# Funding and budgeting for Clean Energy Transition Planning

Public Document

## Changelog

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## Project General Information

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|---|---|
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# Contents

# 1 Thematic Module: Funding and Budgeting for Clean Energy Transition Planning

## 1.1 Description

Developing sustainable budget and securing financing for the implementation of Clean Energy Transition projects remains a great challenge for small LRAs at EU level.

According to surveys carried out by the Covenant of Mayors Office and European networks of cities, regions and energy agencies, one of the most urgent barriers in reaching the EU climate and environmental targets is the lack of internal capacities to transform SECAPs into sound investment plans and ensure their successful implementation despite strained public budgets.

Therefore, this module aims at boosting the skills and knowledge of local authorities on how to:

- Develop bankable projects
- Set up innovative financing schemes, business models and partnerships with key stakeholders
- Find the most coherent type and source of funding

The module aims to provides an in-depth exploration of financial mechanisms of different nature, including grants, subsidies and public-private partnerships, and provides practical hints in calculating costs, securing funding, and managing budgets for CETP-related projects.

It aligns with the objectives of the Step-WISE project to create tailored, dynamic capacity-building programs, helping stakeholders become autonomous early adopters of digitized, integrated Clean Energy Transition (CET) plans.

## 1.2 Aim

The aim of the module is:

1. **To give an overview of the main financial funding opportunities available at EU, national, regional and local level**
   This course will provide an understanding of the different typologies of funding schemes available at EU level for the development of CETP. This knowledge will help stakeholders develop informed, actionable strategies.
2. **To examine different types of funding measures:** Funding schemes for building resilience against climate impacts—such as grants, soft loans, equity —will be explored and this will allow to develop informed choice tailored to the specific needs and characteristic on the CETP-related project.
3. **To highlight the importance of a sound budgeting process:** From the outset of a project's planning phase, its sustainability must be given full consideration. It is essential to take into account all costs and revenues associated with the initiative, in addition to the initial investment cost.
4. **To support replication of best practices:** Participants will be encouraged to share successful funding and budgeting scheme from their own regions, with an emphasis on the scalability and transferability of these solutions to other localities. The aim is to equip LRAs with the knowledge and tools needed to replicate successful budgeting processes after the project ends.

### 1.3 Units

This module consists of the 2 Units, each designed for 1-hour sessions, and supported by both printed and electronic materials:

- **Funding for Clean Energy Transition Planning**
- **Budgeting for Clean Energy Transition Planning**

# 2 Description of the unit: Funding for Clean Energy Transition Planning

## 2.1 Description

This unit provides a framework and practical hints on how to secure funding for CETP-related projects.

## 2.2 Learning Outcomes

Upon completion of this module participants should be able to:

**Knowledge**

- Gather an overview of the main sources of **funding** in the context of Clean Energy Transition available at EU, national, regional and local level

**Comprehension**

- Understand the differences between the main **types of existing funding schemes**
- Have clear the main parameters necessary to choose the best funding scheme

**Application**

- Identify the most **adherent/coherent source of funding** according to the project characteristics and the available financial resources

**Analysis**

- Analyse the characteristics of the **different funding opportunities**

**Evaluation**

- Evaluate the suitability of a certain type of funding in relation to **climate action initiatives** in achieving the desired outcomes, such as emission reductions, increased resilience, and improved quality of life for citizens
- Critically assess the **feasibility and scalability** of proposed projects, considering budgetary constraints

## 2.3 Duration

1 hour

## 2.4 Training method

Training will be conducted in the form of in-presence seminars or online webinars.

## 2.5 Training material

After each unit, participants will receive a variety of **educational materials** designed to reinforce and expand on the concepts covered during the session.

Overall, these resources aim to support various learning styles and ensure that participants can engage with the content in multiple ways to enhance comprehension and application.

## 2.6 Content

This unit is meant to provide public CETP promoter with an overview of the potential financial opportunities available for the realization of energy related initiatives, which shall be mapped and analysed according to a set of common features (ticket size, duration, interest rate, requirements, ...).

In order to guide LRAs and other CETP promoters in the choice of the best funding schemes according to the specific characteristics of their initiative, the following steps should be followed:

### 2.6.1 Provide an overview of typical schemes for energy transition projects

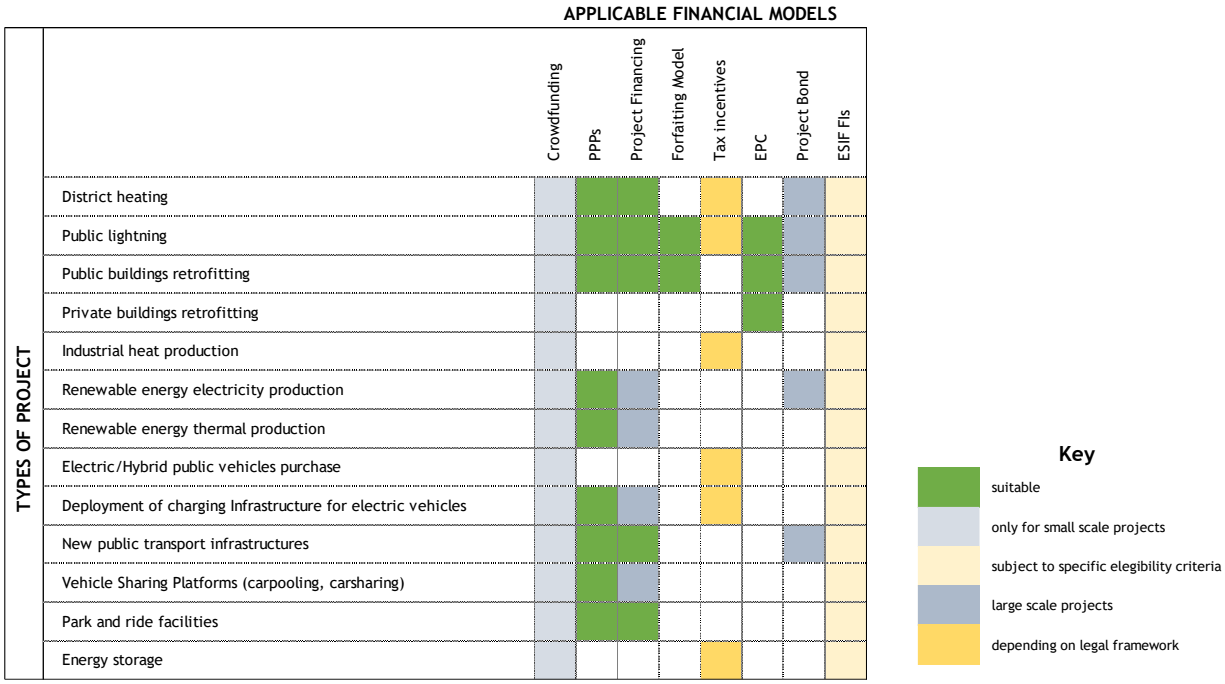
Various sources and types of funding are available at local, regional and European levels, including both public and private funds, combined in traditional and innovative schemes.

| Financial Scheme | Source | Description |
|---|---|---|
| Technical assistance funds | Different entities | Large scale technical assistance resources to develop projects already identified needing dedicated expertise for their structuring. Examples include but are not limited to EIB European Local ENergy Assistance - ELENA, EBRD Green Energy Financing Facility - GEFF, other assimilable European/National Project Development Assistance schemes… |
| Public subsidies | National and Regional Programs | Governmental programs and incentives designed to support clean energy transitions, including planning grants, technology development funds, and policy support |
| | Local Government Funding | Specific regional or municipal programs that focus on sustainability, clean energy planning, and infrastructure modernization |
| | International Climate Finance | International funding sources, such as the Green Climate Fund (GCF) or the Global Environment Facility (GEF), which offer grants for clean energy projects, planning, and capacity building |
| Fiscal incentives / Tax credits | Public funds | |
| Green loans | Private and public financial institutions and banks | Credits and loans are some of the most well–known forms of financing for projects. Both small- and large-scale projects can benefit from such forms of financing. Both private companies and public promoters can access baking lending, but public entities may find it difficult because of balance restrictions. For energy projects, some banks offer specific loans. However, conditions applied by commercial banks may not be competitive.<br>International Financial Institutions, National Development Banks or Commercial Bank with specific programmes may provide loans with lower interest rate.<br>Banking funding can be complemented with grants and/or subsidies. |
| Private sector and impact investment | Corporate Sponsorships | Approach private companies, particularly those with a sustainability or ESG (Environmental, Social, and Governance) focus, for partnership and funding opportunities. |
| | Venture Capital and Private Equity | Investment funds may carry out an institutional investment activity in the medium-long term risk |

| | | |
|---|---|---|
| | | capital of unlisted companies. For infrastructure projects, the investment funds usually invest by increasing capital through the issuance of new shares, or by increasing the nominal value of existing shares. Usually, the investor remains as a partner of the company for a period of at least five years. |
| | Climate and Sustainability-Focused Foundations | Engage with philanthropic organizations like the Rockefeller Foundation, Bloomberg Philanthropies, and others that prioritize supporting clean energy planning efforts. |
| Equity and lending Crowdfunding | Community Investment | Crowdfunding is a financing practice that involves collecting money from a large number of private investors, via online platforms, to fund specific projects.<br>There exist different types of crowdfunding, i.e. equity and lending crowdfunding.<br>Explore local crowdfunding and cooperative models where communities or stakeholders can contribute to planning efforts, particularly in smaller-scale or localized clean energy transitions. |
| 3rd party financing | Public-Private Partnerships (PPPs) and | Collaborate with private sector stakeholders who can co-fund transition planning initiatives, sharing both financial and technological resources (ESCOs, BOT (Build-Operate-Transfer), BOO (Build-Operate-Own).<br>In particular, Public Private Partnerships (PPP) are framework of cooperation between the public and private sectors for the realization and/or management of public works or works of public interest. A PPP is realized through the creation of a dedicated company, called Special Purpose Vehicle (SPV), as a long-term contract (up to 200/30 yr), in which part of the investment and risks is typically bear by the private operator. |
| | Energy Performance Contracting (EPC) | In an EPC a supplier (namely an Energy Service Company – ESCo) provides a range of services aimed at improving the energy efficiency of real estate assets owned by the Municipality, which pays a rent. Savings in excess of the minimum guaranteed level may be shared between the parties. In the event that the minimum is not reached, penalties are imposed on the ESCO. |

Different financial schemes may apply to similar projects: therefore, a dedicated analysis is needed to identify the most appropriate funding.

Based on previous experience and market practices, the following framework emerges:




### 2.6.2 Provide guidance on how to find the best instrument

In the process of choosing the most suitable source of funding for a CET project, some essential parameters need to be taken into consideration:

- Project maturity
- Project size
- Beneficiary (public vs private entity)
- Technology
- Project cashflows
- Project timeline (starting date, next stages for development, ...)
- Instrument timeline (deadlines for submission, minimum duration, …)

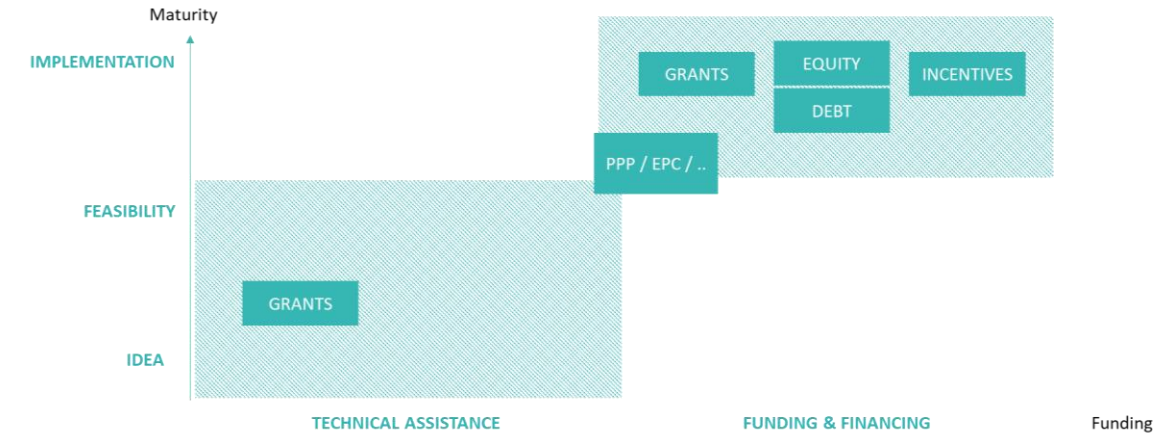
***Project maturity***

Project maturity represents a parameter that deeply influences the choice of the funding scheme.

The first distinction must be made by distinguishing between projects that are at an 'idea' or 'pre-feasibility' stage, and projects for which more in-depth analyses have been carried out and feasibility studies, designs, etc. are already available.
Sometimes this distinction may not be easily depictable, as much depends on the type of project being examined.
In general, 3 macro levels of maturity of a project can be distinguished:

- **IDEA**: no detailed analyses are available, and the project still needs to be defined from a technical and economic point of view, relying on parametric sizing and estimates;
- **FEASIBILITY**: more detailed analyses have been developed in order to quantify investments and have an understanding of technical characteristics. The first design levels are available;
- **IMPLEMENTATION**: once the final design has been carried out, the characterization of the project from a technical and economic-financial point of view is made available, together with a risk analysis; the subsequent step is construction.

The following figure depicts the interrelation between the project maturity and the different types of main funding schemes available.




***Project size***

Project size, i.e the expected investment, also represents a key factor in the funding choice.

Each financial instrument or call has its own requirements. Whether public or private resources are involved, there are often limits to the size of the project, which is equalized to the size of the investment. To give an example, the European Investment Bank (EIB) finances projects capable of activating at least EUR 30 million of investment through the ELENA programme, while calls promoted by the regions under the European Development Fund (ERDF) tend to be smaller in size, up to a maximum of EUR 500,000 (varying according to the specific financing measure).

***Beneficiary***

Different funding schemes apply to different typologies of beneficiary, which in most cases coincide with the project promoter.

The main difference concern public and private nature of beneficiary. In fact, public entities may face specific regulatory constraints for activating investment and/or apply to certain type of funding, while private subjects may be excluded from public funding for their profit-purpose nature and often present a higher investment risk.

***Technology***

The technology assets necessary to carry out a CET project represent another key parameter that orient the choice of a funding scheme.

In fact, CET project often requires the use of advanced technology to foster decarbonization processes emission targets and meeting the objectives of the identified local adaptation and mitigation strategy.

Although the cost for implementing new technologies is generally high in terms of CAPEX, different groups of technologies (electrical renewables, thermal renewables, cogeneration of Heat and Power, electric mobility, energy storage, energy Efficiency in Buildings…) present different characteristics (apart for risk of construction, particularly for what concerns durability and maintenance needs) that adheres to different types of therefore funding.

***Project cashflows***

The possibility for the project to generate positive cash flows, especially from the early stages of its realization, is a discriminating factor between the two broad categories of resources, i.e. grant and debt. Although applicable, and to almost all projects, a grant is instead necessary when the project is unable to achieve sustainability, and its realization can only depend on resources that do not have to be repaid over time. This is typically the case for infrastructures or public works, which perform a function for the community, such as schools or hospitals. Again, the possibility for the project to generate flows also makes it possible to attract private capital, as in the case of PPPs and EPC contracts, or banking - where in addition to the return of capital, interest is also added.

***Project timeline & Instrument timeline***

Typically, these two dimensions must be assessed together. The timing of the project must be aligned with that of the funding sources in terms of both development and duration. As an example, some public calls, which typically have a limited time window for participation, may require specific documentation at the application stage: it is therefore necessary for the promoter to make an early effort to get to the submission stage with all the necessary documents. Similarly, the timing of application, evaluation and disbursement of funds should be known in order to be able to properly assess them in relation to the project's objectives: the aforementioned ELENA funds typically require 9 to 12 months to complete the application process and start the project.

Therefore, an LRA must therefore allow adequate time:

- for the project to develop to the required level, and
- for the resources to be obtained.

Another example concerns the duration of projects: ELENA always finances projects lasting three to four years. In other cases, however, the work is expected to be completed in less time.

A variety of tools and methods exist to smooth the research and choice process.

For example, the Covenant of Mayors website offers a comprehensive overview on financing opportunities, that allows interested users to filter available financial opportunities according to the

- Type of support needed
  - hiring of experts / preparation of bankable projects
  - SECAP development
  - SECAP implementation (hard measures)
  - SECAP implementation (soft measures, e.g. awareness raising, stakeholder engagement)
- Type of beneficiary
  - Academia
  - Coordinators
  - Signatories of CoM
  - Supporters
- Country
- Sector
- Type of funding
- Project size
- Co-funding

### 2.6.3 Provide examples of available instruments/fund

Various sources of funding are available at local, regional and European levels, including the local authority's own resources, resources of local partners, public-private partnerships, municipal, regional and national grants.

In particular, the European Commission is strongly committed to mobilizing financial resources through dedicated programs and political support at European level. The most important funding and financing schemes are listed below:

| Type of funding | Name | Description |
|---|---|---|
| Technical assistance | Smart Cities Marketplace (SCM) | The Smart Cities Marketplace is a European Commission platform bringing all urban actors together, to support the green, digital and just transition in cities, with a focus on small and mid-sized municipalities. The platform collaborates closely with the Covenant of Mayors, the EU City Facility (see below) and many other initiatives. It offers hands-on capacity building and know-how, and features an integrated Explore-Shape-Deal Matchmaking process to help exploring the possibilities, shaping project ideas, and closing a deal for financing with any of the members of the Smart Cities Marketplace's Investor Network – a steadily growing catalogue of opportunities |
| | **European City Facility (EUCF)** | The pan-European City Facility is set up under Horizon 2020. The EUCF supports municipalities, their groupings, as well as local public entities aggregating them across Europe to develop investment concepts and accelerate investments in sustainable energy. With a 60,000 € grant, the EUCF finances services and activities to support the development of investment concepts, such as (technical) feasibility studies, analyses of the market analyses, of the stakeholders, of the risks, legal, economic and financial analyses, etc. The grant is not meant to directly finance investments. |
| Temporary grant | **NextGenerationEU** | NextGenerationEU (NGEU) is the temporary instrument designed to boost the recovery, as part of the largest stimulus package ever financed in Europe. The Facility is available to member states but can also serve to finance local projects |
| | **Recovery and Resilience Facility** | The Facility is a temporary recovery instrument that allows the Commission to raise funds to help repair the immediate economic and social damage brought about by the coronavirus pandemic. It finances recovery and resilience plans submitted by Member States, including reforms and investments to be implemented by end of 2026 |
| Bonds | **NextGenerationEU Green Bonds** | Environmental, Social, and Corporate Governance (ESG) labelled bonds are a fast-growing segment in capital market. As part of NextGenerationEU the European Commission's will issue 30% of the NGEU Facility as green bonds. The objective of these bonds is: |

| | | |
|---|---|---|
| | | • Providing access to a wide range of investors, in particular ESG-focused investors, in line with the objectives of the NextGenerationEU funding strategy.<br>• Boosting the size of the green bonds' market and inspire more issuers to issue green bonds.<br>• Increasing the financial flows to green technologies with risk potential, thus benefitting the real economy in the longer run, thanks to the increased availability of a safe and sizeable green asset to diversify green investments. Investments in riskier green projects can be balanced out with safe NextGenerationEU green bonds. |

Other important sources of funding are provided by:

- European Investment Bank
- Cohesion Fund
- European Regional Development Fund
- European Social Fund

The specific characteristics of the different EU funding schemes and sources will be further explored in the training material.

What is more, different types of funding opportunities are available at national, regional and local levels. The analysis of the specific characteristics of country-, local- and regional-specific available funding opportunities will be further detailed in the training material.

## 2.7 Step-WISE toolkit potential

The Step-WISE toolkit allows LRAs to create and characterize their CETP-related project, especially for what concerns the abovementioned parameters. In this way, LRAs can rely on **concrete data and visualizations that can be presented to potential investors and/or in case of an application to a public fund**.

## 2.8 Assessment

In order to evaluate comprehension, participants will be asked to perform a self-assessment exercise, and in particular to describe in brief the following questions:

- Which funding scheme do you believe is suitable for your city or region, and why?
- What are the key challenges you foresee in activating those resources, and how could these be overcome?

This exercise encourages participants to apply the knowledge they've gained to their own local context, while also prompting critical thinking about practical challenges and potential solutions.
The goal is for participants to develop a deeper understanding of the financial and economic side of energy transition and recognize how they can be adapted for their specific urban environments.
In order to assess the quality of the training, questions will be developed accordingly.

# 3 Description of the unit: Budgeting for Clean Energy Transition Planning

## 3.1 Description

This module provides practical hints in calculating costs and managing budgets for CETP-related projects.

## 3.2 Learning outcomes

**Knowledge**

- Understand what are the main categories of costs that need to be accounted for in a CETP project
-

**Comprehension**

- Have clear the definitions of different voices related to an energy transition budget
- Understand the main parameters needed to evaluate the financial sustainability of a CET project

**Application**

- Structure a tailored budget analysis based on benchmark costs according to the project characteristics and the available financial resources

**Analysis**

- Analyse the main financial factors of a energy transition plan

**Evaluation**

- Evaluate the suitability of a certain type of investments in relation to the desired outcomes of the specific CETP
- Critically assess the **feasibility and scalability** of proposed projects, considering budgetary constraints

## 3.3 Duration

1 hour

## 3.4 Training method

Training will be conducted in the form of in-presence seminars or online webinars.

## 3.5 Content

When developing an CET-related project, an economic analysis should always be included, thus presenting the foreseen costs and quantifying the required investment.

The particularity of CET projects is that the CAPEX (initial investment) is very large compared to the OPEX (maintenance, taxes, administration, rents, etc.). Indeed, most of the costs come from the infrastructure and technology itself rather than from its operation.

Key questions to be addressed are:

1. What is the expected cost for the intervention?
2. How should the investment be realized?
3. How many own resources (equity) available?
4. Which is the development schedule and relevant milestones for the realization of
5. the initiative?
6. What are the financial needs?

7. Which are the costs drivers (i.e., O&M, insurance costs, concession fees, grid connection charges, etc.)? And the revenue streams?
8. Who is bearing the investments and who are the other stakeholders involved?
9. What are the potential sources of funding?
10. What is the time plan to obtain the required funding and the most adherent pay-back period?
11. Is the profitability in line with the expectations? And with market benchmarks and
12. practices?

### 3.5.1 Definitions

In order to align understanding about the main financial parameters employed in the below analysis, some preliminary definitions are needed.

- **Cost**: monetary value of expenditures for services, supplies, raw materials, labour, products, equipment, etc. Cost is an amount that is recorded in bookkeeping records as an expense.
- **Investment**: an asset or item acquired to generate income or gain appreciation. Appreciation is the increase in the value of an asset over time. It requires the outlay of a resource today, like time, effort, and money for a greater payoff in the future, generating a profit.
- **Cost of investment**: The amount of money spent for the investment, investment expenditure required to exercise the option (cost of converting the investment opportunity into the option's underlying asset, i.e. the operational project).
- **Return on investment (ROI)**: performance measure used to evaluate the efficiency or profitability of an investment or compare the efficiency of a number of different investments. ROI tries to directly measure the amount of return on a particular investment, relative to the investment's cost. Key factors influencing ROI include the initial investment amount, ongoing maintenance costs, and the cash flow generated by the investment. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment. The result is expressed as a percentage or a ratio.

### 3.5.2 Economic and financial profile of the initiative

Also, the economic and financial profile of the initiative needs to be defined. This means **assessing the viability from the economic-financial point of view**, assessing whether the examined initiative worth the investment, its profitability is in line with the expectations and/or which is the best financial structure to carry this out.

Minimum contents to be addressed are:

- Underlying hypothesis (Assumptions on costs and revenues; Expected investments; Development schedule; Further hypothesis)
- Financial structure (equity, loans, others)
- Revenues streams and costs
- Gross operating margin (EBITDA)
- Amortisation & Depreciation
- Taxation
- Summary schedules (EBITDA, Income statement, Balance sheet)
- Project cash flows
- Profitability and bankability indicators (Project Profitability, Project Payback Period, Shareholders' Payback Period, Bankability indicators)

So, in order to have a sound financial and investment plan, the following actions should be carried out:

- Determine the costs and revenues associated to the initiative
- Estimate the investment (CAPEX) associated with the project, including all other cost components of the chosen technical solution
- Identify the financial resources already available, the target financial structure taking into account repayment strategies for any borrowed funds
- Develop relevant KPIs and bankability indicators (Project Profitability, Project Payback Period, Shareholders' Payback Period, Bankability indicators)
- Create a balance sheet and develop a finance plan
- Assess the economic-financial feasibility
- Quantify the economic-financial indicators and KPIs

### 3.5.3 Step-by-step: Develop a detailed budget plan

1. **Budgeting for diverse activities**:
   - **Technology feasibility and assessment**: Budget for technical evaluations of potential renewable energy technologies, grid infrastructure, and energy storage systems.
   - **Consultation and stakeholder engagement**: Ensure funding are allocated for consultations, public outreach, and stakeholder engagement throughout the planning process.
   - **Initial planning and research**: Allocate funds for feasibility studies, data collection, and policy research that will inform the transition plan.
   - **Technology costs**: Estimate the costs of implementing new technologies such as solar panels, wind turbines, grid modernization, and energy storage solutions.
   - **Infrastructure upgrades**: Account for investments in upgrading existing energy infrastructure, including grid enhancements, energy storage facilities, and smart meters.
   - **Workforce development and training**: Include funding for workforce retraining, skill development, and capacity building for workers involved in clean energy sectors.
   - **Operational costs**: Budget for ongoing operational costs such as project management, regulatory compliance, procurement, monitoring and evaluation, and maintenance of infrastructure.
   - **Research and Development (R&D)**: Ensure funding for R&D to explore new technologies, improve existing systems, and optimize energy efficiency.
2. **Align funding with policy and regulatory frameworks**
   - **Incorporate policy alignment**: Ensure that the budget and funding sources align with national, regional, and international clean energy policies and commitments, such as the Paris Agreement.
   - **Leverage policy incentives**: Take advantage of existing or upcoming policies that provide financial incentives for clean energy projects (e.g., renewable energy standards, carbon pricing, and energy efficiency programs).
   - **Compliance costs**: Include the costs associated with meeting regulatory requirements, such as environmental impact assessments and carbon emissions reduction targets.
3. **Establish financial Oversight and Accountability Mechanisms**
   - **Transparent financial reporting**: Implement systems for transparent tracking and reporting of funds spent, ensuring accountability and compliance with funding agreements.

- **Risk management**: Assess potential financial risks related to project delays, cost overruns, and unforeseen market conditions. Allocate contingency funds to address these risks.
- **Auditing and monitoring**: Regularly audit project budgets and expenditures and conduct performance reviews to ensure alignment with clean energy goals.

4. **Adopt a phase-based approach**
   - **Initial planning phase**: Allocate funding for initial research, feasibility studies, and stakeholder consultations to inform the clean energy transition roadmap.
   - **Mid-planning phase**: Budget for activities such as policy design, scenario modeling, and technical assessments that support the development of actionable plans.
   - **Implementation and scaling phase**: Ensure that there are sufficient funds for the transition planning's later stages, including implementation frameworks, monitoring, and assessment tools.
5. **Investment Strategy**
   - **Short-Term Investments**: Prioritize investments in areas that can deliver immediate emissions reductions or cost savings, such as energy efficiency measures or small-scale renewable energy projects.
   - **Long-Term Investments**: Focus long-term funding on large-scale infrastructure projects like grid transformation, widespread renewable energy deployment, and large-scale storage systems.
6. **Monitor and evaluate progress**
   - **Impact Assessment**: Budget for ongoing monitoring and evaluation to assess the effectiveness of clean energy transition investments.
   - **Adapt and adjust**: Be prepared to reallocate funds as necessary based on outcomes and challenges encountered, ensuring that the transition remains flexible and adaptable.

### 3.5.4 Best practices to reduce costs

Renewable energy projects (especially wind and solar) present high upfront capital expenditure (CAPEX) as well as relevant ongoing operational expenditure (OPEX). These costs can create significant challenges, often making it hard for promoters. In this chapter, best practices connected to CET-related project to minimize costs while maximizing efficiency and value for renewable energy technologies are explored.

#### *3.5.4.1 Optimizing site selection and resource assessment*

Proper site selection minimizes grid connection challenges and reduces land acquisition costs. This plays a critical role in determining long-term financial success. For example:

- **Wind Projects**: Conduct thorough wind resource assessments to identify areas with consistent wind speeds. According to the IRENA Future of Wind Report, global wind capacity factors range between 30-45%, depending on technology and site conditions.
- **Solar Projects**: Leverage satellite data and on-site solar irradiance measurements to pinpoint high-sunlight regions.

Leveraging advanced geographic information system (GIS) tools can streamline this process and provide a data-driven foundation for renewable energy investment.

#### *3.5.4.2 Leveraging economies of scale*

As projects scale up, the per-unit cost of equipment, installation, and operations tends to decrease. Promoters can take advantage of economies of scale by:

- Aggregating smaller projects into larger portfolios to negotiate better deals with suppliers.
- Standardizing designs to reduce variability and increase manufacturing efficiency.
- According to the IEA Energy Technology Perspectives 2020, economies of scale have significantly driven down costs for solar PV and wind over the last decade, by sharing infrastructure such as substations and transmission lines.

#### *3.5.4.3 ~~3~~. Embracing advanced renewable energy technologies*

Incorporating innovative renewable energy technologies can lower both CAPEX and OPEX:

#### *3.5.4.4 4. Mitigating supply chain disruptions*

Supply chain disruptions can significantly increase project costs. To mitigate this risk, promoters should:

- Build strong relationships with diverse, reliable suppliers.
- Find local sources where it is possible to minimize shipping costs and delays.
- Plan for long lead times for critical components like transformers and inverters. According to a McKinsey report emphasizes the importance of proactive risk management.

#### *3.5.4.5 6. Enhancing Operational Efficiency*

Ongoing operational costs can often exceed initial capital investments over the lifetime of a project. Best practices for lowering OPEX include:

- Proactive and systematic maintenance: Use drones and sensors for faster and more cost-effective inspections of wind turbines and solar panels.
- Energy Storage: Integrate battery storage systems to store excess energy and stabilize supply during peak demand.
- Workforce Training: Invest in skilled personnel to ensure efficient operations and reduce the likelihood of costly errors.

Reducing CAPEX and lowering OPEX in renewable energy projects is not just about cutting costs but also about creating resilient, scalable systems that deliver long-term value.

These strategies not only make renewables more affordable but also ensure that they remain a cornerstone of the transition to a sustainable future. With the right approach, renewable energy investment can be both economically viable and environmentally impactful.

## 3.6 Training material

After each unit, participants will receive a variety of **educational materials** designed to reinforce and expand on the concepts covered.
Overall, these resources aim to support various learning styles and ensure that participants can engage with the content in multiple ways to enhance comprehension and application.

## 3.7 Step-WISE toolkit potential

In the budgeting process, the Step-WISE toolkit can provide efficient inputs for investment estimation, as it quantifies the costs in particular for what relates to the CAPEX category (costs for materials, installations, …).

Specifically, by modifying the inputs for different scenarios, the software allows to discern the amount of investment needed for the different sectors (mobility, energy, public lighting…).