Solar Guidelines India - A Pathway to Project Finance and Implementation

Report on Indian circumstances for the promotion and development of solar installation compared to international standards and lesson learned

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1. Executive summary

The Solar Guidelines India project was initiated in the context of the Indo-German Energy Forum (IGEF) in April 2010 to address the identified challenges of the then emerging Indian solar market. The Ministry of New and Renewable Energies (MNRE) identified the missing information on the new renewable technology and the development procedures in the Indian context as a central challenge for the large scale roll out of the solar technology in India. Based on this assessment the MNRE and the German Federal Ministry for Environment and Nuclear Safety (BMU) jointly agreed in the framework of the IGEF to realise the Solar Guidelines India project, providing comprehensive and up to date information on the development procedures, lead times and involved authorities in India. The project was realised by the consortium eclareon/E.Quadrat and under the supervision of GIZ. Phase I addressed the national JNNSM scheme as well as the first Indian Union State, namely Rajasthan. Phase II saw the roll-out of information to further Union States, Karnataka and Andra Pradesh. The Solar Guidelines platform is constantly updated and will be further extended to additional Union States to ultimately be the central information source for solar projects in India, covering all Union States with a solar policy.

The Solar Guidelines project described and analysed the development procedures in the assessed Union States. The analysis has led to the identification of a number of challenges which are lengthening the development process for solar projects and which are ultimately leading to higher realisation costs for the individual developer or investor.

The identified issues comprise the following aspects:

Challenge	Issue/Impact	Recommendation	Section in Report
High level of involved authorities	• The developers of solar projects have to interact with a high number of authorities during the development process. • The lead times of the individual authorities lead altogether to a lengthy process.	• Streamline the existing development process by reducing the number of involved authorities • At best, introduce a real single window clearance system, whereby one single authority is competent to lead the process	• **Rajasthan**: sec. 4, b, (2), aa. • **Karnataka**: sec. 4, c, (2), aa. • **Andra Pradesh**: sec. 4, d, (2), aa.
Unadapted permitting procedure steps	• Project development procedures are not sufficiently adapted to the solar technology • Existence of development steps, which are irrelevant for the solar technology,	• Streamline existing procedures to only comprise relevant development steps • Review respective legislation to reflect solar specific aspects	• **Overall analysis**: sec. 3, b • **Rajasthan**: sec. 4, b, (2), bb, (i) • **Karnataka**: sec. 4, c, (2), bb, (ii)

	which are however still applied		• **Andra Pradesh**: sec. 4, d, (2), bb, (iii)
Unharmonised application of rules, respectively the existence of unharmonised clearance requirements	• Rules and development procedures are inconsistently applied between different authorities or different authority levels • Confusion of developers/investors on correct procedures	• Identify existing inconsistencies • Clarify competencies among authorities and authority levels • Provide clear guidelines on the correct and up to date development procedure	• **Overall analysis**: sec. 3, b • **Rajasthan**: sec. 4, b, (2), bb, (ii) • **Andra Pradesh**: sec. 4, d, (2), bb, (iv)
No clear deadlines/missing sanctioning system	• Existence of deadlines for developers; however no comparable deadline for the involved authorities to react in due time • Waiting times caused by the inactivity of authorities is leading to a substantial longer development process and higher costs	• Introduce a transparent procedure, containing deadlines for all involved authorities • Provide for an appeal procedure, which can be used by the developer in case of inactivity of the competent body	• **Overall analysis**: sec. 3, c • **Rajasthan**: sec. 4, b, (2), bb, (iv) • **Karnataka**: sec. 4, c, (2), bb, (iii) • **Andra Pradesh**: sec. 4, d, (2), bb, (ii)
Long lead times and procedural delays	• Long lead times for the development process of solar installations, caused primarily by a high number of involved authorities • Waiting times are again lengthening the process	• Streamline the existing development process by reducing the number of involved authorities • Introduce a transparent procedure, containing deadlines for all involved authorities	• **Overall analysis**: sec. 3, c • **Rajasthan**: sec. 4, b, (2), bb, (iii)
No procedural differentiation between small and large projects	• Only one development procedure for all project sizes; at times, even for all solar segments (rooftop/ground-mounted) • Procedures are in consequence either too complex or not detailed	• Provide for differentiated procedures (simplified procedures for smaller projects; more complex procedures for larger projects • Provide in addition for separate segment procedures	• **Overall analysis**: sec. 3, b • **Karnataka**: sec. 4, c, (2), bb, (i) • **Andra Pradesh**: sec. 4, d, (2), bb, (i)

	enough, impacting on the quality of projects		

Table of Contents

2. Project Background & History

The Solar Guidelines India project was initiated in April 2010 in the framework of the Indo-German Energy Forum to address identified challenges of the then emerging Indian solar market and to foster investments and developments in the Indian solar energy sector.

a. Historic Conditions in India for Solar Development

India disposes of a vast and rich solar potential. The energy demand of the country is steadily growing; on the side due to the growing industrial development of the country; on the other side, caused by the raising share of the electrified population.

Renewable energies, especially solar PV, have been identified as a quick to develop generation option for electricity, which can be implemented decentralised or even as off-grid solution; thus, offering a solution which does not immediately require for major grid reinforcement or enlargement works.

The Indian Federal Government as well as some front-running Indian Union States have implemented already at an early stage of the Indian solar market national and state solar polies to allow for a development of solar PV in India and to attract foreign investments in the Indian market.

A substantial share of projects under these first solar policies however failed to conclude a financial closure with the financial institutions, as the developers and investors misperceived the required development process and the required lead times for the realisation of projects. In addition, presented applications were often of low quality and required for a substantial additional work of the competent authorities to allow for their processing. Furthermore, financial institutions and the involved administrative bodies were often only insufficiently trained on the new technology and the individual process path, which ultimately lead to ineffective procedures and long lead times.

At the same time, further Indian Union States have implemented or are in the process of implementing solar policies to support further developments in the renewable sector.

The Ministry of New and Renewable Energy (MNRE) India and the Indian Renewable Energy Development Agency (IREDA) realised the need for comprehensive and updated information for all involved market stakeholders. They therefore aimed at addressing the before mentioned circumstances by providing a central information platform to investors and developers as well as to the Indian Union states and the involved authorisation bodies and financial institutions. The platform was envisaged to provide comprehensive, updated information on the development procedures for solar projects in India. At the same time, the information was also intended to train involved administrative bodies and the financial institutions on the requirements and particularities of the solar technology. Finally, the platform also aims at guiding further Indian States in their process to draft solar policies and the inherent administrative processes.

b. Development of Solar Guidelines India

Based on the before mentioned circumstances, the Indo-German Energy Forum decided in its sub-group 2 in the April 2010 session, to jointly address the issue of a missing central information platform for the development of solar projects in India by implementing the Solar Guidelines Project.

The final project concept for the Solar Guidelines project was agreed between the German Federal Ministry for Environment and Nuclear Safety (BMU) and the Indian Ministry of New and Renewable Energy (MNRE) during the November 2010 session in New Delhi.

The consortium E.Quadrat/eclareon was selected for the implementation of the envisaged platform and started the project execution in October 2011 under the supervision of GIZ.

Phase I of the Solar Guidelines project comprised the development of the web-based platform as well as the initial research and analysis of the first Union State, namely Rajasthan. In addition, phase I also addressed the Federal support scheme JNNSM. For the local research, the consortium built for phase I on the support of Deloitte India. Throughout the implementation of phase I, the Solar Energy Cooperation India was launched and took over the responsibilities from the MNRE for the Solar Guidelines project.

After the successful launch of the website on 5 November 2012, phase II of the project addressed the roll-out of the platform to further Indian Union States. To this end, phase II comprised the states of Karnataka and Andra Pradesh. For phase II, KPMG/Mercados were chosen as local research partners.

c. The Future of Solar Guidelines India

Future activities of the Solar Guidelines project will involve the further roll-out of information to additional Indian Union States, among them Delhi, Gujarat, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand.

At the same time, the information on the existing Indian Union States will be regularly updated to ensure that users can base their plannings on the latest developments.

In addition, the database will also provide information on the policy and regulatory framework as well as on bankability and quality matters.

3. Overall Analysis of circumstances in selected Indian Union States for the promotion and development of solar installation compared to international standards and lesson learned

a. Summary

The analysis of circumstances for the promotion and development of solar installations in selected Indian Union States, namely Rajasthan, Karnataka and Andra Pradesh, identified a number of challenges in the three Union States for the development of solar. While some obstacles applied to all three Union States equally, others were state specific and only applied to one or two of the selected states. Almost all identified barriers were common barriers for emerging solar markets and were already identified in a number of other international solar markets. Therefore, the analysis is also comparing the identified challenges against international standards and international lessons learned. The present analysis remains however at a macro level and describes the identified barriers globally to present an overall picture of circumstances. To this end, the identified individual barriers of the three Union States are grouped in this section into 2 global barrier complexes, i.e. inadequate solar procedures and length of solar procedures. For a detailed analysis of the individual state circumstances you are referred to section 4 of this report, which is providing a comprehensive overview of the individual barriers in the three Union States.

b. Barrier complex I – inadequate solar procedures

The barrier complex "inadequate solar procedures" groups barriers, which describe procedural steps or requirements that apply to the current solar development procedures in the three analysed Indian Union States, which are however unusual in the context of a solar project development, based on international standards and practice.

For the present analysis, the barrier complex "inadequate solar procedures" comprises three individual barriers:

- the existence of unadapted permitting procedure steps (Rajasthan, Karnataka, Andra Pradesh)
- the unharmonised application of rules, respectively the existence of unharmonised clearance requirements (Rajasthan and Andra Pradesh)
- the missing procedural differentiation between small and large solar installations (Karnataka and Andra Pradesh)

The barrier "**unadapted permitting procedure steps**" generally refers to procedural processes, which request from a solar developer certain clearances or certifications that are irrelevant in the context of solar development. To this end, all three analysed Union States are for example requiring for a clearance from the Civil Aviation Department. While a similar permit step is known for large onshore wind installations in Europe, ensuring that the rotating blades of the wind towers do not interfere with the

radar systems of the military and civil aviation control, the requirement in regards to solar systems remains unclear; not at least as solar installations are stable, non-moving objects; thus not emitting any interference that could disturb the radar systems. At best, solar installation may reflect the sunlight in a certain angle to flying objects. As civil aviation is however predominantly operating on instrument flying and not on visual flight mode, the reflection would be an irrelevant factor. Such a clearance step is not known to any European development procedure.

The clearance step is thus a further burden for developers of solar installations in the three Indian Union States, in terms of money as well as of time.

In addition, the analysis also detected issues related to the **unharmonised application of rules, respectively the existence of unharmonised clearance requirements**. This barrier is referring to the fact that different authority levels are applying rules differently, thus resulting in conditions, where the development procedure is not harmonised. An example in the present context is the fact that the Ministry of Environment and Finance India declared solar projects to be exempt from any environmental clearance, while the State Pollution Control Boards of Rajasthan and Andra Pradesh are still requesting the clearances and charge developers with a fee for the application and issuing of the documents.

The unharmonised application of rules is leading on the one hand to uncertainty among developers and investors on the actually correct procedure; on the other hand, the procedure is further extended if additional clearance requirements are applied, even though they are not required. Again, the developer is confronted with longer lead times for the development of the installations and Thus also with higher costs for the project realisation.

Finally, the barrier complex "**inadequate solar procedures**" also comprises the missing procedural differentiation between small and large solar installations. The barrier describes the challenge that the development procedures do not differentiate between smaller and larger projects, in terms of their capacity. In addition, the barrier may also refer to the fact that procedures not even differentiate between different project segments, i.e. rooftop and ground-mounted installations.

Projects with a smaller capacity should generally follow a simplified procedure in comparison to the one applied to projects with a larger capacity. In case of one single procedure for all projects, there is the risk that either substantial more burden is put on smaller projects or a simplified procedure is applied, which would not adequately address the requirements for the development of projects with larger capacities. If not even the solar segment (rooftop/ground-mounted) is reflected in a differentiated development procedure, this is leading to a complete inadequacy of the process.

The phenomenon of inadequate solar procedures or requirements is a very common one, especially in emerging solar markets. The root causes for this are manifold. In some cases, procedures for conventional energy plants seem to be at the basis of the renewable procedure. In absence of a comprehensive understanding of the new technologies, administrations tend to copy certain procedural steps also to the new renewable procedure, which however make no sense in this context. In other cases, the relationship between different authorities or between different authority levels seems not sufficiently been clarified or recognised. In section 4 of this report, the individual circumstances and barriers in the three analysed Union States are analysed in greater detail, also showcasing the international examples

and lessons learned for the identified issues. Solutions from the international markets for similar challenges may serve as role model to also address the identified issues in India.

c. Barrier complex II – length of solar procedures

The second barrier complex "length of solar procedure" is addressing the extended duration of existing solar procedures as well as the root causes for these circumstances. It groups to this extent the two barriers referring to long lead times and procedural delays as well as to missing deadlines and a missing sanctioning system.

For the present analysis, the barrier complex "length of solar procedures" comprises two individual barriers:

- the challenge of missing deadlines and a missing sanctioning system (Rajasthan, Karnataka, Andra Pradesh)
- long lead times and procedural delays (Rajasthan)

The barrier "**no clear deadlines/missing sanctioning system**" refers generally to the fact that procedures do define deadlines in regards to the period in which a developer would have to perform a certain step. The procedure however remains silent as far as the period is concerned in which the authority has to react on an application or a request. In addition, the procedures generally provide for a sanction in case the developer does not deliver in due time, i.e. in the worst case the denial of the project. A comparable sanctioning mechanism for the inactivity of the authority is yet missing. The waiting time, which is resulting from a delayed reaction of the competent authority, is however often the even larger burden for the developer in regard to the overall timeline of the project realisation.

Furthermore, the barrier complex also comprises the challenge of **long lead times and procedural delays**. The barrier "long lead times and procedural delays" was only positively determined for the State of Rajasthan; however, it is to underline that only for this state a comprehensive analysis of the individual lead times was possible. For the other two states, the information remains at least for a number of procedural steps vague. It is to assume that also for these States the barrier applies and procedures could be streamlined.

Long lead times and delays are often caused by the involvement of a high number of authorities in the realisation process of solar installations. The developer has to obtain clearances from a variety of different departments, which all have their own individual lead time and their own investigation process, leading altogether to a substantially longer process and thus to higher costs for the development.

Long lead times caused by a high number of involved authorities or by non-transparent or complicated procedures are a very common and known challenge in a number of international solar markets. In section 4 of this report, solutions for the individual challenges are presented as well as international lessons learned which might be guidance for actions in the Indian context.

d. General international barriers

The analysis of barriers has been performed throughout a number of international projects for almost all international solar markets. Especially in Europe, the European Commission has mandated different institutions to analyse the barriers for the development of renewable energies in the 28 EU-Member States. The existence and nature of barriers is closely linked to the majority of the renewable market. Emerging solar markets generally are facing the same challenges irrespectively of their geographical location and market size. In the same line, mature markets often are confronted with similar barriers for the development and integration of capacities from renewable sources. To this end, the lessons learned from other markets are an important input to analyse the own market and to anticipate challenges, which might impact on renewable projects in the future. In addition, experiences from global markets also help to prevent the duplication of mistakes and to streamline the renewable market already at an early stage to comprehensively support a sustainable renewable development.

In the following, a number of barriers from European solar markets are presented, showcasing further challenges which might also appear in the Indian context in the future or already today in Indian Union States, other than the three that have been analysed in this report:

(1) Existence and reliability of support scheme

The existence and reliability of a general support scheme for renewable energies is the dominant challenge in European markets today. In the framework of the Keep on Track! project on behalf of the European Commission, the barrier has been reported as the central barrier for all renewable technologies and in the majority of EU-Member States. The Keep on Track! project generally monitored the actual development of renewable energy in the EU towards the 2020 target and ensured that Member States were lagging behind their trajectory outlined in the RES Directive. The project also carefully screened all 28 EU-Member States and identified the existing barriers for the projected development.

In general, the Keep on Track! project united 16 European partners under the leadership of EUFORES, being the European Forum for Renewable Energy Sources, a European parliamentary network uniting all major political groups in the European Parliament as well as in the national and regional Parliaments of the EU Member States. Partners of the Keep on Track! Project included 11 national renewable energy associations, the law firm BBH and three scientific and consulting organisations, namely Fraunhofer ISI, EEG-TU Vienna and eclareon. In the course of its three-year implementation period and implemented through funding of the European Commission (Intelligent Energy Europe Programme), the project provided a discussion and dialog platform for different market actors ranging from renewable energy industry associations to national and EU Parliamentarians and the scientific community. In addition, the Keep on Track! project also offered a close-to-market monitoring of the fulfilment of the RES trajectory for each of the 27 EU Member States and for Croatia as of its access to the EU. Finally, the project also delivered early warnings and suggested solutions on how to compensate any possible delay encountered, in case a Member State is lagging behind its trajectory and does not manage to

overcome identified barriers for RES deployment. With the before listed input, the project substantially supported the European Commission in its monitoring of Member State progress.[1]

Regarding the identification of existing barriers in the EU, every fifth barrier out of the 515 barriers, which addressed issues for solar energy development, concerned the challenge of a reliable and existent support scheme.

The 2015 Keep on Track! Deviations and Barriers Report stated in this regard: "…the originally [existent] stable frameworks [for the promotion of renewable energies] have been shaken or even been removed by a number of decisions in the individual Member States and at EU level, leading to conditions, where developers and investors are highly irritated and reluctant to further invest into renewables or develop renewable installations."[2]

Barriers identified in this regard in the different EU-Member States "address the lack of a long-term vision from decision makers with regards to the national energy strategy, characterised by political indecision about the future of RES, the uncertain implementation of regulations for RES or the adoption of a moratorium for new power allocation affecting mostly RES. These elements result in conditions, where the reliability of the support scheme is no longer secure, respectively has already been shaken. As a matter of fact, stop and go policies, retroactive cuts of subsidy or regular legislative changes of the Feed-in Tariff (FIT) system constitute important barriers to the development of renewable energy in the electricity sector."[3]

(2) Integration of renewables in spatial and environmental planning

The integration of renewables in the spatial and environmental planning may cause a number of issues: "First, numerous barriers [in the EU-Member States] result from issues related to local spatial development plans. The lack of spatial planning could lead to a lack of anticipation in grid reinforcement in order to connect future decentralised RES production units. In some cases, the lack of spatial development plans therefore hampers the development of RES projects. In others, barriers are rather due to the incompatibility of RES-projects with the spatial plans or with existing land-use management instruments. Barriers can also be caused by refusal of planning consent from local authorities as well as by ungrounded bans for certain territories".[4] In addition, identified barrier in European markets are also

[1] An overview of all results of the Keep on Track! Project is provided at: http://keepontrack.eu/publications/

[2] Keep on Track! Analysis of Deviations and Barriers 2014/2015, Brussels, June 2015 (www.keepontrack.eu).

[3] Keep on Track! Analysis of Deviations and Barriers 2014/2015, Brussels, June 2015 (www.keepontrack.eu).

[4] RE-frame.eu Database: Online database on barriers to renewable energy and the corresponding policy recommendations, Berlin, June 2015 (http://re-frame.eu/); Keep on Track! Analysis of Deviations and Barriers 2014/2015, Brussels, June 2015 (www.keepontrack.eu).

referring "to the conflict between RES installations and environmental protection, as a result of stringent or unclear environmental requirements hindering the development of RES projects."[5]

The before mentioned results have been taken from the already mentioned Keep on Track! Project, but were confirmed by the findings of the RE-frame project, a project realised by Fraunhofer ISI and eclareon on behalf of the German Federal Ministry of Economic Affairs and Energy. The project aimed at recording and assessing the most important drivers and barriers framing the diffusion of renewable energy technologies in all 28 EU Member States. The assessment covered three major energy sectors: renewable electricity, heating & cooling and transport. Through a large online stakeholder consultation process, the project was able to substantiate the research results and to elaborate on the individual differences and particularities of Member States circumstances. The results served the German government for the assessment of renewable policies in other European Member States and to identify best practices, which could also be interesting within the German context.

(3) Lack of clarity and transparency of technical standards and grid connection rules for solar projects

The clarity and transparency of technical standards and grid connection rules for solar projects is a central prerequisite for a large scale roll-out of solar. The PV Legal Project, which analysed different European solar markets during the years 2009 to 2012, stated in this regard: "In many cases, technical standards and connection rules are not defined rigorously at national level, and this results in very different interpretations of regional or local administrative authorities, electrical companies and distribution system operators. In France, the grid connection process is not fully linked to a single law or provision. As a consequence, the electricity distribution operators are free to set their own standards and to change them arbitrarily. Similarly, in Spain, there are as many different grid connection request forms as there are electricity distribution operators. The same is true in Germany, where grid operator associations and other bodies compile minimum standards for grid connections of PV systems. Unfortunately, these are only partially adopted by individual grid operators and indeed are supplemented by tougher demands so that, in practice, different requirements apply for PV system developers. This leads to discussions between developers, installers and distribution system operators and can only partially be resolved by legal recourses."[6]

Disputes between parties may be settled bilaterally. The German EEG Clearinghouse may however also be seen as a best practice body for the settlement of issues and disputes between market stakeholder. "The German Clearingstelle is an independent mediation office, founded by the German government under the supervision of the German Federal Ministry of Economic Affairs and Energy, whose mission is to help "to settle any disputes and issues of application arising under the EEG (Renewable Energy Sources Act)". In practice, the Clearingstelle offers alternative dispute resolution options that may prove more efficient and cost-effective than resorting to legal action. Such options include mediation, joint dispute resolution and arbitration. Thereby, opposing parties can avoid costly litigation and tedious,

[5] RE-frame.eu Database: Online database on barriers to renewable energy and the corresponding policy recommendations, Berlin, June 2015 (http://re-frame.eu/); Keep on Track! Analysis of Deviations and Barriers 2014/2015, Brussels, June 2015 (www.keepontrack.eu).

[6] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

lengthy court actions, but yet achieve a feasible and mutually acceptable solution. Furthermore, the Clearingstelle provides general advice on how to apply the provisions of the EEG. The Clearingstelle consist of 18 legal energy experts and has the clear mission to provide impartial advice on the application and interpretation of the German Renewable Energy Law (EEG). Since its foundation in 2007, the Clearingstelle has received a total of 8.539 requests, of which 1.306 were out of its mandate. In the remaining 7.233 cases, the Clearingstelle provided its advice and served clarifying or solving the raised issues.

As an example, on 25 June 2010 the Clearinghouse has published a clarification on the conditions for the commissioning of a PV system. […] According to the decision, the commissioning of a PV system depends neither upon the connection of an inverter nor "the prior application for grid connection, implementation of a connection study or the laying of the grid connection or of connecting lines". To commission the installation, it is merely necessary that, alongside the technical operational readiness, the generation of power is guaranteed. Even though decisions of the Clearinghouse EEG are not legally binding, most of the German distribution grid operators have informed that they are implementing the decision."[7]

(4) Virtual saturation and speculation

The issue of virtual saturation and speculation appeared in a number of European renewable markets, among them the Czech Republic, Estonia, Finland, Hungary, Italy, Latvia, Romania and Slovakia. It generally describes two different challenges, which are however closely linked to each other.

The term virtual saturation is referring to a situation, whereby companies or private individuals are blocking connection points or connection capacities for virtual renewable projects without a clear intention to actually develop these project in due time. This practice is ultimately leading to a virtual saturation of the potential grid connection points, respectively of the potential grid connection capacity, even though in reality the projects are not developed. Real projects may be denied for connection with the argument that the grid is already saturated.

Under these circumstances, some companies or private individuals have blocked the connection point or connection capacity with a virtual project to sell their right or position in the connection line later to interested developers and investors for a high price; thus, speculating with their connection rights.

The issue of virtual saturation and speculation may be addressed by introducing "for the grid connection process a set of intermediate steps, each of them ending with a realistic and appropriate milestone that the project developer has to reach within a defined period of time (e.g. first step submission of building permissions, second step financial guarantees and so on until the grid connection process is completed). After having achieved the first steps, the project developer may reserve a certain amount of capacity. If a project developer fails to reach the next milestone in the given time, the reservation expires and the developer has to restart with the first process step. However, in case of delays that do

[7] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

not lay in the responsibility of the project developer, for example waiting time for administrative decisions, the time for fulfilling the milestones should be extended."[8]

(5) Complexity and Duration of administrative procedure

The complexity and duration of administrative procedures is a classical issue, especially in emerging renewable markets. Still, also mature renewable markets in Europe may be characterised by a complex or long administrative process, which a developer has to perform for the realisation of the renewable installation. Challenges flagged under the term complexity of the administrative process involve the "tardiness and inflexibility of administrative procedures for the granting of permits, environmental impact assessments or the issuance of grid connection requirements. Moreover, authorisation processes are deemed to be uncertain and expensive. In addition, also the involvement of a multitude of public authorities in the permitting process, respectively a lack of harmonisation and coordination between the competent authorities is perceived as obstacles for the development of renewables [in European renewable markets]. As far as the duration of the process is concerned, identified challenges in EU-Member States involve on the one hand the actual processing time of authorities; on the other hand, it however also addresses the issue of extensive waiting times. Waiting times may occur in form of delays after the filing of an application and prior to its actual processing, respectively in form of delays in between the processing of two authorities. Also the lack of know-how in all levels of administrative personnel, who are often not trained enough to efficiently assess the given framework for RES projects, has been raised as an obstacle in the administrative process."[9] In addition, the requirement of a high number of permits for the realisation of a project is further extending the development period.

[8] RES Integration – Analysis of the integration of electricity from renewables to the electricity grid and to the electricity market, Brussels, December 2011 (www.res-integration.eu).

[9] RE-frame.eu Database: Online database on barriers to renewable energy and the corresponding policy recommendations, Berlin, June 2015 (http://re-frame.eu/); Keep on Track! Analysis of Deviations and Barriers 2014/2015, Brussels, June 2015 (www.keepontrack.eu).

4. Analysis of selected Indian states regarding the circumstances for the promotion and development of solar installation

a. Summary

The following chapter analyses the circumstances for the promotion and development of solar installations in three selected Indian Union States, namely Rajasthan, Karnataka and Andra Pradesh. The three Union States were the first to be analysed under the Solar Guidelines India project. All three have a state solar policy in place and have specific solar targets for the upcoming years.

The three Union States developed development procedures for solar projects. These procedures have common elements; however, they also differ for certain elements such as the number of involved authorities. The following analysis gives a short overview of the three individual solar targets and the already achieved shares of solar capacities. In addition, all three states are analysed in a quantitative and qualitative way:

b. Rajasthan

(1) Market Update

The Rajasthan Solar State Programme foresees the installation of 25.000 MW from solar installations.

Until May 2015, 28 MW of utility scale solar installations have been commissioned under the Rajasthan state solar policy. Additional 63 MW of utility scale solar projects are under development.

As far as the rooftop segment is concerned, 7 MW have been installed in the commercial sector under the state policy until May 2015. Further 9 MW have been installed in the industrial sector and additional 5 MW in the residential sector.

(2) Process Analysis

aa. Quantitative

The Rajasthan state solar policy procedure is characterised by a high number of involved authorities, with which a developer has to interact for the realisation of his solar project.

The entire project development process for ground-mounted solar installations involves not less than 28 authorities; at times up to 34 authorities, many of them repeatedly. Only during the approval and clearances phase, 9 to 12 authorities are involved.

The list of involved authorities for the entire development process includes the following bodies:

Rajasthan State Revenue Department (Patwari/Tehsildar), State Transmission Utility/Distribution Licensee, Rajasthan Renewable Energy Cooperation (RREC), District Collector, RVPN, NVVN, IREDA, Registrar of companies, Revenue Minister, Land Registration Department, Rajasthan Pollution Control Board, Directorate General of Foreign Trade (DGFT), Civil Aviation Department/Directorate general for Civil Aviation, Renewable Energy Development Agency (REDA), State labour Department, SNA, MNRE, Chief Electrical Inspector (CEI).

A high number of authorities, which are involved in the realisation process of a solar project, generally leads to different implications: on the one hand, the realisation process is often prolonged if more authorities are involved. The developer has to interact separately with the individual authorities; at the same time, the individual authority also needs its time to treat the developers' case. Furthermore, waiting times are often involved, caused by a high number of requests to public authorities and leading to delays for the individual developer.[10] The more authorities are involved, the more interaction the developer has to perform and the more lead time for the treatment of requests will occur. An additional reason for delay is the need of authorities to interact with each other. There is a risk that authorities will claim responsibility for certain questions that can lead to inconsistent and contradictory cases. The more authorities are involved the more likely is such an outcome. In combination, this is leading to a substantially longer process.

The high number of authorities is generally caused by procedures, which are not adequately adapted to solar technology. Often procedures for fossil installations seem to be at the basis of the approval procedures of solar installations, leading to criteria which are not applicable to the solar technology.[11]

The phenomenon of a high number of authorities involved in the approval process and the through this caused long procedure is a known challenge, especially in emerging solar markets. The PV Legal Project identified the involvement of a high number of authorities in the permitting process as a central challenge in number of European markets including France, Greece, Portugal and Italy. The project stated in this regard: "[The involvement of a high number of authorities] often results in an exaggerated quantity of documentation that needs to be produced and in long lead times with lack of respect towards the deadlines."[12]

Proposed solution(s)/ international experience(s):

The identified challenge of a high number of involved authorities in the permitting process could be addressed by implementing a one-stop-shop or single window clearance body.

Under a one-stop-shop system one central authority would be empowered to decide (at least) on all required permits and approvals. The developer is thus only interacting with one central body instead of interacting with a multitude of authorities individually.

[10] See also section "Rajasthan state analysis, qualitative analysis, no clear deadlines/missing sanctioning system".

[11] See also section "Rajasthan state analysis, qualitative analysis, Unadapted permitting procedure steps".

[12] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

The implementation of a one-stop-shop system however requires that responsibilities from all before involved authorities are transferred to the new central competent body.

In Europe, several states declared to have implemented a one-stop-shop system, under which the developer only had to interact with one central authority. The one authority however did not receive the competency to decide on all permits and approvals but was forced to now interact itself with all before involved bodies. Under such a system, the issue of long lead times was not solved; the problem is rather transferred from the developer to the new body. Systems operating in this *modus operandi* do not address the identified issue adequately.

bb. Qualitative

(i) Unadapted permitting procedure steps

The analysis of the approval and clearances procedure of the Rajasthan solar policy identified a number of procedural steps and requirements, which a solar project had to perform, even though their actual relevance is not clear in the solar context. These circumstances have led to the assumption that the procedure is not adequately adapted to the reality of solar projects.

As far as the first requirement is concerned, solar ground-mounted installations have to receive a no-objection-certificate from the Civil Aviation Department. The reason for this permit does not become evident. While a similar permit step is known for large onshore wind installations in Europe, ensuring that the rotating blades of the wind towers do not interfere with the radar systems of the military and civil aviation control, the requirement in regards to solar systems remains unclear.

Solar installations are stable constructions, which do not move or rotate and thus which do not emit any potential interference source for radar installations. At best, solar installation may reflect the sunlight in a certain angle to flying objects. As civil aviation is predominantly operating on instrument flying and not on visual flight mode, the reflection would be an irrelevant factor.

A second example of an unadapted requirement that is applied to solar installations is the requested clearance under the Boilers Act 1923. Solar PV installations have to apply to the Rajasthan State Boiler Investing Authority to receive a clearance of the boiler. Solar PV Installations however do not use a boiler; still, the requirement is defined as required permit.

In both cases, it appears that procedures for fossil installations have been copied and pasted to solar installations. The applied regulations do refer commonly to “industry installations”. Throughout the definition of requirements for solar installations, solar installations apparently have been considered as “industry installations”, most likely in the absence of a detailed understanding of the technology.

Proposed solution(s)/ international experience(s):

The phenomenon of unadapted procedures for renewable installations is well known and numerous examples can be identified throughout the world.

To this end, the PV Legal project identified "sound testing" as an approval steps for solar installations in a regulation of European Member State, even though PV installations are not emitting any sound.

In addition, the former Thai solar regulation for rooftop installations applied a historical definition of a power plant under the national Factory Act 1992. Electrical installations with a capacity of more than 5 Horse Powers (~3.73 kWp) were considered as power plant, requiring for a factory operation license issued by the Thai Department of Industrial Works (DIW). For the calculation of the Horse Power of a PV installation, the definition referred to the cumulative capacity of the installation as well as of the used inverters. Through this definition even very small rooftop installations on private households were treated as power plant. The regulation in addition foresaw that "power plants" were not allowed in urban areas and were to be installed with a 200 m safety zone around (residential) buildings.

The applied procedure as well as the compliance with the defined criteria made the application of solar rooftop almost impossible, at least for private residential buildings, even though the regulation defined these building as a clear target group.

The Thai government realised the unadapted regulation and corrected the existing barrier by revaluating the applied procedure and eventually waiving the factory license for rooftop solar installations.

Correspondent to the measures taken by the Thai government, it is advised to carefully screen all applied procedures for solar installations again to identify those requirements and requested approvals, which do represent a roadblock for the development of solar projects and which are not suitable for the solar technology. Another approach is to introduce mandatory, internationally accepted certificates for solar power installations. This will allow the application of secure technologies without tedious individual checks.

(ii) Unharmonised application of rules/unharmonised clearance requirements

A second set of challenges identified in the framework of the analysis of the Rajasthan solar policy and the inherent solar development procedure regards the unharmonised application of rules as well as the unharmonised clearances requirements.

To this end, the Rajasthan State Pollution Control Board requires environmental clearances for solar project and is charging a fee for the treatment of an application. The clearances are required for ground-mounted project in Rajasthan under the JNNMS as well as under the Rajasthan State Solar Policy. Regarding the environmental clearances for solar projects, the Ministry of Environment and Finance India however has declared that solar projects are exempt from any environmental clearance. This situation is resulting in conditions, where the legal framework is not uniformly applied; leading ultimately to higher costs and longer lead times of solar projects in Rajasthan.

It is however to ask whether the Ministry of Environment and Finance India is competent to decide the matter for projects under the JNNSM as well as for projects under the state policy. In case the Federal ministry is only responsible for the JNNSM, but has no competency in state matters (state solar policy), Rajasthan is free to opt for stricter criteria, even if this is resulting in different project development procedures.

In addition, the analysis of solar development procedures in India has shown that there is no documented list of clearances, which shall be applied uniformly to solar projects. Rather, each state has its own set of clearances and requirements, resulting in a patchwork-regulation in the different Indian Union States, which is especially for international developers and investors only hard to differentiate. These circumstances minimise the development potential of India as a whole.

Proposed solution(s)/ international experience(s):

The unharmonised application of rules is a common challenge, especially in emerging solar markets. Beside the question of competencies (Federal/State), it is to ask, whether the application of individual criteria for each state is economically reasonable. For international developers and investors, it is very difficult to understand and differentiate the patchwork regulation for the different Indian States as well as for the implementation of projects under the JNNSM in the different Indian Union States. At the same time, investors and developers will always opt for those states that offer a lean and easy to implement development procedure. To apply a certain set of clearances to the solar technology even though other states have waived them for a good reason is leading to a competitive disadvantage and ultimately to lower investments and developments.

Procedures should thus be regularly screened and revised to streamline them and to adapt them to the actual reality. To include in the revision process also lessons learned from other states is wise and avoids the doubling of mistakes.

Regarding the unharmonised clearance requirements for solar projects in the different Union States, the above reasoning applies equally. Where Federal competencies are violated, states will have to change their behaviour and adapt the common Federal set of rules and procedural steps. Where the competency lies with the Federal States, the states itself will have to question if the unharmonised set of clearances has a valid reason at its basis or if it would not be advised to streamline existing regulations and processes, while accounting for lessons learned from other states.

(iii) Long lead times/ procedural delays

The solar development procedure in Rajasthan is characterised by long lead times and at times considerable delays caused by a number of different factors, which are ultimately lengthening the realisation of solar projects.

Long lead times and delays are caused by the involvement of a high number of authorities in the realisation process for solar installations.[13] The developer has to obtain clearances from a variety of different departments, which all have their own individual lead time and their own investigation process. In this regard, the missing single window clearance system is also leading to considerable delays and costs for the developers.[14] Often the administration has a discretionary power and needs to investigate

[13] See also section "Rajasthan state analysis, quantitative analysis"

[14] See also section "Rajasthan state analysis, quantitative analysis"

the individual case further to be able to decide on the respective case. This individual process with each involved department is substantially delaying the development of the solar installation.

The PV Legal Project stated in this regard: "[the involvement of an excessive number of involved administrations or public bodies] often results in an exaggerated quantity of documentation that need to be produced and in long lead times with lack of respect towards deadlines." The barrier was inter alia detected for France, Greece, Poland and Italy.

Furthermore, there is no single integrated project information system, which would minimise the coordination time required for the individual involved agencies and authorisation bodies to exchange and investigate on the respective dossier. Every individual authority has to obtain the required information individually, even though other authorisation bodies might have already investigated the exact same question. The required time for the authority to interact with the developer or with other authorisation bodies is further lengthening the realisation process.

Proposed solution(s)/ international experience(s):

Long lead times caused by a high number of involved authorities or by non-transparent or complicated procedures are a very common and known challenge in a number of international solar markets.

A good practice example in this context was however identified in form of the German "bound decision" principle. "That means that in the authorisation process, the administration has no discretionary power. If the requirements for the permission defined by law are fulfilled, the permit authority has no choice but to grant the permission. In case of rejection, the German judicial system provides for a broad range of legal remedies and independent courts".[15]

An international good practice example for a true single window clearance system " may be identified in form of the "Sistema de Registro Micro-produção" (SRM) in Portugal, being an online registration system for micro generation installations. The online portal was initiated by the renewable industry and received the full support of the Portuguese Ministry of Economic Affairs and Labour. Through the "Portal Renováveis na Hora" (www.renovaveisnahora.pt) developers are today able to perform the required project registration as well as all required permitting procedures. The portal provides all information that a developer of a small-scale renewable installation needs to develop and administer the project. At the same time, one single authority is taking care of the entire process; thus providing a true one-stop-shop."[16]

(iv) No clear deadlines/missing sanctioning system

[15] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

[16] Portal Renováveis na Hora: www.renovaveisnahora.pt; PV Rooftop Development in Thailand - Analysis of Regulations and Challenges, Berlin/Bangkok, March 2014 (http://www.thai-german-cooperation.info/download/20140408_pdp_th_report_pv_regulations.pdf).

The analysed procedure for the development of solar project in Rajasthan, especially as far as the approval and clearances process is concerned, does provide at times for a timeline for the required permits and approvals; yet, only regarding the period, in which a certain approval or permit as to be obtained by the developer.

The procedure does however not account for a sanctioning systems, which holds also the authority liable to react in due time on an application. The "waiting time" caused by the delayed reaction of the administration is however often the even bigger issue for developers of solar projects.

Waiting time are delaying the realisation process of a solar project decisively, resulting in higher realisation costs for the individual developer. At the same time, certain permits and approvals are often prerequisites for others; thus blocking the entire process in case of delays.

The PV Legal Project analysed in detail the process length of the administrative procedure in the different European markets.[17] The analysis on the one hand identified the actual length of the process, in terms of the actual time in which the developer is actively contributing to the administrative process as well as the waiting time, during which the developer is passive and waits for a decision of the competent body. The results were striking: while the overall length of the administrative procedure using the example of ground-mounted installations already differed between the European markets by more than 125 weeks; the developer in some processes (for example in Spain) were only active during 40 weeks, while he waited up to additional 110 weeks on decisions of the individual authorities, which were involved in the process.

The below graph visualises the finding of the PV Legal Project in terms of total duration of the PV project development process for the analysed 12 EU-Member States[18]:

[17] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

[18] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, p.9, Berlin, February 2012 (www.pvlegal.eu).

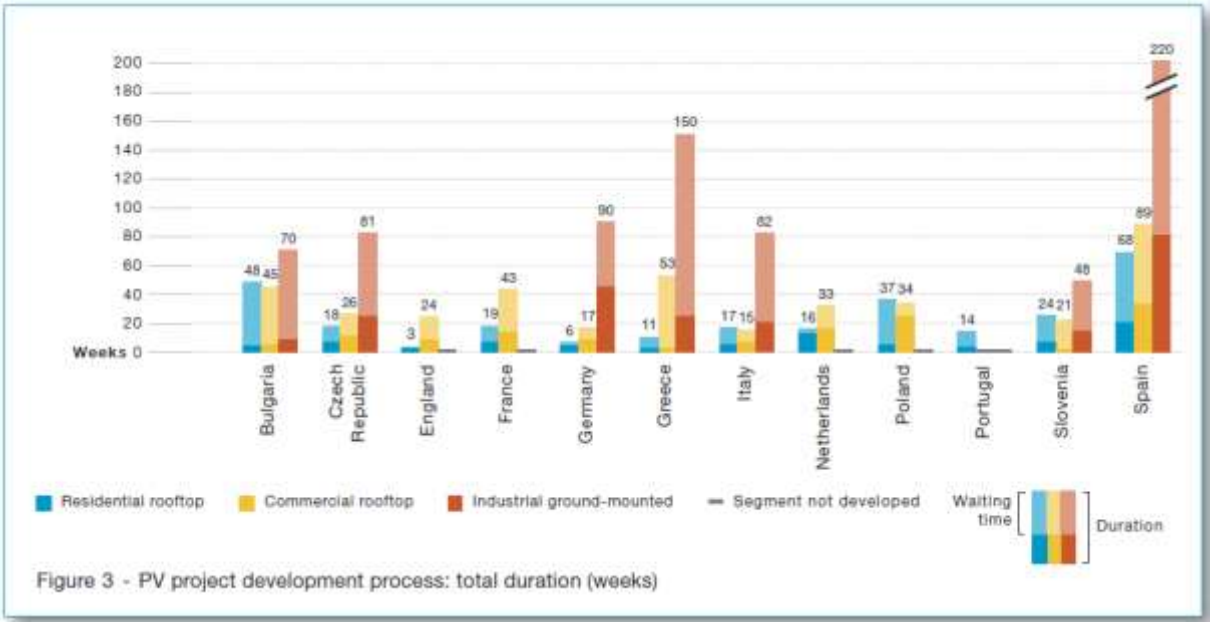

Figure 3 - PV project development process: total duration (weeks)

Proposed solution(s)/ international experience(s):

The above described European examples depict clearly the consequences of missing deadlines and missing sanctioning systems.

The applied procedures for solar projects should provide for clear deadlines for the developer as well as for the involved authorities. At the same time, the developer should have an appeal possibility through which he can appeal to higher authority levels in case of inactivity of the competent body or even to a judicial body, which would force the competent authority to consider the presented application. In addition, there should also be a legal regulation for the question of compensation of occurred damages of the developer, caused by the inactivity of the competent authorities.

A clear defined procedure, including deadlines for all involved parties, also offers the advantage of a predictable realisation period, which is not at least of crucial importance for the planning of lead times and the negotiations with financial institutions.

Examples from European markets show that simple and predictable procedures attract the highest attention from developers and investors and can even compensate lower support scheme levels.

c. Karnataka

(1) Market Update[19]

The Karnataka solar policy foresees a 2000 MW target for solar electricity until 2022.

Until May 2015, 80 MW of utility scale solar installations have been commissioned under the Karnataka state solar policy. Additional 610 MW of utility scale solar projects are under development.

As far as the rooftop segment is concerned, 9 MW have been installed in the commercial sector under the state policy until May 2015. Further 6 MW have been installed in the industrial sector and additional 10 MW in the residential sector.

(2) Process Analysis

aa. Quantitative Analysis

Also the procedure under the Karnataka state solar policy is characterised by a high number of involved authorities. In case of Karnataka, the number of involved authorities is however lower than in Rajasthan; still, with up to 14 authorities, which are involved in the project development process for ground-mounted solar installations in Karnataka, the number remains very high. During the approval phase, the developer has to interact with 8 authorities. This is one authority less than in Rajasthan; however more than in other solar markets. In Germany for example the developer interacts during the approval phase only with 4 authorities.

As outlined above[20], a high number of involved authorities in the realisation process of solar projects, is leading to different implications: a prolonged realisation process and the risk of inconsistent and contradictory procedures.[21] It is a common phenomenon for emerging solar markets.

Proposed solution(s)/ international experience(s):

The identified challenge of a high number of involved authorities in the permitting process could be addressed by implementing a one-stop-shop or single window clearance body.

Under a one-stop-shop system one central authority would be empowered to decide (at least) on all required permits and approvals. The developer is thus only interacting with one central body instead of interacting with a multitude of authorities individually.

[19] Market update data based on „India Solar Handbook 2015, Bridge to India, Delhi, June 2015" (www.bridgetoindia.com/reports/).

[20] See section "Karnataka state analysis, quantitative process"

[21] See section "Karnataka state analysis, qualitative analysis, unadapted permitting procedure steps".

The implementation of a one-stop-shop system is however requiring that responsibilities from all before involved authorities are transferred to the new central competent body.

In Europe, several states declared to have implemented a one-stop-shop system, under which the developer only had to interact with one central authority. A closer look however showed that the developer had in fact only to interact with one authority. The one authority however did not receive the competency to decide on all permits and approvals but was forced to now interact itself with all before involved bodies. Under such a system, the issue of long lead times was not solved; the problem is more transferred from the developer to the new body. Systems operating in this *modus operandi* are no true one-stop-shop systems, which address the identified issue adequately.

An international good practice example for a true single window clearance system " may be identified in form of the "Sistema de Registro Micro-produção" (SRM) in Portugal, being an online registration system for micro generation installations. Through the renewable industry online portal "Portal Renováveis na Hora" (www.renovaveisnahora.pt) developers are able to perform the required project registration as well as all required permitting procedures. At the same time, one single authority is taking care of the entire process; thus providing a true one-stop-shop."[22]

bb. Qualitative Analysis

Under the qualitative analysis, the current development procedures for solar installations is analysed in detail. The analysis is generally identifying the different challenges within the development procedure, which are lengthening the procedure or rendering it more complicated; at the time, it also identifies positive aspects within the given procedure, which can serve as good practices for other Indian states:

(i) No procedural differentiation between small and large installations

The current procedure for ground-mounted solar installations in Karnataka foresees no procedural differentiation between ground-mounted installation with a smaller capacity and those with larger capacities. All ground-mounted installations have to follow the same development procedures, especially regarding the approval and clearances process and have to comply with the same requirements. The same applies for rooftop installations, for which a procedure is applied, which differs from the one for ground-mounted installations; yet, no differentiation is made within the rooftop segment.

Such an undifferentiated procedure bears the risk that installations with a smaller capacity have to comply with higher requirements, designed primarily for larger installations, even though this requirement would not be required in case of a small installation. For the smaller installation, the process is thus lengthened and developers have to spend more time and money to comply with the defined

[22] Portal Renováveis na Hora: www.renovaveisnahora.pt; PV Rooftop Development in Thailand - Analysis of Regulations and Challenges, Berlin/Bangkok, March 2014 (http://www.thai-german-cooperation.info/download/20140408_pdp_th_report_pv_regulations.pdf).

criteria. Moreover, it is also impeding the development of large projects as project officers at public authorities have more applications of small and large projects piling up. Due to this workload the project officers will have less time to focus on the large projects.

On the other hand, the equal application of only one procedure for all installations, irrespectively of their capacity size, also holds the risk that a process is defined, which shall serve as "middle ground"; i.e. a process which requests a set of permits or approvals; yet not necessarily all approvals and permit, which normally would be applied for large installations, to account more for the reality of small and medium capacities within the ground-mounted or rooftop segment. In these cases, there is the danger that large installations are realised with an inferior quality, which ultimately might put the reputation of the technology at stake.

Proposed solution(s)/ international experience(s):

Development procedures as well as the approval and clearances process shall be designed in regard to the applied solar technology (ground-mounted/rooftop), while at the same time accounting for the capacity sizes of the individual project.

To this end, it is advised to create procedures for the different capacity sizes of projects. This however does not imply that every single project shall have an individual procedure; rather capacity groups shall be defined for which the defined procedures shall apply. The capacity groups would group a range of capacities. The group "small ground-mounted installation" for example may comprise all projects with an individual capacity of up to 1 MW. A second group "medium ground-mounted installations" shall then address installations with a capacity of 1 MW to 10 MW. Finally, a group "large ground-mounted installations" would include any installation with a capacity above 10 MW.

For all three groups, the procedures would be designed in accordance to individual requirements. To this end, the procedure for medium and large ground-mounted installations may contain an environmental impact assessment (IEA), while such a permit is waived for small ground-mounted installations.

Through such a differentiated approach, smaller projects can be realised in shorter time and with les financial burden, while at the same time the quality of larger projects can be assured.

A thorough analysis of the actual required approvals and permits for every individual group is however required, to ensure that the defined procedure is accounting for the actual reality.

(ii) Unadapted permitting procedure steps

Throughout the analysis of the approval and clearances procedure of the Karnataka solar policy, several procedural steps within the defined permitting procedure were detected, which lead to the assumption that the procedure has not adequately be adapted to the reality of solar projects.

To this end, ground-mounted installations shall in first receive a no-objection-certificate from the Civil Aviation Department. The reason for this permit does not become evident. While a similar permit step

is known for large onshore wind installations in Europe, ensuring that the rotating blades of the wind towers are not interfering with the radar systems of military and civil aviation controls, the requirement in regards to solar systems remains unclear.

Solar installations are stable constructions, which do not move or rotate and thus which do not emit any potential interference source for radar installations. At best, solar installation may reflect the sunlight in a certain angle to flying objects. As civil aviation is predominantly operating on instrument flying and not on visual flight mode, the reflection would be an irrelevant factor.

A second example of an unadapted requirement that is applied to solar installations is the requested clearance under the Boilers Act 1923. Solar PV installations have to apply to the Divisional Inspector of the Department of Factories, Boilers, Industrial Safety and Health to receive a clearance of the boiler. Solar PV Installations however do not use a boiler; still, the requirement is defined as required permit.

In both cases, it appears that procedures for fossil installations have been copied and pasted to solar installations. The applied regulations do refer commonly to "industry installations". Throughout the definition of requirements for solar installations, solar installations apparently have been considered as "industry installations", most likely in the absence of a detailed understanding of the technology.

Proposed solution(s)/ international experience(s):

The phenomenon of unadapted procedures for renewable installations is well known and numerous examples can be identified throughout the world.

To this end, the PV Legal project identified "sound testing" as an approval steps for solar installations in a regulation of European Member State, even though PV installations are not emitting any sound.

In addition, the former Thai solar regulation for rooftop installations applied a historical definition of a power plant under the national Factory Act 1992. Electrical installations with a capacity of more than 5 Horse Powers (~3.73 kWp) were considered as power plant, requiring for a factory operation license issued by the Thai Department of Industrial Works (DIW). For the calculation of the Horse Power of a PV installation, the definition referred to the cumulative capacity of the installation as well as of the used inverters. Through this definition even very small rooftop installations on private households were treated as power plant. The regulation in addition foresaw that "power plants" were not allowed in urban areas and were to be installed with a 200 m safety zone around buildings.

The applied procedure as well as the compliance with the defined criteria made the application of solar rooftop almost impossible, at least for private residential buildings, even though the regulation defined these building as a clear target group.

The Thai government realised the unadapted regulation and corrected the existing barrier by revaluating the applied procedure and waiving the factory license for rooftop solar installations.

Correspondent to the measures taken by the Thai government, it is advised to carefully screen all applied procedures for solar installations again to identify those requirements and requested approvals, which do represent a roadblock for the development of solar projects and which are not suitable for the solar technology. Another approach is to introduce mandatory, internationally accepted certificates for solar

power installations. This will allow the application of secure technologies without tedious individual checks.

(iii) No clear deadlines/missing sanctioning system

The analysed procedure for the development of solar project in Karnataka, especially as far as the approval and clearances process is concerned, does provide at times for a timeline for the required permits and approvals; yet, only regarding the period, in which a certain approval or permit has to be obtained by the developer.

The procedure does however not account for a sanctioning systems, which holds also the authority liable to react in due time on an application. The "waiting time" caused by the delayed reaction of the administration is however often the even bigger issue for developers of solar projects.

Waiting time are delaying the realisation process of a solar project decisively, resulting in higher realisation costs for the individual developer. At the same time, certain permits and approvals are often prerequisites for others; thus blocking the entire process in case of delays.

The PV Legal Project analysed in detail the process length of the administrative procedure in the different European markets.[23] The analysis on the one hand identified the actual length of the process, in terms of the actual time in which the developer is actively contributing to the administrative process as well as the waiting time, during which the developer is passive and waits for a decision of the competent body. The results were striking: while the overall length of the administrative procedure using the example of ground-mounted installations already differed between the European markets by more than 125 weeks; the developer in some processes (for example in Spain) were only active during 40 weeks, while he waited up to additional 110 weeks on decisions of the individual authorities, which were involved in the process.

Proposed solution(s)/ international experience(s):

The above described European examples depict clearly the consequences of missing deadlines and missing sanctioning systems.

The applied procedures for solar projects should provide for clear deadlines for the developer as well as for the involved authorities. At the same time, the developer should have an appeal possibility through which he can appeal to higher authority level in case of inactivity of the competent body or even to a judicial level, which would force the competent authority to treat the presented application.

A clear defined procedure, including deadlines for all involved parties, also offers the advantage of a predictable realisation period, which is not at least of crucial importance for the planning of lead times and the negotiations with financial institutions.

[23] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

Examples from European markets show that simple and predictable procedures attract the highest attention from developers and investors and can even compensate lower support scheme levels.

(iv) Flexibility of the ground mounted permitting procedure

A generally positive feature of the Karnataka solar development procedure is the high flexibility of the system, which offered to project developers. To this end, a project in the state can start project execution without formal approval after filing the necessary application for conversion of category of land with the revenue department of the state.

This approach is to a certain extend also countervails the described challenge of "no clear deadlines/missing sanctioning system", described under 4. Developers do not have to wait for a formal action of the competent authority, but can continue with the execution of his project.

In addition, the policy also does not require for a formal environmental impact assessment (IEA). Such an assessment can be a quite lengthy and cost intensive process. The non-requirement is rendering the development process for investors and developers less burdensome.

On the other side, the taken approach in regard to the flexibility of the process as well as the waived IEA also bears a certain risk. Projects may be developed without being checked in details, resulting in installations which do not conform to international standards; thus, having potentially a shorter lifetime or impacting negatively on the environment. Through the negative impacts, the reputation of the technology might suffer; resulting ultimately in an opposition of the local population.

Proposed solution(s)/ international experience(s):

The procedure for solar installations shall account on the hand for the type of installation (ground-mounted/rooftop) as well as for the individual capacity sizes (small/medium/large).

Furthermore, the procedure shall provide for a high flexibility, while at the same time ensuring a high quality of installations.

Approvals and permits shall be applied for those types and sizes of installations that actually require the individual approval. Consequently, the IEA may be requested for medium and large ground-mounted installations, while they are waived for smaller ground-mounted projects.

The flexibility of a system has generally to be judged as a positive feature of a procedure; still, the execution of project, without formal approval should not lead to a situation, in which projects are realised without being controlled at all.

It should also be avoided to implement a system of "tacit approval", whereby projects receive the requested approval if the competent authority has not objected within a defined deadline. These systems bear the risk that inadequate realised projects may receive the approval, only because the administration is overburdened and not able to react in due time. The overall quality of project would suffer and with this the reputation of the technology as such.

d. Andra Pradesh

(1) Market Update[24]

Under the Andra Pradesh state solar policy, an overall target of 5.000 MW of state government solar electricity projects is foreseen until 2019.

Until May 2015, 45 MW of utility scale solar installations have been commissioned under the Andra Pradesh state solar policy. Additional 600 MW of utility scale solar projects are under development.

As far as the rooftop segment is concerned, 6 MW have been installed in the commercial sector under the state policy until May 2015. Further 4 MW have been installed in the industrial sector and additional 11 MW in the residential sector.

(2) Process Analysis

aa. Quantitative

As already outlined for the Union States Rajasthan and Karnataka above, also the procedure under the Andra Pradesh state solar policy is characterised by a high number of involved authorities. In case of Andra Pradesh, the number of involved authorities for the development of a ground-mounted solar project is lower than in Rajasthan; yet, higher than in Karnataka.

The entire project development process in Andra Pradesh involves not less than 17 authorities, many of them repeatedly. Only during the approval and clearances phase, 11 authorities are involved under the Andra Pradesh policy; this is 3 more than in Karnataka and 1 less than in Rajasthan.

A high number of involved authorities is generally leading to different implications: on the one hand, the realisation process is often prolonged if more authorities are involved. The developer has to interact separately with the individual authorities; at the same time, the individual authority also needs it's time to treat the developers case. Furthermore, waiting times are often involved, extending the process even further. In addition, there is the risk that processes are inconsistently applied between the different involved authorities, leading to inconsistent procedures and contradictory decisions.

The high number of authorities is often caused by procedures, which are not adequately adapted to solar technology. In most cases, procedures for fossil installations seem to be at the basis of the approval procedures of solar installations, including requirements which are not applicable to the solar technology.[25]

[24] Market update data based on „India Solar Handbook 2015, Bridge to India, Delhi, June 2015" (www.bridgetoindia.com/reports/).

[25] See also "Andra Pradesh state analysis, qualitative analysis, unadapted permitting procedure steps".

Proposed solution(s)/ international experience(s):

The identified challenge of a high number of involved authorities in the permitting process could be addressed by implementing a one-stop-shop or single window clearance body.

Under a one-stop-shop system one central authority would be empowered to decide (at least) on all required permits and approvals. The developer is thus only interacting with one central body instead of interacting with a multitude of authorities individually.

The implementation of a one-stop-shop system is however requiring that responsibilities from all before involved authorities are transferred to the new central competent body.

In Europe, several states declared to have implemented a one-stop-shop system, under which the developer only had to interact with one central authority. A closer look however showed that the developer had in fact only to interact with one authority. The one authority however did not receive the competency to decide on all permits and approvals but was forced to now interact itself with all before involved bodies. Under such a system, the issue of long lead times was not solved; the problem is more transferred from the developer to the new body. Systems operating in this *modus operandi* are no true one-stop-shop systems, which address the identified issue adequately.

An international good practice example for a true single window clearance system " may be identified in form of the "Sistema de Registro Micro-produção" (SRM) in Portugal, being an online registration system for micro generation installations. Through the renewable industry online portal "Portal Renováveis na Hora" (www.renovaveisnahora.pt) developers are able to perform the required project registration as well as all required permitting procedures. At the same time, one single authority is taking care of the entire process; thus providing a true one-stop-shop."[26]

bb. Qualitative

(i) No procedural differentiation between small and large installations

The current procedure for ground-mounted solar installations in Andra Pradesh foresees no procedural differentiation between ground-mounted installation with a smaller capacity and those with larger capacities. All ground-mounted installations have to follow the same development procedures, especially regarding the approval and clearances process and have to comply with the same requirements. The same applies for rooftop installations, for which a procedure is applied, which differs from the one for ground-mounted installations; yet, no differentiation is made within the rooftop segment.

[26] PV Rooftop Development in Thailand - Analysis of Regulations and Challenges, Berlin/Bangkok, March 2014 (http://www.thai-german-cooperation.info/download/20140408_pdp_th_report_pv_regulations.pdf).

Such an undifferentiated procedure bears the risk that installations with a smaller capacity have to comply with higher requirements, designed primarily for larger installations, even though these requirement would not be required in case of a small installation. For the smaller installation, the process is thus lengthened and developers have to spend more time and money to comply with the defined criteria. Moreover, it is also impeding the development of large projects as project officers at public authorities have more applications of small and large projects piling up. Due to this workload the project officers will have less time to focus on the large projects.

On the other hand, the equal application of only one procedure for all installations, irrespectively of their capacity size, also holds the risk that a process is defined, which shall serve as "middle ground"; i.e. a process which requests a set of permits or approvals; yet not necessarily all approvals and permit, which normally would be applied for large installations, to account more for the reality of small and medium capacities within the ground-mounted or rooftop segment. In these cases, there is the danger that large installations are realised with an inferior quality, which ultimately might put the reputation of the technology at stake.

Proposed solution(s)/ international experience(s):

Development procedures as well as the approval and clearances process shall be designed in regard to the applied solar technology (ground-mounted/rooftop), while at the same time accounting for the capacity sizes of the individual project.

To this end, it is advised to create procedures for the different capacity sizes of projects. This however does not imply that every single project shall have an individual procedure; rather capacity groups shall be defined for which the defined procedures shall apply. The capacity groups would group a range of capacities. The group "small ground-mounted installation" for example may comprise all projects with an individual capacity of up to 1 MW. A second group "medium ground-mounted installations" shall then address installations with a capacity of 1 MW to 10 MW. Finally, a group "large ground-mounted installations" would include any installation with a capacity above 10 MW.

For all three groups, the procedures would be designed in accordance to individual requirements. To this end, the procedure for medium and large ground-mounted installations may contain an environmental impact assessment (IEA), while such a permit is waived for small ground-mounted installations.

Through such a differentiated approach, smaller projects can be realised in shorter time and with les financial burden, while at the same time the quality of larger projects can be assured.

A thorough analysis of the actual required approvals and permits for every individual group is however required, to ensure that the defined procedure is accounting for the actual reality.

(ii) No clear deadlines/missing sanctioning system

The analysed procedure for the development of solar project in Andra Pradesh, especially as far as the approval and clearances process is concerned, does provide at times for a timeline for the required

permits and approvals; yet, only regarding the period, in which a certain approval or permit as to be obtained by the developer.

The procedure does however not account for a sanctioning systems, which holds also the authority liable to react in due time on an application. The "waiting time" caused by the delayed reaction of the administration is however often the even bigger issue for developers of solar projects.

Waiting time are delaying the realisation process of a solar project decisively, resulting in higher realisation costs for the individual developer. At the same time, certain permits and approvals are often prerequisites for others; thus blocking the entire process in case of delays.

The PV Legal Project analysed in detail the process length of the administrative procedure in the different European markets.[27] The analysis on the one hand identified the actual length of the process, in terms of the actual time in which the developer is actively contributing to the administrative process as well as the waiting time, during which the developer is passive and waits for a decision of the competent body. The results were striking: while the overall length of the administrative procedure using the example of ground-mounted installations already differed between the European markets by more than 125 weeks; the developer in some processes (for example in Spain) were only active during 40 weeks, while he waited up to additional 110 weeks on decisions of the individual authorities, which were involved in the process.

Proposed solution(s)/ international experience(s):

The above described European examples depict clearly the consequences of missing deadlines and missing sanctioning systems.

The applied procedures for solar projects should provide for clear deadlines for the developer as well as for the involved authorities. At the same time, the developer should have an appeal possibility through which he can appeal to higher authority level in case of inactivity of the competent body or even to a judicial level, which would force the competent authority to treat the presented application.

In addition, there should also be a legal regulation for the question of compensation of occurred damages of the developer, caused by the inactivity of the competent authorities.

A clear defined procedure, including deadlines for all involved parties, also offers the advantage of a predictable realisation period, which is not at least of crucial importance for the planning of lead times and the negotiations with financial institutions. Examples from European markets show that simple and predictable procedures attract the highest attention from developers and investors and can even compensate lower support scheme levels.

(iii) Unadapted permitting procedure steps

[27] PV Legal Project, Final Report – Reduction of bureaucratic barriers for successful PV development in Europe, Berlin, February 2012 (www.pvlegal.eu).

Throughout the analysis of the approval and clearances procedure of the Andra Pradesh solar policy, several procedural steps within the defined permitting procedure were detected, which lead to the assumption that the procedure has not adequately be adapted to the reality of solar projects.

To this end, ground-mounted installations shall in first receive a no-objection-certificate from the Civil Aviation Department. The reason for this permit does not become evident. While a similar permit step is known for large onshore wind installations in Europe, ensuring that the rotating blades of the wind towers are not interfering with the radar systems of military and civil aviation controls, the requirement in regards to solar systems remains unclear.

Solar installations are stable constructions, which do not move or rotate and thus which do not emit any potential interference source for radar installations. At best, solar installation may reflect the sunlight in a certain angle to flying objects. As civil aviation is predominantly operating on instrument flying and not on visual flight mode, the reflection would be an irrelevant factor.

A second example of an unadapted requirement that is applied to solar installations is the requested clearance under the Boilers Act 1923. Solar PV installations have to apply to the Divisional Inspector of the Department of Factories, Boilers, Industrial Safety and Health to receive a clearance of the boiler. Solar PV Installations however do not use a boiler; still, the requirement is defined as required permit.

In both cases, it appears that procedures for fossil installations have been copied and pasted to solar installations. The applied regulations do refer commonly to "industry installations". Throughout the definition of requirements for solar installations, solar installations apparently have been considered as "industry installations", most likely in the absence of a detailed understanding of the technology.

Proposed solution(s)/ international experience(s):

The phenomenon of unadapted procedures for renewable installations is well known and numerous examples can be identified throughout the world.

To this end, the PV Legal project identified "sound testing" as an approval steps for solar installations in a regulation of European Member State, even though PV installations are not emitting any sound.

In addition, the former Thai solar regulation for rooftop installations applied a historical definition of a power plant under the national Factory Act 1992. Electrical installations with a capacity of more than 5 Horse Powers (~3.73 kWp) were considered as power plant, requiring for a factory operation license issued by the Thai Department of Industrial Works (DIW). For the calculation of the Horse Power of a PV installation, the definition referred to the cumulative capacity of the installation as well as of the used inverters. Through this definition even very small rooftop installations on private households were treated as power plant. The regulation in addition foresaw that "power plants" were not allowed in urban areas and were to be installed with a 200 m safety zone around buildings.

The applied procedure as well as the compliance with the defined criteria made the application of solar rooftop almost impossible, at least for private residential buildings, even though the regulation defined these building as a clear target group.

The Thai government realised the unadapted regulation and corrected the existing barrier by revaluating the applied procedure and waiving the factory license for rooftop solar installations.

Correspondent to the measures taken by the Thai government, it is advised to carefully screen all applied procedures for solar installations again to identify those requirements and requested approvals, which do represent a roadblock for the development of solar projects and which are not suitable for the solar technology. Another approach is to introduce mandatory, internationally accepted certificates for solar power installations. This will allow the application of secure technologies without tedious individual checks.

(iv) Unharmonised application of rules/unharmonised clearance requirements

A second set of challenges identified in the framework of the analysis of the Rajasthan solar policy and the inherent solar development procedure regards the unharmonised application of rules.

To this end, the Andra Pradesh State Pollution Control Board requires environmental clearances for solar project and is charging a fee for the treatment of an application. The clearances are required for ground-mounted project in Andra Pradesh under the JNNMS as well as under the Andra Pradesh State Solar Policy. Regarding the environmental clearances for solar projects, the Ministry of Environment and Finance India however has declared that solar projects are exempt from any environmental clearance. This situation is resulting in conditions, were the legal framework is not uniformly applied; leading ultimately to higher costs and longer lead times of solar projects in Andra Pradesh.

It is however to ask whether the Ministry of Environment and Finance India is competent to decide the matter for projects under the JNNSM as well as for projects under the state policy. In case the Federal ministry is only responsible for the JNNSM, but has no competency in state matters (state solar policy), Rajasthan is free to opt for stricter criteria, even if this is resulting in different project development procedures.

Proposed solution(s)/ international experience(s):

The unharmonised application of rules is a common challenge, especially in emerging solar markets. Beside the question of competencies (Federal/State), it is to ask, whether the application of individual criteria for each state is economically reasonable. For international developers and investors it is very difficult to understand and differentiate the patchwork regulation for the different Indian States as well as for the implementation of projects under the JNNSM in the different Indian Union States. At the same time, investors and developers will always opt for those states that offer a lean and easy to implement development procedure. To apply a certain set of clearances to the solar technology even though other states have waived them for a good reason is leading to a competitive disadvantage and ultimately to lower investments and developments.

Procedures should thus be regularly screened and revised to streamline them and to adapt them to the actual reality. To include in the revision process also lessons learned from other states is wise and avoids the doubling of mistakes.

Regarding the unharmonised clearance requirements for solar projects in the different Union States, the above reasoning applies equally. Where Federal competencies are violated, states will have to change their behaviour and adapt the common Federal set of rules and procedural steps. Where the competency lies with the Federal States, the states itself will have to question if the unharmonised set of clearances has a valid reason at its basis or if it would not be advised to streamline existing regulations and processes, while accounting for lessons learned from other states

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