

## Solar for self consumption: financial gains and energy independence

With state subsidies and feed-in tariffs for solar electricity on the decline, producing solar electricity for the purpose of self consumption is on the rise, and REC solar panels are contributing to the profitability and energy independence of families and businesses worldwide.

### The emergence of solar's grid parity

For many years, solar electricity was considered expensive in comparison to other sources of renewable or fossil-fueled energy. Today, it is much more affordable. Although the costs of solar systems still vary across different regions, the overall cost is trending downwards. In Germany for example, the Euro per watt cost (€/W) came down more than 70 percent – from 4.80 €/W in 2008 to 1.30 €/W at the end of 2012. This cost reduction was driven forward by rapid technological improvements, increased global competition and overcapacity. For the coming years, we expect this trend to continue, albeit at a reduced rate.

With declining investment costs, solar turns into a competitive source of electricity. The leveled cost of solar electricity is below the residential price in a number of markets. Also for small- and medium-sized businesses whose energy needs stretch out mainly throughout daytime hours, the so-called “commercial grid parity” is already achievable at current cost levels. This is in particular true as conventional electricity prices increase while solar allows companies to lock-in reliable electricity costs. It leads to new business models unfolding quickly. Once spread out in the market, self-supported solar electricity with little or no need for state subsidies will change the game significantly.

### Optimizing a solar installation for self consumption

In many countries, self-consumed electricity is defined as electricity that is generated and consumed at the very same location. In fact, self-consumed electricity enjoys fiscal benefits in some countries as the example below illustrates.

### Savings for a typical household with a residential solar electricity installation in Germany

	Only conventional electricity	With 4 kWp solar electricity installation	
	Annual electricity spending without a solar installation	Annual savings	Additional income
	3,600 kWh	1,080 kWh self consumed	2,520 kWh fed to grid
	€/year	€/year	€/year
Generation, distribution	274	83	Feed-in tariff rate: 0.1430/kWh
Grid usage	252	76	
EEG-surcharge	191	58	
Other surcharges	13.70	4.20	
Grid charges	11.90	3.60	
Value added tax	166	50	
Other	140	42	
<b>Total</b>	<b>1,048.60 €</b>	<b>316.80 €</b>	<b>360.36 €</b>
		<b>TOTAL BENEFIT:</b>	<b>677.16 €</b>

### Significant savings on electricity bills

A typical four-person family household with an average annual electricity consumption of 3,600 kWh could save almost 680 € each year. The calculation above is based on a 4 kWp installation with an average of 900 full-load hours each year. The average family “self consumes” 30 percent of the electricity produced by their own residential solar installation, due to daytime school/working hours. By “self-consuming” 30 percent of the electricity produced, the family’s savings on their electricity bills would amount to 316.80 €. Then, by feeding the remaining 70 percent of produced electricity to the grid, the family would receive 0.1430 €/kWh (14.30 cents/kWh), adding up to around 360 € in additional income, which could be put towards conventional electricity bills.

### Leveraging self consumption

The higher the state’s purchasing price for electricity, the greater the financial benefits for the solar installation owner. In Germany, for example, a small commercial business pays on average around 0.20 €/kWh to local utility providers, while larger industrial customers only pay 0.12 €/kWh. The point at which the investment into solar electricity starts to actually “pay off” depends on the local electricity price tag as well as how well using the solar system for self consumption matches the individual needs.

### Determining load profile

To optimize a solar electricity installation for self consumption, the planner not only needs to take into account the electricity consumption, but also the load profile. The load profile describes how much electricity the system owner needs at certain points throughout the day. For example, a supermarket’s electricity needs are stretched out throughout the day, also extending to overnight and Saturdays and Sundays as freezers and other cooling appliances need to stay powered – an ideal match for a solar installation with a possibility to reach 100 percent self-consumed electricity. An office building, on the other hand, would also have high electricity consumption during daytime hours throughout the work week, but not during the weekend, which would reduce the self-consumption rate slightly to around a maximum of 90 percent. Each consumer has slightly different needs, though when planning, both require a thorough analysis of the system size, the electricity needs as well as the load profile.

### Maximizing self consumption efficiency

Additional factors which influence solar electricity generation are the location and orientation of the solar panels. Both have an effect on the amount of electricity produced as well as how the electricity is spread throughout the day – also an important consideration for self consumption. If a business has its highest electricity demand in the morning hours, simply positioning the orientation of the solar installation to the east can boost the self-consumption rate by around seven percent.

## Benefits of self consumption at a glance

- **Financial gains**  
Solar-generated electricity is cheaper than electricity from utilities
- **Reliability and stability**  
Solar-generated electricity guards businesses against increasing electricity prices
- **Investment in the environment**  
Each year 4,000 kWh of solar-generated electricity saves 2,600 kg of CO<sub>2</sub> emissions
- **Less “red tape”**  
No deadlines for installation to receive subsidies or feed-in-tariffs; no obligation to keep the installation in the same place for 20+ years

### Solar pays off – REC powers commercial rooftops in Spain

High irradiation levels and electricity prices in combination with low solar system costs are making self consumption an attractive solution for commercial businesses in Spain. In addition, the grid parity business model creates more independency from electricity prices.

The following two examples show that solar pays off even without government subsidies or feed-in tariff schemes and also illustrates that solar is an attractive and sustainable investment to combat rising electricity prices.

#### 120 kW in Argentona, Spain

At Beiersdorf Manufacturing in Argentona, Spain, REC solar panels power a 120 kW rooftop installation with 100 percent self consumption. This installation pays off even without the advantage of any feed-in tariff. The 480 REC Peak Energy Series solar panels produce around 170,447 kWh of clean electricity each year. That will cover around six percent of their total electricity needs and thus provide savings of around 18,000 € each year on electricity bills. The Beiersdorf Manufacturing system will have paid for itself after just eight years.

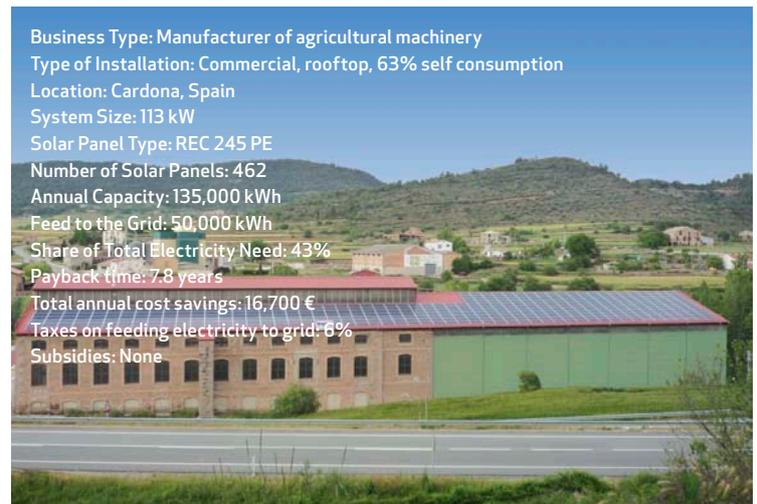


**Business Type:** Manufacturer of sticking plaster (Hansaplast)  
**Type of Installation:** Commercial, rooftop, 100% self consumption  
**Location:** Argentona, Spain  
**System Size:** 120 kW  
**Solar Panel Type:** REC 250 PE  
**Number of Solar Panels:** 480  
**Annual Capacity:** 170,447 kWh  
**Share of Total Electricity Need:** 6%  
**Payback time:** 8 years  
**Total annual cost savings:** 18,000 €  
**Taxes:** No  
**Subsidies:** None

REC Partner: TFM

#### 113 kW in Cardona, Spain

Another example is a 63 percent self-consumption installation powered by REC solar panels on the rooftop of a manufacturer of agricultural machinery located in Cardona, Spain. The 113 kW solar array produces 135,000 kWh of clean, green electricity each year – with 85,000 kWh self consumed, while profitably feeding the remaining 50,000 kWh of produced electricity into the grid. The solar installation saves of the company 16,700 € each year.



**Business Type:** Manufacturer of agricultural machinery  
**Type of Installation:** Commercial, rooftop, 63% self consumption  
**Location:** Cardona, Spain  
**System Size:** 113 kW  
**Solar Panel Type:** REC 245 PE  
**Number of Solar Panels:** 462  
**Annual Capacity:** 135,000 kWh  
**Feed to the Grid:** 50,000 kWh  
**Share of Total Electricity Need:** 43%  
**Payback time:** 7.8 years  
**Total annual cost savings:** 16,700 €  
**Taxes on feeding electricity to grid:** 6%  
**Subsidies:** None

REC Partner: AGECE

### Customized self consumption

In order to operate cost-effectively without subsidies from feed-in tariffs, the Spanish solar installations above are precisely designed and placed to achieve maximum self-consumption rates and thereby the greatest possible electricity cost savings. Once knowing how much electricity is required at different times of the day, the solar electricity installation can be tailored precisely to the customer requirements and determine the system size on the basis of the minimum load. As a result, the installation owner profitably optimizes the use of solar electricity while also contributing to global environmental initiatives.



Renewable Energy Corporation ASA  
Kjørboveien 29  
PO Box 594  
1302 Sandvika  
Norway  
Phone: +47 67 57 44 50

REC is a leading global provider of solar electricity solutions. With nearly two decades of expertise, we offer sustainable, high-performing products, services and investment opportunities for the solar and electronics industries. Together with our partners, we create value by providing solutions that better meet the world's growing electricity needs. Our 2,300 employees worldwide generated revenues of more than NOK 7 billion in 2012, approximately EUR 1 billion or USD 1.3 billion.

[www.recgroup.com](http://www.recgroup.com)