Sustainable finance - paradigm shift

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Abstract Transition to smart, efficient low carbon economy in conventional reception is associated with the process of multi-level transformation of the economic and socio-technological system intended to increase its environmental sustainability and social fairness. According to above transition new concepts of finance have emerged in public debate such as: green finance, sustainable finance, climate finance, carbon finance. New approach of finance is purpose oriented, mission oriented, and value oriented which is opposite to traditional role of finance. The article is based on transitions research approach. It adopts a broader perspective than other approaches to sustainable development, emphasizing wide-scale system transformation. Transition research develops co-evolutionary approaches that highlight multi-dimensional interactions between industry, technology, markets, policy, culture and civil society. The paper presents a paradigm shift in economy which changes the role of finance (financial agents and markets) from dominant view of finance, focusing only on profits and shareholder value to alternative to the current regime. The goal is to identify a new direction for finance which is already emerging in Europe and confirm it by many initiative undertaken on the international arena.

1 Introduction

Finance are adopting themselves to the new trend of greening economy. Transition to green economy means conversion (evolution) from the existing model of economy towards one based on increased social and environmental responsibility. The new model emphasised such elements as: circular economy, low emission, resource efficiency, clean technologies, responsible consumption, social justice and equality (both inter- and intra-generational).

According to above transition new concepts of finance have emerged in public debate such as: green finance, sustainable finance, climate finance, carbon finance. New approach of finance is purpose oriented, mission oriented, and value oriented which is opposite to traditional role of finance. Finance were always an instrument of economic decisions. The aim of finance in the neoclassic market economy was to maximize profits and shareholders value. Financial sector become huge in recent decades and completely decouple from real economy. What is interesting in current transformation in finance? The role of finance is changing from the dominant view rooted in neoclassical economic

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theory (to maximize profits, and shareholder wealth) towards one supporting sustainable development, green economy, low carbon economy also adaptation and mitigation of climate change. The process is powerful, fast and multilevel.

The paper presents a paradigm shift in economy which changes the role of finance (financial agents and markets) from dominant view of finance, focusing only on profits and shareholder value to alternative to the current regime. The goal is to identify a new direction for finance which is already emerging in Europe and confirm it by many initiative undertaken on the international arena.

2 Methods and procedures

The article is based on transitions research approach. It adopts a broader perspective than other approaches to sustainable development, emphasizing wide-scale system transformation. Transition research develops co-evolutionary approaches that highlight multi-dimensional interactions between industry, technology, markets, policy, culture and civil society (STRN 2010). This framework has guided work within the Sustainability Transitions Research Network. Particularly the multilevel perspective created by Geels is effective in the analysis of the sustainability transition and presents a ''socio-technical'' framework for understanding and managing transitions in finance.

The above approach is based on the assumption that the transformation is not a linear process but a joint effect of occurrences observed on three distinct levels:

- in the external economic, social and technological environment (demographic trends, political ideologies, financial crises, social values, and macroeconomic principles – the *socio-technical landscape*).
- in the dominant economic, technological and social system (the existing patterns of production, consumption, management, and legislation – the *socio-technical regime*);
- in *niches* – as areas associated with radical innovations;

The multi-level perspective offers a ''big-picture'' analytical framework that accommodates these broader processes and helps explain both stability and changeThe *sustainability transition* is an end result of all interactions that occur between processes on each of the above levels. In this view, niches are the environment involved in the initiation of changes with potential to accelerate changes in the dominant system, while processes observed in the external surrounding exert pressure upon the system. Destabilisation of the dominant system, in turn, forms windows of opportunity for further innovations generated at niche level. (Geels 2011). Landscape developments comprise both slowchanging trends (e.g. demographics, ideology, spatial structures, geopolitics) and exogenous shocks (e.g. wars, economic crises, major accidents, political upheavals. Conceptually, this means that we should analyse socio-technical transitions as multi-dimensional struggles between niche-innovations and existing regimes. These struggles include: economic competition between old and new technologies; business struggles between new entrants and incumbents; political struggles over adjustments in regulations, standards, subsidies and taxes; discursive struggles over problem framings and social acceptance; and struggles between new user practices and mainstream ones (Geels 2018). The first section of this paper presents the characteristic of landscape and external economic, social and technological environment and challenges to the sustainability transition of finance at hand, as reported in professional literature. Section two presents characteristics of the dominant economic and financial system, we call it dominant regime. The third section discusses the emerging financial initiatives supporting sustainability transition (niches) and autor`s view on sustainable financial system. Finally, the paper closes with a discussion about possible scenario. The research was conducted using a variety of sources, such as scientific articles and reports of green finance experts group.

3 Landscape - Literature review

The present problems are systemic, complex and multilevel. They also involve many actors (government, business, consumers, academia). Main of them: Unlimited growth of production and consumption, devastation of ecosystems, climate change, social inequalities (both in national and global perspective); macroeconomic instabilities and imbalances; depletion of natural resources, and degradation of the natural environment. (Røpke 2013,) Dominant economic model is not able to deal with them (Jackson 2009). The growing trend can also be found with respect to general awareness of the fact that some of the recent changes observed throughout world should be perceived as systemic risks or hazards, i.e. factors that are no longer contained within the narrow framework of individual problems, but pose a serious threat to the operation or the very existence of the entire system (Dietz and O`Neill 2013). Systemic risks may be triggered by certain events or evolve over time, and their effects are typically grave, with potential to reach catastrophic dimensions. Some of the most pronounced risks are produced as consequence of protracted, long-drawn processes and only come into light when certain threshold values are breached. Consequently, it may take decades before the full extent of their damage can be recognised or anticipated. Until then, their potential impact upon the economy and the society tends to be downplayed or underestimated. Following are some of the examples of the present systemic risks: • climate change and the loss of biodiversity – these are interconnected, complex and typically of global scale;• imbalanced and unsustainable use of resources across various economic and social strata – these have the effect of limiting the ecosystem's ability to provide its services (such as waste absorption or the supply of production resources, water, breathable air, etc.); • environmental challenges – of more complex character, strongly correlated to other social problems, and resulting in an influx of uncertainty and risk. As aptly observed by M. McIntosh, we are witness to several concurrent transformation processes at present: from high-emission to low-emission economy; from deep imbalance in income distribution to egalitarianism; from glaring practice of neglect for basic human rights towards communities formed on the sound fundaments of social justice (M. McIntosh, 2013).

Main areas of current situation (table 1) and necessary transition are:

- Economic transition - from dominant neoclassic model of economy to alternative one
- Environmental transition – mitigation and adaptation to climate change, protection of ecosystems and biodiversity
- Social transition – reducing poverty and inequalities
- Digital transition – new technologies, artificial intelligence, Internet of things

Above transitions are leading issues in public debate specially in Europe. International institutions initiatives direct action to deal with problems:

- Strategy Europe 2020 focused on low carbon, resource efficient economy also smart and inclusive and financial framework to support transition
- International climate agreement in Paris in 2015**,** to combat climate change and unleash actions and investment towards a low carbon, resilient and sustainable future is confirming importance of transition.
- The Sustainable Development Goals (SDGs), known as the Global Goals - universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These 17 Goals include areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities.

International organisations and individual countries have undertaken activities in response to global crisis, as part of much broader strategies of development and new policies, strongly rooted in the concepts of sustainable growth, green economy and clean production as the most effective remedies with potential to revitalise and sanitise the economy. Business entities gradually depart from the business as usual model of operation, looking for new business models which Sustainability and Responsibility. The process of transformation that can be witnessed at present is - in its essence – a manifestation of structural changes. Research results and statistical data confirm the growing impact of green economy upon the GDP and employment rates, thus elevating its significance as a source of competitive advantage, a mark of sectoral development and a potent attractor for public and private investors. (Ryszawska 2103). This is a new and very distinct trend. Observation and interpretation of structural changes associated with such concepts as green economy, green growth, green entrepreneurship and green employment are an important and current topic for in-depth studies.

Table 1 Transitions from dominant model to alternative one

Dominant model of economy (brown, high carbon, unsustainable economy)	**Alternative model of economy (green, low carbon, sustainable, circular economy)**
Economic transition	
Unlimited growth	Decoupling economic growth from natural resources consumption
Unregulated markets	
Business as usual	Socially responsible firms and investors
Short term decision	Long term perspective (investment in infrastructure, long life education, demographic problems, environmental issues)
Private profits and socialized cost of actions	
Negative externalities are not internalized in prices	Mission oriented
Profit and shareholder value	Sharing economy, co-consumption
Environmental transition	
Fossil fuels –main energy source	Renewable energy
High consumption of natural resources	Energy and resource efficiency
CO_2 emission	Clean production
Reduction of biodiversity	Biodiversity

Social transition	
Global social inequalities Over consumption Lack of responsibility Lack of social trust	Decent life Sustainable consumption Intergenerational and interregional justice Social trust , partnership, transparency
Digital transition	
Computer`s support for business Technologies for effectiveness Innovations of products and services	Innovation drives success, New customers – generations Y and Z Personalization of products Democratization Decentralization of services Access 24/7 New services Clean technologies

Source: authors own elaboration

It may be observed that some of the processes which, up till recently, were only registered at the niche segments and peripheral areas of the economy, are gradually seeping to the mainstream, turning the brown economy of overabundance into a green economy of moderation and restraint . Some of the manifestations of this process include such phenomena as: the growing share of energy from renewable sources in total energy production, waste recycling, reduced greenhouse gas emission, of modern products and technologies with improved energy efficiency, sustainable transportation, sustainable supply chains, sustainable consumption, collaborative consumption, corporate social and environmental responsibility, corporate sustainability.

Changes of this scale can only be effected through concerted effort of various source of finance; international, national, public, corporate, households.

4 Critique of dominant regime of finance

Discussion about real economy transition (production, consumption) made us aware about a scale of financial sector. The financial sector represents over €100 trillion of assets, or more than six times the EU`s annual GDP. Unbalance on this market strongly influence real economy as we experience during financial crisis. Many experts and researchers express a growing discontent in society regarding the functioning of financial agents and markets. (Sandberg,2015) also general discontent with the dominant view of finance (e.g. Krugman 2013, Dziawgo 2014, Stiglitz 2010). The role of finance can no longer be defined solely in terms of profits and economic efficiency, then how should it be defined? (Sandberg 2015).

Financial markets don't address the more pressing sustainability challenges of our time, such as global poverty and the threat of climate change. The theory of finance needs to incorporate the socio-ecologically embedded nature of finance (Fullwiler 2015) and to align financial systems with the financing needs of an inclusive, sustainable economy this is complementary to real economy actions such as environmental regulations, reform of perverse subsidies and changes to resource pricing (Castilla-Rubio et al. 2016)

How looks dominant model of finance? It is playing primarily intermediate role between those that provide funds and those that need funds, and typically involves transforming and managing risk (Castilla-Rubio et al.2016). Finance in neoliberal economy are concentrated on maximizing profits and shareholder value (profit oriented). Short term perspective in investment and return rate is another feature of modern finance. The time horizon in finance is typically much shorter than the time horizon needed to address society`s pressing challenges; and the conception of risk in finance is typically much narrower than one that effectively captures economic, social and environmental sustainability (Eichler et al. 2017). Privatization of profits and socialization of cost and negative externalities is a common practice in neoliberal economy. Wallerstein calls it a dark secret of capitalism (Wallerstein 2004). Market prices don`t internalize real social cost of products or services. Sandberg writes: that something is wrong when profits are made in a way that imposes such great costs or risks on others. (Sandberg 2015). Neoliberal economy is not contributing in using public infrastructure, investing in long life education, solving demographic problems is not investing sufficiently in R&D. Financial sector is not evaluating a full risk of investment (environmental, climate , social), even is very well equipped to do it. Current financial system is not align with new trends in economy and are not contributing to the transition towards to a low-carbon and climate-resilient economy.(Eichler et al. 2017) Dominant model of finance is adapted to support mainstreaming economy. It means to freeze existing regime and work against sustainable trends (Fig.1).

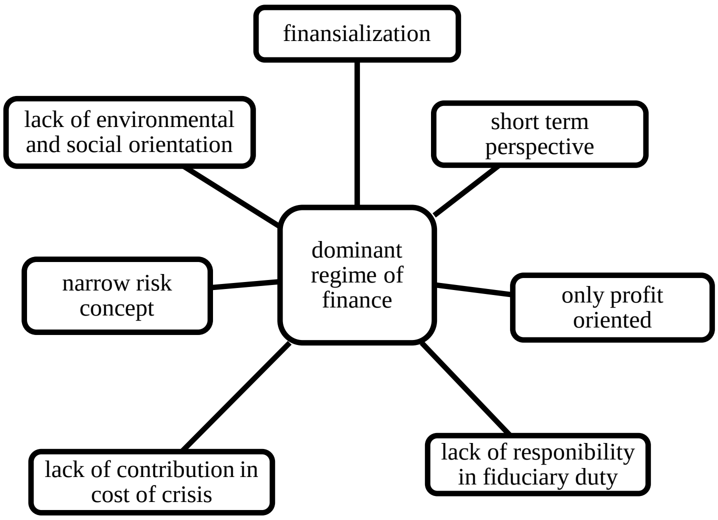


Fig.1 Dominant regime of finance (Source: author`s own elaboration)

Existing regime is focused on finansialisation. It means the financial sector mainly lending to itself rather than to the real (production) economy, with the risk being far higher but severely underpriced. The second factor is the corporate sector`s concentration on short term boost to profitability (trough merges and acquisitions) activity and divestiture from long run areas like R&D and boosting stock prices and stock options (hence executive pay) through the increased trend of share buybacks. (Mazzucato and Perez 2014)

Next issue and week point is fiduciary duty of financial institutions with a lack of responsibility to their beneficiaries and clients, they not consider the broad range of long-term interests. It is leading to extra risk and seems be unethical.

Pressure made by external trends and challenges is leading to an emerging consensus that the financial system is in need of reform.

Summing up dominant regime of finance is not aligned with main social, economic and environmental challenges. So is not serving society to deal with problems. He is more and more separated from society.

5 New action and innovation created in niches – main results.

New concept of finance emerged: sustainable finance, green finance, climate finance, carbon finance. Financial system is already in transition driven by economic and finance strategy oriented towards long-term sustainable and climate-resilient development and also by digital revolution. There are few groups of experts working of the issue of sustainable finance: High –Level Expert group on Sustainable Finance, The Green Finance Initiative (GFI), Green Finance Study Group G20, Green Finance The International Finance Corporation, OECD Centre for Green Finance and Investments. Sustainability is the model for Europe`s future development – and finance is an essential lever for achieving ambitious goals for economic prosperity, social inclusion and environmental regeneration (Financing a Sustainable European Economy 2017).

Sustainable finance are defined as finance supporting sustainable development in three combined dimensions: economic, environmental and social. (Ryszawska 2016). The fundamental purpose of a sustainable financial system is to serve the economy and wider society. Society and economy expect that finance align themselves sustainability transition, social transition and digital transition. Environmental transition needs money for mitigation and adaptation to climate change, protection of ecosystems and biodiversity. Redistribution of financial resources is necessary for social transition – reducing poverty and inequalities. Strongly influencing financial sector is digital transition – new technologies, artificial intelligence, Internet of things.

Expectation of green, low carbon economy is to change role of finance. New aim of sustainable finance is to improve the social, economic and environmental performance of the financial system. For the financial system, sustainability has a dual imperative (Financing a Sustainable European Economy 2017):

- The first is to ensure that environmental, social and governance (ESG) factors are at the heart of financial decision-making.
- The second is to mobilize capital to help solve society`s key challenges that require long-term finance: creating jobs, especially for young people, improving education and retirement finance, tackling inequality, and accelerating the shift to a decarbonized and resource-efficient economy.

Authors of Financing a Sustainable European Economy say: This is key to delivering *better finance* – finance that is more long-term, more attuned to emerging risks and more efficient at delivering returns for the economy and wider society. The second, complementary imperative is for finance to contribute to *better development* – thus supporting the creation of good quality jobs, tackling inequality, delivering inclusive growth and accelerating the shift to a decarbonized and resource-efficient economy The financial system has become more stable, but is not fully connected with a real economy in transition (Financing a Sustainable European Economy. 2017)

A financial system that serves the sustainable development is one that:

1. Considers the full value of financial assets, incorporating sustainability factors into valuation and product design.

2. Is productive, serving its users in their projects and needs, notably households, firms and governments.

3. Is resilient, withstanding and recovering from a wide range of both external and internally generated shocks.

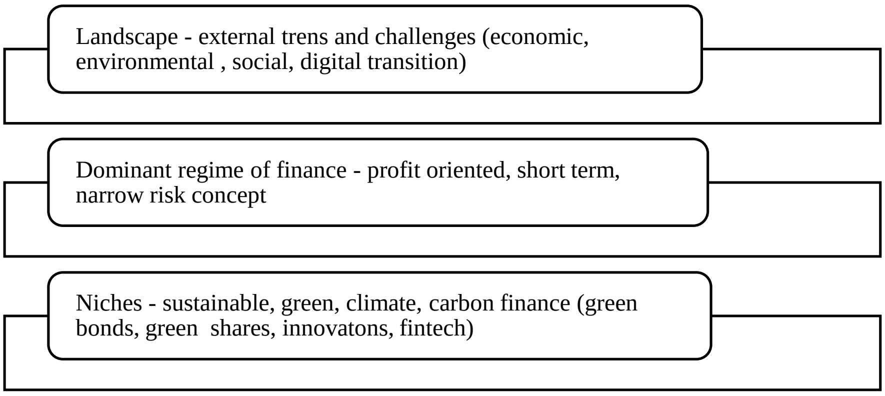
4. Demonstrates alignment between the sustainability preferences of its users and the outcomes of the decision-making process, ensuring accountability and transparency.

5. Takes a long-term perspective and overcomes the ‘tragedy of the horizon’ (Financing a Sustainable European Economy 2017)

Sustainable finance were defined after the first Earth Summit in Rio in 1992 by United Nation Environmental Program. Contemporary we can defined them also as the provision of financial capital and risk management products and services in ways that promote or do not harm economic prosperity, the ecology and community well-being. (Strandberg 2005).

Some of the processes which, up till recently, were only registered at the niche segments and peripheral areas of the economy, are gradually seeping to the mainstream, turning the brown economy of overabundance into a green economy of moderation and restraint (Table 3).

Table 3 Transition in finance – multilevel perspective



Source: authors own elaboration

Sustainability transition in finance is seen as the result of existing regimes which open up as a consequence of external shocks (climate change, energy transition, low carbon economy) and simultaneously bottom up innovations and new financial initiatives like climate finance, green finance, carbon finance. It is a structural change in financial system on many levels: international, public, corporate and household finance.

The significant element of transformation of finance is digitalisation and digital transformation. Technological innovations are important driver of changes in societies, in production, consumptions and communications between people. Digitalization change business model also in financial system specially in banking sector. Digitalisation is described as a "global megatrend that is fundamentally changing existing value chains across industries and public sectors" (Khan 2016). Examples of digital transformation can be seen in the media, banking, telecom and insurance industries as pioneering sectors that are in the middle of large-scale digital transformation. Today digitalization works as the catalyst, enabler and engine of societal development. Transformation of financial system requires to think big and shaping and creating new markets, better distribution of risks and rewards that emerge from this kind of collective effort towards smart innovation-led growth. (Mazzucato et.al 2015) . 2017 is the year where green digital finance can come of age. Group of 20 is taking on themes of "digital" and "resilience," and is considering fintech as part of its focus on green finance. (Zadek 2016).

To sum up new concepts of finance emerged (table 2) as an answer for external pressure (landscape) and bottom up innovations (niches).

Table 2 New concepts of finance

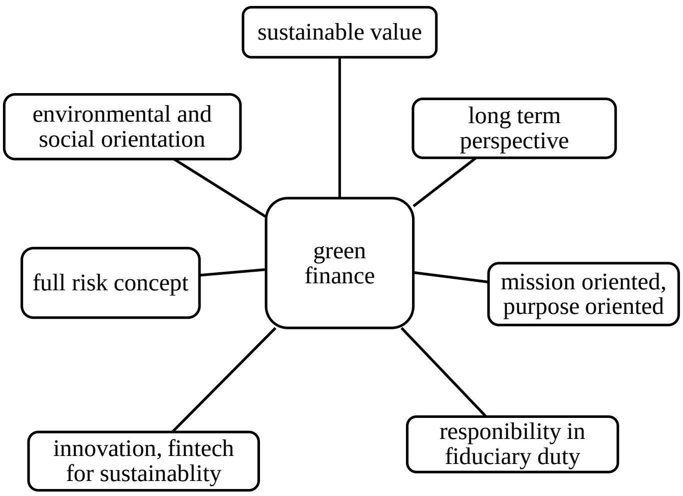
Authors		**Concept**
Centre for Responsible Business,2016 UNEPFI, 2015	Sustainable finance	Finance supporting sustainable development in three combined dimensions: economic, environmental and social
G20 Green Finance Synthesis Report, 2016 Green Finance A Bottom-up Approach to Track Existing Flows 2017	Green Finance	Green finance means investment in renewable energy, reduction of emission in industry, sustainable transport, recycling, organic agriculture, waste management, water management, eco-innovation, clean technology by public and private actors. Green finance can be defined as financing of investments that deliver environmental benefits in the broader context of environmentally sustainable development. These environmental benefits include, for example, reductions in air, water and land pollution, reductions in greenhouse gas emissions, improved energy efficiency while utilizing natural resources, as well as mitigation of and adaption to climate change and their co-benefits. Such a definition is directionally clear whilst allowing for different technical interpretations by countries and markets.
Green Climate Found 2016 Stewart, Kingsbury and Rudyk, 2009	Climate Finance	The aim of climate finance is to support adaptation to climate change and mitigation of climate change. It mean also financing a shift towards low emission and climate-resilient development

Labatt and White 2007	Carbon Finance	Carbon finance marked solution to climate change. (kind of environmental finance)
Mazzucato M., Penna C, 2015	Mission Oriented Finance	Finance oriented to support economic, social and digital challenges , guided by public policies
Guez i Zaouati, 2015	Positive Finance	Re-envision the allocation of capital in order to support social and technological innovations, to design and build sustainable infrastructure, and to finance the energy transition.

Source: authors own elaboration

Green finance supports green growth and transition to green economy and reduces negative environmental outcomes. Green finance means investment in renewable energy, reduction of emission in industry, sustainable transport, recycling, organic agriculture, waste management, water management, eco-innovation, clean technology by public and private actors. Climate finance is a new issue in an international debate. The aim of climate finance is to support adaptation to climate change and mitigation of climate change. It mean also financing a shift towards low emission and climate-resilient development. Climate finance is a critical element of global climate policy. Effective mitigation of climate change will depend on a complex mix of public funds, private investment through carbon markets, and sophisticated national and global regulation, forest and energy policy, international development funding, international trade law, and coordinated tax policy. (Stewart et al. 2009)

Table 4 Green finance align with sustainable and digital transition



Source: Authors own elaboration

A number of green markets have emerged as a result of increased public and private investments. Also examples of green markets and financial instruments emerged in the past decade. They include: carbon finance, green stimulus funds, microfinance, green bonds, international and national climate funds, green infrastructure, real estate funds, socially responsible equity funds.

To sum up all presented kinds of finance facilitate sustainability transition and create a sustainable financial system, which creates, values, and transacts financial assets, in ways that shape real wealth to serve the long-term needs of an inclusive, environmentally sustainable economy (Financial System We Need 2015). A sustainable financial system plays three key roles to enable this transition a low-carbon, climate resilient economy: (Aligning the financial system 2015) first, it effectively recognizes the costs and risks of high-carbon and resource intensive assets; second, it allocates sufficient attractively priced capital to low-carbon, resource efficient assets; third, it ensures that financial institutions and consumers are resilient to climate shocks, including natural disasters.

6 Conclusion

Sustainability transition is a multilevel process which means reaching goals of sustainable development, transforming economy towards green, low carbon, resource efficient and to combat climate change. This process is supported by sustainable finance, green finance and climate finance. Finance are slowly adapting to ongoing transition. It is called quiet revolution in finance because is still emerging on peripheries of mainstream economy. General trend in economy is oriented to decentralization of energy production which means decentralisation and democratisation of economic activities. Also urban and local development is playing bigger role in decentralization process. Transformation empowered by digital revolution is strengthening trends towards personally adjusted goods and services, democratic access to information, sharing economy. Technology revolution has enabled a new global techno-economic paradigm. All this factors will shape financial system in close future. Gradually dominant regime of finance will erode and the engines of growth will be replace by new regime and new drivers. New paradigm in economy and finance will be in power.

References

1. Aligning the financial system with Sustainable Development. The Coming Financial Climate, The Inquiry`s 4th Progress Report, United Nations Environment Programme, 2015
2. Castilla-Rubio J C, Zadek S, Robins N (2016) Fintech and Sustainable Development Assessing The Implications, access 1.02.2018 http://unepinquiry.org/wp-content/uploads/2016/12/Fintech_and_Sustainable_Development_Assessing_the_Implications.pdf
3. Dietz R, O`Neill D (2013) Enough is enough. Building a Sustainable Economy in World of Infinite Resources, London: Earthscan
4. Dziawgo L (2014) Greening financial market. Copernican Journal of Finance & Accounting, 3(2),9–23. http://dx.doi.org/10.12775/CJFA.2014.014.

5. Financing a European Sustainable Economy (2017) Interim Report, By the High-Level Expert Group on Sustainable Finance
6. Fullwiler S.T. (2015). Sustainable finance: building a more general theory of finance. Binzagr Institute for Sustainable Prosperity, Working Paper No. 106.
7. Geels F.W (2018) *Disruption and low-carbon system transformation: Progress and new challenges in socio-technical transitions research and the Multi-Level Perspective,* , Energy Research & Social Science 37 (2018) 224–231, http://dx.doi.org/10.1016/j.erss.2017.10.010
8. Geels F W, Sovacoo B K, Schwanen T, Sorrell S(2017), The Socio-Technical Dynamics of Low-Carbon Transitions, Joule 1, 463–479
9. Green Climate Fund 2015, *Investment Opportunities for the Green Climate Fund*, Elements Issue 02, November
10. Green Finance A Bottom-up Approach to Track Existing Flows, International Finance Corporation (2017), https://www.ifc.org/wps/wcm/connect/48d24e3b-2e37-4539-8a5e-a8b4d6e6acac/IFC_Green+Finance+-+A+Bottom-up+Approach+to+Track+Existing+Flows+2017.pdf?MOD=AJPERES access 1.02.2018
11. Guez H. Zaouati P (2015) Positive Finance. A Toolkit for Responsible Transformation , Greenleaf Publishing
12. Jackson, T. (2009). Prosperity without Growth. Economics for Finite Planet. London: Earthscan.
13. Labatt S., White R.R.,(2007) Carbon Finance: The Financial Implications of Climate Change, Wiley New Jersey 2007
14. McIntosh M., (2013). *The Necessary Transition. The Journey towards the Sustainable Enterprise Economy.* London: Greenleaf Publishing.
15. Recommendation of the Task Force on Climate-related Financial Disclosures,2017 https://www.fsb-tcfd.org/ access 1.02.2018
16. Ryszawska B.(2013), Zielona gospodarka – teoretyczne podstawy koncepcji i pomiar jej wdrażania w Unii Europejskiej, Wrocław
17. The Financial System We Need, Inquiry: Design of a Sustainable Financial System,(2015) Geneva
18. Khan S, (2016) *Leadership in the digital age – A study on the effects of digitalisation on top management leadership*, Stockholm Business School Master Thesis 30 HP, Stockholm
19. Krugman P (2013), End This Depression Now!, New York
20. Mazzucato M, et al(eds) (2015) Mission-Oriented Finance For Innovation, London
21. Perez C, (2004), Finance And Technical Change: A Neo-Schumpeterian Perspective, , in: H. Hanusch and A. Pyka, eds., *The Elgar Companion to Neo-Schumpeterian Economics*, Edward Elgar, Cheltenham, 2004
22. Sandberg J(2015), Towards A Theory Of Sustainable Finance, Inquiry Working Paper 15/08, UNEP
23. Stewart R.B et al(2009), Climate Finance: Regulatory and Funding Strategies for Climate Change and Global Development, New York
24. Strandberg C(2005) , Best Practices In Sustainable Finance, Strandberg Consulting

25. Stiglitz J.,(2010) Freefall: Free Markets and the Sinking of the Global Economy, New York
26. Sustainability Transitions Research Network, 2010. https://transitionsnetwork.org/ access 1.02.2018
27. Wallerstein I., Koniec świata jaki znamy, Warszawa 2004
28. Zadek S., Greening Digital Finance, http://sdg.iisd.org/commentary/guest-articles/greening-digital-finance/ access 1.02.2018