# **MASTER THESIS**

Connecting North-South Energy Cooperatives: Crowdfunding as An Alternative Financing Scheme for Renewable Energy Implementation in Global South

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# List of Acronyms

AB	Autonomous Basic
AC/DC	Alternating Current / Direct Current
AF	Autonomous Full
BMI	Business Model Innovation
CFP	Crowdfunding Platform
СММ	Control-Manage-Measure
EC	Energy Cooperative
GHG	Green House Gases
GW	Giga-watt
IC	Interconnected Community
IEA-RETD	International Energy Agency – Renewable Energy Technology Development
ILI	Interconnected Large Industries
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
KWh	Kilo-watt hour
MW	Mega-watt
NLDI	Night Light Development Index
PLN	Perusahaan Listrik Negara (National Electricity Company)
RUKN	Rencana Umum Ketenagalistrikan Nasional (National Electrification General Plan)
SME	Small and Medium Enterprise
UN	United Nations
UNEP	United Nations Environment Programme
WEO	World Energy Outlook

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### Abstract

Renewable energy initiative in Global South has always been a main topic when it comes to reducing energy poverty issue. One of the major challenges of realizing this initiative is financial source. There are already several types of financing scheme in undertaking renewable projects in Global South. However related stakeholders keep on creating innovation in order to bring their project into reality. In the Netherlands, the number of community-based energy initiative, known as energy cooperative, has been increasing since 2010, along with the number of self-generated sustainable energy as a result of their existence (HIER Opgewekt, 2016). The research is intended to find out if this business model of crowdfund-based energy cooperative can be adapted to develop a model in Global South's business environment by connecting the energy cooperatives in the North and South. The 4I Framework of Business Model Innovation is applied to analyze the development of business model, supported with empirical data from Dutch energy cooperatives collected during interview. The result shows that crowdfunding could be an alternative financial source for energy cooperatives in the South. However, with regards to connecting energy cooperatives between North and South, most Dutch energy cooperatives do not see that partnering with energy cooperative in Global South at the current situation is feasible to be conducted. Future researches can refer to the recommendations for innovative business model to prepare implementation phase.

*Keywords*: crowdfunding, renewable, energy cooperative, Global South, 4I Framework.

# 1. Introduction

### 1.1. Background

In 2013, a database published by World Energy Outlook (WEO) showed that around 17% of world population still had no access to electricity. This number represented more or less 1.2 billion inhabitants who were mostly from developing countries, and approximately 80% living in rural areas. The following Figure 1 is a map of sub-national Night Light Development Index (NLDI) values, indicating that 1.2 billion people live in area with undetectable lights (Ghosh, 2013).



Figure 1. Map of sub-national Night Light Development Index (NLDI)

This type of data has endorsed countries to increase their electrification ratio, besides to improve public welfare and national prosperity. Indonesia, for instance, is a country with electrification ratio of 87.14% (RUKN, 2015) and most of its unelectrified regions are remote or less developed areas. In order to reach full-electrification, the state has deployed its national electricity company (PLN) to supply 17.9 GW within five years, but 60% was planned to be coal-based power plants (EY, 2015), which is a non-renewable resource. The reason on employing this coal-based power plant is because it is relatively cheaper compared to employing renewable energy technology.

In contrast, according to a report published by IEA-RETD (2012), fossil fuel has lower capital expenditure, but in remote areas it would not be cost effective in a long run as its true cost also includes high operational and maintenance expenses, uncertain oil price fluctuation, green house gases (GHG) emissions, and risk of transporting equipment and other construction logistics, for example diesel engines. Increasing electrification ratio is important but considering environmental and financial aspects, sustainable approaches have to adhere the solutions undertaken.

Engelken et al. (2016) collected information on general barriers regarding renewable energy development in developing countries mentioned by past studies. The barriers can be categorized at least into three groups. First group is related to regulation, law, and their enforcement. In some developing countries, long-term regulatory instrument and laws are not followed by consistent approaches and conditions. This is obviously not a convenient situation for stakeholders to work effectively in a long run, and also investors will not see it as a secure place to put their resources. Slightly different case is there are laws taken from other country but not adapted to local context; therefore some concepts may not generate expected result. Other failure factors are corruption and inadequate legal framework.

More barriers come from the second group, which is regarding human resources quality. Lack of skilled people, knowledge and information on renewable energy market are also presented as existing barriers. Together with insufficient level of education system that contributes to a low number of entrepreneur and capable manager, the business models that support renewable energy development are at risk to be effectively implemented. The third group is about data availability. In developing countries, there is not enough data on statistical economy to be used in renewable study, thus the researches are more in the conceptual level or qualitative approach. These barriers are in correlation with the inexistence of smart business models in developing countries that allow—and even support— renewable energy to compete the regime in energy market.

### 1.2. Problem Statement

Due to location and infrastructure, remote areas in some countries have tried to install renewable energy as their supply, e.g.: solar photovoltaic, hydropower, biogas, or wind turbine. Energy technology is improving from time to time but its implementation in remote area is facing multiple issues. Correlating the barriers mentioned and challenges, implementation of renewable energy development in Global South's remote area at least will require support on legal, technical, and financial issues; completed with know-how knowledge that empower local community to integrate with implementation project.

This study aims to design an innovative scheme in order to contribute knowledge in order to tackle these legal, technical, and financial challenges. Especially in developing countries, there are barriers in renewable energy implementation as mentioned above. Solutions today are expected to address multiple challenges, for instance empowering local people as active players, avoiding as much bureaucracy as possible, value-oriented (sustainability), and also being financially transparent at once.

One financial scheme that is being more and more implemented in the Netherlands is crowdfunding. Recently, some renewable energy implementations are financed through crowdfunding, a business model that involves citizen's participation (Vasileiadou, 2016), which is defined by Ordanini et al. (2012) as "the collective effort by people who network and pool their money together, usually via the internet, in order to invest in and support efforts initiated by other people or organizations."

In the Netherlands, renewable energy community is known as *Energiecoöperatie* or in English it is translated to Energy Cooperative (EC). Energy cooperative is established to run managerial function to perform crowdfund-based renewable energy installation. For example one neighborhood manages to collect money, works with facilitator and a team in charge about technical matters, and builds solar photovoltaic (PV) panels to produce energy and electrifies their own neighborhood or surrounding areas.

Crowdfunding could also be an alternative financing scheme to realize renewable energy implementation in Global South's remote area, but they cannot copy-and-paste existing scheme in the Netherlands considering insufficient legal framework, less-skilled people, and also lack of financing that exist as barriers in some developing countries. However, since community-based crowdfunding renewable energy project is an existing scheme in Global North, there is an opportunity to connect experienced energy cooperatives to work together and transfer their knowledge to the communities in Global South who are also concerned in sustainability. This cooperation scheme has to be developed so that it would bring benefit to energy cooperatives in the North too. Therefore, as an outcome of this research, an adapted crowdfunding scheme for remote renewable energy in Global South is designed to see if this scheme is reliable to overcome existing barriers.

### 1.3. Research Objectives

The research aims to contribute to the knowledge of crowdfunding as an alternative financing scheme for remote renewable energy implementation, as well as community-based energy supply in the Global South. This objective can be attained by:

- a. developing crowdfunding-based business model build upon theoretical approach, which is also adapted to known general barriers;
- b. collecting information from ECs in the Netherlands about business model concept of connecting community-to-community in renewable energy project; and
- c. confronting theory-based business model with empirical feedback from Dutch ECs on crowdfunding renewable energy in Global South.

Based on this analysis, the ultimate result would be an innovative crowdfunding-based business model and some strategic recommendations on opportunity optimization over current situation for future implementation.

### **1.4. Research Questions**

The central research question of this study is:

Is financing remote renewable energy projects in Global South by crowdfunding of Dutch energy cooperatives a feasible business model and how could such a business model be organized in practice?

### 1.5. Research Purpose

The research is conducted as a part of study program in Master of Environmental and Energy Management (MEEM) at the University of Twente. Its purpose is to study a new alternative for the sake of renewable energy development in Global South, especially in remote areas due to lack of energy infrastructure. Interestingly, the reason why remote area has no or lack of regime electricity infrastructure gives opportunity for renewable energy to answer this challenge. Different types of financing renewable energy project in developing countries have been undertaken, however challenges still exist. The purpose of this research is to contribute possible alternative financing scheme and explore its feasibility by presenting a suitable business model and recommendations to optimize it.

### 1.6. Methodology

Methodology used in this research is problem-oriented. The idea commenced with the condition of energy access in remote areas. Moreover in Global South, approximately billion of people live in unelectrified areas or there is electricity service but the quality is poor. Looking at the growth of energy cooperative in Global North, financial capacity of citizen in Global North, and the number of population in Global South, it might allow a certain business model to endorse renewable energy implementation in Global South. The aim is to formulize the best possible business model for crowdfunding renewable energy in Global South's remote area as an alternative financing scheme. Furthermore, this research eventually summarizes recommendations in order to feasibly organize and to optimize future implementation.

### 1. 6. 1. Research strategy

In order to develop crowdfunding-based business model for renewable energy project, the research will start to build its model based on literature. This strategy is known as grounded-theory approach, with three essential characteristics: inquisitive researcher, comparison between theoretical concepts and empirical data, as well as attentive and persistent to procedures and techniques set out (Verschuren and Doorwaard, 2010). In carrying out this research, it is necessary to conduct interviews in order to obtain empirical data and information. Then by confronting both theoretical concepts and empirical information, an ultimate output —which is an innovative business model and strategic recommendations— is completed.

The main framework used in the research is Business Model Innovation (BMI). BMI has built 4I Framework that defines steps in developing an innovative business model covering the following phases: initiation, ideation, integration, and implementation. The application of these frameworks is defined in the analysis part of this research. In order to be able to analyze according to 4I Framework, this research constructs a strategy of three stages activities. By applying grounded-theory approach, Stage 1 is to design a business model based on literatures. This stage shares the studies related to crowdfundbased projects in Global South countries to generate a business model concept. This concept is then supported by theories to validate that it encompasses the principles of business model. Respectively in Stage 2, researcher collects data by interviewing related stakeholders in Global North and presents the result. Finally in Stage 3, an elaboration between business model concept and interview result is aimed to create an innovative business model. At the end of the research, some recommendations are concluded to answer the question about how to prepare implementation phase of innovative business model. The following diagram illustrates the stages of the research.





### 1. 6. 2. Data collection

Data collection method used in this research is desk research and interview. Desk research aims to produce a theory-based business model. Meanwhile, interview intends to draw idea about the situation of energy cooperative in the Netherlands and to take into account their feedback about the theory-based business model. Some questions also intend to put these cooperatives to represent the Global North communities that could be future potential funders of the crowd, considering their awareness on climate change issue and renewable energy realization are in a better condition. The interviews were held in different ways, such as: offline meeting, phone call, and Skype call. Interviewees are from nine people from five different Dutch energy cooperatives, HIER Opgewekt (an organization that is concerned about knowledge sharing among energy cooperatives in the Netherlands), service company that works with energy cooperative, and researchers from University of Twente and Technische Universiteit Delft. The interviewees are from different background to cover as wide perspective as possible, and the combination of cooperatives is designed to be as diversified as possible, concerning to age, structure, and location. Detailed information about interviewees is available in Appendix 1.

### 1. 6. 3. Use of research data

Collected data from desk research covers the two first stage of 4I Framework: initiation and ideation, and interview data is analyzed based on integration stage. This data is put as comparison to the theory-grounded business model developed in the previous stages. The comparison means to check whether theory-based business model and empirical data are consistent and analyze what are the challenges to make them work for the final stage that is implementation. The existing crowdfund-based renewable energy business environment in Global North inspires this research to create innovative business model.

### 1.7. Description of the Following Chapters

This whole research comprises six chapters with structure defined as follows.

### Chapter 2: Literature Review

This chapter explains theories and former findings of related studies about the size of project that would fit to the research implementation, which is small-scale installation or also known as renewable mini grid. Furthermore, it brings up the idea about how it is deployed and what are the benefits of renewable energy mini grids. Continued with the theory about crowdfunding, definition is used in this research, along with its typology. There are four types of crowdfunding: donation-based, reward-based, lending-based, and equity-based. In addition, since the main inspiration of this research is the existence of energy cooperatives in Global North, facts about how these cooperatives implement their business, and some related studies are discussed in this chapter.

### Chapter 3: Theoretical Framework

The theoretical framework uses the 4I Framework of Business Model Innovation (BMI). BMI is an approach used to create opportunity when business environment is changed. The 4I Framework consists of four steps to guide an innovative business model to fit to the targeted business environment. The steps are initiation, ideation, integration, and implementation. Considering that this research does not include implementation of the designed business model, thus the last step is not taken into account in this research. However, regarding the implementation, a part of research outcomes advises on how the implementation can be more feasible. Within the steps, more theoretical references are added to support the analysis in order to result in strong reasoning. An example is in ideation stage. The construction of innovative business model concept refers to the theories on business model basic elements and business modeling building blocks.

### Chapter 4: Stakeholder Analysis

Chapter 4 starts the analysis process from the first step of 4I Framework, initiation, by identifying the stakeholders. Including the importance level of each stakeholder, and how they function in the innovative business model. Going on to the next step, ideation, the innovative business model is analyzed in this chapter whether it has principles of a business model. It is analyzed based on the theory of four basic elements of business model, which comprises Product, Customer Interface, Infrastructure Management, and Financial Aspects. In order to validate better, the innovative business model is further assessed according to the nine business model building blocks, which consists of Value Propositions, Key Activities, Key Resources, Partner Network, Customer Segments, Channels, Customer Relationship, Cost Structure, and Revenue Streams.

### Chapter 5: Construction of Innovative Business Model

Based on the interviews conducted in data collection phase, the data and information are sorted to properly explain the findings of empirical approach. This empirical data and information are confronted in order to generate a comprehensive result. The result of this stage is to highlight the challenges along with possible strategies to overcome these challenges in order to integrate the innovative business model into new business environment. The integration phase follows the 4I Framework where the new set of stakeholders of Global South business environment is analyzed according to the four dimensions of questions: Who, What, How, and Why, to define more challenges that may appear before launching the business model to the market.

### **Chapter 6: Conclusion and Recommendations**

Finally, general findings are withdrawn to answer the research question of "Is financing remote renewable energy projects in Global South by crowdfunding of Dutch energy cooperatives a feasible business model and how could such a business model be organized in practice?" The answer is completed with a design scheme of innovative business model. In chapter 6, some recommendations are also structured to strategize the implementation of the business model.

# 2. Literature Review

In this chapter, the discussions are related to the development of business model of connecting energy cooperatives in the North and South. The business model will pose Energy Cooperatives (EC) as the central players to actualize renewable energy project. The scope of study would be a small neighborhood or a set of several houses or a small-scaled home industry, which does not require big amount of energy supply, considering that houses in remote area are not equipped with high energy consuming appliances.

Community-based renewable energy is one of the recent emerging research topics<sup>1</sup>. This research would also contribute some knowledge in identifying the status quo of some Dutch energy cooperatives related to the ability to expand their cooperation activities, especially in knowledge transfer. Chapter 2 depicts the type of project that could be built by energy cooperatives and the position of crowdfunding in financing renewable energy perspective.

### 2.1. Renewable Mini Grids

Mini grid is a form of energy infrastructure that connects energy resources and load, which functions to generate and store power, control-manage-measure (CMM), convert, and also consume. It can be constructed independently from main grids, which is also known as autonomous, or interconnected to neighboring grids (IRENA, 2016). Mini grids came as energy supply back up from main grids proneness even failures, for instance generator-set, a commonly used equipment. Technological innovation supports mini grids evolution to combine with renewable energy to exceed the challenge of tackling the polluting fossil fuel. Renewable mini grids are a form of small-scaled infrastructure in the purpose of energy generation in neighborhood scope.

Facing challenges of logistics and transportation, renewable mini grids are likely to be implemented in remote areas. *Remoteness* is defined as a situation where an area or a community is not connected to ultimate energy infrastructure, e.g.: electricity grids or gas pipeline (IEA-RETD, 2012). Desired value-added is not only from the perspective of cost efficiency, but also in strengthening energy supply reliability (IRENA, 2016). It is already known that conventional grids need constant supply of fuel, i.e.: petrochemical products, and it requires fuel distribution. Whenever fuel transportation is constrained, it consequently affects energy security.

### 2.1.1 Deployment

Renewable mini grids deployment can be classified into four types: Autonomous Basic (AB), Autonomous Full (AF), Interconnected Community (IC), and Interconnected Large Industries (ILI) (IRENA, 2016). This classification is based on how the connection was constructed and the tier level of service provided. As discussed previously, mini grids can be constructed autonomously, which is completely independent from larger grids, or interconnected to neighboring grids as a single supply object of the energy generated.

<sup>&</sup>lt;sup>1</sup> Skype with TU Delft Associate Professor

Meanwhile tier level of service is defined based on the economical activities within the community. The more economical activities a community has, the higher loss it could have if energy supply is not reliable. This higher energy dependency should be followed by higher tier of service. Detailed distinctions among these types are described in the following Table 1 (IRENA, 2016).

Гable	1.	Typol	ogv	of	renew	able	mini	grid	S
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	Lower Tier of Service	Higher Tier of Service
	Autonomous Basic (AB mini-grids)	Autonomous Full (AF mini-grids)
	Generation Sources: PV, hydro and biomass	Generation Sources: PV, hydro and wind
	Tier of service: Less than 24-hour power	Tier of service: 24/7 power
omous	End-users: Remote community without major commercial or industrial activity	End-users: Remote communities with major commercial or industrial requirements; industrial
Itou	Added value:	Added value:
Au	<ul> <li>Alternative to grid-extension</li> <li>Improve quality of life</li> <li>Cost savings</li> </ul>	<ul> <li>Alternative to expensive polluting imported fuels</li> <li>Diversification and flexibility of supply</li> <li>Cost savings</li> </ul>
	Interconnected Community (IC mini-grids)	Interconnected Large Industrial (ILI mini-grids)
	Generation Sources: PV, wind and biomass/biogas	Generation Sources: PV, wind and biomass/biogas
_	Tier of service: High critical/interruptible	Tier of service: Very high: Critical/uninterruptible
nnected	End-users: Medium to large grid-connected community, such as university campus	End-users: Data centres, industrial processing or other critical uses
Interco	Added value:	Added value:
	<ul> <li>Community control</li> <li>Improved reliability</li> <li>Response to catastrophic events</li> <li>Cost savings</li> </ul>	<ul> <li>High reliability for critical loads</li> <li>Enhance environmental performance</li> <li>Resiliency</li> </ul>

Renewable mini grids deployment reduces risk of large-scale energy installations and also supports community involvement, because this scheme allows local people to take bigger role (IRENA, 2016) in operation or maintenance. In addition, this can also lead to operational costs reduction by training the locals instead of full-time outsource experts or technicians. Renewable mini grids can be an option of electricity generation in remote areas besides traditional diesel, which is almost a monopoly (IRENA, 2016). By having more independence in its management, renewable mini grids can be a good leverage for installation development and investment. In this context, users must have adequate knowledge and capability or are assisted by experts.

Focusing on remote or rural areas inhabited by poor community in Global South, the accentuation of this research will be more in the context of the first type of mini grids deployment, i.e. Autonomous Basic (AB). The users are assumed to employ energy for basic residential needs or even though there is economical activity, it should be of home industry scale. The following Figure 3 visualizes the equipment involved in renewable mini grids scheme and the connection amongst (IEA-RETD, 2012).



Figure 3. Multi-user solar hybrid micro-grids

In this example, renewable energy generation is depicted to be able to have more than one renewable resource (solar PV and wind turbine). However, batteries are necessary to storage the electricity generated and to secure the needs when the energy resource does not exist, e.g.: during the night for solar PV. It is essential to have AC/DC converter if users are residential areas, as some renewable infrastructures generate energy in the form of fluctuated AC-current, meanwhile household equipment require DC-current. Besides, there is also communications line for CMM function, which can help energy management and support energy efficiency actions.

Energy generated by renewable resources can be higher or lower than expectation. Mini grids with capacity of around 1 MW almost always require fossil-fuelled generator-set as back-up (IRENA, 2016), thus having redundant energy supplier can be very important in remote areas to tackle low energy generation. By contrast, if energy generated is much higher than expectation, it can be sold to main grid and obtain incentives.

### 2.1.2 Benefits

The world has started to move towards renewable energy due to climate change issue and high oil prices (Beggs, 2009). Even though oil price plunged during the crisis in 2009 and decreased significantly once again in 2014 (Gongloff, 2015), oil is still more economical compared to renewable energy, because the cost for fossil fuel to produce the same amount of energy is lower than the sustainable ones (IPCC, 2011; Griffith-Jones, 2012). Regarding the economics of both types of energy generation, Griffith-Jones et al. (2012) mentioned important three points to note. Firstly, social cost is not taken into account in fossil-fueled energy. A foregoing argument was raised stating that climate change is a 'biggest market failure in history' since market prices do not include carbon emissions, which generate environmental cost (Stern, 2006; Griffith-Jones, 2016).

Second is delivery cost. Transporting fossil fuel to remote areas is actually higher than renewable energy's. Moreover in developing countries, connecting renewables to grids is not yet common, it is a stand-alone construction instead. Repeating transportation is unnecessary to happen which leads to a more competitive transportation cost. Thirdly, based on a report released by IPCC in 2011, renewable energy potential experiences no scarcity and considered globally available (data in 2008).

Based on a report by International Renewable Energy Agency (IRENA, 2016), there are at least seven main benefits of renewable mini grids. All these benefits can lead to financial leverage, directly and indirectly.

- Reduction in energy imports particularly in terms of fuel and stabilization of energy prices because it does not depend on world oil price fluctuation;
- Reduction in energy cost, especially autonomous connection where less grid infrastructure is needed than main grid utility;
- Better resiliency in response to catastrophic events and if it is supported by energy supply from main grids, the supply reliability can be better as well;
- Improved environmental outcomes as a result of renewable resources, where also can lead to reduction in risk assessment and environmental impact costs;
- More energy options through independent management, additionally community and private sector involvement has potential to push project competitiveness;
- Create more opportunities to supply clean energy by building local capacity and exploring local renewable resources;
- Support energy diversification by enhancing any renewable energy potential to grow and reduce dependency over main grids utility.

In the future, innovations and advancements will allow renewable mini grids to be more financially interesting. It is projected to be as cheaper as one-third of current production cost from business model and system operation optimization in 20 years (IRENA, 2016). Once new technology or innovation is successfully applied, this opens more opportunity to expand the market to other remote areas and even to higher tier of service, especially when it is able to create more economical renewable mini grids generation.

Today, renewable mini grids cost between US\$0.47-0.92/kWh. It is expected to fall to US\$0.3-0.57/kWh in 2025, or even to US\$0.19-0.35/kWh in 2035 (IRENA, 2016). Higher capability in energy technology and innovation, which is supported by growing financial environment, will strongly corroborate this alternative of energy supply to be a leading application in the world.

### 2.2. Crowdfunding

Approximately 1.3 billion people all over the world still has no access to electricity (Jolly et al., 2012), which the majority of this number is located in less developed area. This figure also shows that electrification projects are hoped to solve existing problem. Along with this situation, an opportunity to innovate in order to be able supplying reliable electricity is still wide open. Some literatures argued that the alternative development prospects in Asian emerging economics, for example, are surpassing the initiatives in Western countries (Jolly et al., 2012).

The development prospects also include innovative means of financing the technology as well as the project. According to Levi et al. (2010), in order to fulfill the energy demand in developing economies, the biggest democracy in the world—India, will construct escalating number of more cost-effective business models. Hence, more research in alternative development is helpful to improve the capacity to innovate. One of the recent topics about innovative financing means of renewable energy project is crowdfunding.

Crowdfunding has turned into a popular alternative way to finance different types of initiatives (Hossain, 2016). It is considered successful in supporting actions by gaining fund, either as donation, pledge, or lending of paltry sum of money directly from public (Hollas, 2013, Hossain, 2016). In fact, crowdfunding is not a new thing. It resembles typical means of funding, such as microfinance or cooperation, but the hustle of social media has blended in, and corroborates crowdfunding existence (Harrison, 2013). The growth of social media usage is clearly multiplying nowadays. It is a big opportunity to improve the innovation in development project by capturing the close-relation between people and internet.

Crowdfunding project exists to grab the like-minded people who have specific interest or sympathy over certain issue and usually used by entrepreneurs to financially support their activities that touch the crowd's emotion. The bottom-up driver interpreted from recent contributions is the willing to help other people (Muller et al., 2014). However, Grant (2014) in Mickiwicz et al. (2016) distinguishes two important types of altruistic motivation: genuine "givers" who are interested to translate their actions into building greater value; and helpers, whom motivation is instrumental.

These human capitals as financial resource or in the context mentioned by Dongier et al. (2003) as community-driven development, could be a solution for financial contraints faced by entrepreneurs, especially the small and medium-sized ones. Community-driven development is proven to exacerbate provided service to be more effective and efficient in microfinance sector, including the community-based one (Ibrahim and Verliyantina, 2012). Nevertheless, different type of crowdfunding can generate another motivation, for example financial gain, which dependence lies in the business model.

Hossain (2016) claimed that crowdfunding still poses shortfall in theoretical foundation, however by comparing previous definitions of crowdfunding along with its typologies defined by former researchers, he categorized crowdfunding into these four typologies.

### 2. 2. 1 Donation-based

This simplest type of crowdfunding is usually acted upon social purposes. Here, funders do not expect any financial return. They may receive a thankful message, updates, or documentary report of the donations. Since there is no obligation to give any return, it makes donation-based crowdfunding has the lowest risk for the fund receivers.

### 2.2.2 Reward-based

Funders expect and may receive a non-monetary return, which is called as reward. The reward can be in the form of gifts, token, or product supported, depends on the degree of funding. For both funders and fund receivers, the risk level is medium. If the founders cannot manage to produce the expected outcome, then the funders will not receive their reward. Generally, early adopters are potential funders for this type of crowdfunding.

### 2.2.3 Equity-based

Also known as profit-sharing model, this crowdfunding type allows funders to expect financial return. The investment value will define the share of the venture or project financed. It requires more advanced legal and business considerations. Even the US is establishing a regulation specified for equity-based crowdfunding.

### 2.2.4 Lending-based

This model is a peer-to-peer crowdfunding practice. Funders, or in this scheme called lenders, lend some money to be returned within an agreed timeframe, with or without interest. They expect some return from their contribution, which acts similarly as loan. The exchanged item is only money; this is the main distinction of lending-based to other crowdfunding types. It has rather simple mechanism, but lenders risk of losing money if borrowers cannot repay the loan.

Since renewable energy projects usually require high capital, the most suitable schemes would be 'donation' and 'equity'. Equity-based crowd-funding approach would attract more investment since the project is bankable. However, a donation approach is always an option to help reducing the payback period, but it is relatively difficult for renewable energy project to reach the targeted capital by depending on donation only.

Furthermore, not only as a mean of financing, crowdfunding also functions to advertise the project (Fleming and Sorenson, 2016), permits market penetration (Ordanini et al., 2011) as well as its potential as market (Belleflamme et al., 2014; Fleming and Sorenson, 2016). Accompanying all these strengths, there is risk of failure that if the project breaks down, then the organization might suffer from unfavorable marketing situation (Gerber and Hui, 2013), whereas trust is critical in raising fund from the crowd (Cholakova and Clarysse, 2015).

### 2. 3. Energy Cooperatives in Global North

Energy-related business is important in terms of energy transition (Dilger et al., 2017), and the potential of collective action can be an efficient option to fight against climate change (Walk, 2014). It is proven that in the Netherlands, people today tend to establish their own energy supplier instead of depending on the regime. A powerful instrument is registered co-operative (Ott and Wieg, 2014; Volz, 2012; Warren and McFayden, 2010), which in renewable energy context, one of the existing practices is in the form of direct participation of energy users, for instance profit sharing among citizens (Huijben and Verbong, 2013). This practice is acknowledged as Energy Cooperative (EC).

Energy cooperative is in the spectrum of crowdfunding-based small-scaled (mini grids) renewable energy project. As defined by Mollick (2014), crowdfunding is a mean of collecting relatively small contributions from many individuals with the help of internet. Thus, there are at least three main actors in the scheme: crowd, fund receiver, and webbased fundraising platform (Dilger et al., 2017).

Supporting the potential of community-based business model, Vasileiadou et al. (2014) argued that crowdfunding does not only reinforce energy transition, but also increases societal awareness by having higher participation degree of energy users and even worldwide citizen, which potentially leads to political support to renewable energy. They added that crowdfunding could constructively evaluate the relationship among energy system transformation dimensions (technology, business, society, and politics).

Based on the past researches, there are a number of strengths performed by the energy cooperatives concerning their crowdfunding renewable energy project business model scheme. The main strength is that this cooperative model is able to bring together the potential of individual to obtain bigger impact through support of its member (Draheim, 1952; ICA, 2015; Staab, 2013). This leads to a better customer relationship (Blome-Drees, 2012) through a direct result, since the customers are its own members (Chiang, 2014; Draheim, 1952; Ringle, 1994; Viardot, 2013).

Nonetheless —opposing to shareholder principle, — as funders, members can endorse the project more than just from pure financial gain purpose (Davis and Worthington, 1993; Ringle, 1994), instead working in cooperative value of togetherness. These facts explain that from both perspectives of member as funder and manager, a democratic and active participation is prior to financial orientation in realizing energy transition (Dóci and Vasileiadou, 2015; Eiselt, 2013; Volz, 2012; Yildiz et al., 2015).

In the Netherlands, the initial energy cooperatives —which were only dedicated for wind energy— were initiated by farmers<sup>2</sup>. This energy cooperative scheme was firstly established in 2008 and has been growing since 2010 (HIER Opgewekt, 2016) as depicted in Figure 4. The founders of some energy cooperatives mentioned that their earliest motivation was because they are not satisfied with government's performance<sup>3</sup>.

<sup>&</sup>lt;sup>2</sup> Skype call with Dutch Energy Cooperative

<sup>&</sup>lt;sup>3</sup> Offline interview meeting with Dutch Energy Cooperatives

At the end of 2015, there are more than 250 energy cooperatives and collective group projects with more than 35,000 of members all over the Netherlands (HIER Opgewekt, 2016). Nearly 90 MW of electricity has been generated for more than 50,000 households from local sustainable energy supply (HIER Opgewekt, 2016). The experience of Dutch energy cooperatives also significantly differs in a wide range (Schoffelen, 2015). Thus it is also important to take samples from different characteristics of energy cooperatives during interview stage.



Figure 4. Number of EC establishment in the Netherlands (copied from HIER Opgewekt, 2016)

The following table is provided to translate Dutch terminologies in Figure 4. Table 2. Technical translations

Dutch Terminologies	English Translations
Energiecoöperatie(s)	Energy cooperative(s)
Projectcoöperaties andere partijen	Project cooperative (of other parties)
Projectcoöperatie	Project cooperative
Windcoöperatie	Wind (energy) cooperative
Lokalecoöperatie	Local cooperative

Despite of this development, there are still challenges faced by the energy cooperatives in the Netherlands. At least there are two aspects that can be highlighted: regulation and internal affairs. Based on the interview with HIER Opwgewekt that in 2014, the Dutch government released a regulation related subsidy for citizens who generate their own electricity sustainably or sell the electricity generated to the grid. The subsidy scheme has been enacted by discounting electricity tax from 10 to 7 euro cents directly from citizen's bills, but the result was still not financially satisfying.

Later in 2016, a follow-up regulation related to energy cooperative was again issued. Regarding the fact that energy cooperatives are not supposed to generate electricity except on their own land, a new scheme known as *postcoderoos project* was introduced to clarify that energy cooperatives can use others' land, as long as it is still in their post code number area. This scheme has helped some cooperatives to expand their service, however in general, until today there is only a thin line between profit and loss for the Dutch energy cooperatives<sup>4</sup>. Even according to some cooperatives, they admit that it is quite difficult situation to develop their cooperatives since they struggle with ongoing projects and to secure that there is project in the pipe at the same time.

Concerning internal affairs, Dutch energy cooperatives have different types of organization. There are cooperatives interviewed that establish a company (*Besloten vennootschap* / B.V. or Limited / Ltd.) or provide paid jobs at the energy cooperative. Nevertheless, a similarity in their initial stage of cooperative establishment is that the founders were not paid, or they were working voluntarily. All of the Dutch energy cooperatives started their system on voluntary basis, even today, still most of them do. The challenge is that when people are working voluntarily, then conflict could potentially rise from personal subjectivity. It would be depending on one's prioritization and relative contribution from one person to another.

<sup>&</sup>lt;sup>4</sup> Skype interview with HIER Opgewekt

## **3. Theoretical Framework**

Besides developing new concepts, another way to seize a growth opportunity during the fluctuation of business environment is by developing Business Model Innovation (BMI). Chesbrough (2007) and Gassmann et al. (2013) believe that it is useful to outperform product and innovation through this process. Gassmann et al. (2013) and Frankenberger et al. (2013) formulated BMI by differentiating it into two phases: design and realisation. Gassmann et al. (2013) introduced 4I Framework to build an innovative business model as illustrated in Figure 5. Each step defines its key challenges to focus on. 4I Framework is a process of progressive steps comprising initiation, ideation, integration, and is then actualized by implementation.



Figure 5. 4I Framework (copied from Frankenberger et al., 2013)

In initiation phase, stakeholder analysis is conducted to identify the actors and how they work within the entrepreneurship ecosystem. Then, their impact to business model is observed by sorting their function and needs. Followed by ideation as the second phase to contextualize business model to a new business environment, Dilger et al. (2017) proposed 55 types of business model blueprints as referred in BMI Pattern Cards. Among these 55 patterns, one of them is crowdfunding, —a pattern elaborated in this research. Here, the business logic of crowdfunding project in Global South is discussed to generate a business model concept of crowdfund-based renewable energy project.

Consecutively, integration phase means to ensure that both internal (business model concept) and external (business environment) aspects of business model are consistent. Finally, implementation is intended to test the contextualized business model including before its launch to the market (Gassmann et al., 2013; Dilger et al., 2017), but this scope is not included in the research boundary. The outcome of this 4I Framework analysis is to develop a crowdfunding-based business model for remote renewable energy in Global South by connecting the energy community there to the experienced energy cooperative in Global North. This research also limits the energy cooperative as source of data only of the Netherlands.

### 3.1 Initiation

The main activity of this phase is to conduct stakeholder identification. According to Frankenberger et al. (2013), the mission of initiation stage is to analyze the ecosystem: who are the players and how the system work. Their study mentioned, "The ecosystem comprises players such as customers, suppliers, competitors, universities, governments, and immediately influences the operations of the local firm."

The purpose is to define necessary actions and how these actions should be undertaken. There are two major challenges in this stage: comprehending the needs of stakeholders and identifying change drivers. It is necessary to start with understanding each player's needs, because they could influence the starting point of the innovative business model. In this research, identification includes the function and needs descriptions of each stakeholder.

The second challenge to be overcome in initiation phase is change drivers identification. In the research conducted by Frankenberger et al. (2013), some drivers that possibly impact the contemplation of business model are technology and regulatory aspects. This step is important so that the system or the business model developed can prepare for the future changes that could affect any player or relationship within the ecosystem.

### 3.2 Ideation

In generating idea of business model, a process of ideation comprises three challenges (Frankenberger et al., 2013). The first challenge is to overcome the existing business logic, as in to think over the boundary to generate a breakthrough. In this research, the breakthrough that wants to be achieved is to solve the energy poverty problem in Global South by contributing knowledge about energy cooperative business model inspired by the Global North cooperatives. Then, second challenge requires a contemplation process to realizing the solution as defined in the first challenge. Nonetheless, the inexistence of systematic tools to generate new business model idea is also an obvious final challenge. Therefore in this phase, business model theories are provided as tools to support the ideation of innovative business model.

A theory-based design is considered as a reasonable start to build an innovative design. Referring to Osterwalder (2004), theory perspective of business model gives structured system to plan, design, and implement business model. This theory-based scheme will then be proposed to the Dutch energy cooperatives and related organization to get their feedback, since the main idea is to connect experienced energy cooperative to create new energy cooperative in Global South. The experienced energy cooperative will play important role as knowledge transfer agent and as a part of research stages, their advice on how the role should be organized is necessary to take into account.

The theories used in supporting ideation stage are business model basic elements and business modeling building blocks. According to Osterwalder (2004), a business model encompasses basic elements of product, customer interface, infrastructure management, and financial aspects. A firm that works in providing goods or services through a certain interface to their customers, where both products and interface are built and supported by certain infrastructure, has to be clearly managed under defined procedure. All these relations in business model can be completed by injecting capital, distributing it, and eventually the firm would generate revenue from sold products or services.

In addition to the four basic elements, Osterwalder (2010) also developed nine business modeling canvas building blocks. The aim of analyzing business model based on these nine dimensions is to collect information in order to make decision about approaching business opportunity (Leschke, 2013). The nine building blocks are used in this research to analyze business model concept, by following hereunder description.

Business Model Canvas Building Blocks	Description
Value Propositions	the goods and services offered and their distinguishing advantage
Key Activities	the most important activities in executing the value proposition
Key Resources	the resources necessary to create value for the customer
Partner Network	relationships considered essential to accomplishing the value proposition
Customer Segments	the specific target market(s) intended to be served
Channels	the proposed channels of distribution
Customer Relationship	the type of relationship the firm wants with its customers
Cost Structure	characteristics of the cost and expense structure
Revenue Streams	the way the firm will make money, how it is paid, and pricing

Table 3. Business modeling building blocks (Osterwalder, 2010; copied from Leschke, 2013)

### 3.3 Integration

Crowdfunding can be perceived as a new way or breakthrough in renewable energy actualization. There is chance to innovate energy cooperative business model following the changing market (Müller et al., 2015), to race the digitization trend (Stappel, 2016), as well as to generate benefit from untapped potential optimizely (Dilger et al., 2017). Crowdfund-based renewable energy project in developing countries—especially in remote areas where there is no or poor quality of electricity— could facilitate everyone who has interest or social awareness to directly contribute in increasing the life quality of less developed people and sustainability on the other side of the world.

Energy cooperative who represents a certain identity is potential to attract its attention "givers". For instance, even though geographic dispersion plays crucial role in engaging

participation (Agrawal et al., 2011) and energy cooperative represents "community of locality", energy cooperative can also be built as "community of interest" (Holstenkamp and Degenhart, 2013). This shows an opportunity to grab like-minded people to bring the same value together despite of location. However, it is important to ensure a reciprocal relationship, be it in the form of financial return and non-monetary benefit. It applies to funders who are interested in supporting the project through their financial contribution, and also to enrich the experience of energy cooperatives in Global North who are willing to perform knowledge transfer and to partner with energy community in Global South.

The third stage of 4I Framework is integration of innovative business model into the business ecosystem. Considering the opportunity to build and develop crowdfund-based renewable energy cooperative in Global South, an integration process of this business idea should be carefully designed according to the way the ecosystem works. Following up ideation stage where a business model concept is built based on theories, answering questions such as, "How to link the parties in the new model and integrate them into a solid system?" is the type of challenge to be solved. Therefore, taking into account the perspective of Dutch energy cooperatives as stakeholder who is experienced in such business model is necessary. Completing this research of empirical information, the outcome of ideation phase—or a theory-grounded business model concept— was presented to Dutch energy cooperatives. Their feedback is then used to finalize the integration phase from both theoretical and empirical approaches.

The theoretical approach of integration phase in 4I Framework is to assess stakeholders based on four question dimensions: Who? What? How? Why? Furthermore, studies done by Frankenberger et al. (2013) discussed that integration process also intends to answer the question of, "How to interconnect and manage the partners?" Thus, after analyzing integration process, the business model concept of ideation phase will be reformulated to obtain an innovative business model. Along with that, a list of recommendations is provided to prepare the implementation phase.

### 3.4 Step-by-step Framework Application

**Step 1 – Initiation:** Identify stakeholders and their function in the current business environment of Global South.

**Step 2 – Ideation:** Build a business model concept (a theory-based innovative business model) and validate the scheme based on theories on business model.

**Step 3 – Integration:** Analyze feedback from respondents (Dutch energy cooperative) about the business model concept and compare this empirical approach analysis with the theoretical approach business model to finalize an innovative business model. The comparison would conclude recommendations to prepare implementation stage.

# 4. Stakeholder Analysis

This chapter covers stakeholder analysis before continuing to develop business model concept of crowdfunding-based renewable energy project by establishing energy cooperative in Global South. The stakeholder analysis is approached by identifying their function and needs by following the first step of BMI's 4I Framework: initiation.

### 4.1. Initiation

In initiation step, the expected outcome is identification of stakeholder and their needs. The identification starts within the business environment analysis of crowdfunding project in Global South based on literature. From this identification, change drivers are being discussed to conclude important stakeholder to be involved in Global South's business environment at the end of this chapter.

### 4. 1. 1. Stakeholder identification

In the current studies, discussion about crowdfund-based renewable energy project in Global South is relatively limited, thus the theoretical approach in this chapter includes any crowdfunding activities in Global South. The aim is to identify existing stakeholders in order to create a community-based energy cooperative as inspired by the energy cooperative business model in Global North. The stakeholders then are arranged to see whether a new type of business model by connecting the cooperatives between Global South and North would work to be implemented in current business logic.

According to Hekkert et al. (2011), key stakeholder is a parameter to assess innovation system. The main goal of this business model is to form energy cooperatives in Global South and to make it work with both existing stakeholders and potential stakeholders as designed in this research. A cooperation-based community means to tie individuals as an association to obtain greater objective (Draheim, 1952; ICA, 2015; Staab, 2013 quoted in Dilger et al., 2017). It becomes important to identify stakeholders' objective by describing their function and needs. Dilger et al. (2017) concluded that there are three protagonists in crowdfunding: the crowd, fundraiser (new energy cooperative in Global South), and crowdfunding platform.

As a matter of fact, crowdfunding can also be perceived as an outgrowth of information technology (Adhikary and Kutsuna, 2016), since they believe that crowdfunding has three fundamental factors, i.e.: trust, web-based technology, and people willingness (to help others). Besides referring to literature, many pratices of crowdfunding today have close relation with web-based interface as it is spread out through internet, for instance social media. Quoting analysis from Hemer (2011) in Adhikary and Kutsuna (2016), "A unique feature of crowdfunding is that it exploits the new features of the Web 2.0, especially viral networking, marketing and social media, to pool funds from mass people within a relatively shorter period." Media, as an advertiser, holds a crucial position as an interface to the crowdfunders to directly access the project as investor or secondary advertiser. Its user-friendliness could also affect willingness of the crowd to contribute.

Fatoki (2014) found out that because of its recentness, crowdfunding in South Africa still exists without accompanying legal and regulatory boundary. He continued that the role of regulators is important in terms of addressing investors' potential risks and promoting transparency. The availability of financial sources is crucial, for example the small entrepreneurs in Rwanda start to develop reciprocal crowdfunding model because of lacking access to monetary capital (Elkuch et al., 2013). Align to this motivation, small and medium enterprises (SME) in Indonesia have been challenged to limited financial source that put crowdfunding as one of their options to gain monetary capital (Ibrahim and Verliyantina, 2012). Another situation that shows that the government can be a highly important stakeholder happens regarding Security Act (2007) in Nepal and Security Act (2008) in Sri Lanka, which consider that gaining capital with return or reward (discrete activity of equity-based crowdfunding) is unlawful (D'Rosario et al., 2016). Thus, an active role of government as immediate influencing player to regulate crowdfunding as alternative financial source is important in the business ecosystem.

Discussion about the existence of crowdfunding as alternative finance is also elaborated by Adhikary and Kutsuna (2016) with regards to the role of microfinance institutions in Bangladesh. They argued, "Microfinance is predominantly a bank based exercise, whereby the bank is solely the originator, provider, and risk-taker of the loan. By contrast, in crowdfunding, the crowdfunding platforms (CFPs) originate the fund, and the fund suppliers (ordinary people) bear the risk of the fund." They added, for growing firms that require a relatively big amount of capital, microcredit cannot provide beyond their funding limit. Thus, crowdfunding does not compete with institutional investors (e.g.: microfinance and venture capitals), instead of filling the gap left amongst financial institutions (Adhikary and Kutsuna, 2016).

Thus, as discussed from relevant literatures, there are at least three stakeholders in the inner layer and two immediate influencing players as second-layer stakeholders as shown in Figure 6. If the second-layer stakeholders play their roles constructively, the crowdfunding system would work properly and to some extend is expected to deliver better result, for instance if government provides subsidy, or media applied as interface is considerably user-friendly for as wide users as possible.



#### Figure 6. Stakeholder layers

This stakeholder identification in the beginning of initiation phase finds out that there are at least five stakeholders with specified roles to carry out crowdfund-based project in Global South, based on theory. Respectively, Table 5 describes stakeholders' objective based on their function and needs. They are project owner (fundraiser), crowdfunder, fundraising tool (web-based crowdfunding platform), government, and media.

First-layer stakeholder	Function	Needs
Fundraiser	Project owner; a group of people who wants to finance the project they are concerned about	Building and establishing an project by collecting financial support from the crowd
The crowd	Crowdfunders; individual or institution who wills to donate or invest their money to finance the project of fundraiser, where they are interested in	Being contributive to positive change of the issue or project they are concerned about, as well as financial return, to some extend
Crowdfunding platform	Fundraising tool; a team that concerns on raising fund, managing project finance and investment return	Establishing an interface that brings those who need monetary capital and those who will to donate or invest in the same platform
Second-layer stak	eholder (Immediate influencing j	players)
Government	Regulator; government who can issue regulation to endorse the project, e.g.: permit or subsidy	Being able to facilitate and rule the activities of the society through regulations
Media	Advertiser; the tool to be used to attract more funders and also to inform the crowd about the project growth	Providing attractive news to the readers, as well as to gain profit as an enterprise

#### Table 4. Stakeholders' function and needs identification

### 4. 1. 2. Change drivers

As mentioned earlier, in initiation phase, there are stakeholders whom their existence is needed to understand the business ecosystem, e.g.: "customers, suppliers, competitors, universities, governments, and immediately influences the operations of the local firm" (Frankenberger et al., 2013). In the context of renewable energy cooperative in Global South, customers would be the people who put their contribution in the crowdfunding project. Suppliers are the players who provide goods or services to design and build the infrastructure. Competitors could be the other crowdfunders with similar interest of renewable energy project development. Meanwhile universities could be local academic institutions or even worldwide who put effort in conducting research in renewable energy project development, crowdfunding movement, or energy cooperative in Global South business environment. Likewise, governments from different level, region, and nation could also directly and indirectly contribute to issue constructive regulations.

From the supply and demand sides, there is still a huge area of unelectrified region that can be perceived as the demand side of this business model. Considering that the issue of energy poverty and community development, the supply of financial support from the crowd can be very promising, referring that one of the strengths of crowdfunding is to involve the investors (crowd) to directly access the project they finance, where energy poverty issue could always attract the interest of different kind of person globally. Also since crowdfunding becomes more and more popular, this alternative finance scheme can be a promising supply of monetary capital for remote renewable energy project in Global South. Supply of knowledge and technology is also an important aspect to note, but in line with the development of renewable technology that provides cheaper and more efficient technology from time to time, technology might not be a strong change driver at the moment in this Global South context.

Learning from the experience in Global North, regulation and internal affairs are two principal aspects that deserve high attention. Related to regulation, it might be not yet sufficient considering that renewable energy development in Global South is not as advanced as Global North, for instance subsidy for individual's electricity bill might not yet exist. This perspective will depend on the country context, but the idea is to identify the regulations that are related to renewable energy implementation, even to push the policy direction to support innovative business model. As discussed in the previous section about the conditions of related regulation in Global South countries, the main change driver for crowdfund-based business model for renewable energy in Global South is regulation.

The next point is about internal affairs, the way the members interact with their energy cooperative in Global South has to be secured in order to ensure project's sustainability. In the favor of gaining capital for the energy cooperative in Global South, the local community is not the one who provides monetary capital. It can be an option to engage local community involvement to financially contribute in the project, as it could also be interesting for the crowd to see that the energy cooperative is willing to invest in their own project. However, since the community in remote area is relatively poor, another strategy to engage their commitment is important to plan, for instance to open paid positions for infrastructure maintainance. Nevertheless, engagement strategy cannot be generalized because every project could have different characteristics of people and culture; also different amount of fund raised so that the fund can be used to increase the participation of the local community. One thing for sure is that stronger engagement of members to their energy cooperative might increase the trust of the crowd over the project and gain more financial support from the crowd as well.

# 5. Construction of Innovative Business Model

The construction process includes the next two steps of 4I Framework: ideation and integration. In ideation stage, the business logic of current environment is taken as a benchmark to develop business model concept in the new business environment. The concept developed is strengethen by identifying its basic elements and building blocks as a business model. Following up to integration, this stage requires analysis, which is approched from two perspectives: theoretical (4I Framework) and empirical (interview with Dutch ECs and HIER Opgewekt) in order to finalize an innovative business model by considering future challenges by conducting innovation analysis.

This chapter explains both ideation and integration processes are adapted to renewable energy cooperative opportunity in business environment of Global South. At the end of analysis, the reformulated business model concept is claimed as innovative business model proposed by this research in order to contribute to the knowledge regarding crowdfunding-based renewable energy implementation in Global South.

### 5.1. Ideation

In ideation step, overcoming existing business logic is the first thing to do. Then from the current logic, contemplation process of idea generation is conducted to obtain a theory-based business model concept as ultimate outcome of this chapter.

### 5. 1. 1. Current business logic

A qualitative research conducted by Hidajat et al. (2016) claimed that the most decent and appropriate type of crowdfunding model for small and medium enterprises (SMEs) in Indonesia is profit-sharing-based investment. In this model, the crowdfunders are aware that they have no guarantee of getting their contribution back, but crowdfunders and SMEs have agreed the profit sharing scheme together (Hidajat et al., 2016). Their research question was to find out whether crowdfunding is appropriate as financing model for SME's activities.

A theoretical perspective of their research has showed in correspondence to theoretical base used in this research, for instance Hidajat et al. (2016) stated that there are three main actors in their model: "SMEs as those in need of capital, crowd funders provider of capital, and the operators of crowd funding as a party to bring together and facilitate business cooperation among SMEs with crowd funders." Interview sessions were also conducted to modelize the current business logic in Indonesia, which invited various backgrounds, e.g.: academicians, SMEs, crowdfunding managers, and investors. A step-by-step description of crowdfunding business logic was sorted as follows according to their research:

- 1. SMEs that needs capital for its business must register (campaign) through crowdfunding website.
- 2. Crowd funding operator is selecting to determine its eligibility to be funded and add the selected one in the website.

- 3. Then, crowd funder candidates see the website to select and define SMEs that they want to fund.
- 4. Later, crowd funder is transferring fund through the bank designated.
- 5. Crowd funder is confirming to the operator that the remittance has been done.
- 6. Bank is confirming to the operator that the remittance from the crowd funder has been received.
- 7. Afterward, operator is authorizing the bank to transfer the money to SMEs.
- 8. Bank is transferring the money to SMEs.
- 9. An SME is utilizing the fund to finance the project handled.
- 10. If the project can generate the profit, the SMEs gets profit that is shared based on the agreement.
- 11. Crowd funder is getting profit sharing from capital gains and return of initial capital that is transferred through the bank.
- 12. Bank is transferring profit sharing and return of initial capital to the crowdfunder. (Hidajat et al., 2016)

Based on the finding of the research above and recalling stakeholder identification in the previous sub-chapter, there are three main players taking role in the current business ecosystem of crowdfunding project in Global South, who work together with supporting instruments. Two supporting instruments mentioned above are website (as the main tool used by crowdfunding platform) and bank (as payment gateway). Figure 7 illustrates the mechanism of how crowdfunding business logic in Global South, in this case Indonesia, works by taking into account the discussed literatures.



Figure 7. Business logic of crowdfunding-based project in Global South

The three essential protagonists in crowdfunding within this scheme are the crowd or crowdfunder, internet-based crowdfunding platform, and fundraisers who collect and distribute fund to the concerned project or issue. This above scheme is relatively simple considering not many stakeholders involved. By default, the storyline of the project to be financed is published on the internet and spread worldwide and to some extend, specific potential market is approached, related to the issue brought up. The crowd or general public then collect their money via internet (green arrow) and donate or invest it to the fundraiser as the object or to conduct the project (purple arrow). In donation-based crowdfunding, the financial support will stop at the end of this purple arrow. In equitybased crowdfunding case, the financial support from the crowd would eventually come back to the crowd via crowdfunding platform (orange arrows). This part requires knowledge about regulation of the country, since for example in Sri Lanka and Nepal, discrete activity of equity-based crowdfunding is considered unlawful (Adhikary and Kutsuna, 2016). Thus, knowing that business model conforms the law is fundamental to be noticed upfront. Furthermore, in renewable energy generation context, regulations about permit, feed-in-tariff, subsidy, etc are crucial to perform the business model.

### 5. 1. 2. Business model concept

In the purpose of establishing energy cooperative to run a crowdfund-based renewable energy infrastructure, the theory-based business model needs to be rearranged since the energy cooperative concept of Global North might be new to local community. Based on stakeholder identification and business logic of crowdfunding-based project in Global South (taking Indonesian case as example) described above, a business model concept of crowdfund-based renewable energy business model is developed.

In stakeholder identification section, there are five stakeholders exist in the literatures about crowdfunding project in different countries in Global South. Those five stakeholders are crowdfunder or general public, fundraiser, crowdfunding platform, media, and government. In the business model concept below, crowdfunder is the crowd; fundraiser is the new energy cooperative in Global South; and crowdfunding platform remains the same terminology. Media stays together with the crowdfunding platform as its natural part of web-based platform. Government from the Global South side has been mentioned by a number of literatures as important actor in conducting crowdfunding platform that also function to manage the collected fund and distribute it. An entity of technical team is included to support the design and construction phases of renewable energy infrastructure. This team can be a group of experts who teach and train technical matters to the local community or professionals who are paid to accomplish technical jobs and to commission to the local community.

The innovative part of this business model is to introduce the existing business logic of crowdfunding projects in Global South and to integrate an experienced stakeholder from the existing business model in Global North in order to optimize the execution and to improve project sustainability, which is Dutch energy cooperative. This actor is designed in business model concept as knowledge provider who shares their knowledge and experience as an established crowdfunded energy organization and furthermore to partner with the new energy cooperative in Global South. This research would like to

find out whether their contribution as knowledge provider is feasible to be organized. By involving Dutch energy cooperative, a business model concept is drafted as shown in Figure 8.



Figure 8. Business model concept

Before the business model concept being implemented, there are some actions required as preparation. It started with the crowdfunding platform team to find an experienced Dutch EC and a potential energy community in Global South to perform as an energy cooperative. It is important to be sure that both communities in this stage are motivated to actualize renewable energy project in Global South. From the early stage relationship, a short story is prepared in order to introduce the main stakeholders to the crowd.

This story must include the energy challenge faced by the energy community in Global South and the experience of conducting crowdfunded renewable energy project by Dutch energy cooperatives. In this stage, it is necessary to make preliminary calculation on the electricity capacity needed, as well as the amount of required investment. The idea is to be clear to the crowd of how big the impact they can give to the story. Once the story launched and the crowd reacts, the business model starts to perform as follows.

- 1. The first events happen as shown by the green arrows. As the story is spread through the internet, some people in the crowd may be attracted by the story and trust to put their money to be invested to pitch a project and construct energy infrastructure. The preliminary calculation is shown as a target of the amount of money required to execute the project and also a benchmark of the crowd's contribution. In addition, it is also expected that the community in Global South (fundraiser) could also participate financially to have a stronger bond with the project.
- 2. At a certain point, crowdfunding platform is sure to commence further actions planning with both energy cooperatives. On one side, it arranges necessary activities related to knowledge transfer. On the other side, it manages to engage

technical team to work with the new EC in Global South. Purple arrows depict this relationship.

- 3. The moment the crowd reached the goal of required investment, crowdfunding platform team starts to distribute the fund as planned in their cost analysis and budgeting strategy.
- 4. Respectively, execution can be started simultaneously, i.e.: capacity building of energy cooperative in Global South and delivering detailed engineering design as well as all necessary permits. This stage is visualized by orange arrows.
- 5. It is also expected that the local government begin to see through potential supportive regulation for the future so that renewable energy implementation accelerates.
- 6. During activities, the crowd will be frequently informed about the project growth.
- 7. As soon as the energy cooperative in Global South are able to generate electricity and pay it back to crowdfunding platform until Break Even Point (BEP), the revenue is distributed back to the crowd along with the interest. Meanwhile, the ownership of the assets are handed over to the new EC in Global South.

A clear structure in the energy cooperative of Global South shall have a management team who takes responsibility over the assets and to manage the finance of maintenance activities. The authority scope and structure of the management team can always be developed from time to time and also discussed with the experienced Dutch energy cooperative as the relationship is not only project-wise, but also informal partnership. Likewise the preparation stage, an establishment phase is necessary to assure that the system is mature enough after detachment with the crowdfunding platform.

### 5. 1. 3. Systematic tools

Creating innovative business model is the main activity of BMI's ideation phase. Even though Frankenberger et al. (2013) argued that systematic tool to create business model idea does not exist, to strengthen the concept as a new idea of a business model, author also analyzed it based on fundamental relevant theories about business model.

As a concept that universally acknowledged by researchers, business model is selected to analyze the way organization works in order to create and present its oriented value (Engelken, 2017). The aim is to keep the business model idea clear in defining its value and purpose. In renewable energy sector, Osterwalder (2004) defined 4 basic elements that construct business model, namely:

- Product is a defined area of business and value proposition of the company to the market or public.
- **Customer interface** is related to the customer target, how the company delivers product and service, as well as relationship maintenance.
- **Infrastructure management** involves firm's logistical approach and network to deliver the created value.
- **Financial aspects** include revenue model and cost analysis.

The following Table 6 functions to identify the four basic elements incorporated in the Business Model Concept of Figure 8.



#### Table 5. Basic elements of business model



It can be observed that the innovative business model concept fulfills four Osterwalder's basic elements. Furthermore, Osterwalder (2010) also introduced nine building blocks of business modeling. These nine dimensions are used to withdraw business decisions by presenting adequate information in order to move toward a business opportunity (Osterwalder, 2010; Leschke, 2013) as shown in Figure 9.

Value Propositions	Key Activities	Key Resources
Partner Network	Customer Segments	Channels
Customer Relationship	Cost Structure	Revenue Streams

Figure 9. Building blocks of business model (Osterwalder, 2010)

Building blocks identification helps breaking down basic elements to generate a clearer view of the innovative business model as a package of connected and integrated causal interactions. The following building blocks identification describes how the innovative business model encompasses the nine building blocks.

### 1. Value Propositions

Similar to previous analysis, the first building block of the business model concept is to empower community-based renewable energy project in Global South through energy cooperative establishment. To funders without financial gain motivation, this may be the utmost reason to contribute. This motive also supports environmental movement. Apart from donation, the scheme provides possibility to invest in the project. Thus, another proposed value next to community empowerment and sustainability is monetary interest. It explains that the project is able to attract a big number of people by offering diversed advantages related to today's issues.

### 2. Key Activities

Referring the analysis about 'Products' provided by the business model, there are three products: A, B, and C. Respectively, crowdfunding platform, trained new energy cooperative, and renewable energy installation in Global South. Based on these products, it can be identified that some key activities are fundraising for the project along with securing investment return, conducting capacity building for the Global South community to perform a crowdfund-based renewable energy project, and the construction of the renewable energy infrastructure. These activities represent the main actions. Supposing that they do not work properly, the likelihood of failure in delivering value propositions is high.

### 3. Key Resources

The value of empowering energy cooperative in Global South through renewable energy project depends on the key activities described. In order to ensure that business model will convey the value(s) proposed to the crowdfunders, required resources to execute the activities are human and monetary capital. Human is the most fundamental resource for the activities of this research. In the context of business model concept, human resources encompass: (1) crowdfunding platform team who are capable to create web-based interface platform to connect with energy communities and cooperatives, to marketize the project, and to manage investment return. Likewise, (2) energy community in Global South and (3) energy cooperative in Global North are also main human resources. Additionally, (monetary) capital is also necessary for project initiation or the preparation stage and capital from the crowd throughout the time between preparation and establishment stages.

### 4. Partner Network

Relationship in the business model is not only considered essential to present the value to the crowd, but also crucial. It is the backbone of the scheme, especially from the perspective of Product A and B, which are crowdfunding platform and trained new energy community in Global South. The crowdfunding platform is an interface between the crowd and other stakeholders. It is very important that crowdfunding platform team can marketize the story to attract more people to contribute, as well as to build trust. The same goes to both energy cooperatives in Global North and Global South in transferring knowledge and experience. Trust can exist from the incredibility level of service provider, e.g.: who run the project?<sup>5</sup> This relation can be maintained by being transparent and well performing. An increasing number of project funders will demonstrate a bigger trust the project obtained.<sup>6</sup>

<sup>&</sup>lt;sup>5</sup> Offline meeting with Dutch Energy Cooperative from the perspective of the crowd

<sup>&</sup>lt;sup>6</sup> Offline meeting with Dutch Energy Cooperative from the perspective of the crowd

### 5. Customer Segments

Related to value propositions, the segments of the customer are those who have interest in sustainability, community empowerment, and financial gain. However, there is possibility to attract a certain group of people, be it gender-wise, race-wise, nationality-wise, age-wise, or other possible identity group. It will vary from one project to another. However, the silver lining is that emotions do count. The project will strongerly attract to people who connect the storyline of the project with their emotions. Supplementary to thid reasoning, an extra concern is there since the main interface with the project is web-based, it could be less friendly to potential funders who are not familiar with internet.

### 6. Channels

Basically, the crowdfunding platform is designed to only perform on a web-based infrastructure. Yet the spreading of the existence of the project can be organized to touch stakeholders that have power to constructively influence the project, e.g.: funder and regulator. For instance, accessing certain group of people in the crowd whom members may have emotional connection with the project; to build network in person with as many experienced energy cooperatives as possible; and to assess potential energy community in Global South that is considerably ready to have function of an energy cooperative. It is potentially a major concern to engage with government to support through regulation, media to largely publish the project, and reliable technical team (consultant, contractor, vendor, ESCo, etc) to perform the design and construction of renewable energy infrastructure. Even though in the beginning this research would like to analyze whether avoiding participation of government is possible, some literature proves that the existence of government is essential to endorse the equity-based crowdfunding project.

### 7. Customer Relationship

Pointing out the customers indicated in Table 6 of basic elements interpretations the crowd and the new EC in Global South—, the type of relationship desired is determined based on these two customers. In the favor of the crowd, the relationship is limited as donator or investor. The crowd deserves appreciation and compliment over their support and periodic update about the project growth. For investors, a specific platform shall be provided for interaction. Concerning the new EC in Global South, there will be no formal affilitation with crowdfunding platform team is except until BEP is reached and assets are handed over. Meanwhile with experienced Dutch energy cooperative, it would be left between the energy cooperatives in the way they would like to stop or to continue the partnership and how to perform, which could be discussed without intermediary from the crowdfunding platform team.

### 8. Cost Structure

The expenses consist of capital expenditure and operational expenditure. Capital expenditure includes cost for management, transfer knowledge, technical service, equipment, basic infrastructure, and a fixed rate of unexpected cost. In terms of operational expenditure, it only comprises maintenance cost, which is forecasted by the technical team and unique for each project. Any contribution desires to enter the project should deal with crowdfunding platform team to be included in the budget plan and limited until asset handover. This is to avoid confusion in financial management and to reduce the possibility of dishonest manners.

### 9. Revenue Streams

The crowdfunding platform will generate revenue from a fixed margin of fund raised by the crowd. This margin is included in the initial budget plan and categorized as management cost. The amount of margin is expected to be a fixed percentage, but it is subject to change under certain circumstances, for example exceptional project size. Cash flow can also be different from project to project. By default, project will kick-off when the targetted amount of capital is reached. Then the crowd starts to receive their return after a certain period, can be after asset handover or before. Each project will likely need specific business analysis and cash flow model depends on the situation and more experience gained by the team from time to time.

However, in order to assure that the concept can be implemented, more evidence would explain better result. Especially regarding the innovative side of this concept, which is adding an actor in the main stakeholder list. An empirical proof is required to strengthen the hypothese that crowdfunding remote renewable energy project by linking energy cooperatives is a reliable alternative way to finance sustainable energy implementation in Global South.

### 5.2. Integration

After a business model concept is generated, this result was presented to some Dutch cooperatives and a related organization in the form of interview. In fact, there were two terms of interview, before and after building the concept of the business model. Before the concept built, the interview was intended to understand the situation of energy cooperative business in the Netherlands. In the first term, target of interviewees are researchers and any experienced people in carrying out the project. A company who works on energy cooperative's project was selected to give the perspective of field men. Then the second term interview, which is the discussion that will be explained in this chapter, was done after the theory-based business model constructed.

### 5. 2. 1. Interview result

Nine people who are entitled as board members from different energy cooperatives in the Netherlands and representative of HIER Opgewekt were contacted for interview to show them the business model concept, environment, and the most important is to have the feedback about their involvement within the concept in the form of partnership. The purpose of the second term interview is to capture ideas from the energy cooperatives whether they think this theory-grounded business model is feasible to be executed and whether it can be organized in a smart way. See Appendix 2 for more details on the list of interviewees and the interview guideline. Each interview was done between 45-60 minutes.

The interviews are considered very fruitful to develop the innovative business model. Based on the interviews conducted, it can be observed that basically the Dutch energy cooperatives gave positive feedback related to the idea of adapting energy cooperative business model in the Netherlands to the business environment in Global South, as well as designing a wider range of crowd to finance the project. Since from one to another energy cooperatives have different characteristics, i.e.: location, age, structure, and experience, their feedback are quite vary, but still deliver general points to note down.

From the interview conducted, it can be concluded that even though the respondents from energy cooperatives support the idea of the innovative business model, actually most of them think that it is not possible to be the person-in-charge of knowledge transfer within the model built. There are challenges to overcome, but along with those challenges, there are also opportunities previsioned to help the situation and advance the innovative business model. The perceived challenges are listed as below.

### 1. <u>Current business situation of Dutch energy cooperative</u>

They argued that they are still struggling with their own project and are not ready for an engagement that most probably will be intensive for a certain period of time. This reasoning is in line with the information from HIER Opgewekt, —an organization who focus on knowledge transfer among energy cooperatives in the Netherlands—that the Dutch national regulation about renewable enegy generation and tariffing is considered not a strong support to Dutch energy cooperative business. The subsidy (in the form of tax discount) does not increase the likelihood of the projects to be reasonably profitable.

### 2. Benefit for Dutch energy cooperative from the partnership

Apart from the current business situation, "What is the benefit for Dutch energy cooperative by involving in the project?" is a naturally asked question by the interview respondents. This question is covered in the interview guideline, but feedback from respondents indicates that they actually do not expect any specific return. However, there are two natural returns by being a part of the project: worldwide publication of the energy cooperative and knowledge exchange, since some correspondents admit that energy cooperative in Global South could inspire or even teach the energy cooperative in Global North something new within the different business environment.

### 3. New business environment requires intensive focus

In addition to the current business challenges faced by the Dutch energy cooperatives, it would be necessary to learn and understand the new business environment in order to advise better. This requires time and energy to focus and to understand the context. Moreover, in some Global South countries, there might not be any document available in English, which makes the situation more challenging. Therefore, since Dutch energy cooperatives are not yet ready for such commitment to partner as in contributing in terms of energy, time, and knowledge, the innovative business model is not yet relevant for their current situation. Otherwise, another strategy should be managed to keep the role or function by the experienced energy community can still be performed.

### 4. Preparation of business model implementation

Based on experience, the main asset of energy cooperatives in Global North is their members and volunteers. These people support their movement through real actions. Dutch energy cooperatives believe that it is important to prepare the energy community in Global South before they execute the project. Mindset is the key, but besides human capital, monetary capital in pitching a project is also crucial. The founders of Dutch energy cooperatives built their organization voluntarily. They initiated the project without financial return, engaged like-minded people, and conducted feasibility study on their own, supported by the knowledge exchange in their network. The business model needs to secure that the energy community in Global South will be able to work together before pilot project storyline is introduced to the crowd.

In addition, an idea proposed by the Dutch energy cooperative to reduce the pressure from hereabove challenges is by adding more strategic stakeholders, for instance: big companies or organizations and larger network of energy cooperative in Global North. Based on these four challenges, it is necessary to add more stakeholders within the system who can support the preparation process, particularly the capital for conducting feasibility study and network of energy cooperatives or government in Global North that provides support in terms of knowledge transfer and even finance.

### 5. 2. 2. Innovation analysis

The final phase of developing an innovative business model before it is launched to the market is to integrate the model to the new business environment. According to a study conducted by Frankenberger et al. (2013), there are two challenges that appear in this phase based on the information from the respondents involved in the study. The first challenge is to find a strategy for integrating the elements in the new ecosystem into a business model. Secondly, the challenge that usually shows up in integration phase is about managing the partners. The players in the ecosystem have their own way to reach their goal, until an innovation is being introduced, these players have to adapt to the intention of the innovation and changes the innovation brings along.

Still from the same study, in order to answer integration challenges above, there are four dimensions of question: *Who, What, How,* and *Why*. The first two dimensions, 'What' and

'Who', to be identified are the stakeholders that are previsioned to play roles in the new business model. 'How' defines the strategy to perform the new role in order to achieve their 'Why', which is described by Frankenberger et al. (2013) as the *revenue model*. So, basically this integration phase based on 4I Framework intends to identify the benefit or motivation of the stakeholders by playing their role and further to gain for themselves through the innovation implemented. The following Table 7 applies the four dimensions to analyze the changes that are potentially caused by the implementation of innovative business model.

	Table 0.	innovation analysis	
Who	What	How	Why
Energy	Supplying their area	Establishing an	Ability to secure the
community in	or neighborhood	energy cooperative	energy supply in their
<b>Global South</b>	using renewable	and improving their	neighborhood
	energy sources	capability	
Dutch Energy	Partnering with new	Strengthening their	Benefit of taking more
Cooperative	energy cooperative	organization and	advanced actions as an
	in Global South	preparing human	energy cooperative
	through knowledge	resources	
	and experience		
	transfer		
The crowd	Supporting the	Being attracted to	Financial return and
(funders and	project especially in	the project via a	satisfaction of helping
institutional	the form of financial	user-friendly	poor people and
investors)	contribution	interface	supporting sustainable
			development
Crowdfunding	Fundraising and	Producing a	Business
platform	project coordination	provocative and	establishment and
	of innovative	interesting storyline	impact to the
	business model	and engaging strong	customers
		partners	
Government	Supporting the	Enacting regulation	Advancement in terms
(in Global	project through	related to renewable	of energy policy and
South)	constructive	energy, e.g.: feed-in-	increment of
	regulation	tariff, permit, or	electrification ratio
		subsidy	
Technical	Designing and	Having	Self-actualization and
team	constructing the	characteristics that	financial profit in an
	renewable energy	fit best to the	international scale
	infrastucture with	criterias defined by	project
	the spirit of	the crowdfunding	
	empowering	platform team	
	community		

Table 6. Innovation analysis

Media	Successfully	Touching relevant	Opinion leader in a
	marketizing the	markets as large as	trending and
	project	possible with	innovative topics
		attractive	
		advertisement	
Government	Supporting the	Enacting regulation	Self-actualization in
(in the	project through	related to empower	reducing the impact of
Netherlands)	constructive	Dutch energy	climate change and
	regulation	cooperatives and	advancement in energy
		activities in Global	policy
		South	
Large	Supporting the	Injecting financial	Self-actualization and
companies	financial capacity of	support and	company branding in
and	project preparation	marketizing the	reducing the impact of
organizations	phase in performing	project	climate change
	feasibility study		
Network of	Supporting the	Providing more	Self-actualization in
energy	capacity of Global	human resources to	reducing the impact of
cooperatives	North energy	the project through	climate change and
in Global	cooperatives with	information sharing	organization
North	regards to		advancement
	knowledge sharing		

From innovation analysis, new challenges and opportunities are identified to finalize an innovative business model. Particularly in the 'How' column, taking different perspective of stakeholders, more challenges are extracted from the desired actions to be performed. Challenges extracted from 'How' column that have not been mentioned before in this research and the ones that are not part of the business model concept are identified in Table 8 below.

#### Table 7. Challenges identified based on 4I Framework in integration phase

How	Challenge	
Being attracted to the project via a user-friendly interface	Main funders interface is only web-based, meanwhile potential funders may not familiar with it, and interface is a form of service to the funders as customers	
Producing a provocative and	Limited talent of videomaking as it is not related to	
interesting storyline and	the core business, or there might be challenge in	
engaging strong partners	providing the budget during preparation phase	
Enacting regulation related to	Some countries in Global South do not have adequa	
renewable energy, e.g.: feed-in-	information nor regulation related to community-	
tariff, permit, or subsidy	based renewable energy implementation	

Having characteristics that fit	Finding reliable and motivated technical team that
best to the criterias defined by	has altruist character over the development of
the crowdfunding platform team	renewable energy in Global South
Touching relevant markets as	Limited means of funding and project advertisement,
large as possible with attractive	also projects are unique from one to another in
advertisement	terms of the attraction it owns
Enacting regulation related to empower Dutch energy cooperatives and activities in Global South	Support Dutch energy cooperatives in developing its organization and expanding their impact is still considered low
Injecting financial support and marketizing the project	Feasibility study is best to be done before launching the pilot project storyline to the crowd, meanwhile the participation of the stakeholders is voluntary, according to the original business logic
Providing more human resources	There is shortcoming of people in Dutch energy
to the project through	cooperatives who are willing to involve in the project
information sharing	as well as have strong experience and enough time

The hereabove challenges and challenges identified from second terms interview are elaborated to finalize an innovative business model as main finding of this research in the next chapter.

# 6. Conclusions and Recommendations

The main objective of this research is to contribute to the knowledge regarding business model to endorse the implementation of sustainable energy in Global South, especially in the means of crowdfund-based financing scheme. A business model in this research is being developed as adapted from literature and inspired from the energy cooperative in Global North, precisely in the Netherlands. The purpose of this research is to answer the question of "Is financing remote renewable energy projects in Global South by crowdfunding of Dutch energy cooperatives a feasible business model and how could such a business model be organized in practice?"

By employing 4I Framework of Business Model Innovation (BMI), a construction of an innovative business model has developed through three steps: initiation, ideation, and integration. Besides this theoretical approach, an empirical approach was also done by interviewing Dutch energy cooperatives and HIER Opgewekt, —the players related to knowledge sharing of energy cooperative business in the Netherlands. The interview is intended to conclude their perspective about business model concept developed. The findings of this research indicate feasibility and readiness of innovative business model to be implemented in the new business environment, which is the Global South.

### 6. 1. General Findings: Innovative Business Model

Developing an existing business model to a new environment needs to be done carefully, because there might already be some basic challenges, for instance limited regulation framework. Also get inspired from different business environment require thorough steps of analysis as both ecosystems work might be very different or some stakeholders do not exist or do not function as in the previous environment. The 4I Framework provides a structured analysis about the current logic of business model; in this case is general crowdfunding project in Global South. 4I Framework comprises four steps: initiation, ideation, integration, and implementation. This research does not include the implementation phase in the research boundary.

The initiation phase identified the stakeholders in the current business model of crowdfunding project in some countries of Global South. Based on the literature, there are five stakeholders exist in the current business environment: the crowd, fundraiser, crowdfunding platform (along with payment gateway—bank), government, and media. This is the first step of identifying main and immediate influencing stakeholders to be taken into account in business model concept and in the new business environment of renewable energy project of Global South. Interview respondents also give more ideas about other stakeholders that can be valuable to be incorporated in the model.

Regarding the innovative business model itself, ideation phase generates and structures idea inspired by the business logic in the Global North. Then a business model concept is developed and it has fulfilled certain characteristics and principles according to theories about business model basic elements and business modeling building blocks developed by Osterwalder in 2004 and 2010.

In finalizing an innovative business model, an integration analysis of stakeholder (Who) and the intended innovation achieved (What) is used to identify the strategy to realize it (How) and the benefit they can seize by doing the defined innovation (Why). Taking into account the knowledge and advices from Dutch energy cooperatives, a general finding of an innovative crowdfund-based renewable energy business model in Global South by linking energy cooperatives in the North and South is concluded as in Figure 10 below.



Figure 10. Innovative business model

Explanation of the innovative business model:

- 0. The crowdfunding platform team initiates the project by engaging the two main stakeholders in the business model: experienced Dutch energy cooperative and an energy community in Global South who is ready and willing to commit to function as energy cooperative.
- 1. In order to make sure that there will be interesting potential to build renewable energy infrastructure, a feasibility study needs to be undertaken. This activity requires capital that could be gained from large company, organization, or under certain circumstances, the capital could be supported by government of Global North country if they have certain scheme to support business developed by their citizen in Global South. This capital gain relationship is shown by green arrows.
- 2. Once the capital gained, it is distributed to experienced Dutch energy cooperative and to finance a technical team to perform the feasibility study in Global South. The purple arrows illustrate monetary distribution as capital expenditure, both for feasibility study and implementation of pilot project.
- 3. If the project shows a reasonable profitability, a storyline about this pilot project can begin story production. Advertisement activities are depicted by red arrow, including the situation when the project hits implementation phase and needs to share project's updates to the crowd.

- 4. If the crowd were attracted, they would trust the organization and put their contribution in. This financial contribution is shown again by the green arrow (flow of money) from the crowd to the crowdfunding platform,
- 5. and then it is distributed following the purple arrows. When the targeted capital for pilot project is collected, knowledge transfer and technical activities are the next things to do.
- 6. The orange arrows represent knowledge transfer activities performed by experienced Dutch energy cooperative to the energy community in Global South, in which can also be supported by related organization within the Global North energy cooperative's network. At this point, the construction of renewable energy infrastructure is the main target to achieve.
- 7. When the energy cooperative in Global South is able to benefit the energy generated by the infrastructure and within a certain range of time, the money collected from selling the electricity is collected and returned back to the crowd via crowdfunding platform. The curvy blue arrows show the relationship of the return on investment in the scheme.

### 6.2. Recommendations

In conclusion, this innovative business model needs to prepare and consider important points withdrawn from challenges of general findings before entering implementation phase. The challenges are points sorted in integration phase, analyzed from theoretical perspective of innovation analysis and empirical information collected from interview with Dutch energy cooperatives and HIER Opgewekt. Recommendation points are addressed to crowdfunding central stakeholders plus the experienced Dutch energy cooperative as the innovative strategy of the business model. These four stakeholders thus are new energy cooperative in Global South, experienced energy cooperative in Global North, the crowd, and crowdfunding platform team. Since the crowd is generally not controllable, thus recommendations are categorized according to the following perspectives.

### 1. New energy cooperative in Global South

• Choose an energy community that potentially grab a wide interest of the crowd, an analysis may be necessary to relate it with market research

Criteria of the new energy cooperative in Global South can be developed in order to choose the best available energy community. Nevertheless, once the energy community has adequately strong mindset about transforming themselves into an energy cooperative, it can act and perform the strategies more actively.

### 2. Experienced Dutch energy cooperative

• Study about available scheme to obtain financial support from Dutch government or other organization, which in line to the international commitment to adaptation and mitigation impacts of climate change.

Addressing the question about benefit to the Dutch energy cooperative, author proposes financial return as a return that is available in the current situation. The financial return here is not something that they share with the energy cooperative in Global South. Financial return may be relevant for Dutch energy cooperatives since the challenges they face in their projects also related to internal profit. The return could be in the form of financial appreciation that is rewarded from other party, e.g.: government, recognized organization, or companies, by acknowledging their contribution of supporting renewable energy development in Global South.

### 3. Crowdfunding platform

- Together with the new energy cooperative in Global South, engage their government since the project initiated in their region/city/country to sharpen their sense of belonging to the project, also to get clear information about the existing regulation regarding renewable energy implementation
- Market research should be done as early as possible, including the selection of energy community in Global South for pilot project in order to engage as large scope of potential market
- Study about available scheme to obtain support from companies who provide financial aid and are interested to boost their branding in the topic of sustainability or renewable energy in particular
- Study about existing organizations who have similar vision about sustainability and renewable energy, especially by involving and empowering the community in Global South
- Together with experienced Dutch energy cooperative, develop a certain way to hire the technical team to avoid conflict of interest while choosing the one who is motivated in empowering energy community in Global South
- Continuously improve the interface with (potential) funders from time to time
- Perform documentation of the activities and probably hire a talented videomaker or online marketer

As the coordinator and the owner of business model, crowdfunding platform is the hub to other stakeholders and the most controllable player in the scheme. It has direct connection to almost all stakeholders in the innovative business model.

To sum up, crowdfunding renewable energy implementation in Global South country by connecting the community with experienced energy cooperative in Global North can be an alternative financing scheme for future development. The actualization of innovative business model needs to be prepared properly since renewable energy infrastructure project usually requires long-term commitment, not only for the first layer stakeholders, but also the immediate influencing stakeholders. However, looking at the current situation, this innovative business model requires a lot of communication and engagement of different perspective and interest to pitch a pilot project. It can be also a smart way to begin the networking from the most powerful, as in the stakeholders who have ready to use resources.

This research could also be more thorough by interviewing more energy cooperatives in Global North, not only limited to the Netherlands. Additionally, to have more empirical arguments from other stakeholders' point of view will enrich the result of this research, as well as to produce more reliable analysis about how to organize the implementation of the research findings. Future research can advance this research topic from different perspective, or different methodology in developing a business model.

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# Appendices

## A. List of Interviewees

No	Institution	Function	Interview	Date of
NU	mstitution	runction	Method	Interview
1	Lochem Energie	Coordinator electric car	Phone call	5 <sup>th</sup> May 2017
		sharing and research		
2	MEEM –	PhD Researcher on	Offline	10 <sup>th</sup> May 2017
	Universiteit	community-based	meeting	
	Twente	renewable energy project in		
		the Province of Friesland		
3	ITEM – TU Delft	Associate Professor on	Skype call	31 <sup>st</sup> May 2017
		crowdfunding renewable		
		energy project in the		
		Netherlands		
4	De A	Treasurer of Dutch energy	Offline	3 <sup>rd</sup> August 2017
		cooperative in Apeldoorn	meeting	
5	Zetenergie	Board of Member of Dutch	Offline	3 <sup>rd</sup> August 2017
		energy cooperative in	meeting	
		Zutphen		
6	HIER Opgewekt	Knowledge and	Skype call	11 <sup>th</sup> August 2017
	(Organization in	communication officer		
	knowledge sharing			
	platform among			
	Dutch energy			
	cooperatives)			
7	Eerste Maastricht	Board of Member of Dutch	Skype call	14 <sup>th</sup> August 2017
	Energie Cooperatie	energy cooperative in		
	(EMEC)	Maastricht		
8	Grunneger Power	President of Dutch energy	Skype call	17 <sup>th</sup> August 2017
		cooperative in Groningen		

### **B. Interview Guideline**

INTERVIEW & SURVEY SHEET: Dutch Energy Cooperative (EC)

Name of Energy Cooperative:

### Linking North-South Energy Cooperatives (ECs)

Take a look at the following business model.



**0. Preparations.** Crowdfunding Platform brings together (a) Experienced Dutch EC and (b) potential energy community in Global South (developing countries) to build an EC. This team prepares and publishes a storyline to attract attention and fund of the crowd.

**1. Green arrows.** People in the crowd may be attracted by the story and trust to put their money to be invested to build a project. It is also expected that the community in Global South can also participate financially to have a stronger bond to the project.

**2. Purple arrows.** Once the crowdfund reaches the goal, crowdfunding platform team starts distributing the fund to finance knowledge transfer activities by Experienced Dutch EC and to engage a technical team to work in Global South.

**3. Orange arrows.** Execution starts in parallel: capacity building of EC in Global South and delivering detailed engineering design as well as permits. When the EC in Global South are able to generate electricity and pay it back to crowdfunding platform until Break Even Point (BEP), the revenue is distributed back to the crowd along with the interest and the ownership of the assets are handed over to the new EC in Global South.

**4. Establishment.** It is necessary to assure that the system is independent enough after detachment with crowdfunding platform. Along its way, the partnership with Dutch EC is still ongoing informally.

### How it works in scheme:

This scheme is to show the workflow of business model. Orange circle indicates the role of Dutch energy cooperative within the project as knowledge transfer agent.



### **Motivation and Interest in Knowledge Transfer Involvement**

In above scheme, the Dutch EC plays a role to transfer their knowledge and experience in building and establishing a crowdfunded renewable energy project. All activities will be funded by the crowd. Please answer the following questions from the **perspective of an Energy Cooperative**.

### 1. Would you take the opportunity to help the future EC in Global South?

- o Yes!
- o Yes, but...
  - $\circ$  I can not allocate time
  - I do not have complete experience in the EC
  - Other (if any): ...
- o No, because...
  - $\circ \quad I \ am \ not \ interested$
  - $\circ$  I do not have time
  - $\circ~$  Other (if any): ...

### 2. If yes, what would be your motivation or interest?

I want to ...

- Inspire more people
- o Share my knowledge
- Fight against poverty
- Other (if any): ...

### 3. If yes, how long would you like to be in partnership with EC in Global South?

- o Only during project establishment
- $\circ \quad$  1-3 years after the project established
- $\circ$  3-5 years after the project established
- More than 5 years after the project established
- No time frame

### 4. What would be an expected benefit for the Dutch EC by playing this role?

- $\circ \quad I \text{ do not expect any return} \\$
- $\circ$  Publication of your own EC
- o Financial return
- $\circ~$  Other (if any): ...
- 5. In your opinion, what can influence the energy community in developing country to function as an energy cooperative in their area?
  - o Financial return
  - o Sustainable energy supply
  - Reliable energy supply
  - Other (if any): ...
- 6. (Open question) What more can be done within the scheme to organize a renewable energy project better, which eventually will be led by the local EC in Global South?

### EC Member as Benchmark of the Crowd for Financial Involvement

In this section, you are treated as the benchmark of the crowd (people in the world) who are willing to realize an energy cooperative in Global South. Please answer the following questions from **the perspective of the crowd** (people all over the world).

- 1. If there is a crowdfunding-based renewable energy implementation in developing country (especially remote area) that allows you to contribute as low as 10 euro, would you be a part of it?
  - Definitely yes!
  - It depends on:
    - Whether I consider the community to be very poor
    - If I consider the advert of the project to be attractive enough
    - The financial scheme, if it allows me to get my money back
    - Other (if any): ...
  - No, because:
    - I do not allocate money for that
    - $\circ \quad \text{Not a priority for me} \\$
    - $\circ \quad I \text{ do not see the benefit to join}$
    - Other (if any): ...

### 2. If yes, what are your motivations or interests?

#### Possible Motivation / Interest

- o Directly helping poor community to access clean energy
- Increasing human development in remote areas
- Realizing equality since energy is our basic need
- Supporting environmental-friendly development
- Obtaining financial gain (although it takes a long time)
- Encouraging other people in the crowd to do the same

Other (if any): ...

### 3. In your opinion, what makes such project more attractive?

### Possible Attractiveness Factors

- Energy access condition of community is really low
- o Information on how much carbon footprint reduced
- The organization team or founder is credible
- Transparency on project development
- Educational activity for the receiver community
- Higher or shorter return on investment (investment scheme only)

Other (if any): ...

### 4. (Open question) What would you like to see in the project advertisement?

This is the end of the survey.