

# *Solar Apartments*

Opportunities for deploying PV on multi-occupancy residential buildings

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# Solar Apartments - Workshop



UNSW  
SYDNEY

*Our task today: Identify some key findings and policy approaches to highlight in the final report*

12:15 – 1:00 Overview of project findings

1:00 – 1:15 Grab a Sandwich

1:15 – 1:35 Panel Contributions:

Lynne Gallagher : Energy Consumers Australia

Chris Byrne : Green Strata

Murray Hogarth : Wattwatchers

Gareth Huxham : Energy Smart Strata

1:35 – 1:55 Group Discussion

1:55 – 2:00 Summary





**Why?**  
**How much?**  
**What for?**  
**Where & how?**  
**What's it worth?**  
  
**What's stopping us?**  
**What is to be done?**

**Why?**

**How much?**

**What for?**

**Where & how?**

**What's it worth?**

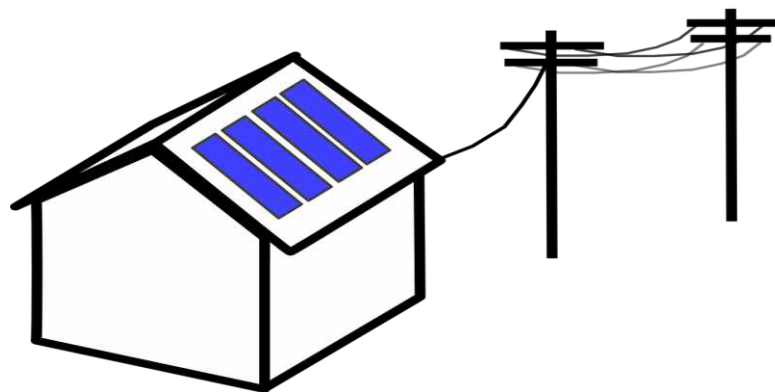
**What's stopping us?**

**What is to be done?**

# Why Solar Apartments?



GHI: Australia: 0.7 – 2.7 MWh/m<sup>2</sup>/year  
Sydney: 1.7 MWh/m<sup>2</sup>/year



**2 million solar households**  
(23% penetration, 50% in some areas)



**10% of Australians live in  
1.4 million apartments / units**

# Why Solar Apartments?

## For households

- Clean electricity
- Lower bills
- Increased energy independence

## For society

- Low cost generation
- Reduced fossil fuel reliance
- Reduced CO<sub>2</sub> emissions
- Energy Equity

## For networks

- Reduce network demand
- Generation close to (commercial) loads
- Defer network augmentation

**An opportunity for a clean energy community?**

**Why?**

**How much?**

**What for?**

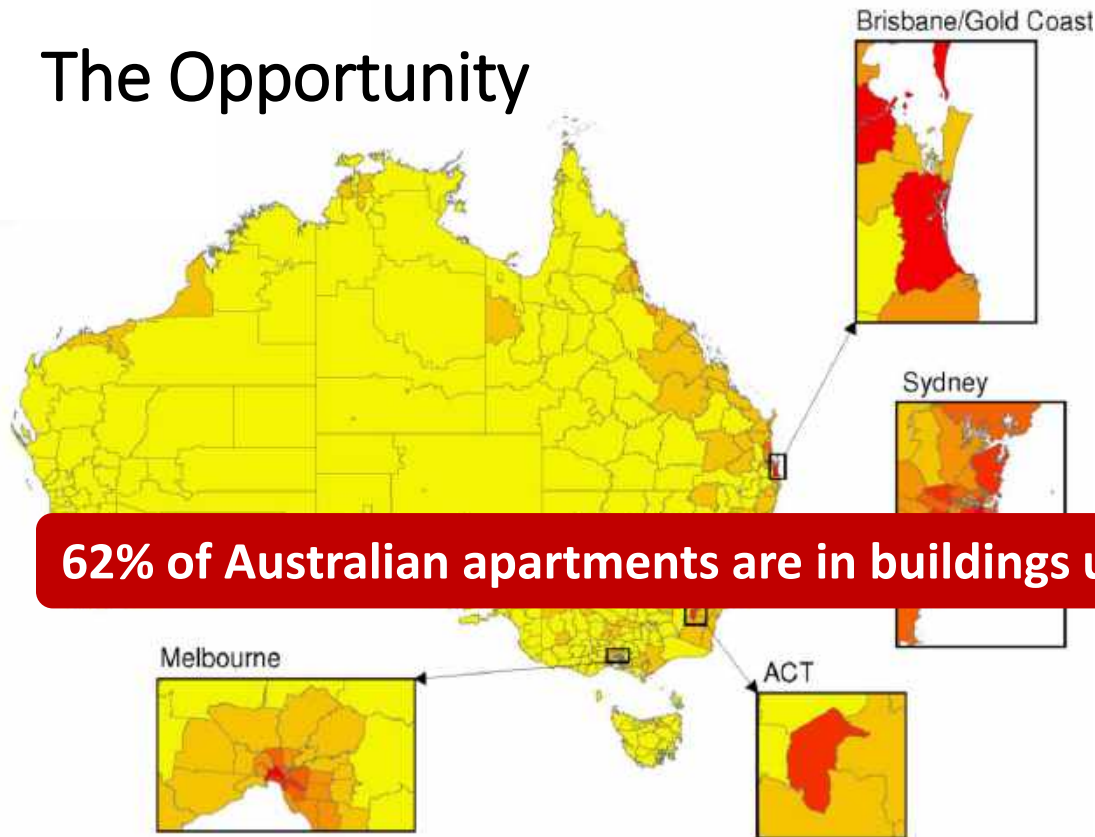
**Where & how?**

**What's it worth?**

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# The Opportunity



1.4 million  
apartments

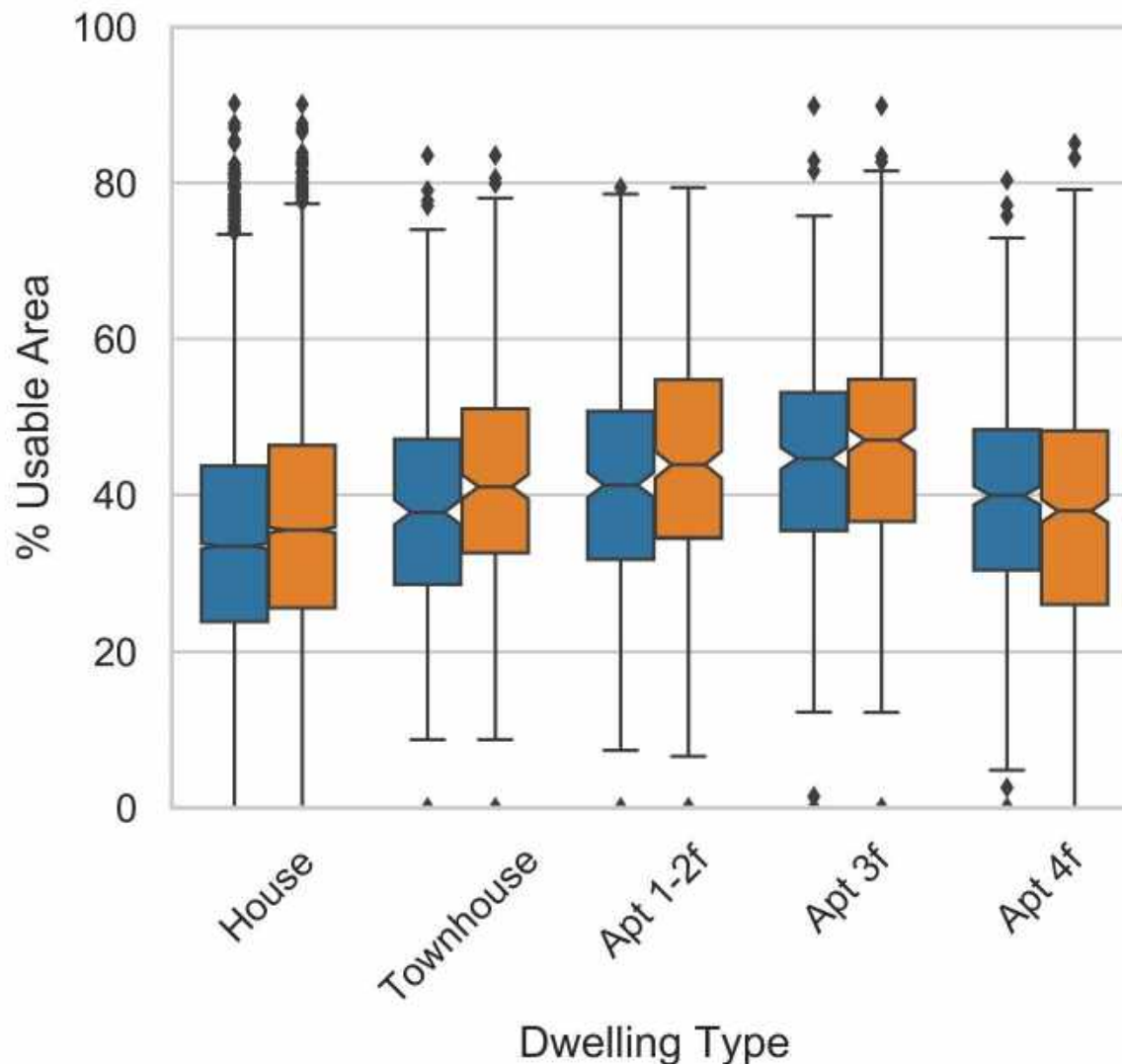
Housing 10%  
of Australians

Up to 70%  
in some LGAs

A third of new  
dwellings

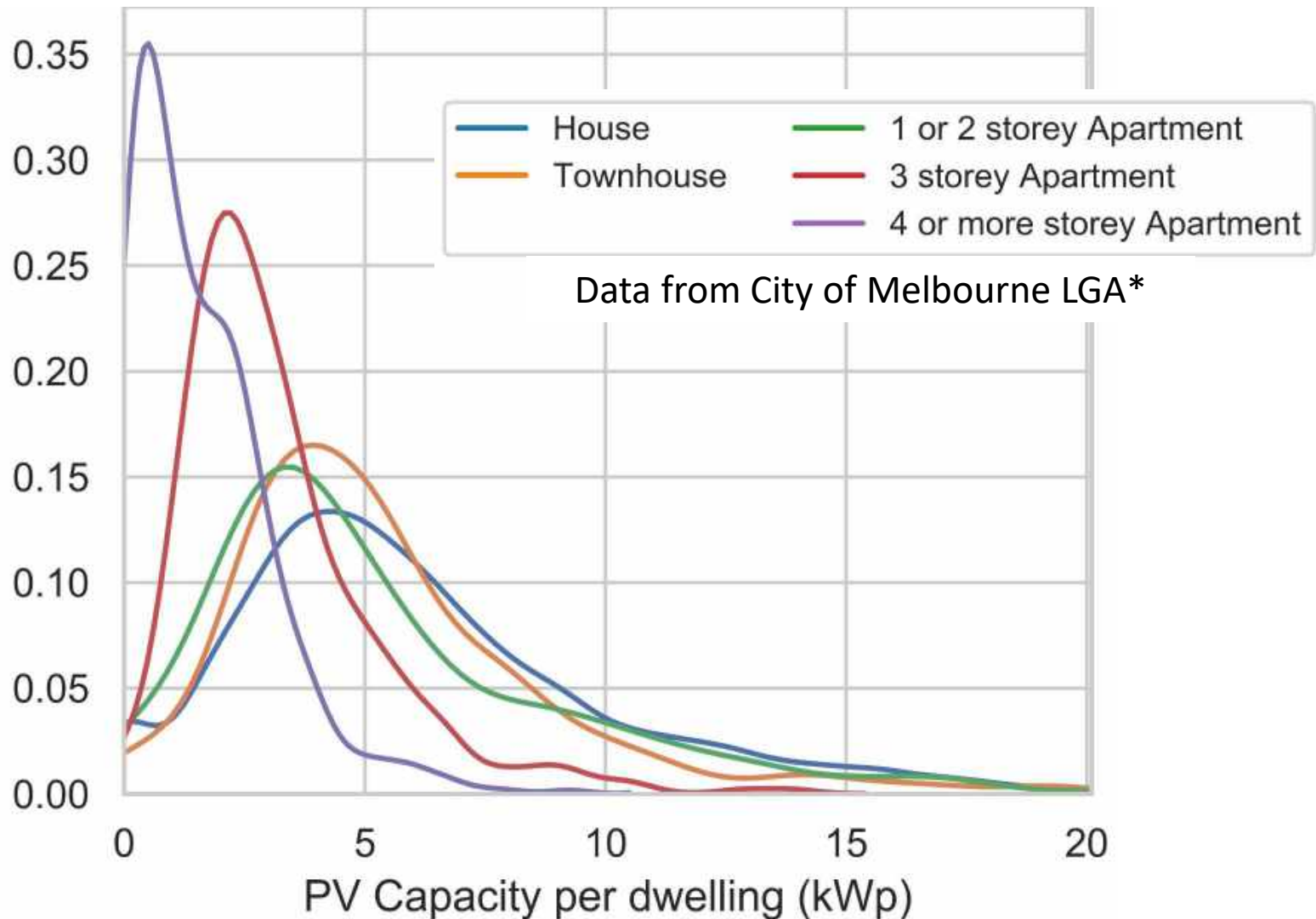


# The Solar Opportunity



Based on 3D model of  
City of Melbourne  
LGA, with 2 methodologies\*

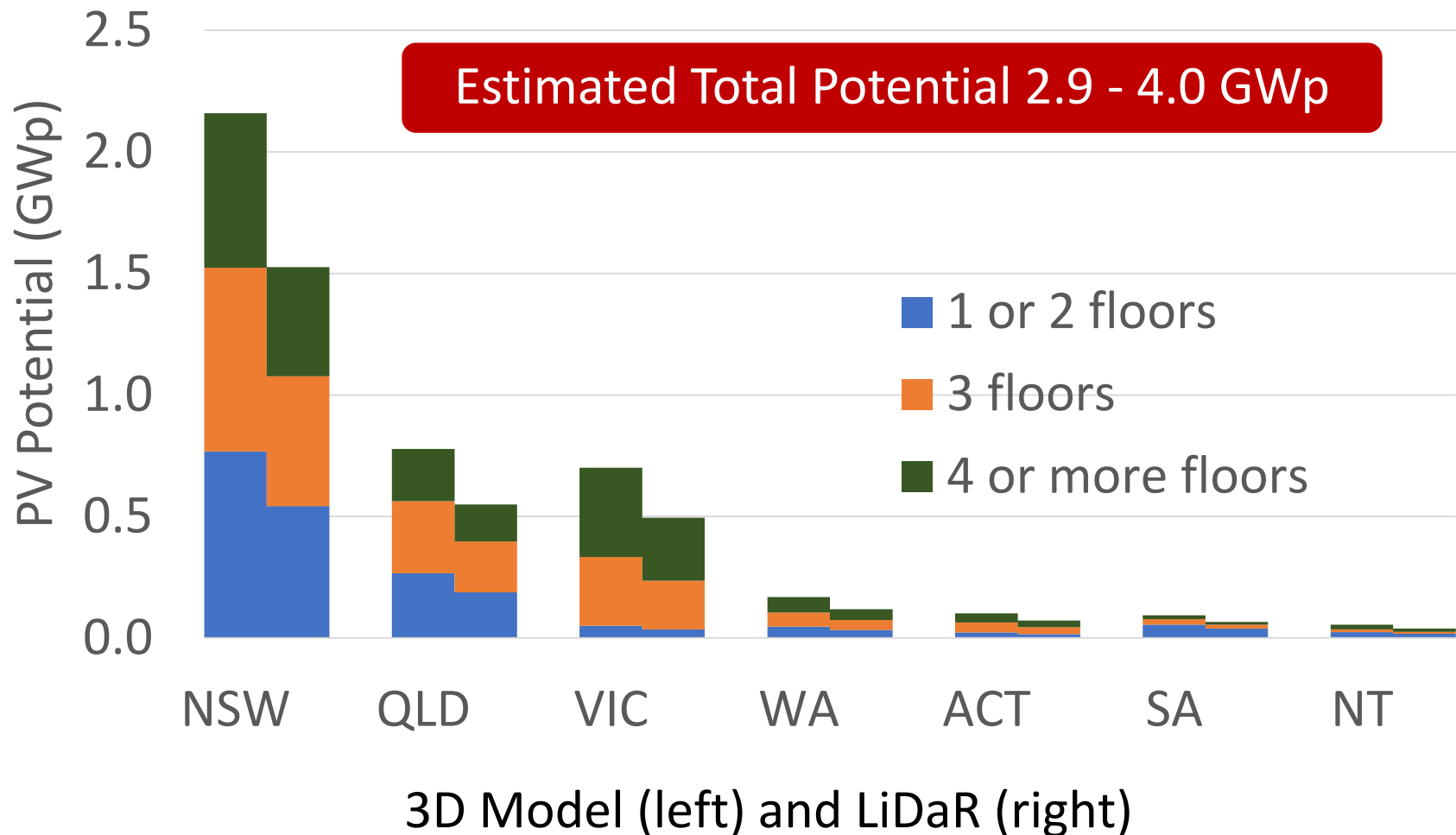
# The Solar Opportunity



# Rooftop Issues



# The Solar Opportunity



**Why?**

**How much?**

**What for?**

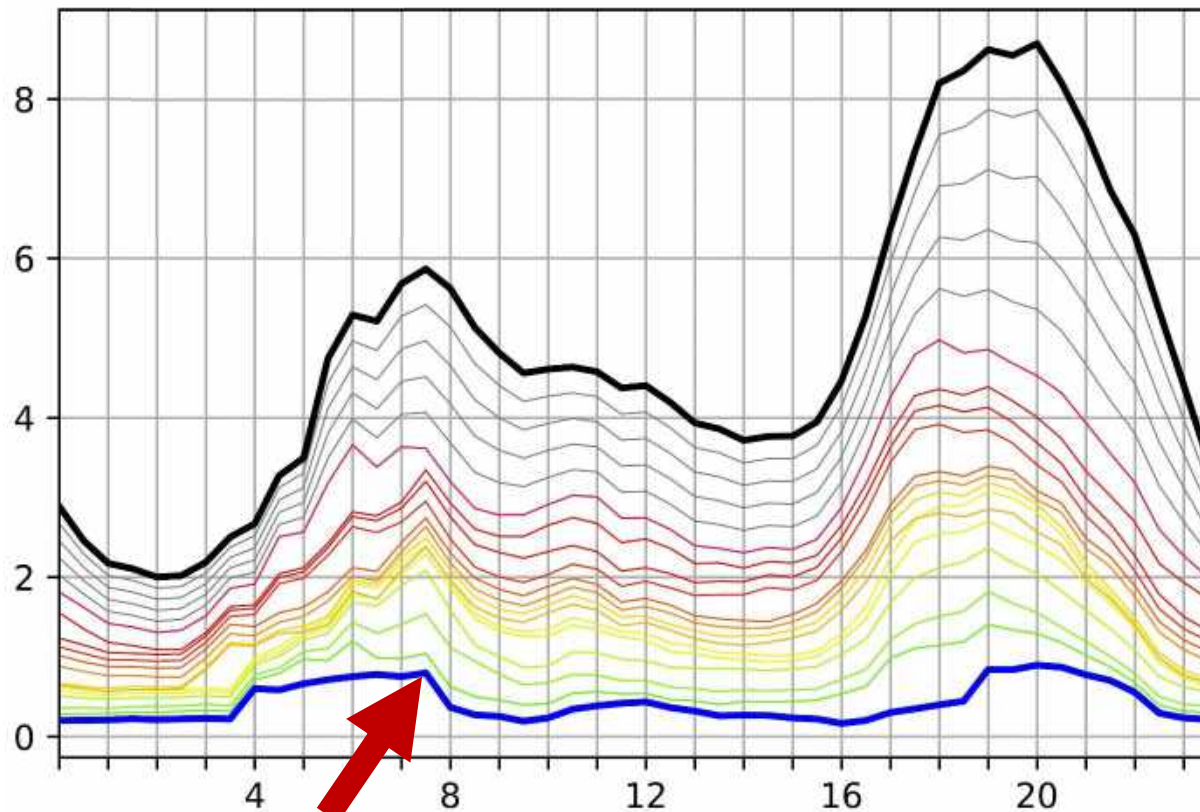
**Where & how?**

**What's it worth?**

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# Apartment Electricity Loads



Average Energy 41%  
compared to houses

Average energy per  
occupant 79% of  
houses

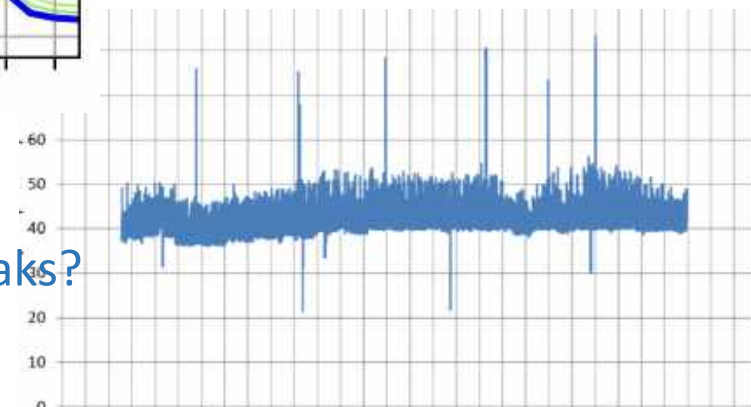
Higher daily variability

## Common Property

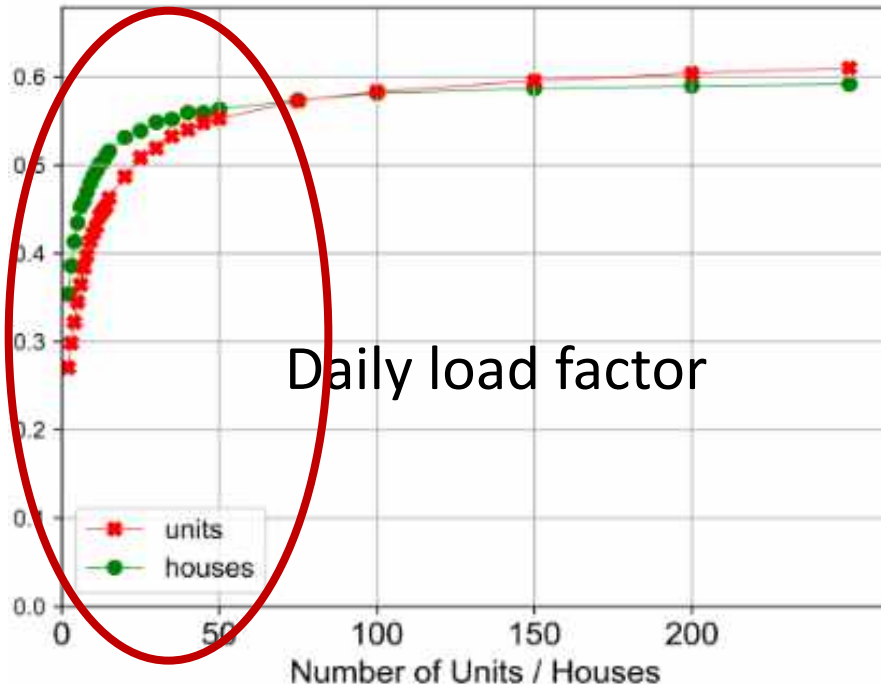
Highly diverse

5% → 60% of building load

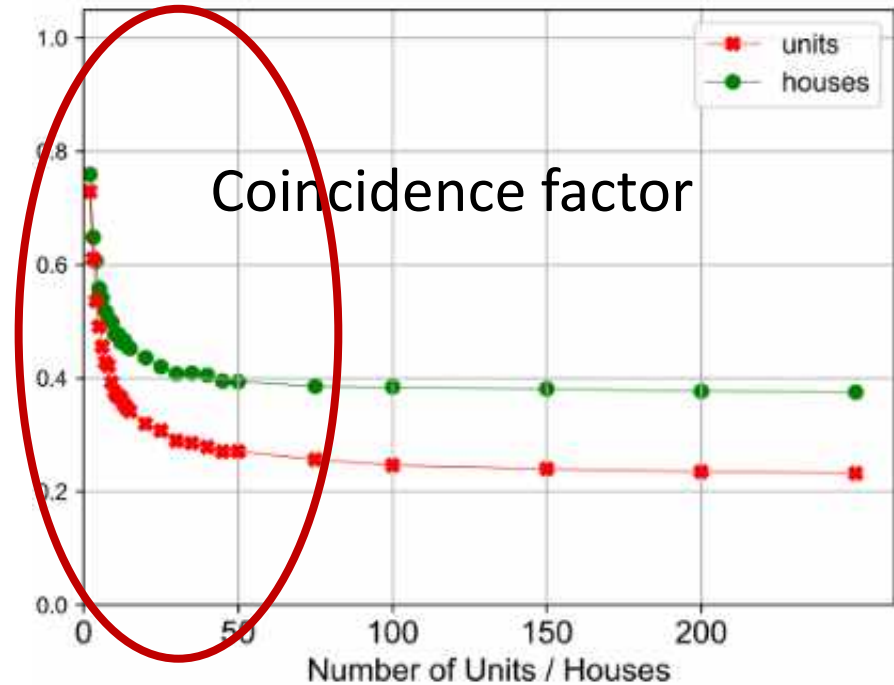
- Daytime load?
- High demand peaks?
- Control issues?



# Aggregating Loads



Lower load factor  
Higher variability



Lower coincidence factor  
Greater diversity

**Greater benefits from aggregating diverse loads**

**Why?**

**How much?**

**What for?**

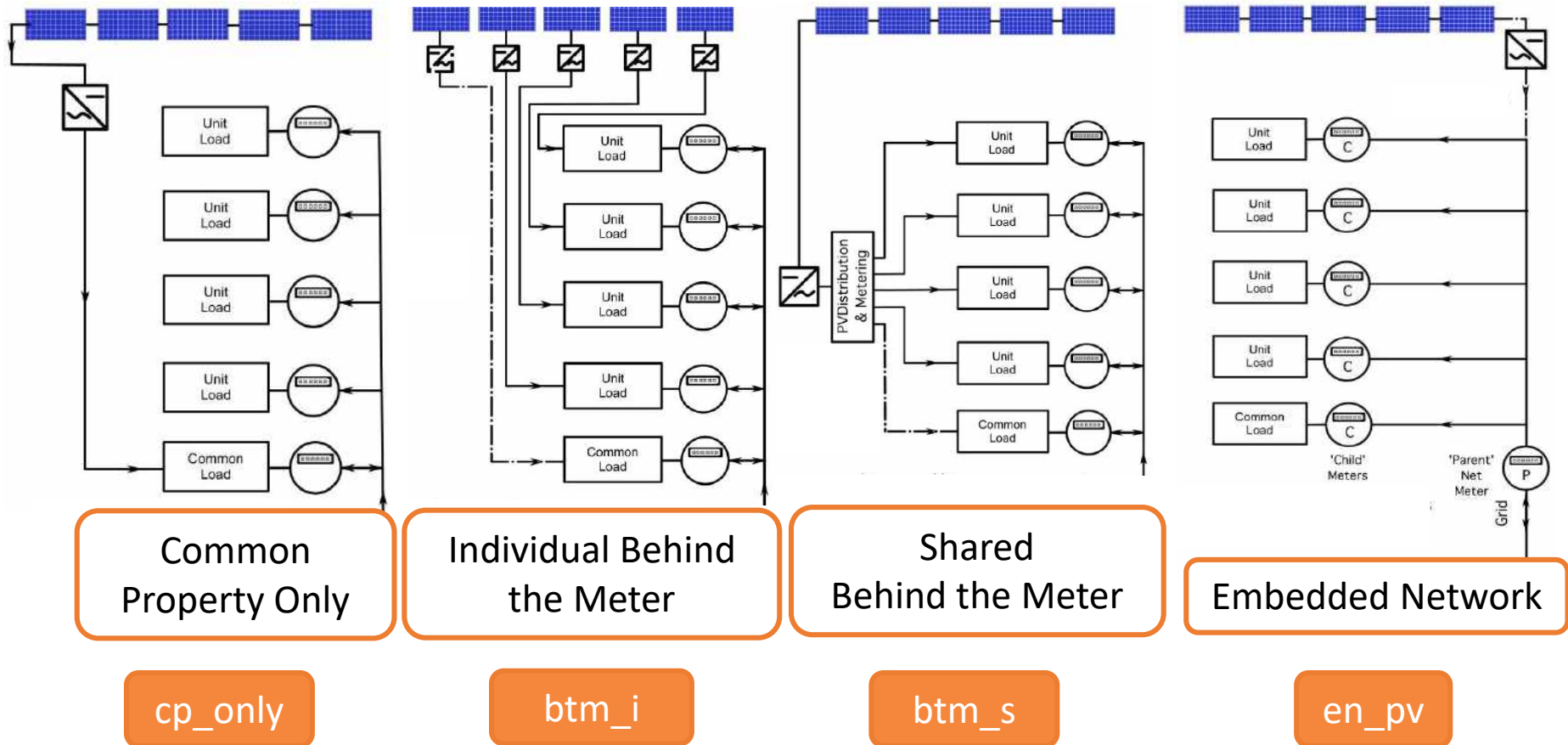
**Where & how?**

**What's it worth?**

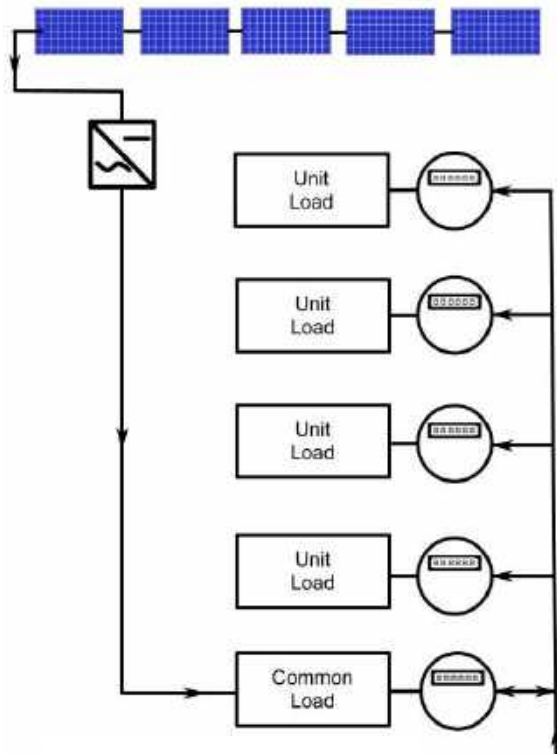
**What's stopping us?**

**What is to be done?**

# PV Technical Arrangements



# Common Property Only (cp\_only)



Common system  
on common roof  
applied to common load

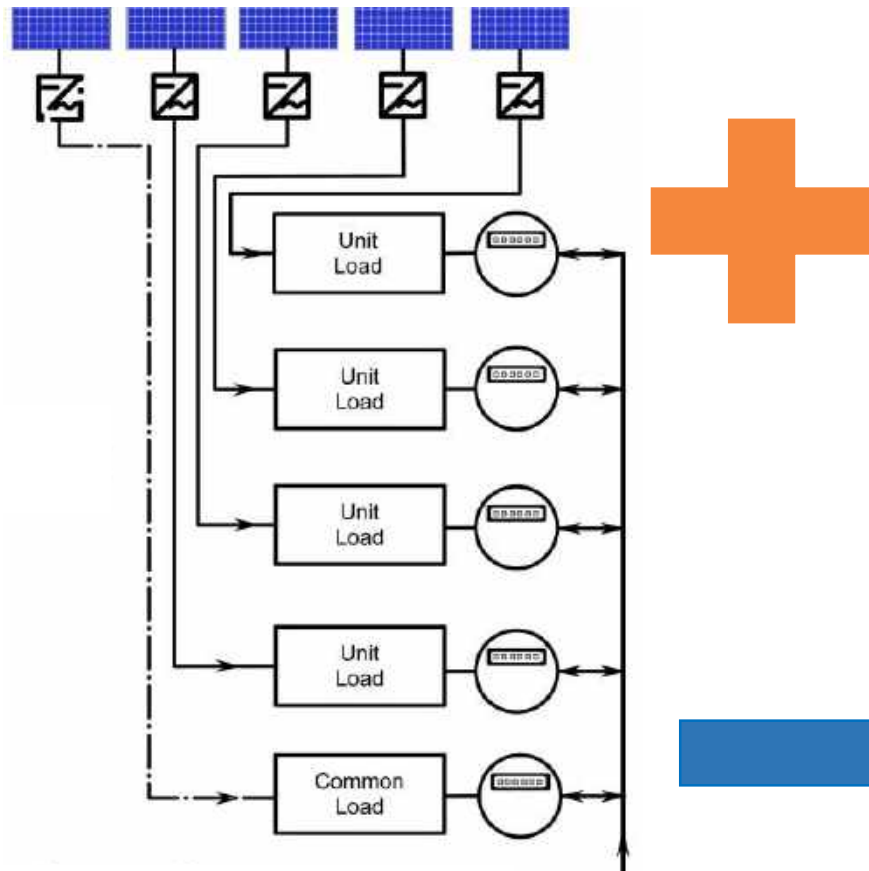
For high-rise,  
high self-consumption

Low self-sufficiency

For low-rise,  
unutilised roof space

~~Tax issues for FiT~~

# Individual Behind the Meter (btm\_i)



Choice rests with each  
apartment owner

Owner occupier can be investor  
and beneficiary

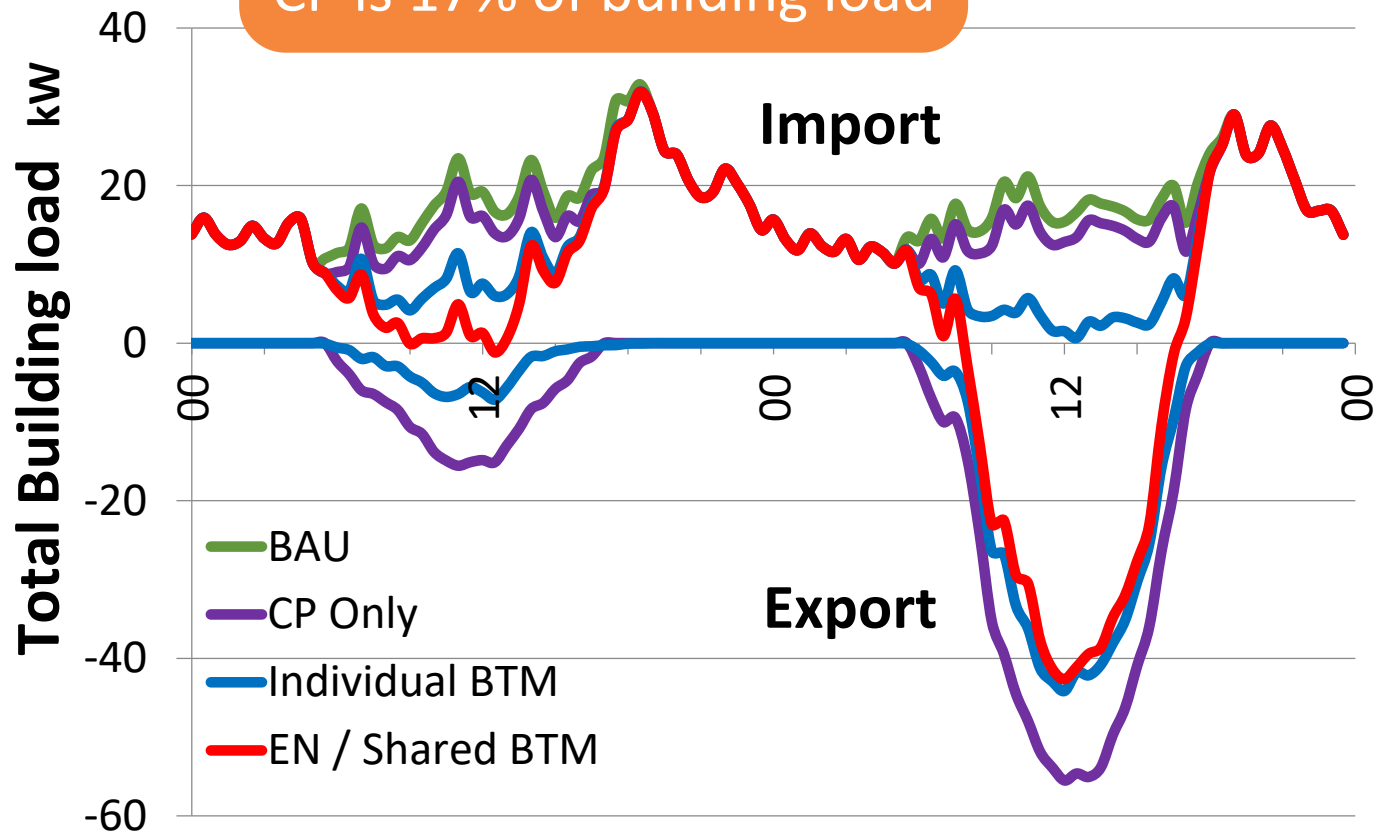
Individual system  
on common roof  
- bylaw

Low self-consumption

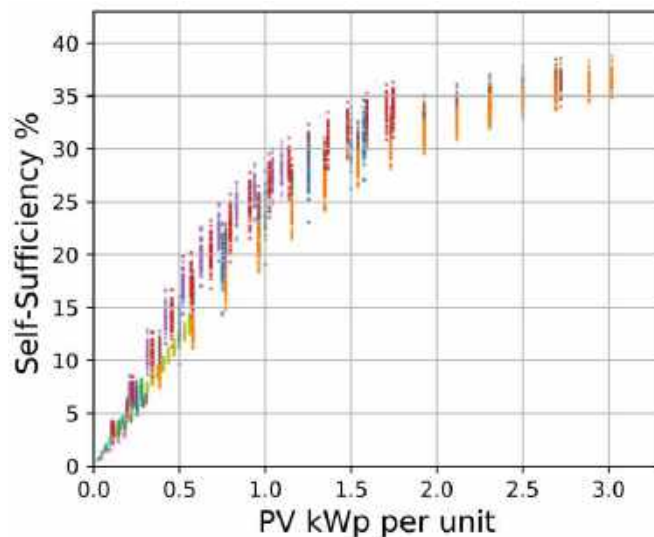
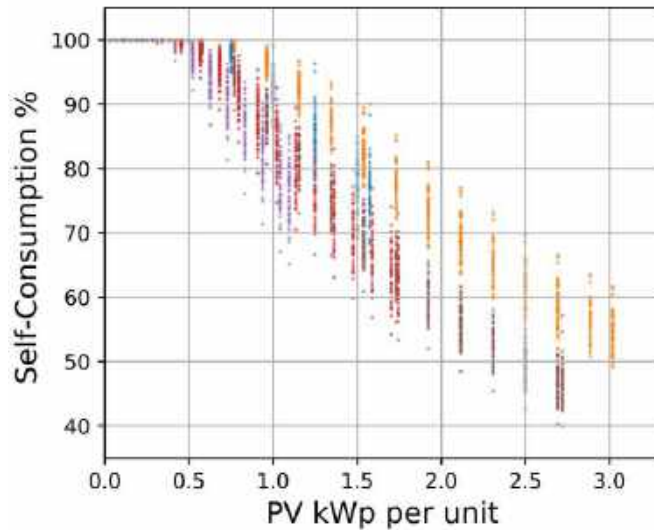
Landlord / tenant  
Split incentives

# PV Self-Consumption

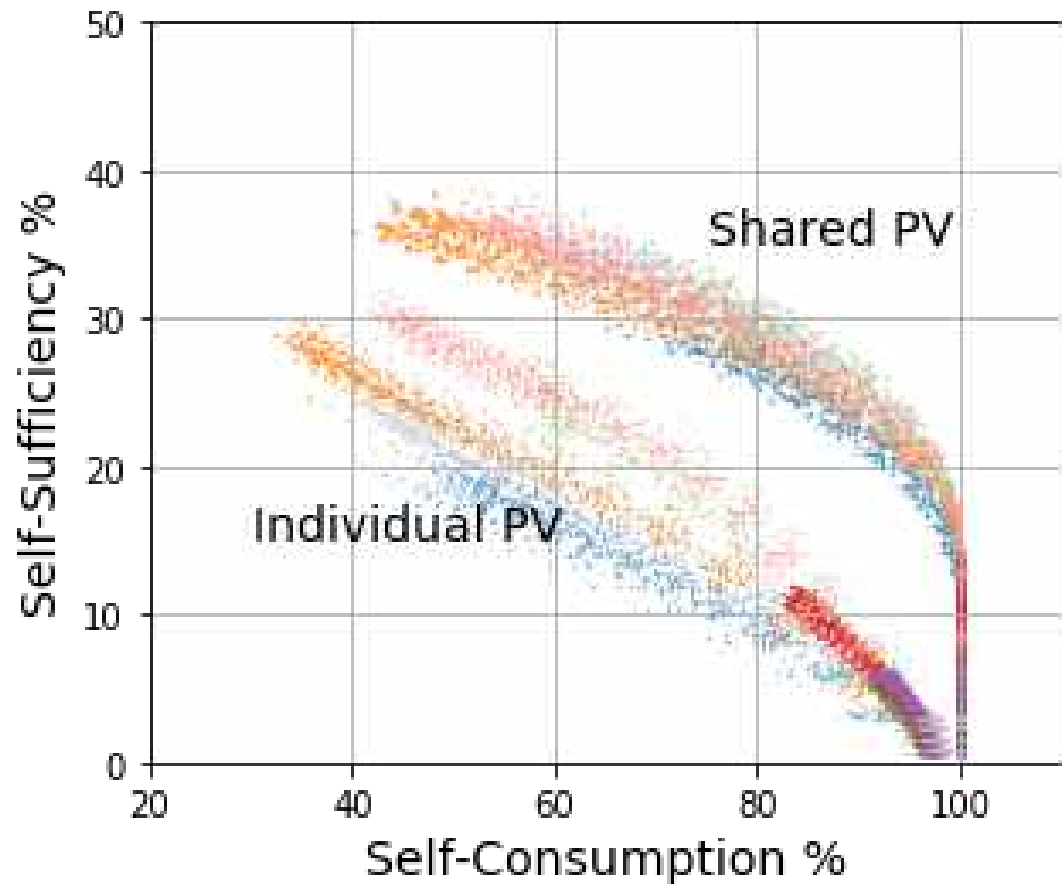
44 apartments  
PV = 77kWp  
CP is 17% of building load



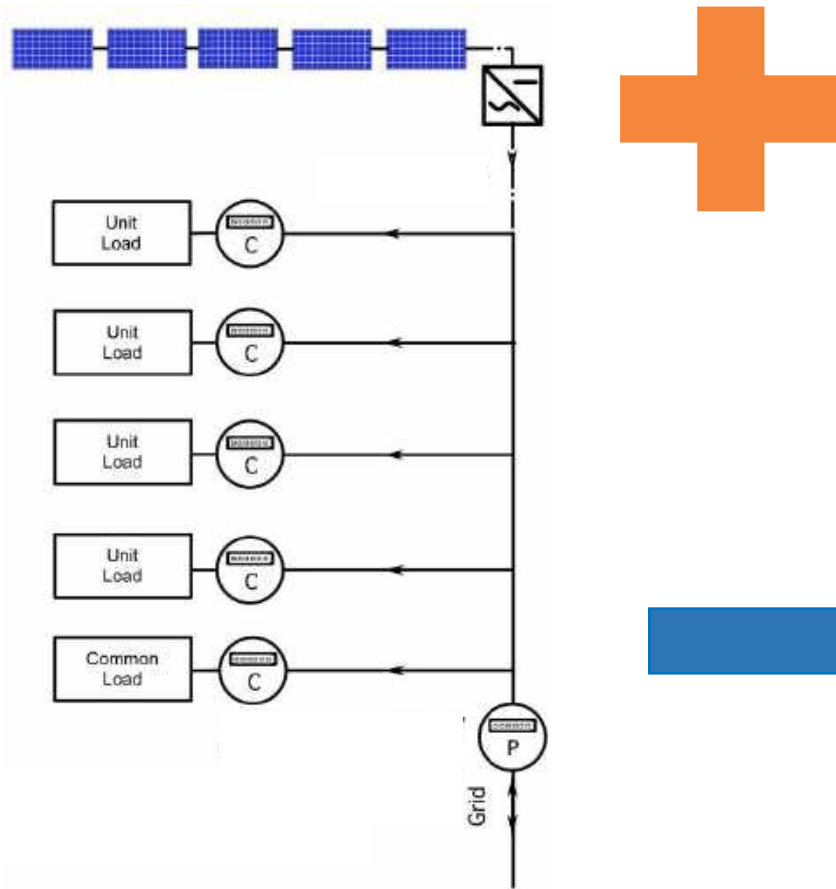
# Self-Consumption and Self-Sufficiency



...increased by aggregating loads



# Embedded Network (EN)



Shared PV system / shared roof

Maximise Self-Consumption

Economies of Scale – PV Capex

Access Commercial Tariffs

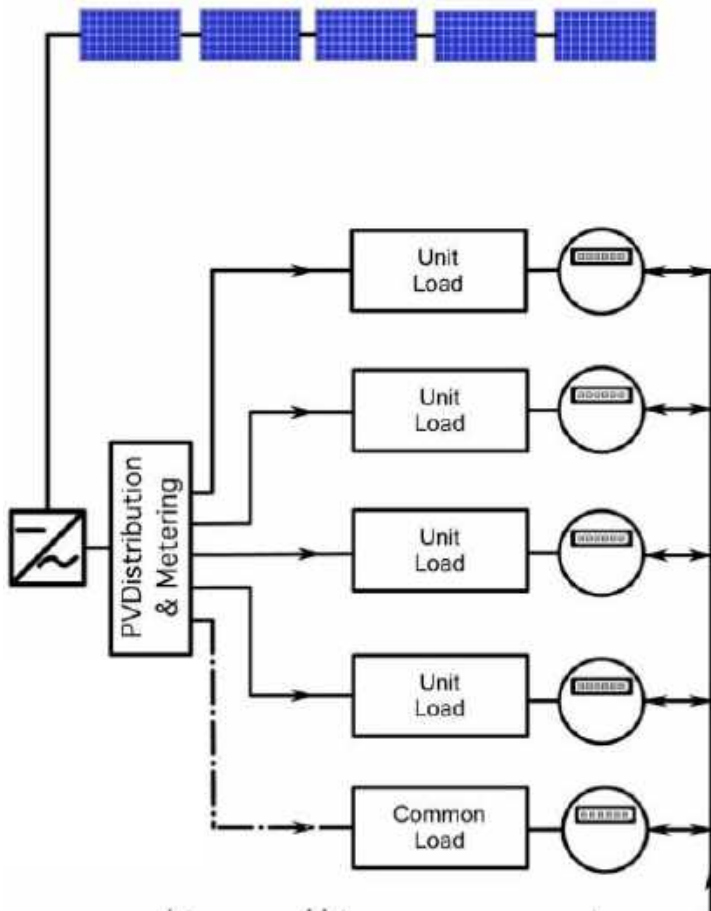
Split Incentives

EN Installation Costs

Regulatory Barriers

Finance Issues

# Shared Behind the Meter



Maximise Self-Consumption

Avoids EN Costs

Economies of Scale – PV Capex

Avoids EN Regulatory Issues

Two Bills

EN Installation Costs

No bulk buy benefits

**Why?**

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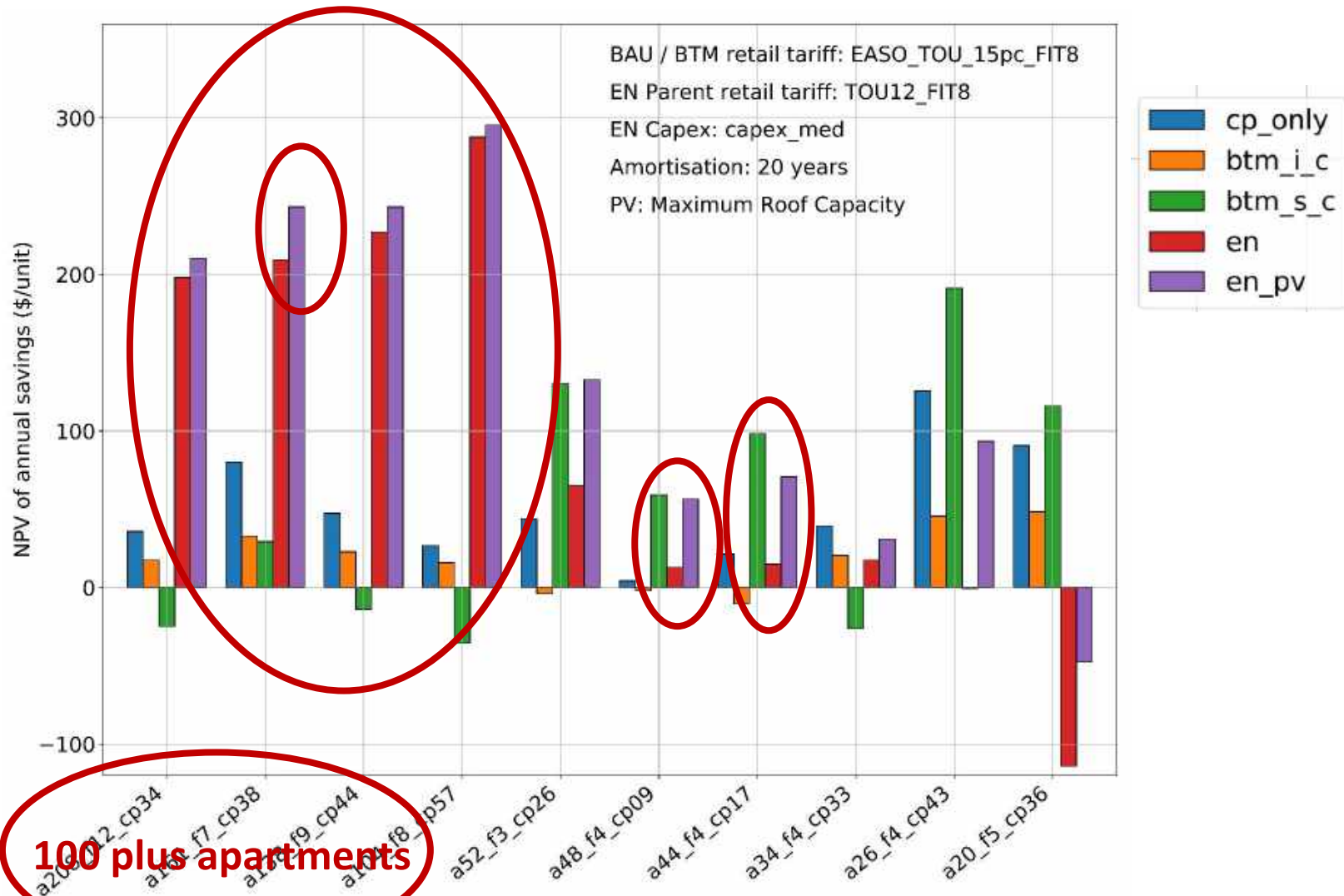
**Where & how?**

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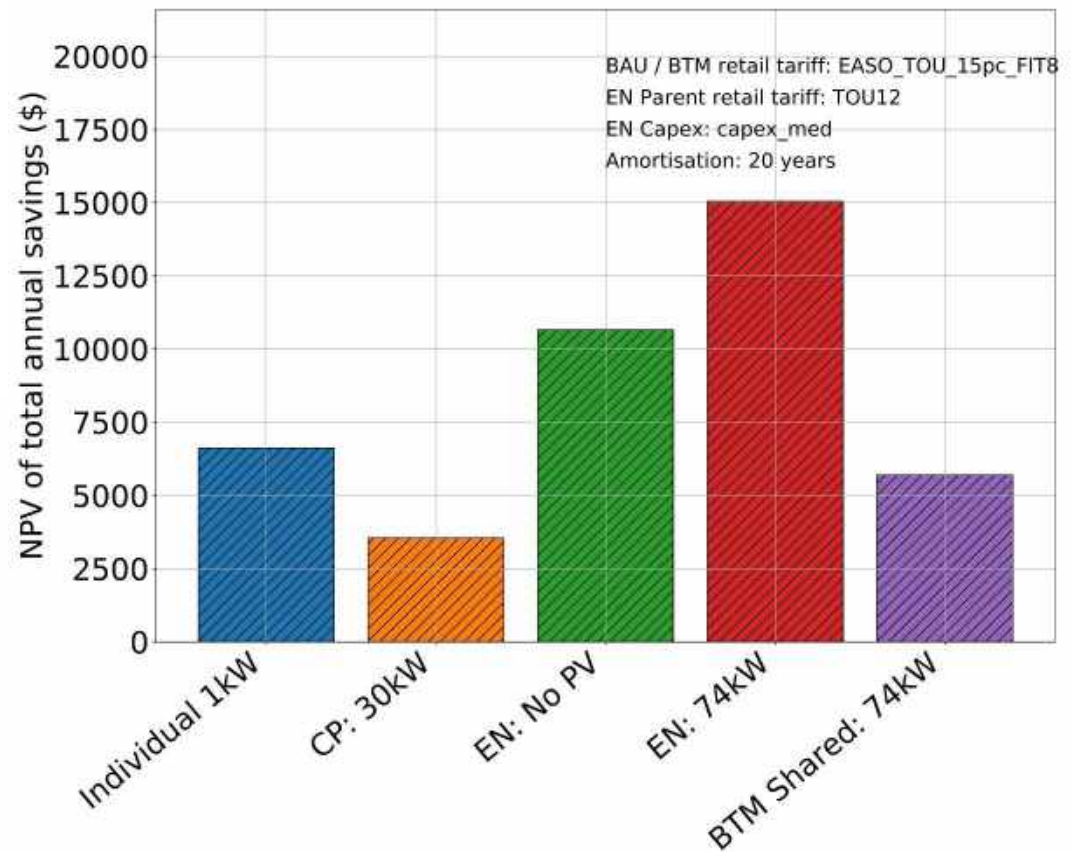
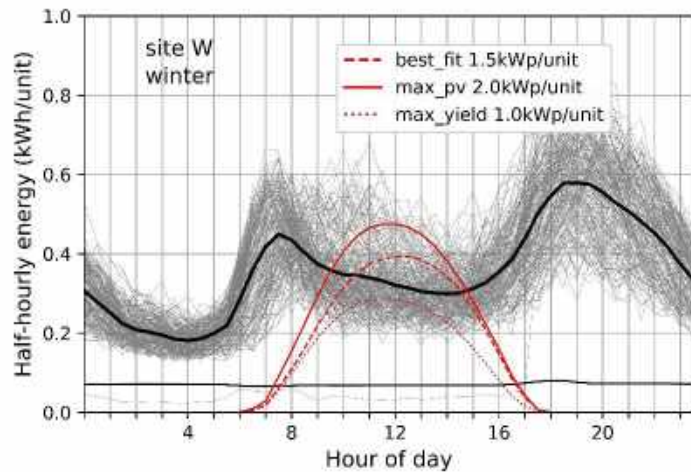
**What is to be done?**

# Savings for whole building

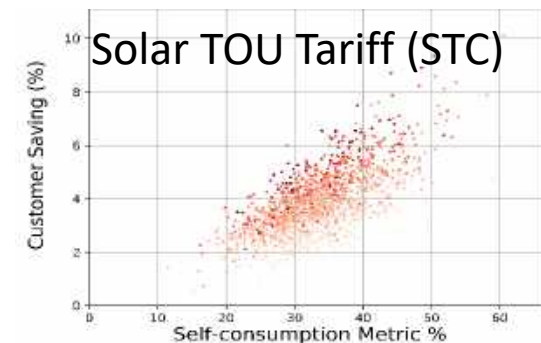
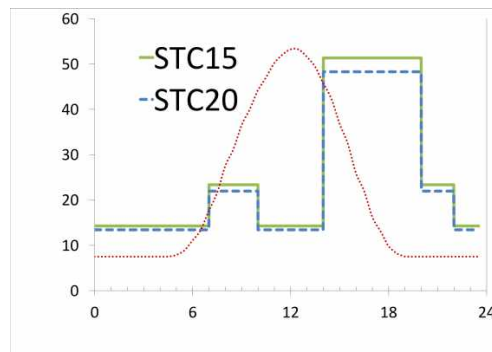
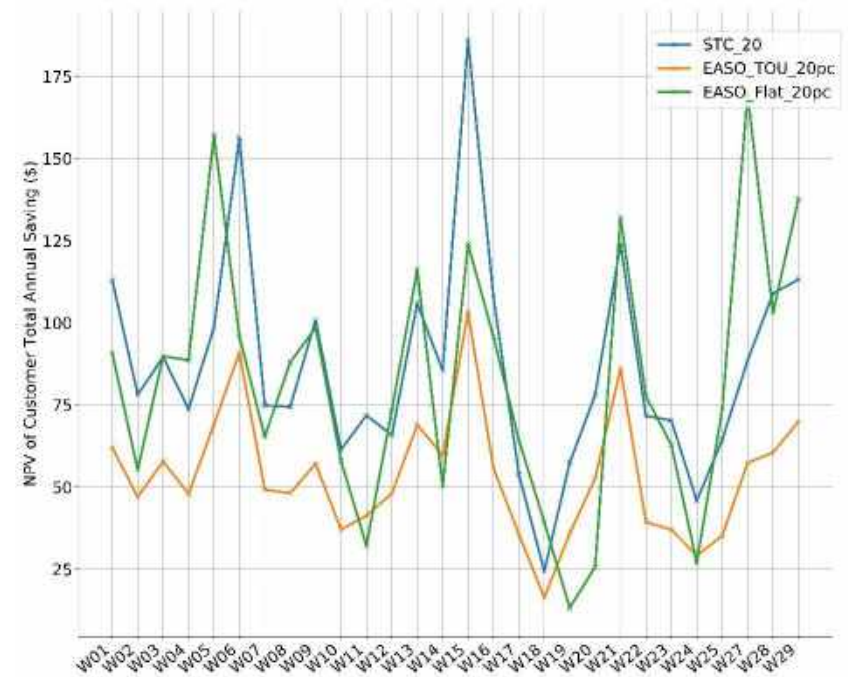
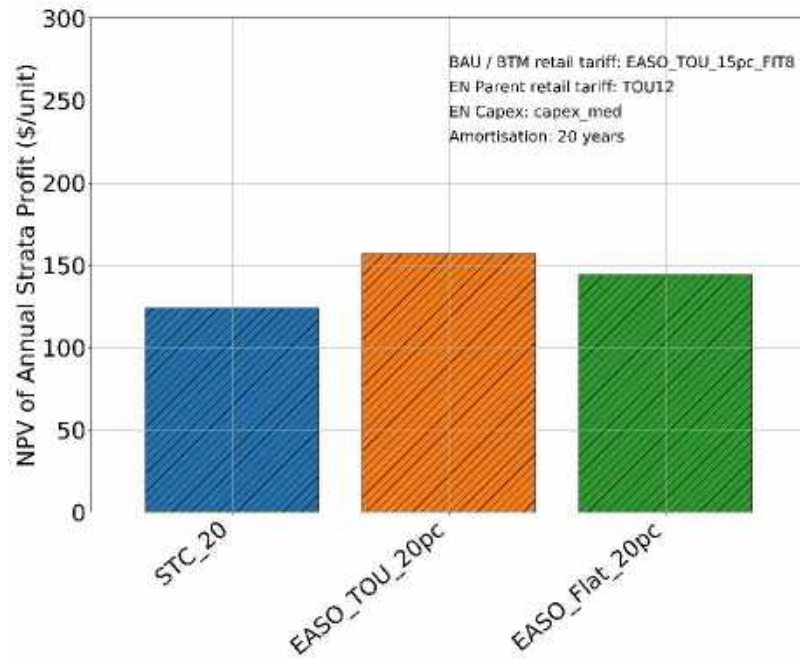


# Case Study W

72 apartments  
3 floors  
Lifts, carpark, etc  
CP is 22% of load

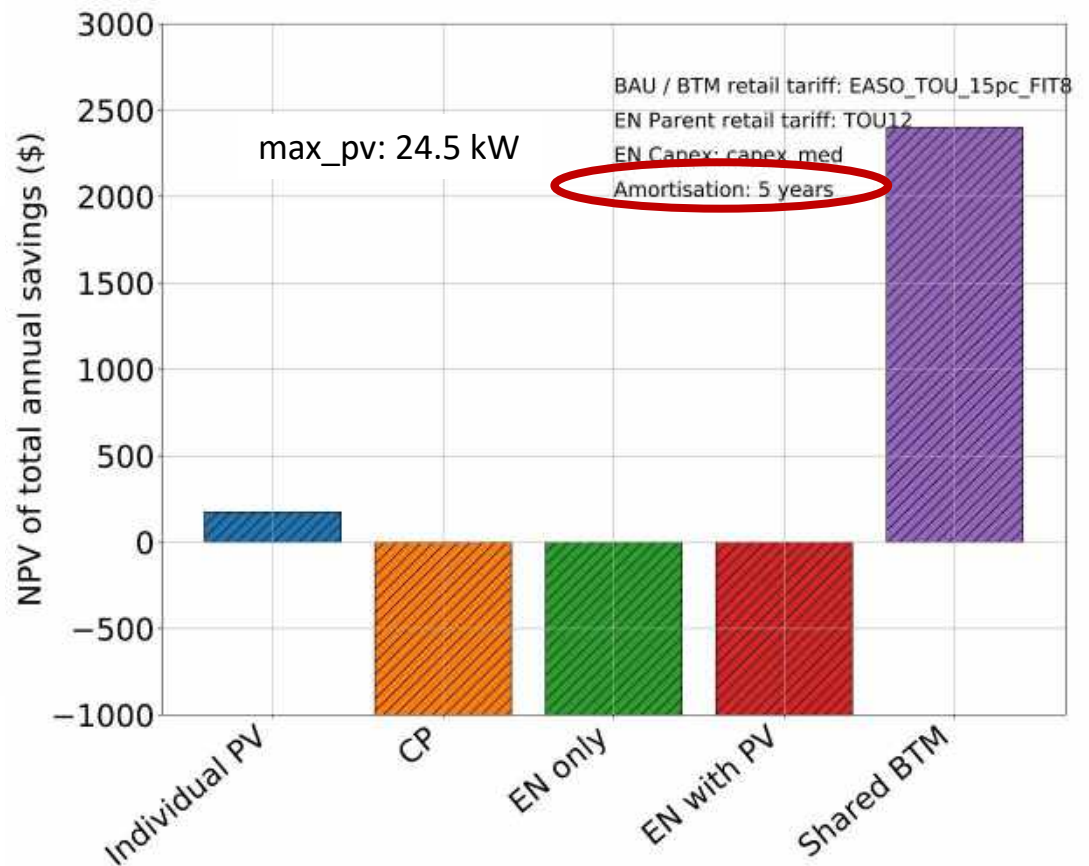
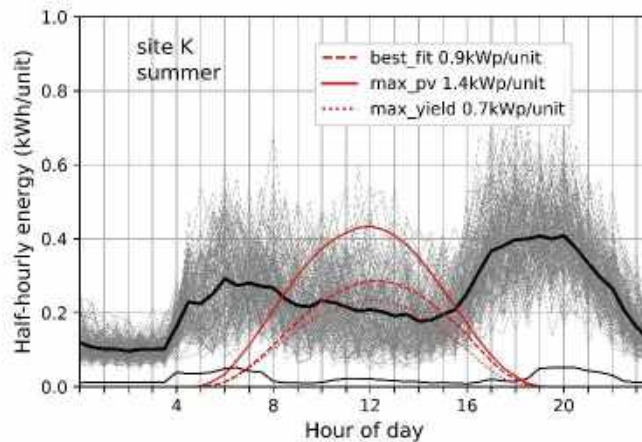


# Case Study W – Embedded Network



# Case Study K

18 apartments  
3 floors  
CP is 9% of load



# Embedded Networks

## Capital Costs

- Parent meter
- Child meters (\$200 - \$300)
- Meter Abolishment (\$300-\$400)
- Switchboard and wiring upgrades
- Highly variable for brownfield sites

## Operating Costs

- Parent tariffs (9c-15c/kWh?)
- Billing (\$15 - \$35 /meter /month)
- Metering (~\$3 /meter /month)
- Compliance (~\$2/meter/month)

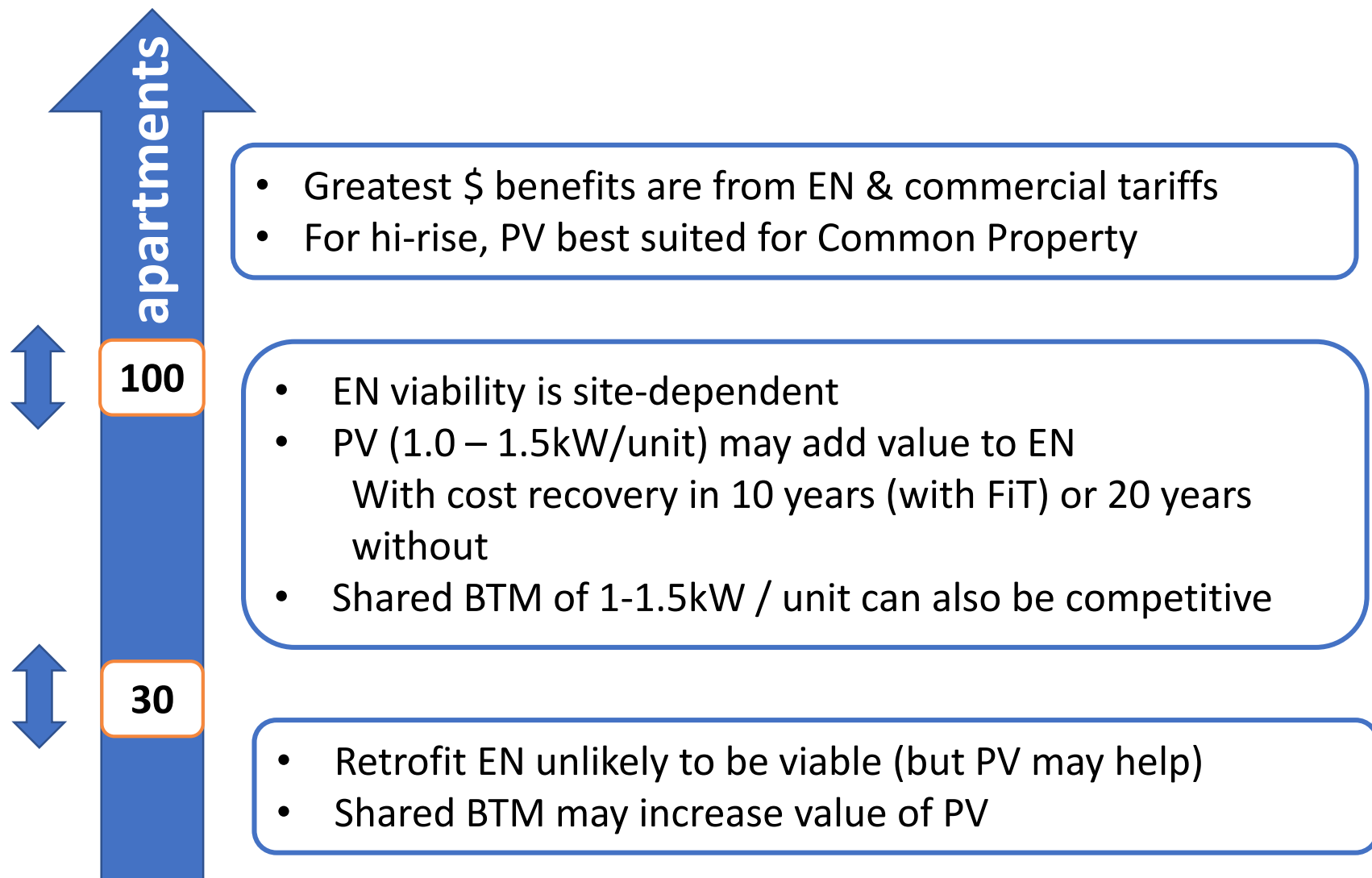
## Business Models

- Strata Body owns EN  
pays ENM / ENO for service
- Strata / ENO share risks  
and benefits
- Third Party

## Finance

- Sinking Fund
- Strata levy
- Finance: @ 7%—11% ?
- May need longer term (10-20  
years) to repay capex

# Some Generalisations:



# Battery Storage (BES) for ENs

| Parent Tariff              | Control Strategy          |
|----------------------------|---------------------------|
| High Demand Charge         | Peak Demand Shaving       |
| No / low Feed-in Tariff    | Increase Self Consumption |
| High peak / Off-peak Ratio | Demand Shifting           |

|                 | Individual PV and BES | EN, shared PV and BES |
|-----------------|-----------------------|-----------------------|
| Optimum size    | 3 – 4 kWh / apartment | ~ 1 kWh / apartment   |
| Threshold capex | ~ \$750/kWh           | ~ \$400/kWh           |

Current Capex ~ \$1000 / kWh BUT:

- Government Incentives (e.g. QLD, VIC, federal ALP...)
- Decreasing Capex?
- Increasing Tariffs
- Potential Network Benefits



*(Any questions?)*

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# Some of the barriers

## Embedded Network Regulation

- Administrative complexity
- Exemption Framework -> Authorised Retailers
- Small ENO's, Community, Strata squeezed
- VIC: "Abolish Embedded Networks" (but Microgrids)

## Embedded Network Costs

- Meter contestability reducing costs, but:
- Unnecessary meter churn
- Meter abolishment charges
- Switchboard upgrades

## Organisational

- Split Incentives
- Communication
- Apathy
- Lack of information

## Finance

- Strata access to finance

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# Potential Policy Approaches

## Embedded Networks

- Is market access the only solution?
- Is the “Power of Choice” restricting choice?
- Better regulated Embedded Networks:
  - Constraints on developer incentives
  - *Meaningful* tariff controls
  - Recognition of customer benefit
  - Contract time limits

## Metering

- Customer ownership
- Simplify meter transfer

## Strata Law

- Sustainability Exemptions (e.g. ACT, QLD)
- Tenant involvement

## Incentives

- State & Federal PV / Battery Grants -> Strata Bodies
- Feasibility Grants (every building is different)
- Project Grants

## Network Charges

- Cost-reflectivity
- Local Generation Credits

## Finance

- Low-cost strata finance for sustainability (not EUAs)
- Rationalise strata tax rules



What are the key findings to highlight in the project report?

What policy approaches would most increase PV deployment on apartment buildings?

What future work is needed in this space?



## Key outcomes from discussion

- Apartments don't have the same access to solar as stand alone housing
- Lack of information/motivation, cost/payback/other priorities are key barriers
- Embedded networks are challenging – need to work for residents
- Solar enables ENs and vice versa (depending on scale and solar penetration)
- Metering and regulatory issues are barriers to choice despite opportunities presented by DERs
- Tax on revenue is an issue

## Policy approaches

- Stop objections within strata organisations from restricting solar
- Need specific policies and support for apartments, community energy
- Removal of strata law barriers

## Future work

- Disseminate info and help apartment owners to help decision making (not a role for solar installers). Currently need tailored solutions. Can they self assess, or do they need assistance? Role for user-friendly tools, step by step guide for apartment solar.
- EVs – complexities around fleet cars, different business models
- Compare with other options e.g. off-site