

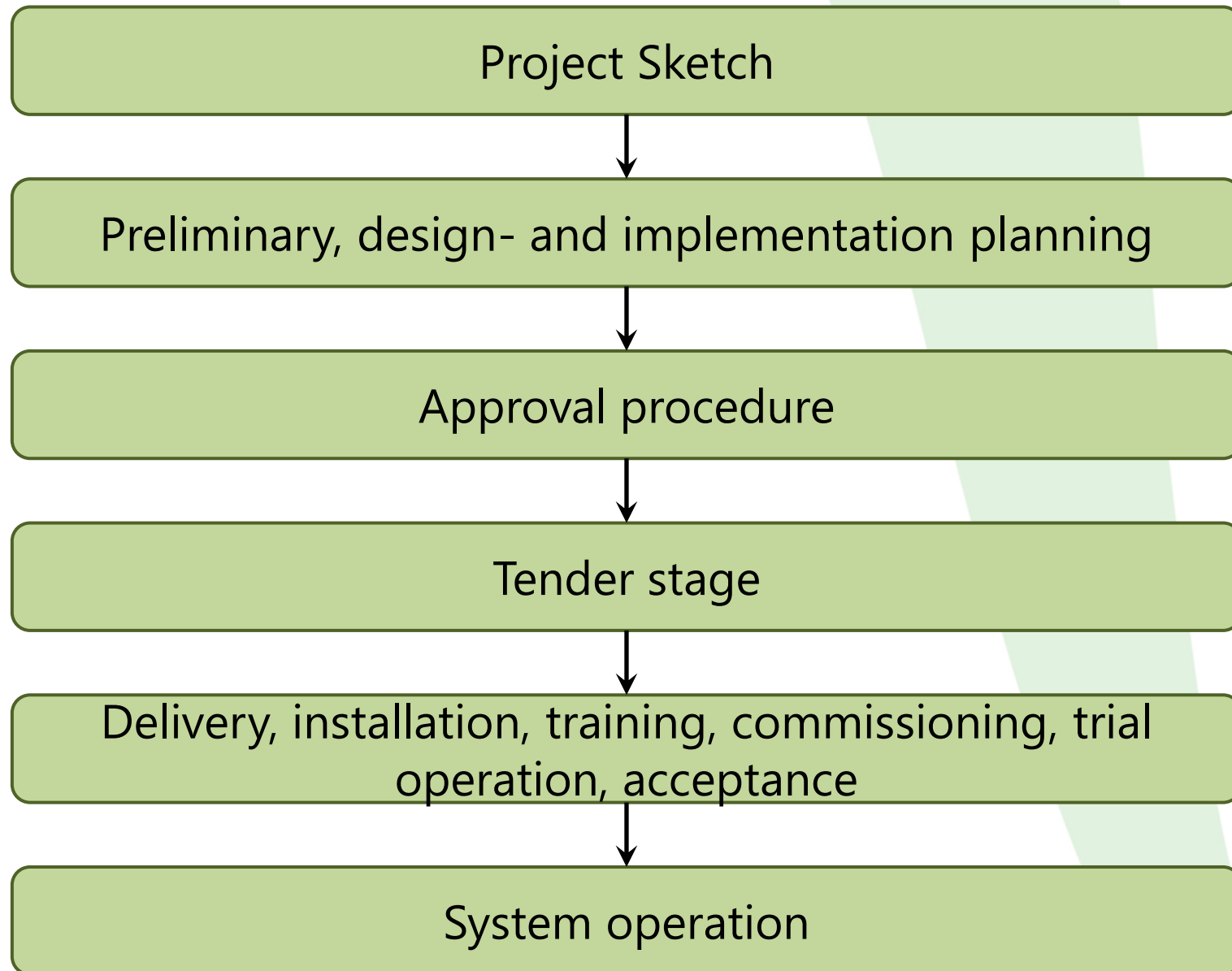
Guidelines for planning solid biomass fuelled heat plants

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CRES

General Procedure / Project stages



1. Organisation of project and cross-sectional tasks

Project management

- Superordinate process to organize work packages
- Ensure an execution in line with timeline

Cross sectional tasks

- Evaluation for finance and funding
- Specific public relation
- Selection of suitable operator model and legal form
- Quality Management

1.1 Project Management

Main tasks

- General project planning, project structure
- Determination of responsibilities
- Scheduling of work packages following a top down approach

Work packages should include:

- Fixes dates
- Person assignments
- Estimated / calculated costs
- Monitoring during the course of the project
- Permanent risk management
- Documentation

1.2 Project Management

Project Schedule for a heating plant with 500 kW to 1,000 kW

Stage	months												
	01	02	03	04	05	06	07	08	09	10	11	12	
Sketch	█												
Planning				█									
Approval						█							
Tendering							█						
Realisation								█					

1.3 Financing and promotion opportunities

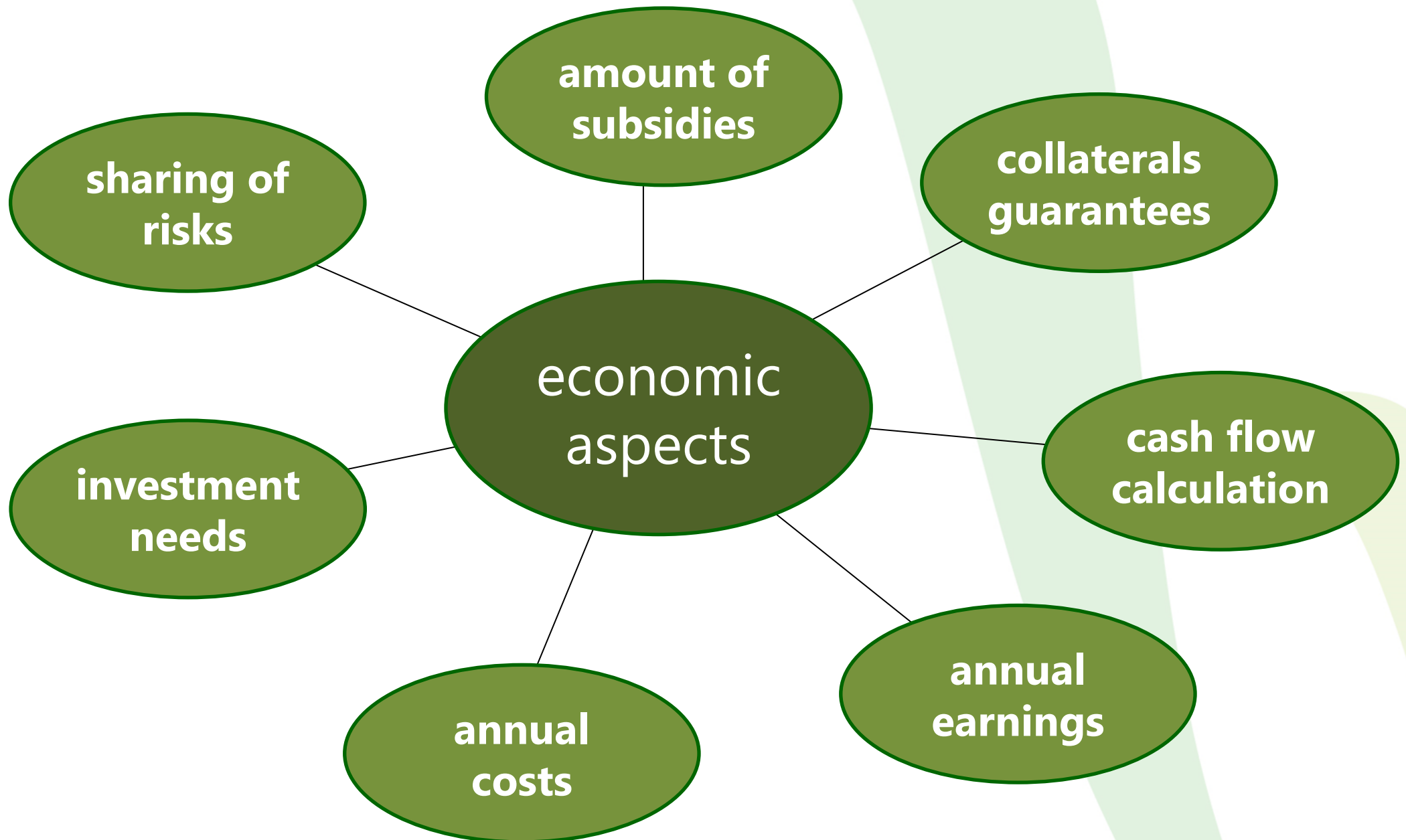
Financing Options

- Own resources
- Bank loan
- Contracting
- Fund financing and leasing is unusual for in-house installations

Required frame conditions

- Mature technology, future-proof, sustainable
- Secure fuel supply
- Assured sale for heat and power

1.3 Financing and promotion opportunities



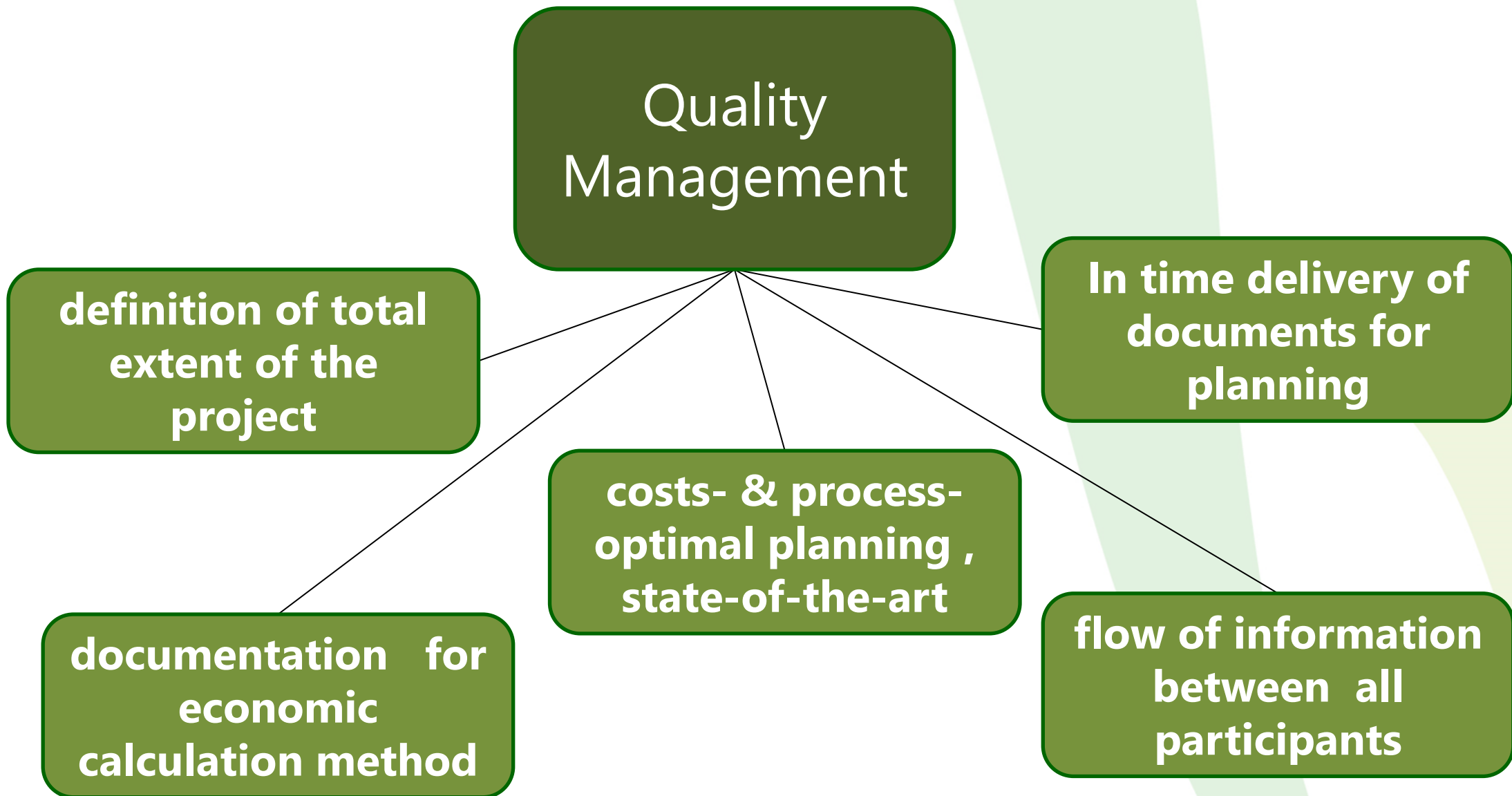
1.4 Public Relations

- **Important for a successful implementation of a project**
- **Negative attitude can be caused by**
 - Lack of information
 - Late of public participation
- **Ideal point in time for public information after project outline**
- **Activities for Public Relation**
 - information like: visitation, flyer, information board
 - Active involvement like: citizens meeting, round table
 - Comprehensive involvement: options for economical participation such as energy cooperative society

1.5 Operating models and legal forms

- **Depends on national statutory framework and kind of the project**
- **Legal Form is closely connected to the chosen operator model**
- **In Germany commonly indoor installations are organised as part of the customers business, some times as an extra limited liability company**
- **Contracting models could be an option, if the customer like to source out the effort for installation and operation**

1.6 Quality Management for wood-fired heating



2. Project Outline and Feasibility Study

- **Multilevel and iterative Project development**
- **Analysis of technical, economical and other aspects**
- **Project outline**
 - Targeting on project evaluation for the initiator himself
 - Identification of obstacles and conceptual weaknesses
- **Feasibility Study**
 - Targeting on support for ultimate decision (pro or contra)
 - Wide experienced risk assessment, different layouts and concepts
 - More detailed than the project outline, mostly done by external experts

2. Project Outline and Feasibility Study

General content of a project outline or a feasibility study

Technical Aspects	Economical Aspects	Other Aspects
Edge conditions (location, heat demand)	Economic frame conditions and basic data	Preliminary definition Project participants Organisation structure
Available fuel (choice, amount, supply chain)	Investment calculation	Examination for licensing requirement
Rough plant concept (conversion, building, ash disposal)	Economic assessment	Evaluation of acceptance and public relation
Pre-planning for distribution of heat, cooling, power feed-in	Evaluation for funding opportunities	Preparation for following realisation steps

2.1 Analysis of Technical Aspects I

- **Edge conditions**

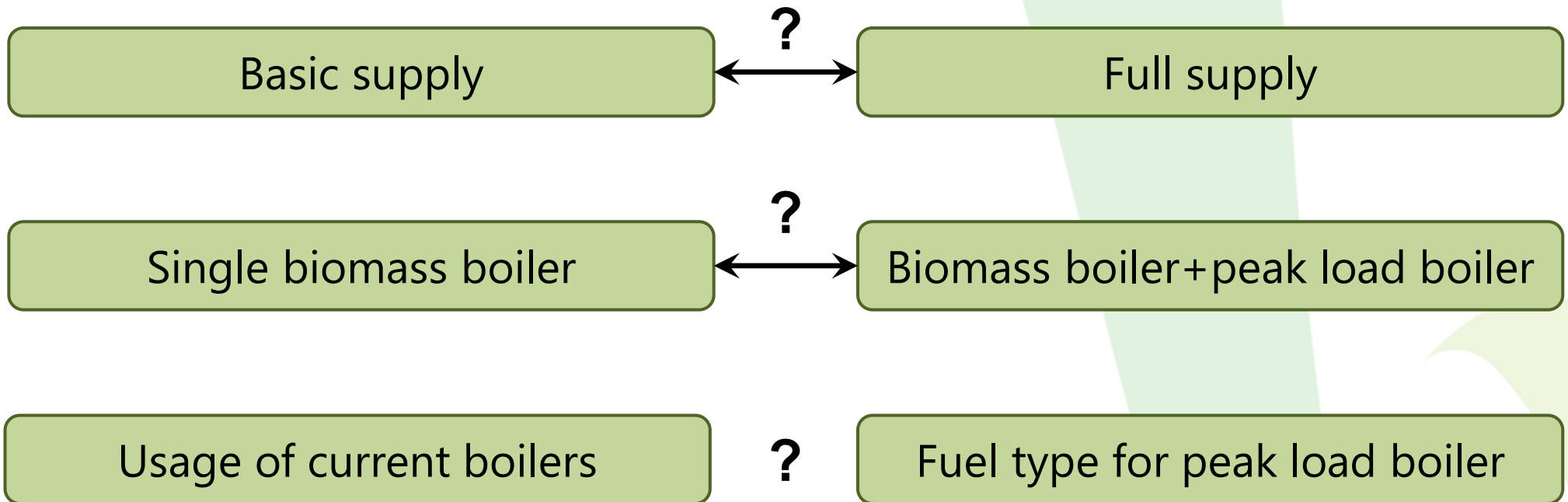
- Plant location
- Estimation of heat demand (absolute amount and load curve)
- Estimation of demand for cooling (trigeneration)
- Renovation level (insulation) and expected renovation rate

- **Available fuel:**

- Fuel spectrum depends on boiler type (given fuel compatibility)
- Consideration of local provision structures
- Different strategies for fuel procurement (own supply, purchasing via producer organisation or fuel trader)

2.1 Analysis of Technical Aspects II

- **Rough plant concept – fundamental issues**



- **Pre-planning for distribution of heat, cooling, power feed-in (almost minor importance, short distribution distances)**

2.2 Analysis of economic aspects II

- **Estimate and examine the profitability, based on**
 - All costs (invest, operation)
 - Expected earnings (heat, power, cooling)
 - Potential funding
- **Methods for economic evaluation**
 - net present value method
 - annuity method
 - internal rate of return method
 - amortisation method

2.2 Analysis of economic aspects I

Process steps

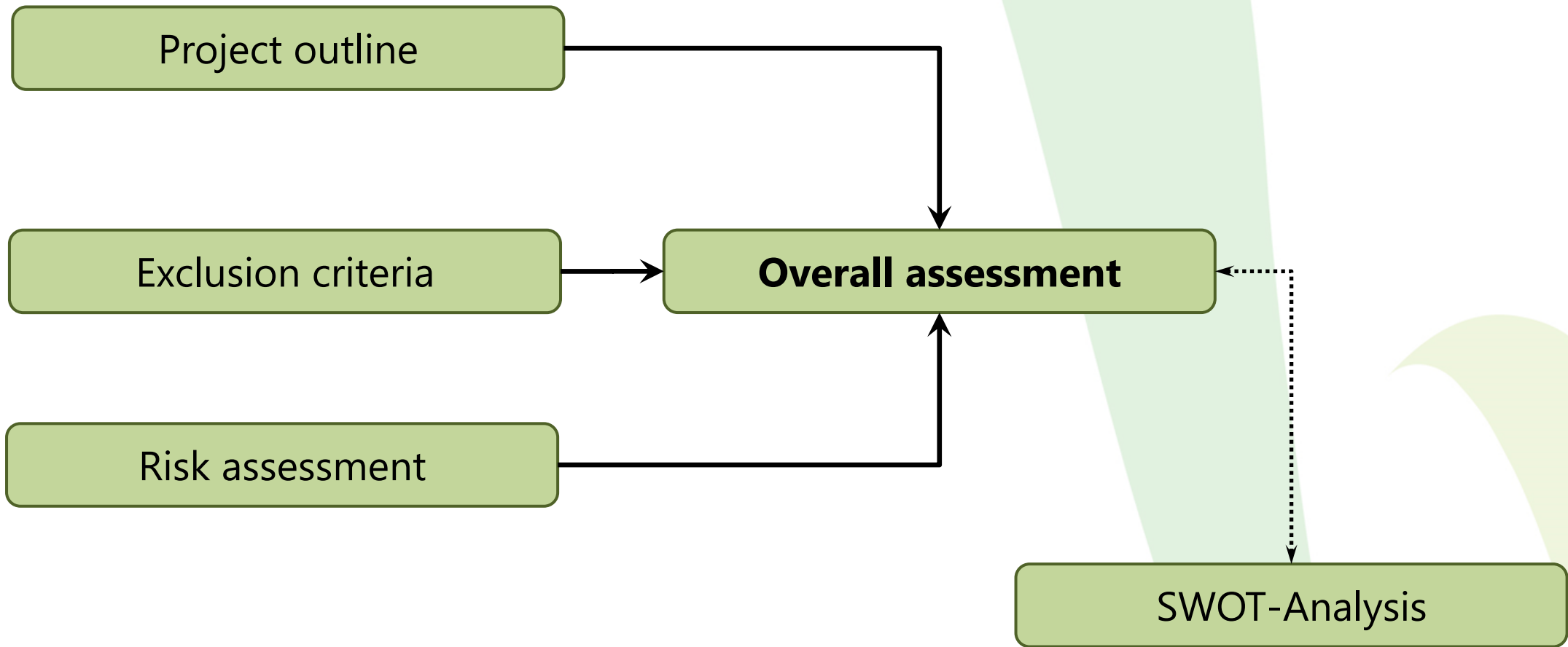
1. Determination of calculation method
2. Fixing of economic frame conditions and basic data
3. Execution of economic calculation
4. Interpretation of results → profitability assessment
5. Evaluation of funding options

2.3 Analysis of non-technical / economic aspects

Preliminary definition Project participants

- Fuel provider
- Operator/Owner of the bioenergy plant
- Plant manager
- Customers
- Financing partners and funding body
- Approval authority
- Planer
- Neiborhood / Public
- Plant supplier

2.4 Review and Recommendation



3. Preliminary-, design- & implementation planning

- **Following the project outline and feasibility study**
- **fluent transition between:**
 - Preliminary planning
 - Design planning
 - Implementation planning
- **Progressive Procedure with improving detail level**
- **in parallel with concretise of costs, project structure and scheduling**

4. Approval procedures

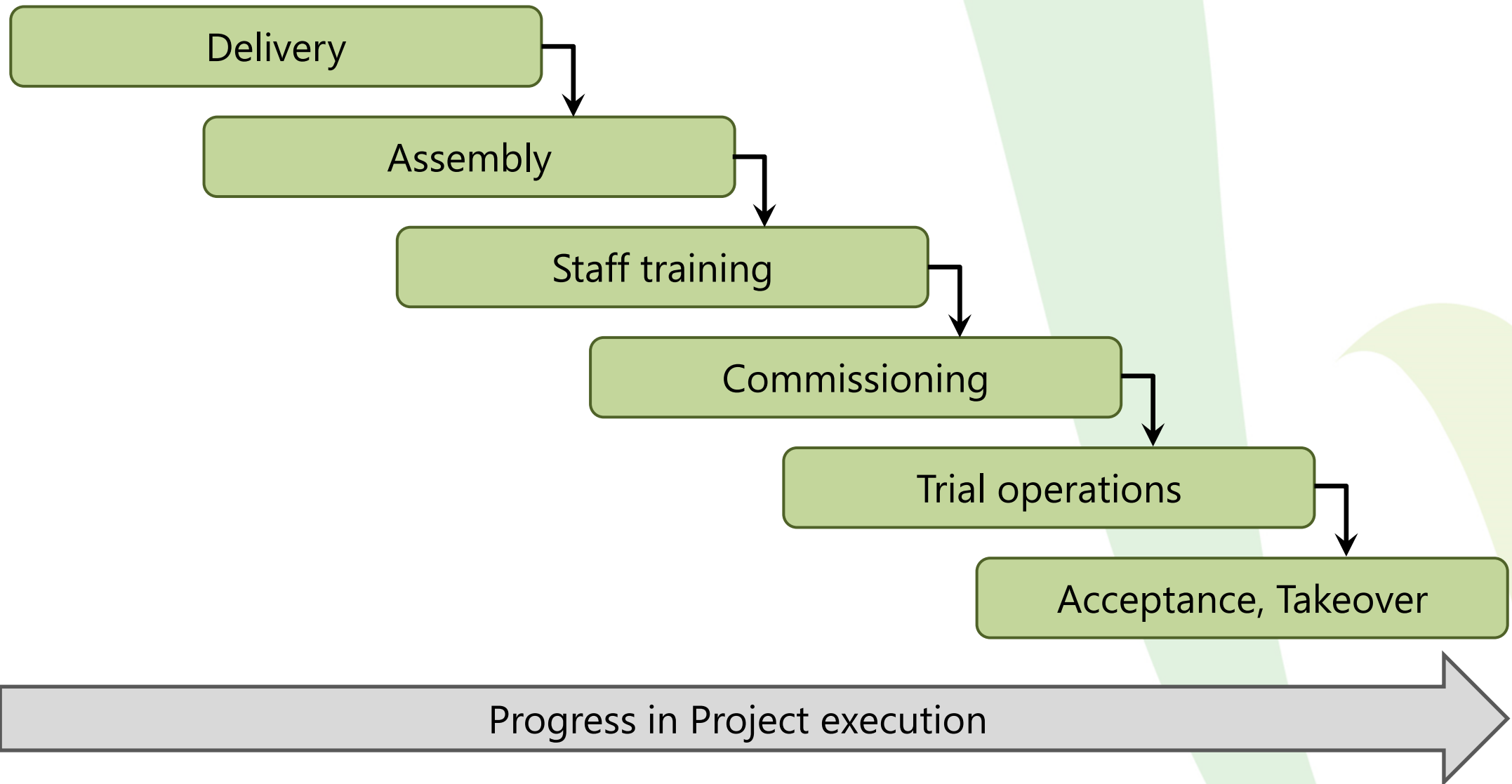
- **Depending on national guidelines**
- **In Germany plant with less than 1,000 kW have not be approved under Federal emissions protection act (BImSchG)**
- **Approval procedures could take a relatively long time period**
- **Preparation phase: appropriate approval procedure**
- **Application phase: Identification of required documents**
- **Approval procedure: coordination of requests by the authority**

5. Tender stage

Pro and Con: awarding single systems vs. activation of a general contractor

	Pro	Con
Award of single systems or and components	<ul style="list-style-type: none">• Longer suggestibility of technical design• Lower over all investment costs• Better comparebility between different offers	<ul style="list-style-type: none">• Depending on Project complexity higher effort for coordination of different suppliers and trades• the entrepreneurial risk is bearing by the customer
Activation of a General contractor	<ul style="list-style-type: none">• Turn-key solution, where the general contractor is responsible for plant functionality• Lower investment risks for fixed priced contracts• Less effort to coordination, by just one single contact	<ul style="list-style-type: none">• The general contractor compensate the entrepreneurial risk by a surcharge• General contractor do a optimisation towards minimal investment with discounting later operating costs

6. Delivery, installation, trial operation



7. System operation

- **Tasks for the operator**

- Ongoing operational management
- Control and Measurement
- Maintenance and Service
- Examination and updating of contracts

- **Models for operational management**

- Selfmanagement if appropriate staff is available
- Partial Outsourcing, for Example for stand duties
- Outsourcing if no appropriate staff is available or if there are cost benefits

7. System operation

Tasks during plant operation

Plant operation	
Control and Measurement	<ul style="list-style-type: none">• Plant operation• Process monitoring, Ensuring plant and operation safety• Fault management• Supervision of fuel delivery• Plant optimisation
Maintenance and Service	<ul style="list-style-type: none">• Boiler cleaning• Ash removal / disposal• Simple maintenance• Comprehensive maintenance should be done by producer
Examination and updating of contracts	<ul style="list-style-type: none">• Contracts for fuel purchase• Contracts for produced energy• Contracts for maintenance• Contracts for Ash-disposal



Thank you

