

**INTERNATIONAL ENERGY AGENCY  
CO-OPERATIVE PROGRAMME ON PHOTOVOLTAIC  
POWER SYSTEMS**

**Task 1**

**Exchange and dissemination of information on PV  
power systems**

**National Survey Report of  
PV Power Applications in Israel  
2009**

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## Definitions, Symbols and Abbreviations

For the purposes of this and all IEA PVPS National Survey Reports, the following definitions apply:

PV power system market: The market for all nationally installed (terrestrial) PV applications with a PV power capacity of 40 W or more.

Installed PV power: Power delivered by a PV module or a PV array under standard test conditions (STC) – irradiance of 1 000 W/m<sup>2</sup>, cell junction temperature of 25°C, AM 1,5 solar spectrum – (also see 'Rated power').

Rated power: Amount of power produced by a PV module or array under STC, written as W.

PV system: Set of interconnected elements such as PV modules, inverters that convert d.c. current of the modules into a.c. current, storage batteries and all installation and control components with a PV power capacity of 40 W or more.

Module manufacturer: An organisation carrying out the encapsulation in the process of the production of PV modules.

Off-grid domestic PV power system: System installed to provide power mainly to a household or village not connected to the (main) utility grid(s). Often a means to store electricity is used (most commonly lead-acid batteries). Also referred to as 'stand-alone PV power system'. Can also provide power to domestic and community users (plus some other applications) via a 'mini-grid', often as a hybrid with another source of power.

Off-grid non-domestic PV power system: System used for a variety of industrial and agricultural applications such as water pumping, remote communications, telecommunication relays, safety and protection devices, etc. that are not connected to the utility grid. Usually a means to store electricity is used. Also referred to as 'stand-alone PV power system'.

Grid-connected distributed PV power system: System installed to provide power to a grid-connected customer or directly to the electricity grid (specifically where that part of the electricity grid is configured to supply power to a number of customers rather than to provide a bulk transport function). Such systems may be on or integrated into the customer's premises often on the demand side of the electricity meter, on public and commercial buildings, or simply in the built environment on motorway sound barriers etc. They may be specifically designed for support of the utility distribution grid. Size is not a determining feature – while a 1 MW PV system on a rooftop may be large by PV standards, this is not the case for other forms of distributed generation.

Grid-connected centralized PV power system: Power production system performing the function of a centralized power station. The power supplied by such a system is not associated with a particular electricity customer, and the system is not located to specifically perform functions on the electricity grid other than the supply of bulk power. Typically ground mounted and functioning independently of any nearby development.

**Turnkey price:** Price of an installed PV system excluding VAT/TVA/sales taxes, operation and maintenance costs but including installation costs. For an off-grid PV system, the prices associated with storage battery maintenance/replacement are excluded. If additional costs are incurred for reasons not directly related to the PV system, these should be excluded. (E.g. If extra costs are incurred fitting PV modules to a factory roof because special precautions are required to avoid disrupting production, these extra costs should not be included. Equally the additional transport costs of installing a telecommunication systems in a remote area are excluded).

**Field Test Programme:** A programme to test the performance of PV systems/components in real conditions.

**Demonstration Programme:** A programme to demonstrate the operation of PV systems and their application to potential users/owners.

**Market deployment initiative:** Initiatives to encourage the market deployment of PV through the use of market instruments such as green pricing, rate based incentives etc. These may be implemented by government, the finance industry, utilities etc.

**Final annual yield:** Total PV energy delivered to the load during the year per kW of power installed.

**Performance ratio:** Ratio of the final annual (monthly, daily) yield to the reference annual (monthly, daily) yield, where the reference annual (monthly, daily) yield is the theoretical annual (monthly, daily) available energy per kW of installed PV power.

**Currency:** The currency unit used throughout this report is New Israeli Shekel - NIS.

**PV support measures:**

Enhanced feed-in tariff	an explicit monetary reward is provided for producing PV electricity; paid (usually by the electricity utility) at a rate per kWh somewhat higher than the retail electricity rates being paid by the customer
Capital subsidies	direct financial subsidies aimed at tackling the up-front cost barrier, either for specific equipment or total installed PV system cost
Green electricity schemes	allows customers to purchase green electricity based on renewable energy from the electricity utility, usually at a premium price
PV-specific green electricity schemes	allows customers to purchase green electricity based on PV electricity from the electricity utility, usually at a premium price
Renewable portfolio standards (RPS)	a mandated requirement that the electricity utility (often the electricity retailer) source a portion of their electricity supplies from renewable energies (usually characterized by a broad, least-cost approach favouring hydro, wind and biomass)

PV requirement in RPS	a mandated requirement that a portion of the RPS be met by PV electricity supplies (often called a set-aside)
Investment funds for PV	share offerings in private PV investment funds plus other schemes that focus on wealth creation and business success using PV as a vehicle to achieve these ends
Income tax credits	allows some or all expenses associated with PV installation to be deducted from taxable income streams
Net metering	in effect the system owner receives retail value for any excess electricity fed into the grid, as recorded by a bi-directional electricity meter and netted over the billing period
Net billing	the electricity taken from the grid and the electricity fed into the grid are tracked separately, and the electricity fed into the grid is valued at a given price
Commercial bank activities	includes activities such as preferential home mortgage terms for houses including PV systems and preferential green loans for the installation of PV systems
Electricity utility activities	includes 'green power' schemes allowing customers to purchase green electricity, large-scale utility PV plants, various PV ownership and financing options with select customers and PV electricity power purchase models
Sustainable building requirements	includes requirements on new building developments (residential and commercial) and also in some cases on properties for sale, where the PV may be included as one option for reducing the building's energy foot print or may be specifically mandated as an inclusion in the building development

## Foreword

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD) which carries out a comprehensive programme of energy co-operation among its 23 member countries. The European Commission also participates in the work of the Agency.

The IEA Photovoltaic Power Systems Programme (IEA-PVPS) is one of the collaborative R & D agreements established within the IEA and, since 1993, its participants have been conducting a variety of joint projects in the applications of photovoltaic conversion of solar energy into electricity.

The 21 participating countries are Australia (AUS), Austria (AUT), Canada (CAN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Malaysia (MYS), Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), the United Kingdom (GBR) and the United States of America (USA). The European Commission, the European Photovoltaic Industry Association and the US Solar Electric Power Association are also members.

The overall programme is headed by an Executive Committee composed of one representative from each participating country, while the management of individual Tasks (research projects / activity areas) is the responsibility of Operating Agents. Information about the active and completed tasks can be found on the IEA-PVPS website [www.iaepvps.org](http://www.iaepvps.org)

## Introduction

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of photovoltaic power systems. An important deliverable of Task 1 is the annual Trends in photovoltaic applications report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the Israel National Survey Report for the year 2009. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

The PVPS website [www.iea-pvps.org](http://www.iea-pvps.org) also plays an important role in disseminating information arising from the programme, including national information.

## **1 EXECUTIVE SUMMARY**

To differentiate the National Survey Report from the Annual Report the Executive summary should focus clearly on national numbers and trends. For consistency, each Executive summary should contain the following sub-headings:

### **1.1 Installed PV power**

During 2009, a total of approximately 21 000 kW grid-connected, under the new feed-in tariff, and about 500 kW off grid, in the traditional applications of agriculture, Bedouin housing, etc.

### **1.2 Costs & prices**

A standard PV module costs from NIS 14 to 23 Wp.

A "best price" 50 kWp system cost between NIS 700 000 – 750 000.

### **1.3 PV production**

There is no production of photovoltaic panels in Israel; one company assembles PV-Thermal panels, though the encapsulation does not take place here. One Israeli company has begun manufacture and export of inverters.

### **1.4 Budgets for PV**

The government and government-related institutions invested NIS 1 361 600 in research and development; with another NIS 625 000 in industrial start-up.

## 2 THE IMPLEMENTATION OF PV SYSTEMS

The PV power system market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or more. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries.

For the purposes of this report, PV installations are included in the 2009 statistics if the PV modules were installed between 1 January and 31 December 2009, although commissioning may have taken place at a later date.

### 2.1 Applications for photovoltaics

Following the 2008 introduction of feed-in tariffs, the market for "Grid-connected, distributed" exploded, completely surpassing the non-grid connected market. The first stage of the program was for rooftop-sized photovoltaic systems from small (up to 15 kW) to medium size (up to 50 kW).

### 2.2 Total photovoltaic power installed

The PV power installed in 4 sub-markets during 2009 should be entered in Table 1.

It is necessary to know the accuracy of the data provided in section 2.2. Please provide a very brief summary here of the methods used to collect, process and analyse these data. If, in your estimation, the accuracy of any of the data in this section is worse than  $\pm 10\%$  you may provide the data as a range and also provide a statement explaining why there are difficulties in achieving accuracy. Also, if a country cannot provide any of the required data please give the reason here.

Accuracy: the data for grid-connected systems were obtained from the IEC (both in the form of quantity of W installed, then correlated with data on the total sums paid out). The data for non-grid connected systems are a rough estimate, as no reliable source of information was found.

**Table 1: PV power installed during calendar year 2009 in 4 sub-markets.**

Sub-market/ application	off-grid domestic	off-grid non- domestic	grid-connected distributed	grid-connected centralized	Total
PV power installed in 2009 (kW)	500	0	21 000	0	21 500

During 2009, there were 292 applications for grid-connected PV systems to the Ministry of National Infrastructures (MNI) – all up to 50 kW. 25 applications were rejected (for not meeting published criteria, and mostly DIY projects). The MNI is aware of some systems which were connected to the grid without licensing and approval, though in this case they do not benefit from the payback from the IEC.

A summary of the cumulative installed PV Power, from 2004-2009, broken down into four sub-markets is shown in Table 2.

**Table 2: The cumulative<sup>§</sup> installed PV power in 4 sub-markets.**

Sub-market	2004	2005	2006	2007	2008	2009
Stand-alone domestic	653	809	1 084	1 584	2 144	2 644
Stand-alone non-domestic	210	210	210	210	260	260
Grid-connected distributed	9	11	11	11	611	21 611
Grid-connected centralized	14	14	14	14	14	14
TOTAL (kW)	886	1 044	1 319	1 819	3 029	24 529

<sup>§</sup> There are a number of older systems (pre-2000) which may still be on the books, though are no longer operating. As can be seen from the above table, such systems would provide negligible results in the best case.

Please provide at least three paragraphs of text following Table 2:

Details of key PV deployment activities in **2009**:

- Israel's first full year of feed-in tariffs was characterized by continued activity regulatory, following the mid-2008 implementation of feed-in tariffs for small and medium systems. By and large, the project was well received by the public and commercial sectors. The original quota was set at a total of 50 MWp (household systems: 15 MW and small commercial up to 50 kW: 35 MW). Results show a quantum leap of approximately 21 000 kW in one year! By the end of 2009, the household systems quota had been underbooked, whereas the small commercial projects were overbooked, resulting ultimately in expansion of that quota.
- Tariffs: during 2009 the feed-in tariff stood at NIS 0.197 kWh, slightly lower than the starting year 2008.
- The number of PV distributors and installers may have reached 100 companies!
- A variety of barriers to PV installations were encountered, and most of them were solved:
  - Barrier 1: Requirement that all rooftop PV systems obtain a building permit. Solution: The Ministry of Interior gave instructions that municipalities were to treat PV systems as they do solar hot water heaters (which are widespread in the country), in other words no special building permit is required.
  - Barrier 2: Financing and credit. Solution: Banks may use future income from PV systems as collateral for loans.
  - Barrier 3: PV rooftop systems enhanced the financial value of buildings, so some municipalities want to increase local taxes on such buildings. Solution:

Some municipalities are willing to waive this tax in favor of a “greener” town image, others are not.

- Barrier 4: Depreciation. In 2010, depreciation of PV systems for businesses was set at 25%.
- Weaknesses in implementation:
  - From the consumer angle: individuals, organizations and companies who were primed and excited about the possibility of “finally” installing PV systems found the procedure arduous and too complex. In most cases, therefore, the PV company hired to install the system also took care of the paperwork. In some limited cases where individuals wished to Do-It-Yourself, they ran into some difficulties and in fact, of those applications for systems which were not approved by the Public Electricity Authority (PUA), all were from private applicants.
  - Still from the consumer angle: individuals and companies who had not previously been aware of PV’s existence were approached by companies offering to install PV systems – and in this case, the public did not have enough information to make informed decisions on whether to go ahead with the project.
  - From the PV business angle: the number of companies offering to install PV systems jumped from 4-5 in 2007 (the year before feed-in tariffs) to about 100 by the end of 2009. There was no regulation of such companies, nor mandatory standards of installation.
- There were no major public or demonstration programs.
  - A descriptive outline of key PV policy initiatives, promotional activities (commercial and non-commercial) or any other market drivers of significance starting in 2009; The Key Policy initiative took place in 2008, with only adjustments in 2009. There are now (2010) some more initiatives underway, which will be described later in this report (Section 5)
  - Any interesting electricity utility and public stakeholder developments that were important during the year. Israel’s first Concentrator Photovoltaic (CPV) field was installed in 2009, developed by an Israeli company, consisting of several solar dishes each with a capacity of 4.5 kW electricity and 10.5 kW thermal, depending on solar conditions.

### **2.3 PV implementation highlights, major projects, demonstration and field test programmes**

Please provide quantitative details of PV implementation highlights in 2009, including major projects, demonstration and field test programmes, and market stimulation programmes in operation during the year (one paragraph for each item).

The only major non-standard PV system was the CPV system described earlier, and the company is currently unwilling to provide quantitative details of its project.

## 2.4 Highlights of R&D

Research in photovoltaic related subjects has continued at most of Israel's academic institutions, as in the past focussing on subjects as new materials (nano-technology, dye cells), various ways to design PV systems.

Under a new government plan to support start-up companies, a new way to implement PV as a cover for water sources (reservoirs, etc.) – where the water serves to keep the PV modules cool, the cover prevents water losses to evaporation, etc.

## 2.5 Public budgets for market stimulation, demonstration / field test programmes and R&D

Please complete Table 3 giving figures for the year on budgets from the public authorities for R&D, demonstration/field test programmes and market incentives (public subsidies, fiscal incentives) on the national/federal level, and on the state/regional level.

**Table 3: Public budgets for R&D, demonstration/field test programmes and market incentives.**

	R & D	Demo/Field test	Market incentives
National/federal	NIS 1 361 600 – Academic NIS 625 000 – Ind. Start Up	0	0
State/regional	NA	NA	NA
Total	1 986 600		

### 3 INDUSTRY AND GROWTH

#### 3.1 Production of feedstocks, ingots and wafers

There were still no manufacturers of PV feedstocks or other materials in Israel in 2009. There is one company assembling hybrid panels – photovoltaic + thermal – though they are also not involved with encapsulation here.

#### 3.2 Production of photovoltaic cells and modules

NA

#### 3.3 Module prices

In Table 6 please add year 2009 module prices (excluding VAT/TVA/sales tax): for small (typical?) and large (best price?) orders, if possible; OR an indicative national figure. Please clarify whether you are reporting an average price, a representation of all known prices, a typical example, or so on.

Also, if possible, please report separately the minimum price that has been achieved in 2009, noting whether this is an import or locally manufactured.

**Table 4: Typical module prices for a number of years NIS/Wp**

Year	2007	2008	2009
Standard module price(s): Typical	22.5 - 28.35	15.6	20
Best price		14.5	14
PV module price for concentration		11.8	NA

### 3.4 Manufacturers and suppliers of other components

Balance of system component manufacture and supply is an important part of the PV system value chain. Please briefly comment on the nature of this industry in your country, paying particular attention to recent trends and industry outlook, under the headings of:

- PV inverters (for grid-connection and stand-alone systems) and their typical prices

For the first time, manufacture and sales of PV-related products.

Manufacturer: SolarEdge

Products: PV inverters, module-level power optimizers and monitoring systems.

Average Price level: NIS 1.85/w

Production Jan-Dec 2009: 2Mw

Export/local use ratio: 70% Export

Employment: 78 employees in Israel (95 sub-contractor production workers), 5 abroad



Figure 1: 100 kW Installation – Inverters (photos courtesy of SolarEdge)



Figure 2: 100 kW SolarEdge Commercial Installation (photos courtesy of SolarEdge)

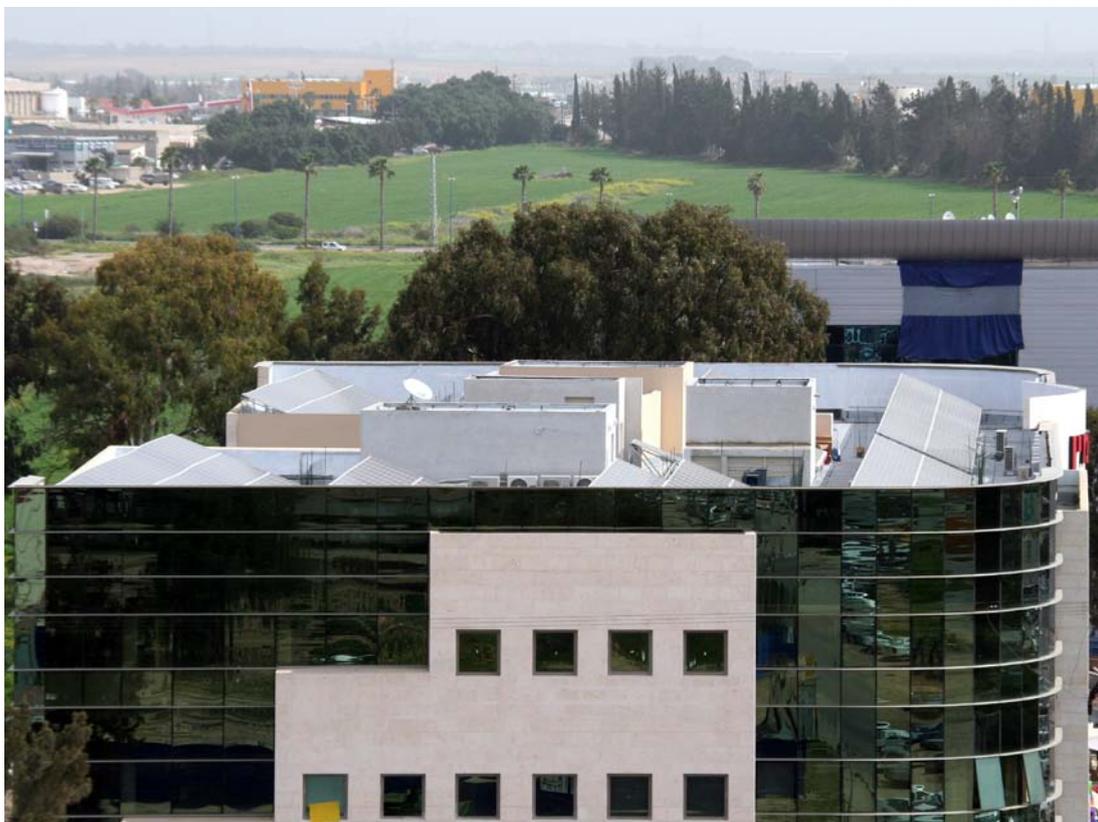


Figure 3: 100 kW SolarEdge Commercial Installation ((photos courtesy of SolarEdge)

### 3.5 System prices

Please give in Table 7 turnkey prices (excluding VAT/TVA/sales tax) per W for the various categories of installation. Prices should not include recurring charges after installation such as battery replacement or operation and maintenance. Additional costs incurred due to the remoteness of the site or special installation requirements should not be included. Please indicate whether you are reporting an average price, a range of all known prices, a typical example, or so on.

Additional information should also be provided, where possible, regarding national trends in the turnkey prices of selected applications (in Table 7a).

Additional information should also be provided, if applicable, on the price of home PV system kits (marketed in some countries through retail outlets). No home PV (DIY) system kits are sold in Israel.

A summary of typical system prices is provided in the following tables.

**Table 5: Turnkey Prices of Typical Applications – Range of known prices**

Category/Size	Typical applications and brief details	Current prices per W
OFF-GRID Up to 1 kW		
OFF-GRID >1 kW	No such systems identified	NA
ON-GRID Specific case	<a href="https://www.linkedin.com/e/r5b0qp-gb8zh4w4-64/doi/1417110450/r_vZON_y/gir_87785683_0/EML-inv_17_rem/">https://www.linkedin.com/e/r5b0qp-gb8zh4w4-64/doi/1417110450/r_vZON_y/gir_87785683_0/EML-inv_17_rem/</a>	15
ON-GRID up to 10 kW		NIS 14 – 23
ON-GRID >10 kW		NIS 14 – 23
GRID – CONNECTED (centralized, if relevant)		NA
Photovoltaic-thermal PVT	Where is this number taken from?	NIS 6.47

**Table 7a: National trends in system prices (current) for ... (specify application, for example from table 7 above)**

YEAR	2007	2008	2009
Price /W:			

### 3.6 Labour places

Provide an estimate of labour places in the following (where these are mainly involved with PV):

- a) Public research and development (not including private companies);
- b) Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D;
- c) All other, including within electricity companies, installation companies etc.

**Table 6: Estimated PV-related labour places in 2009**

Research and development (not including companies)	20
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	Not available: Difficult to receive confirmed data
Distributors of PV products	
System and installation companies	
Utilities and government	0
Other	
<b>Total</b>	

### 3.7 Business value

Provide an estimate of the value of PV business in your country by the Gross Domestic Product approach, using Table 7 and as described in the Swiss discussion paper previously circulated (further copies from Task 1 OA).

**Table 7: Value of PV business**

Sub-market	Capacity installed in 2009 (kW)	Price per W (from table 7)	Value	Totals
Off-grid domestic	500	20	$a = X \times Y \times 1\,000$	2 000 000
Off-grid non-domestic			$b$	0
Grid-connected distributed	21 000	14	$c$	294 000 000
Grid-connected centralized			$d$	0
				$a+b+c+d$
<b>Export of PV products</b> (including information from Tables 4 & 5)				2 590 000
<b>Change in stocks held</b> (including information from Tables 4 & 5)				NA
<b>Import of PV products</b> (including information from Tables 4 & 5)				$g$
<i>Value of PV business</i>				<b>298 590 000</b>

If possible, please provide some brief comment on the industry value chain in your country or provide references to articles, reports dealing with this topic.

#### 4 FRAMEWORK FOR DEPLOYMENT (NON-TECHNICAL FACTORS)

If not already covered in section 2.2, please identify and give a brief description of any support measures from Table 10 that have been launched or identified in your country during 2009 (or early 2010). Please indicate whether the measures were in place at the national, regional (state) or local levels.

Table 8 lists the main support measures (definitions at start of guidelines) for PV during 2009. Further details on these are to be provided on the following pages.

**Table 8: PV support measures**

	On-going measures*	Measures that commenced during 2009
Enhanced feed-in tariffs (gross / net?)	y	no
Capital subsidies for equipment or total cost	no	no
Green electricity schemes	no	no
PV-specific green electricity schemes	no	no
Renewable portfolio standards (RPS)	no	no
PV requirement in RPS	no	no
Investment funds for PV	no	no
Income tax credits	no	no
Net metering	no	no
Net billing	no	no
Commercial bank activities e.g. green mortgages promoting PV	no	Special interest rates; future income as collateral
Electricity utility activities	no	no
Sustainable building requirements	no	no

#### Feed in tariffs for PV – past, present, future (NIS)

Year	Small: up to 50 kW		Medium: 51 kW – 10 MW		Large: over 10 MW (including thermal)	
	Price	quota	Price	quota	Price	quota
2008 (implementation)	2.04	50 MW*	-		-	
2009	1.97		-		-	
2010	2.04		1.55	300	1.05	500
2011**	1.55		1.44			
2012-2014**	1.55		1.34			

\* (divided: 15 MW household, 35 MW small commercial); \*\* Proposed

## INDIRECT POLICY ISSUES

Please give one paragraph on any policy initiatives that may influence the implementation of PV power systems in your country. This could include details of:

- a) international policies affecting the use of PV Power Systems; NA
- b) the introduction of any favourable environmental regulations; NA
- c) studies relating to externalities and hidden costs of conventional energy generation when compared to renewable energy; During 2009, three position papers were published which were designed to influence national energy policy:
  - "Establishment of Israel's national renewable energy production target". The Knesset (Parliament), Research and Information Center, submitted to the Knesset Environment-Social Lobby, December 2009. The document summarized previous government decisions regarding RE targets, reviews the potential of various RE technologies, and barriers to implementation.
  - "Solar energy power plants in Israel". Summary and recommendations of the Energy Forum, Shmuel Neaman Institute for Advanced Science and Technology Research. February 2009. General recommendation to encourage and proceed with building solar power plants, while at the same time investing heavily in Research and Development.
  - "Evaluating the financial benefits of using Renewable Energy in Israel through 2030: The economic profitability of the renewable energy law". Greenpeace Mediterranean and Eco-Energy Corp. February 2009. Conclusion: The added benefit of using RE to the Israeli economy under a "reasonable" expectation of implementation would add between USD 2.5 – 2.9 billion to the economy.
- d) taxes on pollution (e.g. carbon tax); NA
- e) national policies and programmes to promote the use of PV in foreign non-IEA countries. NA

### 4.1 Standards and codes

Please give one paragraph maximum on any new issues relating to Standards and Codes of Practice. Areas to be considered include:

- Technical regulations for PV plant construction and operation (d.c. working voltage, safety and control devices, supporting structures, etc.); Towards the end of 2009, the various bodies involved in implementing the PV business, headed by PUA, began developing a set of rules and regulations that installers will need to comply by – for the protection of the consumer.
- Availability of standards and grid interconnection rules for PV systems (protection; islanding; harmonic distortion, power factor, safety, etc.) The Israel Standards Institute began the process for preparing a Standard for Installations and Installers.
- Specific rule problems to be solved in order to facilitate PV system diffusion;
- Building and wiring codes

## 5 HIGHLIGHTS AND PROSPECTS

Please highlight key aspects of PV deployment or production in your country during 2009.

Please give one paragraph maximum on forward looking issues within your country such as:

- Details from industry of planned increases in PV module production capacity NA
- Any significant developments in technologies: Concentrator Photovoltaics (CPV) saw its first plant established in April 2009, with a field of several dishes.

Please specify any long-term targets for installed PV power capacity that exist, or future energy scenarios that are being discussed, within your country.

1. National Sustainable Energy Target: in the beginning of 2009, the Israeli government established a target of 10% of electricity production to come from renewable sources by 2020.
2. Ashalim Power Station(s) Tender: Several years ago, the Israeli government approved the construction of solar power plants at a Negev site called Ashalim, in response to the 2004 policy and targets for clean energy. Being a public project on public land, a tender is mandatory, being operated by the Ministries of Treasury and Infrastructure. The original plan was for one 500 MW solar thermal plant; this was then changed to two solar thermal plants of 80-120 MW each; and one 15 MW photovoltaic plant (with an option for an additional 15 MW). Stage one - "pre-qualification" - of the tender issued in 2008 called for preliminary approval of competitors to the solar thermal plant, to which seven companies and consortiums were approved. Stage two is the actual bidding – meanwhile (2010) only two contenders for the solar thermal plants remain in the running. TEN companies had passed stage one "pre-qualification" of the PHOTOVOLTAIC PLANT TENDER, though the tender itself will be issued about three months after the solar thermal tender is closed – which is currently scheduled for September 2010. It is therefore expected that the PV tender will be finalized by the end of 2010, largely based on the ST tender. Both are BOT tenders.
3. National Zoning Plan (TAMA) 10/D/10: One outcome of the above target is the preparation of a special national level zoning plan outlining the criteria necessary for large scale renewable production. As one of the worlds most densely populated countries, the issue of land appropriation has become one of vital concern to all developers and planners. By establishing at this stage criteria, both will be able to know in advance what types of power plants will be approved. The priority is for PV systems is: on rooftops, or nearby buildings, in other words – not requiring allocations of any additional OPEN land. At the next level of desirability are projects, though requiring new land allocations, are still close to existing structures or communities. There are two conditions under which no system will be approved: if it would require establishing high-voltage lines (400 kW) or along a beach.
4. Israel's Ministry of Trade, Industry and Employment: The ministry is charged with developing vocational training and education programs. Starting in 2009, the Ministry has begun preparing a curriculum for technicians in renewable energy applications, preparing a cadre for future expanded operations.
5. Position of the Environmental Organizations: Israel's environmental organizations have long been at the forefront of encouraging the introduction of renewable energies in Israel. Recently (June 2010) a consortium of the five most prominent organizations has issued a position paper on the subject, though it is still unknown how much this will influence overall policy. The main elements of their position paper: to continue to encourage standard PV implementation on rooftops and urban areas; large solar power plants requiring extensive open lands should be of the thermal type; and land should be preserved for more efficient, therefore less land required which will be coming available in the future.

## Annex A: Country information

This information is simply to give the reader some background about the national environment in which PV is being deployed. It is not guaranteed to be 100 % accurate nor intended for analysis, and the reader should do their own research if they require more detailed data.

Please provide the following, including a short reference as to the source of the information (for example, author's estimate, electricity supply association etc):

- 1) retail electricity prices - household, commercial, public institution
- 3) typical metering arrangements and tariff structures for electricity customers (for example, interval metering? time-of-use tariff?)

Customer	Rate NIS/kWh		
Household	0.4893		
General	0.556		
Taoz: Time of Use tariff	Peak	Medium	Low
Summer:	86.61	55.33	18.56
Winter:	83.14	48.42	17.24
Spring and Autumn	66.46	41.48	17.68

- 2) typical household electricity consumption (kWh) 500 kWh
- 4) typical household income. NIS 13 339 (2008 figures. Israel Central Bureau of Statistics, Sept. 2009)
- 5) typical mortgage interest rate: Typical Basic Interest Rate (Prime): 3.00%; Average Bank mortgage interest rate: 2.44 (The average interest rate was calculated as the weighted average of the interest on nondirected credit from a mortgage bank's funds extended or renewed during the month). (Source: Bank of Israel)
- 6) voltage (household, typical electricity distribution network) **220**
- 7) electricity industry structure and ownership (eg vertically integrated or separate generation, transmission, distribution?; retailers and network businesses – integrated or separate?; state owned or municipal or private etc?; electricity industry regulator?). **single vertically integrated monopoly, "island economy", state owned, with independent regulator (PUA)**
- 8) price of diesel fuel **NIS 6 - 8**
- 9) typical values of kWh / kW for PV systems in parts of your country. **Entire country is one region.**