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Australia's Experience with Rooftop Solar PV

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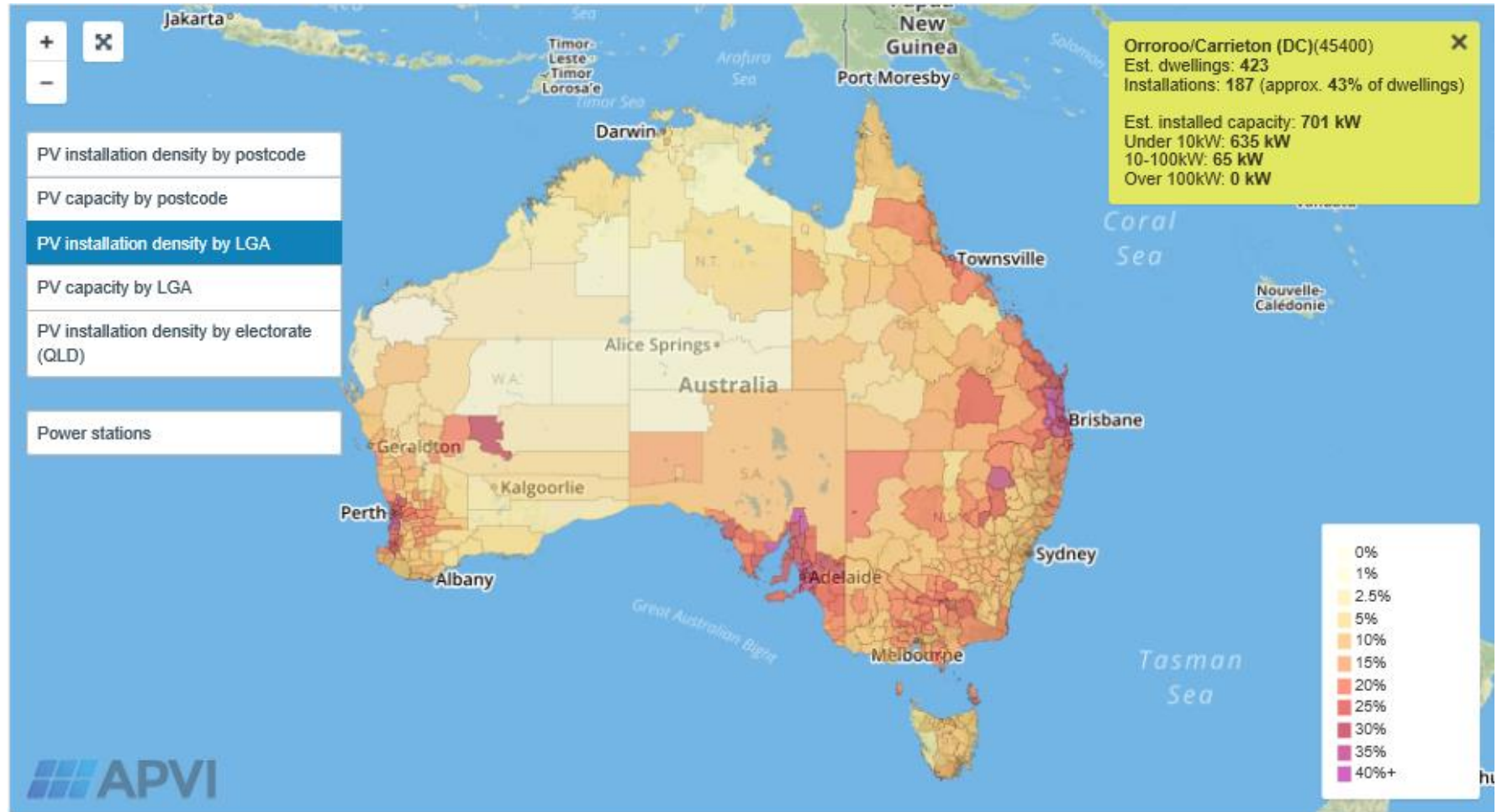
Overview

- Current status of rooftop PV in Australia
- Drivers, barriers and history
- Future

Rooftop PV in Australia: Current world leader in residential uptake

Highest household penetration (% and abs): >20% for SA, QLD

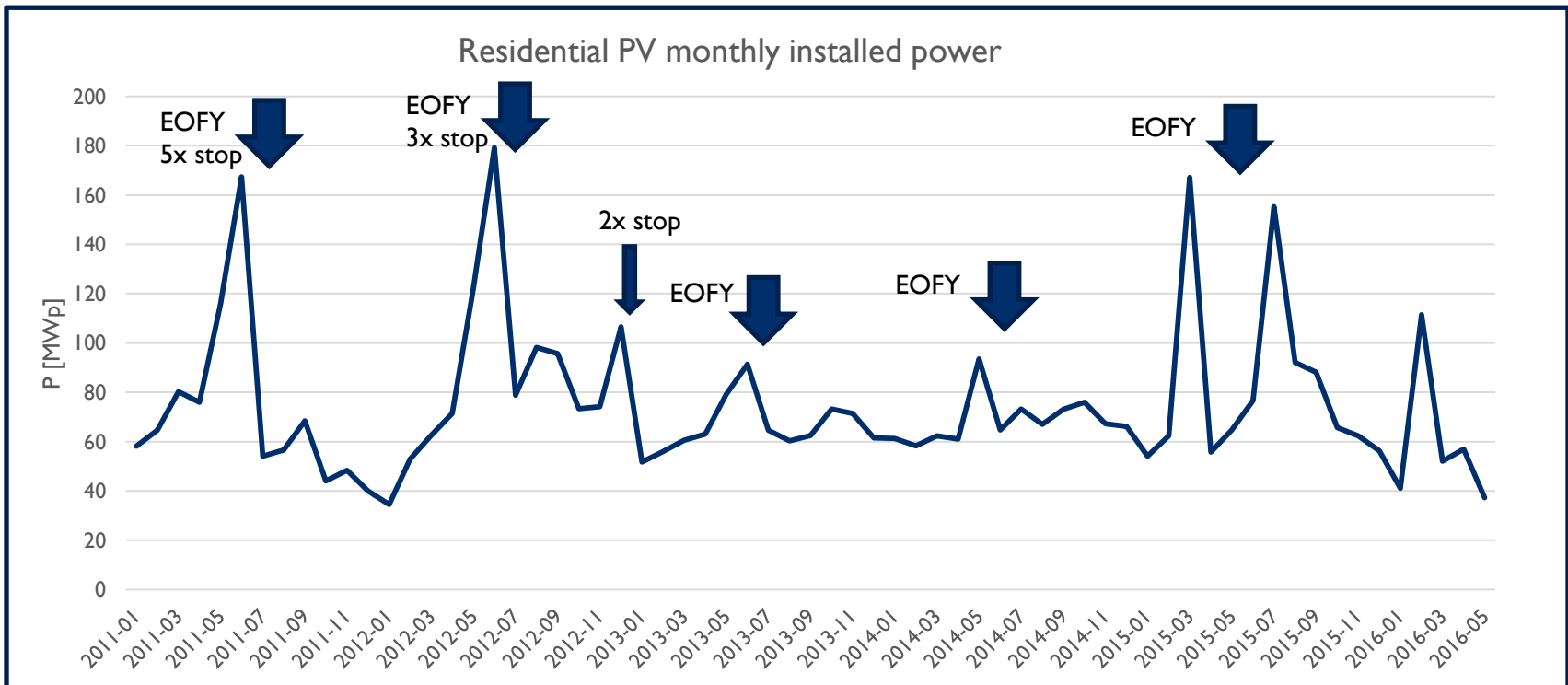
(Belgium 8%, Hawaii 12%, California <3%); Some postcodes with >40%



Source: [APVI Mapping Australian Photovoltaic installations](#)

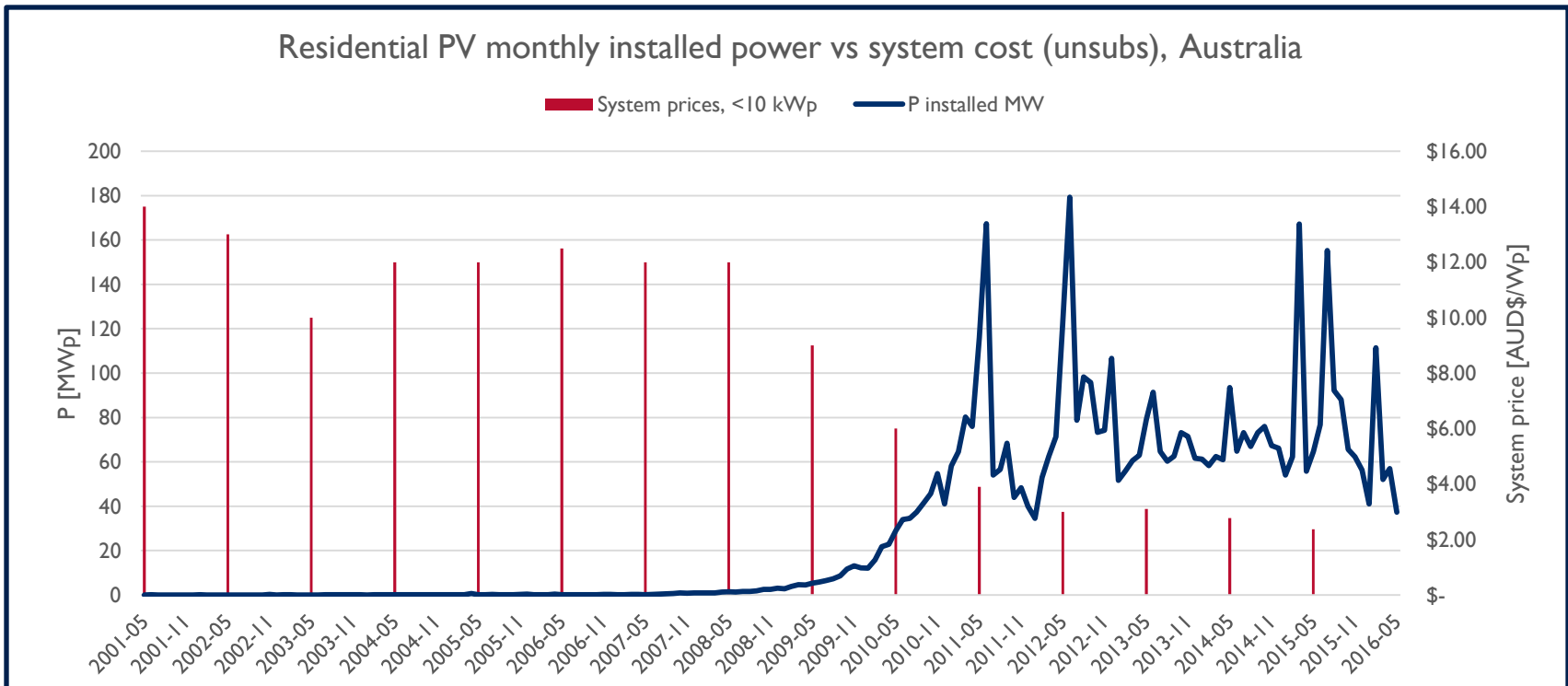
Residential update of PV since 2011

- > **1.6M households**, > **5.4 GW**. Monthly added: 50-150 MW
- FiT expiration and financial year (Jul-Jun) lead to installation peaks
- Various subsidies by states and federal government ending lead to very high peaks:
 - Solar Bonus Schemes: **May 2011** NSW, **July 2012** QLD
 - Renewable Energy Certificates (RECs): 5x multiplier in **Jul 2011**, 3x in **Jul 2012**, 2x **Jan 2013**
- Some lags due to self-reporting by owners (e.g. 2015 double peak)



Residential PV in Australia: improving economics have helped

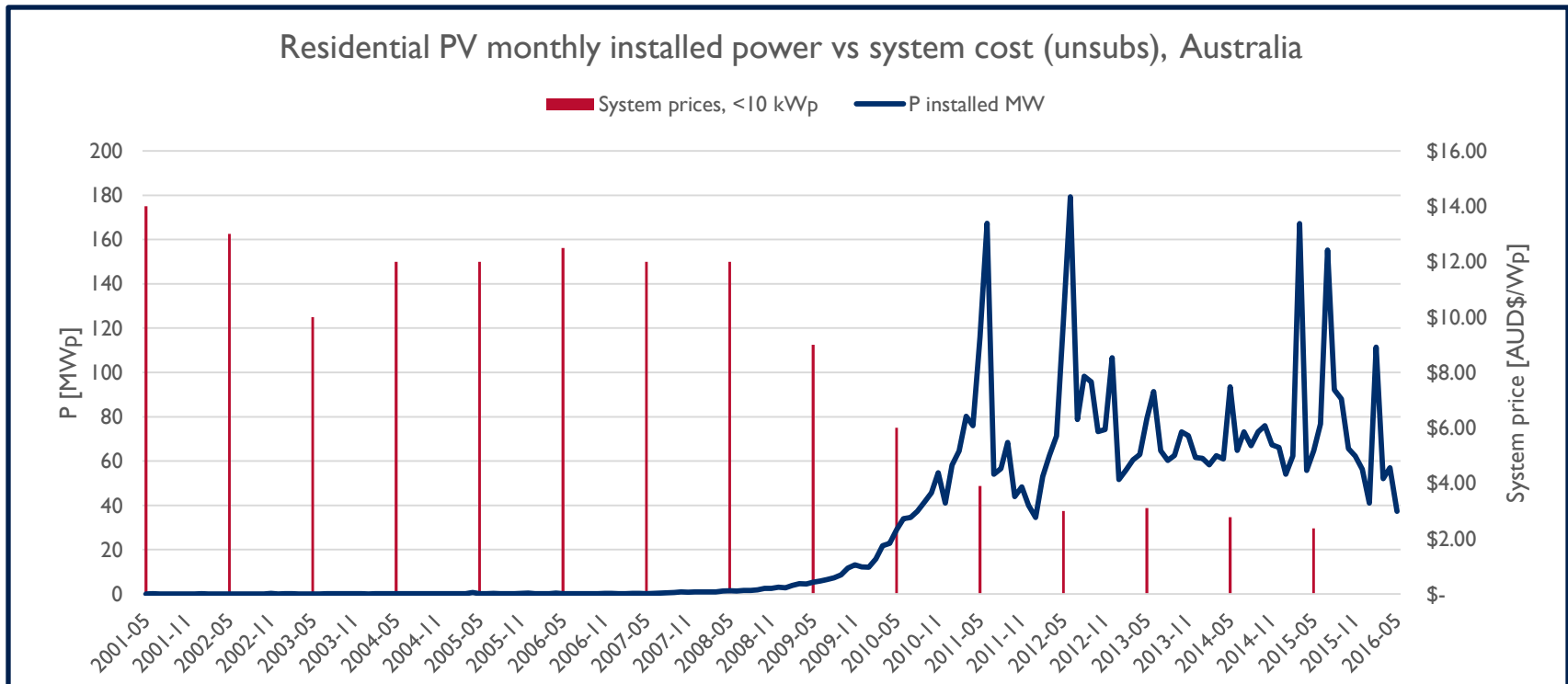
- **PV electricity** \leq **electricity from grid**
- From FY 2010-2011 (6 \$AUD/W_p \approx **5.3 \$USD/W_p**): median \geq 64 MW_p/mo.
- FY 2015-2016 (2.4 \$AUD/W_p \approx **1.75 \$USD/W_p**).
- Cost/W (2010-2016): -60 % (AUD), -67% (USD).
- Average system size \nearrow : 2.2 kW_p (2010) \Rightarrow 5.5 kW_p (2016).



Sources: [APVI Mapping Australian Photovoltaic installations](#) + [2015 Australia IEA PVPS report](#)

Residential PV in Australia: improving economics have helped

- Residential electricity prices are 20-35 AUc/kWh.
- FiT 5-8 AUc/kWh (states), 25 AUc/kWh (NT: net metering);
VIC: 5 AUc/kWh \Rightarrow 11.3 AUc/kWh (Feb 2017);
- FiT \searrow after market overheated.
- Installer profit margins low compared to US (~5-15% vs 30-40%).
- Batteries touted for further PV uptake, currently ~ 1000 \$AUD/kWh.



Sources: [APVI Mapping Australian Photovoltaic installations](#) + [2015 Australia IEA PVPS report](#)

Requirements for rooftop PV in Australia (& worldwide)

- **Installers & designers** (Australia & EU): need Clean Energy Council (CEC) **accreditation**
- CEC also gives list of approved PV modules & inverters
- Installation (Australia): system needs to meet **AS/NZS 5033** (Installation and safety requirements for photovoltaic (PV) arrays)
⇒ Local/country electrical codes and standards
- Modules: **IEC 61215** (initial module rating, initial degradation), **IEC 61853** (power & energy rating)
- Systems (commissioning & monitoring): **IEC 61724**
- **Permission to connect to grid**: once installation has been
 - a) installed by qualified electrician/technician and
 - b) verified by third-party certifier⇒ e.g. in Belgium, Australia: **all** grid-connected systems > 0.5 kW must register in national database. Before: subsidy, now: simple requirement. **Simple, automated system** online, very low cost. **Do not need license to generate/export**. Register is to know where, how much, when (and helps utilities plan/know about their systems).
- **IECRE**: IEC System for Certification to Standards Relating to Equipment for use in Renewable Energy Applications

Future growth of rooftop PV in Australia

- Electricity from grid (a.o. network costs) ↗
- PV system costs ↘, PV electricity ↘
- Battery prices ↘ (store PV electricity: black-outs & economics)
- Regulations for PV well established (easy permitting)
- High quality of equipment, competition between installers
- PV perceived as good economical and ecological decision
- Some states (Victoria, South Australia, Northern Territory, Australian Capital Territory) value PV power more (FiT, or similar ↗)

Additional background resources

- DKASC: Free data (5 min) for technologies in Alice Springs climate, installed between 2008 & 2016. These show how the technologies behave in the field.
- APVI: Free data on residential systems in Australia & total production.
- AREMI: Spatial Data Platform for Australia (GIS + layers, with data to download).
- IEA PVPS (Task 13): Consensus & latest data on state-of-the art on reliability, characterisation, monitoring and bankability of PV systems.
- Equipment used for solar PV systems (modules, inverters and more) have to meet Australian standards for installation:
<http://www.solaraccreditation.com.au/products.html> allows you to select the product (module or inverter for example), and verify that these meet the quality standards.

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