Building energy commons:
Three mini-PV installation cases in apartment complexes in Seoul

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How do production/supply/sharing energy communities emerge and develop?
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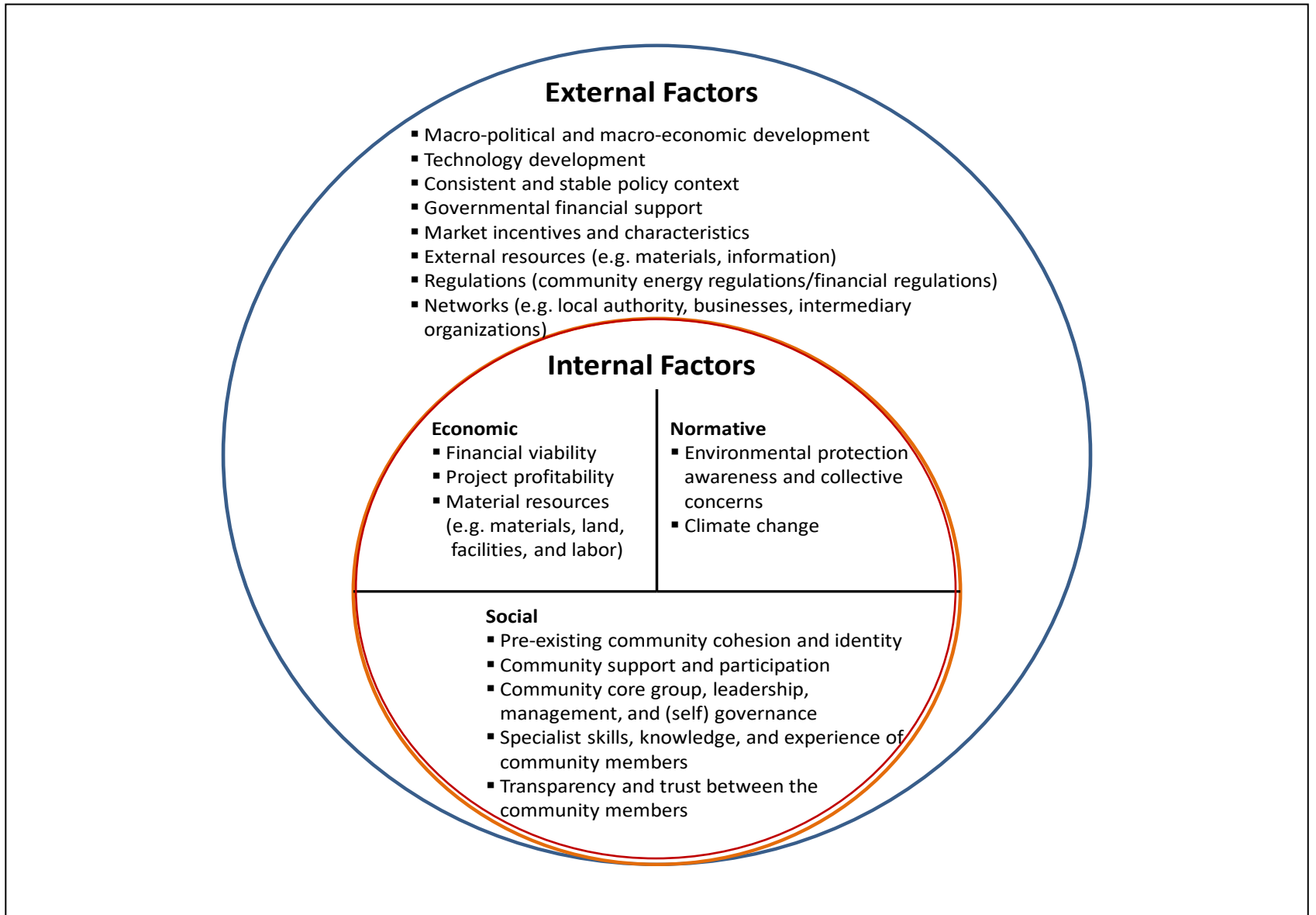
PV: The most viable option for cities but…

- Many barriers to install PVs in megacities.
  - A large share of the population in dense urban area lives in high-rise multi-family housing
  - A significant proportion of these people rent rather than own their housing
- Off-site and centralized installation of renewable energy facilities has been promoted.
  - Limitations such as…
    - Not obtaining the awareness enhancement
- In megacities, community energy initiatives rarely develop spontaneously (Kim, 2017).
- A feasible model in Seoul, South Korea

Research goal

Analyze how communities processed the collective installation of small-scale PV in every unit of their apartment complexes,
with a focus on how community internal factors apply
within a dense urban context.

Success factors for community energy



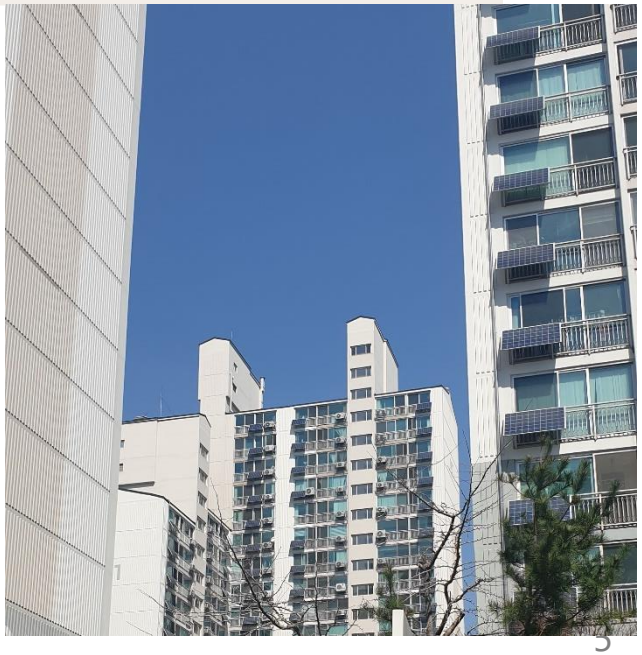
Mini PV

- Mini-PV generally refers to PV with a small capacity used for household consumption.

Table: Types of mini-PV

	Balcony type	Residence type	Building type
Capacity	250kW-1kW	1kW-3kW	3kW+
Connectivity	Power outlet	Electric meter	Electric meter

- Can be installed on the balconies of apartment buildings
- Can be easily detached and reinstalled like electric appliances



Promotion of mini-PV in Seoul

Photo by Yeonhap News

- One Less Nuclear Power Plant (OLNPP) policy
  - Promoted mini-PV aggressively
- Prioritized mini PV installation to achieve 1 GW of PV, ‘The City of Sun, Seoul’
- Provides financial support for deploying mini-PVs
  - The actual payments to people who install mini-PVs: 60 to 250 thousand KRW (50 to 210 USD)

The complex A: The first collective mini-PV installation cases in apartment complexes

	The Complex A
Installed unit/total units in the apartment complex	360/371 (94.3%)
Project period and major schedule miles tones	2016.11~2017.6 ◆ First discussed the project at the council of occupants' representatives (2016.11) ◆ Introduced the project as an official agenda item at the residents' representative meeting and agreed upon the implementation (2016.12) ◆ Selected the PV installer and promoted the project to residents (2017.1~2) ◆ Installed mini-PV in 94.3% of the total households
Major players	◆ The council of occupants' representatives ◆ The office manager ◆ The committee of senior residents
Major drivers for the commencement of the project	◆ Desire to increase apartment value ◆ Obtain the economic benefits of mini-PV
Internal enabling conditions	◆ Awareness of energy-related activities built from previous energy efficiency enhancement projects ◆ Persuasion efforts of opinion readers including residents' representatives and the head of the management office ◆ Enough money collected from various activities such as parking lot lease, sales of recyclables, etc. ◆ The consensus of residents' representatives ◆ Leadership of the chairman of the residents' representative meeting ◆ High awareness within the management office
Challenges experienced	◆ Space limits at lower floors ◆ Different preferences for installation locations ◆ Distrust between landlords and tenants ◆ Distrust of the project ◆ Distrust of the management office ◆ Contact problems

Installed mini-PVs in Complex A

Photo by Complex A management office

The complex B: The imitative case

	The Complex A
Installed unit/total units in the apartment complex	362/372 (97.3%)
Project period and major schedule milestones	2017.12~2018.6 ◆ First discussed the project at the council of occupants' representatives (2017.12) ◆ Selected the PV installer and presented the project to residents (2018.02) ◆ Obtained residents' agreement (2018.02) ◆ Installed the mini-PV in 97.3% of the total households (2018.04~06)
Major players	◆ The council of occupants' representatives ◆ The office manager
Major drivers for the commencement of the project	◆ Needs to enhance the community environment ◆ Obtain the economic benefits of mini-PV ◆ Desire to increase apartment value
Internal enabling conditions	◆ Existence of a model to follow ◆ Inflow of money to use ◆ Well-organized decision-making process ◆ Proactive management office manager with expertise in energy areas
Challenges experienced	◆ Residents' opposition to the project ◆ Different preferences for installation locations

Installed mini-PVs in Complex B

The complex C: The scaling-up but failed case

	The Complex A
Installed unit/total units in the apartment complex	Not initiated but discussed 0/1,110
Project period and major schedule miles tones	2017.12~ ◆ First discussed the project externally at a regular meeting of a local grassroots group (2017.12) ◆ First discussed the project internally at the council of residents' representatives (2018.02) ◆ Prepared for and applied to the ESV program (2018.02) and was designated as the ESV (2018.04) ◆ The scheduled project presentations were suspended due to temporal sensitivity (2018.04)
Major players	• Not detected
Major drivers for the commencement of the project	◆ Needs to expand the activities of an external local grassroots group
Internal enabling conditions	◆ Existence of the model to follow
Challenges experienced	◆ No consensus regarding the project among occupants' representatives ◆ Weak leadership of newly elected leaders ◆ Lost momentum due to temporal sensitivity ◆ Reactiveness of office manager

Discussion: An innovative model for shared solar

- An innovative ‘community shared solar’ model for deploying PV in megacities
  - Collectively installed very small-scale PVs on the balconies of individual units in an entire apartment complex
  - Then designated the installed mini-PVs as common resources for the complex
  - Effectively resolves the space issue

  - Relives the initial installation burden by using the reserve collectively raised for long term maintenance and repair of apartments
  - Direct economic benefits to individual households through reduced electricity bills
  - Increased property values

Discussion: The leadership and trust do matter

- The leadership facilitated the process of collective installation based on the concrete trust built from past energy-related achievements in the successful cases
  - Especially, the office manager (a full-time employee of the complex)
  - Occupants' representatives

- The timing of the project
  - The scale-up case(Complex C) was carried forward during a politically sensitive period, as the provincial election approached
  - This dwarfed the newly elected leadership.
  - There was not much room for them to take on a new initiative.

Conclusions and policy implications

- Economic factors shaped the initial conditions for the commencement of the project.
- Leadership played a key role across the whole project by speeding up the process, relieving residents' concerns and distrust.
- The scaling up or mainstreaming of this project needs external enabling conditions as well
  - The existence of strong incentives or education and training

Thank you!

For additional comments or questions:
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