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SOLAR PANEL'S LOSS OF YIELD

Guidelines for a proper cleaning

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PHILOSOPHY FOR A PROPER CLEANING OF SOLAR PANELS

- The cleaning of the panels allows to **maximize the energy production**.
- Studies have shown that **without proper regular cleaning**, a solar plant can lose an average of **8% to 30**% energy efficiency.
- The cost of cleaning of the photovoltaic panels is less than the value of the energy loss that would occur in the "not" clean the panels. Being an important gesture towards the environment and a good form of investment, **PV systems must be properly maintained to avoid loss of money and energy**.
- **Proper cleaning is the key point to prevent damage to the panels**: the rain water or cleaning "do it yourself" should be avoided categorically. Avoid the accumulation of scale deposits and pollutants and aggressive is essential for the proper maintenance of the panel. The use of pure water, without detergents, and certificated cleaning systems are the perfect solution for your plant and to protect the environment.
- It is important to spread this **philosophy and good practice** for proper maintenance of solar plants and optimum energy efficiency.

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CONSEQUENCIES OF AN INAPPROPRIATE CLEANING

This photograph was taken in a company of agricultural plants in central California.

Cleaning is carried out by spraying water on the panels by a truck every day.

You can easily notice strips of calcium deposited using hard water without filtration.

These panels have been installed since only two years and unlikely they can last more than two or three years without causing significant damage to the modules and the system output.

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CONSEQUENCIES OF AN INAPPROPRIATE CLEANING

A photograph of a company of food products in Germany. There are many droppings of birds that have never been removed. This results in a substantial loss of yield due to the lack of frequent cleaning.

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CONSEQUENCIES OF AN INAPPROPRIATE CLEANING

On the surface of these panels on the roof of a manufacturer of animal feed can be noticed residues of pork rinds, together with droppings of seagulls.
The residues deposited on the panel and, mainly due to the heat, became scaled very difficult to remove.

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CONSEQUENCIES OF AN INAPPROPRIATE CLEANING

Greenhouse with photovoltaic system, proximity to the sea. Deposits of salt on the panels.

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CONSEQUENCIES OF AN INAPPROPRIATE CLEANING

Deposits of dirt on panels on the roof of a farm of breeding pigs.

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VALUATION LOSS OF YIELD-PROFIT

POWER OF PLANT	AVERAGE VALUATION PER MONTH ON ANNUAL BASE	VALUED PROFIT *	ANNUAL LOSS OF YIELD WITHOUT CLEANING **	NO MONTHLY PRODUCTION DUE TO DIRT	NO MONTHLY PROFIT DUE TO DIRT	NO ANNUAL PROFIT DUE TO DIRT	EQUIPMENT	BUDGET FOR MONTHS OF AMORTISATION ***
Kw	kW/mese	€/kW	%	kW	€	€		N°
20	2083	0,407	10	208,33	80,8	1017,24	OUT MINI	53
50	5208	0,407	10	520,83	212	2543,8	OUT MINI	21
100	10417	0,407	10	1041,67	424	5087	OUT MINI	11
200	20833	0,407	10	2083,34	848	10175	OUT MINI	5
400	41667	0,407	10	4166,67	1695	20350	OUT 1800	4
500	52083	0,407	10	5208,3	2119,8	25437	OUT 1800	3
700	72917	0,407	10	7291,7	2967,6	35612	OUT 1800	2
1000	10416600	0,407	10	104166	42395	508750	OUT 1800	0

*estimates and studies derived from the plant owned by VIP Clean enjoying the 4th energy bill 7kW € 0.307 + 0.10 € / kW ENEL

** Data from the study by Prof Häberlin of University of Engineering and Architecture of Bern (Switzerland), second World Conference on converting energy from sun, 2007 Vienna (Austria)

***Standard package containing: machine, hosereel 100 m, 2 brushes, 3 rods, rod holder bag, 25 replacement filters, 20 replacement pads, 1 replacement brush

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SOLUTION OF CLEANING AND AMORTIZATION EXPENSES

The graph presents several case studies of proposed installations subject to annual yield loss 10%.

Considering as **example** the analysis of a plant of **100 k**W, and estimating a production monthly of **10,417 kW**, with a yield loss of **10%** per year, resulting in **a loss of annual income of 5087 euro**, caused by dirt present on the modules and not removed.
This loss of income can be resolved through a **periodic cleaning** of panels through machinery for cleaning with pure water of the line *OUT*: with the use of reverse osmosis system and brushes suitable for every type of dirt and plant, we estimate a payback period of **11 months** to recoup costs.

The investment is not only realizable, but essential to avoid energy and economic losses and much more consistent over time.

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VIP CLEAN MACHINES: SOLAR PANELS CLEANING WITH PURE WATER

The machinery of VIP Clean comprises:

OUT MINI
OUT 1800
OUT 3600

for the cleaning of solar panels with only osmotic water
for a quick, constant,
efficient and environmentally friendly cleaning for each type of plant.

www.vipclean.it/en

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