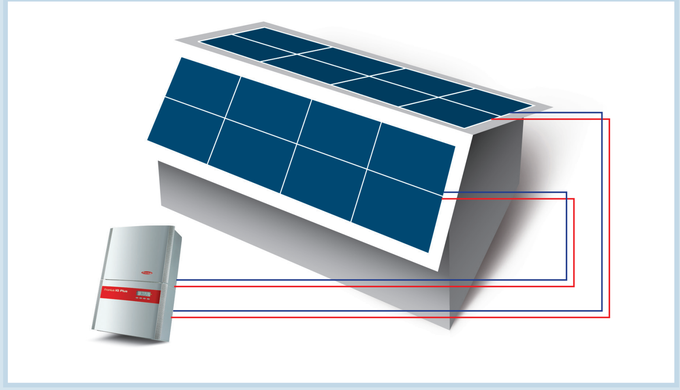
Efficient East-West oriented PV systems with one MPP-Tracker

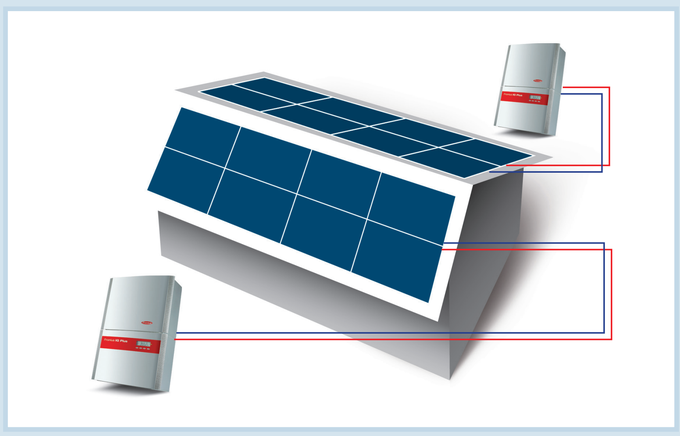
INTRODUCTION

Approach: Comparative measurements of east-west oriented PV systems with different installation variants

Variant 1: Installation of one single inverter (one MPP-Tracker) for east- and west-roof



Variant 2: Installation of separate inverters for east- and west-roof



CONCLUSION VARIANT 1

Low mismatching losses
- Matching losses depend on the inclination angle of the installed solar modules and on the used module technology

Inverter costs can be reduced
- Number of inverters
- Nominal power of the single inverter can be reduced by up to 35%
- Installation costs

Economically better solution
- Low energy yield losses
- Cost savings > Energy yield losses
- Payback time of the PV system is shorter

Basic installation rules
- Shading must be avoided
- Number of solar modules must be identical in all strings
- Within a single string the directions of the solar modules must be identical (inclination angle and orientation of the solar modules)

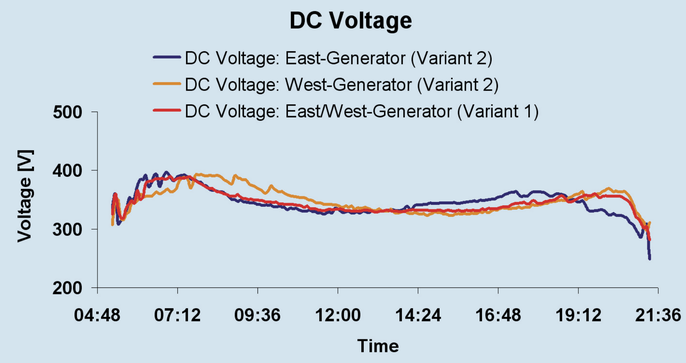
ABSTRACT: The acceptance to install east-west oriented photovoltaic (PV) systems was rather subdued in the past. But nowadays the interest to mount PV systems on east-west roofs increases steadily. Although south orientation is more ideal, east-west oriented PV systems can generate substantial earnings as well. Moreover, due to the sharp drop in module prices increased demands for east-west plants are expected in the future. From the perspective of grid operators east-west oriented PV systems are desirable compared to south oriented PV systems because the energy is fed-in more evenly throughout the day, power peaks can be reduced and thus relieving the grid. Up to now it was assumed that east-west oriented PV systems require inverters for both orientations or at least one inverter with more MPP-Trackers (Maximum Power Point) to avoid mismatching losses. This poster will show an analysis of east-west oriented PV systems connected to one MPP-Tracker and demonstrate a high performance of such systems.

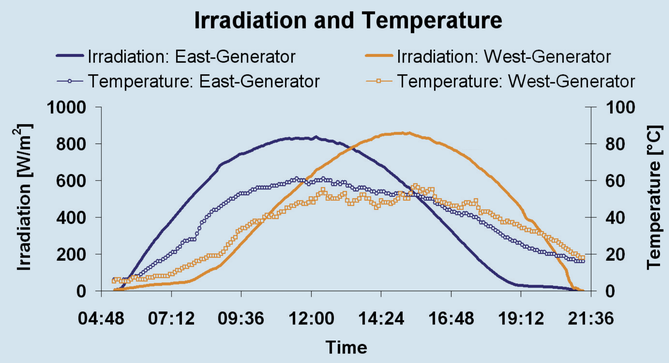
MEASUREMENT RESULTS

Low mismatching losses with installation variant 1

Example sunny day:

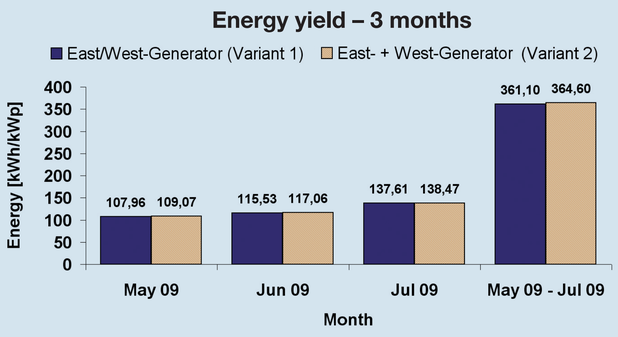
- DC voltage of the east/west-generator (Variant 1) follows the DC voltage of the east-generator (Variant 2) in the morning as well as the DC voltage of the west-generator (Variant 2) in the afternoon
- ~0.5% mismatching losses of the east/west-generator with one single inverter
- Single inverter in variant 1 operates mostly in a higher efficiency range
- ~0.1% energy losses of installation variant 1 compared to installation variant 2





PV system 1: Minimal energy yield losses with installation variant 1

Characteristic of the east-west PV system:
- Solar modules: a-Si
- Orientation: -67,5° east / 112,5° west
- Inclination angle: 30°

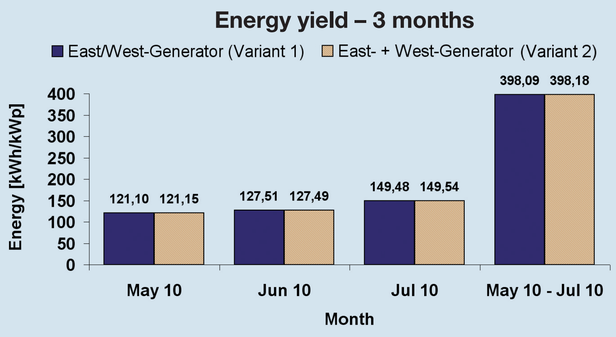


Energy yield comparison – 3 months:
- ~1% energy losses of the east/west-generator with one single inverter compared to the east/west-generator with separate inverters
- Annual energy losses are smaller than 1%

Cost savings - installation variant 1:
- One inverter
- Nominal power of the single inverter can be 15% lower than the sum of the nominal power of the separate inverters
- Installation costs

PV system 2: Hardly any energy yield losses with installation variant 1

Characteristic of the east-west PV system:
- Solar modules: c-Si
- Orientation: -90° east / 90° west
- Inclination angle: 15°



Energy yield comparison – 3 months:
- The energy yield of the east/west-generator with one single inverter is nearly equal to the values of the east/west-generator with separate inverters

Cost savings - installation variant 1:
- One inverter
- Nominal power of the single inverter can be 5% lower than the sum of the nominal power of the separate inverters
- Installation costs

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