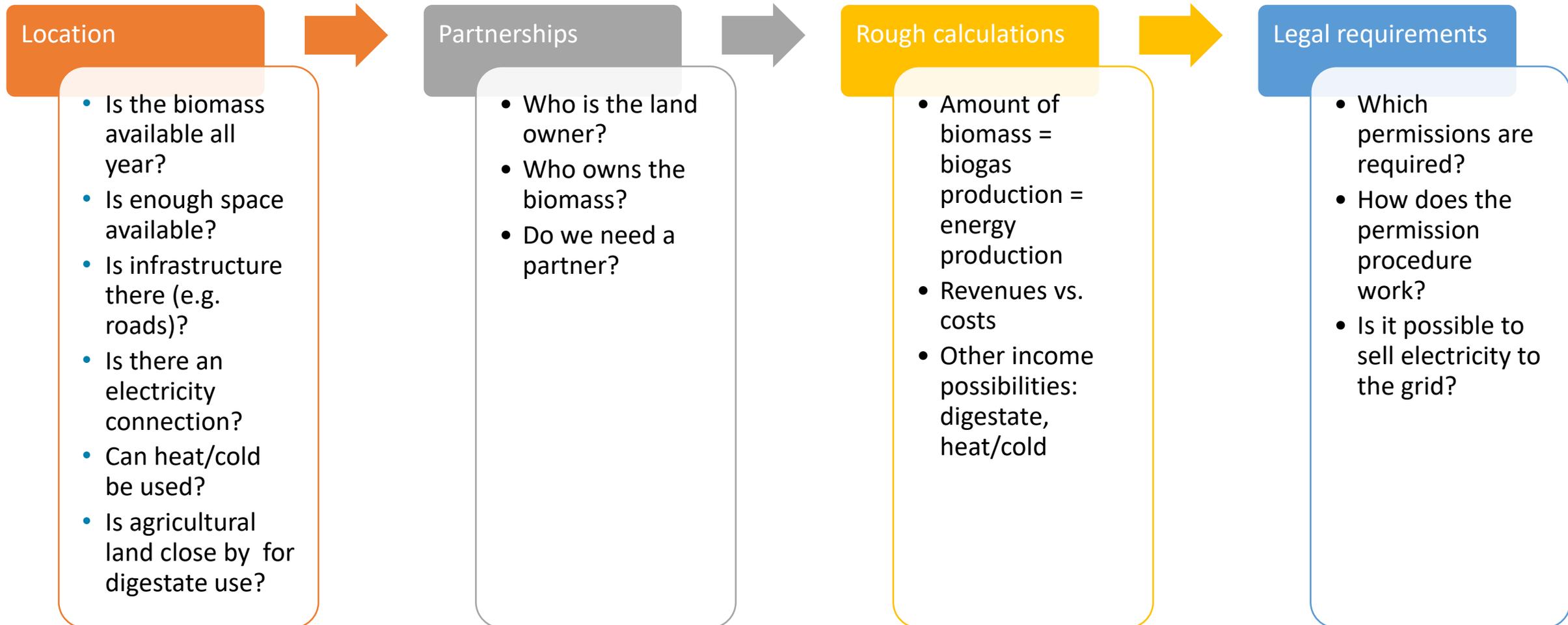
Steps when planning a biogas plant



Rough planning – The first project idea



Asking the right questions:



Pre-Feasibility study

- The involvement of a biogas expert is highly recommended!
- The result of the Pre-feasibility study is a report with the main aspects needed in order to make further decisions to go for the FDPR or not
- A Pre-feasibility study should indicate:
 - ✓ Assessment of different Raw material for the biogas plant
 - ✓ Quantity of raw material available
 - ✓ Availability of each raw material (Yearly/Seasonal/Daily)
 - ✓ Qualitative analysis of the raw material
 - ✓ Source of supplying of raw material
 - ✓ Total biogas generation potential for setting up the CBG plant
 - ✓ Recommendations for next steps

Feasibility study

- The involvement of a biogas expert is highly recommended!
- The result of the feasibility study is a report with the main aspects needed in order to make further decisions
- A feasibility study should indicate:
 - ✓ Investment proposal,
 - ✓ Total biogas generation potential (including all raw material required and output from the same)
 - ✓ Possible and appropriate technologies,
 - ✓ Respective technical specifications (including sizing of digester, capacity of purification and compressor) and
 - ✓ The cost estimate, economic viability/pay back/break even period, and O&M cost
 - ✓ Advantages and disadvantages of each technological option
 - ✓ Rating of the options
 - ✓ Risk assessment
 - ✓ Recommendations for next steps
- ➔ For bigger projects with higher investments an additional Due Diligence might be required

Due Diligence

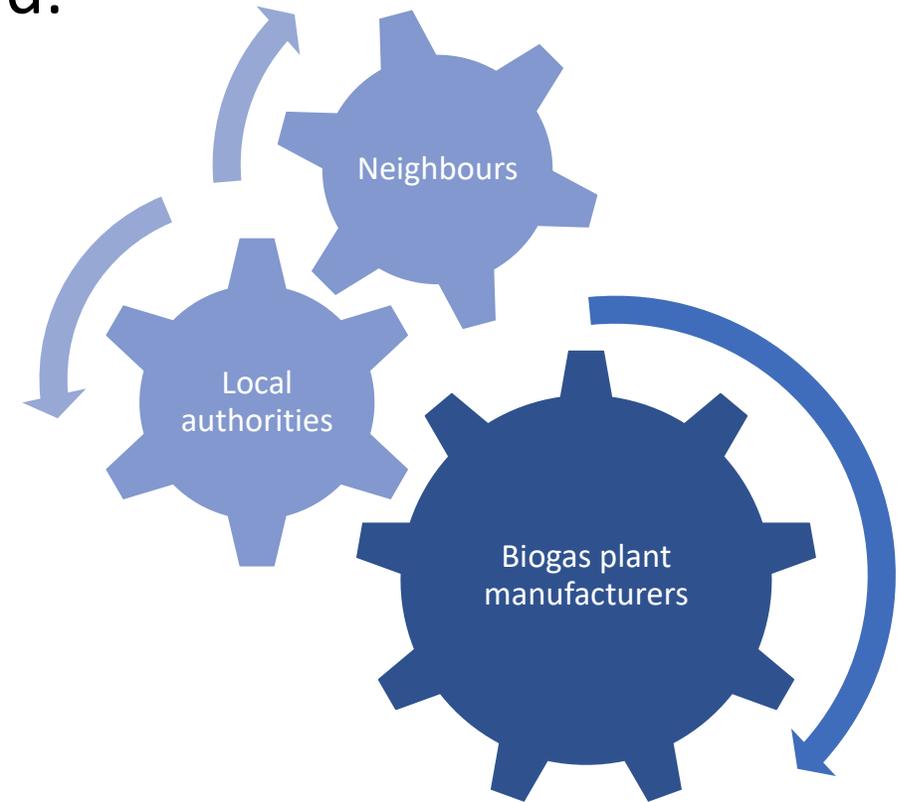
- Is a report performed by an independent expert.
- It covers similar aspects as the (pre)-feasibility study but
 - only for the best option.
 - with more precise understanding of the topic and
 - more detailed calculations
- The result is a report in order to convince investors, banks and authorities to support the project.
- It contains recommendations for next steps within the project



Getting in touch with stakeholders

It is highly recommended to conduct a stakeholder analysis in advance, which should:

- identify the most important stakeholders and all relevant parties,
- determine their possible interests in the project,
- determine how they might influence other stakeholders,
- identify potential risks,
- identify the key persons to be informed,
- identify negative stakeholders (and their adverse effects on the project).



Permissions / licenses you need in India

Topics which should be considered regarding permissions for biogas plants:

Phase	Approvals	Few of them are
A	Approvals before start of Plant	Loan approval (optional), MNRE (Optional for subsidy) CLU, PESO, CTE-Pollution Dept., Fire dept. etc.
B	Approvals During construction	Water and Power Connection, etc.
C	Approvals after construction of plant	PESO, CTE-Pollution Dept., Agri Dept. etc

Get informed on the permission procedures for your country/area

Involve authorities right from the start

What has to be fulfilled in order to get an approval?

What kind of information is needed?

Why is precise planning of an biogas plant so important?

If the right questions are not answered at the beginning of the project, it will fail!

→ In India, biogas plants are built to run for 15-20 years and more

- Devices and machinery must be designed for a long period
- Subsidiary supply contracts are designed for a period of 10-20 years with a price adjustment clause
- Permits are also required for this period
-

Experiences with several thousand biogas plants show that the better the planning, the more successful a project will be.

→ Therefore it is highly recommended to involve an interdisciplinary team of experts.

→ Project development costs are approx. 10% (+/-5%) of the investment costs.

→ Planning takes a lot of time, somewhere between 9 and 36 months.

Necessary expertise for operating a biogas plant

Biogas plant manufacturers should supply a complete documentation regarding:

- Overall description of the plant
- All construction and technical drawings
- Operation manual for each component
- Manual for whole plant operation including an action plan for unplanned situations
- Check lists, daily, weekly, monthly, annual
- Safety documents



It is absolutely necessary to employ trained workers and to instruct and train them on a regular basis and not only once!

Plant operation and maintenance

When operating a biogas plant documentation and regular checks should be done:

Operation diary

Biomass input (quantity and quality)

Gas production (quantity and quality)

Energy production

Non-planned operation

Hazards

Maintenance and control

Daily, weekly, monthly, quarterly and annual checks.

See documentation of the plant

Typical factors for maintenance work:

CHP	Input feeder
Pumps	Stirrer
Process parameter	Foam

A biogas project is only successful if the biogas plant works!

Technical success factors

A biogas project is only successful if the biogas plant works...

...in a reliable way,

- biogas production 8760 h/a
- CHP about 8.200 h/a
- biogas upgrading to biomethane 8,600 h/a

....in an efficient way

- High gas yields
- Optimized energy utilization, low parasitic load (electrical consumption below 8%)
- Optimized reactor load

...and at least for the calculated lifetime of the project

- Lifetime could be more than 20 years, but 12 years typical

Conclusions

- A biogas plant is a complex industrial building!
- Experiences with several thousand biogas plants show:
 - that the better the planning, the more successful a project can be.
 - it is better to invest more in a reliable plant than buying a low cost technology with low performance parameters.
- Most important is the reliable, stable and safe operation with low maintenance effort and low still stand time.
- Project development costs are around 10% (+/- 5%) of the investment costs.
- Planning needs months, usually between 9 and up to 36 months (from first idea to operation).
- The operating staff and the plant owner need profession
Training and periodic retraining are important!!!





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Thank you

