

# Dissemination of biogas system solutions in the Global South

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Nordic Biogas Conference - Session 3B

*International dissemination of biogas systems solutions*

# Agenda

- Introduction
- Why is the Global South interesting?
- Demand side - Biogas contexts in the Global South
- Supply side - Swedish biogas sector
- Conclusions

# Introduction

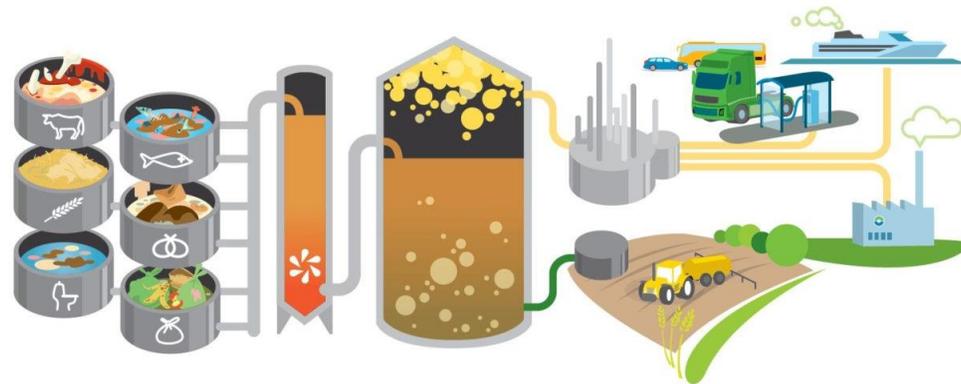
- Nordic Biogas Model can be of great interest in many parts of the world
  - Organic waste is digested
  - Biogas is upgraded for transportation
  - Digestate can be used as fertilizer
- Biogas systems could help achieve several of the SDGs



# Introduction

However, the Nordic Biogas Model requires certain conditions for successful implementation

Overall question: How can the Nordic Biogas Model be implemented in different international contexts?



# Why is the Global South interesting?

- Large un-explored resources for biogas production
- Need for proper waste management, energy, and food security
- Opportunity for more transformative sustainability impact
- It is a more challenging context (e.g., informal and unstable institutions)

# Global South

To analyze the diffusion of biogas systems in the Global South, we need to understand how the different environments and the biogas systems influence each other.



User



Business



Regulations



Culture



Translocal

# Sweden

## Biogas production

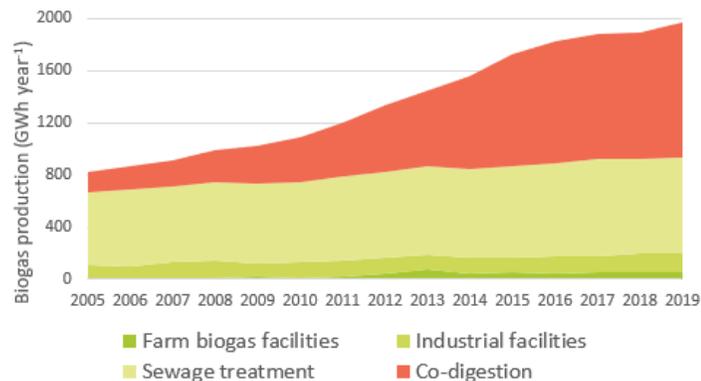


Figure 1. Biogas production in Sweden according to the energy produced in different sectors. Biogas production from landfills and gasification is not included in the figure. Source: SEA.

## Anaerobic digestion units

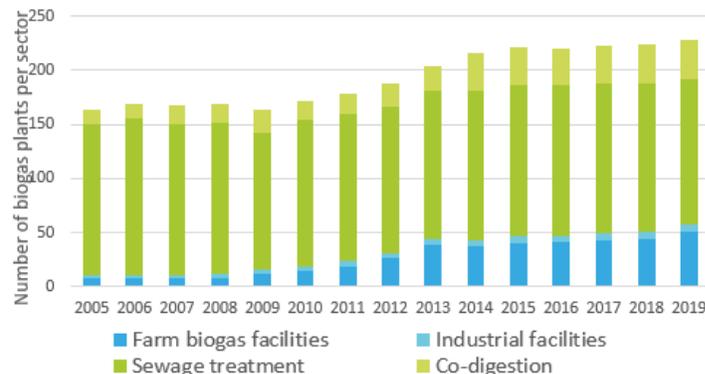


Figure 2. Number of anaerobic digestion units per sector in Sweden. Source: SEA.

## Biogas use

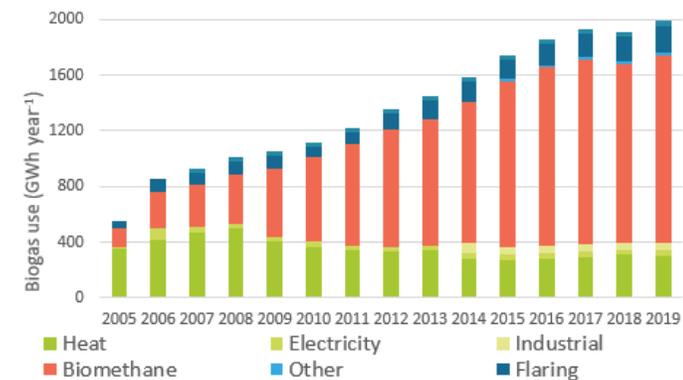


Figure 3. Use of biogas produced in Sweden. Source: SEA.

# Paraná

## Biogas production

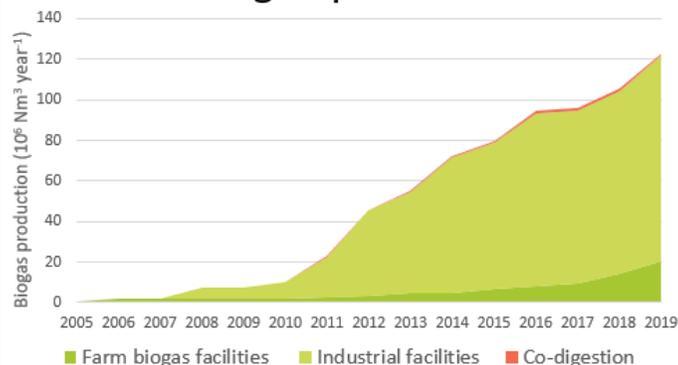


Figure 4. Biogas production in Paraná according to the volume produced in different sectors. Biogas produced from sewage and landfills is not included in this figure. Source: CIBioGás.

## Anaerobic digestion units

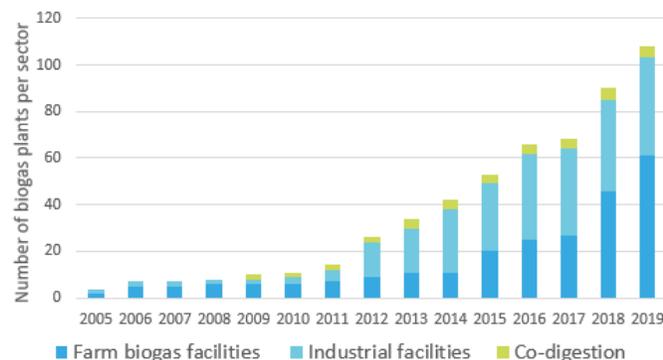


Figure 5. Number of anaerobic digestion units per sector in Paraná. Source: CIBioGás.

## Biogas use

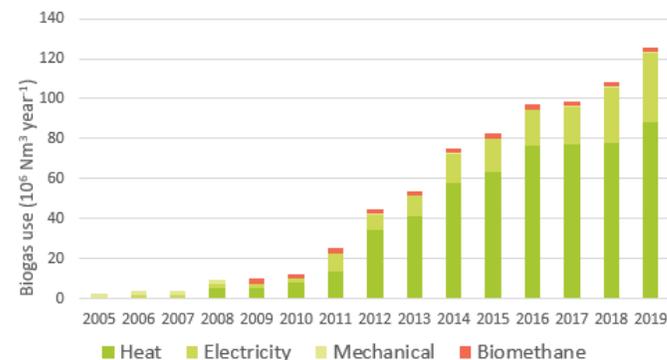


Figure 6. Use of biogas produced in Paraná. Source: CIBioGás.

# Different context across Brazilian states

- Interactions between different environments and local biogas systems differ across different administrative levels and sectors
  - Biogas actors change the context to fit biogas systems
  - Biogas actors change the biogas system to fit the context

## User environment – Paraná

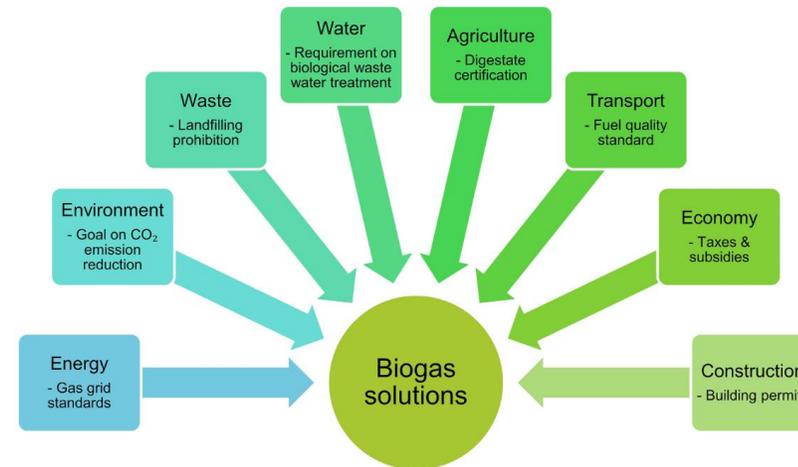
The adoption of farm-based biogas systems in Paraná transforms the practices and routines of users

## User environment – São Paulo

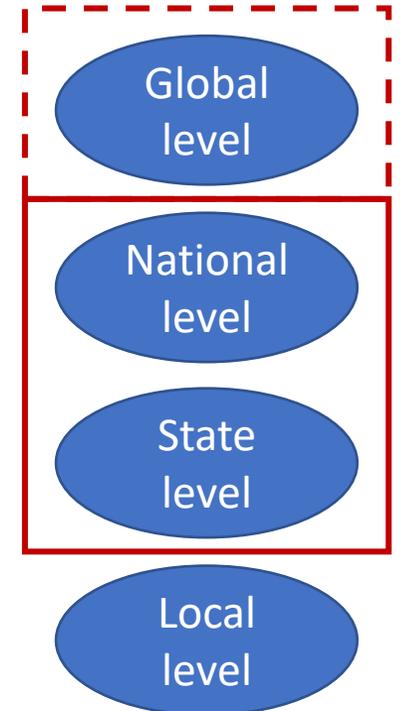
The adoption biogas systems in the sugarcane industry (ethanol) fits the practices and routines of users

# Policy coherence in a fragmented context

- Pre-conditions for biogas production, distribution and use differ considerably between the Brazilian states (Kanda, Zanatta et al., 2022)
- Biogas systems as being locally embedded constitutes a challenge in hierarchical market economies such as Brazil (Kanda, Zanatta et al., 2022)



Source: Gustafsson & Anderberg (2021)



# Socio-economic structures and system formation

## Sweden

- Municipalities as core actors



- Collaborative and complex systems
- Trust based relations



- Bottom-up
- State as supporter



## Paraná



- State organizations as core actors



- Vertical integration: private actors that control the value chain



- Top-down
- State as coordinator

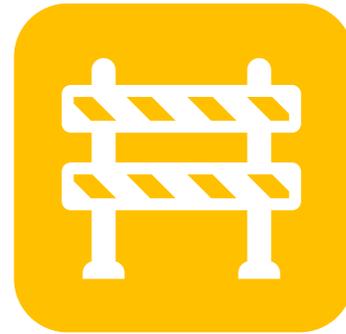
# Supply side - Swedish biogas sector



Business  
models



Target  
countries

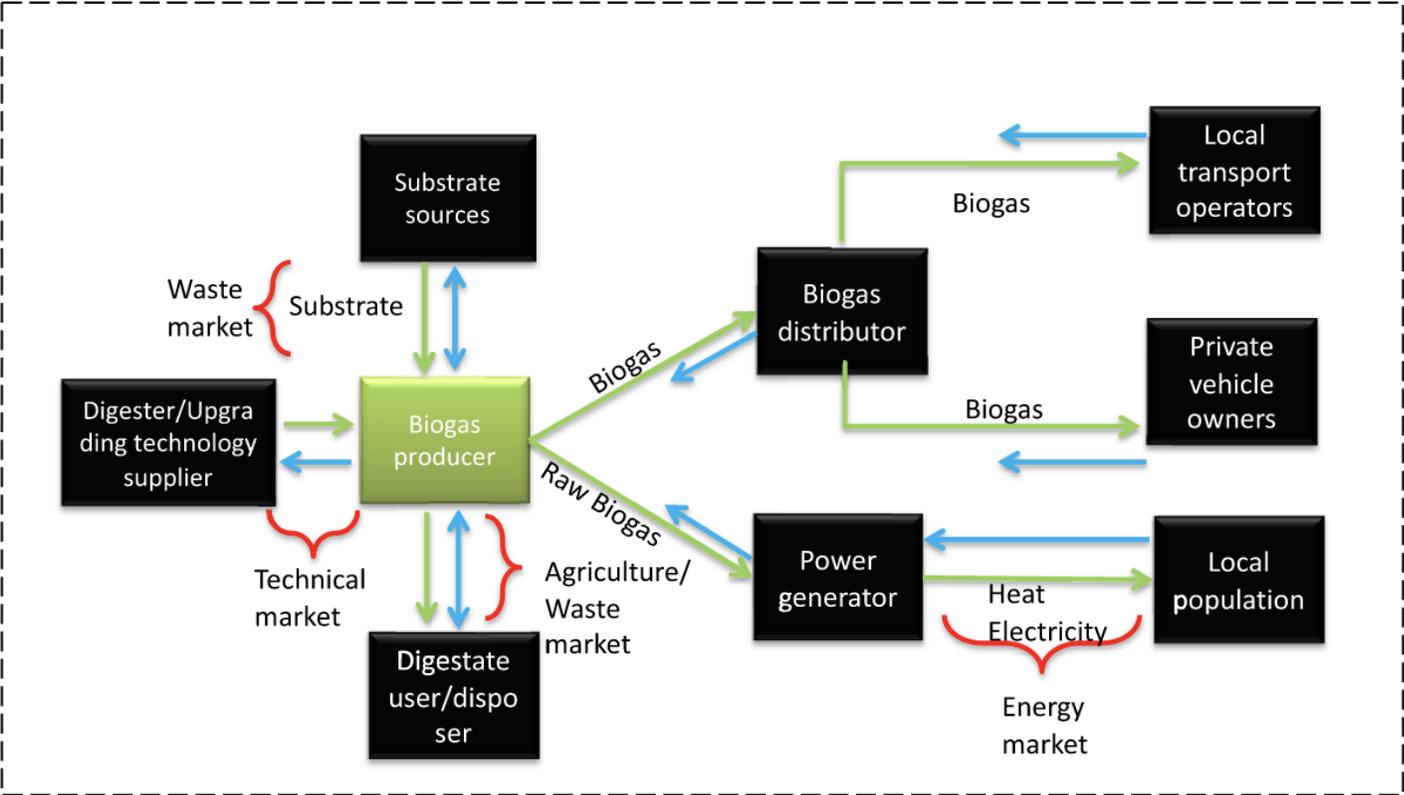


Export  
barriers

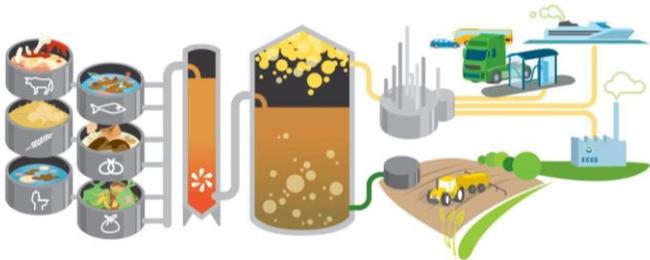


Government  
support

# Supply side - Swedish biogas sector



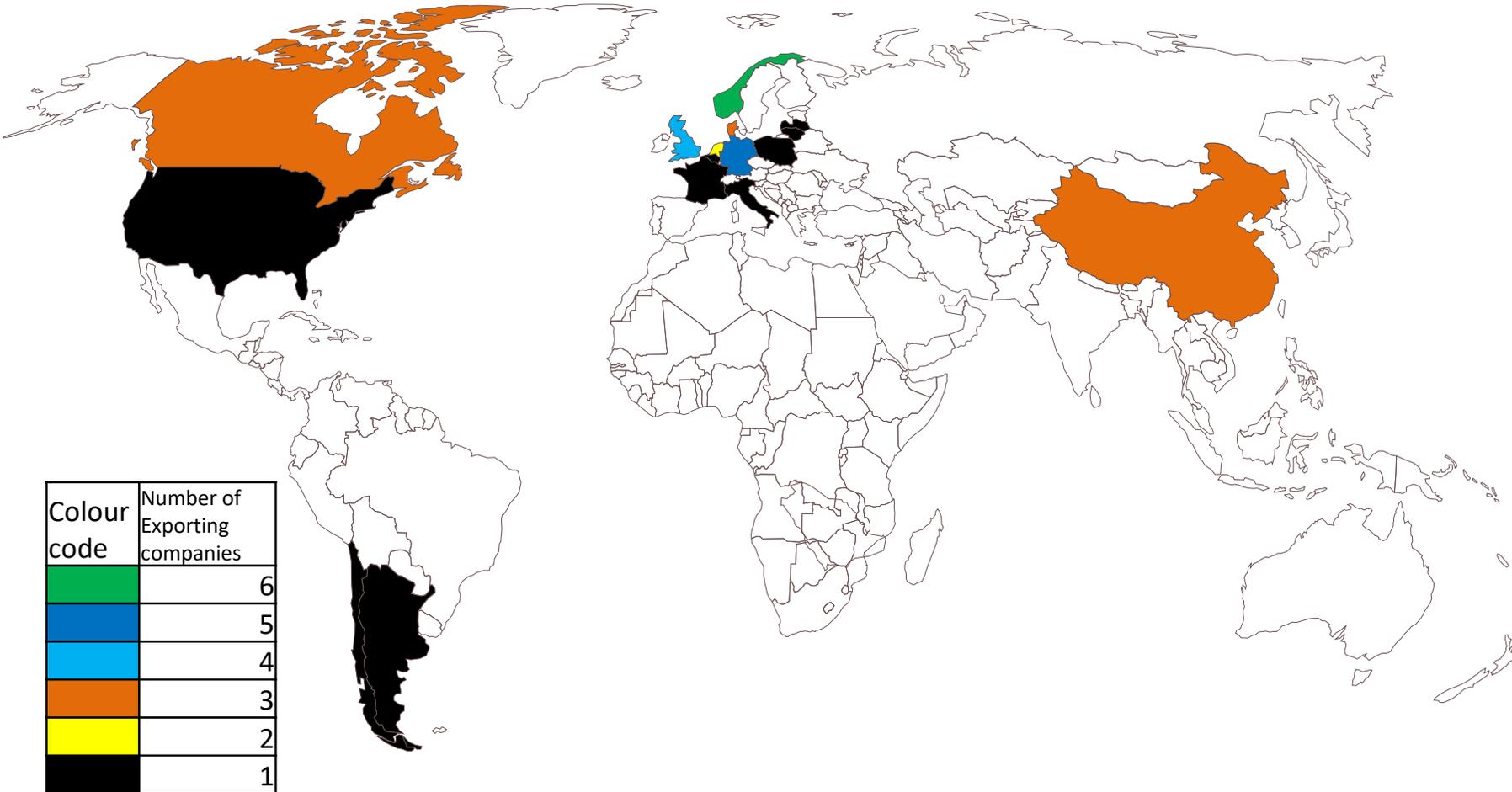
Very rarely is the entire biogas system solution exported.



--- Business scope    { Market segment    → Product and /or service flow    → Cash flow

(Kanda et al., 2022)

# Target countries for export



Swedish biogas companies focus on the Global North.

(Kanda et al, 2020)

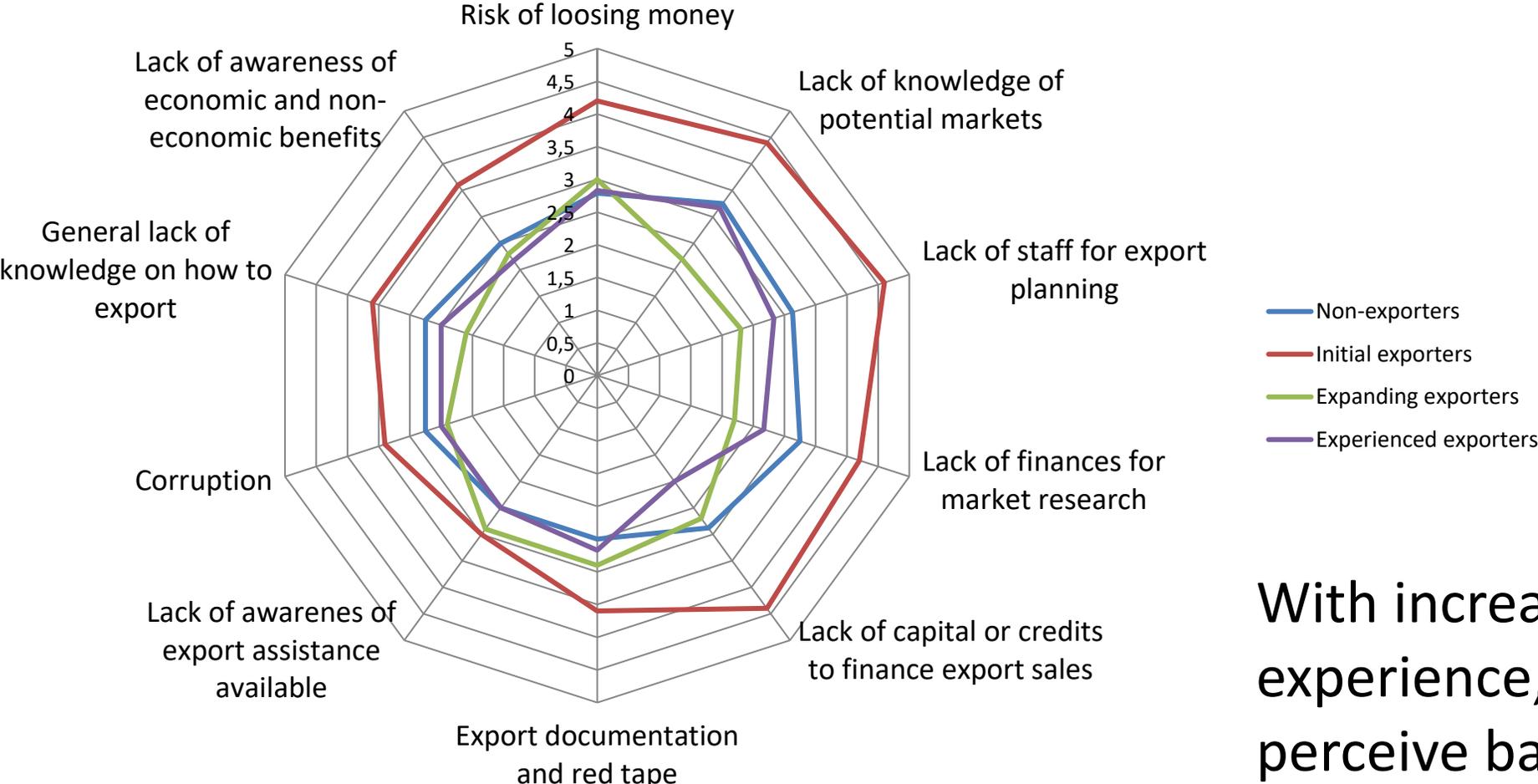
Number of companies exporting to various markets: Norway (6), Germany (5), England (4), Denmark (3), China (3), Canada (3), Netherland (2), Italy (1), Chile (1), Slovenia (1), USA (1), Argentina (1), France (1), Belgium (1), Poland (1), Lithuania (1), Latvia (1)

# Publicly funded biogas internationalization projects (2009-2017)

Funding Agency(ies)	No. of projects	Total financing	Target markets
Energimyndigheten	13	SEK 37.501, 800	<b>USA, India</b> , Philippines, Adaman Islands, Indonesia
Vinnova	5	SEK 3. 000, 000	General export, Developing countries,
Business Sweden and SKL	2	Not detected	Zambia, China
Tillväxtverket	1	SEK 100. 000	Vietnam
SIDA	1	SEK 6. 800, 000	China
Vinnova and Energimyndigheten	1	SEK 690. 877	China
SIDA and Tillväxtverket	1	SEK 1.800, 000	Indonesia
SIDA and Energimyndigheten	1	SEK 341 000	India

Public funding for biogas projects targets the Global South.

# Comparing barriers to internationalization



With increasing export experience, companies perceive barriers as less challenging.

(Kanda et al, 2020)

# Conclusions

How can the Nordic Biogas Model be implemented in different international contexts?

- **Adaptation:** the Nordic Biogas Model needs a local touch.
- **Collaboration:** between Nordic and local actors.
- **Differentiated government support:** for Global North and South.



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