Bioenergy Finance Guidelines for Project Developers

Promotion of Least Cost Renewables in Indonesia (LCORE-INDO)

Implemented by:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the Parliament of the Federal Republic of Germany

In cooperation with:

Directorate General of New, Renewable Energy and Energy Conservation

Imprint

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Publisher
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Directorate General of New, Renewable Energy, and Energy Conservation (DG NREEC)

Place and date of publication
Jakarta, Indonesia
October, 2017

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Table of Contents

List of Figures

List of Tables

Glossary

CAPEX	Capital Expenditure
COD	Commercial Operations Date
Developer	Company initiating a project through to implementation; developer can be same as investor
DG NREEC	Directorate General for New, Renewable Energy, and Energy Conservation
DSCR	Debt Service Coverage Ratio
DSRA	Debt Service Reserve Account
EBIT	Earnings Before Interest Tax
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EFB	Empty Fruit Bundles
EPC	Engineering Procurement Construction
Investor	Company providing equity; investor can be same as developer

IPP	Independent Power Producer
IUPTL	*Izin Usaha Penyediaan Tenaga Listrik* (Supply of electricity permit)
Lender	Financial institution providing loan
MEMR	Ministry of Energy and Mineral Resources
OPEX	Operational Expenditure
PFI	Project Financial Institution
POME	Palm Oil Mill Effluent
PPA	Power Purchase Agreement
PPP	Public Private Partnership
Project Owner	Entity that initiates a project, finances it, contracts it out and benefits from its output(s)
Project Sponsor	Equity investor
RE	Renewable Energy
SPV	Special Purpose Vehicle

Foreword

With an abundance of almost every renewable energy source, Indonesia can be a global clean energy leader. The government's plan to raise renewables' share to 23 percent by 2025 from just 7.7 percent now (bioenergy 2.39%, geothermal 1.65%, hydro 3.64%, solar 0.02%, and wind 0.001%) would expand access to electricity and green fuels, support industrial growth, and reinvigorate the country's less developed regions. As one of the countries in the world with the highest potential for biomass, bioenergy is expected to contribute by 5.5 GW to the energy mix by 2025.

The rapid development of modern bioenergy in the last several years presents great opportunities for sustainable development and climate change mitigation. However, financing of bioenergy projects is still a hurdle in Indonesia as banks take into serious consideration the risk-return profiles of their bioenergy investments. Meanwhile, investors may consider Indonesia's growing demand for energy as a significant reason to invest in the nation's renewable energy sector. The archipelago's growing consumption of energy as well as the government's interest in boosting its domestic supply of energy resources presents firms with an outstanding opportunity.

It is with the above background in mind that the Directorate General of New, Renewable Energy and Energy Conservation (DG NREEC) in a cooperation with Deutsche Gesselschaft fur Internationale Zusammenarbeit (GIZ) GmbH under the project Promotion of Least Cost of Renewables in Indonesia (LCORE) developed "Bioenergy Finance Guidelines for Project Developers" as a guideline for bioenergy development.

The guidelines aim to facilitate access to financing for bioenergy for sustainable development at the project level. It provides a tool for use by project developers when assessing different financing opportunities for bioenergy projects, giving a clear picture of selection criteria and project characteristics that should be fulfilled to receive financing.

We are pleased to publish the guidelines as a reference for project developers in the Indonesian bioenergy sector in structuring their projects for a successful financial close.

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About the Guidelines

The Government of Indonesia through the Directorate General for New, Renewable Energy, and Energy Conservation (DG NREEC) has drafted enabling policies and regulations for renewable energy (RE). It has set itself the target to provide 23% of renewable energy in the energy mix by 2025. In order to achieve this, an additional 35 GW of electricity provide by renewable power plants is needed according to the Indonesian Ministry of Energy and Mineral Resources (MEMR). To achieve this target, a total investment of around USD 118 - 130 billion capital has to be raised until 2025 or about USD 15 billion annually[1]

Out of this total electricity production based on renewable energy, it is targeted that more than 10% of the anticipated installed capacity, namely 5.5 GW, will be produced based on biomass and biogas. These investments in bioenergy require an approximate total investment of USD 13.5 billion until 2025. The target translates to around 1300 projects which will seek appropriate

[1] Based on estimate by the Institute for Essential Services Reform (IESR)

finance. This challenge cannot be taken up by the state utility PT Perusahaan Listrik Negara (PLN) alone but should be supported by private-sector investment. Thus, the private sector and its stakeholders, such as project developers and investors as well as the finance sector, must work together to develop sustainable business models.

The objective of these guidelines is to support project developers to obtain external funding, mainly debt finance, equity finance and grant, by helping them to understand the different investment perspectives and, based on that, to prepare a successful demand for funding.

The **"Bioenergy Finance Guidelines for Project Developers"** are structured as follows:

Introduction (chapter 1) gives an overview of the objectives of the guidelines.

Investment Perspectives (chapter 2) describes the perspective of project owner and lenders and summarizes possibilities to finance biomass projects by debt and capital finance as well as grant.

Steps Towards Successful Financial Closure (chapter 3) names the involved entities that have interest or concern in a given project and outlines ways, such as risk mitigation, collaboration with banks and management measures, to improve the access to the above-mentioned methods of financing.

Case Studies (chapter 4) of bioenergy projects serve to explain on a cash-flow basis the principles of financing biomass projects.

The **Appendices** lists explanations and helpful links (A.1 and A.2).

1. Introduction

In Indonesia, the availability of financial instruments for RE projects in general is improving but the access to them is still limited. Government and donor-funded financial institutions have provided funds to support new projects with soft or subsidised loans. However, even in cases where projects have achieved financial closure, only traditional financing schemes have been applied. This means that the creditworthiness analysis carried out by the financing institutions was based on the company's ability to demonstrate sufficient assets on its balance sheets to use as collateral in the case of default. These models are called corporate finance and are not favourable from an investor's perspective. In fact, they limit the possibility for investments, because project owners have to secure their funding through their balance sheets rather than securing it through the project itself. Instead, investors prefer financing models that accept the project itself as collateral. These models are called non-recourse or off-balance sheet "*project finance*" which limits the risk to the project itself. Usually, the project developer creates a special enterprise for the implementation and management of such project, the so called special purpose vehicle (SPV).

	Project Finance	Corporate Finance
The funding decision is mainly based on...	... the CF and profitability of the project.	... the creditworthiness of the project owner.
The funding is collateralized...	... by the project (off-balance / non-recourse).	... by the company's assets (on-balance / recourse).
The risks lie with...	... the shareholders of the special purpose vehicle.	... the project developer and owner.
This approach is suitable for...	... medium-sized and big projects.	...small to medium-sized projects.

Table: 1 Corporate Finance vs Project Finance

Project finance models do not exist yet in Indonesia, mainly because of regulatory restrictions and the high-risk aversion of financial institutions.

However, even traditional financing methods, namely corporate finance, are rather limited for bioenergy projects in Indonesia due to a lack of capacity among the banks (related to technological awareness, internal procedures, credit application evaluation, legal restrictions etc.) and also from the project developers' side (related to quality of credit application and project documentation etc.). Only a few biogas and biomass power plants are in operation, some of which are technically and economically underperforming compared to the expectations. The evidence of strong business cases and successfully implemented projects could motivate the banks to look more into the industry. This new financial approach would be a key to stimulating investment, especially in larger bioenergy projects, meaning some millions of USD per investment, to achieve the goals mentioned above.

In order to support the developers and investors to perform better at the project-level, the **"Renewable Energy Guidelines on Biomass and Biogas Power Project Development in Indonesia"** was published DG-NREEC and Asean Center of Energy (ACE) with support from GIZ in 2015. The guidelines assist project developers and related actors in navigating through necessary permitting procedures and administrative processes in Indonesia. The new Ministerial Regulation 50/2017 has altered some of the administrative procedures for Independent Power Producers (IPPs) although sizable parts of the guidelines are still relevant today.

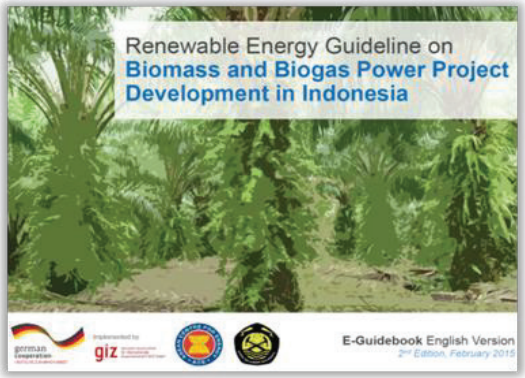


Figure 1: "Guidelines on Biomass and Biogas Power Project Development in Indonesia" (2nd Edition, February 2015 by the Directorate General for New, Renewable Energy, and Energy Conservation and the ASEAN Centre for Energy.

The **Bioenergy Finance Guidelines for Project Developers** address developers of bioenergy projects in Indonesia and aims to give an understanding of finance procedures as well as to offer a checklist on information necessary for financial closure. It addresses the gap between the entrepreneurial perspective of the banking sector (e.g. pay-off within a short-term) and the requirements of the energy business (e.g. long-term repayments, uncertainty).

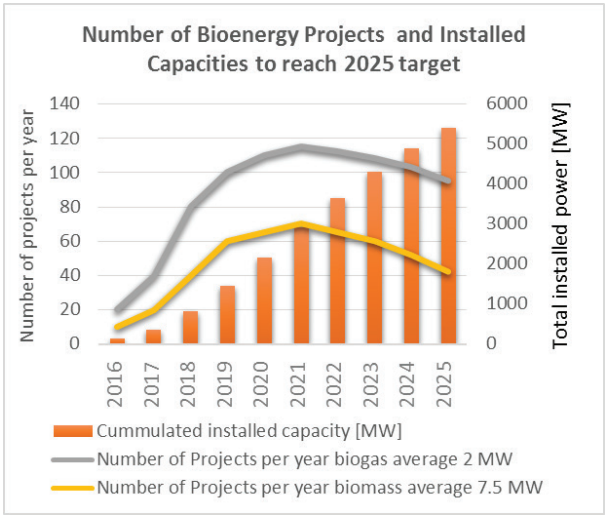
The **Bioenergy Finance Guidelines for Project Developers** are aimed at small to medium scale projects between 1 MW and 10 MW nominal electrical power generation and an investment volume between approximately USD 2 million and 25 million. These projects are characterised by capital intensity and the requirement for long-term investment. Investment costs for bioenergy in contrast to conventional technologies are marked by high upfront CAPEX and long payback periods.

2. Investment perspectives from Stakeholders

In order to understand the different requirements of the involved stakeholder, the differing perspectives between the project owner and the financing institution need to be analyzed.

2.1. Investment Potential

To contribute to the national RE target of 23%, investments amounting to USD 13.5 billion are required to install 5.5 GW in biomass and biogas. This reflects a total of around 1,300 projects in this sector until 2025.



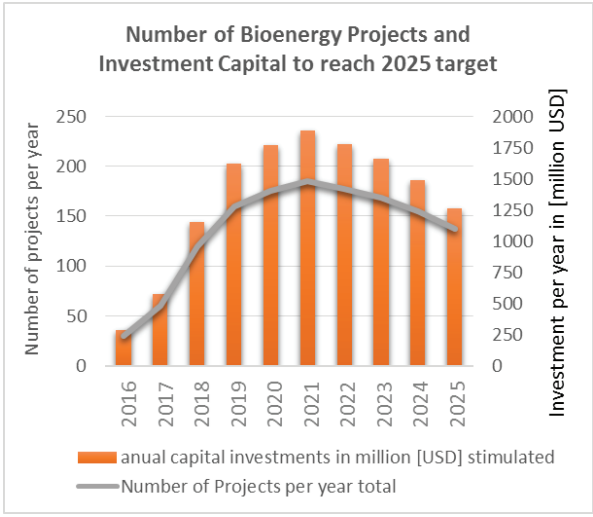


Figure 2: Biomass and biogas targets for 2025: 5.500 MW. Approximately 1.300 projects with an approximate total investment of USD 13.5 billion is required. Source: DG NREEC, estimation by E.Quadrat and GIZ.

2.2. Perspective of Project Owner and Developer

At present, the project sponsors investing in bioenergy projects in Indonesia are either developers or investors who are - in one way or another – mainly:

- Local enterprises operating in the agricultural, nutrition, forest or wood industry, and/or
- National or international developers and/or investors providing debt or equity.

Local enterprises operating in the mentioned fields usually produce waste from biomass as a by-product of their core processes. This serves as feedstock for bioenergy purposes whether in solid, liquid or gaseous forms. For these enterprises, there are basically three business opportunities for bioenergy.

Firstly, they invest in their own business by installing and operating a power plant which runs on bioenergy. This decreases the enterprises costs for electricity and can increase their revenues if overproduction is sold. In this case, the local company bears the investment risks and has to provide or find the funding. Investments of this kind usually pay off in the medium term.

Secondly, the local enterprise partners with project developers by selling his biomass to the former, thus increasing his revenues or decreasing his costs for the disposal of waste. This option does not bear substantial risks for the local enterprise.

Thirdly, the local enterprise uses his surplus of waste of bioenergy as starting point for his investment in the energy producing industry. This means his main purpose of transferring the biomass into electricity is not to cover his own electricity needs but to sell the electricity. In this case, the local enterprise becomes a local operator who bears the project risks and has to find the funding. As bioenergy is a relatively new market, most local enterprises have a limited track record and lack experience in developing and operating such power plants. Consequently, local feedstock suppliers are often searching for international partners for developing, financing and operating the projects.

These guidelines will focus on the third approach only.

2.3. Perspective of Financing Institutions

Financing institutions in Indonesia are still restraint in offering funding solutions for bioenergy projects and if they do, credit conditions are usually not suitable for project owners. In the following reasons for this will be outlined. Project developers should understand these restraints of financing institutions in order to prepare their demands for funding correspondently.

Limited capacity to analyse projects

Given the relative newness of the bioenergy market, financial institutions have limited knowledge of the technologies and the related business models. Thus, they usually compare the business model of a bioenergy projects with those of conventional energy technologies as the latter are already established on the market. Based on this, it might not be clear to the financial institutions why bioenergy projects require a much higher upfront-investment and need longer repayment periods. As a result, their financial products are generally not tailored to bioenergy but are standard corporate credits with standard terms. Moreover, processes for analysing bioenergy projects might be lengthy and complicated due to the fact that they are not yet standardized.

Perceived risks

In general, financial institutions consider credit risk as the biggest challenge to loan growth, although the rate for non-performing loans, although recently growing, is still comparatively low.[2] This reflects the high-risk aversion of financial institutions in Indonesia. However, the perceived risk of bioenergy projects is even bigger.

Again, as bioenergy technology is rather new, financial institutions might not yet have experience in lending to this kind of projects. Moreover, there is a lack of successfully implemented bioenergy projects that could have been considered as lighthouse or baseline projects as well as project demands handed in to financial institutions that presented a real business case. In fact, financial institutions experienced the opposite. Those few projects already financed via the local financial market were often underperforming and resulted in some cases in non-performing-loans.

Moreover, given the special business model, financial institutions are not yet familiar with strategies and methods to mitigate these risks. Without benchmarks and lacking an understanding

[2] PWC (2017): Indonesia Banking Survey 2017

of bioenergy projects in Indonesia and the related business models, lenders have difficulties in performing risk assessment, especially when sound documentation is not provided. Therefore, lenders require clear, transparent, sufficiently detailed and comprehensive documentation in respect to the development, construction and operation phases. In addition, they seek protection against changes in law or force majeure. This is why the risks of bioenergy projects are, in contrast to those of conventional energy projects, perceived to be high or even not manageable. This leads to unfavourable terms for funding for bioenergy projects, mainly high requirements for collateralisation, high financing costs and short maturities.

Moreover, giver their limited number, bioenergy project sponsors have a low bargaining power towards financial institutions.

Mismatch funding and investing

Another obstacle for banks to offer suitable funding is their own funding situation. They are only able to offer long-term financing to project owners at affordable interest rates, when they dispose corresponding funding from the capital markets. Banks in Indonesia possess mainly short- and medium-term funding and are lacking themselves access to affordable long-term financing.

Moreover, financial institutions feel a pressure on their margins because of high costs for risk management[3], forcing them to higher interest rates for their clients.

Thus, even on side of the banks, there is a mismatch of the conditions at which funding is available and the conditions at which the project owners demand their investment.

As a consequence of this, financial institutions demand high interest rates and short repayment periods, which creates a gap between the entrepreneurial objective and the requirements of the energy market. Table 2 lists some key expectations of project owners and developers and mirrors them versus lenders' requirements and considerations. Chapter 4 discusses how project developers can respond to these gaps.

[3] PWC (2017): Indonesia Banking Survey 2017

Project Developers and Owners usually...	*Financial institution and banks usually...*
... have technical knowledge on bioenergy technology.	... are lacking technical knowledge of bioenergy technology.
... are lacking experience in developing sound financial models and business cases.	... are looking to invest in projects that present business cases.
... are looking for project finance.	... offer corporate finance.
... are looking for long-term finance	... are lacking long-term funding themselves.
... are looking for affordable interest rates.	... have to demand higher interest rates due to decreasing margins because of high costs for risk management.
... are looking for finance in a new field of business.	... are looking for project developers and owners with a track record.

Table 2: Key expectations of project owners and developers versus lenders' requirements and considerations

2.4. Finance Structures

A project's "financing structure" refers to the passive side of a project company's [4] balance sheet. It is thus the composition of equity and debt contributions.

In order to develop a bioenergy project, a range of equity and debt funding schemes are available depending on various factors such as the commercial and financial needs of investors or market conditions (e.g. demand, incentives). The project owner and/or developer must be aware that all financial structures are subject to risk profiling and the respective awareness of the given financial institution.

2.5. Equity

The term equity refers to financial resources that the project company possess and are not borrowed from lenders, thus equity is subscribed or share capital. The initial equity is usually provided by the project owner who is simultaneously the owner of the project company.

[4] In the following, the term project company refers to the structure that owns the project, thus either a standard company or a SPV.

Additional equity can be raised by selling shares of the project company to investors that become co-owner of the company. Those investors might be project participants, local investors and government-owned development banks as well as international partners, institutional investors and bilateral or multilateral organizations. Some of the equity investors are willing to invest during the development phase while others only invest during operation.

Equity holders bear the primary risk meaning that they will be reimbursed after the debt providers have been served. Thus, they will in return seek a higher return on the funding they provide. Moreover, there are two different kinds of shares regarding seniority, i) preferred shares and ii) common stock. Preferred stocks are, as the name implies, more senior, meaning that they have priority over common stock in terms of payment of dividends or in case of liquidation. In return, holders of preferred stocks do not have a vote in shareholder meetings.

Funding agreements between equity investors and the project company can be arranged flexible based on the needs of the project company and the expectations of the equity investor, for example in terms of duration of the investment or exit solutions. Thus, equity contributions can be adapted to the special characteristics of bioenergy projects. However, different type of equity investors usually prefers different conditions as summarized in the table below.

Investor	Project Phase	Duration	Return Expectation	Investment Size (Million USD)
Private Equity Fund[5]	Development Construction Operation	Short – medium	More than 20%	Minimum 100
Infrastructure Fund	Operation	Long	10 – 20%	50-100
Industrial Investors	Construction Operation	Short - long	15 – 20%	1 - 100

Table 3: Investors and their usual investor size

[5] A private equity fund is a collective investment scheme used for making investments in various equity (and to a lesser extent debt) securities according to one of the investment strategies associated with private equity. It is raised and managed by investment professionals of a specific private equity firm

2.6. Debt Contributions

Debt can be obtained by mainly three different financing schemes: 1) bonds, 2) loans from local commercial financial institutions and 3) loans from development banks.

Debt holds a higher priority in terms of repayment than equity. This means that lenders have the right to project assets and revenues before the equity investors can obtain any return or any repayment in case of termination or insolvency.

Bonds

The issuer of a bond, for example the project company, has the obligation to pay the holder of the bond a predefined sum at a predefined date and to pay a fixed interest. The interest rate, the so called coupon, is usually paid on a yearly basis. Thus, a bond is similar to a bullet loan. However, in the case of bonds, individuals as well as companies or states can be holders. This means that there is a higher number of potential investors. As the structuration of bonds is highly regulated as well as costly and complex, bonds are usually only suitable for financing of big projects. Thus, bonds will not be further considered within these guidelines.

Loans from commercial financial institutions

Loans from commercial banks are often, beside equity, the standard method to finance small and medium sized energy projects. The terms of a loan are based on the creditworthiness of the project company as well as the bankability of the project.

For debt securitisation, banks traditionally require collateral from the project owner or investor. Collateral can be tangible assets such as equipment, property and real estate, or intangible such as mortgage, pledge from a parent organization or credit guarantee. In this case the finance scheme is called recourse or limited recourse depending on the guarantee profile or fallback.

In addition, banks may request a debt service reserve escrow account. An escrow account can be understood as a trust account in which project developers pay in a part of their electricity revenues on a regular basis to secure liquidity for future payments.

Investors that offer debt finance require a minimum amount of equity contribution, usually in the range of 20% to 50%. This debt-to-equity ratio reflects the risk profile of the project.

Chapter 4 will discuss in more detail how to attract debt financing by banks.

Loans from development banks

The main difference between a commercial loan and a loan from a development bank is its credit terms. As the name implies, development banks do not offer loans for commercial reasons but to support the development of the local economy or of a specific sector, e.g. renewable energy. Thus, their loan products are more adapted to specific funding requirements and offer longer funding with grace periods at lower interest rates. In return, they usually ask for a description of the social, environmental or economic impact of that project to the society. Until now, there is no local development bank in Indonesia but projects can obtain funding from international development banks such as the Asian Development Bank viat its Leading Asia's Private Private Infrastructure Fund (LEAP), see chapter 4.1.4.

In Indonesia PT. Sarana Multi Infrastruktur (Persero) (PT. SMI) offers long-term as well as short-term project financing that include renewable energy, see chapter 4.1.3.

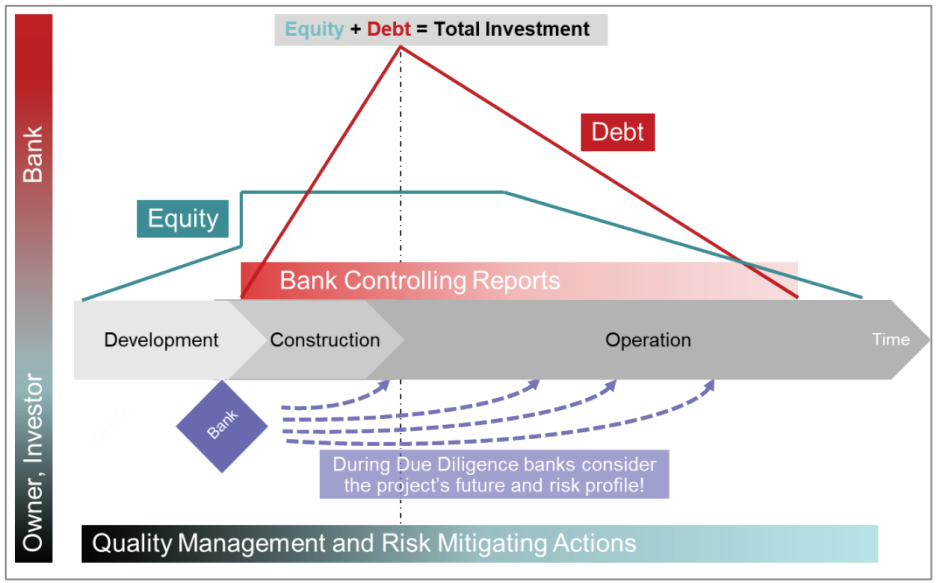


Figure 3: Equity and debt contribution and allocation throughout the project phases; for project finance the bank, lender will execute a detailed due diligence of the project for a project finance scheme.

2.7. Appropriate finance structure for bioenergy projects

In Indonesia, there are two technologies of biomass to energy: 1) biogas to energy via e.g. liquid agricultural waste digestion and ignition engines and 2) biomass waste to energy via boilers and (steam) power plants. Both are internationally established and mature technologies, although different investment costs and financial structures apply.

The main criteria to distinguish whether the project could be finance via a fully non-recourse project financing scheme are a reasonable size of the project and its risk perception.

As outlined above, the project developer creates a special enterprise for the implementation and management of an energy project, the so called special purpose vehicle (SPV). The SPV offers the opportunity to single out the project and isolate it from the rest of the project owner's business. Financing occurs off-balance: the SPV holds all assets (e.g. the power plant) and liabilities and accordingly receives all revenues. There are no revenues generated during the development and construction phase. Hence, SPV loans are based on future cash flow from the project, with no, or only limited, recourse to the project sponsor, and debt servicing will only be possible once the project is operating and creating positive cash flow.

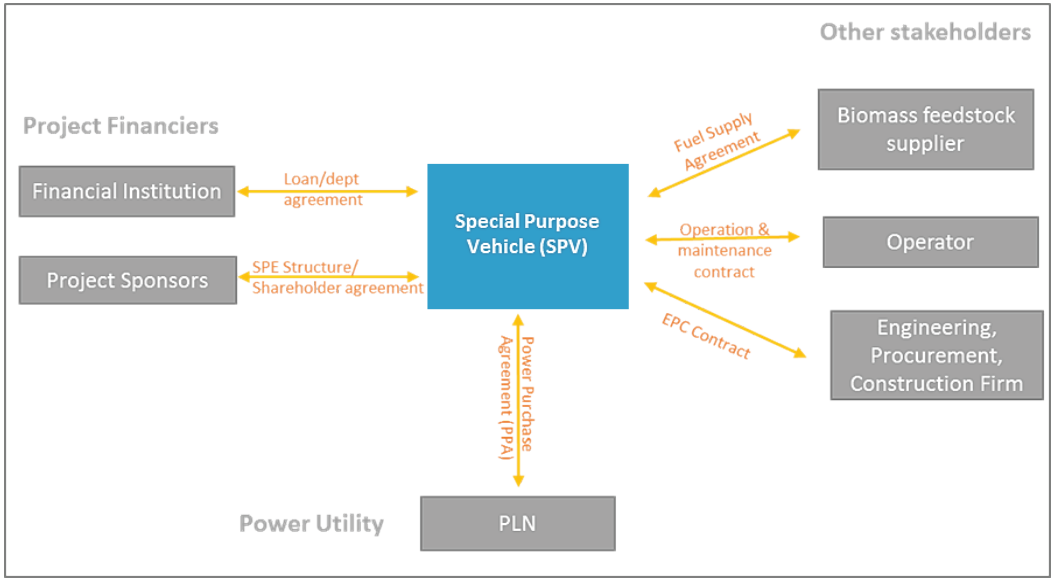


Figure 4: The SPV Project Structure

The figure above expresses the relations between the different actors involved in an SPV project structure. It owns the project assets and the actual borrower for the *project finance*.

To consider the risk perception within a *project finance* structure the Debt Service Cover Ratio (DSCR) comes into picture and the equity to debt ratio, see Appendix A.1. Projects with higher risk profile request a higher equity portion and some buffer in the applicable DSCR factor.

As the lender takes over project risks in terms of the non-recourse scheme the project shall pass a detailed due diligence to prepare the structuring of loan for the given SPV. Such a structure involves the lender more deeply and creates additional transaction costs both for the developer and the financial institution. Because of its higher finance costs as well as its complexity, *project finance* is considered economic viable only for reasonable project size, usually above USD 5 million; however, in Indonesia SMI realized smaller *project finance* structures for hydropower projects in the past. Otherwise the traditional collateral-based scheme applies, bearing in mind that transaction costs, time consumption and complexity are usually lower compared to non-recourse financing.

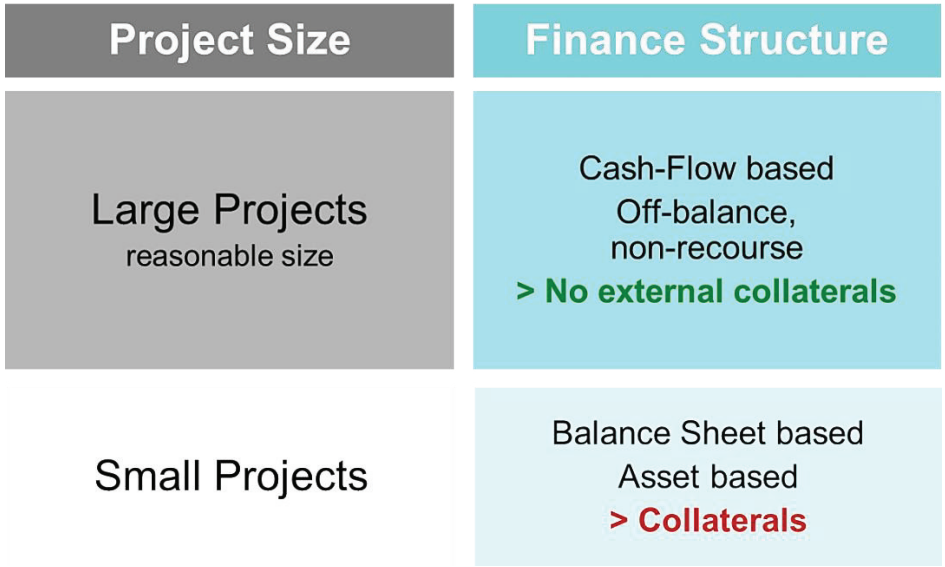


Figure 5: Project size usually defines financial structure.

3. Steps Towards Successful Financial Closure

3.1. Role of relevant entities

Beside those that are directly involved in financing the project, public entities play an important role in developing and implementing the projects. Their roles will be outlined below.

3.1.1. Ministry of Energy and Mineral Resources Indonesia

MEMR assisted by the two Directorate Generals: 1) Directorate General for New, Renewable Energy, and Energy Conservation (DG NREEC) and 2) Directorate General of Electricity (DGE) sets policies and programmes that governs the renewable energy sector. It also sets norms, standards, technical procedures and criteria for suitable developments that follow the Government of Indonesia's target of 23% RE in the energy mix by 2025.

In the current regulatory scheme as stipulated by Ministerial Regulation 50/2017, the final purchase price negotiated between PLN and IPPs needs to have approval from the Minister, who may appoint either DG-NREEC or DGE to review the agreed price in the PPA. Only once the

Minister has given its approval, PLN and the project owner can sign the PPA. See Appendix A.2 for DG NREEC contact details.

3.1.2. PT. Perusahaan Listrik Negara (PLN)

PLN has always been the main electricity off-taker but since the issuance of Ministerial Regulation 12/2017 (which has since been revised to the current 50/2017), the state-owned utility company has assumed full responsibility in the procurement of renewable energy. Ministerial Regulation 50/2017 not only clarifies the ceiling price for various renewable energy technology PPAs but also shifts a lot of the responsibilities to PLN. Unless other regulations are introduced to supersede regulation 50/2017, PLN is required to perform a direct selection for renewable energy projects rather than a direct appointment. This change alone require PLN to be prepared and to pre-select the developers to be invited to the limited tender process that meet the direct selection criteria. The developers who pass the pre-qualification process are put on the "List of Selected Providers" and will be able to participate in the tender process. Foreign entities from countries with diplomatic relations with Indonesia can participate provided they partner with a local entity to meet the mandatory Indonesian ownership requirements.

The pre-qualification criteria cover compliance in technical, financial and administrative aspects. The technical requirements call for experience in developing, constructing and/or operating renewable energy plants that have successfully been in operation for at least one year. A parent company with no such experience but has an operating subsidiary with the required expertise (e.g. a special purpose project entity located in the jurisdiction in which the relevant project is located), can still submit the prequalification application.

On financial aspects, the requirements demand bidders to have certain credit rating guaranteed by one of the recognised credit rating agencies and meeting certain minimum historical EBITDA thresholds to demonstrate that they have sufficient means to fund the equity portion of the project. A letter from the bank confirming relations with the company is also demanded.

The PLN tender will offer specific location and capacity to bid for developers. The winner will be decided based on the lowest price which still has to be approved by the Minister of Energy. If developer has simulated in its proposal that USD dominated PPA is necessary as funding and/or investments are in USD, PLN is open to have the PPA-contract also denominated in USD. Prior to PPA signing, developers need to provide a bank guarantee at 10% the value of the project as a commitment to realise the project on time. After signature of the PPA contract, the developer has

6 to 12 months to reach financial closure. PPA contract will be cancelled if financial closure not succeeded and the bank guarantee will be released to PLN.

See Appendix A.2 for PLN contact details.

3.1.3. PT Sarana Multi Infrastruktur (PT. SMI), Indonesia

PT. Sarana Multi Infrastruktur (Persero) (PT. SMI) is a state-owned enterprise that specialises in infrastructure financing, acting as a catalyst in accelerating infrastructure development in Indonesia. PT SMI was established in February 2009 as a non-banking financial institution and became a bridge to facilitate project owners and financial institutions through project preparation and advisory services. PT. SMI also supports the Government of Indonesia's infrastructure development agenda, stated in Indonesia's National Medium Term Development (RPJMN) 2015-2019 plan, by partnering with private and/or multilateral/bilateral financial institutions in public-private partnership (PPP) projects.

PT. SMI offers long-term as well as short-term project financing and is involved in different sectors that include renewable energy and energy efficiency by providing various investment/financing products from equity investment to loans such as investment loans,

working capital loans, bridging loans, take-out financing, promoter financing, subordinated loans and mezzanine loans.

PT. SMI currently has experience in structuring project financing for mini hydro power plants by providing senior and mezzanine loans for the projects. PT SMI requires strong project sponsorship from the special purpose vehicles (SPVs) developing the project. At the same time, PT SMI also provides advisory services, which effectively support its function as a catalyst because it allows for capacity development among government officials and business entities in financing infrastructure development. Apart from RE projects, PT SMI also finances fossil-fuel power plants and also other infrastructure projects such as roads, airports, railway stations, etc.

PT SMI has been successfully accredited as the National Implementing Entity (NIE) of the Green Climate Fund (GCF). With more than USD 10- billion in initial resource mobilisation and variety of financial instruments available including grants, concessional loans, subordinated debt, equity, and guarantees, giving flexibility to match project needs, PT. SMI will play key role in supporting Indonesia's ambition to implement low carbon development.

In 2011, PT SMI together with the Asian Development Bank (ADB), International Finance Corporation (IFC) and the Deutsche Investitions- und Entwicklungsgesellschaft GmbH (DEG) set

up a joint venture company focusing on financing for infrastructure projects, called PT Indonesia Infrastructure Finance (PT IIF).

In cooperation with different donors, PT. SMI developed products to support renewable energy projects.

Program for renewable energies

Due to the financial support of the AFD, PT. SMI offers 100 million USD for investments in renewable energy projects. Moreover, this program offers grants amounting to 5 million USD in the form of interest rate subsidies, guarantees and first loss mechanisms.

See appendix A.2 for PT SMI contact details.

3.1.4. Asian Development Bank (ADB), Indonesia

The Asian Development Bank (ADB) manages the Leading Asia's Private Infrastructure Fund (LEAP) as a co-financing vehicles dedicated to quality and sustainable private sector infrastructure (including renewable energy generation among others) in Asia and the Pacific. The fund can

provide financing to companies and projects. The Japan International Cooperation Agency (JICA) has made a contribution to the fund to the tune of USD 1.5 billion in equity commitment at its inception in August 2016.

The fund provides co-financing to large-scale infrastructure projects at different stages of development including early stage, growth stage, greenfield and brownfield projects. It supports projects with strong anticipated development impacts and alignment with the strategies of ADB and JICA. The fund will undertake project finance (non-recourse or limited recourse) and corporate finance transactions, and will seek to support a range of private sector participation modalities including public–private partnerships, joint ventures, private finance initiative projects, and privatizations, as well as conventional project finance. The co-financing is provided in the form of loans, equity investments, and mezzanine finance transactions.

ADB which is headquartered in Manila, is dedicated to reducing poverty in Asia and the Pacific through inclusive economic growth, environmentally sustainable growth, and regional integration. It recognizes the importance of sustainable investments in the region and has been investing more than $2 billion in clean energy projects each year since 2011.

See appendix A.2 for ADB contact details.

3.2. Pathway Through Institutions

The project owner or investor must be aware that they have to manage the project successfully by navigating past hurdles in the different institutions. The management can actually steer the project and its risk profile to comply with high standards. Achieving a lower risk profile will subsequently result in lower financing hurdles and lower interest rates. The investor should acknowledge that the application forms, proposals, permits, agreements etc., that describe the bioenergy project is to be understood from the point of view of individual institutions.

The banks have their own due diligence process which is usually more detailed compared to the requirements of the utility. However, Ministerial Regulation 50/2017 which mandates PLN to assume full responsibility for the procurement of renewable energy renders similar documentation to be provided to both PLN and the banks. Considering the bank's due diligence on every detail of the project especially under *project finance* scheme, it would be reasonable and highly recommended to cooperate with the bank from the very beginning and to elaborate on the project descriptions – even those for PLN – comprehensively and detailed enough for the bank.

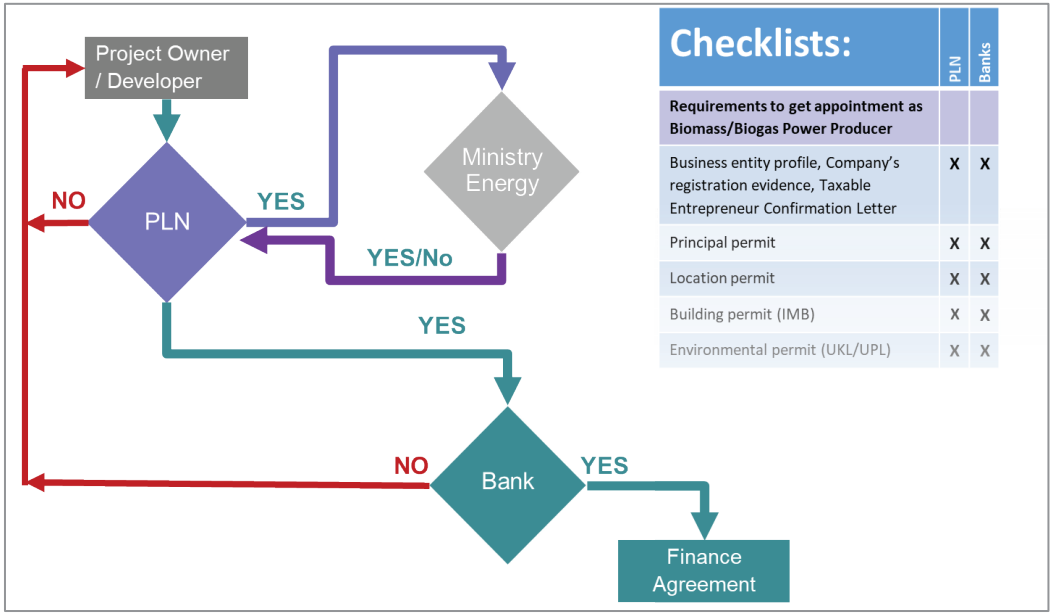


Figure 6: Pathway through institutions and helpful checklists (see chapter 3.4.)

The checklist given in chapter 3.4. contains an extensive and explanatory listing of the checklists of PLN and some banks showing the overlap of documents. Figure 6 illustrates the dependencies of the subsequent steps of a development to the final "yes" or "no" decision of the individual institution. In a case where the project documentation is not up to the standard required or complete or if the agreed price between the project sponsor and PLN is not approved by MEMR, there will be grounds for rejection. Therefore, the investor should reflect his project description through the eyes of these institutions for successful finalisation.

The *Guidelines* recommend developing all the project documentation to the level of the bank's due diligence requirements, starting with the first documentation prepared for PLN.

3.3. Risk Management

An essential element of financial structuring is the detailed assessment of risks that may occur throughout the life of the project in order to achieve an optimum risk mitigation and allocation. Risk categories can be divided depending on who takes on the risk, either the project company (project risk) or the bank (lender risk). However, the lenders will also evaluate the project risks as they have a direct impact on the cash flow of the project and thus on the creditworthiness of the project. The impact on the cash flow can either be on the revenue side, meaning a decreased or delayed inflow, or on the expenses side, meaning an increased outflow.

In the following, risk management strategies will be described.

1) Risk Avoidance

Risk avoidance eliminates a specific risk by simply abandoning that specific risk. However, risk avoidance usually leads to a loss of profit or/and the occurrence of other risks. For example, a project owner thinks about buying a high quality, custom-made machinery to increase efficiency and thus profits. This technology however bears the risk that, if the machinery breaks down, spare parts or engineers to repair it might not be available. To avoid this risk, the project owner could decide to buy standard machinery instead which leads to decreased profits.

2) Risk Transfer

Risk transfer is a way to shift risks to a third party typically for a fee.

Non-insurances as partner for risk transfer

As a legal principle, in sales transaction, the risk accompanied with the product sold, passes from the supplier to the buyer with the property, meaning that as soon as the project developer bought machinery, the risks e.g. for breakdown lie with the buyer. The most common way to transfer this kind of risks by not involving insurances are warranties. A warranty is a legal binding assurance, usually limited in time, which describes the conditions under which the supplier has to repair, replace or compensate for a product or service. A warranty could for example define that the supplier has to replace machinery in case it is broken for failure reasons.

Insurances as partner for risk transfer

There is no insurance that covers all different kind of risk and an insurance is always the second best option after quality in materials and operation. A project owner rather has to choose several insurances that fit best to his project. A contract with an insurance should cover the scope of the insurance, what is covered and what is not covered as well as the duties of both parties and how to settle legal disputes. Common insurances are for example liability insurances that cover

damage to others such as accidents of worker or an electric equipment insurance that covers the damage of equipment for example because of fire or flooding. For a *project finance* scheme a machinery breakdown insurance is mandatory, best covering losses during the downtime caused by the failure.

3) Risk Sharing

Risk sharing or risk distribution is a method of risk management where the costs of the consequences of the risks are shared among the partners. A typical form of risk sharing is a syndication meaning forming a group of people or enterprises, the so called syndicate. Banks often use syndication to share the credit risk of a project. In this case, banks partnered up in a syndicate give several loans with smaller loan amounts instead of one bank giving a high volume loan and bearing the credit risk totally itself.

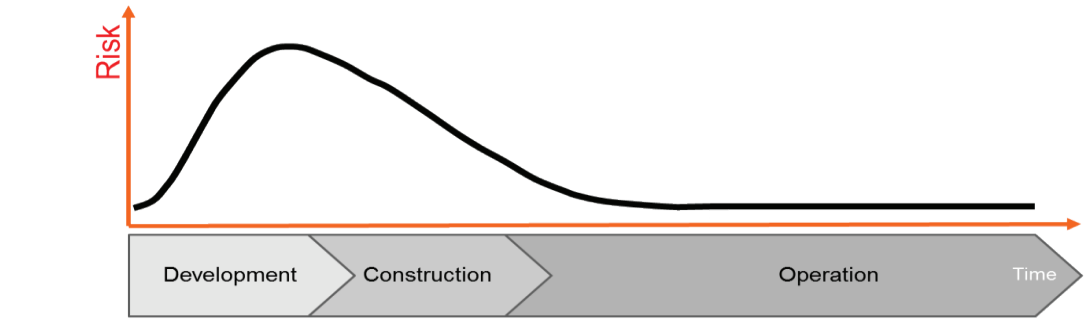
4) Risk Reduction

Risk reduction means actively mitigating the likelihood that a risk occurs or lowering the exposure to a risk. The term is rather loosely defined and includes activities such as buying more stock to reduce the risk of supply shortage as well as capacity building for employees to reduce

the likelihood of operational risk. In contrast to risk avoidance, a specific risk is not fully abandoned but lowered.

5) Risk Acceptance

Risk acceptance is choses as an appropriate risk management strategy in the case the costs for managing the risks are considered too high given the likelihood or exposure of the risk. A bioenergy developer for example bears the theoretically risk that his feedstock is destroyed because of droughts. However, he considers the likelihood of such event as improbably thus he does not actively manage this risk but simply accepts it.



Technical	Biomass feedstock, site location, design, technology	Reliability of technology, weather, installation & controlling, testing	Reliability of technology, O&M experience, spare parts, benchmark, better technical solution, biomass alternative use
Commercial	Grid connection, PPA agreement, developer & bank experience	EPC track record, sub-contracts and warranties, project management	Revenues, interest rates, inflation, labour costs, insurance, tax, currency
Regulatory	Permits, land lease/ ownership, environmental, social	Regulatory change, interconnection and transmission	Regulatory change

Figure 7: Risk profile throughout project development to operation phase of a biomass power plant.

3.3.1. Project Risk Categories

The following overview describes the most common project risks and corresponding mitigation strategies[7]:

Risks	Mitigation Actions
I. Construction Risk: **Cost of completion will be fundamental to the financial viability of the project as the financial assumptions and ratios are all dependent on the assumed cost of construction of the project.**	The investor will need some mechanism to manage the risk, detailed EPC contracts and day-to-day project control on the construction site, red/yellow/green flag reports for actions to be taken for control means.

[7] Some elements are taken from http://ppp.worldbank.org/public-private-partnership/financing/risk-allocation-mitigation#construction

Risks	Mitigation Actions
Delay in construction which pushes the completion date.	Clear contractual definition of completion; strong EPC should be selected to be liable for delays caused and resulting compensation
II. Performance Risk: **The lenders will want to ensure that completion requires the work to be in a condition sufficient to merit release of the construction contractor from underperformance liquidated damages liability.**	Performance must be checked during completion and before warranty and guarantee periods end; EPC to be liable for underperformance. Performance to be benchmarked during operation period to assure technical basis for revenue stream. Third party opinion might be required.

Risks	Mitigation Actions
III. Operating Risk: **The viability of the project depends on the projected costs of operation. If the cost of the operation increases, lenders will want to be protected to any extent that it impacts on the revenue stream.**	The project, i.e. the debt service, must be protected against unpredicted cost increases in biomass feedstock (biomass for power plants or POME for biogas plants); another key cost in operations will be the cost of workers and an assumption for wage inflation usually built into the agreement by reference to an index such as the retail price index.
IV. Demand Risk: **The capability of the grid to accommodate the power produced must be assured.**	The demand projections of the off-taker of a given site must be assessed, e.g. growth forecasts, demographic movements; bankability of the off-taker in paying tariffs.

Risks	Mitigation Actions
V. Force Majeure and Change in Law: **Financing agreements do not include force majeure or change-in-law provisions.**	The obligation to repay the loans will continue in the event of force majeure or a change in the law and is subject to the lender's financial capability; otherwise the project might become unviable.
VI. Political and Regulatory Risk: **Decisions on feed-in tariffs or other promotion schemes might be cancelled or changed by the government.**	Usually the investor has to bear this risk. For large projects there are some financial instruments like derivatives, futures contracts or hedging. But these instruments do not apply for small projects like biogas power plants.

Risks	Mitigation Actions
VII. Currency Exchange Risk: **Debt finance might be sourced from foreign lenders, in foreign currencies besides, or in addition to, local debt.**	The current Ministerial Regulation 50/2017 allows PLN to provide remuneration in USD. The Developers should simulate in its proposal that USD-denominated PPA is necessary. If the payments are linked to the USD exchange rate and balanced monthly, the risk would be mitigated to monthly fluctuations.
VIII. Interest Rate Risk: **Interest may be charged at a fixed rate over a defined period of time or at variable rates over the redemption period.**	*Project finance* debt tends to be fixed-rate at least for a foreseeable period, to provide a stable repayment profile. If no fixed rate can be provided the investor has to bear the risk for small projects; hedging applies only for large projects.

Table 4: List describing the most common risks and appropriate actions.

3.3.2. Collaboration between Project Developers and Financing Banks

Once the financial agreement is in force, the construction of the project begins followed by the operational phase later. Under *project finance* scheme, this is where the collaboration begins between the developer and the bank – or the bank and the developer in terms of total capital contribution – to realise a performing project. This partnership means that the bank becomes a real partner of the project with full insight into every detail of the progress, problems and delays. In respect of the progress, the bank controls accounts and approves payments. All the costs and expenses related to the bank's involvement or its advisors will be borne by the SPV. The bank's key controlling elements are listed as follows:

Construction phase:

- Periodic reporting of the progress made according to the schedules (investment, time); issues, delays, implications and consequences (potential time overruns cost overruns and underperformance) must be analysed and described. Periods and level of reporting are subject to definition by the bank.
- At larger power plants or when problems occur the bank might install a lender's engineer or advisor to control the project management at the premises of the company or on the

construction site. The lender's engineer should be accepted by the developer as a supportive partner.

- All significant payments to third parties like the EPC, subcontractors or other obligations must be approved by the bank and transferred by the bank from the SPV accounts to the addressee. The bank usually employs this four-eye principle to reduce the risk of undue payments.
- The final acceptance testing procedure has to be executed by an independent engineer or body with an official acceptance certificate. The transfer of the plant's ownership from the EPC to the SPV takes place with the commercial operations date (COD), which follows this step. The bank will accept the COD and transfer related payments only when the punch list is cleared.

Operational phase:

- Periodic (e.g. quarterly) reporting of the economic and technical performance of the plant; issues, replacements, downtime, implications and consequences (potential future

downtime, OPEX overrun and underperformance) must be analysed and described. Action plans must be developed once severe threats are identified; the bank might involve a lender's engineer or third parties.

- All significant payments to third parties like OPEX costs or other obligations must be approved by the bank and transferred by the bank from the SPV accounts to the addressee. Again, the four-eye principle is in place to reduce risks of undue payments.
- The surveillance of the bank ends with the final redemption payment.

3.3.3. Supportive Management Measures

The bank will assess the investor, its project team and the management structure to ensure strong management and quality. It is highly recommended for the developer and investor to employ a knowledgeable and skilled project management team and an experienced project manager. For specific development phases and challenges, an owner's engineer might be required. The following tools give some ideas about control measures such as project management software, red-flag reports and protocols.

Detailed project schedule - Gantt charts

Project schedules, often called Gantt charts, illustrate in detail the starting and finishing time of a given project. The charts list the milestones and final points of a project broken up into its different activities, and show the dependency relationships between these activities such as key approval procedures as well as minor sub-suppliers, implementation, comissioning and final acceptance testing. The list can be compiled in varying levels of detail, covering, for example, contractual details of suppliers to be fullfilled at specific points in time, documents, plans, photographs, protocols etc. To support project control, it is advisable to use appropriate database management and analysis tools covering all relevant project details in order to calculate the

respective dependencies. Dependencies can be shown temporally as time overrun of milestones or cost-wise in cases where time overruns would result in additional costs. Such tools offer a detailed project insight at any given moment and provide warning signals if planned schedules are not met. Helpful aspects of such tools are that the investor submits himself to following the internal logic of the particular tool to mitigate project risks along the implementing path. There are many types of professional Gantt chart software that are commercially available.

Gantt chart example

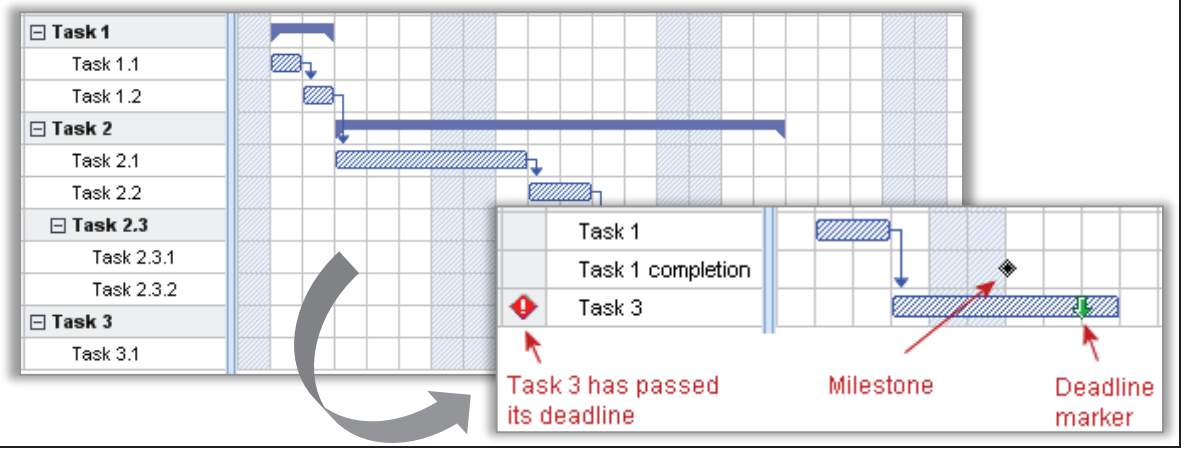


Figure 8: Professional project management software provides a control tool for time and budget.

Listing of components and interfaces

As an additional element of management, a comprehensive list and description of all key technical components such as technical infrastructure and civil work, grid access, fuel treatment, plant boilers and generators etc. should be compiled covering technical data and relevant interfaces. This list should be linked to the procurement and supply of components to ensure proper interface management. Furthermore, the list should contain status flags of information and related details, contracts, agreements etc. Finally, the list will become an essential part of the project management and set of control tools.

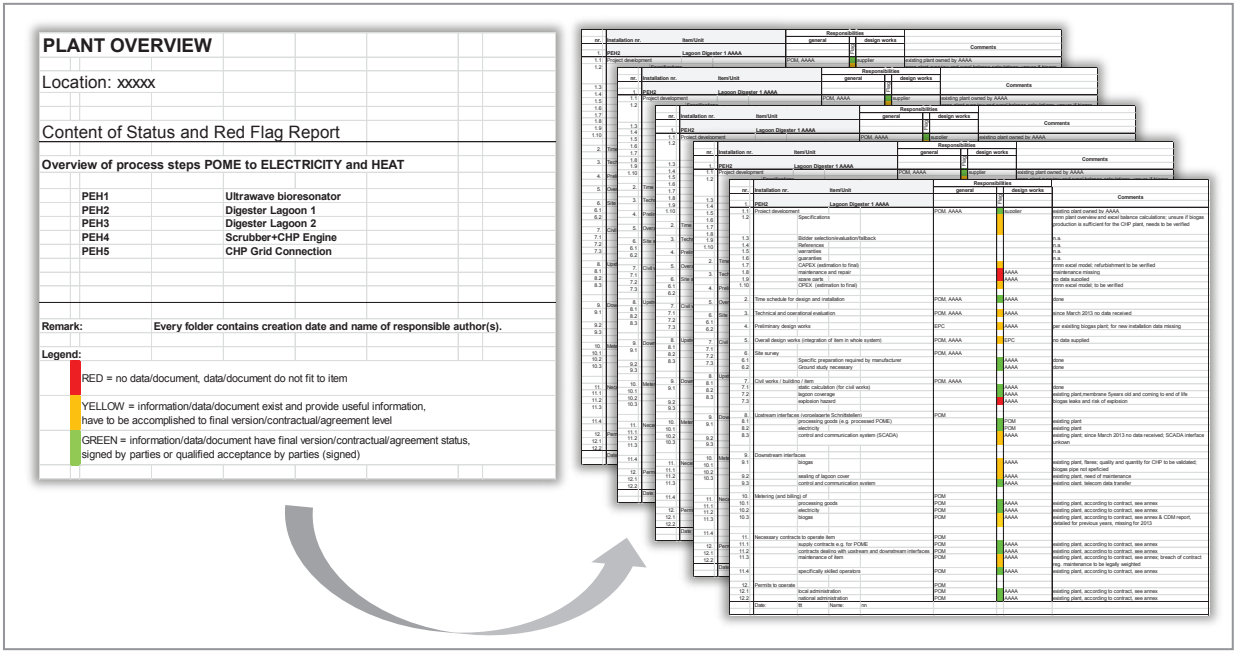


Figure 9: Comprehensive protocols showing red-flag structure for level of action needed.

The list should be ranked along a coloured-flag alert system. The idea behind this structure is to rank every individual step of the process into this alert mechanism and to tag them with red, yellow or green flags depending on the alert status.

Examples for Management Control List		Actions
	RED - Out of spec - Time overrun - Budget overrun	Immediate action required
	YELLOW - Almost out of spec - Overrun of time possible - Budget endangered	Preventive action required and intensive control
	GREEN - on spec - on time - cost under control	No additional action required

Table 5: Ranking every individual step in process for management control

Protocols

The investor should employ a construction site supervisor who thoroughly takes care of the progress of the implementation. For control reasons, the supervisor should use a construction site diary where he protocols all events, incoming goods, achievements, milestones etc. and evaluates the impact in respect of the project scheduling. He should call periodic site meetings together with the contractors, EPC etc., if necessary daily, to fix the status of the site and to record the details. The protocol should be countersigned by all parties involved. The protocols serve as an enabler for progress payments to suppliers, if the objectives are achieved and agreed upon. The control ends with the sucessful final acceptance testing where all performance data on the plant will be checked, listed and recorded, while items on the punch list of deficiencies are resolved. As a result, a detailed control mechanism is implemented to assure project quality.

Software, reports and protocols are helpful tools not only in supporting the management in controlling a project but also in providing the structure for periodic reports to the finance institutions. Having proven experience with those tools from former projects, the confidence level between investor and banks will certainly increase. As an additional benefit, future negotiations with the banks will become easier and smoother. Eventually the interest rate for the debt portion of the project may benefit from a sound and professional control team.

3.4. Preparing a successful demand for funding

A well-prepared demand for funding is key to obtain the desired financing resources. A project demand should be *clear and complete*.

Firstly, clear refers to the comprehensibility of the demand.

Financial institutions in Indonesia are not yet very experienced in financing bioenergy projects and hence their capacity to analyse technical as well as legal aspects of such projects is limited. Therefore, project developers should prepare their projects in a way that non-technical people can understand the project design. Moreover, as the main interest of financial institutions lies within the project owner's creditworthiness meaning whether the project owner is capable of repaying the credit and paying the interest, the project presentation should highlight the economic aspects. Thus, it should be presented in a clear way how the project generates the revenues and how the underlying company can assure the continuity of the payments to the financial institution if the project is underperforming.

Secondly, a complete finance demand facilitates the project analyses for the potential investors and can accelerate the decision process. In the following, the documents and information necessary for a complete project presentation are outlined. The data was compiled using sources from DG NREEC, PLN, PT. SMI and local banks. It is based on the assumption that these stakeholders usually demand the same documents and information. However, the table can only give guidance and different parties might request further information.

CHECKLIST		No.	Document	Information included	PLN / Banks
Documents about the company	General Documents	1	Structure of the company	Organigram, profiles of management team	X
		2	Description of the sector the company is working in		X
		3	Annual Report	Description of company's activity	X
		4	Financial Statement		X
	Administrative Documents	5	Articles of Establishment		X
		6	Business License (SIUP)		X
		7	company's registration evidence (TDP)		X
		8	Taxable Entrepreneur Confirmation Letter (SPPKP)		X
		9	Tax Identification Number (NPWP)		X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Permits	10	Principal permit		X
		11	Location permit		X
		12	Building permit (IMB)		X
		13	Environmental permit (UKL/UPL)		X
		14	Forestry permit (if location of power plant is in a forest area)		X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Feasibility Study	15	Project overview	description of location, site access, geography, related authorities, socio-economic conditions, overview of electricity conditions, etc.	X
		16	Site Topography	Topographic conditions, geographic coordinates, overview of regional geology, climatology, overview of feedstock resources area	X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Feasibility Study	17	Interconnection Study	Condition of electrification, power supply, power balance, load and projected demand, plan of additional power capacity, grid condition, including SLD, plan of grid connection point to PLN grid, levelised cost of energy, customer composition, etc.	X
		18	Feedstock Supply Study	Biomass supply, sources, suppliers, competing use of biomass, seasonal impacts, storage and logistics, transportation	X
		19	Biomass laboratory tests	proximate, ultimate analysis, heating value, and ash composition analysis	X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Feasibility Study	20	Thermal conversion technologies	appropriate technologies	X
		21	Technology study	Technology to be implemented, Study of technology options	X
		22		Technology system description	X
		23		Study of operation and maintenance	X
		24		Emission/effluent handling	X
		25		Water resources requirement	X
		26	Environmental Study	Environmental management and monitoring report (UKL-UPL)	X
		27	Performance warranty		X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Project Design	28	Basic Design	Civil work	X
		29		Electromechanical work	X
		30		Basic engineering design, equipped with drawing, plant layout and technical specifications	X
		31	Implementation plan and project management	Work plan	X
		32		Staff concept	X
		33	Risk Analysis and mitigation approach	Technical risks	X
		34		Political risks	X
		35		Financial risks	X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Project Design	36	Economic Project Design (Business Plan)	Investment costs (CAPEX)	X
		37		Operational costs (OPEX)	X
		38		Financing plan	X
		39		Profit and Loss Account	X
		40		Cash Flow (incl. CF available for Debt Service)	X
		41		Sensitivity analysis	X
		42		Key Figures (IRR (Internal Rate of Return), NPV (Net Present Value), DSCR (Debt Service Coverage Ratio)	X

CHECKLIST		No.	Document	Information included	PLN / Banks
Information about the Project	Project Design	43	Construction schedule until the commercial operation date (COD) of the power plant		X
		44	Statement regarding the land availability for the project development		X
		45	Statement guaranteeing the availability of biomass feedstock for the power plant		X

Table 6: Checklist for Project Developers

4. Case Studies: Key Project Data and Business Plan

4.1. Biogas Power Plant

In the following section, the principles of project finance will be explained through an exemplary biogas power plant using palm oil mill effluent (POME) as input material. Some of the data are taken from the Belitung biogas power plant (ANJ Group/PT. Austindo Aufwind New Energy) to explain the principles of financing bioenergy projects using the example of a real project.

First of all, the main parameters of CAPEX and OPEX costs have to be considered. The following checklist provides some key cost components.

Key Cost Components	
CAPEX	**OPEX**
Biogas Process	**Biogas Process**
POME cooling pond **Anaerobic digester including coverage** **Post treatment/stabilisation pond including coverage** **Sludge pond drying system** **Civil work for foundations, concrete, piping of liquids and biogas**	POME condensation Electricity supply/parasitic loads Spare and replacement parts Control of biological conditions
Ignition Engine and Components	**Ignition Engine and Components**
Biogas cleaning system (scrubber, dryer) **Biogas ignition engine and generator** **Blower and chiller**	Operation and maintenance contract for biogas engine and generator Electricity supply/parasitic loads Spare and replacement parts

Key Cost Components	
CAPEX	**OPEX**
Grid Access	**Grid Access**
Step-up transformer **Switch yard or cabinet** **Cables or line**	Usually minor
Auxiliaries	**Auxiliaries**
Biogas flare **Security system** **SCADA system and control room**	Spare and replacement parts Operation and maintenance staff
Finance	**Finance**
Insurance package (implementation) **General management** **Third party appraisals** **Quality control** **Bank fees**	Insurance package (operations) Management Finance service payments Costs for collateralization

Table 7: Key cost components for a biogas power plant

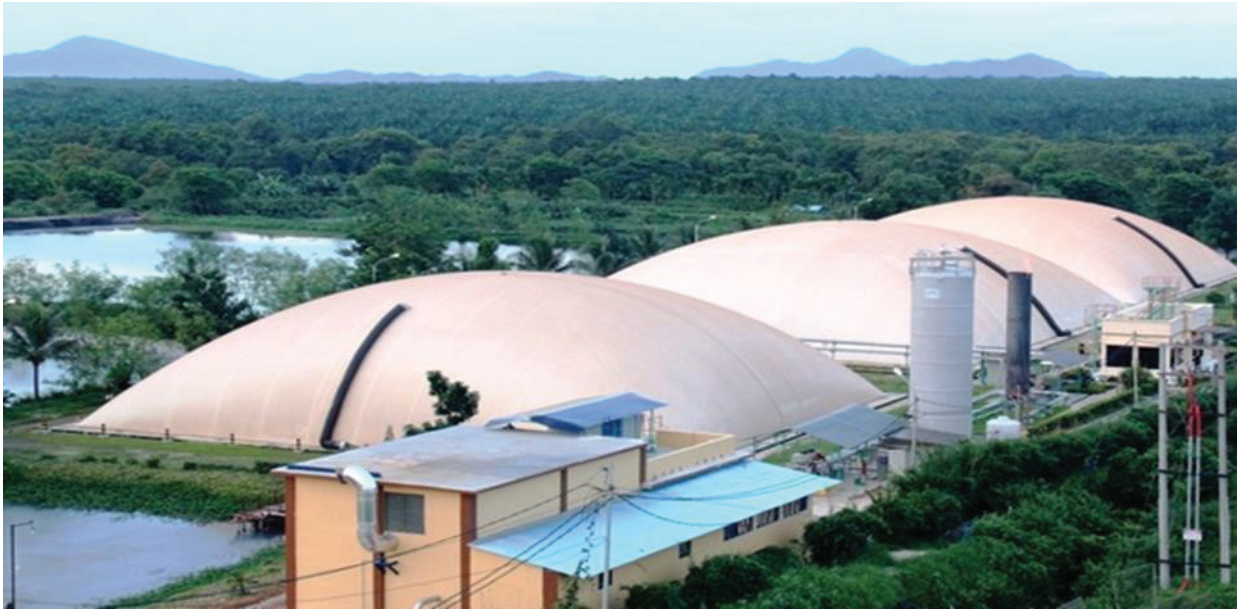


Figure 10. The POME Biogas Plant in Belitung © GIZ

For the given example of a biogas power plant the key parameters like CAPEX, OPEX costs as well as information on debt servicing are as follows. Some confidential parameters have been filled with assumptions for the purpose of this exemplary calculation.

Key Technical and Economic Figures (Assumed)		
Installed capacity	1.2	MWel
Full load hours	6,570	h/a
Capacity factor	75%	
Parasitic loads, aux.	4%	
Energy delivery	7,569	MWh per year
CAPEX turn-key investment	40,500	million (IDR)
[exchange rate 13.500 IDR = 1 USD] October 2017	3.0	million (USD)

Key Technical and Economic Figures (Assumed)				
OPEX including staff	5%			of CAPEX
Input material: POME	no cost			
Feed-in tariff (Belitung, medium voltage, October 2017)	1376			IDR/kWh
Equity	30%		12,150	million (IDR)
Debt	70%		28,350	million (IDR)
Redemption period	10			years
Repayment method	Annuity loan / stable total payment (stable repayments + decreasing interest)			
Interest rate	11%			p.a.
Price increase	4%			p.a.

Table 8: Key technical and economic figures for a biogas power plant (assumed)

The present example shows a debt-to-equity ratio of 70% to 30% indicating that more creditor financing (debt) is used than investor financing (equity). Projects with a higher debt-to-equity ratio are considered more risky to lenders than those with a lower ratio. Thus, lenders usually prefer low debt-to-equity ratios, because their interests are better protected in the event of an underperforming project. Figure 11 explains this relationship using the key financial results earnings before interest, tax, depreciation and amortisation (EBITDA) and earnings before interest and tax (EBIT); the delta between EBIT and EBITDA equals depreciation plus amortisation.

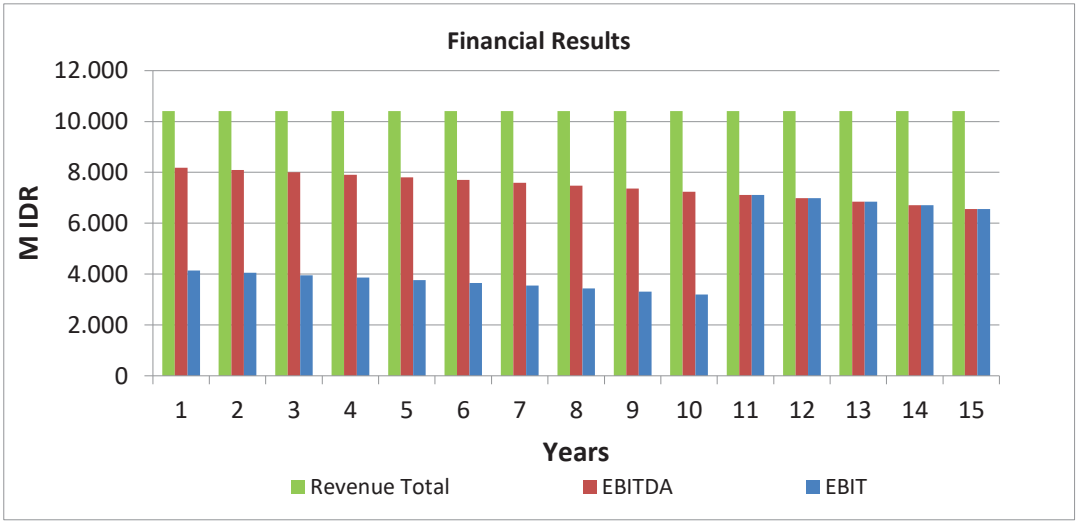


Figure 11: Financial results of EBITDA and EBIT; delta between EBIT and EBITA equals depreciation plus amortisation.

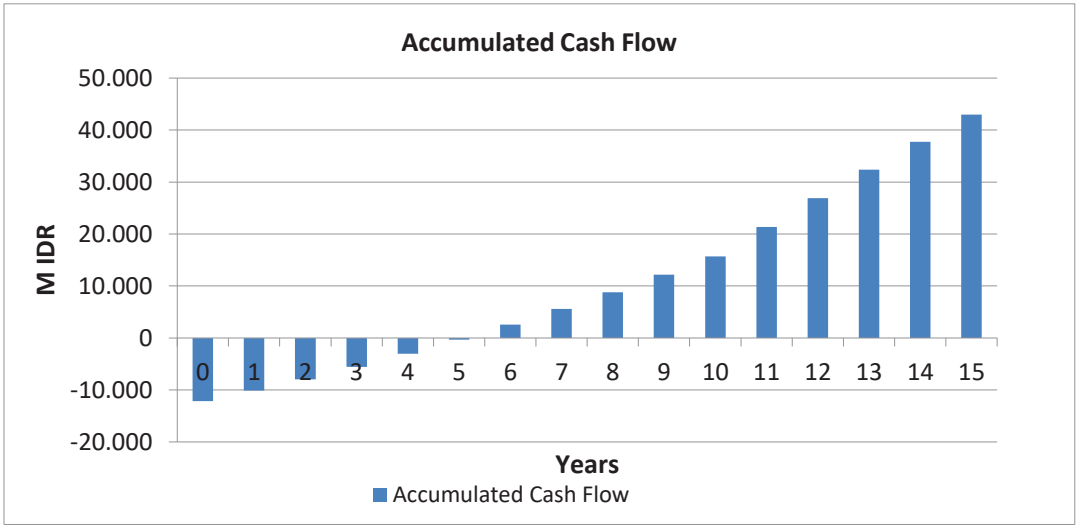


Figure 12: Accumulated cash flow starting from the initial year and considering the initial equity investment.

The given example as illustrated in Figure 12, shows a positive cumulated cash flow in the sixth year.

In order to estimate a project´s ability to service current and future debt, the net operating income, which is the income or cash flow that is left over after all operating expenses have been paid, will be compared to its total debt service obligations, see Figure 13.

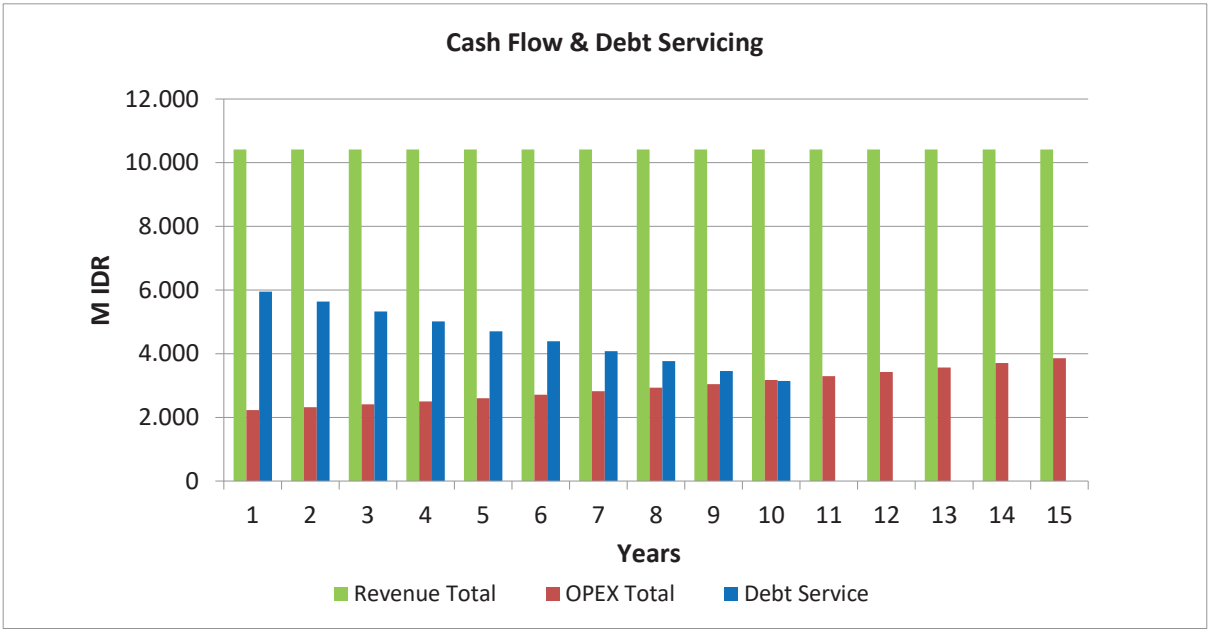


Figure 13: Financial Figures starting from the first operational year, balancing revenues, OPEX and debt service

The resulting financial ratio is the debt service coverage ratio (DSCR). It compares a project's available cash flow with its current total debt service obligations, being composed of interest and principal. Thus, the DSCR states whether the project produces enough cash to cover its debt payments. The higher this ratio is, the easier it is to obtain a loan, see Figure 14.

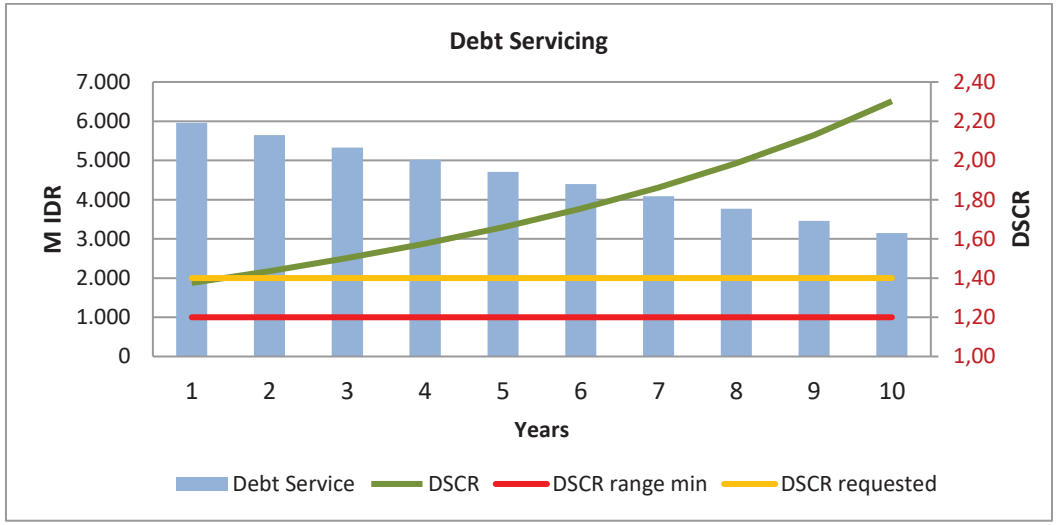


Figure 14: Actual (green colour) and requested or min DSCR over debt service period.

The DSCR may be expressed as a minimum ratio that is acceptable to a lender. It is essential for lenders that the projects can meet the lenders' annual DSCR requirements (for calculation see

appendix A.1). While there may be a grace period during the construction phase, or even into early project operation, debt principal and interest (and other annual costs) must basically be covered every year. If the developers do not meet these requirements, it is going to be extremely difficult to get projects financed without risk-balancing collateral.

The required DSCR for renewable projects ranges between 1.2 and 1.4. Given a DSCR of 1.2 IDR120 free cash flow is required to cover every IDR100 in obligations and annual payments.

Additionally, a debt service reserve account (DSRA) or an escrow account has to be provided in order to secure debt servicing. Commonly investors miss this out when they apply for financing. This financial instrument typically accounts for 50% of next year´s debt service. The escrow account / DRSA is held by the financing bank to secure the subsequent debt service payments. The tenor of the requested escrow account is subject to the redemption period and its respective debt service, see Figure 15. At the end of the finance period, the remaining escrow account / DSRA will be paid back to the investor.

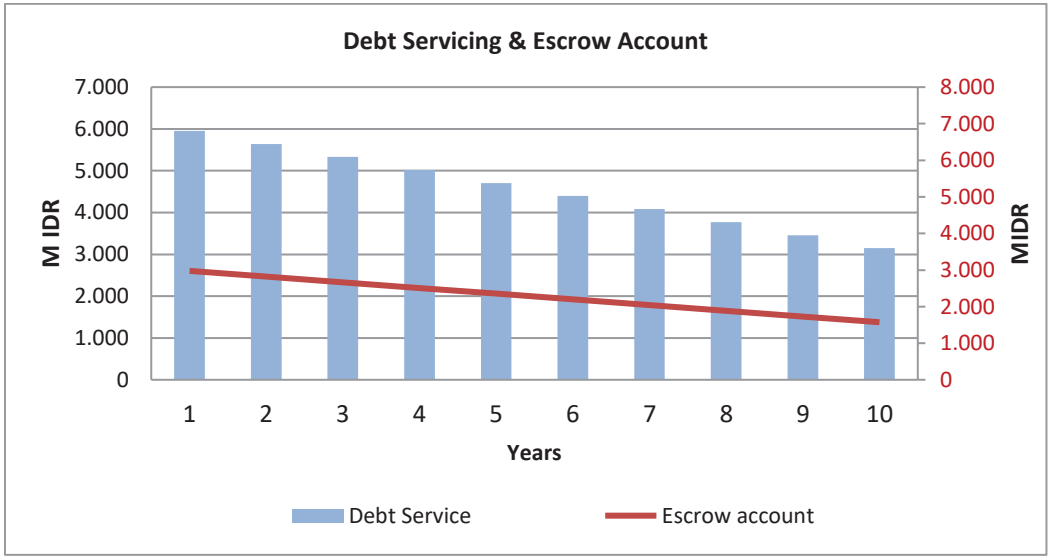


Figure 15: Escrow account over debt service period.

Given the various favourable financial indicators as illustrated in the example above, the biogas project would usually qualify for debt financing.

4.2. Biomass Power Plant

In the following, the principles of financing a bioenergy project will be explained on the basis of an exemplary biomass power plant using empty fruit bunches (EFB) as fuel. Some of the technical and economic data are taken from a plant in Malaysia, where 25.5 tons of EFB (70% moisture content) per hour is available. The data were provided by TT Renewable Sdn Bhd, Malaysia. Nevertheless, the data are transferrable to Indonesia to serve as input for an economic calculation under Indonesian conditions, especially the financial indicators for biomass projects.

Key Cost Components	
CAPEX	**OPEX**
EFB Biomass Processing	**EFB Biomass Processing**
Weight bridge **Buffer storage** **Shredding and conditioning station** **Conveyor system** **Civil work for foundations, concrete and housing**	Feedstock cost of EFB free gate Electricity supply/parasitic loads Spare and replacement parts

Key Cost Components	
CAPEX	**OPEX**
Boiler and Turbine	**Boiler and Turbine**
Boiler and grates **Steam process including heaters, super-heaters and turbine** **Chilling tower**	Maintenance contracts for boiler, grates, steam process and turbine Cost of operators and workers for plant operation Electricity supply/parasitic loads Cooling water cost Ash disposal cost Spare and replacement parts
Grid Access	**Grid Access**
Step-up transformer **Switch yard or cabinet** **Cables or line**	Usually minor

Key Cost Components	
CAPEX	**OPEX**
Auxiliaries	**Auxiliaries**
Fire protection of fuel storage **Security system** **SCADA system and control room**	Spare and replacement parts Operation & maintenance Staff
Finance	**Finance**
Insurance package (implementation) **General management** **Third party appraisals** **Quality control** **Bank fees**	Insurance package (operations) Management Finance service payments Costs for collateralization

Table 9: Key cost components for a biomass power plant

Figure 16: Photographs of biomass power plant in Malaysia, showing boiler house, fuel conveyor, EFB processing.
© TT Renewable Sdn Bhd, Malaysia.

For the given example of a biomass power plant the assumed key parameters like CAPEX, OPEX, cost of EFB as fuel as well as information on debt servicing are as follows.

Key Technical and Economic Figures (Assumed)		
Installed capacity	7.0	MWel
Parasitic loads and auxiliaries	5,548	MWh per year
Energy delivery at meter	53,348	MWh per year
Full load hours	7,621	h/a
Capacity factor	87%	
CAPEX turn-key investment including project development	189,000	million (IDR)
[exchange rate 13.500 IDR = 1 USD] October 2017	14	million (USD)

Key Technical and Economic Figures (Assumed)				
OPEX		1.4		million (USD) per year
- Maintenance of boiler, turbine, EFB processing				included
- Wages, auxiliaries (water, diesel, electricity), insurance				included
Input material: EFB		70%		moisture content
EFB fuel cost ex-mill		25,000		IDR/ton
EFB transportation cost free plant		115,000		IDR/ton
EFB consumption		120,000		tons per year
EFB fuel cost plant gate (increase 4% p.a.)		16,800		million IDR per year
Feed-in Tariff (Belitung, medium voltage)		1376		IDR/kWh
Equity	30%		56,700	million (IDR)
Debt	70%		132,300	million (IDR)

Key Technical and Economic Figures (Assumed)		
Redemption period	10	years
Interest rate	11%	p.a.
Price increase	4%	p.a.

Table 10: Key technical and economic figures for a biomass power plant (assumed)

While the specific CAPEX in terms of investment per capacity (million IDR/MW) of a steam based thermal power plant is lower than a biogas fermentation plant, there are substantial OPEX costs for periodic maintenance and spare parts. The latter are significantly higher compared to a biogas incineration engine as described above. Additionally, these costs are subject to yearly price increases especially due to increasing wages and spare parts coming from international suppliers and auxiliaries.

Besides those costs, a certain amount has to be added in order to account for EFB and their transportation. EFB do not have a real market except only very locally. These costs could be reduced or even eliminated if the plant is located next to an existing palm oil mill. The developer must develop sound feedstock planning for sustainable sourcing to avoid shortages. A joint

venture partnership between the mill owner and the biomass power plant investor can mitigate this risk.

Both aspects, accounting for EFB as well as for price increases have to be considered as in the long run there will be no compensation for increases in OPEX, steadily rising OPEX may harm the long-term cost effectiveness of a given project.

Against the background of the selected debt-to-equity ratio of 70% to 30% - as stated above - 30% of equity is assumed to be acceptable due to a sufficient DSCR over the redemption period. Based on the technical and economic input parameters of a business plan, Figure 17 explains the relationship using the key financial results of EBITDA and EBIT; the delta between EBIT and EBITDA equals depreciation plus amortisation.

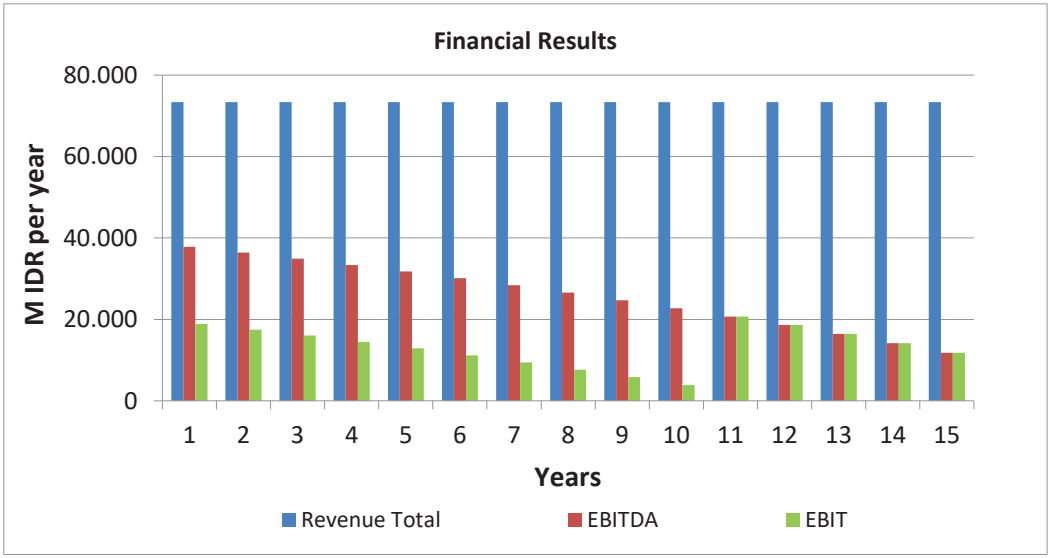


Figure 17: Financial results of revenues, EBITDA and EBIT; delta between EBIT and EBITA equals depreciation.

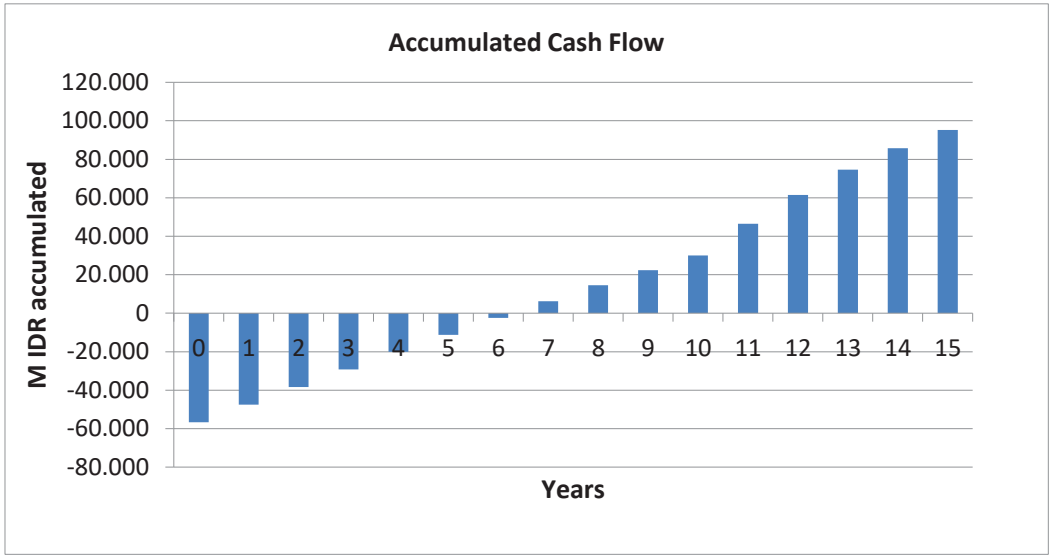


Figure 18: Accumulated cash flow starting from the initial year and considering the initial equity investment.

As can be seen in Figure 18, positive accumulated cash flows occur in the seventh year of the project where the initial investment will pay off.

In order to estimate a project´s ability to pay current and future debt, the net operating income, which is the income or cash flow that is left over after all operating expenses have been paid, will be compared to its total debt service obligations (see Figure 19).

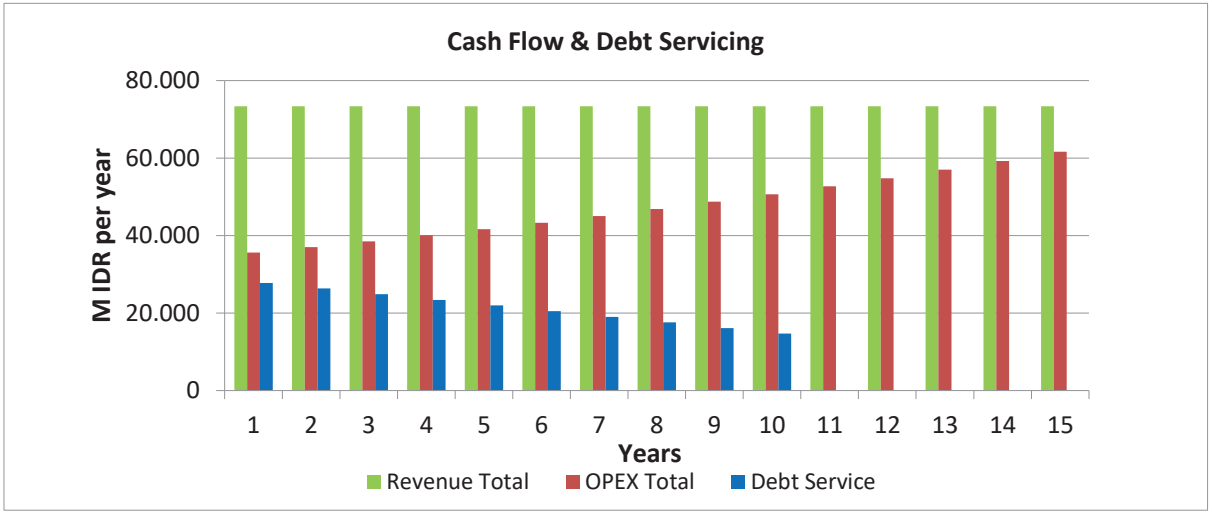


Figure 19: Financial Figures starting from the first operational year, balancing revenues, OPEX and debt service.

Again, the resulting financial ratio, DSCR, must be observed to compare the project's available cash with its current interest, principal and sinking fund obligations over the redemption period. The DSCR as shown in Figure 20 turns out to be higher as the basic requirement is 1.4. Therefore, there is a possibility for project financing.

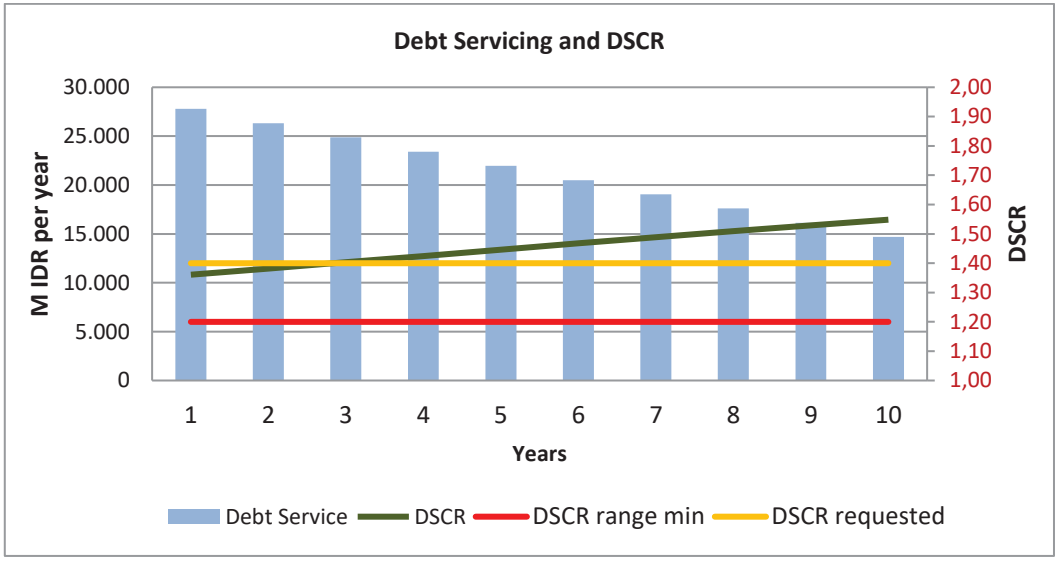


Figure 20: Actual (green colour) and requested/min DSCR over debt service period.

As mentioned previously the annual DSCR requirements must basically cover debt principal and interest (and other annual costs). If the developers do not meet these requirements, it is going to

be extremely difficult to get projects financed without risk-balancing collateral. See appendix A.1. for calculation.

To provide the full picture, Figure 21 describes the escrow account over the debt service period which will be paid back to the investor after all obligations have been met.

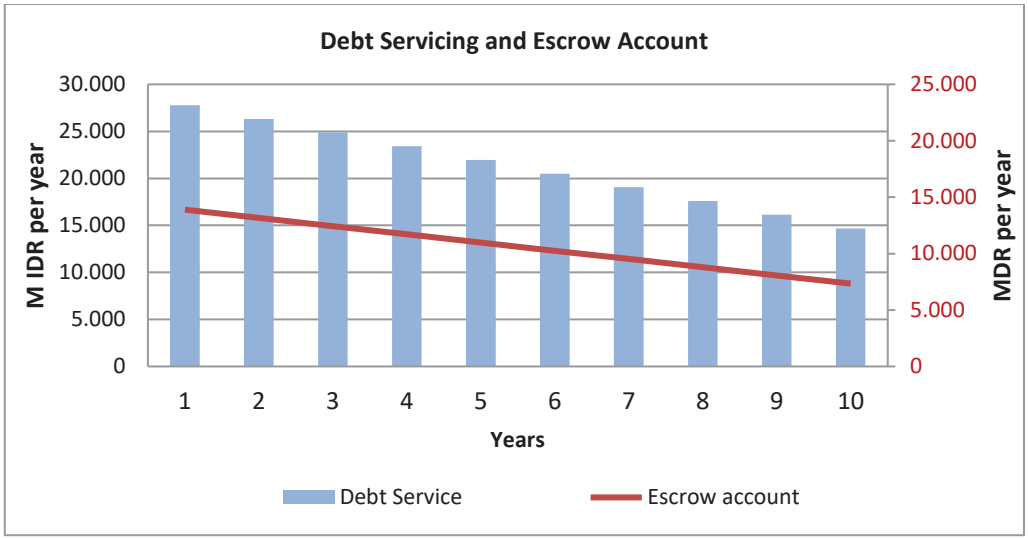


Figure 21: Escrow account over debt service period.

Given the various favourable financial indicators as illustrated in the example above, the biogas project qualifies for financing the project via bank debts.

APPENDICES

A.1 Debt Service Coverage Ratio

In corporate and project finance, the DSCR defines the amount of cash flow available to meet the interest and principal payments of debt. The banks use the DSCR to determine whether a project is financially viable to meet its debt servicing obligations.

$$DSCR = \frac{\textbf{Net Operating Income } [= Revenues - OPEX - Lease\ Payments]}{\textbf{Debt Service } [= Principal\ Repayment + Interest\ Payments]}$$

Notes:

DSCR = 1 : Project generates the cash flow to meet the periodic debt service payments but there is no safety margin

DSCR ≤ 1 : Project has a negative cash flow and there is not enough revenue to cover the periodic debt service payments

DSCR ≥ 1 : Project has a positive cash flow and there is enough revenue to cover the periodic debt service payments and a safety margin

For project finance, the minimum DSCR will be defined by the financing bank according to the risk profile of the project and the necessary safety margin for additional operational costs or potential underperformance of the given project.

For bioenergy projects in Indonesia, a DSCR in the range of 1.2 to 1.4 must be assumed.

A.2 Helpful Contacts and Links

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Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
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Bioenergy Finance Guidelines for Project Developers

Photos:
GIZ Indonesia

Layout:
Aliefah Permata Fikri

Print:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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This project is part of the International Climate Initiative (IKI). The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) supports this initiative on the basis of a decision adopted by the German Bundestag.

Bioenergy Finance Guidelines for Project Developers

1st Edition, October 2017

Implemented by:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the Parliament of the Federal Republic of Germany

In cooperation with:

Directorate General of New, Renewable Energy and Energy Conservation