FACULTEIT ECONOMIE EN BEDRIJFSKUNDE

REPORTING 3.0 - LINKING THE VALUE MANAGEMENT PLATFORM AND THE MULTICAPITAL SCORECARD: SUSTAINABLE ENERGY CASE-STUDY

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07.01.2020

FOREWORD

I am pleased to present this Master's Dissertation whereby I had the possibility to contribute to academic knowledge. I look back with satisfaction to the obtained result.

I would like to acknowledge all the people who assisted me in this process. First, I thank Mark McElroy for giving me the opportunity to work on a case-study linked to a challenging and current issue with the help of a context-based, Triple Bottom Line performance measurement tool developed by himself and Thomas, namely the Multicapital Scorecard. Secondly, I would like to thank Henk de Man for guiding me through the Value Management Platform, the business modelling tool of his company VDMbee, and for all the meetings while implementing the case in VMP. I also want to thank Prof. Dr. Geert Poels for his valuable advice and detailed feedback that took this master's dissertation to a higher level. Finally, I want to thank Bill Baue and Ralph Thurm of r3.0 for giving me the opportunity to present this master's dissertation at the sixth international Reporting 3.0 conference 2019 in Rotterdam.

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1. LIST OF USED ABBREVIATIONS

AOI	Area of Impact
BSC	Balanced Scorecard
BM	Business Model
CBMP	Continuous Business Model Planning
CBS	Context-based Sustainability
GPI	Greenlight Power Inc.
IR	Integrated Reporting
MCS	MultiCapital Scorecard
OMG	Object Management Group
SN	Sustainability Norm
TBL	Triple Bottom Line
TT	Trajectory Target
VDML	Value Delivery Modelling Language
VMP	Value Management Platform

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4. INTRODUCTION

Since the Industrial Revolution, there was a steep increase of the concentration of greenhouse gas emissions due to a major dependence on fossil fuels, such as coal and oil. These emissions are partly the cause of global warming we are suffering now. We start to recognize that the environmental footprint outpaces the biosphere's capacity (Borucke et al, 2012). The negative effects as result of this disparity become increasingly visible, including rising sea levels and extreme weather events.

The awareness of global warming challenges led to the adoption of the first, universal global climate deal at the Paris Climate Conference in December 2015 by 195 countries. Their aim is to limit average global warming to below 2°C above pre-industrial levels – or to below 1.5°C, if possible. The global agreement sets out a trajectory towards this goal with a mutual focus on reduction of greenhouse gas emissions and increased transparency and accountability (EC, 2015). Gradually sustainable development initiatives have been implemented to address the demand and expectations of society (Szekely et al, 2005).

Szekely (2005) states however that pitfalls occur "when companies view sustainable development as a mere regulatory compliance issue and addresses it through typical environmental, health and safety programs." It is important to embed sustainable development initiatives in the overall business strategy and including them already in the strategic business modeling process (Short, 2012). There is empirical evidence (William et al, 1998) that the integration of environmental concerns in the strategic planning process positively relates to financial and environmental performance.

If companies start with implementing strategies with environmental, social and economic dimensions, it is interesting to measure the impact on performance accordingly. However, measuring the impact of sustainable development on different aspects of performance (economic, social and environmental) encounters growing difficulty. According to Bourne et al (2003) traditional performance measures had already by the 1980s been criticized to be inappropriate for managing businesses. Due to the financial and internally focused character of traditional performance measures, they were criticized for fostering short-term decision making and their inapplicability to manage modern, complex organizations. The Balanced Scorecard (BSC) of Kaplan and Norton (Kaplan et al, 1992) was intended as solution to this problem.

The framework was developed to measure organizational performance using a more balanced set of performance measures and to give managers a more comprehensive view of the business. The customer, internal business and innovation and learning perspectives were added to the financial perspective.
As the BSC was not designed to consider community perspectives, The Triple Bottom Line (TBL) of John Elkington (Elkington, 1997) followed as new tool for measuring organizational performance with a much wider stakeholder perspective, focusing on the three bottom line dimensions of performance (social, environmental and economic). He argued that an organization should measure its performance in relation to all stakeholders affected by the organization and attend its impacts on the natural environment and on society, as it strives for profit. However, the practical implementation in performance measurement systems was not successful (Hubbard, 2006).

The MultiCapital Scorecard (MCS), originally developed in 2013 by Martin Thomas and Mark McElroy, could help address the challenge of operationalizing this multi-dimensional approach to performance measurement. The MCS is fundamentally a sustainability performance measurement tool which takes into account the impact of human activities on all vital capitals (natural, human, social & relationship, constructed and economic) (Thomas and McElroy, 2014).

While it is very true that most existing organizations do not measure, manage and report their performance in context-based, triple bottom line terms, it is also true that most models used to plan and assess future businesses (i.e., as business models in scenario planning tools) do not take such steps either. So it is value-adding to set up an attempt to (a) rigorously assess the estimated performance of prospective business models using the scoring function of a context-based, Triple Bottom Line performance measurement tool, and (b) to do so in way that also involves the integrated use of a business modeling tool.

By integrating the MCS with the Value Management Platform (VMP), a tool to model business change, this thesis aims to contribute to academic knowledge by demonstrating that multidimensional performance measurement tools (like the MCS), in combination with a business modelling tool (like the VMP), can support strategic decisions in the process of business planning and modeling. Besides that, we show that it is possible to backcast, by a way of modelling, from the desirable, future performance of an enterprise. Backcasting involves setting future targets and then determining which intermediate steps are needed to attain the desired state (Robinson, 1982).

These challenges can be summarized in the research objective of this thesis:
Integrating the MultiCapital Scorecard with VDMBee's Value Management Platform, in the context of a sustainable energy production case-study in which multicapital performance measurement is used in support of business modelling.

5. BACKGROUND

In the first phase (Reporting 1.0), some companies started reporting on social and ecological issues, next to the financial performance. However, this reported information remained superficial and was fragmented. In 1997, John Elkington institutionalized the term "Triple Bottom Line" (Elkington, 1997), which gave rise to the area of Reporting 2.0. Businesses aimed to report comprehensively on the three bottom line dimensions of performance (i.e., social, environmental and economic), leading to gradual improvement of the quality of reports. Yet, those reports fail to address the Sustainability Gap (Thurm et al, 2018). Most businesses, that is, fail to take into account the limits and demands placed on environmental and social resources, levels that either must not be crossed, such as the emission of greenhouse gases, or must be maintained at some level, such as government services, when reporting on the company's performance. The Reporting 3.0 movement aims at closing this gap by reporting the information relative to the different capitals' limits involved (r3.0,2019).

r3.0, formerly known as Reporting 3.0[1], plays a pioneering role in this third phase of reporting. r3.0 is a global common good non-profit platform that crowdsources recommendations for necessary transformations and next-generation practices as response to the negative ecological and social evolutions. It acts as a think tank in the broader reporting field "in order to achieve a thriving, regenerative and distributive economy and society" (r3.0, 2019).

r 3.0 publishes "Blueprints" (currently there are eight[2]) that identify the gap between current practice and necessary progress and offers recommendations to fill those gaps. r3.0 wants to guide businesses in standardizing the practical use of **Context-Based Sustainability (CBS).** CBS is a performance measurement method originally developed by Mark McElroy starting in 2005 (McElroy et al, 2007; McElroy, 2008). CBS is *context-based* in the sense that it assesses performance relative to social, economic and environmental thresholds and not just in incremental terms. Thomas and McElroy (2016) define a threshold as "either an upper or lower limit in the supply of a capital stock" such as the amount of renewable water in a watershed and the size of the population it can support. It takes effort to include different contextual circumstances when measuring, managing or reporting the sustainability performance of an organization. These circumstances involve an organization's stakeholders and its impacts on vital capitals (McElroy, 2013).

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1 Reporting 3.0 recently rebranded to r3.0. You can visit their new website on https://www.r3-0.org

2 Blueprints Overview at https://www.r3-0.org/projects/

These vital capitals are six broad categories of capital that stems from capital theory in the sustainability and economics literature (Harris, 2000; Spangenberg, 2001): economic, social and relationship, natural, human, constructed and intellectual (*figure 1*). The intellectual capital is mostly embedded in the other five. To ensure human well-being all six are required. Thomas and McElroy define *sustainable as* "maintaining all vital capitals in sufficient supply" (Thomas et al, 2016).

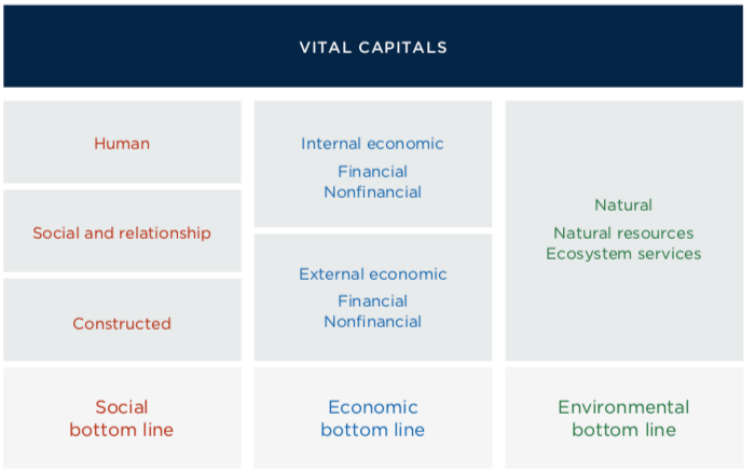


Figure 1: Vital capitals and the triple bottom line (Source: Thomas, M. and McElroy, M. (2016). *The Multicapital Scorecard. P.33)*

To attend to the quality and sufficiency of all their vital capitals, organizations should define meaningful norms. These norms indicate what their impact on the vital capitals should be in order to perform sustainably. A fair and proportionate share of thresholds is allocated to organizations and the preferable impact on vital capitals is thus determined relative to their "fair shares" of available multicapital resources (Thomas and McElroy, 2014). In the case of natural capital, for example, a fair and proportionate share of available natural resources is allocated to organizations. The *sustainability performance of an organization* is thus calculated following this formula, initialized by McErloy in 2013:

$$Sustainability\ Performance = \frac{Actual\ Impact\ on\ a\ Vital\ Capital}{What\ the\ impact\ on\ the\ same\ Vital\ Capital\ must\ be\ in\ order\ to\ be\ Sustainable}$$

It is possible that the numerator is larger than the denominator (i.e., the actual impact is higher than the desirable impact). To assess the sustainability performance, a context-based scoring convention is adopted.

The convention states that for societal quotients, scores ≥ 1.0 are sustainable, < 1.0 are unsustainable. For environmental quotients, scores ≤ 1.0 are sustainable, > 1.0 are unsustainable. For example, if water consumption of 1.5 million liter/year (numerator) is measured against an allocation of available renewable supplies of 1 million liter/year (denominator), the sustainability performance ratio equals 1.5 which is unsustainable score for an environmental quotient.

CBS, originally restricted to social and environmental performance, was extended by Thomas and McElroy to address financial performance as well. As a result, a fully operationalized and context-based, Triple Bottom Line performance measurement tool was born, branded as the **Multicapital Scorecard (MCS)** (MultiCapital Scorecard, 2013). The MCS calls for assessment of performance against sustainability targets or norms but does not prescribe them. Instead, the MCS relies on results of organization-specific analyses to identify relevant "areas of impact" (AOIs). So, the MCS requires organizations to assess and manage in stakeholder-centric way their impacts on all types of vital capitals and to set purposeful norms for their performance to be sustainable in their own context (Thomas and McElroy, 2014).

Alternatives methods and standards (such as Integrated Reporting framework, Common Good Balance sheet, Future Fit Business Benchmark) does not asses performance relative to sustainability norms. Their indicators of sustainability performance solely measure the impact and asses the size and changes between consecutive years. (McElroy, 2019),

If the MCS is compared with the BSC of Kaplan & Norton, it can be identified that the BSC does not incorporate employee, supplier or community perspectives on firm performance (Mooraj et al., 1999). Hubbard (2006) states that this performance measurement system is "primarily a tool to measure external and internal economic value", not a tool for assessing sustainability performance. Further, the BSC is not context-based and not multicapital-based, what is however the case for the MCS, due to its CBS roots.

In this thesis, the MCS is used in an integrated way with the **Value Management Platform (VMP)**, a business modelling tool. The VMP is a tool developed by the Dutch company VDMbee to discover business ideas, rationalize strategy and analyze scenarios for successful business models (VDMbee, 2016). It is empowered by an industry-standard metamodel, called the **"Value Delivery Modelling Language"** (VDML), which is owned by the Object Management Group (OMG).

The purpose of VDML is to provide a standard modeling language for the analysis and design of enterprise operations with particular focus on the creation and exchange of value. (VDML, 2018). VMP applies the VDML for the purpose of strategic and continuous planning. The platform provides an interactive interface to support managerial decision making and strategy development, execution and evaluation. Primarily it focuses on how different businesses can evolve over time by envisioning different plans to new or radically transformed businesses.

VMP allows businesses to describe their current situation (*As-Is Phase)* and the future strategic directions they are willing to pursue (*To-Be Phases)*. For planning a desired innovation or transformation in a business model whilst modelling value creation and demonstrating the impact on the organization and its value objectives, the **Continuous Business Model Planning (CBMP)** method (Poels et al, 2019) has been proposed. According to this method, a strategic initiative of an organization (or group of organizations) is expressed as an ecosystem of interacting business models of this/these organization(s), its/their partners and its/their customers. The method distinguishes three stages in its application: Discover – Prototype – Adopt (*Figure 2*)

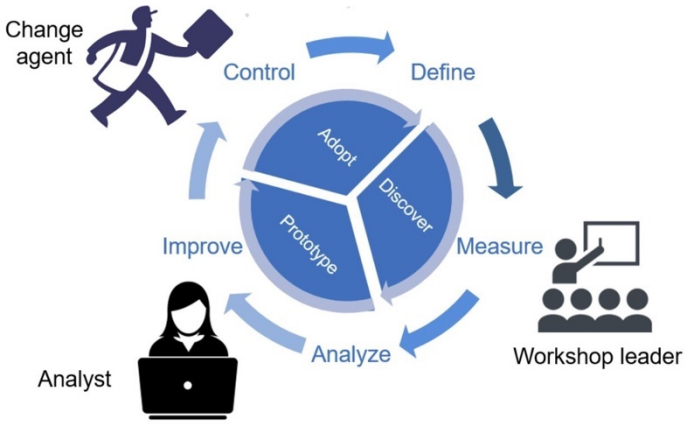


Figure 2: Graphical representation of the CBMP-method

(Source: https://vdmbee.com/work/training-and-certification/)

“Discover” (VDMbee, 2019) covers the creative part of the method to build understanding and consensus of how things work or should work. This stage is divided in five steps (Poels et al, 2019). It is possible to omit certain steps or to adjust them later on. First, the *context* of a strategic initiative is determined. Second, the *business ecosystem* and *business models* are described using the Business Model Canvas of Alexander Osterwalder (Osterwalder et al, 2010). Third, the *value streams* of the activities of business ecosystem participants are mapped that are needed to deliver value propositions in the business ecosystem.

Fourth, *a value creation design* is set up using the strategy map technique for cause-effect value creation (Poels et al, 2018). This technique is based on the strategy maps of Kaplan & Norton (Kaplan et al, 2004). Finally, there is a *call to action* step in which stakeholders will decide if they proceed or not, based on the findings of the Discover stage.

“Prototype” covers the analytical work of transforming the results of the Discover stage into a multi-perspective ecosystem of structured business models. The description of business models should be interconnected and mutual consistent before they are presented in a Business Model Cube, as explained in (Poels et al, 2018). In “Adopt” dashboards are developed to present the results of Prototype in an interactive way focusing on the demonstration of the impact on the organization and his value objectives. In relation to the dashboards alternative scenarios can be developed for the same organization to analyze which choices lead to the preferred outcomes.

6. RESEARCH METHODOLOGY

The integration of the VMP and the MCS will be investigated within the context of a sustainable energy production case-study. In fact, the case is developed as a fact-based realistic simulation of how the integrated VMP-MCS methodology can be used in a sensible way to plan, model and assess prospective new business models before they become operational, accounting for context-based, triple bottom line performance.

The case consists of a fictitious energy company Greenlight Power (Greenlight Power, Inc. or GPI) that decided to take on the challenge to transition from an energy production based on non-renewable sources (resources contributing to global warming like fossil-based fuels) to one with a focus on renewable sources instead (resources that are more differentiated and do not contribute to global warming like wind, solar and nuclear energy). The case was developed by Mark McElroy, the founder and executive director of the America-based Center for Sustainable Organizations (CSO) and co-author of *The MultiCapital Scorecard* (Thomas and McElroy, 2016).

Case studies (Zaidah, 2007) are used to explore and investigate an actual real-life subject by analyzing a limited number of conditions and their relationships. A case-study as form of qualitative research gives the opportunity to gain contextual, in-depth knowledge about a specific real-life phenomenon (Baxter et al, 2008). Further, as far as we know, the integration of VMP and MCS will be investigated for the first time. So, the use of a case-study as research design is suitable to test, evaluate and demonstrate the integrated VMP-MCS methodology. And, as the methodology is designed for use by managers of organizations, our case involved an organization accordingly.

The case-study is derived from a contemporary challenge where the energy companies need to deal with. The negative repercussions due to the growing disparity between the environmental footprint's annual demands and the biosphere's capacity (Thomas et al, 2016), are becoming more and more clear. It gives urge to a transition of the energy industry to a more sustainable way of energy production. To be able to meaningful assess the performance of electricity producers operating under new business models in the future, a scenario where the electricity producers continue to operate under the current business model is necessary for comparison purposes. Accordingly, two scenarios are defined to estimate and compare future performance: The *Business As Usual* scenario expresses no ambition to change the current business model, while the *Transformed Business* scenario models the transition of the business model.

The GPI case-study is based on the experiences of Orsted in Denmark and AEP in the U.S., two energy companies that are in the midst of making the transition to an energy production based on solely renewable resources. As they are covering this contemporary challenge in real life, their information is extremely valuable for our case-study. Relevant data for the simulation of GPI were sourced from the sustainability reports of both companies. A recent report from AEP and Orsted about their own plans is included by reference and can be downloaded here: AEP *http://www.aepsustainability.com*; Orsted- *https://orsted.com/en/Sustainability*. The knowledge from these reports is further supplemented with the latest data from the U.S Energy Information Administration, which can be consulted at *https://www.eia.gov*.

The case-study revolves around an energy company that has the aim to transform its business model to a new one grounded in the principles of sustainable energy production. The desired future performance will be specified through concrete targets related to the level of greenhouse gas emissions, the return on equity and the funding of a climate fund. To be able to estimate and rigorously assess the performance of GPI operating under the prospective new business models in a context-based, triple bottom line way, several intermediate steps towards the desired state should be planned and modelled accordingly. So, the prospective business models will first be planned and modelled in VMP which supports the back-casting method through the use of different phases. Where after, the model can be tested, and the performance can be estimated.

A single Area Of Impact for each of the three bottom lines of performance is defined. These AOIs will serve as indicators for performance and are chosen based on what might reveal differences in performance between the *Business as Usual* and *Transformed Business* scenarios. For the sustainability assessment of the performance itself, we rely on the MCS.

7. THE CASE-STUDY: GREENLIGHT POWER, INC.

A. Storyline of the Greenlight Case

i. Business problem facing GPI

Greenlight Power (Greenlight Power, Inc. or GPI) is a simulated energy company that provides electricity to a population similar to Vermont, around six hundred thousand inhabitants.

From some sort of existential threat and the opportunity associated with being an early mover, they have made the decision to transition from an energy production based on non-renewable resources (fossil-based fuels like coal and natural gas) to one with focus on renewable resources that do not contribute to global warming (like wind, solar, nuclear) instead. This transition is planned over five different periods, starting in 2020 and ending in 2050, wherein gradually new technologies and innovations should come into play.

ii. Two scenarios

Two scenarios for GPI (*table 1*) were analyzed to properly compare different aspects of performance over several periods and to assess the overall sustainability performance of both scenarios. They have three main points of difference.

In the **Business As Usual (BAU) scenario**, GPI has no intention to transform their business models. They do not invest in sustainable generation technologies and maintain their commitment to fossil fuels. They mainly invest in expansion of the existing infrastructure to efficient and more productive practices. As a consequence, their way of doing business and production stays the same. They will have the same sort of technologies and resources throughout the different periods. In terms of assessment of their performance, their main interest is the economic performance of the company. However, they do manage their environmental impacts to some degree.

In the **Transformed Business (Tr. Bus.) scenario**, GPI takes up the challenge to transition to an energy production based on renewable energy resources. So, resources that are more differentiated and do not contribute to global warming. By 2050, they want to reduce the use of fossil fuels to zero. So, investments in new and sustainable technologies are unavoidable as well as external financial support for these projects. We included investments in solar and wind parks, storage technologies and a nuclear plant. Their assessment of performance is more differentiated as well, with a small preference for the social and environmental performance.

	A: Business As Usual (BAU)	**B: Transformed Business (Tr. Bus.)**
Transformation	Investments in the expansion of existing production infrastructure	Investments in new, sustainable generation technologies/innovations
Energy mix	Maintained commitment to *fossil fuels*	Increased use of *sustainable energy resources*
Performance	Focus on *economic* performance	Balanced focus on *all aspects* of performance

Table 1: Summary of the main differences between both scenarios

Both scenarios are developed in VMP as a succession of steps, called *Phases*. In the case, five consecutive phases were defined (2020, 2025, 2030, 2040 and 2050). 2020 is called the *As-Is Phase*, the situation as how GPI operates today. The other phases are defined as the *To-Be Phases*, the intermediary steps describing how GPI may feasibly operate to bring it closer to its goal in a phased manner.

iii. Integration of VMP and the MCS

The first step of the integration consists of recognizing the relevant stakeholders and impacted capitals (*table 2*) for each of the three bottom lines of performance. A single Area Of Impact (AOI) was attributed as indicator accordingly.

These AOIs are defined by Thomas and McElroy (2016) “as discrete impacts of an organization on vital capitals” (p. 54), either as they are already taking place or as they should be taking place. They are chosen based on the duties and obligations owed to the stakeholders of GPI to manage one’s impacts on vital capitals in ways that can affect their well-being and based on what might reveal differences in performance between both scenarios.

Bottom Line	Stakeholders	Areas Of Impact / (Capitals)	Context-based metric
Social	Electricity Consumers	Climate Change Adaptation (H, S, EE)	Funding for Climate Change Adaptation
Environmental	Electricity Consumers	Climate System (N)	Greenhouse Gas Emissions
Economic	Shareholders	Financial Performance (IE)	Return On Equity

Capitals Legend:
EE = External Economic
H = Human
IE = Internal Economic
N = Natural
S = Social and Relationship

Table 2: Summary of stakeholders, AOIs and context-based metrics

Climate Change Adaptation serves as the AOI for the *social bottom line*. The concept of ‘climate change adaptation’ is the whole of social programs and changes to infrastructure that has to be made to handle the accelerated climate change caused by global warming. Examples are the preparation of agriculture and homes against changing weather conditions or the elevation of dikes against higher sea levels. The ambition of transition to an energy production based on renewable energy resources will probably go hand in hand with efforts for improving its social impacts, assuming that the Electricity Consumers are the direct recipients of the adaptation benefits resulting from GPI's impacts on human, social and external economic capitals. GPI recognizes the damage that is caused by fossil fuels and it is aware that they will exist for many more years. So, it is their duty to support programs that try to deal with the effects of global warming. The funding (measured in million $ / year) serves as context-based metric.

The Climate System is the AOI of the *environmental bottom line*. Electricity Consumers are directly affected by environmental issues resulting from GPI's impact on natural capital. It is their duty to reduce greenhouse gas emissions to a sustainable level as specified in a science-based global warming mitigation scenario.

Therefore, greenhouse gas emissions (measured in metric ton CO_2) serve as a context-based metric. Obvious differences in environmental impacts will occur between the two scenarios.
For the *economic bottom line*, we opt for the Financial Performance of the company as AOI. Financial performance is represented in this case by the context-based metric, Return On Equity (measured as percentage). Shareholders (i.e., the owners of GPI) are the direct recipients of the financial performance resulting from GPI's impact on the internal economic capital. Indeed, the transition to sustainable resources should presumably have an economic impact on performance, quite possibly worsening such performance instead of improving it in the beginning. However, its GPI's duty to still maintain a flow of earnings into the organization at a level that meets the needs of shareholders.

The stakeholders are modelled in the business ecosystem map of VMP, as presented under *Modelling in VMP* (except for the shareholders, they are not modelled explicitly. They are seen as part of GPI itself.). Each AOI is measured by means of a context-based metric to adequately assess the performance in a triple bottom line and context-based way via the MCS. The VMP (*figure 3*) produces the estimated performance per AI (via the corresponding context-based metrics) for both scenarios, as presented in *Expected Outcome*. The estimated performance will be scored using the scoring function of the MCS, as presented in *Performance Reports*. In the MCS, scores per AOI are captured together with their applicable weights (which will differ between both scenarios) leading to an overall triple bottom line performance score per scenario, which is presented in *Scorecard Implementation.*

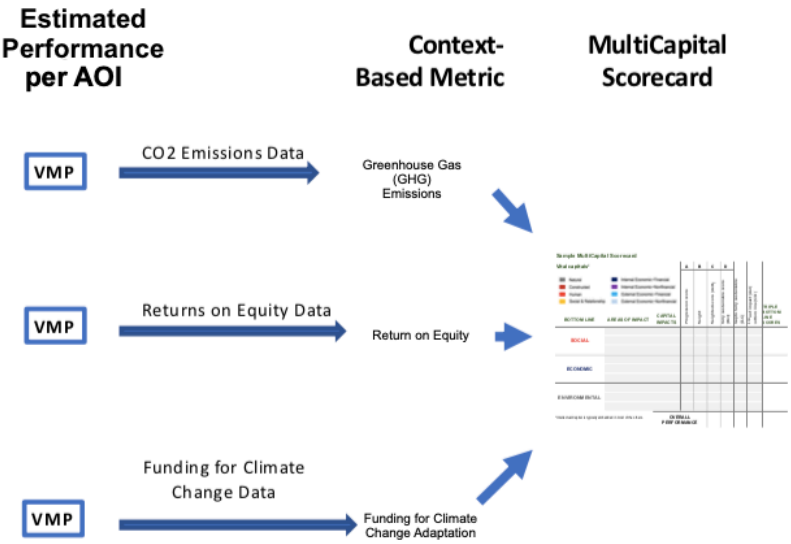


Figure 3: Flow of information from VMP to MCS

B. Scenario A: Business As Usual

In the first place we want to understand the results and effects of the BAU scenario. What if GPI does not change anything and continues to work like it has always done? The business model of the BAU scenario and its estimated, context-based performances are presented underneath.

i. Power Generation Portfolio

The power generation portfolio (*figure 4*) displays the mix of energy resources used to deliver the demand of electricity consumers. For the BAU, it indicates the commitment to fossil fuels. However, following the recent trends, we ascertain a change from coal-fired to gas-fired power generation (EIA, 2013). The contribution of renewable resources stays flat throughout the different periods, as they do not take part in the transformation journey.

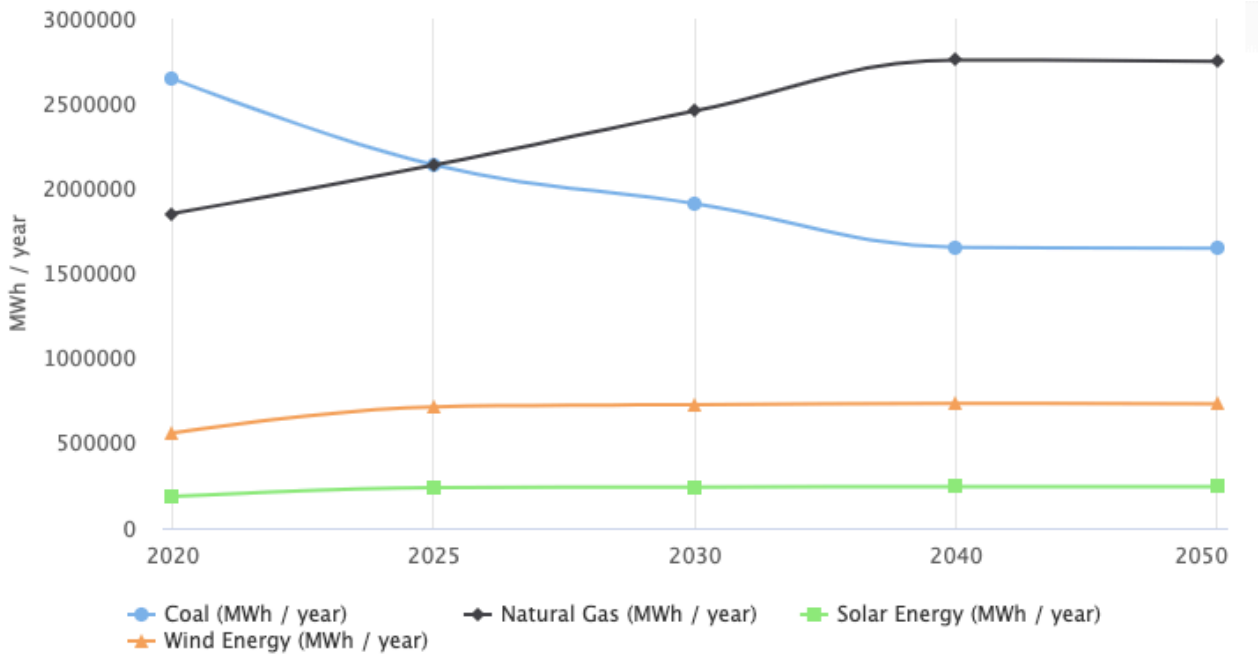


Figure 4: Power Generation Portfolio of the BAU

ii. Modelling in VMP

The development of the scenarios is performed in VMP and as mentioned in chapter 5, the CBMP-method is applied. However, as GPI does not want to transform their business models in the BAU Scenario, nothing will be structurally changed throughout their consecutive *To-Be Phases*. Their main goal is to achieve a high and steady financial performance, with a minor interest in their environmental and social impact.

During the "Discover" stage, VMP offers different representations or diagrams to visualize how a business in each phase should look like. *Figure 5* defines **the business ecosystem** that binds all stakeholders together. It determines the stakeholders (*participants)*, as well as their essential contributions (*value propositions)*. Since there will be no structural changes in the BAU scenario, their ecosystem in 2050 will be identical to this one of 2020.

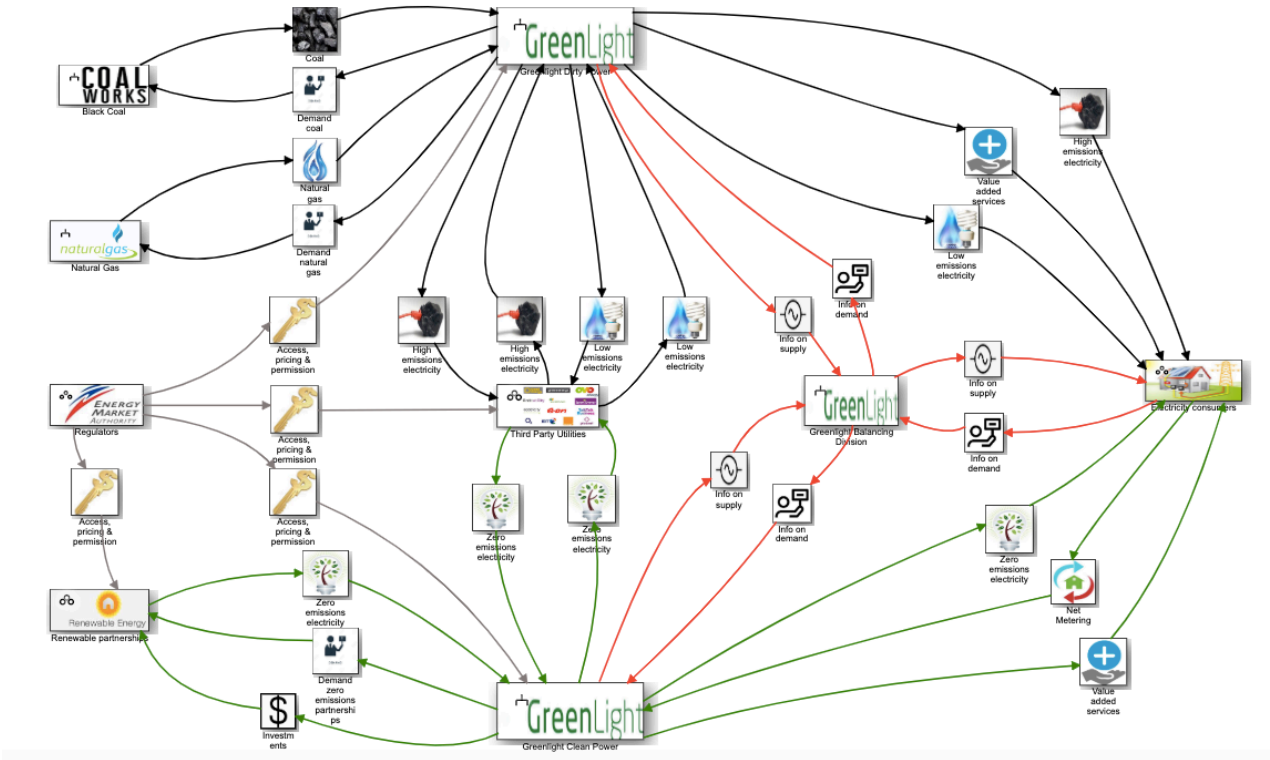


Figure 5: Business Ecosystem Map - BAU (2020)

A good way to describe how GPI operates and should operate in the future, is to make use of *Business Models.* A business model (Osterwalder et al, 2002) defines how an organization creates and delivers value for its stakeholders. In VMP, the Business Model Canvas by Alexander Osterwalder (Osterwalder et al, 2010) is adopted as Business Model Framework for defining how a business operates.

GPI consists of three departments (Greenlight Dirty Power, Greenlight Clean Power and Greenlight Balancing) leading to the development of **three Business Models (BM)**: Centralized Production BM, Decentralized Production BM and Balancing BM. The business models of GPI's consumers and partners are not made explicit. So, the impact of changing value propositions of GPI on the models of the consumers and partners is therefore not considered. However, consumer behaviour is modelled by taking into account the changing expectation patterns, the increase in energy demand and the upward trend of net metering

Below, each actor of the ecosystem is briefly explained with their function and essential contribution in the ecosystem:
Electricity Consumers are the end users of the different electricity streams and value-added services delivered by both GPI's production departments. The case is designed in a way that 100% of the electricity demand distributed by GPI. Not including a transmission system operator or distribution system operator is a simplification of reality for the purpose of the thesis. We deem adding complexity to the ecosystem would not have changed anything in terms of the goal. The assumption was made that the demand volume would always be fulfilled by GPI, either by own production or by reselling of purchased electricity. In the consecutive phases, a growing number of consumers is expected to generate renewable power themselves. Via net metering programs they will be able to tie into the grid to sell their excess energy to Greenlight Clean Power who then resells these volumes to other consumers.

Greenlight Balancing is the *business model owner* of the Balancing BM. This department serves as a database with all the market data on electricity demand and production data: consumer demand volume, demand volume of value-added services, net metering volumes and contribution percentages of energy resources in the generated electricity. Based on this information, this department balances the supply and demand followed by an allocation to Greenlight Clean and Dirty Power of the volumes they should deliver to consumers. So Balancing steers how the total amount of electricity will be generated in both production departments.

Greenlight Clean & Dirty Power are thus seen as two ‘clients’ of the Balancing division, even though they are all part of the same company. Greenlight Balancing acts as an independent business unit with its own cost structure and revenue stream.
This actor was implemented with the future-oriented opportunity of smart meters. The smart meters will be connected with electricity systems that use computer technologies and computer intelligence for generation, distribution and consumption of electricity in two directions. It allows electricity companies to incentivize the consumption at time when pressure on the grid and prices are low. Each household will have a smart meter making the usage of electric machines more efficient. For example, a dishwasher or washing machine would have a program to start automatically when the smart meter receives a signal of surplus electricity on the grid combined with low tariffs.

Greenlight Dirty Power is the *business model owner* of the Centralized Production BM. *Figure 6* shows the Business Model Canvas of the Centralized Production in 2020. This department has a centralized way of energy production with large, central electric generators. The fossil fuels coal and natural gas serve as the primary resources and they are delivered by their respective suppliers, **Black Coal** and **Natural Gas**. Greenlight Dirty Power delivers high emissions electricity (coal-based) and low emissions electricity (natural gas-based) to the electricity consumers. On top of that, they provide value-added (VA) services to the market. VA services include energy packaging options consisting of different mixtures of clean versus dirty, different mixtures/levels by time of day and consultancy services to educate consumers how to save energy (like information on good isolation, energy assessment of household equipment). The gain for the consumer is expressed as a percentage *use reduction.*
Next to the retail market, this production department maintains trade operations with the wholesale market (more details under *Third Party Utilities*). The costs and revenues are separated by electricity type (high or low emissions) and by type of customer (electricity consumers or third-party utilities). Their business is also subject to the influence of policies prescribed by the regulators (more details under *Regulators).*

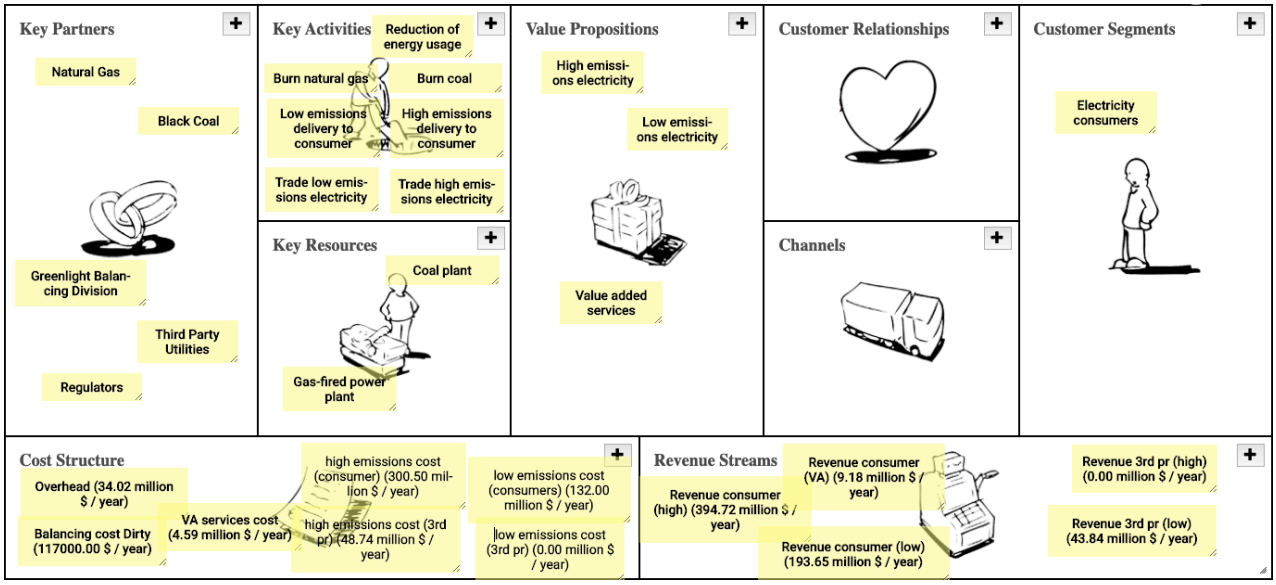


Figure 6: Business Model Canvas Centralized Production (2020)

The Business Model canvasses of Decentralized Production and Balancing can be found in the attachment 7.1.

Greenlight Clean Power is the business model owner of the Decentralized Production BM. This department has a decentralized way of energy production in which a significant portion of the energy is produced near where its consumed. Renewable generation technologies are the key resources to generate electricity from wind & solar energy. We did not include a combustion based renewable resource like biomass, due to rumors that it could be worse than coal (https://burnedthemovie.com). Further, we discounted hydropower electricity because of its location specific requirement of waterways.

Greenlight Clean Power delivers zero emissions electricity to the market and is also responsible for providing certain value-added services to electricity consumers. With their installations Greenlight Clean Power will be able to produce at least the production minimum of the regulators, a minimum production volume expressed in MWh/year. The remaining part of zero emissions that they cannot produce themselves, will be bought from the **Renewable Partnerships**. These Partnerships are separate companies/ventures in which GPI has an ownership interest and which they fund each year with a percentage of the revenues from Greenlight Clean Power. The department Greenlight Clean Power will only buy power from (and not sell to) its Partnerships. Electricity that GPI buys from the Partnerships would be lower priced than electricity that it buys from 3rd-party utilities, as a kind of return on investment in the Partnerships.

Greenlight Clean Power will therefore try to buy first from these partnerships. Instead of investing in own production capacity, we assume a more profitable use of the investments due to the presence of scale-effects.
And just like Greenlight Dirty Power, Greenlight Clean Power is also involved in trade operations with the wholesale market and subject to the influence of policies prescribed by the regulators.

For both production departments, we assume that the installations always operate at full capacity level as far as it is not constraint by the regulators.
The **Third-Party Utilities**, usually producers, not consumers, produce similar types of electricity as GPI for their own use on a municipal or village level. GPI will buy and sell excess power from/to third-party suppliers if they have to deal with a shortage or surplus of electricity. The applied wholesale pricing is also controlled by regulators and is lower than the price charged to consumers.

The **Regulators** control the pricing, set limits for emissions and determine production minima for renewable energy. The pricing of GPI is shown separately on each electricity type. The production departments set their own proposed pricing and then submit it to the regulators for their review and approval. All pricing is regulated, and only approved pricing is allowed to be charged to consumers. There is always a retail and wholesale price per energy type. For zero emissions, there are even two wholesale prices: one in relation with third party utilities and the other in relation with the partnerships. As said, the wholesale prices are always lower than the retail prices for consumers.
Further, regulators strive to push utilities to increase the proportion of renewable energy and decrease the level of non-renewable energy. Therefore, they set strict maximum norms on emissions for Greenlight Dirty Power and minimum targets on production volumes for Greenlight Clean Power.
Regulators support utilities financially through subsidies. However, in the BAU scenario, there is no plan to transform their business model, whereby the subsidies will be limited.

Next, the **value streams** for GPI were developed. They define the activities that need to be performed to deliver certain value propositions from a business model owner to another participant in the ecosystem. GPI has three business models, delivering value propositions to various participants in the ecosystem. *Table 3* summarizes the outgoing value streams per business model. The value streams that are not shown here can be found in the attachment 7.2.

Business Model Owner *(Business Model)*	**Value Streams** *(receiving particpant)*
Greenlight Dirty Power *(Centralized Production BM)*	Demand coal / natural gas *(Black Coal / Natural Gas)* High/Low emissions electricity delivery *(Electricity Consumers)* Value added services *(Electricity Consumers)* High/Low emissions electricity trading *(Third-Party Utilities)*
Greenlight Balancing *(Balancing BM)*	Information relating to the demand *(Greenlight Dirty Power / Greenlight Clean Power)*
Greenlight Clean Power *(Deentralized Production BM)*	Demand zero emissions electricity *(Renewable Partnerships)* Investments *(Renewable Partnerships)* Zero emissions electricity delivery *(Electricity Consumers)* Value added services *(Electricity Consumers)* Zero emissions electricity trading *(Third-Party Utilities)*

Table 3: Summary of the Value streams in the BAU 2020

Figures 7, 8 and 9 are VMPs' graphical representations of some highlighted value streams. *Figure 7* indicates that Greenlight Dirty Power owns a coal plant that generates electricity for the consumers and releases high emissions. *Figure 8* shows the parallel situation for Greenlight Clean Power. It produces zero emissions electricity with its own solar panels and windmills.

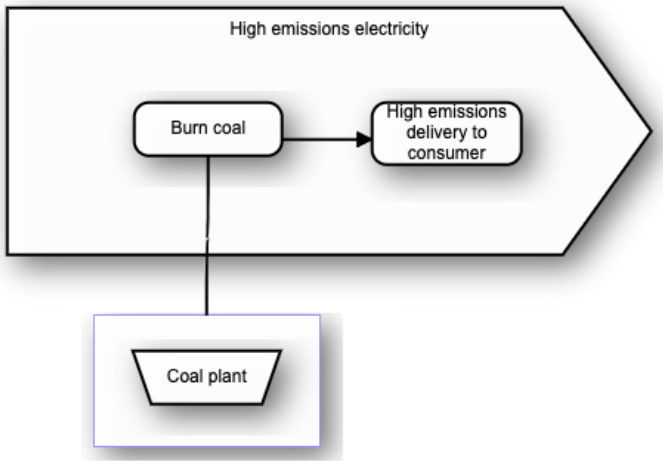


Figure 7: High emissions electricity delivery

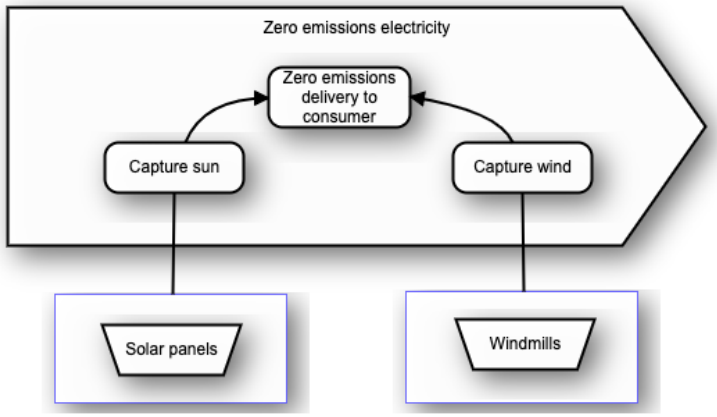


Figure 8: Zero emissions electricity delivery

Based on the market and production data, Greenlight Balancing (*figure 9*) balances supply and demand and allocates to both Greenlight Dirty and Clean Power the volumes they should deliver to the electricity consumers.

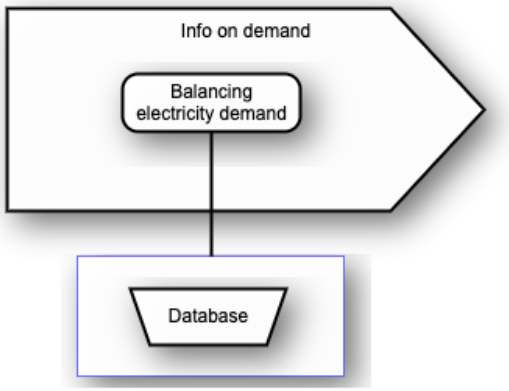


Figure 9: Information relating to the demand

Strategy map is the last type of diagram in the "Discover" stage that VMP has available to visualize a business. In VMP, there is an extended version of the well-known Kaplan & Norton strategy map used (Kaplan et al, 2004). Strategy maps specify the key values and visualize the different cause-effects relating to the creation of value per Business Model. They are the base of the following phase, the "Prototype" Stage.

For each of the three business models, a detailed story of value creation was setup through drawing all the key values and showing the arrow flows. As the BAU will maintain its commitment to a centralized way of electricity production during the following phases, the upper part of the strategy map of the Centralized Production Business Model is highlighted (*figure 10*). The complete strategy maps of all the business models can be found in the attachment 7.3.

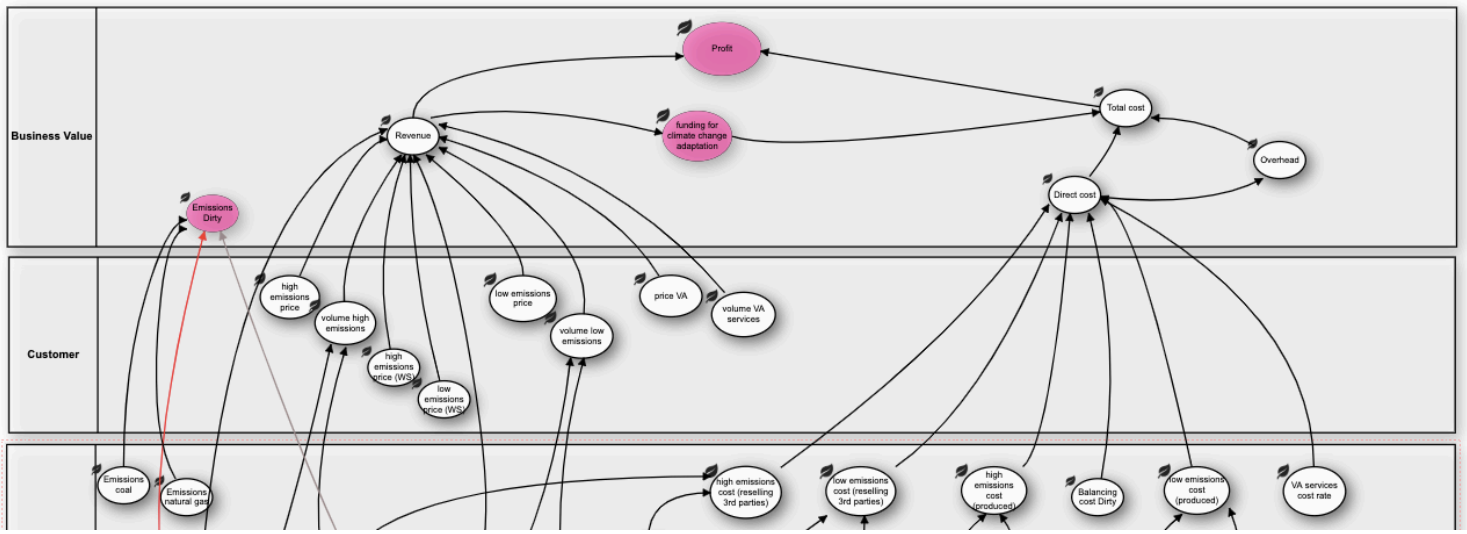


Figure 10: Upper part of the strategy map of the Centralized Production BM in the BAU of 2020

In the BAU scenario, GPI's main interest in terms of assessment of their performance is the economic performance of the company (i.e. *profit*). However, we want to compare the social and environmental performance as well with the Transformed Business Scenario. That explains why GPI in the BAU scenario also measures its social and environmental performance, using *Funding for Climate Change Adaptation* and *Emissions*.

The *funding for climate change adaptation* gets influenced by the Revenues of Greenlight Dirty Power (million $/year) and a variable contribution percentage (%). It's the social duty of this polluting production department to fund programs that help people to coop with changes of the climate. The funding is linked with a percentage to the revenues to stress that the largest companies should contribute the most.

Profit is the result of the total revenue (million $/year) and the total cost (million $/year) of the department. Revenues originate from high and low emissions electricity delivery to consumers and third parties, as well as from the delivery of value-added services to consumers. The total cost is aggregated from the different direct costs linked to its activities and the overhead. The overhead contains general costs like sum of paid rent, maintenance of plants, administrative costs and loans of workers. For simplification, it's calculated as a percentage of the direct costs.

The *Emissions Dirty* is the total of the emissions (million Metric ton CO2/year) released when burning coal and natural gas to generate high and low emissions electricity. The total emissions are a result of the production volumes (MWh/year) and the amount of emissions per energy resource (Metric ton CO2/MWh). The production volumes, in turn, are defined as the minimum of the available capacity level and regulator constraint. If the emissions maximum is higher than the full capacity, the plant will produce on full capacity. Otherwise, GPI obeys the constraint and produces the maximum allowable norm, which can be lower than its full capacity level.

During the “Prototype” stage, structured models are created from the developed “Discovery” diagrams (business ecosystem, business model canvasses, value streams, strategy maps), namely a **Business Model Cube**. A BM cube offers for each business model a structured representation consisting of six dimensions (Customers, Value Propositions, Activities, Competencies, Partners and Values) and relationships to wire them together (*figure 11* is just a simple representation. The cubes are interactive objects in VMP itself, each side presenting one of the six dimensions).

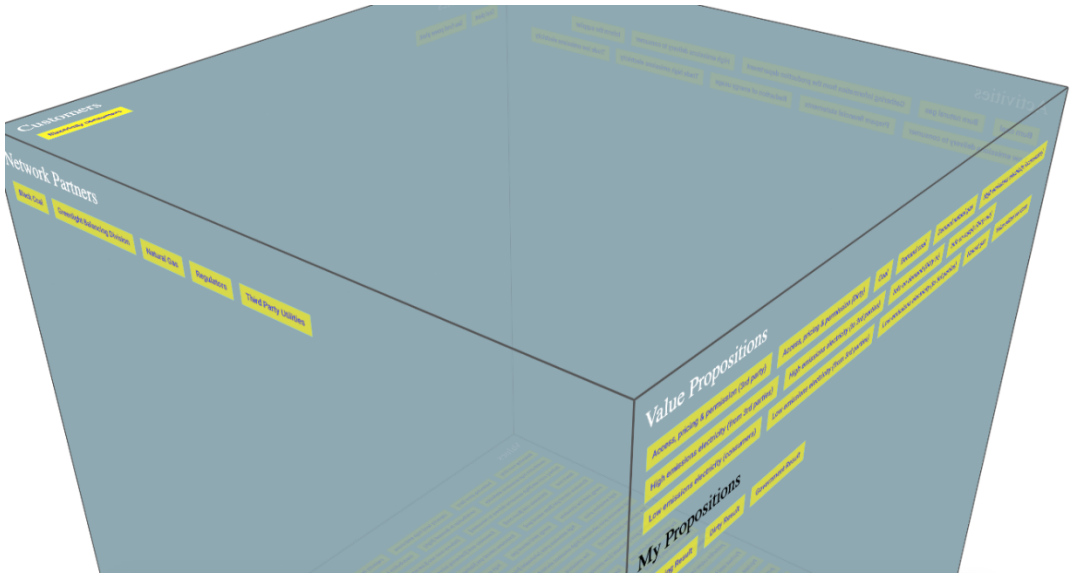


Figure 11: BM-cube of the Centralized Production in the BAU scenario

In VMP, two levels of values are defined: Business Model-level and Plan-level. Values at Business Model-level are captured in the *My Proposition* of the BM Cube. *My proposition* defines a proposition that defines and measures the values that the owner of business model captures from its role in the ecosystem. In brief, it displays the internal performance of a business model. *Table 4* shows for the Centralized Production BM the outcome of costs, revenues, profits and emissions. The My Propositions of the other BM's can be found in attachment 7.4

My Proposition	From (Role)	Values
Balancing Result	Producer Dirty *[Balancing Network]*	Balancing cost Dirty 117000.00 $ / year
Dirty Result	Producer Dirty *[Dirty Electricity Network]*	Direct cost 485.95 million $ / year Emissions Dirty 3.46 million Mt CO2 / year high emissions cost (produced) 300.50 million $ / year high emissions cost (reselling 3rd parties) 48.74 million $ / year high emissions production cost 262.50 million $ / year high emissions purchase cost 38.00 million $ / year low emissions cost (produced) 132.00 million $ / year low emissions cost (reselling 3rd parties) 0.00 million $ / year low emissions production cost 104.00 million $ / year low emissions purchase cost 28.00 million $ / year Overhead 34.02 million $ / year Overhead rate 7.00 % Profit Dirty 73.32 million $ / year Revenue 3rd pr (high) 0.00 million $ / year Revenue 3rd pr (low) 43.84 million $ / year Revenue 641.38 million $ / year Revenue consumer (high) 394.72 million $ / year Revenue consumer (low) 193.65 million $ / year Revenue consumer (VA) 9.18 million $ / year Revenue contribution for funding climate change adaptation 7.50 % Total cost 568.07 million $ / year Total emissions coal 2.50 million Mt CO2 / year Total emissions natural gas 0.96 million Mt CO2 / year VA services cost 4.59 million $ / year

Table 4: My Propositions of the Centralized Production BM

Values at Plan-level are captured in *Plan Values*. At Plan-level, values can be aggregated from the different business models (i.e., GPI has three). *Table 5* shows the most important plan values. In this case, the plan values are the context-based metrics to measure each AOI, as explained in the beginning of chapter 7. The funding for climate change adaptation (million $ / year) is sourced from the Centralized Production BM. The greenhouse gas emissions (million metric ton CO2 / year) cover the sum of the emissions of the Centralized Production BM and the emissions of the Decentralized BM (i.e., a low level of emissions was allocated to wind and solar energy to reflect indirect emissions). ROE (%) is calculated as the total profit of GPI divided by the working capital, which is the sum of the working capital of the previous phase and the retained earnings.
The VMP produces for each phase the estimated performance of these context-based metrics, as presented in the next part *Expected Outcome*.

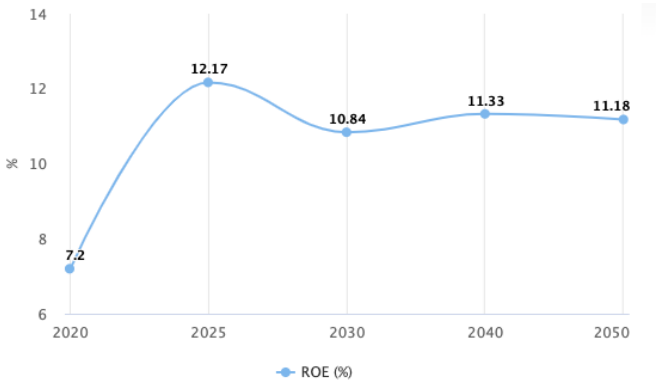
Values	2020
	Base / Business as usual
Plan Values	
Funding for climate change adaptation (million $ / year)	38.60
GHG-emissions (million Mt CO2 / year)	4.77
ROE (%)	7.20

Table 5: Plan Values of the BAU 2020

On the modeling of the evolution towards 2050, we can be brief. As they do not transform, there are no structural changes of the models and diagrams. In the BAU scenario, GPI only changes internally, investments are done to replace old equipment or to increase the production capacity. Their business models remain unchanged throughout the different To-Be phases.

iii. Expected outcome

The prototype outputs are the basis for creating interactive **Dashboards**, during CBMP's Adopt stage. Results can be evaluated and compared in the dashboards over the successive phases and of course between both scenarios. The expected outcome of the context-based metrics defined for each AOI can thus be easily presented and monitored. The estimated performance for these context-based metrics over the different phases is presented below (*figures 12, 13, 14*).



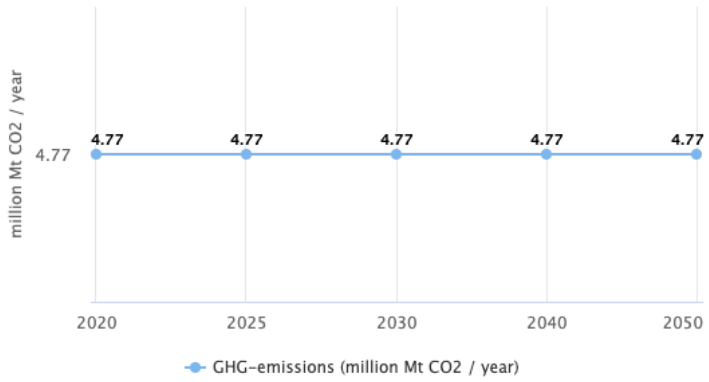


Figure 12: Impact on the Financial Performance *Figure 13: Impact on the Climate System*

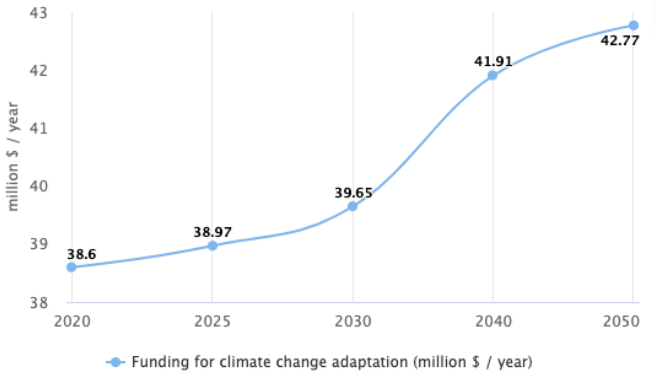


Figure 14: Impact on the Climate Change Adaptation

Based on the absolute numbers, GPI is mainly characterized as a shareholder-focused company in the BAU that strives for a high and stable ROE, measured as profit divided by the sum of capital and retained earnings. They do contribute to programs of climate change adaptation, however they do not meet the proposed *sustainability norm* of 60 million dollar per year (more details in next part).

We do note that having greenhouse gas emissions flat throughout the phases in the BAU scenario is slightly odd. *Figure 4* shows that energy resources portfolio changes during 2020-2050 from predominantly coal-based to predominantly gas-based. However, as explained there, the power generation portfolio only displays the mix of energy resources used to deliver the demand of electricity consumers. They deliver more low-emissions electricity to the consumers to meet their expectations of the use of less emitting energy resources. For purposes of this thesis, the business modelling of the production of Greenlight Dirty Power was simplified. Greenlight Dirty Power produces supply-based and constantly at full capacity level as far as it is not constraint by the regulators. In this case, the emissions maximum norm exceeds the full capacity level. As Greenlight Dirty Power is not constrained and does not commit to generate more renewable energy, it will run its most polluting installations at full capacity and neglect to reduce emissions. So, in the BAU scenario GPI will sell throughout the phases an increasing amount of high-emissions electricity to the third-party utilities which we assumed to use all the surpluses.

iv. Performance reports

A **performance report** for each AOI was developed (i.e., three per scenario) to discover if the estimated performance will be sustainable relative to their "fair shares" (see chapter 5). *Table 6* is the performance report of the AOI Climate Change Adaptation, the others can be found in the attachment 7.5.

GPI determines purposeful *sustainability norms and trajectory targets* per AOI to be sustainable in their own context. A *sustainability norm (SN)* is a standard of performance for what an organization's impacts on vital capitals must be in order to be sufficient, sustainable and supportive of stakeholder well-being and a *trajectory target (TT)* is defined as an attainable interim milestone towards a sustainability goal.

The SNs used are applicable standards of performance no matter what GPI thinks. Even if they choose to ignore them, the standards still apply (i.e., at least in the minds of the stakeholders whose well-being is at stake). So, the SNs are identical for both scenarios, enabling us to see how performance compares against the same targets.
The TTs are discretionary in most cases. It is a scenario specific factor by which GPI can indicate priorities in its business strategy.
The sustainability norms and trajectory targets are thus no arbitrary chosen standards.

Scenario A: Business As Usual - AOI: Climate Change Adaptation: Funding

Funding-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm ($ million/year)	60.0	60.0	60.0	60.0	60.0
Trajectory Targets ($ million/year)	30.0	35.0	40.0	45.0	50.0
Measured Impacts ($ million/year)	38.60	38.97	39.65	41.91	42.77
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	0.64	0.65	0.66	0.70	0.71
Sustainability Performance (TTs)	1.29	1.11	0.99	0.93	0.86
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	+2	+2	-1	-2	-3

***Context-Based Scoring Convention**: Scores of ≥1.0 are sustainable; scores of <1.0 are unsustainable.

Table 6: Performance report of AOI Climate Change Adaptation

The standards for climate change adaptation would ideally be science-based, but we are not aware scientific sources or norms for that. Thus, in principle, GPI can set a standard of performance in any way it likes if it finds that there are no external standards to refer to for a particular AOI. However, once an organization declares a commitment to a particular norm, it effectively becomes a standard of performance, even though it originated internally and there is no external standard to support it. This is known as the principle of promissory estoppel[3]. Performance commitments made in this way have the effect of serving as standards because once a public declaration to achieve them is made by an organization, stakeholders of all kinds respond accordingly. Customers may choose to do business with the company because of it; employees will choose to work for the company, too; and investors who care about sustainability will invest in a company for the same reasons. This all creates an obligation on the part of the company to perform accordingly.

The $60 million, then, can be viewed as the amount GPI felt it could afford to spend while trying to fulfill its fair, proportionate share of the damage caused by their use of fossil fuels and while not putting the financial viability of the company at risk.

The standards for the financial performance (performance report in attachment 7.5) are consistent with norms in the investment community, which in turn can be tied to specific sectors. We choose levels that are highly typical of what investors expect to receive in return for their investments (as acceptable minimums).

As cited in chapter 5*,* the *sustainability performances* are calculated following the formula of McElroy as “the division of the actual impact on vital capitals by what the impact on the same vital capital must be in order to be sustainable”. In practice, the estimated performance of an AOI, referred to as “measured impacts”, is divided by its phase-related Sustainability Norm and Trajectory Targets. This provides us with Context-Based Scores of the Sustainability Performance in two forms: scores based on the SNs and scores based on TTs. The context-based scoring convention states that for societal quotients, scores $\geq$ 1.0 are sustainable, < 1.0 are unsustainable. For ecological quotients, scores $\leq$ 1.0 are sustainable, > 1.0 are unsustainable.

[3] More on this principle on https://sustainablebrands.com/read/finance-investment/move-over-sustainability-accounting-here-comes-purpose-accounting

Next, a *progression score* is attributed to each AOI per phase. For Thomas and McElroy (2016) these scores tell "how an organization's actual impacts on vital capitals compare to the sustainability norms we have defined" (p. 56). The progression scores have a point-based scoring system which is clarified in *table* 7 and are determined in a three-step reasoning.

THE SCORING SCHEMA USED IN ASSESSING PERFORMANCE IN THE MULTICAPITAL SCORECARD
3 = Meeting or exceeding the Sustainability Norm.
2 = Meeting or exceeding the year's Trajectory Target, but falling short of the Sustainability Norm.
1 = Improving upon the previous year's performance, but not meeting the period's Trajectory Target, or any period of improving performance while having no such targets at all (SN or TT).
0 = Maintaining the previous year's performance, while not meeting the period's Trajectory Target.
-1 = A 1-year regression in performance, and not meeting the period's Trajectory Target.
-2 = A 2-year regression in performance, and not meeting the period's Trajectory Target.
-3 = A 3-or-more year regression in performance while not meeting the period's Trajectory Target, or any period of worsening performance while having no such targets at all (SN or TT).

Table 7: Progression Performance Scoring Schema

The first step for any phase is to see if the SN has been achieved. This can be quickly ascertained by looking at the value in the "Sustainability Performance (SNs)" row. If so, nothing else matters and the score assigned is a +3. But as you can see for the Climate Change Adaptation AOI, the SN score never reached 1.0 or greater.

If the SN has not been achieved, the next step is to look at the "Sustainability Performance (TTs)" value to see if the TT has at least been achieved. Here it is important to understand that even if the context-based score has declined in a phase (as it did from 2020 to 2025 for the Climate Change Adaptation AOI), if it still meets or exceeds the TT, it counts as a +2. The only other alternative would be to score it as a -1, but if you read the definition of a -1, you will see that that does not fit because the value obtained in 2025 still meets or exceeds the TT, even though it dropped. Take note that a value that meets or exceeds the SN could also decline and yet still receive a +3 for the same reason.

If neither the SN nor the TT has been achieved, then the scoring possibilities of +1 to -3 come into play. The definitions in *table 7* enable it to make an appropriate decision.

These illustrations of how the MCS scoring system works provide vivid evidence of why adding the context-based metric scores in the AOI tables was such an important move for in this case. In effect, we evaluate the scores in a way that makes it possible to apply the 7-point schema in a rigorous way, and to avoid posting negative scores in cases where performance still meets or exceeds TTs and SNs. The opposite can be a problem as well (i.e., cases where incremental performance may be improving, but when viewed through a context-based lens may actually be worsening).

After completion of the performance report for each AOI, it will be possible to adequately assess the estimated performance in a triple bottom line and context-based way.

v. Scorecard Implementation

Finally, we implement the information from the performance reports in the MCS. For each phase of the scenario, a MCS was developed (i.e., five per scenario). We discuss the MCS of the end period 2050 (*table 8*), the others can be found in the attachment 7.6.

MultiCapital Scorecard for Greenlight Power - 2050

Scenario A - BAU

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		-3	1,00	-3,00	3,00	6,00	-100%	-100%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-3	3,00	-9,00	9,00	18,00	-100%	-100%	11%
Economic	Financial Performance	Return on Equity		3	5,00	15,00	15,00	0,00	100%	100%	
			SUMMARY TOTALS			3,00	27,00	24,00			
			Total Weighting Points		9,00						

Table 8: MCS of the BAU in 2050

The three bottom lines are listed with their corresponding AOI and context-based metric. In column A, the progression score of phase 2050 is filled in for each AOI as extracted from the corresponding performance reports. The weights in column B reflect the discretionary thinking of organizations on the relative importance of each AOI. The division of weights involves thus subjectivity on the part of the reporting organization. GPI will apply a different weighting system in both scenarios, proving the importance of treating weights like a variable. In the BAU, GPI prioritizes Financial Performance, that is why it receives the highest weight of 5. As GPI wants to ensure its viability, they cannot ignore their environmental impacts. They manage their environmental impacts to some degree and attribute an average weight of 3. In the BAU scenario It should in any case be lower than the weight attributed to the economic bottom line, which is the essence of the BAU scenario.

The basis of the weight division stems from the fact that the weighting scale 1 (lowest) to 5 (highest) is used in the MCS. Since the first step in weighting is to set a total budget of available points, we first calculate what a medium weight for any AOI would be on our scale. That would be a 3. Since we also have three AOIs, the result is 3 * 3, or 9. If we had had 6 AOIs, the budget for weighting would have been 18, or 6 * 3.

The columns next to B are calculated following the formulas between brackets in the headline of the MCS. We end up with a poor overall triple bottom line performance score of 11% (= 3 / 27) for the organization as a whole. The evolution over the different phases and the comparison with the other scenario is discussed in *D. Comparison of both scenarios* with an illustrative graph.

C. Scenario B: Transformed Business

The BAU scenario will be compared against the Tr. Bus. scenario. What if GPI puts effort into transformation? The positive impact on the estimated and context-based performance is presented underneath, together with its transformed business model.

i. Timeline of the transformation process

Based on the assumed technological evolutions, the Tr. Bus. scenario will highlight a blend of additional deployment of sustainable technologies, new production capacity with nuclear power and storage technologies. GPI receives financial support through external capital injections. These injections will consist of partly public sources or subsidies and partly private injections and will help to finance the necessary investments of GPI.
The main transformations are detailed described below, together with some context about our selected options, and new and more developed business models will emerge gradually:

2020: GPI formalizes its commitment to transition to the use of 100% sustainable energy generation by 2050, while also committing to fund climate change adaptation projects at a target level of $60 million per year by 2050.
2025: GPI invests in renewable generation technologies (solar and wind) to meet the new production criteria for Greenlight Clean Power.
The first financing support of the government and private investors flows into the company. They use it to start the construction of a nuclear plant to transform Greenlight Dirty Power from a high-emitting site to a more renewable one with very low emissions.
2030: A 250 MW nuclear reactor becomes operational. The nuclear site will be further expanded by 2040 with a 165 MW nuclear reactor. On top of the periodic investments in renewable generation, they invest in storage technology to allow peak shaving.
2040: GPI has a fully operational nuclear plant in the Greenlight Dirty Power department and a storage center in the Greenlight Clean Power department at its disposal.
2050: The share of coal and natural gas in the energy resource mixture is reduced to zero percent.

We used **nuclear energy** as the ultimate source of non-fossil-fuel-based energy on a large scale, since the other alternatives are either insufficient in scale, steadiness or affordability. Nuclear energy can lead to difficult political and social discussions concerning waste disposal and the social danger of a nuclear disaster. However, we deem it necessary for a successful transition. It offers affordability and economic security of electricity. On top of that, it reduces greenhouse gas emissions and offers renewable alternatives extra time to develop more efficiently. We did take into account an additional cost to fund the disposal of nuclear waste later on.
A new nuclear reactor should be up and running in a few years. Despite the remarks that nuclear plants would have a long building time, Lovelock states in his book *The Vanishing Face of Gaia* that "the construction takes the French less than five years, and there is no reason why it should take longer…" (Lovelock, 2009)
A storage center manages large batteries that serve as flexible electricity capacity. They offer the possibility to store renewable energy when there is a surplus at low peak hours (i.e., at daytime the generation of electricity exceeds the demand) and to discharge them at high peak hours in the evening. It's a reserve to fall back on and it allows to balance supply and demand more efficiently.

To transform its business, GPI encounters high transformation costs. The costs as presented in *figure 15* are totals of a phase. To know the costs per year, the values should be divided by five (for periods 2020 and 2025) and by ten (for periods 2030, 2040, 2050). The transformation asks for investments in a more differentiated use of energy resources and investments in innovations. The Centralized department invests in the construction of a nuclear plant. The Decentralized department focuses on the one hand on increasing its own renewable production capacity with extra solar panels and windmills to live by the rule of minimal production as set by the regulators. On the other hand, it contributes to the renewable partnerships because those partnerships benefit from scale effects. In return, GPI receives a lower wholesale price compared to the wholesale price as set by the Third-Party Utilities. Finally, GPI also bears the costs for the storage center.

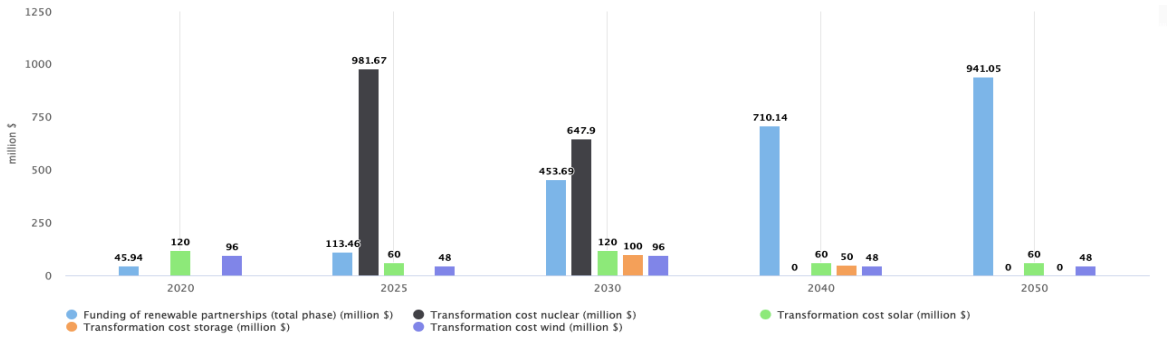


Figure 15: Transformation costs of the Transformed Business

Financing this transition solely with own resources would be very hard. So, we count on broad public support in the form external capital injections by the government and private investors. We tried to find a balance between the financial support of the government, financial support from private investors and GPI's own resources (*figure 16*). Again, the numbers presented are phase totals.

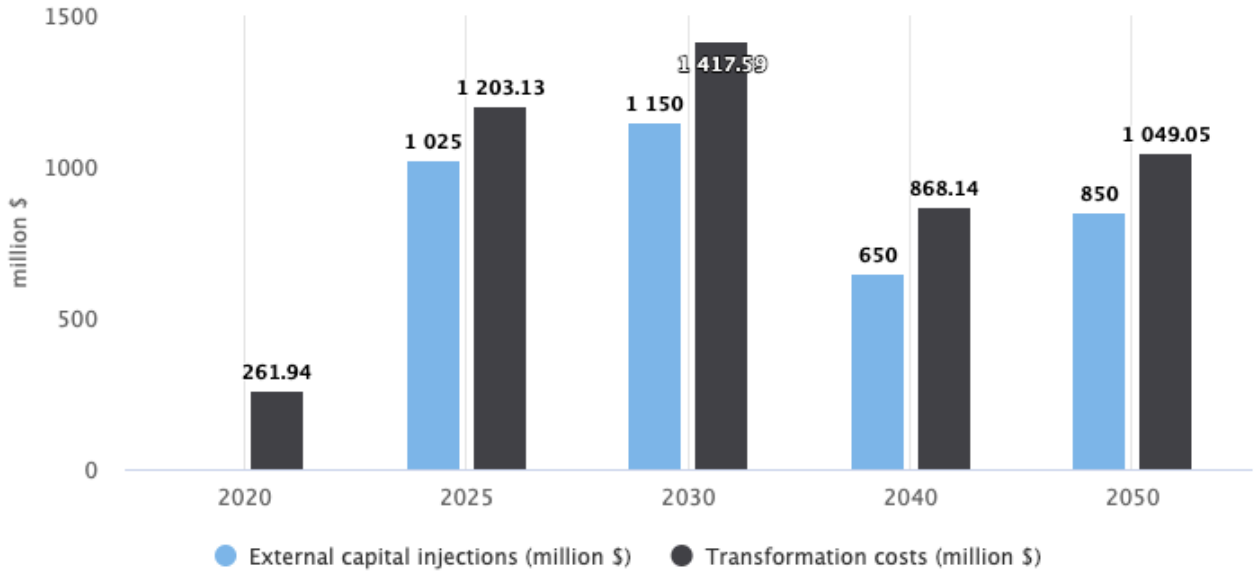


Figure 16: Financial support for the transformation costs

For subsidies of government was no pay back assumed, free money so to speak. To deal with the cost aspect of the crowdfunding, GPI offers a discount on the electricity bill of people who invested in the company.

ii. Power Generation Portfolio

The power generation portfolio of the Tr. Bus. scenario (*figure 17*) indicates the declining use of fossil fuels in the electricity production for electricity consumers. The use of coal and natural gas is reduced to zero by 2050. After investments in the construction of a nuclear plant, GPI is able to deliver nuclear energy by 2030. In 2050, the nuclear power plant has an important part in the mix of energy resources as GPI transitions to a clean energy future, producing zero carbon emissions electricity. The production capacity of renewables will also be gradually expanded via investments in own generation technologies and will be complemented with purchases from the Renewable Partnerships wherein they invest.

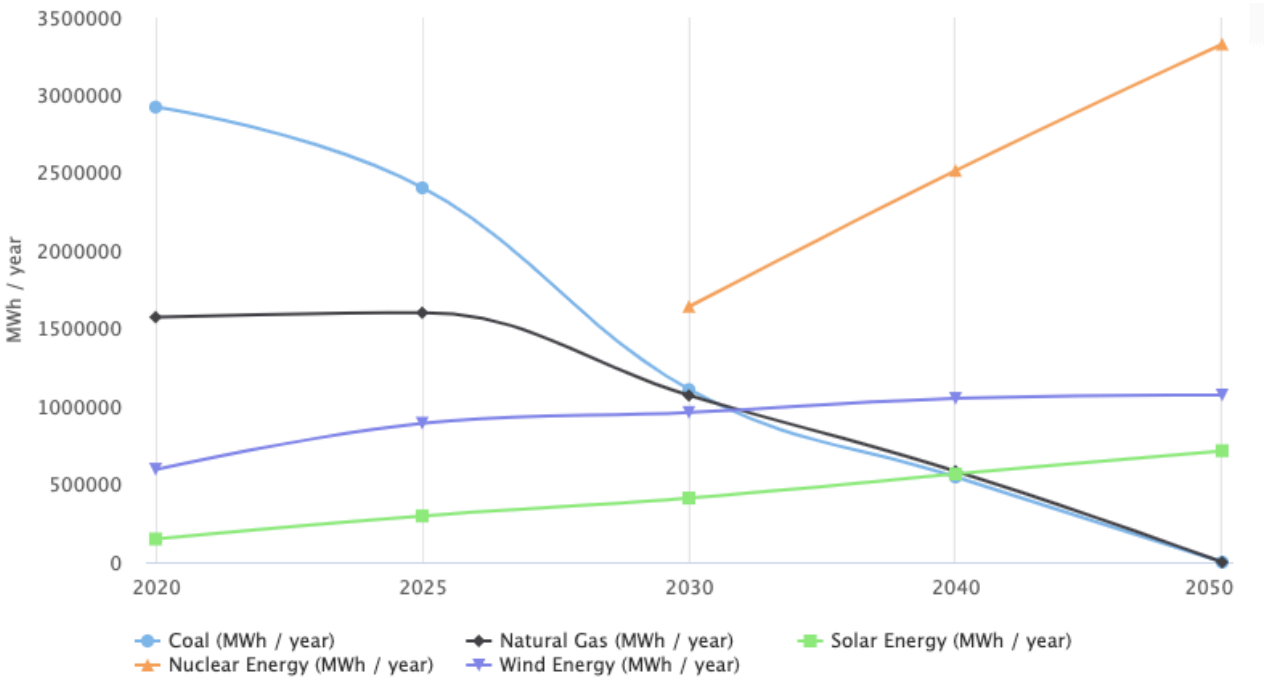


Figure 17: Power Generation Portfolio of the Transformed Business

iii. Modelling in VMP

The Tr. Bus. scenario will also be elaborated using the CBMP-method (as mentioned in chapter 5*)* to plan the desired transformation and therewith improving business and customer value. GPI will introduce structural changes to its business models when evolving towards its fossil-free energy production goal.

For a fair comparison of the performances over several periods, both scenarios should have a similar starting position. Therefore, the business modelling (i.e., the ecosystem and other diagrams) of the Tr. Bus. scenario in phase 2020 (As-Is Phase) will be the similar to the one from the BAU as presented in *Scenario A: Business As Usual*. Therefore, we will mainly focus on the modelling of the Tr. Bus. scenario towards the end phase 2050. It will reveal which main transformations GPI will go through and how the new business model should look like in the end.

Figure 18 represents how the **business ecosystem** of the Transformed Business evolved from 2020 to 2050.

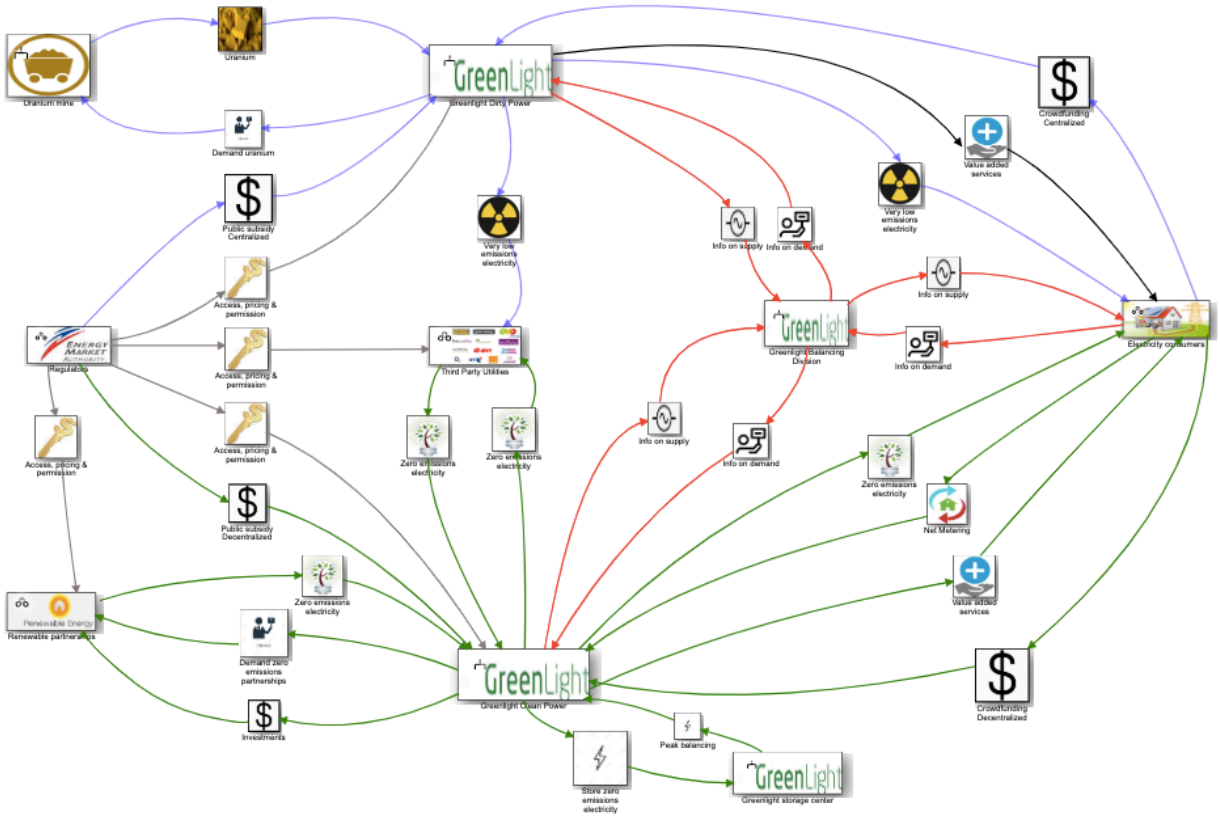
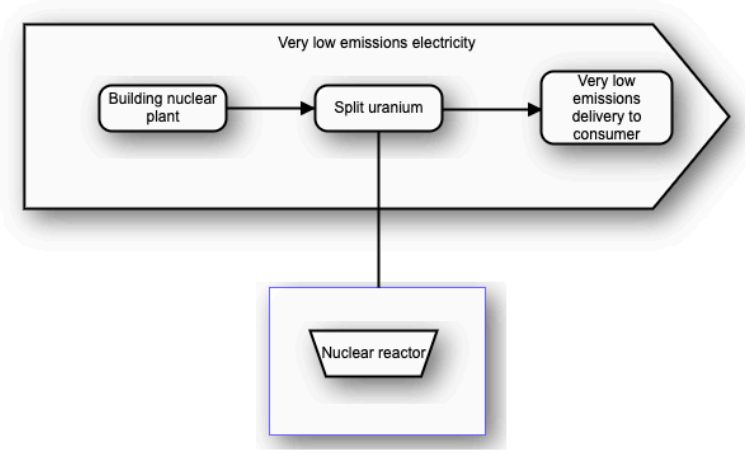


Figure 18: Business Ecosystem Map – Transformed Business (2050)

The three departments (Greenlight Dirty Power, Greenlight Clean Power and Greenlight Balancing) are still present. Greenlight Dirty Power, at the top of the ecosystem, replaced its high polluting generators on coal and natural gas by a nuclear reactor. A supplier of uranium substituted the suppliers of coal and natural gas. The nuclear based electricity is sold to Consumers and Third-Party Utilities. The investments in nuclear are too high for Third-Party Utilities who operate on a municipal or village level, so there will be a one-way electricity transfer from GPI to them. Greenlight Clean Power, at the bottom, is able to charge the storage center in low peak hours and to discharge when the production level is insufficient.

Figures 19 and 20 are VMPs' graphical representations of the most speaking **value streams** of this scenario. The others resemble to the ones of the BAU. *Figure 19* indicates the particular activities Greenlight Dirty Power need to perform to deliver nuclear energy to the market.
Figure 20 illustrates the process of charging the storage center.



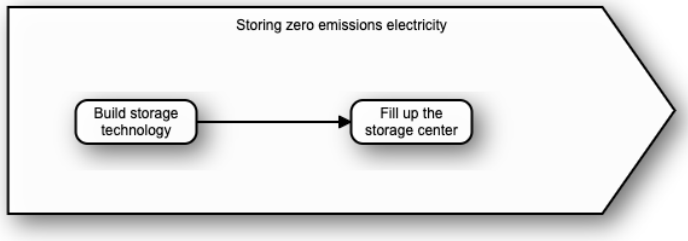
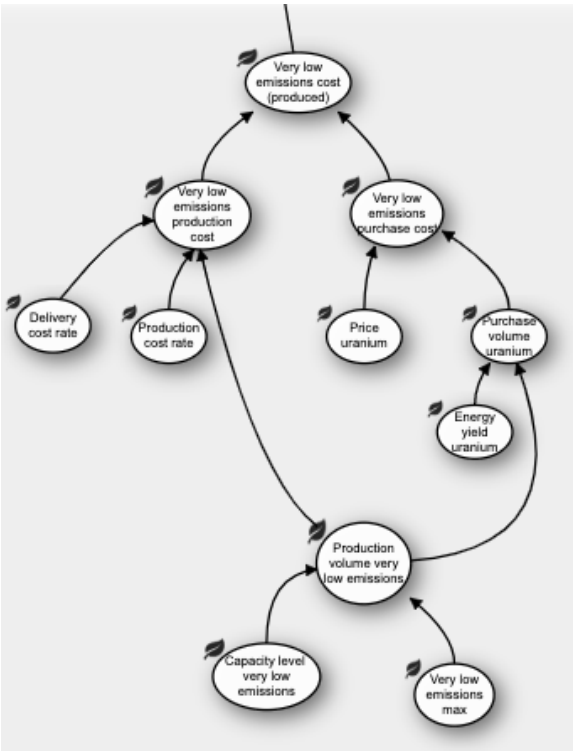


Figure 19: Nuclear energy to the market

Figure 20: Store renewable energy

To visualize the cause-effect of different key values, like cost price, VMP offers a **strategy map** where this can be drawn easily with arrow flows. As illustration, the production cost of the new energy resource, nuclear energy, is examined (*figure 21*).

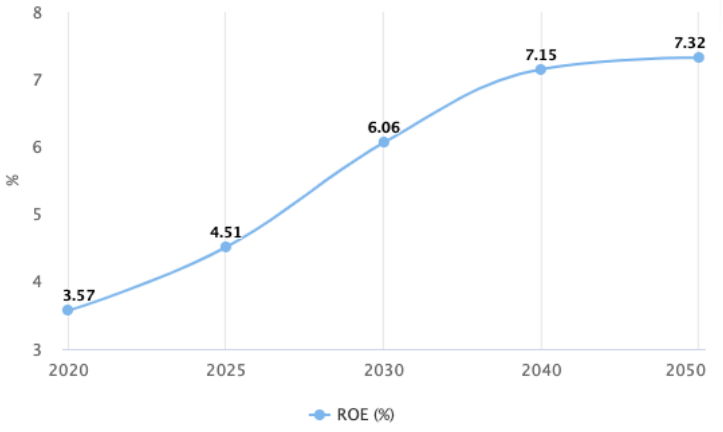


The production volume (MWh/year) of very low emissions electricity (i.e., this name was used in the modeling process for nuclear energy, as contrast to the zero emissions electricity that already existed) is defined as the minimum of the available capacity (MWh/year) and regulator constraint, a maximum (MWh/year). If the emissions maximum is higher than the full capacity, the plant will produce on full capacity. Otherwise, GPI obeys the constraint and produces the maximum allowable norm, which can be lower than its full capacity level. The very low emissions cost (million $/year) is the sum of a production and a purchase cost. Both sub costs are influenced by the real production volume. The production cost includes a cost rate for the production and delivery. The purchase cost is the price paid for the processed uranium.

Figure 21: Production cost of nuclear energy

iv. Expected outcome

By making use of the interactive **Dashboards**, the estimated performance for the context-based metrics in the Transformed Business is presented below (figures 22 and 23).



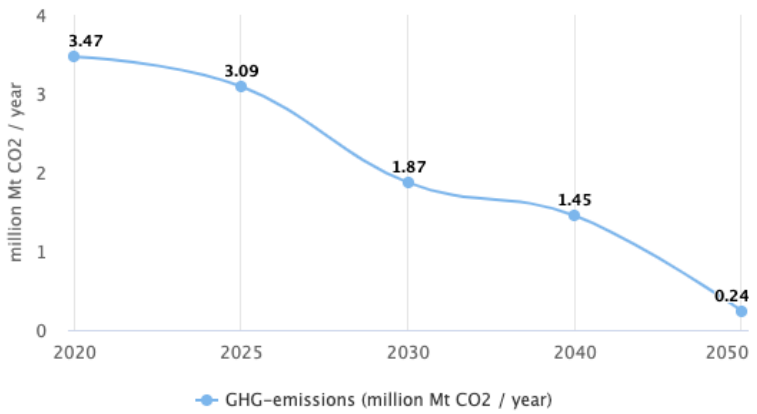


Figure 22: Impact on the Financial Performance

Figure 23: Impact on the Climate System

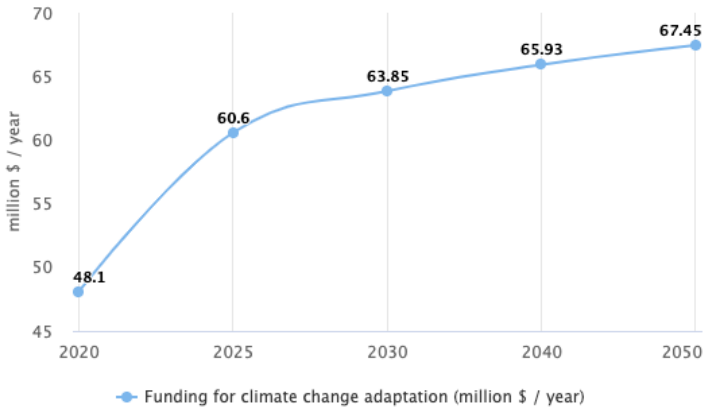


Figure 24: Impact on the Climate Change Adaptation

The absolute numbers indicate that the Tr. Bus. scenario will focus on the social and environmental impact. By 2050, it reduces its greenhouse gas emissions to nearly zero and the funding for climate change adaptation is going up each phase. Their financial performance stays below the *sustainability norm* (more details in the next part), however it is still a profitable scenario. The positive impact of the Transformed Business scenario is already visible.

However, we do recognize that the values for the 2020 phase of the Tr. Bus. scenario differ from the values of the 2020 phase in the BAU scenario. Both scenarios are modelled in five phases, however the values/propositions used are defined per year. The numbers displayed on the graphs are thus an aggregation of multiple years of the phase. For example, the values of phase 2020 are aggregated from the years until 2024.
We stated that the business modelling of the Tr. Bus. scenario in phase 2020 (As-Is Phase) will be the similar to the one from the BAU scenario, however in the 2020 phase differences between both scenarios already occur due to internal strategic decisions for the years 2021-2024 (i.e., that are not explicitly reflected in the business modelling process) based on their priorities. *Table 9* presents the mutual differences in priorities set by both scenarios. In the years following 2020, Tr. Bus. funds consistently a higher percentage, explaining why the funding in phase 2020 is higher in the Tr. Bus. A higher transformation cost in the Tr. Bus. negatively impacts the ROE in phase 2020. In the BAU scenario, more electricity is produced by burning coal and natural gas, indicating why the emissions are higher for the phase 2020 in the BAU scenario.

Values	2020	
	Base / Transformed business	Base / Business as usual
Climate Change Adaptation		
Revenue contribution for funding climate change adaptation (%)	7.50	5.00
Climate System		
production volume high emissions [Burn coal] (MWh / year)	2500000.00	3500000.00
production volume low emissions [Burn natural gas] (MWh / year)	2000000.00	2625000.00
Production volume wind (MWh / year)	600000.00	500000.00
Financial Performance		
Transformation cost wind (million $)	96.00	16.00

Table 9: Difference in priorities in 2020

v. Performance reports

As in scenario A, a **performance report** for each AOI was developed to discover if the estimated performance will be sustainable relative to their "fair shares" (see chapter 5). *Table 10* is the performance report of the AOI Climate System, the others can be found in the attachment 7.7.

Scenario B: Transformed Business - AOI: Climate System: Greenhouse Gas Emissions

Emissions-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm ($MtCO_2$/year)	0.00005	0.00005	0.00005	0.00005	0.00005
Trajectory Targets ($MtCO_2$/year)	3.29	2.37	1.60	0.69	0.21
Measured Impacts ($MtCO_2$/year)	3.47	3.09	1.87	1.45	0.24
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	69,400	61,800	37,400	29,000	4,800
Sustainability Performance (TTs)	1.05	1.30	1.17	2.10	1.14
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	-1	-2	+1	-1	+1

***Context-Based Scoring Convention**: Scores of ≤1.0 are sustainable; scores of >1.0 are unsustainable.

Table 10: Performance report of the AOI Climate System

The standards for climate system are taken from the climate science; so, they are science-based and if achieved by all will have the effect of mitigating global warming. The sustainability norm of 0.00005 recognizes that humans actually exhale CO2 when they breathe. Thus, as long as a company has employees who are breathing, it is emitting at least some CO2. The trajectory targets are calculated with the Context-Based Carbon metric[4,5] (see attachment 7.8) of the Center for Sustainable Operations and we used the SSP1-1.9 scenario (World)[6].

The first step for any phase is to see if the SN has been achieved. This can be quickly ascertained by looking at the value in the “Sustainability Performance (SNs)” row. If so, nothing else matters and the score assigned is a +3. But as you can see for the Climate System AOI, the SN exceeds 1.0 each time.
If the SN has not been achieved, the next step is to look at the "Sustainability Performance (TTs)” value to see if the TT has at least been achieved. Here it is important to understand that even if the context-based score has increased in a phase, if it still meets or exceeds the TT (< 1), it counts as a +2 (which does not happen in this case).
If neither the SN nor the TT has been achieved, then the scoring possibilities of +1 to -3 come into play. The definitions in *table* 7 enable it to make an appropriate decision.

After completion of a performance report for each AOI, it will once again be possible to adequately assess the performance in a triple bottom line and context-based way.

vi. Scorecard Implementation

Finally, we implement the information from the performance reports in the MCS. Again, for each phase of the scenario, a MCS was developed (i.e., five per scenario). We discuss the MCS of the end period 2050 (*Table 11*), the others can be found in the attachment 7.9.

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4 Downloadable at https://www.sustainableorganizations.org/downloadable-context-based-metrics/

5 A full summary of the Context-Based Carbon metric can be found at https://www.sustainableorganizations.org/Carbon-Metric-FAQs.pdf.

6 The data for which can be found at: https://tntcat.iiasa.ac.at/SspDb/dsd?Action=htmlpage&page=50

MultiCapital Scorecard for Greenlight Power - 2050

Scenario B - Transformed Business

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		3	3,25	9,75	9,75	0,00	100,0%	100%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		1	3,00	3,00	9,00	6,00	33%	33%	68%
Economic	Financial Performance	Return on Equity		2	2,75	5,50	8,25	2,75	67%	67%	
			SUMMARY TOTALS			18,3	27,0	9			
			Total Weighting Points		9,00						

Table 11: MCS of the Transformed Business in 2050

The three bottom lines are listed with their corresponding AOI and context-based metric. In column A, the progression score of phase 2050 is filled in for each AOI as extracted from the corresponding performance reports. The weights in column B reflect the discretionary thinking of organizations on the relative importance of each AOI. The division of weights involves thus subjectivity on the part of the reporting organization. GPI will apply a different weighting system in both scenarios, proving the importance of treating weights like a variable. In the Transformed Business, the weights are more equally divided. The Climate Change Adaptation AOI receives the highest weight because GPI recognizes the damage that has been done through years of use of fossil fuels and they are even aware that the negative effects will continue to exist for many years. The GHG-emissions is their second interest, as they want to further minimize their emissions to avoid even more damage to the environment!

The columns next to B are calculated following the formulas between brackets in the headline of the MCS. We end up with an overall triple bottom line performance score of 68% (= 18,3 / 27, rounded) for the organization as a whole. The evolution over the different phases and the comparison with the other scenario is discussed in *D. Comparison of both scenarios* with an illustrative graph.

D. Comparison of both scenarios

i. Overall sustainability scores

The triple bottom line performance summary over the five phases (*figure 25*) reveals a substantial difference between both scenarios. The Tr. Bus. scenario shows significant progressions over the periods, albeit a setback in 2040. This setback is due to the rate of decline in emissions that continues to rise, but at a much slower pace than their decreasing "fair shares" related to emissions. Thus, the combination of (1) lower entitlements to emit and (2) a slower rate of reduced emissions has the effect of worsening GPI's scores from 2031 - 2040. The jump in score from 2030 to 2040 appears to be large, but that is only because it occurs over a 10-year period whereas the preceding jumps occur over a 5-year period.

The BAU scenario suffers a constant decrease of its overall bottom line performance, leading to a significant difference of the triple bottom line performance between both scenarios in 2050.

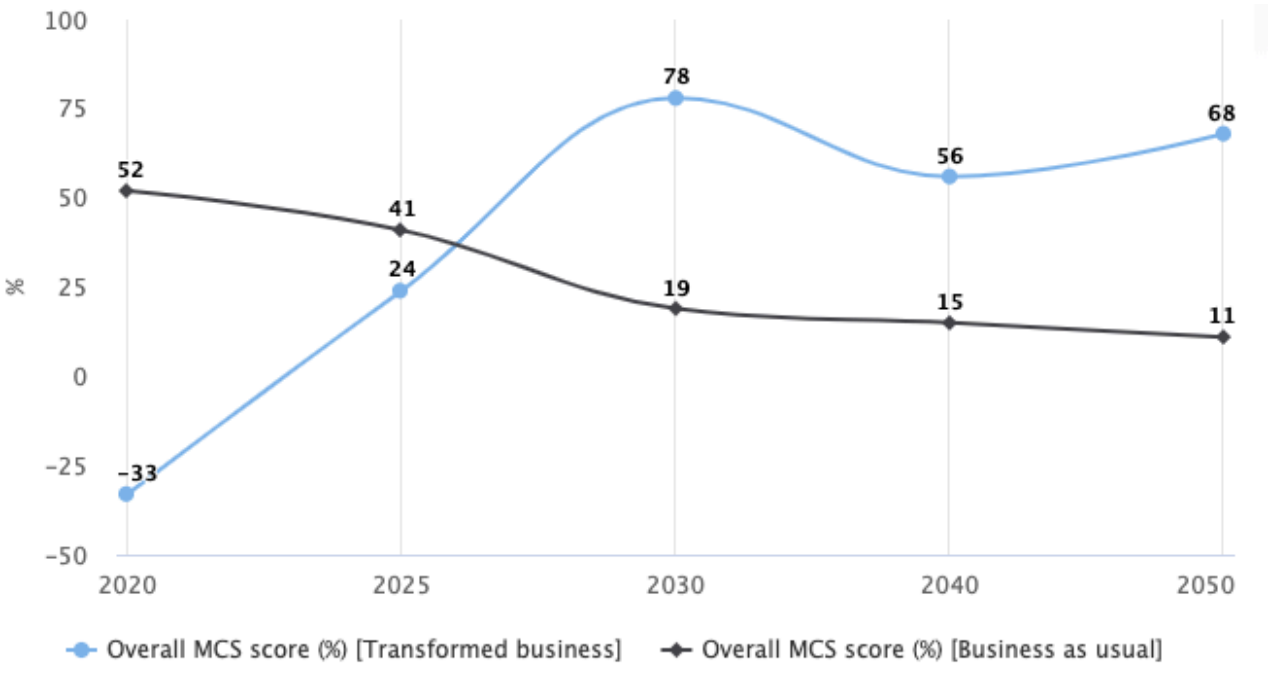

Figure 25: Triple bottom line performance summary

The distribution of weights has remained unchanged for all phases. As we decided to link the division of weights to a particular scenario. The different division of weights underlines the priorities

of each scenario. Each scenario sets its own long-term strategic goal, and the weights are divided accordingly for each phase.

The perfect score of 100% would mean that a company meets the sustainability level for each AOI. Regardless of not attaining a perfect score, the Tr. Bus. scenario managed to fund climate change adaptation at a sustainable level, reduce GPI's emissions and still be a profitable company. The transformation process is a necessary process with positive outcomes. However, it is not something temporarily. It is an ongoing process and it does not become easier towards the future as norms become stricter.

ii. Moral of the story

First of all, the Tr. Bus. scenario outperforms the BAU scenario in the environmental and social criteria. On top of that, both scenarios are still profitable. However, the Tr. Bus. scenario carries high transformation costs. So why would managers choose for this scenario if their company itself does not benefit equivalent to the costs they bear? We come down to the essence Triple Bottom Line Performance. Is the company willing to offer profit to contribute to the wellbeing of society and environment? This mindset will take time to develop among businesses. The combination of managers who stimulate transformation from inside-out and a supporting government that rewards transforming businesses and penalizes the companies who infringe the rules, will accelerate this process. A multi-dimensional vision on performance of companies, will first be a competitive advantage to persuade clients before it becomes norm among companies.
Further, the changing expectations of electricity consumers could also be a driver to opt for the Tr. Bus. Scenario. If consumers expect more green electricity, they may give preference to a provider that transformed his business.

8. CONCLUSION

A. VMP-MCS methodology

The actual integration of the VMP and MCS, can be described as a stepwise process which consists of six steps, namely (1) Context , (2) Business modeling , (3) Performance reports, (4) Multicapital Scorecards, (5) Triple Bottom Line performance summary and (6) Cycle back to business modeling. *Figure 26* depicts these six steps in a diagram.

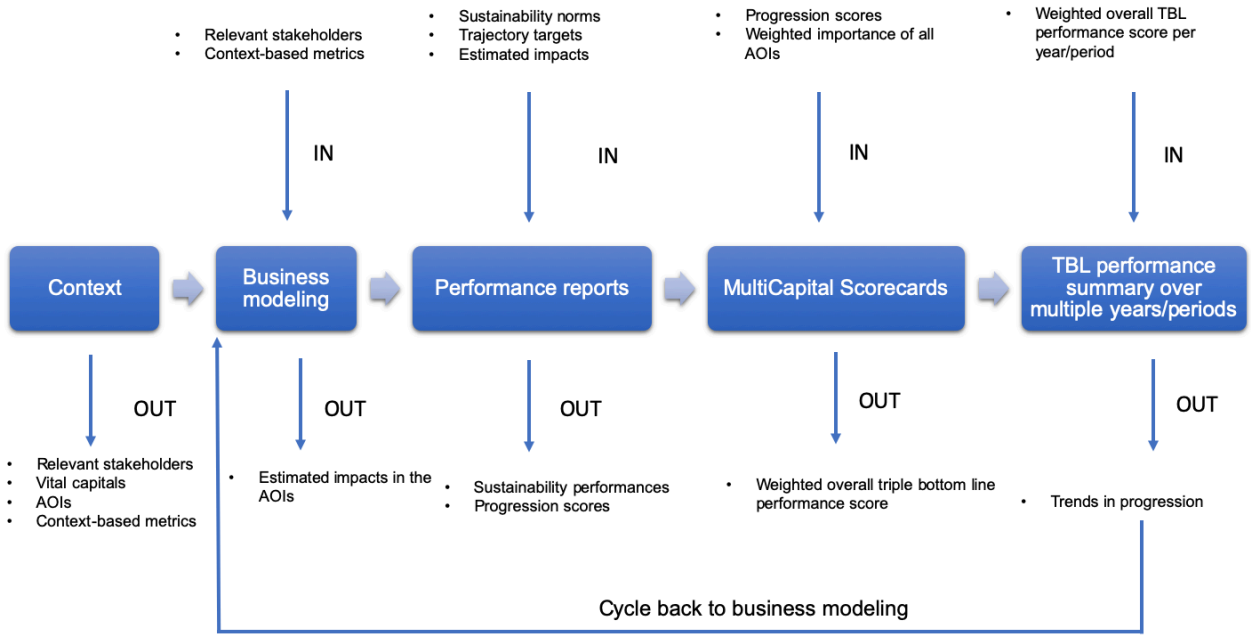

Figure 26: Integration of VMP and MCS

Step 1: Context

For each bottom line of performance (i.e., social, environmental, economic), the *relevant stakeholders* should be identified. The organization's stakeholders are defined by Thomas and McElroy as "anyone to whom the organization owes a duty or obligation to manage its impacts on *vital capitals* in ways that can affect their well-being" (Thomas et al, 2016). Recognizing them is how the *Areas of Impact* can be identified. These AOIs should be organization-specific and determined by their managers themselves. Each AOI can be measured by means of a meaningful *context-based metric*.

Step 2: Business modeling

The information from step 1 (i.e., stakeholders & context-based metrics) can be used explicitly in VMP (i.e., stakeholders can be modelled in a business ecosystem map) when an organization wants to model a certain strategy, strategic initiative or transformation in new, prospective business models. In this business modeling process, VMP applies the CBMP-method, as introduced in chapter 5. An in-depth explanation of this method can be found in the literature (Poels et al, 2018; Poels et al, 2019).

The *estimated impacts in the AOIs* of the new business model are generated after the Prototype phase, using the predetermined context-based metrics, for multiple years or periods. The measured impacts are exported to the performance reports in step 3.

Step 3: Performance Reports

There is a performance report developed for each AOI over multiple years/periods. First, the sustainability norms and trajectory norms are defined. A *sustainability norm* is an organization's benchmark for sustainable performance for an individual AOI. A *trajectory target* is an attainable interim milestone towards the achievement of the sustainability norm.

Once an organization has determined what its proportionate share of available resources is (i.e., the sustainability norm or trajectory target) and also knows what its estimated impacts will be (i.e., measured impacts of step 2 above), it can calculate its sustainability performance by dividing the former by the latter. Two context-based scores for the *sustainability performance* are the result per year/period, one with the norm the other with the trajectory target in the denominator. The context-based scoring convention states that for societal quotients, scores ≥ 1.0 are sustainable, < 1.0 are unsustainable. For environmental quotients, scores ≤ 1.0 are sustainable, > 1.0 are unsustainable. Finally, each year/period should receive *a progression score*. The first step for any year/period is to see if the SN has been achieved. This can be ascertained by looking at the sustainability performance, with the sustainability norm as denominator. If so, nothing else matters and the score assigned is a +3. If the SN has not been achieved, the next step is to look at the sustainability performance, with the trajectory target as denominator, to see if the TT has at least been achieved. If so, the score +2 is assigned. It is important to understand that even if the context-based score has declined in a year/period, if it still meets or exceeds the TT, it counts as a +2. If neither the SN nor the TT has been achieved, then the scoring possibilities of +1 to -3 come into play. The definitions in *table 7* enable it to make an appropriate decision.

Step 4: Multicapital Scorecards

A MCS for each year/period is developed. It sources information from step 1. The bottom-line dimensions of performance, AOIs and their context-based metrics are lined up. Next, the progression scores (found in step 3) for each AOI are integrated. *Weights* are attached to the AOIs and reflect the organization's view of the importance of each. It enables to communicate the importance easily to all stakeholders.

The basis of the weight division stems from the fact that the weighting scale 1 (lowest) to 5 (highest) is used in the MCS. Since the first step in weighting is to set a total budget of available points, we first calculate what a medium weight for any AOI would be on this scale. That would be a 3. Multiplying the medium weight with the amount of AOIs selected in step 1, gives the total budget for weighting.

The output of the MCS is an *overall triple bottom line performance score* for the organization as a whole, calculated as the weighted score total of the entire portfolio (column C) divided by fully sustainable score total of it (column D).

Step 5: Triple bottom line Performance summary

An overall triple bottom line performance score can be calculated for each year/period. These scores can be manually entered in VMP to compile a graph showing the evolution of the overall triple bottom line performance scores in the future. It allows to discover *trends in progression* and to assess in a context-based and triple bottom line way the strategy, strategic initiative or transformation in new, prospective models (as modeled in step 2) before it is put into effect.

Step 6: Cycle back to business modeling.

This meaningful triple bottom assessment serves as a decision support in the business modeling process. As the future impact is estimated, this information can be used to make adjustments to the current business modeling or to develop new, alternative scenarios.

In the attachment 8.1, empty templates are included.

B. Research objective

Conventional performance measurement tools are ill-equipped to deal holistically with the multi-dimensional nature of performance (social, economic and environmental) and do not support the strategic decision-making in the business planning and modeling process. The development of a case-study on the transformation to sustainable energy production shows how modelers can connect TBL performance measurement to business modelling. The integration of the MCS with VMP can be used to plan and model strategic initiatives or transformations and assess the estimated performance of organizations operating under prospective business models, all in a context-based and triple bottom line way. Further, the strategic initiative or transformation can be defined and modeled in a consistent way by backcasting from a desirable future state, including all the intermediate steps to get there, instead of forecasting by just extrapolating from current practice.

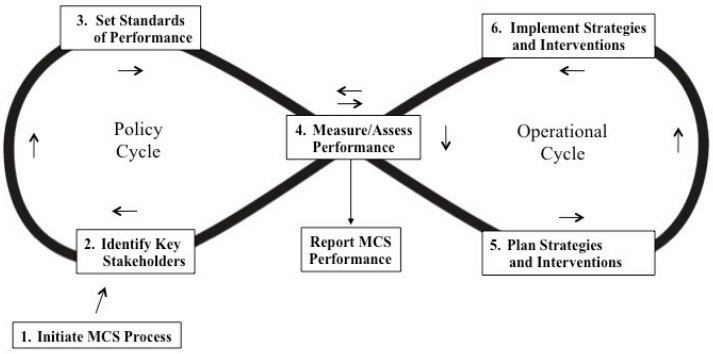

Figure 27: Double loop learning cycles (Source: McElroy and Van Engelen (*Corporate Sustainability Management*, Routledge, 2012)

Figure 27 could be seen as the graphical illustration of the integration of the MCS and VMP. It is an interplay between multicapital performance measurement and business model innovation, leading to a new, sustainable way of business transformation. The *operational cycle* falls to the responsibility of VMP, wherein strategies and initiatives are planned, modelled and measured accordingly. In the *policy cycle*, the estimated performance can be assessed in a context-based and triple bottom line way. In this process, values, weightings and priorities matter when it comes

to judging different aspects of performance. Weightings of impacts is an important variable in performance measurement and planning; not all areas of impact or performance norms have the same levels of importance, and such variations need to be explicitly addressed in a performance measurement system. Varying the weights of impacts in our models makes a difference in performance outcomes and the MCS in combination with VMP provides us with a structured, formal way of discovering and exploring such changes long before we put them into effect.

C. *Shortcomings / Recommendations for further research*

A case-study keeps your project focused and manageable when you don't have the time or resources to do large-scale research. So, a limited amount of technologies and rules was researched; in future research, it can be worthwhile to investigate new and more renewable technologies or government regulations. For example, a molten salt reactor to replace conventional nuclear reactors, carbon dioxide removal technologies or a regulation on carbon tax credits. Further, the production of electricity was simplified to a supply-based model in which certain production volumes at constant full capacity were assumed. In the BAU scenario, this led to a constant level of emissions, which is not a faithful representation of business decisions in the real world. The effort to develop a more variable projection of emissions, based on the level of demand, could value to the case.

The data for this fact-based simulation case was sourced from public available data of two existing companies and further supplemented with the latest data from the U.S Energy Information Administration. Simplifications and assumptions were made when developing GPI. In the future it can be interesting to apply the VMP-MCS methodology in an existing company using the available data of that particular business. Simultaneously, it can be interesting to explore the possibilities to combine both tools in one integrated tool. As VMP and MCS are separate tools, the integration of both is at this stage quite rudimentary. A lot of manual work is required to complete the different sheets as explained in the beginning of this chapter.
Finally, including more AOIs per bottom line and having science-based standards for each AOI (for example climate change adaptation) is something that would be worthy of further research in the future.

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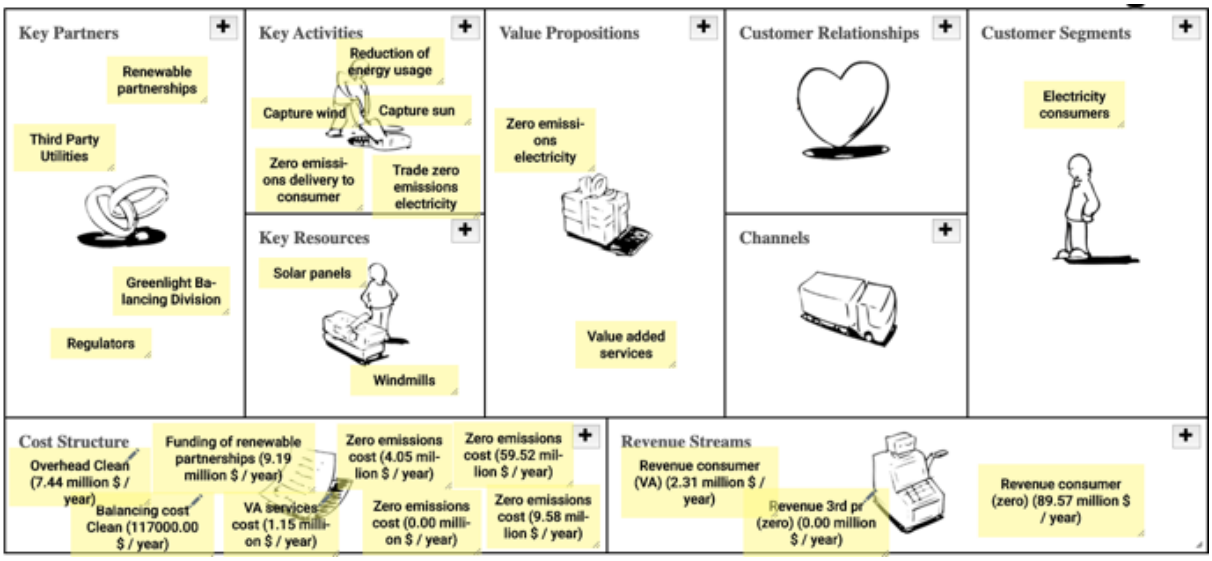
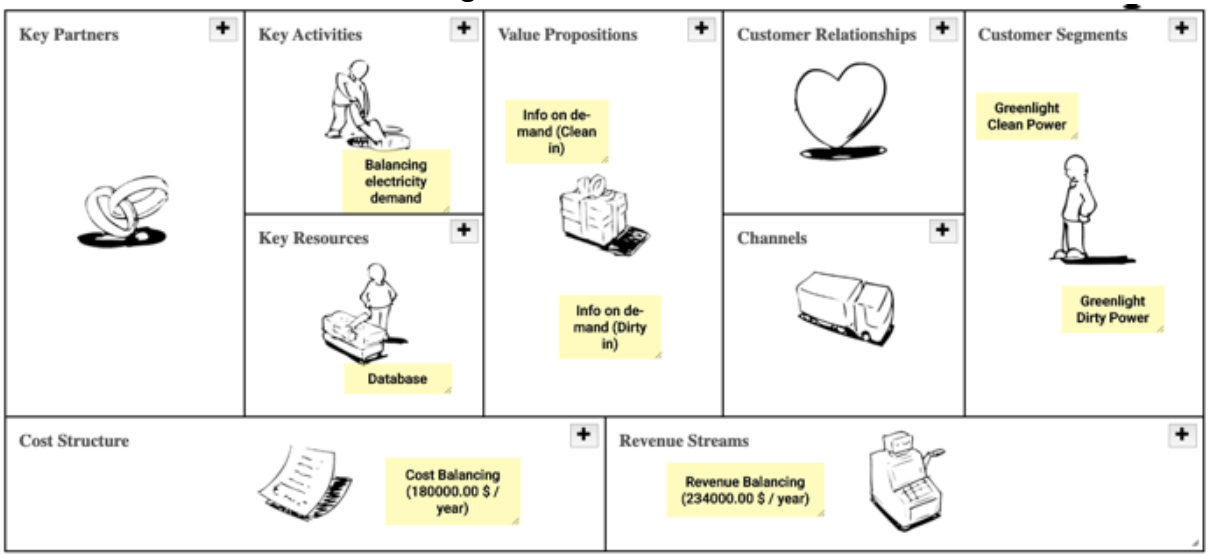
10. ATTACHEMENTS

7.1 Business As Usual: BMC

Business Model Canvas of the Centralized Production

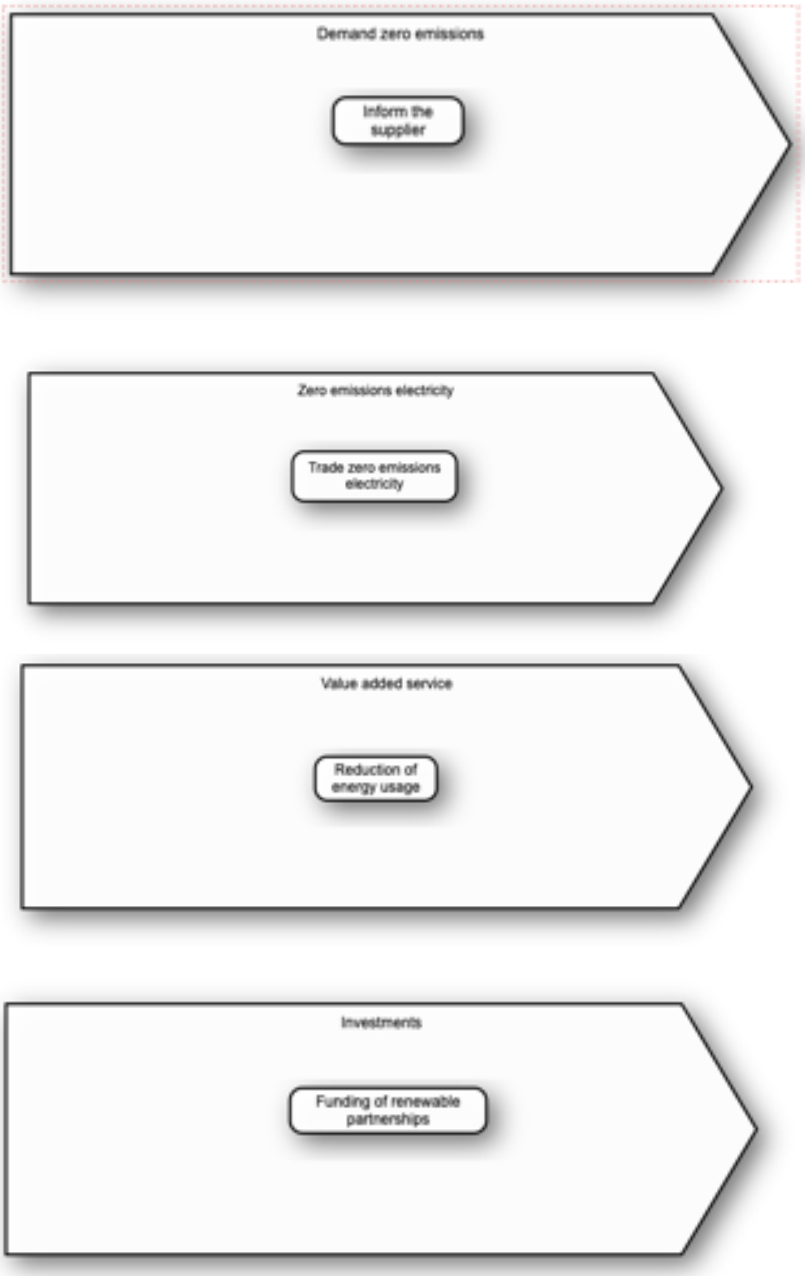


Business Model Canvas of Balancing

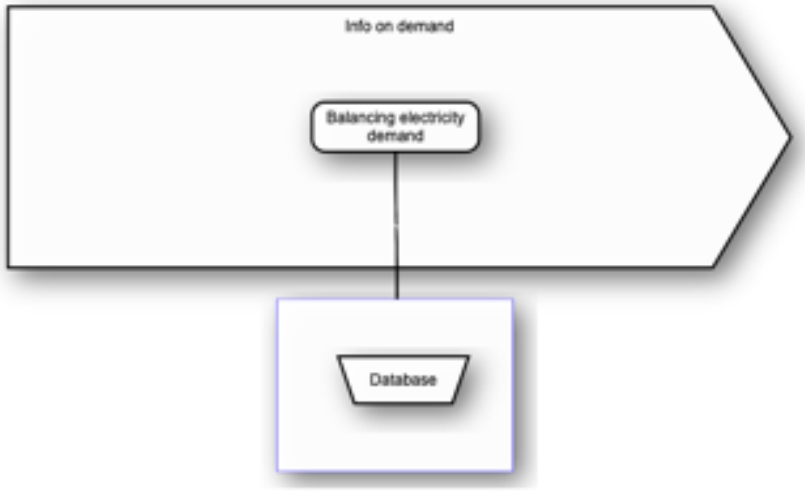


7.2 Business As Usual: Value Streams

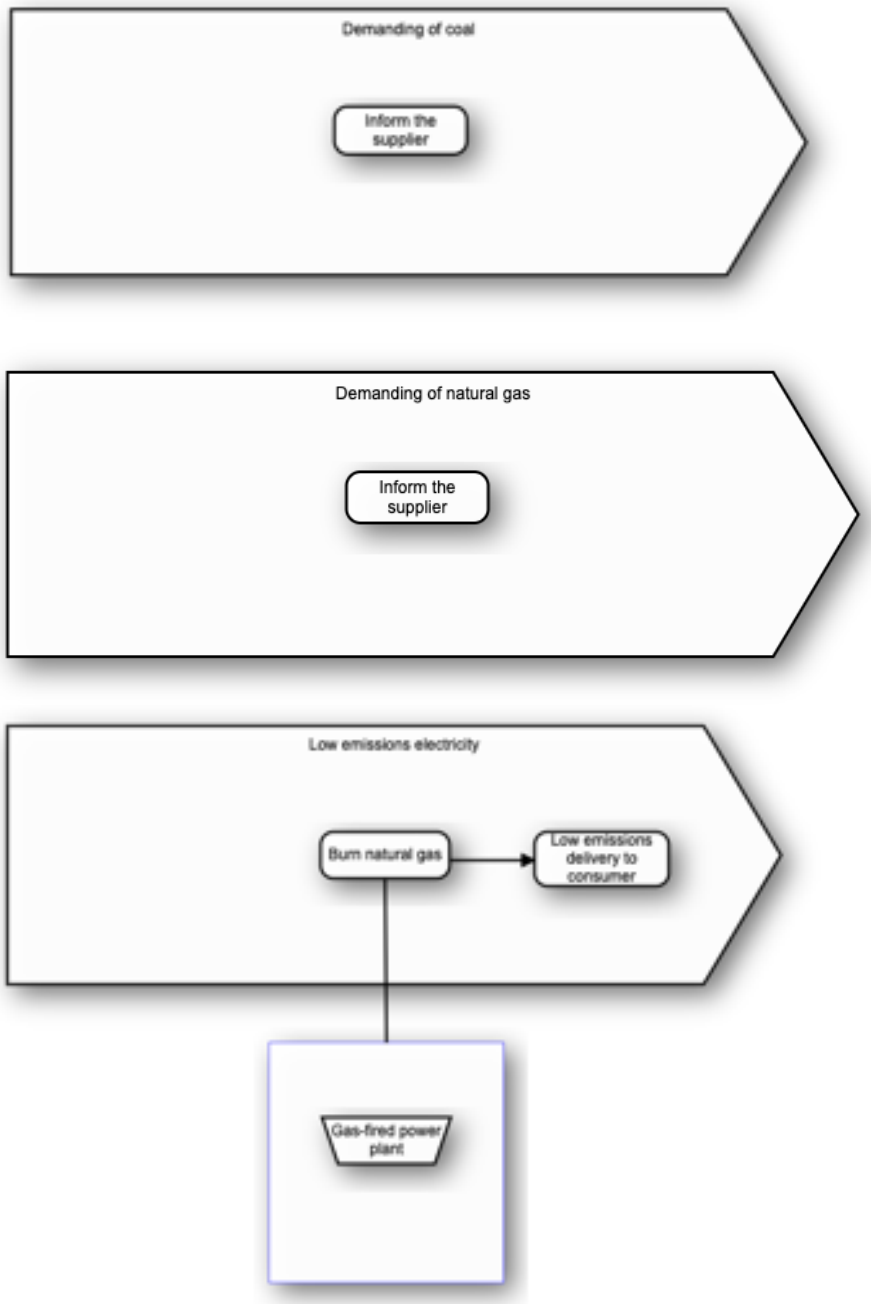
Greenlight Clean Power

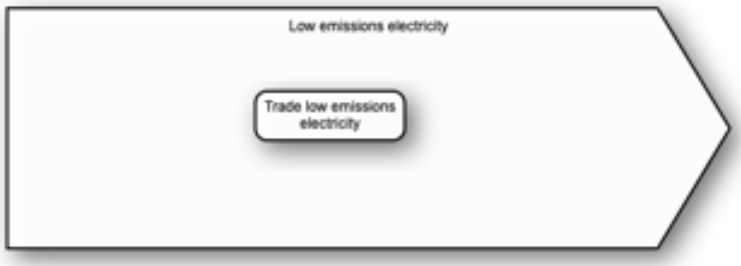


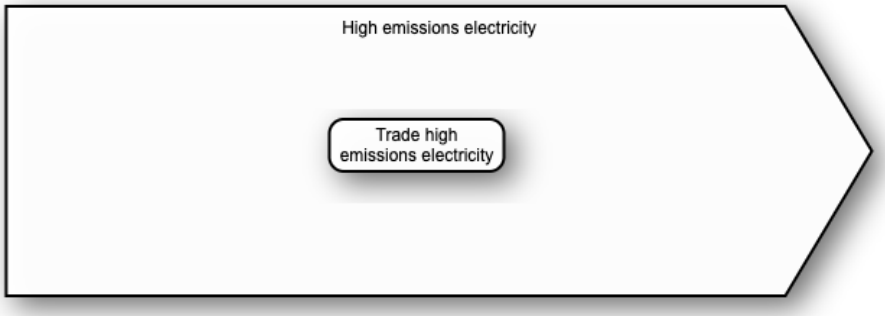
Greenlight Balancing

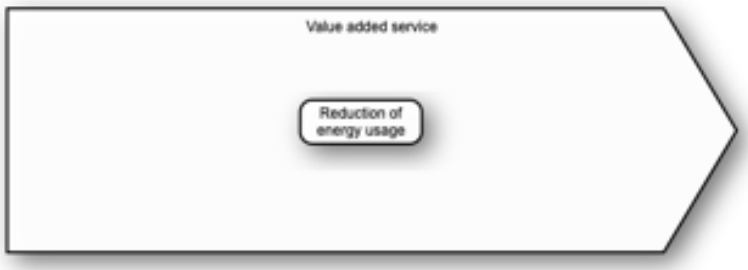


Greenlight Dirty Power



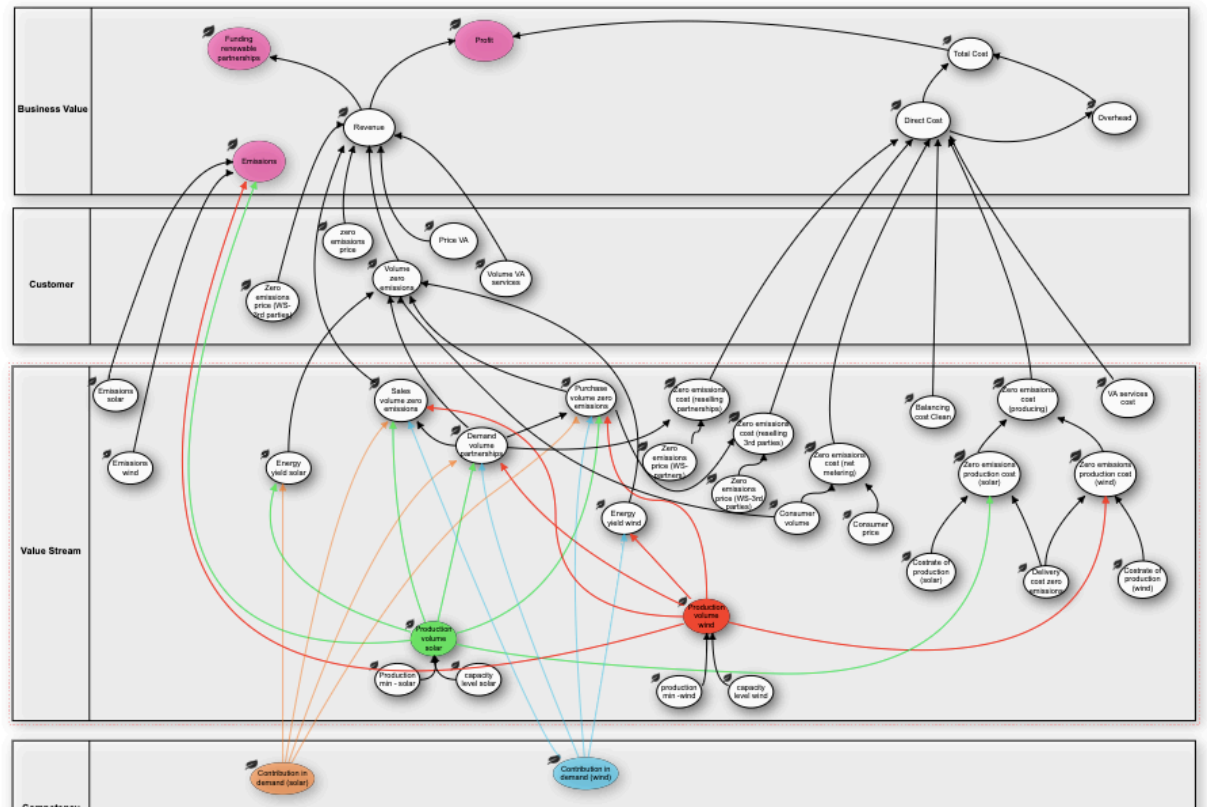

Low emissions electricity
Trade low emissions electricity


High emissions electricity
Trade high emissions electricity

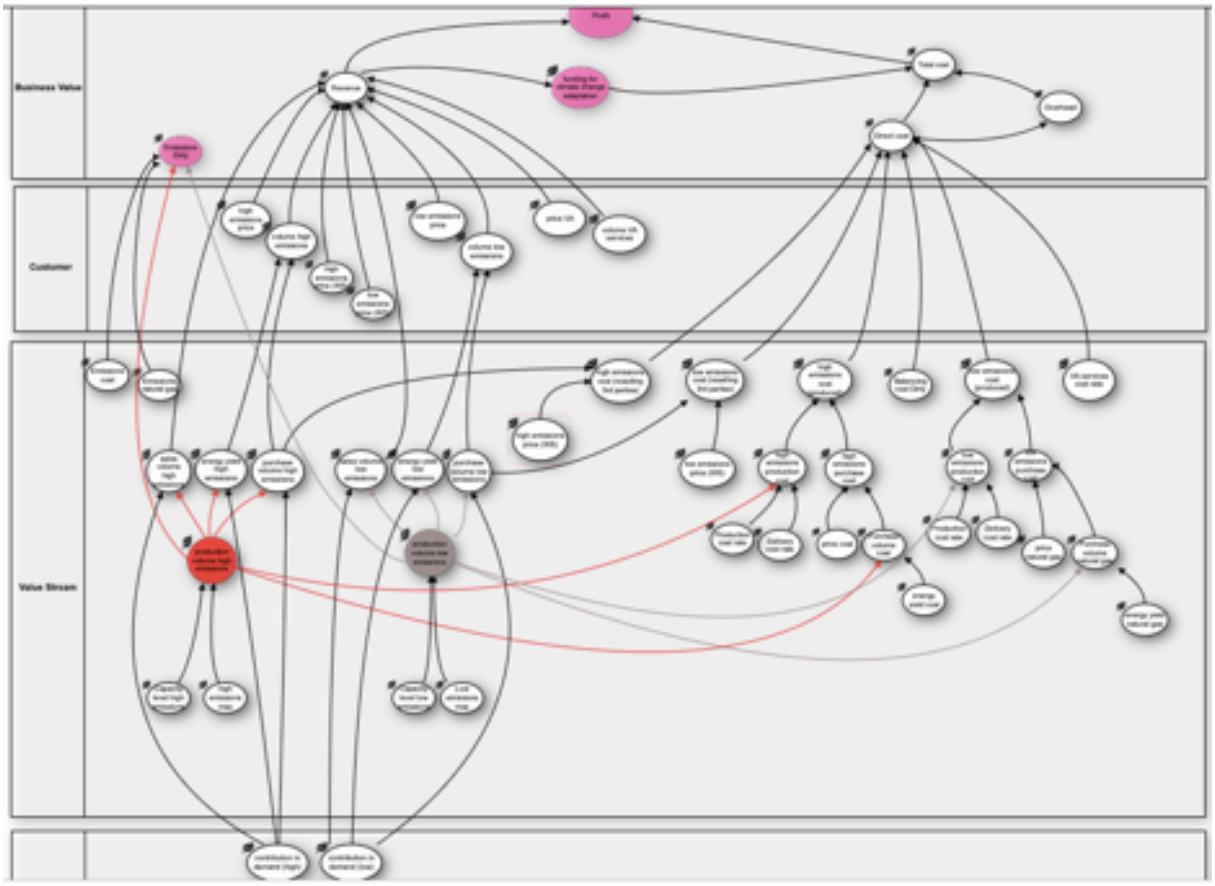

Value added service
Reduction of energy usage

7.3 Business As Usual: Strategy Maps

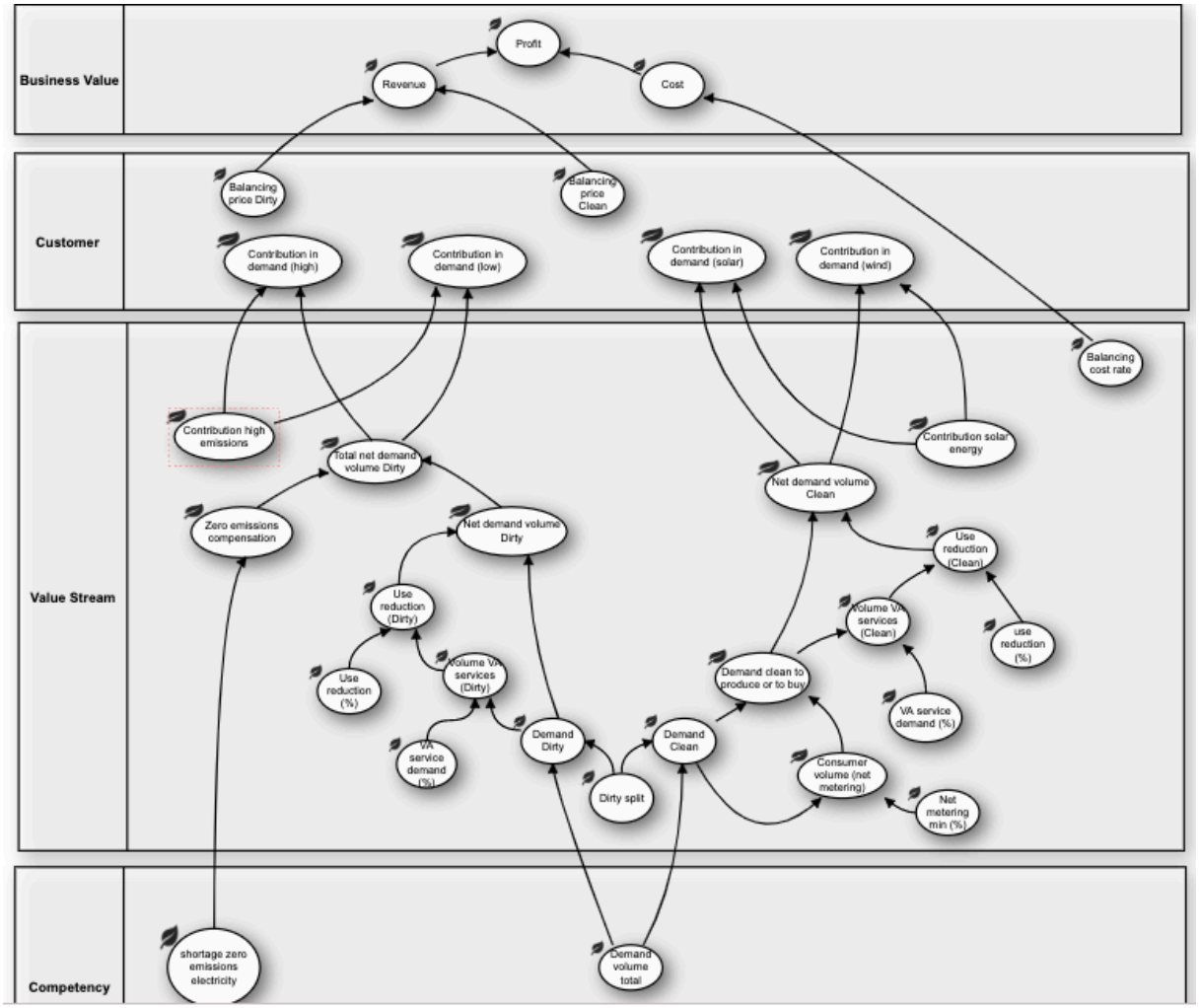
Decentralized Production BM



Centralized Production BM



Balancing BM



7.4 Business as Usual: My Propositions

Balancing BM

My Proposition	From (Role)	Values
Balancing Result	Balancer	Cost Balancing 180000.00 $ / year Profit Balancing 54000.00 $ / year Revenue Balancing 234000.00 $ / year

Decentralized BM

My Proposition	From (Role)	Values
Balancing Result	Producer Clean *[Balancing Network]*	Balancing cost Clean 117000.00 $ / year
Clean Result	Producer Clean *[Clean Electricity Network]*	Contribution funding renewable partnerships 10.00 % Direct Cost Clean 74.42 million $ / year Emissions Clean 7600.00 Mt CO2 / year Overhead Clean 7.44 million $ / year Overhead rate 10.00 % Profit Clean 10.02 million $ / year Revenue 3rd pr (zero) 0.00 million $ / year Revenue Clean 91.88 million $ / year Revenue consumer (VA) 2.31 million $ / year Revenue consumer (zero) 89.57 million $ / year Total Cost Clean 81.86 million $ / year Total emissions solar 1600.00 Mt CO2 / year Total emissions wind 6000.00 Mt CO2 / year VA services cost 1.15 million $ / year Zero emissions cost (net metering) 4.05 million $ / year Zero emissions cost (producing) 59.52 million $ / year Zero emissions cost (reselling 3rd parties) 0.00 million $ / year Zero emissions cost (reselling partnerships) 9.58 million $ / year Zero emissions production cost (solar) 2.52 million $ / year Zero emissions production cost (wind) 57.00 million $ / year

7.5 Business as Usual: Performance Reports

Scenario A: Business As Usual - AOI: Climate System: Greenhouse Gas Emissions

Emissions-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm (MtCO2/year)	0.00005	0.00005	0.00005	0.00005	0.00005
Trajectory Targets (MtCO2/year)	4.08	2.78	1.82	0.81	0.27
Measured Impacts (MtCO2/year)	4.77	4.77	4.77	4.77	4.77
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	95,400	95,400	95,400	95,400	95,400
Sustainability Performance (TTs)	1.17	1.72	2.62	5.89	17.67
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	-1	-2	-3	-3	-3

***Context-Based Scoring Convention**: Scores of ≤1.0 are sustainable; scores of >1.0 are unsustainable.

Scenario A: Business As Usual - AOI: Financial Performance: Return on Equity (ROE)

ROE-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm (% ROE/year)	4.50	5.50	6.0	7.0	8.0
Trajectory Targets (% ROE/year)	6.0	7.0	8.0	8.0	8.0
Measured Impacts (% ROE/year)	7.20	12.17	10.84	11.33	11.18
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	1.23	1.99	1.76	1.65	1.43
Sustainability Performance (TTs)	0.92	1.56	1.32	1.44	1.43
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	+3	+3	+3	+3	+3

***Context-Based Scoring Convention**: Scores of ≥1.0 are sustainable; scores of <1.0 are unsustainable.

7.6 Business as Usual: MCS

MultiCapital Scorecard for Greenlight Power - 2040

Scenario A - BAU

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		-2	1,00	-2,00	3,00	5,00	-67%	-67%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-3	3,00	-9,00	9,00	18,00	-100%	-100%	15%
Economic	Financial Performance	Return on Equity		3	5,00	15,00	15,00	0,00	100%	100%	
			SUMMARY TOTALS			4,00	27,00	23,00			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2030

Scenario A - BAU

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		-1	1,00	-1,00	3,00	4,00	-33%	-33%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-3	3,00	-9,00	9,00	18,00	-100%	-100%	19%
Economic	Financial Performance	Return on Equity		3	5,00	15,00	15,00	0,00	100%	100%	
			SUMMARY TOTALS			5,00	27,00	22,00			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2025

Scenario A - BAU

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		2	1,00	2,00	3,00	1,00	67%	67%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-2	3,00	-6,00	9,00	15,00	-67%	-67%	41%
Economic	Financial Performance	Return on Equity		3	5,00	15,00	15,00	0,00	100%	100%	
			SUMMARY TOTALS			11,00	27,00	16,00			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2020

Scenario A - BAU

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C / TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		2	1,00	2,00	3,00	1,00	67%	67%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-1	3,00	-3,00	9,00	12,00	-33%	-33%	52%
Economic	Financial Performance	Return on Equity		3	5,00	15,00	15,00	0,00	100%	100%	
			SUMMARY TOTALS			14,00	27,00	13,00			
			Total Weighting Points		9,00						

7.7 Transformed Business: Performance Reports

Scenario B: Transformed Business - AOI: Climate Change Adaptation: Funding

Funding-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm ($ million/year)	60.0	60.0	60.0	60.0	60.0
Trajectory Targets ($ million/year)	50.0	50.0	55.0	55.0	60.0
Measured Impacts ($ million/year)	48.10	60.60	63.85	65.93	67.45
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	0.80	1.01	1.06	1.10	1.12
Sustainability Performance (TTs)	0.96	1.21	1.16	1.20	1.12
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	-1	+3	+3	+3	+3

***Context-Based Scoring Convention**: Scores of ≥1.0 are sustainable; scores of <1.0 are unsustainable.

Scenario B: Transformed Business - AOI: Financial Performance: Return on Equity (ROE)

ROE-Related Scores	2020	2025	2030	2040	2050
Sustainability Norm (% ROE/year)	4.50	5.50	6.0	7.0	8.0
Trajectory Targets (% ROE/year)	4.0	5.0	5.50	6.50	7.0
Measured Impacts (% ROE/year)	3.57	4.51	6.06	7.15	7.32
Context-Based Scores*	**2020**	**2025**	**2030**	**2040**	**2050**
Sustainability Performance (SNs)	0.79	0.82	1.01	1.02	0.92
Sustainability Performance (TTs)	0.89	0.90	1.10	1.10	1.05
Progression Scores	**2020**	**2025**	**2030**	**2040**	**2050**
Progression Scores	-1	+1	+3	+3	+2

***Context-Based Scoring Convention**: Scores of ≥1.0 are sustainable; scores of <1.0 are unsustainable.

7.8 Transformed Business: Context-Based Metric

	2020	2025	2030	2040	2050
Background Information and Company Data					
GLOBAL/WORLD GDP (Current Prices in USD)[1]	89.646.146.890.000	105.446.758.876.868	124.032.313.081.787	171.608.208.742.036	237.433.105.744.238
Company's Value-Added Contributions to GDP (Gross Margins/Profits)	**172.900.000**	**183.400.000**	**195.800.000**	**211.110.000**	**209.760.000**
Rest of WORLD's Value-Added Contributions to GDP	89.645.973.990.000	105.446.575.476.868	124.032.117.281.787	171.607.997.632.036	237.432.895.984.238
Company's CO_2e Emissions (tCO_2e)					
- Scopes 1 and 2	**3.470.000**	**3.090.000**	**1.870.000**	**1.450.000**	**240.000**
Company's Total CO_2e Emissions (tCO_2e)	3.470.000	3.090.000	1.870.000	1.450.000	240.000
Variable to be Used for Relative or Intensity Measures if desired (e.g., Revenue, Units of Production, etc.)					
Company's Actual CO_2e Emissions Per $CGDP^2$ in Baseline Year (tCO_2e)					
Rest of WORLD's Emissions in Baseline Year (tCO_2e)					
Rest of WORLD's Actual Emissions Per $CGDP^2$ in Baseline Year (tCO_2e)					
Denominators (D)					
Based on SSP1-1.9 (CMIP6) Scenario (GLOBAL Cut)					
Maximum Allowable GLOBAL CO_2e Emissions Net of Non-GDP Sources ($GtCO_2e$/year)[3]	35,481	28,266	21,051	11,680	4,980
Maximum Allowable GLOBAL CO_2e Emissions (Annual Indexed to Baseline Year)	0,982	0,782	0,582	0,323	0,138
Rest of WORLD's Maximum Allowable Emissions Per $CGDP^2$ (Unadjusted to GLOBAL Norm)	0,000473	0,000377	0,000281	0,000156	0,000066
Company's Allowable Emissions					
Company's Maximum Allowable Annual Emissions (tCO_2e) (Absolute)	4.132.135	3.291.890	2.451.644	1.360.289	579.980
Company's Maximum Allowable Cumulative CO_2 Emissions (Unweighted in Absolute tCO_2e): D_a	20.816.406	38.956.346	52.895.057	71.409.046	80.720.240
Company's Maximum Allowable Annual Emissions Per $CGDP^2$ (Unadjusted Per GLOBAL Norm) (tCO_2e)	0,02276	0,01813	0,01350	0,00749	0,00319
Company's Gross Potential Emissions (tCO_2e)	3.934.608	3.324.885	2.643.639	1.581.510	669.990
Rest of the WORLD's Maximum Allowable Annual Emissions Per $CGDP^2$ (Unadjusted Per GLOBAL Norm) (tCO_2e)	0,00047	0,00038	0,00028	0,00016	0,00007
Rest of the WORLD's Gross Potential Emissions (tCO_2e)	42.383.856.333	39.716.675.324	34.792.584.486	26.709.386.185	15.756.124.630
Overall Gross Potential Emissions (tCO_2e)	42.387.790.942	39.720.000.209	34.795.228.125	26.710.967.695	15.756.794.620
Ratio of Maximum Allowable Emissions to Gross Potential Emissions (For GLOBAL Norm Adjustment)	0,8371	0,7116	0,6050	0,4373	0,3161
ANNUAL INTENSITY TARGETS: Company's Maximum Allowable Annual Emissions Per $CGDP^2$ (Adjusted Per GLOBAL Norm) (tCO_2e): D_b	0,019048	0,012901	0,008169	0,003276	0,001010
ANNUAL ABSOLUTE TARGETS: Company's Maximum Allowable Annual CO_2e Emissions (Weighted in Absolute tCO_2e): D_{bw}	3.293.483	2.366.098	1.599.410	691.566	211.755
CUMULATIVE ABSOLUTE TARGETS: Company's Maximum Allowable Cumulative CO_2e Emissions (Weighted in Absolute tCO_2e): D_c	18.250.846	31.875.388	41.357.177	52.047.518	56.101.689
Numerators (N)					
Company's Actual Emissions					
Company's Cumulative CO_2e Emissions (tCO_2e) (Absolute): N_a	18.830.000	35.040.000	46.830.000	63.220.000	71.065.000
Company's Annual CO_2e Emissions Per $CGDP^2$: N_b	0,02007	0,01685	0,00955	0,00687	0,00114
Company's Annual CO_2e Emissions (Weighted in Absolute tCO_2e): N_{bw}	3.470.000	3.090.000	1.870.000	1.450.000	240.000
Company's Cumulative CO_2e Emissions (Weighted in Absolute tCO_2e): N_c	18.830.000	35.040.000	46.830.000	63.220.000	71.065.000
Context-Based Carbon Scores					
Company's Cumulative CO_2e Emissions (tCO_2e) (Absolute): N_a	18.830.000	35.040.000	46.830.000	63.220.000	71.065.000
Company's Maximum Allowable Cumulative CO_2e Emissions (tCO_2e) (Absolute): D_a	20.816.406	38.956.346	52.895.057	71.409.046	80.720.240
(Cumulative Emissions Score (Context-Free Absolute): N_a/D_a[4]	**0,905**	**0,899**	**0,885**	**0,885**	**0,880**
ACTUAL ANNUAL EMISSIONS INTENSITIES: Annual CO_2e Emissions Per $CGDP^2$: N_b	0,020069	0,016848	0,009551	0,006868	0,001144
ANNUAL INTENSITY TARGETS: Company's Maximum Allowable Annual Emissions Per $CGDP^2$ (Adjusted Per GLOBAL Norm) (tCO_2e): D_b	0,019048	0,012901	0,008169	0,003276	0,001010
SCORE (ANNUAL INTENSITY): Annual Emissions Score (Context-Based Relative): N_b/D_b[4]	**1,054**	**1,306**	**1,169**	**2,097**	**1,133**
ACTUAL ANNUAL ABSOLUTE EMISSIONS: Company's Annual CO_2e Emissions (Weighted in Absolute tCO_2e): N_{bw}	3.470.000	3.090.000	1.870.000	1.450.000	240.000
ANNUAL ABSOLUTE TARGETS: Company's Maximum Allowable Annual CO_2e Emissions (Weighted in Absolute tCO_2e): D_{bw}	3.293.483	2.366.098	1.599.410	691.566	211.755
SCORE (ANNUAL ABSOLUTE): Annual Emissions Score (Context-Based Absolute): N_{bw}/D_{bw}[4]	**1,054**	**1,306**	**1,169**	**2,097**	**1,133**
ACTUAL CUMULATIVE ABSOLUTE EMISSIONS: Company's Cumulative CO_2e Emissions (Weighted in Absolute tCO_2e): N_c	18.830.000	35.040.000	46.830.000	63.220.000	71.065.000
CUMULATIVE ABSOLUTE TARGETS: Company's Maximum Allowable Cumulative CO_2e Emissions (Weighted in Absolute tCO_2e): D_c	18.250.846	31.875.388	41.357.177	52.047.518	56.101.689
SCORE (CUMULATIVE ABSOLUTE): Cumulative Emissions Score (Context-Based Absolute): N_c/D_c[4]	**1,032**	**1,099**	**1,132**	**1,215**	**1,267**
Annual Performance by Type of Metric					
Absolute Emissions	**3.470.000**	**3.090.000**	**1.870.000**	**1.450.000**	**240.000**
Relative Emissions (Intensity: Emissions Per Variable Specified Above)	**#DELING.DOOR.0!**	**#DELING.DOOR.0!**	**#DELING.DOOR.0!**	**#DELING.DOOR.0!**	**#DELING.DOOR.0!**
Context-Based Score[4]	**1,054**	**1,306**	**1,169**	**2,097**	**1,133**

Footnotes

[1] All GDP data through 2017 is actual as found on https://data.worldbank.org/indicator/NY.GDP.MKTP.CD as of 5.22.19; data for 2018 and beyond are estimated. **tainable Organizatior**

[2] $CGDP = Dollar of Contribution to GDP **ut Express or Implie**

[3] Source: https://tntcat.iiasa.ac.at/SspDb/dsd?Action=htmlpage&page=10 (totals are net of 15% attributable to non-GDP-related sources) **ting, Distribution, Res**

[4] ≤1 = Compliant with science-based trajectory targets; >1 = Not compliant with science-based trajectory targets (i.e., as defined in SSP1-1.9 CMIP6 scenario)

7.9 Transformed Business: MCS

MultiCapital Scorecard for Greenlight Power - 2040

Scenario B - Transformed Business

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		3	3,25	9,75	9,75	0,00	100%	100%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-1	3,00	-3,00	9,00	12,00	-33%	-33%	56%
Economic	Financial Performance	Return on Equity		3	2,75	8,25	8,25	0,00	100%	100%	
			SUMMARY TOTALS			15,00	27,00	12,00			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2030

Scenario B - Transformed Business

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		3	3,25	9,75	9,75	0,00	100%	100%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		1	3,00	3,00	9,00	6,00	33%	33%	78%
Economic	Financial Performance	Return on Equity		3	2,75	8,25	8,25	0,00	100%	100%	
			SUMMARY TOTALS			21,00	27,00	6,00			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2025

Scenario B - Transformed Business

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		3	3,25	9,75	9,75	0,00	100%	100%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-2	3,00	-6,00	9,00	15,00	-67%	-67%	24%
Economic	Financial Performance	Return on Equity		1	2,75	2,75	8,25	5,50	33%	33%	
			SUMMARY TOTALS			6,50	27,00	20,50			
			Total Weighting Points		9,00						

MultiCapital Scorecard for Greenlight Power - 2020

Scenario B - Transformed Business

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

*Intellectual capital is embedded in most of the others.

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation		-1	3,25	-3,25	9,75	13,00	-33%	-33%	
Environmental	Climate System	Greenhouse Gas (GHG) Emissions		-1	3,00	-3,00	9,00	12,00	-33%	-33%	-33%
Economic	Financial Performance	Return on Equity		-1	2,75	-2,75	8,25	11,00	-33%	-33%	
			SUMMARY TOTALS			-9,00	27,00	36,00			
			Total Weighting Points		9,00						

8.1 Empty Templates

Bottom Line	Stakeholders	Areas Of Impact / (Capitals)	Context-based metric
Social			
Environmental			
Economic			

Capitals Legend:
EE = External Economic IE = Internal Economic S = Social and Relationship
H = Human N = Natural

Scenario: - AOI:

Related Scores					
Sustainability Norm					
Trajectory Targets					
Measured Impacts					
Context-Based Scores*					
Sustainability Performance (SNs)					
Sustainability Performance (TTs)					
Progression Scores					
Progression Scores					

***Context-Based Scoring Convention**: Scores of ≥1.0 are sustainable; scores of <1.0 are unsustainable.

MultiCapital Scorecard for Greenlight Power - *Scenario:*

Vital Capitals Legend:*

- Constructed
- Human
- External Economic – Financial
- External Economic – Non-Financial
- Internal Economic – Financial
- Internal Economic – Non-Financial
- Natural
- Social & Relationship

**Intellectual capital is embedded in most of the others.*

BOTTOM LINE DIMENSIONS OF PERFORMANCE	INDIVIDUAL AREAS OF IMPACT (AOIs)	CONTEXT-BASED METRICS	CAPITALS IMPACTED	A Progression Performance Score	B Weight	C Weighted Score (AxB)	D Fully Sustainable Score (Bx3)	E Gap to Fully Sustainable (D-C)	INDIVIDUAL AOI SCORES (C/D)	BOTTOM LINE SCORES	OVERALL SCORE (TOTAL C/TOTAL D)
Social	Climate Change Adaptation	Funding for Climate Change Adaptation									
Environmental	Climate System	Greenhouse Gas (GHG) Emissions									
Economic	Financial Performance	Return on Equity									
			SUMMARY TOTALS								
			Total Weighting Points		0,00						