

The word "WIND" is rendered in large, three-dimensional, blue capital letters. It is positioned in the upper right portion of the image, appearing to float above a turbulent blue sea. The background features a bright blue sky with wispy white clouds. In the foreground, there is a patch of green grass on the right side.

# WIND

**Energy** with wpd  
The Taiwanese Offshore  
Challenge



### wpd Group



#### Global Project Developer & Independent Renewable Power Producer (IRPP)

- **4,450 MW (2,200 WTG)** installed
- **IRPP with 1,525 MW** own capacity
- **654** employees
- **36** Offices in **17** countries
- **Onshore, Offshore, PV**
- **Pipelines of 8.7 GW+ onshore, 7.3 GW offshore and 825 MW PV**
- **A-Rating** since 2003



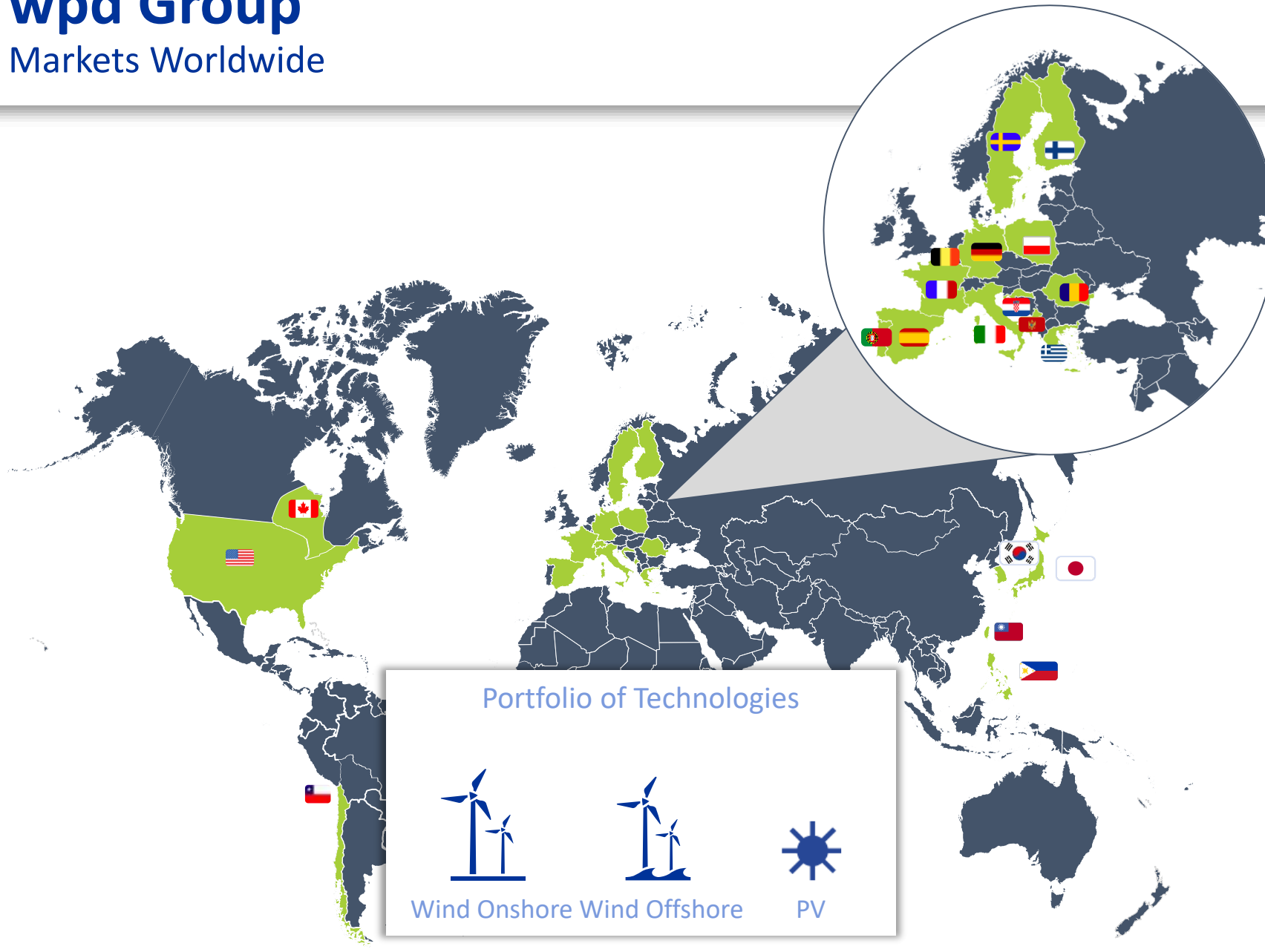
#### Leading wind farm operator

- **1,965 WTG/ 4,053 MW** under TCMA
- Technical 24/365 Management
- Commercial operations
- **370** employees
- **10 offices** in **7** countries
- **Multiple technologies**
- **Broad variety of clients**



#### Independent, multi-brand O&M provider for wind turbines

- **3,617** turbines under contract
- **1,162** employees
- **126** Offices & service stations in **10** countries
- **Multi-brand strategy** (incl. Vestas, Siemens, Nordex, Senvion, Gamesa, Fuhrländer, etc.)
- **Services for On- and Offshore wind**



Installed Capacity	4,450 MW
Onshore Pipeline	8,725 MW
Offshore Pipeline	7,250 MW
PV Pipeline	825 MW

### Portfolio of Technologies



Wind Onshore



Wind Offshore

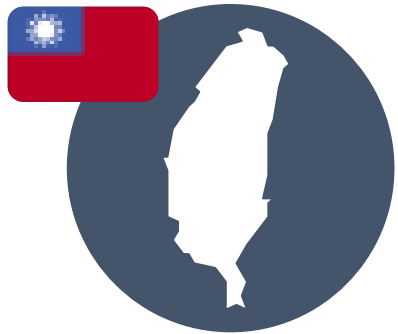


PV

# Offshore Wind in Asia

## Huge Market Opportunity

- “The **Asian offshore market** is expected to become the **largest offshore region globally** [...] total installed capacity for the region under the business as usual scenario is **100 GW by 2030\***
- **Taiwan (AA-)\***, Japan (A)\*, South Korea (AA-)\*, India and Vietnam are expected to be **Key Growth Markets** in offshore wind.



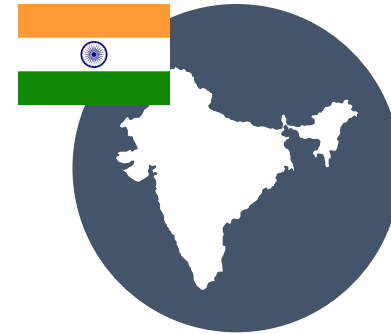
- Attractive FIT
- Strong wind resources
- Mid term goal of 10 to 12GW by 2035
- long term goal of 20 to 22GW by 2050



- Favorable conditions for offshore wind
- Zones selected
- Upcoming auctions
- Industry targets 10 GW by 2030



- Goal to add 47 GW of wind and solar by 2030
- Analysts estimate a 13 GW of offshore wind potential



- Target of 5 GW of offshore wind power by 2022 and 30 GW of by 2030
- Draft auction rules were released in January 2019



- First project online
- Construction started in 2019 on first phase of the 144MW Tra vinh project

# Taiwan

One of Asia's 4 Tiger States

- **Highly developed**, export-oriented, market economy
- 2018 **GDP of USD 613.3 bn** (USD 25,977 per capita; ranking 23th world-wide)
- 13th out of 140 in the “Global Competitiveness Report 2018”
- On the way to smart, energy-efficient and sustainable infrastructure and urban development
- **Stable Democratic Society**
- **Reliable legal system**



Taiwan - Credit Ratings by Fitch as of H2 2018

AA	AA-	A+
<ul style="list-style-type: none"><li>• France</li><li>• UK</li><li>• New Zealand</li></ul>	<ul style="list-style-type: none"><li>• <b><u>Taiwan</u></b></li><li>• Belgium</li><li>• South Korea</li></ul>	<ul style="list-style-type: none"><li>• China</li><li>• Malta</li><li>• Saudi Arabia</li></ul>



# Taiwan

## Setting the Scene

- As an island without own natural resources Taiwan is heavily dependent on energy imports
- Sceptical attitude towards nuclear from the beginning
- 2/3rds of the country covered by mountains
- Taiwanese life focussed on west coast (housing, industry, energy production)
- Security of grid/power supply is key factor
- Different attitude towards infrastructure (less landscape concerns than e.g. in Europe but other issues)



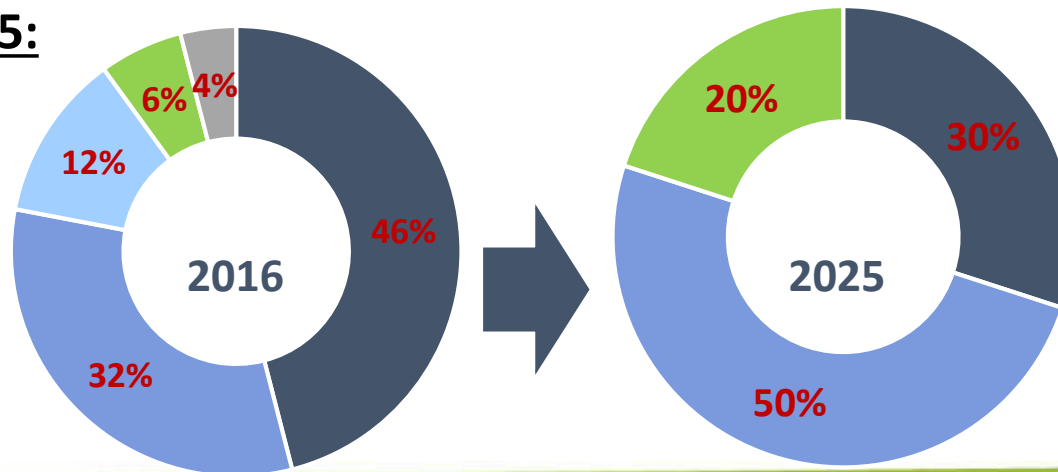
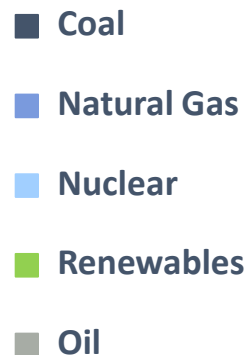
# Regulatory Environment

## Energy Policy

- In 2016, the government announced its policy initiative of the “**Nuclear-Free Homeland**”
- **Phasing out of nuclear** (3 nuclear power plants to shut down; stop construction of 4<sup>th</sup> reactor)
- Taiwan also seeks to diversify the energy mix to **substitute coal fired power**
- Ambitious **renewables program for 2025 supported by 20 year FiT scheme**:
  - 1,250 MW **wind onshore** (684 MW in 2017)
  - 6,500 MW **wind offshore** (8 MW in 2017)
  - 20,000 MW **solar/PV** (1,733 MW in 2017)

➡ **\$ 40-50 bn investment opportunity!**

### Target Energy Mix 2025:



# Feed in Tariff

## Attractive Feed-in-Tariff / PPA

- **20 year fixed feed in scheme**
- **Priority of dispatch**
- FiT is determined annually by the MOEA
- Project specific FiT is determined by the year in which the PPA is signed
- Offshore wind projects can either chose a fixed tariff for the 20 year term or an “**escalated tariff**” with a higher price for the first 10 years
- FIT capped depending on full load hours
- **Taipower** has to purchase power from renewable projects at feed-in tariff (FiT)
- **PPA** with Taipower is **bankable**

FIT	2019 (NTD/kWh)	2019 (US\$/ kWh)
For 20 years	5.5160	0.181
For the first 10 years	6.2795	0.206
For the last 10 years	4.1422	0.136



### **Taipower:**

Stable company with  
AA- Rating (Fitch)





### **Typhoons & earthquakes**

- Consideration in design and selection of equipment (e.g. typhoon certified turbines)
- -> wpd never lost a turbine during 13 years of operation!

### **Grid connection**

- Grid to be reinforced

### **Local content**

- Offshore wind projects with COD starting in 2021 need localization plan

### **Local supply chain**

- Local supply chain in ramp-up phase
- Limited resources of local players and no offshore experience
- International players entering the market
- Market needs transfer of know-how

### Stakeholder management

- Authorities (development of regulations, “local footprint”, administrative procedures)
- Local stakeholders and communities

### Insurance cover

- Fast Taiwanese market development may overcharge insurance market

### Project finance

- Denomination of tariff in NTD requires local funding
- Taiwanese banks have limited experience with non-recourse project finance
- ECA coverage still key for financing
- Innovative solutions required to finance huge investment volume

# Offshore Windfarm Yunlin

## Reference Case for Taiwanese Offshore Wind I

- Capacity **640 MW**, 80 x Siemens 8MW
- First phase is **fast-tracked** (no local content requirement)
- Located 200 km south-west of Taipei, **8 km** offshore
- **2018** PPA has been secured
- Investment vol. > **€ 2.7 bn**
- Financial close achieved in **May 2018**
- Project is **under execution**
- Offshore installation in **2020 and 2021**



### Suppliers

- WTG: EPCI with Siemens Gamesa
- FOU: Multi-contracting with European/Taiwanese suppliers
- Cabling: EPCI with Seaway Offshore Cables
- Substation: EPCI with GE
- Construction management: wpd offshore solutions



# Offshore Windfarm Yunlin

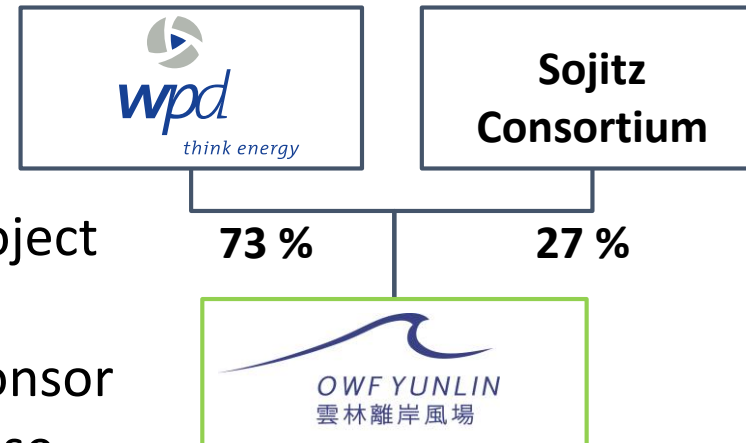
## Reference Case for Taiwanese Offshore Wind II

### Non-recourse debt financing

- Term loan facilities of ~ NTD 71 bn (US\$ 2.3 bn)
- Facilities incl. Euro-Tranche
- Base equity incl. PCRs
- FX-hedging of capex
- Syndication recently closed
- Club of 19 Banks + 3 ECAs

### Equity structure

- Global interest in project
- Agreement in 04/19
- wpd remains key sponsor
- Equity process inhouse



- Sojitz (trading house)  *New way, New value*
- JXTG (oil & gas) 
- Chogoku (utility) 
- Chudenko (facility engineering) 
- Shikoku (utility)  四国電力株式会社

# Offshore Windfarm Guanyin

## Project Overview I

### Location:

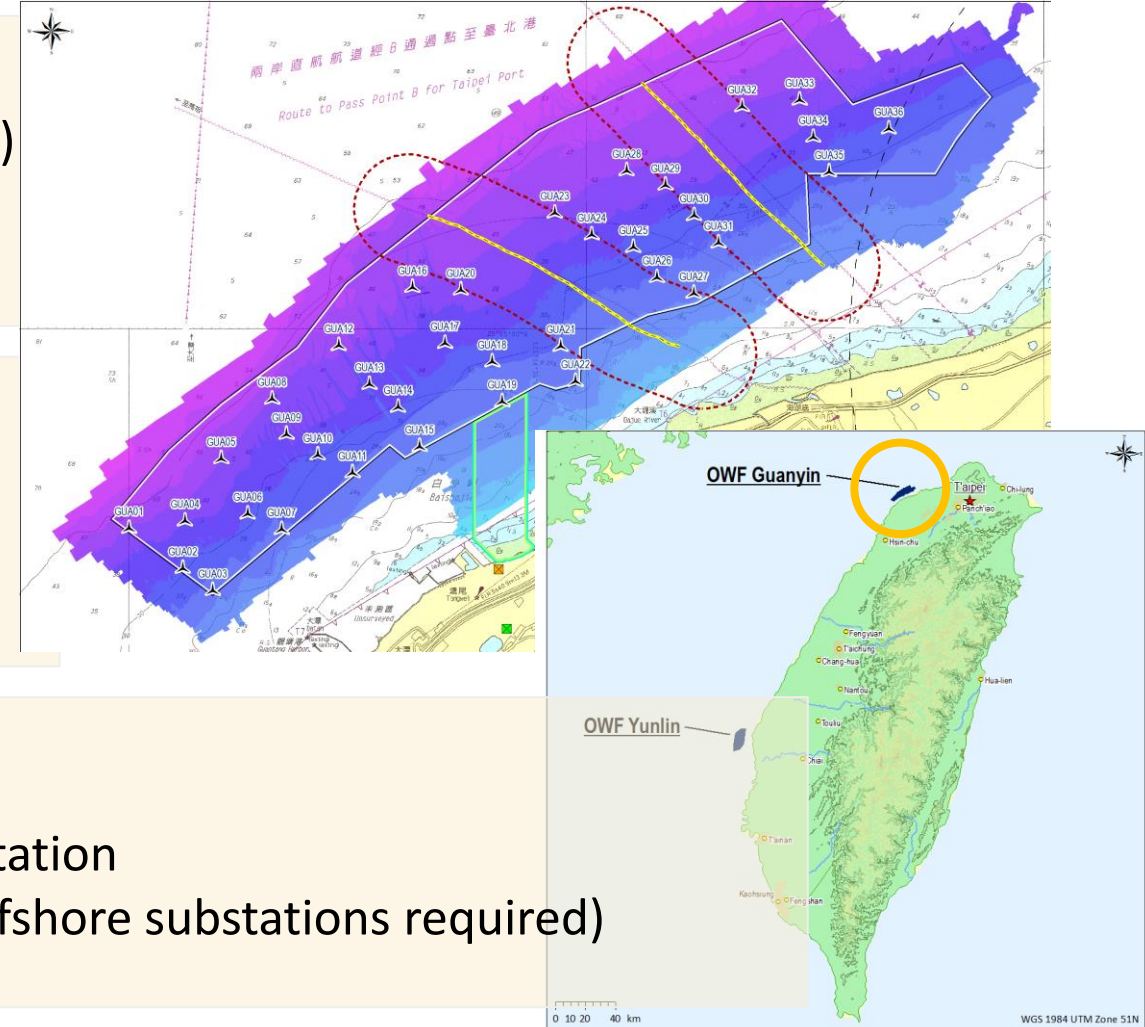
- 8 km off shore, Taoyuan county, Taiwan
- 350 MW (36 x 9.72MW individual capacity)
- Mean wind speeds~ 10 m/s at 90 m hub height

### Project Milestones:

- Tender award: 04/2018
- Concession and PPA expected in 2019
- Financial Close expected in 2020

### Grid Connection:

- Grid connection secured:
- Point of common coupling in existing substation
  - Only onshore substation to be build (no offshore substations required)





# Offshore Windfarm Guanyin

## Project Overview II

### Remu- neration Scheme:

- PPA based on 2019 tariff
- Feed in Tariff: Years 1-10 ~ EUR 184/MWh;  
Years 11-20 ~ EUR 121/MWh

### Financing:

- Capex: approx. NTD 58.3bn/ ~ EUR 1.7bn
- Equity ratio: 25% (incl. PCR's)
- Equity Sponsors: wpd + investors
- Debt: Non-recourse project finance

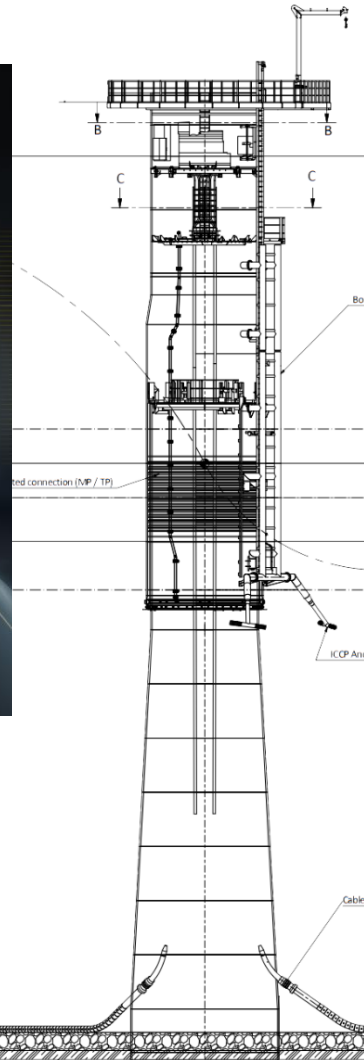
### Project Timeline

Procurement /  
Financing  
2019

Manufacturing  
2020/22

Offshore Works  
2021/2022

Commissioning  
2022





# wpd Taiwan

## Long-Term Experience in Taiwanese Windpower

- Presence since **2001** (via former JV Partner InfraVest) - one of wpd's core markets
- **100 employees** (largest Taiwanese developer, complemented by European experts)
- 383 MW onshore wind installed (330 MW still owned) - **market share > 50%**
- Strong pipeline of onshore wind and PV projects (**70 concessions, mid-term pipeline > 450 MW**)
- **2 offshore projects with a combined 1 GW** (Yunlin 640 MW; Guanyin 350 MW) **awarded in 2018**



# Conclusion

- **Asia will be strong growth market for renewables in coming decades**
- **Taiwan currently is the leading offshore wind market in Asia**
- **The Taiwanese example is a show case on how to build up an industry**
- **Financing of fast market growth is challenging but providing opportunities at the same time**
- **Choosing the right partner/project is a key to invest successfully**

# Contact Details



## Contact:

**Helge Rau**

Head of M&A, wpd AG

Email: [h.rau@wpd.de](mailto:h.rau@wpd.de)

T: +49 (421) 16866-5005

F: +49 (421) 16866-66

