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# PROMOTION OF WIND ENERGY :

## LESSONS LEARNED FROM INTERNATIONAL EXPERIENCE AND UNDP-GEF PROJECTS

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# ACRONYMS & **ABBREVIATIONS**

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|---|---|
| **BNDES** | Banco National de Desenvolvimento Econômico e Social – Brazilian National Economic and Social Development Bank |
| **CDM** | Clean Development Mechanism |
| **CDM M&P** | CDM Modalities & Procedures |
| **CER** | Certified Emission Reductions |
| **CO2** | Carbon Dioxide |
| **COP** | Conference of the Parties (of the United Nations Framework Convention on Climate Change – UNFCCC) |
| **CWET** | Center for Wind Energy Technology (India) |
| **DPRK** | Democratic People's Republic of Korea |
| **GEF** | Global Environment Facility |
| **GWEC** | Global Wind Energy Council |
| **IPP** | Independent Power Producer |
| **IRR** | Internal Rate of Return |
| **JI** | Joint Implementation |
| **JV** | Joint Venture |
| **PDF** | Project Development Facility |
| **PIR** | Project Implementation Review |
| **PPA** | Power Purchase Agreement |
| **Prodoc** | Project Document |
| **PROINFA** | Program de Incentivo às Fontes Alternativas de Energia Elétrica Brazilian Support Programme for Alternative Sources of Electricity |
| **R&D** | Research & Development |
| **RE** | Renewable Energy |
| **ROE** | Return on Equity |
| **RPS** | Renewable Portfolio Standards |
| **SWERA** | Solar and Wind Energy Resource Assessment Programme |
| **TSO** | Transmission System Operator |
| **UNDP** | United Nations Development Programme |
| **WWEA** | World Wind Energy Association |

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# EXECUTIVE **SUMMARY**

Although wind energy is a rapidly growing technology its use remains geographically concentrated, with more than 75 percent of global installed capacity found in just five countries. These countries, and others wishing to develop wind energy have implemented various supportive policies covering areas as diverse as tariffs, technical R&D, administrative procedures, or education and communication, and range from direct project subsidies to general awareness raising.

Experience shows that good wind resources are not on their own sufficient to ensure strong wind energy development and reductions of the cost of wind energy. Even fair pricing is not necessarily enough. Only countries that have set up an adequate enabling environment and long-term stable comprehensive public policies, with strong political commitment, have succeeded in developing wind power. Their policies have been focused, not only on reducing costs and improving revenues to increase profitability, but also on reducing risks.

Policies giving market access to wind energy are the most critical. Feed-In laws – the main instrument used in Europe to promote wind energy – have the advantage of giving developers long-term stability and predictability and have helped create three of the world's largest wind energy producers. In the European context, they have been more cost-effective than Quotas. However, apart from Canada, large industrial countries in the rest of the world (USA, Japan, and Australia) have chosen Quota-based instruments, combined with subsidies or tax credits. Some of these Quota-based systems have been effective in giving rise to new wind capacities but only when carefully designed, and in countries using them, it has not been proven that Quotas effectively provide the lower costs that theory credits them for. China and India have, like Canada, in theory chosen to mix Feed-In tariffs and Quotas, even if, in practice, the Chinese Feed-In pricing system will actually be based on tendering results. Tender-driven policies have major drawbacks and until now, there has been no successful experience of tendering as the sole instrument of a nationwide ambitious wind dissemination policy. The same conclusion can be reached for voluntary policies, such as green pricing.

Whatever policies are chosen, in most countries the development of wind energy will require specific financing, generally through public subsidies and/or an increase in electricity prices, however small. In almost all countries, policies such as Feed-In laws and Quotas are combined with tax credits, subsidies or soft loans.

The necessary public or private money is not always available, especially in developing countries. Available funding should be first allocated to creating an adequate general environment for wind projects, removing barriers, and activities of this kind. The Clean Development Mechanism (CDM) can potentially bring additional revenues to specific wind energy projects.

Wind energy projects will generally be able to comply with the CDM eligibility rules.

CDM and Joint Implementation (JI) can be useful by financing projects in a country for the first few years and help them reach a volume where national competence can develop. As more and more projects are developed, local skills in designing, planning, maintaining and operating wind farms will increase, paving the way for private investor-based projects. In small

countries, the financing of these projects can rely mainly on CDM. However, because of the administrative burden linked with the international assessment of individual projects, it is doubtful that CDM or JI could by themselves be the basis for long-term wind energy development in large countries.

CDM often needs to be combined with other policies designed to bring additional revenues and remove non-economic barriers. Feed-In laws are the easiest of the market access policies to combine with CDM revenues. Such a combination would be most adequate for medium to large-sized projects in countries with medium wind energy potential.

Policies on permitting and licensing and grid issues are also critical. To meet wind energy penetration targets in a cost-effective way, it is necessary to create a process that will facilitate increased generation in a timely and simple manner. If obtaining all the necessary permits and licenses is a complex, costly and uncertain process, investors can be deterred and project profitability jeopardized. Grid access is of course critical to wind energy development, but even when regulations giving grid access to wind farms are in place, many critical issues related to grids can remain – including connection delays and charges, transmission charges and grid stability and ancillary services. Electric grids in most countries were designed to bring electricity from large production centers to urban areas. They were not made for distributed generation.

Both issues – permitting/licensing and grid issues – have been among the focuses of European policy in the past few years and are beginning to be considered in China and India.

Many countries have also implemented policies on national industry promotion, wind resource assessments, technology development, standards and testing, education and awareness-raising because they reduce risks and bring solidity and confidence to a business plan. This is even more important in countries that are seen in themselves as risky for investors, whatever the type of investment.

Setting up an effective and comprehensive wind energy policy requires dealing with a large number of various, often complex, issues. However, much experience has been gained in developed countries, and more recently in some developing countries such as China or India. This should help make things easier, and also faster, for countries wishing to promote wind energy.

To help governments transform the markets for wind energy by implementing enabling policies, the GEF has financed, or is considering financing, 14 projects through UNDP, of which only one has been completed. These projects are generally located in countries with good wind resources and some experience with liberalization/privatization. Electricity prices are very diverse in the different countries.

In order to remove barriers to the development of wind energy, the design of the projects integrates some of the lessons learned from existing successful wind policies. These include the necessity of reviewing the regulatory environment to offer developers clear and expeditious procedures, the importance of giving developers access to data on wind resources and the need to increase awareness of public authorities, companies and the public through education and training programmes.

Demonstration sites are included in all projects but efforts towards enhancing the replicability of these demonstrations need to be continued.

The most recent projects increasingly emphasize the need to have defined, stable, business models and financing schemes with guaranteed market access at the end of the project rather than concentrating essentially on financing the demonstration plant. This should be generalized. Education or wind assessment policies, however important, will not lead to effective wind farms if there is no profitable economic model for developers. The importance of grid-related issues seems generally underestimated.

For future projects, some guidelines can be offered.

Concentrating projects in countries where they stand the best chances of success because of the country's wind energy policies can help maximize the effectiveness of the money available. Wind energy generally has better chances of being successfully developed in countries with the following characteristics:

- A real commitment by policy-makers to develop wind energy;
- A large enough commercial wind energy potential. One strategy for UNDP could be to start working systematically on countries that have successfully participated in the Solar and Wind Energy Assessment Programme (SWERA).

Some public action on energy efficiency/energy savings should also be a prerequisite for initiating a wind energy project.

In order to be successful in each country, wind energy policies should :

- Be long term and consistent;
- Include legally binding targets or obligations;
- Offer wind energy producers standardized long-term contracts with secure payment mechanisms and an acceptable rate of return;
- Provide fair and open grid access and development;
- Provide good governance and appropriate streamlined procedures; and
- Create strong public acceptance and support.

In terms of market access policies, a Feed-In system is probably the safest overall policy choice for any country really committed to developing wind energy. Feed-In systems have provided good results and experience