

Green bonds' social license: Singapore case

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Abstract. Green bonds are a viable tool for upturning the established energy producing principles from upside down, based upon the efforts applied from bottom-up rather than the traditional regulatory approach. The intention of this paper is to evaluate the validity and the efficiency of this mechanism in order to compose a scenario of its most probable future sophistication. The outcome seems to be quite promising, regardless of some downfalls on the way, however, the specifications of inflexible fossil fuel-based economies may not allow this mechanism into play that easily. One of the possible solutions in that case could be suggested by the progressive Singaporean framework, supporting green bonds' advances comprehensively by incentivizing their presence in a hybrid manner both on legislative level and socially. The efficacy of such approach could be proven by time only in the long run, yet the current developments suggest for it to be one of the best practices worthy of reception not only by the energy recipients, but also by the energy producers with customized modifications along the way.

1 Introduction

According to the EY [1], the non-financial ESG indicators of business activities have almost doubled in their significance for making investment decisions between 2013 and 2020. The universally acknowledged trend to prioritize sustainable and climate-resilient investment could be demonstrated by the fact, that the value of green bonds issued worldwide has been coherently increasing for the last 8 years [2].

Nevertheless, although the energy transition and the corresponding use of the instrumental tools for it to be exercised are undeniably existent, the issue of empirical probability of achieving the declarative goals comes into question, when the Energy Transition Index (ETI) [3] is being considered. It becomes evident, that the scope of low-carbon energy transition is not homogenous and could not be categorized as being evenly proportional for the countries, which are energy recipients and for energy producers.

For example, the absolute majority of the top-10 ETI countries in 2021 were the countries which are regarded to as energy recipients, and if this list is cross-referenced (Tables 1 and 2) with the data by the IEA [4] on top energy producers in 2021, it turns out that the world's largest energy producers are way behind in energy readiness. This raises a

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certain question: how could the supply-demand correlation be balanced, if the consumers demand something that the producers do not have?

Table 1. Cross-referencing top-10 major energy producers with top-10 ETI countries in 2021.

Producer	Crude oil	Natural gas	Coal	Nuclear electricity	Hydroelectricity	Wind electricity	Solar PV electricity	ETI
1	US	US	China	US	China	China	China	Sweden
2	Russia	Russia	India	France	Brazil	US	US	Norway
3	Saudi Arabia	Iran	Indonesia	China	Canada	Germany	Japan	Denmark
4	Canada	China	Australia	Russia	US	India	India	Switzerland
5	Iraq	Canada	US	Korea	Russia	UK	Germany	Austria
6	China	Qatar	Russia	Canada	India	Brazil	Italy	Finland
7	UAE	Australia	South Africa	Ukraine	Norway	Spain	Australia	UK
8	Brazil	Norway	Germany	Germany	Turkey	France	Korea	New Zealand
9	Kuwait	Saudi Arabia	Poland	Sweden	Japan	Canada	UK	France
10	Iran	Algeria	Kazakhstan	Japan	Vietnam	Turkey	France	Iceland

Source: by the author in accordance with the data from IEA and World Economic Forum.

Table 2. Cross-referencing top-3 energy producers in each category with their ETI in 2021.

Energy producing country	ETI
Brazil	30
Canada	22
China	68
France	9
Germany	18
India	87
Indonesia	71
Iran	99
Japan	37
Russia	73
Saudi Arabia	81
US	24

Source: by the author in accordance with the data from IEA and World Economic Forum.

One of the most vivid examples on how this current paradox could be dealt with is the Singaporean experience: although being heavily-reliant on fossil fuels imports [5], the share of the low-carbon sources in the country’s energy mix is slowly increasing [6]. Could the efforts of the policy-makers of this country in terms of promoting green finances be deemed sufficient to address the vast dependence on fossil fuels in the ongoing era of the energy transition? Furthermore, could this model be exercised only by the countries that are energy

consumers, or could it be implemented in the energy producing countries? This research will suggest some answers.

The practical significance of finding the right answers to these questions comes down to the fact that it can contribute to promotion of the energy transition worldwide, establishment of the secure balance of supply and demand in the due course of decarbonization and that the right model of incentivizing the green financing both on policy level and on market level by promoting the international standards could guarantee that even if complete energy independence seems highly unlikely in the world of interconnectivity, the stability of the energy interdependence could be a valid point to guarantee the sustainable development of the humanity.

2 Methods

This article views the mechanism of green bonds from the legal perspective and, thus, the qualitative research methodology prevails over the quantitative one due to the formal dogmatic [7] mode of the legal research. The development of the phenomena explored is framed through the Law and Economics theory, investigated by the works of such scholars as Coderch P.S. and Ibáñez A. T. [8], Kornhauser L. [9], Nousiainen K. [10] and through the real options theory explored by Obidzinski M. and Deffains B. [11]

The Law and Economics theory is dedicated to combining the best of the two scientific fields in order to reflect on the practical aspects with more precision, than each single one of them allows to. In this case, legal part is being comprised with the policies of Singapore and international green finance standards, which are being framed through the economic notion of the efficiency in terms of energy transition both on behalf of the energy consumers and the energy suppliers.

The real options theory emphasizes the importance of the flexibility of law that is essential for the practical application of legal rules, which are not always up-to-date with the current developments of the reality – thus, more freedom should be provided by giving preferences to general rules, rather than specific ones. In the context of this article, this concept is used to evaluate the scope and aims of the policies related to the green bonds in Singapore and then in the USA for comparative characteristics.

As energy studies are as a rule of multidisciplinary nature and this one is not an exception, the methods applied are as follows: systematic [12] and synergetic [13] approach, the holistic approach [14] and socio-legal research [15]. A comparative analysis [16, 17] between Singapore and the USA is to be conducted in order to explore how applicable the green bonds approach of the energy recipient countries to the energy producers is.

Such choice of methodology allows for a vivid representation of the current correlation between the regulatory and economic mechanisms of enhancing the diffusion of green bonds as a means to boost the energy transition to carbon neutrality.

3 Results

The existing urge to address the energy transition challenges could explain how the seemingly everlasting order of things could be broken at a glance. Decarbonization efforts could not be enough if only exercised by the public authorities through incentivizing the technological transformation of the industry – they also require the so-called social license, which allows to overcome the trust boundary first, even before the legitimacy boundary [18], making these efforts global through the co-ownership via green bonds financial mechanism. Figure 1 demonstrates such mechanism of implementation, when co-ownership

exceeds the speed of legal regulation and “state’s” approval as a means of national energy policy.

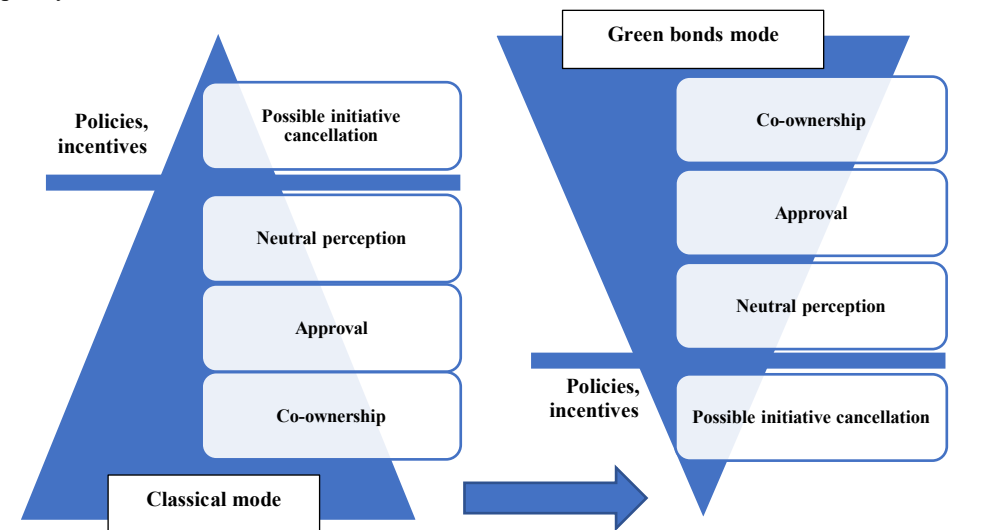


Fig. 1. The green bonds transformation of the energy initiatives implementation mechanisms compared to the traditional mode of events.

Source: by the author inspired by Roche C., Bice S. (2013) Anticipating Social and Community Impacts of Deep Sea Mining.

There are several types of green bonds [19] (Figure 2) and all of them comprise advantages and disadvantages both for the investors and the issuers [20], however, the former outweigh the latter.

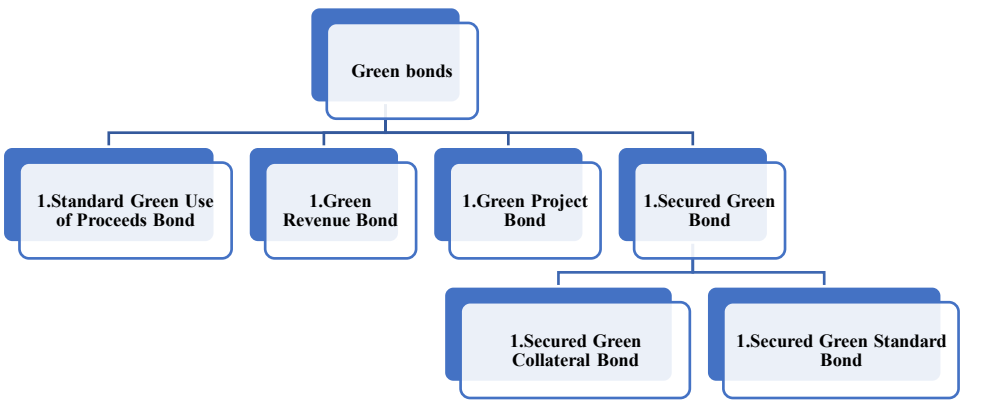


Fig. 2. Types of green bonds.

Source: by the author in accordance with the data from ICMA.

The most important risk for the investors is the risk of confusion as a result of the lack of the standartization in what defines “green” finance; for the issuers the most important downside of green financing is its cost.

To mitigate both of these risks the regulatory frameworks provided by the governments come into play, yet it is vital to remember that the flexibility of the market mechanisms could only be provided through the flexible legal frameworks. This means that this

innovative driver of sustainable energy transition would be regulated by the policy documents and various incentives.

From the legal point of view, the specificity of these sort of documents is to be considered. First of all, they comprise the legal innovations as described by Sandberg H. [21] Legal innovations could be expressed in the following manner: by establishing new rules or concepts, by establishing new legal instruments or by providing sophistication to the already existing ones. In the case of green bonds, it is an already existing and quite appropriately regulated mechanism, yet the presence of conceptual novelty as a notion of green transition and the need for sophistication due to the lack of existing common standardization practices in the specific regulation of the precise definition of the criteria for the “green” part of the term are undeniable – therefore, green bond as a legal phenomenon could very well be regarded to as a legal innovation.

Moreover, the three drivers of legal innovations suggested by Qian Hongdao et al. [22] are relevant to green bonds from an unorthodox perspective: more-for-less challenge can not be explicitly followed, because there is a gap between the initial stage of implementation and the widespread ending of the natural course of development, where the bridges allowing to go from one bank to another are built by money both the issuers and the investors are ready to spent. Secondly, the liberalization could be found not in establishing some new branches of legal functions, but rather in providing some specification to the already existing ones (like setting up some new department at a bank, rather than setting up a separate financial institution). Lastly, the technological driver has its new reading as well: for example, the blockchain technology could allow to form a universally unified registry with an open access to the green finance information.

Justin Chae [23] believes that the speed of implementing legal innovations differs depending on the field of such implementation. This notion is hard to deny, and in regards to the energy sector this speed is undoubtedly quite slow due to the challenges it faces as formulated by Giuseppe Bellantuono [24]. One of these challenges seems to be extremely relevant to the green bonds mechanism – the reliability of the predictive analysis of the resulting outcome of the policies on the practically induced activities exercised by the energy companies is not on sufficient level.

Such lack of the reliability is caused by the specifics of the policy-making practices, which are often [25] performed by issuing white, green papers or other strategic documents of doctrinal character, that do not have the commonly used sanctioned part in the regular legal norms, making the latter obligatory and legally-binding by their nature. Some researchers acknowledge the legal nature of such strategic documents of doctrinal character, some do not, some scholars accept the hybrid concept of their half-legal, half-doctrinal nature [26].

The extent to which the law systems acknowledge the regulatory nature and stimulating effect of the policy documents depends on the national historically conditioned legal system features. Whereas in the civil law countries the role of legal doctrine traditionally yields in its significance as a source of law, in common law countries it is vice versa.

The Singapore’s quest for legal autochthony [27] and the recognition of the urgent need for legal innovations in accordance with the current priorities even though they transform the modern understanding of the legal systems providing for harmonization and internationalization of the existing legal field, still could not lead to the underestimation of the core essence and the specifics of the legal system per se.

The main domestic sources of law include subsidiary legislation [28] as a means to guarantee a certain extent of legal flexibility required for the efficient regulatory frameworks. Thus, the strategic documents of doctrine nature could be deemed an integral part of the decision-making process, even when they are not directly negatively sanctioned by the government in case of the non-compliance.

The Ministry of Finance acknowledges [29] four main directions of developing the green bonds' agenda in Singapore (Figure 3).

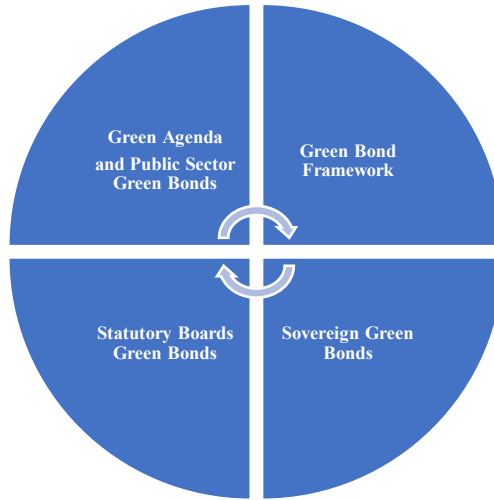


Fig. 3. Singapore's Green Bonds Agenda.

Source: by the author in accordance with the data from MOF Singapore.

The key takeaways of this agenda could be summarized as follows:

- the most comprehensive strategic document is the Singapore Green Plan 2030 [30], which suggests the governmental objectives for the next 10 years to come and the financial support of such objectives by announcing the issuance of up to S\$35 billion worth green bonds by the Government and Statutory Boards.
- Green Bond Framework comprises the internationally-acknowledged best practices in green financing (ICMA Green Bond Principles 2021, ASEAN Green Bond Standards 2018) adapted in retrospective of national specifics, developed in such documents as e.g. the Significant Infrastructure Government Loan Act of 2021.
- Green Singapore Government Securities are to be used for long-term sustainable investment into infrastructural projects and such investment is subject to stricter standards for qualification and cost limits under legislation.
- Singapore Statutory Boards (National Environment Agency, Housing and Development Board, Singapore's National Water Agency) are the governmental bodies established with an aim to enhance the existing green bonds' frameworks and specify them to fit some certain public demand.

Overall, the Singapore's approach unites the policy-making and policy-developing mechanisms with governmental financing and institutional changes. The main areas of the green financing are mostly of internal nature to upgrade the infrastructure of the state and the living standards of the population. However, the question of securing the sustainable energy supply remains under consideration, even though it tops the use of green bonds proceeds list.

The practical implications and the efficiency of exercising the Singapore's green bonds agenda remain to be examined in the forthcoming years, yet generally for the moment being the outlook seems to be quite promising not only theoretically, but also statistically. [31]

The US approach could be of interest as this country is one of the world's top energy producers and at the same time the leader of the world's green bonds issuers [32].

Renewable energy investment is one of the US top priorities, the question is though how much of the energy exports is produced in the due course of green energy projects. Greenwashing is a widespread notion of depreciating the sustainability efforts, but the solution is to be found eventually.

The issuing mechanism is extremely sophisticated and well-developed both on the federal level and on the level of the states which could be explained by the experience of such issuance, maturity of the financial and legal systems and the expertise arising from it. Green bonds could be used for public, private and hybrid projects of financing with various types of bonds. [33]

As noted by Flammer C. [34], the USA are among top leading countries issuing green bonds across the world, and the main proportion of them is comprised by the green financing by the government and the financials, however, energy sector is also on the list above the middle.

Standardization issues and lack of common disclosure framework are viewed as the main problems for the efficacy of this financial mechanism [35], and such lack of transparency prevents the investors from trusting it to the full extent.

The general differences of the green bonds regulatory approaches on the side of the energy recipients (Singapore) and the energy producers (the USA) are reflected in the Table 3. Even though it is impossible to unify all the national differences to fit one paradigm and recommend one specific course of action, the main lesson to be learnt goes as follows: the diversification of the energy portfolio is to be exercised because the energy transition is already an on-going process, and the greenwashing threat of energy companies' marketing strategies, even though being imminent in the absence of common standardization practices, would not be able to stop it.

Table 3. Green bonds regulatory approaches.

	Singapore (energy recipient)	The US (energy producer)
Degree of maturity	Frameworks are currently being developed.	Frameworks are under refinement.
Policies and incentives	Policies and incentives are declared on the governmental level, the practical implementation is still being under way.	Policies and incentives are supported by a widespread area of internationally recognized expertise, one of the possible reasons is the fact that the country is one of the world's richest nations and such achievement already required a certain extent of regulatory and market mechanisms development, for it to become possible.
Established institutional and market mechanisms	The instrumental part of the green bonds' agenda has been established but is only about to be approved by time.	The instrumental part of the green bonds' agenda as part of the already existing institutional bodies has been approved by time but still has not been accounted for as complete.
Priorities	Internal market, mostly infrastructural projects; high level of energy dependency will most certainly prevent from drastic and immediate shifts in energy mix due to the high costs of such transition.	Both internal and external impulses for the energy transition. Being an energy producer and one of the leading countries in the world's financial markets, has to consider not only the diversification of the investment portfolio of the national companies and transnational corporations, but also foreign investment.
Key takeaways for the similar countries	Any advancement for the better future required time and effort to build the sufficient grounds for it to become possible. The beginning of the green financing although usually being a model "from bottom-up", follows the model of governmental implementation, most likely due to the specific nature of the	For the energy producing countries with mature regulatory and financial mechanisms, the main priority lies within furthering the areas of relevant expertise, developing the necessary standards and unified practices to ensure that the issuance process becomes as transparent and efficient as possible to avoid undermining the investors' trust with a possibility of greenwashing agenda instead of an actual green transition. That in turn could help speed up the energy transition process and, thus, reduce the

	country's energy mix in huge part dependent on the energy imports.	initial investment costs sooner than it could happen naturally by market mechanisms only.
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Source: by the author.

It is an already accepted scientific estimation that the concept of the four As of energy security is outdated and could not be deemed inclusive for all the energy security factors of influence. [36] Availability, affordability, accessibility and acceptability – all of these important milestones on the way to establish the energy warrants of permanent stability could be strongly moved across the favorable directions by the internationalization and the interconnectivity trends of the modern energy markets.

Green financing, although lacking the standardized approach of issuance and certification, moves the existing energy markets in the direction of sustainable energy production, meaning the transformation of the supply-demand correlation. For the suppliers, like the USA, it means the need for the urgent transformation of the technological cycle for the fossil fuels, and the renewable energy portfolio project diversification.

For the consumer countries, which rely on the energy supply from abroad it mostly means the need to be financially prepared to overspend on the resources in order to provide for such energy transition, because new investments in the production cycle is required.

For the countries, which use green financing as the means to secure their financial well-being, to allocate their funds, rather than to secure their energy security for various reasons, green bonds are the mechanism of the predictive analysis to wisely avoid financial losses connected with the enterprises that are doomed to cease their existence or have their profits reduced in a wide proportion.

The practical significance of exploring the green bonds framework models of both energy consuming and energy producing countries could be explained by the necessity of establishing high-quality regulatory tools so that law could follow the changing energy relations rather than lagging behind, leaving grey areas of legal uncertainties for the parties to use them to their advantage letting down the other participants of the energy relations.

2021 demonstrated the unprecedented surge [2] in the green bonds' issuance and even though some researchers [37-39] neglect the validity of the sustainable finance popularity under the notion that sustainable finance only provides a convenient camouflage for the financial underperformance, in this case the numbers speak for themselves. Such rapid increase in the number of green bonds may also become the reason for strengthening the transnational relations in terms of non-contractual responsibility in case of certain breaches of law. If not only legal aspects are taken into consideration, the broader spread of green finance could become the game changer for the supply and demand mechanism, when institutional and private investors could force the energy companies to diversify their renewable energy project portfolios, thus, enforcing the energy transition from "bottom-up" as opposed to the more orthodox approach of strategic corporate governance. This influence could not be seen as direct due to the fact, that most investors do not own the percentage of companies' stock sufficient to be the main decision-makers separately one by one, yet this influence through green bonds mechanism could not be regarded to as an indirect one as well: if united, these minorities could simply force the company out of the market in case of non-compliance with their expectations not only financially, but also ecologically. Therefore, the green bonds financial mechanism comprises the sui generis way of influencing the main decision-makers of the energy companies both whilst making decision on what kind of energy to buy and who to buy it from, and what energy carriers to produce, how to produce them (the technological part) and who to sell them to (the logistics also provides important considerations in the due course of decarbonization).

Policy makers are now in the midst of developing the legal frameworks for this *sui generis* phenomenon, and their results depend not only on the maturity of the financial markets, but also on the maturity of the energy sectors that allows them to invest into the transformation that is not promising immediate financial returns.

4 Research limitations

This research is focused on revising the opportunity to change the course of action to decarbonization in the case of high level of fossil fuels energy dependency, yet this does not provide enough information on the model of the other countries, both energy recipients and energy consumers, that are less dependent on the imports of some energy carriers or that are both importers and exporters of different energy carriers respectively.

One more imperfection could be improved through the expansion of the time frame of the research: the 5 to 10 years perspective could provide for a deeper understanding of an ongoing energy transition processes.

Noteworthy remains the fact that the process of employing green bonds as an active driver of the energy transition worldwide is not as widespread yet as it is desirable to be, which means a prospective pool of research as soon as sufficient data is provided by the natural flow of time.

5 Future research directions

In order to broaden the empirical horizon of applying the theoretical findings, more comparative case studies would be of great interest. Such methodology designs as best practice research [41], Most Similar and Most Different Systems Design [42] are perfect tools to enlighten the existing gaps in green bonds promotion as a driver of energy transition worldwide.

Most interestingly, it would be to explore the peculiarities of the case of Sweden to draw up proven by the time working recommendations for the other countries on how to boost their energy transition development. Norway could be studied as one of the best practices on behalf of the energy producers, and the case of France is of interest as it demonstrates how the country with diversified renewable energy portfolio could overcome its energy interdependence in fossil fuels such as natural gas. Such case studies could be accounted for as a sufficient empirical basis for drawing up efficient energy transition-related legal models of regulations and frameworks.

6 Discussion and conclusions

The question on why some stories are vastly more successful than the others has been a reason for heated debates for long enough. The answer lies within the differences in the circumstances. The differences that can not be associated or grouped to fit the common pattern are usually the ones that define the success or failure in the mode of action.

The reasonable balance in terms of the rigidity and the flexibility of the legal regulation of some social phenomenon could be found according to the existing priorities and national interests in each and every single case separately. Even if the market trend is promoting most possible extent of flexibility, there is no guarantee, that it would work to achieve the decarbonization objectives – so what would?

The common efforts by the governmental and non-governmental actors, the cooperation of public and private investment readiness to unite financial efforts for building the

desirable future would be the answer. Law provides the means for establishing the grounds for such cooperation, but it is not sufficient to keep it running.

Internationally acknowledged need for cooperation and co-inspiration as well as the creation of a valid working mechanism of universally harmonized standards and transparent information exchange within the scope of green financing are the two ways (the list is far from being exhaustive) of making sure that the already made efforts are not in vain.

This research constitutes an attempt to form a practically-applicable model for energy recipient countries to enhance their decarbonization progress, combining both regulatory and market drivers for energy transition through such financial tool as green bonds, accompanied by an illustrative example of Singapore. Moreover, a comparative case study is developed between Singapore and the USA in order to underline the specific modifications of the existing green bond regulatory models, which are caused by the distinguishing features between the energy recipient and energy producing countries.

It has been established that green bonds regulatory frameworks are based on the already existing legal mechanisms with the addition on behalf of the policy documents to adhere to their “green” part. Such approach allows for more flexibility that is crucial in times of energy transition and the market changes it causes, yet it also prevents the efficiency of this mechanisms from reaching its full potential at the beginning stage due to the lack of sanctioning part and, thus, the lack of the enforceability. This means that the decision-making process lies solely on the shoulders of the investors and the issuers, who decide to pay now for the future sustainable outcomes.

Singapore has a well-established green bonds agenda that is still being developed. It has both financial and institutional support provided by the government, and its main focus is promoting sustainable economy internally, yet it has not resolved the issue of the energy dependency on external fossil fuels by now, even though statistically the efficiency of the issuance incentives is undoubtedly working.

The US approach could be characterized by the deeper level of the sophistication in the established green bonds issuance mechanisms, which could be explained by the practical expertise of this country in this area. However different are the priorities of the energy producing countries, the lack of standardization practices and transparency of the issuing mechanism still remains a sufficient challenge.

Although some aspects of energy mix changes as the result of the energy transition could only be explained by the national specifics, the redistribution of the investment costs divided between the exporters and the importers of the energy carriers is established on the grounds of the regulatory and market mechanisms, which are unevenly developed and still lack the required amount of transparency and standardization worldwide for the mechanism of green financing to be one of the most efficient divers of the decarbonization.

The energy consumer countries tend to the higher degree of the governmental inspiration in terms of extending the proportion of green investment projects, whereas for the energy producing countries it is vice versa. For the countries, which demonstrate high level of energy independence and for those, which combine the two characteristics, more research is to be conducted to draw the corresponding conclusions.

International cooperation in form of the energy portfolio diversification experience exchange and establishing working transnational green bonds regulatory frameworks is of extreme importance to achieve the set of sustainable objectives worldwide, and as such this cooperation has to take into consideration the sui generis nature of the subject matter in terms of the corporate governance in decision-making process for the energy companies both on the producing and consuming parts.

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