



The background of the slide is a dark blue color with a grid pattern. Overlaid on this are several semi-transparent, light blue charts and data tables. There are line graphs with multiple data series, bar charts, and tables with columns of numbers and text. The overall aesthetic is that of a financial or data analysis dashboard.

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## Transformation of German Hydropower

Dr. Klaus Engels, Director Operations Hydro Germany  
Denver – June 29<sup>th</sup>, 2017

# Significant challenges faced by the German Hydropower business require urgent action

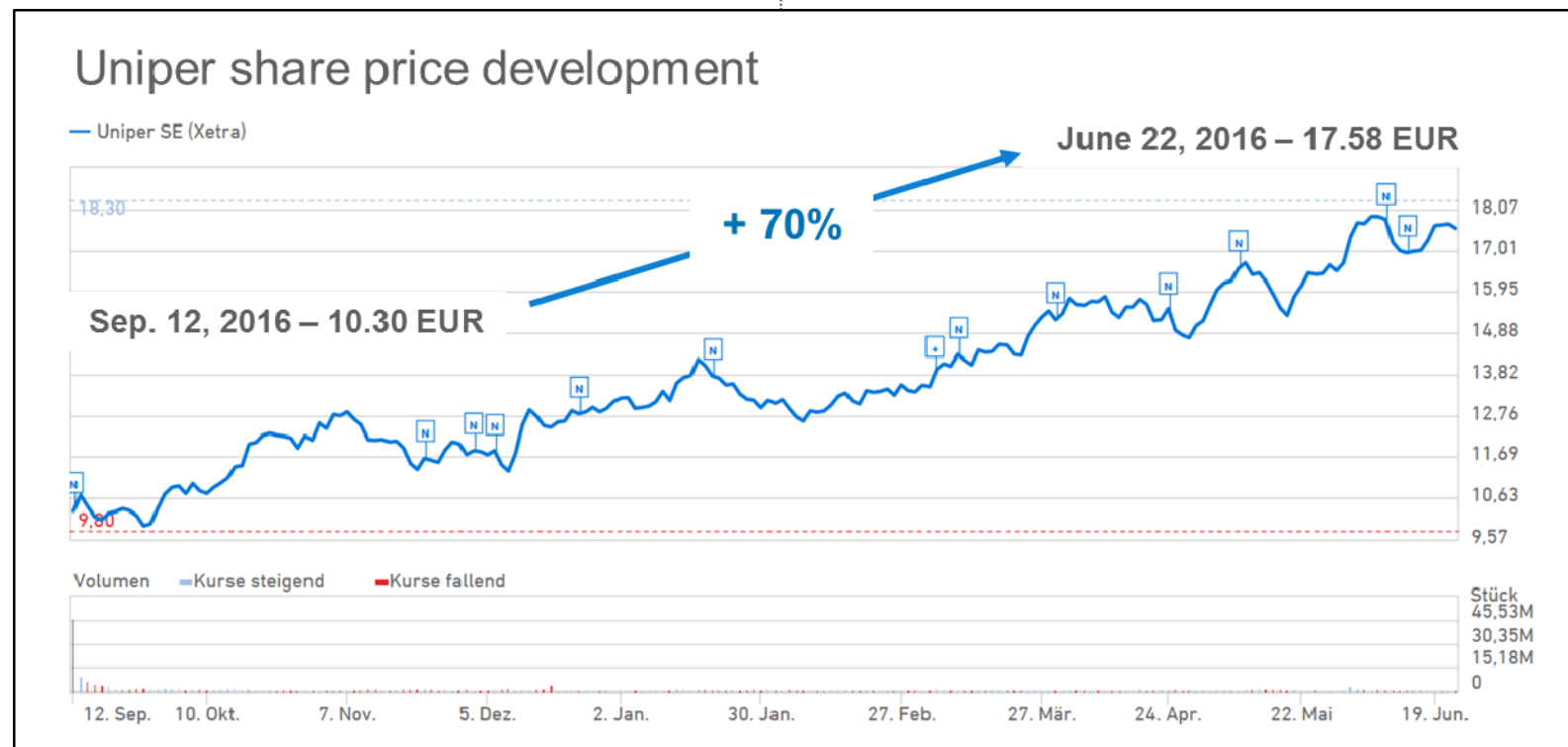
- Significant investments are anticipated for the **implementation of the Water Framework Directive** (structural river bed measures) and future **fish protection / fish bypass measures**.
- Significant price decrease** of more than 60% **since 2011** (Fukushima) and the political announcement of German “Energiewende” deteriorates a sustainable market environment.
- Room to manoeuvre restricted by high **personnel expenses**, the **administrative burden** which reduces the number of **productive work hours**, and low **staff flexibility** (in terms of time/space).
- A challenging **age structure**, a loss of **skills** through early retirement schemes and **organisational shortcomings** prevent a performance culture.
- New **residual water requirements**, reduced **hydro-peaking** and above all **falling electricity prices** lead to significant revenue losses that need to be (at least partly) compensated.
-  Rising **investment needs**, high **costs**, inefficient **structures** and decreasing **revenues** show the need for **efficiency improvements**.
-  Measures to **reduce the costs according to recent benchmarking results** are absolutely essential to **increase the financial flexibility** in response to these challenges.

# End of 2016 – five years after Fukushima the E.ON group is split into two new companies

Two leading entities to address the energy market

**e.on**

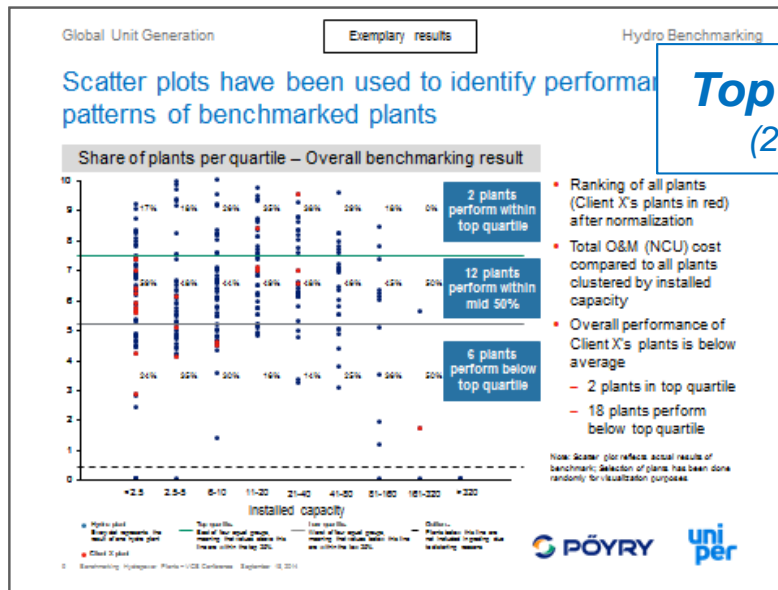
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# The German “Energiewende” put an enormous pressure on the conventional energy business

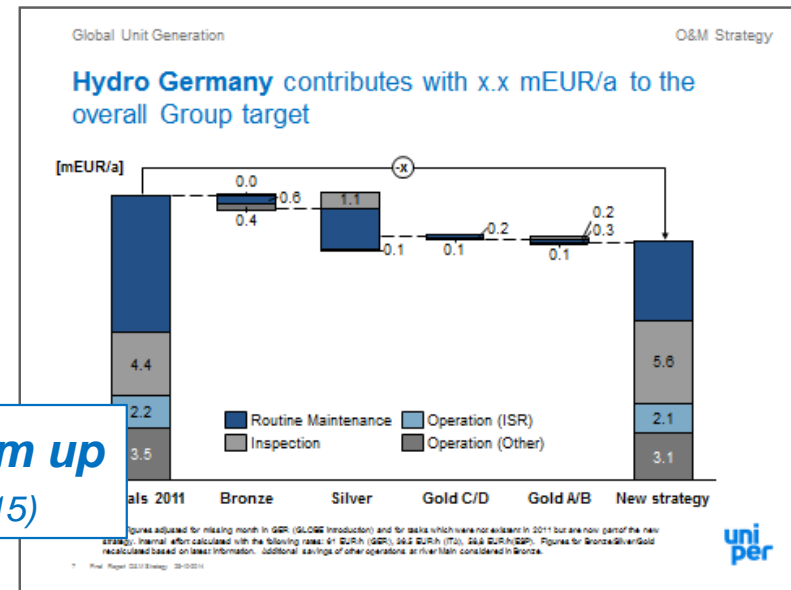
Beside other measures, **cost reduction is one answer** to the market challenges, **but:** a hydropower operator still needs to ensure safe, reliable and competent operation!



**Top down**  
(2014)

vs.

**Bottom up**  
(2015)



Hydro-specific external **Benchmarking**

**Reduced O&M Strategy**

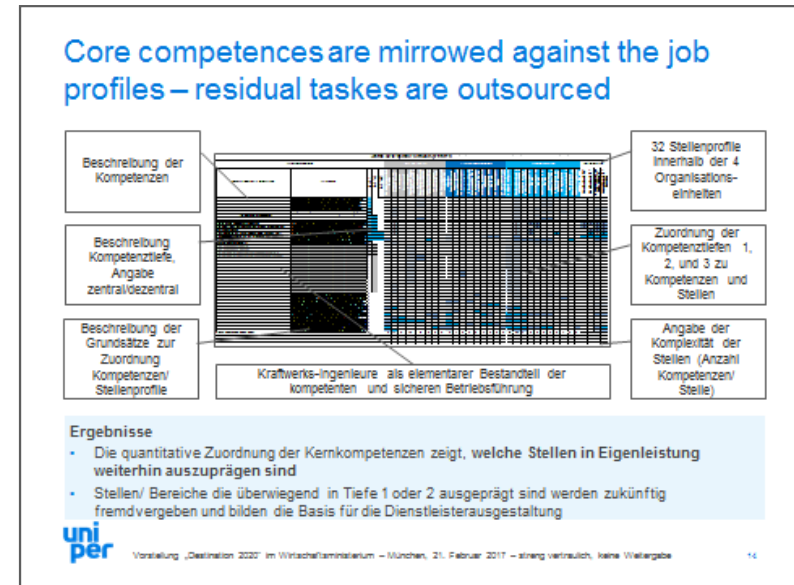
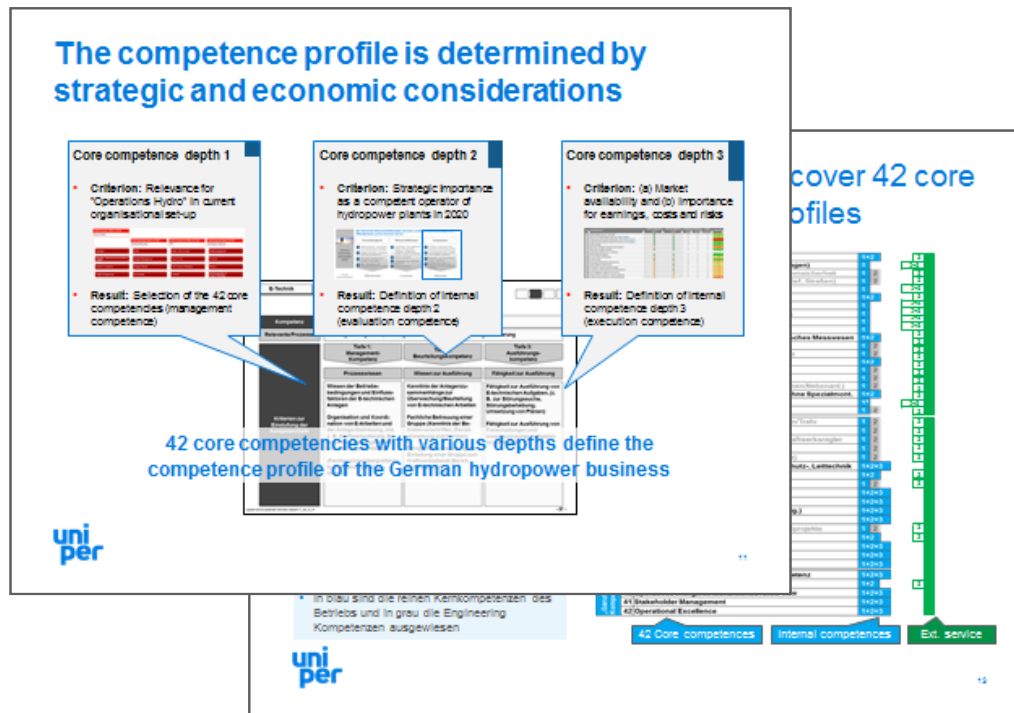


From 2016 onwards: Both approaches form the new target budget – now competences, structures and organization need to be aligned!



# Therefore, Uniper will concentrate on core competences and extend market services

**No compromises at dam safety and flood protection, availability reduction is possible, additional future focus on environmental expertise and stakeholder management**



- **42 core competences** cover the business demand
- Competences have **3 depth level**
- **Assessment** against – market availability  
– economic viability  
– strategic risk

- **Mainly mechanical O&M** activities will be outsourced
- In a **competitive process** one service provider was chosen
- The **outsourced volume** will increase from 45 to **65%**

# Operational plant groups and stand-by duty are the backbone of the internal organization

Organizational principles are now derived from **transparent and objective** criteria!

### In-house standby duty secures capabilities and asset knowledge of an informed buyer

Complexity	Accessibility	Workload
Max. 431 WMO points	Max. 60 min travelling time	Max. 2 call-outs per week

Standby duty groups are optimized in terms of WMO<sup>1</sup>, travelling times and number of call-outs. Design criteria (max. values) remain unchanged from status quo.

1) WMO: Weighted Maintenance Object (indicator of the technical complexity of power plants)

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### Dimensioning of operational groups determined by three scenarios

Szenario 1 Normal operation	Szenario 2 High water level (HVV)	Szenario 3 Major failure (GS)
<p>Min. size according to P2V with internal staff confirmed:</p> <ul style="list-style-type: none"> <li>For small river groups, the foreman ("Meister") is integrated into the on-call service rota</li> <li>Standby duty group comprises 1 Meister 'E' + 3 power plant technicians; Meister 'I' as a deputy would be an advantage</li> </ul>	<p>High water level manpower schedules for rivers revised:</p> <ul style="list-style-type: none"> <li>Hybrid concept for manning hydropower plants (internal and contractor staff)</li> <li>Scenario for starting to man plants (H21, H22,...) defined</li> <li>Standby duty groups optimised</li> </ul>	<p>Possible but unlikely "river group-wide blackout in area of responsibility" investigated:</p> <p>Assumptions</p> <ul style="list-style-type: none"> <li>Response to a crisis situation starts with in-house staff because of the sudden nature of major failure which does not allow up-front external manpower planning</li> <li>Foremen ("Meister") not part of on-call service team in a major failure event</li> <li>Call-out time for in-house staff: 60 min., contractor staff: 90 min.</li> <li>Specific shift models in place (based on number of plants)</li> <li>Optimised foot patrol shifts in PSP group</li> </ul>

Max. approach defines number of staff required (FTE)

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**Operational plant groups**, derived from

- Complexity (**W**eighted **M**aintenance **O**bjects)
- Accessibility (distance **less than 1 h** driving)
- Workload (less than 2 stand-by duty calls)

**Staffing scenarios**, derived from

- Normal **operation**
- **Flood** situation
- Major failure/**blackout**



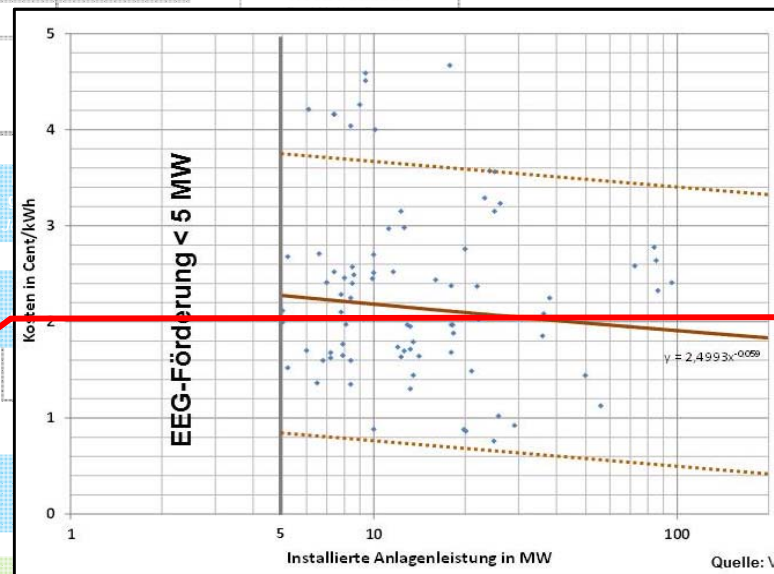
Acknowledging future IT security risks, the staffing goes beyond flood protection plans – supported by educated external experts!

# Cost reduction of approx. 10-15% and structural improvements ensure a sustainable business

Base price development since 2011



Cost per kWh for German HPPs > 5 MW



2 EUR ct per kWh

Zentrale Leitung    Produktionsmanagement    Kraftwerksgruppe    Betriebs/Servicegruppen    Dienstleister

Significant market **challenges** of German “Energiewende” can be managed!  
 Dam safety and flood protection requirements are **not compromised!**  
 External **benchmarking targets** and internal budget restrictions are **delivered!**  
 Attractiveness for the **public, investors and employees** is secured!





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## Backup





# German hydropower secures its business future through "Destination 2020"

## Vision

German hydropower is the leading operator of hydropower plants.

## Mission

German hydropower produces electricity from hydro-energy in a reliable and economically viable and competent way.

**Leading operator of hydropower plants perceived positively by the public and within the Group due to:**

### Reliability

- 1 Ensure high health & safety and environmental standards
- 2 Ensure plant safety and protection against high water levels
- 3 Ensure compliance with statutory requirements and the law
- 4 Create transparency and promote information sharing

### Economic viability

- 5 Secure long-term business continuity: renew concessions, retain asset values, drive expansions
- 6 Minimise costs
- 7 Optimise asset availability
- 8 Maximise revenues

### Competence

- 9 Promote technical, methodical and personal development
- 10 Demand commitment, loyalty and flexibility
- 11 Optimise employee and organisational structures
- 12 Live feedback culture, encourage openness and appreciation

**Unsere Unternehmensziele 2020**

*Main stakeholders*

*The public*

*Investors*

*Employees*

# Uniper Hydropower Germany operates 110 HPPs with 300 turbines in 5 river/plant groups

## PG Pumped Storages

- 1 RoR
- 3 Storages
- 5 Pumpd Storages

## RG Main

- 36 RoR

## RG Donau

- 14 RoR

## RG Isar

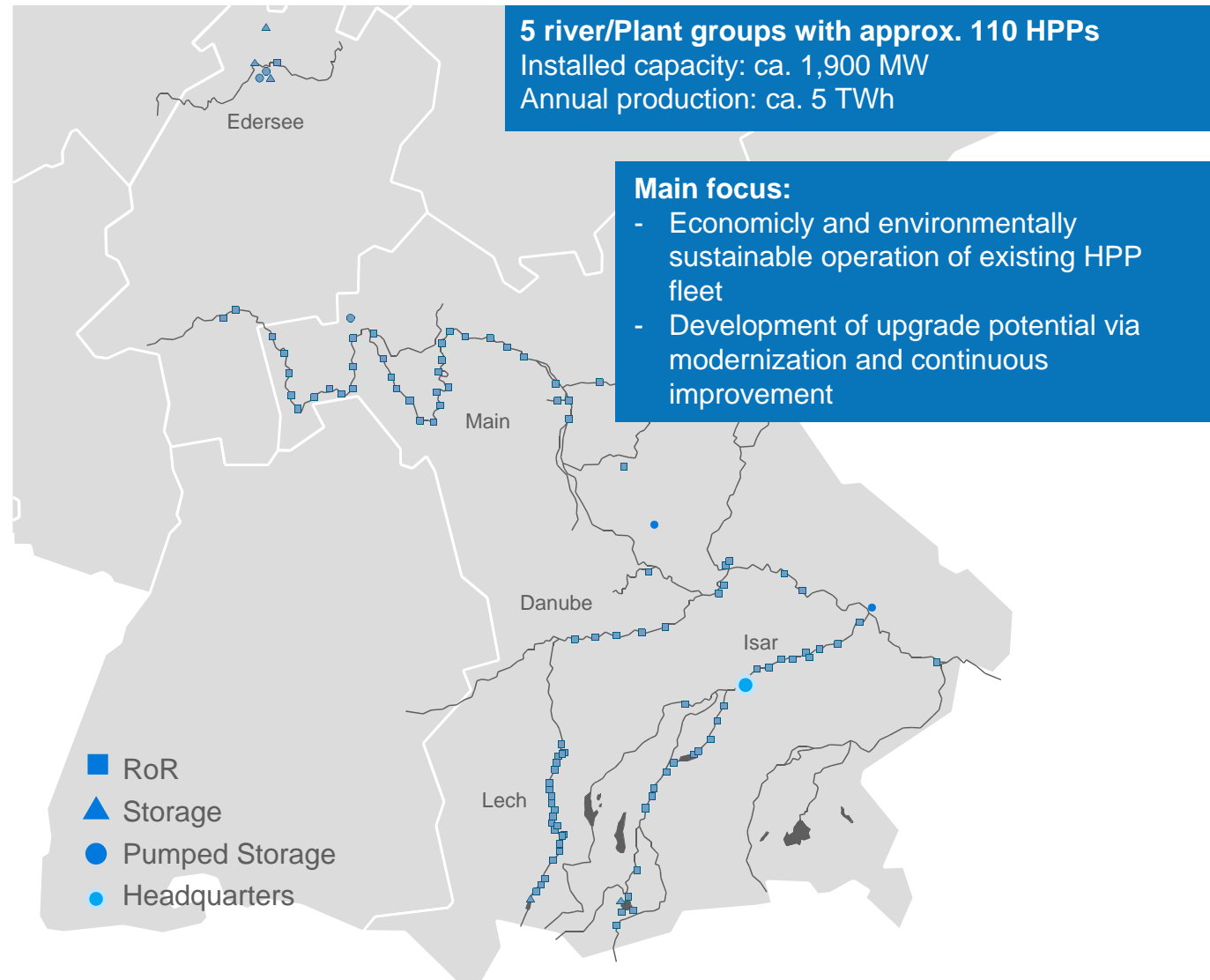
- 25 RoR
- 1 Storage

## RG Lech

- 22 RoR
- 1 Storage

## Headquarters

Central Control Room for all HPPs  
Hydropower Engineering  
Hydropower Evolutions  
([www.hydropower-evolutions.com](http://www.hydropower-evolutions.com))



# Contact details and CV

## Contact

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## Curriculum Vitae

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- University Degree in **Electrical Engineering** (MSc), RWTH Aachen University, Germany
- Doctorate in **Energy Economics** (PhD), RWTH Aachen University, Germany
- University Degree in **Business Administration** (MBA), FernUni Hagen, Germany
- 2002 – 2004 **Asset Manager Transmission Grid**  
RWE Energy AG, Dortmund
- 2005 – 2008 **Project Manager**  
Roland Berger Strategy Consultants,  
Dusseldorf/Munich
- 2008 – today Various **Senior Manager** positions  
in E.ON's/Uniper's Hydropower Division  
Uniper Kraftwerke, Landshut
- Since 2015 **Director Operations Hydro Germany**  
([www.uniper.energy](http://www.uniper.energy))
- Since 2014 **Managing Director**  
Hydropower Evolutions, Landshut  
([www.hydropower-evolutions.com](http://www.hydropower-evolutions.com))
- Since 2016 **Member of the Board**  
Rhein-Main-Donau AG, Munich  
([www.rmd.de](http://www.rmd.de))