Welcome to Don Rodrigo

Europe's first subsidy-free utility-scale Solar Project

Dr. Benedikt Ortmann, Director Solar Projects

BayWa r.e.
renewable energy

r.e.think energy

1

Introduction of BayWa

Founded in 1923

1923

Cooperative of bavarian farmers

1930

Listed on German Stock Exchange

1947

Largest German Agricultural Company

1960

Market leader in Smart Farming

2018

BayWa

Turnover 2017

€17 billion

EBIT 2017

€171.3 million

Employees

17,550

Locations

More than **3,000** locations in **40 countries**

BayWa r.e. – dynamic growth and sustainable profitability

BayWa r.e.
renewable energy

Turnover 2018

1.4 billion €

EBIT 2018

75 million €

Employees

1,500

Founded

2009

Gathering our combined market experience under the BayWa r.e. umbrella

Experience

3,000 MW

Development and realization of projects in the area of solar, wind power, bioenergy and geothermal energy

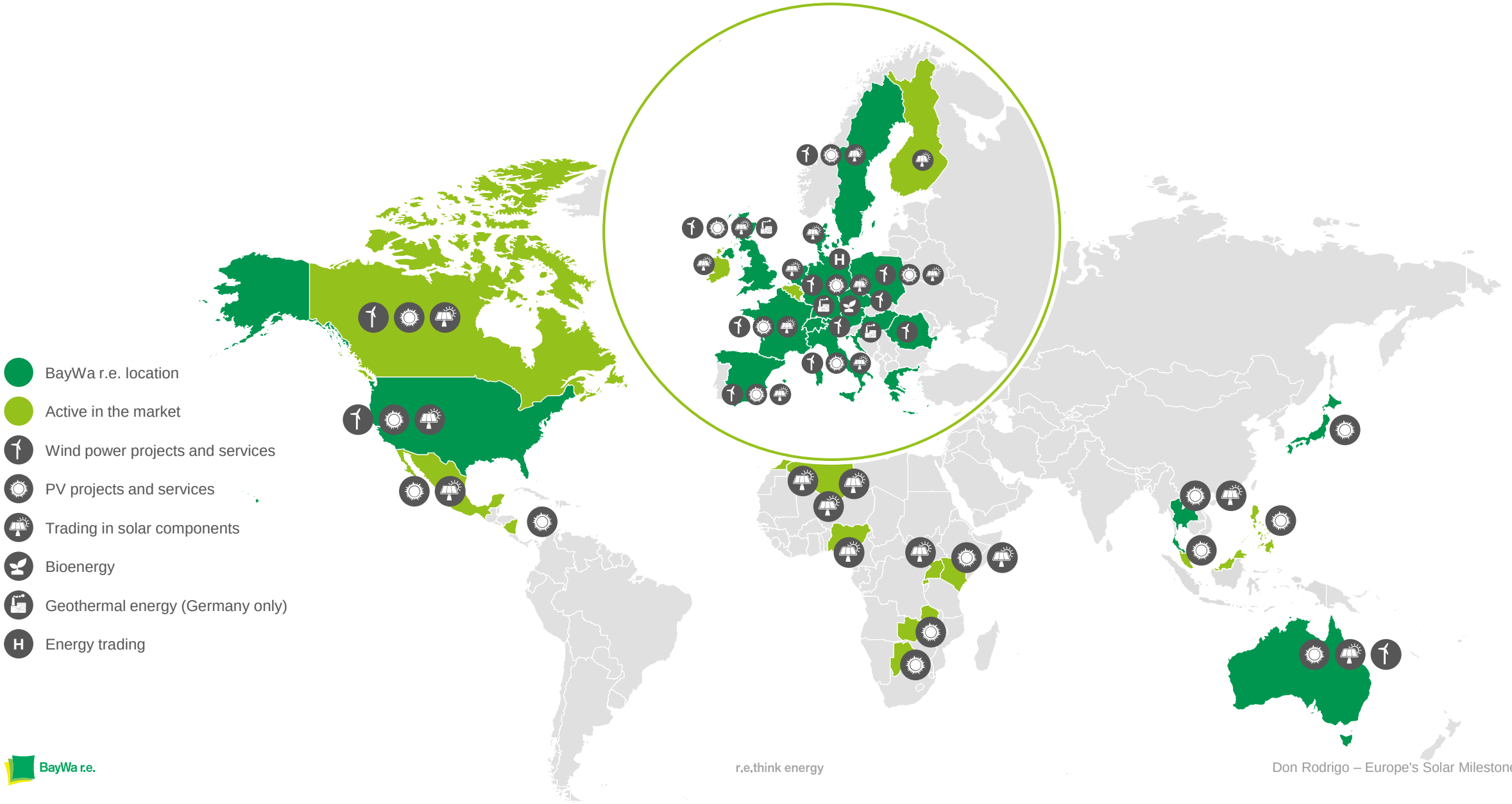
Company

Wholly owned subsidiary

of BayWa AG

our stable parent company

Our Global Footprint



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Grid Parity is happening

In 2012 we started Europe’s solar milestone project on a green field

The selection of the country

Why Spain?

Stable currency

Stable economy

OECD country

Ideal solar irradiation zone

As we planned to build this project unsubsidized, there was no concern major about politics in Spain

The selection of the site

Land Requirements

270 ha

Spatially coherent

Grid con-nection nearby

Relatively flat underground

Reasonable price for the lease

No environ-mental limits for flora and fauna

No major compensatory measures required

The decent site characteristics offered the optimal basis to build this extraordinary project.

Detailed and comprehensive project design from the start

Approval steps

Request to Red Eléctrica for grid connection capacity

Permitting process at ministerial level & a grid extension was required

Environmental impact declaration

Soil group compatibility statement

The planning process was following the same process as for a conventional power plant

Local community Commitment is a key element

Benefit for the community

Yearly local tax of up to 4 Mill. €
will remarkably lift incomes

Our Partners

Ansasol S.L., Prodiel,
the local municipality

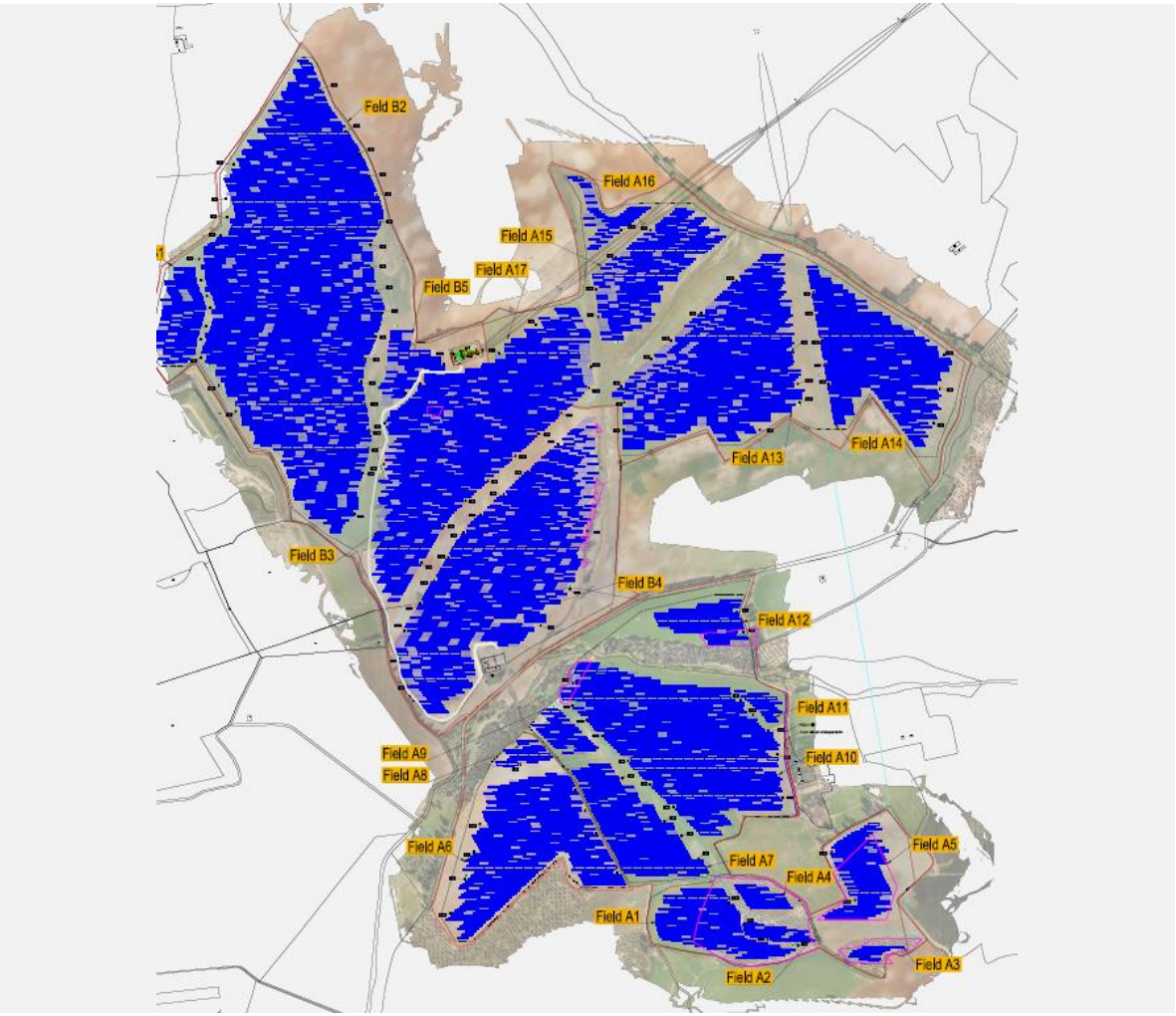
Local support and local commitment was a key element of the project success – more than 200 new jobs were created and local workers are employed.

Optimized technical planning process for most efficient use of land

String inverters and fixed-tilted technology

- Simple module exchange, simple maintenance
- Independency from the manufacturer for 20 years
- No standardized pavement needed, more flexibility for module tables
- 2,000 flexible string inverters adapting to the specific land conditions
- Flexibility, simplicity and independence means lower costs
- 1-axis would have brought less than 155 MW

➢ **Availability, performance and reliability of string inverters optimize the quality of the plant‘s production and lower the total costs of ownership significantly**



Overall state-of-the-art System Design

Module tables with 2 module rows each

27 – 29 panels assembled in strings

Strings deliver the produced electricity to a string inverter

Specific string construction in the lower row and one in the upper row minimizes shading losses at dusk and dawn

Decentral inverter concept leads to

- A maximum of availability on PV-plant-level
- Ease of maintenance, low risk for replacements
- Reduced cost

Overhead cable lines with an approx. length of 2.6 km will be connected to an existing substation owned by the transmission grid operator Red Eléctrica de España (REE)

The electricity are transformed on-site up to 220kV by its own substation

Panel manufacturer	Astronergy & GCL
Panel type	Crystallin
Inverters	Huawei 60 KTL and 100 KTL
Substructure	Zimmermann

We leveraged the full potential of our site’s advantages by designing a perfectly tailored system.

Don Rodrigo – Facts & Figures

Sevilla – Andalucía, Spain

- Europe’s 1st subsidy free Solar Project of its scale
- Capacity: 175 MWp
- Equivalent to the consumption of 93.000 average Spanish households
- 198.000t CO_2 emission reduction annually
- Largest subsidy-free project in Europe
- 1.500V DC and connection to REE’s substation at 220kV
- 3000km DC cable, 160km AC cable, 7,000 tons structure, more than 500,000 modules were processed (800 containers)
- Site has a size of approx. 270 ha, equivalent to 190 football fields
- First project in Spain with a long term PPA of 15 years together with Statkraft, one of Europe’s largest generators of renewable energy
- Commissioning is planned for Q2/2019

Being part of one of the first grid parity projects together with BayWa r.e. is a big milestone for us, showing that full market integration of renewables is possible.

”

Simon Kornek
Head of Continental long-term Portfolio at Statkraft

Don Rodrigo was fully erected in 9 months

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All about Grid Parity – and how Photovoltaic Energy is disrupting the market

What is grid parity?

The 3 levels of grid parity

Consumer price level

Easiest to achieve as cost of energy
are similar to high end-consumers prices

Wholesale price level

Comparable to the regular price,
to which municipal utilities purchase energy

Production price level

Same cost of energy production as classic
electricity utilities companies

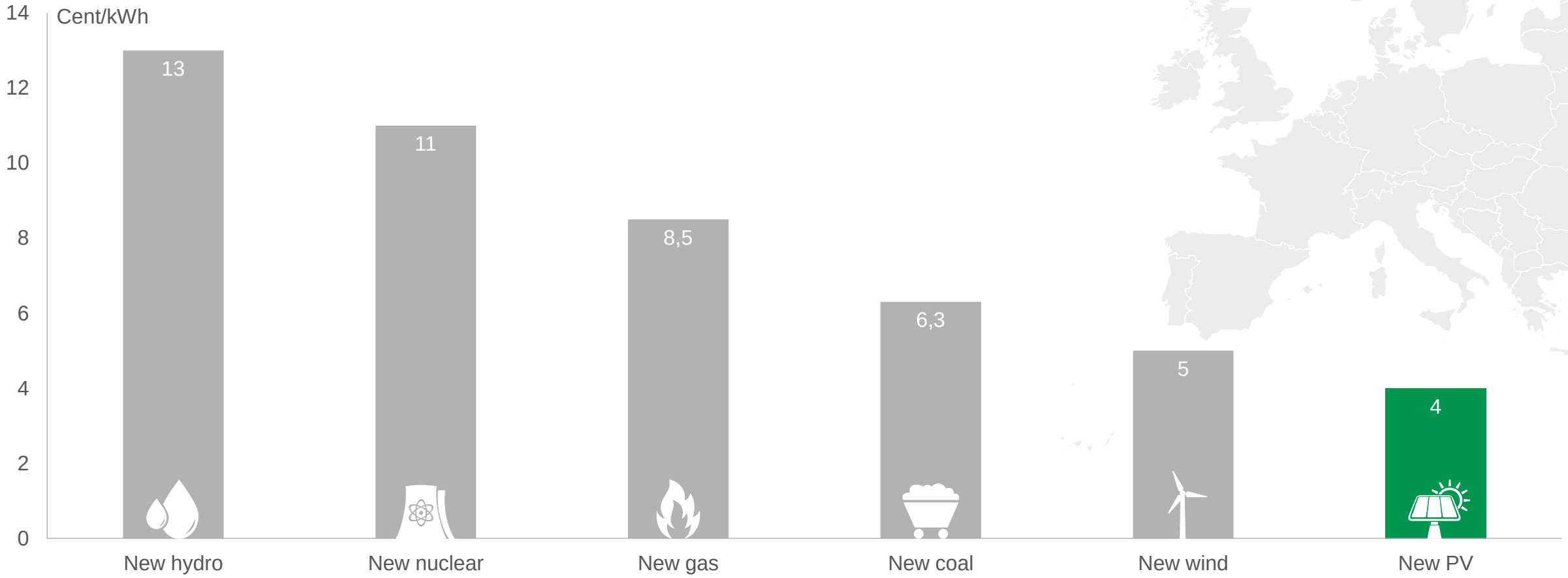
The ultimate goal – to produce Solar Energy cheaper than conventional energies – has now reached!

Source: US Department of Energy

Consumer price level Wholesale price level Production price level

Renewable Energy outperforms every other new energy form

LCOE Comparison of Energy Technologies in Europe



Source: EU reference scenario 2020

Renewable Energy outperforms every other new energy form

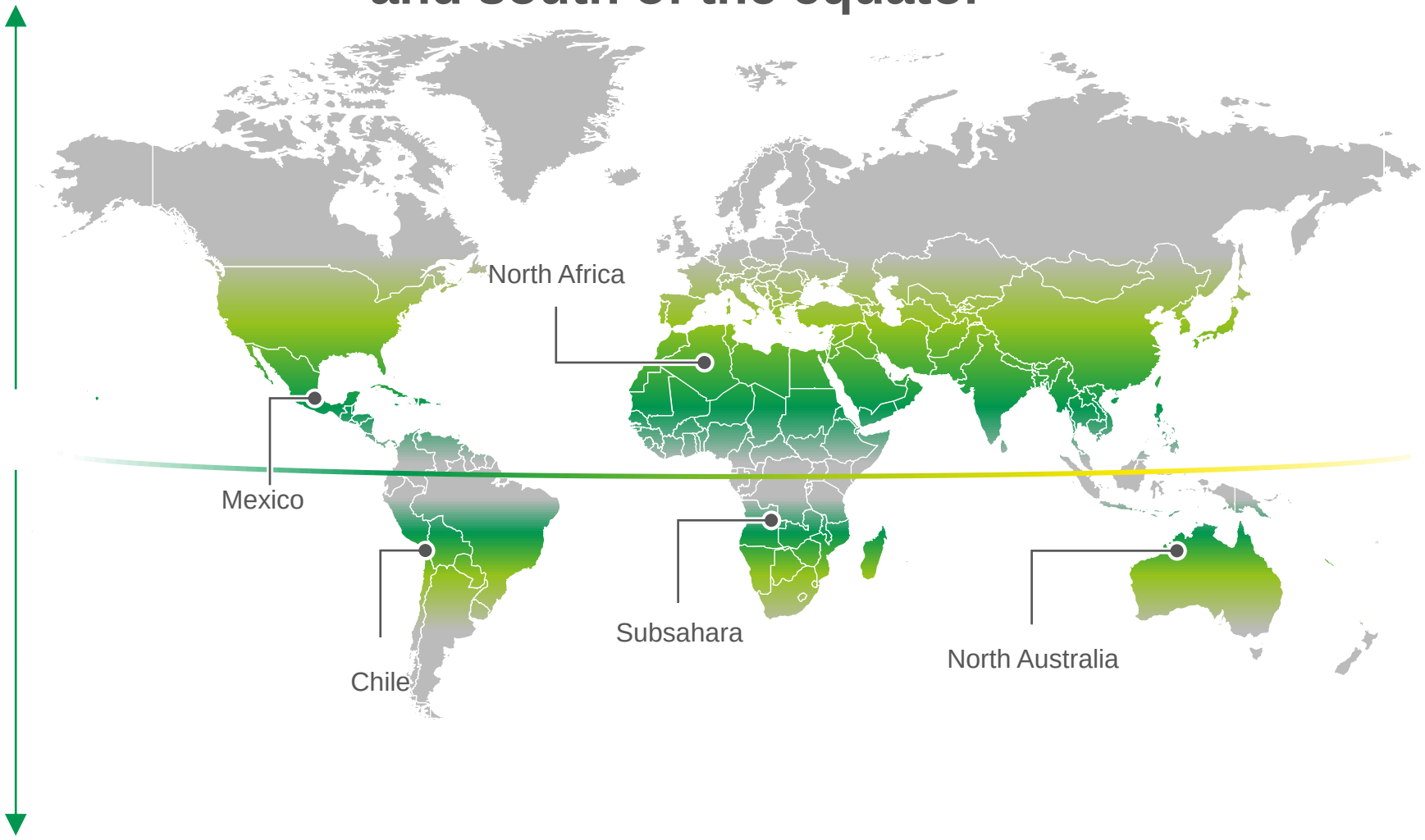
Photovoltaic is the

cheapest power source

in the history of mankind

Source: EU reference scenario 2020

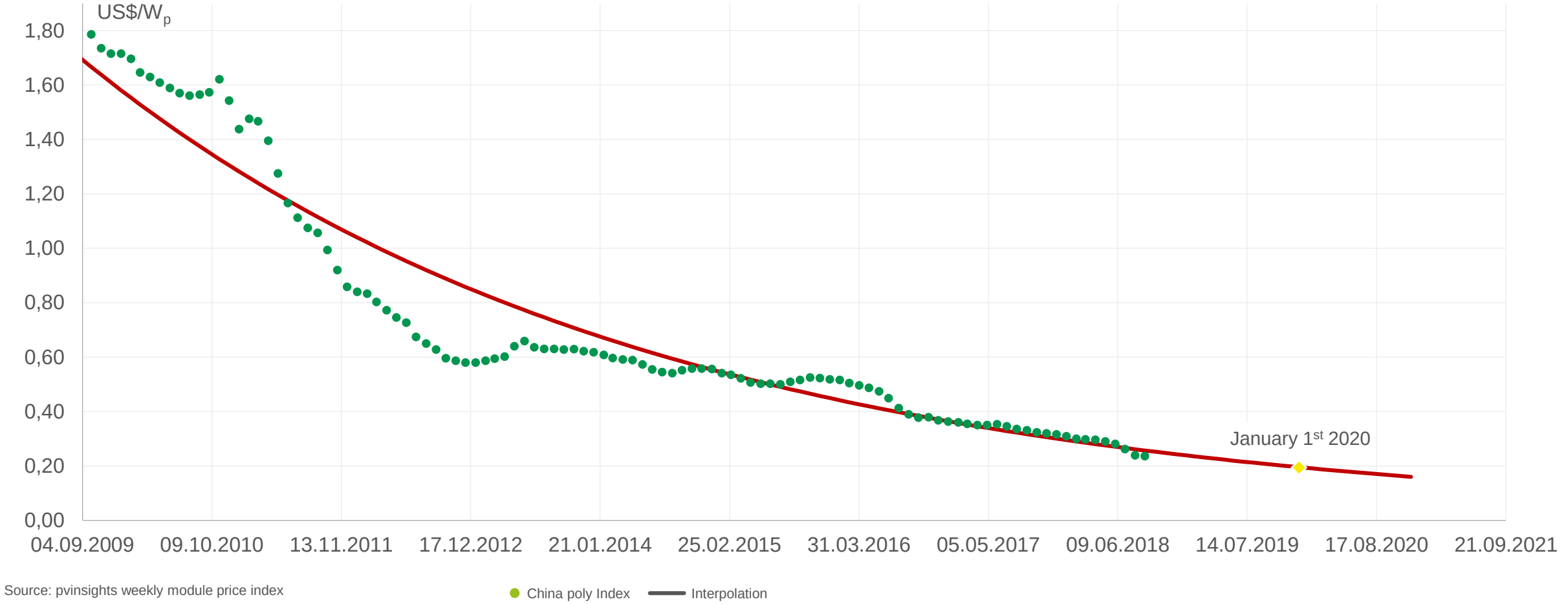
Ingredient No. 1: radiation
Zones with ideal grid parity conditions are spread north and south of the equator



Ingredient No. 2: EPC cost

2020 : 20

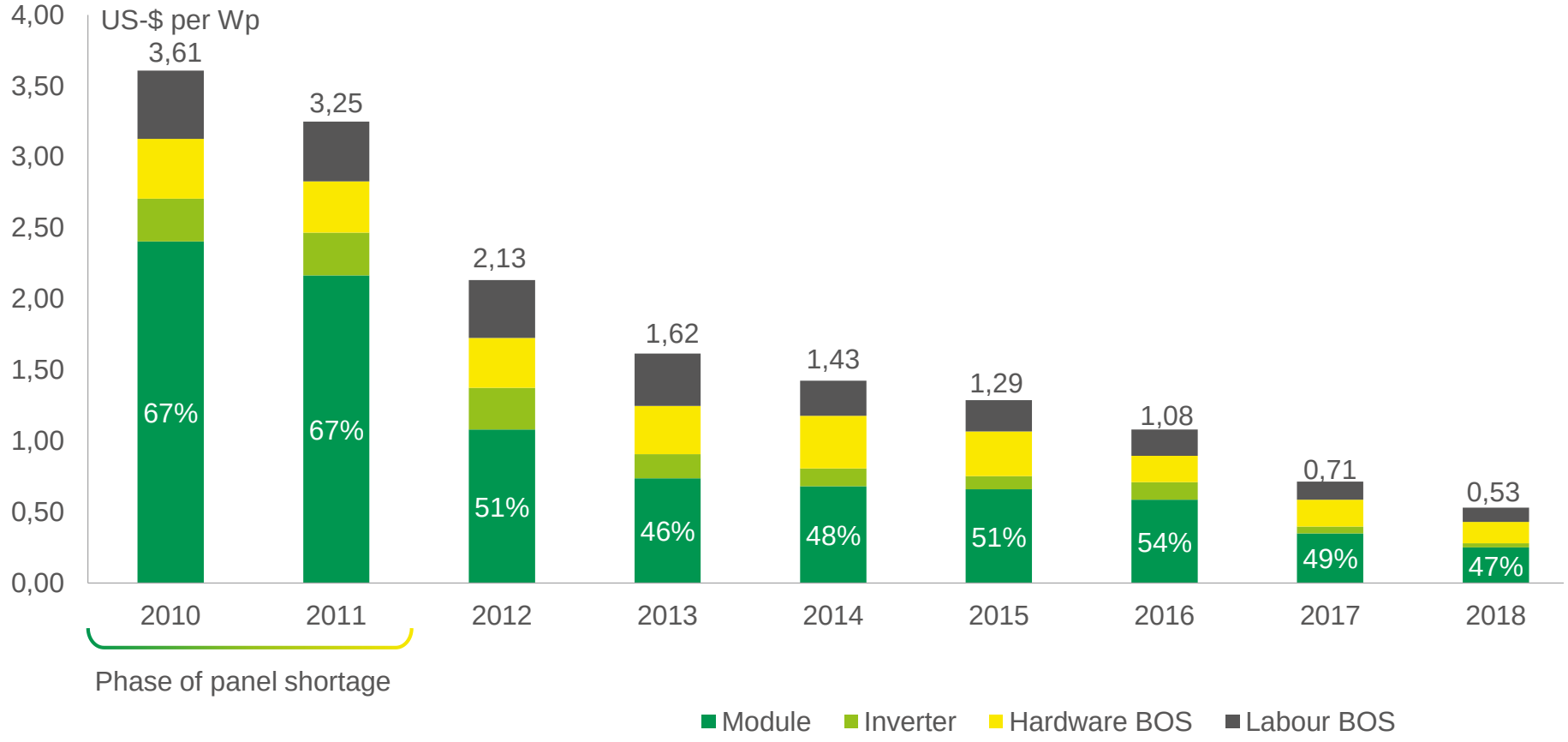
In 2020 panel prices will go below 20 Cent/Wp



Source: pvinsights weekly module price index

The panel remains at ~50% of construction costs

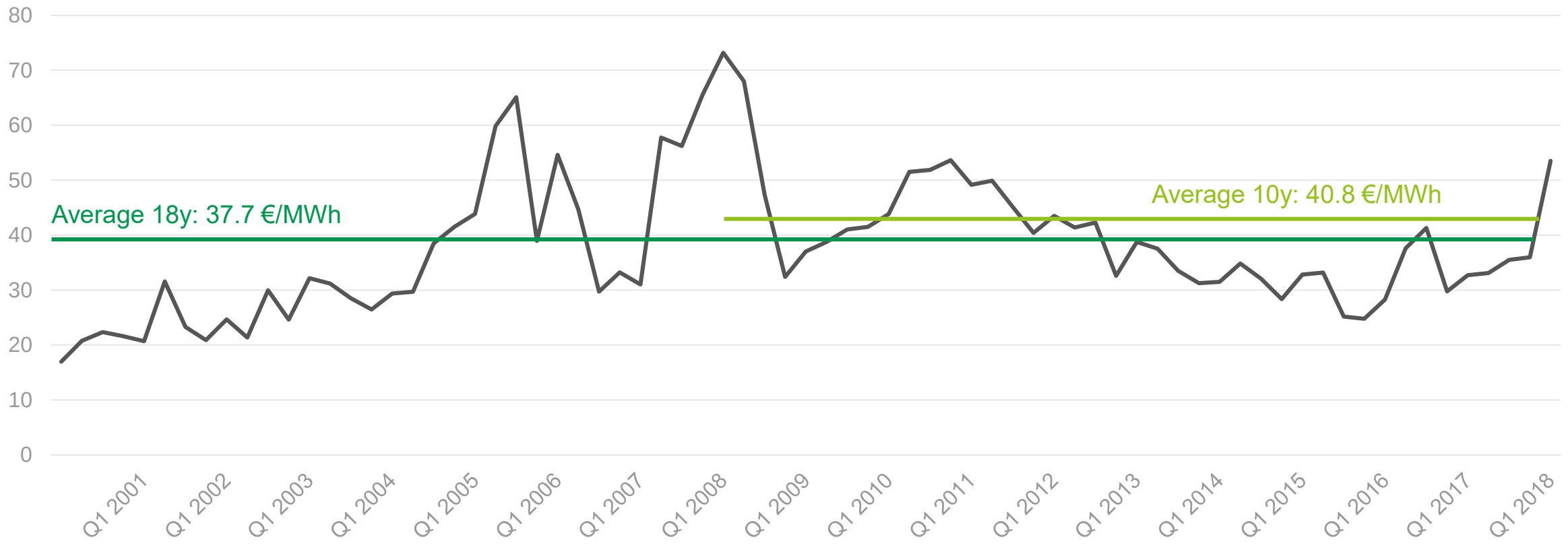
Comparison of the CAPEX Split for a PV installation



Source: NREL (utility-scale PV system costs benchmark summary (inflation adjusted), 2010 – 2017
2018ff: data projection BayWa

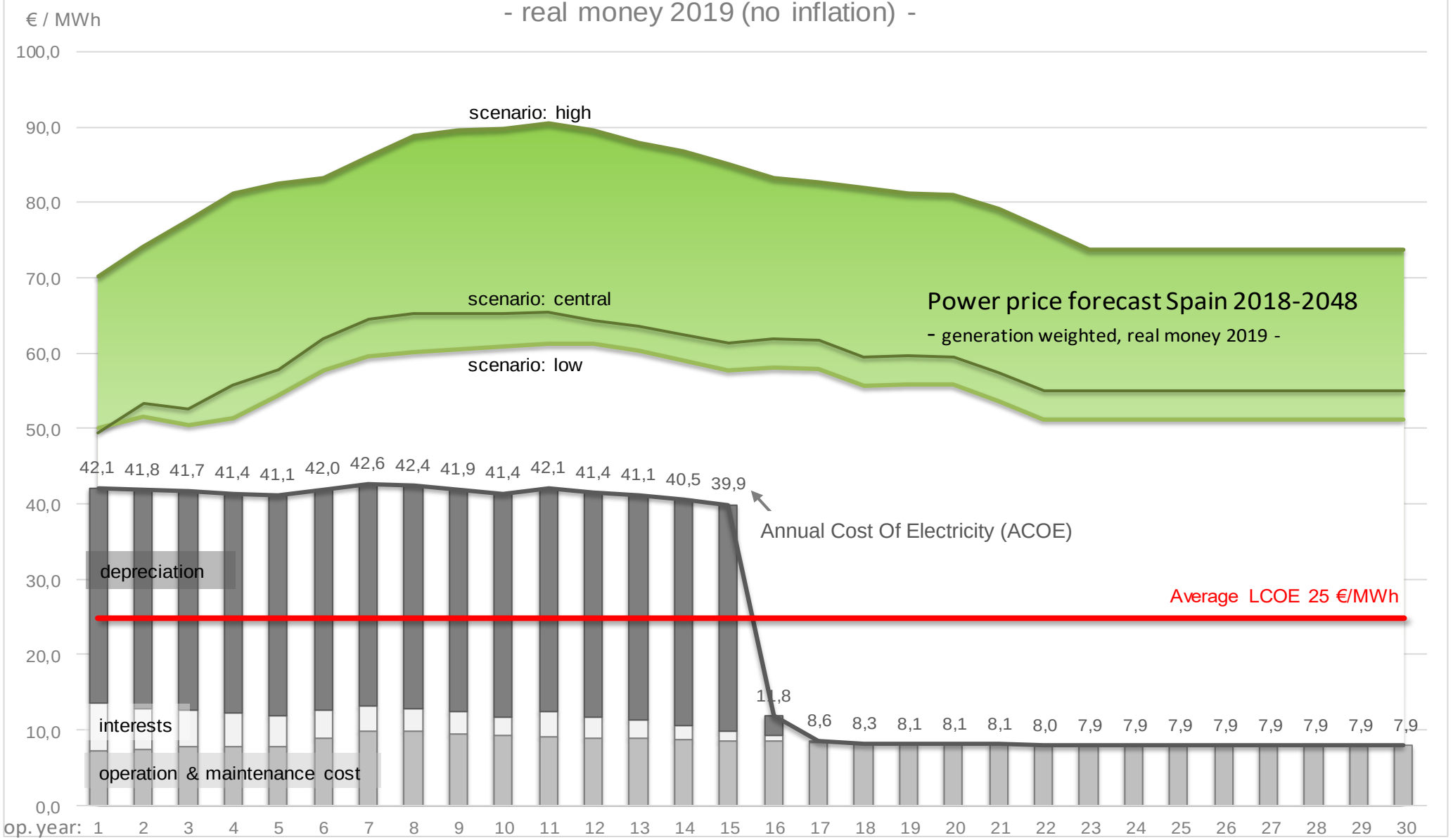
Ingredient No. 3: Sufficient electricity prices

Average Spot Power Price Germany (EUR/MWh, real prices)



LCOE development Don Rodrigo

- real money 2019 (no inflation) -



What is particularly disruptive with solar energy?

It is easy to install

It is easy to scale (every single cell is already a generator of its own)

It is easy adopt to the landscape

It does not harm the nature (green field or roof)

It does not effect people‘s life quality (no emissions, not even shadows etc.)

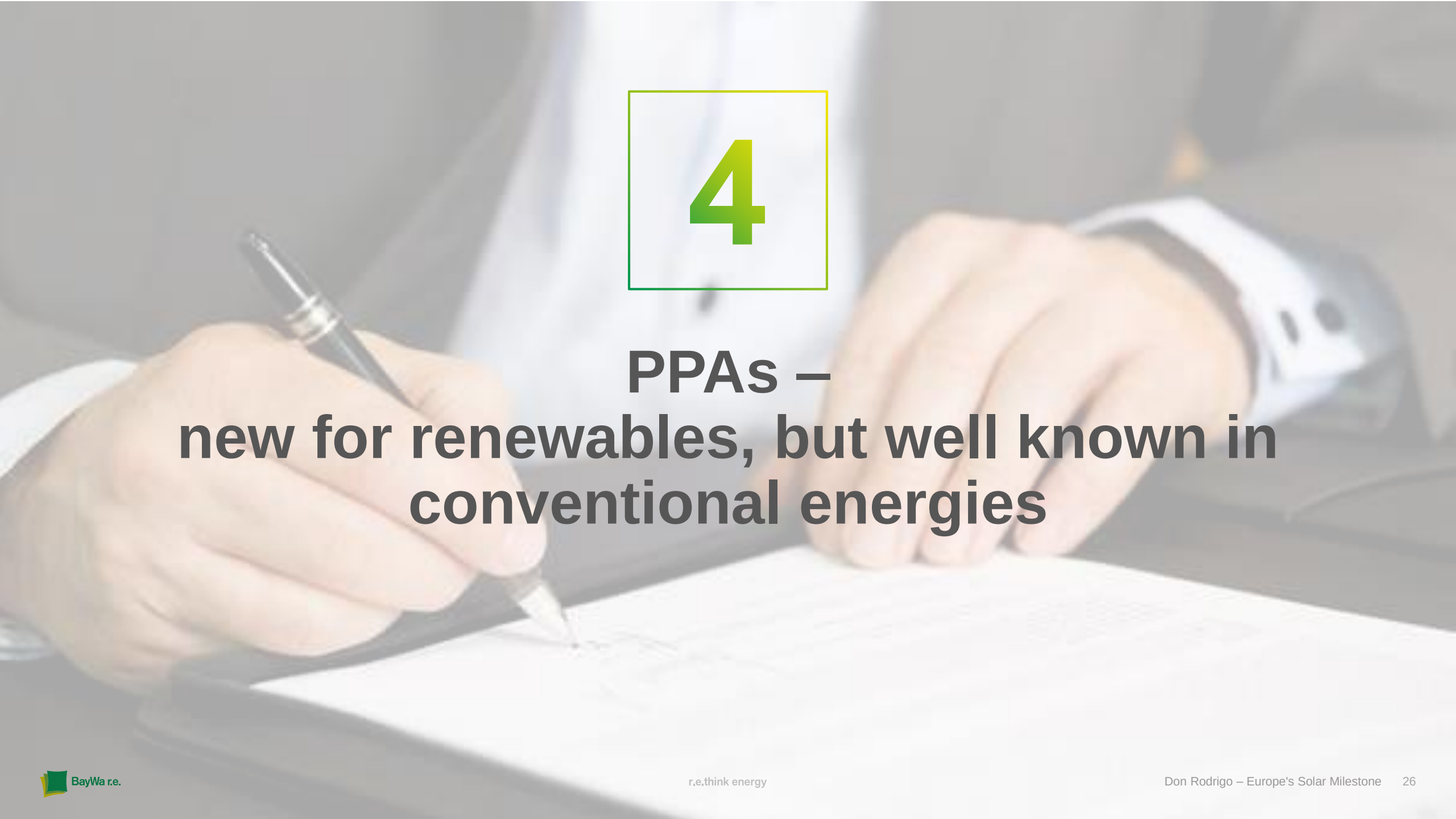
It is made for decentralized energy grids (rural electrification)

It is durable (40+ years of production)

It is reliable (very low volatility)

It is the cheapest!

… and many more



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PPAs – new for renewables, but well known in conventional energies

Overview about PPA (1/2)

1

Secure the offtake of the electricity generated

The more of the generated power is taken off, the better!

2

Maximize the term of the offtake agreement

The duration of the PPA term determines the possible duration of the long term debt!

3

Have a fixed price period in the beginning

A fixed price period secures cash flows in the beginning of the investment, which strengthens the business case.

Overview about PPA (2/2)

4

Switch to a floor price scheme later

Having a flexible pricing lateron helps both counterparties

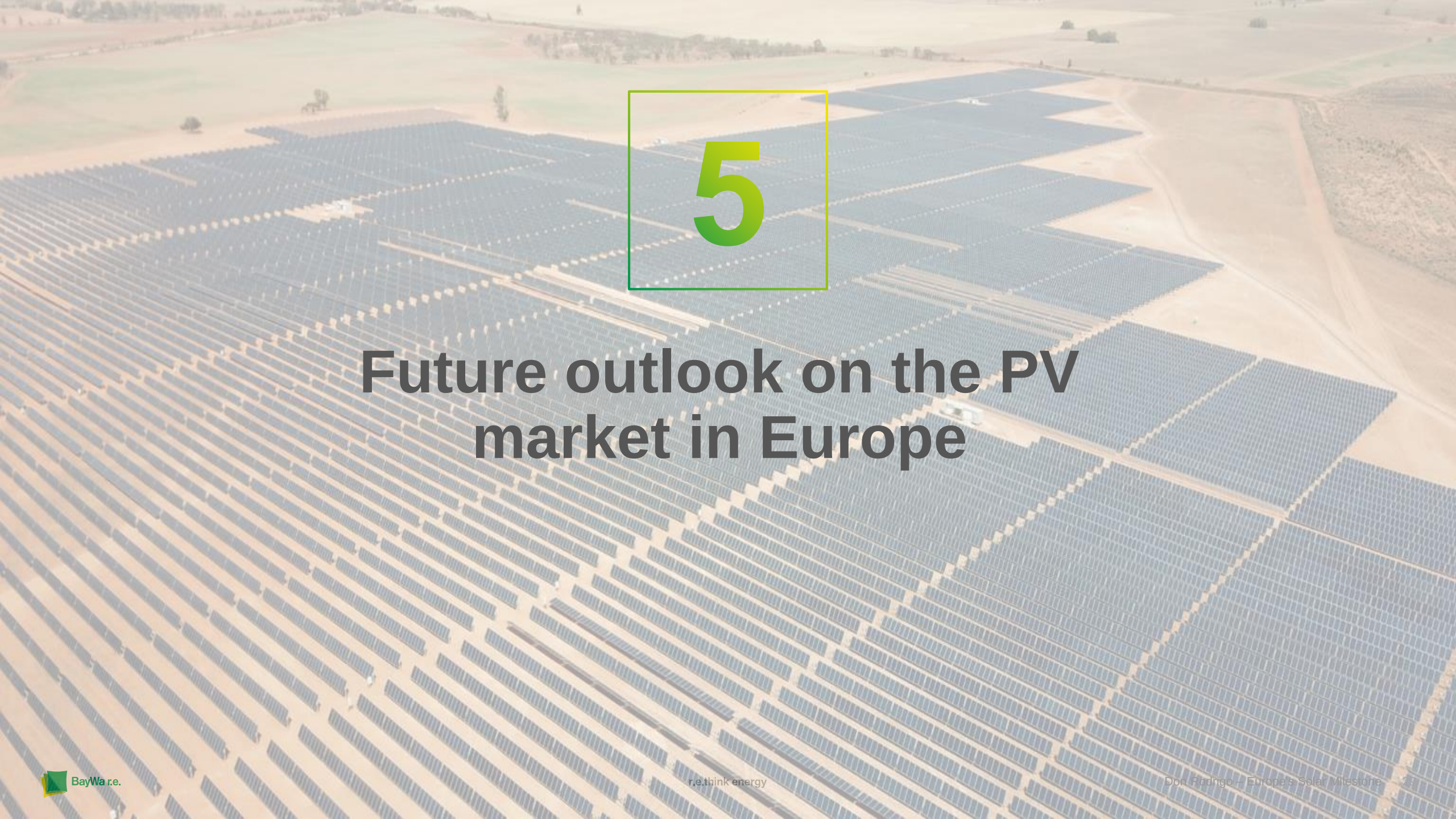
- The offtaker is secured against falling prices over time
- The producer is secured against the worst case
- If prices rise, both profit

5

Choose experienced and bankable counterparts

The bankability of the PPA is linked to the insolvency risk of the offtaker

Provided guarantees by the producer



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Future outlook on the PV market in Europe

Many global companies have committed to a 100% renewable energy future

Transition to fully merchant market is in progress

Grid Parity spreads across Europe

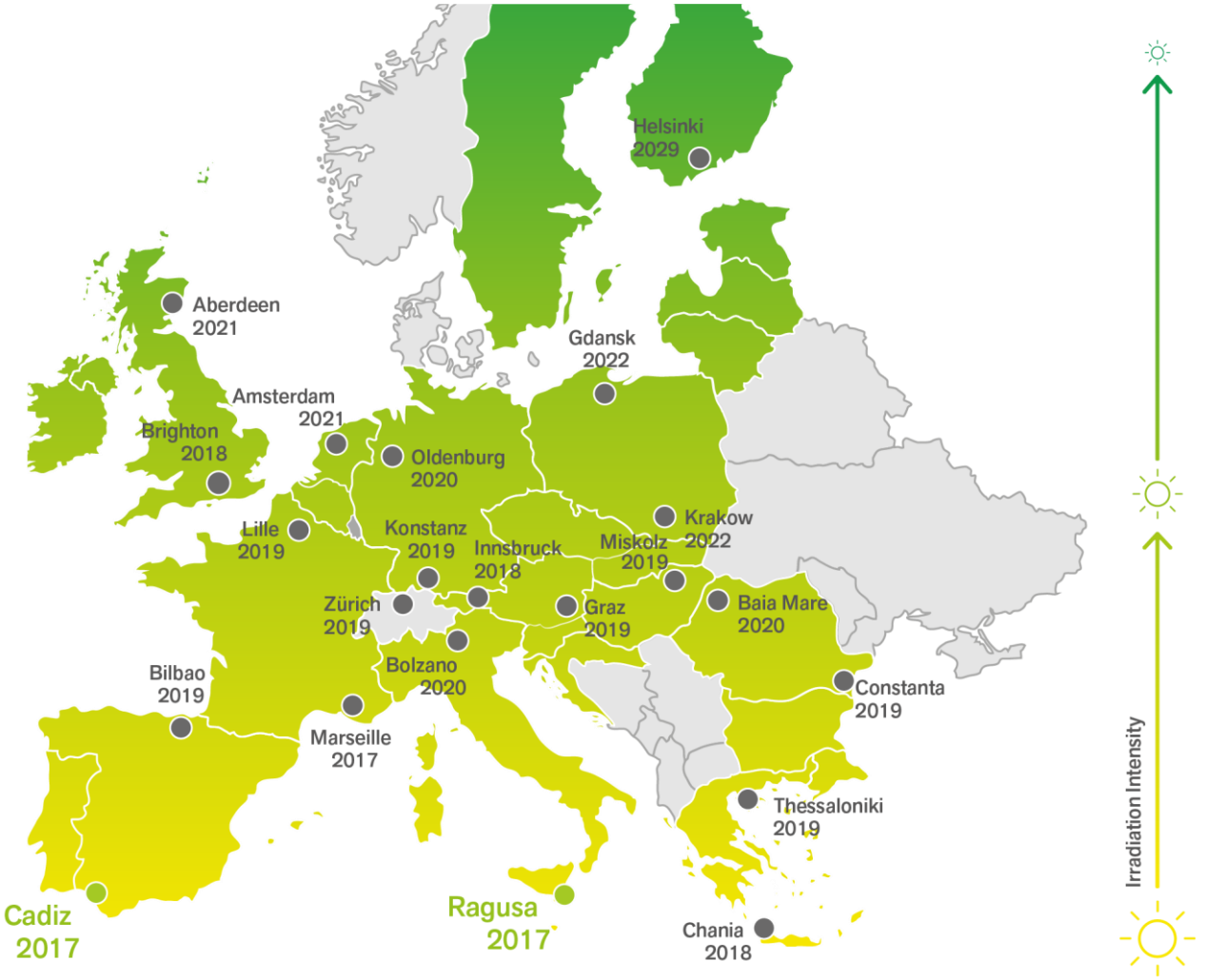
It based on

- The expected price developments of whole sale electricity in each country
- The solar irradiation map
- Expected price developments in EPC and material costs for photovoltaic

It does not contain

- Grid connection costs
- Possible differences in land and development costs

The study was performed 2016 by the Bequerel Institute, Brussels



r.e.levant

r.e.sponsible

r.e.duce

r.e.think

r.e.cycle

r.e.spect

r.e.flect

r.e.lation

r.e.newable

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