



Challenges, cost-efficiency and growth potentials of European hydropower companies

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ACI Hydropower Development Conference 2018 – Zürich | September 6, 2018



- **Challenge** – value creation of European hydropower companies
- **Cost-efficiency** – Uniper’s transformation and competitive advantage
- **Growth** – opportunities in emerging markets



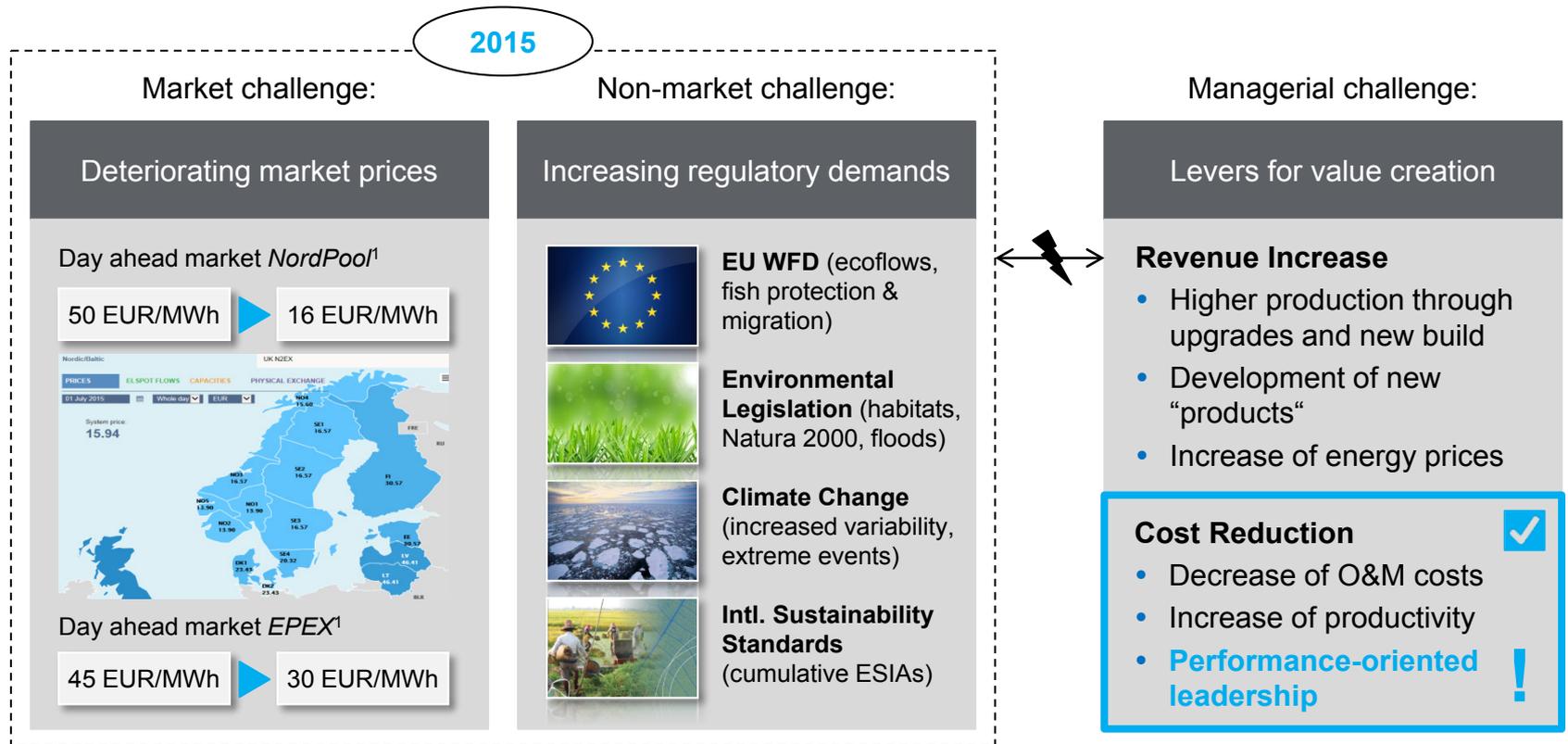
Hydropower
Evolutions



ΕΛΟΙΝΤΙΟΥΣ
ΗΛΕΚΤΡΟΜΕΓΙ



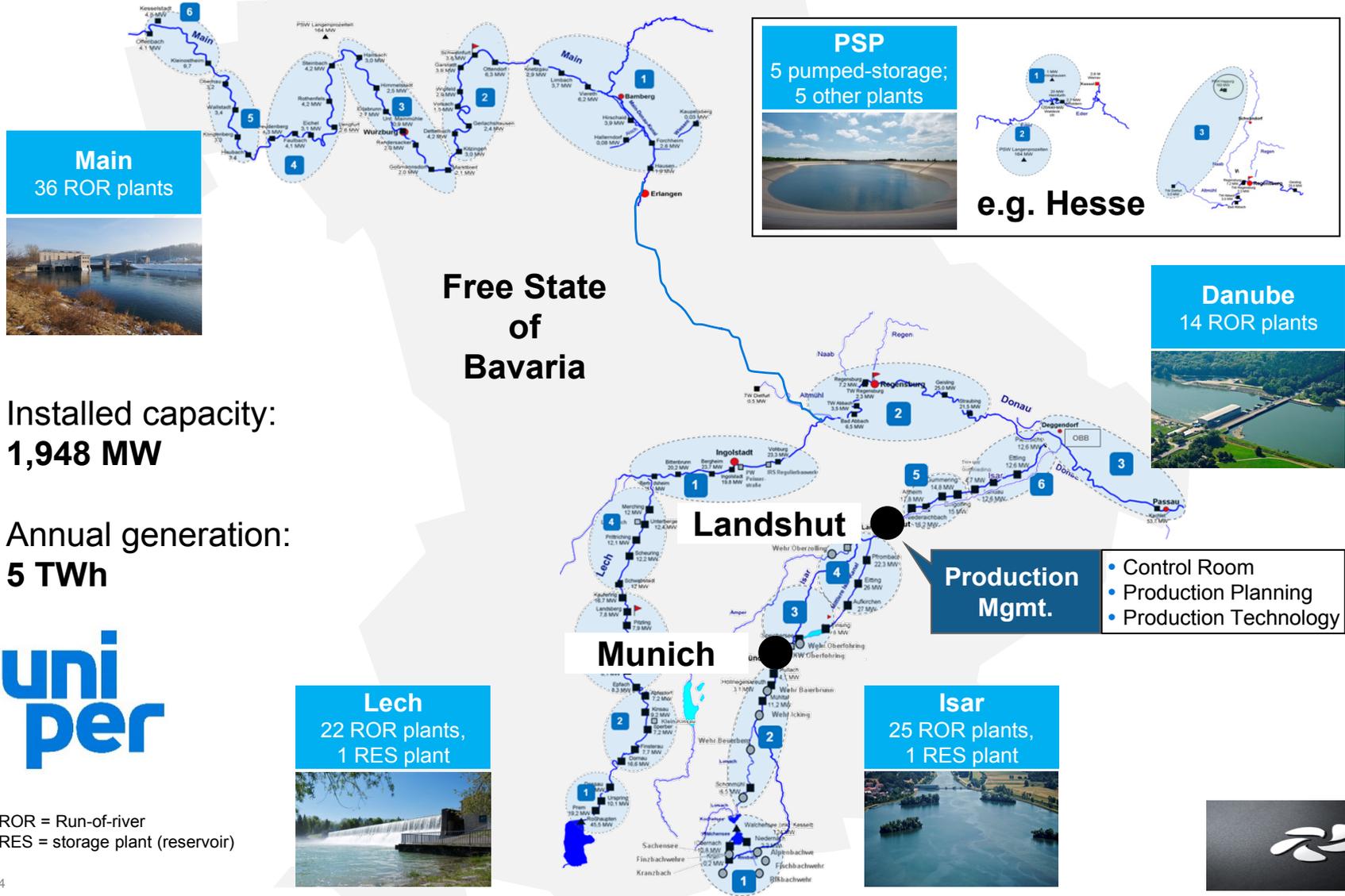
Declining revenues and increasing regulatory obligations require hydro operators to focus on cost performance



1) Average base load prices in July 2010 vs. July 2015
WFD = Water Framework Directive, ESIA = Environmental and Social Impact Assessment



Uniper proactively accepted the challenge,...



Main
36 ROR plants

PSP
5 pumped-storage;
5 other plants

e.g. Hesse

Danube
14 ROR plants

Installed capacity:
1,948 MW

Annual generation:
5 TWh



ROR = Run-of-river
RES = storage plant (reservoir)

Lech
22 ROR plants,
1 RES plant

Isar
25 ROR plants,
1 RES plant

... transformed its German hydropower business and increased its cost competitiveness by up to 30%

Uniper is an experienced and leading operator of hydro plants totaling more than 5 GW in Sweden and Germany



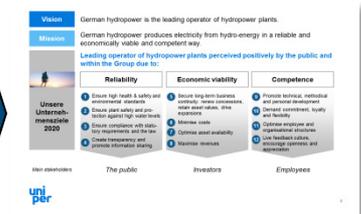
2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Functional Steering		O&M Strategy		Cost Benchmarking		Core Competences		Outsourcing	
Central Control Room		Sustainability Protocol		Project Prioritization		Operational Excellence		Lean Organization	



Unprecedented power price decline in Germany requires entrepreneurial response



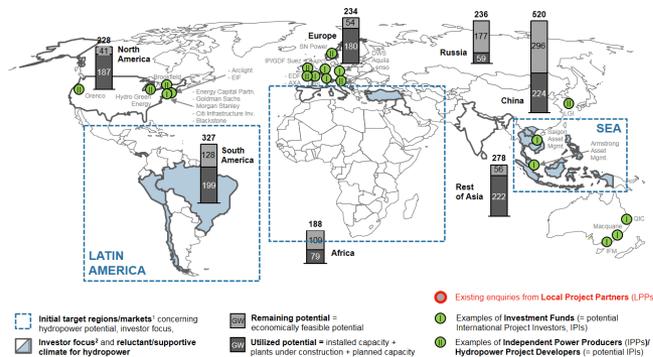
Tailored application of novel, internally developed tools address performance gaps



Organizational measures and change create significant value in challenging times



To then also create growth opportunities, hydro firms should leverage their expertise in emerging markets



Executive Summary

The study concludes that the Indonesian new build, large¹ hydro market holds an entry potential of 1.25 GW

Screening
 Potential in Indonesia (potential power)
 ~75 GW
 Feasible sites¹
 ~22 GW
 Most immediate sites²
 ~1.25 GW

Most immediate sites:

ROK Puncak-1	ROK Sisa-1	ROK Sisa-2	ROK Puncak-2
ROK Puncak-3	ROK Sisa-3	ROK Sisa-4	ROK Puncak-4
ROK Puncak-5	ROK Sisa-5	ROK Sisa-6	ROK Puncak-6
ROK Puncak-7	ROK Sisa-7	ROK Sisa-8	ROK Puncak-8
ROK Puncak-9	ROK Sisa-9	ROK Sisa-10	ROK Puncak-10

Market expertise



Success factors

Technical capabilities



In general, investors scanning the market for cash-flow generating hydropower plants face three challenges

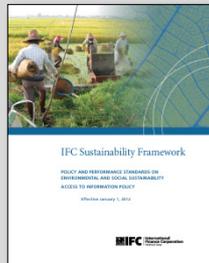
First challenge:

Safeguard engineering quality and international ESG requirements

Intl. technical engineering standards and expertise

IFC Performance Standards

DIN



Second challenge:

Access to hydro investment opportunities in key markets



Third challenge:

Manage asset portfolio from a technical point of view



- Due Diligence
- Project development
- Owner's engineering
- Asset management



A reliable partner addresses these challenges, reduces risks and creates significant value in hydro investments



**Advisory
Services**

Independent Advisor

Worldwide provision of in-depth expertise to clients in the fields of development, execution, rehabilitation, acquisition and divestment of hydropower assets



**Joint
Ventures**

Equity Investor

Development of greenfield hydropower projects together with local partners in emerging markets from site identification until financial close



**Asset
Management**

Technical Partner

International management and portfolio optimization of individual or groups of hydropower plants under operation on behalf of the owners



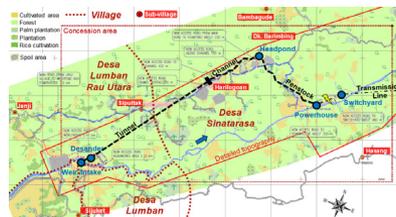
Ideally, the business activities demonstrate a clear link to key stakeholders, i.e. development banks and incumbents



Hydropower potential assessment of 200+ dams:

- Project ranking study
- GHG evaluation report for final options
- High-level presentation for Government of Indonesia

Project examples



Project development of 42 MW Hasang HPP

- Run-of-river, 275 GWh/a
- Feasibility study, ESIA, site investigations
- Successful collaboration with local partner



3-year hydropower capability building program

- Class-room and onsite training in both Indonesia and Germany
- Development of tailor-made hydro-specific curriculum
- Case-study-based learning approach



In short, cost-efficiency, their unique expertise and owner's perspective enable EU hydro firms to also grow overseas



European hydropower firms will successfully grow in emerging markets in the fields of **advisory services**, **joint ventures** for greenfield project developments, and **asset management**, if they **understand the regulatory environment**, **contribute their in-house expertise**, build a strong relationship with a **local partner**, manage the projects' **sustainability performance** and commit **financial resources and people**.





Backup



Uniper Hydro Germany secures its business future through "Destination 2020"

Vision

Uniper is the leading operator of hydropower plants.

Mission

Uniper produces electricity from hydropower in a reliable, economically viable and competent way.

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



Our corporate goals 2020

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

Main stakeholders

The public

Investors

Employees



Introduction of Hydropower Evolutions GmbH



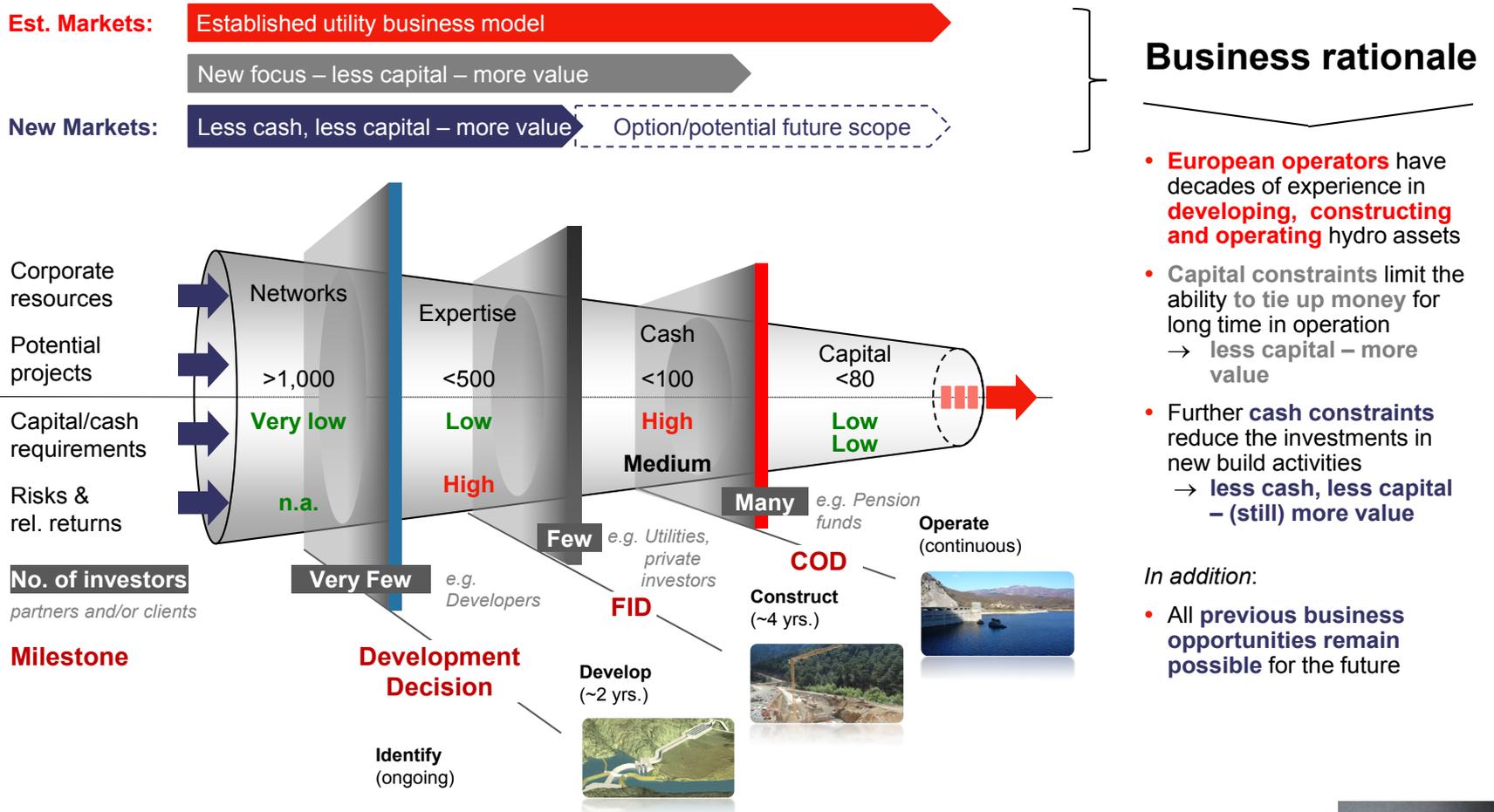
We are a distinguished **Hydropower Development & Advisory Firm** operating worldwide

Hydropower Evolutions serves distinguished clients, provides hydropower expertise to investors and develops greenfield hydropower projects in collaboration with partners in emerging markets.

- ▶ Unique Engineering and Asset Management know-how from an operator's & investor's perspective
- ▶ Subsidiary of Uniper, operator of 180 hydro plants totalling 5 GW in Europe
- ▶ 120 years of operational, maintenance and sustainability experience
- ▶ Strong global expert network and references, including IFC/World Bank, KfW and Indonesian PLN
- ▶ Management team with track record in business transformation and production responsibility for 5 TWh/a
- ▶ Co-developer and advocate of the Hydropower Sustainability Protocol for effective Risk Management
- ▶ Successful developer of hydropower projects in Indonesia since 2010



Breaking up the established utility business model leads to multiple entry points for emerging market projects



FID = Financial Investment Decision, COD = Commercial Operating Date



Detailed analyses of crucial business aspect underline the viability of the business concept

Components and Analyses of the Business Concept



Hydropower Evolutions

Strategic Fit ✓

Business Case & SWOT ✓

Product, Pilot & References ✓

Markets, Clients & Competitors ✓

Global Unit Generation Business Idea - Global Opportunities

Strategic aspirations of funds and energy firms investing in hydropower create the demand for outstanding assets

Global Unit Generation Business Idea - Focal Point

Financial constraints limit E.ON's established business model, but parts of it still remain very attractive

Business rationale

Global Unit Generation Business Case - ROI and Scenarios

Based on current Business Case parameters, break-even will be reached with successfully completing the first project

Project/Pipeline

Sensitivity Analysis

Global Unit Generation Business Case - SWOT analysis

The prepared SWOT Analysis shows that EHE's strengths and opportunities outweigh the weaknesses and threats

	Helpful	Harmful
Internal Origin (attributes of the organization)	<ul style="list-style-type: none"> Results based on sub-optimization Proven operational and engineering Lower external capital cost Proven project delivery and execution Comprehensive portfolio expertise and IP Costs in market at energy Access to E.ON's reputation and assets 	<ul style="list-style-type: none"> Operational operational and engineering Highly competitive and experienced
External Origin (attributes of the environment)	<ul style="list-style-type: none"> Highly competitive and experienced 	<ul style="list-style-type: none"> Highly competitive and experienced

Global Unit Generation Business Idea - Value Proposition

E.ON offers unique value creation for hydropower investors with a great variety of products and solutions

Value Proposition

Business Idea - Focal Point

Hydro projects have external clients

Global Unit Generation Business Environment - Target Markets

Matching regional hydropower potential with investors' focus creates the target markets Latin America and SEA

Global Unit Generation Business Case - Local Project Partners

E.ON Hydropower E between local hydro

In terms of competitive innovative concept

Competitor Analysis

License Agents

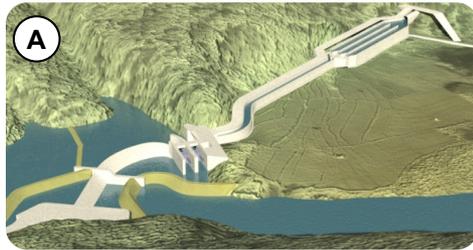
Project Developers

Consultancies



To benefit from each stage in the lifecycle of hydropower projects a fund model approach can be applied

Development Fund



Early stage investments of seed capital in promising hydro project candidates with the aim to develop them from “greenfield” to “bankable” and sell them at market multiple benchmark to the Implementation Fund.

Project investment criteria:

- Approved by local government and PPA counterparty
- Principle development and location permits in place
- Positive technical, sustainability, and legal due diligence

Implementation Fund



Equity investments in concrete hydro projects ready to be constructed with aim to implement them from “bankable” to “COD” and sell them at market multiple benchmark to the Operation Fund.

Project investment criteria:

- FS, ESIA, EPC contract(s) ready for implementation
- All necessary permits in place
- PPA signed

Operations Fund



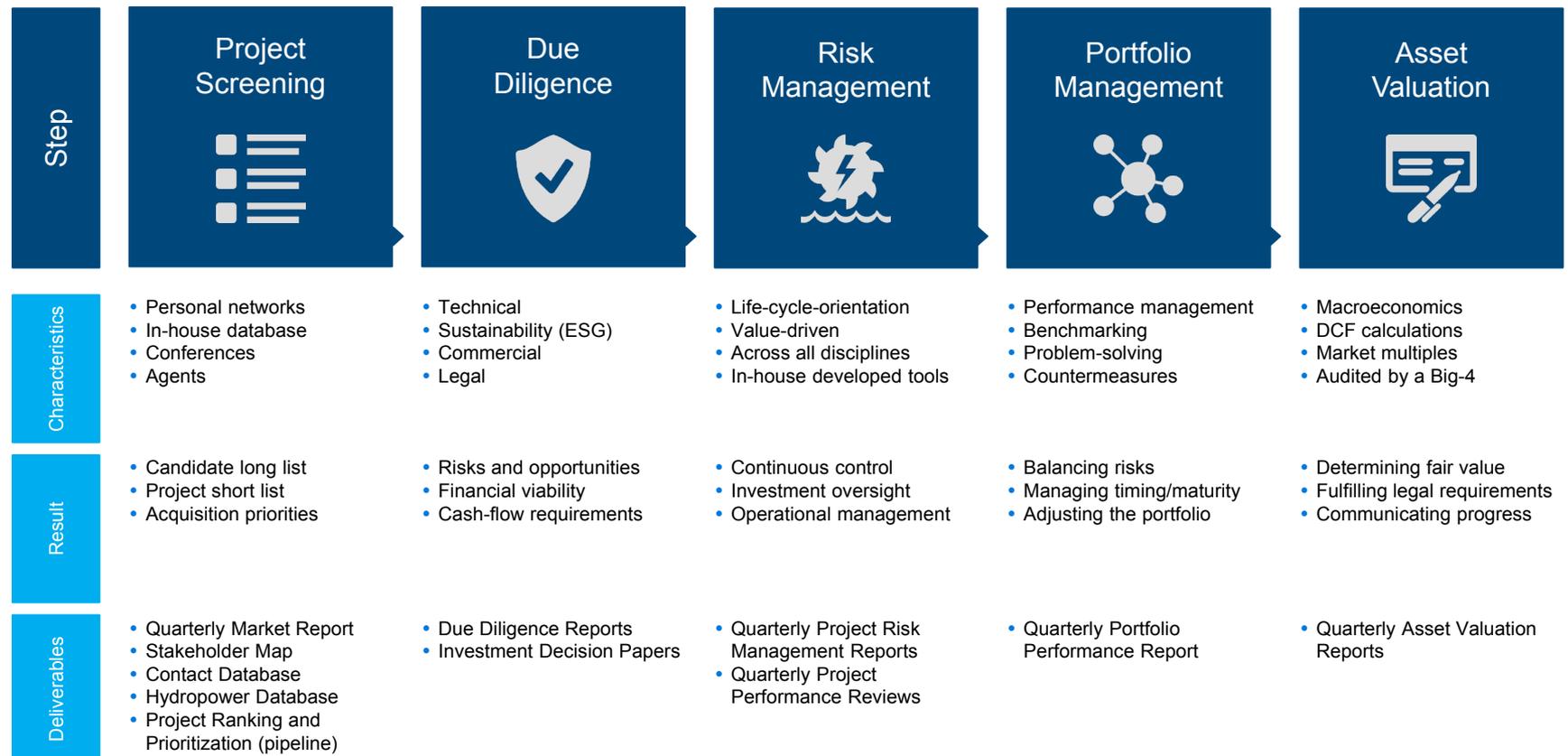
Acquisition of completed hydro plants ready to be operated with aim to take them from “COD” to “reliable operation” and create a unique portfolio delivering a steady and secured fixed income at a low risk level.

Asset investment criteria:

- Asset management in place
- Commissioning successfully completed
- O&M team trained



Hydropower Evolutions developed a sophisticated and compliant investment approach and process



Your partner in emerging markets



Hydropower
Evolutions

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