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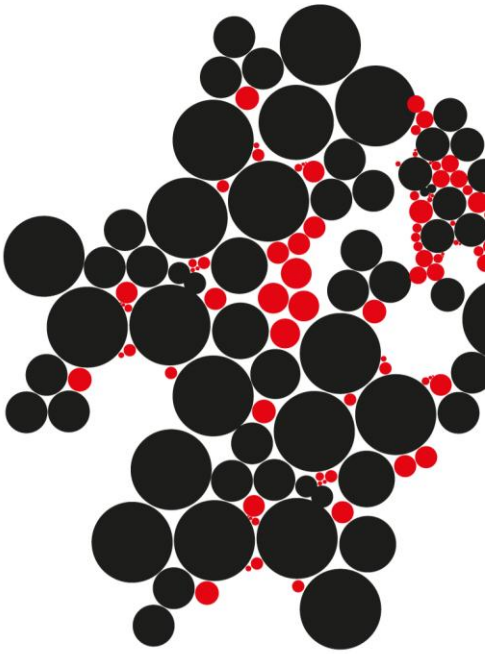

OFF-BALANCE FINANCING OF THE FIBER NETWORK AT REGGERFIBER: A CASE STUDY

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Abstract

Since Reggefiber entered the Dutch broadband market in 2005 it has altered the Dutch broadband market substantially. KPN with its DSL network and Ziggo/UPC with their cable networks were faced with a technique based on optical fiber, the so called Fiber to the Home network (FttH). FttH is currently capable of offering up and download speeds of 1 Gbit/s while DSL and cable networks go up to 200mbps. KPN sees in FttH the 'end game' in the fixed line broadband market and therefore entered into a joint venture with Reggeborgh in 2008. Reggeborgh, the company which was owner of Reggefiber at that time, has now completely sold Reggefiber to KPN. Despite the technological case for FttH, the business case is less distinct.

The rollout of FttH requires significant capital expenditures (capex) of around €800 per connected home. Expenditures that are difficult in the light of KPN's financial situation. KPN is in a situation where capex are already high when compared to sales and the net debt position is also at the higher end of the desirable spectrum . These expenditures are challenged by a number of factors. A lack of consumer's willingness to pay a premium for FttH services, uncertainty around future penetration rate and the risk of competing techniques keeping up (both fixed and mobile) affect the FttH business case. KPN's own efforts of pair bonding and vectoring are a good example of the DSL network constantly being upgraded to keep up with demand, limiting the need for new FttH infrastructure.

In order to reduce the limitation that the financial position of KPN on FttH rollout is, this research focuses on the possibility of off-balance financing. Is off-balance financing possible for the FttH network, and in turn what would be the consequences? Is this advantageous or disadvantageous for Reggefiber/KPN?

Literature research pointed out the suitability of the project financing method. Project financing involves transferring an asset to a Special Purpose Vehicle (SPV), designed specifically for the asset. Allowing for an asset specific governance system, enabling significant higher leverage than under corporate financing. The FttH network shares similarities with other assets commonly financed on project, off-balance, basis (e.g. toll roads). High upfront investments and stable cash flows upon operation justify the project financing method. Risks that harm the FttH business case like the penetration rate are especially hindering the project financing method. In order to identify the demands and possibilities of this financing method, interviews have been conducted with persons within the field of project finance. Persons like project finance advisors, institutional investors as well as the treasury department at KPN have been interviewed.

During the interviews it became apparent that the suggested method of financing is indeed suitable for the FttH network. The project financing advisor indicated that the network of Reggefiber is suited for project financing, with only one major concern, the economic risk. This is in line with the result from the interviews with institutional investors. Institutional investors are eager to invest in the FttH network of Reggefiber. These investors are capable of financing a further rollout with substantial amounts of equity and also allowing the project to be leveraged higher than under the current KPN financing. Effectively only demanding a take-or-pay contract to transfer the economic risk to KPN for a period of 10 years. KPN in turn indicates that take-or-pay contracts are a potential instrument but are not favored. Especially a loss of control is the main barrier for KPN in project financing constructions.

Remaining in control does imply maintaining full economic risk for KPN. This risk goes multiple ways. FttH networks might turn out to be unnecessary, in cases where demand for speed does not develop or in case mobile or DSL/Cable networks can keep up. Otherwise, the risk of withholding the rollout too much due to financial limitations could lead to an underinvestment situation in which the service provider cannot benefit over competitors when demand does develop. Therefore the risk of pay-or-take contracts should be equal or less than being owner. The chosen form of financing should not lead to a higher penetration rate for KPN to breakeven. Required penetration rate for breakeven should ultimately be less or equal in return for a higher rollout of FttH funded by institutional investors. The required penetration rate by institutional investors is subject to bargaining by KPN, allowing at least some room for negotiations on critical control issue like the tuning of FttH rollout regions with DSL plans. As the institutional investors only require minor control, there is certainly an option for off-balance financing the FttH network.

Ultimately, for project financing to be viable, giving up some control should lead to a faster FttH rollout as well as reduced economical risk for KPN.

Contents

1. Introduction

1.1 Company introduction

Reggefiber is a Dutch private company active in the Fiber to the Home market (FttH). Reggefiber is a subsidiary from KPN which recently became 100% owner of Reggefiber after purchasing 40% of the remaining shares from Reggeborgh. Reggefiber is a company which is engaged in the construction, deployment, maintenance and operation of passive Fiber to the Home (FttH) networks in the Netherlands. A technique considered superior when compared to other currently present infrastructures which operate via copper based lines like coax and telephone lines. FttH services are competing with VDSL on the telephone line and DOCSIS 3.0 (Ziggo/UPC) services on coax cable. For an overview of all terms see the glossary in appendix A. At the moment Reggefiber is present in over 200 municipalities and has connected over 2 million homes to their FttH network. The goal of Reggefiber is to "connect as many as possible homes in the Netherlands to their FttH network". The network is financed trough shareholder equity as well as debt from third parties like for example the European Investment Bank (EIB) (Reggefiber, 2013). More about ownership and development of Reggefiber in the following paragraph 1.2 Reggefiber History and development.

1.2 Company history and development

Reggefiber was founded in 2005 in Rijssen by investment company Reggeborgh. KPN had a strong motivation to invest in FttH since its DSL offerings are losing the competition with cable operators Ziggo and UPC. Therefore in 2008 KPN decided to enter into a joint-venture with Reggeborgh. In this agreement, KPN got a minority interest of 41% of Reggefiber's shares and Reggeborgh kept the remainder 59%. At that time the Dutch competition authority (NMa) and Telecom Authority (OPTA), which are nowadays combined in the Authority Consumer and Market (ACM) agreed on the cooperation between Reggeborgh and KPN. As a condition for the agreement the network from Reggefiber became regulated. This meant that the network of Reggefiber is obliged to open the network to other service providers as well. This so-called unbundled access is defined in the "optical distribution framework" and is subject to a monthly tariff.

Further expansion of KPN's share in Reggefiber was defined via certain call/put options. Reggeborgh and KPN made agreements on specific thresholds concerning numbers of homes passed or dates which allows for the execution of call by KPN or put Reggeborgh options. KPN received the 31th of October 2014 approval to increase their stake to 60%. The increase to 60% ownership implied the control and consolidation of Reggefiber by KPN. The third option was exercised the 18th of November where KPN became 100% owner of Reggefiber. For a complete overview of the call/put structure see Appendix B.

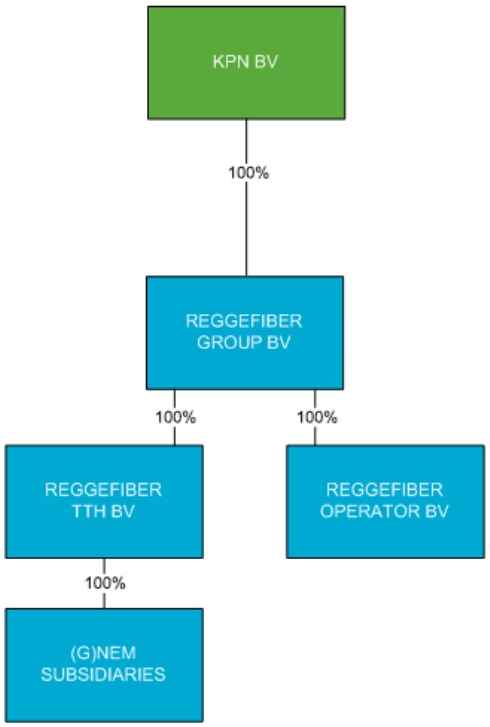


Figure 1.1 Ownership

1.3 Network design and exploitation

This paragraph will provide an insight in the characteristics of FttH and the business model of Reggefiber.

1.3.1 FttH Technical characteristics

First of all a more general description about FttH and its characteristics is appropriate. FttH is generally mentioned as 'future proof' or the 'end game' in communications. FttH has benefits which are not found in the services that make use of the telephone or coax cable line. This is attributable to two main selling points of FttH:

- Speed of light; the theoretical maximum capacity of FttH is virtually unlimited
- Long lifetime; glass and plastic composition of the fiber degrades slow

The lifespan is estimated to be around 30 years, due to the physical composition of the cable. The fiber of the FttH network is supposed to degrade more slowly than copper based alternatives and is less sensitive than for interferences from the surroundings (Fibre to the Home Council Europe, 2012).The main argument for FttH is the unlimited potential of the fiber that is in the ground, i.e. the theoretically unlimited possibilities of the speed of light. Several more benefits come from the optical element, for example latency and reliability of the signal is supposed to be better than with copper based alternatives. Upgrading the capacity of the network only requires updating active equipment at the ends of the fiber, i.e. no new civil works are required. The abovementioned characteristics of FttH are the reasons why FttH is considered the end-game in the telecom industry.

1.3.2 Passive operator

Reggefiber is the passive operator of the FttH network. The passive operator owns, exploits and maintains the dark fiber network. Each FttH project / municipality is legally separated in a 'Netwerk Exploitatie Maatschappij' (NEM). The NEM's are the economic and legal owners of the network and are split by municipalities, e.g. NEM Nijmegen or NEM Coevorden. The NEM's have a management agreement with Reggefiber Operator BV and pay a management fee for maintenance and

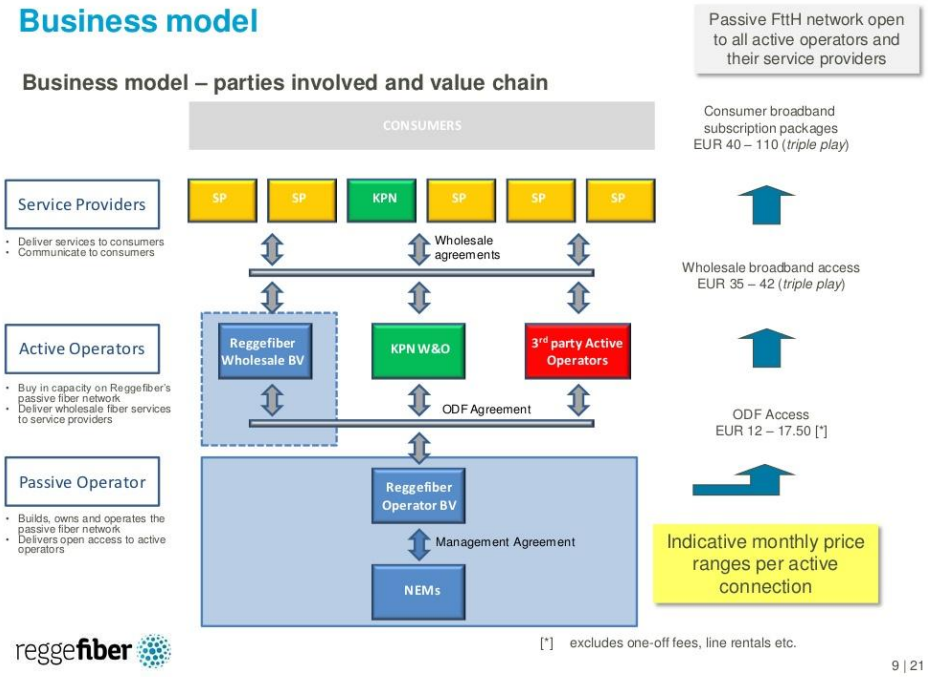


Figure 1.2 Reggefiber business model layout

exploitation. Reggefiber Operator BV thus effectively manages the passive network and provides access to active operators. As mentioned, the ACM has set an unbundling obligation defined in the Optical Distribution Framework ODF which is subject to a monthly tariff. The height of the access tariff depends on the capital expenditure (capex) class a home is in. For example a home within a region with capex class of €700,- is subject to a monthly tariff of €14,36 and €1450 capex class is subject to monthly tariff of €18,25. Active operators can also opt for the national average tariff of €16,76. This tariff is the main source of revenue for Reggefiber Operator BV (Reggefiber, 2013). Next to the ODF tariff there is also a monthly revenue stream coming from POP and backhaul rent.

1.3.3 Active operators

The active operators are the operators which buy access from the passive network of Reggefiber. Active operators 'enlighten' the fiber network via switchgear in the Points of Presence (POP's) and with Fiber Termination Units (FTU's) at the consumer's site. The active operators in their turn provide wholesale access to the service providers.

1.3.4 Service providers

The service providers are the providers that deliver services to and communicate with the consumers. Services offered are internet, telephone and television. When these three services are offered together this is referred to as 'alles-in-1-pakket' or 'triple-play' services. KPN for example offers 100mbit/s up and download, television and telephony for a consumer price of €52.50 per month. Service providers pay a monthly fee to the active operator in order to use the activated fiber. These fees are defined in the wholesale broadband access tariff (WBA).

1.3.5 Connections

The network of Reggefiber consists of Homes Passed, Homes Connected and Homes Activated. Homes passed are homes which are located in regions where fiber is present in the streets and fiber is connected in the POP. These homes Passed become Homes Connected when a fiber branch is connected in the home via an FTU.

Homes Activated are homes where the consumer is purchasing services from a Service Provider and is actually using the fiber network. At the moment there are 2 million Homes Passed and 677k Homes Activated (Reggefiber, 2015).

See Appendix C for more details on the network layout.

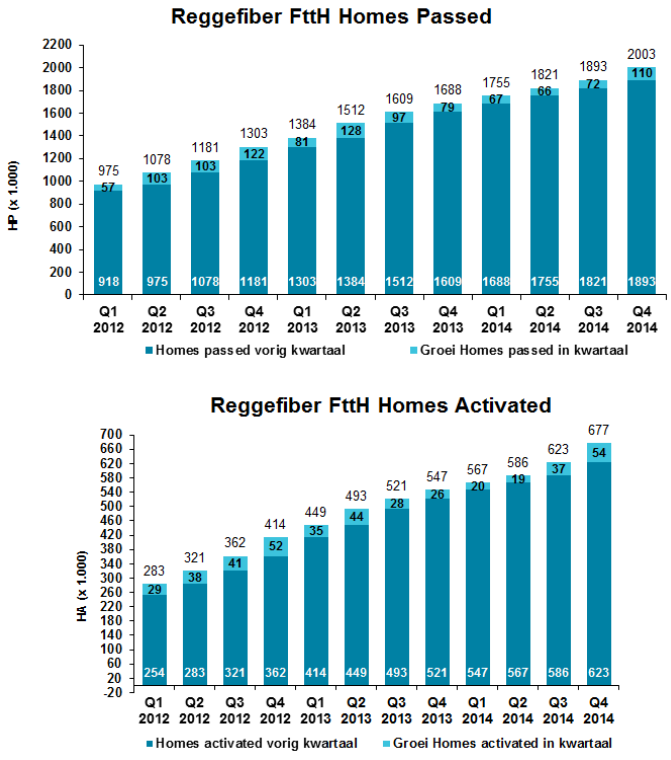


Figure 1.3 Homes Passed and Homes Activated

1.4 Problem introduction

1.4.1 Digital Agenda

The European Commission has set ambitious goals concerning household access to fast broadband by 2020. There are several social benefits associated with access to fast broadband such as that it provides a platform for innovation and is supposed to enable economic growth as access to electricity enabled economic growth in the past. Stimulating fast broadband rollout can work as a continuous cycle, since fast broadband access will push the digital economy. This in turn is assumed to stimulate the development of new data dependent services which will again increase the demand for bandwidth.

In 2020 the targets in the Digital Agenda require that all EU citizens should have access to fast broadband services, which imply speeds of 30mbps or more. Furthermore, 50% off the EU population should have access to so called 'ultra-fast' next generation access networks (NGA) broadband which implies speed of 100mbps or higher (Europese Commissie, 2013). The NGA provided by the European Commission is as follows:

"NGA networks are wired access networks which consist completely or partly of optical elements and can provide broadband services with improved characteristics over existing basic broadband networks"

Several techniques are considered to be capable of providing NGA connectivity. FttH, other FttX (including VDSL) based connections, upgraded coax cable networks like DOCSIS 3.0 and also advanced wireless access networks are considered NGA type of networks (Europese Commissie, 2013). In the Netherlands these DA targets are already achieved. Full coverage for fast broadband is almost met at 98% coverage of 30mbps connection. Due to a relatively high coverage of DOCSIS 3.0 in the Netherlands, namely 97.5% DOCSIS 3.0 coverage versus an European average of 39.3%, the Netherlands are one of the leading countries in Europe. DOCSIS 3.0 allow speeds up to 180mbps down and 18mbps up to be realized (Ziggo, 2014). The DA target that 50% of homes should take up 100mbps is dependent on market development and does not depend on the availability of the network, as network coverage is already met.

There are however different points of view on the goals of the Digital Agenda. The difference can be significant when asymmetrical or symmetrical internet speeds are assumed. The Digital Agenda does not clarify whether symmetrical or asymmetrical internet speeds are required and what the targets are on latency, consistency and reliability of the network; this remains ambiguous. In the case of ambitious targets, i.e. symmetrical up and download speeds and best performance on latency, consistency and reliability, it can be argued that FttH is the only type of infrastructure that is capable of meeting ambitious targets (DotEcon, 2012). DOCSIS 3.0 and VDSL type of infrastructure are not capable of providing symmetrical up and download speeds and score lower on performance regarding stats like latency, consistency and reliability.

1.4.2 Financial situation

As the technological and social-economic arguments for FttH rollout are present. The financial arguments for the FttH business case are less convincing.

The European Investment Bank estimated that, in order to meet the Digital Agenda's broadband goals for Europe, investments in the order of €143 billion are required. This is when asymmetrical

access speeds are assumed, the order of investments changes when symmetric speeds are assumed. This requires investments in the order of €221 billion, since techniques like FttH, with higher initial investment costs are best suited for symmetrical speeds (DotEcon, 2012).

In 2010 prices as high as €1400 per home passed were incurred (Dekker, 2010). Capital expenditures per HP are however constantly declining due to innovations and incremental improvements in the rollout. The costs incurred by Reggefiber are nowadays around €800 per home passed. These costs are due to the nature of the infrastructure, a fixed asset, largely irreversible. The costs involved are considerable due to substantial civil works and the relative labor intensive characteristic FttH rollout. The material costs are only a fraction of total costs and therefore laying out FttH networks is considered a sunken cost. The incurred costs are sunk costs and are activated on the balance sheet. Abovementioned factors indicate that rolling out a nationwide FttH network will put significant pressure on a firm's financial situation. Assuming a capex per HP of €800,- (ignoring rural areas) and a remaining 5 million homes to connect in the Netherlands, passing the remaining homes would require up to 4 billion euro of additional investments.

Especially the financial pressure of FttH rollout on the balance sheet of telecom providers is the problem. Many providers are highly leveraged due to their past activities; mergers and acquisitions and dividend payments have left little financial leeway for FttH investments (FTTH Council Europe ASBL, 2013). Also a relatively high portion of debt is due for maturing in the coming period until 2018. During this period the telecom providers are required to restructure their debt and will be very cautious to initiate new investments via debt. An increase in debt could lead to the credit rating being downgraded by the credit rating agencies and can in turn lead to higher financing costs (Barreto & Dargue, 2014) (Segenhout, 2014). Ratio's that are used to indicate the financial pressure are the net debt/ebitda and the capex to sales ratio.

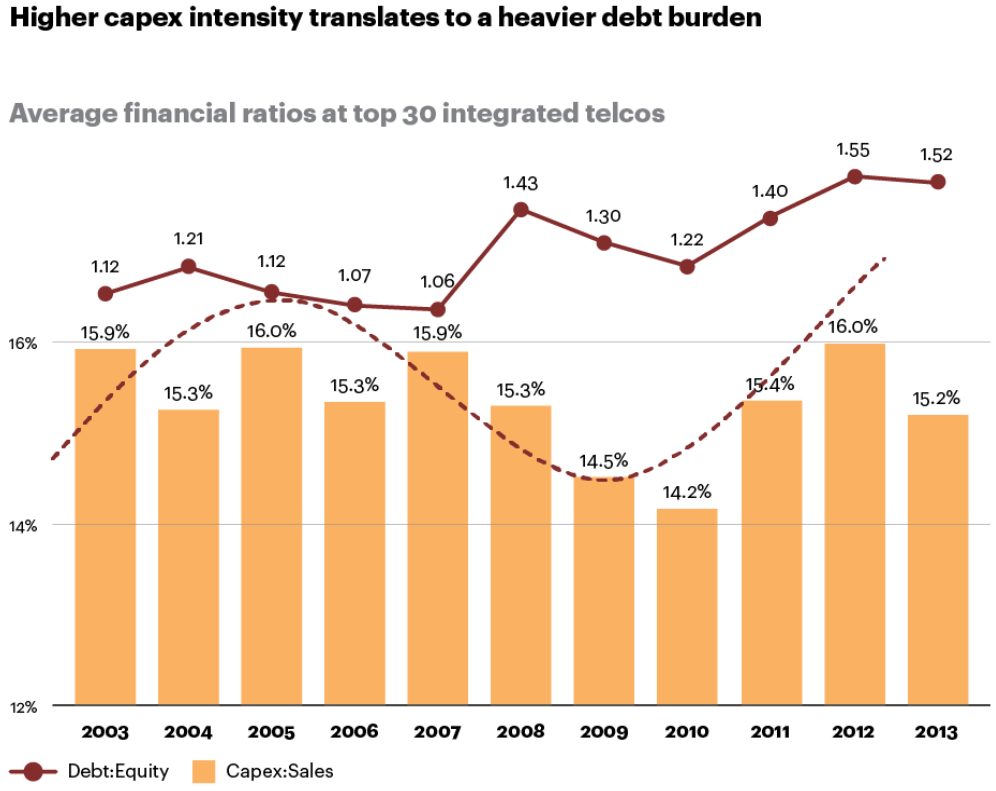


Figure 1.4, Source: (Liu, Garg, & Bhagat, 2014)

As figure 1.4 shows, these ratios are at the higher end of the sustainable spectrum and do not allow for extensive additional investments (Liu, Garg, & Bhagat, 2014).

For KPN the 2014 numbers imply a capex to sales ratio is at around 17.5%. This situation is worsened by the fact that the revenue of KPN is under pressure, leaving less room for increased capital expenditures. A 7.3 billion net debt position and EBITDA of 2.57 billion for 2014 lead to a net debt/ebitda ratio of around 2.8x (KPN, 2015). Taking into account KPN's own target on net debt/ebitda ratio to be in-between 2.0 and 2.5x, their current financial position neither allows for a significant increase in debt.

The fact that FttH investments are characterized by a relatively long payback period makes the FttH investments questionable. Several variables influence the payback period, like the capex per HP, revenue per user and penetration rate. Especially the penetration rate turns out to be problematic as will be described in the following paragraph.

1.4.3 Demand for FttH services

The fact that FttH is a relatively new infrastructure, makes predicting demand for this service difficult. There is a lack of knowledge at consumers on the benefits that FttH can offer; the added value of FttH services goes largely unnoticed. As a consequence there is uncertain user demand for the upload speeds that FttH can offer over the competing infrastructures DOCSIS 3.0 and VDSL. As well as the lack of demand there is no willingness to pay a premium for these services. Research from the European Commission found "that 82% of EU citizens were not willing to pay more for a faster internet connection than their current one" (European Commission, 2012). This lack of willingness to pay is attributable to the fact that there are too few services available which benefit from the higher speeds enabled by FttH. Therefore the consumer is neither showing demand nor a willingness to pay a premium.

Especially the demand uncertainty is the main barrier for firms considering FttH investments (Inderst & Peitz, 2014) (Briglauer & Gugler, 2013) (DotEcon, 2012). On the short term there may be enough revenues but if on the long term demand is uncertain, it will be difficult to justify the substantial investments associated with the rollout of FttH since the payback period is substantial. Therefore the demand uncertainty is a crucial factor in deciding whether to invest or not. FttH has to compete with DOCSIS 3.0 and VDSL offerings on effectively the same revenues per user, but does require substantial higher upfront capital expenditures.

In the Netherlands Reggefiber currently has a penetration rate of around 30%. Until recently Reggefiber was using so-called "demand aggregation" or "trigger level" survey as a prerequisite for the start of an FttH rollout in municipalities. This technique was used in order to reduce the demand risk, 30% of homes had to commit to a FttH service provider. As a threshold, 30% or more of the homes situated in the municipalities needed to take up an FttH subscription before Reggefiber would commence rolling out FttH. However, nowadays the upfront demand aggregation is abandoned, due to substantial marketing costs and the method did not delivered the desired effect.

2. Research design and method

2.1 Problem statement

The abovementioned arguments in the problem introduction paragraph point out the difficulty of the FttH business case. It is too risky for a single provider to invest in a nationwide FttH rollout since it is unknown if it will make a return on the investment. The FttH business case is especially difficult when providers are in a tight financial position as they are in now. At the same time, the European Commission is setting ambitious goals and if symmetrical speeds are desired, FttH is considered to be the most appropriate and the most future proof technique. Therefore telecom providers are in a dilemma. FttH is considered the future technique, however in the current situation a nationwide rollout is not sensible when taking into account the financial situation telecom providers are in. Due to the financial position of telecom providers and the substantial costs related to FttH rollout, alternative financing solutions need to be considered. Therefore the question is whether the FttH network can be financed off balance so that rollout efforts can be increased without putting pressure on the financial position.

This leads to the following main research question: ***"How can an off-balance financing of the FttH network be realized and what would be the advantages and disadvantages for Reggefiber?"***

2.2 Research questions

Several sub questions can be defined in order to get a thorough understanding of the issue and support the answer on the main research question.

1. What is the current financing structure of Reggefiber?

This question will be answered by information gathering within the company, internal documents, and conversations with employees familiar with the subject.

2. What are the current developments in the FttH landscape?

In order to form a complete image on the FttH financing issues it is important to have an understanding on the overall landscape of the FttH case. Answer on this question will be provided via literature research. For this question literature from scientific articles will be used and from sector reports.

3. What are the characteristics of project finance?

The answer on this question will be provided via a literature research. Books on project finance as well as sources from academic management journals will be accessed. The purpose of the literature review is to provide an answer on questions such as: what is project financing, when is it suitable, what parties are involved, what does the capital structure look like, what risks are involved etc.

4. How do IFRS accounting rules limit the possibilities of off-balance financing?

There are restrictions in keeping assets off-balance and this question will provide a legal framework on off-balance financing. A study in the accounting rules by the International Financial Reporting Standards (IFRS) will provide the boundaries of the financing possibilities.

5. What needs to be achieved in Reggefiber's point of view?

The application of off-balance will have to be applied to Reggefiber. Answers on this question will be collected at third parties. Interviews will be held with persons having experience with arranging project financing deals. Capital providers will need to be interviewed since external capital will need to be attracted, these parties will impose their terms when entering a project finance structure. Contrary to these requirements are the demands which Reggefiber/KPN will require when entering a project financing deal.

6. What are the advantages and disadvantages for Reggefiber when an off-balance method will be applied?

Question 2, 3, and 5 will provide answers on the off-balance methods and how this applies to Reggefiber. However, the advantages and disadvantages of a possible solution will need to be weighed. An assessment will be made to decide whether the advantages outweigh the disadvantages.

2.3 Research goal

The goal of this research is to provide Reggefiber with insights on the possibilities of off-balance project financing. What are the advantages and disadvantages of project financing for Reggefiber? What will be the consequences when project financing is initiated? Furthermore the results of the report will lead to a recommendation on whether project financing should be pursued or not.

Another goal is the contribution to the scientific literature. A contribution can be made since the researcher will try to identify country and network specific factors which are limiting the funding of FttH rollout in the Netherlands. Despite the fact that the Netherlands is at the forefront of FttH rollout there are still relevant questions on how to finance a faster rollout. Since FttH is a relatively new infrastructure, there is yet little scientific evidence on the different types of financing and how financing affects the business case.

2.4 Research method

In this paragraph the method to find an answer to the research question will be described. How the research is conducted and what is the reasoning behind this model is will be explained.

The purpose of social research is commonly categorized as being exploratory, explanatory or descriptive (Babbie, 2010). The nature of this research is descriptive; the research focuses on a type of financing that is new for the clients firm in the telecom sector. However, the type of financing itself is not new, information from third parties needs to be identified and described in relation to the subject.

Within a social sciences study any research strategy can be used, from experiments and surveys to case studies. In order to determine which research strategy is appropriate, a selection table from Yin (1994) is applied. The table consists of three conditions which are related to the five major research strategies (Yin, 1994).

Research Strategy ↓	1. Form of research question	2. Requires control over behavioral events	3. Focuses on contemporary events
Experiment	how, why	yes	yes
Survey	who, what, where, how many, how much	no	yes
Archival analysis	who, what, where, how many, how much	no	yes/no
History	how, why	no	no
Case study	How, why	no	yes

Table 2.1 (Yin, 1994)

This table is used as a scoring table. The first criterion, the form of the research question, the research from this paper is categorized as a how and why research. How would an off-balance proposition look like and why would Reggefiber want this, weighing advantages and disadvantages.

This research does not require control over behavioral events. First of all, it is practically impossible to study the subject of this research out of its environment. The FttH network is, as well as the investment, a sunken object. Secondly, the researcher tries to identify critical factors for off-balance financing. This does not require influencing the network. Furthermore, financing of the network itself is a contemporary event. The research question poses a question on a current individual issue in a quick moving market, i.e. telecom. The perspectives and concepts behind the financing are difficult to quantify, therefore a qualitative case study is suited.

2.5 Data collection

This paragraph will shortly describe the method of data collection. There are multiple sources of data that can be used. First of all, it is of importance that multiple sources data will be used. The usage of multiple sources of data contributes to the construct validity of a case study research; findings are supposed to be more accurate and convincing. When using multiple sources of data it is possible to test the reliability of multiple sources compared to each other, also called triangulating (Yin, 1994). This will lead to overall higher quality. When collecting data in case studies there are six primary sources of evidence: documents, archival records, interviews, direct observations, participant-observation and physical artifacts (Yin, 1994). In this research literature review is conducted prior to the interviews.

2.5.1 Literature

Literature used in this research comes from multiple sources. Internal documents like the annual report, organization charts and presentations are used. These documents form an introduction in the business of Reggefiber and help create a better understanding on the overall issue. Literature on the subject of FttH developments, project finance, IFRS comes from scientific articles of management journal articles, books and also sector reports. Sector reports are updated frequently and are especially useful to address the recent issues related to FttH networks.

The literature review on scientific articles and books on project finance will be conducted in order to come up with a framework for project financing. Access to scientific articles is gained via specialized databases like Scopus and Google Scholar. Relevant literature is searched via key terms like "FttH", "FttH business case", "off balance financing", "project finance", "sale and leaseback" or a

combination of these. Furthermore the snowball method is used; reviewing the articles that cite an already found relevant article.

2.5.2 Interviews

Interviews form the most important source of information in this study. Interviewing is considered to be the main method for data gathering in business problem solving projects (Van Aken, Berends, & van der Bij, 2007). Due to the fact that the FttH network rollout is a relatively new development, the involved parties may require explanation on the subject. Interviewed parties are in different positions with different perspectives towards the network and will require an approach tailored to their situation.

Interviews will take place in a semi-structured style where the possibility exists to discuss important factors more in depth. This possibility does not exist when sending questionnaires or doing experiments. The method of interviewing improves validity of the research but does pose a threat to the reliability. Different persons can make different observations than the researcher does (Babbie, 2010). Overall, interviewing is considered to be an appropriate method to collect evidence about the opinions and perspectives on project financing the FttH network.

2.6 Respondents

A total of seven interviews were held within multiple organizations. Interviews were held at Reggefiber and KPN. Interviews outside the organization were held with institutional investors and lead arranging banks. Combining these insights should lead the best possible framework on the project finance situation that is supposed. Interviews need to be specified in line with the interviewee's his or her field of knowledge on a project finance situation (Van Aken, Berends, & van der Bij, 2007).

The outside parties in this research are parties which are commonly involved in this type of transactions. Institutional investors are parties which have the available funds capable of sponsoring a network with the size from that of Reggefiber. The interviewed persons are all active in a position in which they are involved with this type of financing. As mentioned the interviews will be specified to the field of knowledge of the interviewee. Questions for the institutional investors are for example focused on their expectations and requirements when they would enter a project financing deal. At KPN / Reggefiber the interviews will be focused on mapping their demands and requirements.

Category of interviewee	Function of interviewee
Intern Reggefiber	Treasurer Reggefiber
	CFO Reggefiber
	Group controller Reggefiber
KPN	Treasurer at KPN
Institutional investor	Senior investment manager infrastructure
	Senior Portfolio Manager
Arranging bank	Associate Director Structured Finance Nord Deutsche Landesbank

Table 2.2 Interview list

2.7 Research scope

To overcome the financing problem of FttH rollout, several FttH/Telecom sector associated reports point towards the use of project finance as an alternative to regular corporate financing (Barreto & Dargue, 2014) (Stanislawski & Krauze, 2012) (Nucciarelli, Castaldo, Conte, & Sadowski, 2013). These reports compare the FttH rollout with other utility sectors like energy and the highway construction sectors, where similar challenges are faced. These sectors face similar high upfront investment costs and a stable revenue stream during the operational phase. In these sectors the use of project finance is a common technique. Also in project finance literature, telecom is mentioned as a sector suited for project financing (Gatti, 2008) (Finnerty, 2013). Project financing is therefore assumed a viable proposition for off-balance positioning of the FttH network from Reggefiber and is the subject of this research paper. This research only focuses on the FttH network of KPN/Reggefiber and will not take into consideration the influence of other KPN business units on the research; these are considered to remain constant i.e. ceteris paribus. However, these networks of KPN are relevant since FttH competes with DSL. An elaboration on this issue will be made in the discussion.

Due to the nature of project financing, large specifically tailored projects, there is limited ability to collect data (Kayser, 2013). Since there are other financing methods that also imply off balance financing, literature from these types of financing is used in order to help identify advantages and disadvantages of off balance financing. Sale and leaseback construction can be compared to project financing as in the basis, the main question is the same. These two types of financing both have two options, corporate on balance financing or financing on the balance sheet of a third party. Sale and leaseback literature will be used to gain additional understanding on the effects of selling an asset.

3. Reggefiber current financial structure

The structure of Reggefiber is already partially introduced in the company profile chapter. This chapter will describe shortly the legal structure concerning cash flow directions and will give an answer on sub question 1. ***"What is the current financing structure of Reggefiber?"***

Reggefiber has split up their network in the earlier mentioned NEM's. These are separate entities and have the dark fiber network of a municipality as underlying asset. For example NEM Nijmegen has the fiber network of the municipality Nijmegen as asset. This NEM has the right to collect the ODF tariff in this municipality. Collecting the ODF revenues is done by Reggefiber Operator BV (RFO). This is the operating entity that is responsible for the billing of the active operator. RFO is also responsible for the maintenance contracts with construction companies.

Furthermore the NEM's have a management agreement with Reggefiber ttH B.V. This 3% management fee is used for project management, quality control during construction etc.; services performed by Reggefiber employees.

At Reggefiber there is a legal separation of cash flows in place. The network and its assets are divided by municipality and the cash flows stemming from these assets as well. This makes it easier for a potential transfer of ownership. Figure 3.1 gives an organizational overview of the cash flow.

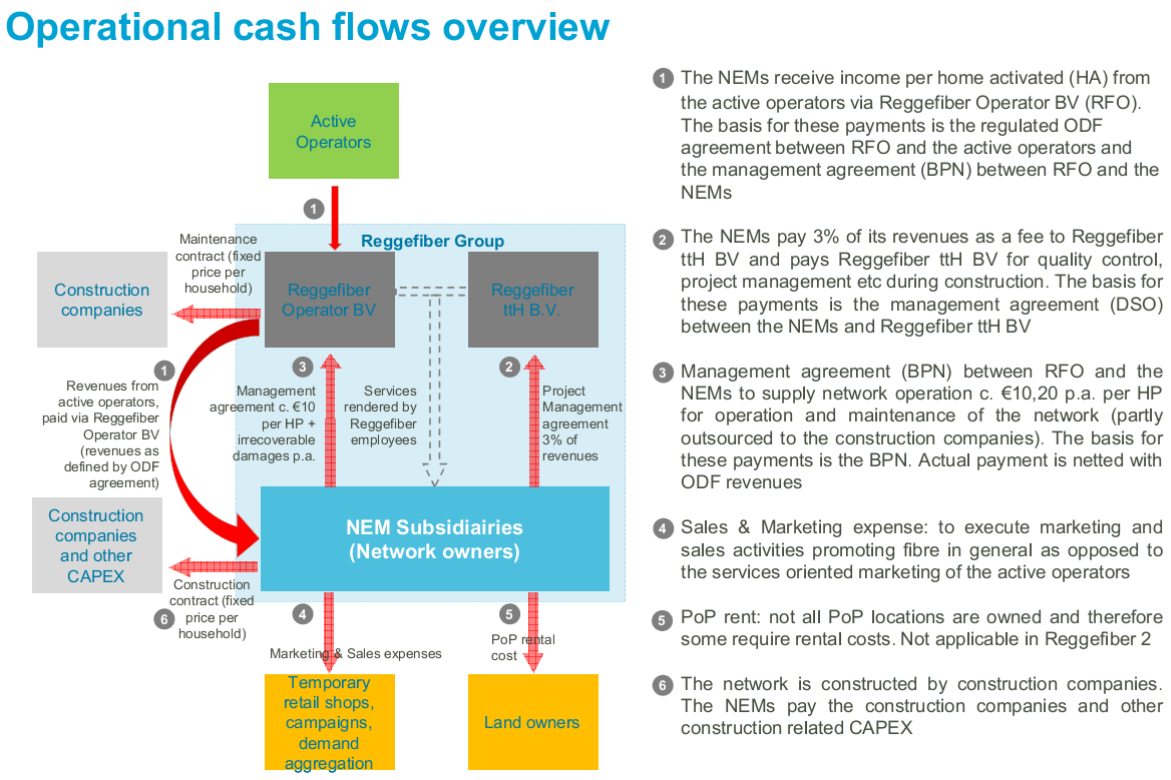


Figure 3.1 Cash flow structure

4. Literature review

This literature review is divided into three separate parts. The first paragraph 4.1 focuses on FttH specific factors found in sector reports and scientific literature. This chapter is of a descriptive nature and will serve as an introduction to common issues that are discussed within the FttH landscape. This will address sub question 2: ***"What are the current developments in the FttH landscape?"***

Chapter 4.2 focuses on the method of project financing. Typical characteristics of project financing will be described, what are the involved parties, type of funding, what are the risks etc.. This will provide an answer to sub question 3: ***"What are the characteristics of project finance?"***

Furthermore paragraph 4.2.13 is dedicated to sale and leaseback literature. After the initial literature review on project finance combined with insights from the interviews, it became apparent that, in order to provide a more meaningful conclusion, more information was required. The impact of selling an asset in a project finance structure is assumed to be comparable to that of a sale and leaseback structure.

Chapter 4.3 on IFRS Accounting standards covers the sub question that is concerned with the limitations that accounting standards put on off balance financing. This chapter will provide an answer to sub question 4: ***"How do IFRS accounting rules limit the possibilities of off-balance financing?"***.

4.1 FttH specific factors

This chapter will focus on FttH specific developments and effects which influence the FttH landscape. The issues that are mainly addressed in FttH literature are the effect of regulation and that of legacy infrastructures. This chapter serves as an summary on these aspects influencing the FttH rollout in order to get a better overall understanding of the issue.

4.1.1 Impact of regulation

Another factor considered to have an impact on FttH investment by telecom operators is the regulation imposed on FttH networks by telecom authorities. The world is largely divisible into three regulatory approaches considering broadband regulation, The United States, East Asian countries and Europe (Cambini & Jiang, 2009).

First of all the East Asian countries like Japan and South Korea are interesting due to their leading position in the global broadband market. As comparable with the approach in the European Union, South Korea and Japan have an unbundling obligation (Cambini & Jiang, 2009). The leading position of these Asian countries is however not attributable to the unbundling obligation but is credited to direct government stimulation, subsidies and other forms of state aid stimulated the FttH rollout in South Korea and Japan (Briglauer & Gugler, 2013). Japan initiated for example programs of subsidies, tax benefits and low to zero interest loans for the broadband operators in order to speed up both supply of broadband services and also demand. Therefore the impact of unbundling regulation in this case is unknown due to the presence of substantial subsidization.

Secondly, there is the United States where the broadband market is mostly deregulated. Until 2005 the Federal Communications Commission (FCC) thought that unbundling at the local loop (LLU) was a suitable regulation in order to stimulate investment. However, it appeared that unbundling regulation had a negative effect on the incentive to invest in upgrading broadband networks (Cambini & Jiang, 2009). Also opposite as to what FCC had hoped for, operators who were renting lines did not had enough incentives to build their own networks and kept renting lines due to this regulation. In 2005 US Court of Appeals ordered the FCC to reconsider the regulation and consequently the FCC decided to lift the unbundling obligation. After the decision from the FCC to deregulate, the US saw a significant growth in FttH rollout and also take up rate after the deregulation came in effect (Briglauer & Gugler, 2013). Apparently unbundling is positively correlated to the FttH rollout in the United States.

The third approach, the European model is considered to be a middle way approach. There is no deregulation approach like in the United States but neither are there severe government subsidies available as mentioned in Asia. In the beginning of the 1990s, short after the liberalization of telecommunications in member states, the European Commission let the regulation decisions being made at the national level. Several countries pursued local loop unbundling, the Netherlands decided in 1999 to opt for local loop unbundling. In 2000 European legislation concerning local loop unbundling became active on an EU wide scale but only for operators that were identified as an operator with Significant Market Power (SMP). Member states consecutively forced unbundling with the idea that this would stimulate competition and accelerate the deployment of FttH network. The results of this approach vary; debates are still going on about the effect of unbundling on the deployment of broadband (Cambini & Jiang, 2009). Results however, show that European Countries are lagging behind the US where there are no unbundling obligations. Causes for this lag are

associated with the demand uncertainty surrounding FttH combined with the unbundling obligation and massive sunk costs associated with FttH.

An exception within Europe is Portugal; the incumbent operator Portugal Telecom was forced to invest in FttH in order to compete with competition from cable operator ZON. The main difference with other European countries is the decision of the Portuguese regulator who decided in 2008 to let go of the wholesale access obligation in areas where there is no party with SMP. In competitive areas i.e. areas where cable operator ZON has 60% homes passed there is no situation of SMP there is no unbundling obligation. The Portuguese regulator additionally imposed regulation that forced access to ducts and other infrastructure for all infrastructures (DSL, cable and FttH). Alternative operators are allowed to deploy their own network using ducts and other infrastructure from the incumbent (Van der Wee, Beltran, & Verbrugge, 2014). This situation is significantly different from a complete national unbundling obligation directly on the passive network, which is the common method when unbundling is forced.

The concluding view on regulation is that local loop unbundling imposes the demand uncertainty on to the party that invests. Since third party service operators can use the network of the party with significant market power these third party operators is able to opt for a 'wait and see' strategy (Cambini & Silvestri, 2011). The incumbent will need to invest and only after the investment is done, the level of demand for the NGA network in that area will become clear. The third party service provider can wait until regulatory charge is set and can decide whether to use the NGA network or not, depending on the level of demand (Cambini & Silvestri, 2011). However, for an incumbent operator this is considered to reduce the incentive to invest, since the incumbent operator will face sunk costs in situations where demand appears insufficient. Thus the uncertainty on demand, substantial capex requirements and uncertainty towards the regulation creates an option value for the incumbent operator to opt for upgrading the existing DSL infrastructure at the expense of FttH rollout.

4.1.2 Replacement effect:

That the current telecom landscape prior to substantial FttH rollout is an important determinant for future FttH rollout. This is motivated by the replacement effect (Briglauer & Gugler, 2013). The replacement effect suggests that incumbent operators, with legacy networks, are supposed to be reluctant in investing in FttH networks. This effect occurs when incumbent operators exploit DSL networks which currently form the majority of profits (Briglauer & Gugler, 2013). It is argued that there is a negative correlation between the presence of a legacy network and the amount of investments in FttH done by an operator. The necessity to invest lacks due to profits from legacy network. Rolling out NGA networks requires substantial investments and NGA rollouts will take over customers from the still profitable legacy network. The NGA network is effectively competing with the incumbents legacy network. When NGA networks are rolled out, it will 'cannibalize' the profits from the legacy network. The replacement effect therefore reduces the incentive to invest and results in a lower FttH rollout than socially desired.

The replacement effect seems to be of relevance for European countries since most member states of the European Union have a legacy infrastructure in place (DSL or DOCSIS services) with high levels of coverage and penetration (Briglauer & Gugler, 2014). As a consequence the consumers in these member states already enjoy broadband services of a fairly well quality. This hinders the switch to

new technologies since FttH is of fewer added value to these regions when compared to areas without basic broadband. Different generations of networks appear to be substitutes in terms of subscription (Grajek & Kretschmer, 2009). The cannibalization effect is supported by a research from Dialogic in 2014, showing evidence for the replacement effect. This report shows that around 80% off new FttH subscribers in the Netherlands come from copper (DSL) networks and only 20% comes from cable (DOCSIS 3.0) providers (Dialogic, 2014). Taking into consideration the market share of around 80% of KPN on the Dutch DSL market, it can be argued that KPN is sensitive for this replacement effect.

Paradoxically, the incumbent DSL operators are supposed to be in the best position to make a fiber investment (Oxera, 2011). Cable operators do not invest in FttH since their investment in DOCSIS 3.0 has given them an advantage over DSL, allowing for bandwidths of more than 100Mbit/s. Their network is effectively completely fiber, only the last connection from the cabinet to the premise is still coax/cable. Therefore DOCSIS 3.0 services are considered a next generation network and are competitive with DSL and FttH. This leads to the incumbent operator being the only one left with enough cash flow coming from legacy DSL networks to invest in FttH.

4.1.3 Conclusion on FttH issues

Research on FttH rollout specifically addresses the impact of regulation and legacy infrastructure as determinants towards FttH rollout. This paragraph will provide an answer on sub question 2. ***"What are the current developments in the FttH landscape?"***

Factor	Description
-Regulation	-Unbundling obligation is correlated negatively to FttH rollout
-Replacement effect	-Legacy infrastructures withhold incumbent operators from rolling out FttH networks -'Cannibalization effect'

Table 4.1

Regulation is shown to significantly impact the rollout efforts of FttH. Unbundling appears to be delaying investments in FttH, motivating telecom operators to opt for a wait and see strategy. Comparing the US and European Union, with FttH rollout in the US to be at the forefront, shows that the main differentiator is the lack of unbundling obligation in the US.

The replacement effect is concerned with the impact of legacy infrastructures that are in place. The revenues from the legacy networks are cannibalized when incumbent operators decide to rollout FttH. Therefore FttH rollout is considered to be restrained by legacy infrastructures.

4.2 Project Finance

Since project finance in is represented as possible option to fund FttH rollout, this chapter will address the project financing method. In this chapter sub question 3 will be address. ***"What are the characteristics of project finance?".*** An answer will be provided by defining what project financing is, who is involved, the financial structure, cash flows, important ratio's and general advantages and disadvantages of project financing.

4.2.1 Project finance definition

The definition of project finance is as follows: "raising funds on a limited-recourse or nonrecourse basis to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested" (Finnerty, 2013).

This definition indicates several important features about project finance, four distinctive features of project financing are as follows (Kayser, 2013):

1. The purpose is the construction of an asset within an arranged amount of time and budget, usually debt financed. The debt and its interest are repaid after the asset goes operational; cash flows coming from the asset will be allocated to the investors.

2. The second key aspect from project financing is that the funds will be invested in a 'special purpose vehicle' (SPV), which keeps the asset and the invested debt on its balance sheet.

3. The third feature is that at least two parties are involved. The first party, called the sponsor, initiates the project, can be a shareholder and raises the funds from a second party. This second party funds the project with financial instruments like bonds or loans (debt funding).

4. Debt providers only have a claim on the assets of the SPV and not on other assets from the project sponsors. This type of funding is called non- or limited- recourse funding.

Whether a project is viable for project financing depends on how well a project can satisfy the project's long-term lenders and equity investor's demands on technological feasibility, economic viability and the creditworthiness of a project (Finnerty, 2013).

1. The technical feasibility is concerned with the rationale of the technique behind the project. Is the design of the proposed project viable, is it a proven technology or is it suitable for a large scale operation. These questions need to be fulfilled, often project sponsors attract outside experts for an independent opinion on the technological feasibility of the proposed project.
2. The economic feasibility is concerned with the profitability of the project. A positive NPV is required for a project to be initiated. The NPV depends on whether the present value of future cash inflow exceeds the cash outflow required for construction. To evaluate whether the future cash inflows are sufficient, a marketing study can be applied. Will future demand be enough in order to justify significant investments in producing the output?
3. The creditworthiness of a project is the third condition required for overall feasibility. Since there is no operating history, project financing involves setting up new projects; the project requires

testing on creditworthiness. Is the project capable of servicing debt from its cash flows? Factors involved are the value of the assets, projected profitability, the debt/equity ratio and possible commitments by third parties.

Overall, in order for a project to be feasible, the technical, economical and creditworthiness needs to be sufficient in order to arrange project financing.

4.2.2 Involved parties

Within project finance there are often only a limited number of parties involved. The following figure shows how a typical project finance structure could look like (Kroon, 2014) (Gatti, 2008) (Finnerty, 2013).

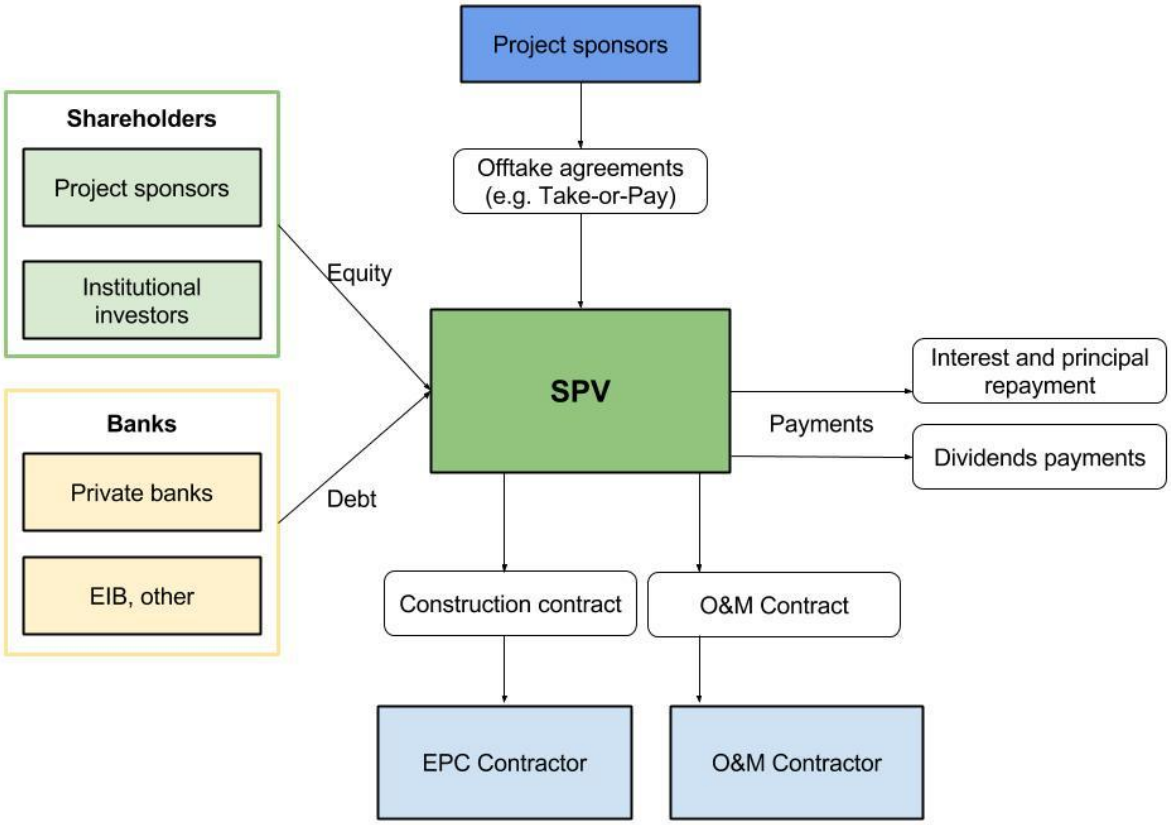


Figure 4.1 Project finance layout

-Project sponsors

Project sponsors are the initiators of the project. Sponsors can be industrial sponsors, i.e. firms which are active or linked to the type of project to be initiated. Governments are also related to project financing, often realized via so called “public private partnerships” PPP’s. Governments are using project financing to realize big public works as for example highways or hospitals. Governments often grand concessions which are ways of ensuring cash flows to be directed to the investors. In the case of the highways the concession to levy a toll is granted to a private party that in turn can use the revenues to get a return on the investment (Gatti, 2008). Industrial sponsors

-Project financial advisors

These are so called advisors. These parties typically arrange project financing deals. Lead arrangers take care of the contact between the involved parties and take care of arranging the deal. Financial advisors are approached by project sponsors in order to evaluate possible deals, structure the deal and consequently help with arranging the project's funds.

-Legal advisors

Due to the nature of project financing, the legal advisors are of significant importance. Structuring the project on a non-recourse basis means there is no room for error. For creditors and also for sponsors it is crucial to structure the deal right, income of the project only exists on paper in the future. The legal advisors are capable of guaranteeing the link between the current investment and the future cash flows.

-Private banks

These are the banks providing the majority of the debt facility for projects. These are banks that are willing to fund projects with debt. This debt is often subject to covenants, ratios often involving the capability of the project to service its debt costs (interest and principal repayments). Ratios like the debt service coverage ratio (DSCR) and the Loan Life Coverage Ratio are commonly used in project financing. These ratios will be covered in 4.2.9.

-Institutional investors

Institutional investors, pension funds and insurers, are the parties that are willing to take an equity stake in the project. Pension funds and insurers have substantial amounts of equity capital at their disposal that they are willing to invest in projects if they are satisfied with the offered rate of return. Of importance to these investors is the long term aspect of project financing. Pension funds can have their own restrictions when it comes to the minimum coverage they are required to make. Legislation or internal regulation on required returns can prevent them from investing in projects that are too risky.

4.2.3 Sources of capital

The sources of capital can be logically deducted from the involved parties. However this paragraph provides a short overview on the type of funds commonly used in project financing. The percentage of funds are historically seen divided as follows: funds provided by equity is around 30%, from debt by bank loans is around 47%, bonds provide another 9% and development agencies provide around 14%.

-Equity; often the project sponsors are responsible for the biggest share in equity. Other equity providing parties often involved in project financing are the purchasers of the projects output or other institutional investors like insurance companies or pension funds (Finnerty, 2013). Shareholders of the project are entitled to the dividend that a project can distribute.

-Debt; often funded by commercial banks but also by institutional investors. Important is the long-term aspect of debt used in project financing. Commercial banks and institutional lenders are dominant in the project financing since the size of the issued debt is relatively big (in order for project finance to become attractive) and therefore parties with substantial funds are required. Also,

as mentioned before, the complexity of project financing requires parties with sufficient knowledge on the subject, found at commercial banks and institutional investors. Debt is often issued with a fixed interest rate by pension funds where commercial banks can supply debt with a fixed or floating interest rate. Debt financing is often provided in multiple “tranches” to the SPV. First and biggest part of debt financing consists of the “base facility”. Additional tranches of debt are possible, but also need to be contractually arranged.

-Bonds are another common form of funds for project financing. Bond financing is not as widely used as debt since financial investors will require at least one rating on the bond by a debt rating agency like Standard & Poor’s or Moody’s. However, having a bond being checked by a rating agency does reduce the problem of the principal – agent conflict. Since rating agencies dig through the contracts related to the project, assess the economic viability and the capital structure of the project, this is seen as a method that reduces the agency cost.

4.2.4 Capital structure

In line with the abovementioned advantage, a capital structure with higher leverage is possible under project financing. The intention with project financing is to achieve the highest possible leverage ratio, this is as high as the cash flows from a project can support. Overall leverage ratios for projects financed between 2002 and 2012 is found to be at debt levels of around 80% (Finnerty, 2013). Differences occur between sectors, with the telecom sector having even an average of 86% debt financing and a median of 100% debt financing. Leverage is however not maintained during the lifetime of a project. When the cash flow becomes positive the cash is allocated to pay debt charges, which includes interest and repayment. Often the loan contracts are such that debt is fully repaid at the end of the project lifetime. Debt repayment thus causes the capital structure to change and leverage to go down during the lifetime of the project.

As is elaborated in paragraph 3.1.5 concerning IFRS, equity from investors, other than the purchaser of the projects output, needs to be high enough so that risk and rewards are sufficiently shared. In project finance it was common to see equity provided by the parties which purchase the output of the project entity. However due to a change in 2009 in accounting standards a project entity has to be consolidated on the balance sheet of the purchaser, which is often under an off-take agreement, if the purchaser is subject to the majority of the economic risk of the project (Finnerty, 2013). So in order for a SPV not to be consolidated on the balance sheet of the purchaser requires equity from investors other than the purchaser. The equity percentage by equity investors needs to be set high enough so that the purchaser of the output does not have to consolidate the SPV.

In order to test if a proposed capital structure is agreed upon by the lenders and equity sponsors, the following scheme in figure 3.2 can be used to identify the optimal

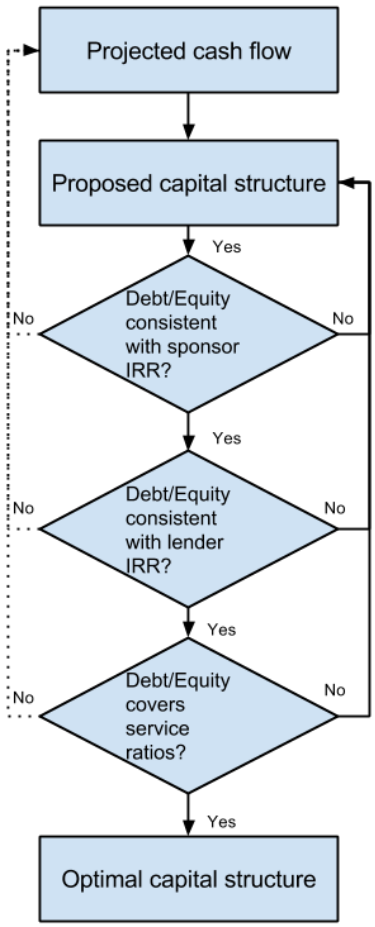


Figure 4.2 Capital structure decision tree

capital structure. Project sponsors require a return on capital invested which matches the degree of risk they are taking, hence sponsors IRR is used. If the proposed debt/equity settings leads to a lower than desired IRR, the capital structure needs to be changed. The same holds for the lenders IRR and their demands on debt service coverage ratios. The debt coverage ratios will be covered in paragraph 4.2.9.

If changes are required on the projected cash flow in order to meet IRR and ratio demands, this probably means the assumptions about the project cash flow are not adequate or that the project is not viable at all. Therefore changing the capital structure in order to meet these demands is the preferred method. It requires financial modeling to achieve the optimum debt/equity structure, depending on the demands of equity and debt providers.

4.2.5 Discounted cash flow analysis

The projected cash flows of a project finance structure ultimately decide whether a project is economically viable or not. Projects usually involve the purchase or construction of tangible assets with a considerable service life. When considering initiating a project it is important to analyze what the future cash flows turn out to be in relation to the cash outflows required for construction.

An important factor is the timing of these cash flows, significant cash outflows commonly occur during the early years of the where cash inflows are often further away and therefore more difficult to estimate. Therefore a discount rate is needed to calculate the net present value of a project, in order to correct for riskiness. In the end the objective is to initiate projects which have a positive NPV, therefore modeling the cash flows is important (Finnerty, 2013).

Since project finance is on non-or-limited resource bases, lenders can only put a claim on the projects cash generation which exist only on paper.

Waterfall model:

Commonly used in project finance is the cash flow waterfall model. This model allows for easy insight into the mechanisms of project finance and a quick view on the cash flow that is addressable to debt service (CFADS). Calculating cash flows based on their seniority will present the cash flow from top to bottom as can be seen in figure 4.3. The waterfall model starts with revenue which is followed by the project's expenses. Capital expenses, operating expenses, taxes and debt service costs (interest and principal). Capital expenditures will only be relevant in the construction phase of the project, when the project is in operational phase these expenditures will eventually go back to zero.

Modeling the cash flow via the waterfall method allows for a fast estimation on the debt capacity the project can support (Powell, 2014). The debt capacity of a project furthermore depends on the required coverage ratios that the debt providers demand. The coverage ratios are described in the following section.

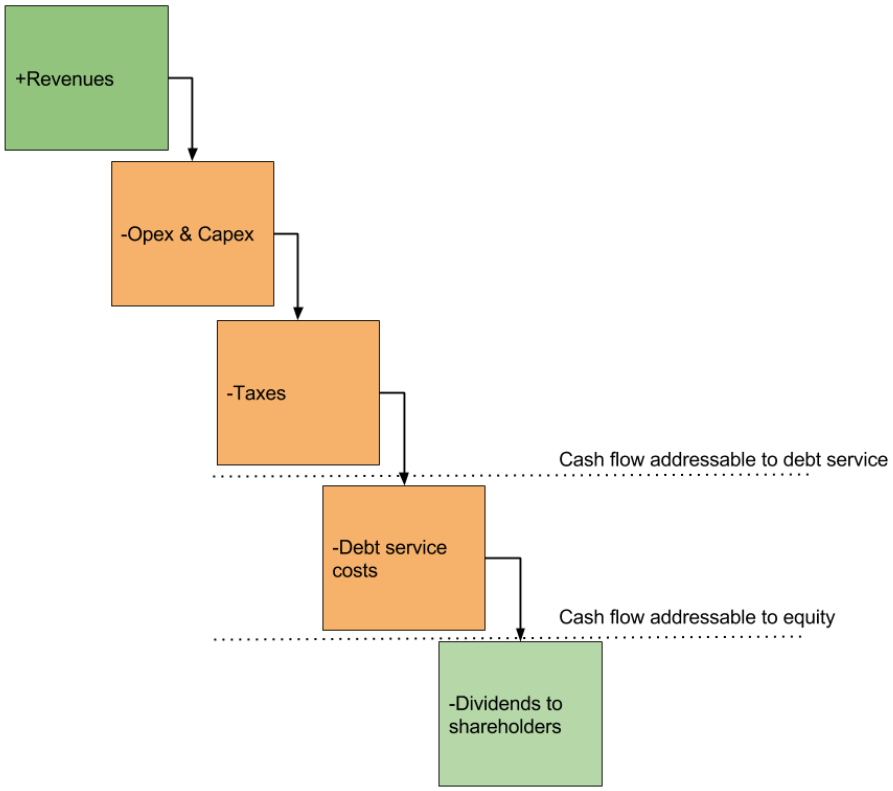


Figure 4.3 Waterfall cash flow model

4.2.6 Coverage ratios

Once there is an indication on the project's cash flow determined by the waterfall model, an assessment can be made on the coverage ratios of project debt. Due to the non-recourse aspect of debt within project financing, it is important for both sponsors and lenders to identify how sustainable the projected cash flow is. Debt holders will be focused on the capacity of a project to pay its interest and principal costs. That is why within project financing there is a focus on the 'coverage ratio's'. These ratios give an indication of the financial sustainability of a project and more specifically the project' capital structure (Gatti, 2008). These ratios are no indicators of profitability for the lenders, therefore the abovementioned IRR is used which can be computed for lenders and sponsors separately.

- *Debt Service Coverage Ratio (DSCR)*

$$DSCR = \frac{Operating\ cash\ flow}{Debt\ service\ costs}$$

Cash generated by the project is attributable to debt service payments. Debt service costs exist out of an interest and a principal component. In order to measure how well the project can pay off its debt service payments is defined in the Debt Service Coverage Ratio (DSCR). This ratio indicates for any given year of operation the ability to pay off debt service costs in that year. If the value of this ratio equals 1, the cash flow the project is generating is exactly the amount what is needed to pay off debt service costs. However, no cash flow remains for the sponsors and this level of coverage would neither be accepted by lenders. DSCR levels below 1 are not acceptable, the project is effectively in default in this situation (Gatti, 2008) (Finnerty, 2013). The debt service coverage ratio is useful when

designing a project. Setting for example a minimum DSCR ratio of 1.2 for each year provides an indication on the amount of debt the project is capable of supporting or the amount of revenues that is needed to cover the debt service costs at a DSCR at 1.2. R

- Loan Life Coverage Ratio (LLCR)

$$LLCR = NPV \frac{CFADS\ over\ loan\ life}{Outstanding\ debt}$$

The loan life coverage ratio is another commonly used ratio within project finance. This ratio represents the number of times the cash flow can repay the outstanding debt at that moment. The cash flows during the debt loan life period are discounted to present value; commonly the cost of debt is used as discount rate (Wärnelid, 2008). A LLCR ratio whit a value greater than 1 represents a cash flow which is greater than required for upcoming debt service costs. Thus the net present value of the revenue is equal to the outstanding debt in that period. In other words, a value greater than 1 represents free cash flow available for the project's sponsors. However, as with the DSCR ratio, a value of 1.2 or higher is considered healthy.

Commonly the DSCR as well as the LLCR ratio are required to be higher than 1 in order to have a buffer for risks that could endanger the project' cash flows in the future. Risks affecting project financing are covered in the next paragraph.

4.2.7 Project finance risks

Risks in project financing form an important aspect when arranging the project. Since project financing is on a non recourse basis, it is important to assess for all possible risks that endanger the cash flow. Due to this non recourse basis, lenders would require most of the risks to be transferred since the cash flow generated by the project is the only revenue stream where the creditors have recourse on.

Project financing is therefore often referred to as a "risk management technique" or "contract financing" due to this specific characteristic of non-recourse.

If project financing is to be successful, all the risks that a project encounters need to be analyzed. Managing risks in project finance is important since any change in for example construction time or project cash flows will influence the ability of the project to pay for debt services or dividends. If these risks affect the cash flow too much, the possibility exists that the project will enter default.

Generally the involved risks in project finance can be categorized as follows:

- The construction phase
- The operational phase
- General risks that apply during construction and operation

As the matrix in figure 4.4 shows, project financing in the telecom sector is especially concerned with market and/or technological risks (Gatti, 2008). These are the main risks in project financing during the operational phase of the project. Project construction risks occur prior to the operational phase of the project and are further elaborated in the following paragraph.

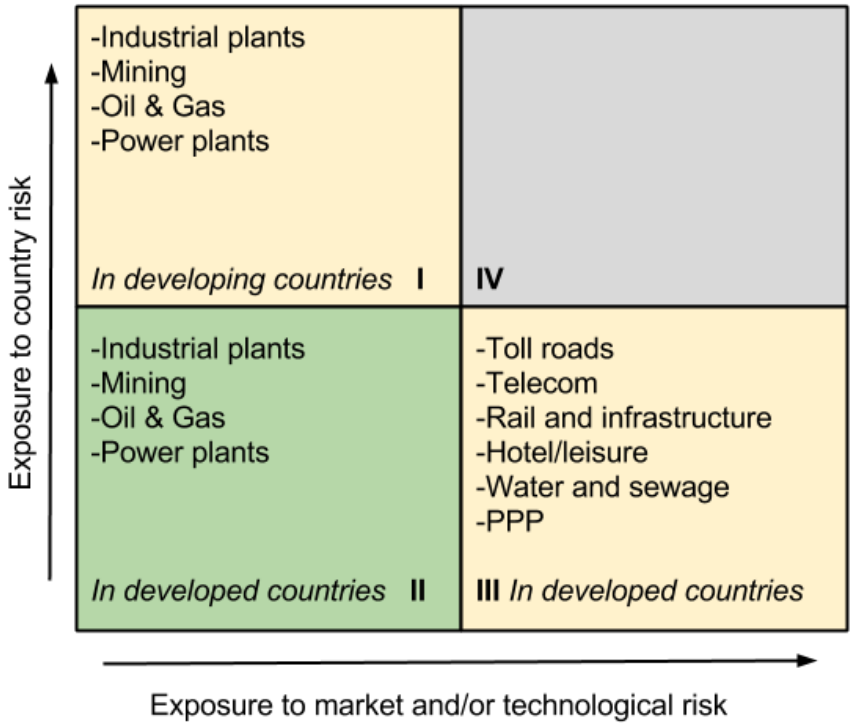


Figure 4.4 Risk matrix

4.2.8 Construction phase risks

Construction phase risks consists of industrial risks, occurring before the project commences. The most common construction risks are the completion risks and the technological risk.

-Completion risk: the risk that a project might be delayed or not be completed at all. The completion risk consists of a monetary and a technical risk.

-Monetary risk; the risk that is concerned with the project's costs. Construction costs may turn out to be higher than estimated. For example a higher inflation rate, higher than budgeted costs or shortage of supplies can cause an increase in the capital expenditures required to complete the project. Also if the prices of the projects output or input alter, this can endanger the viability of the project. Lower output prices combined with higher input prices can turn the project into a loss. If the costs for completion turn out to be e.g. 50% higher than budgeted, this can have a big impact on the projects financial viability, a 50% cost overrun can easily exceed the total amount of equity invested in a project.

-The technical part of the construction risk mainly concerns planning mistakes and technical miscalculations. If key activities are unexpectedly delayed. Another possibility is that a project, despite being properly examined by experts, turn out to be technically infeasible during the construction.

The completion risks are especially important for lenders since these parties do not want to be the creditor of an unfinished project that is incapable of generating cash. Lenders will often take measures to secure their investment when the completion of the project is at risk. Therefore lenders

will not accept significant completion risks and will force the construction to be done by an experienced construction firm, using proven technologies and imposing quality standards with performance tests (Finnerty, 2013) (Gatti, 2008) (Kroon, 2014). Another possibility is that project financing is applied to already constructed assets under turnkey agreements i.e. the project being transferred in a completed state.

4.2.9 Operational phase risks

Risks that occur after project completion are important since the impact of these risks can influence the cash flow during the lifetime of the project. In turn these risk influence the capability of the project to generate cash for debt service repayments and dividends. Risks that occur during the operational phase are the operational risk and the economic risk.

-The operational risk involves operating difficulties after completion. The operating efficiency might drop more often than expected due to e.g. quality of supplies, reliability of equipment or human errors; these can affect project' viability after completion. In order to reduce these risks lenders will insist that there is a conservative approach on input variables and operating levels when planning a project.

-Technological risk. The referred risk here is that of the state of the used technology. The asset may become obsolete after completion. This risk after completion is highly important in sectors where the technology is evolving quickly. Projects in sectors like the telecom sector involve state of the art technology; therefore the technological risk is especially important in such sectors. Project sponsors typically do not want to bear any technological risk and only fund a project with proven technology confirmed by independent experts.

-The economic risk will only become fully apparent during the operational phase of the project. Upfront market analyzes are generally conducted, however how demand for the SPV's output will turn out will become clear after the project is completed and operating. The cash flow generated by the project might turn out to be lower than expected due to demand or other market related issues. This in turn will lead to a lower return on equity or even difficulty on fulfilling the debt service costs on the project's debt. The impact of revenue or price fluctuations will depend on the assumptions being made on the project economics. Since project finance often involves setting up a new firm, there is no history on past performance. Therefore lenders and equity providers cannot base their decision, whether to fund or not, on project's history and will require other measures to ensure that debt service costs and a return on equity are met.

Methods to reduce the economic risk often involve off-take agreements. These off-take agreements can take several forms:

- Take-if-offered

This contract forces the purchaser to accept the output of the SPV and pay for it. There is no payment required when there is no output delivered or if the project is unable to deliver the products. This contract only protects the lenders when the SPV is operating at a level at which it is capable of servicing its debt costs.

- Take-or-pay

The most common found off-take contract is the take-or-pay contract (Gatti, 2008). This forces the purchaser of the output to pay for the output, regardless of taking the output. As with the take if offered contract, this contract only protects lenders when the SPV operates at a level capable of servicing debt costs. However, the take-or-pay contract is different from the take if offered contract in that it does not force the purchaser to take delivery.

- Hell-or-High water

A hell or high water contract is similar to the take-or-pay contract but forces the purchaser to pay, even when no output is produced. Payment is required in all circumstances. Hell or High water contract offers better protection towards lenders but is less common in large projects (Finnerty, 2013).

4.2.10 Scenario analysis

The scenario analysis can be conducted when an assessment is made on the risks that affect the project. Scenario analysis is a form of sensitivity analysis which is able of providing an overview on the different outcomes of a project. Scenario analysis generally starts with the most likely case, i.e. the base case. Alternatively a worst case and a best case can be modeled. It is possible to provide a whole spectrum of possible cases by varying the input variables; this can be performed by performing a Monte Carlo simulation. However, this only makes sense for very large projects with a lot of uncertainties. Providing too much scenarios is confusing, therefore a limited number of scenarios is considered adequate (Gatti, 2008) (Kroon, 2014).

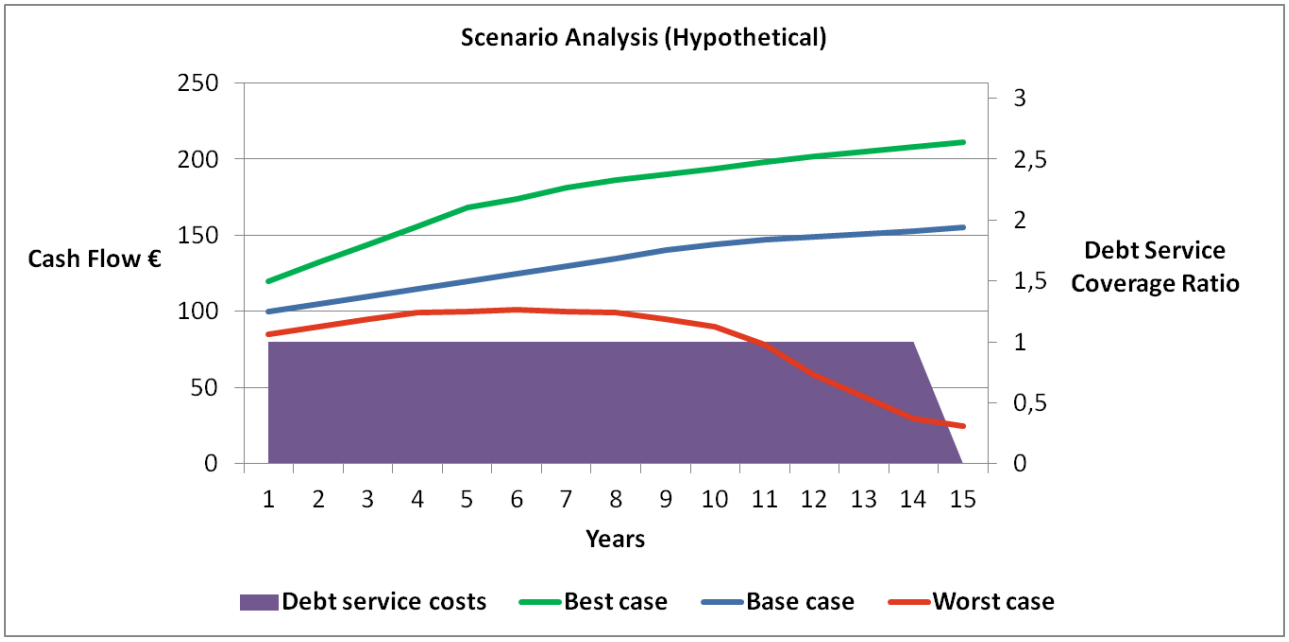


Figure 4.5. Cash flow projections in different scenario's

The scenario analysis allows checking how an output variable like the Internal Rate of Return or debt service coverage ratio will vary when the input variables like revenue, revenue growth, penetration

rate or the debt/equity ratio's differ. This modeling will help in minimizing errors and providing information to stakeholders in project financing. The following figure shows a hypothetical base, best and worst case scenario. In the base and best case scenario the project is capable of servicing its debt costs (principal and interest payments). In the worst case scenario a project is unable to service its debt any longer after year 10 and will be in distress.

4.2.11 Advantages

From the literature general advantages and disadvantages can be distinguished. The advantages are shortly described in this paragraph and the disadvantages in the next paragraph.

Advantages of project financing primarily come from the non or limited-recourse characteristic. The non recourse characteristic is what project financing distinguishes from conventional corporate financing. In conventional lending all assets and cash flows are attributable to the debt holders in the case of financial distress. If one project or asset fails, than lenders can still be paid with cash flows from the sponsor's. In project financing, the project is a separate legal entity which means that only cash flows and assets from this project can be allocated to debt holders. There are more advantages to project financing, most of these benefits stem (in)directly from the non-recourse nature of the used debt (Finnerty, 2013). The most important benefits are as follows:

-Distribution of free cash flow; dividend policies are often recorded in contracts when equity financing is arranged. Free cash flow, which is the remaining cash flow after operating expenses and debt expenses have been covered, must be distributed to the projects equity investors. In conventional financing, where debt is attributed to a company's general credit, the board of directors has discretion to decide to retain, reinvest or distribute the free cash flow. In the form of project financing the board of directors do not have this discretion due to a governance system which is created specific to the asset. This reduces the risk that free cash flow is retained or reinvested without approval of the investors. This reduction in agency costs of free cash flow reduces the cost of equity capital to the project and is considered to be the most important reason why firms use project finance (Esty, 2003).

-Risk Sharing; project financing allows the sponsor to share the risk of a project if more interested parties join the project with equity or purchase the project's output.

-Leverage; due to the nature of project financing the debt capacity is of a sponsor is significantly expanded. Long contracts that ensure that the output of the project is sold and other contractual commitments guarantee that there is adequate cash flow to service the debt. The fact that cash flows are contractually bind to debt service costs allows for higher leverage than under regular corporate financing. Evidence shows that a large number of projects have been financed with debt percentages of 70 or more in the capital mix. So project financing can allow a higher debt-to-equity ratio compared to conventional financing (Gatti, 2008). How much extra debt capacity project financing enables depends on the profitability, type of project, off take agreements by participants etc. This higher leverage ratio especially enables projects which would otherwise be too large for the sponsors' capitalization. Projects which would otherwise be too large for conventional corporate financing become possible under a project financing structure.

-Underinvestment; the fact that project finance allows for higher leverage means that it can reduce underinvestment problems. When firms cannot invest in positive NPV project due to the fact that they are already leveraged to their maximum, this is referred to as "leverage-induced underinvestment" (Esty, 2003). Project finance can allocate project returns directly to new capital providers, something which is more difficult under corporate financing. s

-Lower cost of funds; in the case of a long-term off-take agreement by purchasers who have a higher credit rating than that of the project sponsor, the project is able to borrow cheaper than the sponsor could normally do with conventional financing.

-Resolving financial distress; in the case of financial distress, a project finance structure is easier to resolve than that of a regular financed firm. The project capital structure is normally less complex than that of a regular firm, due to the straight forward 1 asset where the capital structure is based on. Also the number of potential creditors is generally less within a project. In regular corporate financing the time and cost required to resolve claims increase with the number of liabilities (suppliers, pension claims, banks, employees etc.). Also the capital structure could become more complex over time in regular corporate financing. Project financing limits the access possibilities that creditors have on the sponsors other assets or cash flows in case of default of the project's debt. However this same mechanism also protects the same project from a defaulting sponsor. This aspect of project financing makes it easier to resolve the claims of the claim owners.

4.2.12 Disadvantages

Drawbacks to project financing are the additional costs it takes to arrange it. Several aspects increase the costs with about 5-10% costs on top of the total investment sum (Gatti, 2008). These costs mainly stem from the complexity of the project financing. Project financing takes more time to arrange due to the contracts that all parties have to negotiate about and agree with. This stems from the fact that debt holders only have recourse to the project and therefore require a thorough project planning. This means that a feasibility research needs to be performed. Due to the complex nature of project finance there is a need for specialists on legal and financial advice in order to perform the feasibility research. In turn specialists are required when the project is actually being initiated. Specialists are however costly and this creates a certain minimum threshold concerning project size. Project financing is only viable when the benefits of the use of project finance exceed the extra costs incurred with specialists.

Loss of control is another drawback. Since IFRS accounting standards requires setting the equity percentage by other parties than the sponsors high enough to prevent consolidation. However, in turn this implies the loss of control over the asset. The details of control and consolidation will be described in chapter 4.3 IFRS Accounting standards.

4.2.13 Sale & Leaseback

As mentioned in paragraph 2.7 Research Scope, literature beyond the project finance is covered. Due to the individual, over the counter nature of project financing it is indicated that . This is in line with the following statement made in a commented bibliography on project finance: “the specific, highly individualized nature, of project financing deals makes it difficult to collect enough empirical data” (Kayser, 2013). In turn it is difficult to generalize what the effects of initiating a project financing deal will be on a firm. Another off balance financing method often compared to project financing is the sale and leaseback construction. Sale and leaseback literature provides additional insight in the motivations and effects behind selling an asset. Effects of sale and leaseback will not be completely similar to the effect of project financing but an assumption is made that the effects are comparable.

First of all, leasing is in the financial literature considered to be indifferent to debt; every dollar of leasing is supposed to be a substitute for a dollar debt capacity (Slovin, Sushka, & Polonchek, 1990). Some authors do report a difference in debt capacity due to better repossession possibilities for leasing versus corporate financing (Eisfeldt & Rampini, 2009).

The benefit of leasing is often addressed with the indifference proposition from Modigliani and Miller, stating that firm value is independent on the type of financing (Sharpe & Nguyen, 1995). This proposition holds when there is a fully competitive/efficient capital market, i.e. no transaction costs and no information asymmetry. When tax differences do exist between the lessor and lessee it is argued that leasing is beneficial for both parties. This is the case when the lessee’s tax rate is lower than the lessor’s tax rate, also called the “tax-arbitrage argument” (Elayan, Meyer, & Li, 2006). This argument is commonly supposed to be the main argument in explaining the benefits of leasing (Slovin, Sushka, & Polonchek, 1990) (Grönlund, Louko, & Vaihekoski, 2008) (Sharpe & Nguyen, 1995).

The positive effect of sale and leaseback transactions is supported by a large pan-European study performed on 142 sale and leaseback announcements between 1998 and 2004. This study found that “sale and leaseback announcements have on average a positive impact on firm’s value” (Grönlund, Louko, & Vaihekoski, 2008). Debt announcements are associated with negative market reactions versus positive market reactions for leaseback constructions, indicating that a sale and leaseback construction is beneficial for shareholders (Grönlund, Louko, & Vaihekoski, 2008). Additionally stated is that the higher the transaction value is compared to the firm value, the more positive the effect would be. Also for firms under capital constraints or high costs of external capital, leasing becomes a more attracting option. Overall a sale and leaseback transactions are considered to be positive.

However, the motivation behind this positive effect appears to be more than only a tax benefit. Several authors find evidence for the hypothesis that a leaseback construction reveals "hidden value" of the sold asset to the market. These benefits are often related to “hidden value” of assets, information about the asset is ought to become better available when firms decide to enter a sale and leaseback construction (Slovin, Sushka, & Polonchek, 1990). Information which is normally locked into the company as a whole can be untied when the asset is split from the firm; this allows the market to better value the asset independently. Cash flows can be better linked to the asset and this makes the asset easier to valuate. This view is supported by a study on Real Estate Investment Trusts (REIT). These are firms which effectively pay no tax but have to distribute >90% of their income as dividends and only hold real estate assets. REIT type of investment vehicle is also available to the telecom industry as the Windstream case in the United States shows. Windstream is a telecom

operator who decided to divert its network assets into a REIT. For this type of firms the tax motivation argument is not applicable, since a REIT pays less tax than the original owner / new lessee. However, as it turned out, sale and leaseback announcements with REITs generate also a positive market reaction. An explanation for this effect is down to the fact that firms which are subject to greater outside monitoring, like the REIT, experience a positive reaction due to lower expected agency costs (Elayan, Meyer, & Li, 2006). This view supports the agency cost motivation related to project financing.

Sale and leaseback literature indicates that selling the asset can be beneficial for assets . With as most compelling argument behind sale and leaseback the "hidden value" motive and the removal of agency costs. When an asset gets separated from a firm, investors are better able to judge the earning power of an asset.

4.2.14 Conclusion on Project Finance

The characteristics of project finance have been described in this chapter. Table 4.2 provides an overview on the aspects that influence the project financing issue. This will provide an answer to sub question 3: ***"What are the characteristics of project finance?".*** Project financing involves multiple parties which all have their own requirements on factors like the capital structure, coverage ratios and project related risks. Requirements on these aspects eventually determine whether project financing is an attractive way of financing this network. Therefore data needs to be collected at external parties, identifying how the involved parties view the FttH network, what are their perspectives on FttH project financing and what are their demands.

Factor	Description
-Technological risks	-Importance -Impact - What requirements will be made on transferring this risk
-Economic risks	-Importance -Impact -What requirements will be made on transferring this risk
-Funding	-Requirements on funding, what are the demands of institutional investors when investing in the FttH network regarding: -Capital structure (Debt/Equity) -Coverage ratios

Table 4.2

4.3. IFRS accounting standards

This paragraph will provide an answer on sub question 4: ***"How do IFRS accounting rules limit the possibilities of off-balance financing?"***. A short literature review on the IFRS regulation concerning consolidation of subsidiaries is presented.

In 2011 new IFRS regulation on the subject of consolidating subsidiaries was issued in IFRS 10 and IAS 27 "separate financial statements" and IFRS 12 "Disclosure of interests in other entities". IFRS chapter 10 "Consolidated Financial statements" combines the IAS 27 en SIC 12 chapters off IFRS and "addresses the accounting for consolidated financial statements" (EY, 2013). IFRS chapter 10 is most relevant for this study as this will address when a parent company is required to consolidate. Chapter 12 is concerned with how interests, subsidiaries and joint ventures need to be disclosed and what the requirements for disclosure are.

IFRS 10 introduced a model which is based on the factor control. IFRS 10 requires an entity to consolidate its investee when the entity has control over that investee. The definition of control consists of three elements (BDO IFR Advisory Limited, 2014):

- Power over the investee
- Exposure to variable returns
- Ability to use its power over the investee in order to affect the investors amount of return

An investor is a parent of the investee when all of above elements are met. These elements are consecutive; therefore determining whether a parent controls an investee starts with determining the parent has power over the investee.

A parent has power over an investee when it has the ability to manage the relevant activities of the investee thanks to the existence of rights over the investee. Two key concepts can be deducted: relevant activities and existing rights. Activities are relevant when they significantly affect the return of the investee. Relevant activities are for example appointing key personnel, changing financing policies or acquiring or selling assets.

When the relevant activities are identified, the following step would be to decide which investor has the ability to manage the relevant activities. This can stem from voting rights linked to

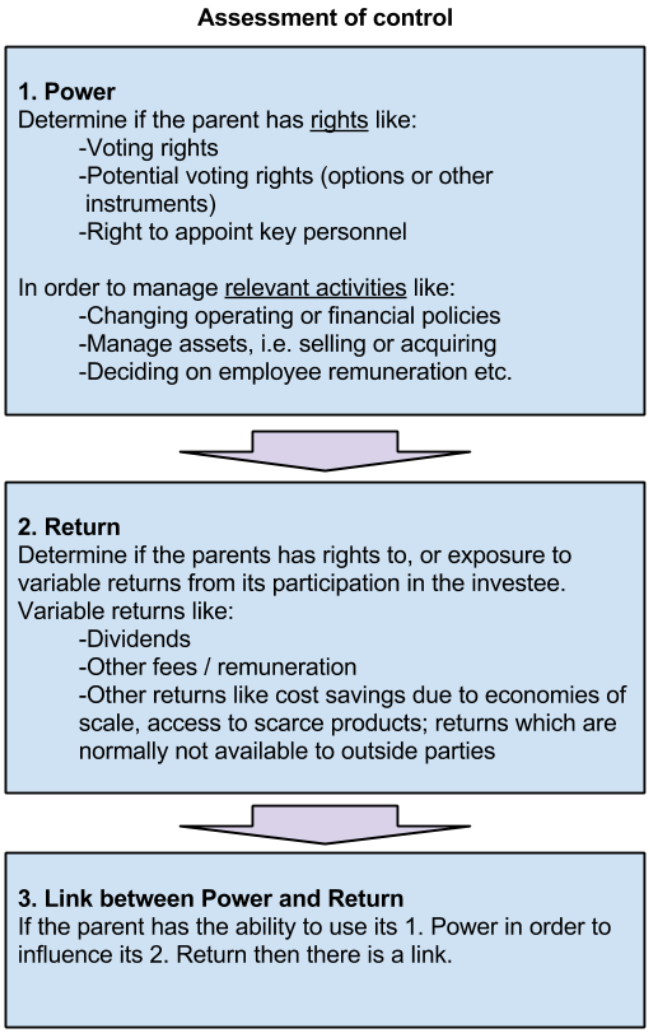


Figure 4.6 Consolidation determinants

shareholding in the investee, but can also be entrenched in contracts.

The second criterion is the exposure of the investor to variable returns of the investee. Variable returns include e.g. dividends, fees or other remunerations but also less tangible benefits like economies of scale or access to scarce supplies/products. The focus is on variable returns since these are interesting returns to influence when exposed to it. Exposure to variable returns is an incentive for an investor to obtain power over the investee. However, having exposure to variable returns alone does not determine if the investor has control. Therefore the next criterion, the link between power and return is the following step.

The third criterion combines the preceding two criteria. It is important that the power the parent has over the investee can be addressed to influence the amount of return it gets from the investee. An important consideration is the principal or agent position the parent has in this situation. If the investee is engaged as an agent, i.e. acting under control of a principal, the parent is not required to consolidate. If however the investee is engaged as the principal, it is required to consolidate (BDO IFR Advisory Limited, 2014).

Simply put, if the parent has the power to control the majority of relevant activities of an entity and with that has the possibility to affect its own return, it is required to consolidate. Also the relevant activities can be directed by contractual arrangement, it is necessary to assess these contracts as well when determining power. A simple indicator of control is a 50% or more equity stake in the investee. Therefore, in order to prevent consolidation, the parent should own less than 50% equity

Summarizing this chapter will provide the answer on sub question 4: ***"How do IFRS accounting rules limit the possibilities of off-balance financing?"***

It is clear that an off-balance financing situation will imply the loss of power over the network. It is no longer possible in an off-balance situation to direct the relevant activities of the network; appoint key personnel, changing financial or operational policies etc. In order to prevent consolidation, the investor is entitled to either a minority equity interest or no equity interest at all. This view is also supported by the project finance literature, stating that the purchaser of the project' output should not own a majority of the equity. The equity stake by other investors should be high enough to prevent consolidation. So off balance financing is possible, but does imply a loss of control.

Factor	Description
-Control	-Power over relevant activities -Exposure to variable returns of the asset -Link between power and return, i.e. is the entity capable of influencing an asset that the entity is exposed to in the form of variable returns.

Table 4.3

5. Case study analysis

In the previous chapters there are several issues identified and summarized in table 5.1. Data from external sources is required in order to get a framework which leads to an assessment on the advantages and disadvantages of project financing.

Factor	Description
5.2. Regulation	-Unbundling obligation is correlated negatively to FttH rollout
5.3. Replacement effect	-Legacy infrastructures withhold incumbent operators from rolling out FttH networks -'Cannibalization effect'
5.4. Technological risks	-Importance -Impact - What requirements will be made on transferring this risk
5.5. Economic risks	-Importance -Impact -What requirements will be made on transferring this risk
5.6. Funding	-Requirements on funding, what are the demands of institutional investors when investing in the FttH network regarding: -Capital structure (Debt/Equity) -Coverage ratios
5.7. Control	-Power over relevant activities -Exposure to variable returns of the asset -Link between power and return, i.e. is the entity capable of influencing an asset that the entity is exposed to in the form of variable returns.

Table 5.1

5.1 Introduction

In order to get an answer on the indicated issues, several interviews were conducted with parties related to project finance. This chapter is dedicated to analyze the viewpoints of the interviewed parties. The data collection started within Reggefiber. Interviews were held with persons well known with the subject. Starting with the treasurer, group controller and CFO of Reggefiber. Furthermore an advisor at a lead arranging bank was interviewed in order to collect opinions on the identified issues and the suitability of project financing for the FttH network. An interview with the treasurer from the corporate finance department of KPN provides evidence from KPN's point of view. Interviews with institutional investors from the Netherlands provide insights on their possibilities and demands related to a hypothetical situation in which they finance the FttH network. For an overview of the interviewed parties see table 2.2.

5.2 Regulation

The impact of regulation is in the literature pronounced as a significant factor that influences the FttH rollout. Also in the Netherlands the impact of regulation is a sensitive subject within the telecom industry. There is an ongoing discussion about the decisions being made by the ACM to let the cable operator Liberty Global (Ziggo & UPC) unregulated while KPN is forced to grant access to other service providers on their network. Identified at the respondents is how regulation affects their investment decisions and how this influences the FttH business case.

Reggefiber

At Reggefiber there is a consensus of regulation posing no harm to the business case of rolling out FttH. Stated is that the regulation almost plays no role when deciding whether to roll out or not, influencing the business case minimal. Regulation is taken into account but is not leading in the business case. Especially in the point of view from Reggefiber, having more providers competing on the same network is considered positive for the development of the penetration rate and revenue; this is not seen as endangering the business case. The penetration rate is stated to be the key variable in determining whether the business case is positive or not. An open network is considered to be the only method to achieve a high penetration rate. Hypothesized is the statement that eventually the cable operators may opt for entering the FttH network when their cable networks become obsolete. Cable operators will then have two choices. Either "fiber" their last meters to the premise or choose to go with the Reggefiber network. Eventually the cable providers are mentioned as customers in the end game as well, when the cable can no longer be stretched with DOCSIS upgrades, it may be better to opt for a single line of data infrastructure. Therefore the unbundling obligation is not seen as negatively impacting the business case at Reggefiber.

KPN

The treasurer of KPN however poses a different image. Pointing out that the ODF tariff is for example subject the regulator has the power to alter this tariff. This ODF tariff is crucial to the business case of FttH rollout, directly influencing the return that will be made on the investment. Another factor is the competition conditions imposed by the regulatory authority. Since the investments under consideration are significant and irreversible. A change in competition conditions should not turn out to negatively affect the investment substantially and is therefore a factor that is taken into consideration.

***Institutional* investor**

Institutional investors stated that regulation is important. Institutional investors are satisfied as long as there is a stable political framework. Comparisons with other utility networks like gas, water and electricity are drawn. These utilities are regulated as well and often the revenue tariffs are allowed to be indexed with inflation rate. Institutional investors are invested in these utility infrastructures as well; regulation does not pose a problem.

5.3 Replacement effect

In the literature the replacement effect came forward. Stating that incumbent operators are hesitant in upgrading to FttH since this will 'cannibalize' their DSL network.

KPN admitted that it want to reduce its capital expenditure by reducing investment in FttH so a link with the replacement effect seems relevant. However, the reduction in FttH rollout is just a temporary setback as it is impossible to do a quick nationwide FttH rollout. Mainly two factors are debit to this strategy. The first explanation is of a practical nature and the second is concerned with strategy.

Reggefiber

The first explanation why the FttH rollout is not realized within a couple of years is of practical nature. There is a limit to the maximum rollout capacity of FttH in the Netherlands (Blecourt, 2014). Contractors in the Netherlands can only fulfill a certain demand concerning the amount of homes to connect in a year, estimated at around 500.000 Homes Passed that is practically possible. The actual amount of Homes Passes has been around 300.000 Homes Passed per year so far. As a consequence, it is impossible to do a nationwide FttH rollout in a short time period i.e. less than 5 years. Therefore, Reggefiber is forced to do a calculated and well planned rollout tuned with KPN's DSL upgrades, which leads to the second argument.

KPN

The second reason why not all capital expenditure is flowing towards FttH is the fact that DSL connections are no longer competitive with cable technologies. Where at the same time, customers are becoming more demanding and are no longer satisfied with the speed the current DSL line is capable of providing. KPN, being the main DSL provider in the Netherlands with around 80% DSL market share (Dialogic, 2014), therefore needs to upgrade its DSL offering in areas where FttH is not yet available, in order to maintain customers. VDSL is considered to be a competitive technique with DOCSIS 3.0, where regular DSL is not. Upgrading ADSL to VDSL is less capital intensive and requires less time to roll out compared to FttH. Upgrading DSL to VDSL ensures that there remains a necessary cash flow in order to finance FttH rollout. Furthermore, KPN is limited regarding their financial position. Capital expenditures cannot be stretched limitless and KPN has to conform itself to a long term plan, aligning its capital expenditures with revenues and free cash flow.

Linking the practical factor of maximum rollout capacity with that of KPN's position leads to a different view on the replacement effect. Current DSL lines require an upgrade since a quick nationwide FttH rollout is impossible. Upgrading DSL is therefore considered to be a temporary, but necessary solution in order to maintain customers in areas where there is no FttH rollout pending. This in turn ensures the presence of a cash flow required to continue rolling out FttH. Since the incumbent is seen as the only logical party capable of rolling out FttH nationally, this is for the incumbent operator the only viable way.

5.4 Technological risks

As indicated in the literature review, technological risks are able to pose a threat to the viability of a project. The respondents were asked as how they perceived the technological risk, if at all present. If the risks are present, what the impact is and how the risk could be mitigated.

Lead arranging bank

The findings of the arranging bank research on project financing FttH networks were among others that FttH networks are suitable for project financing. However, technological and economic risks turned out to be too substantial in order to proceed with project financing. The main conclusion is however that this type of network is in their opinion future proof and could therefore be an interesting asset for institutional investors.

Institutional investors

The institutional investors agree upon the technical viability of the FttH network. As a senior infrastructure investment manager from a pension fund mentioned: “the FttH market is interesting due to the future proof characteristic of the network”. The technical feasibility is further confirmed by stating that due to the “long-lived aspect of the network and its associated cash flow” it is an interesting asset for a pension fund to invest in. From the second institutional investor there was another confirmation on the technical feasibility of the network, comparing the telecom infrastructure with real estate fixed assets. Concerning fixed line infrastructure it is regarded as the ‘end game’ in telecom and certainly an interesting asset.

KPN

KPN has the same opinion on FttH networks as the abovementioned parties; being a future proof technique. That is the reason why KPN is investing in the rollout of FttH and see it as the follow up technique on DSL/VDSL. However, KPN does see the presence of a technological risk. The technological developments on VDSL can turn out to be adequate enough in order to fulfill the foreseeable demand. This could render the FttH business case negative in the short run. In the end it is the infrastructure to opt for; however its value is weighed against that of upgraded DSL networks which still has some viable years of operational life left after upgrading.

Another technological risk that could pose a threat is the continuant improvement of mobile network capabilities. Mobile network possibilities and its capacity keep improving and can act as a substitute for fixed networks in the long run, endangering the FttH and all other fixed lines.

Concluding on the technological risks is that FttH is considered to be future proof by the relevant parties. Main technological risk is the risk of substitutability by other types of networks. For example the DOCSIS 3.0 and also upgraded DSL offerings can pose a threat when these techniques remain capable of fulfilling consumer demands even in the long run. Especially the development of consumer demand towards upload speeds is an unknown factor and this leads to the following paragraph, the economic risk.

5.5 Economic risks

The economic risk is a risk that is often seen as problematic within project financing. As already recognized in the literature review, the economic risk of FttH rollout turns out to be a significant problem when project financing is considered.

Lead arranging bank

The lead arranging bank indicated that the economic risk of the FttH asset is considered to be the biggest risk towards this project. As is inherent to project financing, the economic risk needs to be laid out in contracts or secured/transferred otherwise. Concessions and off take agreements are mentioned as instruments within project financing. These contracts are required in order to reduce the economic risk of the equity sponsors.

Reggefiber

Reggefiber admits that the main risk of the FttH rollout is the uptake or penetration rate of the network. The mentioned variable that affects the business case the most is the uptake or penetration rate. Reggefiber states in their annual report the following: “our main operational risk is the penetration rate” (Reggefiber, 2013). The economic risk is reflected in the fact that Reggefiber, before KPN became in control, previously needed take-or-pay contracts from KPN in order to get access to large-scale debt financing from the capital market. Banks were hesitant to provide debt financing towards Reggefiber due to the demand risk attached to the FttH network.

Another technique previously used was demand aggregation bundling. A certain percentage of homes in a region were required to take off FttH services from one of the connected Service Providers. The aggregated demand programs had a 30% uptake threshold which had to be reached before the FttH rollout was commenced. So there is a high uncertainty about the business case at Reggefiber as well; uncertainty about (future) demand and a lack of willingness to pay a premium for FttH offerings (higher upload) make it difficult to justify large scale investment.

KPN

Within KPN there is uncertainty about the future development of consumer demand towards symmetrical internet speeds. Arguing that at the moment there is negligible customer demand for especially upload speeds. However, this is the main technical selling point of FttH above competing networks as KPN’s own VDSL. The fact that there is currently almost non-existent demand for high upload speeds, combined with uncertainty about how this demand will turn out in the future, makes that investing in FttH is difficult to justify for KPN. Although the assumption is that in the future this demand will develop, at the moment there is too much uncertainty in order to justify the business case to maximize investments in FttH.

As an instrument to enable project financing, KPN would not like to choose for the use of take-or-pay contracts. However, these take-or-pay contracts do belong to the possible instruments in order to create a viable financing situation. The indicated period as scope for off take agreements is 5 to 15 years, preferably 10 or lower. The longer the lifetime of the take-or-pay contract the higher the risk for KPN will be that there are technological changes or breakthroughs that alter the situation of the project.

Institutional investors

Institutional investors indicated that infrastructure investments are an interesting type of

investments for their portfolio. The characteristics of the FttH asset are comparable to that of other infrastructure, utility type, of investments the institutional investors have in their portfolio. These are fixed assets with a long lifetime, i.e. more than 15 years, and a stable cash flow that shows relatively low correlation with the regular economic cyclicality. The stable revenue flow is the interesting element for pension funds, especially when there is the possibility of indexation of the revenues. The ODF tariff at Reggefiber has the possibility to be indexed every year and therefore fits this particular demand by the institutional investors.

Normally institutional investors invest in an asset that is in a monopoly situation, i.e. no competition on infrastructure level should take place. Examples are the utility types of infrastructure like gas, water or electricity nets, infrastructure which is not duplicated and therefore have a certain demand attached to it. FttH networks on the other hand to compete on infrastructure level with other types of NGA networks. This causes uncertainty on the demand side, where utilities like gas, water and electricity have a more or less guaranteed demand on the networks due to the infrastructure monopoly of these networks.

The economic risk is a risk that institutional investors are not willing to take over completely. Therefore the institutional investors will require the transfer of the economic risk to the party that operates the infrastructure, in this case the active operator(s). Additionally indicated is the preference for sharing this risk between multiple parties. The optimal instrument to share this risk is a take-or-pay contract with multiple parties. KPN is however seen as a credit worthy party, only a take-or-pay contract by KPN is therefore indicated to be a plausible solution. The required contract period is indicated to be around 10 years; this is indicated as a minimum requirement. Longer contracts are preferred; however the 10 year period is indicated to be a sort of threshold after which such contracts become a liability which obliges KPN to notice such obligations in their annual report.

5.6 Funding

The type of funding and associated consequences is important since this directly influences the case for project financing. Furthermore the coverage ratios are specified as well in this paragraph.

Lead arranging bank

The lead arranging bank indicated that a benefit of project financing is the degree of leverage that it is capable of supporting. When an asset is separated, this generally allows for higher leveraging than it would be with regular corporate financing. Project financing requires a thorough definition and mapping of the cash flows in order to be capable of tying the cash flow contractually to debt service costs. This leads to a higher degree of certainty towards the lenders which in turn allows higher leverage. In the case of FttH rollout this will function as an accelerator towards the rollout of FttH.

Project finance does require substantial amounts of capital in order to become an interesting financing technique. Due to the amount of time required by advisors, lawyers and other stakeholders, this type of financing is only viable when substantial amounts of capital are involved.

The stable free cash flow, estimated lifetime and other infrastructure related characteristics is where institutional investors are looking for in their investments. The FttH network of Reggefiber matches these characteristics.

Reggefiber

Debt service coverage ratio used at Reggefiber before the acquisition by KPN was set at minimally 1.2. Debt financing was attracted from commercial banks and the European Investment Bank (EIB) where the EIB acted as a catalyst for attracting commercial debt.

KPN

KPN requires full off-balance when this type of financing is initiated. This implies that the applied type of financing is not recognized by accounting standards but neither recognized by credit rating agencies. Since these agencies do account for more liabilities or obligations than IFRS regulation requires. KPN admitted their interest when institutional investors are capable of equity funding the network. However, the remark is made that this should be risk bearing equity. In the institutional investors require the demand risk to be hedged with take-or-pay contracts this is less interesting.

Institutional investors

Institutional investors indicated that the desired type of funding is with equity. Direct investments in telecom can be performed via different legal entities like the limited company (Besloten Vennootschap, BV), public limited liability company (Naamloze Vennootschap, NV) and also via transparent partnerships like the limited partnership (Commanditaire Vennootschap, CV). This last structure, the CV is indicated to be the most preferable structure due to its fiscal transparency. Pension funds pay no tax on distributions done by the fund.

Institutional investors indicated that the possibilities of leveraging are higher when the project finance structure is chosen. Indicated debt levels are estimated at 6 times the net debt/ebitda. This is assumed to be a higher net debt/ebitda ratio that the project can support when compared to the ratio that KPN currently has on its overall corporate financing.

The overall advantage mentioned by the institutional investors is the amount of equity they can invest. Combining this with higher leverage on the project it is clear that the rollout of FttH can be increased significantly when institutional investors would take over the project.

Institutional investors indicated that the preferred DSCR ratio is at least 1.4 or higher. This is motivated by the fact that at a ratio lower than 1.2 would imply that an SPV is generally no longer allowed to pay any dividend. At ratios of 1.1 and below projects are considered to be in the default area. Therefore the DSCR ratios are set high enough and with that the created margins allow for unexpected drawbacks and also assure that dividends can be distributed. The required margins on the DSCR ratio also depend on the volatility of the expected cash flows. Higher project volatility would imply higher DSCR ratios. The purpose of the institutional investors investing in the project is to receive dividends from it. Therefore DSCR ratios of 2.0 or higher are commonly found.

Concerning the return on the investment, institutional investors aim for a return of 8 to 12% as a rule of thumb. This is why the debt service coverage ratios are required to be relatively high; there must be a certain cash flow capacity addressable towards dividend as a return on equity as this is the main source of income for pension funds.

5.7 Control

As indicated in chapter 4.3 IFRS Accounting standards, having full control over an asset implies consolidation. Interviews at Reggefiber, KPN and the institutional investors provide their demands concerning control.

KPN

The major problem indicated by KPN is the loss of control when project financing is initiated. As indicated by IFRS, there is no possibility that KPN remains in control of the network. This would imply that KPN can no longer

- Appoint management staff
- Align VDSL and FttH rollout, i.e. FttH rollout is subject to the new owners whishes
- Make technical adjustments to the network
- Use the FttH network as backend infrastructure for mobile masts
- Has a different negotiation position (when regulation changes)

These issues were mentioned to be problematic. KPN has to adjust VDSL and FttH rollout, areas without a pending FttH rollout in the short term will require an update of the DSL network to VDSL. When KPN is no longer in control it is unable to align its capital expenditures. Other issues are related to access to the network. Physical changes or alterations can no longer be implemented directly. Implying that KPN loses the synergy benefits of the Reggefiber takeover. Another issue is the installation of mobile masts on the FttH network. KPN can now upgrade their mobile 4g capacity by installing mobile masts on the network. This type of access is no longer possible or would require negotiation with the new owners.

Institutional investors

An important notion is the fact that institutional investors only enjoy the tax exemption when they are in the role of investor. When pension funds are in the role of entrepreneur the tax exemption is no longer applicable. This means that pension funds will not require full control; otherwise they are marked as entrepreneur which imply the payment of taxes. However, in order to protect their investment, pension funds will require certain minimum rights of control. Minimum rights of control imply investments done by the company, appointment of staff, rollout regions, etc..

6. Summary of findings

Reggefiber is in a situation in which an increase in FttH rollout will lead to an increasing net debt position for Reggefiber/KPN. An increasing debt position would lead KPN to situations wherein debt/ebitda ratios go beyond the company's target and covenant agreements with banks. Therefore at the moment KPN has an underinvestment issue due to their financial position. There are positive NPV projects but KPN is not in the position to conduct these investments, posing a clear opportunity cost for KPN.

The characteristic of the network itself are arguments for project financing. The assets of Reggefiber NEM's are large, fixed assets upon construction. This means that when an area is up and running it will only require regular operational expenses. This is an asset that is generating high free cash flows but has few growth options. No additional positive NPV investments are present in areas where the asset is situated. Especially this type of cash flows is prone to agency costs, as also mentioned in chapter 4.2.14 Sale and leaseback. Costs that could arise due to conflicts between managers who control the asset and its free cash flow versus the shareholders who own the asset. Managers who are in control of the asset can have different motivations and incentives than that of the shareholders and this could lead, according to the agency cost theory, to a suboptimal return of the free cash flow to the shareholders.

Project finance can address the two abovementioned problems. Especially the limits of KPN regarding their capital expenditures is where institutional investors can make a difference. Institutional investors can supply substantial amounts of equity funding and at the same time allow for a higher leverage ratio than KPN can sustain. This would imply that the FttH rollout effort can be increased significantly when compared to the current situation, reducing the opportunity cost for KPN. At the same time, the selling of the asset would release cash that is locked in the asset. Cash that can be used to pay off debt, improving debt related ratio's. Secondly, agency conflicts can be addressed via project finance. Setting up a new project company SPV allows for the creation of a governance system designed specifically to the asset. Cash flows can contractually be linked to debt holders and shareholders, aligning interests of managers and shareholders.

However, there are several drawbacks attached to selling the network to institutional investors. First of all, institutional investors are only willing to take over the asset when KPN agrees with take-or-pay contracts. In order to transfer the current and future demand risk of FttH networks these take-or-pay contracts are required for a period of at least 10 years. This would imply that the economic risk is still at KPN for a substantial period. These instruments belong to the possibilities according to KPN but are not favored.

The major indicated drawback is the loss of control. Institutional investors require control over the asset if they decide to fund the project with equity. IFRS accounting standards do not allow KPN to be in control over the asset when it wants the assets to be off-balance. Giving up control over the network is the biggest disadvantages according to KPN. KPN would no longer be able to control the FttH rollout. This was the main reason to acquire Reggefiber in the first place. KPN is now capable of aligning the VDSL and FttH rollout in the Netherlands. This is assumed to be no longer possible under project finance since the new owners will have control over key management staff, investment decisions etc.. Another problem associated with the loss of control is the physical access to the

network. If technological specifications are changing and a change to the network is needed KPN would have to negotiate with the new owners instead of being able to alter the network itself. It is quite possible that in the foreseeable future modifications, additions or other alterations are required to the network. Assuming KPN still being the main provider of broadband services over the FttH networks, and totally reliant of it, the importance of control is not to be neglected. When Reggefiber is no longer owner of the network this becomes difficult and is subject to negotiations between KPN and the new owners.

As indicated by the institutional investors that when they become owner of the network, they will not require full control. Institutional investors only require minimum rights of control in order to protect their investment. This leaves a grey zone worth investigating. How much control do the institutional investors require? To what extent are agreements on FttH rollout possible and how much room for control does this leave for KPN?

To visualize the findings, the next chapter 6.1 Visualization of findings will provide a matrix with potential financing situations.

6.1 Ownership matrix

The findings of this research can be visualized in figure 6.1. The starting situation, situation 1 is our starting point.

1. Reggefiber wholly owned subsidiary of KPN. KPN is 100% owner of Reggefiber and is therefore exposed to the economic risks of the FttH network. In turn, KPN has full control over the asset.

2. KPN could form a joint venture with institutional investors. For example a joint venture in which KPN still holds 50% of the shares will imply consolidation of the stake. Off-balance project financing is not applicable in this situation and it is unclear what the effects will be. In this situation there is still substantial control over the asset.

3. Institutional investors wholly own Reggefiber without take-or-pay contracts. This situation would be ideal in terms of economic risks. KPN could pay on basis of usage and has no exposure to the return. This situation is not viable since institutional investors are not willing to fully accept the economic risk. In turn, KPN does not have any control over the asset in situation 3.

4. To overcome the economic risk, institutional investors require take-or-pay contracts. These contracts transfer the economic risk back to KPN for a period of time. In turn, KPN loses control over the asset and is not required to consolidate. However, with the take-or-pay contracts KPN is the main client of the network and could wield this contract as an instrument to control aspects like the rollout areas. This is however subject to negotiations between the institutional investors and KPN.

Option 4 has been developed in the following paragraphs as this is the researched situation and considered to be the most viable for off balance financing.

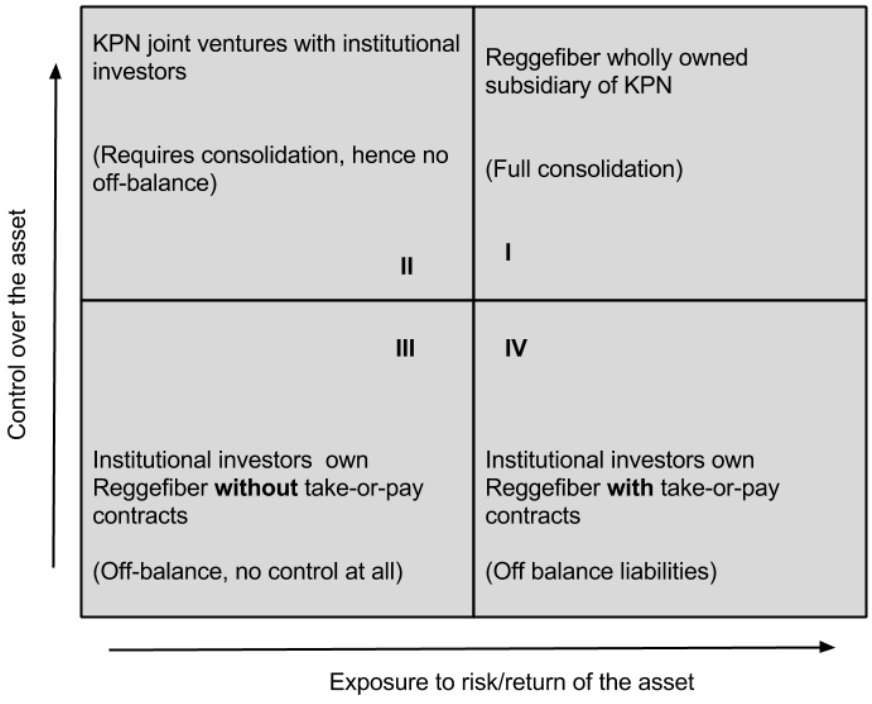


Figure 6.1: Financing situations for KPN/Reggefiber with corresponding control and risk

6.2 Proposed project finance model

In this chapter we propose a model on how project financing could look like for Reggefiber. This concerns a hypothetical model including several assumptions. However, these assumptions are constructed upon the feedback and information gathered during the research. This model will hopefully at least provide an image on the structure of project financing the FttH network and its financials.

A model on how the project financing structure could look like is presented in 6.3 Project Finance Structure. Furthermore a financial model and its financial result is presented in 6.4 Financial Model.

6.3 Project finance structure

Figure 6.2 shows the project finance structure with the related parties and its connections to the SPV. The Reggefiber NEM's will be the center of the project, the so-called SPV.

Shareholders will consists out of institutional investors and, optionally, KPN with a minority interest. The institutional investors will be the majority of equity providers. Debt funding can be provided by private banks and via for example the European Investment Bank.

The debt and equity providers will require a return. This is generated in the NEM's via ODF tariffs generated by the active operators like KPN and Glasoperator. The active operators in their turn will collect revenues from the service providers via whole sale access tariffs. The ODF revenues are however subject to the demand risk attached to FttH. In order to ensure a return the shareholders and banks will require a take-or-pay contract from the active operator in order to reduce the economic risk.

The NEM's will eventually provide a return to the debt holders in the form of interest and dividend to the shareholders.

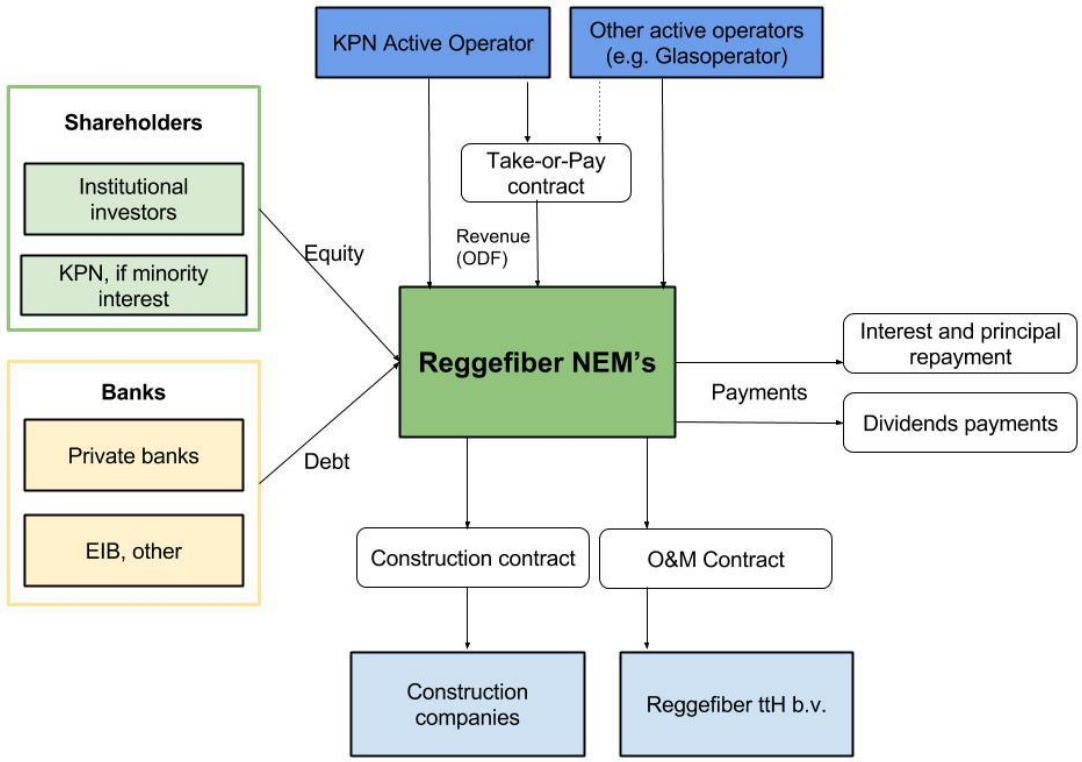


Figure 6.2, Project finance layout

6.4 Financial model

This paragraph will provide an overview of the financial variables that influence the FttH business case. Paragraph 6.4.1 shows input variables related to the Reggefiber FttH network that require specification. Paragraph 6.4.2 shows the outcome of the project after the input variables are specified. Paragraph 6.5 covers a little scenario analysis; demonstrating the impact of the penetration rate on the business case.

6.4.1 Input screen

Several variables influence the viability of the proposed project financing structure. In figure 8.1 the input screen for a project financing structure for FttH is filled in. In this construction scenario there are 350.000 Homes to be Passed every year for a period of 4 years. This would lead to total capital expenditures of €1.12 billion. Assumptions are made on the following numbers (these approach reality as good as possible):

- 4. Capital expenditures per HP: €800,-
- 9. Interest rate: 2%
- 13. ODF access tariff indexation: 1%
-14. Penetration rate: 40%
- 15. Ebitda margin: 80%

	Project finance input	
	Investments	
1	Number of Homes Passed (HP) per year	350.000
2	Number of construction (Years)	4
3	**Total HP**	**1.400.000**
4	Capex per HP	€ 800
5	**Total Capex**	**€ 1.120.000.000**
	Capital structure	
6	Percentage debt financing	50%
7	Amount of debt	€ 560.000.000
8	Debt payback period (Years)	10
9	Interest	2,00%
10	Percentage of equity	50%
11	Amount of equity	€ 560.000.000
	Revenues	
12	Monthly ODF tariff	€ 16,76
13	Tariff indexation	1,0%
14	FttH penetration rate	40,00%
	Costs	
15	Ebitda margin	80,00%
16	Operation and Maintenance expenses per HA	3,352
17	Tax rate	0%
18	Depreciation period (Years)	30

Figure 6.3 Input variables (Base Case)

6.4.2 Output

The input entered in the input screen will lead to a financial model with results for the Debt Service Coverage Ratio (DSCR) and Internal Rate of Return (IRR) of the project. This is presented in the following figure. The input, as assumed in 6.4.1 will lead to a DSCR ratio of minimal 1.4 during the operational phase of the project and an IRR rate of 10.22%.

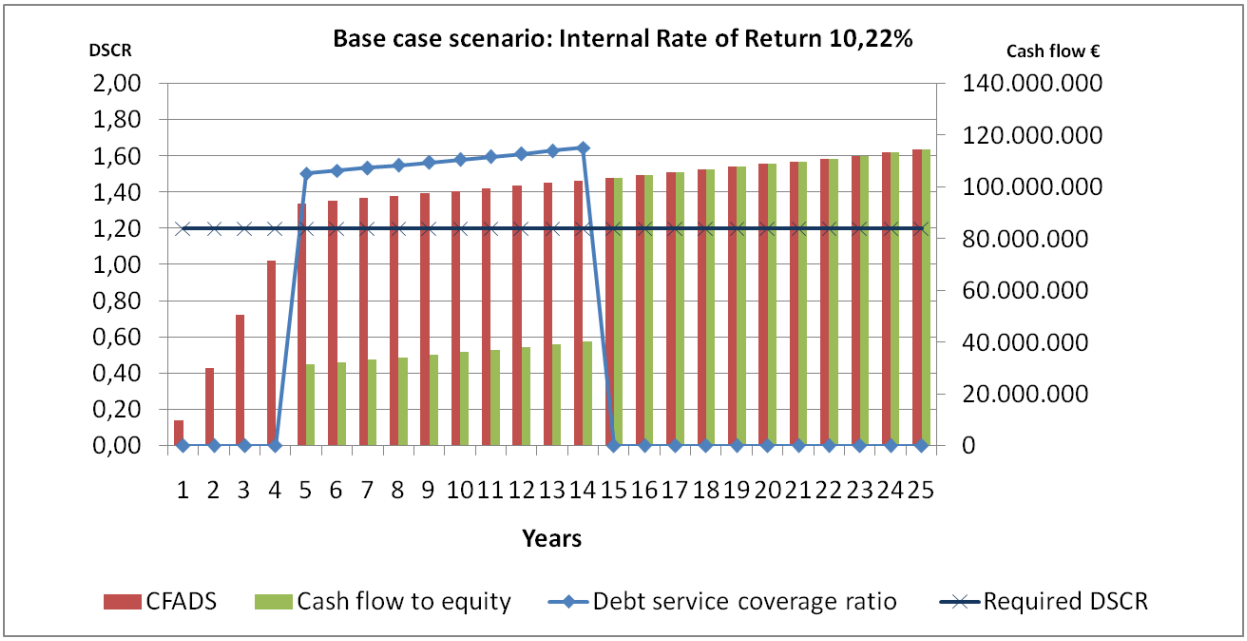


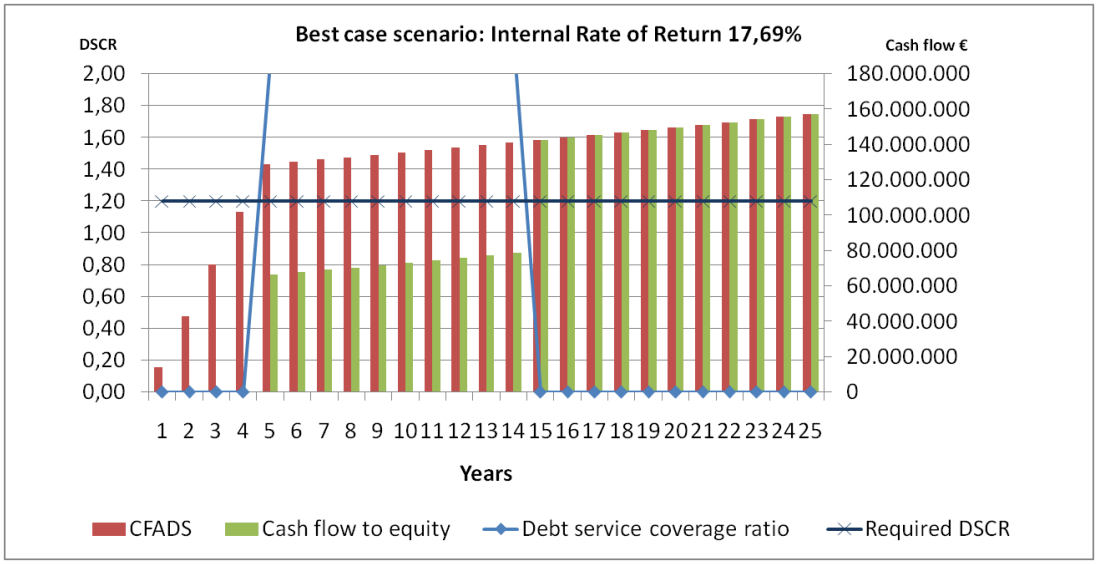
Figure 6.4

Figure 6.4 is derived from a waterfall cash flow model built upon the assumptions made in 6.4.1. This cash flow model can be found in Appendix E.

6.5 Scenario analysis

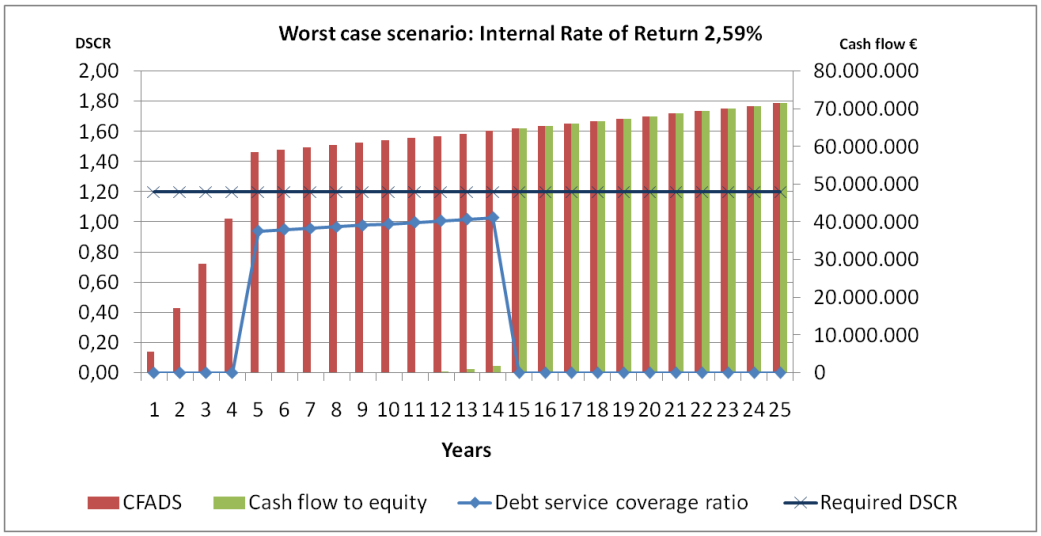
As already mentioned in paragraph 4.2.9 Sensitivity analysis, it is possible to model for different scenario's within project financing. Abovementioned examples are considered to be a base case. However, due to the demand uncertainty associated to the FttH penetration rate, it is important to take into account different scenarios.

14	FttH penetration rate	55,00%



In a best case scenario the assumption on the penetration rate is set at 55%, all other variables are kept constant. This leads to an IRR of 17.69% and a DSCR ratio of at least 2.0.

14	FttH penetration rate	25,00%



In a worst case scenario, the penetration rate is set at 25% and immediately the project turns out to be incapable of supporting its debt service costs. The DSCR ratio is below 1 in the start of the operational phase, implying a default. Also the internal rate of return is barely positive at 2,59% and is not the return where institutional investors aim for. The penetration rate being the main risk that affects the business case shows why take-or-pay contracts are required in order for institutional investors to take over the network.

7. Conclusion

The summary on the findings brings us back to the main research question: ***"How can an off-balance financing of the FttH network be realized and what would be the advantages and disadvantages for Reggefiber".***

The critical factor is the importance of control. Is control that important for KPN so that it justifies underinvestment? Does KPN need to remain owner of the network and the corresponding debt? If so, KPN is undermining its own position as leading operator in the telecom market since it cannot increase investments. Investments which are considered highly necessary in order to remain competitive in the fixed line telecom landscape.

A viable project financing situation is situation 3 from Figure 6.1. In a project finance situation with institutional investors as owner of the network, substantial investments in FttH can be made. The rollout of FttH is no longer limited by KPN's financial position, the underinvestment problem could be solved. KPN can use the unlocked capital to reduce its net debt position. Potential agency conflict costs are also reduced, the assets cash flow is better allocated to shareholders and debt holders under project financing than under corporate financing.

As a consequence these advantages have a downside. Project financing the asset will imply a loss of control for KPN. According to IFS, in order to achieve an off-balance situation, KPN can no longer have control over the asset. Institutional investors indicated as well that they require minimum rights of control in order to protect their investment.

Furthermore, to enable this type of financing, take-or-pay contracts are required. KPN will be subject to a take-or-pay contract for around 10 years. This type of obligation is not favored by KPN due to the fact that KPN will remain subject to the economic risk associated while losing control. However, if KPN chooses to remain in situation 1, in full ownership of the network, KPN will be subject to the same economic risks as well. Contrary, the take-or-pay contract could precisely be an instrument to direct the activities of the SPV to the extent required by KPN and still in accordance with the boundaries imposed by IFRS and the institutional investors.

Unknown is if the control issues that KPN considers critical, are a possible point of debate between KPN and institutional investors. In the case that critical control issues can be point of negotiation, i.e. agreements can be made that would satisfy both parties interests, project financing is an interesting method to speed up the rollout of FttH. Institutional investors indicated that they only require minimal control in order to control their investments, this indicates that there is room for negotiations by KPN.

Ultimately, in order to decide if project financing is an attractive financing alternative, the economic risk measured in penetration rate needs to be addressed. The required penetration rate should at most be equal to the current penetration rate that is required to turn break-even. Under a new financing method, such as situation 3, KPN does give up control. Less ownership and control should lead to a situation with less risk. Therefore, in order for project financing to be interesting, KPN should only opt for this situation if the take-or-pay contract requires a penetration rate that is less than the current break-even penetration rate. If not, project financing is not interesting to op fort. If the project financing leads to less risk for KPN, and agreements can be made upon specific control issues, project financing will enable a quicker FttH rollout.

8. Discussion and future research directions

In this chapter several points of discussion are introduced. These reflect some alternatives not covered in the main research paper but are related to the issue. The introduced points can be directions for future research.

Selling KPN's complete infrastructure

In order to overcome one specific control issue, namely the tuning of investments between FttH and upgrading DSL, KPN can decide to sell its complete network infrastructure as a whole. In this way the new owner can align the investments. Ultimately the selling of the FttH assets could be beneficial for KPN if the service provider can capitalize on this. Enabling FttH to more homes could imply a better business case for the service provider. As KPN would no longer have a return on the assets, the return ultimately needs to come from the service provider in an off balance situation. Assuming that FttH enables KPN to compete better with DOCSIS 3.0 services than with VDSL, the service provider will benefit from a quicker FttH rollout. Allowing KPN to focus on its core competency, namely the service provider activities.

Selling the infrastructure assets frees up assets and the capital expenditures can be reduced drastically. Selling the infrastructure assets will make KPN more transparent and easier to valuate. However, since this research did not take into account the other networks of KPN, there is no indication on how these networks are influencing each other. Selling KPN's entire network operations could be point of future research. It felt that not taking into account the other networks of KPN harms the overall relevance of this research.

Utility comparison; converging of TV, telephone and data line into 1 data only

Comparing FttH, DOCSIS 3.0 and regular DSL offerings, one can argue that currently there are 2 or more types of network infrastructure in place who offer the same service, i.e. data connectivity. The FttH infrastructure can be compared to that of other utilities like gas, water and electricity networks. At the moment there is still the separation between telephone, television and internet, however one could argue that his will converge into a single offering, i.e. that of data. Consumers now purchase television, telephone and data services from one or more providers. In the case of FttH this is all converged in one service, i.e. data. Assuming that FttH will be the end-game and the only data infrastructure in the end, regulators need to anticipate. As well as electricity, gas and other utility infrastructures are regulated, FttH need as well. Regulators should clearly express that regulation for all utilities will be equal. At the moment there is still uncertainty surrounding the ACM decisions since these are revised every 3 years. Future research could be in the direction of how governments can facilitate the rollout of FttH without being redirected due to unfair state aid.

Nielsen's Law

FttH investments is currently characterized as high risk, however not investing in FttH may turn out to be equally or more risky overall. According to Nielsen's Law s user bandwidth will grow by 50% per year for high end users. If this law holds, this would mean that in 2020 speeds of 1Gbit/s are demanded. Implying that the targets from the Digital Agenda would be surpassed greatly and will be beyond that of any DSL vectoring capabilities. This developments depends on assumptions, will future demand show the same development as in the recent years? If so, than under investing in FttH could turn out to be more risky than investing.

8.1. Limitations

This research has presented some valuable insights into the possibilities of project financing the FttH network of Reggefiber. However, as with all research, there are several limitations. This chapter will discuss the limitations and how this could have influenced the research.

As already mentioned in the discussion, the fact that the DSL networks of KPN were left out of consideration in this research made it difficult to give a relevant conclusion. The FttH network can no longer be seen out of the equation since the takeover by KPN. The takeover occurred during this research and taking into account the other networks of KPN was no option due to practical limitations. This felt like the most important limitation to this research. Hopefully this research still provides an insight in how the chosen financing method could speed up the rollout of FttH when excluding the impact of KPN's other networks.

Furthermore, the researcher's bias could be a limitation of this research. Working with employees from the subject organization could have influenced the view and opinion of the researcher. The fact that the researcher was active within the organization that is the subject of the research could've also influenced the responses of interviewees. Although the researcher indicated prior to the start of the interviews that this research is an independent research, there is still the possibility that interviewees responded differently than they would have to a completely independent researcher.

The chosen evidence collection method of interviewing inherently has some more limitations as well. As already mentioned in the method, interviewing can pose a threat to the reliability of the research. Different interviewers could make different observations and make different interpretations. Furthermore, the researcher could steer an interview unnoticed, resulting in interviewees giving back information the researcher wants to hear. Or even the researcher only hearing information that he wants to hear.

Another limitation is that interviewed parties where not always capable of providing all information, either due to sensitivity of the information or due to the unique positioning of the network is in. However, indicated was that the replied answers approach reality. The number of interviewees is another point of concern. Only five external parties were interviewed, however e.g. the two institutional investors returned answers during the interview that corresponded with each other, indicating reliability. For a more complete view of the Dutch institutional investor landscape, more interviews can be held in a future research.

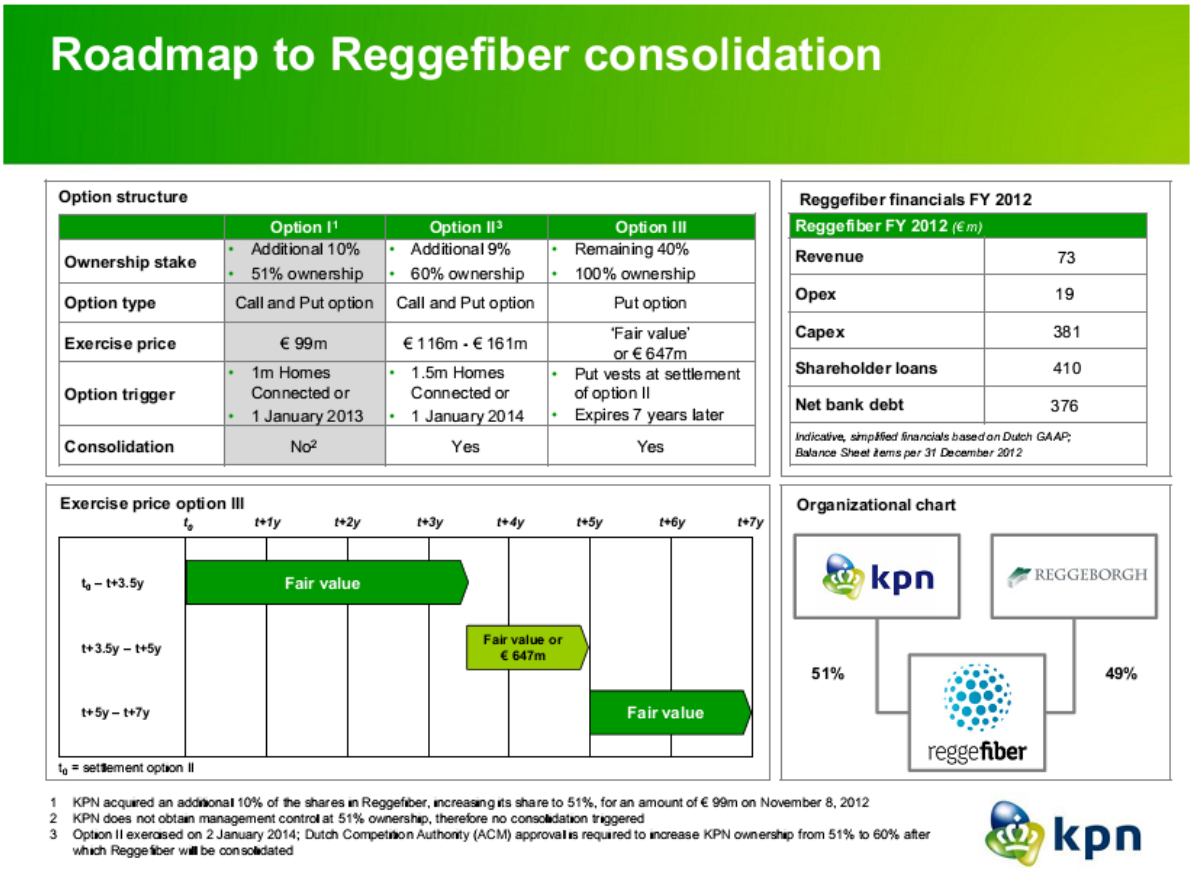
Furthermore, the fact that this research is conducted in one period in time might harm the external validity. Technical developments follow quickly in the telecom sector, financing issues may alter as quickly as well. Another limitation is that this research only studied the network of Reggefiber, networks of other Dutch FttH operators is not taken into consideration. These may have different issues related to financing. Interesting to see is whether the issues mentioned here hold for other European incumbents as well. Is the impact of the legacy network as strong as in the Netherlands? How does the control issues relate to other incumbents etc. is , can the findings be generalized?

Appendix

Appendix A. Glossary

ACM	Authority Consumer and Market
ADSL	Asymmetric DSL, 20Mbps down and 1 Mbps upload speed
DA	Digital Agenda, document from the European Commission, setting targets for the development of broadband infrastructures
DSL	Digital Subscriber Line
FttC	Fiber to the Cabinet, seen as interim solution prior to FttH rollout, fiber rolled out to the street cabinets. The last part of the connection uses the telephone line. VDSL services are based on this technique.
FttH	Fiber to the Home, connection existing completely out of fiber.
FttX	Fiber to the X, generic term for broadband networks existing completely or partly out of fiber
HA	Homes Activated, homes that purchase FttH services from a service provider
HC	Homes Connected, fiber is connected to the home
HP	Homes Passed, the fiber is in the streets but not yet connected to the home
NGA	Next Generation Access Network, access speeds of at least 100Mbps or higher
NRA	National Regulatory Authority (ACM in the Netherlands)
ODF	Optical Distribution Frame
PoP	Point Of Presence, (wijkcentrale), cabinet with fiber connections for an area
SMP	Significant Market Power, operator get entitled by the regulator as having SMP
ULL	Unbundled Local Loop,
VDSL	Very-high-bit-rate DSL, upgraded version of ADSL, 52Mbps down and 5 Mbps upload
VDSL2	Upgraded VDSL, capable of reaching 100Mbps down and 20Mbps upload

Appendix B. Reggefiber consolidation roadmap

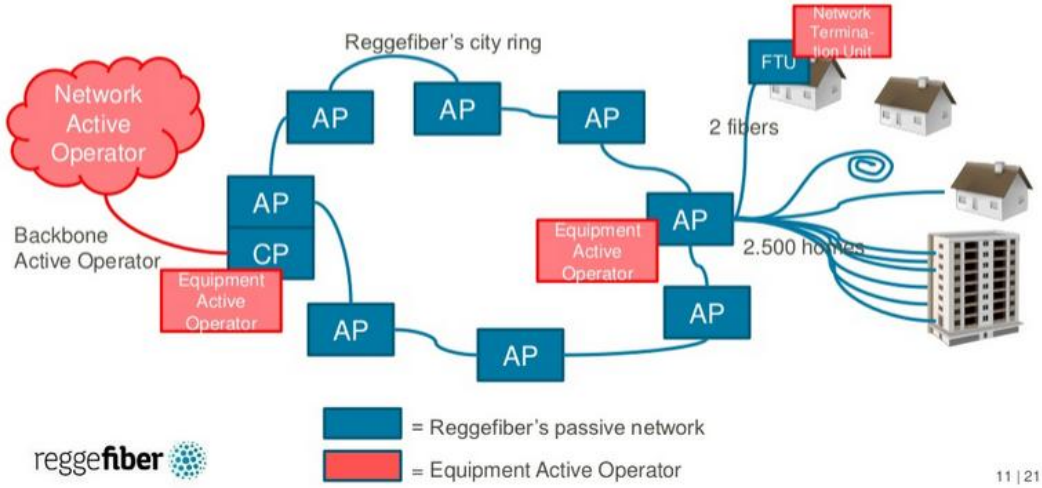


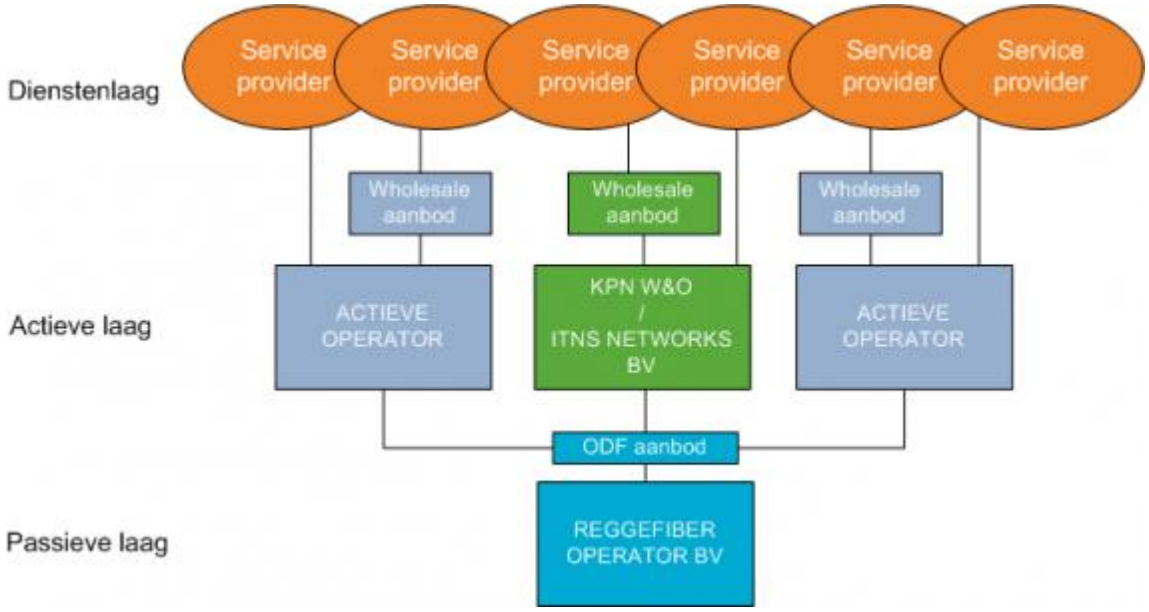
1 KPN acquired an additional 10% of the shares in Reggefiber, increasing its share to 51%, for an amount of € 99m on November 8, 2012
2 KPN does not obtain management control at 51% ownership, therefore no consolidation triggered
3 Option II exercised on 2 January 2014; Dutch Competition Authority (ACM) approval is required to increase KPN ownership from 51% to 60% after which Reggefiber will be consolidated

Appendix C. Network architecture

Business model – network architecture

- As many homes as possible will be connected to a Fiber Termination Unit (FTU) in the metering cupboard inside the home
- About 2.500 homes are connected to an Area-POP (AP) with two fibers. Here ODF access can be obtained
- Max 8 AP's are connected to a City PoP (CP) using a ring structure (city ring)





Appendix D. Project finance user input screen

Input variabelen

	Project finance input	
	Investments	
1	Number of Homes Passed (HP) per year	350.000
2	Number of construction (Years)	4
3	**Total HP**	**1.400.000**
4	Capex per HP	€ 800
5	**Total Capex**	**€ 1.120.000.000**
	Capital structure	
6	Percentage debt financing	50%
7	Amount of debt	€ 560.000.000
8	Debt payback period (Years)	10
9	Interest	2,00%
10	Percentage of equity	50%
11	Amount of equity	€ 560.000.000
	Revenues	
12	Monthly ODF tariff	€ 16,76
13	Tariff indexation	1,0%
14	FttH penetration rate	40,00%
	Costs	
15	Ebitda margin	80,00%
16	Operation and Maintenance expenses per HA	3,352
17	Tax rate	0%
18	Depreciation period (Years)	30

Targets 2020 EU Digital Agenda

Annuity

☑ Geactiveerd

Appendix E. Project finance results

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Cash flow analyse												
2													
3	Project fase	1=construction, 2=operation 3=aflossingsvrije perio-	1	1	1	1	2	2	2	2	2	2	2
4	Indexatie	0=nee, 1=ja	1	1	1	1	1	1	1	1	1	1	1
5	Indexatie tarief rekenfactor		1,00	1,01	1,02	1,03	1,04	1,05	1,06	1,07	1,08	1,09	1,10
6	Debt repayment type	1=annuïteit, 2=equal installments, 3=cash sweep	1	1	1	1	1	1	1	1	1	1	1
7													
8	Periode Tot jaren		1	2	3	4	5	6	7	8	9	10	11
9	*Aantal aan te sluiten woningen*		*350.000*	*350.000*	*350.000*	*350.000*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
10	*Aantal aangesloten woningen rekenhoeveelheid*		*175.000*	*525.000*	*875.000*	*1.225.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*
11	*Totaal aantal aangesloten woningen*		*350.000*	*700.000*	*1.050.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*	*1.400.000*
12													
13	Cash flows												
14													
15	**Operationele cash flow**												
16	Omzet		14.078.400	42.657.552	71.806.879	101.534.927	117.200.316	118.372.319	119.556.042	120.751.603	121.959.119	123.178.710	124.410.497
17	Operationele kosten		2.815.680	8.531.510	14.361.376	20.306.985	23.440.063	23.674.464	23.911.208	24.150.321	24.391.824	24.635.742	24.882.099
18													
19	**EBITDA**		**11.262.720**	**34.126.042**	**57.445.503**	**81.227.942**	**93.760.253**	**94.697.855**	**95.644.834**	**96.601.282**	**97.567.295**	**98.542.968**	**99.528.398**
20		Debt/Ebitda	12,4	8,2	7,3	6,9	6,0	5,4	4,8	4,2	3,6	3,0	2,4
21	**Investeringen**												
22	Investeringen / Capex		280.000.000	280.000.000	280.000.000	280.000.000	0	0	0	0	0	0	0
23	Rente gedurende constructie		1.400.000	4.200.000	7.000.000	3.800.000	0	0	0	0	0	0	0
24													
25	**Cash flow voor financiering**		**-270.137.280**	**-250.073.958**	**-223.554.497**	**##########**	**93.760.253**	**94.697.855**	**95.644.834**	**96.601.282**	**97.567.295**	**98.542.968**	**99.528.398**
26	Cumulative cash flow		-270.137.280	-520.211.238	-743.765.735	-958.337.793	-864.577.541	-769.879.685	-674.234.851	-577.633.569	-480.066.274	-381.523.306	-281.994.909
27	**Financieringsbehoeften**												
28	Inbreng eigen vermogen		140.000.000	140.000.000	140.000.000	140.000.000	0	0	0	0	0	0	0
29	Te lenen bedrag in dat jaar		140.000.000	140.000.000	140.000.000	140.000.000	0	0	0	0	0	0	0
30	Outstanding debt		140.000.000	280.000.000	420.000.000	560.000.000	508.857.144	456.691.432	403.462.405	349.209.197	293.850.526	237.364.680	
31													
32	**Cash flow na financiering**		**9.862.720**	**29.926.042**	**50.445.503**	**71.427.942**	**93.760.253**	**94.697.855**	**95.644.834**	**96.601.282**	**97.567.295**	**98.542.968**	**99.528.398**
33													
34	*Tax deduction posts*												
35	Depreciation		0	9.380.000	18.853.333	28.420.000	38.080.000	38.080.000	38.080.000	38.080.000	38.080.000	38.080.000	38.080.000
36													
37	Tax expenses		0	0	0	0	0	0	0	0	0	0	0
38													
39	**CFADS**		**9.862.720**	**29.926.042**	**50.445.503**	**71.427.942**	**93.760.253**	**94.697.855**	**95.644.834**	**96.601.282**	**97.567.295**	**98.542.968**	**99.528.398**
40													
41	Interest payments		0	0	0	0	11.200.000	10.177.143	9.133.829	8.069.648	6.984.184	5.877.011	4.747.694
42													
43	**Cash after interest**		**9.862.720**	**29.926.042**	**50.445.503**	**71.427.942**	**82.560.253**	**84.520.712**	**86.511.005**	**88.531.634**	**90.583.111**	**92.665.957**	**94.780.704**
44													
45	Types of debt repayment												
46	*Annuity*		*0*	*0*	*0*	*0*	*57.142.856*	*52.857.713*	*53.209.027*	*54.273.208*	*55.358.672*	*56.465.845*	*57.595.162*
47	*Equal installments*		*0*	*0*	*0*	*0*	*56.000.000*	*56.000.000*	*56.000.000*	*56.000.000*	*56.000.000*	*56.000.000*	*56.000.000*
48	*Cash sweep*		0	0	0	0	82.560.253	84.520.712	86.511.005	88.531.634	90.583.111	92.665.957	94.780.704
49													
50	*Applied debt repayment type: Annuity*		*0*	*0*	*0*	*0*	*57142.8555.6*	*52.857.712.72*	*53.209.026.97*	*54.273.207.57*	*55.358.671.66*	*56.465.845.09*	*57.595.162*
51													
52	Total debt service costs		0	0	0	0	62.342.856	62.342.856	62.342.856	62.342.856	62.342.856	62.342.856	62.342.856
53													
54	**Cash flow to equity**		**-130.137.280**	**-110.073.958**	**-89.554.497**	**-68.572.058**	**31.417.397**	**32.355.000**	**33.301.978**	**34.258.427**	**35.224.439**	**36.200.112**	**37.185.542**
55													

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