



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

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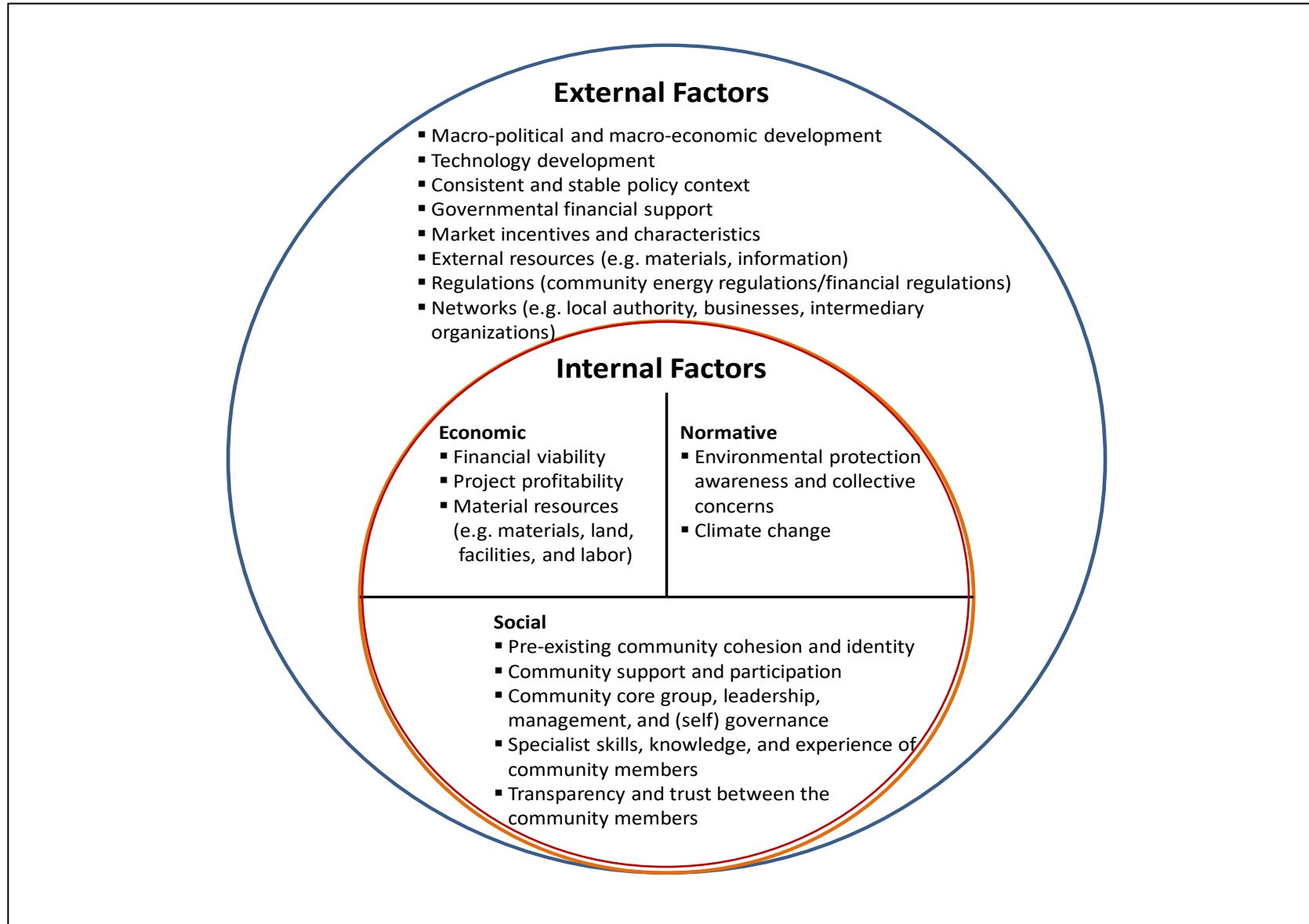
PV: The most viable option for cities but...

- ◆ 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



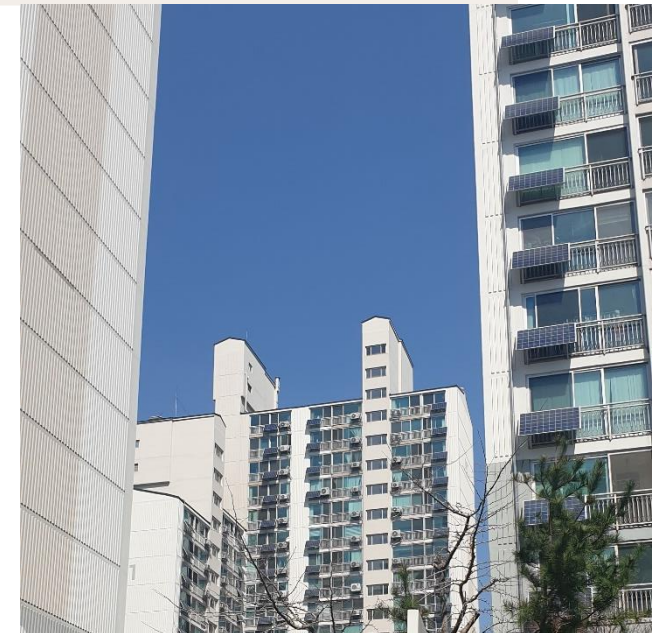
Mini PV

- ◆ 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 milestones	2016.11~2017.6 <ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ The council of occupants' representatives ◆ The office manager ◆ The committee of senior residents
Major drivers for the commencement of the project	<ul style="list-style-type: none"> ◆ Desire to increase apartment value ◆ Obtain the economic benefits of mini-PV
Internal enabling conditions	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 <ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ The council of occupants' representatives ◆ The office manager
Major drivers for the commencement of the project	<ul style="list-style-type: none"> ◆ Needs to enhance the community environment ◆ Obtain the economic benefits of mini-PV ◆ Desire to increase apartment value
Internal enabling conditions	<ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> ◆ 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 milestones	2017.12~ <ul style="list-style-type: none"> ◆ 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	<ul style="list-style-type: none"> • Not detected
Major drivers for the commencement of the project	<ul style="list-style-type: none"> ◆ Needs to expand the activities of an external local grassroots group
Internal enabling conditions	<ul style="list-style-type: none"> ◆ Existence of the model to follow
Challenges experienced	<ul style="list-style-type: none"> ◆ 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
 - Relieves 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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