

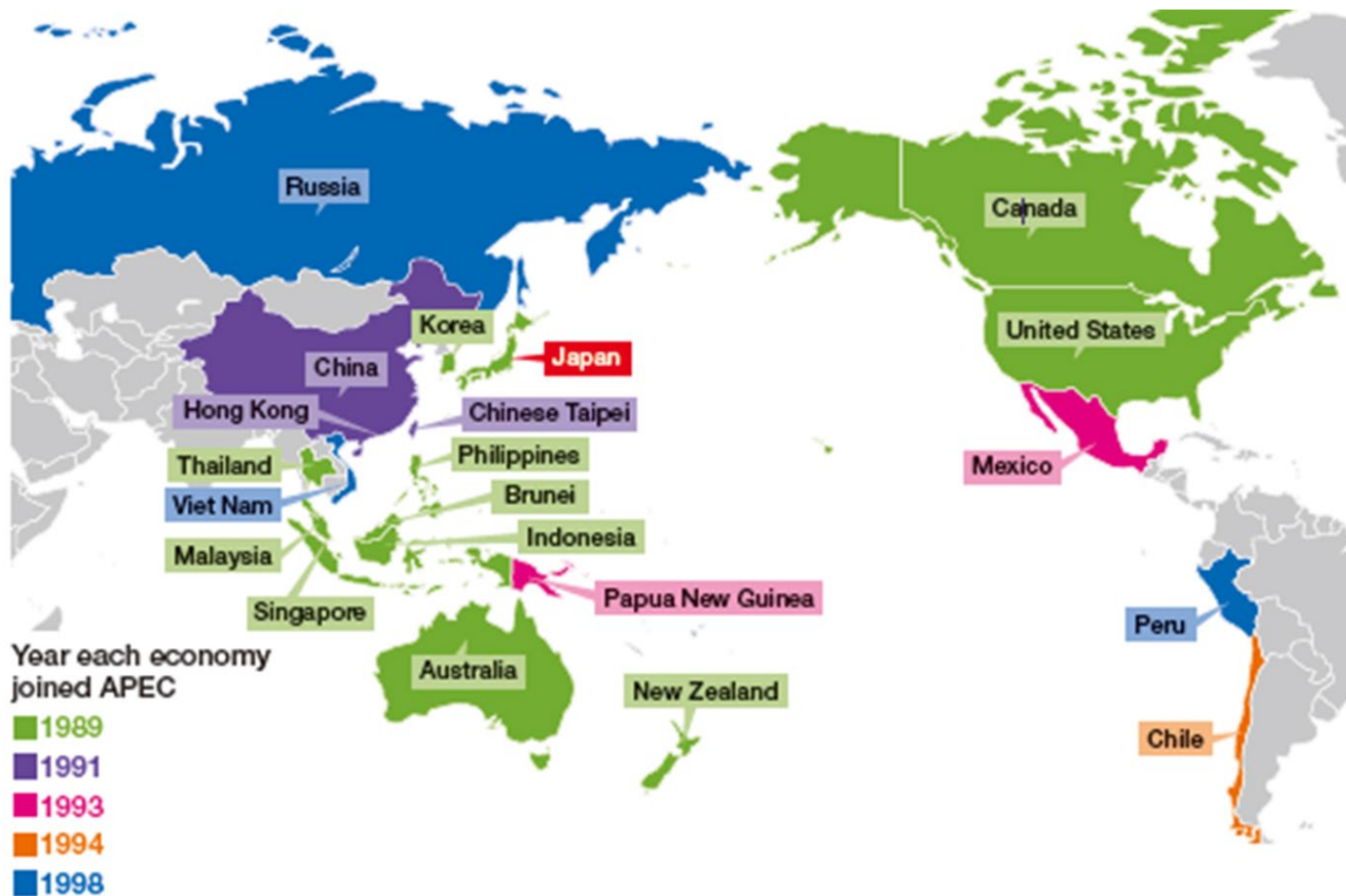
Overview and updates on the APEC Energy Outlook 7th and 8th editions

APERC Annual Conference, Tokyo, Japan
15 May 2019

James Kendell, Senior Vice President

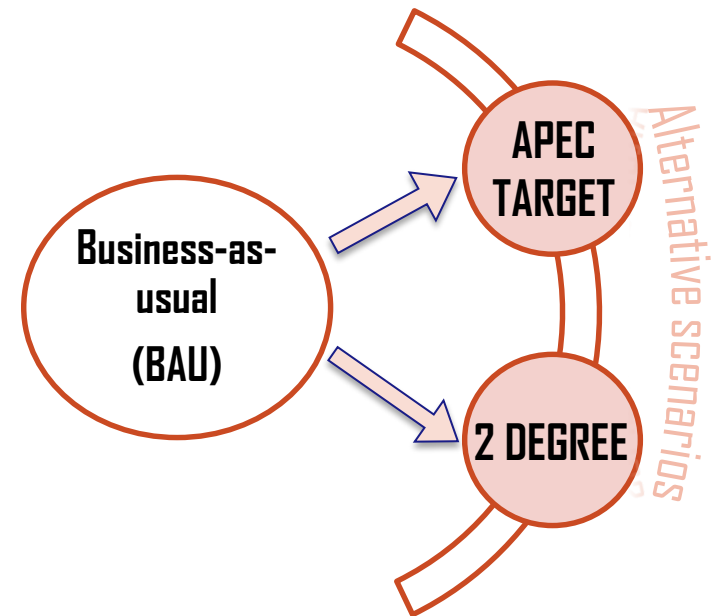


Process innovations increased engagement

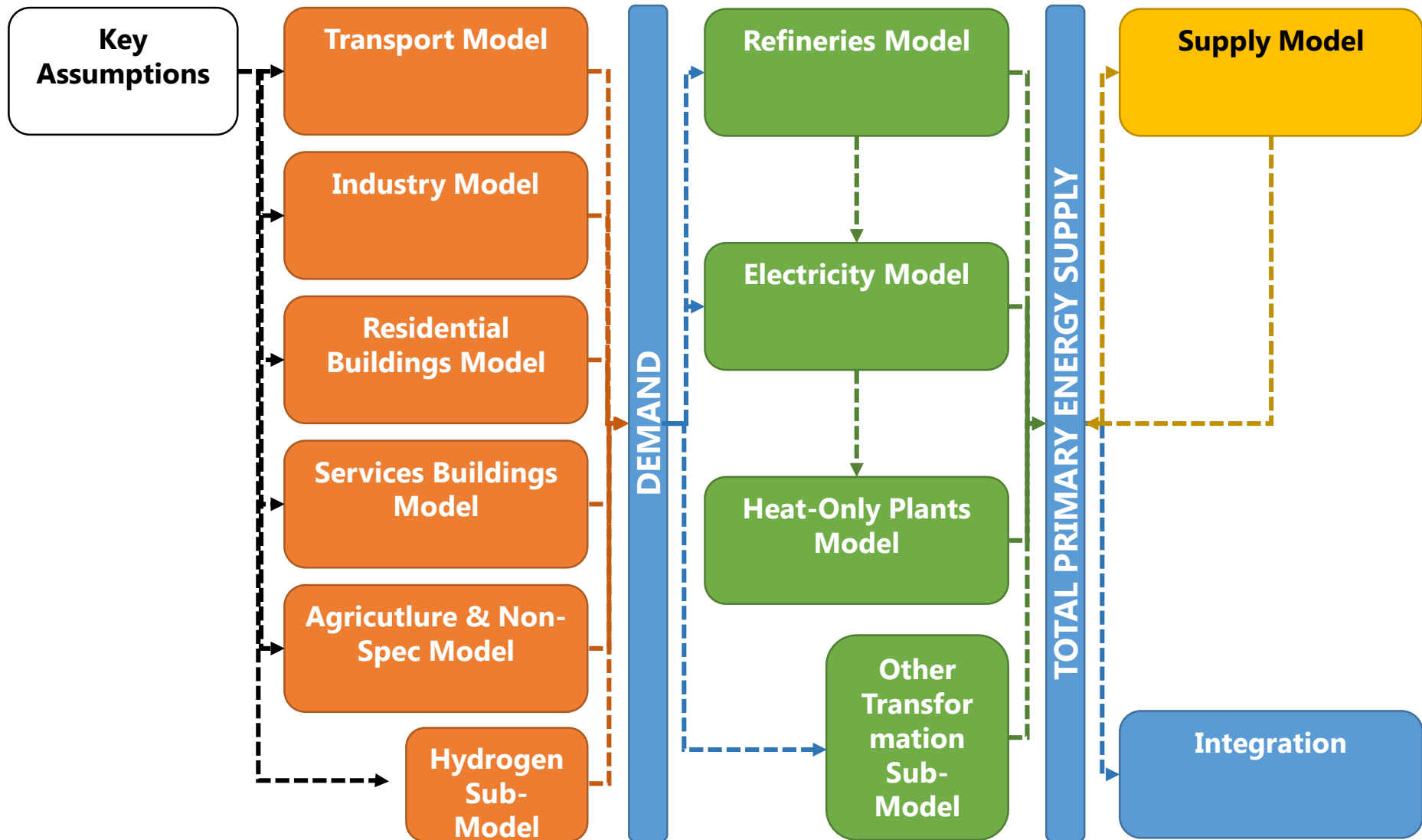


7th edition extends to 2050, enhances supply

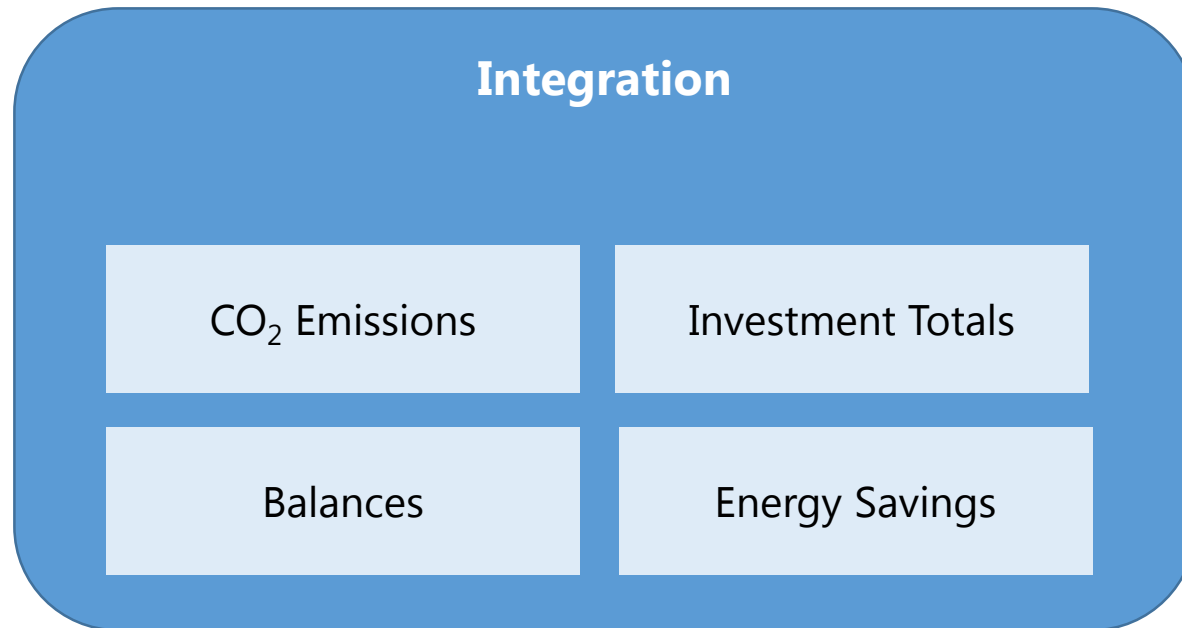
- Extends projection to 2050
- Uses OECD GDP forecasts
- Makes buildings models activity driven
- Distributes renewables to the demand and electricity models
- Adds refinery and supply models as well as an integrating module
- Extends investment calculations to include demand side investment and fuel savings



Modelling structure reflects changes



Integration module was a key change



7th edition of the Outlook has 10 chapters

INTRODUCTION

BAU

Energy demand
Energy supply
Power sector

ALTERNATIVE SCENARIOS

TGT

2DC

Investment

Trade

Security

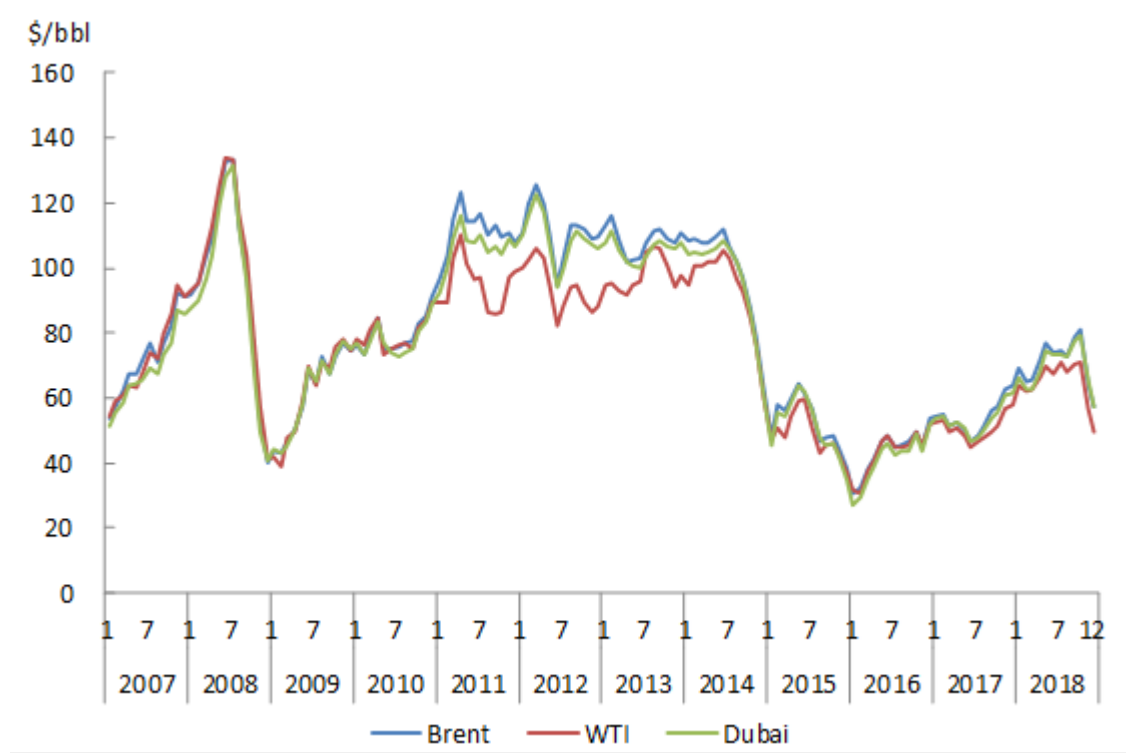
Climate change



Energy developments in the last three years

Crude oil prices have been rising since 2015

Crude oil prices, 2007-2018



Source: IEA 2018 and IEA 2019

Rising US shale oil production is holding down crude prices.

Coal prices have been rising since early 2016

Thermal coal spot price, 2011-February 2019

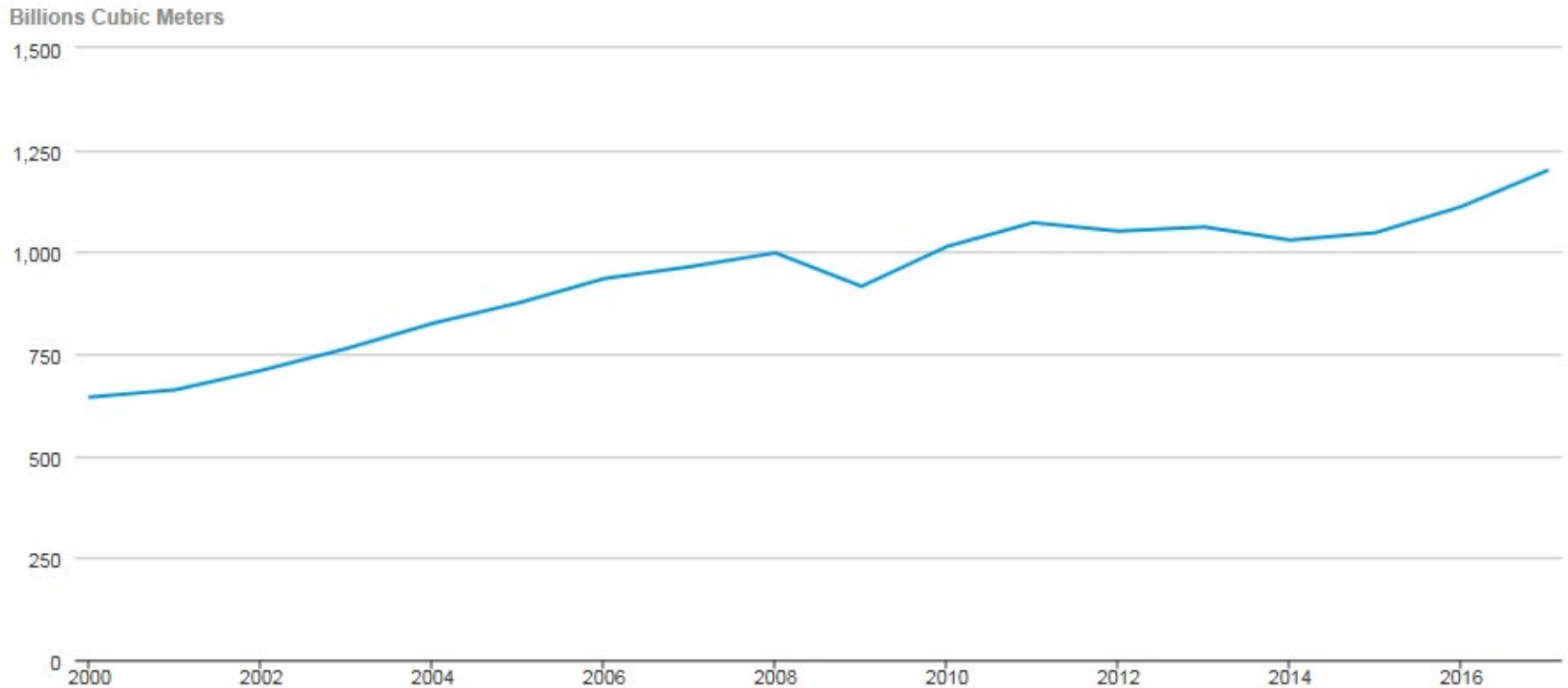


Source: globalCOAL

China has been driving up world coal prices.

Natural gas trade has risen, but not prices

World dry natural gas trade, 2000-2017



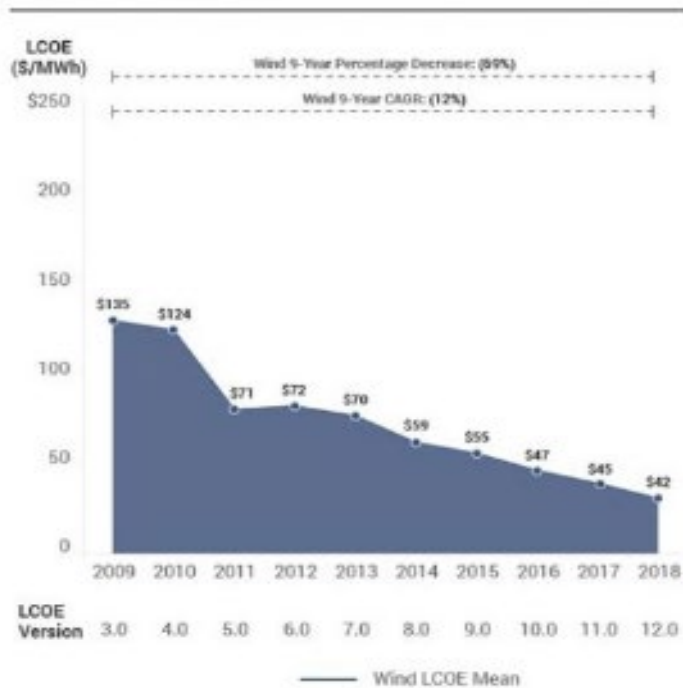
US Energy Information Administration, 2019

World LNG and pipeline trade in 2017 was 170 billion cubic meters higher than in 2014.

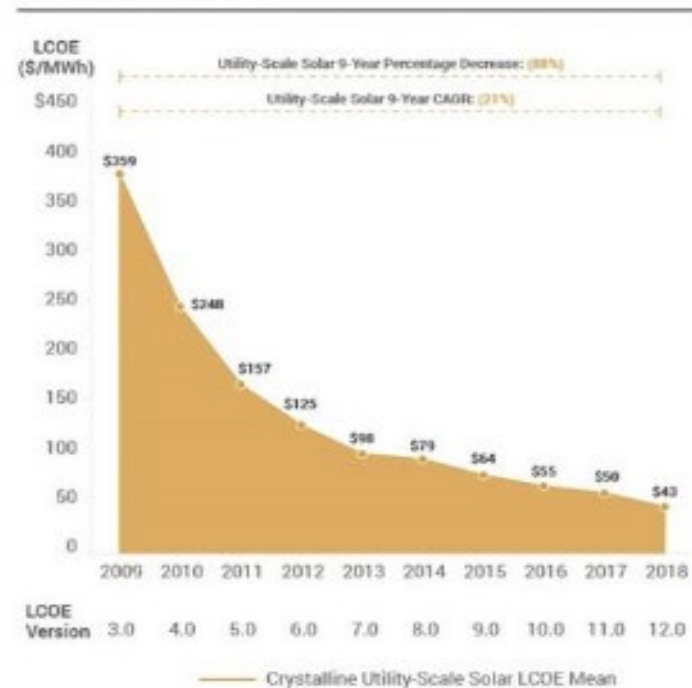
Wind and solar costs continue to fall

Levelized cost of electricity for wind and solar photovoltaics, 2009-2018

Unsubsidized Wind LCOE



Unsubsidized Solar PV LCOE

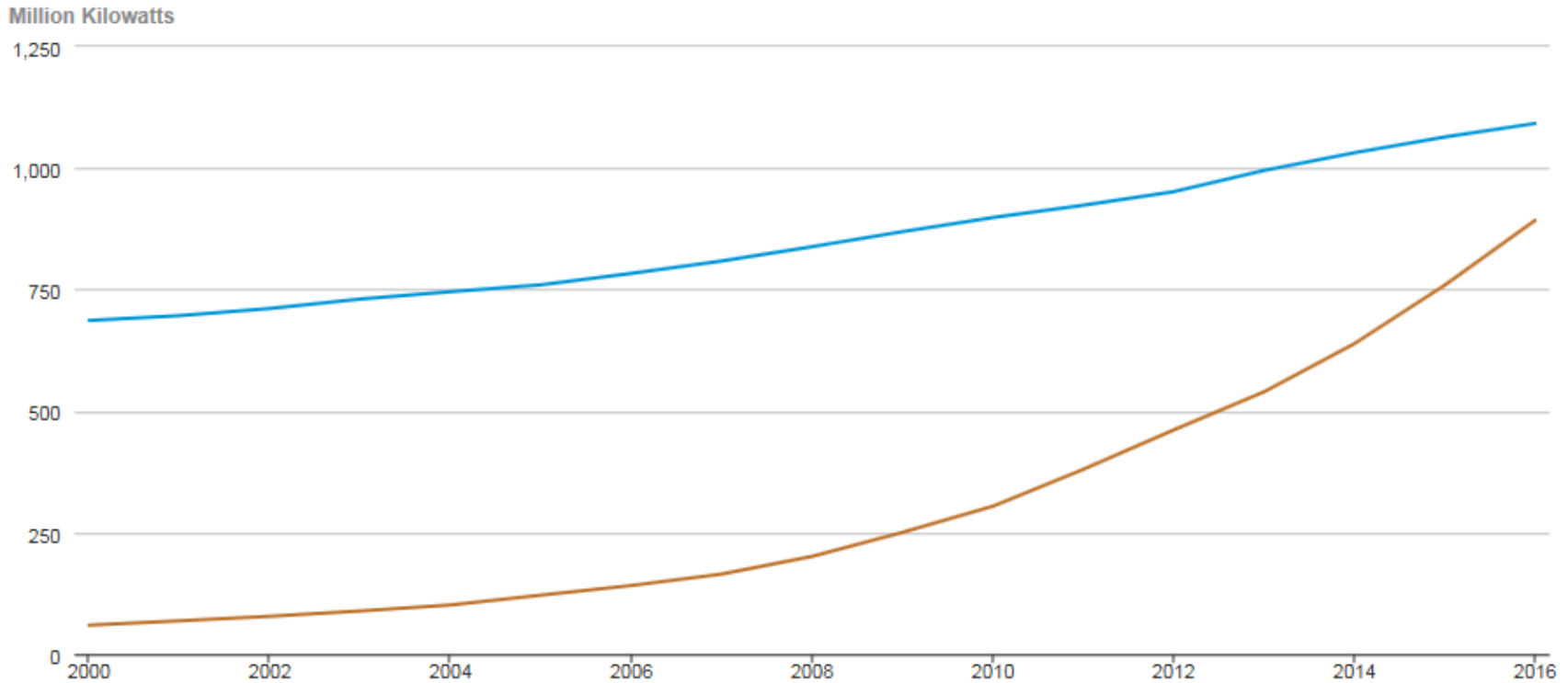


Giles Parkinson, Renew Economy, 12 November 2018

According to Lazard, the levelized cost of utility-scale solar is nearly identical to the marginal cost of coal, at \$US36/MWh.

Non-hydro renewable capacity is soaring

World renewable generating capacity, 2000-2016



US Energy Information Administration, 2019

Geothermal, solar and wind capacity is more than four times as high as in 2008.



Thank you!

<https://aperc.ieej.or.jp/>