GREENPEACE Briefing

# Solar Generation: electricity for over 1 billion people and 2 million jobs by 2020 – a report by EPIA and Greenpeace

## What does this report tell us?

Solar energy is on the brink of a boom. The industry is already worth $1billion annually. By the time the generation born today reaches adulthood in 2020 solar energy could easily provide energy to over a billion people globally and provide 2.3 million full-time jobs. By 2020 solar can provide a projected 276 terawatt hours of energy. Even if we double current consumption rates that would be equivalent to supplying 30% of Africa's energy needs, or 10% of OECD European demand by 2020. This is equal to 1% of the projected global demand.

This would replace the output of 75 new coal fired power stations and prevent the emission of 664 million tonnes of carbon dioxide. It would have an investment value of US$75 billion a year and bring the cost of solar modules down to US$1 per watt delivered.

By 2040 solar output could be more than 9000 terawatt hours, which would be 26% of the projected global demand, or more than the combined demand of OECD Europe and OECD North America in 1998.

If we want to prevent dangerous climate change, we have to phase out the fossil fuels currently used to meet the majority of global electricity demand. This report, using conservative modelling, shows that we can easily use solar to replace a large part of the global energy demand. At the same time as protecting the planet from climate change, solar energy can create millions of jobs.

"Solar Generation" is part of the global Choose Positive Energy campaign, aimed at massively increasing the uptake of renewable energy. The Choose Positive Energy campaign aims to encourage the public to demand that they can get connected to Green Energy supplies, and demand that renewable energy be made available to two billion people of the world's poorest people within the next decade.

The campaign demonstrates the point that the energy to meet human needs does not have to come at the cost of more climate change. "Solar Generation" shows that solar PV can meet a large part of this demand.

EPIA and Greenpeace produced "Solar Generation" as a long-term analysis of the global solar electricity market. It provides a detailed analysis of the PV market up until 2020, with projections to 2040. It is designed to add more weight to the political arguments supporting better market conditions for the expansion of solar PV.

This study is based upon clearly defined and realistic assumptions from which extrapolations could be made on the likely expansion of the solar electricity market up to 2020. Those assumptions include a projected average PV market growth rate of 30% up to 2020 and 15% growth between 2020 and 2040. It uses International Energy Agencay (IEA) assumptions of increased of energy demand 27,000 terawatt hours by 2020, and 35,000TWh by 2040.

## How do we get to this solar future?

Joint political and industrial support is needed to give solar the boost required to allow it to realise this potential. Already in countries such as Japan and Germany, the combination of government and industrial commitment has achieved greater penetration of solar electricity into the energy mix at local, national, regional and global levels. This has included extensive investment in new facilities and products from the industry, and the implementation of legislative support frameworks at the political level. While Germany and Japan have been the leaders in forging and optimising these joint commitments, more countries are rapidly pursuing similar initiatives.

"Solar Generation" has identified several areas where effective joint action by industry and governments would have a significant impact in ensuring that the rapid progress of the past few years translates into achieving the medium- and long- term potential revealed by this study.

*Stabilisation of the annual world market at a level of 1GWp+ by 2006*
This would be achieved through the extension of (adapted) best practice support schemes to encourage the uptake of solar electricity amongst consumers.

*Building a global export market for photovoltaics*
The solar electricity industry must be a truly global industry to deliver the economies of scale needed to catalyse significant price reductions and achieve its status as a driving force for sustainable development in both the industrialised and developing worlds. This requires action at both national and global levels, including better co-operation between export promotion agencies, tapping financing credits through the mobilisation of the huge funds available to Export Credit Agencies, promoting local capacity building measures relating to financing and developing supply networks, and raising awareness among all actors of the potential role of the Kyoto Protocol mechanisms in developing the industry.

*Better targeting of R&D resources for the solar electricity industry*
The emphasis here should shift towards achieving better automation of the production chain, the development of new products and achieving greater economies of scale

*Enhanced co-operation between the global solar electricity industry and research organisations*
The global solar electricity industry should play an enhanced role in the allocation of funds earmarked for research

*Fostering the development of an advanced PV plant technology industry*
Expansion of production facilities in the solar electricity sector will lead to a massive increase in demand for plant and equipment. Emphasis will have to be placed on strengthening this part of the industry in order to ensure that state-of-the-art production processes can be effectively and efficiently put into operation world-wide

## Who's winning the solar race?

At present, the nations of the industrialised world vary greatly in their commitment to solar electricity. While countries such as Germany, Japan and the Netherlands, as well as others in Europe, have moved forward from discussion to implementing the necessary support schemes, others have actually cut back their solar electricity programmes. In the United States in particular, this could severely affect the ability of the national solar electricity industry to fulfil its promise as a global exporter providing for sustainable employment at home.

Entry into the solar electricity market is not the preserve of companies only active in the clean energy sector. Many of the leaders in the solar electricity industry were, and still are, leading lights in the "old" energy economy. The sustained commitment of these companies will be appropriately rewarded if we create the right climate to ensure that the whole solar electricity business sector moves rapidly ahead.

Solar power will certainly play an ever more significant role in the energy supply mix. However, the extent to which solar electricity will make its impact on that market will depend very much on ensuring that the potential winners in this business are made fully aware of the opportunities available.

Those opportunities will only be realised if both industry and governments continue to strengthen their commitment to broadening the energy supply base and, through the deployment of solar electricity

## Why we need solar

Combating climate change: International consensus now clearly states that business-as-usual is no longer an option, and the world must move to a clean energy economy, if we are to prevent further climate change. Solar power is a prime choice in developing an affordable, feasible, substitute for fossil fuels in all climate zones around the world. Climate change will persist for many centuries, due to the long life of greenhouse gases, however an expansion of the solar market now can play a vital role in limiting both the rate and magnitude of climate change over the next century.

Meeting human needs: More than 2 billion people in the world today are without access to electricity, trapped in a cycle of poverty and without basic needs including clean water, health care facilities, heating and lighting. Renewable energy sources offer us the best chance we have to avoid a potential climate catastrophe, and to ensure that the world's poor also have access to clean and reliable energy. The Choose Positive Energy campaign aims to bring renewable energy to 2 billion people in 10 years, and solar can be large part of that mix.

Energy security: Strengthening the renewable energy sector will also provide real energy security. Fossil fuels, due to their wholesale contribution to the climate catastrophe, represent an intrinsically insecure energy source regardless of whether they are from Alaska or the Middle East. Decentralised renewable sources of supply from the sun can help countries achieve true energy security, and energy independence.

## The impact on consumers & job seekers born today

Phasing in solar photovoltaics requires a shift from centralised to decentralised power production, allowing far greater control to individual consumers.

More jobs are created in the installation and servicing of PV systems than in their manufacture. Based on information provided by the industry, it has been assumed that 20 jobs are created per MW of capacity during manufacture (assumed to fall to 10 jobs/MWp of capacity after 2010) and about 30 jobs per MW during the process of installation, retailing and providing other local services. As far as maintenance is concerned it is assumed that with the more efficient business structures and larger systems of the industrialised world, about 1 job will be created per installed MW. Since developing world markets will play a more significant role beyond 2010, however, the proportion of maintenance work is assumed to steadily increase up to 2 jobs per MW by 2020.

The result is that by 2020, around 2.3 million full time jobs would have been created by the development of solar power around the world. The majority of those would be in the installation and marketing of systems.

## Key Findings

Global Solar Electricity Output in *2020*: 276 Terawatt hours

= 30% of total demand in Africa

= 10% of total demand in OECD Europe

= 1% of total global demand

= the annual output of 75 coal-fired power stations

Detailed Projections for 2020:

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| PV systems capacity | 207 GWp |
| Grid-connected consumers | 82 million worldwide<br>35 million in Europe |
| Off-grid consumers | 1 billion worldwide |
| Employment potential | 2.3 million full-time jobs worldwide |
| Investment value | US$75 billion per annum |
| Cost of solar modules | Level of US$1 per Wp achieved |
| Cumulative carbon savings | More than 660 million tonnes of $CO_2$ |

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| Global Solar Electricity Output in *2040*: | 9,113 Terawatt hours |
| | = 26% of total global demand |
| | = more than the combined demand in OECD-Europe and OECD-North America in 1998 |

Conclusions

The results of this EPIA/Greenpeace joint initiative clearly point to solar electricity potentially making a significant impact on the global energy mix over the next few decades.

Our goal must now be to mobilise the necessary industrial, political and end-user commitment to this technology and, more importantly, the service it provides. We must redouble our efforts to ensure that the population born today benefits from all the socio-economic and environmental benefits that solar electricity offers.

The Solar Generation should know no north/south divide. It should be an inclusive generation bringing together by 2040 a significant fraction of the world's population in both industrialised and developing countries – a generation, supplied by an industry driven by customer needs and the ability of a sophisticated global market to meet those needs.

Copies of the report can be downloaded from http://www.greenpeace.org

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