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Financial risk management in renewable energy sector: Comparative analysis between the European Union and Turkey

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Abstract

Renewable energy is clean sources of energy that have a much lower environmental impact than conventional energy technologies. Renewable energy sector plays a very important role in the strategic energy planning process in any country. Most renewable energy investments are spent on materials and workmanship to build and maintain the facilities, rather than on costly energy imports. In this context, renewable energy provides innovative, cost effective renewable energy risk management and insurance programmes, helping this increasingly competitive industry meet the challenges it faces. At the same time, the speed of change in renewable energy technology requires specialists able to provide expert risk advice and insurance broking services. Meanwhile, focus on the renewable energy sector has never been higher, with governments around the world setting tough targets for the amount of energy provided by renewable sources.

The main aim of this paper is to examine the financial risk management instruments that are evolving to meet the needs of the renewable energy sector in both the EU and Turkey. Finally, we provide the research findings according to our objective and discuss their managerial and theoretical implications related to renewable energy investments.

Keywords: The EU, renewable energy, financial risk management, Turkey, envirionmental economics

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1. Introduction

Renewable technologies have significant environmental benefits compared to fossil fuel based electricity generation. It is now widely accepted that renewables to fossil energy sources are needed in order to meet energy shortage. The European Union is geopolitically in a fragile position, relying on politically unstable regions, but also very vulnerable to uncontrollable fossil fuel price increases. The growth of renewable energy sources also stimulates employment in the EU. Some countries keep track of total jobs from renewable energy; for example, the German government estimates 300,000 jobs currently and expects this to increase to 400,000 by 2020. Renewable energy has always been a part of Europe's industrial development. But, rrenewable energy is often more expensive than traditional sources.In addition, the financing of the growth of the renewables sector needs more attention.

Turkey has an ideal geography for renewable energy such as wind and solar energy investments, with an average of over seven hours of sunshine a day and borders with the Aegean, Black and Mediterranean Seas, it would be a wise strategy to investment in such renewable energy sources. In Turkey, the efficiency of energy utilization is not as high as the EU yet. Due to its economic growth and increasing energy demand, Turkey's energy bill will surpass budget expectations by the end of 2011, and Turkey needs to get the best of its gateway position in order to meet its energy shortage. In this regard, new financial risk management approaches and instruments are evolving and can be adopted to meet the needs of the renewable energy sector include alternative risk transfer products, specialist underwriting vehicles, credit derivatives, and political risk insurance. At a macroeconomic level, it is evident that stable policy support measures are needed to mitigate the real and perceived risks for investors related to the renewable energy projects. Renewable energy popularity in the business world increasing; for example about 94 percent of global investment in renewable energy in 2007 came from the private sector .

The article proceeds in the following manner. First, we briefly review the literature regarding the EU´s vulnerability to fossil fuel and Turkey's dilemma of energy shortage. At the second section, we take into account the economic stimulus driver to financial risk management for the renewable energy sector. Third section; investment and consumption decisions are steered at the EU level towards renewable energy based economy. Next, we explain therefore, Turkey needs to benefit from the energy resources in its immediate surroundings such as current deficit account in a more realistic way and, final section provides the readers a summary of the findings.

2. Literature Review

Most studies of renewable energy in the economics literature focus on one or two policy mechanisms. In recent years, a number of studies analyzed possible transformations to a more-or-less carbon free energy usage in the European Union. Renewable energy clearly forms an important part in reducing the EU´s vulnerability to fossil fuels and for that reason the EU citizens are most in favour of renewable energy sources. According to Eurostat, the number of citizens in the EU-27 will rise from 500 million today to 514 million in 2020, reaching approximately 520 million in 2030 before gradually declining to reach about 515 million in 2050. According to Pitman (1988); although per capita energy consumption remained low by European standards, Turkey expected a long-term energy shortage. In order to maintain growth, the country would need to find comprehensive solutions to the energy shortage.

The renewable energy sector has benefited from large numbers of investors effectively competing for relatively scarce volumes of deals over the past number of years. This has led to debt and equity returns perhaps not fully reflecting the level of risk.

Due to the long-term effects of decisions in the energy sector and due to the political visions for 2050, several institutes calculated scenarios with a 80/100 percent energy supply by renewables (Zervos et al., 2010; Klaus et al., 2010). These studies mainly focus on the feasibility of a 100 percent supply based on renewable energies.

Lending to the renewable energy sector has slowed recently due to bank capital constraints. In this context, insurance can lower a corporation's cost of capital and increase liquidity by reducing the financial impact of events.

Accordingly, for insurers, there will be both increased risks and increased opportunities. Indeed, helping business clients and national governments to assess, mitigate and insure the risks from their increased global exposures is going to be a significant business opportunity for risk management services arising from the threat of climate change. These increased vulnerabilities will require new services and competencies to assist business clients to improve Enterprise Risk Management Systems to manage increased supply chain and facility disruption risks and political risks. (Kleindorfer ,.2009)

3. Renewable Energy And Financial Risk Management

The economic case for government support for R&D is familiar: the private firm will invest in R&D less than the optimal amount from a societal perspective because the firm cannot appropriate the full benefits of such long-term investments, which are needed to spur technological innovation, the single most important contributor to long-term economic growth. In the case of energy, there is compelling evidence that government R&D support should be increased substantially.(Margolis and Kammen, 1999:690)

For renewable energy, the key challenge is finding a mechanism to accommodate decentralized producers into the power grid. (Knight:2011:19) Cities and regions that are not municipal power producers can still use their regulatory authority to remove obstacles to local renewable energy production and their self-governing authority to purchase renewable energy for city or regional operations.(IEA,2009a)

Table 1 :Renewable Energy and Financial Risk Management Instruments

Renewable Energy Project Risks	Financial Risk Management Instruments
Risks associated with Large Scale Projects	
Project Development/ Pre-construction Phase	
Concept to implementation	Grants, Contingent Grants (GEF)
Construction Phase	
Construction/ Completion Risk	Insurance – Construction All Risks (CAR/EAR)
Counterparty Risk	Surety bonds - Performance guarantees Liquidation damages
Operating Phase	
Performance Risk	Insurance
Counterparty Risk	Surety bonds - Performance guarantees Liquidation damages
Fuel Supply/Weather resources Risk	Weather Insurance/ Derivatives
Credit Risk	Guarantees Credit derivatives
Generic – All Phases	
Financial Risk	Standard derivative products
Political Risk	Political Risk Insurance MFI Guarantees Export Credit guarantees
Force Majeure Risk	Insurance Catastrophe bonds
Risks associated with small scale projects	
Project Developer	
Development (Credit) Risk	Guarantee Funds
End User	
Risks of physical damage including theft	Insurance
Credit Risk	Guarantees Credit lines
Risks associated with Carbon Financed projects	
Market Risk	Standard derivative products to hedge against price
CER delivery Risk	Insurance – carbon delivery guarantee, permit delivery guarantee

Source: UNEP, 2008.

According to the Table 1 above; the success of any resultant prototype renewable energy -specific financing and risk management vehicles may be initially dependent upon credit enhancement or other support from multi- or bi-lateral agencies. The main risks to manage are technological and political risks. Naturally, the objective of any pilot programme would be to transit the current asset class of renewable energy projects into the mainstream.

Hence, changing investment climate influences investment decisions over the time lag. The investor needs that time to be aware of and to adopt for changed investment conditions and after that to review its investment decisions. Once previous and current decisions have been revised, the changing investment climate finally impacts the behaviour of investors.(Kotov:2008:551) The view that greater economic

activity inevitably hurts the environment is based on static assumptions about technology, tastes and environmental investment .(IBRD:1992: 38) In this regard ,investments in more environmentally efficient capacity take longer to react to changes in prices and policy, and are also determined by the level of economic activity over time and the degree of openness to foreign direct investment. The pace of economic growth may have different impacts on environmental efficiency and productivity. A higher rate of growth might encourage investments in technological innovations and lead to more sophisticated and more efficient plants, or it might stimulate more efficient employment of resources in order to meet the increasing energy demand. (Jaraitė:2011:12)

We then showed that firms accommodate the different risk environments by implementing different types of technology. The intuition behind our result on technology choice is straightforward. First, both regulatory regimes may cause the highest variance in abatement. Second, the firms' valuation of a flexible technology increases if the variance in optimal abatement is inflated. Therefore, the firms may choose the most flexible abatement technology under either regulatory regime, depending on the characteristics of the stochastic elements. Finally, we showed that tradable emissions permits induce heterogeneous technology investments if we allow the risk environment to differ across firms.(Storrøsten:2011:23)

Therefore, as part of their efforts to reduce greenhouse gas emissions and improve the security of their energy supply, many governments have made similarly worded pronouncements and set ambitious goals for sourcing a signicant portion of electricity generation from renewables. However, the transition to a renewable energy system will be challenging because of the modest energy density of the alternative fuels, the low conversion efficiency and power density of renewable energy extraction, and problems of intermittency which lead to low load factors. (Kessides:2011:2)

As a renewable energy alternative; the hydropower technology of the next decades will evolve towards more sustainable solutions. However, in order to minimise the environmental impact while at the same time maximising electricity production, a change of thinking is required and investment in current and future R&D is highly recommended to explore and test different solutions**.** (Zervos:2010:61)

3.1. Renewable Energy and Insurance Opportunity

When we think about financial security related to renewable energy sector, at the same time we think about insurance of desirable energy investments against risk management services arising from the threat of climate change.

With the advent of the new EU legislation on emissions trading, energy efficiency and wider environmental issues (as well as soaring crude oil prices),there is probably greater interest in Europe than elsewhere in as yet uninsurable RE - renewable energy technologies. Barrier removal that will increase the uptake of desirable technologies is an EU objective. The interest in new technologies can be translated into demand by stimulating the insurance community to create new products that can be used by the banking community as a platform for finance. (Barbut:2010: 39)

Investment in energy efficiency (EE) is hard to track in its entirety as efficiency improvements can be done at different levels – generation, transmission and distribution (T&D) and end use devices. Investments come into EE projects particularly to smart/grid distribution and power storage and also in the establishment of energy service companies (ESCOs). Financing through commercial banks remains difficult in many cases because energy efficiency (EE) investments often do not meet the standard investment criteria, such as collateral requirements. However, a growing number of specialized financing sources for energy efficiency are presently available particularly through Clean Development Mechanisms (CDM). Though different sources have their own set of priorities and criteria used to select projects for investment, all of the sources have one thing in common; that is they want to invest in projects that will generate enough EE savings cash flow to repay their investment. As more and more EE projects prove themselves, both the fund seekers and investors will gain confidence and the financing environment will improve.(Sudhakara:2010:20)

However, despite their high potential and societal needs, supportive actions to improve energy efficiency must be intensified combining research, fiscal incentives and initiatives to promote end-user acceptance in order to avoid the high underinvestment risk. Both experts and energy community agree that under all the Societal Visions energy demand technologies are the most important ones in terms of the total social impacts. However, energy conservation technologies may face problems of underinvestment, as its evaluation is around 10-15 % higher than that of policies needed to implement it. If only demand technologies are the most important ones in terms of the total social impacts. However, energy conservation technologies may face problems of underinvestment, as its evaluation is around 10-15 % higher than that of policies needed to implement it. (Wehnert :2004:12& 92)

On the other hand, what we seek instead is to evaluate whether the up-front energy investment in the context of a rapid scale-up of renewable generation is likely to impose a heavy burden on existing energy resources and thus exacerbate the current scarcity and price volatility. (Kessides:2011:3)

Therefore ,it is clear that at this stage of the renewable energy market's development, where financial innovation is required to support the development of small- to medium-size enterprises and projects, a specialist and focused risk transfer/finance operation with dedicated capital and low overheads will be a prerequisite to provide efficiently priced risk management solutions for small-scale developers. (Barbut:2010:22)

Most of us buy insurance to mitigate risk, such as the personal financial risk associated with one's house burning down. In the case of climate change, we can buy insurance, in a sense, by trying to minimize the change. But there is a big difference in the latter case: unlikely as it might be, if climate change brings human society to its knees, we are out of luck because we will not be able to buy a new planet. In other words, we can seek only to reduce the risk. This is an important point: efforts to limit climate change and to mitigate its impacts are exercises in risk management, and understanding the problem in that light helps to guide our response. (Mathez: 2009: 18)

Generally, markets promote transparency and innovation. Reliance on markets allows those affected to adapt, flexibly and autonomously, to local conditions. This principle applies both to insurance as well as to the carbon economy and other elements of the economic response to climate change. They apply both to direct insurance instruments such as traditional business and homeowner policy coverage as well as to securitization instruments linked to capital markets . (Kleindorfer : 2009: 22)

In countries with private insurance involved in catastrophe cover (e.g., Australia, USA, and Germany),insurance regulation in terms of rates, underwriting and coverage restrictions as well as solvency represent direct governmental interventions in catastrophe insurance. In other countries (e.g., France,New Zealand, Turkey), the government or its direct agent is a primary risk-bearer for catastrophe risks. (see CCS, 2008; von Ungern-Sternberg, 2004) This indicates that for example, a renewable energy company that is about to begin construction on a new project may be concerned about construction risks and the potential for delays in start-up. Then, once the project is up and running, the company's focus may shift from construction risk to the potential for business interruption or equipment breakdown. These business concerns translate into insurance issues. Companies may decide to purchase insurance to cover builder's risk, delays in start up, business interruption and equipment breakdown. Thus, insurance is a risk transfer mechanism that can help reduce a company's risk portfolio for future losses. Although insurance cannot protect against all losses, it can be used to manage some risks for renewable energy companies, including builder's risk, business interruption and equipment break-down. (Stevens:2010:254)

There are several very simple ways to account for risk and uncertainty in environmental economics and policy development. These include:

(i) Clearly defining the problem to ensure that the researcher thinks through any possible risks or issues of uncertainty and considers how they may affect the research or policy in question;

(ii) Utilising existing frameworks such as Adaptive Management and the Precautionary Principle which have been created for problems such as those in environmental economics and their resulting policy options;

(iii) Being aware of, and accounting for, the different perceptions and attitudes towards risks of different actors within the system, especially the general public.(Lobby:2011:8)

Finally, although litigation risk in Europe and other parts of the world may differ from litigation risk in the US, an analysis of U.S lawsuits can provide insight to non-US renewable energy companies about risks they may encounter if they do business in the US identification of these risks can, in turn, guide renewable energy companies in determining what kind of insurance to purchase in an effort to transfer some of the risk**.** (Stevens:2010:252)

4. New Approaches In The EU Towards Renewable Energy

Today, a number of electricity market models coexist in Europe and they are different from one another in terms of the type of ownership, degree of openness, market concentration, and the degree of vertical integration. So, it is very difficult to argue that a unique European pattern of reform is emerging. (Erdoğdu:2010 :20)

One way of moving forward could be to operate a typical EU-style tender where entrants can compete for sponsored engineering studies to test their currently uninsurable but promising renewable energy technologies. The resulting data could be disseminated to underwriting and lending 'teams' that combine the creativity and speed of boutiques with the distribution networks and balance sheets of the larger players. A combination of carrot (potential new business) and stick (environmental fines and penalties) policy instruments along with the availability of indemnity cover for attractive technologies would create demand. (Barbut:2010:39) On the other hand, the well-known Porter hypothesis claims that introducing, or strengthening, the 'right kind' of environmental regulation (e.g., in principle taxes and tradable permits) will induce productivity gains and reduce inefficiencies, leading to increased competitiveness and profits compared to countries with lower environmental ambitions. As a result environmental policy could be costless and, consequently, by being a 'first mover', the EU and Sweden could actually benefit more than they loose from its climate mitigation endeavors.(Lundgren:2010:1)

In the field of renewable energy; the crucial question for Europe is the pace of development of a paralel transport infrastructure based on hydrogen. FC cars have so far not reached a market share of 20%, due to the slow development of the hydrogen infrastructure. The transitional use of natural gas has been discarded, since the necessary investments in the conversion of the car fleet, increased dependence on imported gas, as well as price increases would have rendered this solution too risky.(Velte: 2004: 27)

Table 2: RES - Renewable Energy Source Market Overview (2004 – 2010)

	2004	2006	2008	2010
Jobs	200,000	300,000	400,000	550,000
Turnover (€bn)	10	15	35	70
RES share (%)	8.2	9.2	10.5	12

Source: Zervos, 2010.

A number of multilateral development banks have sought to deploy public finance to address the capital intensity challenge of renewable energy projects with high levels of technology risk. The presence of public sector bank guarantees or subordinate loans can assist with the commercial terms of project finance for new renewable energy projects. In the absence of these interventions, private investors may be unwilling to finance a project. The European Investment Bank offers equity financing and financial guarantees for selected large-scale infrastructure schemes. Examples of tools used include guarantees for pre-completion or early operational risk, subordinated loans or mezzanine finance. (Knight: 2011:12)

4.1. A learning-by-doing approach to the renewable energy

Learning-by-doing can affects energy sector and improves international competitiveness this has consequences for the economic assessment of the costs and benefits of renewable energy .At the same time, learning-by-doing effects in the renewable energy sector are allocated to the production of renewable based electricity.

The concept of learning-by-doing is based on the observation that production costs or investment costs of a certain technology or product decrease with cumulated experience of producing it. Experience can be described in terms of cumulated production, output, sales or cumulative installed capacity. Often learning-by-doing is distinguished from learning-by-using or learning-by-researching**.** (Schumacher:2007:6)

A learning-by-doing approach to developing new and commercially acceptable RE- renewable energy -financing and risk management products should be adopted through focused interactions between the public sector, specialist financial boutiques and insurers, and several multinational financial intermediaries. Rather than financing individual projects, the goal of these exercises would be to design and then scale up the size of RE-related financing and risk management instruments. (Barbut:2010:40) On the other hand, learning-by-doing spillovers can serve as practical justification for RES-renewable energy source production incentives**.** (Fisher :2010:25) This can be accomplished through partnerships that combine the support, balance sheet and credit rating of public sector entities with the creative vision of specialist private boutiques and distribution networks of large companies.

The objective of this approach is to send creativity and responsiveness up the renewable energy financing spectrum in major financial centres, while sending capacity, credit strength and distribution networks back down. The public sector assistance would function as a ‘mezzanine facilitator’ between the two. In this way, existing demand for smaller-scale risk management structures can be satisfied, while concurrently building critical mass for later-stage, large scale commercial deployment of RET. The deliverable result of the initial exercise should be product blueprints with an action plan for implementing a pilot programme. (Barbut:2010 :40)

Two main effects take place by introducing learning-by-doing in the renewable energy equipment industry. Firstly, learning-by-doing leads to a reduction of the unit costs of equipment, which will, via capital goods (investment), translate into reduced renewable electricity costs and prices. The second effect relates to international trade. Learning improves the international competitiveness of renewable energy equipment (first-mover advantage) and stimulates national and international demand for this technology, which then again may induce higher learning. (Schumacher : 2007: 26)

5. Private Sector Renewable Energy Project For Turkey

Turkey’s all renewables index score saw a five point increase due to the parliament’s amendments on the Law on the Utilization of Renewable Energy. Therefore, renewable energy was focused on wind and hydro energies in Turkey. Turkish government is channeling the funds needed for control of the climate change into dam building or natural gas distribution projects. It has not been allocating resources for environmentally friendly projects like energy efficiency. 72 of the 80 renewable energy projects funded

by the Turkish Industry and Development Bank, or TSKB, by the end of 2009 were hydro-power plants. It means that the loans are not spent for controlling climate change or on renewable resources but for dams.

Turkish companies have initiated environmentally conscious practices. Though the adoption level is still immature, the positive relationships are significant .Environmental management has become an emerging issue for organizations to improve environmental image and gain economic profit. Recently, Turkish enterprises have increased their environmental awareness due to regulatory, competitive, and marketing drivers. (Ozer:2009:83)

Table 3 : Population, Economy and Energy in Turkey Between 1973-2020

Years	Population (000s)	GNP/capita	Total GNP	Total energy demand (Mtoe)	Energy/capita (Kep)	Energy intensity
1973	38,072	1994	75,915,568	24.6	646	81
1990	56,098	2674	150,006,052	53.7	957	50
1995	62,171	2861	177,871,231	64.6	1,039	44
2000	67,618	3303	223,342,254	82.6	1,218	40
2010	78,459	5366	421,010,994	153.9	1,962	35
2020	87,759	9261	812,736,099	282.2	3,216	33

Source:Koyun,2007.

As it can be seen from the Table 3 above; consumption of nonrenewable energy sources such as oil, coal and natural gas has increased steadily in recent decades, some of it driven by rising standards of living, but much of the increased demand stems from population growth.

Turkey has recently embarked on a new energy policy era, which has brought about radical changes in the energy industry with massive implications for consumers, producers and regulators. The electricity market law passed in 2001 aims basically at establishing a competitive market in the fields of transmission, distribution, and competition in the energy industry, which includes electricity, natural gas, petroleum, and liquefied petroleum gas sectors **.** (Halicioglu:2007:199)

In Turkey the main barriers for development renewable energy are**:** lack of financial resources and proper lending facilities, particularly for small-scale projects constitute, and lack of detailed renewable energy resource assessments and data banks pertains to Turkey like to many other countries. But, lack of awareness and knowledge is not a big barrier in Turkey. Renewable energy is recognized as a major potential for indigenous, clean energy production. The most important handicap for foreign investors is Turkish bureaucracy. The permission for a foreign investor can be taken through one-year period with applying numerous different associations. (Koyun : 2007:5)

Government regulations can encourage the firms to implement environmental management. Proactive efforts towards environmental regulation are more likely to be drivers of successful green supply chain management projects. Environmental regulations can be seen as a motivator to innovate and reduce the environmental impact at low cost, rather than only legislation (Bowen et al. 2001:59). In addition to this,there is growing (but stil not conclusive) evidence that countries with more stringent environmental regulations are less competitive in those sectors. However, future research might distinguish betweeen command-and- control, performance –based and market-based instruments to whether the form of regulation has an impact on these findings**.** (Ambec et al:2010:10)

The total investment required for power plants and distribution lines up to 2010 is expected to be around 45 billion US$, 19 billion of which will be under the build-operate-transfer (BOT) and build-own-operate (BOO) models. The huge size of this investment makes it impossible to lay the burden entirely on

public finances. Private capital has to be introduced into Turkey's electricity sector to meet these requirements. (Koyun :2007:3)

In order to meet this energy shortage; the state leads the private sector to the World Bank's credit in all sources of renewable energy. The State says that it will be the guarantor for the 30-40% of the cost of the private sector's investments which are for their own needs. If the private sector can find buyer, it can sell the electricity produced in these plants. .(Koyun :2007:6) Another opportunity related to renewable energy investment for Turkey is EU membership period. A good vision of this process is by analyzing the complex aspect of Turkey adhesion to EU.

However, EU candidates accept more control from the EU because of the ongoing integration process. The distinction between members-to-be and current members is probably not strong enough in terms of incentives to assess the difference between budgetary transfers and external aid. (Przyluski :2010:15)

6. Findings and Conclusion

Turkey's relationship with the EU enjoy a deep trade nature is long-standing dating back to the early 1960s. In order to bring out the complete picture of Turkish-EU relationship it is also important to state the developments in relation to financial cooperation between Turkey and the EU at the debate generated by Turkey's application for the EU membership.

Turkey has abundant reserves of renewable energy, such as solar , wind , hydrogen and geothermal. Renewable energy would reduce reliance on imported fuels and at the same time enhance Turkey's energy security. Renewable technologies have no fuel costs and are virtually inexhaustible. Although per capita energy consumption remained low by the EU standards, the objective of the private sector renewable energy for Turkey is to help increase privately owned and operated energy production from indigenous renewable sources within the market-based economy**.** If we take into account current electricity production 200.000 GWh; Turkey's electricity demand is estimated to reach 300.000 GWh to satisfy the require targets by 2012 compared to 2010.

Our work has shown that private sector investment via World Bank and EBRD credits have to be introduced into Turkey's renewable energy sector to meet energy shortage. Because the renewable energy industry could substantially reduce investors' risk perceptions by improving some aspects of their technologies.

It is clear that the Turkish economy is dependent on the trade with those of the EU member countries .However, the trade relationship between Turkey and the EU has not followed a stable trend over the years. Turkey as a neighbour country to the European region, cannot afford to be an outsider to the EU, especially in the field of both fossil and renewable energy.

On the other hand, The EU defines the energy priorities for the future and sets the actions to be taken in order to tackle the challenges of saving energy, achieving a market with competitive prizes and secure supplies, boosting technological leadership. In this regard, as Barbut's 2010 study stated that one way of moving forward could be to operate a typical EU-style tender where entrants can compete for sponsored engineering studies to test their currently uninsurable but promising renewable energy technologies.

Finally, the risk challenges facing the renewable energy sector can be addressed through adequate technical assistance programmes that help project developers and others understand the benefits of financial risk management both in the EU and Turkey. In addition, the development of technology-specific insurance cover public and private financial institutions would encourage an increased number of renewable energy projects.

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