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Crowdfunding platforms for renewable energy investments: an overview of best practices in the EU

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ABSTRACT

This paper takes a closer look at EU crowdfunding platforms offering investment in renewable energy (RES) projects, how they are exposed to and lead with investor risk. The platforms' business model and the resulting risk types are analyzed, as well as their assessment, mitigation and communication based on an in depth document review and on a survey taken among the platform's representatives. The resulting overview shows that RES-crowdfunding activity thrives on stable long-term policy support schemes for small and medium scale projects, as well as on comprehensive financial regulation that exempts crowdfunding from traditional financial service regulatory obligations. When combining the offered financial instruments and underlying remuneration of RES-projects, a considerable exposure to credit risk can be verified. Risk awareness among platforms can be considered high. However, confidence in the investor's capability to deal with risk is high as well.

Keywords:

Crowdfunding;
Renewable energy;
Risk analysis;
JEL classification: G23, G31, G32, L31;

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1. Introduction

Crowdfunding has presented itself as an alternative to finance companies, non-profit organizations and projects in the aftermath of the 2008 financial crisis, compensating for credibility loss of traditional financial services [5, 17] Over the same period Renewable energy (RES) projects have been greatly affected by a funding gap that had its origin in the financial crisis, but was widened by the reduced policy support [6, 20] As a consequence, crowdfunding initiatives have surged that couple support for renewables by the public [19], the historical low interest on savings accounts [2], the need for financing felt by RES-project promotors due to decreasing public support [8, 20] and lacking private finance [21] or the risk-return characteristics of smaller RES projects that do not fit traditional lending conditions [4].

This paper will (1) identify the risks that rise from the financial mechanics used by the crowdfunding platforms offering RES-projects and (2) give an overview of how platforms assess, mitigate and communicate the risks that can affect their investors. Therefore, three questions have to be answered: (1) which are the business models used, (2) how are these models exposed to risks that lead to credit/default risk for the crowdfunding investor and (3) how are platforms assessing/mitigating/communicating those risks? The document review will permit us (1) to detect significant relations between the number of platforms, the type of projects and the given RES-regulation in each country, thus laying bare implications for liquidity, credit or default risk to the crowdfunding investor, (2) to identify the financial regulatory framework in which RES-crowdfunding platforms operate, the financial instruments they offer, with the adopted regulation as a benchmark for the level of protection.

The paper is divided in the following sections: Section 2 will give background on RES-crowdfunding

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activity in the EU, the business models crowdfunding platforms use and the perceived risk of crowdfunding investors. Section 3 lays out the methodology for breaking down those business models and conducting the survey on risk among the platforms representatives. Section 4 gives an overview of the results of both document review and survey. In Section 5, conclusions and suggestions for future research are presented.

2. Background

Crowdfunding platforms offering RES-projects are a relatively new phenomenon, with the Dutch pioneer De Windcentrale going back to 2010. In majority these platforms rely on equity and debt they collect from the crowd to finance the projects [7, 9, 14, 20].The energy production of the funded RES-projects generates steady cash flows coming from policy support schemes, energy sales or energy saving costs. The projects use a variety of financial instruments such as loans, bonds or securities to materialize the financial return for their investors. As future cash flow is feeding the investment return, 'robustness and stability of cash flow' works as a proxy for the liquidity, default and credit risk that weighs upon the investor [15]. Cash flow robustness is determined by the policy and financial de-risking instruments that set out the frame (in time and amount) for the RES-project revenues [1, 15, 16]. These policy schemes now face uncertainty because governments have been scaling back the initially generous support in the aftermath of the financial and economic crisis. Meanwhile the European State Aid Guidelines require that renewable energy should be progressively exposed to market competition. As a consequence, an overall tendency of fading out or cutting back Feed-in-Tariffs (FiT) can be verified, thus creating pockets of legal uncertainty [1, 3, 10, 11, 15, 18]. Therefore, focus will lie on the transfer from the project's business/policy risk to the crowdfunder's credit/default risk.

As crowdfunding models offering financial return attract investors with financial motivations, they show an increasing risk/return intensity [14, 20]. This leads to a 'risk paradox' in the RES-crowdfunding environment. The RES-projects that serve as an underlying asset are highly complex to evaluate due to regulation and technical viability assessment [4, 20], while crowdfunding platforms typically attract non-specialist investors, thus creating an additional gap where low preparedness stands against high complexity. Moreover there are indications that the financial, but also cause-related motivation of RES-crowdfunding investors [14, 20, 22] may relate positively to perceived risk. The particular motivation and perceived risk of the RES-crowdfunding investor has to be weighed against the crowdfunding platform's exposure, awareness, mitigation and communication of risk, in order to draw any conclusion on its attitude towards investor risk.

3. Methodology

In order to break down each business model in its respective regulatory frame, a qualitative field study [8] was conducted, consisting of a document review and a survey. Information was obtained via an in depth review of all information made available by active RES-crowdfunding platforms in the EU, breaking down the business models into; type of RES-project (technology and remuneration), financial regulation of platform activity and financial instruments (type and characteristics). Simultaneously a survey was taken among platform representatives (C-level) on their attitude towards risk. The sample frame was established at 23 active crowdfunding platforms offering RES-projects on December 31st 2016, in both mature (volume, number of platforms, years of activity) and upcoming markets; of those 10 responded the survey.

These 23 platforms most likely do not coincide with all active platforms offering RES-projects, as the crowdfunding market is still an early stage there is a constant flow of new platforms, platforms that cease activity or that stop offering RES projects. The sample selection is based on crossing data of databases such as crowdsurfer.com, eurocrowd.org (European Crowdfunding Network), citizenergy.eu, crowdfundres.eu, recrowdfunding.eu, crowdfunding.de and the Cambridge Centre for Alternative Finance. Excluded were one off crowdfunding campaigns by project promotors or energy companies, as well as cooperatives and community energy projects, mainly because they use fundamentally different business models.

The survey is based on the same dual approach, focusing on both underlying asset and the financial instruments that are used. At RES-project-level representatives are questioned about impact and probability of nine risk types affecting the project [6]. In regard to the financial instruments, the survey questions the platform's compliance and attitude towards risk mitigation and communication.

4. Results

First an overview of RES-crowdfunding activity is given (number of platforms, age, volume, per capita volume), then a relationship is established between platform activity and regulation. Finally risks resulting from the platform's business models are reviewed.

4.1. The EU RES-crowdfunding market in numbers

Out of the 23 active platforms, seven are German (30.4%), five are Dutch (21.7%), four are French (17.4%) and two Austrian (8.7%). The UK, Sweden, Belgium and Finland each have one platform (4.3%). Germany and the Netherlands have the eldest active platforms, with German platforms counting on average 1,721 days of activity and the Dutch 1,542 days.

Germany has the largest volume of crowdfunded RES-projects (61,744,080 euro), followed by the UK (49,340,000 euro — including the projects from the Trillion Fund that stopped funding RES in 2015) and the Netherlands (42,968,648 euro). At a distance come France (14,982,875 euro), Austria (3,160,046 euro), Finland (889,992 euro), Sweden (440,000 euro) and Belgium (150,000 euro). When considering RES-crowdfunded volume per capita the Netherlands clearly come first (2.52 euro/person), then Germany (0.77 euro/person), the UK (0.75 euro/person), Austria (0.37 euro/person) and France (0.23 euro/person). The Netherlands have two major platforms each representing 37% of total volume, with the other 26% split evenly over the remaining three platforms. In contrast, Germany and France count each one platform that represents respectively 72% and 75% of the total RES-crowdfunded volume. The Netherlands thus stand out as the most mature RES-crowdfunding market, having the most and the eldest platforms, as well as the most equalized market and the highest volume per capita.

4.2. Relation between regulation and RES-crowdfunding activity

4.2.1. RES-policy support-RES-crowdfunding activity

Countries with the most RES-crowdfunding platforms have a RES-policy based on premium tariff and/or Feed-in-tariffs (FiT), which enables and guarantees long term foreseeable cash flows necessary for the investment return. Platforms in those countries in majority offer RES-projects based on small to medium scale solar PV systems (74% of all platforms) and wind turbines (52% of platforms), selling produced electricity to the grid. In comparison, energy efficiency projects (CHP –in 17% of platforms, relighting — 17%, insulation — 9%) are less frequent as underlying asset. The Dutch and German platforms rely on market premium schemes that are based on market-oriented tender procedures, in order to cover the costs of (non-mature) RES-technologies and ensure their profitability. While being exposed to a market of electricity producers, the premium tends towards a minimum risk premium. Coinciding with the largest RES-crowdfunding markets, the stable market premiums of Germany and the Netherlands emerge as the policy instrument that most favors platform activity (Table 1). Policy changes towards a market-oriented market premium — as in France — have not hampered RES-crowdfunding development. While policy uncertainty (UK) or abruptly scaling back (Spain) have an immediate negative effect on activity.

4.2.2. Financial regulation- RES-crowdfunding activity

RES-crowdfunding platforms in the Netherlands all operate under different regulatory frameworks and have benefitted from a tolerant regulatory environment. German platforms initially chose lightly regulated instruments that fitted their purposes (subordinated loans), but were forced to adopt a heavier framework when those loans were considered investment products. The UK has regulated lending based crowdfunding under the existing regime for financial services, forcing platforms towards a compliance with the Markets in Financial Instruments Directive (MiFID). France has created a specific status for investment based platforms, but nonetheless the larger ones prefer a MiFID authorization. Austria, Belgium, Finland and Sweden show a regulatory landscape with non-specific or unfinished regulation not favoring RES-crowdfunding (Table 2).

4.2.3. Business model/amount of fees-RES-regulation

A review of RES-regulation/support schemes and the amount of the management and funding success fees reveals that platforms relying on cash flows from older FiT-policies, practice lower management and success fees than platforms relying on market premium or energy saving costs. There are some exceptions, with Ecrowd (ES) practicing the lowest fees on the market (2-4%+1-1.5% annually) in spite of having no access to support.

Table 1: Remuneration feeding return of RES-projects/Number of platforms per country

Name platform	Country	Feed-in-tariff	Market premium	Energy saving cost	Product sales
Trine	SE/UK*				X
Abundance	UK	X	X	X	
GreenCrowding	DE	X	X		
Bettervest	DE	X		X	X
Greenvesting	DE		X	X	
Wiwin	DE	X	X		
GreenXMoney	DE	X	X		
LeihDeinerUmweltGeld	DE	X	X	X	
Econeers	DE		X	X	X
Lumo	FR	X	X		
WeDoGood	FR			X	
Lendosphère	FR	X	X		X
Enerfip	FR	X	X	X	
Windcentrale	NL		X	X	
Greencrowd	NL		X	X	X
WeShareSolar	NL		X		X
DuurzaamInvesteren	NL		X	X	
OnePlanetCrowd	NL		X		
Conda	AT				X
GreenRocket	AT				X
EccoNova	BE			X	
ECrowd!	ES			X	X
Invesdor	SF				X

**Trine works under an UK/FCA authorization, source: Author's own construction based on platform's websites*

4.3. Risk types surging from the business models used by RES-crowdfunding platforms

4.3.1. RES-regulation and risk

Eight platforms (four DE, three FR and one UK) have RES-projects alimented by FiT-schemes, making these projects the least exposed to business risk. With the major RES-crowdfunding markets (NL, DE, UK, FR) tending to market premium schemes and phasing out FiT's, business risk is likely to rise. Four platforms offer projects relying on cash flows only from sales, exposing them to a comparative higher business and default risk.

Also, the type of financial instrument determines the level of credit risk for the investor. Nine platforms (39%) offer lower risk instruments such as secured business loans, bonds/debentures and senior bond loans. Differences exist across countries and even within the same platform; Dutch senior bond loans and secured business loans are offered next to unsecured business loans. The bonds issued by the projects on the French platforms are not secured; they are senior to shareholders and junior to the bank. Finally, the subordinate profit participating loans that are used by six German RES-crowdfunding platforms, put crowdfunders junior to all other company/project-creditors, exposing them to huge credit risk.

Knowing that both underlying RES-remuneration and financial instrument type are steering credit risk, data crossing shows that four platforms (17%) are combining low risk FiT-support with low risk instruments, while another four benefit from FiT/market premium offering higher risk instruments (Table 3).

Overall 13 platforms (56.5%) include additional bank financing. Especially the French platforms (75%) highly rely on extra bank financing; with the same three platforms offering complex products (portfolio, refinancing existing projects or crowdfunding as a part of a complex debt structure). German (57%) and Dutch (50%) platforms show average additional bank financing, with only two Dutch and two German platforms offering complex products. When it comes to risk, bank/third party financing is a sword that cuts both edges. It can be an extra guarantee for the project quality — as additional due diligence is carried out — but when investors are junior to bank financing (as with the bond-type used by three French platforms), they are exposed to credit risk.

Nine platforms (39%) offer instruments that are transferable. Only three of them have a secondary

Table 2: Authorization of platform activity/Number of platforms per country

Name platform	Country	Authorization under MiFID	Domestic bespoke regime under MiFID Art. 3 exemption	Authorization for services and activities in relation to non-MiFID financial instruments	Authorization outside the MiFID framework
Trine	SE/UK*	X			
Abundance	UK	X			
GreenCrowding	DE			X	
Bettervest	DE		X		
Greenvesting	DE		X		
Wiwin	DE		X		
GreenXMoney	DE		X		
LeihDeinerUmweltGeld	DE		X		
Econeers	DE			X	
Lumo	FR	X			
WeDoGood	FR				X
Lendosphère	FR	X			
Enerfip	FR			X	
Windcentrale	NL				X
Greencrowd	NL		X		
ZonnepanelenDelen	NL				X
DuurzaamInvesteren	NL	X			
OnePlanetCrowd	NL			X	
Conda	AT				X
GreenRocket	AT				X
EccoNova	BE				X
ECrowd!	ES			X	
Invesdor	SF	X			

Sources: Author's own construction based on survey, (ESMA 2015), platforms' websites

market where they can be traded on, thus exposing the investors to liquidity risk. Finally, all platforms but TRINE, base their revenues on the funded capital (success fee) and some kind of management fee for the duration of the project. Depending largely on the funding success of the project promotor, platforms do not depend directly on the project's performance and are thus exposed to moral hazard.

4.4. The platform's attitude towards risk

The risks that platforms judge most probable to affect their RES-projects are; finance risk (60%), technical and management risk (50%) and administrative risk (40%). Finance risk affects both smaller and bigger platforms, all kind of debt instruments (bonds, debentures and (un)secured business loans), but is more frequent among platforms that are not/no longer benefitting from FiT-support schemes. Also, platforms in the large crowdfunding markets such as France, Germany and the Netherlands, think a sudden change in policy is highly unlikely. Even after the Brexit vote the UK platform Abundance calls a market design and regulatory risk 'unthinkable' and a sudden policy change 'unlikely'.

As for the impact of these risks, the technical and management risk is considered by a majority to have a considerable (60%)-very high (20%) impact. Financing risk (30% considerable impact and 30% very high) emerges as the most likely risk with the highest estimated impact on the project. Whereas policy design, market design and sudden regulatory changes are considered of considerable/very high impact by half of the platforms (30% considerable, 20% very high).

When it comes to risks that affect the investor, platforms are confident that fraud, loss or theft of client data will not happen (80% calling it 'unlikely'). Interestingly 70% consider a loss of invested capital (all or part) unlikely, while only the Swedish platform specializing in projects located in developing countries

Table 3: Remuneration feeding return/type of financial instruments/country

Country	Sales	Energy saving cost	Market premium	FiT	Secured loans	Bonds debentures	Unsecured loans	Subordinate loans	Shares	Royal-ties
SE/UK*	X				X	X	X			
UK		X	X	X		X				
DE			X	X				X		
DE	X	X		X				X		
DE		X	X					X		
DE			X	X				X		
DE			X	X				X		X
DE		X	X	X				X		
DE			X							
FR			X	X		X				
FR		X								X
FR	X		X	X		X				
FR		X	X	X		X			X	
NL		X	X							X
NL	X	X	X		X		X			
NL	X		X			X				
NL		X	X		X					
NL			X				X	X	X	
AT	X							X		
AT	X							X	X	
BE		X					X			
ES	X	X			X		X			
SF	X								X	

Sources: Author's own construction based on survey, platforms' websites

and a German platform call a default risk 'probable'. About loss of interest there is no consensus, with 40% saying it is 'probable' — against 50% calling it 'unlikely'.

All 23 platforms conduct a form of due diligence before accepting RES-projects to be published for offering, making it the most important risk mitigation instrument. The most complete due diligence (project/promotor/regulation) is carried out by seven platforms. Among this group, four mitigate risk upfront beyond compliance obligations. These platforms operate under four different authorization categories. Two of them (DE-UK) have projects relying on FiT-schemes and all have projects benefitting from market premiums (DE-UK-NL), among them both complex portfolio products and simple subordinated loans based on one project. When it comes to credit and liquidity risk only the investor is exposed to, we find that of three platforms offering higher risk instruments (subordinated participatory loans, unlisted shares), only one mitigates beyond compliance. All platforms communicate risk upfront, five out of ten platforms make available information of which the content goes beyond compliance. Within this group, three are mitigating risk beyond compliance, resulting in 30% of platforms that are outperforming the rules on both aspects. When compared to the fairly high confidence of platforms regarding risks that affect the investor, we could state a possible conflict of interest arises.

Comparing results of a 2013 global Environmental Awareness Index (EIA) [12] and the latest Yale Environmental Performance Index [13], poorly performing countries (DE-NL) seem to have a more environmental aware population, that in turn is more willing to crowdfund RES-projects. Or, as is shown by the UK and France, there is no apparent link between environmental awareness and RES-crowdfunding activity, confirming the financial motive as the most probable. The survey results confirm this complex investor profile, with 90% of platforms calling their investors' motives both 'financial' and 'cause-related'. When it comes to investors' competence, 70% of platforms think they deal with 'well informed investors' (against 20% poorly informed) and people 'capable to deal with risk (against 20% vulnerable to risk).

5. Conclusions and future research

Stable market premium schemes emerge as the policy instrument that most favors platform activity. Germany and the Netherlands have been identified as the markets with the eldest and the most platforms, as well as the largest crowdfunded volumes. Both countries have stable market premium schemes in place. In contrast, policy uncertainty (UK) or abruptly scaling back (Spain) have an immediate negative effect on activity. The overview shows that there is a predominance of small to medium scale solar PV systems and wind turbines that benefit from policy support schemes. Survey-results showed that financing risk is considered more probable by platforms offering projects that no longer benefit from the — long term, predictable — Feed-in-tariffs (FiT).

Comparing the evolution of financial regulation of crowdfunding, it shows that a loose financial regulatory framework leads to a range of business models and financial instruments (NL), while a more specific framework tends to reduce RES-crowdfunding to one business model/one instrument (DE). Restrictions on crowdfunding (FR) or levelling it next to traditional financial services (UK), tend to force platform adopting MiFID in order to enter the level playing field.

Business and credit risk affecting the RES-crowdfunding investor are highly dependent on the remuneration/support scheme of the underlying project. With the phasing out of FiT and decreasing of market premium, business risk is expected to increase. Only one in five platforms offer RES-projects combining low risk FiT-support with low risk instruments. Thus, credit risk exposure for investors can be considered high, making platforms dependent on their mitigation policy to reduce risk. Platforms seem to be aware they are offering a high-risk investment. Mitigation through due diligence is generalized, even when the process is far from uniform. Confidence in their business models is high, with a minority calling default or even credit risk for the investor probable. The dispersion in attitude towards risk shows that platforms in general are not dealing with the 'risk paradox'. Possibly they are overstretching the crowdfunders' capability to deal with the risk they are actually exposed to, a situation from which conflicts of interest can arise. Future research should explore how perceived risk of crowdfunding investors relates to actual risk, including project size, RES-remuneration/support and financial instruments, ideally resulting in risk modelling that is adaptable to particular business models.

References

[1] Alafita, T. and J. M. Pearce. "Securitization of residential solar photovoltaic assets: Costs, risks and uncertainty." Energy Policy, Vol. 67, (2014) pp. 488-498. http://www. sciencedirect. com/science/article/pii/S0301421513013098

[2] Bruton, G., et al.. "New Financial Alternatives in Seeding Entrepreneurship: Microfinance, Crowdfunding, and Peer-to-Peer Innovations." Entrepreneurship Theory and Practice, Vol. 39, Nº1, (2015) pp. 9–26. http://onlinelibrary. wiley.com/doi/10.1111/etap.12143/full

[3] CrowdfundRES (2016a). Review of crowdfunding regulation & market developments for RES project financing in the EU. WIP Renewable Energies. Munich. Retrieved October 2nd 2016 from http://www.crowdfundres.eu/wp-content/uploads/2016/06/CrowdFundRES-Crowdfunding-RES-Regulation-in-EU.pdf

[4] CrowdfundRES (2016b). Report on the practical experience of RES project financing using crowdfunding. WIP Renewable Energies. Munich. Retrieved September 29th 2016 from http://www.crowdfundres.eu/wp-content/uploads/2016/09/CrowdFundRES_Case_Studies.pdf

[5] De Buysere, K., O. Gajda, R. Kleverlaan, D. Marom (2012). A framework for European Crowdfunding. Retrieved March 14th 2017 from http://eurocrowd.org/2012/10/29/ european_crowdfunding_framework/

[6] DIACORE (2016). The impact of risk in res-investments and the role of smart policies. Ecofys. London. Retrieved October 17th 2016 from http://diacore.eu/images/files2/WP3-Final%20Report/diacore-2016-impact-of-risk-in-res-investments.pdf

[7] EBA (2015). EBA Opinion on lending based Crowdfunding. European Banking Authority. London. Retrieved December 22nd 2016 from https://www.eba.europa.eu/documents/10180/983359/EBA-Op-2015-03+(EBA+Opinion+on+lending+based+Crowdfunding).pdf

[8] Engelken, M., B. Römer, M.Drescher, I.M. Welpe, A. Picot. "Comparing drivers, barriers, and opportunities of business models for renewable energies: A review." Renewable and Sustainable Energy Reviews, Vol. 60, (2016) pp.795-809. http://www.sciencedirect.com/science/article/pii/S1364032115015464

[9] ESMA (2015). Investment based crowdfunding: Insights from regulators in the EU. European Securities and Market Authority. Paris. Retrieved February 9th 2017 from https://www.esma.europa.eu/sites/default/files/library/2015/11/esma-2015-856_ann_1_esma_response_to_ec _green_paper_on_cmu_-_crowdfunding_survey.pdf

[10] European Commission. (2014). Guidelines on State aid for environmental protection and energy 2014-2020. European

Commission. Brussels, Official Journal of the European Union. Retrieved March 14th from http://eur-lex.europa.eu /legal-content/EN/TXT/?uri= CELEX%3A52014XC0628% 2801%29

[11] Gatzert, N. and N. Vogl. "Evaluating investments in renewable energy under policy risks." Energy Policy, Vol. 95, (2016) pp. 238-252. http://www.sciencedirect.com/science/ article/pii/ S0301421516301951

[12] Harju-Autti, P and K., Eevi. "A Novel Environmental Awareness Index Measured Cross-Nationally For Fifty Seven Countries." Universal Journal of Environmental Research and Technology, Vol. 4, Nº4, (2014) pp. 178-198. http://www. environmentaljournal.org/4-4/ujert-4-4-1.pdf

[13] Hsu, A. e. a. (2016), 2016 Environmental Performance Index. Yale University, New Haven. Retrieved June 12th 2017 from http://epi.yale.edu/reports/2016-report

[14] Lam, P. T. I. and A. O. K. Law. "Crowdfunding for renewable and sustainable energy projects: An exploratory case study approach." Renewable and Sustainable Energy Reviews, Vol. 60, (2016) pp. 11-20. http://www.sciencedirect.com/science/ article/pii/S1364032116000769

[15] Lee, C. W. and J. Zhong. "Financing and risk management of renewable energy projects with a hybrid bond." Renewable Energy, Vol. 75, (2015) pp. 779-787. http://www. sciencedirect. com/science/article/pii/S096014811400679X

[16] O'Sullivan, F. and C. Warren. "Solar securization: an innovation in renewable energy finance." A MIT Energy Initiative working paper, nº MITEI-WP-2016-05. MIT (2016). https://energy.mit.edu/wp-content/uploads/2016/07/MITEI-WP-2016-05.pdf

[17] Ordanini, A., L.Miceli, M. Pizzetti and A.Parasuraman. "Crowdfunding: transforming customers into investors through innovative service platforms." Journal of Service Management, Vol. 22, Nº4, (2011) pp. 443-470. http://www. emeraldinsight.com/doi/abs/10.1108/09564231111155079

[18] Sisodia, G. S., I.Soares and P.Ferreira. "Modeling business risk: The effect of regulatory revision on renewable energy investment — The Iberian case." Renewable Energy, Vol. 95, (2016) pp. 303-313. http://www.sciencedirect.com/science/ article/pii/S0960148116302609

[19] Stigka, E. K., J.A. Paravantis and G.H. Mihalakakou. "Social acceptance of renewable energy sources: A review of contingent valuation applications." Renewable and Sustainable Energy Reviews, Vol. 32, (2014) pp. 100-106. http://www. sciencedirect.com/science/article/pii/S136403211300840X

[20] Vasileiadou, E., J.C.C.M.Huijben and R.P.J.M. Raven. "Three is a crowd? Exploring the potential of crowdfunding for renewable energy in the Netherlands." Journal of Cleaner Production, Vol. 128, (2016) pp. 142-155. http://www. sciencedirect.com/science/article/pii/S0959652615007489

[21] Yildiz, Ö.. "Financing renewable energy infrastructures via financial citizen participation — The case of Germany." Renewable Energy, Vol. 68, (2014) pp. 677-685. http://www.sciencedirect.com/science/article/pii/S0960148114 001293

[22] Zhao, Q., C-D. Chen, J-L. Wang and P-C. Chen. "Determinants of backers' funding intention in crowdfunding: Social exchange theory and regulatory focus." Telematics and Informatics, Vol. 34, Nº1, (2017) pp. 370-384. http://www.sciencedirect.com/ science/article/pii/S0736585316300582