

ENVIRONMENTAL FINANCE AND IMPACT INVESTING: STATUS QUO AND FUTURE RESEARCH

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Abstract: *Environmental finance (EF) has largely taken root in the financial world. Although the term EF is not commonly used among scholars, in practice though, its components, such as carbon, energy and climate finance, are present in various forms. A proliferation of views, theories and future action alternatives has emerged that could hamper a promotion of the EF field. Consequently, the aim of this paper is to structure, highlight and summarize existing streams, obstacles and future research areas with the assistance of a systematic literature review. Imposed by this review, 117 identified and examined articles have been categorized into three meta-themes: types of EF and markets, impact investing in EF and business models in EF to recap major themes. Based on these findings, the main hurdles and future research avenues are proposed as a research agenda to urge the EF field and stimulate the appetite to develop new analyses, models, tools and regulations in both theory and practice. Future comparative, large-scale quantitative and sector-specific studies should verify the findings in this paper and provide new insights into the EF field. Practitioners might benefit from proper definitive environmental and impact markets with accurate measurement tools and tailored financial products that assort well with personal values of interested parties.*

Keywords: *Environmental Finance; Environmental Markets; Impact Investing*

Introduction

Climate change, water and air pollution and deforestation only represent an assortment of dilemmas that human populations have to master in order to live again in intact and flawlessly working ecosystems worldwide. A false assessment of natural resources has potentially caused this dicey situation (Allen & Yago, 2011; Kopnina, 2015).

Several initiatives on a global level have been implemented to reduce CO₂ emissions with trading systems to be in line with agreed carbon targets in the Kyoto Protocol. Specific trading cycles, rules and limitations have been developed in these schemes (Gasbarro, Rizzi, & Frey, 2013; Zhang & Wei, 2010). The CO₂ allowances market exhibits certain dynamics and price characteristics that could affect market efficiency, volatility and return predictability (Balcilar, Demirer, Hammoudeh, & Nguyen, 2016; Benz & Trück, 2009; Charles, Darné, & Fouilloux, 2011; Hammoudeh, Nguyen, & Sousa, 2014; Montagnoli & de Vries, 2010). Different policies submit the reduction of emissions at the lowest cost and allure investors in the renewable energy sector (Abolhosseini & Heshmati, 2014; Branker, Shackles, & Pearce, 2011; Criscuolo & Menon, 2015). The main and most challenging fields of action in the energy market might be the role of finance and its impacts on a well-working energy shift (Hall, Foxon, & Bolton, 2015; Pathania & Bose, 2014). In the combat against climate change, there is still a gulf between developed and developing countries to work together in order to diminish greenhouse gas emissions and invest in low-carbon technologies and models. The lack of capital endowment and investment needs may represent the major obstacles in future climate and sustainable development (Fankhauser, Sahni, Savvas, & Ward, 2015).

In the area of impact investing in environmental finance (EF), unanswered questions have emerged. For instance, the explicit amount of the received financial return, when an exchange of financial resources occurs and social and/or environmental issues are also concerned, is not explained. The investor's intent, measurable impact, altering variables, risk, liquidity and sustainability interact with each other, determine themselves and finally yield the return (Cengiz, Braun, & von Nitzsch, 2010; Höchstädter & Scheck, 2014; Jackson, 2013; Louche, Arenas, & van Cranenburgh, 2012; Mac Cormac & Haney, 2012; von Wallis & Klein, 2014). Therefore, trade-offs in performance very often have to be accepted (Evans, 2013). The measurement of social and environmental return could be seen as the key obstacle in the field of impact investing. Lacking or missing measurement standards and tools are frequently utilized, and investors' motivation to get an adjustment started is possibly low (Reeder, Colantonio, Loder, & Rocyn Jones, 2015).

Investors are willing to invest as much capital into socially responsible investments (SRI) as a budget dictates. In other words, a large budget does not automatically infer a high amount of SRI activities. Yet, demographic groups subsist with another SRI behavior that give more priority to personal values and ethics in the decision-making process (Dorfleitner & Nguyen, 2016; Pasewark & Riley, 2010; Säve-Söderbergh, 2010). Screening techniques show how SRI funds are selected in the portfolio building and reflect the investor's attitudes towards business practices and values in various industries. Screening methods can positively or negatively influence the performance and risk of the stock portfolio (Auer, 2014; Capelle-Blancard & Monjon, 2014; Henke, 2016; Leite & Cortez, 2014; Trinks & Scholtens, 2015). Sustainable value creation in financial markets still needs time. Occasionally, some sustainable concepts develop, however, they are more the exception to the rule due to the recurrent lack of investors' motivation and falsely assumed sustainable market conditions (Busch, Bauer, & Orlitzky, 2015; Calderon & Chong, 2014; Paetzold & Busch, 2014). Moreover, several institutional logics, SRI dimensions and mission accomplishments are in place and impact financial, social and environmental outcomes (Doherty, Haugh, & Lyon, 2014; Nicholls, 2010; Sandberg, Juravle, Hedesström, & Hamilton, 2008). To provide reliable reporting standards, special accounting and investment models have emerged (Gibbon & Dey, 2011; Nicholls, 2009) and financing options for environmental and social ventures are currently being researched (Lehner, 2013; D. Wood, Thornley, & Grace, 2013). Correctly offered manager incentives might positively impinge on firm value and stakeholder engagement. As opposed to this, undiversified and only strategically-oriented investments barely have an economic upswing of findings as a result (Chaigneau, 2016; Luo, Wang, Raithel, & Zheng, 2015; Rees & Rodionova, 2013).

In contempt of the high consideration of EF and impact investing, their characteristics, obstacles and future research fields in literature, a clear and holistic overview of streams, contradictions and future implications is not existent yet. Additionally, they are neither categorized nor assigned to a condensed range of subjects. Hitherto, a sound and well-arranged synopsis is missing. A proliferation of opinions, concepts and improvement suggestions hampers advancement in the field. Hence, setting research agenda has not been possible to date. However, some researchers have already started to perform literature reviews that highlight contradictions, for instance the discrepant investment performances of funds in impact investing (van Dijk-de Groot & Nijhof, 2015; von Wallis & Klein, 2014).

In connection with the diverse definitions and perspectives of scholars, this thesis builds on present research. Consequently, the objective of this thesis is to structure the many voices pertaining to EF, markets and impact investing in research and practice and give academics a research agenda to take along. The thesis outlines the most discussed voices; their overlaps and future focus areas and charting them in the form of a landscape in EF. In addition, the author provides summarized tables with applicable references, as well as information about the cited articles in the appendix to assist the reader in gaining further insights into each theme.

Methodology

In order to afford the status quo and future research directions of EF, it is necessary to take stock. Firstly, in this thesis a systematic literature review is carried out to give holistic and precise insights into EF, markets and the impact investing fields with current streams, obstacles and future research propositions. Secondly, to illustrate the big picture, the ABS 4th list (Association of Business Schools, 2010) is used to ensure that only peer-reviewed and high quality articles are used. Due to the nascent status of the topics, additional niche journals that are not ABS ranked are included in the article as well. They are selected because they are either referenced in the ABS 4th list or they comprise a theme that is approached in this article and mentioned in the title of the journal. Furthermore, a systematic literature review facilitates the gaining of structured information, and brings articles into a homogeneous order to cope with the proliferation of existing articles in literature and provide clear distinctions and logical conclusions (Bryman, 2012). Table 1a shows all ABS ranked journals cited in the article and are ordered by their ABS grade and Table 1b shows all cited niche journals with a high impact in the field ordered by their frequency.

Table 1a: List of ABS Reviewed Journals

Journal Name	ABS grade	Frequency	ISSN
Strategic Management Journal	4	4	1097-0266
Journal of Environmental Economics and Management	4	4	0095-0696
Academy of Management Journal	4	3	1948-0989
Accounting, Organizations and Society	4	3	0361-3682
Journal of Business Ethics	3	13	1573-0697
Ecological Economics	3	3	0921-8009
Journal of Banking and Finance	3	3	0378-4266
European Financial Management	3	3	1468-036X
International Journal of Management Reviews	3	3	1468-2370
Journal of Business Research	3	3	0148-2963
Economics Letters	3	1	0165-1765
Accounting Forum	3	1	0155-9982
Energy Economics	2	5	0140-9883
Economic Modelling	2	3	0264-9993
Energy Policy	2	2	0301-4215
Business Ethics: A European Review	2	2	1467-8608
Journal of Applied Corporate Finance	2	2	1745-6622
Research in International Business and Finance	2	1	0275-5319
Organization & Environment	2	1	1552-7417

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Journal of Environmental Management	2	1	1432-1009
European Management Journal	2	1	0263-2373
Environmental and Resource Economics	2	1	1573-1502
Accounting and Finance	2	1	1467-629X
Venture Capital	2	1	1464-5343

Table 1b: List of Niche Journals

Journal Name	Frequency	ISSN
Journal of Sustainable Finance & Investment	28	2043-0809
Journal of Cleaner Production	2	0959-6526
Environmental Politics	2	1743-8934
Climate Policy	2	1752-7457
Social Enterprise Journal	1	1750-8614
Social and Environmental Accountability Journal	1	2156-2245
Renewable and Sustainable Energy Reviews	1	1364-0321
Management of Environmental Quality: An International Journal	1	1477-7835
International Environmental Agreements: Politics, Law, Economics	1	1573-1553
Global Environmental Change	1	0959-3780
Enterprise Development and Microfinance	1	1755-1986
Corporate Finance Review	1	1089-327X
Community Development	1	1944-7485
Climate and Development	1	1756-5537
Business & Society	1	1552-4205
Applied Energy	1	0306-2619
Ambio	1	1654-7209
Environment, Development and Sustainability	1	1573-2975
Journal of Social Entrepreneurship	1	1942-0684
Public Administration	1	1467-9299
Corporate Finance Biz	1	1867-5476
Entrepreneurship Research Journal	1	2157-5665

Altogether, 117 articles from 24 different ABS ranked journals and 22 niche journals are cited. Noteworthy is that one niche journal evidently constitutes the speaking tube in the EF field, namely the ‘Journal of Sustainable Finance & Investment’ with 28 cited articles. In addition, a

qualitative interpretive coding scheme is used and the author uses the guidance of Denzin and Lincoln (2011) for the coding procedure. Main codes are inductively defined for sorting the articles. If overlaps between streams occur they are combined to one code that emphasizes the topic. The author categorizes the articles first by their headlines, abstracts and conclusions, and then assigns them to the following three meta-themes: types of EF and markets, impact investing in EF and business models in EF to summarize the major themes (Table 2). Thus, the relevance of the article is determined and it is decided whether an inclusion or exclusion criteria applies. This system of coding makes it easier for the researcher to outline, group and interconnect the data (Denzin & Lincoln, 2011). The empirical research methods used in the articles are elaborated and depicted on a meta-level. A table of utilized and investigated themes, search keywords and inductive structuring topics is shown below.

Table 2: List of Themes, Search Keywords & Inductive Structuring Topics

Search Keywords Meta-Theme 1: Types of Environmental Finance and Markets
<p>Carbon Finance: trading scheme, allowance trading, market efficiency, return, predictability, trading rules, price behavior, market dynamics, market linkages, volatility, hedging, accounting, reporting, measurement, management, organizational change</p> <p>Energy Finance: linkage emission market, renewable energy, development, regulations, policies, venture capital, investments</p> <p>Climate Finance: climate change, developing & developed countries, United Nations, agreements, carbon, principles, uncertainty, investment, capital, costs, risk, climate aid, future, enforcement, governance, ecosystem services, trading, non-governmental organizations, provision</p>
Inductive Structuring Topics Meta-Theme 1: Types of Environmental Finance and Markets
<p>Carbon Finance: EU ETS efficiency/inefficiency, long-term technology investments, return and price (un)predictability, weak-form efficiency, CO₂ spot & forward price, risk spillovers, time and price dependencies, environmental & carbon accounting, EMS, push & pull variables</p> <p>Energy Finance: technological innovations, feed-in tariffs, tax incentives, tradable green certificates, energy transition</p> <p>Climate Finance: Green Climate Fund, mitigation & adaption, carbon-based monetary instrument, investment needs & financing gaps, incentives, push & pull policies, integration, markets in ecosystem services, market scale, command & control, private governance, double-dipping, sustainable finance</p>
Search Keywords Meta-Theme 2: Impact Investing in Environmental Finance
<p>Objectives and Financing, Measuring Impact and Screening Methods: return, risk, social & environmental concerns & impacts, social investment, social finance, measurement & instruments, portfolio tools, governance, SME, incentives, capital, ratio, investors, performance, relationships, screening, financing forms, private and public capital</p>
Inductive Structuring Topics Meta-Theme 2: Impact Investing in Environmental Finance
<p>Objectives and Financing, Measuring Impact and Screening Methods: definition, determining variables, measurement practices, standards, investors' engagement, theory of change, crowdfunding, co-investment, public-private partnerships, social & financial benefits, beneficiaries, trade-offs, performance determinants, financial & social risks, GIIN, GIIRS & IRIS, entrepreneur & investor relationship, positive & negative screening</p>
Search Keywords Meta-Theme 3: Business Models in Environmental Finance
<p>Sustainable, Social and Organizational Value Creation: ESG, stock indices, characteristics, return, portfolio diversification, decision-making process, crises, sustainable concepts, sustainable investing, disclosure, Global Reporting Initiative, governance, funds, institutional investors, greenwash, SRI, SRI funds, retail investors, SRI & CSR financial performance, stock picking, managers' abilities & compensation, manager & shareholder & stakeholder relationship, reporting practice, measurement tools, challenges</p>

Inductive Structuring Topics Meta-Theme 3: Business Models in Environmental Finance

Sustainable, Social and Organizational Value Creation: long-term investors' preferences, sustainable lending, sustainable development & financial markets, sustainable linkage, rethinking, sustainable stock indices & screening, holistic & exclusionary view, personal values & ethical principles, SRI dimensions, SRI heterogeneity, performance persistence, Blended Value Accounting, SROI, equity-based managerial compensation, sell-side analysts, ownership & CSR

Meta-Theme 1: Types of Environmental Finance and Markets

The subsequent types of EF and markets are chosen based on the coding and mapping of articles, their high relevance and applicable inclusion criteria. Carbon, energy and climate finance are pooled into one strong stream in the field. A coding example: the author reads the article's title and abstract of Pathania and Bose (2014) and Hall et al. (2015), spots the words "transitions, finance and energy", forms the stream 'energy finance' and resumes the articles in this stream based on the carried out analysis. In literature, all three EF streams are thoroughly explored and scholars have displayed a strong correlation with each other. For example, Balcilar et al. (2016) and Hammoudeh et al. (2014) have identified certain relationships between the energy and carbon market concerning risk and price and Eyckmans, Fankhauser, and Kverndokk (2015) call for a holistic and binding contract in the fight against global warming. Hence, the author elucidates a process of causal chains to the reader during the course of this chapter to reasonably structure and simplify the findings and express logic.

Carbon Finance

Initially, the mitigation of CO₂ emissions with initiated programs is ranked first in carbon research literature to fight against environmental degradation. Zhang and Wei (2010) take a comprehensive look at the European Emissions Trading Scheme's (EU ETS), cap-and-trade function principles and economic consequences in the related energy sector. Gasbarro et al. (2013) concur with the EU ETS to be a cost-effective way for carbon burdened industries to reach agreed emission objectives. However, to be well-informed about observable special dynamics and price behavior in the CO₂ allowances market, results of market efficiency tests of the first two EU ETS trading phases should be in a common currency. Charles et al. (2011) and Montagnoli and de Vries (2010) come in their variance ratio tests to the result that Phase I was inefficient, however spot price changes in specific markets were predictable. In Phase II, a recurrence of market efficiency but no return predictability of CO₂ spot and futures price changes was noticeable. Of the same opinion are Niblock and Harrison (2013) in their study of times of economic crisis and introduced trading rules to enhance market efficiency by revealing risks and transaction costs. Overall, unpredictability of price and return could signal an incentive for industries to long-term invest into ecofriendly technologies to mitigate emissions, and credibility of the EU ETS may be reinforced through an increasing weak-form market efficiency (Charles et al., 2011; Montagnoli & de Vries, 2010; Niblock & Harrison, 2013).

Owing to economic and financial instabilities, energy prices and legal risk, as well as seasonal influences, the allowances market naturally seems to have high volatility in command. Benz and Trück (2009) use GARCH-models to investigate dynamics of CO₂ spot prices related to a dependence of time and price in the volatility structure and include forecast estimates for traders and managers to keep the price risk better under control. They note that investors, traders and businesses are interested in both long and short-term developments of their assets because of the ever-increasing complexity in the carbon market (Benz & Trück, 2009). Balcilar et al. (2016) also discover with a GARCH-model risk spillovers from the energy market to the carbon market that significantly influence volatility and pricing. Above, Hammoudeh et al. (2014)

recognize several relationships between emission prices and price shocks in the oil, coal, gas and electricity sector with a VAR-system. In contrast, Reboredo (2014) who employs a CARR-model, finds no evidence for any transmission of price volatility between the oil and carbon market. Country-specific regulations and circumstances may be the reason for occurring relations between price volatilities and dependencies in different markets (Kara et al., 2008). Hedging allows for some security against such uncertainties. Investors can profitably predict spot returns with forward returns in the carbon market and polluters are able to successfully implement procedures for a cleaner generation (Balçilar et al., 2016; Narayan & Sharma, 2015).

In this context, environmental accounting as a distinct valuation method emerged. It considers the disclose, report and industry's impact and grants their correct measurement and presentation (M. J. Jones, 2010). For instance, Stechemesser and Guenther (2012) give a review of definitions and research areas of the term carbon accounting and argue that the concept ensures recognition, tracking and assessment of greenhouse gas emissions in a monetary and non-monetary way along the value chain. However, notably the way to include environmental externalities with their exact costs into reports is still limited and difficult to achieve (M. J. Jones, 2010). For this reason, Stoneham, O'Keefe, Eigenraam, and Bain (2012) counteract the insufficient cost management with the creation of physical environmental asset accounts when utilizing ecosystem services. Furthermore, M. J. Jones (2010) originates a theoretical model that comprises contextual prerequisites to a more integral accounting approach. The management of externalities can be regarded as the central and decisive task for corporations. Environmental Management Systems (EMS) allow to set parameters for compliance strategies, create a physical CO₂ emission management with guidelines, define social and environmental disclosure standards and invest large-scale into new technology and organizational change (Cho, Guidry, Hageman, & Patten, 2012; Contrafatto, 2014; Feng, Cai, Wang, & Zhang, 2016; Gasbarro et al., 2013; Phan & Baird, 2015). The case study of Baumann, Lehner, and Losbichler (2015) renders corporations assistance for the initiation and design of environmental management accounting (EMA) with influential push and pull variables. To conclude, regulations in EMA might hinder more than advance unified reporting practices in EMS progression (Bracci & Maran, 2013) and to resume the EU ETS, the EU should extend the program because otherwise trading beyond European borders with international partners and enhanced economic incentives for companies will not be able to materialize (Wrake, Burtraw, Lofgren, & Zetterberg, 2012).

Energy Finance

After setting achievable carbon targets, the next step is to excite a conversion in the energy generation. As seen already, the energy sector could impact the price of the carbon market. Vice versa, the EU ETS may entail expansion possibilities in technological innovations in the power sector by means of rigorous, predictable and enforced policies in accomplished case studies by Rogge, Schneider, and Hoffmann (2011). In order to reduce emissions and find alternative energy sources, the field of renewable energy development has arisen. Policies appear to represent the most effective ways to reach this goal and provide new green jobs. Researchers in this field find that the introduction of trading schemes and tax incentives constitute a good practical solution for emission reduction at the lowest cost. Moreover, feed-in-tariffs attract investors with a risk-averse mindset. By doing so, long-term investments can be financed with venture capital and sustainable and trustworthy new avenues can be explored (Abolhosseini & Heshmati, 2014; Barradale, 2010; Branker et al., 2011; Criscuolo & Menon, 2015). Nonetheless, the role of finance in companies and industries and its impact on a successful operating energy transition is still one of the most difficult challenges to handle (Hall et al., 2015; Noailly & Smeets, 2015; Pathania & Bose, 2014).

Climate Finance

The last step in this delineated environmental cycle is the combat against global warming. Various institutions worldwide have set the overarching goal to fight against climate change. For example, the Green Climate Fund was initiated to assist developing countries to fulfill their expectations of climate policies which correspond with the core climate aims of the United Nations (UN). However, developing and developed countries are advised by the UN to collaborate closer, reduce greenhouse gas emissions and invest in low-carbon technologies and models that are steadfast in light of freak weather (Aglietta, Hourcade, Jaeger, & Fabert, 2015; Cadman, 2014). Uncertainty might play an essential role here as well. Fankhauser et al. (2015) address the following gaps in climate finance: first, the mitigation process where upfront capital requirements should be more in focus because carbon technologies are complex and running costs are added on the operation. Second, the adaptation process with investment needs should be estimated with additional billions of funds (Narain, Margulis, & Essam, 2011) to be forearmed against climate catastrophes. Furthermore, to overcome such financing gaps and to attract investors in developing countries to increase capital, it is judicious to look at a country or region's investment needs and access to finance. For Fankhauser et al. (2015) India, the Middle East and Africa embody action fields. Despite a large amount of climate capital needed, China has good access to available finance (Fankhauser et al., 2015). Eyckmans et al. (2015) discover in their study that without obstacles in the mitigation, adaptation or development process, climate change helps provide climate aid to not reach its purpose. They think an international agreement could retrieve an efficient operating cycle – raise income, mitigate emissions and improve climate-resilience – to be in balance again (Eyckmans et al., 2015).

Alike, governments are trying to find solutions for information symmetry, enough capital and appropriate policies. In the paper of Brunner and Enting (2014), possibilities for a frictionless progress in climate finance include direct support in the form of donors from developed countries to developing countries and Hogarth (2012) claims push guidelines in technology, strategic alignment and pull actions on the demand side. The creation of tangible advantages, integration of climate finance into financial and monetary systems and a stringent policy enforcement demonstrate further feasible approaches for a solution (Aglietta et al., 2015; Skovgaard, 2015). However, transaction and opportunity costs and the long-term characteristics of regulations in all these actions need to be preconceived (Brunner & Enting, 2014; Hogarth, 2012).

Besides governmental organizations that are trying to make markets more efficient, critical voices are arising that more emphasis should be placed on non-governmental and private institutions. Thistlethwaite (2014) notes that firms have already stroked up successful partnerships that are not governmental driven to raise the credibility and assessment of climate change risks in financial disclosures. At the same time private governance submits to ease the technical implementation to downscale external effects in environment and political dependence (Thistlethwaite, 2014). However, Simons, Lis, and Lippert (2014) and Vatn (2014) remark in their analyses that markets for ecosystem services like the EU ETS would scarcely exist without political regulations. Therefore, ecosystem services cannot operate fully efficiently without a certain scale of governance (Simons et al., 2014; Vatn, 2014). Woodward (2011) states that the provision of environmental services is more lucrative and contributes more to social welfare if market participants are allowed to trade their credits in multiple markets. This positive effect would remain in the long term only if reduction measures were effectively and strictly enforced (Woodward, 2011). In terms of sustainable finance, investors should work closer together with companies to receive as much information as needed to evaluate future prospects of their investment. Corporate governance can assist this decision when corporations integrate sustainably aligned strategies into their involvement processes for fostering sustainable and innovative development in the financial sector (Bloxham, 2011a,

2011b; Weber, 2014; Yu, Dong, Shen, Khalifa, & Hao, 2013). In the end, corporate governance and environmental matters may interact, depending on the firm's environmental commitment, shareholders and management board (Walls, Berrone, & Phan, 2012). Principles in organizations may be conducive to lower the bar for environmental efficiency as well (Amore & Bennedsen, 2016).

Table 3 sums up the most important obstacles and potential developments in carbon, energy and climate finance once again. Market efficiency and predictability, CO₂ market dynamics and price behavior, risk spillovers and a solid measurement of environmental externalities are the hurdles that need to be overcome. However, introducing trading rules, weak-form efficiency, environmental accounting and EMS smooth the way to sustainable development. The energy market's weak point is the still misunderstood or underestimated role of finance and the included impacts in energy transition. Several regulations and technological innovations are promising future developments. Climate finance suffers from uncertainties in the mitigation and adaptation process, investment needs and financing gaps. International agreements and non-governmental partnerships highlight new avenues.

Table 3: Environmental Finance and Markets – Obstacles and Potential Developments

Obstacle	Author
Carbon Finance	
Market (in)efficiency, (un)predictability	Montagnoli and de Vries (2010); Charles et al. (2011); Niblock and Harrison (2013)
CO ₂ price behavior, dynamics and relations, risk spillovers, country-specific regulations	Kara et al. (2008); Benz and Trück (2009), Hammoudeh et al. (2014); Reboredo (2014); Balçılar et al. (2016)
Expiration of EU ETS and regulations in EMS	Wrake et al. (2012); Bracci and Maran (2013)
Energy Finance	
EU ETS stringency and predictability	Rogge et al. (2011); Zhang and Wei (2010)
Capital, finance and innovation in energy transition	Hall et al. (2015); Pathania and Bose (2014); Noailly and Smeets (2015)
Climate Finance	
Uncertainty in mitigation & adaptation process, development, investment needs, financing gaps	Fankhauser et al. (2015); Narain et al. (2011); Eyckmans et al. (2015)
Information asymmetry, capital constraints, short-term policies, transaction & opportunity costs	Brunner and Enting (2014); Hogarth (2012); Aglietta et al. (2015); Skovgaard (2015)
Potential Development	Author
Carbon Finance	
Trading rules, long-term investments, weak-form efficiency	Montagnoli and de Vries (2010); Charles et al. (2011); Niblock and Harrison (2013)
Hedging, return prediction, cleaner generation	Balçılar et al. (2016); Narayan and Sharma (2015)
Environmental & carbon accounting along the value chain, push & pull variables	Stechemesser and Guenther (2012); M. J. Jones (2010); Stoneham et al. (2012); Baumann et al. (2015)

EMS: compliance strategies, physical accounts, disclosure standards, high tech investments	Gasbarro et al. (2013); Feng et al. (2016); Cho et al. (2012); Contrafatto (2014); Phan and Baird (2015)
Energy Finance	
Technological innovations	Rogge et al. (2011)
Feed-in tariffs, tax incentives & green certificates	Abolhosseini and Heshmati (2014); Barradale (2010); Criscuolo and Menon (2015); Branker et al. (2011)
Climate Finance	
Climate Green Fund, international agreements	Aglietta et al. (2015); Cadman (2014); Eyckmans et al. (2015)
Donors, push & pull policies, long-term regulations	Hogarth (2012); Brunner and Enting (2014); Skovgaard (2015)
Tangible benefits, financial & monetary integration	Woodward (2011); Thistlethwaite (2014); Vatn (2014); Simons et al. (2014)
(Non-)governmental partnerships: improvement of financial disclosure, external effects and social welfare, scale-making practices	Aglietta et al. (2015)
Sustainable finance integration into financial sector & corporate governance & innovative development	Bloxham (2011a); Bloxham (2011b); Weber (2014); Walls et al. (2012); Yu et al. (2013); Amore and Bennedsen (2016)

The introduced trading rules of Niblock and Harrison (2013) allow that carbon market efficiency rises and Phan and Baird (2015) take the view that with the assistance of EMS technological and organizational changes can be urged. Abolhosseini and Heshmati (2014) and Criscuolo and Menon (2015) encourage long-term investors with distinct regulations to advance the energy shift. Non-governmental partnerships, as Thistlethwaite (2014) proposes, may be able to enhance the assessment of climate change risks in disclosures and hone external effects down.

Meta-Theme 2: Impact Investing in Environmental Finance

The emphasis of this section is comprised of impact investing in EF, impact measuring tools and screening methods. Essential here is the information of investors about possible impacts in EF and how and why they can be provoked.

Objectives and Financing

The purpose of impact investing is to provide financial resources and obtain financial return, but simultaneously impacting on social and environmental concerns (Louche et al., 2012). To what extent the financial return should attain is not clearly defined. According to Mac Cormac and Haney (2012) this depends on the investor's intention to make a social and/or environmental impact, as well as on the conditions of the investment. Höchstädter and Scheck (2014) define the following variables in their analysis of impact investing understandings from researchers and practitioners: demographic, geographic, organizational, financial and impact. These variables arguably determine the interplay between social, environmental and financial outcomes and depend on the respective investment case. Impact investing also differentiates from SRI and goes beyond, not only with enhancing companies' practices in the form of

environmental, social and governance (ESG) issues, but anticipatory remedying environmental and social shortcomings too (Höchstädter & Scheck, 2014). Financing possibilities in the environmental and social field could be restricted due to high expectations of investors and financial institutions (Lehner, 2013). Lehner (2013) in his paper investigates crowdfunding as a financing alternative for social ventures. He further derives themes from a drawn up crowdfunding operating model as a research agenda to resolve uncertainties and urge new progression. D. Wood et al. (2013) explore co-investment in their study in the form of public-private partnerships as a chance to diminish financial risk of an investment. Through the combination of public and private capital, long-term investors might feel more often involved, and perhaps scaling potentials would arise (D. Wood et al., 2013). Thus, co-investment enables gaining and sharing of professional knowledge in uncertain investment cases and the ability to contribute to diversification in the venture capital area (Matusik & Fitza, 2012).

Measuring Impact

One main challenge in impact investing appears to be the measurement of social and environmental return. Investment incentives may be small and impact investors might be challenged to enter the market. Additionally, the interests of investors would have to be increased again to guarantee uniformed measurement standards (Evans, 2013; Reeder et al., 2015). Reeder et al. (2015) identify that the measurement of greenhouse gas mitigation describes one special case where the measurement system is already well-operating due to implemented market regulations. Nevertheless, in other markets the investors' motivation is still lacking and attention should be placed more on the beneficiaries of impact investment (Reeder et al., 2015). Therefore, Reeder et al. (2015) conducted interviews and distinguish between different forms of measurement practices with respect to knowledge, value creation and impact assessment tools of investors for their investments. Brandstetter and Lehner (2015) mention a vicious circle regarding market entries of impact investors due to the limited number of available measuring instruments and objects of comparison. They call for portfolio building tools that consider financial and social risks to the same extent at the investment decision. The Global Impact Investing Network (GIIN) has successfully implemented measurement systems like the Impact Reporting and Investment Standards (IRIS) and Global Impact Investing Rating System that are not only utilized by investors, but also by governments and social organizations. Such systems could pave the way for a unified and transparent measurement of social, environmental and financial impacts and returns (Brandstetter & Lehner, 2015). The theory of change may play a crucial role here as well as it "enables all parties to better understand and strengthen the processes of change and to maximize their results, as well as to test the extent to which results and processes actually align with the expected theory of the intervention" (Jackson, 2013, p. 96). People, families and communities should be central because they are able to benefit most from impact investing (Jackson, 2013). L. Jones and Turner (2014) investigate the small and medium-sized enterprises (SME) sector that both social and financial benefits constitute essential requirements for sustainability and profitability in the long run. Both advantages do not have to be contrary (L. Jones & Turner, 2014) and sustainability should be seen as "the mere possibility for future generations to achieve a certain outcome" (Fleurbaey, 2015, p. 50). However, trade-offs in performance should always be taken into account. The design of the contract and incentives, state of technology and measurement techniques might impinge performance. A close relation between the investor and the entrepreneur can reduce information asymmetry and better satisfy impact return expectations (Evans, 2013). In addition, investors should be aware of the amount of invested capital, areas of impact, risk and return proportion and relationships with non-impact-oriented assets in their portfolio (Combs, 2014). The core elements and investor's needs, including their trade-offs in impact investing, are summarized and illustrated in Figure 1 below.

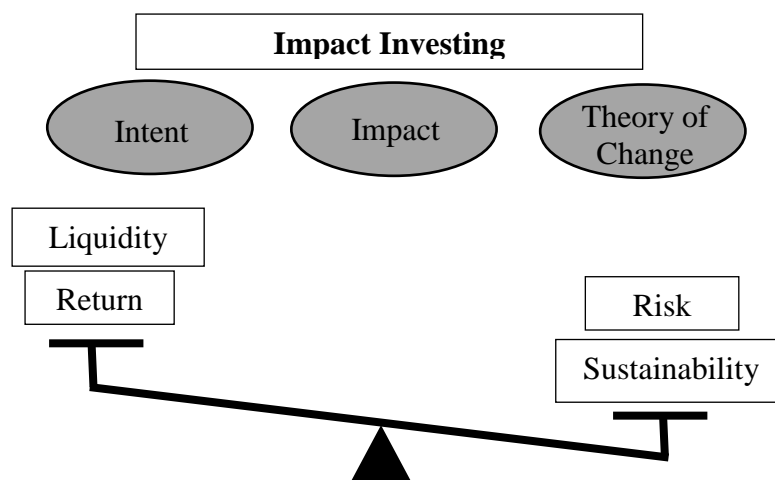


Figure 1: Core Elements and Investors' Needs in Impact Investing (based on Jackson (2013); Cengiz et al. (2010), as displayed in von Wallis and Klein (2014))

Screening Methods

The amount of money investors are willing to invest in SRI when building their portfolios is a crucial question. The answer to this is given by Dorfleitner and Nguyen (2016) in the results from their survey: the higher the budget, the smaller the amount of SRI. Nevertheless, well-educated women and young people are more likely to spend a higher amount on SRI. When private individuals decide on SRI they do it mainly because of personal values and ethics. The resolve for SRI appears to be independently made, no matter if it concerns an equity or debt form of financing (Dorfleitner & Nguyen, 2016). The screening task of SRI funds in the selection process of portfolio building can influence the subsequent performance of it on the market. Negative screening in certain areas, such as in the military armaments, nuclear weapons, pornography or tobacco industry, also called the 'sin stocks' (Louche et al., 2012), lead to a reduction in financial performance and a rise in risk, shown in the study of Capelle-Blancard and Monjon (2014). Nonetheless, they also commend that after excluding specific investments in non-favored company sectors, the investor's portfolio is often reduced in complexity and represents one-on-one with the investor's personal values (Capelle-Blancard & Monjon, 2014). Exemplary areas for positive screening are employee and welfare rights, labor practices, diversity and inclusion or transparency (Louche et al., 2012). Consequently, positive screens could improve performance or even outperform conventional funds and diminish the risk-adjusted return (Capelle-Blancard & Monjon, 2014; Henke, 2016). Yet, the results of both screening techniques only refer to 'best-in-class' fund cases, as evident from the studies of Capelle-Blancard and Monjon (2014) and Leite and Cortez (2014). If the screens do not bear on the sectoral high performer, and if corporations stick to international agreements like the UN Global Compact Principles or Rights at Work, no performance and risk impacts can be observed (Capelle-Blancard & Monjon, 2014; Leite & Cortez, 2014). Lee, Humphrey, Benson, and Ahn (2010) confirm in their study the unrecognizable impact on unadjusted returns and risk when screens are conducted, as Humphrey and Tan (2013) do as well. Auer (2014) also finds no impact of negative screening activities on the portfolio value. However, positive screens can lead to an underperformance in comparison with benchmarks due to an undiversified portfolio with bad performing firms (Auer, 2014). In the end, Trinks and Scholtens (2015) may agree with an impact on returns and performance, but consider the inclusion of opportunity costs in negative screens.

In summary, impact investing has multiple meanings in practice. Lacking investors' engagement, standards, financing possibilities and adaptability to environmental change defer future developments. Trade-offs are necessary to be adequately taken into account when

planning an impactful investment as well as incurred risks and costs. A small trend can be recognized in the form of enhanced measurement practice cultures. The available screening methods allow investors to create personalized and ethical stock portfolios.

Table 4: Impact Investing in Environmental Finance – Obstacles and Potential Developments

Obstacle	Author
Objectives and Financing	
Heterogeneity of terms, determining outcome variables	Louche et al. (2012); Mac Cormac and Haney (2012); Höchstädter and Scheck (2014)
Scarce environmental and social finance alternatives	Lehner (2013); D. Wood et al. (2013)
Measuring Impact	
Lack of standards, motivation, change, instruments and metrics	Reeder et al. (2015); Jackson (2013); Brandstetter and Lehner (2015)
Trade-offs in performance, risk & return proportion	Evans (2013); Combs (2014); Cengiz et al. (2010)
Screening methods	
Performance reduction and risk increase with negative screens, best-in-class funds, no impact, underperformance and positive screens, opportunity costs and negative screens	Capelle-Blancard and Monjon (2014); Lee et al. (2010); Humphrey and Tan (2013); Auer (2014); Trinks and Scholtens (2015)
Potential Development	Author
Objectives and Financing	
Crowdfunding and co-investment (public-private partnerships), gaining & sharing of expertise	Lehner (2013); D. Wood et al. (2013); Matusik and Fitza (2012)
Measuring Impact	
Measurement practice culture, theory of change, financial and social risks intercorrelation	Reeder et al. (2015); Jackson (2013); Brandstetter and Lehner (2015)
SME sector: social & financial return harmony, sustainability = possibility	L. Jones and Turner (2014); Fleurbaey (2015)
Investor & entrepreneur interaction, goal-oriented	Evans (2013)
GIIN: IRIS and GIIRS guidelines	Brandstetter and Lehner (2015)
Screening methods	
Performance improvement, outperformance and risk decrease with positive screens	Capelle-Blancard and Monjon (2014); Henke (2016)

For Reeder et al. (2015) the central point in impact measurement is the type of impact investor. Measurement practices are elementarily distinguished from each other with regard to investment expertise, value creation and used measuring instruments (Reeder et al., 2015). The process of change might also play an essential role in the creation of an integral impact measurement picture as posed by Jackson (2013).

Meta-Theme 3: Business Models in Environmental Finance

The subsequent business models in EF point at value creation in the field of sustainability, SRI behavior, shareholder and stakeholder commitment and management. The author highlights them to support the reader in providing an understanding of future research areas and action fields in EF.

Sustainable Value Creation

Sustainable development may be difficult to achieve in financial markets. Whilst ESG themes are more and more integrated into investment actions, long-lasting and radical changes in the company's organizational environment have only been sparsely undertaken as of yet. With stagnation, short-term orientation and doubtful business practices, progress towards sustainable financial markets is still far from satisfactory (Busch et al., 2015). However, some remarkable steps in the financial sector are noticeable. Banks have introduced sustainable lending as a new way of how SME are able to track their environmental and social behavior during the drawdown of the loan (Calderon & Chong, 2014). Institutional investors consciously include ESG topics into their decision-making process and are able to link sustainable concepts. But only a limited amount of concepts is possible and governance frameworks that are used might not detect sustainable odds and risks and create a distorted picture of reality (Hachigian & McGill, 2012; Rook, 2012). Shrivastava and Addas (2014) examine that high quality governance systems can cause high sustainable performance in terms of ESG disclosure scores. Extending beyond, high scores presumably yield the exercise of Global Reporting Initiative principles, climate change, social and environmental supply chain management and green building policies to be already available in a corporation (Shrivastava & Addas, 2014). In sustainable lending, borrowers' sustainable performance is often shown better than it actually is due to mistakes and false statements in reports and performance appraisals issued by the lender. Only with coherent clarifications, risk reducing actions and freedom to develop new tools and frameworks can a biodiverse and multi-perspective banking landscape be generated (Calderon & Chong, 2014; Mulder & Koellner, 2011; Quak, Heilbron, & Meijer, 2014).

A similar problem in the impact investing field contingently emerges in sustainable investing too, namely the lack of engagement and wrong assumptions by investors. Interviews conducted by Paetzold and Busch (2014) unveil prevalent obstacles in sustainable investing. Investors should be cautious towards volatile and short-term investments, unpredictable losses and no transparent advising communication (Paetzold & Busch, 2014). Moreover, Waygood (2011) alleges that the investment market itself mainly recognizes sustainable concerns as side issues in its mechanism and market failure does not encompass long-term costs for investors. A rethinking has to happen; Wiek and Weber (2014) display this in their case study and their thereof derived framework from a systems view. Wiek and Weber (2014) further assert and Waygood (2011) sympathizes with their views that otherwise companies will not be spotlighted on their bad sustainable performance practices, new market policies will not be implemented and technological upgrades will not be finalized.

Sustainable stock indices shed light on the value of a stock portfolio and differ only marginally from conventional stock indices. Tail-risk, variance and average parameters are similarly marked, but stock price history appears to fare better over long time horizons than looking at specifically defined short-term timeframes (Bianchi & Drew, 2012). Bianchi and Drew (2012) conclude in their study that the MSCI KLD 400 Social Index meets the requirements of the efficient frontier best. Stock screening findings recommend revealing financial opportunities and advantages for long-term investors and pension funds. Sustainable indices could also be applied as a benchmark in emerging markets to incentivize corporations to act in a responsible way and attract investors both at home and abroad (Vives & Wadhwa,

2012). In times of crises and instability, companies can benefit from sustainably managed and adequately priced funds and do not have to fear a collapse of financial performance, manifested by the studies by Mervelskemper, Kaltofen, and Stein (2013) and Nofsinger and Varma (2014) and the created model by Peylo and Schaltegger (2014). Overall, with sustainable and responsible practices, corporations can be positioned better strategically in the market, obtain better economic results and be evaluated higher in relation to firms without such practices (Callado-Muñoz & Utrero-González, 2011; Guenster, Bauer, Derwall, & Koedijk, 2011).

Social Value Creation

SRI has become very popular among investors in their decision-making process. Berry and Junkus (2012) have found that the investors' main selection criteria in investment decisions present environmental and sustainable problems and how to solve or at least improve them. They also found that SRI intention is chosen primarily on a positive holistic view of a company's actions and not due to specific negatively conducted practices or certain goods with hazardous features. This cognition would be especially important for socially responsible vendors who primarily offer SRI funds with an exclusionary format to tap the full SRI potential (Berry & Junkus, 2012). The vast majority of SRI research concentrates on the impacts on financial performance. However, only economic benefits can negatively influence social behavior. On this account, Capelle-Blancard and Monjon (2012) and van Dijk-de Groot and Nijhof (2015) demand that conceptual and theoretical models have to be more focused. Säve-Söderbergh (2010) and Pasewark and Riley (2010) set a feasibly good example as they bring ethical principles and personal values into focus in investment decision-making and conclude that non-economic values, reputation and self-esteem are powerful personal drivers for socially responsible investors and they often outweigh selfishness, economic returns and income maximization.

Nevertheless, the financial performance of SRI is the most focused research area. Revelli and Viviani (2015) and Sandberg et al. (2008) concord that SRI dimensions like investment period, information analysis and cultural conditions distinctly determine performance. Different investors' logics might also influence financial outcome. Nicholls (2010) explains in his conceptual paper several types of investment logics and investor rationalities. Either investors act 'Means-Ends Driven' which expresses a return maximization intention, blended investment logic or purely socially or environmentally-driven actions. Clean energy investments are examples of a clear financial logic, and SRI as a blended form because it is geared at value creation in both financial and social/environmental directions. Or, investors act 'Systemic' which means they search for advantages for investors and beneficiaries at the same time. Impact investing falls into this category. A third investor rationality is the 'Value-Driven' one that concentrates solely on the beneficiary side (Nicholls, 2010). The inducement of social enterprises is "the pursuit of the dual mission of financial sustainability and social purpose" (Doherty et al., 2014, p. 417). This apparent negative hybridity in social organizations may sound disillusioning in regards to future developments; however, in the explained case study of Pache and Santos (2012) and in the article of Skelcher and Smith (2015) such social enterprises provide a wide spectrum of investment chances for various types of stakeholders and oppositions of logics can lead to organizational adaptations that mirror current environmental turbulences and offer solutions.

To enhance reporting practices in respect to a transparent and complete disclosure of financial, social and environmental performance impacts, Nicholls (2009) has introduced 'Blended Value Accounting'. The model combines social entrepreneurs' institutional logics with strategic goals and hence, it is possible to inform stakeholders about the firm's social impact performance. Consequently, the model can solve the previously discussed various SRI dimensions because a number of reporting practices are in place for managers to account for

and react to uncertain situations and strategic directions (Nicholls, 2009). Another reporting regulation and social impact measurement tool is expressed by the social return on investment (SROI) model. It is plain and clear and computes the ratio of a fictitious 1 monetary unit to the monetized return. In this way, policy-makers and investors are able to number, depict and match the social value with other social investments and choose the most favored one (Gibbon & Dey, 2011; van Dijk-de Groot & Nijhof, 2015). However, the primary financial focus, flexible valuation approaches and lack of stakeholder involvement reveal weak spots in the model. Information should be easier to access and the values and understandings in the third sector should be communicated clearer to policy-makers, investors and the rest of the community (Gibbon & Dey, 2011; Pathak & Dattani, 2014; Pillai, Hodgkinson, Kalyanaram, & Nair, 2015).

Organizational Value Creation

The relationship between shareholders and managers in the socially responsible context might also be of major importance. To attain satisfactory results for the firm and its shareholders, managers ought to be incentivized correctly. Chaigneau (2016) suggests that socially responsible corporations should issue equity shares to managers. By doing so, managers should act in socially responsible and shareholder-oriented ways to boost the share price or at least hold it on a stable level and secure future firm profits (Chaigneau, 2016). In the study of Luo et al. (2015), security analysts can assist and assure a certain level of sharing information between corporate social performance and stock return. Thus, shareholders and managers have the ability to collaborate closely and express that equity-based managerial compensation and social mission do not have to disagree (Chaigneau, 2016). However, the type of ownership here might be the decisive factor; Rees and Rodionova (2013) state in their article that the corporate social responsibility (CSR) performance fluctuates and is affected by family and corporate cross-holdings. Such undiversified and strategic investments could induce a negative impact on ESG scores and mostly could not contribute to CSR performance (Rees & Rodionova, 2013). Furthermore, challenging tasks may be the provision of measurably tangible corporate social performance incentives, the combat of manipulative activities owing to undisclosed knowledge, the composition of the stakeholder structure, and the establishment of an organizational identity (Battilana & Dorado, 2010; Chaigneau, 2016; Holland, 2011; Lok, 2010; D. J. Wood, 2010).

On the sell-side, analysts' recommendations regarding future earnings, stock return volatility, cost of capital and firm value can differ due to various assessment approaches. Ioannou and Serafeim (2015) argue that if CSR scores are high, but analysts interpret combined agency costs, a company's future financial performance is assessed negatively. This effect is surprising because generally high CSR ratings facilitate finance access and reduce the cost of equity and risk (El Ghouli, Guedhami, Kwok, & Mishra, 2011; Mishra & Modi, 2012). However, Ioannou and Serafeim (2015) also point to the fact that a clear stakeholder focus and a long-term assessing horizon cause a more optimistic analyst's recommendation again. Likewise, the study of Harjoto and Jo (2015) reveals that legal CSR policies add to lower costs of capital, decrease stock return volatility and appreciate firm value. To broaden the view and include stakeholders into the responsible ESG investing field, it would be vital to encourage them to participate in binding principles, for example the UN Principles for Responsible Investing. Normative power, represented values of the managers, organizational legitimacy and an auspicious investment case, are possibly the dominant attributes for stakeholders to decide to invest long-term and responsibly into a company (Gifford, 2010; Majoch, Hoepner, & Hebb, 2016).

Comprising sustainable development in the financial sector is on the march, albeit with some delay. Incorrect information about the sustainable market structure needs to be rectified. Some sustainable concepts still exist, more will soon follow. The social field unveils new ways for organizations to adapt to changing investors' needs and environmental turbulences.

Stakeholders can benefit from correctly incentivized managers who ensure future firm profits and permanently secure the existence of a company.

Table 5: Business Models in Environmental Finance – Obstacles and Potential Developments

Obstacle	Author
Sustainable Value Creation	
Sustainable development in financial markets	Mulder and Koellner (2011); Hachigian and McGill (2012); Calderon and Chong (2014); Quak et al. (2014); Busch et al. (2015)
Lacking investors' engagement and wrong assumptions	Waygood (2011); Paetzold and Busch (2014); Wiek and Weber (2014)
Social Value Creation	
Exclusionary vendors' view, financial performance focus, heterogeneity, SRI budget & dimensions, hybridity	Berry and Junkus (2012); Capelle-Blancard and Monjon (2012); von Wallis and Klein (2014); Revelli and Viviani (2015); Sandberg et al. (2008); Dorfleitner and Nguyen (2016); Nicholls (2010); Pache and Santos (2012); Skelcher and Smith (2015)
Organizational value creation	
Financial focus, stakeholder engagement, limited information access	Gibbon and Dey (2011); Pathak and Dattani (2014); Pillai et al. (2015)
CSR and type of owner, measurably tangible performance, undisclosed knowledge, stakeholder structure, organizational identity, analyst recommendations	Rees and Rodionova (2013); Chaigneau (2016); Holland (2011); D. J. Wood (2010); Lok (2010); Battilana and Dorado (2010); Ioannou and Serafeim (2015)
Potential Development	Author
Sustainable Value Creation	
Sustainable lending	Mulder and Koellner (2011); Calderon and Chong (2014)
ESG topics in decision-making process, linking sustainable concepts and governance support	Hachigian and McGill (2012); Quak et al. (2014); Rook (2012); Shrivastava and Addas (2014)
Rethinking of sustainably operating financial markets	Waygood (2011); Paetzold and Busch (2014); Wiek and Weber (2014)
Sustainable stock indices: satisfactory long-term return, attraction of investors, benchmark, crises and instability resistance, better strategic position and higher firm valuation	Bianchi and Drew (2012); Vives and Wadhwa (2012); Mervelskemper et al. (2013); Peylo and Schaltegger (2014); Nofsinger and Varma (2014); Callado-Muñoz and Utrero-González (2011); Guenster et al. (2011)
Social Value Creation	
Holistic company's view, personal & ethical values in decision-making, investor groups and environmental changes	Berry and Junkus (2012); Capelle-Blancard and Monjon (2014); Säve-Söderbergh (2010); Pasewark and Riley (2010); Revelli and Viviani (2015); Dorfleitner and Nguyen (2016); Skelcher and Smith (2015)

Nicholls (2009); Gibbon and Dey (2011); van Dijk-de Groot and Nijhof (2015)

Blended Value Accounting, SROI

Organizational Value Creation

Managerial compensation, security analysts, high CSR scores and low cost of capital, long-term horizon, legal CSR, stakeholder and ESG investing, normative power, managers' values and legitimacy

Chaigneau (2016); Luo et al. (2015); El Ghouli et al. (2011); Mishra and Modi (2012); Ioannou and Serafeim (2015); Harjoto and Jo (2015); Majoch et al. (2016); Gifford (2010)

Sustainable lending is one example of sustainable development in financial markets. Calderon and Chong (2014) critically investigate requirements and performance measurement tools applied by banks. Social organizations may offer a broad range of investment possibilities owing to their multifarious missions and lived values depicted in the study of Skelcher and Smith (2015). Companies could gain from correctly incentivized managers with reference to higher profits as indicated in the article of Chaigneau (2016).

Discussion

In the preceding systematic literature review the following core obstacles have been recognized as significant, including future research focus areas as a research agenda to urge the EF field and move ideas forward:

Meta-Theme 1: Types of Environmental Finance and Markets

Peculiar to the carbon market might be a generally existing unpredictability of price and return (Charles et al., 2011; Montagnoli & de Vries, 2010). Niblock and Harrison (2013) support the finding of previous weak-form efficiency research and confirm trading schemes, such as the EU ETS, to be one possible way to successfully combat global warming. However, to guarantee this climate goal, a clear communication of price signals for investors and an effectively executed CO₂ mitigation should be prerequisites for policies in place in trading schemes (Niblock & Harrison, 2013). Future research may also focus on the question of if a single solid model is capable of reliably computing risks, dependencies and spillover effects all in one. Hedging instruments, for example futures, are an option to provide a remedy (Balcilar et al., 2016; Hammoudeh et al., 2014). In environmental accounting, the crux is still the exact monetary measurement of externalities. What could be frameworks that provide decent reports with correct environmental costs for stakeholders and future investors? In the area of EMS, the author is of the opinion that future research could concentrate on long-term oriented investigations (as already proposed by Baumann et al. (2015) for EMA) of the initiation, design and effort of holistic environmental performance measurement tools. In addition, why is the attention of research chiefly paid to combined effects on financial performance? The corporate social and environmental performance is to be respected at least equivalently. Action fields in energy finance can embody policies that cost-efficiently reduce emissions, incentivize technological innovations and provide financing capabilities (Abolhosseini & Heshmati, 2014; Criscuolo & Menon, 2015; Rogge et al., 2011). The author sees great potential in the combination of public and private financing forms to boost environmental and social shifts and overcome financing and investment gaps with the aid of projects worldwide, especially in SME in emerging markets. What might a uniformly binding international agreement look like? Eyckmans et al. (2015) give an example and claim it might be a one solution approach to

socially, environmentally and financially fulfill obligations and actuate climate change measures. On a final note, how could the company's contestability and strategic orientation towards sustainability be ensured? Corporate and private governance may produce relief (Amore & Bennedsen, 2016; Thistlethwaite, 2014; Yu et al., 2013). However, this can only be achieved if there is a link between finance and environmental governance to foster sustainable development. Therefore, conceptual models need to be more strongly embedded into political environmental regulations (Thistlethwaite, 2014).

Meta-Theme 2: Impact Investing in Environmental Finance

Whether an impact investment can be classed as successful mostly depends on the investor's expectations and the respective investment purpose (Mac Cormac & Haney, 2012). The defined determining variables of the social, environmental and financial results by Höchstädter and Scheck (2014) raise the following issues: do the impact recipients always need to be organizations that place social/environmental and non-financial mission foremost? From an academic stance, diverse standpoints about what sector(s) the organization has its fields of business activities and where it is located may be controversially discussed to gain new findings in the field (Höchstädter & Scheck, 2014). Moreover, what other financing possibilities in the social and environmental sector are redundant? Lehner (2013) delves into crowdfunding as a chance to enable social organizations to finance their projects. Another way might be to strike up public-private partnerships to integrate social and environmental values into public regulations and cement ties (D. Wood et al., 2013). Nonetheless, the author calls for future research to search for additional alternative financing forms that provide firms with enough capital to regulate their objectives for a responsible environment. Laws could also be relaxed worldwide to incorporate socially and environmentally-driven companies no matter where the business operates or what the formation intention is.

Why is the practical side of impact investing still dominated by the GIIN and its conceptualization of measurement systems like IRIS? The research of Reeder et al. (2015) is an exception and a pioneer in academic literature. Reeder et al. (2015) advocate a creation of scorecards that capture the various elements of social value in investments to correctly measure it, however in variable modalities depending on the investor's pursued outcomes. This research approach is opposed by the general conception of impact investing institutions which recommend a single valid measurement method. Independently from the quantity of value measurement systems, it is essential in this subfield to ask how impact investors evaluate risk in their portfolios. Brandstetter and Lehner (2015) pose the question for further research if and how social and financial risk correlate and how investors and the impact investing market are influenced by the findings. Furthermore, future research could focus on the issue of why a critical mediation of processes and results in the evaluation practice of impact investments is often neglected. According to the theory of change, there needs to be a 'fit' clearly evident at the same time, otherwise accountability and learning progressions will hardly be achievable (Jackson, 2013). Changing and new investment conditions and preferences have emerged. Especially women and young people, the so-called 'millennials', are increasingly entering the responsible investment market, challenging their investment decisions and are not only and primarily looking for financial returns, but are also evoking socially and environmentally sustainable changes (Dorfleitner & Nguyen, 2016). For the author these new responsible investment groups could be the key element in the transformation process from sustainable investing as a niche investing method in its early stages to impact investing as the mainstream method in the private banking sector. Questions asked within this theme could be: why do millennials act more responsibly, raise other questions in an investment decision and strive against environmental change more auspiciously?

Meta-Theme 3: Business Models in Environmental Finance

Issues within this meta-theme could be: why are new sustainable investors commonly more reserved than others? It is time to put an end to false perceptions of potential investors of the sustainable market. For instance, volatility may not be significantly higher than in other markets (Paetzold & Busch, 2014), sustainably managed funds could be likely more crisis resistant than conventionally managed ones (Mervelskemper et al., 2013) and portfolio performance might be increased by the degree of sustainability (Peylo & Schaltegger, 2014). Future research should emphasize the potential benefits of sustainable value creation compared to the stringent achievement of exclusively financial goals and smooth the way for case studies with financial intermediaries for the generation of a more sustainable environment (Wiek & Weber, 2014). Why is the most part of social value creation literature only available for SRI and its implications on financial performance? For Capelle-Blancard and Monjon (2012) and van Dijk-de Groot and Nijhof (2015) the academic focus should be more directed towards the motives of SRI investors, SRI compatible regulations and conceptual and theoretical models. In addition, what is the amount of the actual ‘extra-financial’ performance of SRI in respect to the represented values (Revelli & Viviani, 2015)? What is the reason why social enterprises have a bias towards the financial long-run instead of the representation of social purpose in times of existence threats (Doherty et al., 2014), and how can the attractiveness of social investments via managerial actions be raised effectively (Chaigneau, 2016; Skelcher & Smith, 2015)? These questions have not been clearly examined yet and could be further questions for future research to explore new avenues.

Conclusion

This paper has reviewed contemporary literature on EF and impact investing and has pooled the varying streams, opinions and concepts into three meta-themes that structure and process existing literature further. Additionally, key obstacles and future development possibilities in the fields have been illustrated to check the proliferation in literature, and thereof deduce a research agenda for researchers, policy-makers and practitioners.

Based upon the findings in the previous chapters, the author identifies the following research implications: first, comparative studies may be helpful to verify the results of this article. For instance, are the canvassed and shaped streams the only possible ones or can additional trends be found? Second, large-scale quantitative studies and eventually sector-specific studies would enhance the field with valuable information such as required formation qualifications and ways of funding companies in the environmental sector worldwide. Are the corporation’s missions or industry of business operations the only main influential factors? It would help to promote the enhancement of EF and impact investing field as well, if researchers might become reconciled with their different definitions and points of view to better structure the sector and obtain a robust agenda for the future.

Practical implications could be seen in the clear boundary and extension of environmental and impact markets in comparison to financial ones and their correct monetary and transparent measurement. Especially when terminology becomes clearer and applications more frequent, supply and demand could slowly balance. In the banking industry institutions may offer more tailored sustainable and responsible products that are in conformity with personal values to counteract environmental turbulences. As a consequence, new financing options for environmentally and socially-driven firms and solutions approaches against environmental degradation might be investigated.

References

- Abolhosseini, S., & Heshmati, A. (2014). The main support mechanisms to finance renewable energy development. *Renewable and Sustainable Energy Reviews*, 40, 876-885. doi:10.1016/j.rser.2014.08.013
- Aglietta, M., Hourcade, J.-C., Jaeger, C., & Fabert, B. P. (2015). Financing transition in an adverse context: climate finance beyond carbon finance. *International Environmental Agreements: Politics, Law and Economics*, 15(4), 403-420. doi:10.1007/s10784-015-9298-1
- Allen, F., & Yago, G. (2011). Environmental Finance: Innovating to Save the Planet. *Journal of Applied Corporate Finance*, 23(3), 99-111.
- Amore, M. D., & Bennedsen, M. (2016). Corporate governance and green innovation. *Journal of Environmental Economics and Management*, 75, 54-72. doi:10.1016/j.jeem.2015.11.003
- Association of Business Schools. (2010). *Academic Journal Quality Guide* (C. Harvey, A. Kelly, H. Morris, & M. Rowlinson Eds. 4 ed.). London: The Association of Business Schools.
- Auer, B. R. (2014). Do Socially Responsible Investment Policies Add or Destroy European Stock Portfolio Value? *Journal of Business Ethics*, online version. doi:10.1007/s10551-014-2454-7
- Balcilar, M., Demirer, R., Hammoudeh, S., & Nguyen, D. K. (2016). Risk spillovers across the energy and carbon markets and hedging strategies for carbon risk. *Energy Economics*, 54, 159-172. doi:10.1016/j.eneco.2015.11.003
- Barradale, M. J. (2010). Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit. *Energy Policy*, 38(12), 7698-7709. doi:10.1016/j.enpol.2010.08.021
- Battilana, J., & Dorado, S. (2010). Building Sustainable Hybrid Organizations: The Case of Commercial Microfinance Organizations. *Academy of Management Journal*, 53(6), 1419-1440.
- Baumann, S., Lehner, O. M., & Losbichler, H. (2015). A push-and-pull factor model for environmental management accounting: a contingency perspective. *Journal of Sustainable Finance & Investment*, 5(3), 155-177. doi:10.1080/20430795.2015.1100036
- Benz, E., & Trück, S. (2009). Modeling the price dynamics of CO2 emission allowances. *Energy Economics*, 31(1), 4-15. doi:10.1016/j.eneco.2008.07.003
- Berry, T. C., & Junkus, J. C. (2012). Socially Responsible Investing: An Investor Perspective. *Journal of Business Ethics*, 112(4), 707-720. doi:10.1007/s10551-012-1567-0
- Bianchi, R. J., & Drew, M. E. (2012). Sustainable stock indices and long-term portfolio decisions. *Journal of Sustainable Finance & Investment*, 2(3-4), 303-317. doi:10.1080/20430795.2012.715577
- Bloxham, E. (2011a). Corporate governance and sustainability: new and old models of thinking. *Journal of Sustainable Finance & Investment*, 1(1), 77-80. doi:10.3763/jsfi.2010.0003
- Bloxham, E. (2011b). The knowledge gap between investors and companies. *Journal of Sustainable Finance & Investment*, 1(2), 156-158. doi:10.1080/20430795.2011.582326
- Bracci, E., & Maran, L. (2013). Environmental management and regulation: pitfalls of environmental accounting? *Management of Environmental Quality: An International Journal*, 24(4), 538-554. doi:10.1108/meq-04-2012-0027
- Brandstetter, L., & Lehner, O. M. (2015). Opening the Market for Impact Investments: The Need for Adapted Portfolio Tools. *Entrepreneurship Research Journal*, 0(0). doi:10.1515/erj-2015-0003
- Branker, K., Shackles, E., & Pearce, J. M. (2011). Peer-to-peer financing mechanisms to accelerate renewable energy deployment. *Journal of Sustainable Finance & Investment*, 1(2), 138-155. doi:10.1080/20430795.2011.582325
- Brunner, S., & Enting, K. (2014). Climate finance: A transaction cost perspective on the structure of state-to-state transfers. *Global Environmental Change*, 27, 138-143. doi:10.1016/j.gloenvcha.2014.05.005
- Bryman, A. (2012). *Social Research Methods* (4 ed.). Oxford: Oxford University Press.
- Busch, T., Bauer, R., & Orlitzky, M. (2015). Sustainable Development and Financial Markets: Old Paths and New Avenues. *Business & Society*, 55(3), 303-329. doi:10.1177/0007650315570701
- Cadman, T. (2014). Climate finance in an age of uncertainty. *Journal of Sustainable Finance & Investment*, 4(4), 351-356. doi:10.1080/20430795.2014.971097
- Calderon, F., & Chong, L. C. (2014). Dilemma of sustainable lending. *Journal of Sustainable Finance & Investment*, 4(2), 192-209. doi:10.1080/20430795.2014.883302
- Callado-Muñoz, F. J., & Utrero-González, N. (2011). Does It Pay to Be Socially Responsible? Evidence from Spain's Retail Banking Sector. *European Financial Management*, 17(4), 755-787. doi:10.1111/j.1468-036X.2009.00518.x

- Capelle-Blancard, G., & Monjon, S. (2012). Trends in the literature on socially responsible investment: looking for the keys under the lamppost. *Business Ethics: A European Review*, 21(3), 239-250. doi:10.1111/j.1467-8608.2012.01658.x
- Capelle-Blancard, G., & Monjon, S. (2014). The Performance of Socially Responsible Funds: Does the Screening Process Matter? *European Financial Management*, 20(3), 494-520. doi:10.1111/j.1468-036X.2012.00643.x
- Cengiz, C.-B., Braun, D., & von Nitzsch, R. (2010). Alpha-Vehikel oder Preis für das gute Gewissen? - Eine Performanceanalyse ethischer Investments. *Corporate Finance*, 1(4), 263-271.
- Chaigneau, P. (2016). Managerial Compensation and Firm Value in the Presence of Socially Responsible Investors. *Journal of Business Ethics*. doi:10.1007/s10551-016-3115-9
- Charles, A., Darné, O., & Fouilloux, J. (2011). Testing the martingale difference hypothesis in CO2 emission allowances. *Economic Modelling*, 28(1-2), 27-35. doi:10.1016/j.econmod.2010.10.003
- Cho, C. H., Guidry, R. P., Hageman, A. M., & Patten, D. M. (2012). Do actions speak louder than words? An empirical investigation of corporate environmental reputation. *Accounting, Organizations and Society*, 37(1), 14-25. doi:10.1016/j.aos.2011.12.001
- Combs, K. (2014). More Than Just a Trend: The Importance of Impact Investing. *Corporate Finance Review*, 18(6), 12-18.
- Contrafatto, M. (2014). The institutionalization of social and environmental reporting: An Italian narrative. *Accounting, Organizations and Society*, 39(6), 414-432. doi:10.1016/j.aos.2014.01.002
- Criscuolo, C., & Menon, C. (2015). Environmental policies and risk finance in the green sector: Cross-country evidence. *Energy Policy*, 83, 38-56. doi:10.1016/j.enpol.2015.03.023
- Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage Handbook of Qualitative Research* (4 ed.). Thousand Oaks: SAGE Publications, Inc.
- Doherty, B., Haugh, H., & Lyon, F. (2014). Social Enterprises as Hybrid Organizations: A Review and Research Agenda. *International Journal of Management Reviews*, 16, 417-436.
- Dorfleitner, G., & Nguyen, M. (2016). Which proportion of SR investments is enough? A survey-based approach. *Business Research*, 9(1), 1-25. doi:10.1007/s40685-016-0030-y
- El Ghouli, S., Guedhami, O., Kwok, C. C. Y., & Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, 35(9), 2388-2406. doi:10.1016/j.jbankfin.2011.02.007
- Evans, M. (2013). Meeting the challenge of impact investing: how can contracting practices secure social impact without sacrificing performance? *Journal of Sustainable Finance & Investment*, 3(2), 138-154. doi:10.1080/20430795.2013.776260
- Eyckmans, J., Fankhauser, S., & Kverndokk, S. (2015). Development Aid and Climate Finance. *Environmental and Resource Economics*, 63(2), 429-450. doi:10.1007/s10640-015-9883-3
- Fankhauser, S., Sahni, A., Savvas, A., & Ward, J. (2015). Where are the gaps in climate finance? *Climate and Development*, 1-4. doi:10.1080/17565529.2015.1064811
- Feng, T., Cai, D., Wang, D., & Zhang, X. (2016). Environmental management systems and financial performance: the joint effect of switching cost and competitive intensity. *Journal of Cleaner Production*, 113, 781-791. doi:10.1016/j.jclepro.2015.11.038
- Fleurbæy, M. (2015). On sustainability and social welfare. *Journal of Environmental Economics and Management*, 71, 34-53. doi:10.1016/j.jeem.2015.02.005
- Gasbarro, F., Rizzi, F., & Frey, M. (2013). The mutual influence of Environmental Management Systems and the EU ETS: Findings for the Italian pulp and paper industry. *European Management Journal*, 31(1), 16-26. doi:10.1016/j.emj.2012.10.003
- Gibbon, J., & Dey, C. (2011). Developments in Social Impact Measurement in the Third Sector: Scaling Up or Dumbing Down? *Social and Environmental Accountability Journal*, 31(1), 63-72. doi:10.1080/0969160x.2011.556399
- Gifford, E. J. M. (2010). Effective Shareholder Engagement: The Factors that Contribute to Shareholder Salience. *Journal of Business Ethics*, 92(S1), 79-97. doi:10.1007/s10551-010-0635-6
- Guenster, N., Bauer, R., Derwall, J., & Koedijk, K. (2011). The Economic Value of Corporate Eco-Efficiency. *European Financial Management*, 17(4), 679-704. doi:10.1111/j.1468-036X.2009.00532.x
- Hachigian, H., & McGill, S. M. (2012). Reframing the governance challenge for sustainable investment. *Journal of Sustainable Finance & Investment*, 2(3-4), 166-178. doi:10.1080/20430795.2012.742632
- Hall, S., Foxon, T. J., & Bolton, R. (2015). Investing in low-carbon transitions: energy finance as an adaptive market. *Climate Policy*, 1-19. doi:10.1080/14693062.2015.1094731
- Hammoudeh, S., Nguyen, D. K., & Sousa, R. M. (2014). What explain the short-term dynamics of the prices of CO2 emissions? *Energy Economics*, 46, 122-135. doi:10.1016/j.eneco.2014.07.020

- Harjoto, M. A., & Jo, H. (2015). Legal vs. Normative CSR: Differential Impact on Analyst Dispersion, Stock Return Volatility, Cost of Capital, and Firm Value. *Journal of Business Ethics*, 128, 1-20.
- Henke, H.-M. (2016). The effect of social screening on bond mutual fund performance. *Journal of Banking & Finance*, 67, 69-84. doi:10.1016/j.jbankfin.2016.01.010
- Höchstädter, A. K., & Scheck, B. (2014). What's in a Name: An Analysis of Impact Investing Understandings by Academics and Practitioners. *Journal of Business Ethics*, 132(2), 449-475. doi:10.1007/s10551-014-2327-0
- Hogarth, R. J. (2012). The role of climate finance in innovation systems. *Journal of Sustainable Finance & Investment*, 2(3-4), 257-274. doi:10.1080/20430795.2012.742637
- Holland, J. (2011). A conceptual framework for changes in fund management and accountability relative to ESG issues. *Journal of Sustainable Finance & Investment*, 1(2), 159-177. doi:10.1080/20430795.2011.582328
- Humphrey, J. E., & Tan, D. T. (2013). Does it Really Hurt to be Responsible? *Journal of Business Ethics*, 122(3), 375-386. doi:10.1007/s10551-013-1741-z
- Ioannou, I., & Serafeim, G. (2015). The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal*, 36(7), 1053-1081. doi:10.1002/smj.2268
- Jackson, E. T. (2013). Evaluating social impact bonds: questions, challenges, innovations, and possibilities in measuring outcomes in impact investing. *Community Development*, 44(5), 608-616. doi:10.1080/15575330.2013.854258
- Jones, L., & Turner, K. (2014). At the nexus of investment and development: lessons from a 60-year experiment in SME impact investing. *Enterprise Development and Microfinance*, 25(4), 299-310. doi:10.3362/1755-1986.2014.028
- Jones, M. J. (2010). Accounting for the environment: Towards a theoretical perspective for environmental accounting and reporting. *Accounting Forum*, 34(2), 123-138. doi:10.1016/j.accfor.2010.03.001
- Kara, M., Syri, S., Lehtilä, A., Helynen, S., Kekkonen, V., Ruska, M., & Forsström, J. (2008). The impacts of EU CO2 emissions trading on electricity markets and electricity consumers in Finland. *Energy Economics*, 30(2), 193-211. doi:10.1016/j.eneco.2006.04.001
- Kopnina, H. (2015). Sustainability: new strategic thinking for business. *Environment, Development and Sustainability*. doi:10.1007/s10668-015-9723-1
- Lee, D. D., Humphrey, J. E., Benson, K. L., & Ahn, J. Y. K. (2010). Socially responsible investment fund performance: the impact of screening intensity. *Accounting & Finance*, 50(2), 351-370. doi:10.1111/j.1467-629X.2009.00336.x
- Lehner, O. M. (2013). Crowdfunding social ventures: a model and research agenda. *Venture Capital*, 15(4), 289-311. doi:10.1080/13691066.2013.782624
- Leite, P., & Cortez, M. C. (2014). Style and performance of international socially responsible funds in Europe. *Research in International Business and Finance*, 30, 248-267. doi:10.1016/j.ribaf.2013.09.007
- Lok, J. (2010). Institutional Logics as Identity Projects. *Academy of Management Journal*, 53(6), 1305-1335.
- Louche, C., Arenas, D., & van Cranenburgh, K. C. (2012). From Preaching to Investing: Attitudes of Religious Organisations Towards Responsible Investment. *Journal of Business Ethics*, 110(3), 301-320. doi:10.1007/s10551-011-1155-8
- Luo, X., Wang, H., Raithe, S., & Zheng, Q. (2015). Corporate social performance, analyst stock recommendations, and firm future returns. *Strategic Management Journal*, 36(1), 123-136. doi:10.1002/smj.2219
- Mac Cormac, S., & Haney, H. (2012). New Corporate Forms: One Viable Solution to Advancing Environmental Sustainability. *Journal of Applied Corporate Finance*, 24(2), 49-56.
- Majoch, A. A. A., Hoepner, A. G. F., & Hebb, T. (2016). Sources of Stakeholder Salience in the Responsible Investment Movement: Why Do Investors Sign the Principles for Responsible Investment? *Journal of Business Ethics*. doi:10.1007/s10551-016-3057-2
- Matusik, S. F., & Fitza, M. A. (2012). Diversification in the venture capital industry: leveraging knowledge under uncertainty. *Strategic Management Journal*, 33(4), 407-426. doi:10.1002/smj.1942
- Mervelskemper, L., Kaltfofen, D., & Stein, S. (2013). Are sustainable investment funds worth the effort? *Journal of Sustainable Finance & Investment*, 4(2), 127-146. doi:10.1080/20430795.2013.837809
- Mishra, S., & Modi, S. B. (2012). Positive and Negative Corporate Social Responsibility, Financial Leverage, and Idiosyncratic Risk. *Journal of Business Ethics*, 117(2), 431-448. doi:10.1007/s10551-012-1526-9
- Montagnoli, A., & de Vries, F. P. (2010). Carbon trading thickness and market efficiency. *Energy Economics*, 32(6), 1331-1336. doi:10.1016/j.eneco.2010.04.001

- Mulder, I., & Koellner, T. (2011). Hardwiring green: how banks account for biodiversity risks and opportunities. *Journal of Sustainable Finance & Investment*, 1(2), 103-120. doi:10.1080/20430795.2011.582323
- Narain, U., Margulis, S., & Essam, T. (2011). Estimating costs of adaptation to climate change. *Climate Policy*, 11(3), 1001-1019. doi:10.1080/14693062.2011.582387
- Narayan, P. K., & Sharma, S. S. (2015). Is carbon emissions trading profitable? *Economic Modelling*, 47, 84-92. doi:10.1016/j.econmod.2015.01.001
- Niblock, S. J., & Harrison, J. L. (2013). Carbon markets in times of VUCA: a weak-form efficiency investigation of the phase II EU ETS. *Journal of Sustainable Finance & Investment*, 3(1), 38-56. doi:10.1080/20430795.2013.765381
- Nicholls, A. (2009). 'We do good things, don't we?': 'Blended Value Accounting' in social entrepreneurship. *Accounting, Organizations and Society*, 34(6-7), 755-769. doi:10.1016/j.aos.2009.04.008
- Nicholls, A. (2010). The Institutionalization of Social Investment: The Interplay of Investment Logics and Investor Rationalities. *Journal of Social Entrepreneurship*, 1(1), 70-100. doi:10.1080/19420671003701257
- Noailly, J., & Smeets, R. (2015). Directing technical change from fossil-fuel to renewable energy innovation: An application using firm-level patent data. *Journal of Environmental Economics and Management*, 72, 15-37. doi:10.1016/j.jeem.2015.03.004
- Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. *Journal of Banking & Finance*, 48, 180-193. doi:10.1016/j.jbankfin.2013.12.016
- Pache, A. C., & Santos, F. (2012). Inside the Hybrid Organization: Selective Coupling as a Response to Competing Institutional Logics. *Academy of Management Journal*, 56(4), 972-1001. doi:10.5465/amj.2011.0405
- Paetzold, F., & Busch, T. (2014). Unleashing the Powerful Few: Sustainable Investing Behaviour of Wealthy Private Investors. *Organization & Environment*. doi:10.1177/1086026614555991
- Pasewark, W. R., & Riley, M. E. (2010). It's a Matter of Principle: The Role of Personal Values in Investment Decisions. *Journal of Business Ethics*, 93, 237-253.
- Pathak, P., & Dattani, P. (2014). Social return on investment: three technical challenges. *Social Enterprise Journal*, 10(2), 91-104. doi:10.1108/sej-06-2012-0019
- Pathania, R., & Bose, A. (2014). An analysis of the role of finance in energy transitions. *Journal of Sustainable Finance & Investment*, 4(3), 266-271. doi:10.1080/20430795.2014.929000
- Peylo, B. T., & Schaltegger, S. (2014). An equation with many variables: un hiding the relationship between sustainability and investment performance. *Journal of Sustainable Finance & Investment*, 4(2), 110-126. doi:10.1080/20430795.2013.837808
- Phan, T. N., & Baird, K. (2015). The comprehensiveness of environmental management systems: The influence of institutional pressures and the impact on environmental performance. *J Environ Manage*, 160, 45-56. doi:10.1016/j.jenvman.2015.06.006
- Pillai, K. G., Hodgkinson, G. P., Kalyanaram, G., & Nair, S. R. (2015). The Negative Effects of Social Capital in Organizations: A Review and Extension. *International Journal of Management Reviews, Online Version*.
- Quak, S., Heilbron, J., & Meijer, J. (2014). The rise and spread of sustainable investing in the Netherlands. *Journal of Sustainable Finance & Investment*, 4(3), 249-265. doi:10.1080/20430795.2014.928999
- Reboredo, J. C. (2014). Volatility spillovers between the oil market and the European Union carbon emission market. *Economic Modelling*, 36, 229-234. doi:10.1016/j.econmod.2013.09.039
- Reeder, N., Colantonio, A., Loder, J., & Rocyn Jones, G. (2015). Measuring impact in impact investing: an analysis of the predominant strength that is also its greatest weakness. *Journal of Sustainable Finance & Investment*, 5(3), 136-154. doi:10.1080/20430795.2015.1063977
- Rees, W., & Rodionova, T. (2013). What type of controlling investors impact on which elements of corporate social responsibility? *Journal of Sustainable Finance & Investment*, 3(3), 238-263. doi:10.1080/20430795.2013.791143
- Revelli, C., & Viviani, J.-L. (2015). Financial performance of socially responsible investing (SRI): what have we learned? A meta-analysis. *Business Ethics: A European Review*, 24(2), 158-185. doi:10.1111/beer.12076
- Rogge, K. S., Schneider, M., & Hoffmann, V. H. (2011). The innovation impact of the EU Emission Trading System — Findings of company case studies in the German power sector. *Ecological Economics*, 70(3), 513-523. doi:10.1016/j.ecolecon.2010.09.032
- Rook, D. P. (2012). How can we know if investors are coherently linking sustainability concepts? *Journal of Sustainable Finance & Investment*, 2(3-4), 198-221. doi:10.1080/20430795.2012.742634

- Sandberg, J., Juravle, C., Hedesström, T. M., & Hamilton, I. (2008). The Heterogeneity of Socially Responsible Investment. *Journal of Business Ethics*, 87(4), 519-533. doi:10.1007/s10551-008-9956-0
- Säve-Söderbergh, J. (2010). Who lets ethics guide his economic decision-making? An empirical analysis of individual investments in ethical funds. *Economics Letters*, 107(2), 270-272. doi:10.1016/j.econlet.2010.02.003
- Shrivastava, P., & Addas, A. (2014). The impact of corporate governance on sustainability performance. *Journal of Sustainable Finance & Investment*, 4(1), 21-37. doi:10.1080/20430795.2014.887346
- Simons, A., Lis, A., & Lippert, I. (2014). The political duality of scale-making in environmental markets. *Environmental Politics*, 23(4), 632-649. doi:10.1080/09644016.2014.893120
- Skelcher, C., & Smith, S. R. (2015). Theorizing Hybridity: Institutional Logics, Complex Organizations, and Actor Identities: The Case of Nonprofits. *Public Adm*, 93(2), 433-448. doi:10.1111/padm.12105
- Skovgaard, J. (2015). Greener than expected? EU finance ministries address climate finance. *Environmental Politics*, 24(6), 951-969. doi:10.1080/09644016.2015.1056575
- Stechemesser, K., & Guenther, E. (2012). Carbon accounting: a systematic literature review. *Journal of Cleaner Production*, 36, 17-38. doi:10.1016/j.jclepro.2012.02.021
- Stoneham, G., O'Keefe, A., Eigenraam, M., & Bain, D. (2012). Creating physical environmental asset accounts for markets for ecosystem conservation. *Ecological Economics*, 82, 114-122. doi:10.1016/j.ecolecon.2012.06.017
- Thistlethwaite, J. (2014). Private governance and sustainable finance. *Journal of Sustainable Finance & Investment*, 4(1), 61-75. doi:10.1080/20430795.2014.887348
- Trinks, P. J., & Scholtens, B. (2015). The Opportunity Cost of Negative Screening in Socially Responsible Investing. *Journal of Business Ethics*. doi:10.1007/s10551-015-2684-3
- van Dijk-de Groot, M., & Nijhof, A. H. J. (2015). Socially Responsible Investment Funds: a review of research priorities and strategic options. *Journal of Sustainable Finance & Investment*, 5(3), 178-204. doi:10.1080/20430795.2015.1100035
- Vatn, A. (2014). Markets in environmental governance — From theory to practice. *Ecological Economics*, 105, 97-105. doi:10.1016/j.ecolecon.2014.05.005
- Vives, A., & Wadhwa, B. (2012). Sustainability indices in emerging markets: impact on responsible practices and financial market development. *Journal of Sustainable Finance & Investment*, 2(3-4), 318-337. doi:10.1080/20430795.2012.715578
- von Wallis, M., & Klein, C. (2014). Ethical requirement and financial interest: a literature review on socially responsible investing. *Business Research*, 8(1), 61-98. doi:10.1007/s40685-014-0015-7
- Walls, J. L., Berrone, P., & Phan, P. H. (2012). Corporate governance and environmental performance: is there really a link? *Strategic Management Journal*, 33(8), 885-913. doi:10.1002/smj.1952
- Waygood, S. (2011). How do the capital markets undermine sustainable development? What can be done to correct this? *Journal of Sustainable Finance & Investment*, 1(1), 81-87. doi:10.3763/jsfi.2010.0008
- Weber, O. (2014). The financial sector's impact on sustainable development. *Journal of Sustainable Finance & Investment*, 4(1), 1-8. doi:10.1080/20430795.2014.887345
- Wiek, A., & Weber, O. (2014). Sustainability challenges and the ambivalent role of the financial sector. *Journal of Sustainable Finance & Investment*, 4(1), 9-20. doi:10.1080/20430795.2014.887349
- Wood, D., Thornley, B., & Grace, K. (2013). Institutional impact investing: practice and policy. *Journal of Sustainable Finance & Investment*, 3(2), 75-94. doi:10.1080/20430795.2013.776256
- Wood, D. J. (2010). Measuring Corporate Social Performance: A Review. *International Journal of Management Reviews*, 12(1), 50-84.
- Woodward, R. T. (2011). Double-dipping in environmental markets. *Journal of Environmental Economics and Management*, 61(2), 153-169. doi:10.1016/j.jeem.2010.07.004
- Wrake, M., Burtraw, D., Lofgren, A., & Zetterberg, L. (2012). What have we learnt from the European Union's Emissions Trading System? *Ambio*, 41 Suppl 1, 12-22. doi:10.1007/s13280-011-0237-2
- Yu, Y., Dong, X.-Y., Shen, K. N., Khalifa, M., & Hao, J.-X. (2013). Strategies, technologies, and organizational learning for developing organizational innovativeness in emerging economies. *Journal of Business Research*, 66(12), 2507-2514. doi:10.1016/j.jbusres.2013.05.042
- Zhang, Y.-J., & Wei, Y.-M. (2010). An overview of current research on EU ETS: Evidence from its operating mechanism and economic effect. *Applied Energy*, 87(6), 1804-1814. doi:10.1016/j.apenergy.2009.12.019

Appendix

Author & Year	Major Keywords	Empirical Research Method*
*qualitative, quantitative, conceptual or review		
Journal of Sustainable Finance & Investment		
Baumann et al. (2015)	push/pull variables EMS	conceptual
Bianchi and Drew (2012)	sustainable stock indices	qualitative
Bloxham (2011a)	sustainable corporate governance	conceptual
Bloxham (2011b)	knowledge gap	qualitative
Branker et al. (2011)	renewable energy deployment	qualitative – case study
Cadman (2014)	climate finance uncertainty	qualitative
Calderon and Chong (2014)	sustainable lending	review
Evans (2013)	principal – agent impact investing	conceptual
Hachigian and McGill (2012)	governance challenge	qualitative
Hogarth (2012)	climate finance innovation	qualitative
Holland (2011)	fund management ESG issues	conceptual
Mervelskemper et al. (2013)	sustainable investment funds	qualitative – sampling
Mulder and Koellner (2011)	banks & biodiversity risk	qualitative
Niblock and Harrison (2013)	carbon markets & VUCA	qualitative – data monitoring
Pathania and Bose (2014)	finance & energy transitions	qualitative
Peylo and Schaltegger (2014)	sustainability & investment	conceptual & quantitative
Quak et al. (2014)	sustainable investing development	qualitative
Reeder et al. (2015)	impact in impact investing	qualitative – interviews
Rees and Rodionova (2013)	CSR & controlling investors	qualitative
Rook (2012)	sustainable investment beliefs	conceptual
Shrivastava and Addas (2014)	governance & performance	conceptual
Thistlethwaite (2014)	private governance & finance	qualitative
van Dijk-de Groot and Nijhof (2015)	SRI funds priorities & options	review
Vives and Wadhwa (2012)	sustainable indices & markets	qualitative – case study
Waygood (2011)	capital markets & sustainability	qualitative
Weber (2014)	financial sector & sustainability	review
Wiek and Weber (2014)	sustainability challenges	qualitative – case study

D. Wood et al. (2013)	private & public investing	qualitative
Journal of Business Ethics		
Auer (2014)	SRI policies & portfolio value	qualitative – portfolio creation
Berry and Junkus (2012)	SRI & investors	qualitative – survey
Chaigneau (2016)	managerial compensation & value	qualitative
Gifford (2010)	shareholder engagement	conceptual
Harjoto and Jo (2015)	CSR impact	qualitative – sampling
Höchstädter and Scheck (2014)	impact investing understandings	qualitative – text analysis
Humphrey and Tan (2013)	screening experiment	quantitative – portfolio simulation
Louche et al. (2012)	responsible investing & screening	qualitative – survey & interviews
Majoch et al. (2016)	stakeholders & responsibility	qualitative - survey
Mishra and Modi (2012)	positive & negative CSR	conceptual
Pasewark and Riley (2010)	personal values & investments	quantitative – experiment
Sandberg et al. (2008)	heterogeneity of SRI	qualitative
Trinks and Scholtens (2015)	opportunity cost negative screens	qualitative – sampling
Energy Economics		
Balcilar et al. (2016)	risk spillovers energy & carbon	conceptual & qualitative
Benz and Trück (2009)	price dynamics allowances market	qualitative & conceptual
Hammoudeh et al. (2014)	short-term dynamics CO ₂ market	conceptual
Kara et al. (2008)	CO ₂ emission trading & electricity	conceptual
Montagnoli and de Vries (2010)	carbon market efficiency	qualitative – testing
Economic Modelling		
Charles et al. (2011)	emission allowances behavior	qualitative – testing
Narayan and Sharma (2015)	profitability of carbon trading	qualitative – sampling
Reboredo (2014)	spillovers oil & carbon market	conceptual
Ecological Economics		
Rogge et al. (2011)	EU ETS & innovation impact	qualitative – case studies
Stoneham et al. (2012)	physical environmental accounts	qualitative – pilot
Vatn (2014)	ecosystem services & governance	conceptual
Journal of Business Research		
Dorfleitner and Nguyen (2016)	responsible investment proportion	qualitative – survey

ENVIRONMENTAL FINANCE AND IMPACT INVESTING: STATUS QUO AND FUTURE RESEARCH

Yu et al. (2013)	innovation & emerging markets	conceptual & qualitative
von Wallis and Klein (2014)	ethical & financial investments	review
Strategic Management Journal		
Ioannou and Serafeim (2015)	CSR & analyst recommendations	qualitative – sampling
Luo et al. (2015)	social performance & value	qualitative & quantitative
Matusik and Fitza (2012)	venture capital diversification	qualitative
Walls et al. (2012)	governance & environment link	qualitative – sample
Journal of Cleaner Production		
Feng et al. (2016)	environmental management systems	qualitative – survey
Stechemesser and Guenther (2012)	carbon accounting	review
Environmental Politics		
Simons et al. (2014)	duality & environmental markets	qualitative
Skovgaard (2015)	climate policies & institutions	qualitative
Energy Policy		
Barradale (2010)	renewable energy investment	qualitative
Criscuolo and Menon (2015)	environmental policies & risk	qualitative
Climate Policy		
Hall et al. (2015)	energy market & adaptation	qualitative
Narain et al. (2011)	climate change & adaptation costs	qualitative
Business Ethics: A European Review		
Capelle-Blancard and Monjon (2012)	trends in SRI literature	qualitative – text analysis
Revelli and Viviani (2015)	financial performance of SRI	quantitative – meta-analysis
Journal of Applied Corporate Finance		
Allen and Yago (2011)	EF innovations	qualitative
Mac Cormac and Haney (2012)	environmental sustainability	qualitative
Journal of Banking and Finance		
El Ghoul et al. (2011)	CSR & cost of capital	qualitative – sampling
Henke (2016)	social screening & outperformance	qualitative
Nofsinger and Varma (2014)	socially responsible funds & crises	qualitative – sample
Economics Letters		
Säve-Söderbergh (2010)	decision-making & ethics	qualitative – sampling

Social Enterprise Journal

Pathak and Dattani (2014) SROI challenges qualitative

Social and Environmental Accountability Journal

Gibbon and Dey (2011) social impact measurement qualitative

Research in International Business and Finance

Leite and Cortez (2014) selectivity & timing SRI funds qualitative

Renewable and Sustainable Energy Reviews

Abolhosseini and Heshmati (2014) support mechanisms energy qualitative

Organization & Environment

Paetzold and Busch (2014) sustainable investing behavior qualitative – interviews

Management of Environmental Quality: An International Journal

Bracci and Maran (2013) environmental accounting conceptual

Journal of Environmental Management

Phan and Baird (2015) environmental management systems performance qualitative – survey

Journal of Environmental Economics and Management

Amore and Bennedsen (2016) corporate governance & environmental efficiency qualitative

Fleurbaey (2015) sustainability & possibility conceptual

Noailly and Smeets (2015) renewable energy innovation conceptual

Woodward (2011) double-dipping environmental markets qualitative

International Environmental Agreements: Politics, Law, Economics

Aglietta et al. (2015) climate finance transition qualitative

Global Environmental Change

Brunner and Enting (2014) climate finance transaction costs qualitative

European Management Journal

Gasbarro et al. (2013) environmental management systems & EU ETS qualitative – multiple case study

European Financial Management

Callado-Muñoz and Utrero-González (2011) valuation & social performance conceptual

Capelle-Blancard and Monjon (2014) performance & screening process qualitative – sampling

Guenster et al. (2011) corporate eco-efficiency & value qualitative

Environmental and Resource Economics

Eyckmans et al. (2015) development aid & climate finance qualitative

Enterprise Development and Microfinance

L. Jones and Turner (2014) SME & impact investing quantitative – experiment & case study

Corporate Finance Review

Combs (2014) impact investing importance qualitative

Community Development

Jackson (2013) theory of change review

Climate and Development

Fankhauser et al. (2015) gaps in climate finance review

Business & Society

Busch et al. (2015) financial markets & sustainability qualitative

Applied Energy

Zhang and Wei (2010) EU ETS mechanism & effect review

Ambio

Wrake et al. (2012) EU ETS lessons learned qualitative

Accounting, Organizations and Society

Cho et al. (2012) corporate environmental reputation qualitative

Contrafatto (2014) social & environmental reporting qualitative – case study

Nicholls (2009) blended value accounting conceptual

Accounting Forum

M. J. Jones (2010) integral accounting approach conceptual

Accounting and Finance

Lee et al. (2010) SRI fund performance & screens qualitative

Environment, Development and Sustainability

Kopnina (2015) sustainability & new thinking qualitative – survey

Journal of Social Entrepreneurship

Nicholls (2010) investment logics & investors rationalities conceptual

Academy of Management Journal

Battilana and Dorado (2010) sustainable hybrid organizations qualitative – comparative case study

Lok (2010) institutional logics & identity qualitative

Pache and Santos (2012) institutional logics qualitative – case studies

Public Administration

Skelcher and Smith (2015) hybridity & institutional logics conceptual

International Journal of Management Reviews

Doherty et al. (2014) hybrid organizations review

Pillai et al. (2015) negative effects social capital review

D. J. Wood (2010) measuring corporate social performance review

Corporate Finance

Cengiz et al. (2010) impact investing & investors' needs qualitative

Entrepreneurship Research Journal

Brandstetter and Lehner (2015) adapted portolio tools qualitative

Venture Capital

Lehner (2013) crowdfunding social ventures conceptual