

### 24 Hours ahead Forecasting and Reporting to the Distribution Regulator

The usual method requested by the country distribution authorities for transferring the next day's forecasted energy production information is via the forecast report, tabulating the hourly predicted energy production of the specific PV plant. For the report to be of real value to the national distribution authority or specifically the Energy Market regulator depending on the country in question, it should be forwarded as early as possible the previous day, giving the authority time to be able to consolidate the country's total energy needs against its available sources and allocate requirements.

Usually the reports should be sent the previous day before 17:00 latest, but there may be a requirement to be even sent as early as 15:00 in the afternoon. In such case, the forecast prediction calculations may be needed even further than 24 hours ahead into the future! In addition, the specific format of the report is usually predefined according to the corresponding country's requirements.

Logged as test (Logout)

PV Plant (50MW Sky Plant)  
[Edit park](#)  
[View Production Data](#)

#### Productiondata

Production year: 2013  
 Production month: August

Date	production kwh
2013-08-01	238,373.3
2013-08-02	297,445.2
2013-08-03	297,529.5
2013-08-04	281,174.8
2013-08-05	287,175.7
2013-08-06	281,089.8
2013-08-07	279,919.7
2013-08-08	277,077.7
2013-08-09	285,243.8
2013-08-10	272,529.4
2013-08-11	250,101.3

Time(hr)	Production - kWh
01:00	0
02:00	0
03:00	0
04:00	0
05:00	0
06:00	1501
07:00	2531
08:00	9461
09:00	19276
10:00	27102
11:00	32641
12:00	35125
13:00	36353
14:00	34141
15:00	32068
16:00	28546
17:00	21260
18:00	11844
19:00	4325
20:00	1350
21:00	0
22:00	0
23:00	0
24:00	0

### Solar & Benefit's - SBS PV Forecast Service

Addressing the needs of the PV industry, Solar & Benefit International has developed its highly sophisticated PV Energy forecasting tool and services covering the obligatory requirements of the country energy market regulator or responsible energy distribution authority. In accordance with the specific country regulation, the SBS PV Forecast tool fulfills all the plant producer's obligations, providing accurate energy production predictions approaching an 99% accuracy level averaged over the entire monthly interval. Such very small levels of error are not commonly attained but are reached by the SBS PV Forecast tool due to its use of sophisticated prediction algorithms, in conjunction with on-line data collection of the plant's daily and historical production data and SBS's specialized weather prediction services for the specific location.

The net result for the producer is that whatever the applicable penalty scheme employed by the country, the result corresponds to a monetary equivalent penalty of the lowest possible level available in the market today, thus maximizing the energy revenues for the investor.

The forecasting service provided by S&B today, takes the form of an annual subscription, where the plant operator is given continuous access to the PV plant's specific SBS PV Forecast webpage, for viewing the on-line results and downloading the daily energy production forecast reports for transmission daily to the authority. downloading the daily forecast reports for transmission to the authority.

### iPLON References

A small part of iPLON's monitoring services today are installations belonging to the renown German STARDWERKE Electrical Utility's smart grid for the monitoring of their wind, PV and hydro plants, alone being iPLON's strongest vote of confidence! Also the MBR farmer's association of total 26MWp, consisting of over 5.000 small PV systems.



22 MWp PV  
 2x 500kW Wind  
 4 x Hydro Power



26MWp PV  
 Private  
 Farmers

### Benefits of SBS PV Forecast and Monitoring Solutions

S&B's range of fully integrated Monitoring systems and solutions from iPLON and the SBS PV Forecast service, provides a complete solution covering all the PV producer's needs for the PV data collection and archiving as well as his plant's obligation to the country electrical authorities.

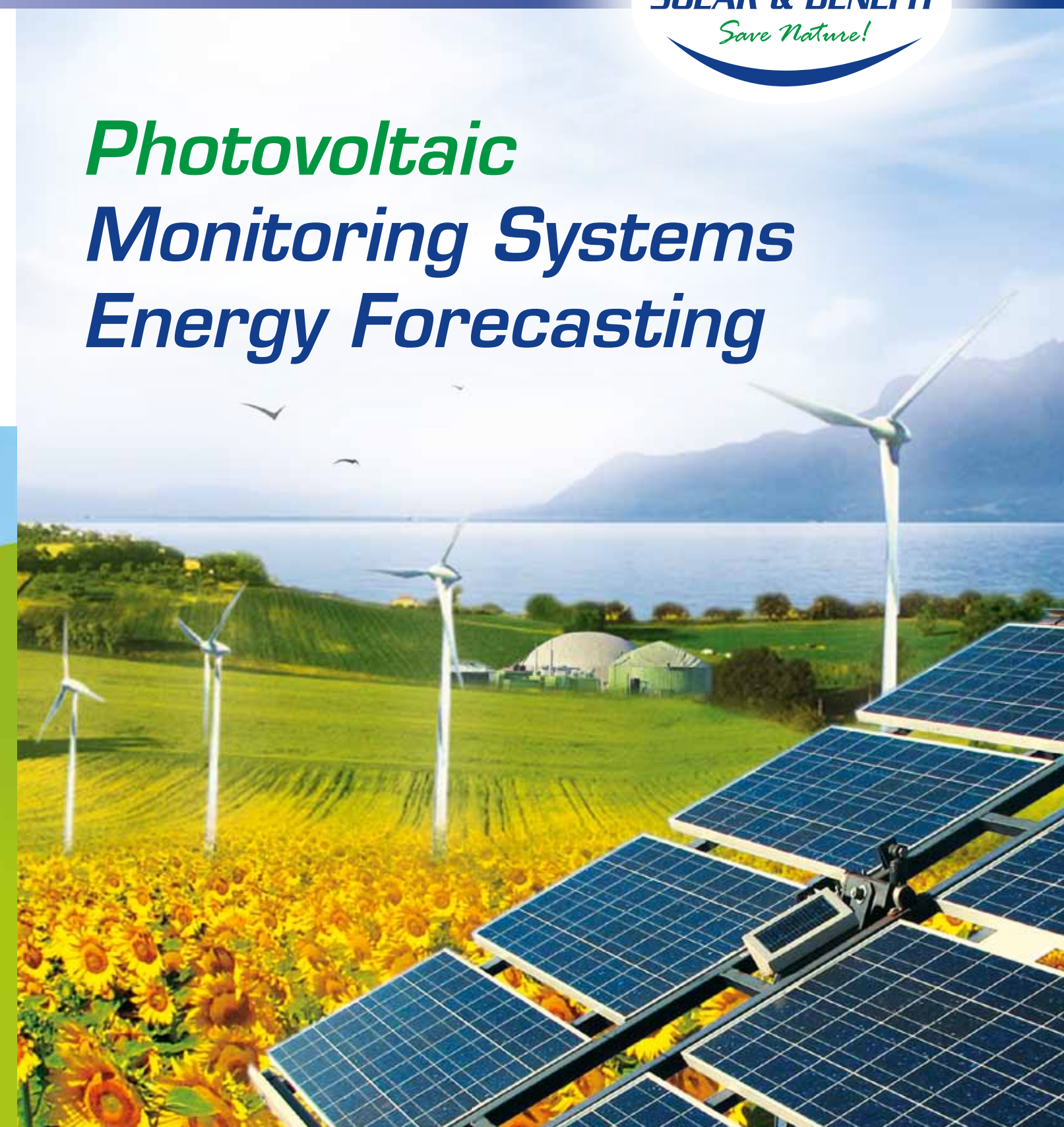
Having installed an S&B integrated monitoring and forecasting system, the investor can now be rest assured his PV system is in good hands, enjoying the desired longer term protection of his investment's reliable operation and accurate energy reporting obligations, in the long term guaranteeing him the maximum PV revenues!



Smart solutions will become more and more important in the near future.

At Solar & Benefit International, we encourage the consolidation of energy producers from all the different renewable energy sources including the dynamic energy consumption of homes and the consumers from the commercial and industrial sector.

We believe that the electrical grid of the future, should be a smart grid combined with wind energy, hydropower, solar energy and biogas plants, using intelligent control systems. By the application of the smart grid concept, local energy production and local energy consumption will go hand in hand.

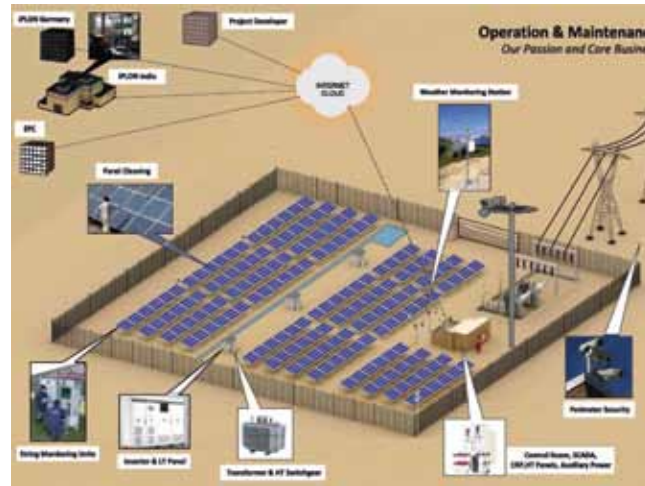


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## PV Monitoring Systems

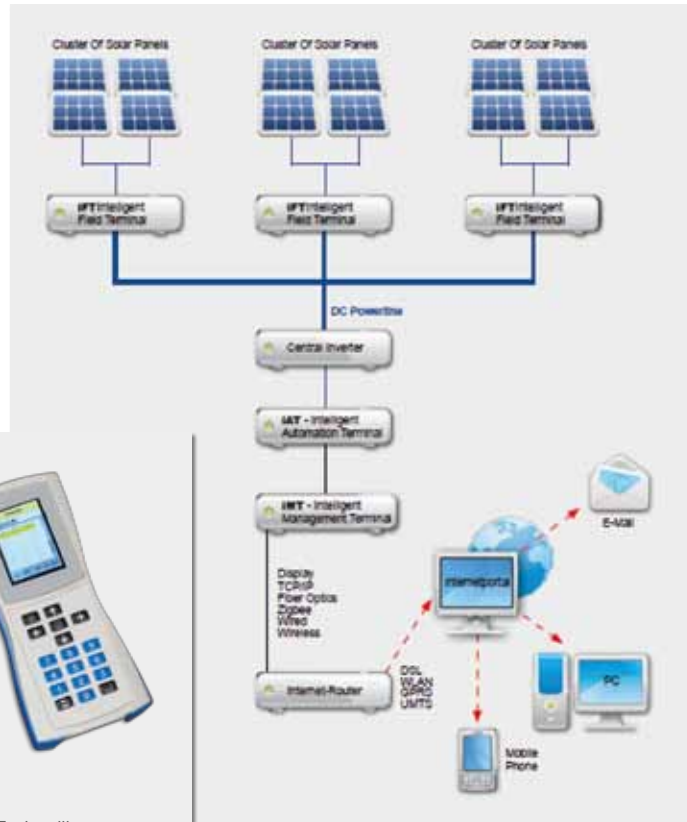
To date, the monitoring of PV plants was handled at the level of monitoring the inverter and substation operation, relying only on the selected manufacturer's proprietary web based system for the monitoring of each PV plant subsystem. In most cases the PV modules and their strings could not be usually accessed for obtaining their operational status. Having achieved the possibility to access all the above subsystems and PV components, in this scenario, it was necessary to work with multiple and individual manufacturer's platforms, making the execution of the monitoring center's obligation, a very difficult task.



Another approach adopted by maintenance organizations for large PV plants, were the central monitoring systems where the interfacing to the plant's subsystems was enabled via general purpose PLC's and localized expensive computer systems. Comparing the two approaches, each one has its advantages and disadvantages. Such comparisons may be achieved by noting their following strengths and weaknesses:

## Inverter & Equipment Manufacturer's Platforms

- Multiple platforms for each inverter and equipment type
- Non real-time response and data availability
- Different platforms for the monitoring of multiple PV plants
- Data incompatibility between platforms addressing multiple PV plants
- Limited interfacing and capability with respect to PV module strings
- Individual PV string monitoring, in most cases not possible



## Central Monitoring Platforms

- Input/Output facilitation via expensive general purpose PLC's.
- Possibility to have 100% PV subsystem coverage, with multiple PLC's and high cost.
- Expensive on-plant communication network.
- Extensive on-site computer facilities for the connection to all PLC's.
- On-site back-up requirement of all PV plant data.
- SCADA S/W specially designed for each plant.
- Single O&M platform possible.
- Long and costly setups for each individual PV plant.

## Decentralized Monitoring Platforms

The more modern approach however is the decentralized PV monitoring system, for example that offered by iPLON for the PV market. Comparing this methodology with the previous two approaches, the following advantages become inherently evident:

- Lower cost compared to central systems.
- Dedicated PV input-output data collection interfaces with PV hardware, minimizing setup times and system cost.
- Real Time data acquisition and data logging.
- Multi manufacturer/type inverter monitoring.
- True single platform O&M monitoring.
- 100% data/status coverage of PV plant.
- Easy retrofitting on older PV plants.
- Dedicated alarm structure with emphasis on fault finding.
- Modular and scalable according to PV plant size and complexity.
- Inherent data integrity with no backup requirements necessary on-site.
- No need for expensive on-site computer/SCADA systems.
- No need for expensive in-house computer systems, this being facilitated by remote specialized third party server farms.
- 100% data security for 5 years due to use of multiple server farm facilities.
- Inexpensive cloud based computing, remote monitoring stations in multiple locations, e.g. investor, bank, contracted monitoring center, on-site.

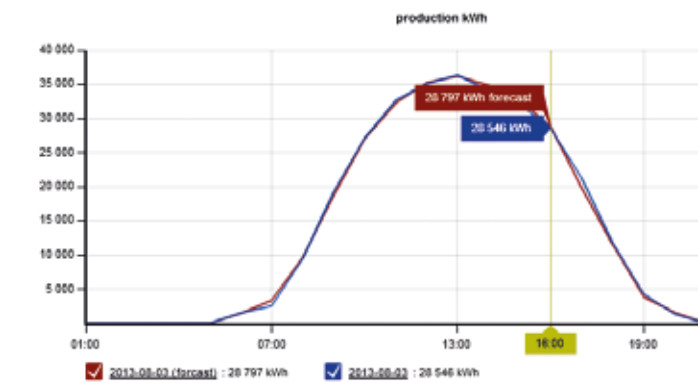
The same philosophy may be extended to all types of renewable energy production schemes, whether, PV, wind, biogas, biomass, even the smallest of systems including consumer home roof PV systems. In this way the monitoring platform always remains the same for all RES systems, enabling standardization, ease of use monitoring, flexibility, performance and price scalability while having the shortest setup times for all new systems.

## Energy Production Forecasting

New regulations being introduced by each country's electrical energy distributing regulator are gradually coming into force specifying the obligation to provide accurate prediction of next day's energy production by the PV plant producer inserted into the electrical grid network. The authorities impose such requirements for the following day's planning of the overall national energy consumption requirements and the adequate coverage of supply by all its country grid connected energy producers, especially in the case of the renewable energy producers. One might say that it appears especially imposed on the renewable energy producers, as the cost of green energy to the utility or market



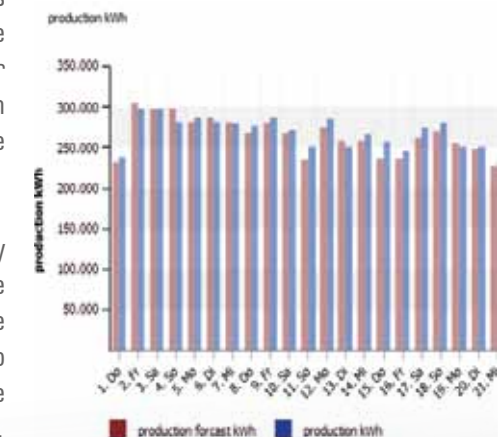
regulator because of the special incentives programs, is substantially higher than that of the traditional sources. In fact penalties are generally imposed on the energy producers, both for the oversupply or their deficiency with respect to the specific PV plant's production capability. Therefore there is a need to be able to accurately predict the plant's next day's energy production, based on its PV capacity, historical plant performance, local climatic conditions and weather prediction. The accuracy levels normally needed should exceed 95%, to be useful to the producer to minimize imposed penalties.



## Accurate PV Forecasting – Penalty Consequences

To ensure the highest possible compliance of forecasted energy production data with respect to that actually produced and inserted into the grid, the authorities impose heavy monetary penalties calculated on both the positive and negative production deviations and the hourly rates corresponding to the level of "punishment" they wish to apply on the producer. For instance if the public energy distributor has a need for a greater amount of energy insertion into the grid the next day, then the applied rates are normally lower, otherwise much higher rates are applied.

The opposite applies in the case where the energy authority wishes to reduce the overall amount inserted. For this purpose, the penalty rates are calculated on an hourly basis depending on the demand, thus requiring the notified forecasted production quantities to be provided on an hourly basis. Usually the penalty rate is based on the county's next day's "day ahead" market prices for energy consumption.



Save Nature!