



ENERGY
INVESTMENT
MANAGEMENT

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

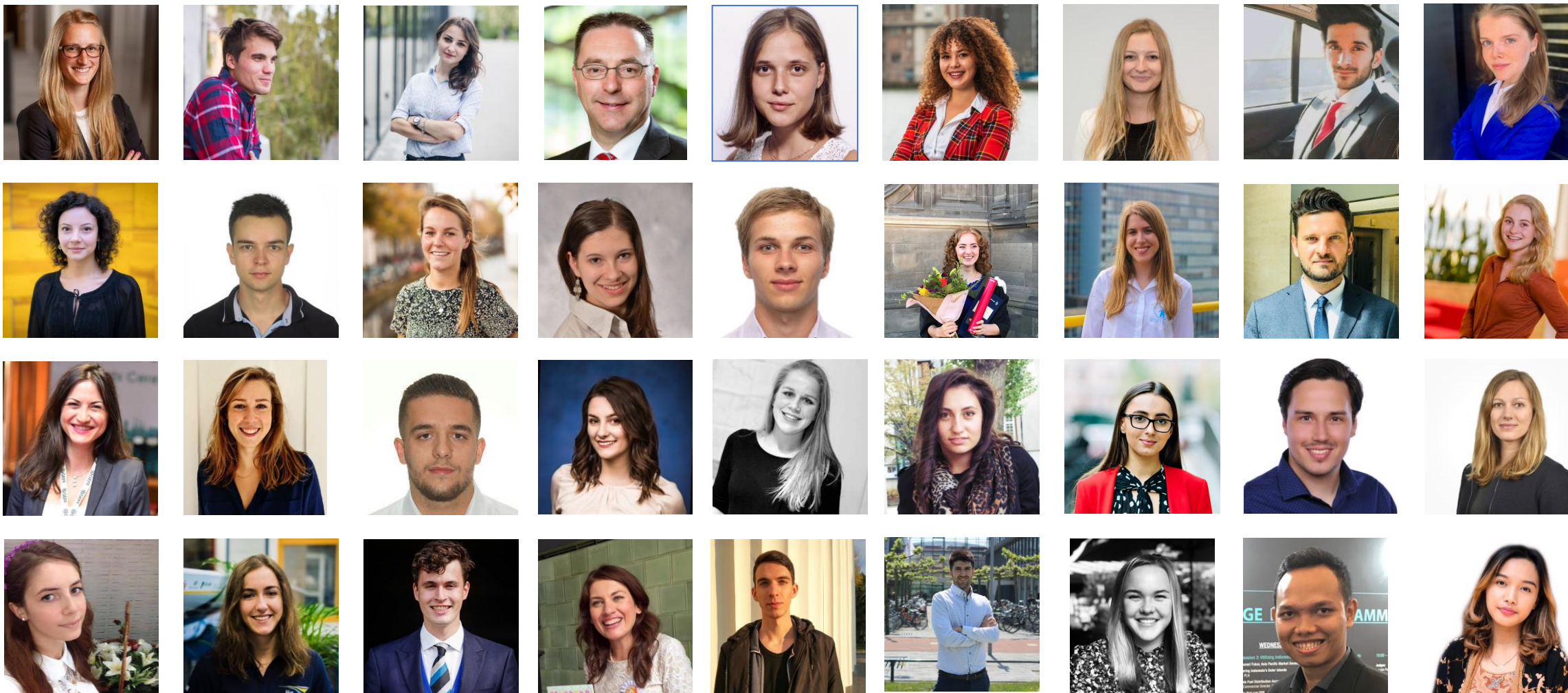
Thought Leadership

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

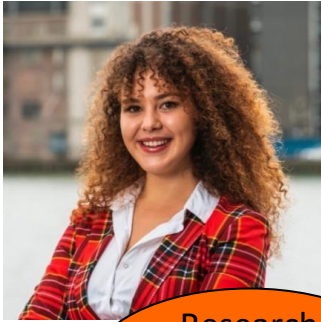
Investments

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

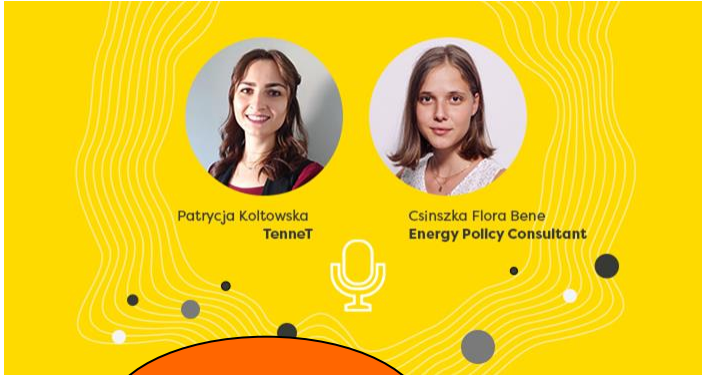
European Energy Transition Network - East meets West



Program



Research
Erasmus
University



Enlit Europe



Master-classes
...

Research
....

East-European Energy Transition Entrepreneurial Opportunities Program

Research
VU
Amsterdam

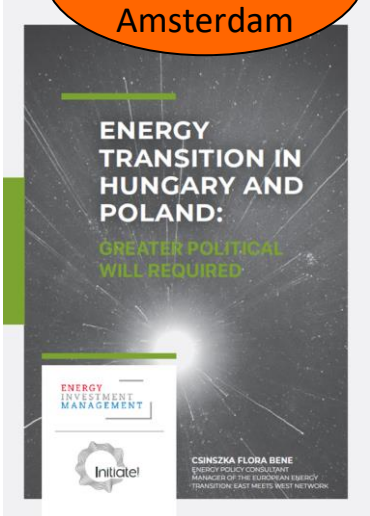
EU SEW

East
European
Knowledge
Team

Cooperation
Energy
Community

...

Multi Media
Eastern
Europe



Key-elements East-European Energy Transition Entrepreneurial Opportunities Program

Business Portfolio Strategy

Business Development Accelerators

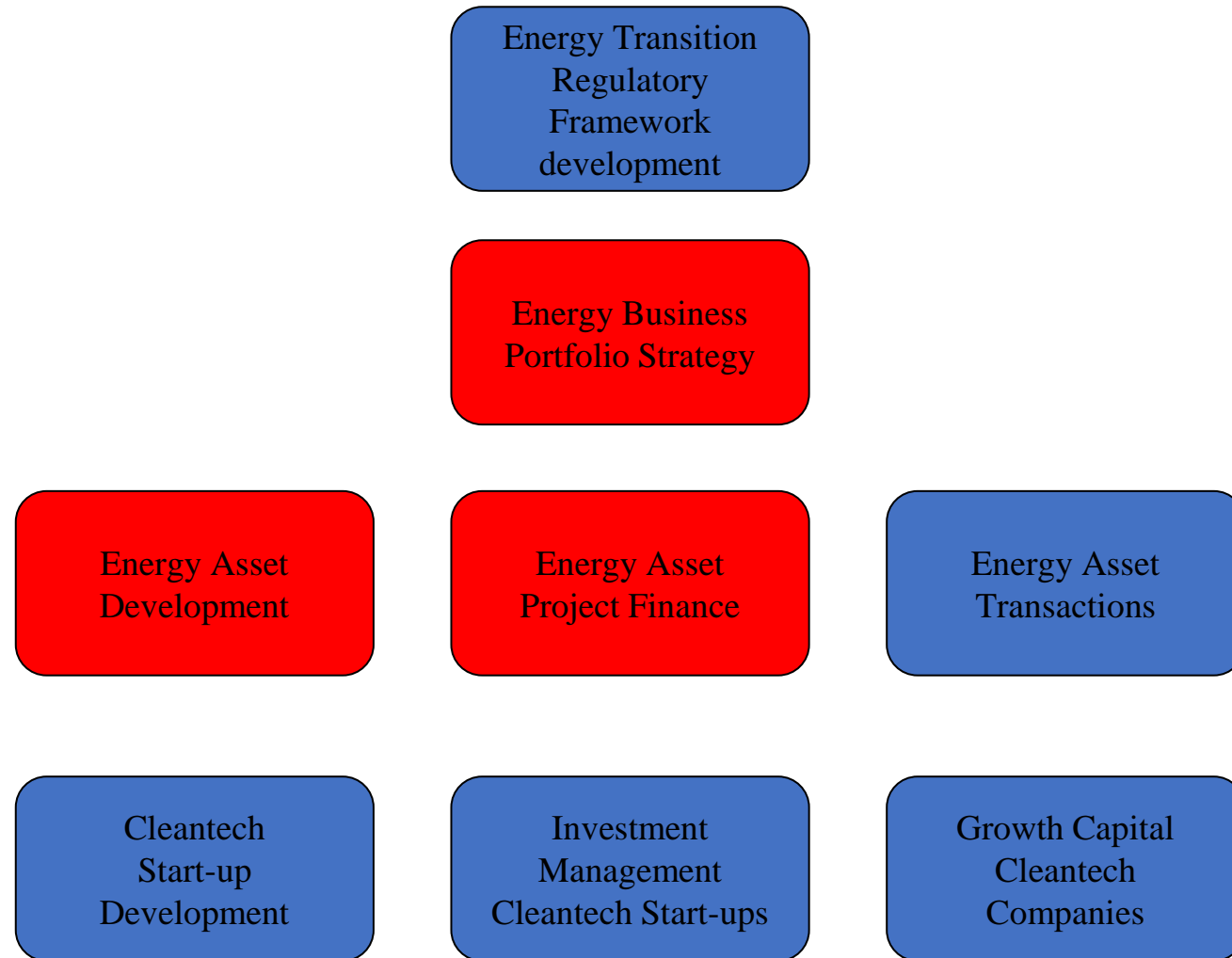
In-depth understanding regional circumstances

Enlit
Europe



Denisa Kasa
Program manager

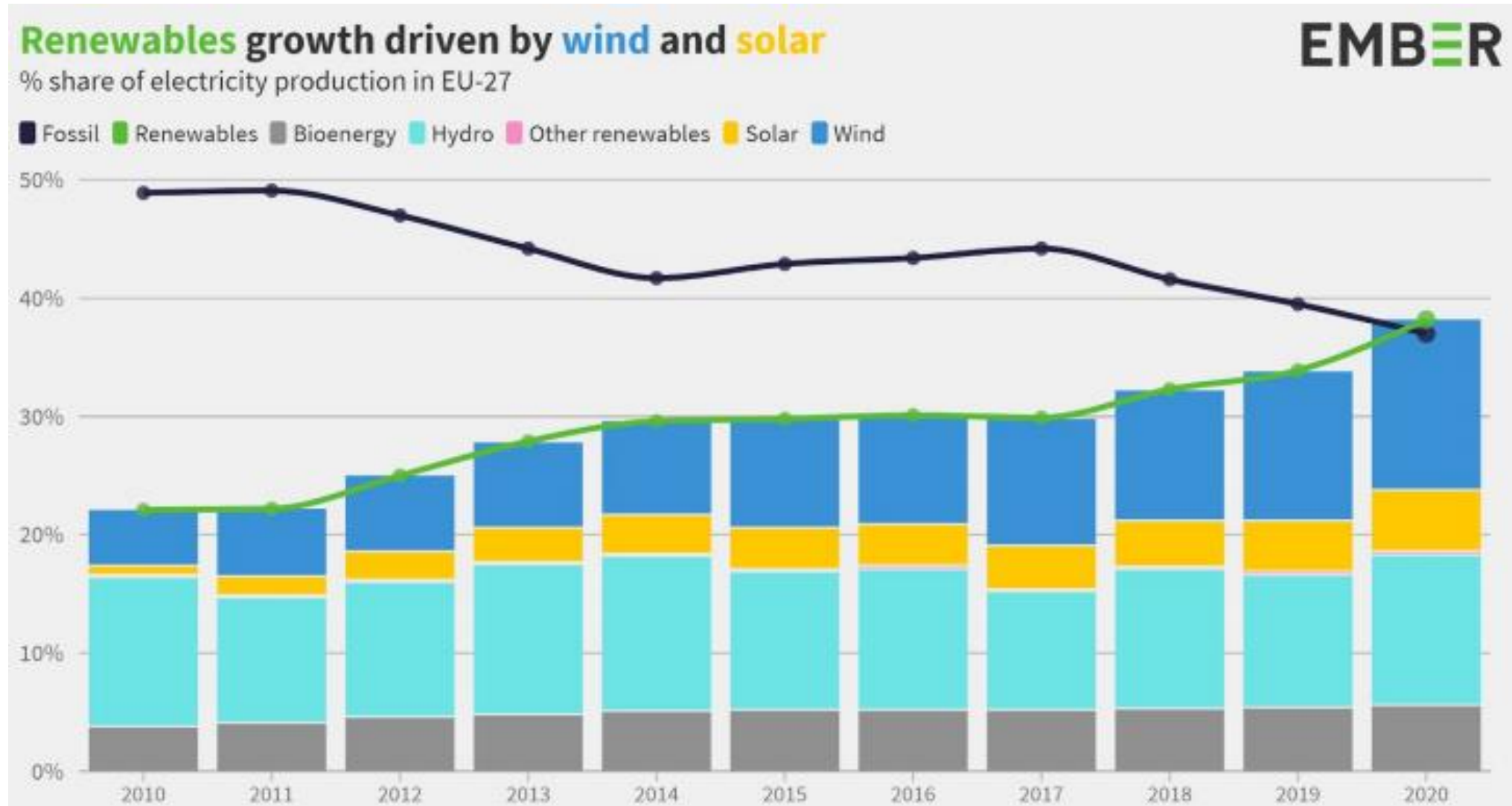
Masterclass Series Energy Investment Management



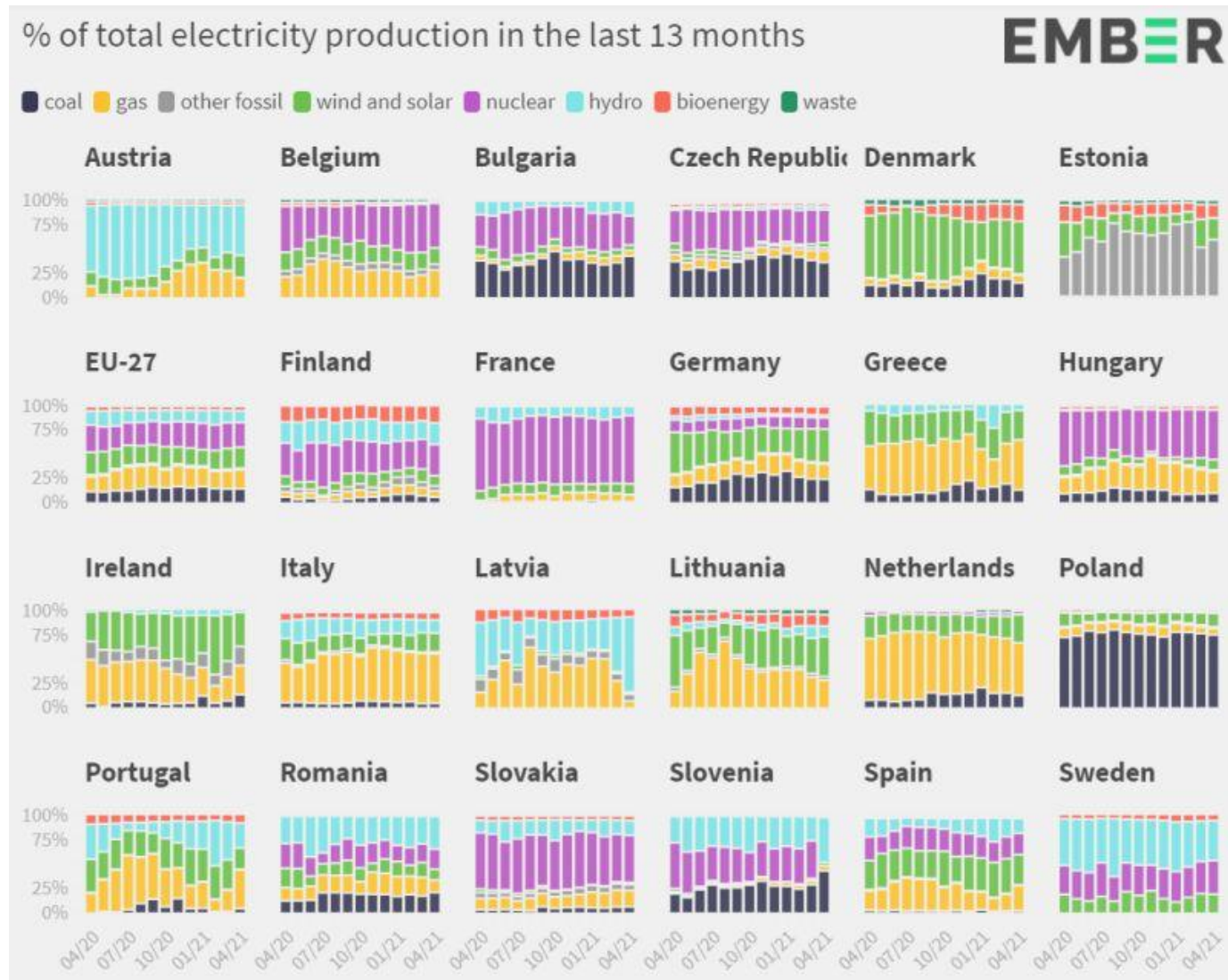
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European Renewable growth in the last decade

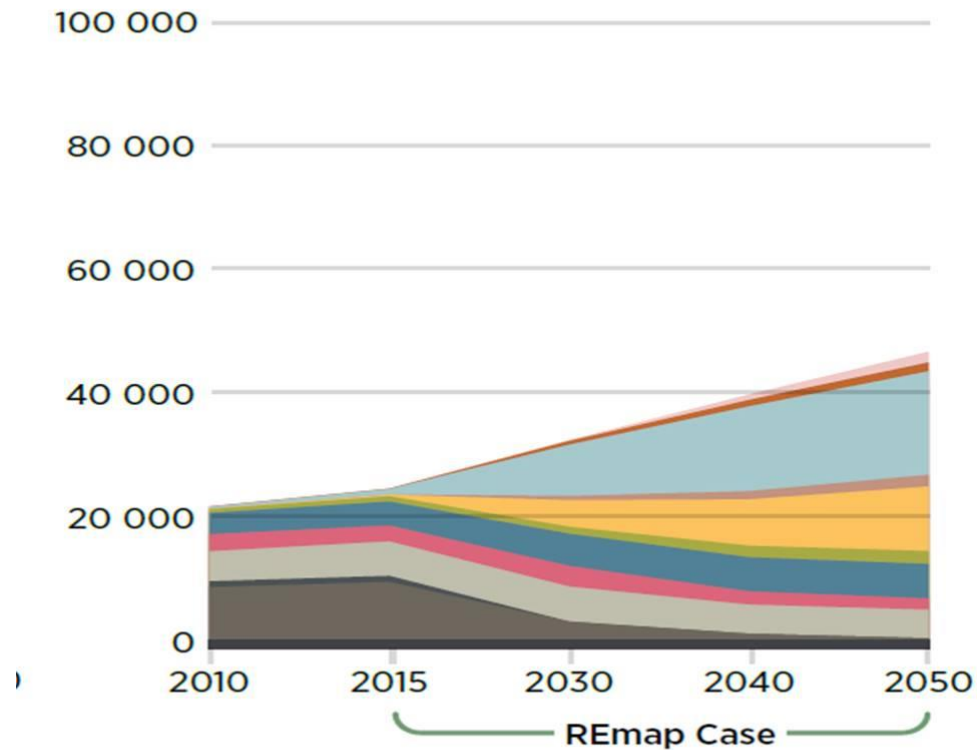


Europe 2020/2021

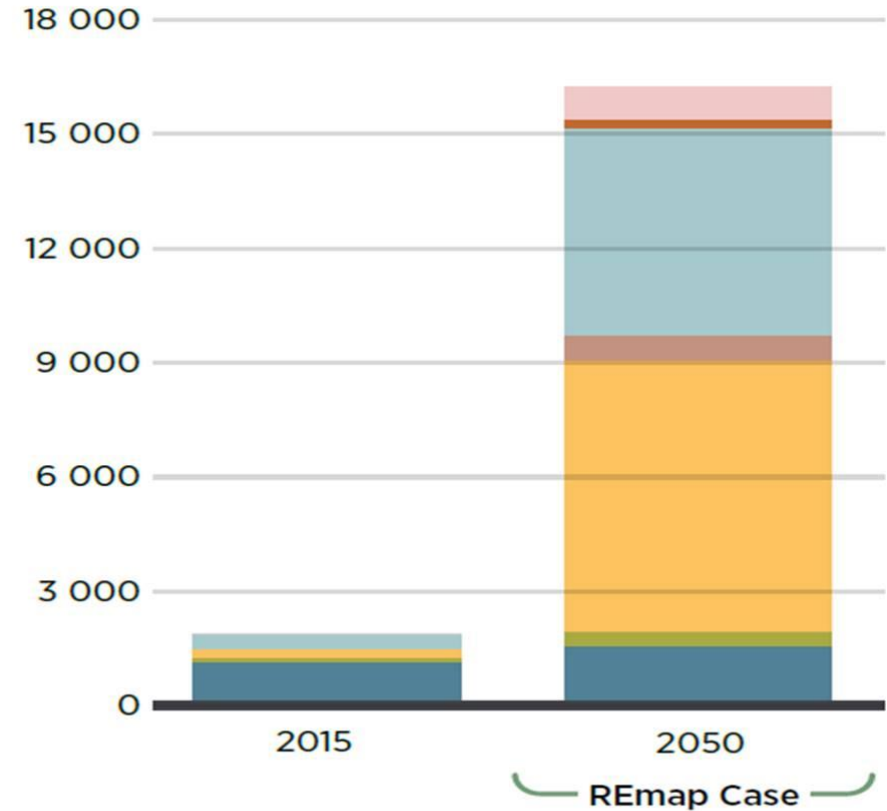


Global Renewable growth looking forward

Electricity generation (TWh/yr)



Renewables installed power capacity (GW)



- Wind
- Bioenergy
- Coal
- Others (incl. marine and hybrid)
- CSP
- Hydro
- Oil
- Geothermal
- Solar PV
- Nuclear
- Gas

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

Knowledge &
Experience

Permitting
procedures

Readiness
developers,
contractors

Readiness
investors, banks

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Learning the asset development and financing language

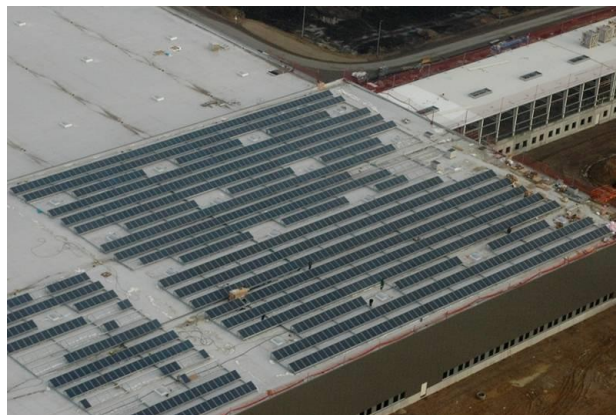
| | |
|------|--|
| SPC | Special Purpose Company (legal entity) |
| DSCR | Debt Service Cover Ratio |
| MoU | Memorandum of Understanding |
| FID | Financial Investment Decision |
| BOD | Basis of design |
| ISBL | Inside Battery Limit (within the site) |
| OSBL | Outside Battery Limit |
| PPA | Power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

https://en.wikipedia.org/wiki/Project_finance

Energy Asset Classes



Hydro Power Plant



Solar (PV) Power Plant



Biomass Power Plant



Windfarm

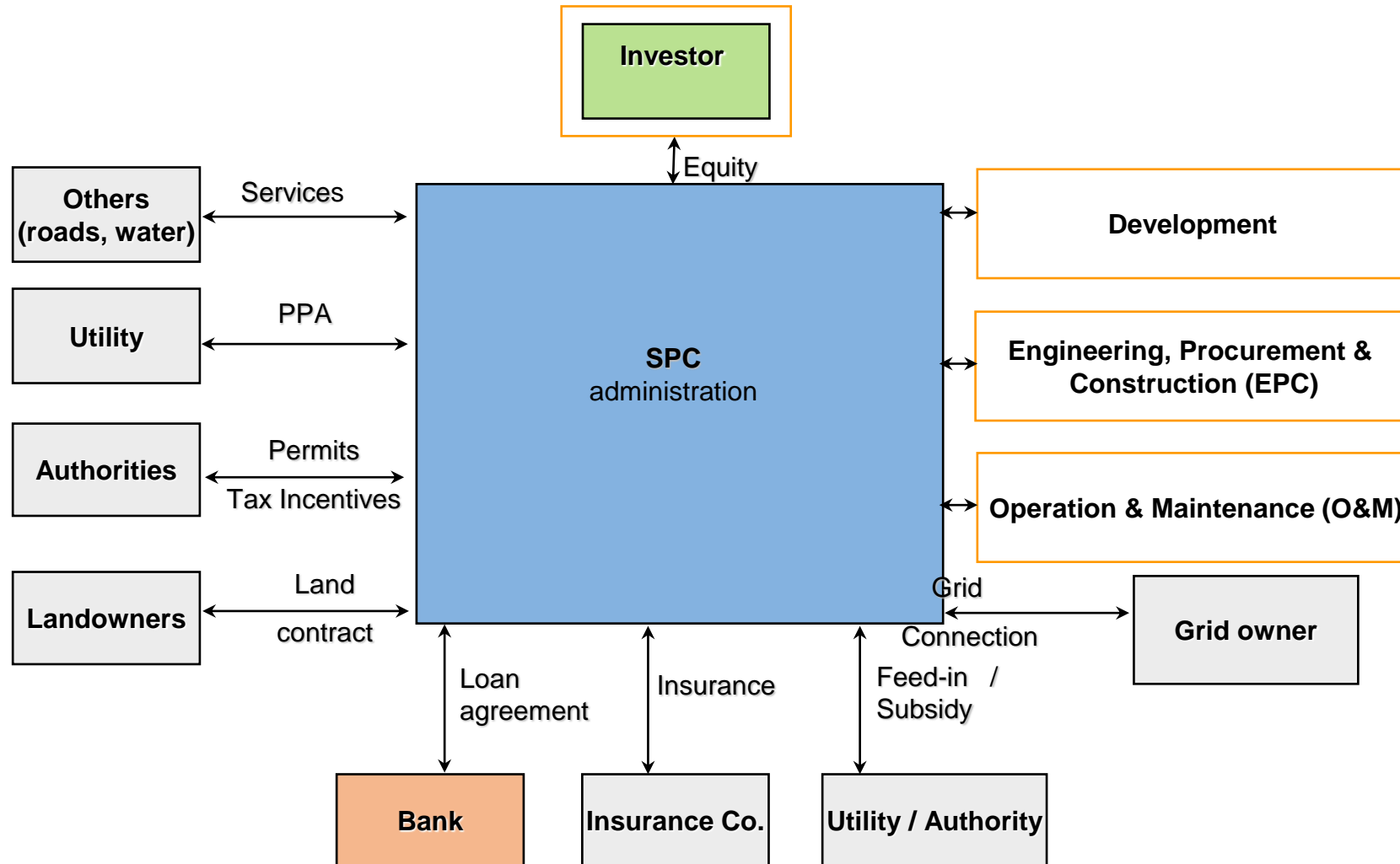


Waste to Energy Plant

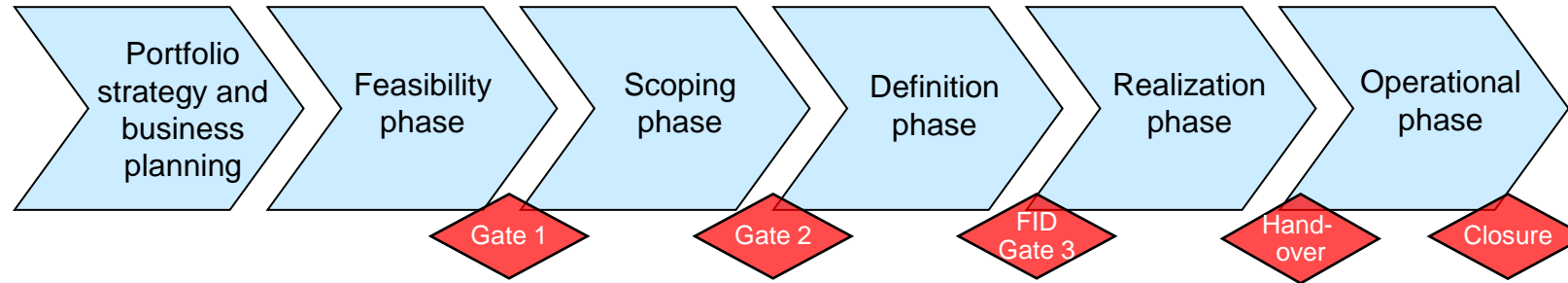


Combined Heat and Power Plant

Structuring of an energy asset in a SPC



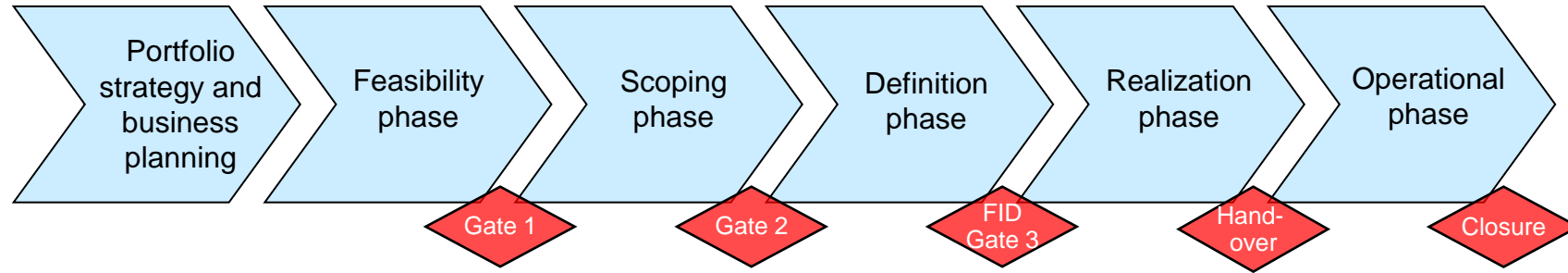
Project lifecycle – overview



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

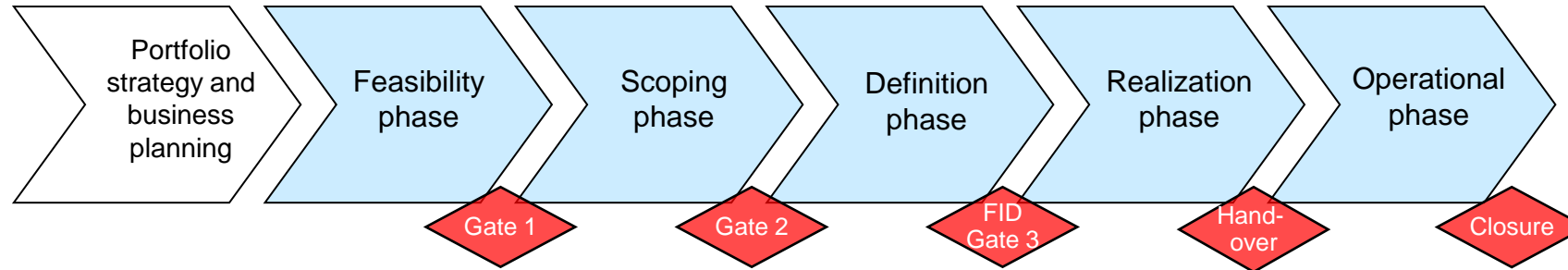
Project lifecycle – overview



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



Purpose

Identification and selection of project opportunities

Deliverables

A business plan including identified opportunities and budget

Activities

Write business plan

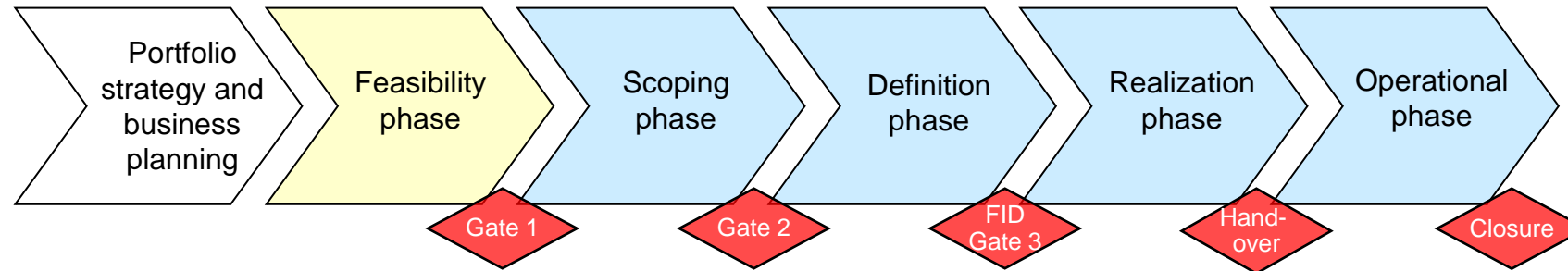
Administration

File and distribute Business plan and allocate budget in ERP accordingly

Decision

Business plan to be agreed in Board

Project lifecycle – overview : Feasibility phase



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, ...)

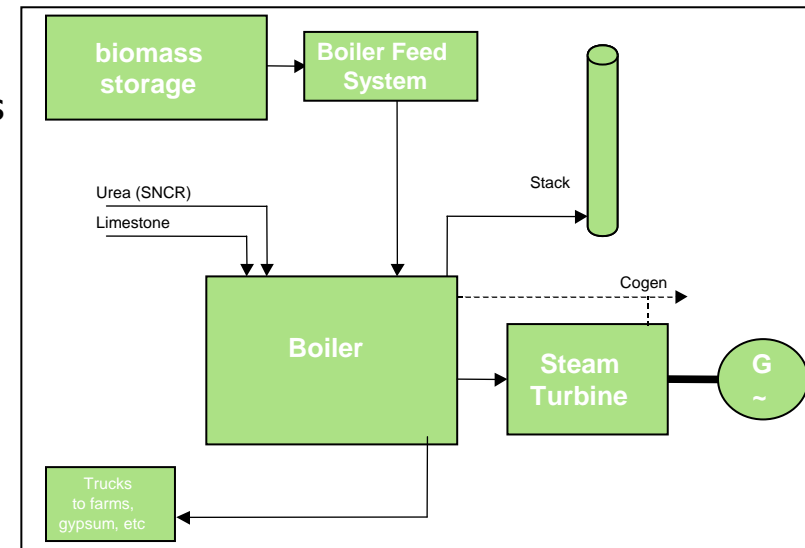
Decision

Outcome (go/no go) to be agreed by senior management

Feasibility phase – Project Bio-energy XL

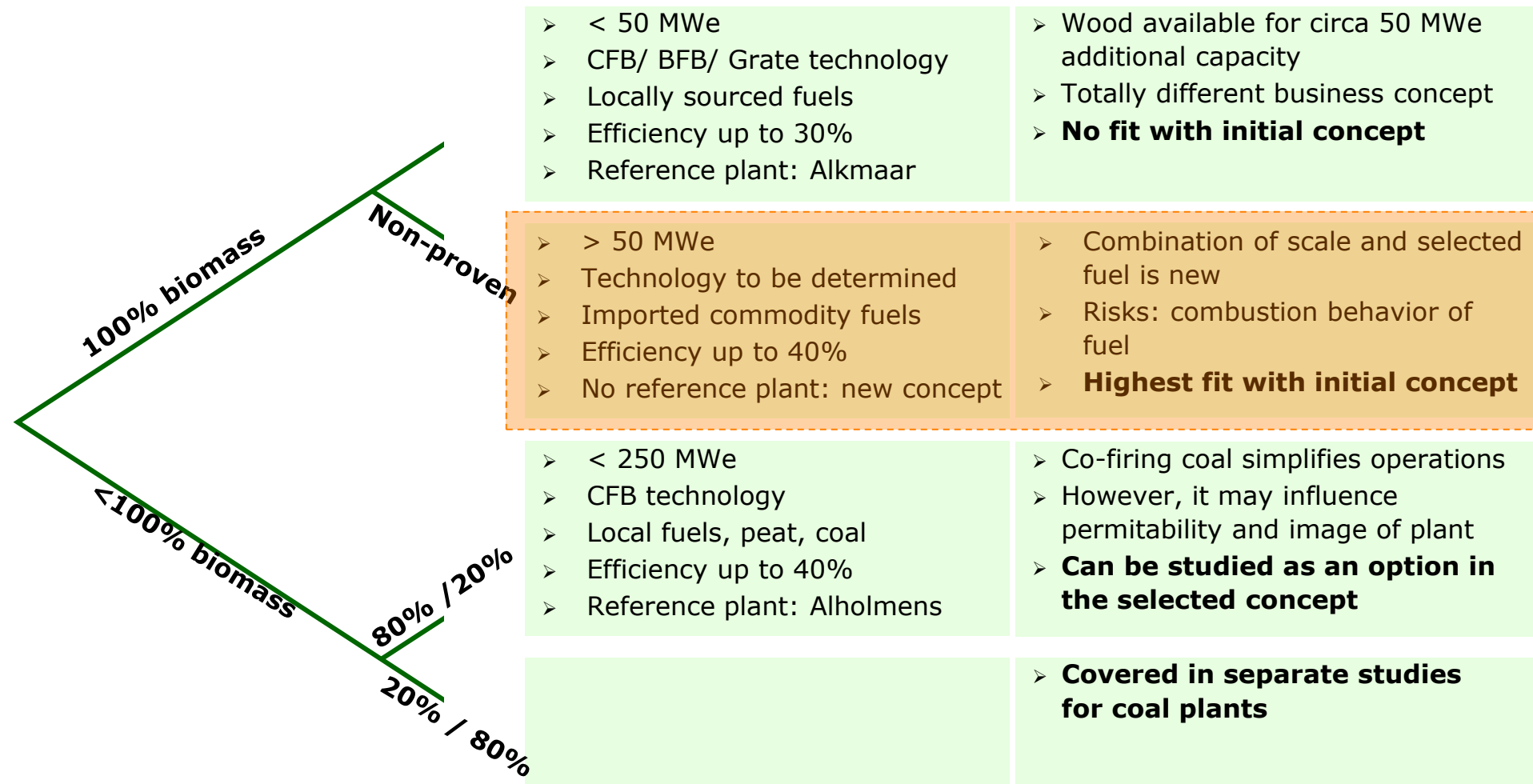
A 250 MWe biomass plant requires 1-2 Mton biomass per year. Due to large fuel volumes, large plot space in sea harbor is required

- 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

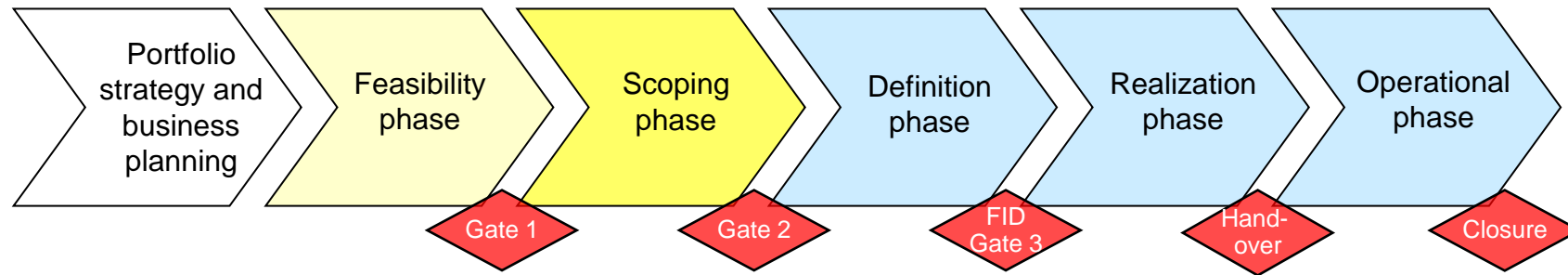


Feasibility phase – Project Bio-energy XL

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

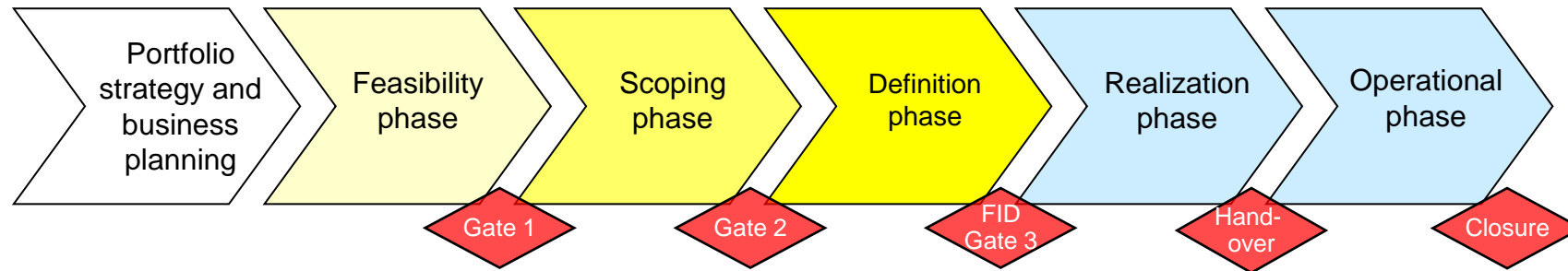


Project lifecycle – overview : Scoping phase



| | |
|----------------|--|
| 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 | <ul style="list-style-type: none"> - 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 realisation 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

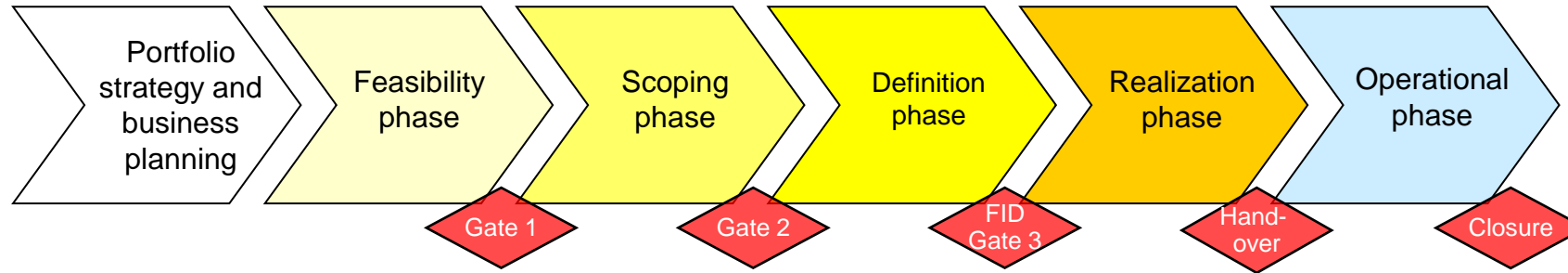
Administration

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



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

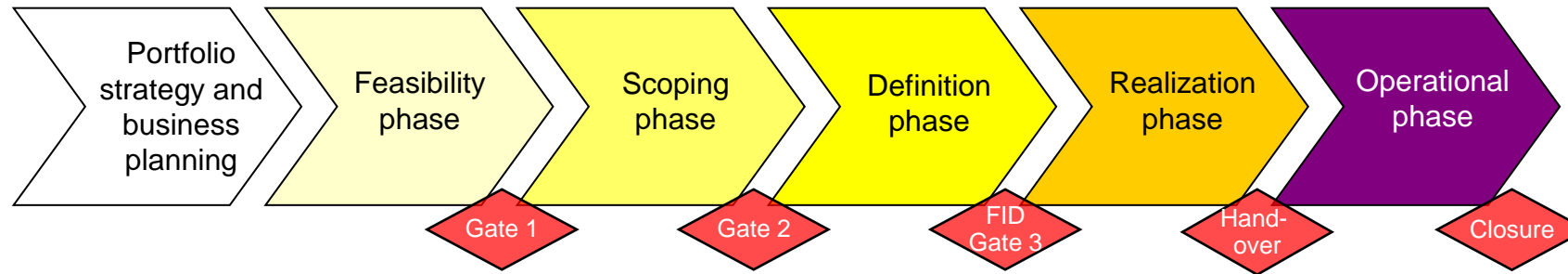
Administration

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)

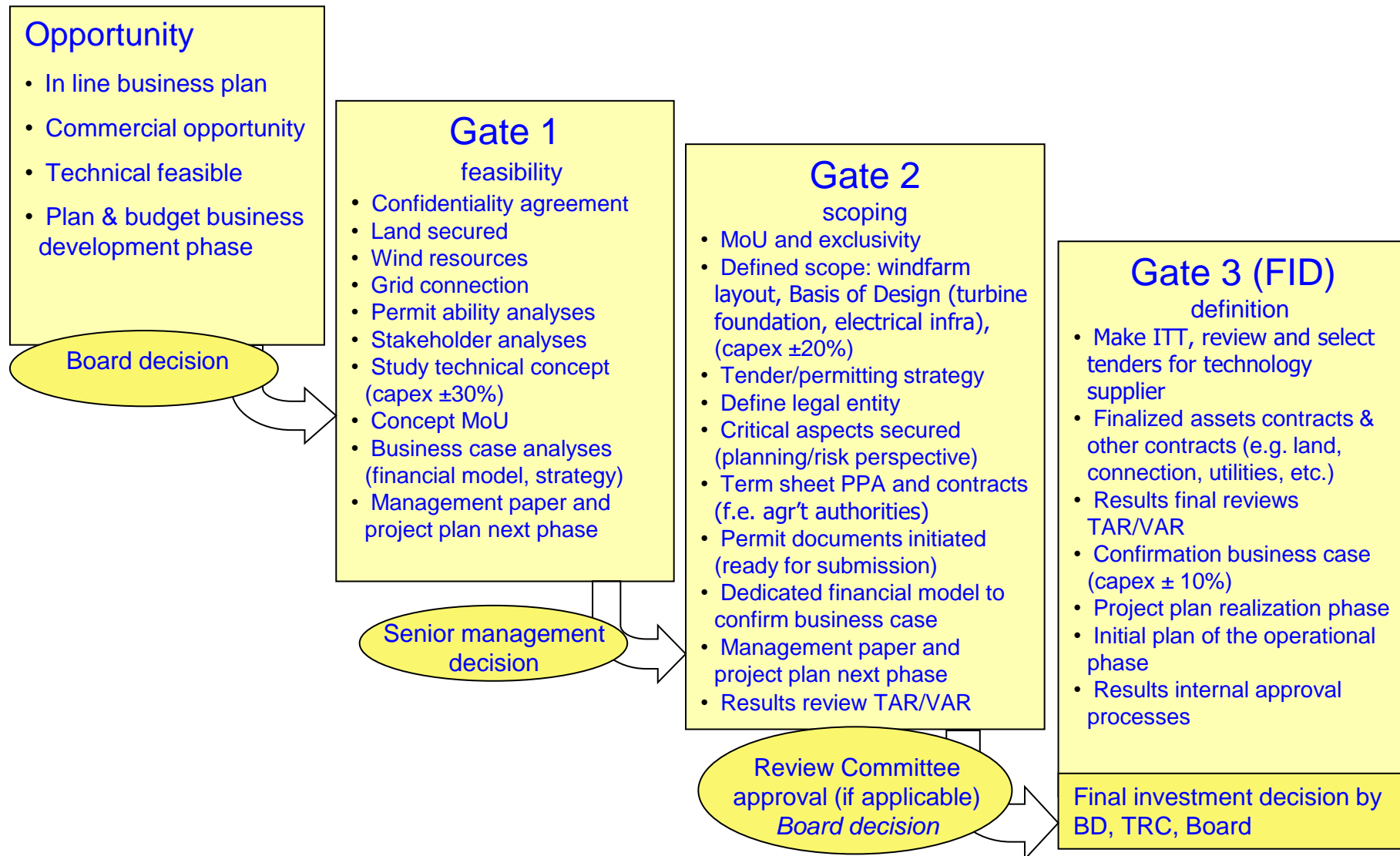
Activities

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

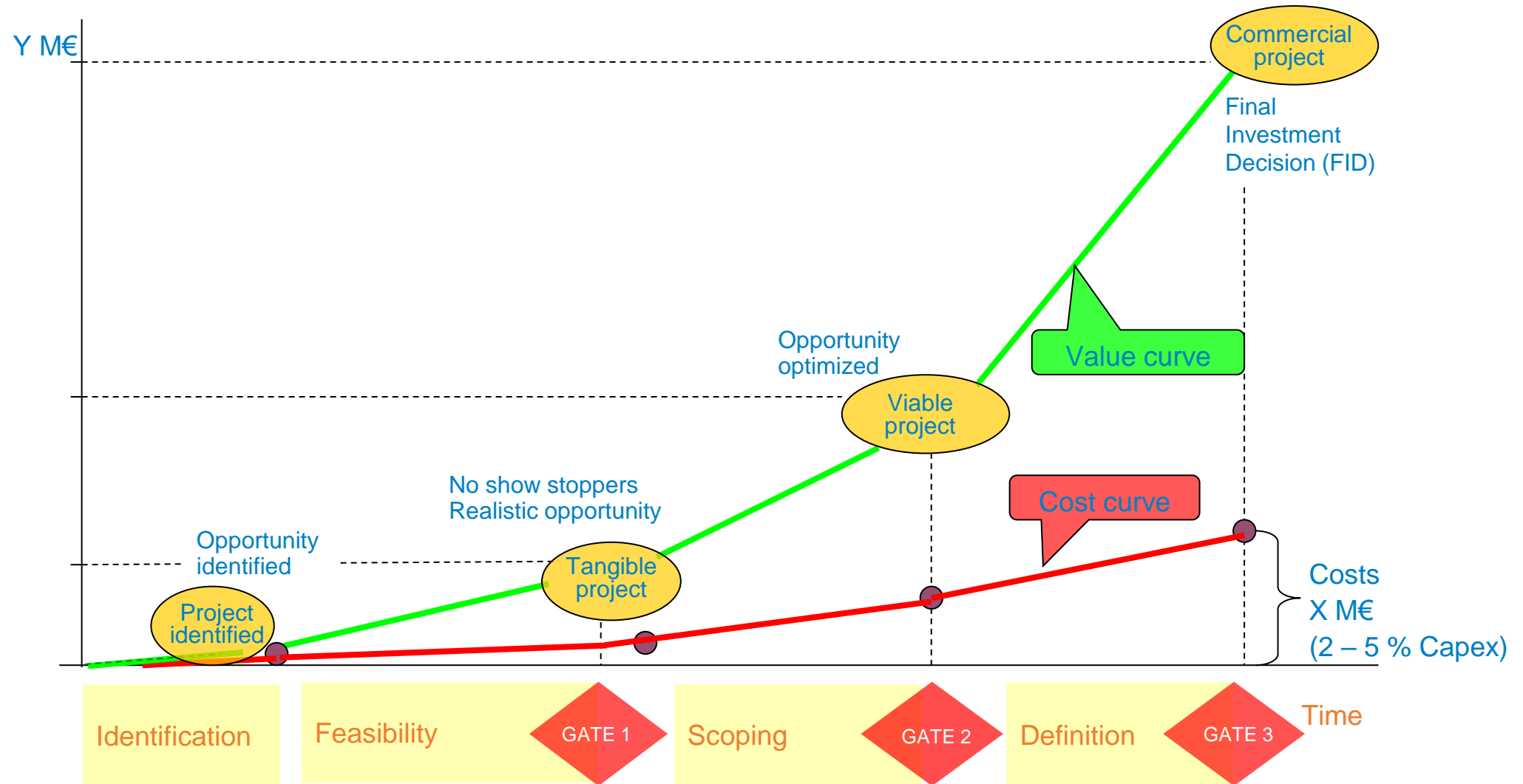
Administration

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

Gate criteria - key deliverables per phase



Value creation during project development RE project



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Case study: Floating Solar Plant



Innovations in technology, concepts and business models

HyET Solar
Flexible light weight solar modules



 **BayWa r.e.**
renewable energy




Solease

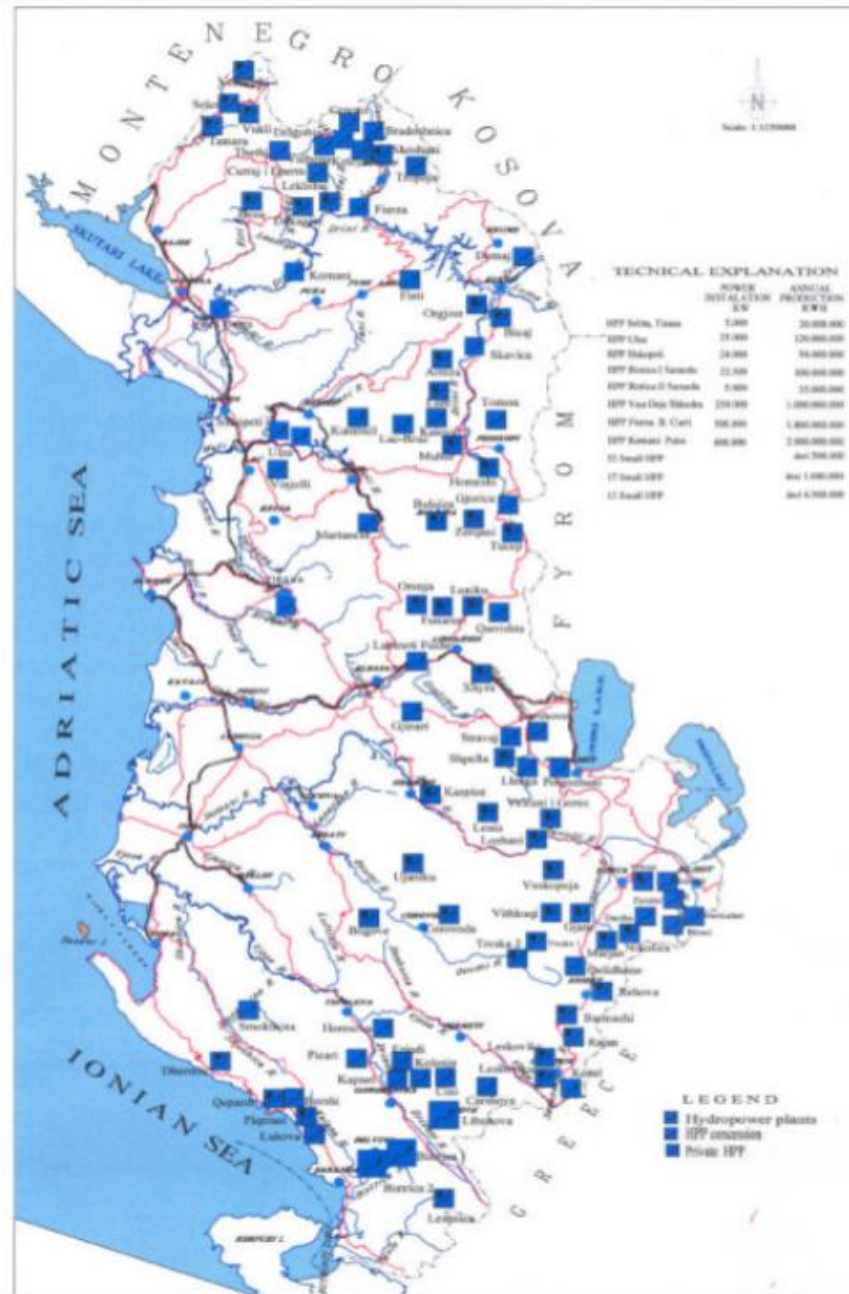


Important elements by developing new concepts

- 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



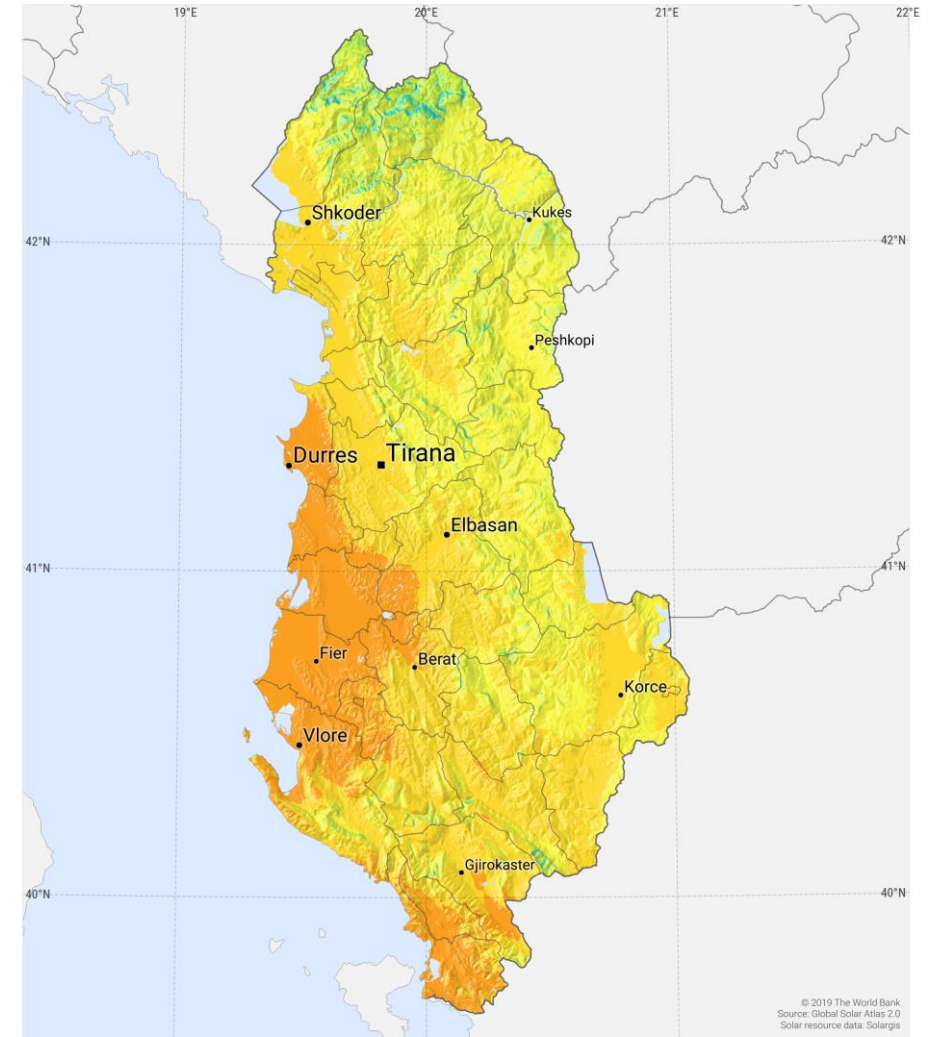
Albania



SOLAR RESOURCE MAP

GLOBAL HORIZONTAL IRRADIATION

ALBANIA



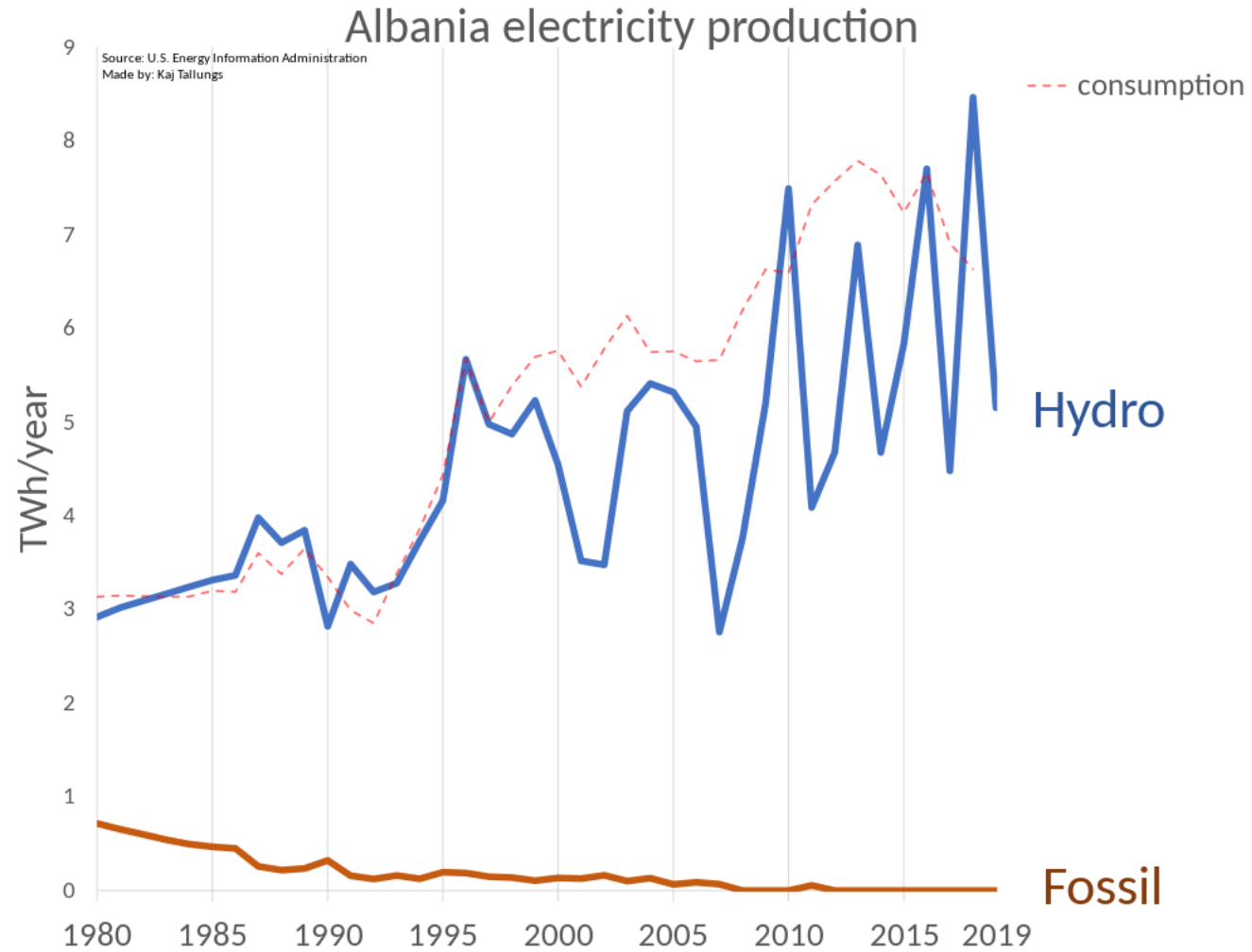
Long term average of GHI, period 1994-2018

| Daily totals: | 3.2 | 3.6 | 4.0 | 4.4 |
|----------------|------|------|------|------|
| Yearly totals: | 1168 | 1314 | 1461 | 1607 |

20 kWh/m²

This map is published by the World Bank Group, funded by ESMAP, and prepared by Solargis. For more information and terms of use, please visit: <http://globalsolaratlas.info>

Case study: Hydropower Albania



Case study: Hydropower Project



Fierza Hydroelectric Power Station

Project assessment at mid-scoping phase

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)

4. Organization & Stakeholders



- RE service contract gives project organization obligations towards local community
- Important to assess commercial feasibility of these obligations

6. Market outlook & Regulations



- Perceived political risk and economic insecurity
- Over-subsidization may trigger counter measures government support

2. Hydro concept & resources



- Management of fluctuations in water supply (seasonal influence)
- Evaluate detailing of hydropower concepts for optimizing production & revenues



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

3. Site & Permits



- Important to make progress in application processes
- Permitting is main cause of delay based on our benchmarking

5. Asset development & Production



- Project development approach can be more robust
- Detailed schedule and progress monitoring needed
- Reviews on value creation and risk management

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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