

Is rooftop solar a play-thing of the well-to-do?

**Reflections on the economic reasoning for and
against local use of system charges**

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ANU Battery Storage and Grid Integration Program Seminar

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Centre**



**VICTORIA
UNIVERSITY**

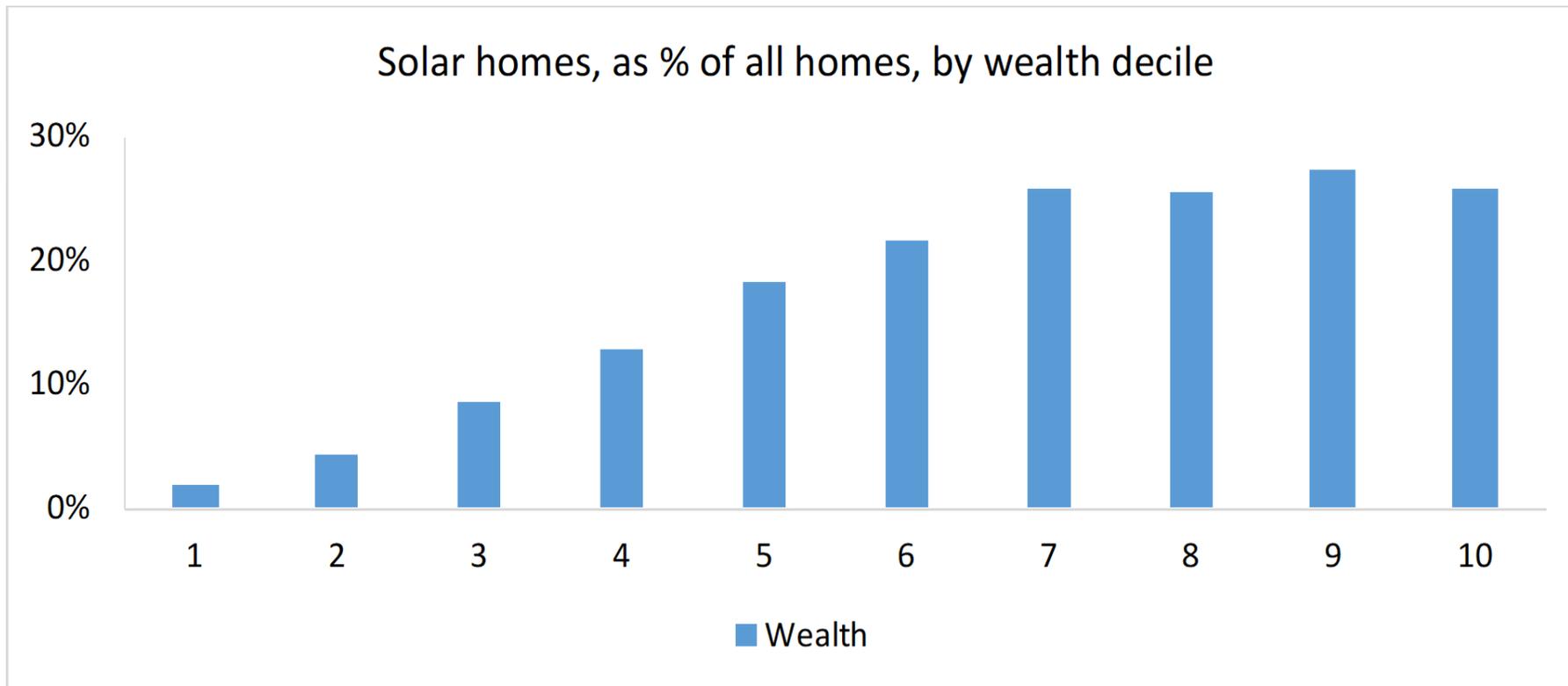
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Outline

Part I: Is rooftop solar a play-thing of the well-to-do? (10 mins)

Part II: Reflections on the economic reasoning for and against local use of system charges (15 mins)

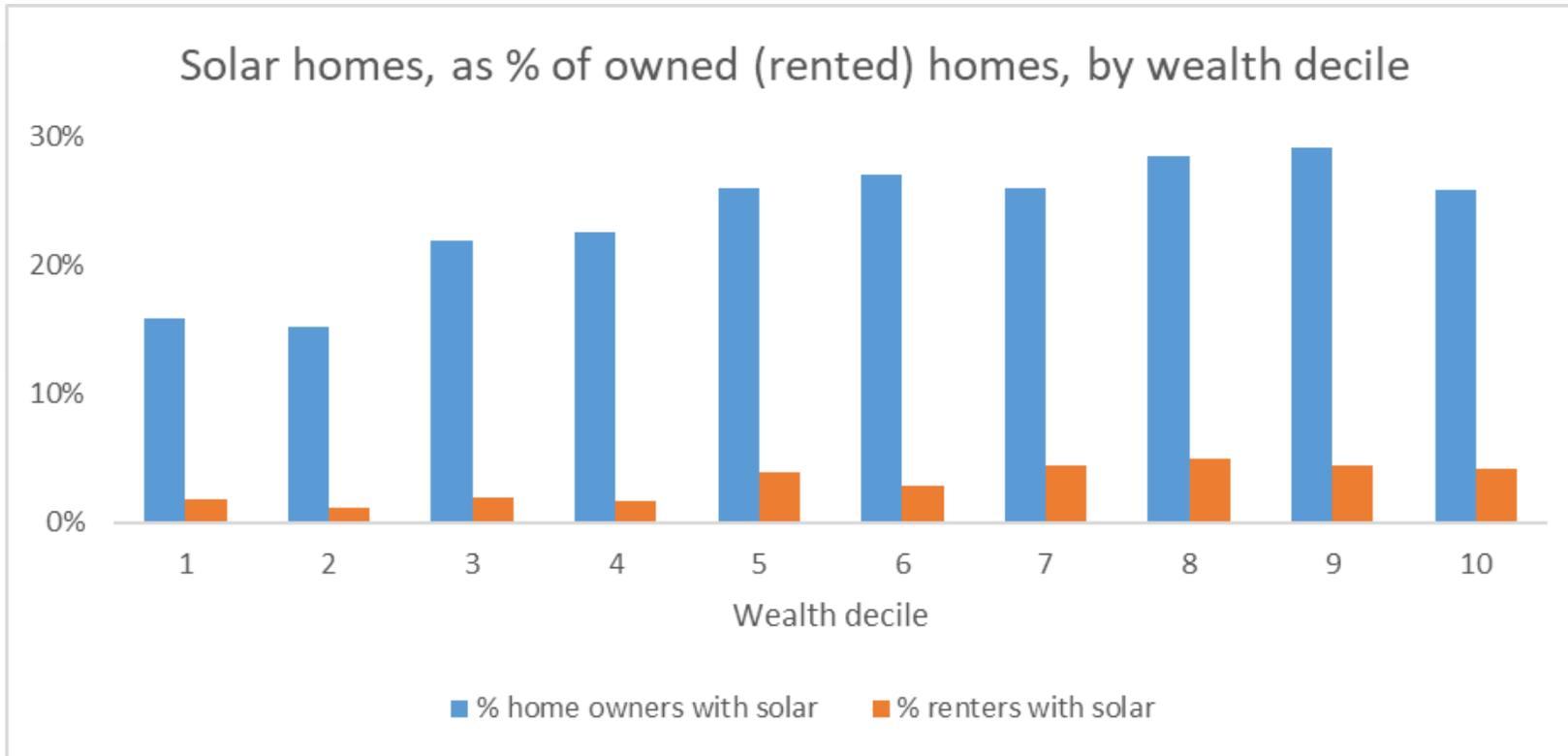
Prima facie, wealth affects rooftop solar uptake



ABS SIH survey 2017-18

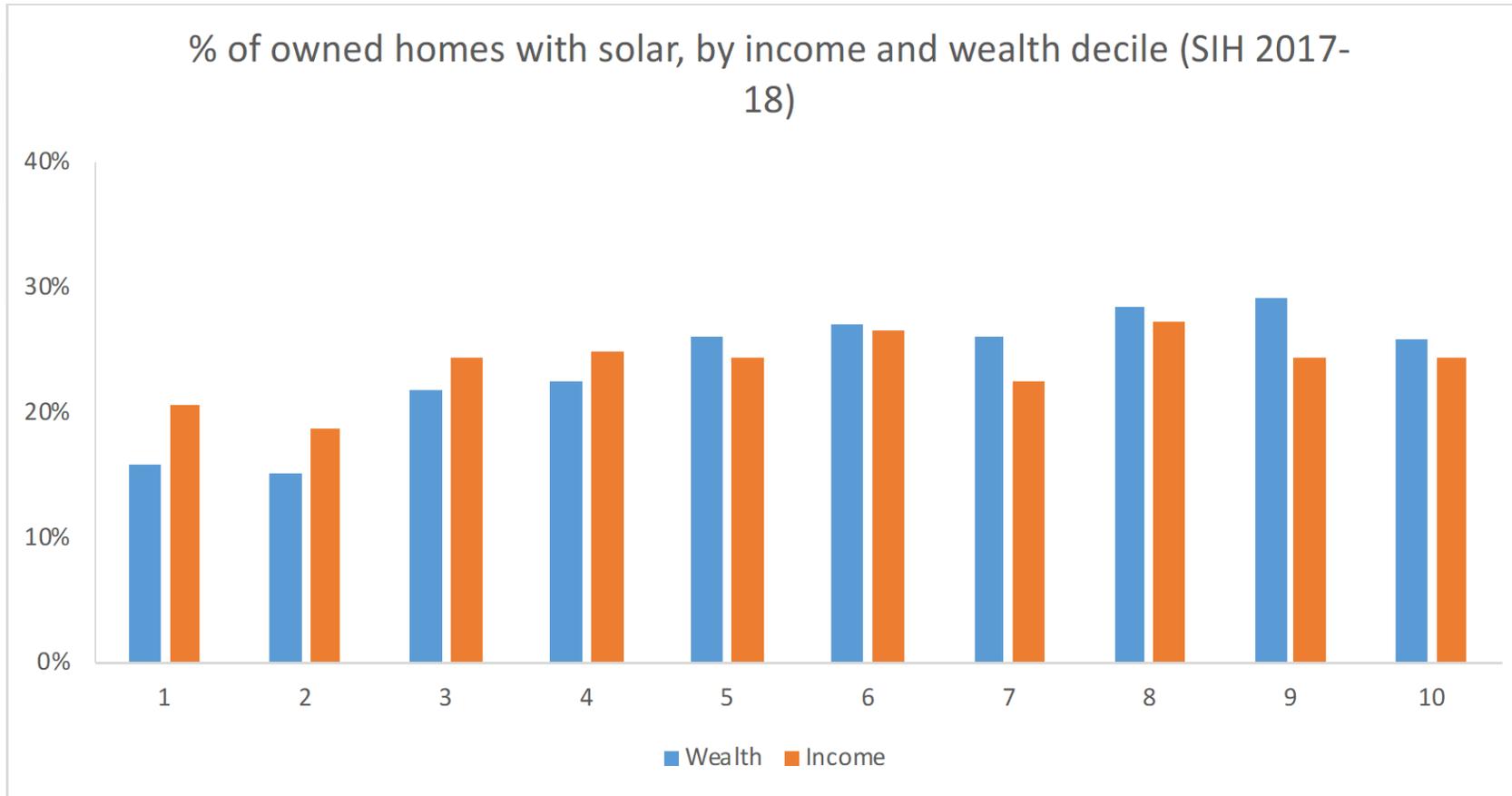
Much of the literature concludes that there is a wealth effect Australia: (Best, Chareunsky, & Li, 2021), (Best, Burke, & Nishitateno, 2019), Phillips, B., 2018)

In reality, wealth does not affect solar uptake



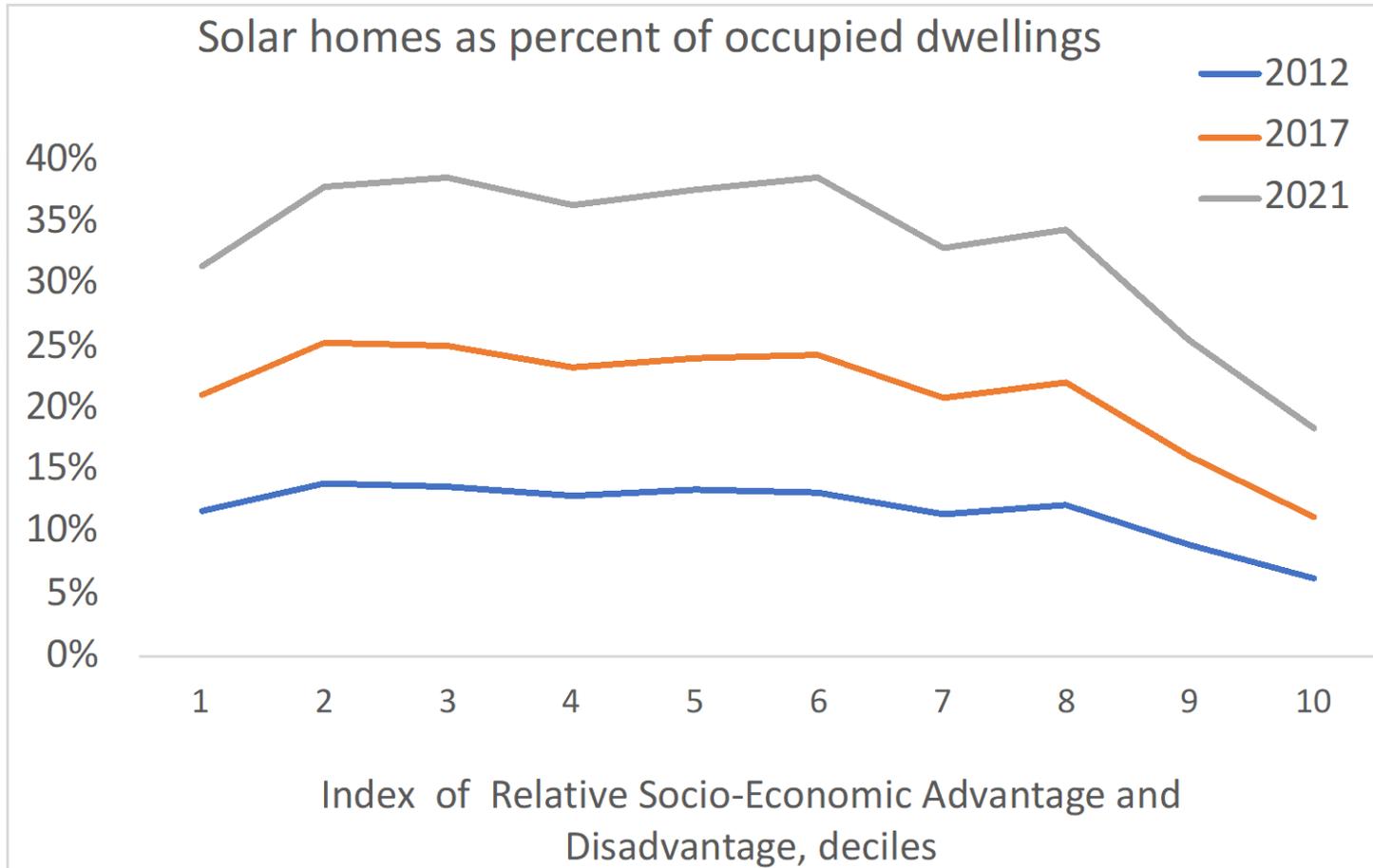
But when we separately analyse owned and rented homes, the wealth effect evaporates.

Does income affect solar uptake?



No - the picture for wealth and income is much the same.

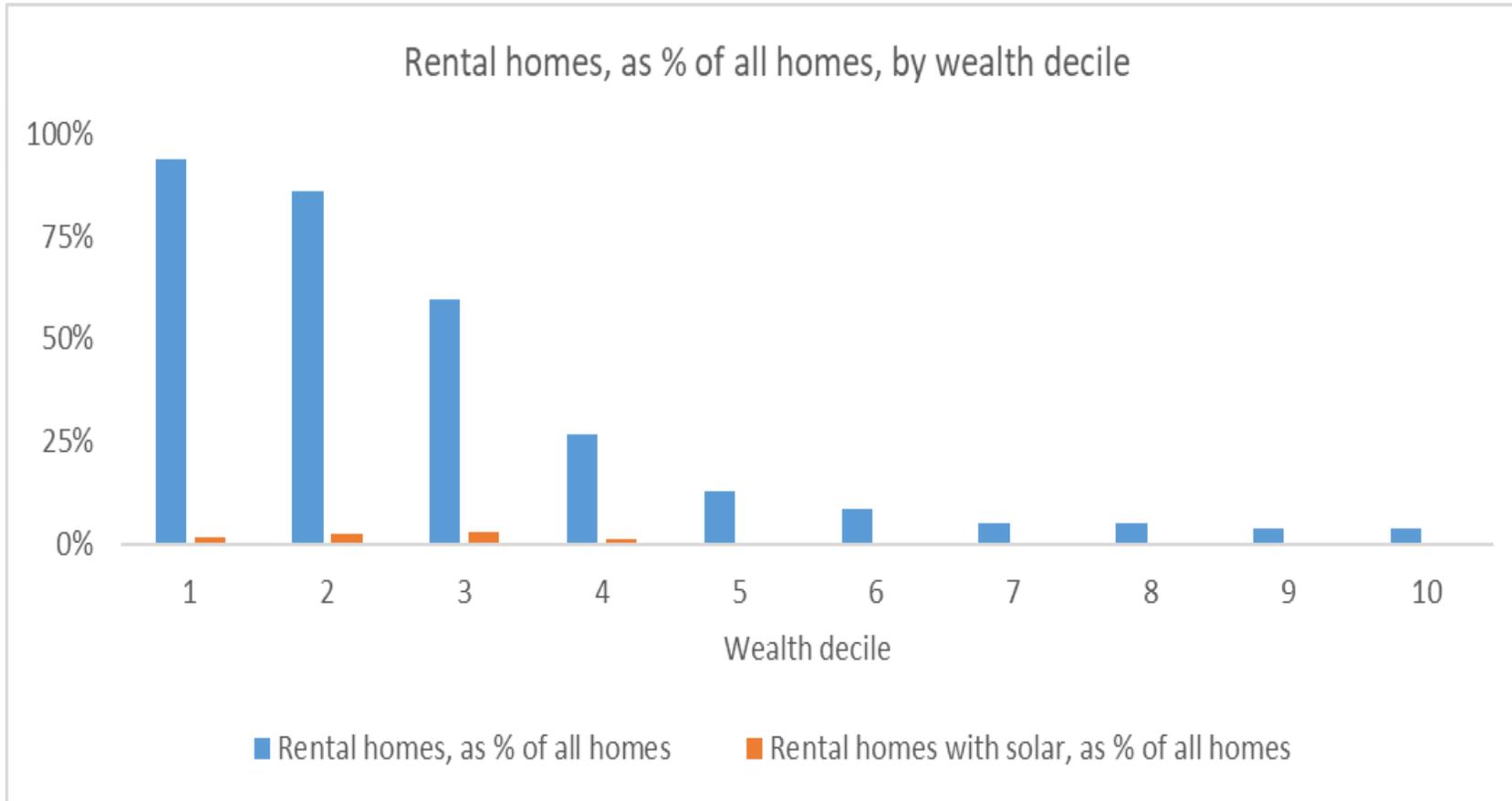
Socio-economic status and solar uptake?



ABS Census data

- Post code level socio-economic analysis suggests a similar conclusion.
- Socio-economic advantage and disadvantage does not affect solar uptake.

Property ownership, wealth and solar uptake



- Renters are heavily skewed to the bottom of the wealth distribution (same wealth deciles used).
- Solar uptake amongst renters is inconsequential.

So, what is going on

1. Property ownership and wealth is strongly associated: Renters dominate the lowest wealth deciles.
2. Wealth and building form is strongly associated: Poorer people live mainly in flats/apartments.
3. Solar and building form is strongly associated: Transaction costs and building form make solar rare in flats/apartments.
4. Problem = multi-collinearity (wealth and solar are strongly associated with building form). Therefore, an analysis of solar must take account of ownership (i.e. must separately analyse renters and owners as distinct datasets).

Questions & Discussion

Part II

Reflections on the economic reasoning for/against local use of system charges for neighbourhood batteries

Overview

- ▶ Research question
- ▶ Background
 - ▶ What the agencies think
 - ▶ Evidence from feasibility studies
 - ▶ Current market arrangements
- ▶ Theory
- ▶ Arguments for and against
- ▶ If LUoS, how?
- ▶ What about locally consumed solar?

Research question

“Should local (i.e. discounted) use of system charges apply to neighbourhood batteries?”

Background

- ▶ Agencies disagree:
 - ▶ AEMO: no NUoS when charging (treat batteries the same way as generators,
 - ▶ AER: charge full NUoS (treat batteries in the same way as load),
 - ▶ AEMC: undecided.
- ▶ Feasibility studies: not viable without LUoS and flows are mainly local.
- ▶ Current arrangements for trials:
 - ▶ WA and AusGrid: no serious thought yet given to LUoS.
 - ▶ Yarra Energy Foundation: currently under consideration

Theory

- ▶ Natural monopoly: $AC > MC$ and capacity increments are lumpy.
 - ▶ Therefore, efficient to charge MC to some users if, for those users, charging the AC would undermine efficient investment or forego efficient consumption.
- ▶ Kirchoff's Current and Voltage laws: electrical current follows the path of least resistance.
 - ▶ Therefore, impossible to track the origin of electricity on a shared grid. We can not know for certain whether a battery is charging with locally produced solar.
 - ▶ Likewise, we can not know for certain whether electricity discharged by the battery is being consumed by one customer rather than another.

Arguments for and against LUoS

1. Transaction costs: *No, better to transact properly*
2. Local grid usage: *Maybe, but depends. If true for N-B even more true for local solar*
3. N-B expands upstream grid capacity: *Maybe, but not necessarily valuable*
4. 100% DUoS discount may be revenue neutral: *Possibly, but why not apply also to BTM-B or other end-use consumption?*
5. Double revenue recovery: *Of itself, no, electricity has to be shipped to and from the battery*
6. Inefficient by-pass: *Yes, quite possibly, if cost N-B < (but not <=) BTM-B and N-B does not pose additional costs on network.*
7. Consistency in treatment of generation and battery: *No, subjective.*

If LUoS, how?

- ▶ Should LUoS discounts apply only for flows into N-B or also for flows out of N-B? *Only in, and only from say 10am to 4pm*
- ▶ Should LUoS discounts apply to demand charges and/or consumption charges and if so, how much? *Both*
- ▶ How should N-B LUoS eligibility be defined? *Size, location and voltage (<11kV)*
- ▶ Is a solar sponge tariff justified to address unfairness concerns? *Yes, fairness (not economics)*

Questions & Discussion