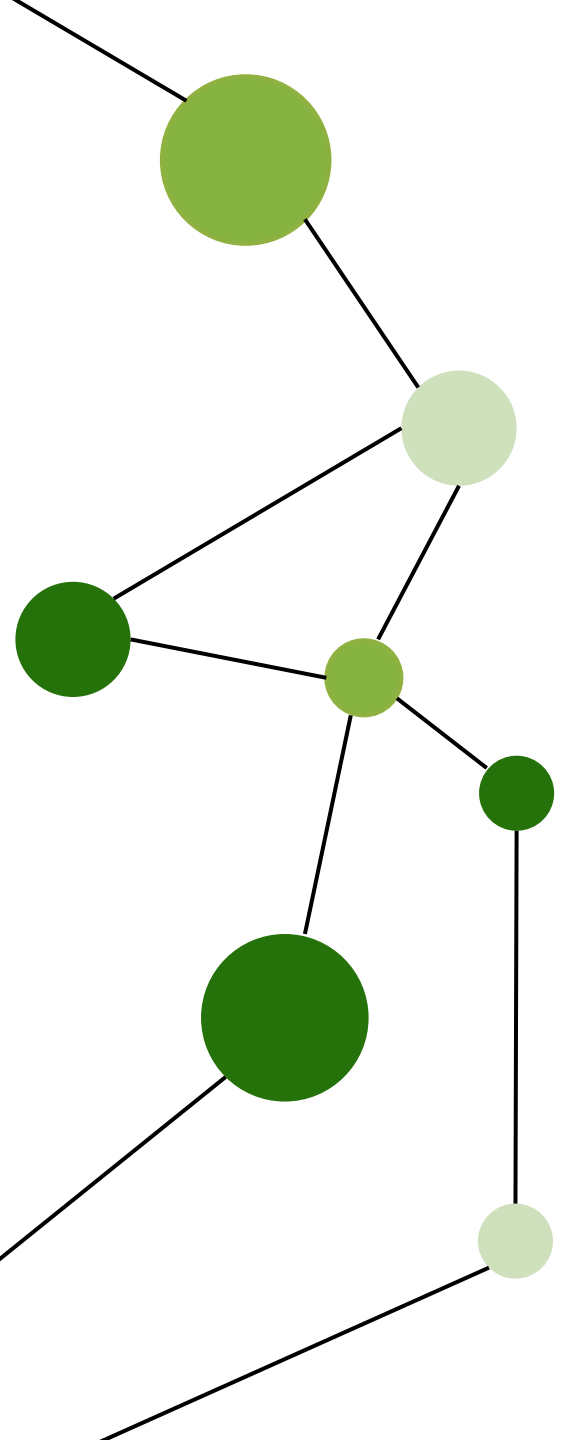
EXPLORING STAKEHOLDER COLLABORATION IN LOCAL ENERGY SYSTEMS

P5 Presentation - Floor Berkouwer

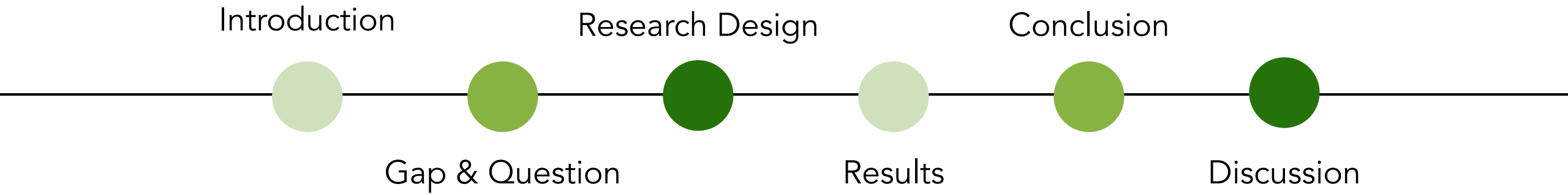


TU Delft Delft University of Technology

FAKTON ENERGY

A research on the underlying factors influencing stakeholder collaboration, to improve the further deployment of local energy systems on Dutch business parks.

Content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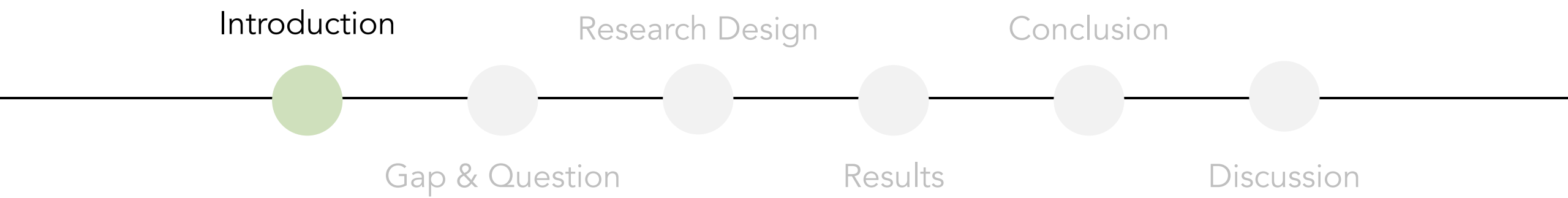
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"Because we want to be ready by 2050"

- Fakton Energy

"Because we want to be ready by 2050"

- Fakton Energy

Moving towards a more sustainable world by;

Reduction in carbon emissions

1. Reduce energy consumption
2. Covering the remaining energy demand with renewable energy sources

"Because we want to be ready by 2050"

- Fakton Energy

Moving towards a more sustainable world by;

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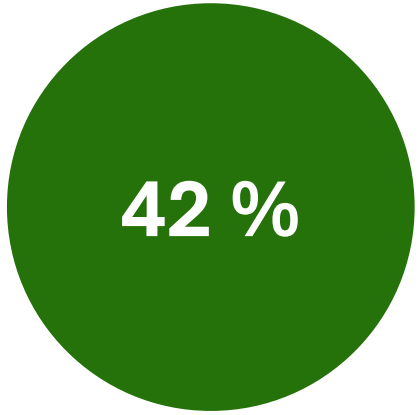
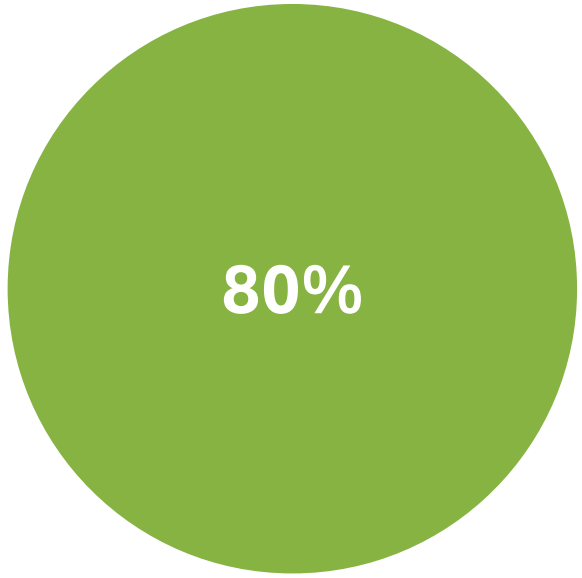
The Built Environment



of global energy use

of global greenhouse gas emissions



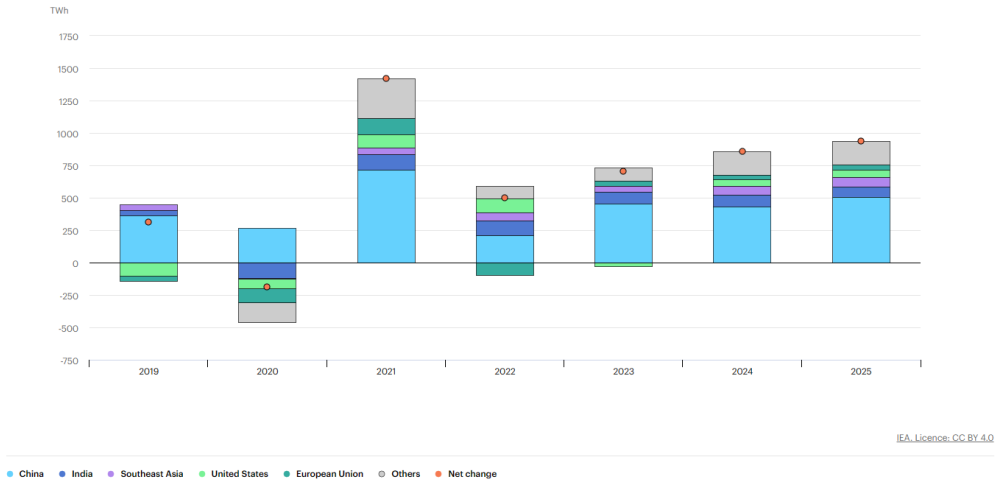
of the building stock in 2050 are existing buildings

Energy transition

Away from fossil fuels, towards renewable energy sources

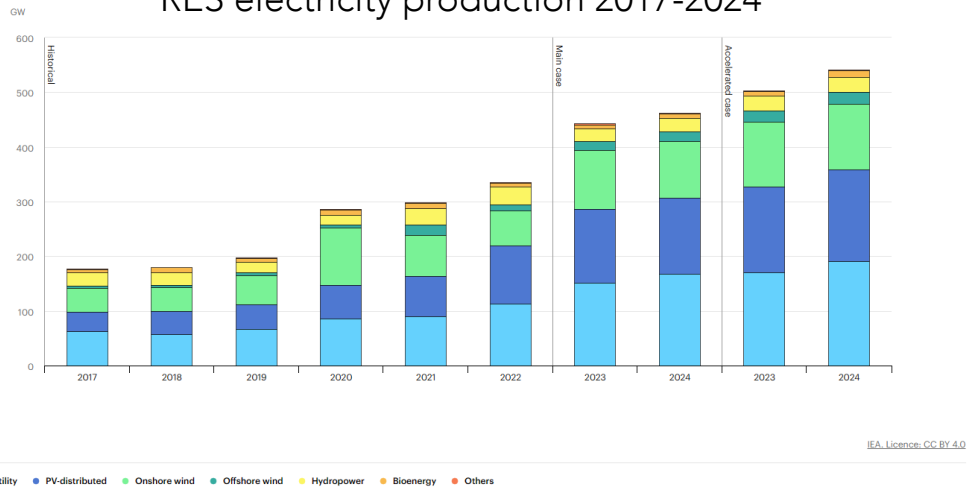
Increase in electricity demand

Global electricity demand 2019-2025



Increase in electricity supply

RES electricity production 2017-2024



(IEA, 2023)

Synergie!

Increase in supply ánd demand!

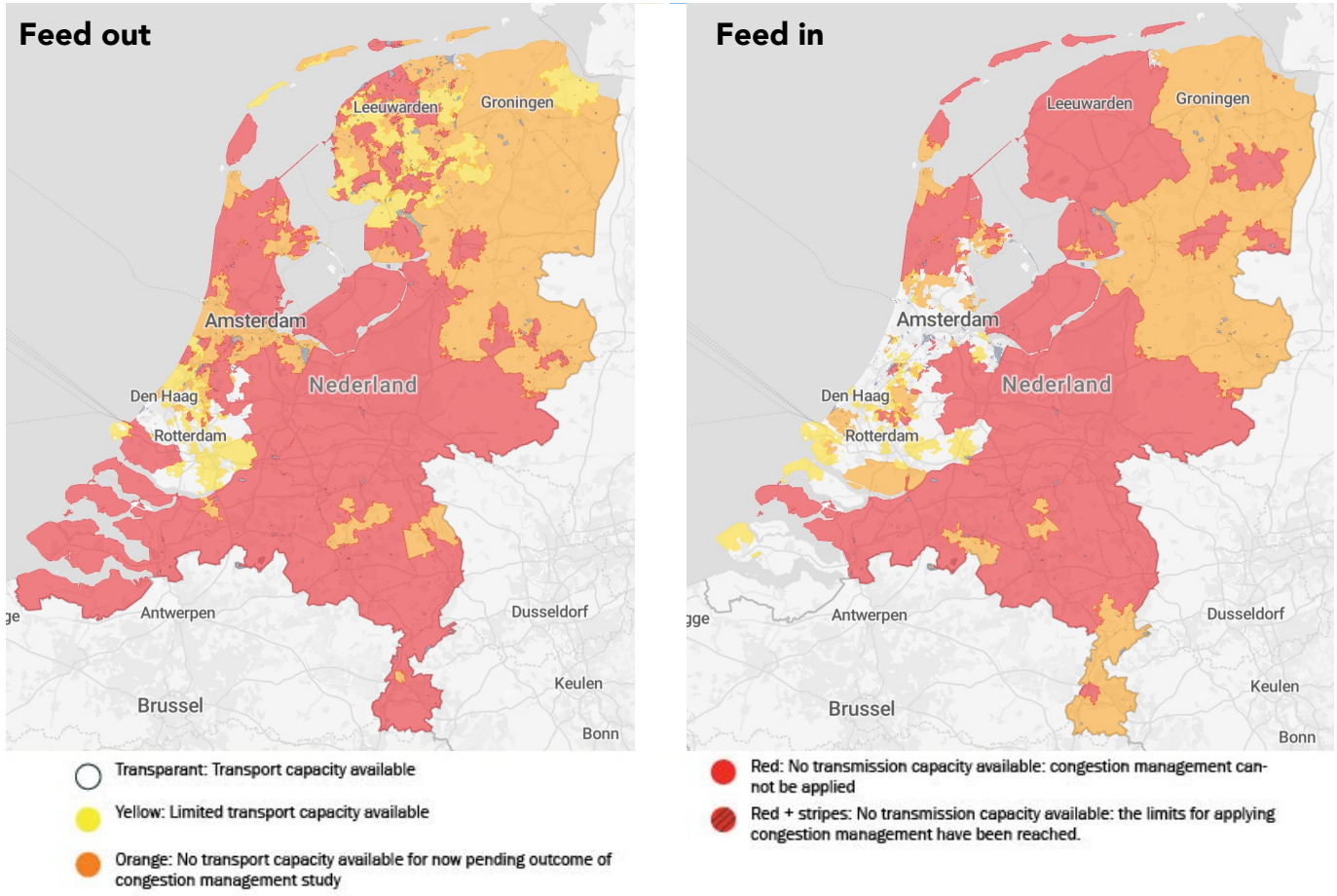
Net congestion

"the demand for the transmission of electricity, exceeds the available transmission capacity of the existing grid"

- Tennet

Net congestion

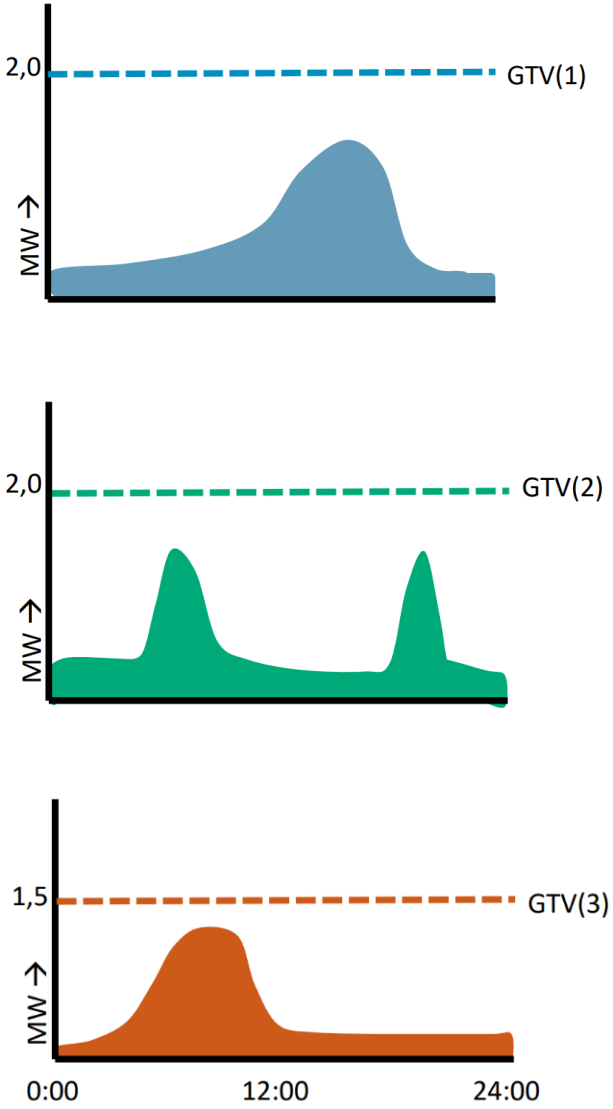
- Transmission demand exceeds capacity



(Netbeheer Nederland, n.d.)
Map retrieved on the 24th of June 2024

Net congestion

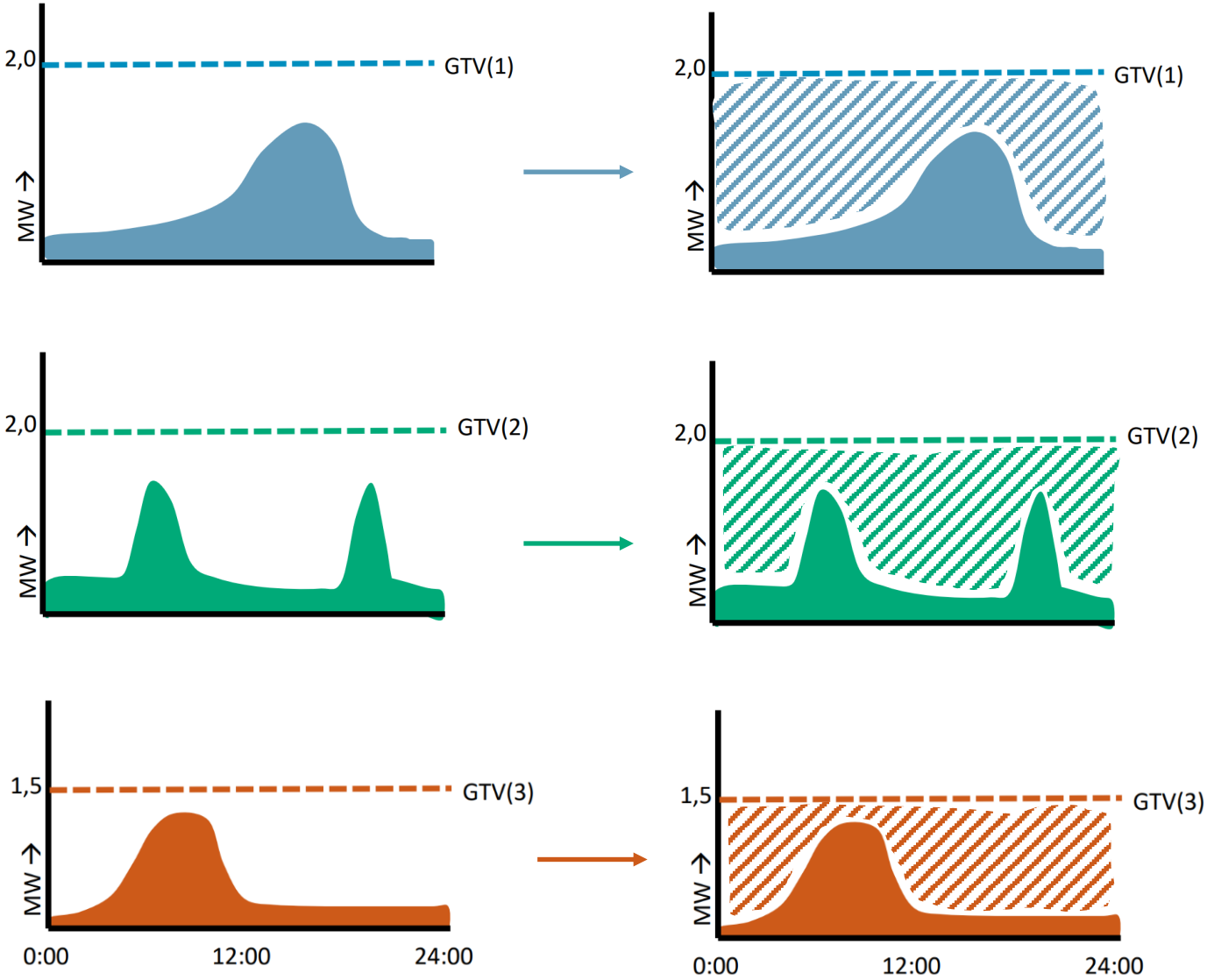
- Peak moments vs Contracted capacity (GTV)



(Netbeheer Nederland, 2023)

Net congestion

- Peak moments vs Contracted capacity (GTV)
- 'Free space'
  - *"The grid is only congested on paper"*



(Netbeheer Nederland, 2023)

Net congestion

Impact on the Built Environment

Voorlopige stop voor nieuwe grootverbruikers van elektriciteit in Noord-Brabant en Limburg

Leestijd
3 Minuten

Laatste update
12-7-2022

Congestie

NOS Nieuws • Donderdag 16 november 2023, 22:49 •
Aangepast vrijdag 17 november 2023, 19:22

Deel nieuwe huizen Almere niet aangesloten op stroom vanwege vol elektriciteitsnet

21 november 2023

#Bouwpraktijk

Bouwprojecten onder hoogspanning door netcongestie

Congestion prevention

- Expansion of the current grid
  - Too slow to keep up with electricity increase
- Peak shaving
  - Needs financial incentives
- Decentralization
  - Optimizing the 'free space'
  - Local energy systems, like smart grids/energy hubs
  - Most promosing alternative

Local energy systems

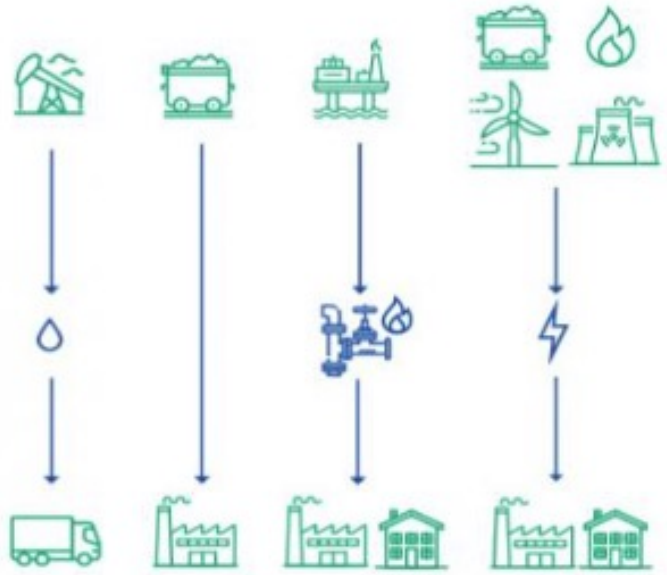
- Smart grid, energy hub, etc.
  - No single defintion

Local energy systems

"The local energy system is an energy system in which consumers can use, generate, and store electricity by using smart tools. Energy, data, and communication flows in both ways, in order to deliver sustainable, economical, and secure electricity supplies efficiently."

Local energy systems

The energy system today :
linear and wasteful flows of energy,
in one direction only

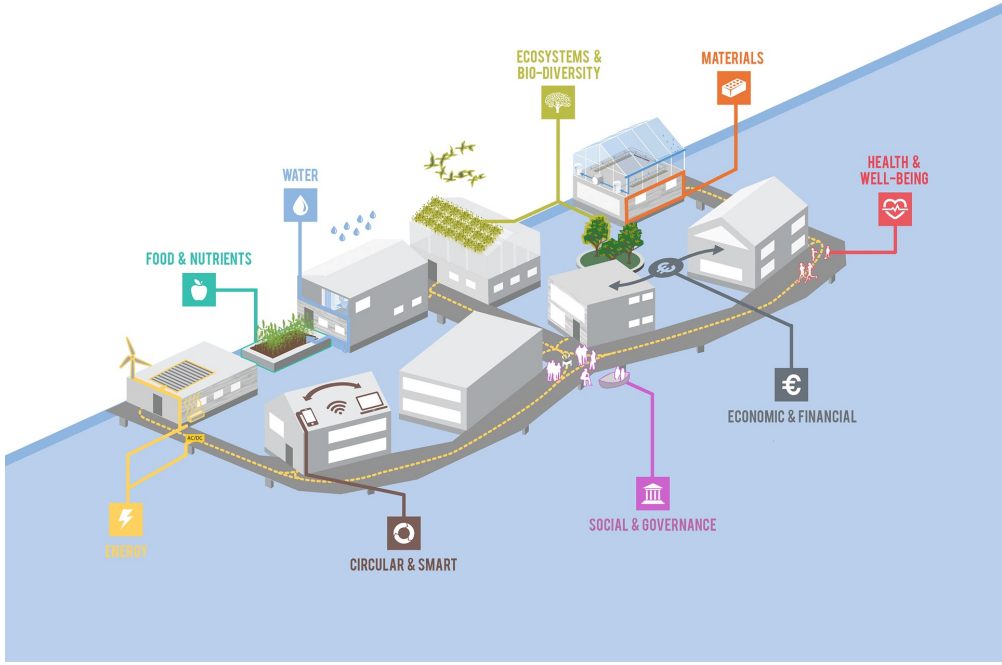


Future EU integrated energy system :
energy flows between users and producers,
reducing wasted resources and money

(European Commission, n.d.)

Local energy systems

- Smart grid, energy hub, etc.
  - No single defintion
- Lowering the burden on the main grid
  - In Schoonship, 1/5th of the normal capacity is needed (see project on the right)



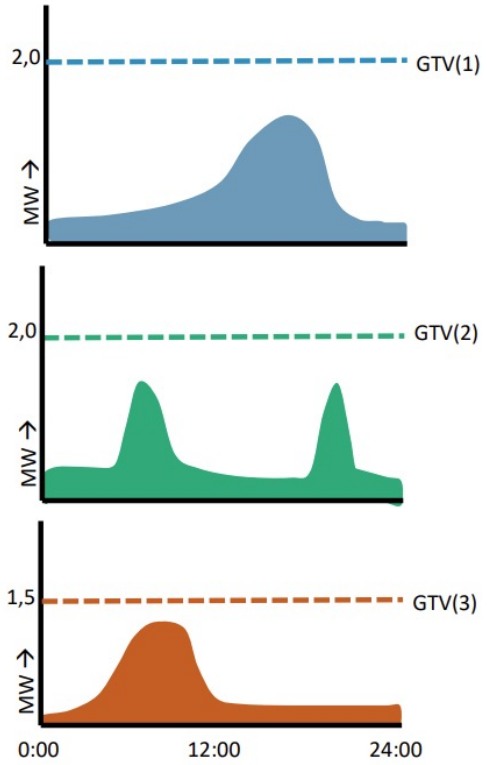
(Schoonschip Amsterdam, n.d.)

"Everyone who is still working on a solar panel field in East-Drenthe, is working against all laws of nature"

- Interviewee STP

Relevant legislation

- Electricity act 1998
- Experiments Electricity Act 2015-2018
- EU Legal Framework
- Group Contract
  - Shared capacity for business parks



(Netbeheer Nederland, 2023)

Relevant legislation

- Electricity act 1998
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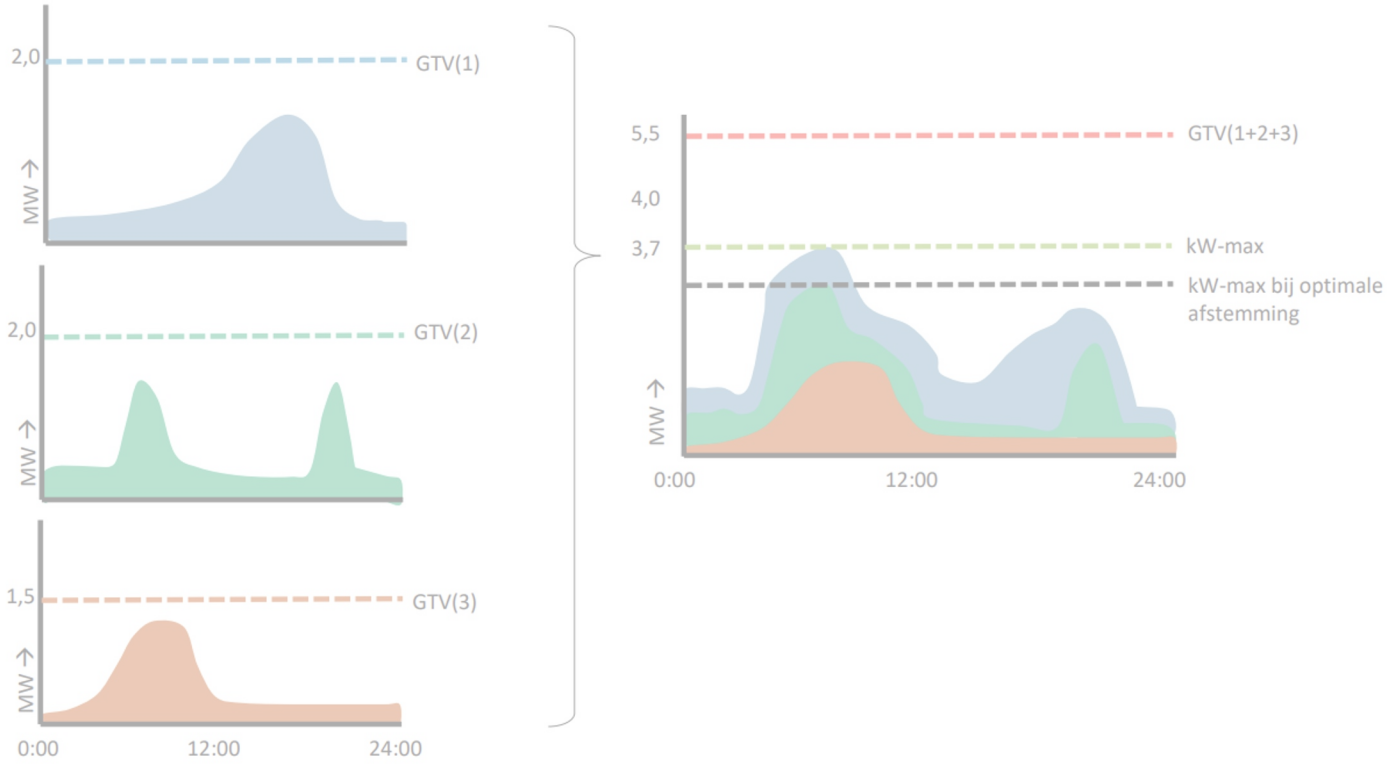
  - Shared capacity for business parks

↳ *Why business parks?*



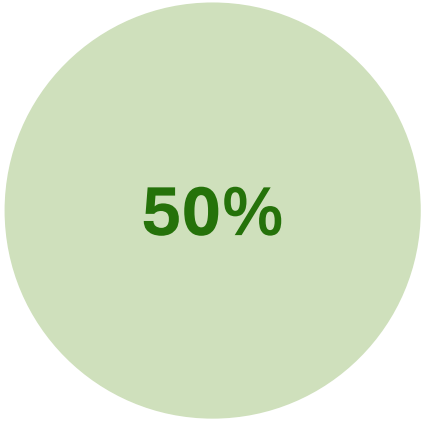
(Netbeheer Nederland, 2023)

Dutch Business Parks

- Industrial sector is one of the biggest contributors to the energy demand in the built environment
- Industrial buildings mainly grouped in business parks

of national electricity consumption

(TNO, 2022)



of national gas consumption

(TNO, 2022)

What's stopping LES?

Barriers of developing local energy systems on business parks

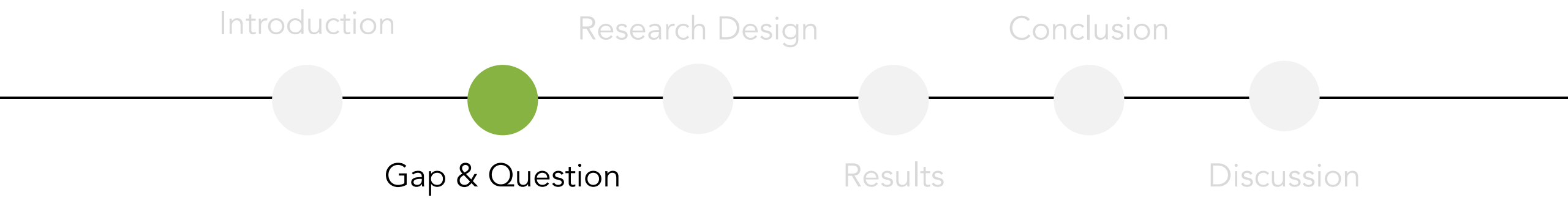
Low organizational structure and complex stakeholder process

- (CE Delft, 2023)

"Stakeholder acceptance and behaviour are crucial to the succes of energy flexibility in buildings"

- (Ma et al., 2019)

(CE Delft, 2023)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The research gap

The main barriers are focussed on the stakeholders and the multi actor processes.

However, there is little insight into stakeholder collaboration on business parks using a local energy system.

The research aim

Create a better understanding of these collaborational processes.

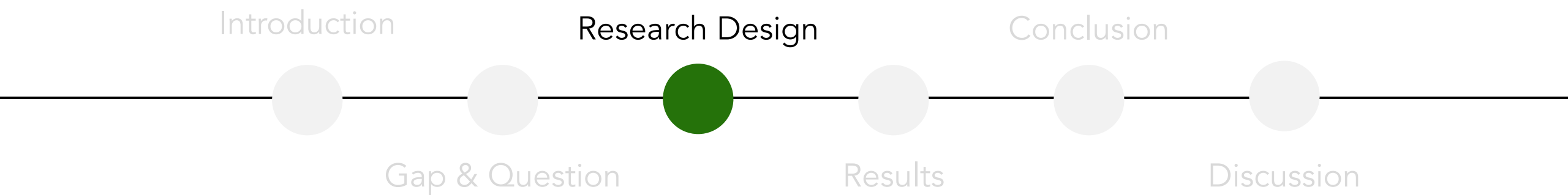
For further development of local energy systems, as a solution for net congestion.

This provides ground for the sustainable transition of our current building stock, and paves the way for future developments.

The research question

How can underlying factors influence stakeholder collaboration to improve further deployment of local energy systems on business parks?

1. *What factors stimulate the further deployment of local energy systems?*
2. *What are the current practices of collaboration on business parks?*
3. *To what extent do the actor-networks established in local energy system projects facilitate vision and learning activities?*
4. *What are the barriers and enablers within stakeholder collaboration?*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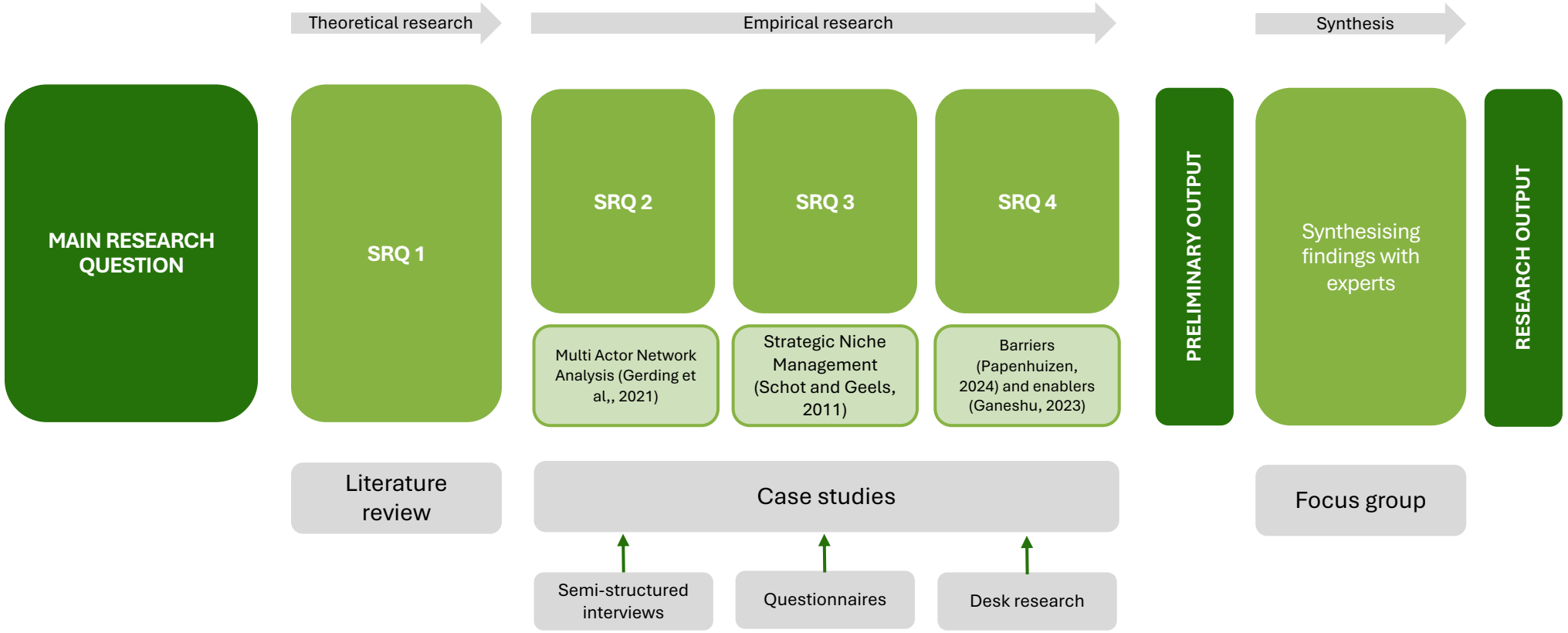
The research design



Research methods

- Literature review
- Case studies
- Interviews
- Focus group

Research methods

Literature review

Case studies

Interviews

Focus group

Background knowledge

SRQ1

Research methods

Literature review

Case studies

Interviews

Focus group

4 case studies -> individual and cross case

Desk research – interviews – questionnaire

SRQ2, 3 &4

Selection criteria

- Operational local energy system
- Diverse project initiator
- Diverse regional network operator

Research methods

- Literature review
- Case studies
- Interviews
- Focus group

Schiphol Trade Park (STP)

Slabbecoornpolder en Welgelegen

Tholen (THO)

Hessenpoort (HES)

Ecofactorij (ECO)

Research methods

Literature review

Case studies

Interviews

Focus group

Business park organization

Regional Network Operator

Municipality

External Advisor

Companies

Research methods

Literature review

Case studies

Interviews

Focus group

Business park organization

Regional Network Operator

Municipality

External Advisor

Companies

→ Questionnaire: Companies

Research methods

Literature review

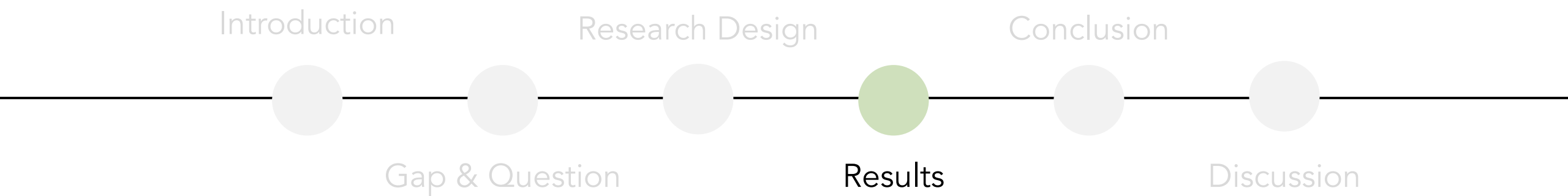
Case studies

Interviews

Focus group

3 experts

Validating results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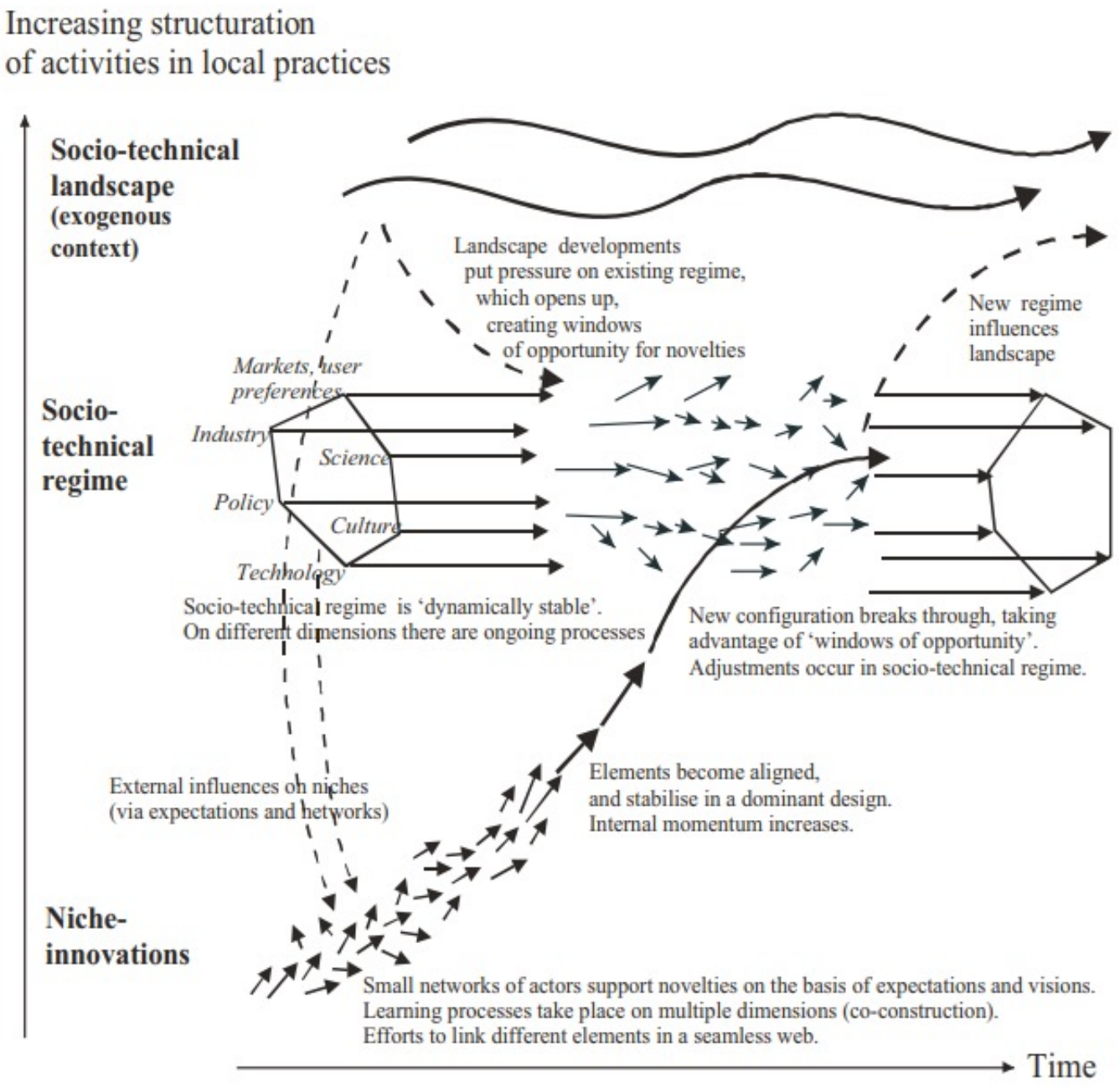
Theory

SRQ 1: “What factors stimulate the further deployment of local energy systems?"

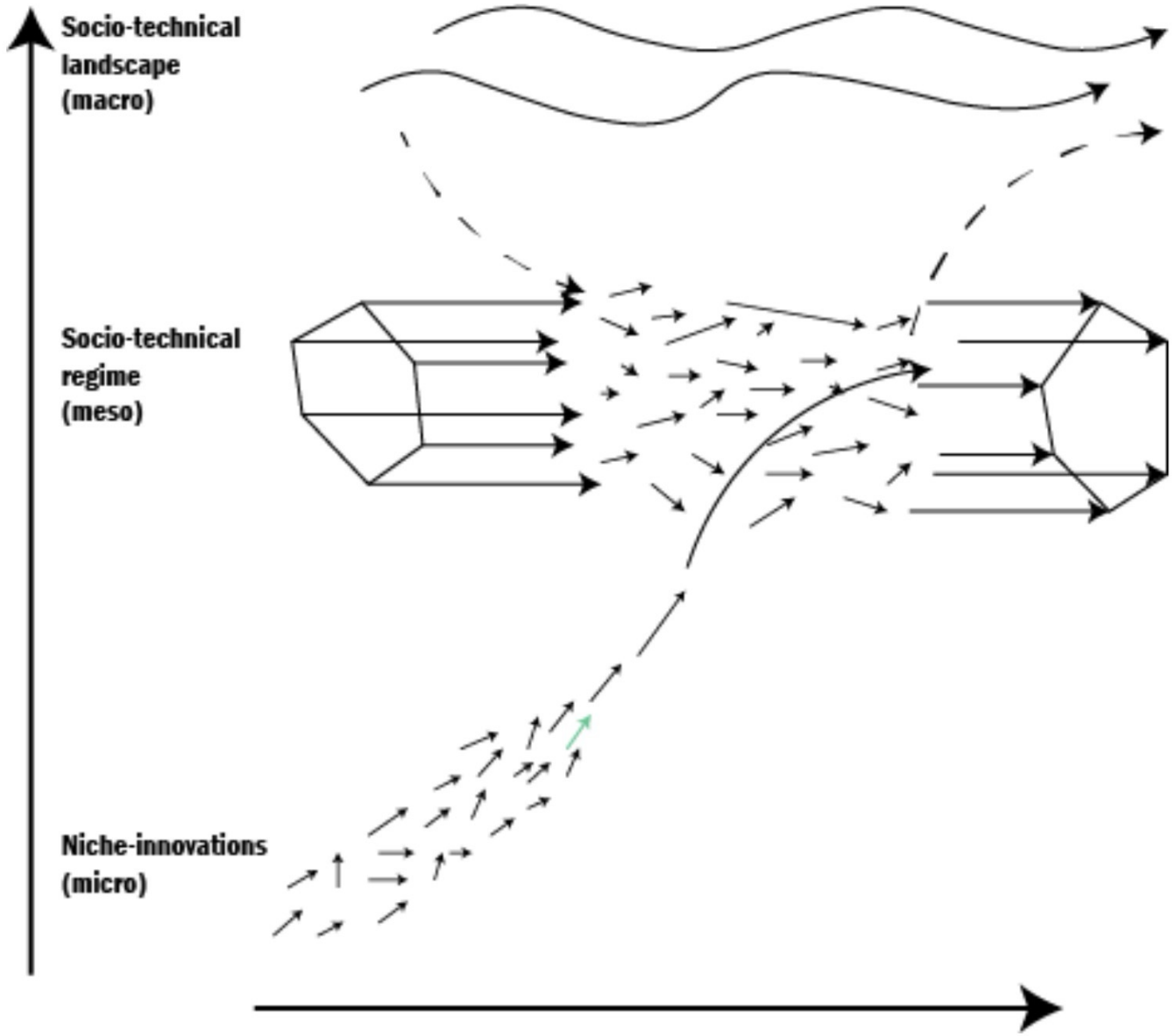
Literature review

The Multi Level Perspective Framework



(Geels, 2011)

The Multi Level Perspective Framework



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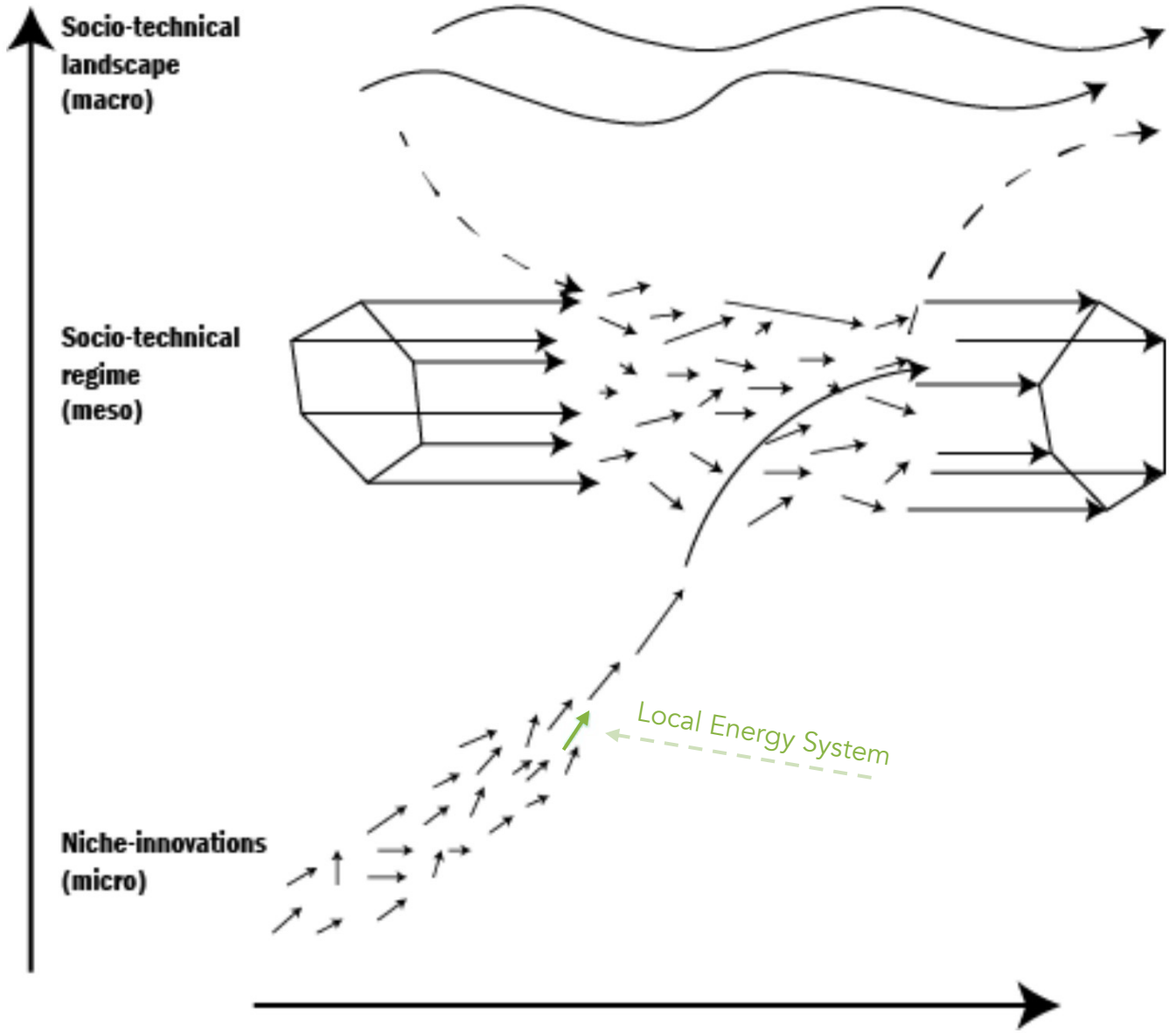

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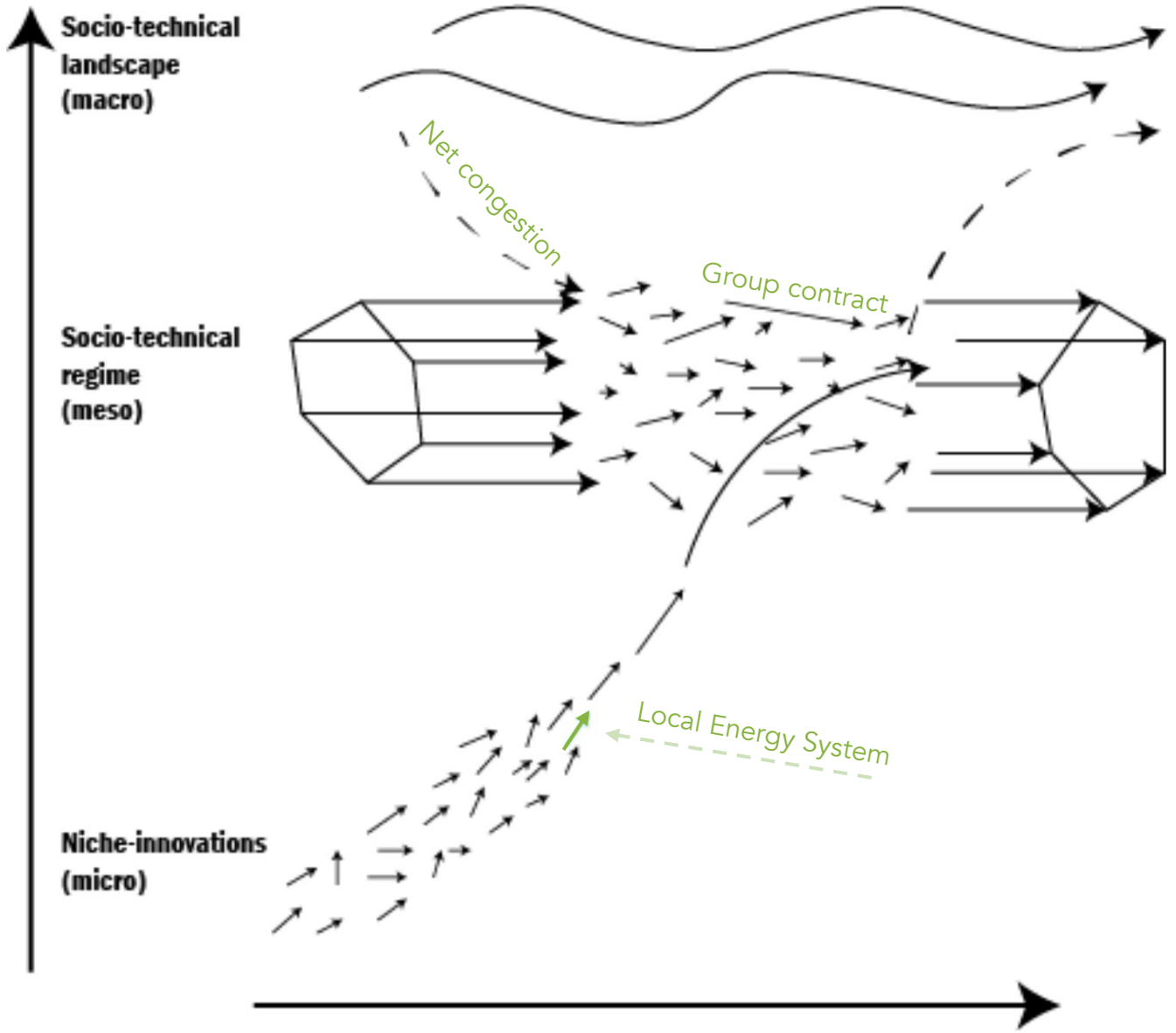

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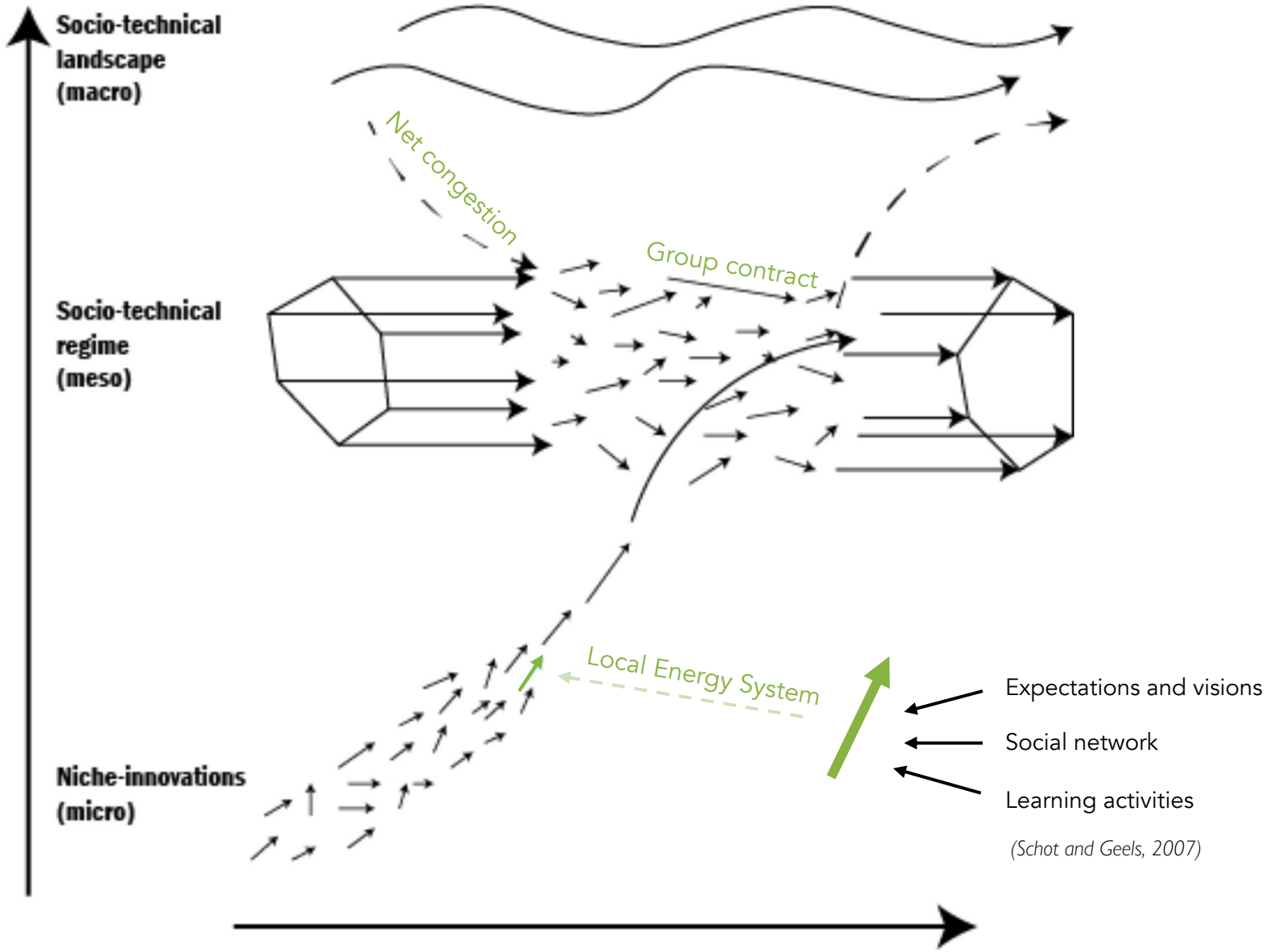
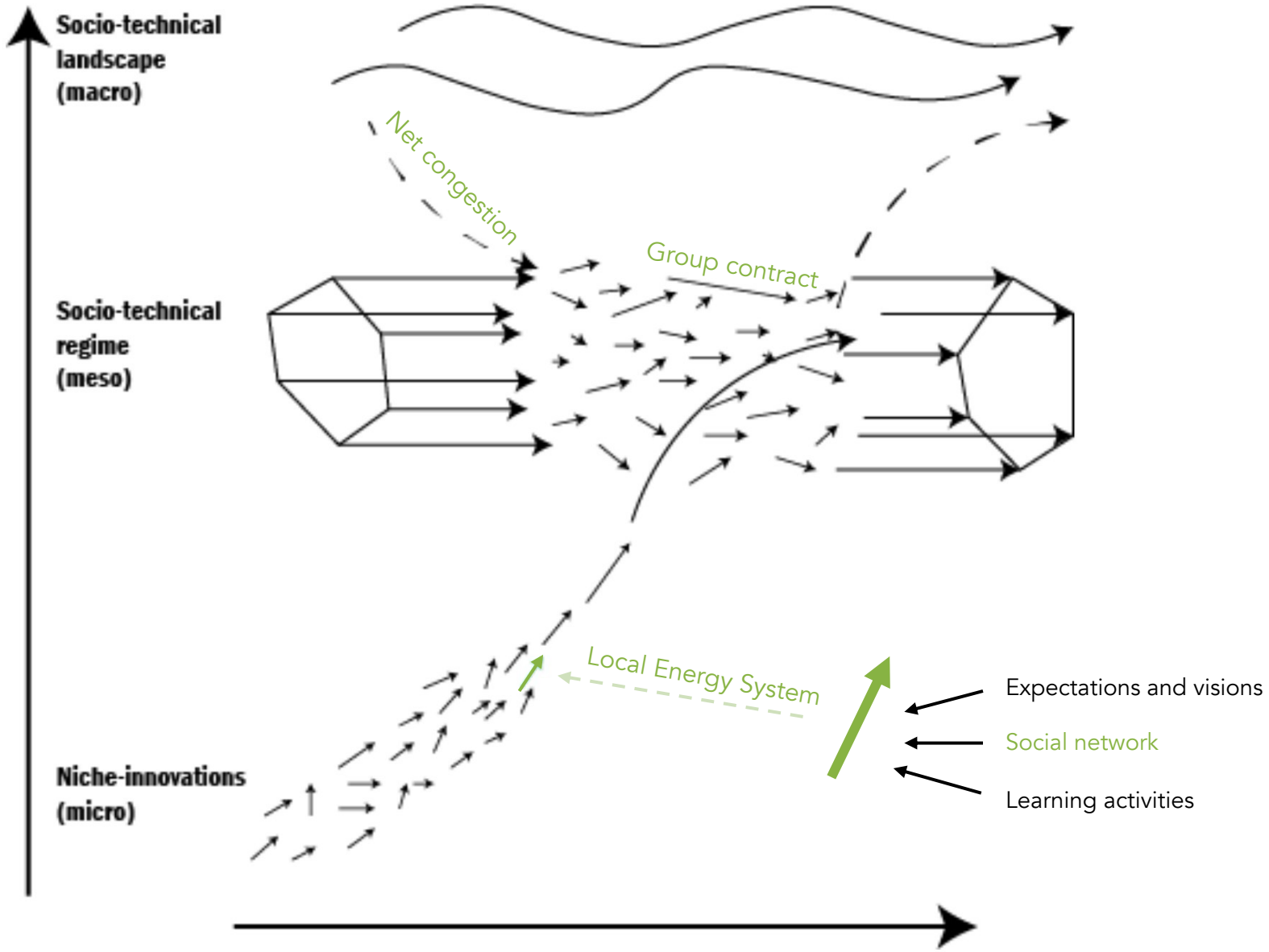


(Schot and Geels, 2007)

The Multi Level Perspective Framework



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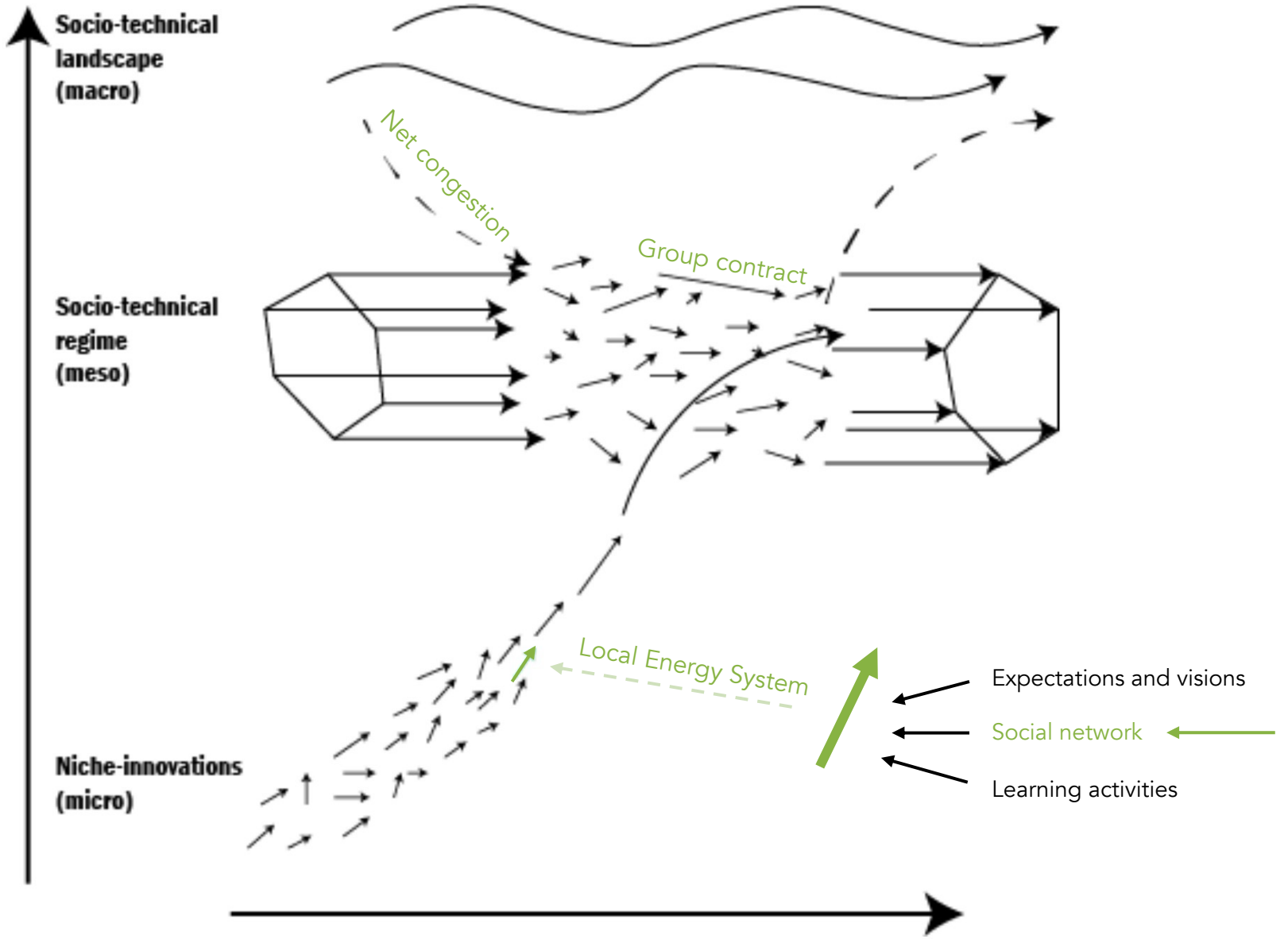

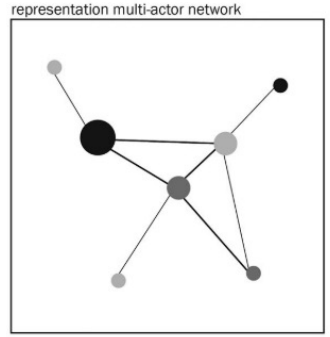

Strategic Niche Management

Vision		
Robust	Specific	Quality
Shared among actors	Clear further steps	Experiment supports expectation

Learning activities	
First-order learning	Second-order learning
Existing facts and data	New frameworks and routines
Stimulated by narrow networks	Stimulated by broad networks

Practice

Multi Actor Network Analysis (Gerding et al., 2021)	Strategic Niche Manegement (Schot and Geels, 2011)	Barriers (Papenhuijzen, 2024) and Enablers (Ganeshu et al, 2023)
SRQ 2: "What are the current practices of collaboration on business parks?"	**SRQ 3:** "To what extent do the networks established in local energy system projects facilitate vision and learning activities?	**SRQ 4:** "What are the barriers and enablers within stakeholder collaboration?"

Case study

- Semi-structured interviews
- Question-naires
- Desk research

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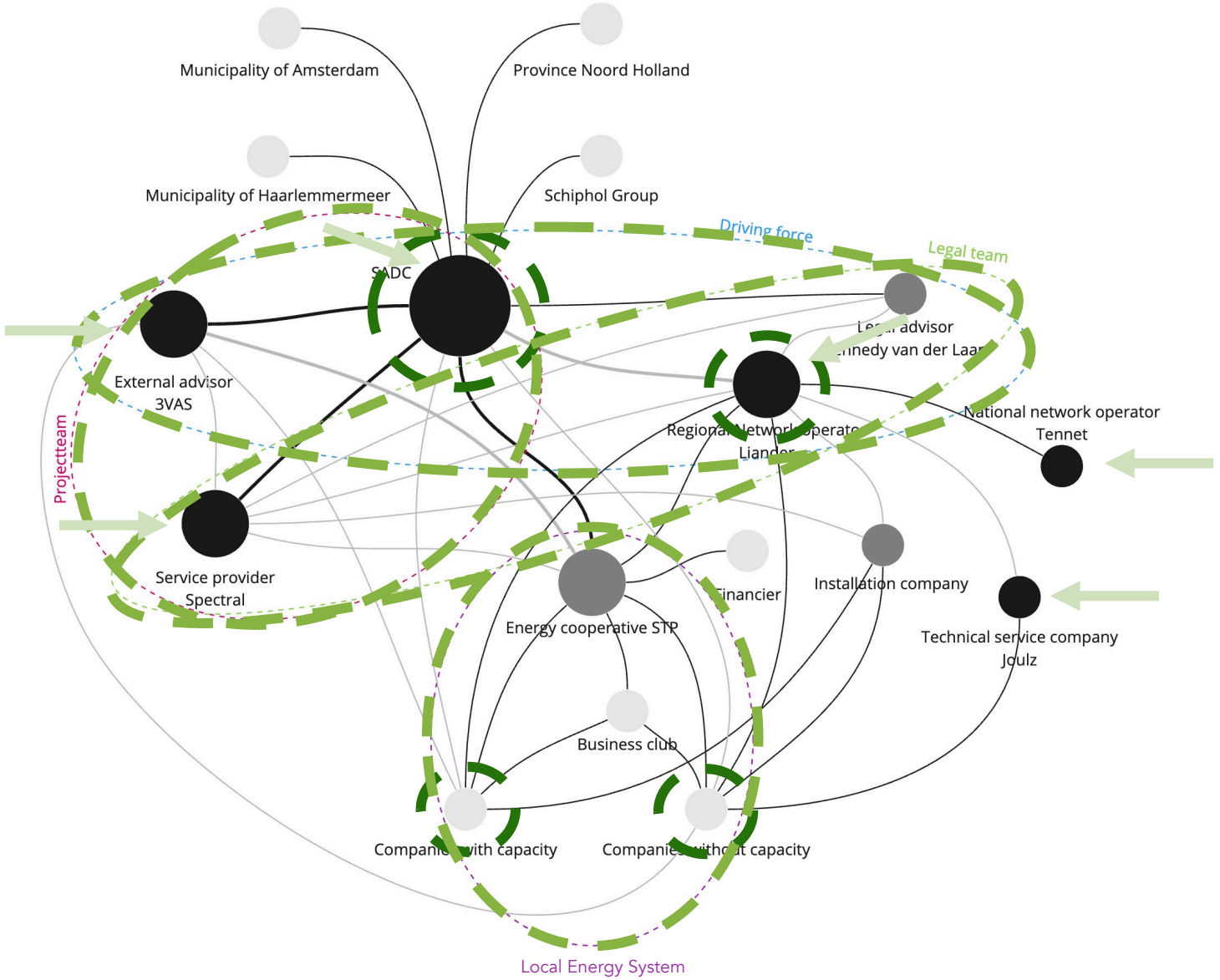
Actor Network
Schiphol Trade Park



Practice

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Case study

Semi-structured interviews

Question-naires

Desk research

Vision & Learning activities

Schiphol Trade Park

Vision

- Robust
- Specific
- Quality

Learning activities

- First-order learning
- Second-order learning

Vision & Learning activities

Schiphol Trade Park

Vision

Robust | Specific | Quality

- No clear next steps

Learning activities

First-order learning

- Due to quick development

Second-order learning

- Stimulated by external advisors

"We are also already working on that period after from 2026 when there is no congestion to still based on that smart steering, real-time measurement, assets that are, to put down a really somewhat innovative sustainable business park."

"We worked like a massive tornado to see if we could find a solution, and if we could implement it. We learned an incredible amount, but it was all learning by doing."

Practice

Multi Actor Network Analysis (Gerding et al., 2021)

Strategic Niche Manegement (Schot and Geels, 2011)

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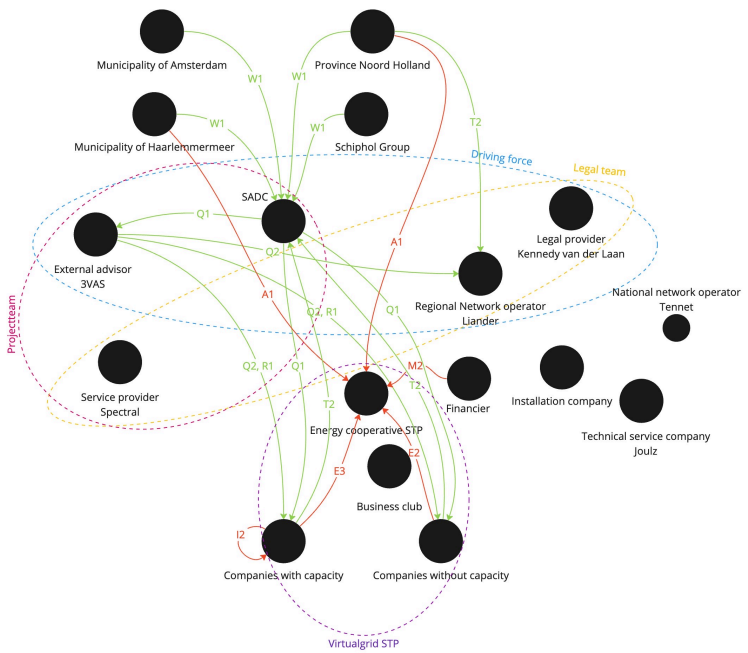
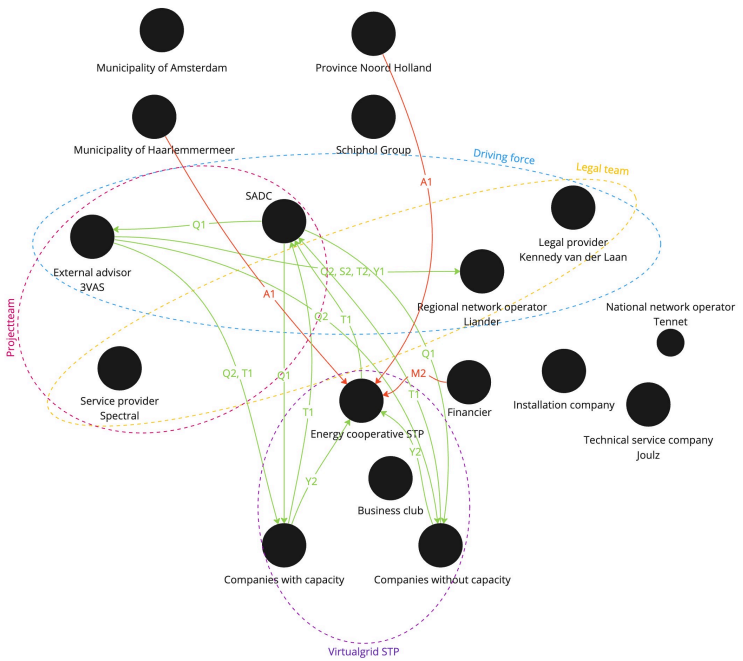
Schiphol Trade Park

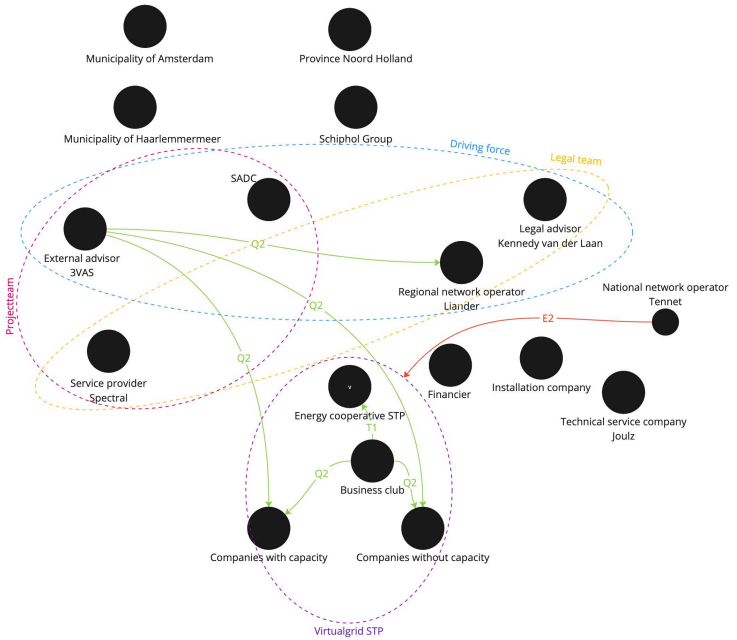
Initiation



Research and Design



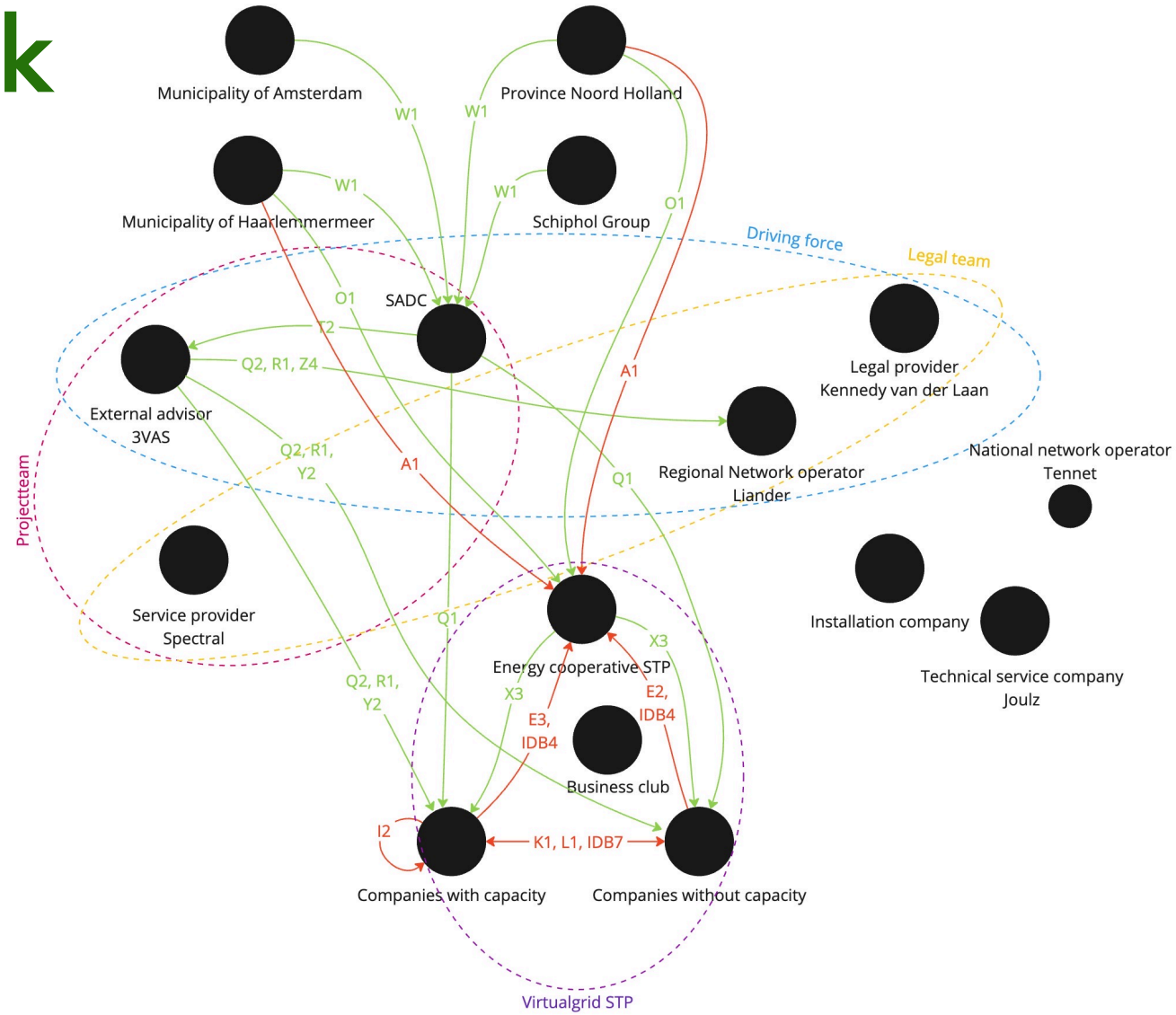
Exploitation



Schiphol Trade Park

Initiation phase

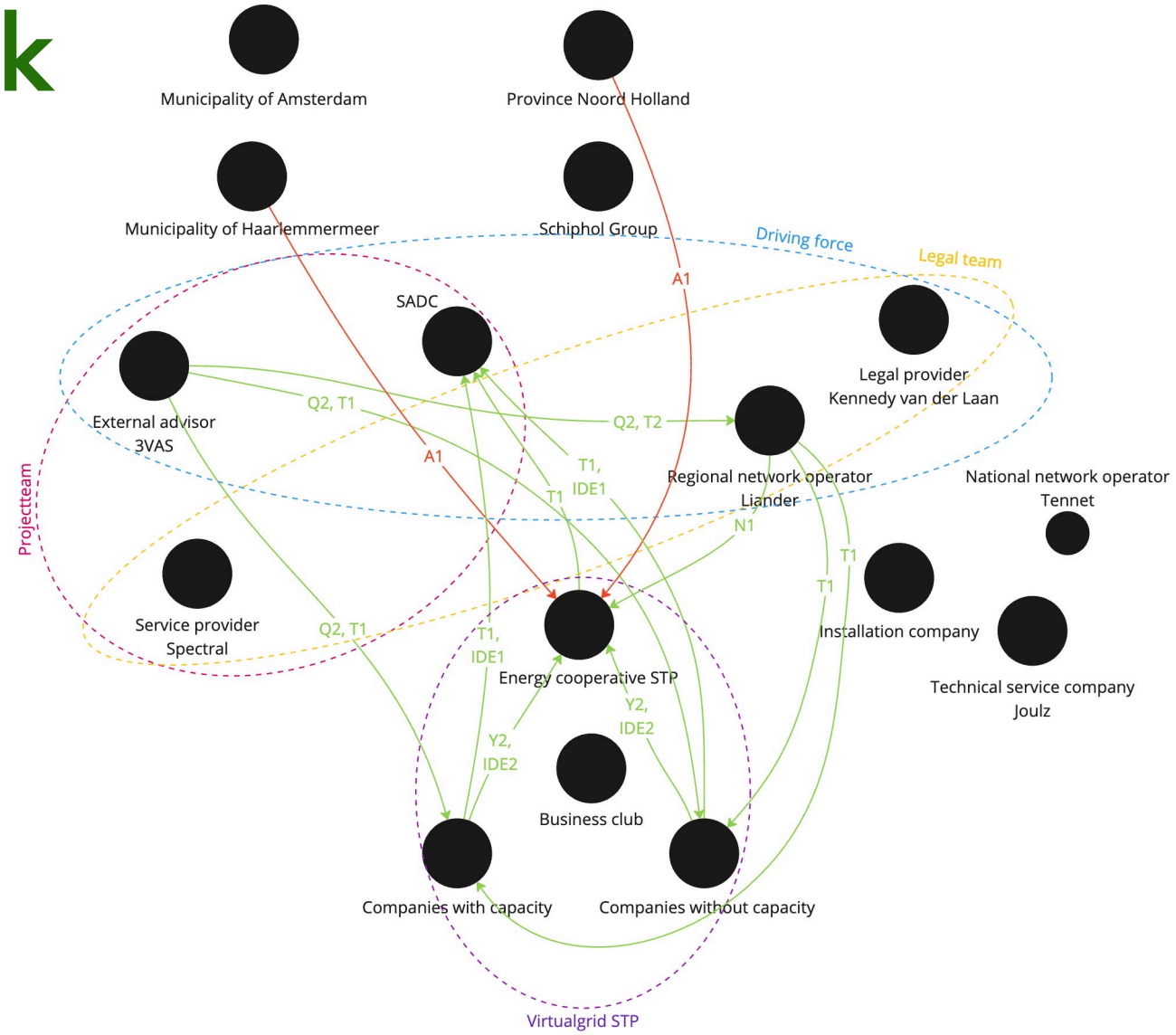
- Barriers from public parties
- Barriers aimed at energy cooperative while enablers aimed at BP developer
- Companies show barriers to LES



Schiphol Trade Park

Reseach & Design phase

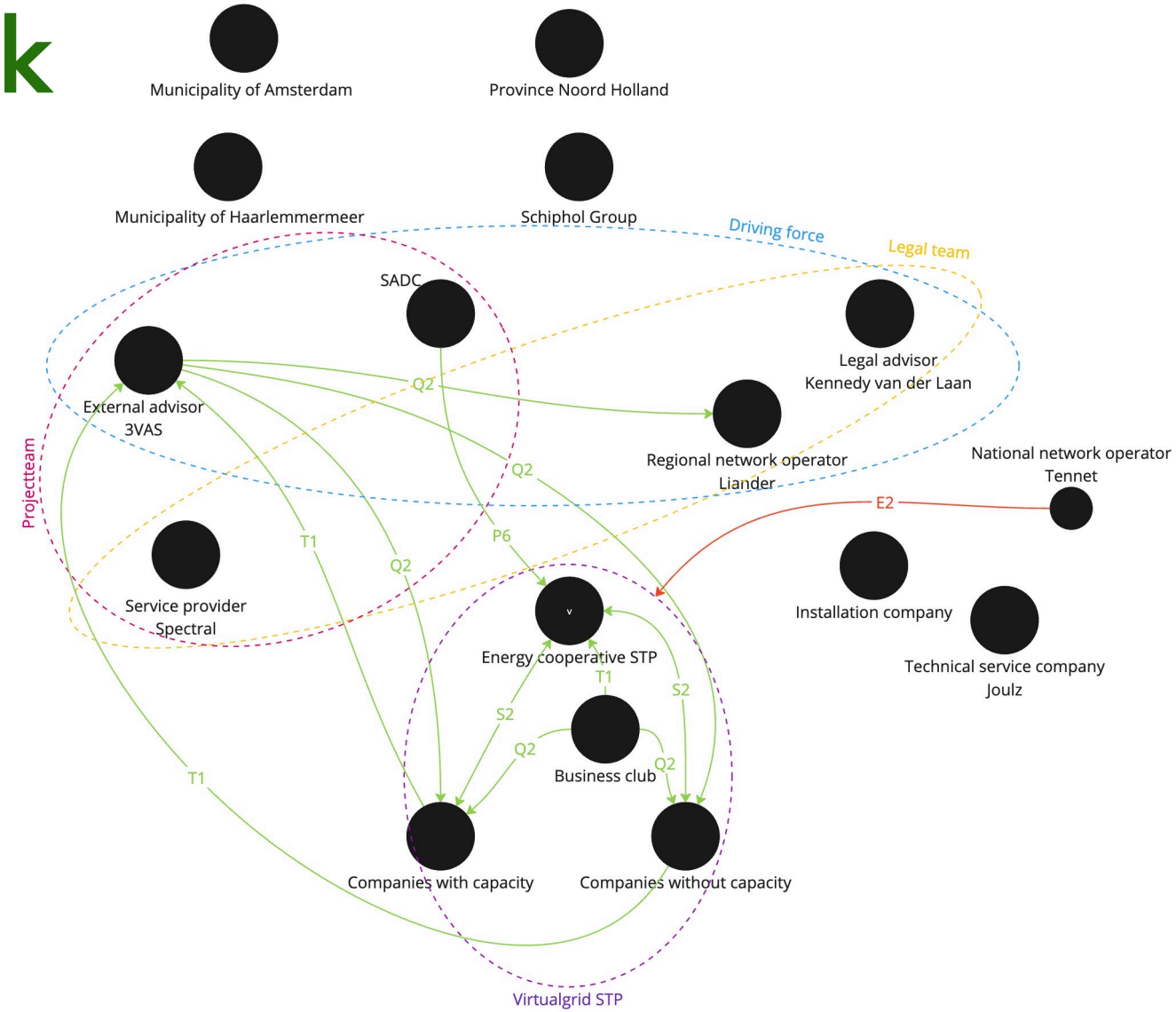
- Barriers from public parties
- Barriers aimed at energy cooperative while enablers aimed at LES developer
- Companies show barriers to LES
- Enablers from External advisor



Schiphol Trade Park

Exploitation phase

- Barriers from public parties
- Barriers aimed at energy cooperative while enablers aimed at LES developer
- Companies show barriers to LES
- Enablers from External advisor
- Business club stimulates egagement companies



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Case study

- Semi-structured interviews
- Question-naires
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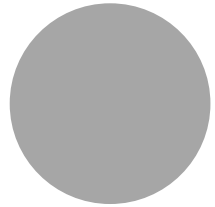
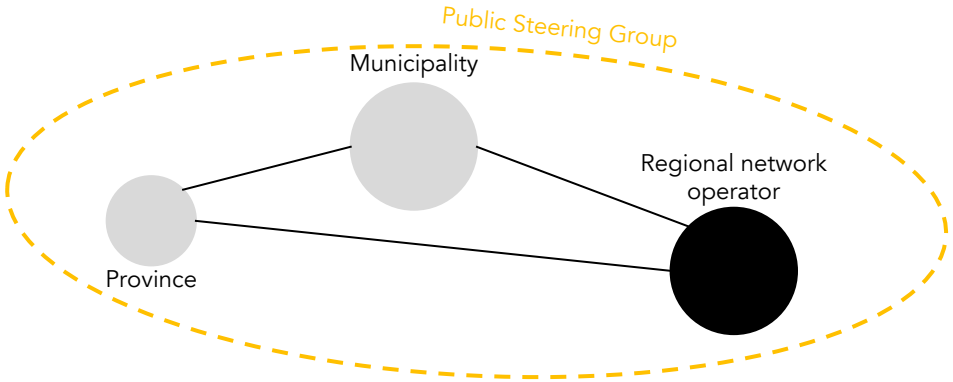
Cross case findings

- Key actor: business park organization



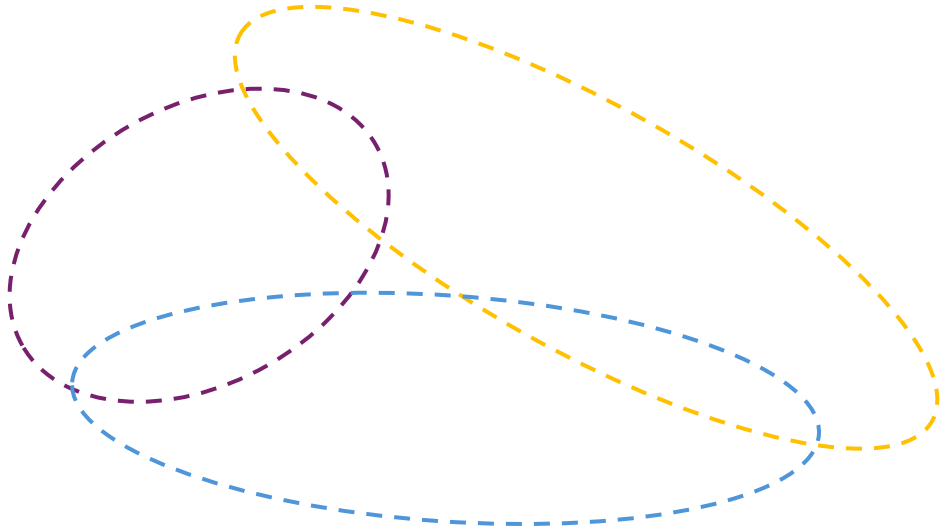
Business Park Organization

- Public Steering Group involved
  - Subsidy stimulates first-order learning
  - Less barriers experienced

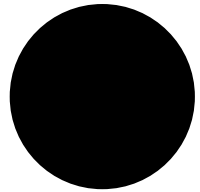


Cross case findings

- Team overlap
  - Enables trust and tackles the barrier of jargon
  - Stimulates shared vision among actors



- Close involvement Regional Network Operator
  - To minimize collaboration barriers
  - By its knowledge and influence

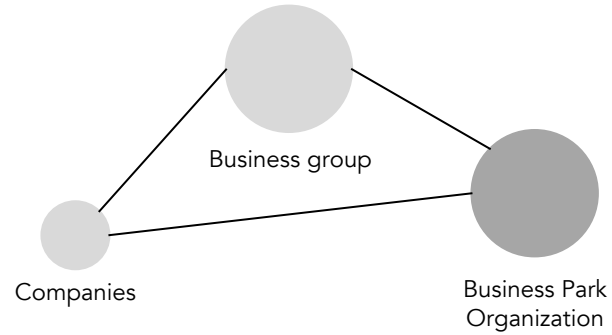


Regional network operator

Cross case findings

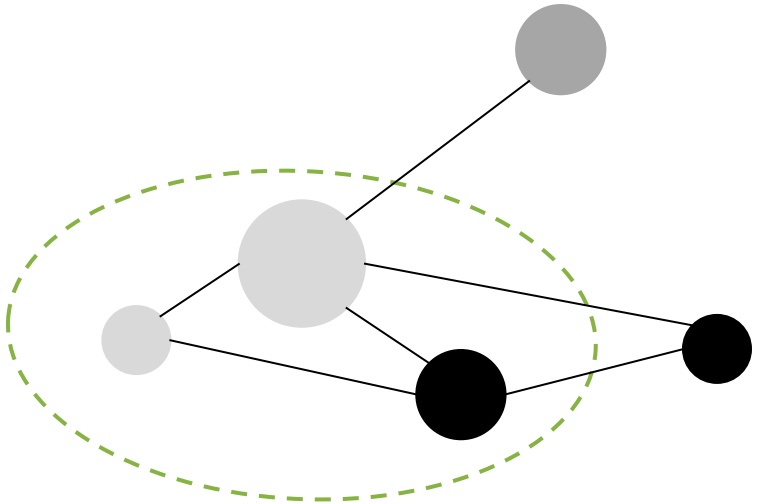
- Connected companies
  - End user
  - Central position, but lack knowledge

- Informal “business groups”
  - To engage companies and stimulate knowledge-sharing
  - To build trust and aligning the vision

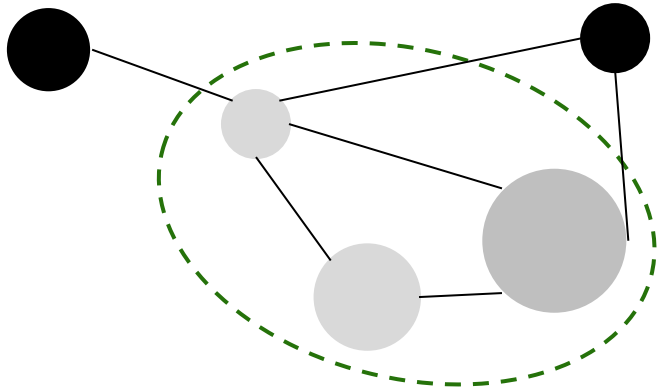


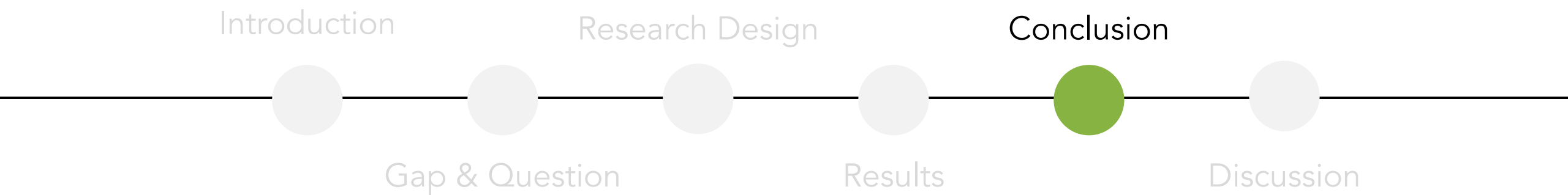
Cross case findings

- External actors
  - External advisors, bring enablers
    - Stimulates second-order learning
  - Research group or knowledgeplatform
    - Stimulates first-order learning



- Knowledge from external actors
  - Creates barriers
  - Learning important factor

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How can underlying factors influence stakeholder collaboration to improve further deployment of local energy systems on business parks?

1. *What factors stimulate the further deployment of local energy systems?*
2. *What are the current practices of collaboration on business parks?*
3. *To what extent do the actor-networks established in local energy system projects facilitate vision and learning activities?*
4. *What are the barriers and enablers within stakeholder collaboration?*

SRQ1: *What factors stimulate the further deployment of local energy systems?*

Expectations and vision

Social network

Learning activities

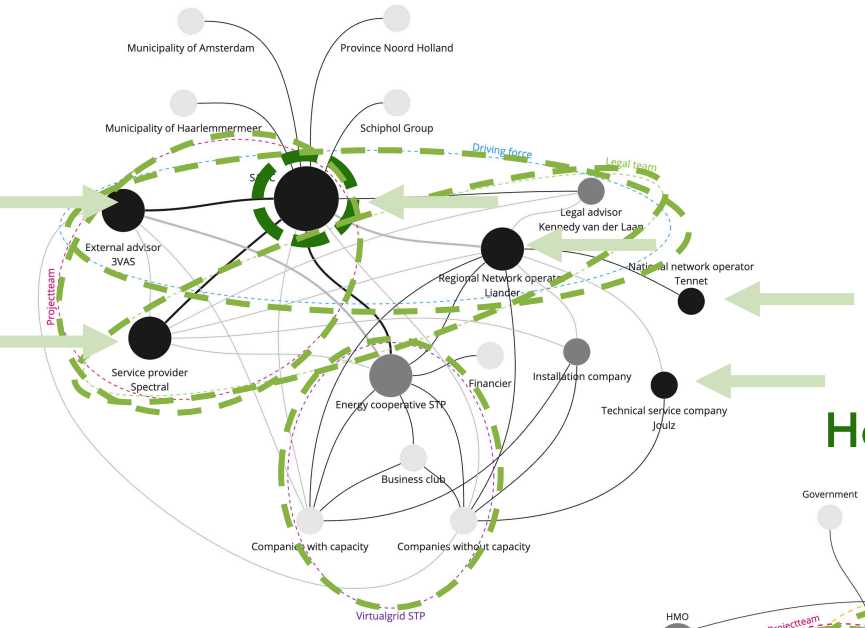
SRQ1: *What factors stimulate the further deployment of local energy systems?*

Expectations and vision

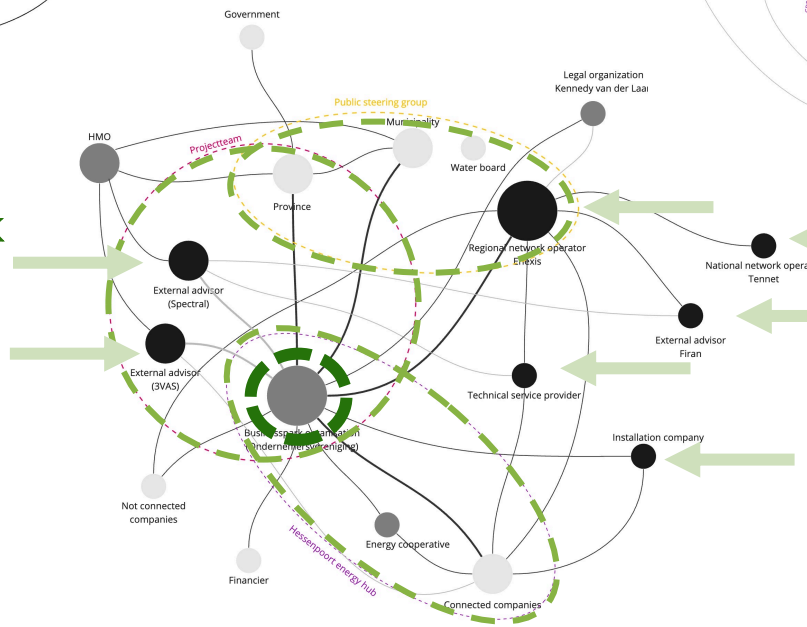
Social network

Learning activities

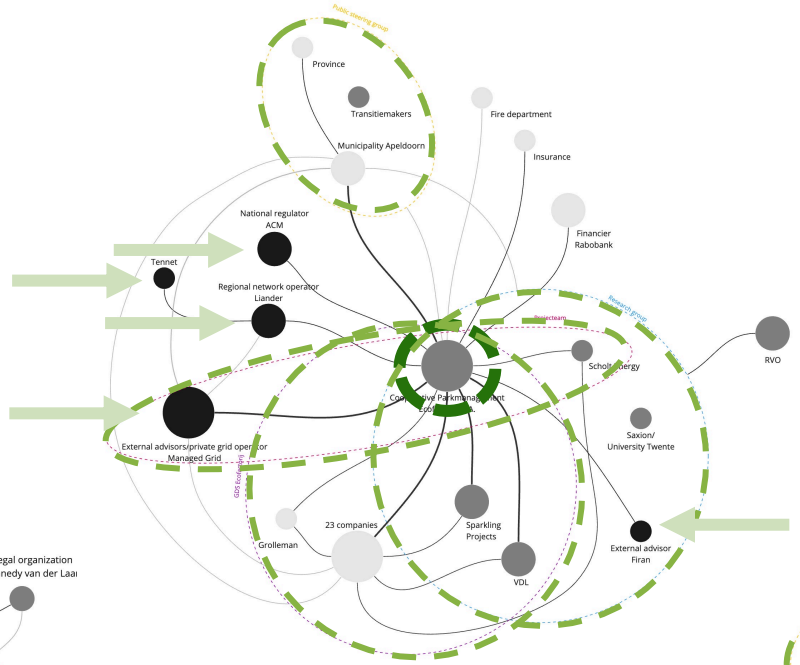
SRQ2: *What are the current practices of collaboration on business parks?*



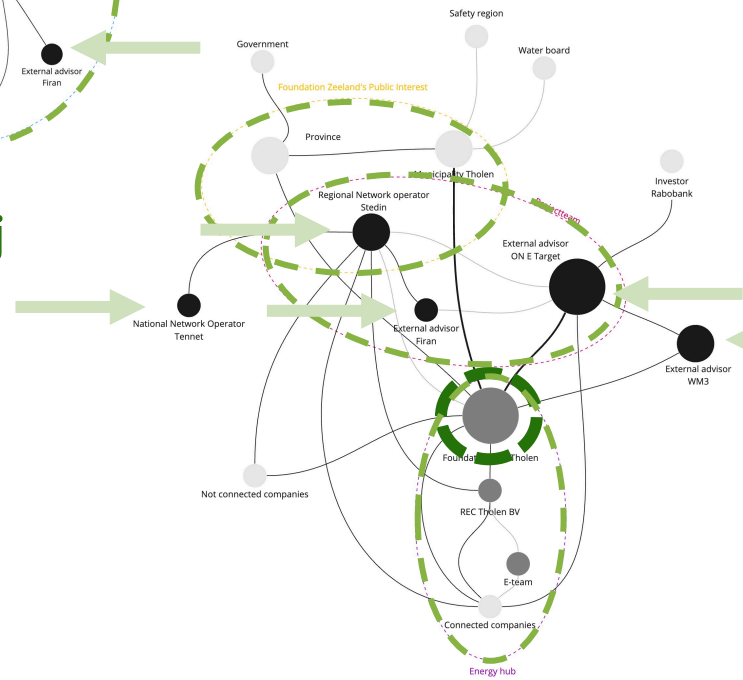
Schiphol Trade Park



Hessenpoort

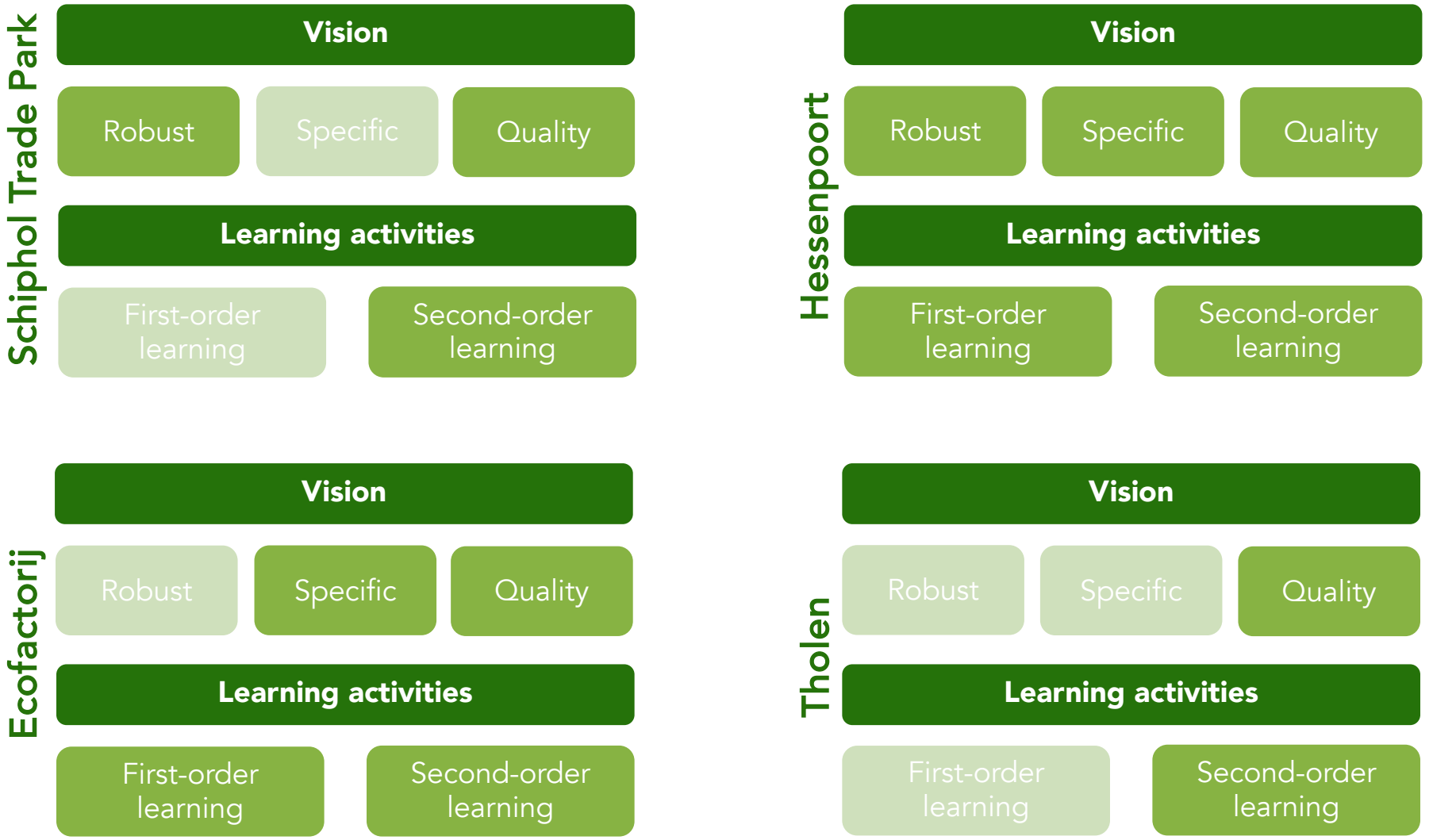


Ecofactorij



Tholen

SRQ3: *To what extent do the actor-networks established in local energy system projects facilitate vision and learning activities?*



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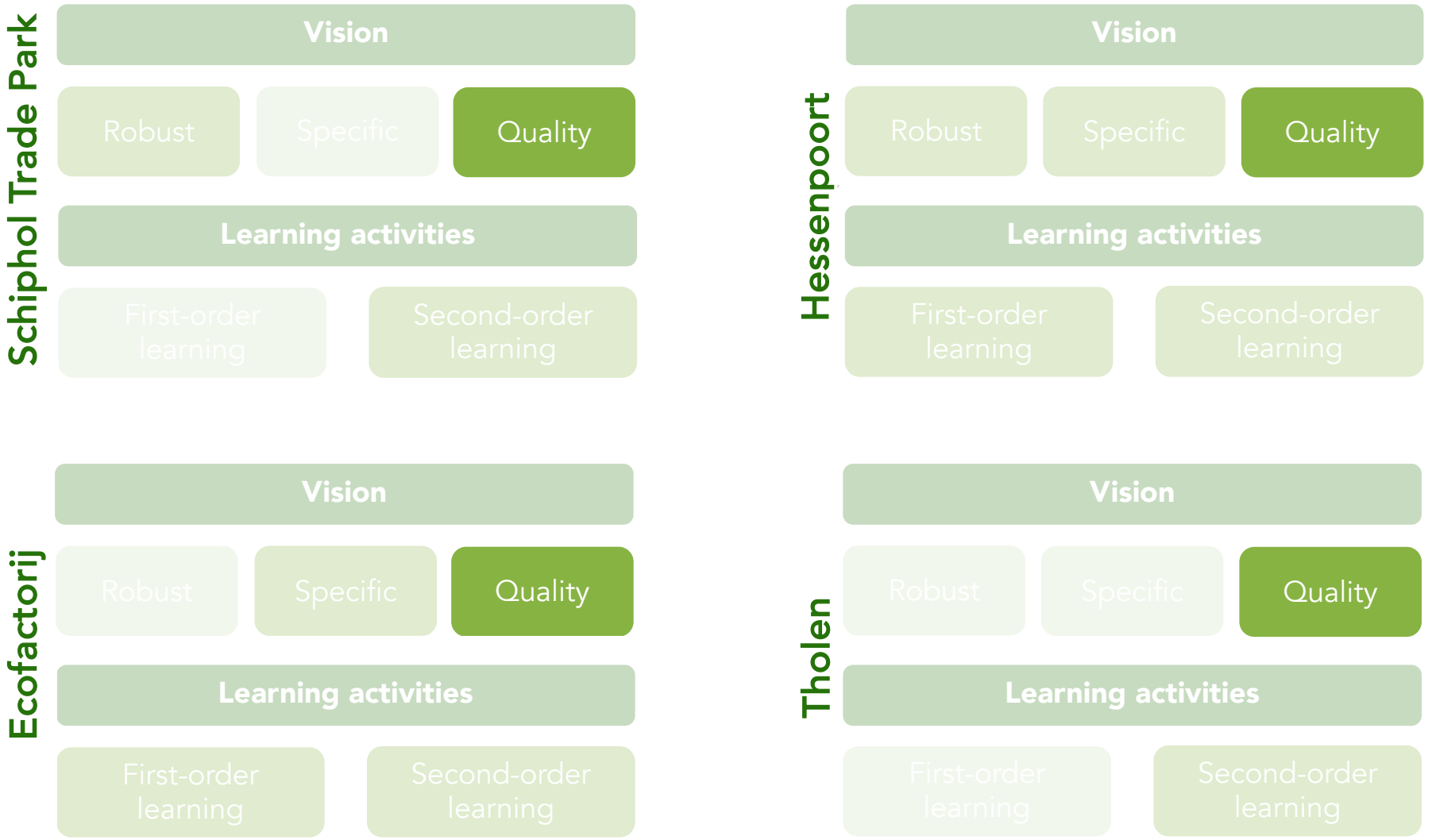

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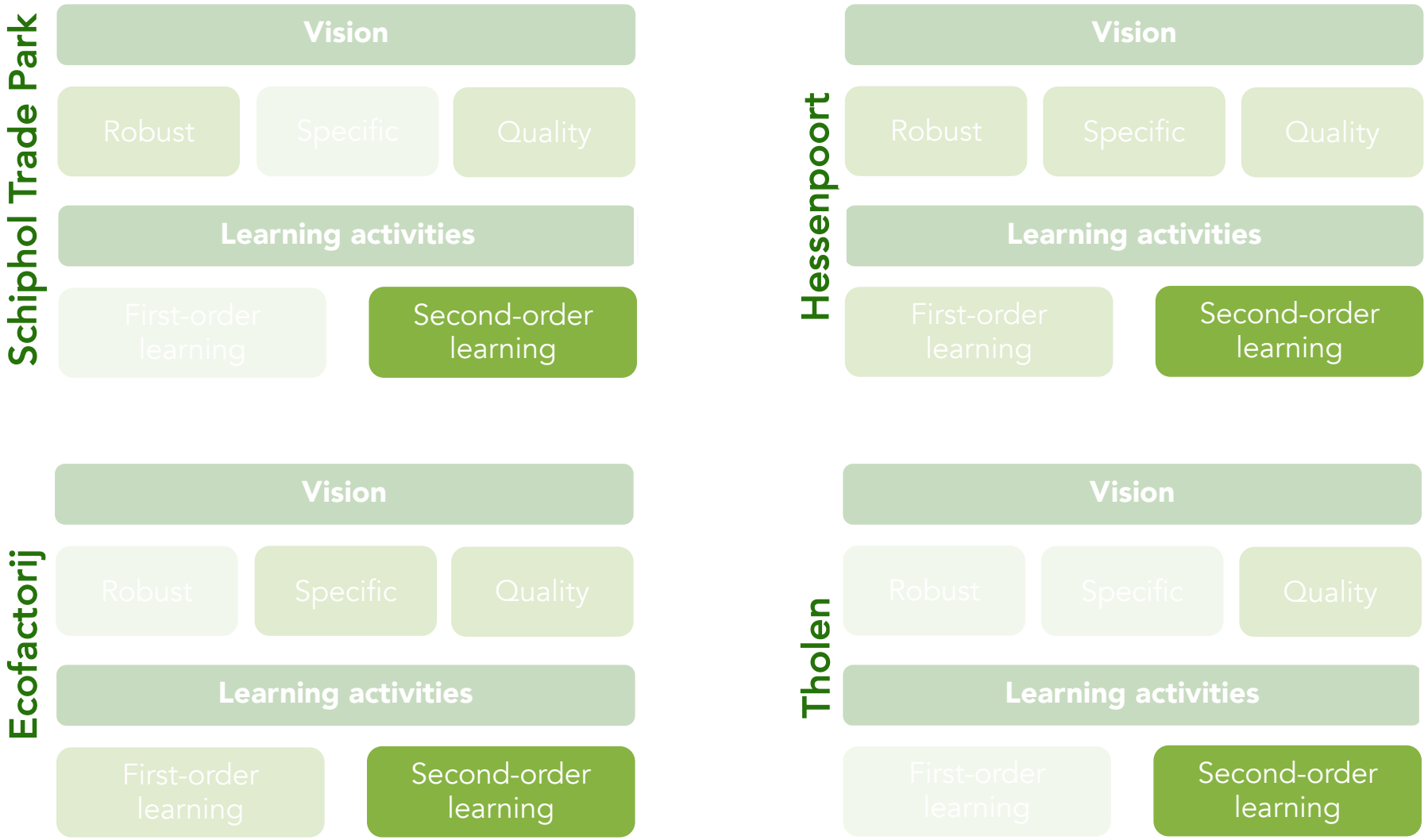
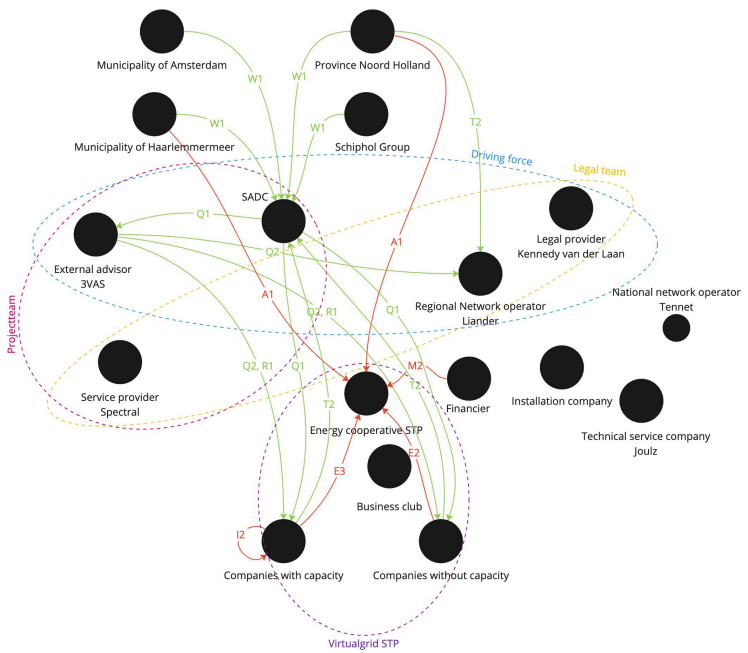
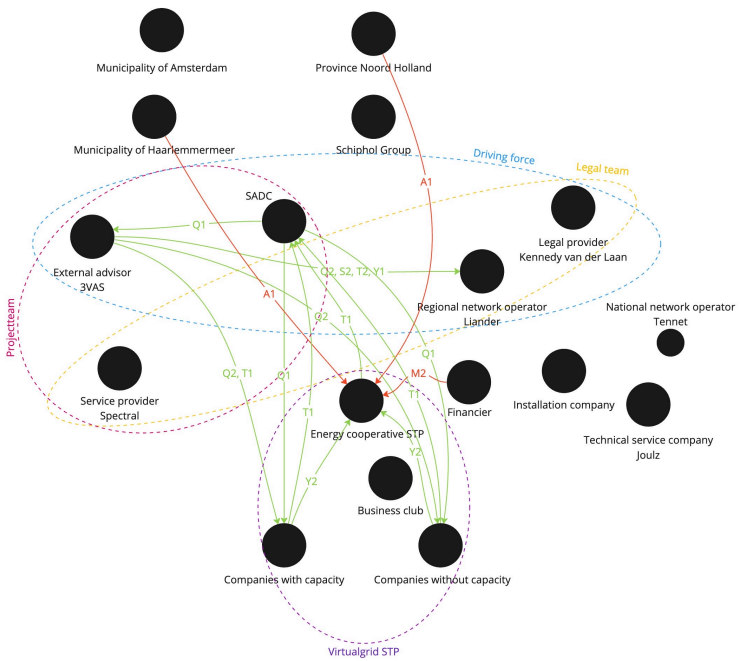


SRQ4: *What are the barriers and enablers within stakeholder collaboration?*

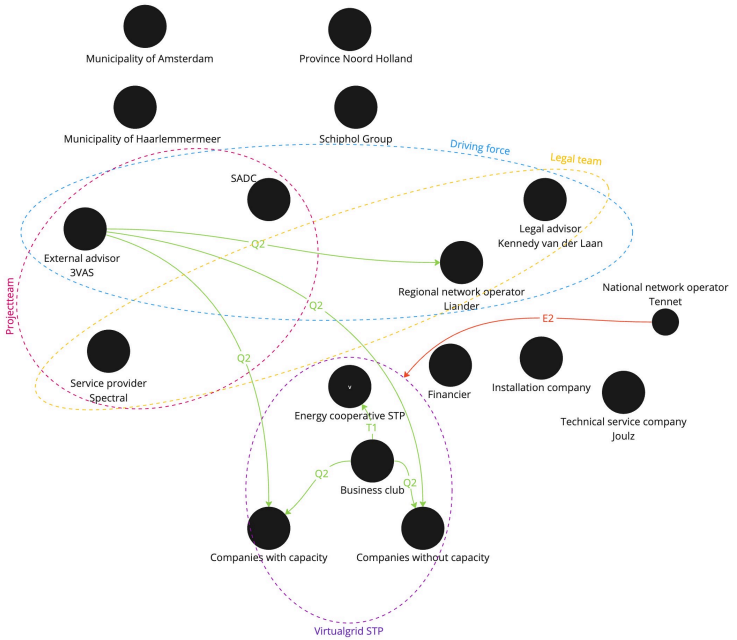
Initiation



Research and Design



Exploitation



SRQ4: *What are the barriers and enablers within stakeholder collaboration?*

Initiation

- Barriers of jargon with companies involved
- Lack of policies
- Different needs, interests and issues by companies
- External advisors enabled by creating synergies

Research and Design

Exploitation

SRQ4: *What are the barriers and enablers within stakeholder collaboration?*

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- Barriers of jargon with companies involved
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Research and Design

- Lack of knowledge stakeholder
- Different needs, interests and issues by companies
- Providing financial resources to support collaboration
- Improve understanding of the information needs and requirements of organizations

Exploitation

SRQ4: *What are the barriers and enablers within stakeholder collaboration?*

Initiation

- Barriers of jargon with companies involved
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- External advisors enabled by creating synergies

Research and Design

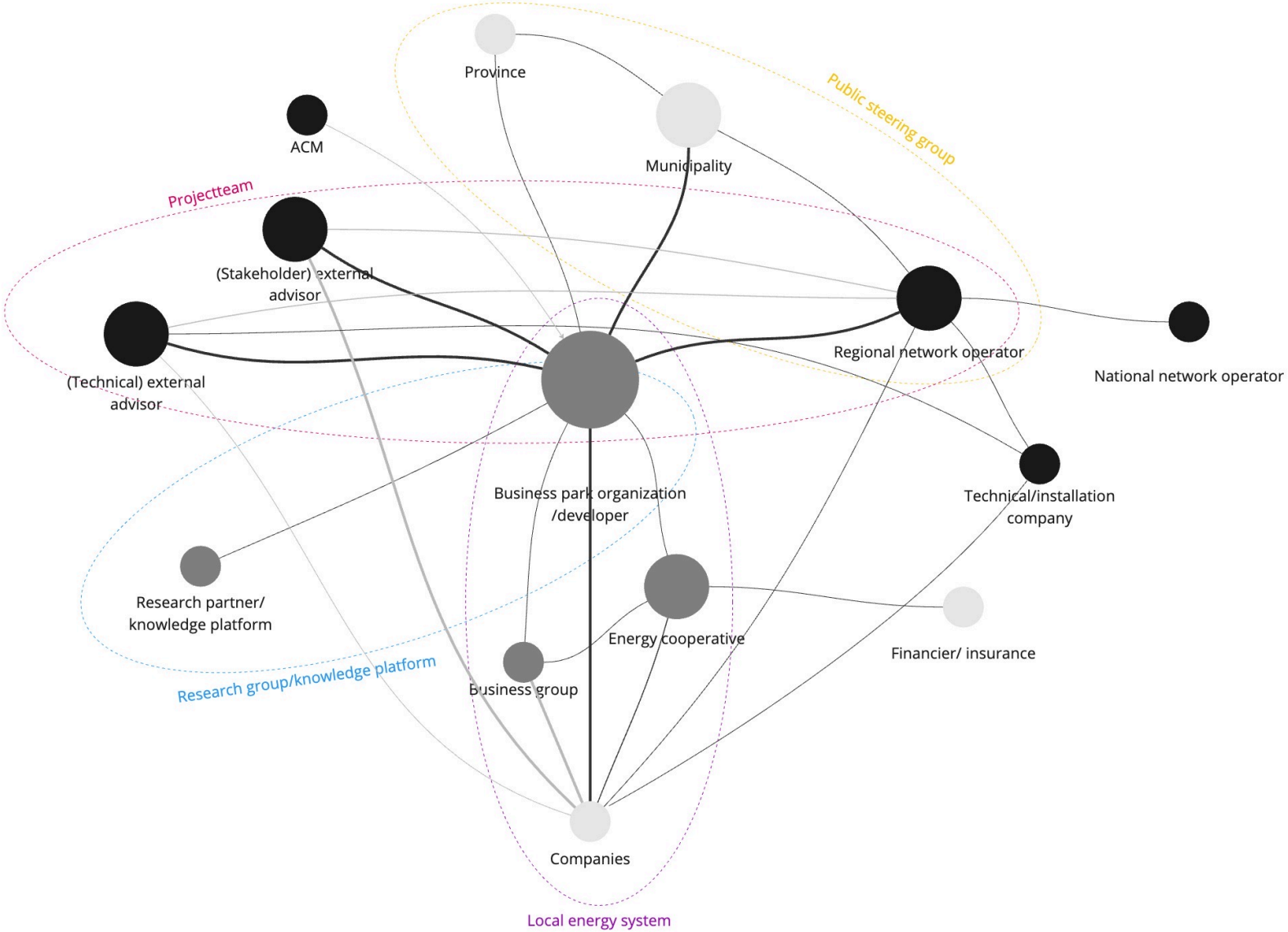
- Lack of knowledge stakeholder
- Different needs, interests and issues by companies
- Providing financial resources to support collaboration
- Improve understanding of the information needs and requirements of organizations

Exploitation

- Nurturing trust-based relations
- Establish synergies by creating a joint vision among organizations
- Barriers differ per case study

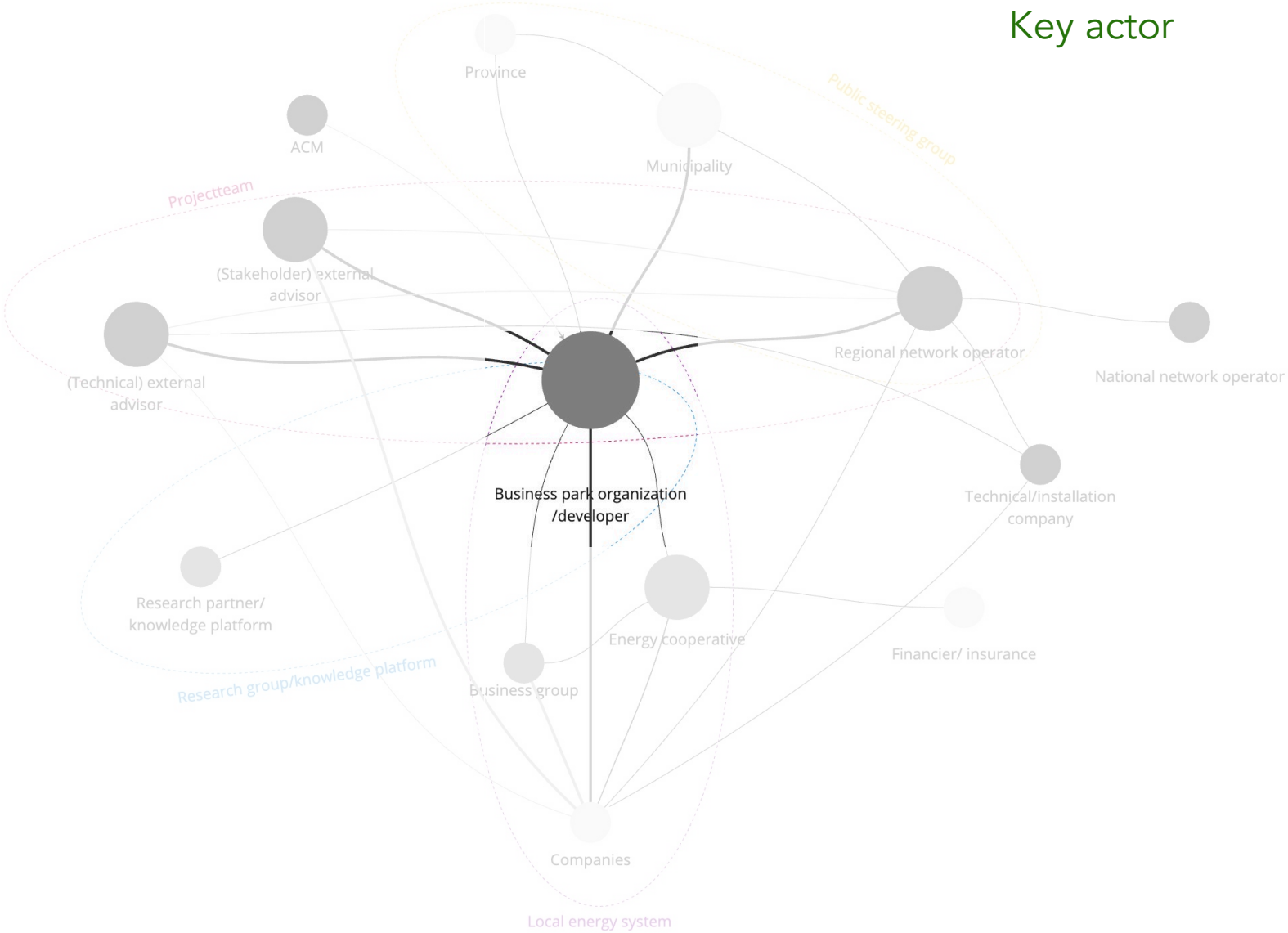
How can underlying factors influence stakeholder collaboration to improve further deployment of local energy systems on business parks?

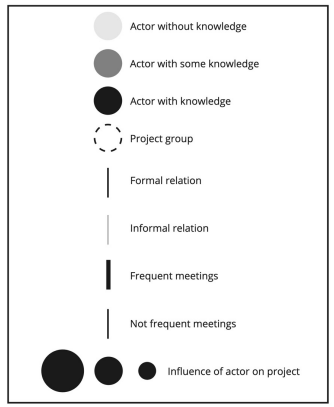
Conclusions



Conclusions

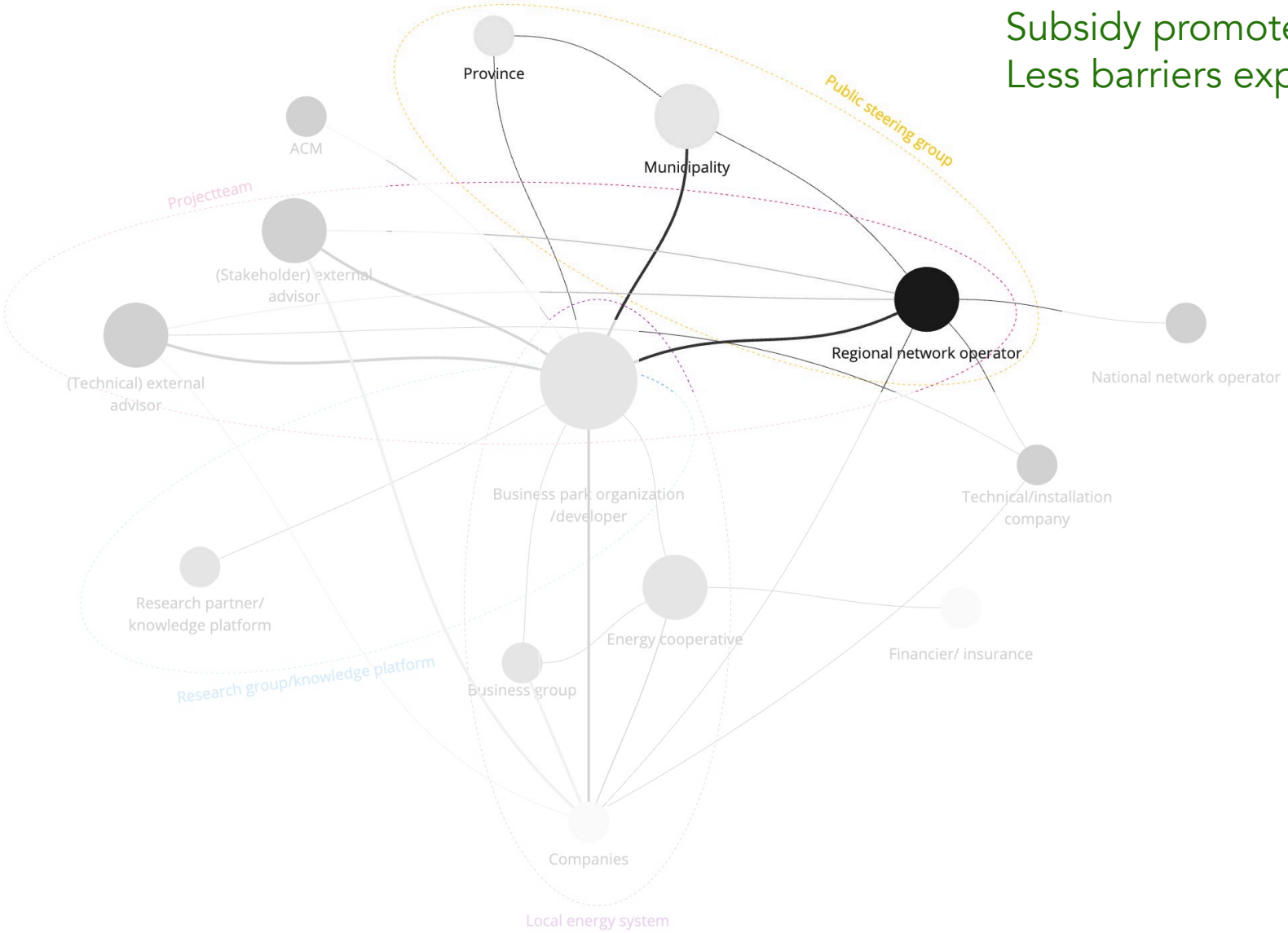
Key actor

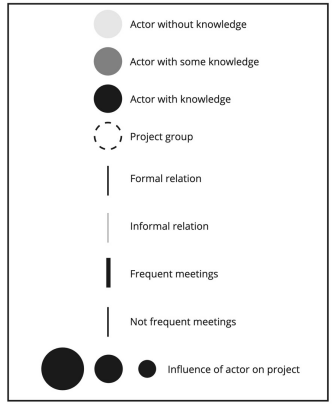




Conclusions

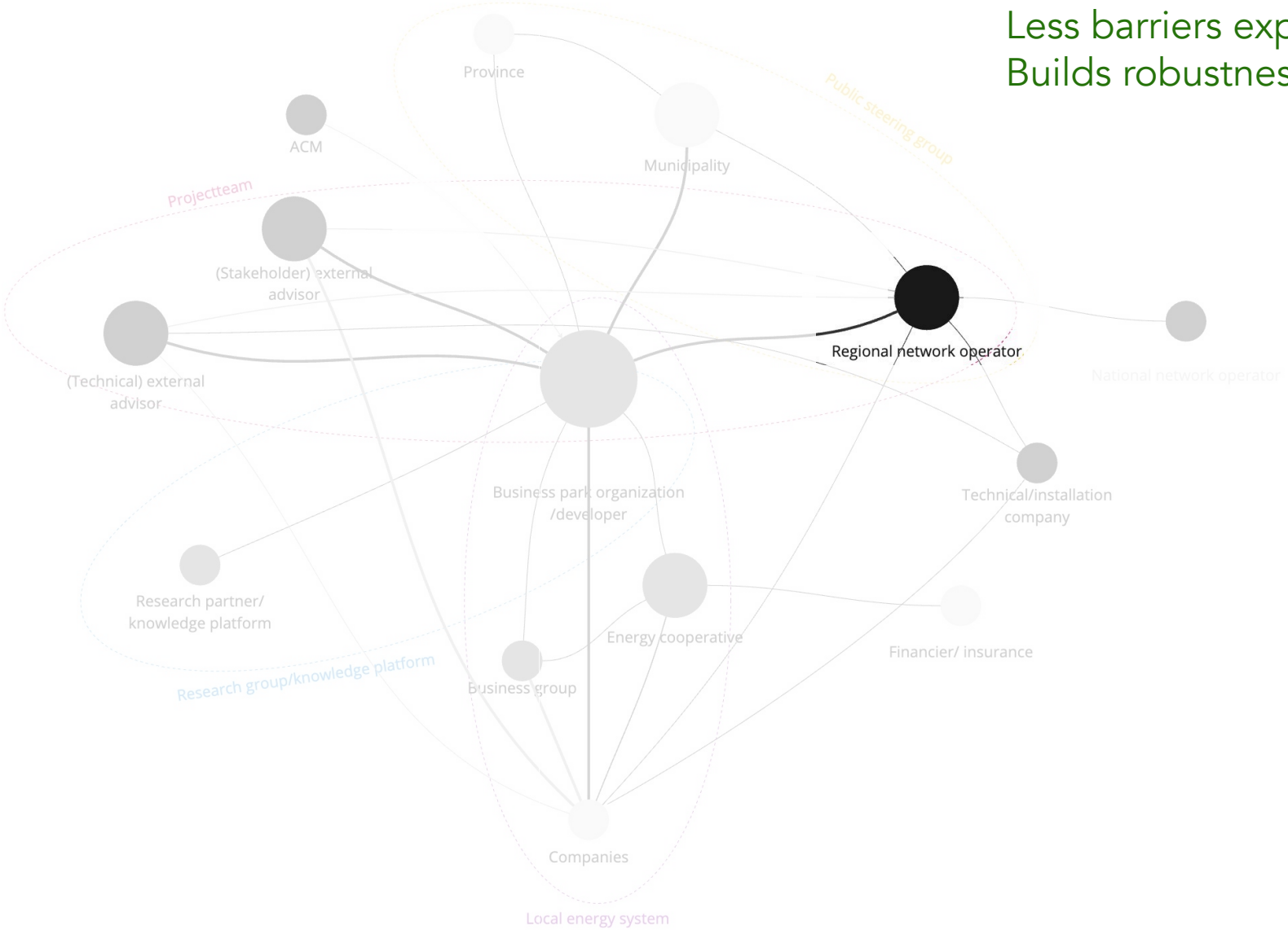
Subsidy promotes first-order learning
Less barriers experienced

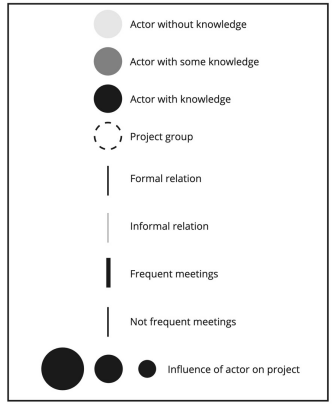




Conclusions

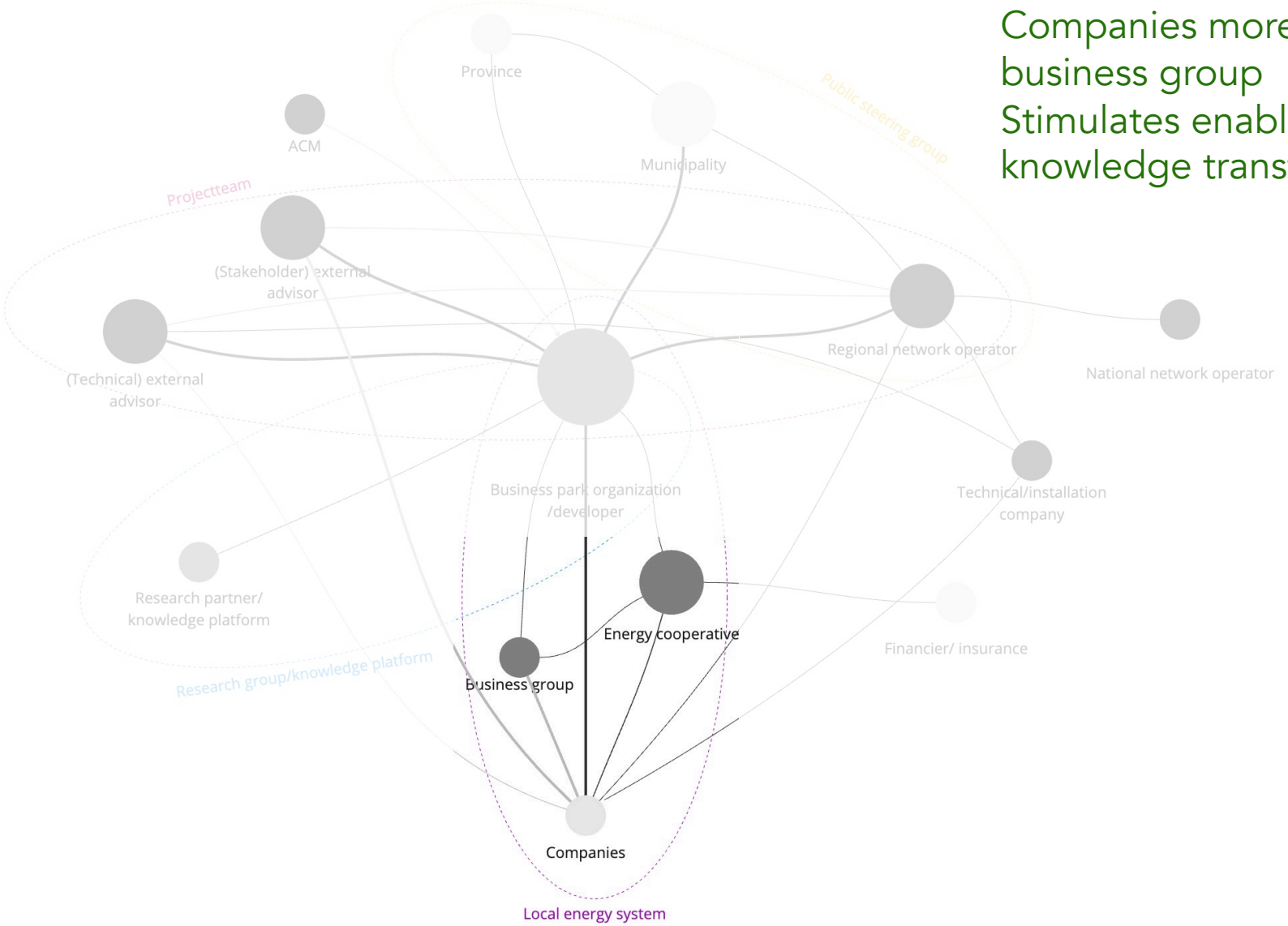
Less barriers experienced
Builds robustness

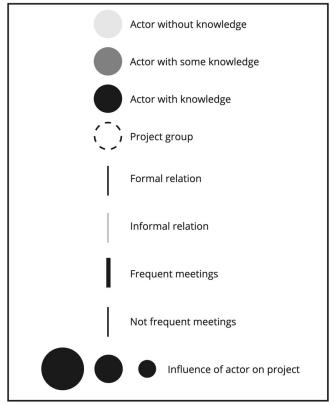




Conclusions

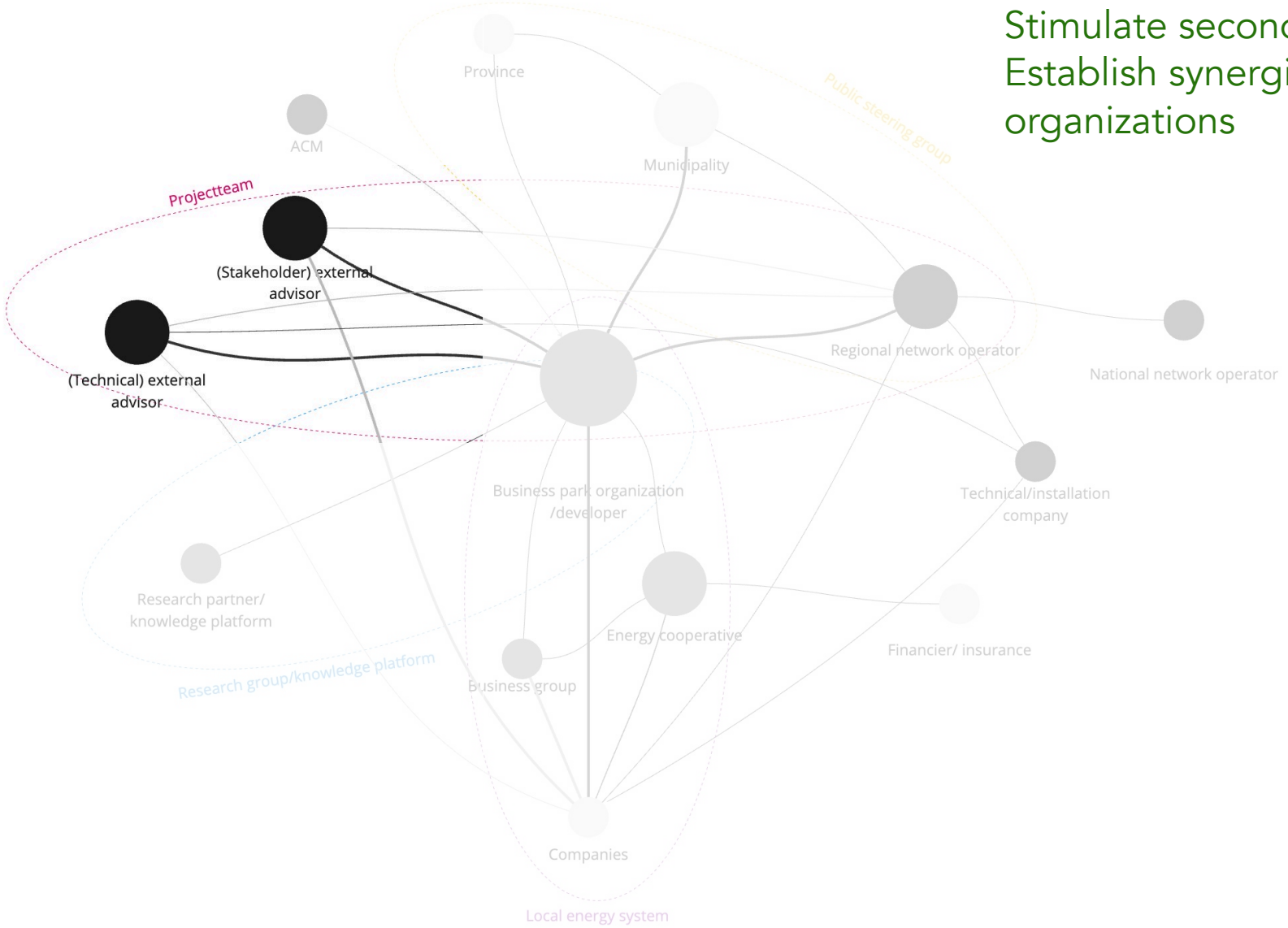
Companies more engaged by business group
Stimulates enablers such as knowledge transfer





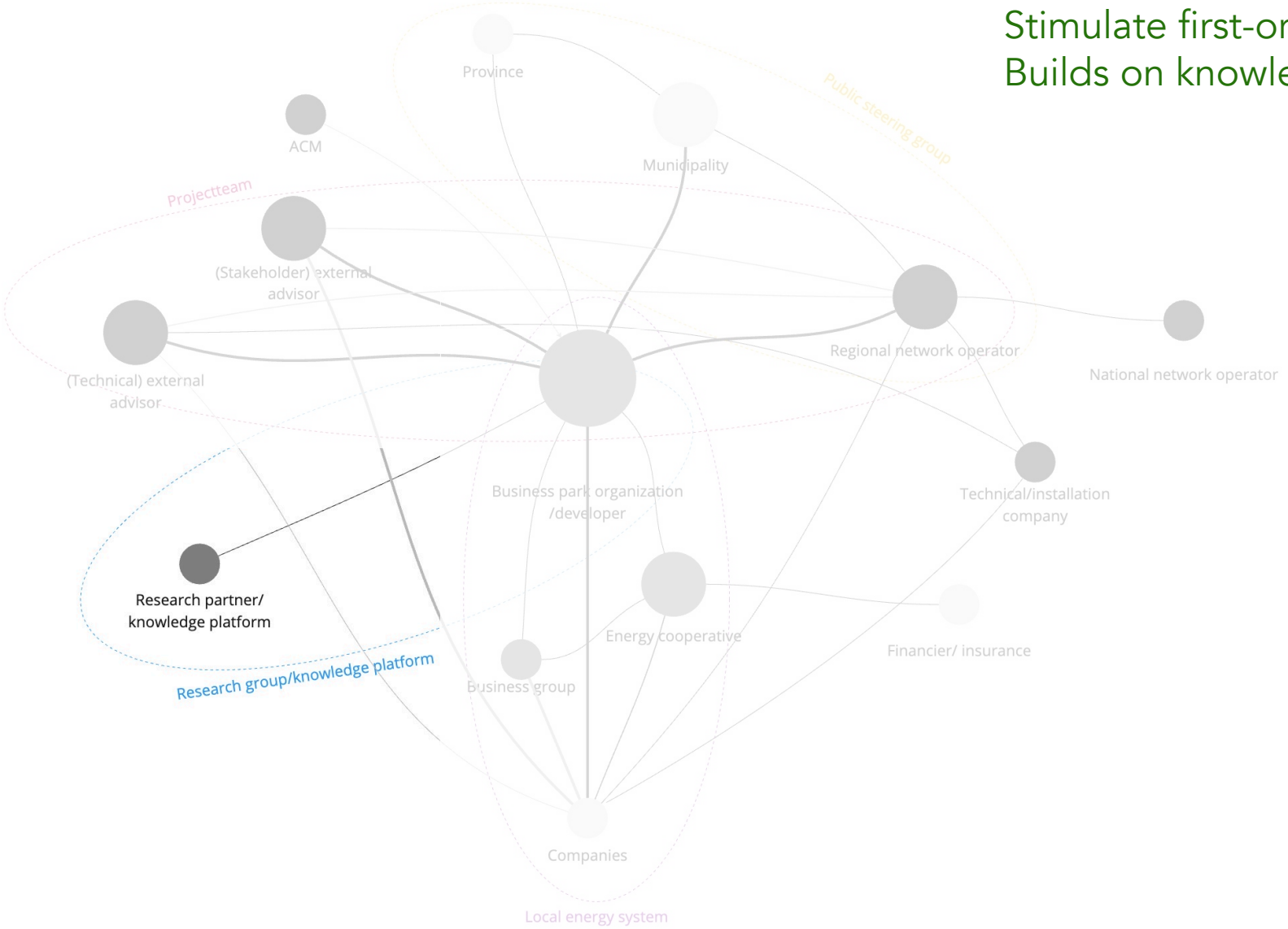
Conclusions

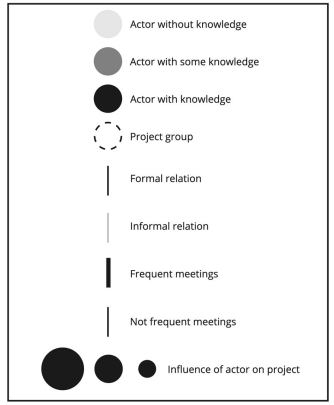
Stimulate second order learning
Establish synergies among organizations



Conclusions

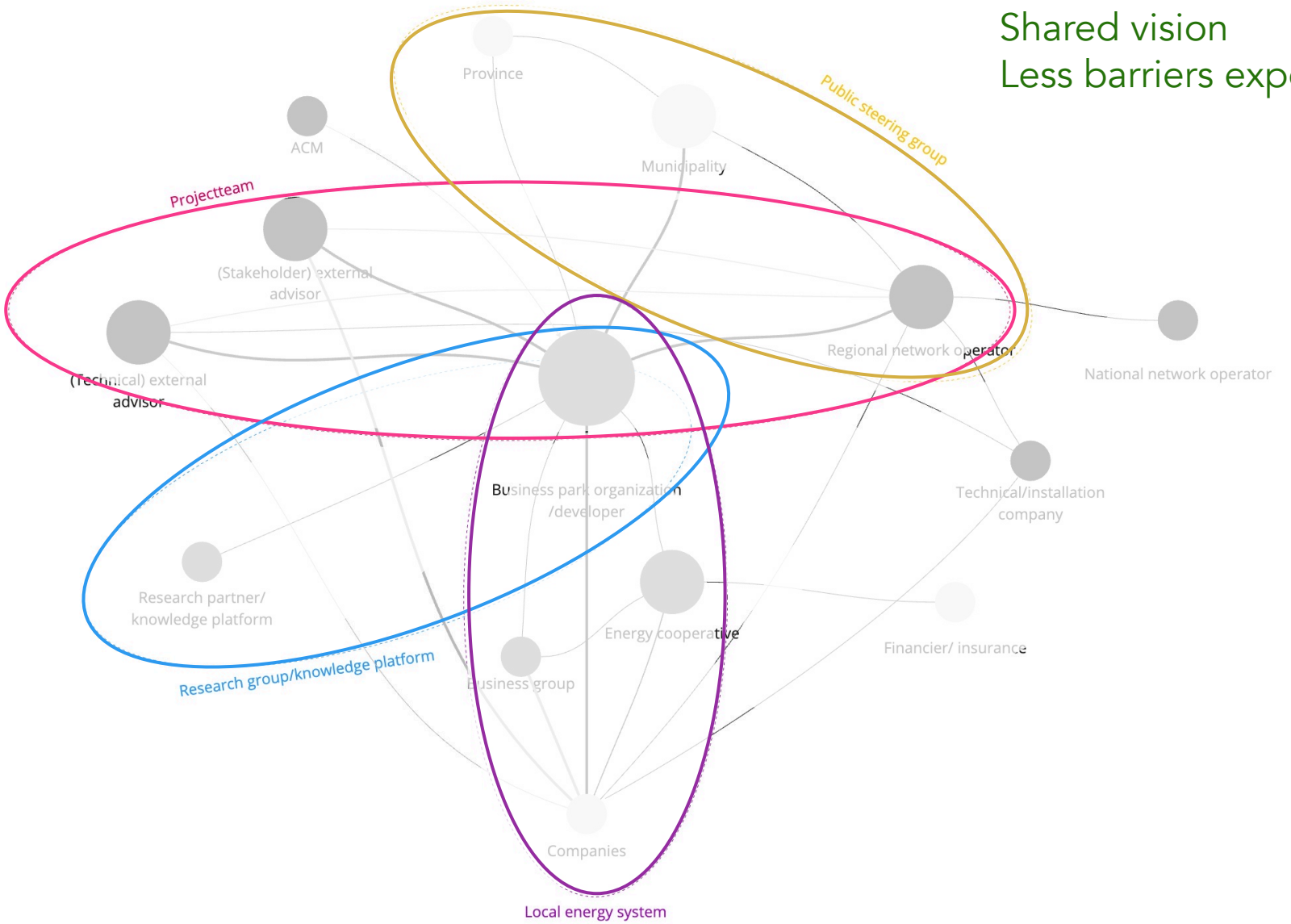
Stimulate first-order learning
Builds on knowledge capacity

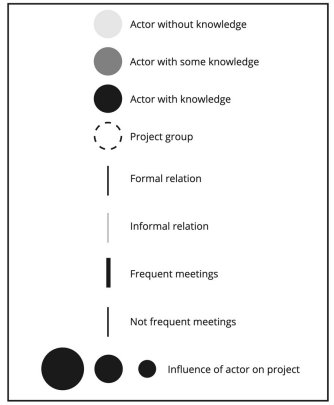




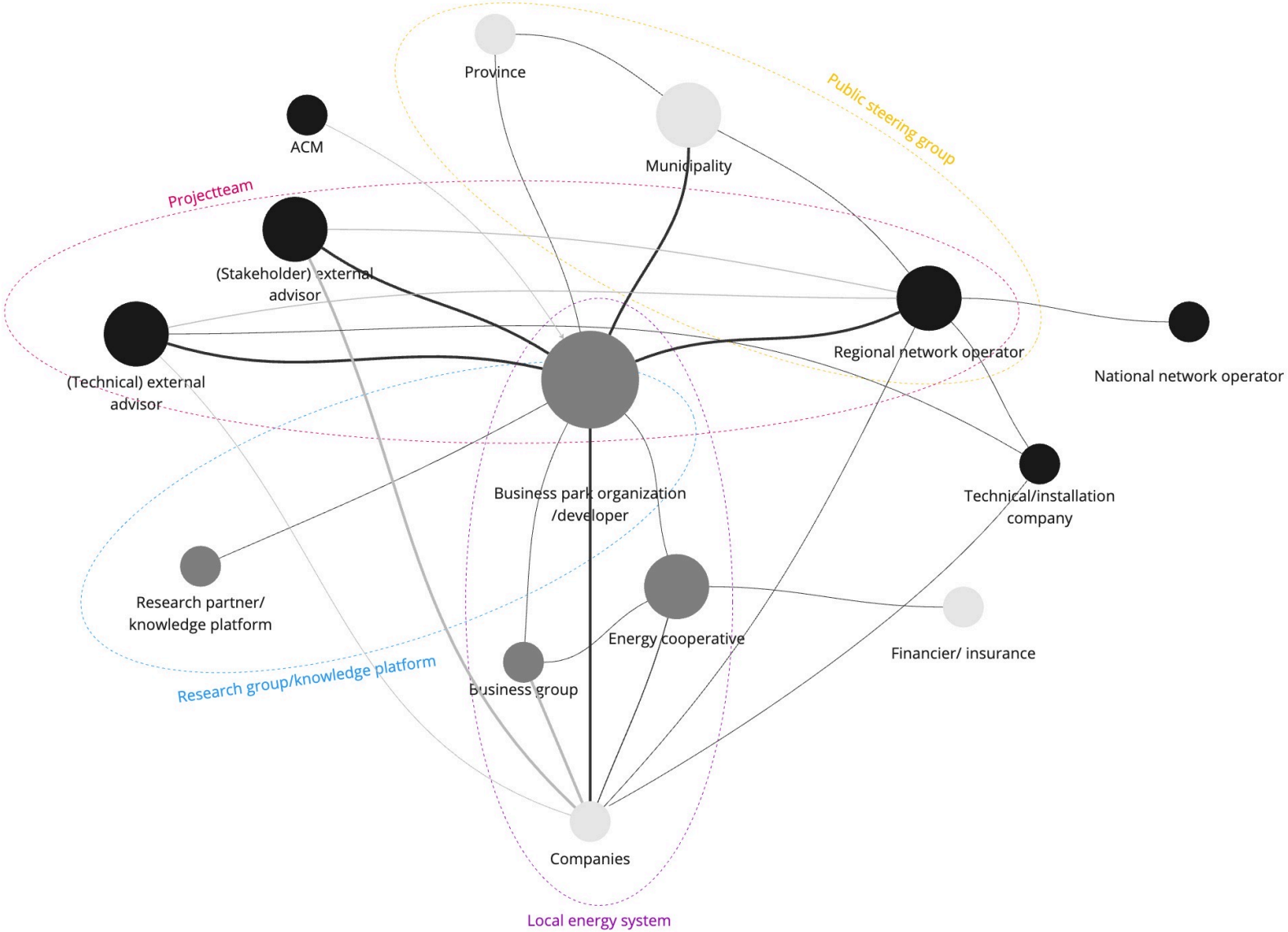
Conclusions

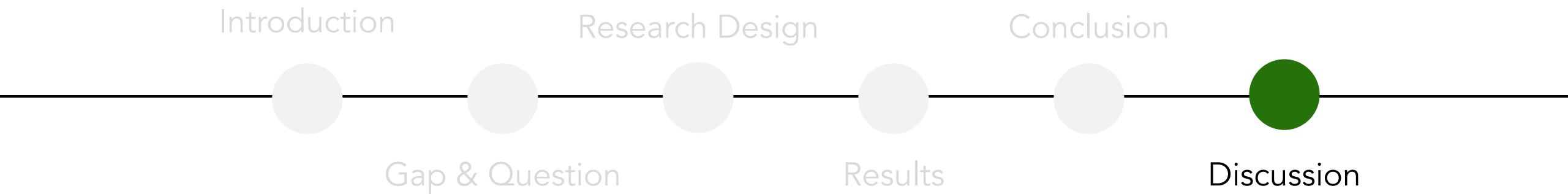
Shared vision
Less barriers experienced





Conclusions

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Discussion

Lack of knowledge

- From the end user and key actor
- Knowledge comes externally

&

Uncertainty

- Lack of policies
- No guidelines on the groupcontract yet

Discussion

deVolkskrant

Columns Opinie Cartoons Cultuur & Media

NIEUWS

In laatste weken loodst het demissionaire kabinet Energiewet door de Tweede Kamer

Een grote meerderheid van de Tweede Kamer heeft dinsdag ingestemd met een nieuwe Energiewet. Daarin zijn regels afgesproken die de energietransitie moeten vooruithelpen en energiecowboys tegenwerken.

Tjerk Gualthérie van Weezel 4 juni 2024, 16:01

SOLAR MAGAZINE website van het jaar

Nieuws Productzoeker Installateurzoeker Bedrijvenregister

19 oktober 2023

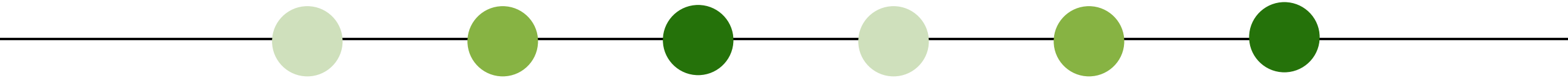
Minister Jetten trekt 166 miljoen euro uit voor energiehubs

Minister Jetten voor Klimaat en Energie trekt 166 miljoen euro uit voor een nieuw stimuleringsprogramma voor energiehubs. Via het programma worden regisseurs aangesteld en diverse standaarden ontwikkeld.

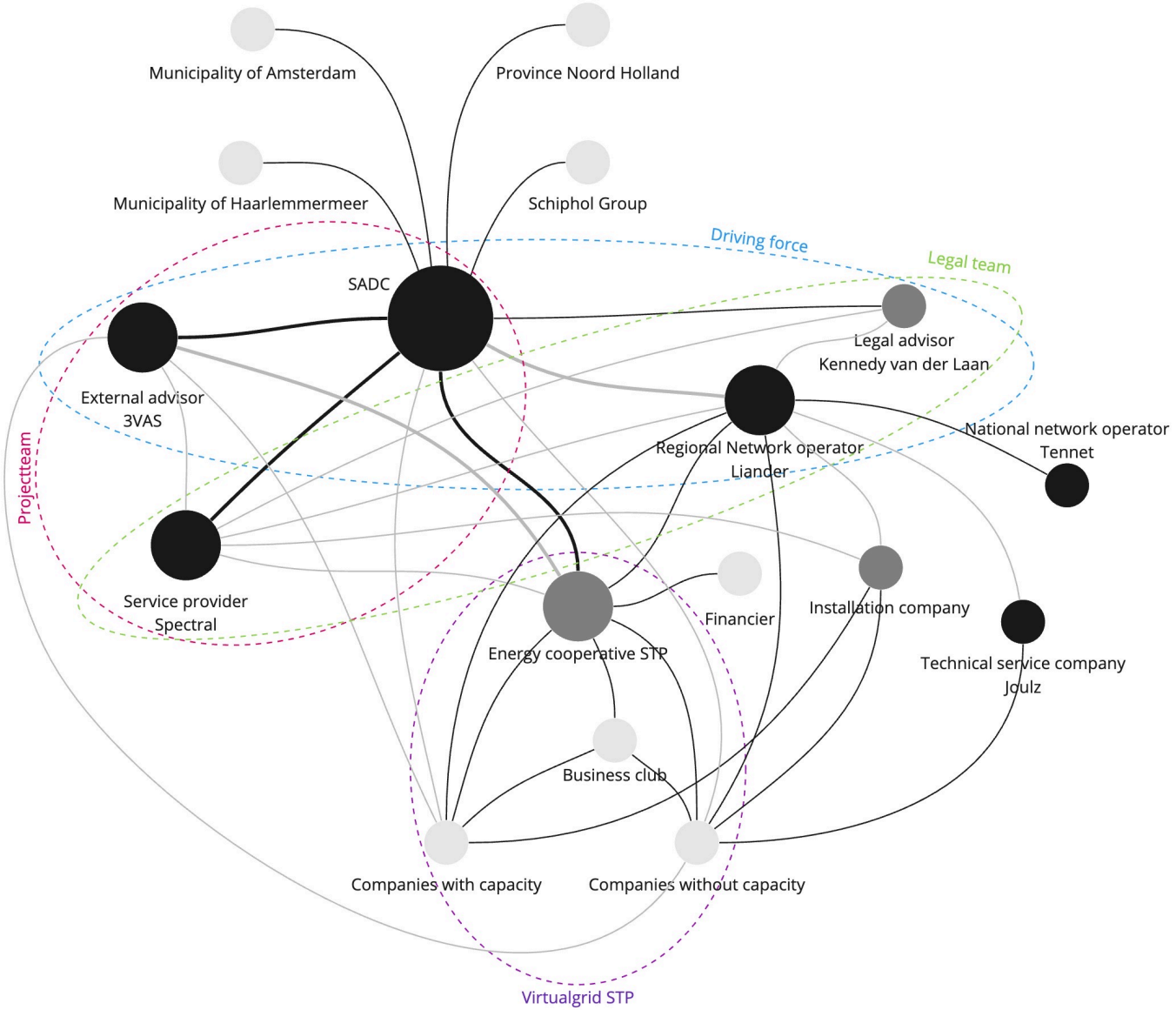
'Het elektriciteitsnet wordt minder belast als de vraag naar en het aanbod van lokaal opgewekte energie bij elkaar worden gebracht', schrijft minister Jetten aan de Tweede Kamer. 'Dit kan mogelijk worden gemaakt door versnelling van de ontwikkeling van energy hubs of door bij eigen opwekinstallaties batterijen toe te voegen en bedrijfsprocessen af te stemmen. Dit kan men individueel doen, maar de voorkeur is om dit collectief te organiseren door samenwerking in energiehubs.'

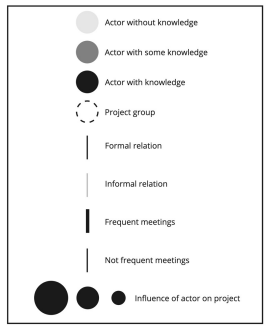
"It is about bringing supply and demand together, in time and place. Technically, this is already possible. The biggest barrier remains the social aspect."

-Interviewee STP

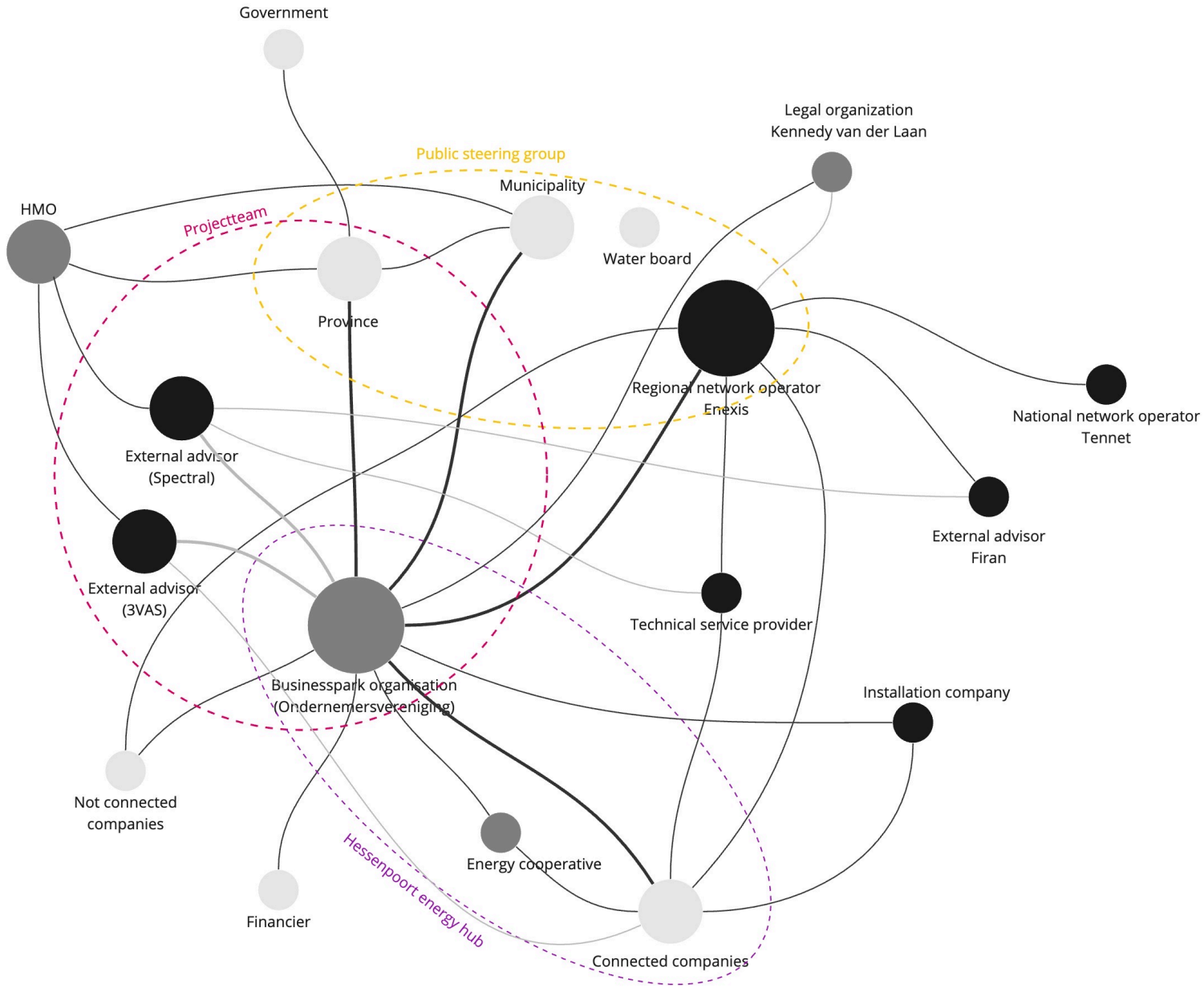


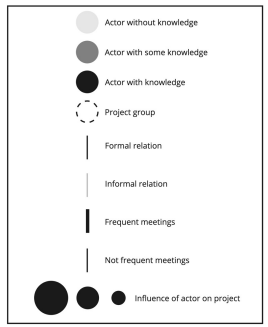
Actor Network
Schiphol Trade Park



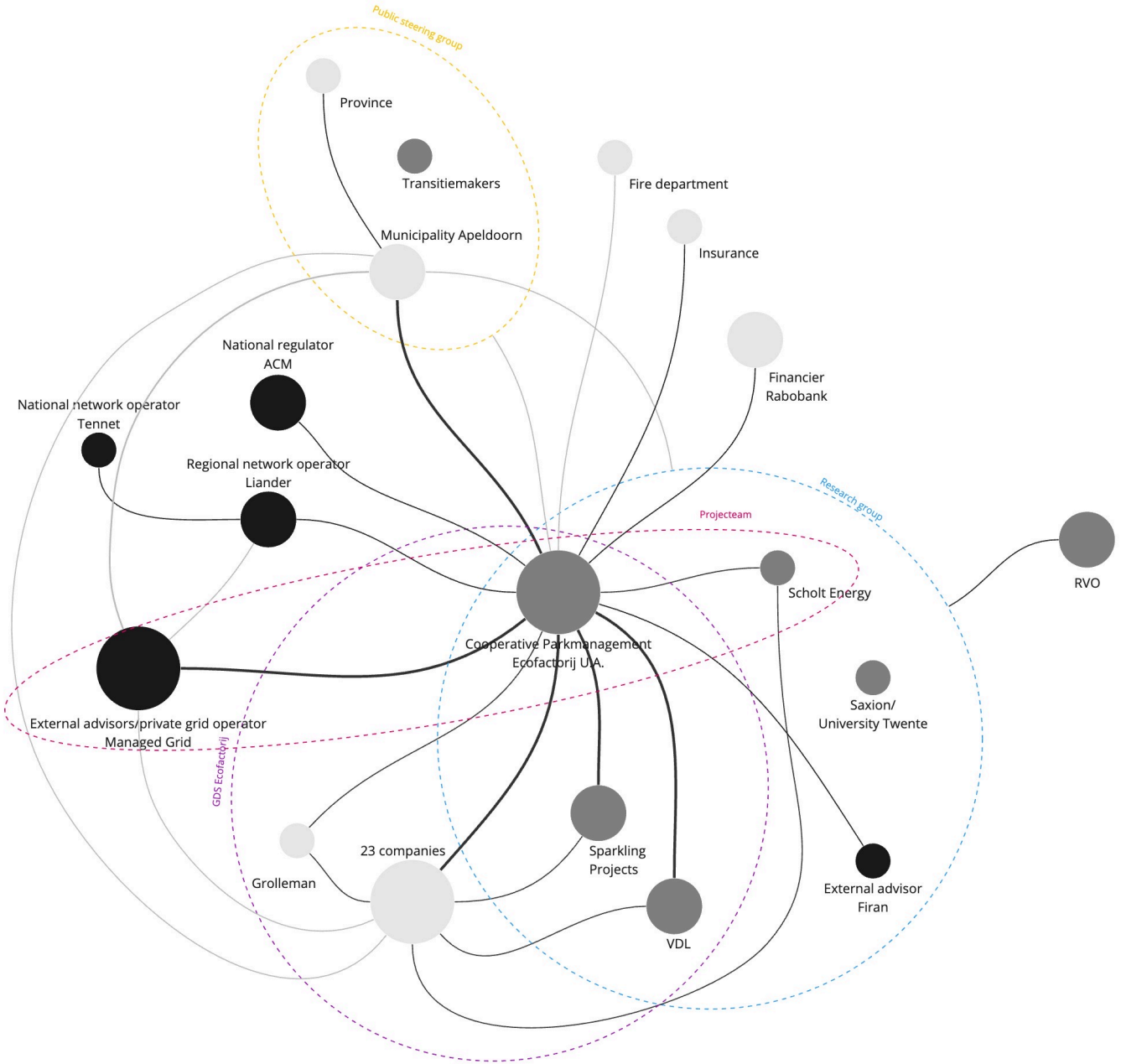


Actor Network
Hessenpoort

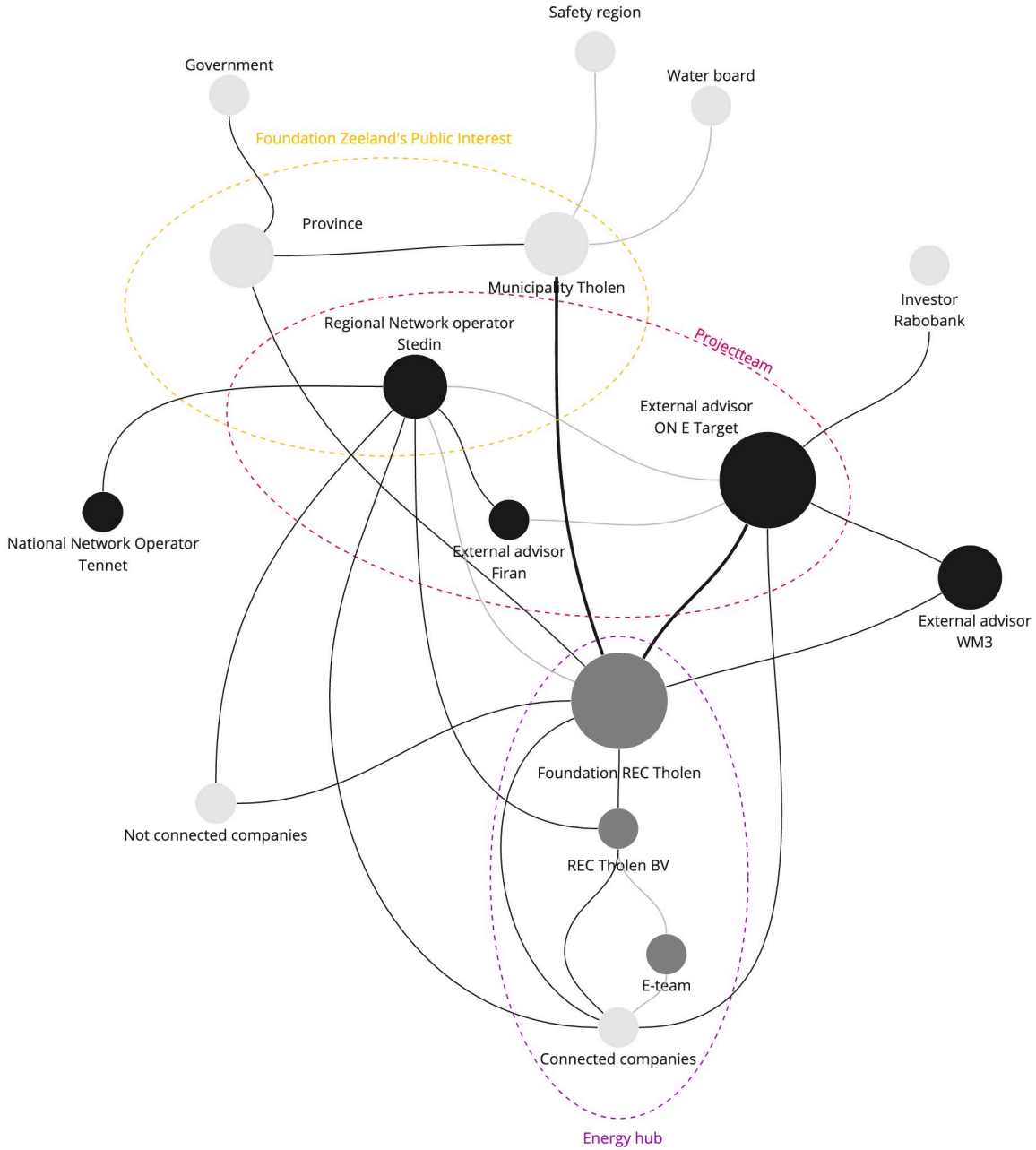


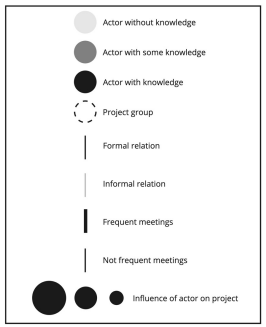


Actor Network
Ecofatcorij



Actor Network
Tholen

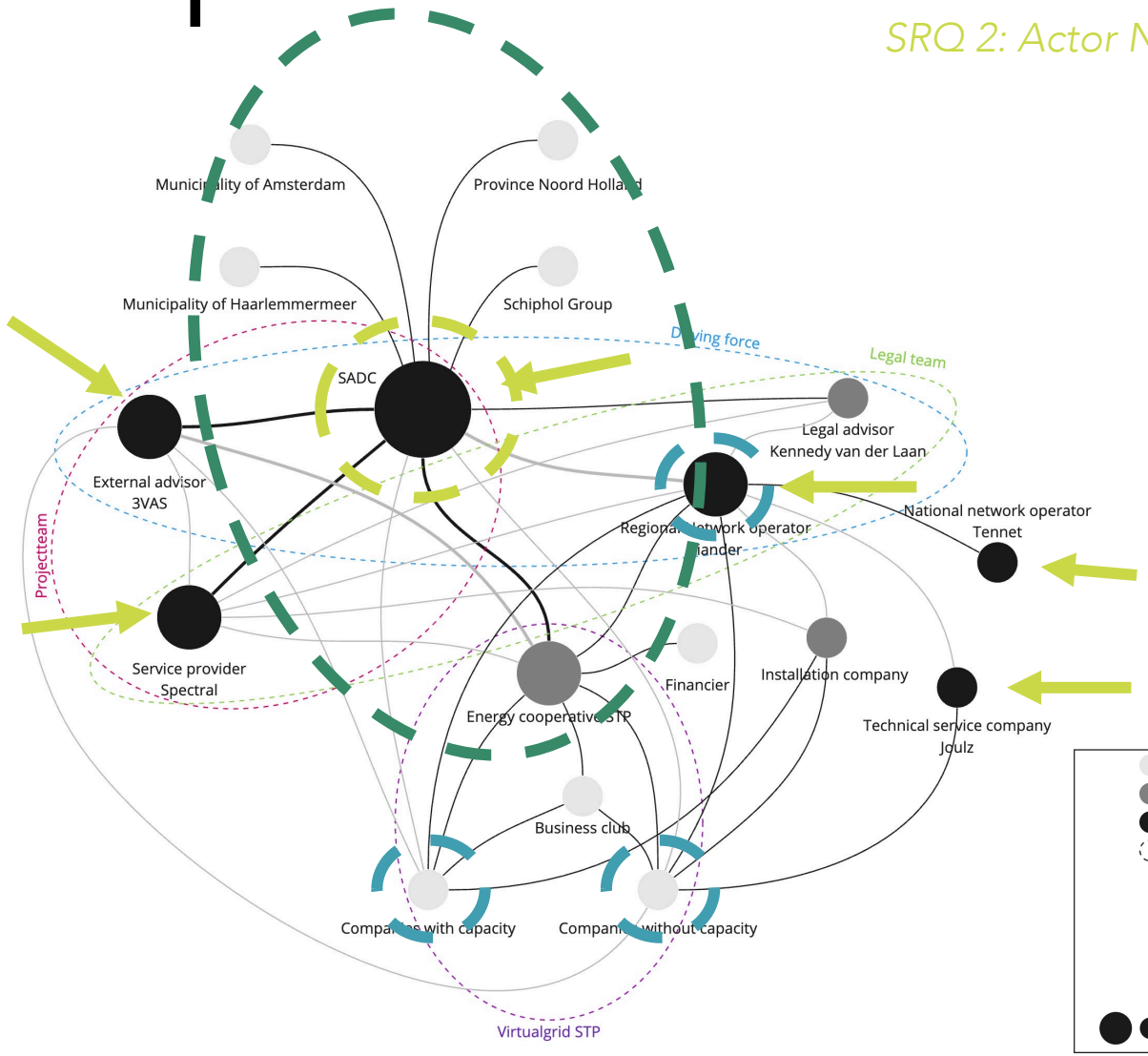


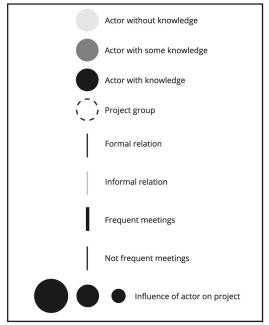


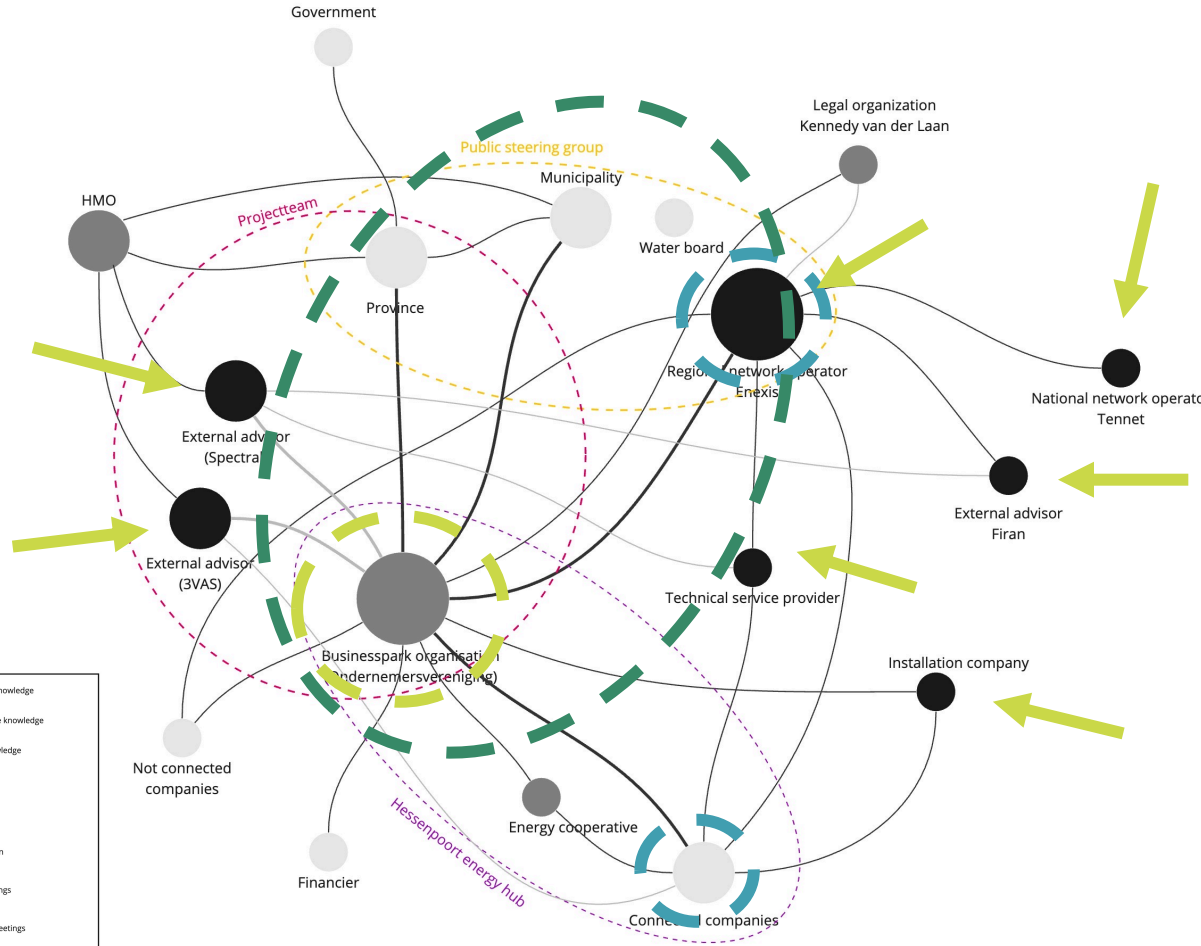
Schiphol Trade Park

Hessenpoort

SRQ 2: Actor Network



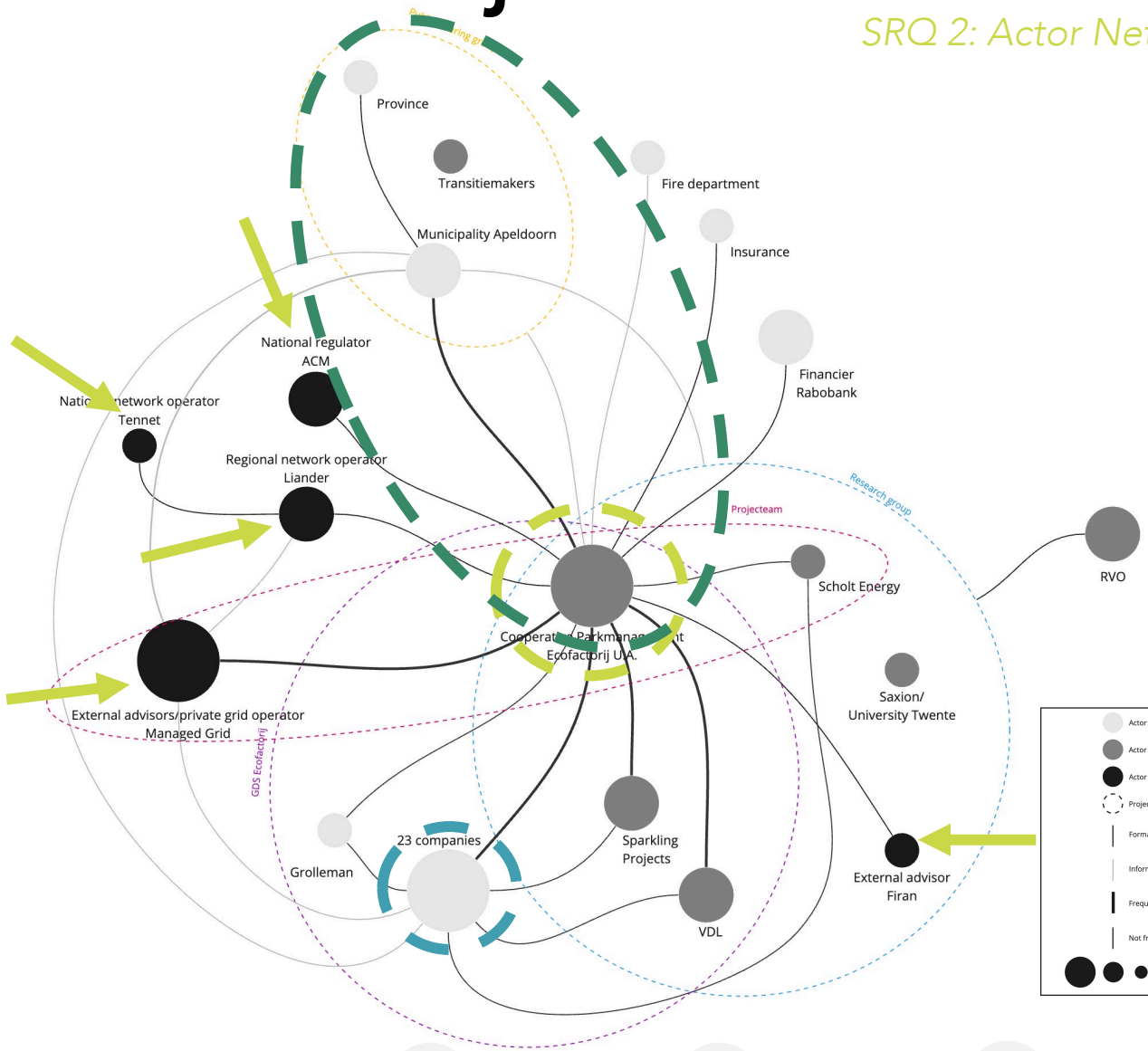


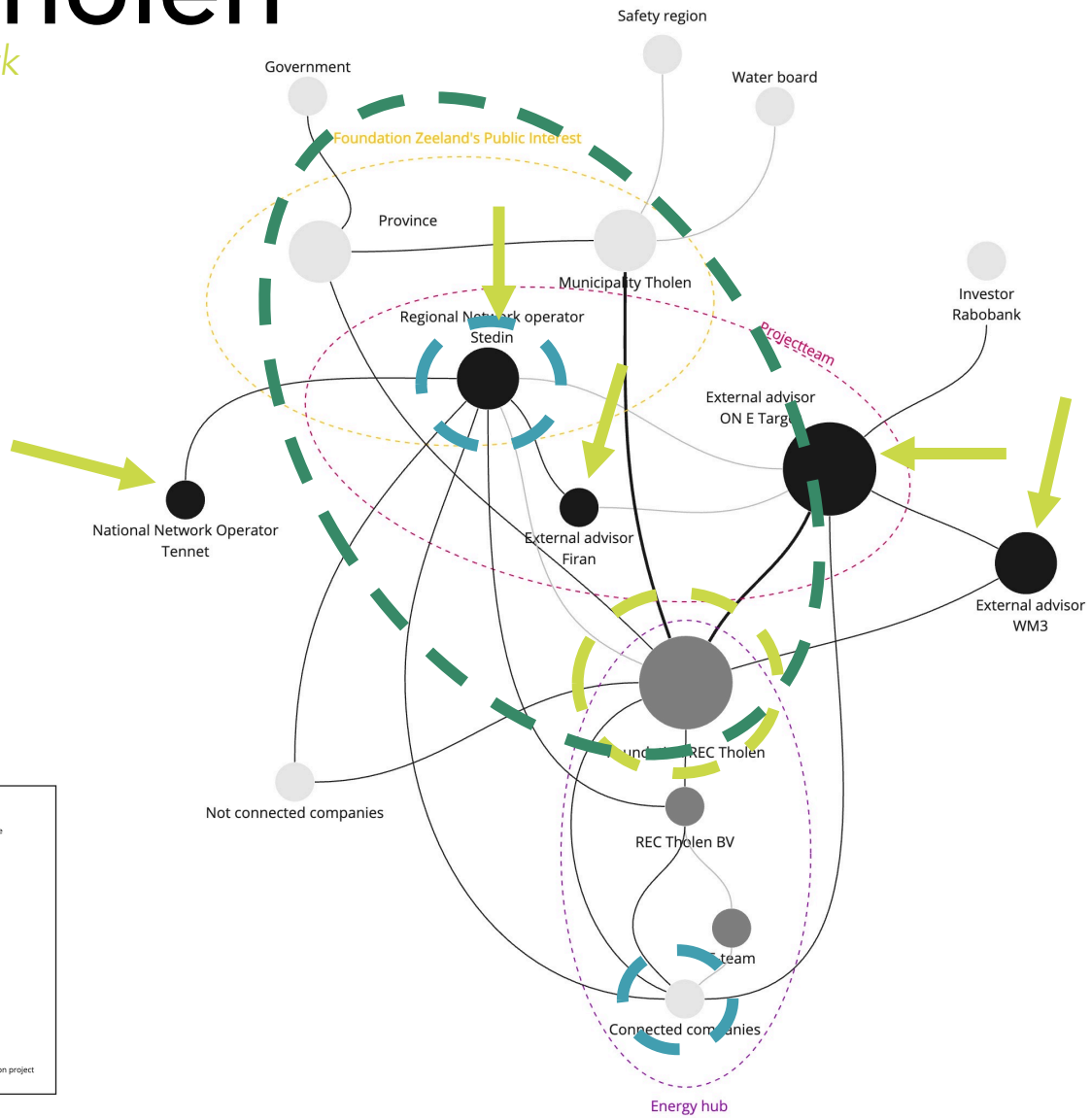


Ecofactorij

Tholen

SRQ 2: Actor Network





Schiphol Trade Park

Hessenpoort

SRQ 3: Vision and Learning Activities

Vision

Robust | Specific | Quality

- No clear next steps

Learning activities

First-order learning | Second-order learning

- Due to quick development
- Stimulated by external advisors

Vision

Robust | Specific | Quality

- Not shared among all actors

Learning activities

First-order learning | Second-order learning

- Learning from STP
- Pilot Project DSO

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SRQ 3: Vision and Learning Activities

Vision

Robust | Specific | Quality

- Not shared among all actors (DSO & Companies)

Learning activities

First-order learning

- Condition of subsidy

Second-order learning

- Stimulated by research group

Vision

Robust | Specific | Quality

- Not shared among all actors, and no clear next steps

Learning activities

First-order learning

- No possible blueprint

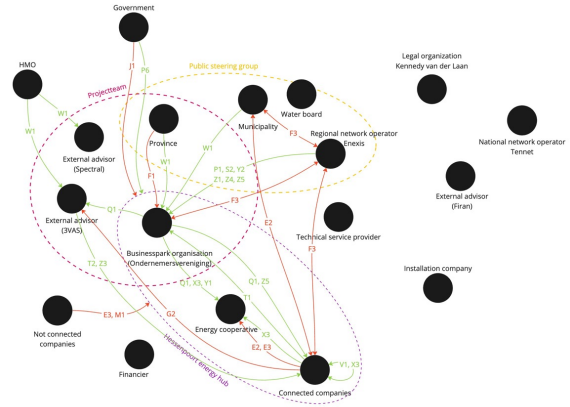
Second-order learning

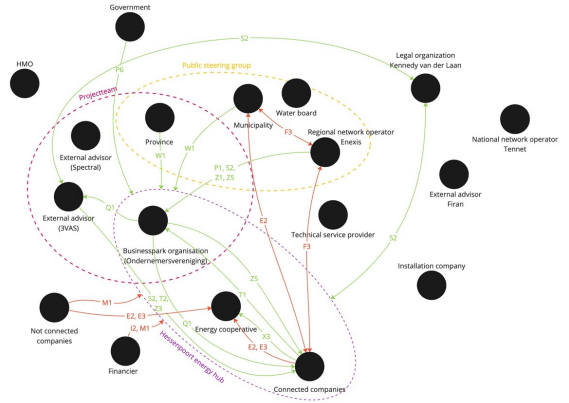
- Stimulated by knowledge platform

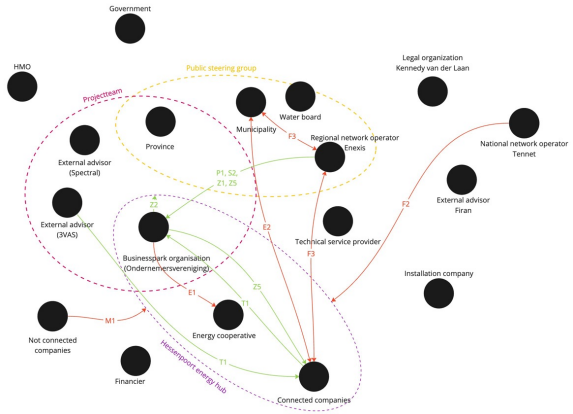
Hessenpoort

SRQ 4: Barriers & Enablers

- Jargon barrier
- Companies show barriers to LES
- Financier shows barriers to LES
- Enablers from External advisor
- Enablers from public parties







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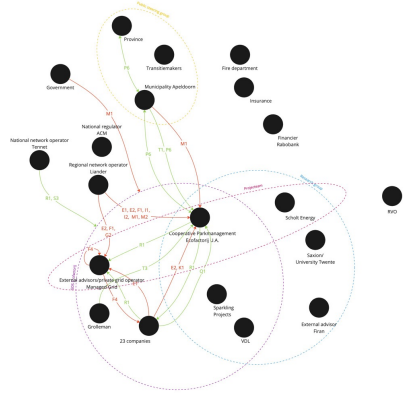
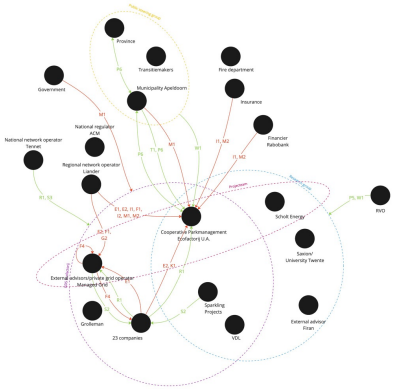
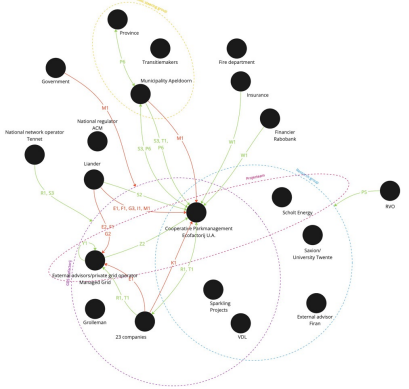
SRQ 4: Barriers & Enablers

- Main barriers from regional network operator
- Jargon barrier
- Financier shows barriers to LES
- Enablers from public parties
- Research group stimulated knowledge sharing







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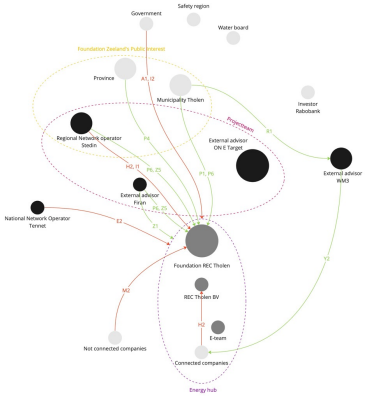
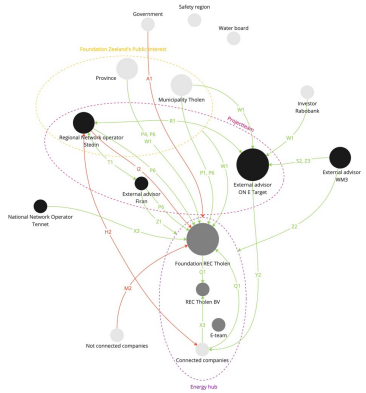
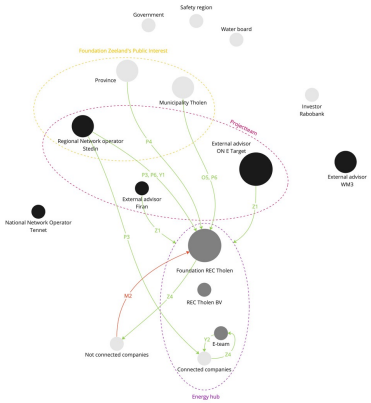
SRQ 4: Barriers & Enablers

- Companies show barrier to LES
- Enablers from public parties
- Financier shows barriers to LES
- Enablers from external advisors
- E-team stimulates egagement companies