# Grid parity in MENA and lessons from other rooftop markets

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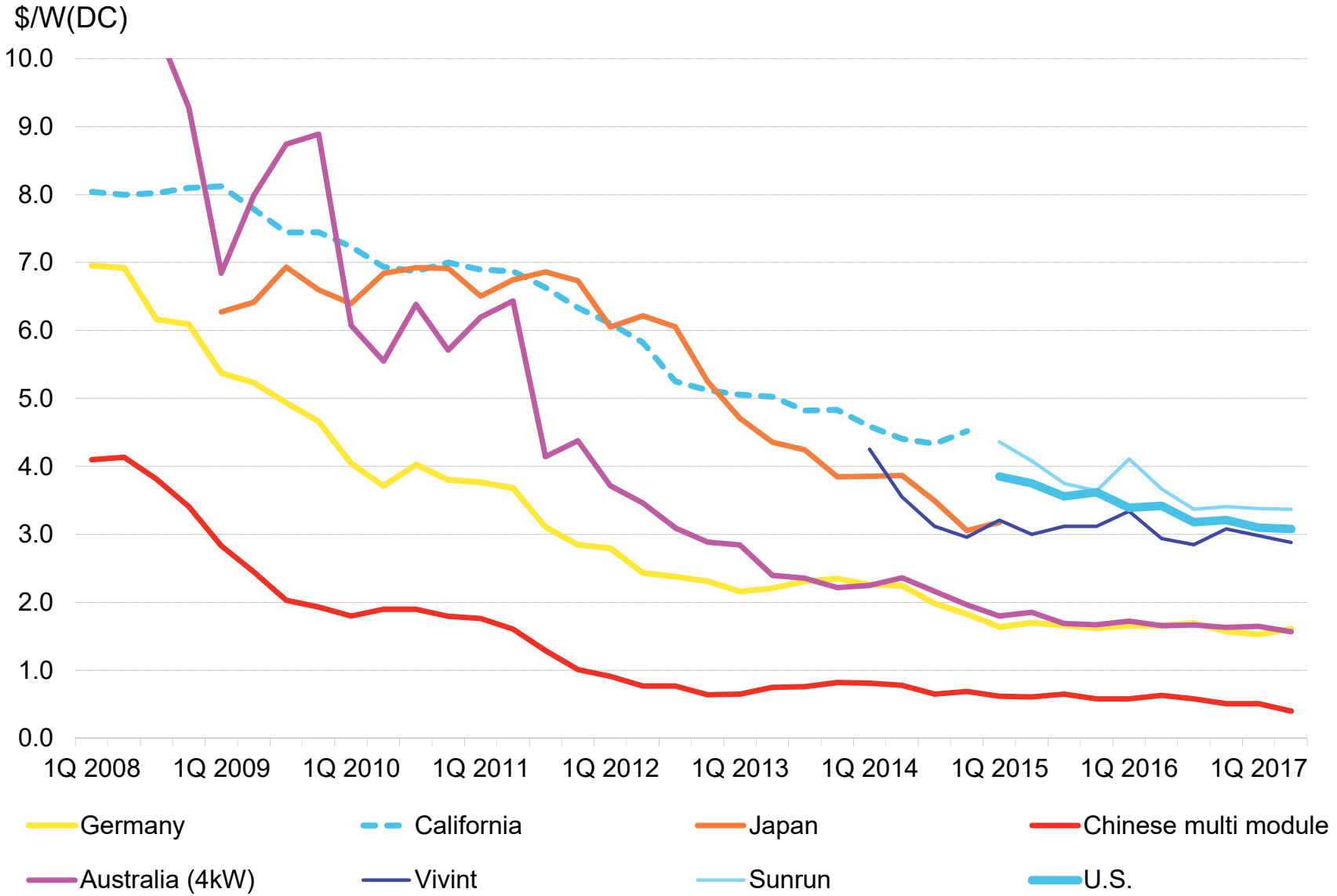
Bloomberg New Energy Finance

# Key points – rooftop solar

- Rooftop solar is almost always higher-capex than utility-scale solar. This is due to less economy of scale in sales, planning, purchase and installation.
- It is very difficult to build a large business making money out of small-scale solar. Local family firms have cost advantages over large ones. In the U.S., large installers seem to be losing their edge over small ones. In Europe, large installers never really happened.
- Prices are coming down, and nominal grid/ socket parity has been reached in many developed countries – when net metering is assumed. Dubai and Jordan are already seeing a significant amount of uptake of rooftop solar.
- Net metering is not a sustainable solution in countries with a high solar penetration, and is being challenged. Time-of-use pricing may be interesting in these countries.
- We expect about 1.4TW of small-scale solar worldwide in 2040, compared with 3.1TW of utility-scale solar. Together these would supply 17% of the world's electricity supply.

# Residential PV system prices in different markets




Source: Energysage, METI, Solarchoice.au, BSW-Solar, company filings, BNEF

# Dubai's net metering

- In March 2015, DEWA launched a net metering scheme.
- We estimate that a typical residential system worldwide (outside the U.S) will cost about $1.39 per W(DC) in 2018, and a commercial system will cost about $1.22 per W(DC) . This probably has flexibility to include the AED 1,500 ($400) connection charge.
- A quick back of the envelope calculation of the economics – using a cost of capital of 10%, 18% capacity factor, $20,000 per MW per year opex - suggests the prices you would have to assume, inflation-adjusted, for the 25-year lifetime of the plants.

- These are: AED 337 ($91) /MWh for residential
- AED 302 ($82)/MWh for commercial

enerwhere

SirajPower

akuoenergy middle east

(With apologies to similar companies not listed here)

May be able to get 10% project return

Electricity Tariff

**Residential/Commercial**

| Consumption/ month | | Slab tariff |
|---|---|---|
| G | 0-2000 kWh | 23 fils / kWh |
| Y | 2001-4000 kWh | 28 fils / kWh |
| O | 4001-6000 kWh | 32 fils / kWh |
| R | 6001 kWh & Above | 38 fils / kWh |

**Industrial**

| Consumption/ month | | Slab tariff |
|---|---|---|
| G | 0-10000 kWh | 23 fils / kWh |
| Y | 10001 kWh & Above | 38 fils / kWh |

*Source: DEWA website, Bloomberg New Energy Finance*

# Net metering becomes contentious at higher penetrations

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by Julia Pyper

U.S. ENERGY NEWS

## Nevada regulators approve new net-metering rules

WRITTEN BY
Lacey Johnson
September 6, 2017

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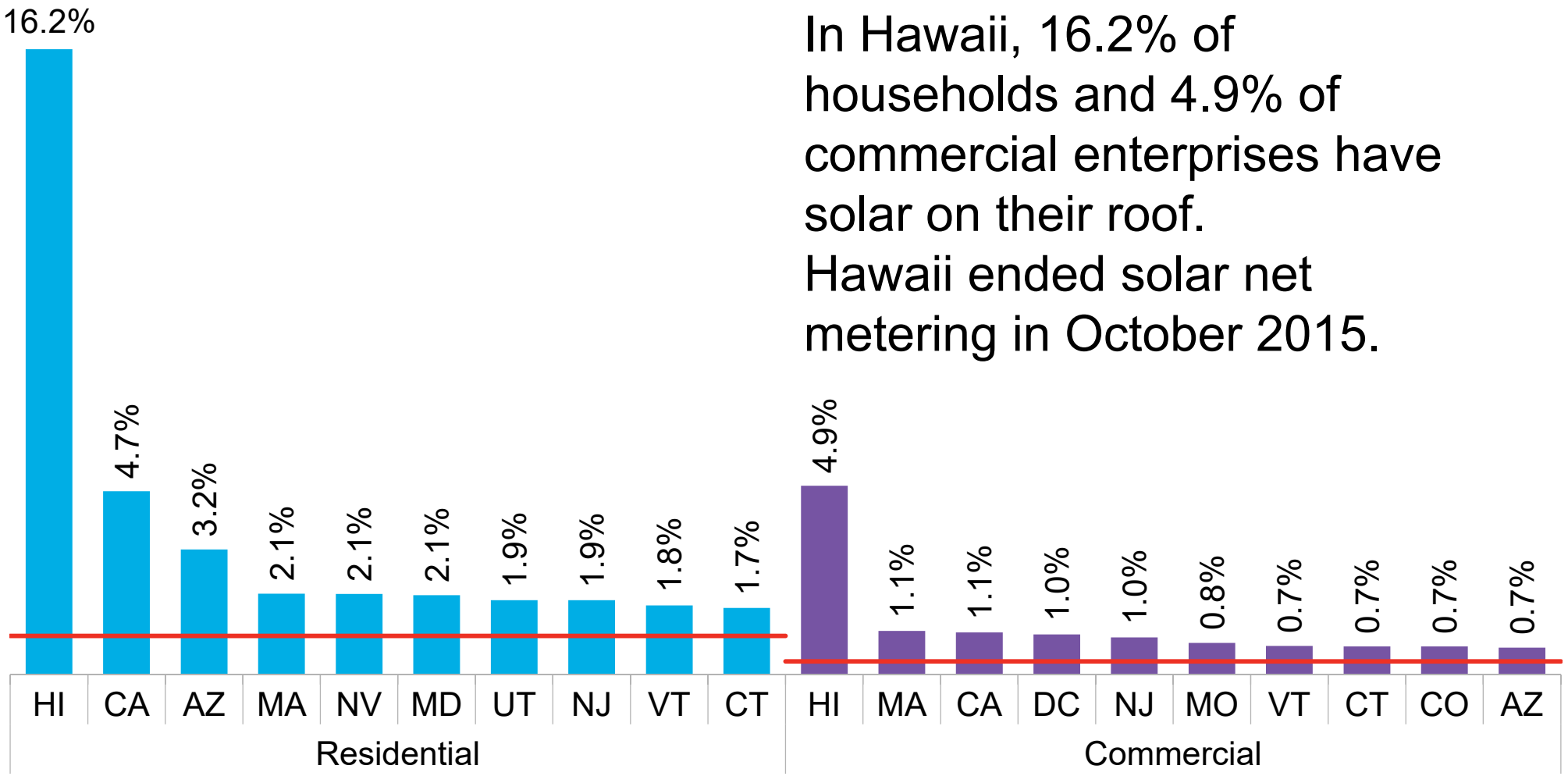
## Solar firms, power companies battle over 'net metering'

Javier E. David | @TeflonGeek
Published 11:04 AM ET Sun, 12 Oct 2014 | Updated 8:17 AM ET Mon, 13 Oct 2014

CNBC

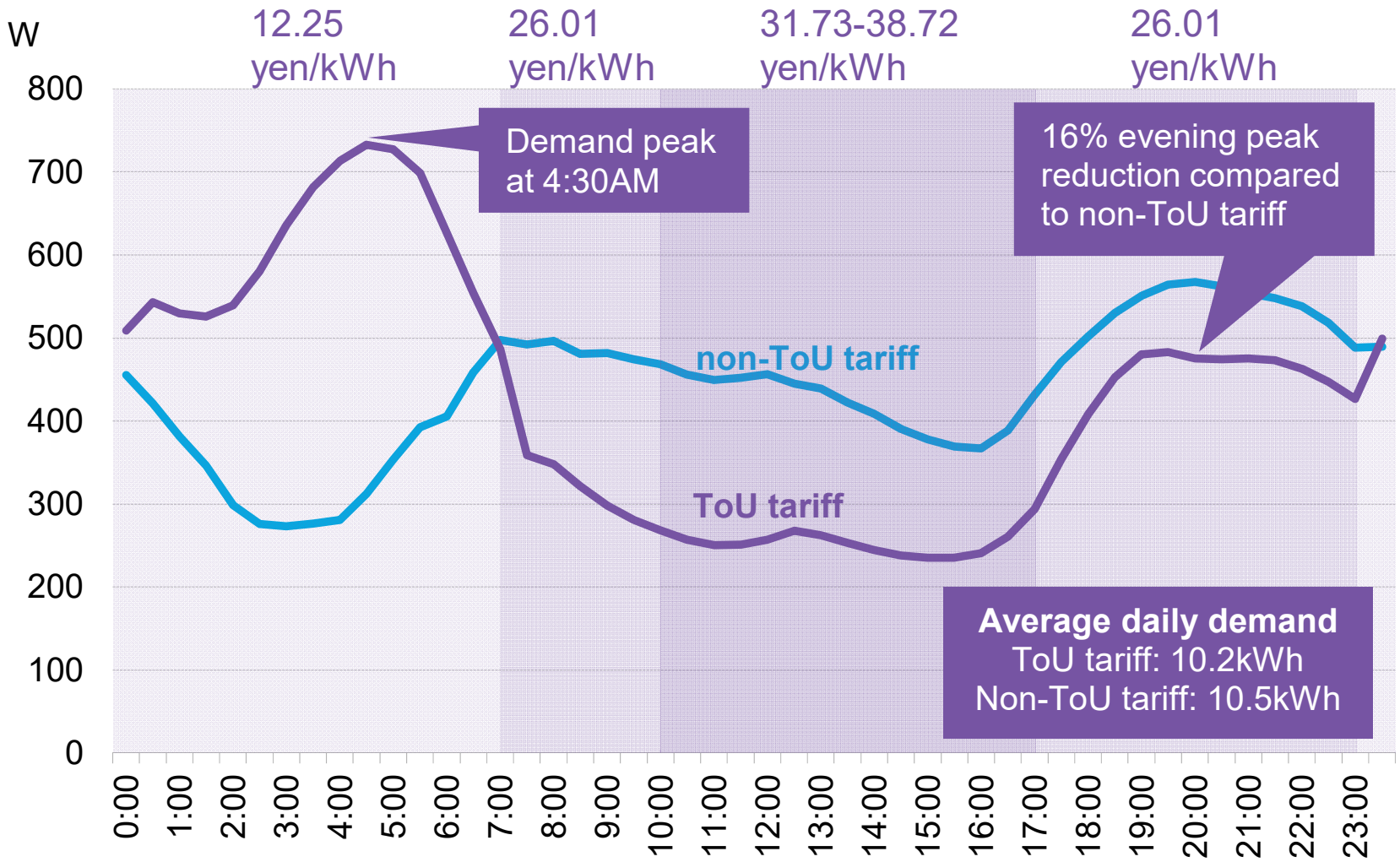
# U.S. small-scale PV state markets by penetration level, 1Q 2017




In Hawaii, 16.2% of households and 4.9% of commercial enterprises have solar on their roof. Hawaii ended solar net metering in October 2015.

*Source: Bloomberg New Energy Finance, EIA*

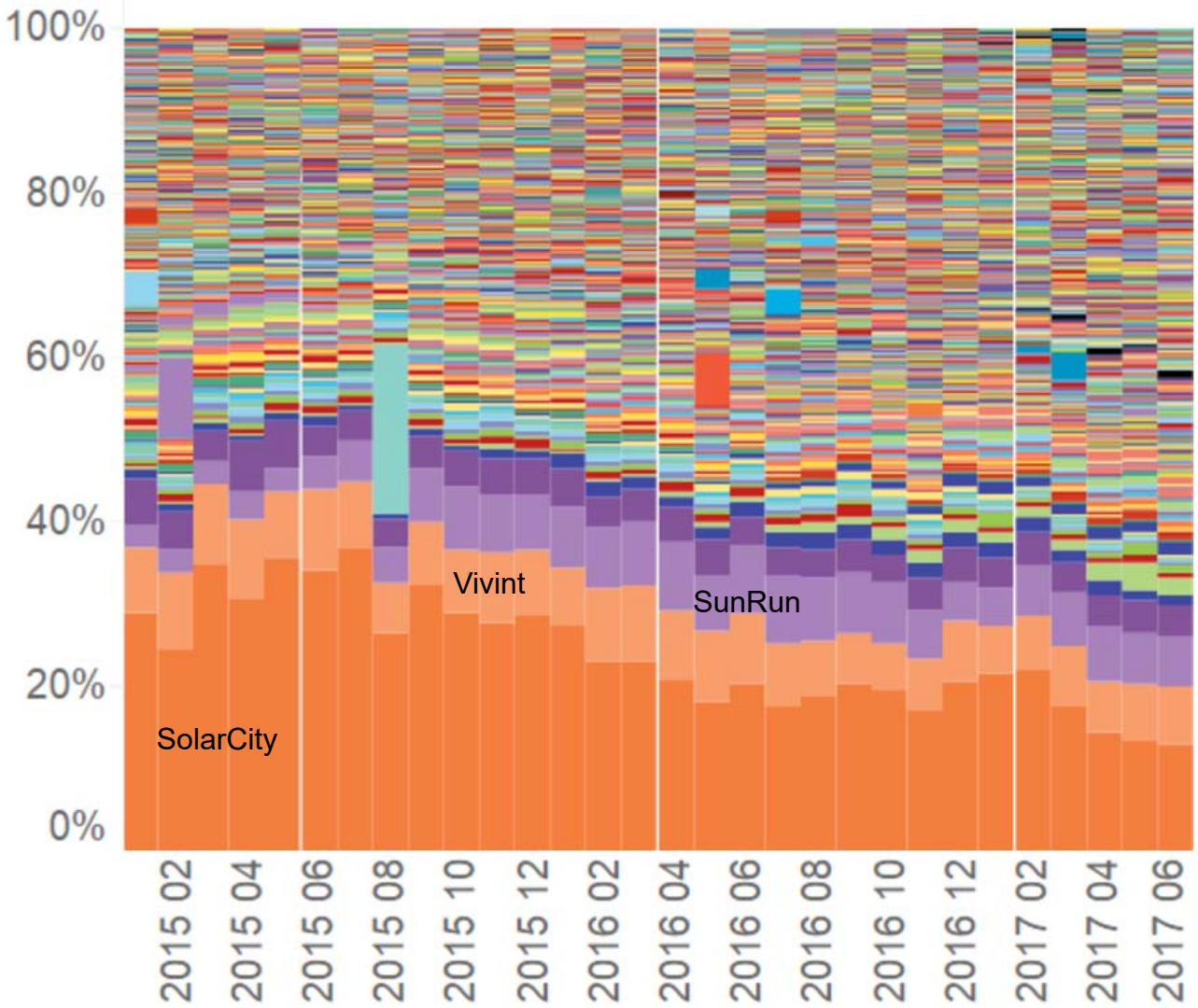
# Hourly power demand, households in Japan, depending on Time of Use electricity pricing




**Time of Use customers use 36% of their electricity between midnight and 6am, vs 19% of non-ToU households. This suggests about 17% of electricity demand can be shifted in Japan – perhaps due to electric water heating.**

*Source: NTT Smile Energy, Bloomberg New Energy Finance. Note: the purple highlights in the chart represent the ToU tariff pricing periods. 4-member households only for comparability. The power consumption includes both electricity from the grid as well as from the rooftop PV.*

# U.S. Installer Market Share by Capacity

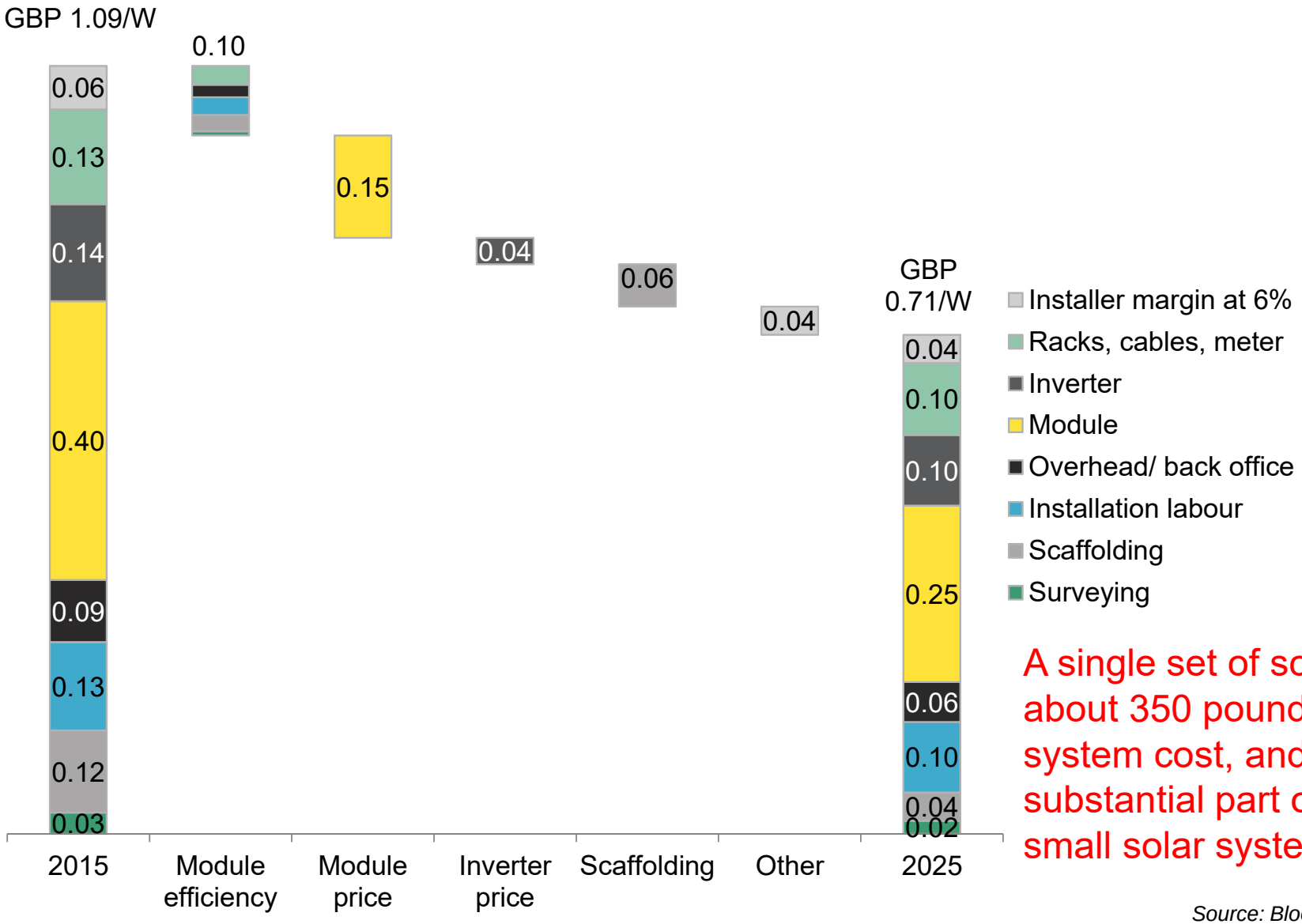



The three largest U.S. solar installers have lost market share from 40% in 1Q 2015 to 26% in 2Q 2017.

(The next largest category after these three is 'owner-installed' systems!)

*Source: Building permit data by Construction Monitor, Bloomberg New Energy Finance*

# Expected price of an aggregate-purchase PV system in the UK, 2015-2025, GBP/W




A single set of scaffolding costs about 350 pounds or 8% of the system cost, and is a substantial part of the cost of small solar systems.

*Source: Bloomberg New Energy Finance*

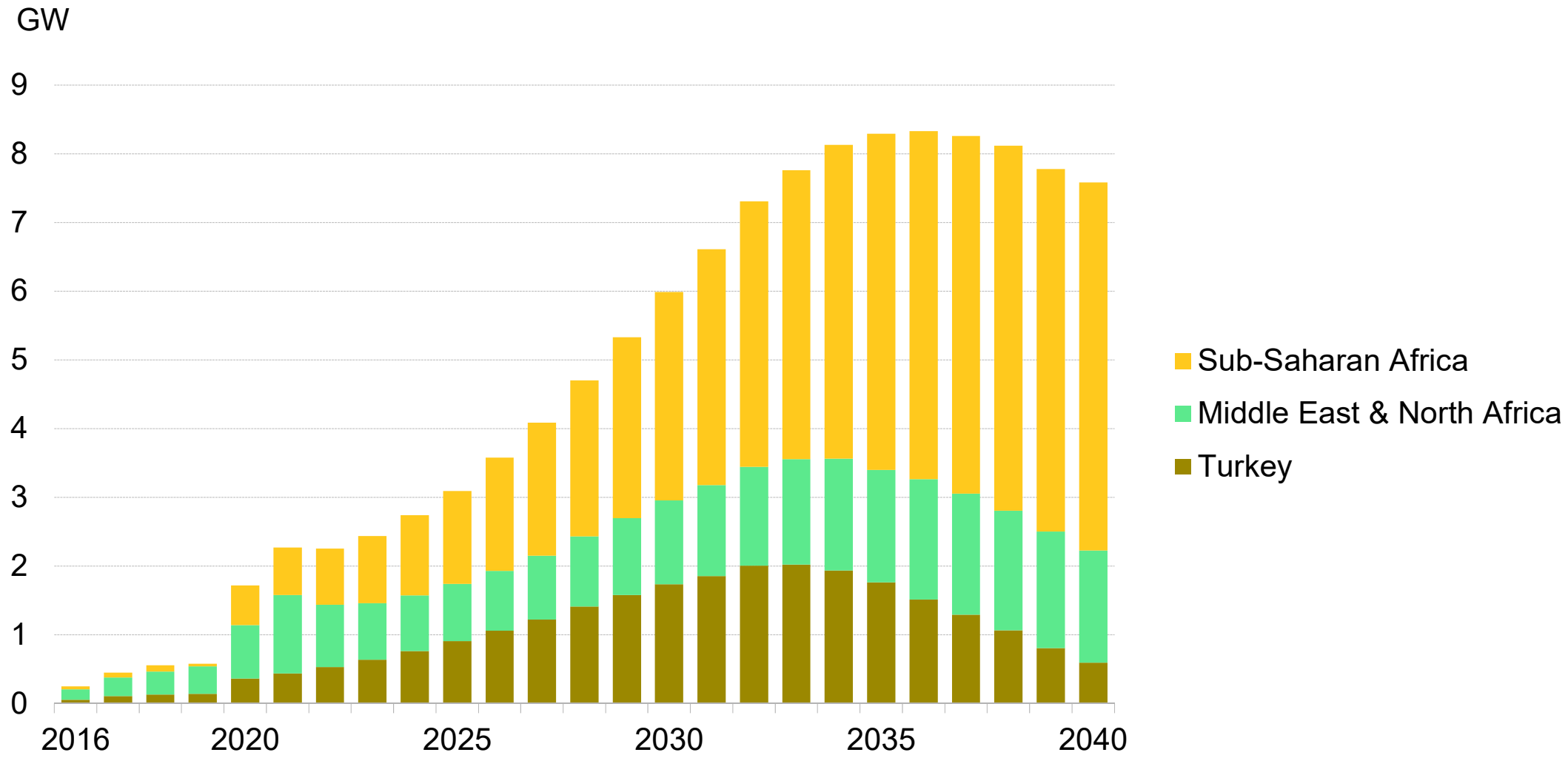
# BNEF's long-term modelling of rooftop PV

- Small-scale PV build is the output of a complex Bass diffusion adoption model running off electricity prices, insolation, and cost of capital by country.
- Residential users are assumed to make decisions based on simple payback periods, while commercial users make decisions based on net present value. Since the model only outputs individual decisions, we used some crude assumptions on future system size (table below)
- From a modelling perspective, it is applied before any other calculations – because generally retail electricity prices do not correlate very well with anything going on in the wider power markets. We did not apply any particularly complex assumptions regarding time-of-use rates, although we do expect these to be widely applied by regulators to encourage use of power at sunny times.

**Standard PV system size assumptions, kW**

| Region | Residential | Commercial | Industrial |
|---|---|---|---|
| Australia | 4 | 30 | 200 |
| China | 4 | 200 -100 dropping to 40 | NA |
| E.U. | 4 | 40 | NA |
| India | 3 | 25 | NA |
| Japan | 4-5 | 20 | NA |
| U.S. | 4 | 10-100 | NA |
| Latin America | 3 | 40 | NA |
| South East Asia | 3 | 40 | NA |
| Rest of world | 4 | 40 | NA |

# Small-scale solar new build in the Middle East. Africa and Turkey




*Source: Bloomberg New Energy Finance New Energy Outlook 2017*

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