# BETTER PROJECT: "BRINGING EUROPE AND THIRD COUNTRIES CLOSER TOGETHER": IS THE ARTICLE 9 OF THE RES DIRECTIVE 2009/28/EC AN OPPORTUNITY TO FURTHER DEPLOY CSP TECHNOLOGIES IN NORTH AFRICA?

*Caldés N.*[(+)], *Trieb F.*[(*)], *Santamaria M.*[(+)], *de la Rúa C.*[(+)], *Moser M.* (*), *Fichter T.* (*)

[(+)]*CIEMAT- Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas*
*Av. Complutense 40, 28040 Madrid- SPAIN*

*(*) DLR-Deutsches Zentrum für Luft-und Raumfahrt*
*Pfaffenwaldring 38-40, 70569 Stuttgart - GERMANY*

**Abstract**

Under Article 9 of the Renewable Energy Sources (RES) Directive 2009/28/EC, Member States are granted the possibility to partially fulfil their 2020 RES targets in a more cost-effective way by developing new RES projects and importing electricity from Third countries with high RES potential, high quality of supply and low generation costs. However, compared to the other cooperation mechanisms (Art. 6, 7, 11), the implementation of Article 9 seems to be lagging behind due to the associated added complexity and multiple variables at play for both Europe and Third countries (eg: higher degree of grid infrastructure and interconnection requirements, higher degree of geopolitical unrest, more complex finance schemes, differences in public acceptance, potential socio-economic and environmental impacts, existing laws and regulations, etc).

While several major RES initiatives have been launched in North Africa, the concrete framework for making use of cooperation mechanisms has not yet been investigated. In this context, the core objective of the BETTER project is to assess, through case studies, stakeholders involvement and integrated analysis, to what extent cooperation with Third Countries can help Europe achieve its RES targets in 2020 and beyond, trigger the deployment of RES electricity projects in Third countries and create synergies and win-win circumstances for all involved parties.

A priori, North Africa and Concentrated Solar Power (CSP) technology seem to be a suitable region and technology for the implementation of Article 9 due to the physical import potential, large solar potential as well as technology particularities, like e.g. the capability to deliver flexible power on demand. However, various issues need to be further analyzed in order to assess whether or not such win-win situations exist and under which circumstances.

Thus, the goal of this paper is to explore what are the prospects for further CSP deployment in North Africa from a geo-political point of view. By identifying the current uncertainties, barriers and catalysers, this work attempts to shed some light to what seems to be an exceptional opportunity for CSP technologies to further expand in the North Africa Region.

## 1. Introduction

RES Cooperation within the EU as well as with EU neighbouring countries is high on Europe's political agenda (COM, 2012 (164). On the one hand, on January 2011, the EC called for more cooperation to meet the 2020 RES targets[1] and on the other hand, the recently published EU 2050 roadmap opened up discussion on how to fully decarbonise Europe's Energy system on the long term keeping in mind that current capacity and infrastructure will be of critical importance for the long term pathways. An important role for cost effectively meeting the RES 2020 targets but also for the design of Europe's Energy system beyond 2020 may involve cooperation within the EU and with the EU's neighbour regions incentivized by RES cooperation mechanisms as provided for in the new RES directive that entered into force in June 2009. RES cooperation may also have a political dimension. Against the background of the political

[1] EU Communication "Renewable Energy: Progressing towards the 2020 target".

changes in northern Africa, the EC has proposed to establish an "EU-South Mediterranean Energy Community", while other European neighbour regions such as the West Balkan or Turkey are in the process of integrating into the EU.

The EU Directive on the promotion of the use of renewable energy sources (RES) was adopted in April 2009 (2009/28/EC) and sets binding targets for all EU Member States to reach the European target of 20% RES share in EU gross final energy consumption by 2020. Such targets are based on a flat rate approach - same additional share for each country - adjusted to the member state´s GDP. This target allocation approach does not necessarily correlate with the Member States´ RES potentials, since the available resources vary significantly across the different Member States (Klessmann et al. 2009).

Given such resource and renewable energy generation costs variability within Europe, articles 6-11 of the Directive introduce the possibility to use "cooperation" mechanisms so that those countries with low or expensive RES potential partially fulfil their RES target by purchasing or jointly developing RES energy produced in other countries with higher RES potential or lower production costs. Consequently, their objective is twofold: on the one side they aim at providing Member States greater flexibility and, on the other side, they aim at achieving the overall 20% target in a cost-effective way.

The directive 2009/28/EC, provides for four cooperation mechanisms available to EU Member States to realise part of their national EU target abroad.

The flexible mechanisms, defined in the RES directive are:

- Statistical transfers between Member States (Article 6)
- Joint projects between Member States (Article 7)
- Joint support schemes (Article 11)
- Joint projects between Member States and third countries (Article 9)

Within statistical transfer, Member States may agree to make arrangements for the statistical transfer of specified amount on energy from renewable sources from one Member State to another, while within joint support schemes two or more Member States can decide to jointly or partly co-ordinate their national support schemes for RES production.

The concept of joint projects allows two or more Member States to cooperate on projects relating to the production of renewable electricity, heating and cooling meaning that one country having more favourable conditions to increase renewable energy production will host the project and the other country or countries will also benefit from the resulting power production. This co-operation mechanism may also involve private operators.

The Directive also enables one or more Member States to cooperate with one or more third countries in joint projects regarding the generation of electricity from renewable sources. A prerequisite to the acceptability of the project is that the electricity produced within the project must be consumed in the Community area. Other preconditions for using this mechanisms include that an equivalent amount of electricity to the electricity accounted for the buyer country has been allocated to interconnection capacity by all responsible Transmission System Operators in the country of origin, the country of destination and, if relevant, each third country involved in the transit; and that third countries cannot provide support for the RES production, other than investment aid.

## 2. Problem statement: Research question

While the European Commission estimates that great savings can arise from an international cooperative approach in reaching EU Renewable Energy targets by 2020, most member states still aim to focus on their natural resources and disregard the potential cost savings that can arise from the use of the cooperation mechanisms.

Thus, the framework for the cooperation mechanisms set in the RES directive is only a corner-stone. To implement these mechanisms there is the need of:

- additional investigations that display the potential and the real cost-effectiveness of the measures in comparison to only national efforts to reach the targets as well as the
- investigation of technical (e.g. grid capacities and storage) and socioeconomic barriers and opportunities.
- Concrete concepts to operate the mechanisms including financing and regulatory issues.

While several recent European and national projects have started to analyse potential benefits of the use of the cooperation mechanisms within Europe (e.g. the IEE project RES4Less), an analysis on the use of the cooperation mechanisms with third countries seems to be lagging behind.

Though several major RES initiatives have been launched in North Africa, the concrete framework for making use of the cooperation mechanism is not sufficiently investigated. Thus, the starting point should be the existing experiences and body of knowledge generated within the existing relevant initiatives that aim at fostering EU RES cooperation. Based on that, there is the need to go one step further to identify the opportunities and barriers as well as the conditions under which the implementation of Article 9 can contribute to that goal.

Among the four RES cooperation mechanisms, joint projects with third countries are the most complex. Compared to the other mechanisms, some of the existing barriers to the implementation of the "4rth" cooperation mechanism include a higher degree of grid infrastructure requirements, some degree of geopolitical unrest, more complex financing schemes, differences in public acceptance, potential socio-economic and environmental impacts, existing laws and regulations, etc. Besides, projects in third countries may need a long lead-time before being fully interconnected to the territory of the Community.

Consequently, there is a need to assess, through case studies analysis, the role and design of this cooperation mechanism with regards to (i) helping Europe achieve (or overfull fill) its RES targets in a cost effective way and (ii) helping third countries to deploy RE. By doing so, it will be possible to identify not only the associated barriers but also the opportunities for both European and third countries.

The BETTER project, an EC funded project within the Intelligent Energy Europe programme that will be presented in the next section, attempts to shed some light to the above mentioned issues.

## 3. Introduction to the BETTER PROJECT

BETTER – "Bringing Europe and Third countries closer together through renewable Energies" is not only the title but also the guiding pricinple of this project. BETTER intends to address RES cooperation between the EU and third countries in several dimensions.

The differencial aspect of the BETTER project compared to other existing initiatives is that it attempts to address RES cooperation with third countries through the lens of the Article 9 of the RES Directive by: (i) Assessing the potential and real cost-effectiveness of implementation of Article 9 in comparison to only national efforts to reach the RES targets, (ii) identifying the technical, financial, legal, environmental and socio-economic barriers and opportunities and, finally, (iii) proposing concrete measures to operate the mechanisms including financial and regulatory issues

Thus, the core objective of BETTER is to assess, through case studies, stakeholders involvement and integrated analysis, to what extent cooperation with third countries can help Europe achieve its RES targets in 2020 and beyond, trigger the deployment of RES electricity projects in third countries and create synergies and win-win circumstances for all involved parties.

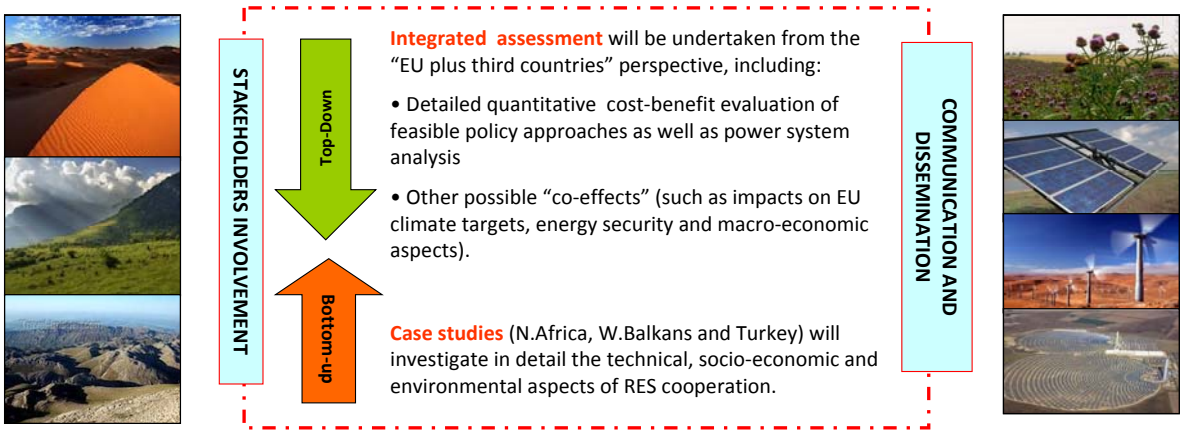
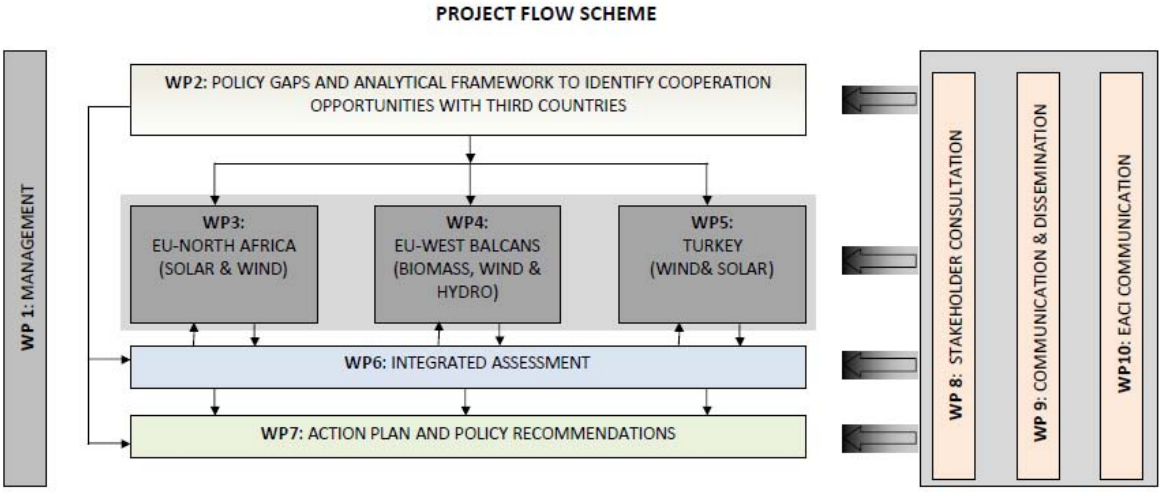



**Figure 1: BETTER project methodological framework**

The case studies focusing on North Africa, the Western Balkans and Turkey will investigate in detail the technical, socio-economic and environmental aspects of RES cooperation. Complementary to these bottom-up analyses, an integrated assessment will be undertaken from the "EU plus third countries" perspective, including a detailed quantitative cost-benefit evaluation of feasible policy approaches as well as strategic power system analyses. Moreover, co-effects such as impacts on the achievement of EU climate targets, energy security, and macro-economic aspects will be analyzed. The final outcome will be a fine-tailored policy package, offering a concise representation of key outcomes, guidelines for practical implementation of RES cooperation, and actions plans reflecting regional specifics.

The strong involvement of all relevant stakeholders will enable a more thorough understanding of the variables at play, an identification and prioritisation of necessary policy prerequisites. The dissemination strategy lays a special emphasis on reaching European-wide actors and stakeholders, well, beyond the target area region.

The project flow below illustrates how this methodological approach will be organized in different work packages. The implementation of this project will go from July 2012 to January 2015.




Summarizing, the major outputs & expected results of this project will be:

- Evaluation through case studies and integrated analysis of the impacts that the implementation of the cooperation mechanism in the studied countries can have in helping Europe achieve its RES targets as well as the associated co-effects (market opportunities, grid requirements, environmental and socio-economic impacts, etc) for both Europe and third countries.
- An action plan to foster renewable energy production, transfer and use in the EU member states as well as third countries through cooperation initiatives highlighting its strengths, weaknesses opportunities and threats.
- Policy recommendations with regards to: (i) the implementation of the RES cooperation mechanism for each case study region and for the European Union, (ii) the implementation of the joint project with third countries mechanism in general and (iii) the comparison of the third countries cooperation mechanism with the other EU internal RES cooperation mechanisms.
- Practical guidelines for project developers to facilitate private sector involvement in the deployment of mutually beneficial renewable energy projects in third countries through the cooperation mechanisms defined in the Res Directive.
- The establishment of a solid stakeholder network between Europe and selected third countries to foster RES cooperation and knowledge transfer.
- Generation of knowledge and dissemination material and activities in order advocate in favour of EU RES cooperation mechanisms as well as RES deployment.

## 4. Prospects for CSP deployment in NA related to Art 9

Despite the enormous potential for RES-E (Renewable Energy Source for Electricity), NA countries are still largely underdeveloped in this regard. However, the situation is changing and some progress was made over the past months (e.g., Algeria, Morocco). The current political turmoil in many NA regions is a crucial threat to future cooperation projects with EU countries as it significantly increased investment risk in the short run. However, this might change in the middle to long-run when governments that are more democratic have seized power. Under such conditions, the fourth cooperation mechanism could be a crucial instrument to foster the social, economic and environmental benefits of RES-E projects in NA. However such projects are currently also being targeted as possible new Carbon finance mechanisms ("NAMAs"). Regulatory overlaps and possible synergies between RES mechanism and Carbon finance therefore need to be investigated. Sustainable forms of energy will play a crucial role for the further development of the region. Population will increase by a factor of two and economy will grow by a factor of four or five. This will require large amounts of energy to power such a development.

On the technology hand, huge potentials for solar and wind energy exist in the region that could easily cope with future demand, if exploited efficiently and in time, as shown in Trieb and Müller-Steinhagen (2007).

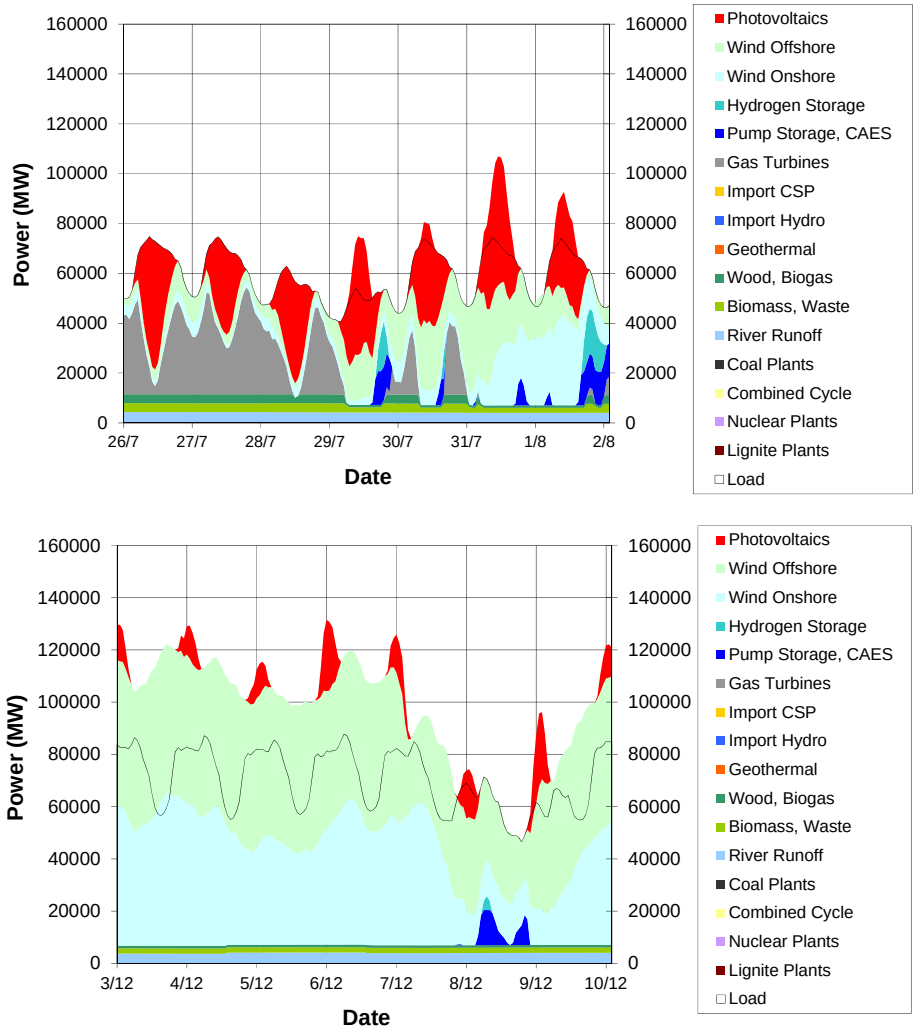



**Figure 1: Scenario of the German electricity mix with 90% renewable energy based mainly on variable sources and considerable expansion of storage, backup and net transfer capacity. Generation higher than demand (black line) is stored or transferred to neighbor countries.**

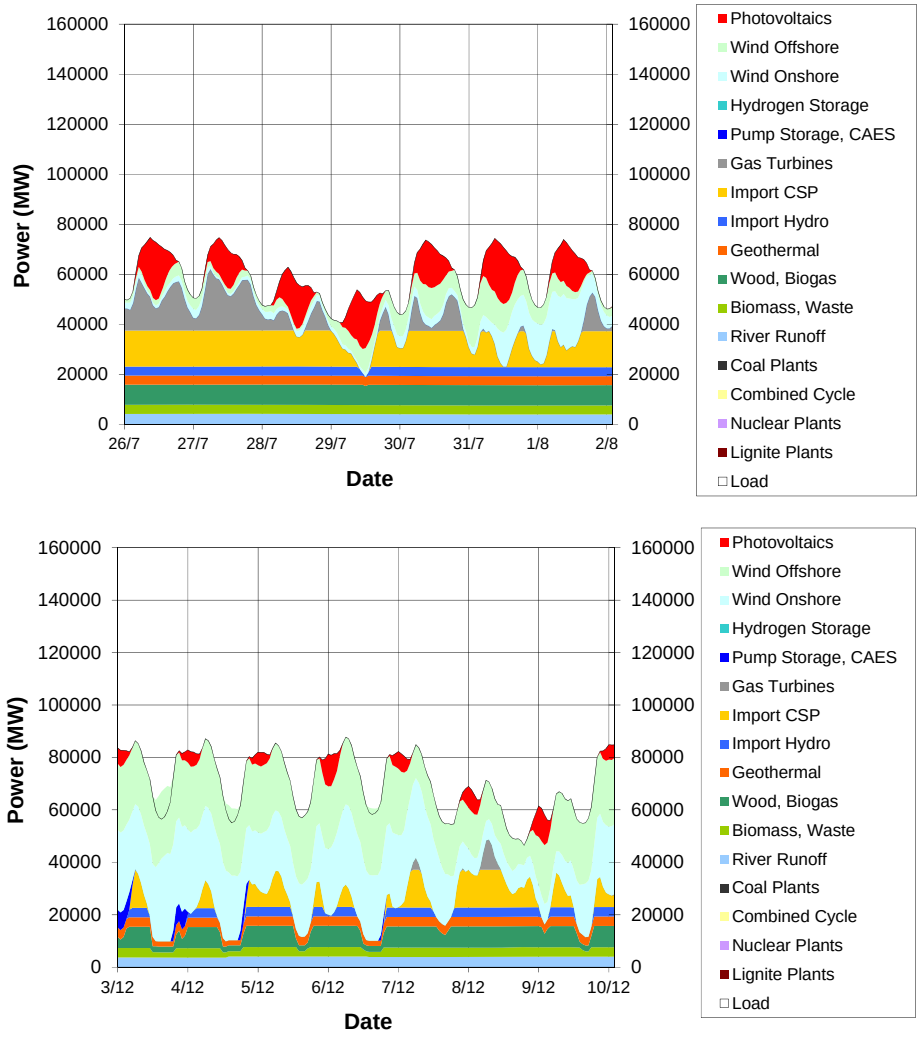



**Figure 2: Scenario of the German electricity mix with 90% renewable energy based on a well-balanced mix of variable and flexible sources and existing storage and transmission grid capacity.**

In particular, the intrinsic capability of CSP to provide firm and flexible renewable power on demand can be a key for Art. 9 type cooperation, because flexible and at the same time renewable sources – biomass, stored hydropower, CSP and in the long-term eventually geothermal power - are rather scarce in Europe. Also, - due to the dry climate and the lower latitude - the availability and quality of supply of CSP over the year is much higher in North Africa than in Europe. Therefore, CSP imports from North Africa could play a crucial role to balance out domestic variable sources like wind and PV in order to reduce the pressure on the demand of backup, grid transmission and storage capacity.

There are in principle two different approaches to achieve large shares of renewable energy in Europe, taking e.g. Germany as a model case: the first is to expand significantly the domestic renewable energy sources, mainly wind and PV, and balance their fluctuations through a significant expansion of storage, grid transmission and conventional backup capacity (Figure 1).

The second approach (Figure 2) is based on a well-balanced mix of variable and flexible sources of energy in order to avoid the need for grid, storage and backup expansions, and instead deliver a major part of renewable electricity on demand. This implies the import of flexible renewable power, like stored hydropower from Norway or the Alps and concentrating solar power from North Africa via High-Voltage-Direct-Current (HVDC) links. By delivering higher shares of renewable energy on demand, surplus generation and the need for storage, transmission and backup capacities can be reduced, thus reducing the related socio-economic and environmental impacts as shown in Trieb and Müller-Steinhagen (2007).

The importance of firm and flexible renewable power capacity from CSP for the economic development of North Africa is obvious, as flexible power from biomass, hydropower and storage options like those available in Europe are rather limited.

## 5. Open issues: potential barriers and opportunities

RES-E, CSP and particularly CSP exports from North Africa to Europe still face significant barriers (Table 1), but there are also opportunities to overcome them (Table 2). First of all, there is still only little know-how and professional capacity on RES-E available, at least in North Africa, not only on the technical, but also financial, structural and institutional side. Therefore, only few people are in principle capable of starting RES-E projects in the region, and less are capable of starting international projects.

The BETTER project itself tries to provide and disseminate the related know-how, and further measures must also be taken, as e.g. the enerMENA and the REMENA courses on renewable energy. By providing access to key information on RES-E and by setting appropriate goals for RES-E expansion just as discussed before, the technical barriers related to the variability of RES-E can be addressed and solved.

A reliable framework to start RES-E business is not yet in place, so RES-E projects in North Africa still imply a significant investment risk. This affects particularly the CSP sector, as project investment is typically in the order of several hundred millions or even billions of Euros per power plant unit. The high investment risk leads to high interest rates of investors, both on the loan and equity side, and thus makes renewable electricity more expensive than necessary or in some cases even unaffordable.

The German Renewable Energy Act (GREA) is a success story of RES-E implementation, but it will be difficult to adapt it to the NA Region because of a very different economic situation. However, the core element of the GREA is a long-term power purchase agreement (PPA) guaranteed and enforced by the state that covers the full cost of the RES-E projects. Due to the high investment security equivalent to AAA rating, interest rates of GREA projects are typically as low as 6-7% only, thus making the GREA a least cost instrument for RES-E implementation. PPAs are rather usual in North Africa, and instruments to increase their rating to AAA are available, as e.g. the Partial Risk Guarantee (PRG) of the World Bank. In North Africa, a scheme based on internationally insured power purchase agreements (iPPA) would be a viable alternative to the implementation of something like the GREA, and could be adapted to the specific demand situation of the region as shown in Trieb et al (2011).

**Table 1: Potential barriers for RES-E deployment:**

**Barriers for large RES-E shares:**

1. RES-E Variability:
    1. RES-E are considered variable and potentially risky for grid stability
    2. RES-E are considered unable to assume functions for grid management
2. RES-E Cost:
    1. investment and electricity cost related to RES-E is considered too high
    2. investment risks are considered high and further increase capital cost
    3. marginal-cost-based electricity markets are not compatible with RES-E
3. RES-E Impacts:
    1. large land areas for RES-E lead to high environmental impact
    2. large land areas for RES-E lead to high socio-economic impact
4. Political Framework:
    1. no consensus in Europe and Third Countries about future RES-E role
    2. no reliable political environment for RES-E business established yet

Socio-economic and environmental impacts of large structures like a potential CSP-HVDC import scheme from Morocco to Germany as described e.g. in Trieb et al. (2012) are related to the large land

areas required and will probably affect the life of thousands if not millions of people. This category of barriers is probably the most complex and the most difficult to overcome. Public participation in the planning process of these large infrastructures and also financial participation in the projects, eventually in form of cooperatives and cooperative banks, will be a major challenge, but also an opportunity to get things going.

Finally, national and international policies must put in place a transparent, stable, fair and predictable legal framework for the development of national and international RES-E projects. The BETTER project will provide first recommendations for such a framework, which will be elaborated in close contact and dialogue with all kinds of stakeholders of the EUNA Region.

**Table 2: Opportunities for RES-E deployment:**

**Opportunities for large RES-E shares:**

1. Limit RES-E Variability:
    1. tap flexible RES-E to provide firm capacity and grid management functions
    2. develop and secure all available and acceptable flexibility and backup options

2. Limit RES-E Cost:
    1. establish national RES-E administrations and adequate RES-E tariffs
    2. provide internationally insured power purchase agreements and further risk mitigation measures specifically adapted to the RES-E sources to be tapped

3. Limit RES-E Impacts:
    1. ensure public participation through consultation and cooperative banks
    2. enforce thorough environmental and socio-economic impact assessment

4. Establish Political Framework:
    1. pursue consensus within Europe and Third Countries about future RES -E role
    2. establish transparent, stable, fair and predictable framework for RES-E

## 6. Conclusions

The cooperation mechanisms, as described in articles 6-11 of the RES directive (2009/28/EC), were designed to provide MS with greater flexibility to achieve their National targets as well as to contribute to the achievement of the overall European 20% target in a cost effective way. Besides allowing for MS to cooperate among themselves (Art 6,7,11), the Directive also allows MS to cooperate with third countries (Art. 9).

A priori, the implementation of Article 9 could play a catalyzer role in further deploying Renewable Energies in EU neighbouring countries and, in particular, in the North Africa region. Given the large solar resource endowment of the region, solar technologies and, in particular, CSP technologies seem to have a larger potential to benefit from such deployment opportunities. Similarly, from a EU point of view, compared to other technologies, CSP presents various technical advantages such as the intrinsic capability to provide flexible renewable power on demand.

Despite the potential benefits that could arise from the implemenation of Article 9 from both a European and Third countries perspective, various barriers need to be overcome such as the higher degree of grid infrastructure and interconnection requirements, higher degree of geopolitical unrest, more complex finance schemes, differences in public acceptance, potential socio-economic and environmental impacts, existing laws and regulations, etc.

In that context, during the next 30 months, the EU funded project BETTER project (Bringing Europe and Third Countries Closer together through renewable energies) attempts to shed some light to the above mentioned opportunities and barriers in the framework of the RES Directive. By conducting a dual approach (case studies as well as integrated analysis) together with a strong stakeholder involvement from

the different areas –financing institutions, project developers, policy makers, TSO, civil society, etc- , this project aims at provide concrete actions plans and guidelines to identify and materialize “win-win” situations.

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