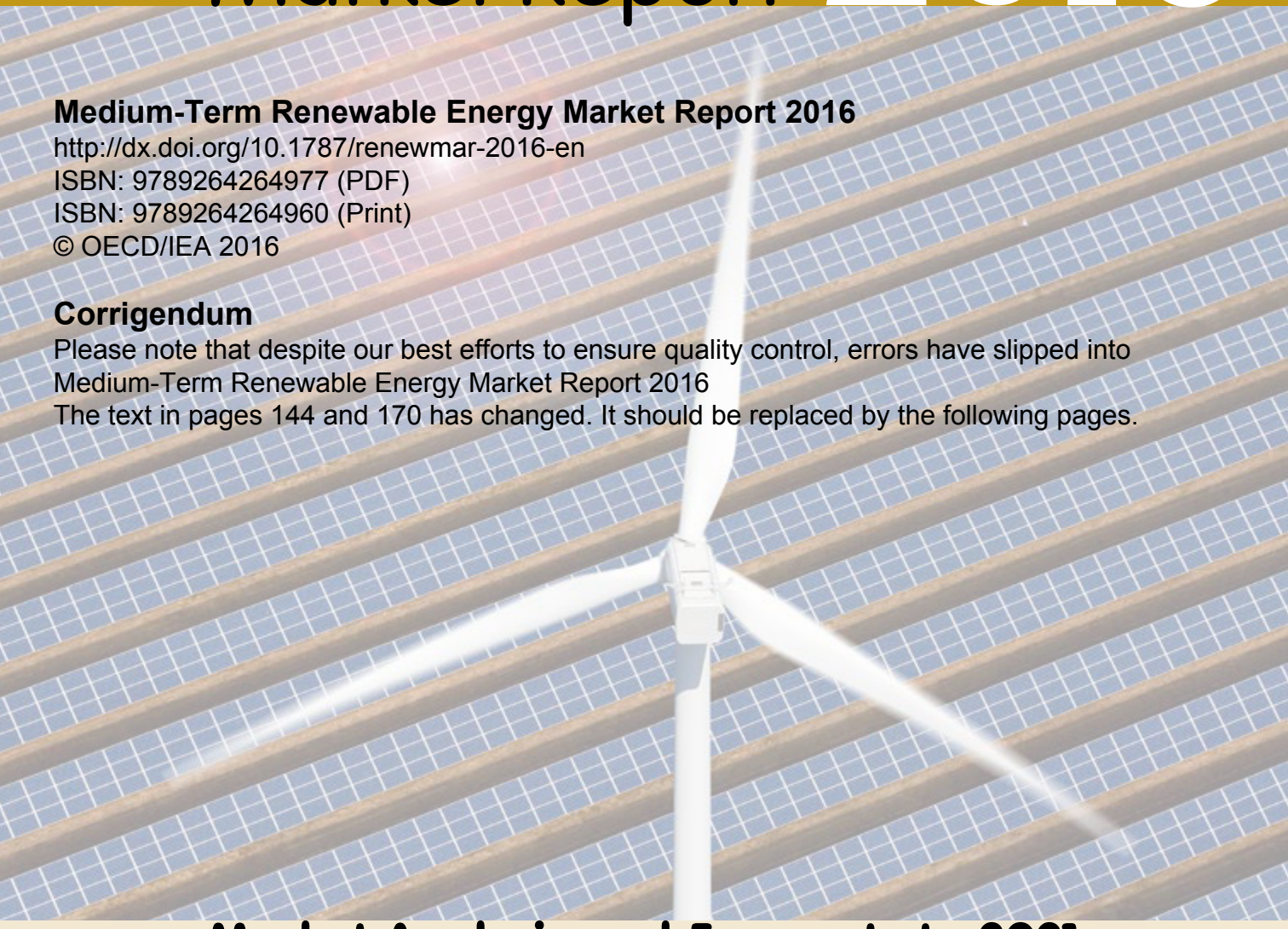
RENEWABLE ENERGY

Medium-Term Market Report 2016



Market Analysis and Forecasts to 2021

Medium-Term Renewable Energy Market Report 2016
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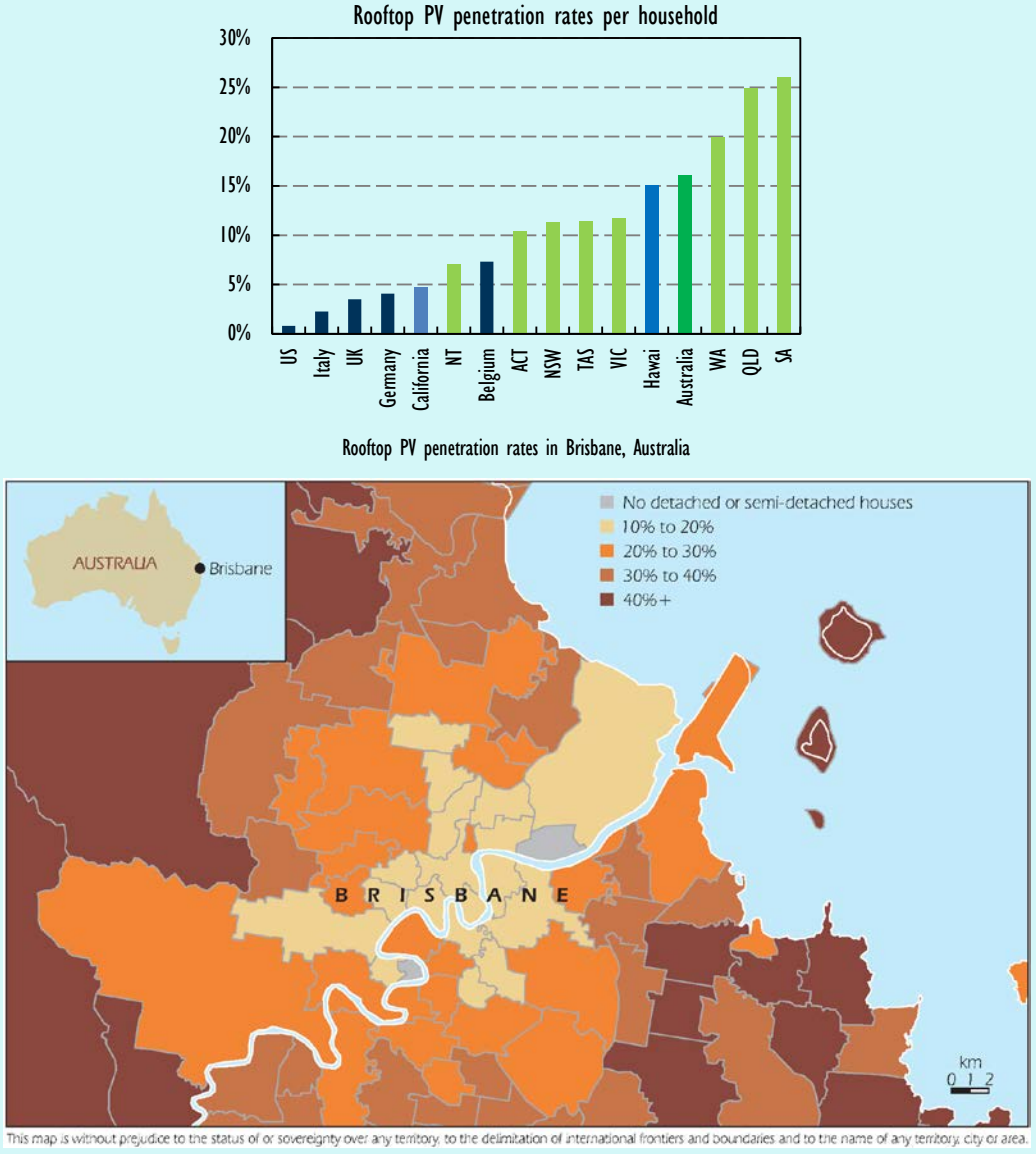
Corrigendum

Please note that despite our best efforts to ensure quality control, errors have slipped into Medium-Term Renewable Energy Market Report 2016
The text in pages 144 and 170 has changed. It should be replaced by the following pages.

International Energy Agency
Secure Sustainable Together

Box 2.3 Rooftop solar PV in Australia (continued)

Figure 2.23 Rooftop penetration rates per household in Australia with international comparison

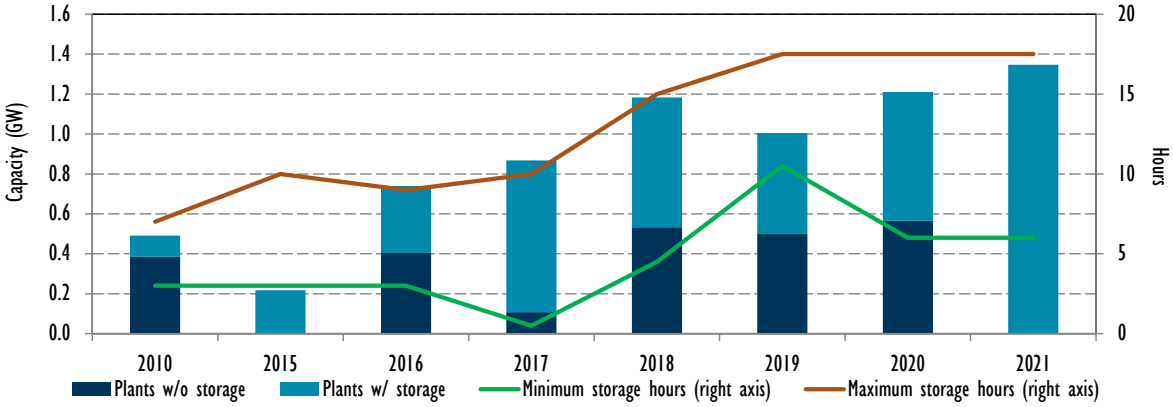


Notes: The figure (left) shows the percentage of number of residential rooftop PV systems over the number of dwellings in selected countries or States/territories. The map (right) shows the percentage of residential rooftop PV systems over the number of detached or semi-detached houses in the area of Brisbane, Queensland, Australia. SA = South Australia; Qld = Queensland; WA = Western Australia; VC = Victoria; Tas = Tasmania; NSW = New South Wales; ACT = Australian Capital Territory; NT = Northern Territory.

Map source: APVI (2016), Mapping Australian Photovoltaic installations

Under the SSRES, small-scale technology certificates can be created with new systems delivering electricity or hot water. Each certificate represents 1 MWh equivalent to the estimated electricity that will be generated or displaced over the lifetime of the system. In 2015, around 16 million certificates were created. Residential solar PV systems received the majority of certificates (89%) followed by solar water heaters (9%) that were installed over 2014-15. Liable entities, mostly electricity retailers, were required to procure and surrender 20.6 million small-scale technology certificates in 2015, or approximately 12% of the electricity they bought

Figure 2.32 Annual additions of CSP installed capacity with or without storage and average corresponding battery size (in hours), historical and forecast



Sources: Historical data based on IEA (2016d), Renewables Information 2016, www.iea.org/statistics/; NREL (2015), Concentrating Solar Power Projects; BNEF (2015b), Renewable Energy Projects database.

While once considered a novelty, the use of advanced molten salt storage is now a standard concept. Abengoa Solar's 250 MW Solana parabolic trough plant, installed in the United States in 2013, has six hours of full-load thermal energy storage using molten salt and yields as much annual energy as California's nine Solar Electric Generating Systems that do not use molten salt. SolarReserve operates the 110 MW Crescent Dunes tower that uses molten salts as both heat transfer fluid and a storage medium for ten-hour storage and is planning a 260 MW plant (with 14 hours of storage) utilising similar technology in Chile. In emerging markets, storage remains critical, driven by the need to meet evening peak demand in countries such as South Africa, where regulators approved at least a half-dozen CSP plants with storage. In northern Chile, reliable electricity from CSP can be combined with large-scale PV to deliver base-load power, a requirement for the country's large mining industry.

Although parabolic trough plants with oil as a heat transfer fuel represent the bulk of existing capacity, with or without molten salt thermal storage, the diversification of the CSP technology landscape is notable to date. Although parabolic dish and Fresnel linear promises have not materialised, central receiver systems (CRS – heliostats surrounding towers) are becoming the alternative. Capacities of newly developed parabolic troughs and tower plants draw closer every year, with 46% of added capacity based on parabolic trough technology, and 41% based on tower technology (mainly due to capacity in the United States) as of 2014.

The shift toward tower technology represents the inherent limitations in trough technology. Temperature levels and the high costs associated with relatively low efficiency are challenges that tower technology can potentially overcome. In particular, where there is a need for large storage, the higher working temperature of molten salt towers reduces the volume of storage material by a factor of three. However, a number of risks remain, and some large current projects are exemplary of the technology's low level of maturation to date. For a variety of reasons, both BrightSource's Ivanpah plants (three CRS on one site, no storage) and SolarReserve's Crescent Dunes (one tower, large storage) experienced extensive commissioning periods, and have not yet reached their full capacities.