



REF Solar Holdings, AS

Not that big, but very interesting

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Demand for 750 kilowatt arrays has recently soared in Germany. System providers are putting together turnkey packages costing from €750 per kilowatt

Highlights

- An output limit of 750 kilowatts has been in force for fixed feed-in payments in Germany since January. Larger arrays now need to win payments for the power produced by participating in tendering processes.
- It is hardly surprising that ever since then, the interest in systems with outputs just below this limit has increased.
- Numerous companies are now catering to this, offering full packages for open-field arrays, as well as flat roofs and even pitched roofs. The least expensive offers available promise returns of around ten percent.

A 749.95 kilowatt photovoltaic array started operation in the municipality of Finne in Saxony Anhalt on March 2. In Arendsee, which is also in Saxony Anhalt, another array with 749.95 kilowatts had already gone online on February 24. On March 22, it was a 749 kilowatt array in the Bavarian town of Falkenberg, and on March 23, a 749 kilowatt array in Mansfeld, Saxony Anhalt and one in Barver, Lower Saxony, which started producing solar power. On March 31, a 749 kilowatt array started operating in Jübar, Saxony Anhalt. Since the start of the year, other 749 kilowatt arrays have also been connected to the grid in Seelow (Brandenburg), Woringen (Bavaria) and Zeulenroda (Thuringia).

Systems with a capacity just under 750 kilowatts have become attractive due to the latest amendment to the Renewable Energy Act (EEG). This is because it is only up to this limit

that system operators are able to claim fixed feed-in payments, one which is currently 8.87 cents for open-field arrays and 11.03 cents per kilowatt hour for roof-mounted systems. Once this limit is exceeded, participating in tenders becomes mandatory. The rates yielded, however, only averaged 6.58 cents in the last round of tenders. To attain the same returns from an open-field array as could be earned from fixed feed-in payments, construction would need to cost one-quarter less. Or, conversely: when the costs for each kilowatt of output installed stay the same, then the returns from the 750 kilowatt system are 25 percent higher.

Since the amended law entered into force at the start of the year, installers and project planners all over Germany have therefore been registering increased demand for arrays of exactly this size. A number of them have put together package offers for turnkey systems, which we

are presenting in a table on page 34 to give you an overview.

The module manufacturer REC Solar was the first to make an offer in February, presenting a 750-kilowatt package solution, including grid connection, in cooperation with Schneider Electric. »We're currently seeing great interest from the market«, as Olaf Krückemeier, head of sales for Central Europe at REC Solar EMEA GmbH, explains. He estimates that around 20 percent of capacity expansion in Germany this year will be attributable to systems of this size – and the first data released by the Federal Network Agency would seem to prove him right. While systems with a capacity of just under 750 kilowatts didn't appear in the statistics at all in January, by February they already accounted for five, and in March ten, percent of capacity expansion.

One-stop shop

In contrast to all the other offers in our market overview, the components for the »REC-Schneider 750 kW All-In-One Solution« need to be ordered from the two system providers separately. The operator also needs to take

care of assembly, whereby REC will organize partner companies for this. This is why the assembly costs specified in the overview are not a binding offer made by REC/Schneider, but rather are equivalent to the usual market prices of around €70 per kilowatt. Around €35 per kilowatt also need to be added to this for cables, which also need to be purchased separately and are invoiced under the item »Assembly costs«. As long as the grid connection point is at the edge of the property, then no extra costs need to be factored in for this; in other cases, there will be additional costs for the cable routing, which depend on the distance to the edge of the property.

This sounds more complicated than it ultimately is. The walk-in concrete station for the inverters, transformers and medium-voltage switchgear is delivered for free to the construction site already assembled, where it is installed. A turnkey system obtained from one source: »Thanks to the plug-and-play solution, significantly less interfaces need to be defined. This makes project planning and implementation much easier«, as Steffen Emmerich, customer care manager for »Power Plants & Energy Storage« at Schneider Electric, says.

Assuming standard market assembly costs, the system, at just €732 per kilowatt, is also the least expensive in our overview. Once costs for perimeter fencing are factored in, it all comes in at a comfortable €750. With an average yield of 1,000 kilowatt hours per kilowatt, respectable returns – which may still change due to operating costs – of a good nine percent can be yielded. And those who do not own property of their own still has plenty of financial leeway for leasing land given this calculation.

Nevertheless, demand has failed to skyrocket. »The first orders have arrived, but no »packages« have been delivered yet«, as Krückemeier stated in mid-May, but not without adding: »Of course we – meaning Schneider and REC as separate companies – have already supplied a number of 750 kilowatt projects so far this year.«

Diverse products on offer

Numerous other companies have done so too. The range of products on offer is actually much wider than the overview might suggest. The fact that numerous offers such as those from IBC Solar or Hanwha Q Cells have not been included in the table is primarily be-

◀ This is what the 750 kilowatt array that REC and Schneider Electric are offering as a full package might look like: Due to a lack of systems already installed, a 250-kilowatt array in South Molten, Great Britain, was used for the product photo. The green and white box in the background was added to the photo later on, providing an impression of how the central Schneider Electric inverter might blend into the landscape.

▼ Roof surfaces sufficient for a system output of several hundred kilowatts do indeed exist: This is a 650-kilowatt array in Hochstadt, installed by Solar-Info-Zentrum SIZ GmbH.



750 kW system package deals

System provider	Sunvers / B.I.E.M. UG (limited liability)		Solar-Info-Zentrum SIZ GmbH
Name of the full system	750RF	750HF	750-kW-System
Assembly by same company	no	no	no
Assembly by partner company	yes	yes	yes
System output	749.70 kW	749.79 kW	749.95 kW
Space required	4,642 m ²	4,590 m ²	4,670 m ²
Solar module: Manufacturer	Recom	Heckert	Heckert
Type designation	Leopard 315	NeMo 2.0 P	NeMo P
Quantity	2,380	2,777	2,830
Inverter: Manufacturer	Kaco	Kaco	SMA
Type designation	BluePlanet 50.0 TL3	BluePlanet 50.0 TL3	STP 25000 TL30
Number	14	14	28
DC circuit breaker	integrated or separate	integrated or separate	integrated
Assembly system: Manufacturer, type	Schletter	Schletter	K2 - trapezoidal sheet
Construction type	Flat roof	Flat roof	Pitched roof
Material	Aluminum, stainless steel	Aluminum, stainless steel	Aluminum
Cable: Manufacturer	IBC Solar	IBC Solar	Lapp or comparable
Type	FlexiSun	FlexiSun	n/a
Cross-section	6 mm ²	6 mm ²	6 mm ²
Connector (manufacturer, type)	Stäubli (Multi-Contact), MC4	Stäubli (Multi-Contact), MC4	Tyco
Component return for recycling	Return of full system	Return of full system	Return of modules
Guarantee for defect-free assembly	10 years incl. insurance package	10 years incl. insurance package	2 years
Yield guarantee *1	1,010 kWh / 10 years	1,010 kWh / 10 years	no
Feed-in management as per §6 EEG 2012	opt.	opt.	yes
Remote system monitoring	yes	yes	opt.
System price not including assembly and grid connection (net)	565,790.00 €	665,818.00 €	465,000.00 €
Assembly price (net)	54,000.00 €	54,000.00 €	135,000.00 €
Grid connection price (net)	63,500.00 €	63,500.00 €	acc. to location
Total price (net)	683,290.00 €	783,318.00 €	n/a
Price per kW (net)	911.42 €	1,044.72 €	n/a
Delivery period	4 weeks	4 weeks	6 weeks
Offer valid until	31 July 2017	31 July 2017	31 July 2017
Remarks	Also available as a pitched roof system (€663,290) and open-field system (€703,290)	Also available as a pitched roof system (€763,290) and open-field system (€803,318)	Individual changes to products chosen possible
Offer available	Europe	Europe	Germany
Contact	www.biem.online		www.s-i-z.de

*1 Reference system: Optimally aligned solar generator without shading installed in Frankfurt/Main

*2 Installation by REC partner network, estimated assembly costs incl. cables by PHOTON based on REC data

cause the manufacturers have no interest in setting a binding price – at least not for materials and assembly.

There are statistical anomalies that differ from the rate currently standard on the market for assembly costs, this being €60 to €70 per kilowatt, and which soar to as much as €180 per kilowatt, for example at Solar-Info-Zentrum SIZ GmbH. Specifying a fixed price for grid connection is, in contrast, will-nigh impossible. »The prices are difficult for us to calculate and are always specified individually«, as the managing director of SIZ, Wolfgang Müller, says: »They not only depend on the power utility or the grid

operator, but are also highly dependent on individual conditions and distances.« Other companies that have specified a price for grid connection in order to give prospective customers an idea of the costs for an actual turnkey system have therefore preferred to work with a safety margin. If the on-site conditions are good, then this item should be able to be renegotiated.

Although small, our random sample still does provide a number of interesting insights. The company B.I.E.M. UG, for example, offers its system with a choice of modules made by Heckert (made in Germany) or Recom AG (from Italy and Poland). The difference totals a full €100,000

net for the 750 kilowatt package – and regardless of whether the flat roof, pitched roof or open-field version is chosen. This works out at 13 cents per watt. Managing director Olaf Schweizer confirms that this difference is due to purchasing conditions, which he passes on to the customers. He has been doing business with Heckert for nine years, and with Recom for two. To date, he has only had good experiences with both module manufacturers. One special feature that comes with the B.I.E.M. systems is the ten-year yield guarantee. However, with a price of €911.42 per kilowatt for the flat-roof system, this is rather high even for a system with Recom modules.

Franke Elektrotechnik GmbH Sovisol GmbH Buschmann Energietechnik GmbH	Solarnova			REC*2 / Schneider Electric
Freiland Turnkey 750	Solarnova 750 kW Freifläche	Solarnova 750 kW Schrägdach Growatt	Solarnova 750 kW Schrägdach Fronius	REC-Schneider 750 kW All-In-One Solution
no	no	no	no	no
yes	yes	yes	yes	yes
749.79 kW	752.14 kW	750.12 kW	750.06 kW	750.00 kW
7,000 - 10,000 m ²	11,000 m ²	5,600 m ²	5,600 m ²	10,000 m ²
Astronergy	Solarnova	Solarnova	Solarnova	REC
ASM 6610P 270 Wp	Monocrystalline, 296 Wp	Polycrystalline, 266 Wp	Monocrystalline, 296 Wp	e.g. TwinPeak2 285 Wp
2,777	2,541	2,820	2,534	3
Kaco	ABB	Growatt	Fronius	Schneider Electric
BluePlanet 50.0TL3-XL-INT	ULTRA-MVC-S	CP850TL-S	Agilo 100.0-3	Conext CoreXC680,1 x 680 kW
14	1	1	1	1
integrated	integrated	integrated	integrated	integrated
PUK Solar	Schletter, FS Uno	Schletter, Single Fix	Schletter, Single Fix	Schletter, FS3V Combi
Open-field	Open-field	Pitched roof	Pitched roof	Open-field
Hot-dip galvanized steel	Hot-dip galvanized steel	Aluminum	Aluminum,	Steel
diverse	KBE Berlin	KBE Berlin	KBE Berlin	n/a
H12222-K4/6	can be buried	can be buried	can be buried	n/a
4/6 mm ²	4-35 mm ²	4-35 mm ²	4-35 mm ²	n/a
Stäubli (Multi-Contact), MC4	Stäubli (Multi-Contact), MC4	Stäubli (Multi-Contact), MC4	Stäubli (Multi-Contact), MC4	n/a
n/a	Return of modules	Return of modules	Return of modules	n/a
5 years	2 years	2 years	2 years	n/a
acc. to location	no	no	no	n/a
yes	no	no	no	n/a
yes	yes	yes	yes	yes
520,000.00 €	564,100.00 €	488,000.00 €	525,000.00 €	470,000.00 €
69,000.00 €	68,000.00 €	62,000.00 €	62,000.00 €	78,750.00 €
75,000.00 €	97,800.00 €	105,000.00 €	105,000.00 €	included in system price
664,000.00 €	729,900.00 €	655,000.00 €	692,000.00 €	548,750.00 €
885.58 €	970.43 €	873.19 €	922.59 €	731.61 €
6 to 8 weeks	12 weeks	12 weeks	12 weeks	n/a
30 June 2017	06 July 2017	06 July 2017	06 July 2017	30 June 2017
Individual changes to products chosen possible	Individual changes to products chosen possible	Individual changes to products chosen possible	Individual changes to products chosen possible	
international	international	international	international	international
www.solar.elektro-franke.de, www.sovisol.de, www.buschmann-energietechnik.de	www.solarnova.de			www.recgroup.com

Nonetheless, as a roof-mounted system with a feed-in payment of 11.03 cents, it still yields a good rate of return of around nine percent.

Anyone with a large roof surface available in the first place should consider themselves lucky. This is because roof-mounted systems are often considerably less expensive due to the lower costs of the assembly system – something our sample reflects. The two pitched roof systems from the German module manufacturer Solarnova, for example, cost €873.19 per kilowatt (with an inverter made by the Chinese manufacturer Growatt) or €922.59 per kilowatt respectively (with an inverter made by Fronius).

The most expensive version is, at €970.43, the open-field array.

Sylvia Schmenk, sales director at Solarnova, knows that these offers tend to be at home at the upper end of the scale. She is currently writing offers for 750 kilowatts on a regular basis. The enquiries are largely coming in from Bavaria, with a number of prospective customers even planning several systems. By distributing the risks, Schmenk hopes that her systems will be considered in a number of the projects offered – even if they are a little more expensive.

The offers in the market overview represent the figures until the end of June, with a number

remaining valid until the end of July. No system provider was willing to commit for longer, because module prices are on the move – and may even starting moving upwards over the next few months. Schmenk, for one, reported that cell prices had increased slightly.

Further information
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