

Universität Stuttgart

Fakultät Wirtschafts-
und Sozialwissenschaften
Betriebswirtschaftliches Institut
Abteilung III (Finanzwirtschaft)
Prof. Dr. Henry Schäfer

University of Stuttgart

Faculty of Business
and Social Science
Institute of Business Administration
Department III (Corporate Finance)
Prof. Dr. Henry Schäfer

**Green Finance and the
German banking system****Prof. Dr. Henry Schäfer**

Research Report

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**University of Stuttgart****Faculty of Business and Social Science
Institute of Business Administration
Department III (Corporate Finance)**

Keplerstraße 17
70174 Stuttgart
Germany

T: +49 (0)711-685-86000

F: +49 (0)711-685-86009

E: h.schaefer@bwi.uni-stuttgart.de

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Abbreviations

AuM	Assets under Management
COP21	UN Climate Summit 2015 in Paris
GHG	Greenhouse Gas
GE	Green Economy
IPCC	Intergovernmental Panel on Climate Change
FNG	German Socially Investment Forum (Forum Nachhaltige Geldanlage)
MENA	Middle East & North Africa
P2P	Peer-to-Peer
SME	Small and Medium Sized Enterprises
SPV	Special Purpose Vehicle
SRI	Socially Responsible Investments
TECDax	Technologie - Deutscher Aktien Index

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Summary

With the Paris summit on climate change in December 2015 (COP21) nations have agreed to formulate national climate targets. They can only be reached if urgently needed massive real investment projects and adequate measures are undertaken. Although most national climate action plans do not formulate explicitly emission reduction targets for the financial sector, banks, investment trusts et al. have a pivotal role to play in mobilizing private capital and managing carbon risks. International committees like relevant working groups installed by the G7 and the G20 summits mostly use for such purposes the term green finance.

National financial sectors differ in their capacities and preparedness to fulfill their roles in green finance. First of all the following survey reports about the capacities and deficits of the German financial sector to cope with the challenges of green finance. The analysis starts with the description of central pillars of the German climate change strategy, i.e. the political and legal framework that is needed to transcribe COP21 in national action plans. The report proceeds with an analysis of the Germany's banks as they ought to operate as enabler and risk manager in green finance. In addition a focus is placed on green finance for small and medium sized companies. The most important outcome of the analysis is, that with the exception of the state-owned KfW, some regional public and developing banks and so-called alternative and clerical banks the majority of German banks has not yet integrated workable elements of green finance in their business and product models. The report concludes, that the German financial sectors at present is not well prepared for green finance. There is an urgent need for the implementation of competences and capacities in green finance in Germany.

1. Green Finance - a new paradigm starts working

Green Finance seems to become a new and universal paradigm in order to enable the transition of today's existing carbon intensive economies to a **Green Economy** (GE) which the United Nations Environmental Program defines as follows: *"A green economy can be defined as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities."*¹ It was in the aftermath of the subprime and banking crises that a Global **Green New Deal** was seen as the workable concept of a growing and socially new economic policy approach. In several steps the United Nations developed the principle of a carbon reduced, resource efficient and socially inclusive economy: *"In a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services."*²

For such a purpose the private real sector of the economy needs to undertake investments and measures that contribute to national climate goals. With goal-oriented public expenditures (e.g. in green infrastructure), accompanying public reforms and necessary regulations, governments, ministries and other public institutions should enable the private sector to deploy innovative forces that could cope best with the challenges of green house gas reductions. The **financial sector's task** is understood as to **mobilize private capital** that is needed to fund such activities.

With the Paris summit on climate change in December 2015 (**COP21**) nations have agreed to formulate national climate targets that contribute to the global greenhouse gas reduction targets as proposed by the Intergovernmental Panel on Climate Change (IPCC).³ As **global warming** now threatens the survivorship of mankind, a fundamental transformation to carbon reduced economies is urgently needed.⁴ In many countries the concept of the GE is understood as the **new economic order** that unleashes innovative power and mobilizes entrepreneurial capacities which can impact greenhouse gas emission reductions and curtail resource intensities. Green finance should be the grease for such transformational processes: *"It is clear that across banking, investment and insurance – the core activities of the financial system*

¹ UNEP FI (2010), p. 4.

² UNEP (2011), p. 16.

³ IPCC (2013).

⁴ Beech (2016).

– significant changes in philosophy, culture, strategy and approach, notably the overwhelming dominance of short-termism, will be required if capital and finance is to be reallocated to accelerate the emergence of a green economy"⁵

The necessity of a new type of financial system is highlighted by the latest report of the **Chinese Government** on green finance: "A 'green finance system' refers to a series of policies, institutional arrangements and related infrastructure building that, through loans, private equity, issuance of bonds and stocks, insurance and other financial services, steer private funds towards a green industry."⁶ Based on such an understanding each nation needs to reflect on its current readiness to identify existing shortcomings and to initiate improvements with respect to green finance.. International collaborations seem necessary to be able to exploit workable proofs of concepts, to share experiences and learnings, to ease and to accelerate actions that reduce greenhouse gas emissions and can turn down the heat from global warming.

2. Germany's green house gas reductions - from contributions of the public and real sector

Prior to the UN climate summit 2015 in Paris (COP21) **Germany** has a long standing **track record** on its efforts to reduce greenhouse gas emissions. Its **climate targets** were formulated in 2007, have been confirmed by the 2014 progress report and updated by the latest monitoring report in December 2016. It corresponds to the update of Germany's national sustainable development strategy.⁷ In the latest Energy Transition Monitoring Report, the Federal Ministry of Economic Affairs and Energy illustrates the structure of Germany's targets (see figure 1).⁸

The **Climate Protection Report** released by the Federal Ministry of Environment et al. in December 2016 examined the progress made with the Climate Action Program.⁹ The report concluded that the program and the other smaller measures are likely to be less effective than predicted. Expert opinion on the latest Energy Transition Monitoring Report by the Federal Ministry of Economic Affairs and Energy in December 2016 also warned that the country would probably miss its 2020

⁵ UNEP (2011), p. 44.

⁶ Green Finance Task Force (2015), p. 6.

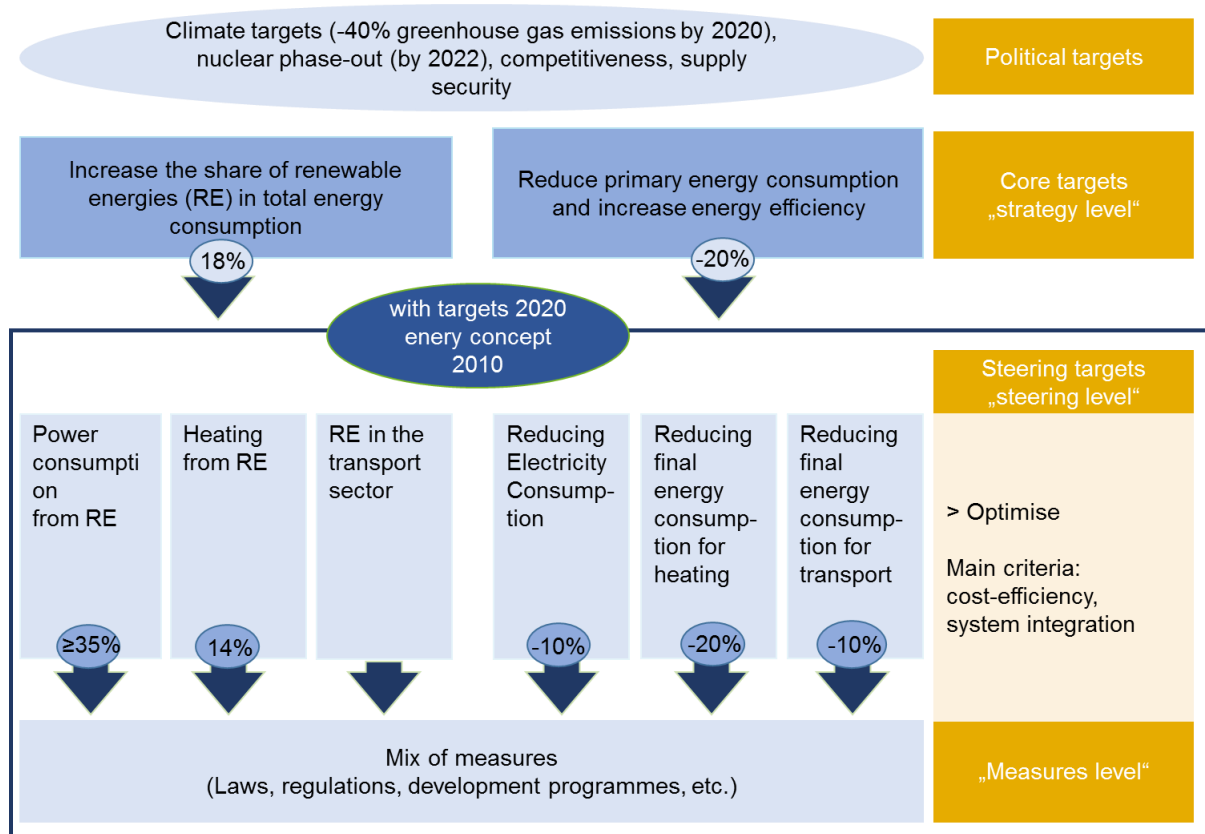
⁷ The Federal Government (2017).

⁸ Federal Ministry of Economic Affairs and Energy (2016). The German term "*Energiewende*" is used in the following instead of the English term "Energy Transition".

⁹ Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2016a).

emission targets and other crucial *Energiewende* goals, threatening the entire project's credibility.

Figure 1: Germany's climate goals¹⁰



In November 2016, the German government agreed on its Climate Action Plan in preparation for COP22 in Marrakesh.

As interim goals for the year 2030, the plan includes target corridors for reducing greenhouse gas emissions in the individual economic sectors. By that time, Germany aims to reduce GHG emissions by at least 55 percent compared to 1990 (s. figure 2). It is remarkable that the German Climate Action Plan 2050 covers all sectors with the exception of the financial sector. In terms of the Green Gas Protocol it is obvious that reduction targets primarily cover scope 1 and 2 emissions and nothing is said in the German Climate Action Plan about the finance sector's role as an enabler to contribute to greenhouse gas emission reductions within its scope 3 emissions.

¹⁰ According to <https://www.cleanenergywire.org/factsheets/germanys-greenhouse-gas-emissions-and-climate-targets>.

Figure 2: German greenhouse gas emission reduction sector targets 2030 (climate action plan 2050) and reductions of the past¹¹

Sector	1990*	2014*	2030*	2030 (reduct., comp. to 1990)
Energy	466	358	175-183	61-62%
Buildings	209	119	70-72	66-67%
Transport	163	160	95-98	40-42%
Industry	283	181	140-143	49-51%
Agriculture	88	72	58-61	31-34%
Other	39	12	5	87%
Total	1.248	902	543-562	55-56%
* in million tonnes of CO ₂ equivalents.				

At an earlier stage the resolutions of the Paris summit and the later COP 22 in Marrakesh were accompanied by official reports of the OECD, UNCTAD, UNEP FI and the World Economic Forum that highlighted the role of the financial sector to reach the emission reduction targets in general.¹² They all of them demand from banks, asset managers, stock exchanges etc. to contribute with their loan granting policies, their asset management and their risk management tools to achieve the sustainable development goals and climate protection targets. The banks new clothes should be interwoven with green threads, i.e. banks should contribute to the reduction targets as enabler and risk manager. They have the pole position in order to mobilize private capital that is urgently needed to finance the enormous amounts of real investment projects, companies and measures that contribute to greenhouse gas reductions.

¹¹ Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2016b).

¹² OECD (2016), UNCTAD (2015), UNEP (2015), WEF/OECD (2015), G20 Green Finance Study Group (2016).

Germany has a long tradition to cope with environmental challenges:

1. The first environmental regulations were constituted in the 1950s with laws that regulated the protection of potable water. The 1970s were the most creative years in environmental regulations; many laws enacted then are still in force. But the most important environmental decision of the Federal Government was the transition from nuclear power to renewable energy in 2011 in the aftermath of the Fukushima nuclear disaster ("*Energiewende*"). Since then Germany has claimed implicit leadership in renewable energies and the transition to a Green Economy.
2. The past and intensive environmental regulation waves in Germany were accompanied by immense efforts of the German industry to cope with such regulations. It spurred the innovative capacities of the German industry in its economic core sectors like automotive and machinery. The efforts and outcomes were remarkable: Eco-efficiency manufacturing substituted end of pipe technologies, created new resource efficient products and installed environment-friendly technologies in many parts of sector-specific value chains. The German industry increased its energy productivity from 2000 to 2015 by 10 percent. However, economic growth counteracted this development. (rebound effect). Reaching the aim of the German government for the economic final energy productivity (+ 2.1 % per year between 2008 and 2050), energy efficiency of German industry has to increase further on (Deutsche Bank 2016). Well-known is the emergence of a completely new sector in the 1990s, the renewable energy sector, with far reaching consequences for the later *Energiewende*. Today the next level of manufacturing, the era of Industrial Internet has started. It not only promises new opportunities in energy savings and emission reductions, but will lead to smart technologies and new business models. Since 2016 the Federal Government has updated its High Tech Strategy together with the Industrial Internet Initiative (so-called "Industry 4.0"). It integrates beside sustainable production and consumption a new field - sustainable finance. The intention of the reformulation is to combine new technological and digital opportunities in order to achieve an effective contribution to the targets of the national climate action plan.

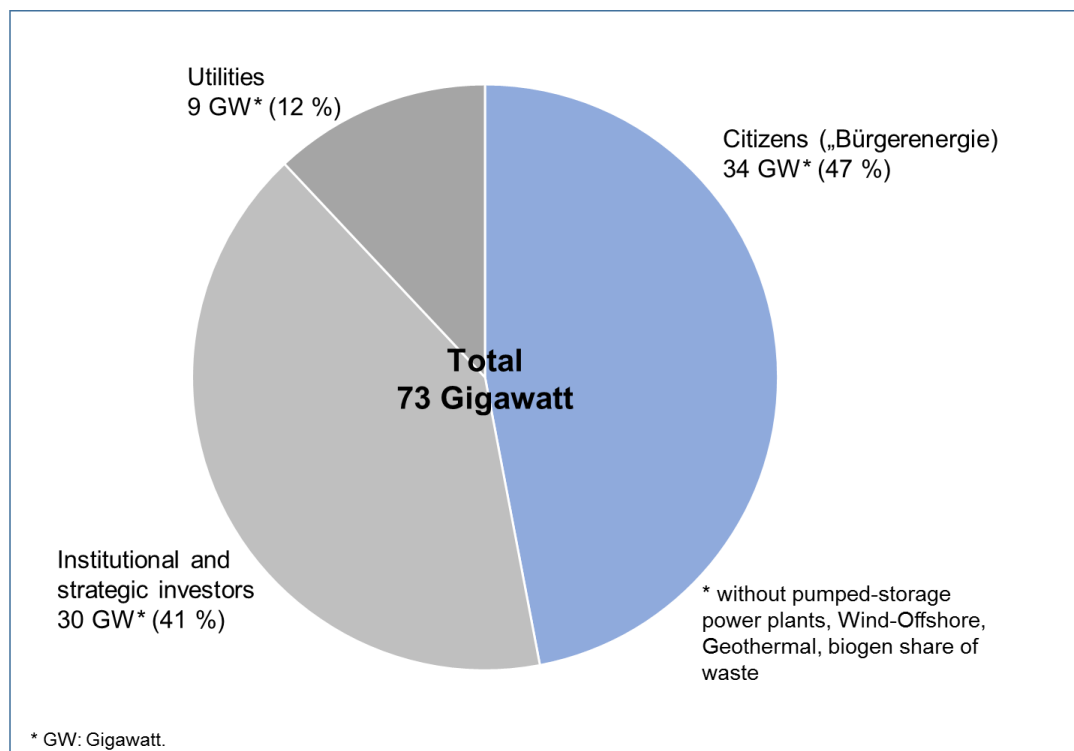
3. From the beginning of Germany's environmental policy programs until today civil rights movements were closely linked to it. In the early years environmental groups sometimes confronted governments and politicians with new unorthodox activism as well as sometimes inspired them with 'bizarre' ideas. But, on the other hand, as pioneers in renewable energy projects, they overcame many impediments voiced by numerous skeptics with pragmatic and often do-it-yourself approaches.

Germany's environmental policy programs and particularly actions related to the Energiewende motivated primarily small and medium sized enterprises (SMEs) to invent and innovate technologies with which energy and resource efficiency can be increased. Over the years many of these pioneering companies became leader in greentech technologies, not only in the domestic market but also abroad. Especially in the fields of renewable energies like wind and solar power new companies like e.g. Solarworld, Nordex, Conergy emerged and became internationally well respected pioneers. Many of these companies are listed on Germany's most important stock exchange at Frankfurt and registered in the TECDax, the stock index of the Deutsche Börse Group that covers highly innovative technology driven companies. Based on our own research the current number of companies with business models in greentech and being listed at the stock exchange in Frankfurt counts for 27 companies.

With the carve out of Innogy AG from one of Germany's largest energy supplier, RWE AG, in 2016, renewable energies reached mainstream energy suppliers. It represents also a remarkable turnaround in the strategies of Germany's leading energy suppliers, RWE AG, Eon AG and EnBW AG, as for decades they had regret to accept the ongoing changes in the national energy market and abroad, i.e. a reversal from fossil energy (and for Germany from nuclear power) towards renewable energies.

Very special for Germany's SMEs are institutional arrangements in the fields of renewable energy. Prior to the nowadays increasing number of large-scale offshore and onshore wind energy farms, small-scaled cooperatives and not for profit organizations, often augmented by elements of civic participation were the real pioneers in Germany's renewable energy sector.

Figure 3: Ownership structure of renewable energies in Germany in 2012¹³



Many of these organizations have survived from the very beginning of the renewable energy movement until now. Nowadays such investments are generally understood as **infrastructure projects** and a special type of **real estate investments**.

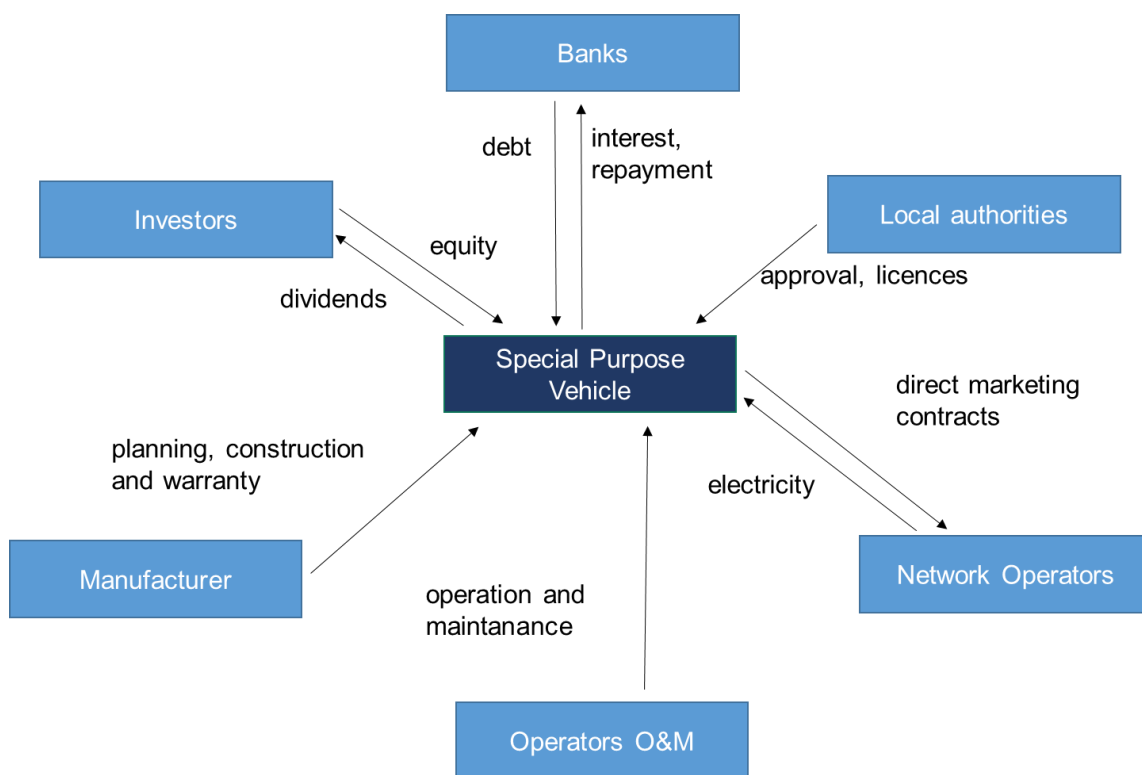
In the new millennium, in addition to wind and solar power plants, biomass energy plants have been on the increase with a very regional and local business focus. In most cases they have been financed by local and regional cooperative banks and savings banks and were accompanied by the subsidies of the **German renewable energy law**. In its original version it guaranteed renewable energy producers stable sales prices and established one of the largest public subsidy systems Germany has ever had. With the help of such administered prices renewable energy along the entire value chain (from supplier of technical items to the producers of energy) enjoyed the benefits from a regulated energy market segment. From the financial side the constant and stable prices created sustainable cash for the companies situated along the value chain of renewable energy production. With such continuous and growing cash inflows the working capital of the renewable energy supplier steadily increased and made them independent from bank loans or capital market

¹³ Trendresearch (2013, p.1).

based financings like bonds or *Schuldscheindarlehen* (a hybrid loan contract in between a bank loan and a bond, mostly not tradable in the capital market).

In Germany many renewable energy plants are organized as private limited companies, cooperatives and partnerships. Their equity is financed via private placements among interested parties. Many of these companies distribute ownership rights by financial advisory companies specialized in Socially Responsible Investments (SRI) and green investments. Traditionally civic environmental groups have organized the founding of new renewable energy power plants.

Figure 4: Typical project financing in renewable energies



Today this business lies in the hands of professional real estate developers and engineering companies. Cooperative banks sometimes assist in the acquisition of potential investors among their members and customers. Savings banks have constructed special financing instruments under the umbrella "*Bürgerbeteiligung*" (civic financial participation), enabling retail customers and mass affluent customers who represent the typical customers of local and regional savings banks to invest in green projects even when investing small amounts of money. Renewable energy projects in Germany are typically handled via project financing models. An established project company (Special Purpose Vehicle, SPV) allows the outsourcing of

the financial burden (off-balance sheet financing). The financing risk is distributed to the individual project participants through bilateral contracts. Figure 4 shows the model of such project financing (Roedel & Partner, 2014, p. 25). SPVs are applied in a variety of legal forms such as co-operatives, and are intended to enable retail customers to finance direct renewable energy along with other saving products offered by their bank.

3. Contributions of the German banking sector to green finance

Investments in green finance are most often understood as a part of SRI. It is also often understood as social impact investing as most impact investors in Germany associate with impact investing renewable energy and related green projects.¹⁴ The most reliable statistics on SRI and social impact investing are delivered by the Forum Nachhaltige Geldanlagen (FNG) which is the industry association promoting sustainable investment in Germany, Austria and Switzerland. For Germany's SRI market, the latest statistics of the FNG for 2015 show a **total volume of 136.6 billion Euros** which means an increase of 10% on the previous year. Through the last decade the average annual growth rate was 27.6% (s. figure 5).¹⁵ The largest proportion of Germany's SRI market consists of investments that underlie negative screenings mostly with criteria that exclude producers of armaments, nuclear power, violators of human rights and child labor. An increasing part of exclusionary criteria reflect divestments from carbon related sectors and firms. Germany's institutional investors like insurance companies and pension insurance funds represent such divesting asset owners, but they still play a minor role.

¹⁴ Eckert/Schäfer (2015).

¹⁵ FNG (2016), pp. 27ff.

Figure 5: Germany's SRI market 2015¹⁶

	Volume (in Mio. Euro)
Investment funds	20.580
Mandates	48.358
Customers/Proprietary Investments	71.249
Funds & Mandates: sustainable investment strategies	
Exclusions/negative screens	44.884
Integration	27.733
Best-in-Class	21.088
Engagement	22.234
Norm Based Screening	15.379
Voting	25.799
Sustainable Themes	8.157
Impact Investment	4.763

The FNG's statistic provides some insights into **thematic investments** and **impact investments** which in Germany are often related to greentech and renewable energy companies and projects. As no reliable statistical breakdown of the single financed targets is available, only some indications from market participants are known. They give many hints that the thematic and impact investments in the FNG statistics consist mainly of renewable energies and microfinance. A study by the University of Stuttgart showed that Germany currently has 113 investment funds with a climate link whose investment strategies cover a volume of assets under management (AuM) of about 7.5 billion Euros. Their thematic focus ranges from renewable energies, green-tech investments, investments in emission certificates to companies specialized in the manufacturing of climate and environment related technologies.¹⁷

A current market study of Novethic comes to a somewhat different conclusion. While the volume of AuM in Germany totals 2,600 billion Euros and nearly 400 SRI funds are on offer, German asset managers have only created around twenty green funds,

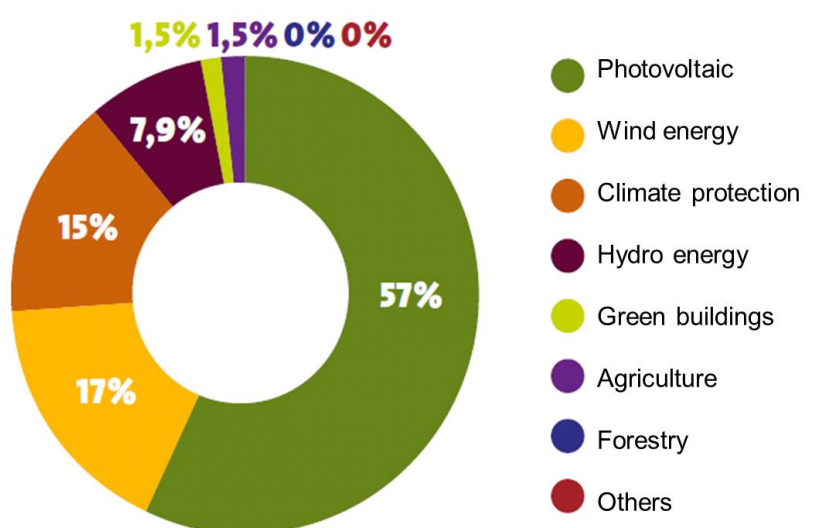
¹⁶ FNG (2016), pp. 27ff.

¹⁷ Steiauf/Schäfer (2014).

totalling around 2 billion Euros in assets. These funds are mostly positioned on broad environmental themes and there are virtually no funds dedicated to water, the climate or renewable energies.¹⁸

More illustrative is the market segment of SRI **closed end funds**. Here the FNG's statistics deliver a breakdown on the different parts of investment targets as figure 6 demonstrates. The dominance of green investments is obvious.

Figure 6 Breakdown of green closed end funds in Germany 2015¹⁹

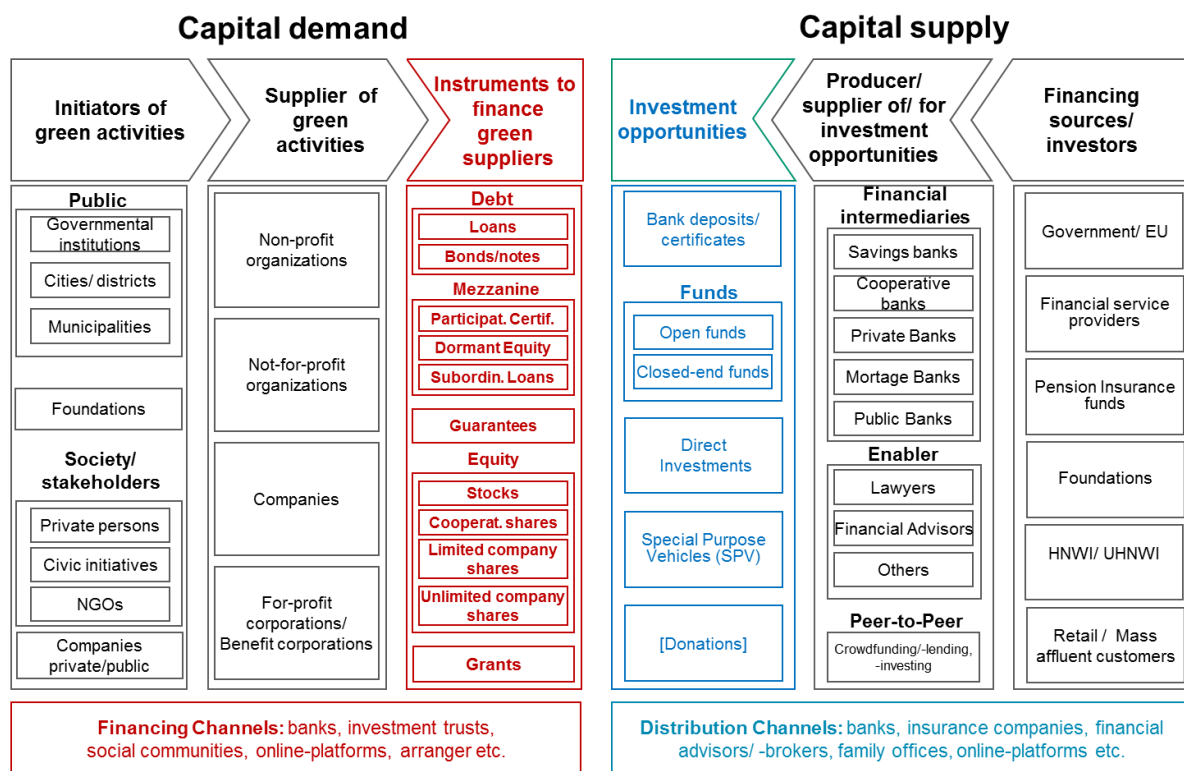


Investments in green finance related themes and impact investments are the outcome of a very complex and interdependent network of relationships between different agents on the supply and demand side and connected financial intermediaries. Many transactions in green finance are carried out by banks and only a minor part by the use of the stock exchange. Financings were based on relationship based principles as it is typical for the German financial system. Over the last decade in Germany a special **green finance ecosystem** has evolved as it is demonstrated in figure 7.

¹⁸ Novethic (2017), p. 7

¹⁹ FNG (2016), pp. 27ff.

Figure 7: Germany's green finance ecosystem



The specific relationship between investors/capital providers and investees regarding green finance as shown in figure 7 is depicted in an **extended value-added process** although they differ for several types of green finance products and services. The right side of figure 7 captures the **supply side** which represents investors differentiated by the funding sources and according to the common investor groups. They obtain their investment opportunities from financial intermediaries and other supporting parties. Furthermore there is a differentiation in peer-to-peer relationships which can be found in particular in the domain of crowdfunding and crowdinvesting. To a certain extent, the producers of green finance products and services are simultaneously the distributors for such products.

4. Status quo of green finance in Germany's ecosystem

Although Germany's path to environment-friendly consumption, production and innovation in the past was based on the three pillars mentioned in chapter II - regulation, industrial innovation and civil rights movement - a fourth one completes the overall picture: Germany's financial sector. Resting on the typical **three pillar banking system** - public banks especially savings banks, cooperative banks and private

banks - it was not the conventional part of the banking system that contributed most to the pioneering developments described above. Instead a very special group of banks playing in a niche of the German banking system was the most innovative one. Such banks now play a more active role in green finance: **alternative and social banks** and to some parts clerical banks. The focus of these banks is directed to business models that already allowed a symbiosis of conventional banking, responsible acting and the creation of positive external effects for the environment (and society or stakeholders). Until now these alternative banks deliver many best practices for green finance as they often have long-standing experiences and leadership in this area.²⁰

4.1. The pioneering role of alternative banks

Founded by citizens' groups in the 1980s the **Ökobank** in Frankfurt was the first bank that devoted its entire business model and products to environmental projects, especially from the renewable energy sector. Due to mismanagement the bank fell into deep financial difficulties, its business model failed and it was overtaken by the **GLS Bank**. This bank (formerly anchored in the anthroposophic movement) became the most important alternative bank in Germany. Other banks like the Umweltbank, Ethikbank and Fintech related banks (e.g. the Fidor Bank) have adopted basic elements of banking business models that are devoted to environmental friendly asset management, commercial banking and related financial services.

According to the current statistics of the German Socially Investment Forum (FNG) in 2015 Germany's 13 alternative and clerical banks hold customers' deposits of 29.3 billion Euros, a volume that has increased steadily since 2010 together with their own direct investments in the capital market by 41.9 billion Euros. In 2015 this banking group has invested 71.2 billion Euros under the umbrella of SRI, many of them with a pronounced impact (see again figure 5 on page 13 in this report).²¹ These banks are well accepted by a growing number of private households and in many ways offer best practices for conventional banks to cope with their new challenge as enablers of the climate action plan.

Remarkable and outstanding concepts and financial products have been developed by the **GLS Bank**. For instance its "financing partnership for green entrepreneurs" as

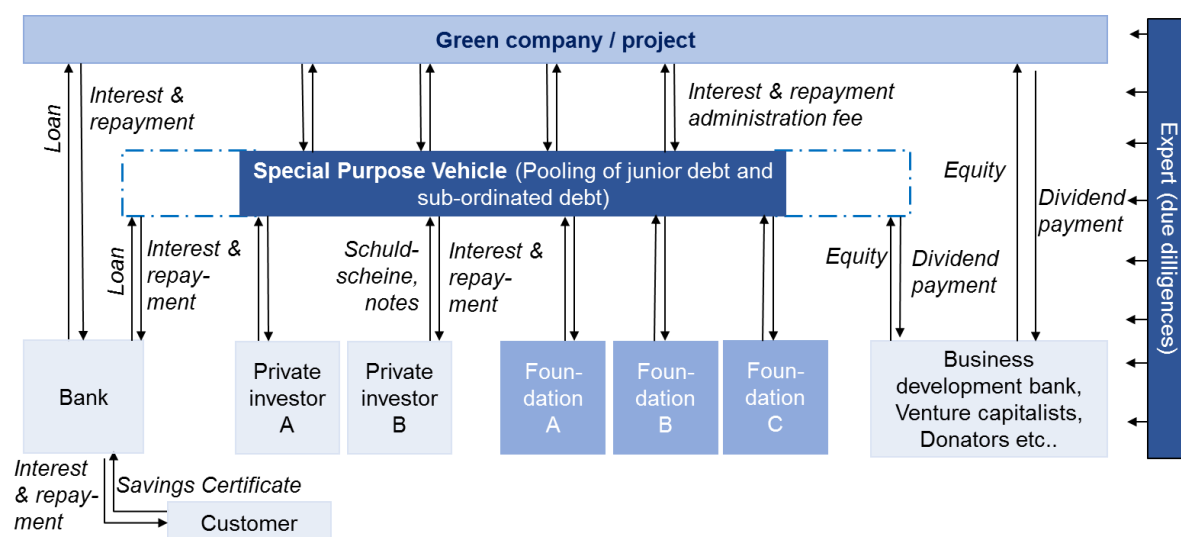
²⁰ Weber/Remer (2011).

²¹ FNG (2016), pp. 33-34.

illustrated in figure 8 adopts the basic elements of structured finance. A special purpose vehicle (SPV) operates centrally by pooling several investments and granting subordinated loans for green companies. The model is very flexible as it allows the allocation of different capital funding sources and types of capital. Private investors and foundations (e.g. through bonds), development banks and venture capitalists (e.g. through equity) as well as banks (e.g. through loans that in turn are refinanced through the issuance of savings certificates) can provide the required capital for this pool. Thus a portfolio with green projects is created through several funding components whereby the components are customer-tailored and risk-adequate for all parties.

Another illustrative example is the **Umweltbank AG** which has announced that since its inauguration ten years ago, it had financed environmental projects encompassing a total loan volume of 2.4 billion Euros by the end of 2015. The bulk of financings was contributed to solar energy projects (39%), construction of energy efficient building (31%) and wind and water energy projects (25%).²²

Figure 8: GLS Bank's structured finance model for green finance partnerships²³



Systematic management of risk and return by a strategic portfolio:

- Risk bearing parts: equity (e.g. ownership rights of limited private companies).
- partly risk bearing parts: unsecured notes (junior debt).
- non risky parts: secured bonds, savings certificates.

²² Umweltbank (2016), p. 68.

²³ GLS Bank (2015).

4.2. The core of green finance in Germany: KfW Group

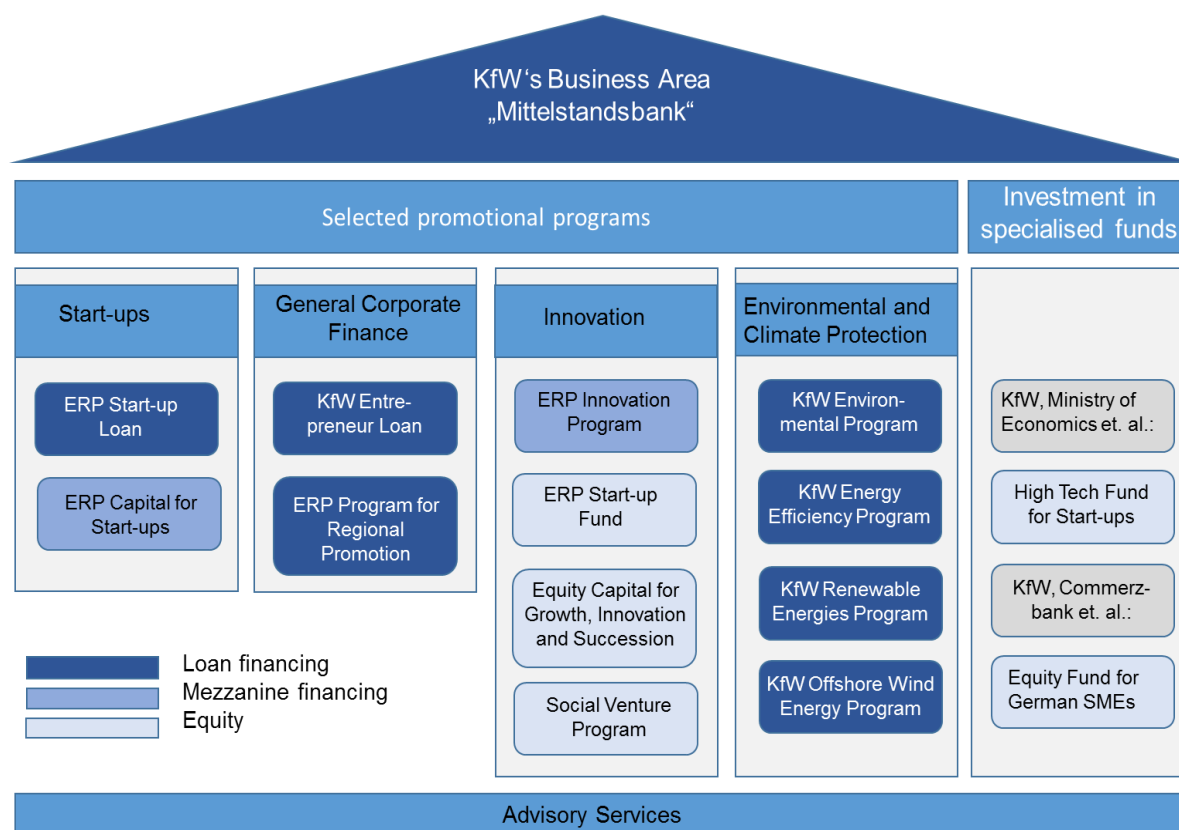
Despite these admiring entrepreneurial performances of Germany's alternative banks, the most driving force in a huge variety of climate related financings was over the last decades the state-owned **KfW Group**. This bank is the real financial heart of Germany's public environmental policy and it is no wonder that it plays a pivotal role for the *Energiewende* and the financial incentives for private households, public communities and the industry in their environment-friendly efforts.

In the international arena, the climate related financings of the KfW Group are also outstanding. In 2015 half of KfW's 74 billion Euros capital available for financing purposes was fueled to projects related to environment and climate change. Besides its direct financings, KfW is an important partner for conventional banks as they grant loans for their customers that are funded by the KfW on a pass-through basis. In 2015 out of the total 1.2 billion Euros of such loans with a total of 300 million Euros were granted for real investment projects and measures that reduce greenhouse gas emissions. By the end of 2015 Germany's total international climate financing was 7.4 billion Euros including the KfW's part of about 4.7 billion Euros. The funds have been used for project finance, investment funds, funding of public private partnerships, developing finance, subsidized loans and direct subsidies. In 2016 more than 9,000 projects in the renewable energy sector and about 1,500 energy efficiency projects in Germany and abroad were financed by the KfW's programs. One of KfW's priorities are the financings of SMEs. The bank's activities were focused under the roof of the "Mittelstandsbank" and show a variety of services and products that should ease SMEs' financing opportunities. Figure 9 illustrates the entire product and service portfolio of the state-owned bank and specify the promotional programs with respect to environmental and climate protection.

Inside the SME portfolio the very important special loan program is KfW's **energy efficiency program**. It finances energy efficiency measures of manufacturing companies in Germany by offering loans with yields below market levels and with special repayment arrangements. The focus is on SMEs that offer goods and services for heating, energy efficient buildings and renewable energies. In the year 2016 the exploited volume out of the program was about 3.5 billion Euros.²⁴

²⁴ KfW (2016a).

Figure 9: KfW's product and service portfolio for SMEs



As a very agile participant in Germany's and international capital markets the KfW Group plays a prominent and pioneering role in the issuance of climate and green bonds. Since 2014 it has issued green bonds with a volume of 7.8 billion Euros²⁵, which partly contributes to national and international green finance operations of the bank. KfW initiated the "**Green for Growth Fund**" (GGF), which finances financial institutions and climate related projects in South East Europe and the MENA region in Northern Africa.²⁶ The group plays also an outstanding role in Germany's developing finance policy and related energy financing for developing and emerging countries.

4.3. Conventional banks' contributions to green finance

Contrary to the pioneering role of alternative banks and the leadership of the KfW Group in public environment financing, the majority of German banks ignored environmental-friendly business opportunities for a long time. Not until the *Energiewende* did conventional banks understand that politicians, non-governmental organizations

²⁵ KfW (2014), KfW (2015), KfW (2016a).

²⁶ Green for Growth Fund (2016).

and ministries expect more financial support and more awareness of green finance in their business activities. German banks were among the first offering green fixed-income passbook savings accounts and regular savings accounts.²⁷ They ought to mobilize more private capital, even from private households in the retail banking business and should help to finance the mushrooming of photovoltaic installations that started to cover the roofs of private and commercial buildings and stand alone plants.

Different stakeholder groups are skeptical with respect to the environmental promises made by financial firms, in part due to the lack of transparency of offered funds. FNG certification may be able to revitalize the market, as institutional investors, insurers and pension funds will need to be more active. As surveys demonstrate, private households are not enthusiastic about green investments and reveal a very strong home bias in their investment attitudes.²⁸

As mentioned earlier, the German industry was challenged by public laws, nudging and self-regulation to contribute to waste and emission reductions, to care for clean water, to lessen energy and resource intensity etc. Germany's real sector mastered the induced additional cost burden by a silent and unique innovation campaign, based on the business case of investment decisions. According to a PWC (2016) study²⁹, "energy costs could be reduced by 20 percent or more by investing in energy efficiency, reducing overall costs by 3.6 percent more than half of the investments of the SMEs surveyed are amortized after less than ten years. In concrete terms, the average payback period for an energy efficiency investment is only 8.5 years. 89 per cent of respondents are driven by a reduction in energy costs, followed by the desire to modernize and increase the value (47 per cent) of their company; only one in three companies just want to meet legal requirements (33 per cent)." Above mentioned developments helped to modernize the German manufacturing industry and strengthened and expanded its leadership in global markets. German companies integrated green technologies in their regular real investment decisions as embodied technological progress (e.g. the modernization and extension of manufacturing plants). Due to the oligopolistic market power of many German high-tech companies (many of them are family-owned), their profit margins allowed the accumulation of internal funds and made them available for re-investments and net investments. This goes

²⁷ Novethic (2017, p. 7).

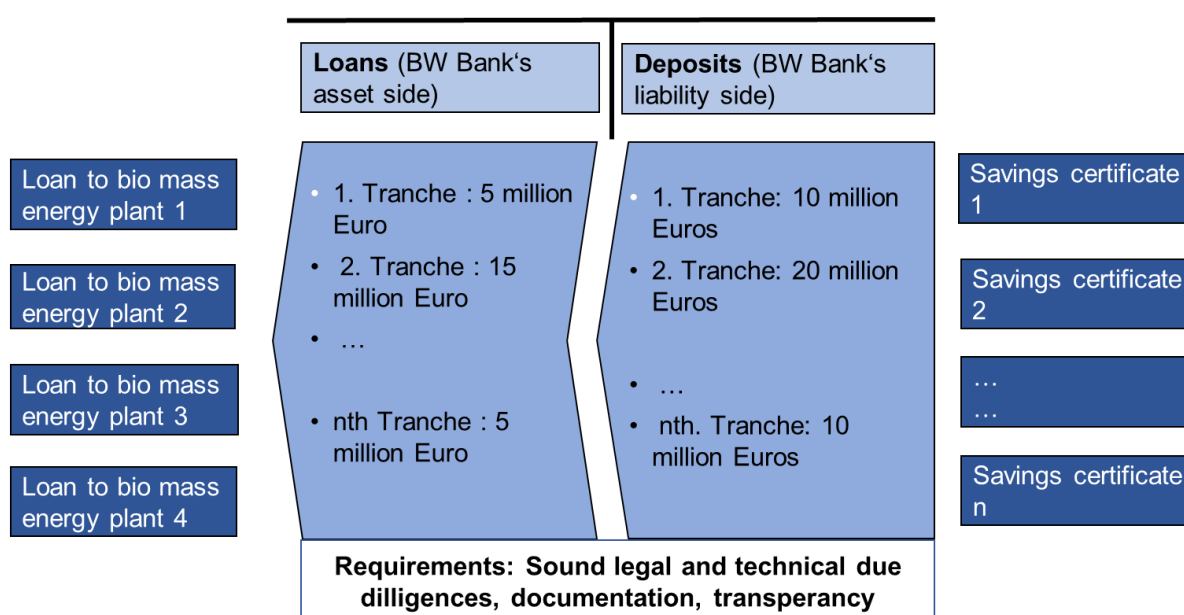
²⁸ Verbraucherzentrale Bremen (2015).

²⁹ PWC (2015).

along with the strategy of many of Germany's family-owned and medium-sized companies to integrate corporate social responsibility in the core business silently and seldom transparent.³⁰

The remaining funds needed for those companies' real investments were mobilized in the typically German way, namely through bank loans. It is remarkable that the transition from resource and energy intensive manufacturing and goods was accompanied by mainstream banking: Banks actually did not finance green projects and only seldom green companies, but simply financed real investments of SMEs.

Figure 10: BW Bank's Future Savings Certificate (numbers are examples)³¹



It was the breakthrough of the *Energiewende* that conventional banks together with alternative and social banks innovated green financial products. Green finance related banking services show very close links to impact investing as banks then offered capital and risk management tools for organizations, companies and projects that deliver greentech services like renewable energies, energy efficiency devices etc. Banks and saving banks in Germany only occasionally reacted to this trend and in particular in the domain of renewable energy. A typical example of green finance related investment products is presented in figure 10. The Stuttgart based BW Bank, a subsidiary of the state-owned Landesbank of the state of Baden-Wurttemberg (LBBW) in the Southwest of Germany, offers a deposit savings product called

³⁰ Schäfer/Völker (2017).

³¹ In dependence on BW Bank (2015).

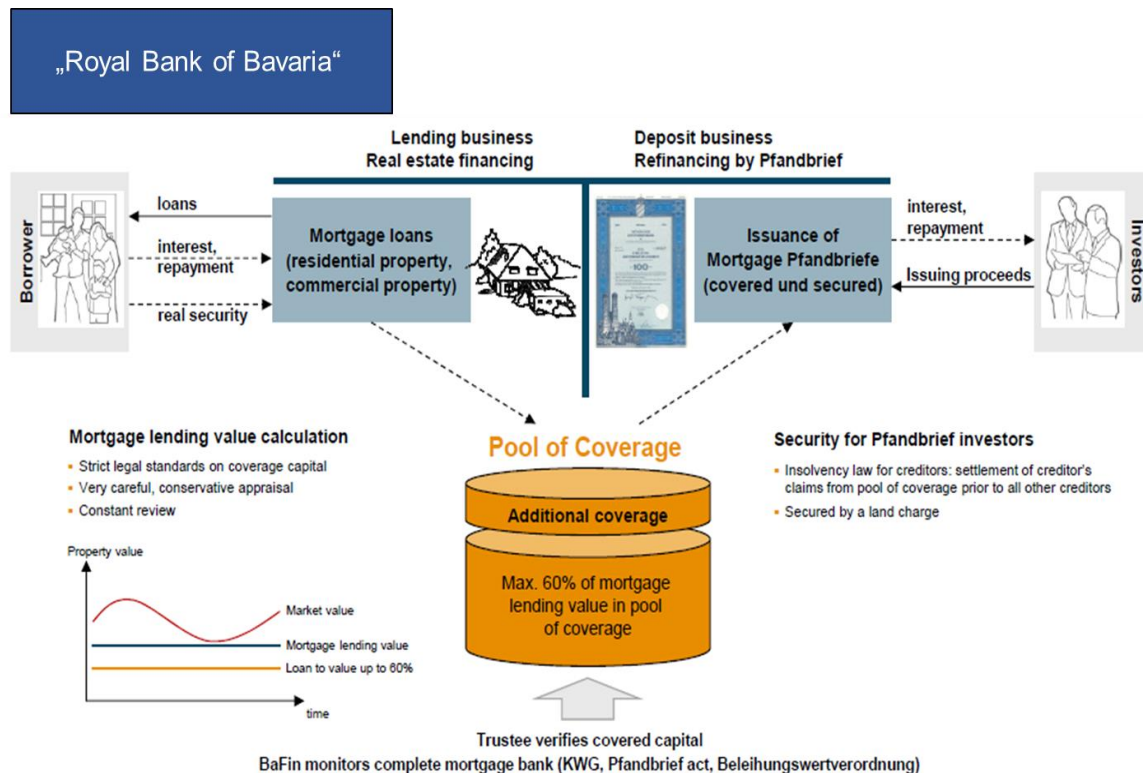
"FutureSavings Certificate" within its retail banking business. Customers from average private households can invest their savings in a special deposit in the bank's balance sheet. The BW Bank has promised that these deposits will be exclusively reserved for the funding of loans granted to four local bio mass energy plants situated in the Stuttgart region.

One obvious outcome of the growing awareness of German banks and financial intermediaries to take part in the financing of greentech is the emergence of green bonds. In 2016 green bonds with a total volume of \$14.3bn were issued in Germany. As already mentioned before in the explanation of KfW's contributions to green finance, this bank already in 2014 was pioneering in the German green bond market and is the most important issuer of Green Bonds in Germany. However it also acts as an investee and plans to increase its Green Bond portfolio up to 1 billion Euro within the next three to four years.³² Meanwhile and over the last five years, green bonds in the German capital market mainstreamed step by step. The main driving force is the public sector. Since 2013 also Northrhine-Westphalia's NRW.Bank issued green bonds with an outstanding volume of about 3.5 billion Euros in order to refinance energy efficiency projects, renewable energy projects and projects in the field of biodiversity of this federal state.³³ A very active bank is the DKB, which belongs to the Bayerische Landesbank (BayernLB), a bank owned by the state of Bavaria. The ESG Bond of the Munich based mortgage bank Royal Bank of Bavaria also has substantial "green" links within its financing activities (objects) and therefore can be allocated within the category of green bonds.

³² KfW (2016b).

³³ NRW.Bank (2016), p. 26. The bank calculated that with one million Euros invested from that green bond in green house gas reducing investments and measures, an annual CO₂e savings of 540 million tons was possible.

Figure 11: Royal Bank Bavaria's ESG Mortgage Bond³⁴



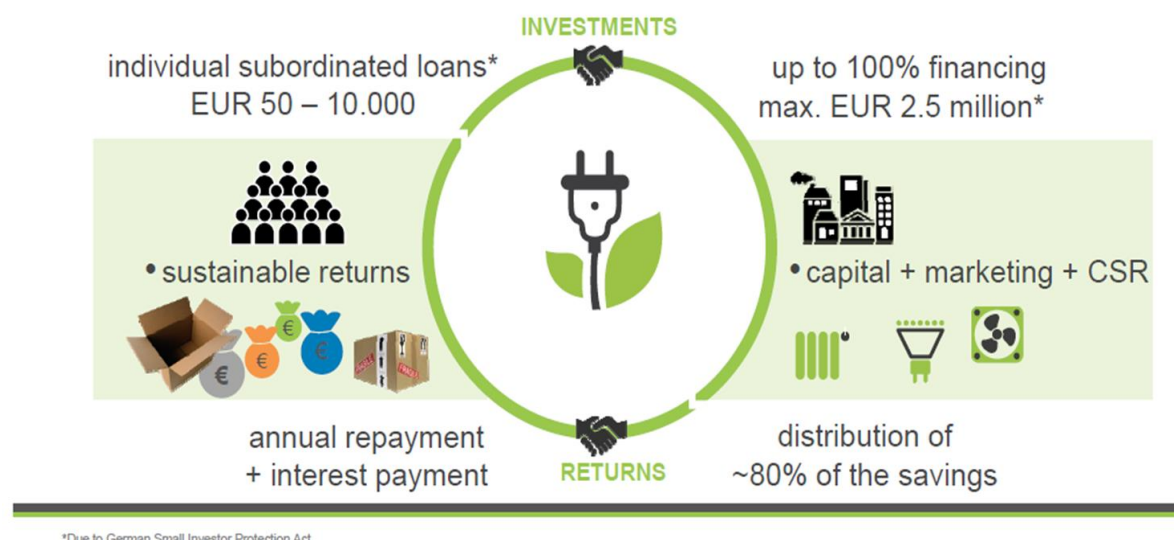
This bank has introduced a bond that contributes in several ways not only to emission reduction targets but also to social welfare and to many different environmental issues. In figure 11 the on-balance sheet operations of the bank's ESG mortgage bond is demonstrated. At first glance it exhibits the elements of a classical covered mortgage bond, the German Pfandbrief. The set of ecological criteria for the project selection provides an interesting component of green finance when it comes to the selection of housing projects. As the bank has documented, the bond's funds will exclusively be channeled to housing cooperatives. They are qualified to be financed by the Bavarian bank if certain conditions are fulfilled: modernizations in large parts for energetic activities (e.g. power-heat cogeneration, renewable energies), moderate operating costs, project developments and new construction like installation of high efficient block heating works, only to mention a few items. Beyond ecological criteria the bank demands outstanding social attributes of its financing targets like social renting levels.

³⁴ Munich Hyp (2016).

4.4. Peer-to-peer in green finance

Another source that mobilizes private capital for green projects in Germany are peer-to-peer (P2P) platforms. They are well known as crowdfunding and consist of the three pillars crowdfunding, crowdinvesting and crowdlending. The statistic for Germany is presented by the organization "Für Gründer". For the year 2016 it collected the following data: total volume of crowdfunding in Germany was 154.2 million Euros (2015: 114 million Euros), of which the bulk (76.7 million Euros) was collected by crowdinvesting, followed by P2P consumer and business lendings (58.8 million Euros). Reward based crowdfunding was only of minor importance (9.7 million Euros). Out of the total of 144.2 million Euros only 5.3 million Euros were collected for green projects and it can be concluded, that in Germany P2P green financing is still in an infant stage.³⁵ The German market leader is the Frankfurt based web-platform bettervest.de. For 2016 they reported 43 climate related projects funded by private investors with a volume of 3.8 million Euros. These funded projects were able to save greenhouse gas emissions of 3,100 tons CO_{2e} per year. The average annual rate of return was about 7%. Figure 12 exhibits the crowdfunding business model of bettervest's green finance.³⁶

Figure 12: Bettervest's approach in P2P green finance at glance



³⁵ https://www.fuer-gruender.de/fileadmin/mediapool/Publikation/Crowdfinanzierung_2016-Fuer-Gruender.de-Dentons.pdf.

³⁶ bettervest (2016).

Banks did not enter the crowdfunding market on a grand scale yet. They are involved when it comes to financial transactions, but are rarely seen as a provider of crowdfunding services. Only in the field of charitable crowdfunding, several banks started to run regional platforms. They offer also fundings for green projects. P2P business is for German banks part of their overall digitalization strategy with a special reference to social communities. Generally speaking the development of crowdfunding with banks is in Germany just at the beginning. If medium-sized companies with business operations in green areas fully understand the advantages of crowdfunding and together with the regional crowdfunding potential, experts expect a considerable advancement in the market.

5. First conclusions and next steps

To our best knowledge the presented study is the first survey of Germany's green finance first draft in order to describe the state of green finance in the German banking green finance landscape. It is a preliminary study that needs further research and more data. The analysis should be continued as soon as possible, as the dynamics of climate action plans are getting stronger and malfunctioning of the financial sector as enabler and risk manager would jeopardize Germany's very challenging climate action plan. Despite the preliminary character of the study, some insights are noteworthy:

- German alternative banks operate as pioneers since several decades in green finance related areas. Some of these banks were enabler from the first moment of civic environmental movement with innovative and creative approaches in the installments and financings of renewable energy plants. These banks often operate in networks and built their financing decisions more on project cash flows than on balance sheets items and income statements of their borrowers (as conventional commercial banking does). So far, they have built up dynamic capabilities and proofs of concept that should enable them to reach more large scaled financings. On the other hand their experiences should be made available for banks lagging in green finance, to which the majority of German banks seems to belong to. Such a transfer of knowledge, experiences and capabilities should also be advisable as the customer basis of clerical and alternative banks is getting exhausted, partly due to bank internal restrictions as in the case of

clerical banks which have to restrict their business to members of churches and clerical organizations like diakonins.

- The already developing field of investment banking in green finance mostly represented by green and climate bonds should expand further in Germany. Public authorities should encourage such issuances by focusing more on debt financed infrastructure projects. As the public sector has to contribute to the goals of the climate action plan as well, it is necessary, to mobilize private capital. A sole tax-based financing of public investments and measures in the green area would not allocate sufficient funds. New collaborative models between the public and the private and also the public banking sector are urgently needed. They can offer new promising market segments for today's mainstream banking.
- Most of the green bank products are driven by occasional marketing campaigns or as a reaction to comparable campaigns of competitors. So far green finance has not yet become a systematic, structured and integral part of the banking business models and strategies in Germany.
- Currently green finance is not understood by many German banks as an important contributor to their overall sustainability and corporate social responsibility strategies. Beside such advantages for the business development of banks green finance would comply with the new legal obligation for German banks (and insurance companies) with a workforce of 500 employees upwards, to report on corporate social responsibility (German CSR directive).
- The scaling up of green finance investments requires growing bank capacities in project financing and measurability of climate impact (i.e. reductions in greenhouse gas emissions). Such investments share many attributes of conventional infrastructure projects but differ tremendously in their regulation. For many banks this would require a paradigm shift in their business models and new dynamic capabilities as banks are used to operate with corporate finance thinking. Only a few banks in Germany are capable to operate with scaled up and investment banking related green finance models and products.
- The core financial competences of German banks lie in the fields of regional and local based green finance. Here they have experienced from very different kinds of often tailor-made financing concepts. They are also able to integrate

public participation elements into such financing concepts. But so far it seems that on average German savings banks and cooperative banks still are not aware of the green finance market potential. They even seem not well prepared to play their pivotal role as financial enabler and carbon risk manager as demanded by international institutions and the climate action plans of the German Federal Government.

- Green finance challenges many German banks to adjust and to develop (new) products faster and more efficient to fulfill the requirements as enabler and carbon risk manager due to the climate action plans. But with the existing experiences and capabilities in green finance German banks should understand, that some of them are already in a good market position, if they have prototypes of finance and investment products at hands. It seems that banks are still not aware of this market potential and their available capabilities.

Despite the existing backlog needs in green finance, German banks and other financial intermediaries possess dynamic capabilities that qualify them to create new financing facilities and investment opportunities in the field of green finance. As many of those green financings require the interaction with different parties beside bankers, a network based approach seems promising. By means of its innovative capacities, Germany's manufacturing sector was able to exploit its market opportunities. A core element was the network based and open innovation approach institutionalized in innovation clusters. By adopting this long standing tradition of innovative power generation from the manufacturing sector, German banks should be able to reduce time to innovation in green finance and time to market. Some alternative banks in Germany have understood this potential and care about different networking with their customers, experts from different sectors etc.

- Beside such necessary improvements in green finance innovations and the adoption of green finance in the business and product models of banks, institutional investors as the main driving force in SRI in Germany generally demand more asset owners and managers, who are open minded to green finance. Together with banks (public and private), stock exchanges, insurance companies, foundations and pension insurance funds they represent a critical mass of financial agents that would be able to identify promising green business

areas. In network based collaborative approaches they can enable themselves and others to design financing and investment concepts that suit the needs of environment friendly investment of private households, the industry and the public sector.

- As many parts of green finance can be understood as a contribution to a public good called reductions in greenhouse gas emissions, the public sector should support the building of networks in Germany's financial system. The initiative of the Ministry of Economic Affairs of the state of Hessian to vote for a green finance hub at Germany's most important financial center in Frankfurt, can be an important step towards capacity and competence building in green finance and is not be limited within Germany's boundaries.

Literature

- Beech, M., 2016, The Paris agreement is a historic turning point on climate change, in: Utility Week, 15. Jg., Nr. 5, S. 11
- BW Bank, 2015, Presentation: VfU Forum Nachhaltige Kapitalanlage und Impact Investing, 12.05.2015
- Deutsche Bank, 2016, Deutsche Energiewende: Zielverfehlungen in Sicht, https://www.dbresearch.de/PROD/DBR_INTERNET_DE-PROD/PROD0000000000403870/-Deutsche_Energiewende%3A_Zielverfehlungen_in_Sicht.pdf, accessed on 10.04.2017
- Eckert, St., Schäfer, H., 2015, Risk, return... and impact? Current attitudes of selected German investors towards social impact investing, Bertelsmann Foundation, Gütersloh, URL: <https://www.bertelsmann-stiftung.de/en/publications/publication/did/risk-return-and-impact/>, accessed on 31.01.2017
- Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2016a, Climate Action Plan 2050, URL: <http://www.bmub.bund.de/themen/klima-energie/-klimaschutz/nationale-klimapolitik/klimaschutzplan-2050/>, accessed on 29.01.2017
- Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety 2016b, Climate Action in Figures URL: http://www.bmub.bund.de/fileadmin/Daten_BMU/Pool/Broschueren/klimaschutz_in_zahlen_2016_grafiken_en_bf.pdf, accessed on 29.01.2017
- Federal Ministry of Economic Affairs and Energy, 2016, Fourth Energy Transition Monitoring Report -, Berlin URL: https://www.bmwi.de/Redaktion/EN/Publikationen/vierter-monitoring-bericht-energie-der-zukunft-kurzfassung.pdf?__blob=publicationFile&v=15 , accessed on 29.01.2017
- FNG [Forum Nachhaltige Geldanlagen e.V.], 2016, Marktbericht Nachhaltige Geldanlagen 2016, URL: http://www.forum-ng.org/images/stories/Presse/Marktbericht_2016/FNG_Marktbericht_2016_online.pdf, accessed on 31.01.2017
- G20 Green Finance Study Group, 2016, G20 Green Finance Synthesis Report, URL: http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf, accessed on 31.01.2017
- GLS Bank, 2015, Präsentation auf der Frankfurter Fundsinvest, Juni 2015
- Green Finance Task Force, 2015, Establishing China's Green Financial System. Final Report of the Green Finance Task Force, Beijing, URL: <https://www.cbd.int/financial/privatesector/china/Green%20Task%20Force%20Report.pdf>, accessed on 07.02.2017
- Green for Growth Fund, 2016, About the fund, URL: <http://www.ggf.lu/about-green-for-growth-fund/>, accessed on 31.01.2017
- IPCC [Intergovernmental Panel on Climate Change], 2016, Climate Change 2014 Synthesis Report, URL: <https://www.ipcc.ch/report/ar5/syr/>, accessed on 31.01.2017
- KfW, 2014, Green Bond Reporting, URL: <https://www.kfw.de/KfW-Konzern/Investor-Relations/KfW-Green-Bonds/KfW-Green-Bonds-Reporting/Mittelverwendung/Reporting-2014/> , accessed on 29.12.2016
- KfW, 2015, Green Bond Reporting, URL: <https://www.kfw.de/KfW-Konzern/Investor-Relations/KfW-Green-Bonds/KfW-Green-Bonds-Reporting/Mittelverwendung/Reporting-2015/>, accessed on 29.12.2016
- KfW, 2016a, Green Bond Reporting, URL: <https://www.kfw.de/KfW-Konzern/Investor-Relations/KfW-Green-Bonds/KfW-Green-Bonds-Reporting/index.html>, accessed on 29.12.2016
- KfW, 2016b, Green Bond Reporting, URL: <https://www.kfw.de/nachhaltigkeit/KfW-Konzern/Nachhaltigkeit/Nachhaltige-Unternehmensprozesse/%20Nachhaltiges-Investment/KfW-Green-Bond-Portfolio>, accessed on 29.12.2016
- Munich Hyp, 2016, https://www.muenchenerhyp.de/en/downloads/publications/2016/presentation_investors/Investor_presentation_English_Mar_April_2016.pdf, accessed on 29.12.2016
- Novethic, 2017, The European green funds market, http://www.novethic.fr/fileadmin/user_upload/tx_ausynovethicetudes/pdf_syntheses/Green-funds-study-Novethic-Ademe-2017.pdf , accessed on 09.04.2017

- NRW.Bank, 2016, Sustainability Report 2015, URL: https://www.nrwbank.com/en/press/pressarchive/2016/160616_PR_SustainabilityReport, accessed on 24.01.2017
- OECD, 2016, Development Co-operation Report 2016: The Sustainable Development Goals as Business Opportunities, <http://dx.doi.org/10.1787/dcr-2016-en>, accessed on 17.02.2017
- PWC, 2015, Energiewende Mittelstand. URL: <http://www.pwc.de/de/mittelstand/wie-der-mittelstand-von-energieeffizienz-profitiert.html>, accessed on 26.01.2017
- Roedel & Partner, 2014, Finanzierung von erneuerbaren Energien auf internationalen Märkten: Länderübergreifende Untersuchung der wirtschaftlichen und rechtlichen Rahmenbedingungen für erneuerbare Energien, <http://www.roedel.de/de-de/de/medien/publikationen/studien/documents/studie-finanzierung-von-erneuerbaren-energien-auf-internationalen-maerkten.pdf>, accessed on 10.04.2017
- Schäfer, H., Völker, F., 2017, Socially Driven Stakeholder Networks of German Family-owned Companies as Enablers of Economic Success - A Theoretical and Empirical Study, in: Idowu, S.O, Schmidpeter, R. (Eds.), CSR, Sustainability, Ethics & Governance, Heidelberg et al., forthcoming
- The Federal Government, 2017, Germany's National Sustainable Development Strategy, URL: https://www.bundesregierung.de/Webs/Breg/EN/Issues/Sustainability/2006-07-27-die-nationale-nachhaltigkeitsstrategie_en.html, accessed on 26.02.2017
- Trendresearch, 2013, Anteile einzelner Marktakteure an Erneuerbare Energien-Anlagen in Deutschland, <http://www.trendresearch.de/studien/16-0188-2.pdf>, accessed on 10.04.2017
- Umweltbank, 2016, Umweltbericht 2015, URL: https://www.umweltbank.de/pdf/UMWELTBERICHT_2015.pdf, accessed on 19.02.2017.
- UNCTAD, 2014, World Investment Report, RL: http://unctad.org/en/Publications_Library/wir2014_en.pdf, accessed on 20.01.2017
- UNEP FI, 2010, Universal Ownership - Why Environmental Externalities Matter to Institutional Investors, Geneva 2010
- UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers, URL: <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=126&menu=1515>, accessed on 23.01.2017
- UNEP, 2015, The Financial System We Need. The UNEP Inquiry Report. Aligning the Financial System With Sustainable Development, http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=011830_en, accessed on 20.01.2017
- Verbraucherzentrale Bremen, 2015, Der Klima-Fußabdruck von Investmentfonds - Eine exemplarische Untersuchung der finanzierten Treibhausgasemission von Aktienfonds, <http://www.verbraucherzentrale-bremen.de/mediabig/233231A.pdf>, accessed on 29.01.2017
- Verbraucherzentrale Nordrhein-Westfalen, 2015, Klimafreundliche Geldanlagen - Ein Renditevergleich, <http://www.vz-nrw.de/mediabig/235980A.pdf>, accessed on 29.01.2017
- Weber, O., Remer, S., 2011, Social Banks and the Future of Sustainable Finance, Abingdon, et al.
- WEF/OECD, 2015, Blended Finance Vol. 1 - A Primer for Development Finance and Philanthropic Funders. An overview of the strategic use of development finance and philanthropic funds to mobilize private capital for development, URL: http://www3.weforum.org/docs/WEF_Blended_Finance_A_Primer_Development_Finance_Philanthropic_Funders_report_2015.pdf, accessed on 26.01.2017