

# Securing income from European renewable energy investments

IAPF Trustee Network Event

17<sup>th</sup> September 2019





## Aquila Capital essentials



### Business model



- **One stop shop:** Asset origination, development, financing and management in combination with fund management → **fully integrated.**
- **Top-down macro** approach in combination with **expert-driven, bottom-up management.**

### Company, clients and culture



- **Owner-managed since 2001**
- **Entrepreneurial mindset** in combination with **sustainable return focus**
- **EUR 6.6bn AuM<sup>2</sup> in real assets, more than 190 institutional clients** in Europe and Asia including the largest European Pension Fund, 3/5 of the largest German institutional investors, five pension funds and insurance companies in Asia

### ESG



- **Since 2006** Real assets and ESG
  - **184 TWh<sup>1</sup>** green energy produced
  - **51.2m<sup>1</sup>** households supplied
  - **74.9m tons<sup>1</sup>** overall reduction in CO2 emissions
- Aquila founded and now operates Germany's largest provider of voluntary carbon neutrality, **KlimalInvest Green Concepts.**

## Real asset track record since 2006

### Renewable energy



- **EUR 5.3bn** transaction volume in **11 countries**
- **2,078 MW** in wind energy; **550 WTGs** in portfolio
- **1,129 MW** in solar pv; **39 parks** in portfolio
- **602 MW** in hydropower; **143 plants** in portfolio

### Real estate



- Strong track record in **logistics investments**; Specialising in green logistics with developments in Germany, Spain, Portugal and Italy.
- **2,400+ apartments** in the **social housing construction** space, developed, under development or in pipeline.
- **>1,400,000 m<sup>2</sup>** developed, under development and in pipeline

### Agriculture and forestry



- **EUR 344m** transaction volume in agriculture
- **35,703 ha** total transacted farmland
- **32,000** milk cows on farms
- **EUR 83m** transaction volume in forestry
- **36,033 ha** total transacted forestland

### Diversified infrastructure and multi asset



- **Broad experience:** direct, co-investments, non-listed fund investments (including secondaries) and infrastructure debt.
- **Track record:** strong net return in real assets since inception 2010
- **> EUR 1.4bn** fund investments managed by investment team

As at 30.06.2019

<sup>1</sup> Over the lifetime of current portfolio. <sup>2</sup> Assets under Management; based on enterprise values.

## Transacted capacity

Wind energy  
**2,078 MW**  
**550 WTGs**

Solar pv  
**1,129 MW**  
**39 parks**

Hydropower  
**602 MW**  
**143 plants**

## ESG

Overall reduction of  
 CO2 emissions<sup>3</sup>  
**74.9m tons**

Green energy  
 produced<sup>3</sup>  
**184 TWh**

Households supplied<sup>3</sup>  
**51.2m**

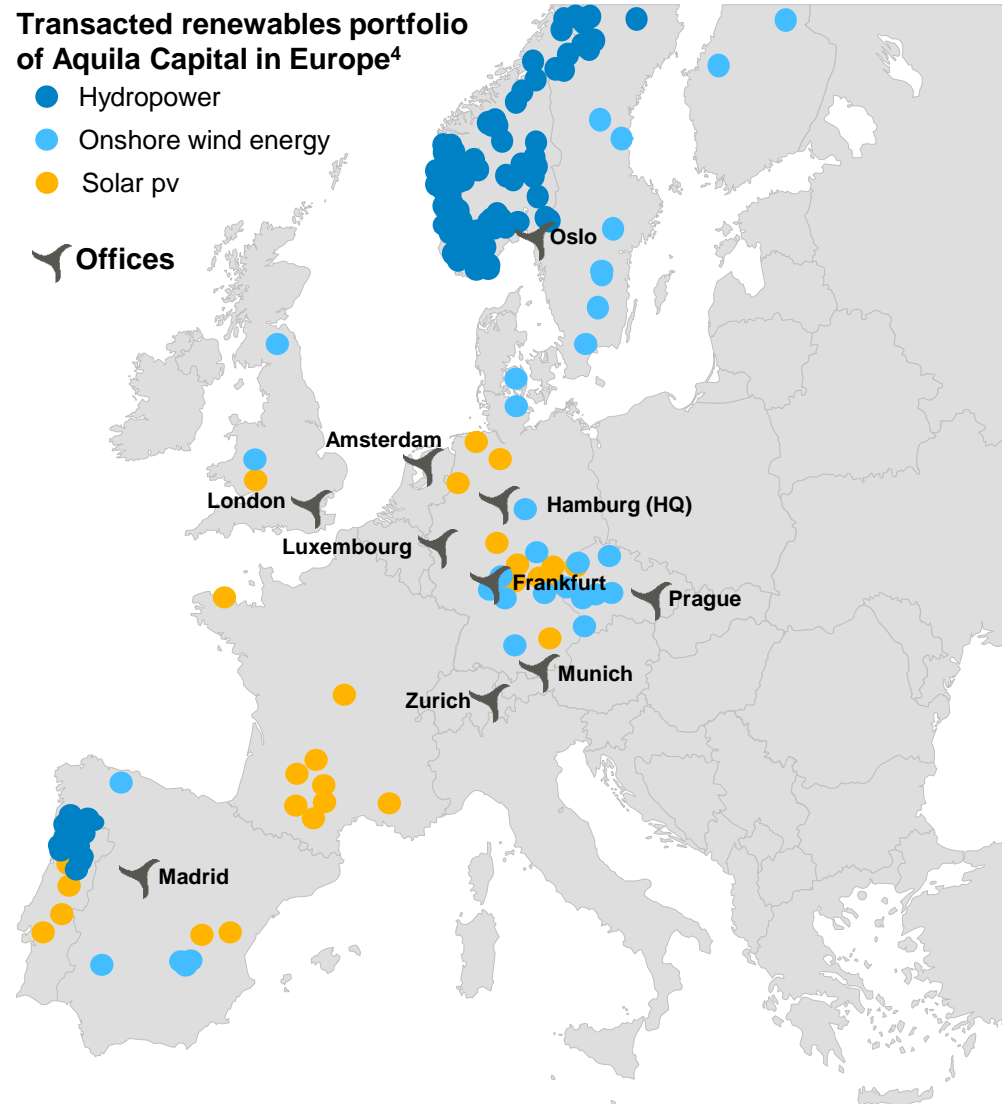
### 18 years experience in alternative investment solutions and close proximity to our assets and our investors

- EUR 8.2bn AuM/AuA<sup>1</sup>
- EUR 5.3bn transaction volume in actively managed real assets
- Independently owned and operated
- Fully regulated with BaFin & CSSF<sup>2</sup>
- More than 300 employees across Europe and Asia
- Winner of Swedish Renewable Energy Award at 2018 Vind conference
- Multi technology focus on wind energy, solar pv and hydropower
- Covering the whole value chain

### Transacted renewables portfolio of Aquila Capital in Europe<sup>4</sup>

- Hydropower
- Onshore wind energy
- Solar pv

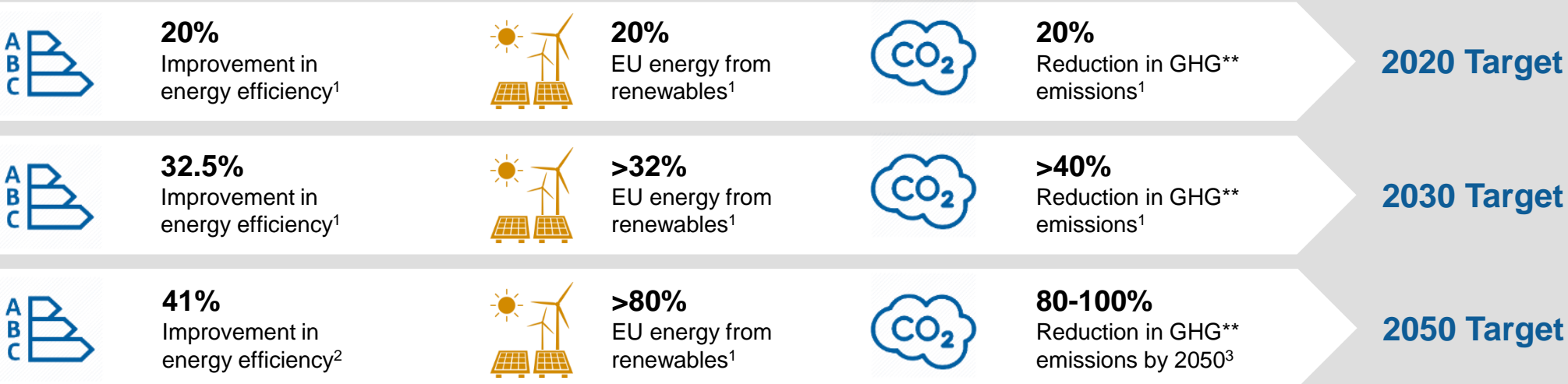
#### Offices



<sup>1</sup> Assets under management (AuM) based on net asset value (NAV); enterprise value for real asset-funds respectively; Assets under administration (AuA) of the AIFM Alceda include funds managed by Aquila Capital. <sup>2</sup> Aquila Capital Investmentgesellschaft mbH is fully regulated and is supervised by BaFin. Alceda Fund Management S.A. is fully regulated and supervised by the CSSF. <sup>3</sup> Over the lifetime of current portfolio. <sup>4</sup> Exact locations might deviate due to illustrative purposes. As at 30.06.2019

# Strong momentum for new energy infrastructure investments

The roadmap\* to 2050 requires significant capital and creates an investment opportunity in three key sectors.



## Generation assets

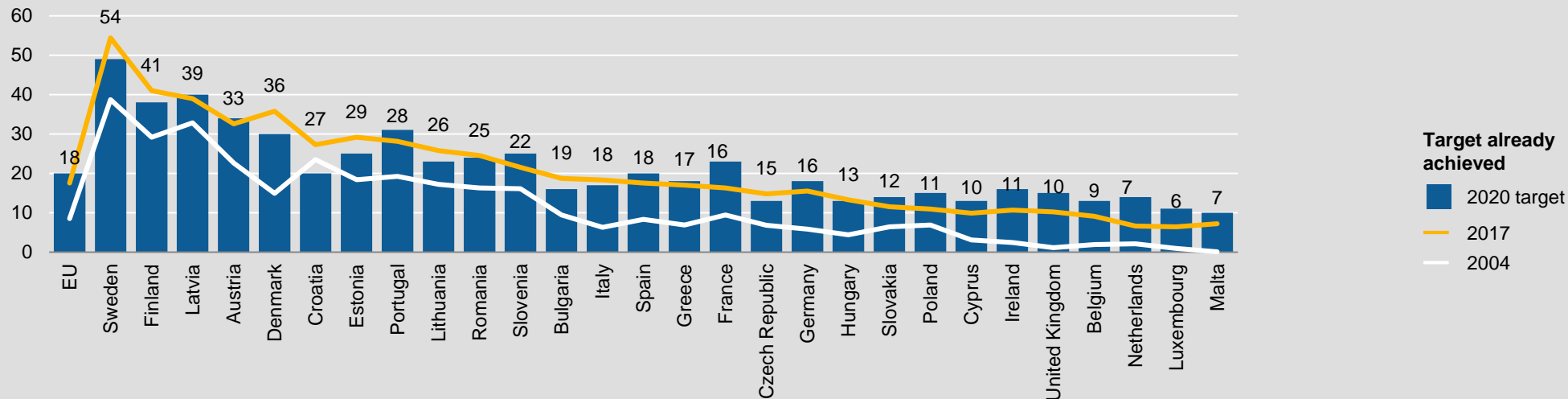
- Attractiveness of renewable energy generation: Ongoing momentum for renewables buildout combined with steady drop in capital costs
- Future investments in wind energy, solar energy and hydropower will be more dependent on the attractiveness of deals and price hedging strategies
- The increase in decentralized renewable energy generation will add new requirements for the grid and open up opportunities for energy storage

\*Target figures are calculated on the base year 1990. \*\* Greenhouse gas emissions. <sup>1</sup> Source: European Commission. [https://ec.europa.eu/clima/policies/strategies\\_en](https://ec.europa.eu/clima/policies/strategies_en). Last website access as at 10.09.2019. <sup>2</sup> European Commission, Energy Roadmap 2050. <sup>3</sup> European Commission, as at 28.11.2018 (“The Commission presents strategy for a climate neutral Europe by 2050 – Questions and answers”).

# Energy transition

## Broad momentum – no turning back<sup>1</sup>

Share of energy 2004 vs. 2017, target 2020 (in %) – Europe getting on track



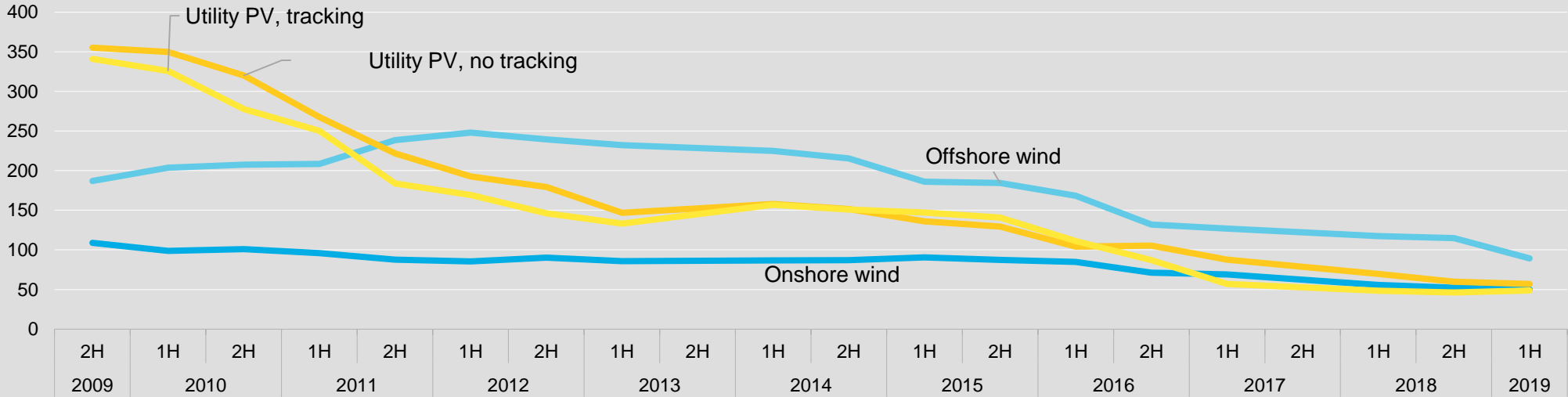
- Guided by the long-term vision of a low-carbon and resource-efficient European economy by 2050, the EU has embarked on a major transformation. The energy sector is at the heart of this transformation.
- Since the 2009 G8 decision by European leaders to reduce domestic greenhouse gas emissions by at least 80% below 1990 levels by 2050, renewable energy installed capacity has grown substantially.
- EU leaders view renewable energy as a critical component to the energy transition due to its impact on (i) social & economic development, (ii) access to energy, (iii) energy security, and (iv) climate change mitigation.<sup>1</sup>
- Majority of European nations are on track to meet the 2020 targets established in the 2009 Renewable Energy Directive, evidencing that the commitment of EU member states is real.
- Existing energy infrastructure has been designed for conventional energy sources and needs to change significantly to support the current and planned renewable energy installed capacity.
- Renewable energy generates intermittent electricity and often takes place far from consumers, creating a need for better storage and distribution of energy.
- European nations spurred investment in the renewable energy industry by providing feed-in tariffs or green certificates until the point where the technology was cost competitive.
- The investment areas of storage and distribution have gone through technological changes, cost reduction and market liberalization, giving access to previously unavailable investment opportunities.

<sup>1</sup>Source: Renewable Energy in the Context of Sustainable Development – intergovernmental panel on climate change



# Historical LCOE development

LCOE (\$/MWh, 2018 real)



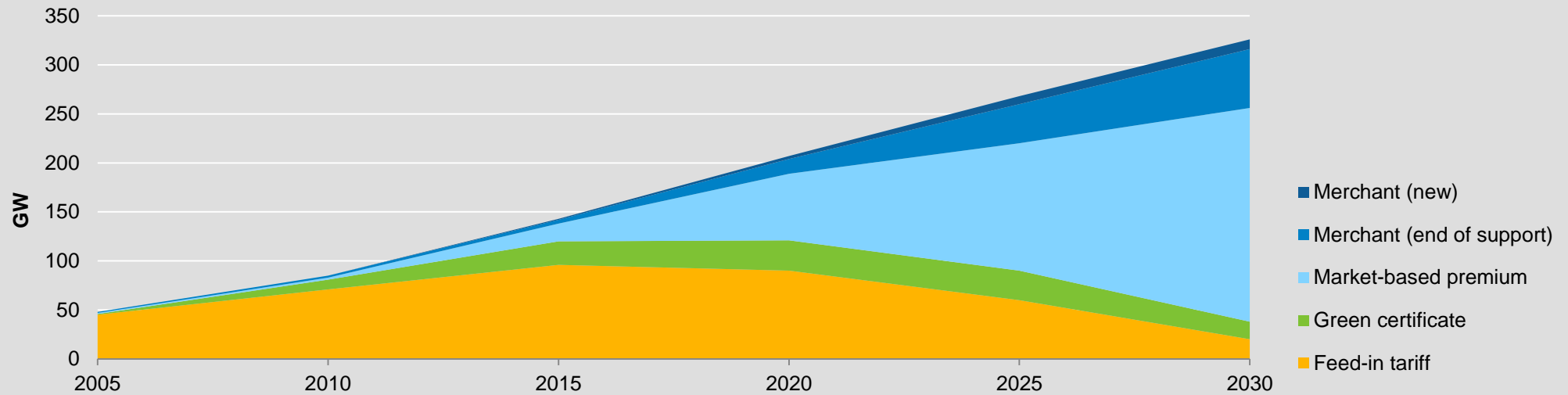
Renewable auctions are expected to continue to drive competition across the value chain and thus, further decrease prices going forward.

Source: BNEF, 2019.



# Merchant Market vs FiT

Type of support used on the total cumulative EU wind capacity to 2030

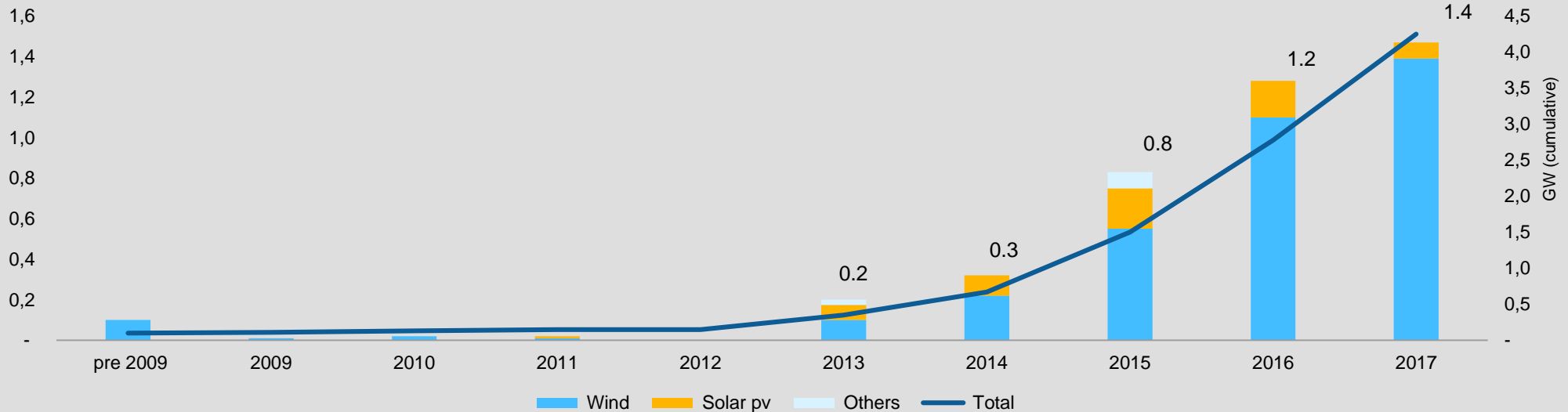


While governments across Europe increasingly focus on market-based, sustainable subsidy schemes to limit the impact on consumer bills, two trends become apparent:

- 1 PPA: In order to mitigate the market risk, investors are searching for long-term, fixed-price power purchase agreements
- 2 Location: Projects need to be economically viable when not depending on feed-in tariffs

Source: WindEurope, 2017.

**Contracted PPA volume in Europe, renewable energies (RE) capacity in GW<sup>1</sup>**



## Market-based price hedging

- Subsidy programmes have made a significant contribution to the introduction of renewable (RE) systems in Europe's core markets
- Private sector price hedging instruments, such as power purchase agreements (PPAs), are gaining ground as a substitute for decreasing or discontinued promotion instruments
- PPAs are bilateral contracts for the delivery and acceptance of specified goods. In RE systems, the goods are generated electricity
- A wide range of structuring options (base load, fixed volume, as produced/ physical or synthetic/pure financial forward contracts) require active management and structuring
- Electricity consumers are usually energy supply companies or energy-intensive businesses

**In many parts of Europe, renewable energies are already realised completely or largely independent of subsidies**

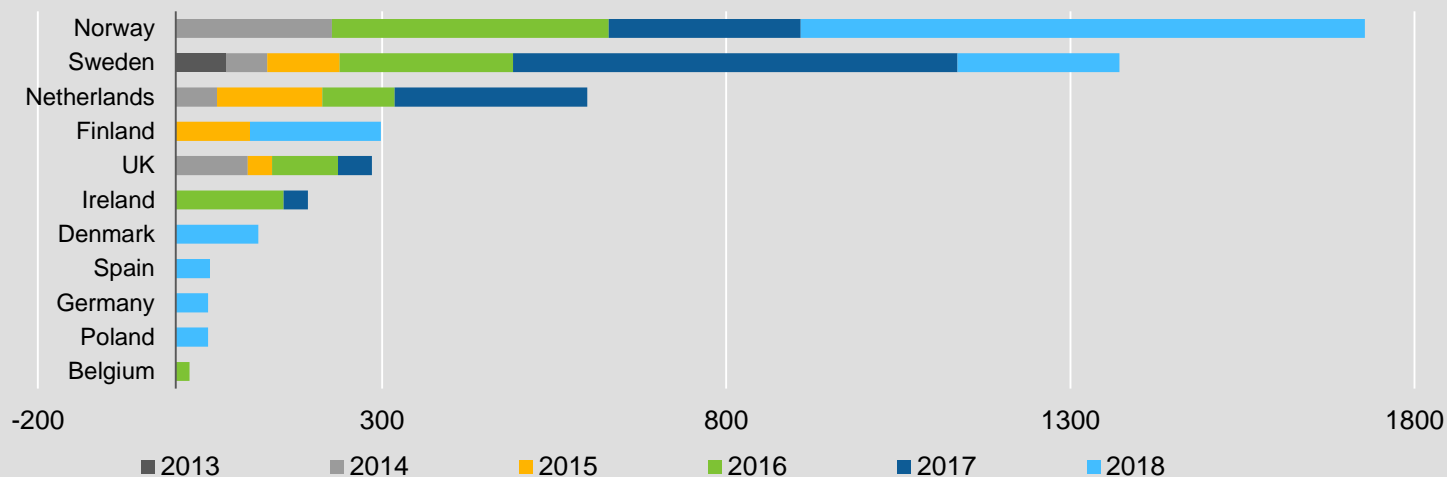
<sup>1</sup> Source: Bloomberg New Energy Finance, company data, HSH Nordbank, 2018.



# PPAs have seen an important increase over the last five years

## Corporate PPAs<sup>1</sup> per country and per year<sup>2</sup>

All wind energy PPAs by year and country in MW



In some regions of Europe, renewable energy is already fully or largely feasible without subsidies

## Corporate PPAs are booming – 2018 was with 1.5 GW<sup>2</sup> a record year for corporates buying wind energy

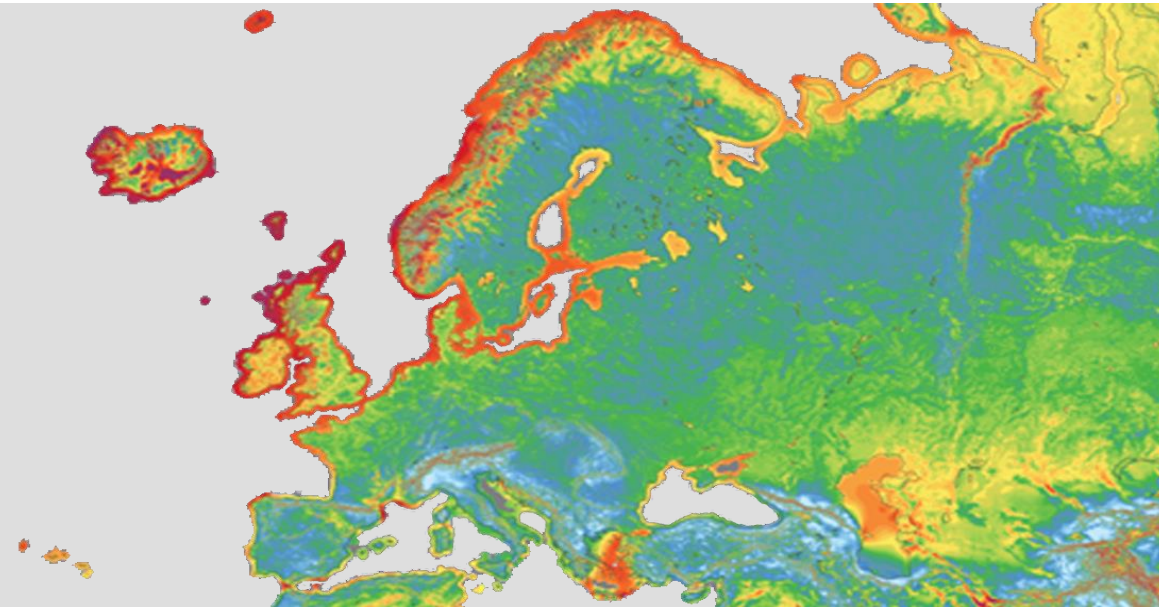
- In the last couple of years, there has been a great number of long-term PPAs being entered into throughout Europe, led by the Nordics
  - Corporates signed wind energy PPAs for 4.7 GW since 2013<sup>2</sup>
- Norway and Sweden are the most mature PPA markets in Europe, driven by power-intensive industry. Nordic industry has purchased energy through fixed price contracts for decades from utilities and have now also started purchasing energy from wind farms

- In contrast, the Iberian market is in its infancy:
  - This PPA market is growing due to high power prices, which has put pressure on the competitiveness of several industries. International utilities and traders are expanding their presence
- A key difference between Nordics and Iberia is the longer tenors on has seen in the Nordics. This has been driven in large part by the aluminum smelters (Hydro, Alcoa)
- Going forward, Aquila Capital expects increasing demand from tech companies as well as other corporations with strong sustainability goals (e.g. from the RE100 initiative)

<sup>1</sup> PPA = Power Purchase Agreement. <sup>2</sup> Source: WindEurope. As of 14.06.2019.

## Average wind speeds in Europe (m/s)

**High wind capacities:  
The region offers the  
highest capacity factors for  
wind resources within  
Europe**



<2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 >9.75

### Overview of the Scandinavian energy market

- All Scandinavian countries offer high wind speeds and capacity factors with more reliable forecasts than in many other European markets
- Nord Pool is an integrated electricity market for Northern Europe, including Germany, the UK and Baltic countries. Electricity certificates (EI-certificates) and guarantees of origin (GoOs) supplement the incomes of renewable energy producers
- Scandinavia offers deep forward markets provided by Nasdaq OMX
- The construction of interconnectors to mainland Europe and the UK offers the potential for huge electricity exports and increases in electricity prices

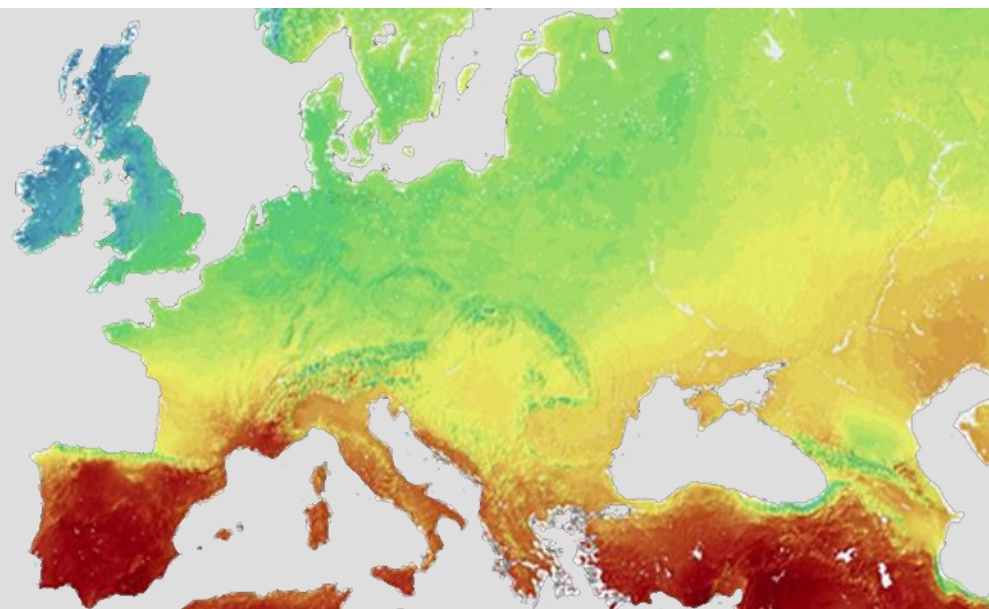
### Available land in crucial areas

- Relatively small population in comparison to the land mass
- Across Scandinavia the greatest population densities are in the south
- This offers substantial opportunities to further increase of existing capacities with new developments in the north

Source: Aquila Capital, IRENA Global Atlas 2018, [globalwindatlas.info](http://globalwindatlas.info).

## Average solar radiation levels in Europe (kWh/m<sup>2</sup>)

**High solar resources :  
Spain and Portugal have the  
greatest solar radiation  
within the EU**



<700    900    1,000    1,300    1,500    1,700    1,900>

### Overview of the Iberian energy market

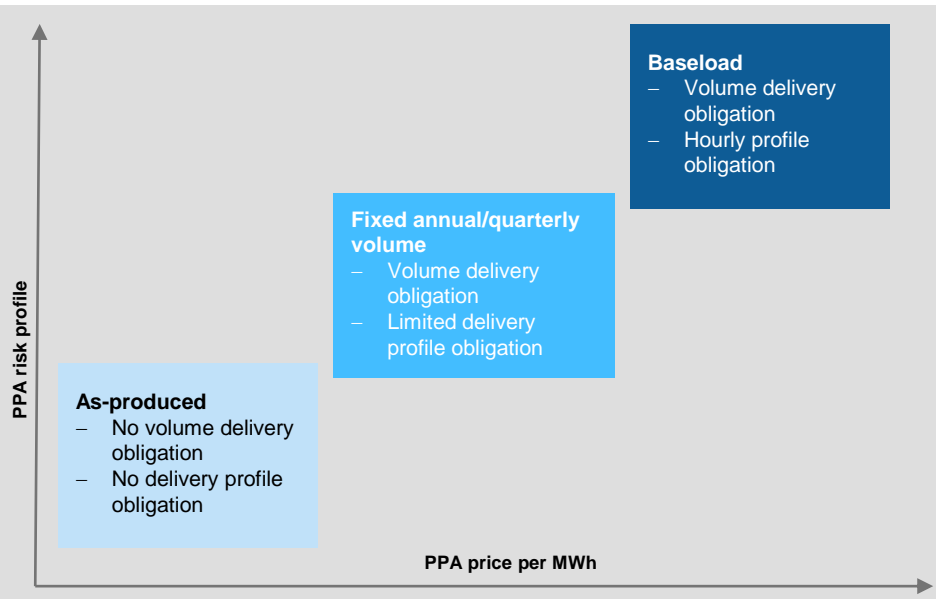
- Portugal and Spain offer interesting opportunities in so-called "grid parity projects" that do not require government support.
- These projects have no exposure to FiTs and price premiums and there is no risk of retroactive intervention
- Both countries offer very good photovoltaic site conditions (hours of sunshine and irradiation) as well as optimal PV profiles in comparison with other Southern European countries
- The northern part of the Iberian Peninsula offers good hydrological conditions for hydropower development
- The highest radiation exists at the southern coast of Spain and Portugal with average annual solar radiation over 1,900 kWh/m<sup>2</sup>

- Portugal and Spain are part of the common Iberian electricity market MIBEL:
  - With more than 2 GW of power interconnected between the two markets, there is a tight price coupling
  - Since 2014, MIBEL has been integrated into Europe's price coupling project (PCR), which provides a daily link between European markets from Iberia to the Nordic countries
- The spot market OMIE is organised as a marginal ("pool") day-ahead market for the Iberian Peninsula
- The total energy demand of Spain is projected to increase to 313 TWh by 2020 and 58 TWh in Portugal. Energy demand will be met in both countries with an increase in solar, wind and natural gas

Source: Statista 2018; Solargis 2018; Baringa 2017; IEA 2016,2015.



# Deciding on the right type of PPA becomes critical



Types of PPA		Volume delivery obligation & delivery profile	Volume risk	Production profile risk	Merchant risk <sup>1</sup>
Fixed volume	Baseload	<ul style="list-style-type: none"> <li>Predefined volumes according to a predefined hourly profile</li> <li>Delivery profile obligations for every hour</li> <li>Pre-agreed price</li> </ul>	✓	✓	✗
	Fixed annual/quarterly volume	<ul style="list-style-type: none"> <li>Annual/quarterly pre-defined volumes</li> <li>Delivery profile obligation within the predefined timeframe but no matter when</li> <li>Pre-agreed price</li> </ul>	✓	✗	✗
As-produced		<ul style="list-style-type: none"> <li>Pre-agreed % of production at a pre-agreed price</li> <li>No volume delivery obligation or delivery profile obligation</li> </ul>	✗	✗	✗
Route-to-market		<ul style="list-style-type: none"> <li>Pre-agreed % of production at market spot price</li> <li>No volume delivery obligation or delivery profile obligation</li> <li>No fixed price</li> </ul>	✗	✗	✓

## A sophisticated approach to PPAs enables generators to optimise their risk-return profiles through stable cash flows and access to potential upside

- The common PPA structures (e.g. tenor, fixed price vs floating price) in each market are largely dependent on:
  - Liquidity of the forward market
  - Type of renewable subsidy available
- Fixed price PPAs provide a strong base of stability and are often considered a risk management instrument for all parties involved

- PPAs with stricter delivery obligations tend to be balanced with a more attractive remuneration for the generator
- The appetite for merchant exposure is often the deciding factor when considering an optimal structure for PPAs
- Views on market risk and outlook are therefore the key drivers of the approach adopted to power purchase, given the trade-off between security and potential upside

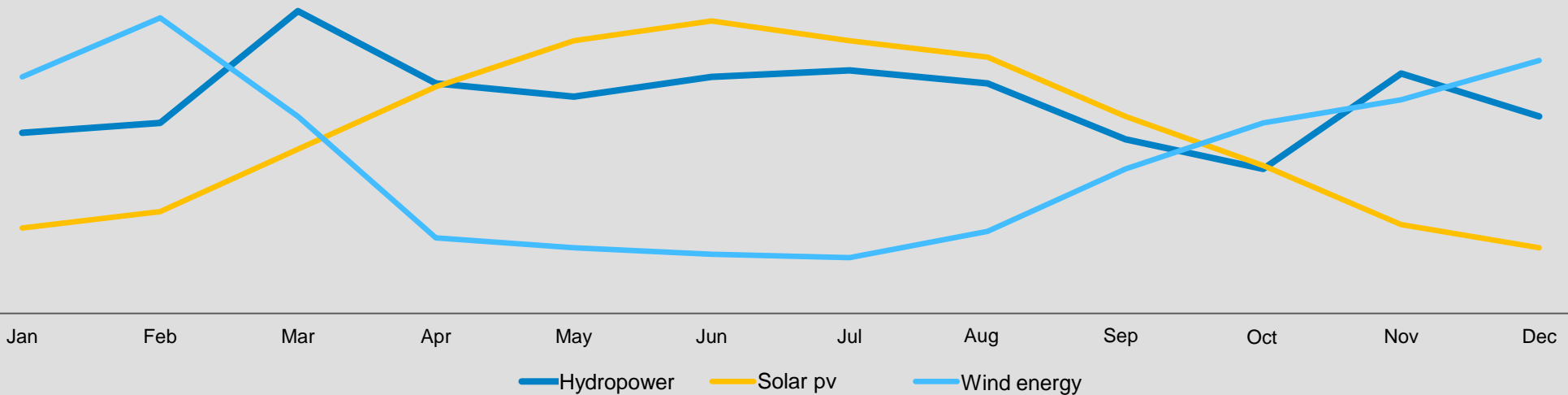
<sup>1</sup> Merchant exposure depends on the percentage of production covered by the PPA.



	Drivers	Elements	Key examples of value added by Aquila Capital
Revenue	<b>Volume</b>	– Electricity production	– Secure existence of measurement campaigns
	<b>Availability (%)</b>	– Technical performance	– Negotiation of availability guarantee with O&M provider
	<b>Price</b>	– Market price vs FiT	– Negotiation of PPAs, identifying FiTs, hedging of green certificates
Costs	<b>OPEX</b>	<ul style="list-style-type: none"> <li>– O&amp;M</li> <li>– Grid costs</li> <li>– Land leases</li> <li>– Personnel</li> <li>– Insurance</li> <li>– Audit</li> <li>– Accounting</li> </ul>	<ul style="list-style-type: none"> <li>– Key customer of large wind turbine manufacturer and, therefore, able to secure competitive pricing</li> <li>– Challenges O&amp;M with existing asset management teams</li> </ul>
	<b>Financing</b>	<ul style="list-style-type: none"> <li>– Financing</li> <li>– Structuring</li> </ul>	– Extensive experience with development finance institutions such as KfW and EKF as well as commercial loans, mezzanine financing and green bonds
	<b>Tax</b>	<ul style="list-style-type: none"> <li>– Property tax</li> <li>– Corporate income tax</li> </ul>	– Structuring of tax-efficient investments
	<b>CAPEX</b>	<ul style="list-style-type: none"> <li>– Civil engineering</li> <li>– Machinery</li> <li>– Electrical equipment</li> </ul>	– Extensive track record enables the securing of attractive pricing with developers and manufacturers

# Comparison of renewable energies

Seasonal production fluctuations of renewable energies over the course of the year<sup>1</sup>



## Hydropower

- Conversion of kinetic energy into electricity
- Hydropower has very low electricity generation costs at all locations
- Term of investments: >100 years

## Wind energy

- Conversion of kinetic energy into electricity
- Wind energy has already reached grid parity in coastal regions
- Term of investments: 30 years

## Solar pv

- Conversion of light energy into electricity by solar cells
- In sun-intensive regions in Southern Europe, such as Spain or Portugal, photovoltaics has already reached grid parity.
- Term of investments: >30 years

<sup>1</sup> Illustrative representation. Source: Alceda Fund Management S.A.



## PPA structure

- As governments reduce their revenue support for renewables, private sector PPAs become increasingly important to infrastructure investors and lenders
- PPAs are highly specialized instruments that need to be tailored to the technology

## Location

- Equally important is the choice of the right location to achieve attractive economics
- Locations that are rich in resources are increasingly at focus, such as the Iberian Peninsula and the Nordics
- Multiple energy markets reduce impact associated with energy market fluctuations

## Technology mix

- Renewable energy assets have a seasonal pattern of cash flows. Blending technologies according to their production profile help to ensure that at least one technology in the portfolio is producing cash at any time in the calendar year

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