

Job Creation Potential of Renewable Energies in South Africa

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to be published in *ESI Africa*, Issue 3, 2002
- draft pre-print, do not copy -

Motivation

The 1997 White Paper on Renewable Energy in the European Union proposed a target of a 12% share of total renewable energy sources in the gross EU energy consumption by 2010 [1]. This translates to a Renewable Energy share of 23,5% of all electricity consumed. The major contributions derive from hydro, biomass and wind energy. This ambitious target will be met through various national schemes. For example, Germany alone had already more than 9 GW of wind power installed in April 2002 with an approximate annual growth rate of 40%. A fundamental change in the European energy supply structures leads to a completely new industrial sector with enormous job creation potential. This paper examines the related South African situation and provides guidelines to boost a similar national and regional development in this promising field of high international exposure.

Jobs in the South African Renewable Energy Sector

In order to collect information on the current situation in the Renewable Energy sector of South Africa, a comprehensive internet survey was conducted amongst a large number of companies that are active in the field. It was learned that most of the Renewable Energy activity (59%) covered by the survey is found in the field of photovoltaics (see figure 1). The business areas are shown in figure 2. Furthermore 45% of all recorded jobs fall into the category „public projects“ and 55% into „private demand“.

While the average annual growth of the companies' staff over the last two years was 6%, the companies (apart from the concessionaires for PV-electrification of rural areas) expect an average annual staff growth of 11% for the next 5 years. Only the concessionaires for rural PV-electrification expect to grow significantly faster. It is interesting to note that amongst those companies, that had been able to increase their

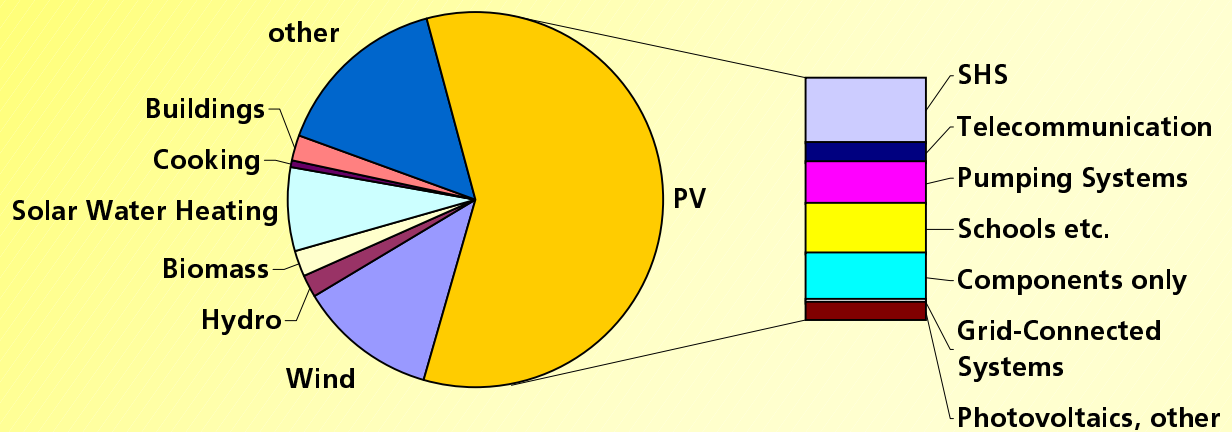


Fig. 1: Working hour distribution of all permanent staff working in Renewable Energies, analysed by technical categories

PV: 59%, Wind: 12%, Hydro: 2%, Biomass: 2%, Solar water heating: 7%, Cooking: 1%, Buildings: 2%, other: 15%
 PV sub-categories: Solar Home Systems: 16%, Telecommunication 5%, Pumping Systems: 10%, Schools etc.: 12%, Components only: 11%, Grid-Connected Systems: 1%, PV other: 4%

staff over the last 2 years, 90% of all jobs were based on private demand. Evidently it is essential for a company to focus strongly on the private demand instead of public projects if growth is to be achieved.

Considering *only* those companies that focus on private demand (figure 3), the overall picture is that the activities based on private demand are rather similar to those which focus on public projects, apart from solar water heating where approximately 90% of all jobs recorded in this survey are actually based on truly private demand.

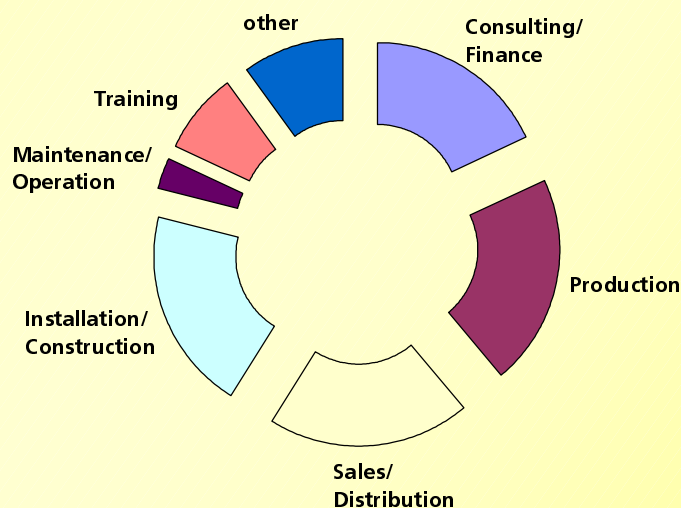


Fig. 2: Working hour distribution of all permanent staff in companies with >50% activity in Renewable Energies, analysed by business areas

Consulting/Finance: 18%,
 Production: 21%,
 Sales/Distribution: 20%,
 Installation/Construction: 20%,
 Maintenance/Operation: 3%,
 Training: 8%, other: 10%

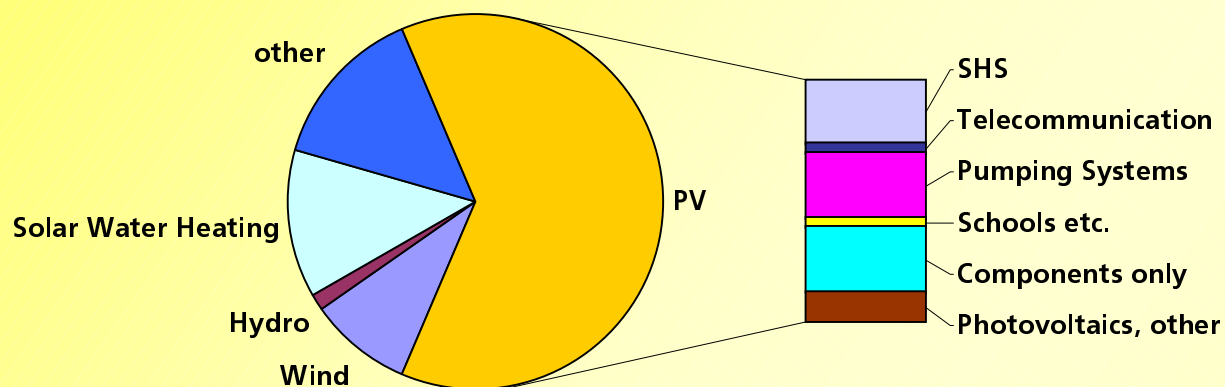


Fig. 3: Working hour distribution of all permanent staff working in Renewable Energies, considering *only* those companies that focus on private demand

PV: 63%, Wind: 9%, Hydro: 1%, Solar water heating: 13%, other: 14%
 PV sub-categories: Solar Home Systems: 16%, Telecommunication: 3%,
 Pumping Systems: 16%, Schools etc.: 3%, Components only: 17%, PV
 other: 8%

For companies concentrating on private demand the average staff was 68% of the maximum number, while this percentage was only 40% for companies that focus on public projects. This indicates that the private sector is a rather continuous business while the public projects work on a stop-start basis.

It can be summarized that the current South African Renewable Energy sector is strongly focussing on off-grid photovoltaic applications. Compared to the European example the overall growth expectations with regard to Renewable Energies in South Africa are rather moderate. While public projects account for almost half of the national Renewable Energy activity, wherever modest growth takes place it is linked to private demand.

Job Creation: Niche markets and/or bulk energy supply?

As seen above, Renewable Energies in South Africa mainly focus on niche markets such as non-grid electrification in rural areas. By contrast, the EU is introducing Renewables on a large scale in order to substitute conventional forms of energy. It has been calculated that this process can lead to over 900 000 new jobs in the EU by 2020 [2]. For Germany alone the number of direct and indirect jobs in the Renewable Energy sector is currently between 80 000 and 130 000. Most of the RE jobs in Europe are anticipated in the sectors of agriculture, building, and manufacturing with a strong focus on biomass technologies (both fuel supply and biomass electricity/co-generation).

Many of these entirely new industries would find a much better business environment in South Africa than in Europe due the favourable climatic conditions, if only a suitable

range of support instruments would be applied and a number of institutional barriers be removed. The South African White Paper on Renewable Energy states the medium-term (10-year) target that the Renewable Energy sources' share of final energy consumption should increase from 9% in 1999 to 14% by the year 2012. This amounts to an additional annual final energy supply generated from *Renewable* Energies of approximately 110 000 TJ. In order to achieve this ambitious objective, Renewable Energies in South Africa must leave their niches and start to contribute to the bulk supply of energy on a large scale. In this context, major contributions to the national final energy mix can mainly be expected from biofuels, solar water heating, and grid-connected electricity. This development is associated with the creation of enormous numbers of new jobs: It is estimated that biodiesel alone can contribute 64 000 TJ (equivalent to 58% of the intended national Renewable Energy increase for 2012) to South Africa's final energy supply, coming along with up to 200 000 new jobs in the related sectors. Similarly, a significant number of new jobs will be created in the field of green electricity because it is much more labour intensive than conventional electricity. As with biodiesel, many of the jobs related to green electricity can be created in the agricultural sector, where biomass co-generation techniques are an efficient and cheap option for power generation. However, other grid-connected renewable energies also have a significant job creation potential: As already seen in Europe, wind energy for example is approximately a factor of 10 more labour intensive per energy unit than nuclear energy.

While the number of jobs in the coal based conventional electricity supply industry has been continuously decreasing for many years, it can be concluded that the bulk use of Renewables Energies in the fuel and electricity sectors will clearly create enormous numbers of new jobs in South Africa. In order for this job creation potential to materialise, Renewable Energies will have to expand far beyond their current South African niche markets. As a consequence, instead of carrying on with a business-as-usual, a new regulatory framework is urgently needed to achieve this ambitious target.

A new regulatory framework to support Renewable Energies in South Africa

As Renewable Energies are still more expensive per unit than many conventional energies, intelligent support policies must be created in order to make the field of Renewables attractive for local and international investors. The resulting extra costs for the national economy will easily be counterbalanced by the positive side benefits of Renewable Energies such as job creation, diversification of the national energy mix, independence from energy imports, and international funding for carbon dioxide mitigation (Clean Development Mechanism, CDM). Furthermore, a strong grid-focused Renewable Energy industry can serve as a powerful seed for the related companies' off-grid activities in rural markets, thereby enhancing the existing national electrification efforts. As a consequence, Minister Phumzile Mlambo-Ngcuka stated in the DME's budget vote speech on 7 May 2002: "We are poised to push renewables much higher and even people with grid electricity need to be given the choice."

While the use of biofuels can easily be stimulated by tax incentives, a suitable incentive to support grid-connected Renewable Electricity sources still remains subject to discussions. The wide variety of related support policies that have been tested in many countries [3] has boiled down to just two approaches: feed-in laws and quota-/green certificate systems. Both approaches lead to long-term production incentives (instead of often embezzled short-term investment incentives), and both focus on collecting the extra money on the electricity market (instead of an inefficient redistribution of taxpayers' money via subsidies). In the following, both approaches will be briefly described and the feed-in law will be identified as the better solution for the particular South African context.

The quota-/green certificate approach

Under the quota-/green certificate approach an entrepreneur will sell green electricity in an unprotected market at free prices. "Green certificates" are issued by a regulator for every green energy unit sold. These green certificates are provided with tradable value by the so-called "quota": All suppliers of electricity are forced to include a certain percentage of green electricity in their purchases or otherwise pay a penalty. The suppliers are given the choice of either producing green electricity themselves or buying green certificates in order to avoid the penalty. Suppliers with a surplus of renewably generated electricity can now sell both electricity *and* green certificates, possibly making the large-scale production of green electricity an attractive business. However, this scheme will only support the cheapest Renewable Energy options which do not necessarily bring along the desired side benefits such as job creation. In addition, there is not much international experience available as this model is rather new. Just like the stock market the quota-/green certificate approach is not very trustworthy for investors as the exact value of green certificates cannot be accurately predicted in the long term. The "penalty approach" is perceived to be a threat rather than an incentive, there is a lot of bureaucracy, and quotas have to undergo a politically delicate and investor-unfriendly annual re-adjustment. In summary, a combined quota-/green certificate approach cannot be recommended for South Africa.

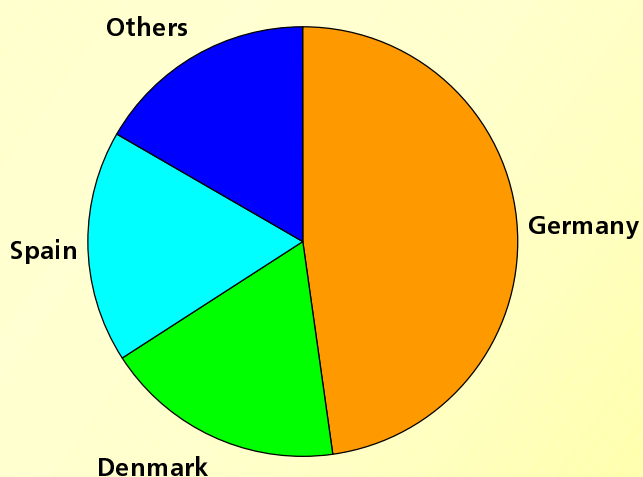


Fig. 4:
Wind energy capacity installed in the EU in 2000 with feed-in laws in Germany, Denmark and Spain

Germany: 6113 MW, Denmark: 2300 MW, Spain 2235 MW, others: 2121 MW

The feed-in law

On the other hand, the so-called feed-in law appears well-suited to the country. Under such a scheme, the grid operators are obliged to

- a) buy all renewably generated electricity that is offered to them by any grid-connected producer, and
- b) pay fixed prices for green electricity which are defined in the law.

The grid-feeder tariffs defined by law must be chosen sufficiently high so that they create an attractive business environment for investors. As a result, the electricity distributors must slightly raise the end-user prices. However, due to the small percentage of Renewables compared to the high amount of other energy forms in the electricity mix the overall price increase is negligible. As the grid operators are still autonomous with regard to the end-user tariffs, subsidised tariffs for low-income customers are of course still possible.

The feed-in law does not need any public funds to be collected before its implementation and can therefore in principle be passed at any time. As in a feed-in law some forms of Renewable Electricity can be granted more favourable prices than others, Government keeps effective control over the energy mix. Especially highly job intensive energy forms such as biomass co-generation can be offered more attractive conditions.

It is therefore no surprising result of the above mentioned survey that 65% of the companies indicated to expect a significant growth in the field of grid-connected Renewable Energies provided South Africa passed a well-crafted national feed-in law. As the electricity distribution sector is currently subject to fundamental reforms, the framework of a feed-in law should be included in the relevant blueprints. The proposed

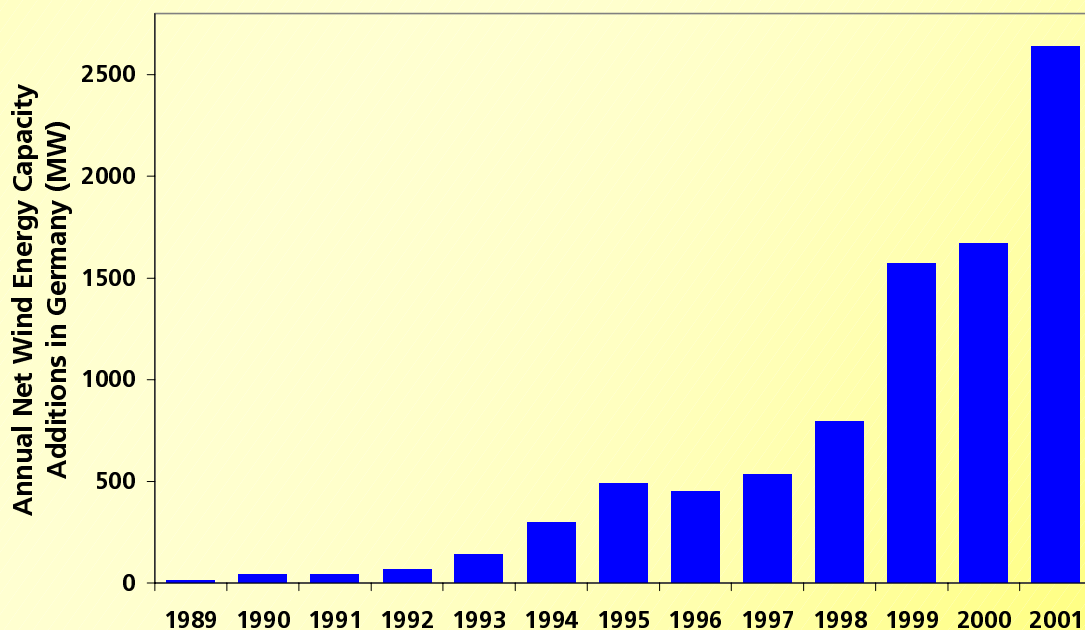


Fig. 5: Annual net wind energy capacity additions (MW) in Germany

reform will thereby not only increase the sector's efficiency, but could also lay the foundations for massive job creation through Renewable Energies in South Africa and the region.

References

- [1] *Energy for the Future: Renewable Sources of Energy*, White Paper for a Community Strategy and Action Plan, European Commission 1997
- [2] *The Impact of Renewables on Employment and Economic Growth*, ECOTEC Research & Consulting Ltd., EU ALTENER Programme
- [3] *Internationaler Vergleich energiepolitischer Instrumente zur Förderung von regenerativen Energien in ausgewählten Industrieländern*, Simone Espey, Books on Demand, Norderstedt, Germany, ISBN 3-8311-1614-8