Masterclass
Energy Asset Development
1 June 2021
Agenda

- Introduction
- Renewable energy growth in EU27 and globally - Csinszka
- Energy Asset Development - Leon
- Case studies - Denisa
- Q & A
- Closing
Energy Investment Management BV

*Investment Management & Advisory Boutique*

*with focus on*

*Energy Transition Assets and Cleantech Ventures*

**Advisory**
Advisory services related to investments in energy industry assets and cleantech ventures: development, transactions and implementation

**Thought Leadership**
We show and create leadership in investment management in energy transition assets and cleantech ventures with organizing and participating in: research projects, programs, networks and events

**Investments**
We invest ourselves with our private investor network in energy transition assets and cleantech ventures. We structure investment portfolios, develop fund structures and participation concepts
Key-elements East-European Energy Transition Entrepreneurial Opportunities Program

- Business Portfolio Strategy
- Business Development Accelerators
- In-depth understanding regional circumstances

Denisa Kasa
Program manager
Masterclass Series Energy Investment Management

- Energy Transition
  - Regulatory Framework development
- Energy Business
  - Portfolio Strategy
- Energy Asset
  - Development
- Energy Asset
  - Project Finance
- Energy Asset
  - Transactions
- Cleantech
  - Start-up Development
- Investment
  - Management Cleantech Start-ups
- Growth Capital
  - Cleantech Companies
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European Renewable growth in the last decade
Europe 2020/2021

% of total electricity production in the last 13 months

EMBER

- Austria
- Belgium
- Bulgaria
- Czech Republic
- Denmark
- Estonia

- EU-27
- Finland
- France
- Germany
- Greece
- Hungary

- Ireland
- Italy
- Latvia
- Lithuania
- Netherlands
- Poland

- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
Global Renewable growth looking forward
Support regimes for renewables in EU

- Feed-in tariff (FIT)
- Feed-in premium (FIP)
- Quota
- Tenders

Note: This map does not include secondary support instruments like tax incentives, investment grants, etc.

Source: Ecofys
Enablers renewable energy asset development

- Support Regime
- Permitting procedures
- Readiness of developers, contractors
- Knowledge & Experience
- Readiness of investors, banks
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Learning the asset development and financing language

**SPC**  Special Purpose Company (legal entity)
**DSCR**  Debt Service Cover Ratio
**MoU**  Memorandum of Understanding
**FID**  Financial Investment Decision
**BOD**  Basis of design
**ISBL**  Inside Battery Limit (within the site)
**OSBL**  Outside Battery Limit
**PPA**  Power Purchase Agreement
**VAR**  Value Assurance Review (Value at Risk)
**TAR**  Technology Assurance Review
**HSE**  Health Safety Environment
**EPC**  Engineering Procurement Construction

Energy Asset Classes

Hydro Power Plant

Solar (PV) Power Plant

Biomass Power Plant

Windfarm

Waste to Energy Plant

Combined Heat and Power Plant
Structuring of an energy asset in a SPC
Six phases can be distinguished in the project lifecycle:

- **Portfolio strategy and Business Planning**: Select relevant activities for organization based on the long term strategy and scope
- **Feasibility**: Assess leads on their feasibility (identify show-stoppers)
- **Scoping**: Select and optimize business opportunities
- **Definition**: Define, negotiate and finalize contracts
- **Realization**: Realization of the project (including commissioning)
- **Operational**: Operational management of asset
Five milestones are defined in the project life cycle:

- **Gate 1 & 2**: a go / no go decision is applicable for starting the next phase;
- **Gate 3 = FID**: regards the Final Investment Decision by the Board for execution and construction the project
- **Handover**: hand-over to Commercial and Operational units for commercial dispatch and operational management and respectively
- **Closure**: finalizing the project with the assessment of the outcome of the project
Project lifecycle – overview: Portfolio strategy and business planning

<table>
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<th>Phase</th>
<th>Purpose</th>
<th>Deliverables</th>
<th>Activities</th>
<th>Administration</th>
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<tr>
<td>Feasibility phase</td>
<td>Identification and selection of project opportunities</td>
<td>A business plan including identified opportunities and budget</td>
<td>Write business plan</td>
<td>File and distribute Business plan and allocate budget in ERP accordingly</td>
<td>Business plan to be agreed in Board</td>
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<td>Scoping phase</td>
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Gate 1, Gate 2, FID Gate 3, Handover, Closure
**Purpose**

Evaluate and explore the opportunity to identify “show-stoppers”, to enable first quantification and identify risks.

**Deliverables**

A project file and a management paper summarizing the feasibility results. If applicable: project plan for the scoping phase.

**Activities**

- Sign confidentiality agreement upfront (if applicable)
- Select site and secure land
- Analyze wind resources and grid connection
- Analyze permit ability + stakeholders (participation)
- Analyze technical concept (capex estimate 30%)
- Finalize MoU with partners/stakeholders and get exclusivity (if applicable)
- Prove potential business case (model, strategy)
- Management paper and project plan next phase (if applicable)

**Administration**

Set-up project file and project controls (filing, budget, ERP, ...)

**Decision**

Outcome (go/no go) to be agreed by senior management.
Feasibility phase – Project Bio-energy XL

A 250 MWe biomass plant requires 1-2 Mton biomass per year. Due to large fuel volumes, large plot space in sea harbor is required

- **Feedstock**
  - Wide range of fuels possible (compared to co-firing)
  - Circa 2-5 kton per/ day (depending on energy content feedstock)
    - Wood pellets circa 2.5 kton/ day → circa 1 Mton/ year
    - Dry wood chips circa 3.6 kton/ day → circa 1.7 Mton/ year
  - Equivalent to approximately 3,500-12,000 m³ (depending on bulk density feedstock)

- **Technology**
  - Electrical output 250 MWe
  - No interference with/ risk on current assets
  - Performance guarantees

- **Location**
  - Located in a port in The Netherlands
  - Panamax vessel access
  - 10-15 hectares required
  - Storage requires approximately 50% of plot space
Feasibility phase – Project Bio-energy XL

100%, non-proven biomass concept is most in line with initial starting points

- < 50 MWe
  - CFB/ BFB/ Grate technology
  - Locally sourced fuels
  - Efficiency up to 30%
  - Reference plant: Alkmaar

- > 50 MWe
  - Combination of scale and selected fuel is new
  - Risks: combustion behavior of fuel
  - Highest fit with initial concept

- < 250 MWe
  - Co-firing coal simplifies operations
  - However, it may influence permitability and image of plant
  - Can be studied as an option in the selected concept

- Wood available for circa 50 MWe additional capacity
- Totally different business concept
- No fit with initial concept

Wood available for circa 50 MWe additional capacity
- Co-firing coal simplifies operations
- However, it may influence permitability and image of plant
- Can be studied as an option in the selected concept

- Covered in separate studies for coal plants
# Project lifecycle – overview: Scoping phase

## Purpose
Asses and optimize the business case (commercial, technical) and minimize risks

## Deliverables
A project file and a management paper summarizing the scoping results. If applicable, a project plan for the definition phase.

## Activities
- Sign MoU and get exclusivity prior to start scoping phase (if applicable)
- Define scope: windfarm layout, Basis of Design (turbine foundation, electrical infra), (capex estimate 20%)
- Develop tender and permitting strategy
- Define legal entity
- Secure critical aspects (planning/risk perspective) as e.g. grid connection, participation
- Develop term sheet for PPA and contracts (f.e. agreement authorities)
- Initiate permitting process (e.g. ready for submission)
- Develop dedicated financial model and confirm business case
- Finalize with reviews: TAR/VAR
- Management paper and project plan next phase (if applicable)

## Administration
Manage project file and project controls (filing, budget, ERP, ...)

## Decision
Outcome (go/no go) to be agreed by the Board
Project lifecycle – overview: Definition phase

**Purpose**
Establish investment opportunity and finalize all contracts for go/no go decision for the realization and exploitation of the project (Financial Close)

**Deliverables**
- A project file and an investment proposal.
- A project plan for the realization phase.

**Activities**
- Make ITT, review and select tenders for technology supplier
- Ask Board mandate to negotiate and finalize assets contracts (if applicable)
- Negotiate and finalize contracts f.e. concession, land, connection
- Carry out final reviews TAR/VAR with risk, legal, ...
- Confirm business case incl. stress testing for key parameters (capex estimate 10%, opex, wind output, contingencies)
- Make project plan realization phase (and a concept of the operational phase)
- Make monitoring & evaluation plan (influence environment, technology & economics, communication to stakeholders)
- Manage internal approval procedures

**Administration**
Manage project file and project controls (filing, budget, ERP, ...)

**Decision**
Outcome (go/no go) to be agreed by Board and, if applicable, Review Committee
Project lifecycle – overview: Realization phase

**Portfolio strategy and business planning**

**Feasibility phase**

**Scoping phase**

**Definition phase**

**Realization phase**

**Operational phase**

**Gate 1**

**Gate 2**

FID

**Gate 3**

Handover

**Closure**

**Purpose**

Realize and build the project within approved scope (budget, planning, quality, etc.) and handover to Commercial and Operational units

**Deliverables**

- Monthly progress reports
- Hand-over signed by Commercial and Operational units
- Key documents for operational phase

**Activities**

- Establish the project team realization phase
- Supervise the construction process (budget, planning, quality, HSE, change orders)
- Prepare all documents for hand over to Commercial and Operational units
- Prepare key documents for operational phase

**Administration**

Manage project file and project controls (filing, budget, ERP, …)

**Decision**

Project Handover is endorsed by Board
Project lifecycle – overview: Operational phase

**Purpose**
Settle remaining outstanding issues and finalize project for BD

**Deliverables**
- Signed handover document with Commercial/Operational Post Investment Review document (see best practices)

**Activities**
- Solve outstanding issues (e.g. subsidies, EPC contractor, documentation)
- Make a post investment/project review (see best practices)

**Administration**
- Manage project file and project controls (filing, budget, ERP ...)

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**Gate 1**: Portfolio strategy and business planning

**Gate 2**: Feasibility phase

**Gate 3**: Scoping phase

**FID**: Definition phase

**Handover**: Realization phase

**Closure**: Operational phase
Gate criteria - key deliverables per phase

**Opportunity**
- In line business plan
- Commercial opportunity
- Technical feasible
- Plan & budget business development phase

**Gate 1** feasibility
- Confidentiality agreement
- Land secured
- Wind resources
- Grid connection
- Permit ability analyses
- Stakeholder analyses
- Study technical concept (capex ±30%)
- Concept MoU
- Business case analyses (financial model, strategy)
- Management paper and project plan next phase

**Gate 2** scoping
- MoU and exclusivity
- Defined scope: windfarm layout, Basis of Design (turbine foundation, electrical infra), (capex ±20%)
- Tender/permitting strategy
- Define legal entity
- Critical aspects secured (planning/risk perspective)
- Term sheet PPA and contracts (f.e. agr’t authorities)
- Permit documents initiated (ready for submission)
- Dedicated financial model to confirm business case
- Management paper and project plan next phase
- Results review TAR/VAR

**Gate 3 (FID)** definition
- Make ITT, review and select tenders for technology supplier
- Finalized assets contracts & other contracts (e.g. land, connection, utilities, etc.)
- Results final reviews TAR/VAR
- Confirmation business case (capex ± 10%)
- Project plan realization phase
- Initial plan of the operational phase
- Results internal approval processes

**Board decision**
- Review Committee approval (if applicable)
- Senior management decision

**Final investment decision by BD, TRC, Board**
Value creation during project development RE project

Cost curve

Value curve

Opportunity identified

Project identified

No show stoppers
Realistic opportunity

Tangible project

Viable project

Opportunity optimized

Commercial project

Final Investment Decision (FID)

Costs
X M€
(2 – 5 % Capex)

Y M€

Identification

Feasibility

GATE 1

Scoping

GATE 2

Definition

GATE 3

Time
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Case study: Floating Solar Plant
Innovations in technology, concepts and business models
Important elements by developing new concepts

- Technology
  - Design
  - Floating elements
  - Anchoring
  - Selection materials

- Permitting
  - Environmental impact
  - New concept for permitting authority
  - New concept for grid company

- Construction
  - Safety requirements
  - Logistics
  - Quality assurance
  - Lessons learned

- Maintenance
  - Safety requirements
  - Accessibility
  - Preventive maintenance schedule
Albania
Case study: Hydropower Albania
Case study: Hydropower Project

Fierza Hydroelectric Power Station
## Project assessment at mid-scoping phase

<table>
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<tr>
<th>Section</th>
<th>Notes</th>
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</table>
| 1. Valuation & Business Case                | • Check robustness of IRR  
• Improve IRR calculation methodology  
• Include best & worst case scenarios, ranging values of important parameters  
• Include financial ratios (DSCR) |
| 2. Hydro concept & resources                | • Management of fluctuations in water supply (seasonal influence)  
• Evaluate detailing of hydropower concepts for optimizing production & revenues |
| 3. Site & Permits                            | • Important to make progress in application processes  
• Permitting is main cause of delay based on our benchmarking          |
| 4. Organization & Stakeholders              | • RE service contract gives project organization obligations towards local community  
• Important to assess commercial feasibility of these obligations |
| 5. Asset development & Production           | • Project development approach can be more robust  
• Detailed schedule and progress monitoring needed  
• Reviews on value creation and risk management |
| 6. Market outlook & Regulations             | • Perceived political risk and economic insecurity  
• Over-subsidization may trigger counter measures government support |
| 7. Contracts / Supply chain                 | • During coming definition phase critical contracts have to be drafted: EPC contract, O&M contract, power purchase agreement  
• Special attention for contract interfaces |
| 8. Finance & Risks                          | • Availability of funding the development expenditures (devex) for the coming phase  
• Challenging to attract financing with the current development stage |
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