SolarEdge

Distributed Solar Power Harvesting System

SolarEdge Mission

Distributed power harvesting and inversion systems that revolutionize solar energy harvesting by providing:

- Up to 25% more energy

- Optimal site-area utilization at reduced cost

- Real-time panel-level web monitoring

- Unique electrocution prevention and fire safety

Acclaimed Achievements and Global Recognition

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One of the year's most promising private technology ventures from the European business region 5/2010

One of "The World's 10 Most Innovative Companies in Energy for 2010" Fast Company 2/2010

"2010 AlwaysOn GoingGreen Top 50 Winner" for emerging companies that disrupt user behavior and create new opportunities in green technology 3/2010

Hot Investment Opportunity Award in European PV Market '09 Frost & Sullivan - Business Research and Consulting, 9/2009

A "Global Cleantech 100 Company" 9/2009

"The Exceptional Product in the Environmental Protection Arena" 6/2009

Inherent Problems in Traditional Systems

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Energy Loss

Panel Mismatch (3-5% loss)

Partial Shading (2-25% loss)

Undervoltage/Overvoltage (0-15%)

Dynamic MPPT loss (3-10% loss)

System Drawbacks

No module level monitoring

Limited roof utilization

Safety Hazards

Theft

SolarEdge solution overcomes all energy losses providing up to 25% more energy while solving all other system drawbacks at a comparable price to traditional inverters

SolarEdge System Overview

- Module level optimization
- Fixed voltage - ideal installation

- Module level monitoring
- Enhanced safety solution

SolarEdge PowerBox and Inverters

PowerBox - Per-module Maximum Power Point Tracking (MPPT)

- Advanced, real-time performance measurement

- Module shut-down for installer and firefighter safety

- Embedded by module manufacturers / retrofitted by installers

3.3kW-15kW Inverters, Specifically designed for Power Optimizers

- 97.5% weighted average efficiency

- Highest CEC efficiency rating for any inverter <250KW

- Optimal fixed string voltage

- Simpler design with highest reliability

- Built-in communication gateway; lightweight and quiet

Module-Level Monitoring

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- Each PowerBox transmits data over the DC lines

- Artificial Intelligence SW pinpoints

   fault on site map

- Access via user-friendly web portal

The Result:

- Remote diagnostics

- Operations and maintenance cost reduction

- Increased system availability and production

- Proactive customer service

The SolarEdge Product Family

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Value Proposition

Maximum Energy Gain

Ground mounted system: 2-5%, commercial 2-10%, residential 2-25%

Constraint-free site design

Optimal site-area utilization at reduced cost

Real-time panel-level web monitoring

Increased uptime and remote maintenance

Automatic panel shut-down

Unique electrocution prevention and fire safety

Panel theft detection and immobilization

Summary

Unique Advantage

Maximum power harvesting at lower cost:

- End to end solution – from panel to grid
- Fits any type and size of PV installation
- Widest feature set in the industry
- Priced similarly to traditional centralized inverter

Proven Success

- From 30 patents to mass production in less than 3.5 years
- Worldwide partnerships with 40% WW market access
- 50 MW of products to be shipped in 2010

Global Leadership

Leading the Distributed Power Harvesting Trend

Case Study:

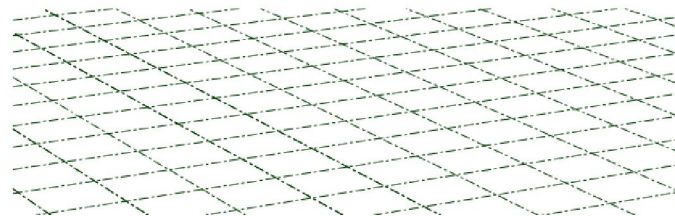## Design and Energy Benefits

350kW installation in Czech Republic

250kW installation in France

Case 1: Commercial Site with Limited Space

- A 100kW roof has been simulated using PVsyst

- Panel rows have been placed distanced apart to minimize inter-row shading
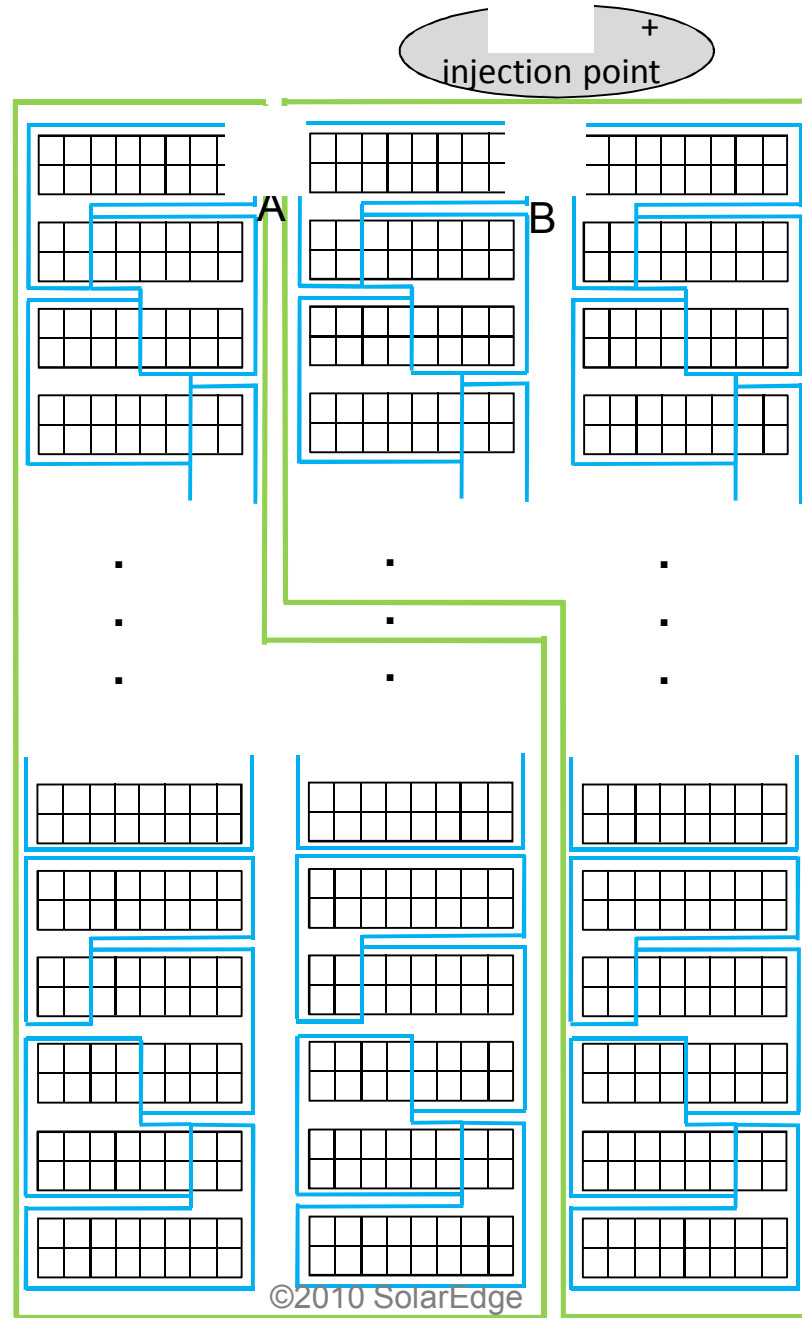
- The roof space is 2,000 sqm

- Kyocera KD210GH-2P modules x 210w x 480 = 100.8 kW

- 48 modules per row, 10 rows, **9 m between rows**

Comparative Analysis

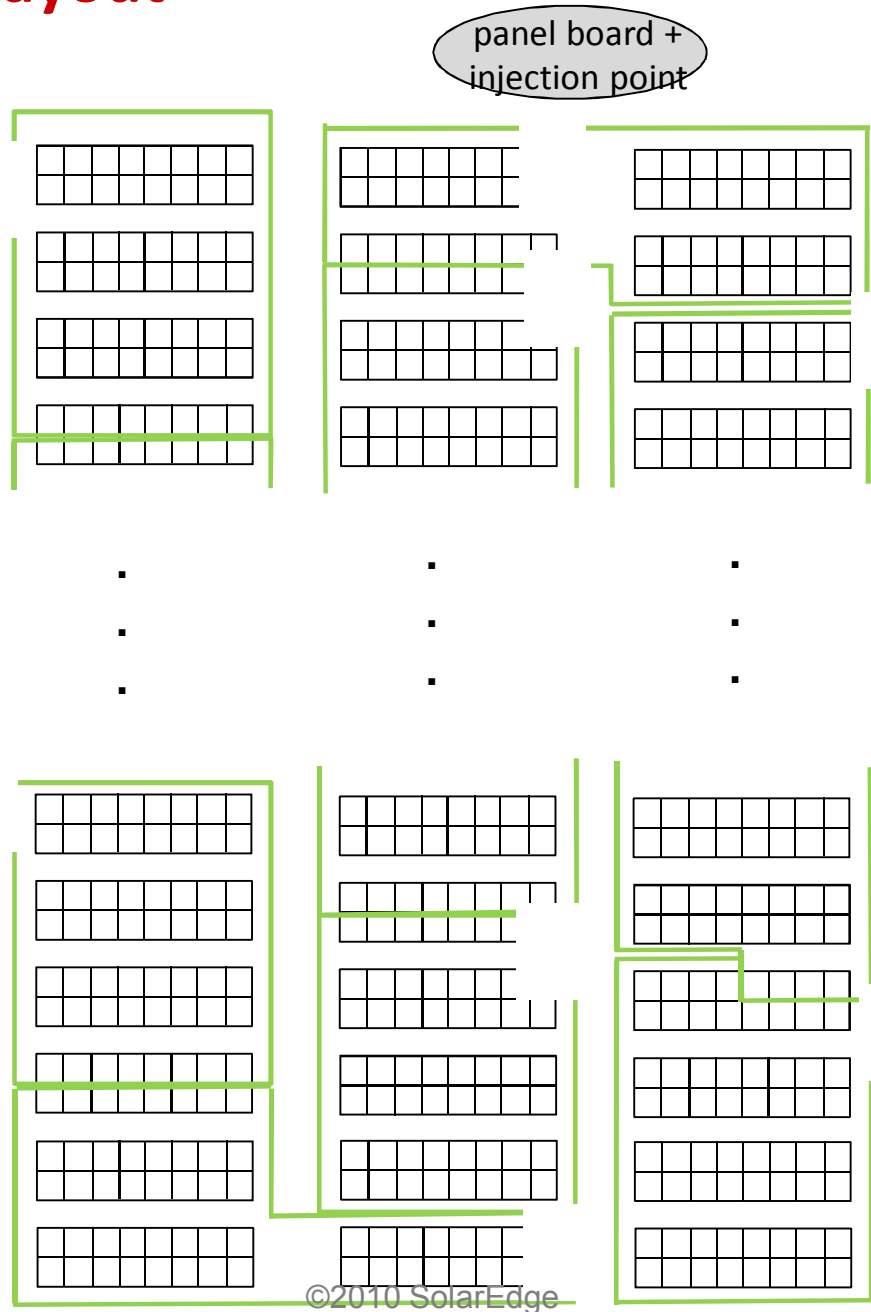|	100kW		200kW	
	Traditional system	SolarEdge	Traditional system	SolarEdge
Inverters	1x100	8xSE12K, 1xSE8K		
Modules/String	24	56/32		
Strings/inverter	20	1		

Site Layout

- Combiner Boxes: 2 (24 strings per box)

- Wiring:
  - String-combiner box, total: 4640m (DC)
 - Combiner boxes-inverter: 50m (DC)

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SolarEdge Site Layout

panel board + injection point

Wiring:
- String-inverter, total: 485m (DC)
- Inverters-transformer: 835m (AC)

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System Design – Traditional System

	100kW		200kW	
	Traditional system	SolarEdge	Traditional system	SolarEdge
Inverters	1x100	8xSE12K, 1xSE8K		
Modules/String	24	56/32		
Strings/inverter	20	1		
Peak power	100.8	100.8		
Combiner boxes	1	0		
Wiring	2,000m (DC)	165m(DC) + 340m(AC)		
Shading loss	1.5%	1.4%		
Annual AC energy	**175 MWh**	**177 MWh (1.1% gain)**		
AC energy / sqm	87.5 kWh/m^2	88.5 kWh/m^2		

Case 2: Commercial Site with Limited Space
Alternative Design

- On the same roof we reduce the distance between module rows to double the power capacity, while increasing inter-row shading

- PVsyst design and energy calculation
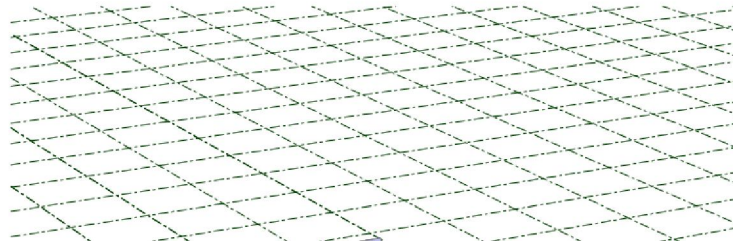
- Kyocera KD210GH-2P modules x 210 x 960 = 201kW

- 48 modules per row, 20 rows, **4.5 m between rows**

Comparative Analysis

	100kW		200kW	
	Traditional system	SolarEdge	Traditional system	SolarEdge
Peak power	100.8	100.8	201.6	201.6
Combiner boxes	1	0	2	0
Wiring	2,000m (DC)	165m(DC) + 340m(AC)	4,000m (DC)	330m(DC) + 679m(AC)
Shading loss	1.5%	1.4%	11.4%	5.2%
Annual AC energy	**175 MWh**	**177 MWh (1.1% gain)**	**306 MWh**	**341 MWh (+11.4% gain)**
AC energy / sqm	87.5 kWh/m^2	88.5 kWh/m^2	153 kWh/m2	170.5 kWh/m2

Comparative Analysis – System Cost Breakdown

- **Cost of 200kW and 200kW SolarEdge system components, relative to 100kW system components (100%)***

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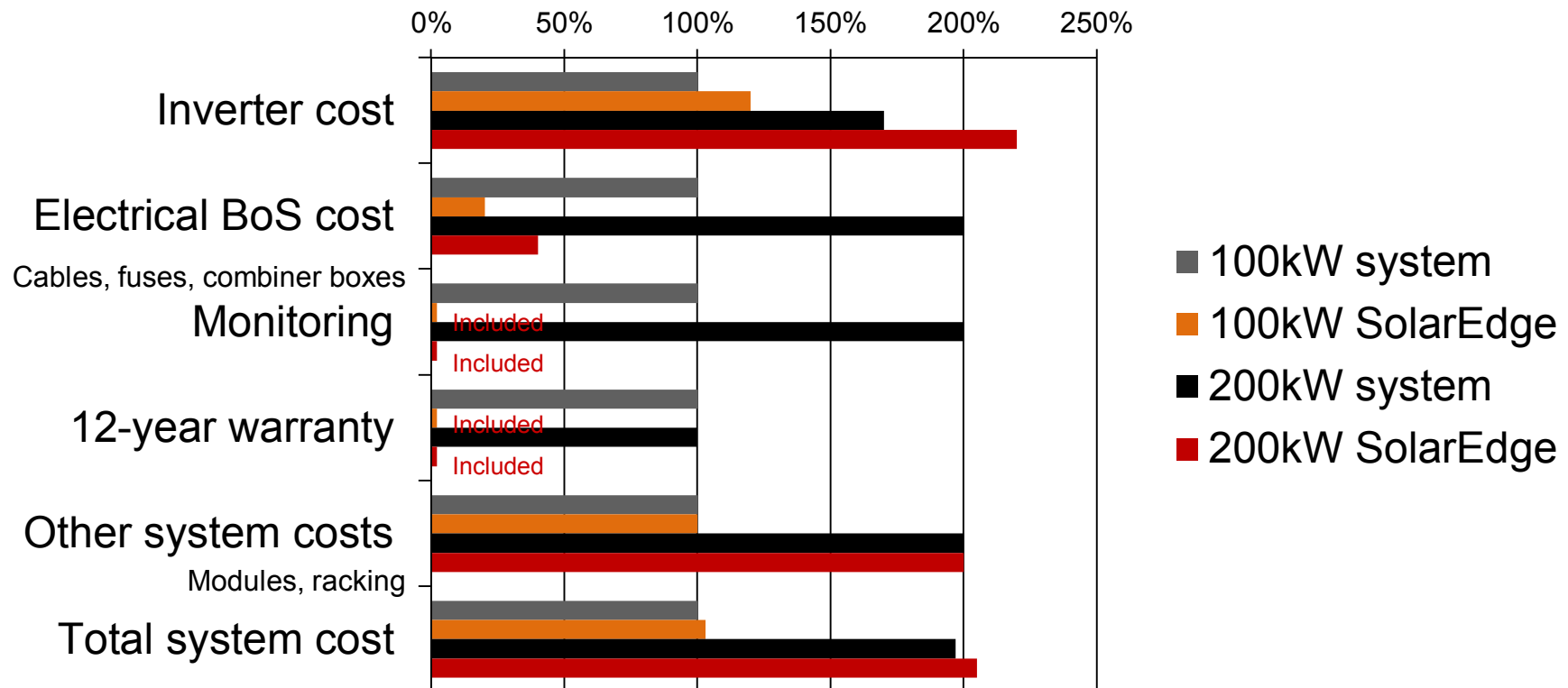
Case 2: Distributed DC Architecture – Enabler

- Installation on 4 roof facets enables 15kW capacity
- Different types of panels connected in a string enable full roof utilization

3 Types of Modules, 3 Long Strings, 4 Orientations

- 25 Suntech 280W modules
- 34 Suntech 210W modules
- 4 Suntech 185W modules
- PowerBox per module
- 3 single phase SE5000 SolarEdge inverters
- 2 strings of 20 modules and 1 string of 23 modules

# Full Roof Utilization Proves to be Cost Efficient

■ The larger the system, the lower the cost per kWp

■ Efficiency decreases in non-south-facing facets

	South	East	West	North	System total	System average
KWp	4.3	3.8	2.9	3.9	14.9	
		KWh/KWp /day			KWh/day	KWh/KWp/day
January	2.82	2.26	1.50	0.98	28.9	1.9
February	3.38	2.88	2.11	1.54	37.6	2.5
March	4.15	3.76	3.06	2.49	50.7	3.4
April	4.77	4.59	4.07	3.64	64.0	4.3
May	5.33	5.40	5.10	4.79	76.9	5.2
June	5.70	5.92	5.76	5.54	85.3	5.7
July	5.67	5.82	5.58	5.31	83.4	5.6
August	5.63	5.53	5.01	4.55	77.5	5.2
September	5.33	4.90	4.05	3.40	66.5	4.5
October	4.52	3.87	2.89	2.15	50.9	3.4
November	3.53	2.86	1.90	1.24	36.4	2.4
December	2.76	2.17	1.38	0.86	27.5	1.8
Year average	4.47	4.16	3.53	3.04	57.1	3.8
Year total	1630	1520	1290	1110	20853	1400
As % of maximum potential (1650 KWh/KWp/year)	*99%*	*92%*	*78%*	*67%*	*85%*	

■ With total system efficiency of 85% of complete-south system, the ratio between system cost and system throughput remains attractive

■ **Average production – >5kWh / kWp per day**

Module Level Monitoring – Physical System Layout
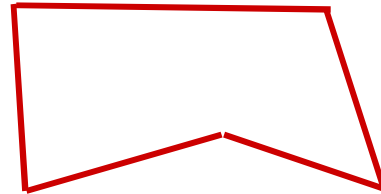
String 3, panels 1-20:

Facet	West	West	East	East
Model	210w	280w	280w	210w

Module Level Monitoring – Power Curves

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280w West   280w East

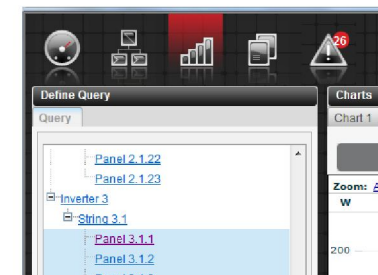210w West   210w East
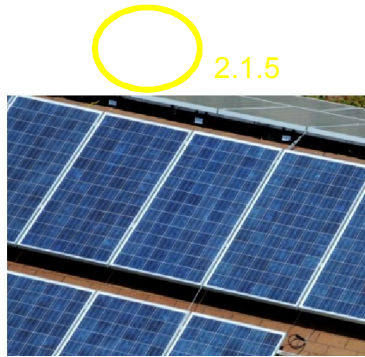
280w East   280w West
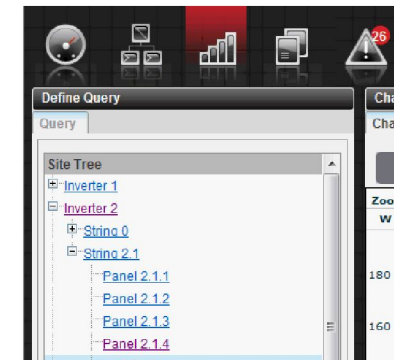
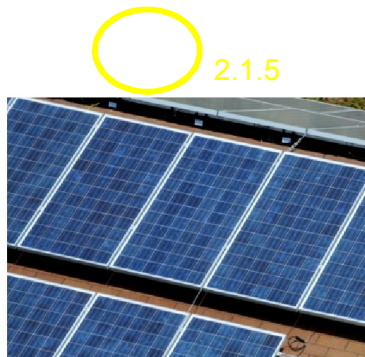210w East   210w West

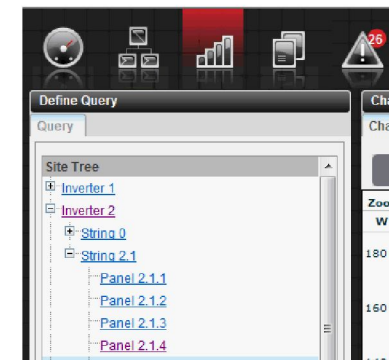# Module Level Monitoring – Accurate Fault Detection

- Module 2.1.5 (red curve) is partially shaded by the bottom right corner of the opposite module, as shown in the power curves

Module Level Monitoring – Accurate Fault Detection

2.1.5

- Underperformance of module 2.1.5 was automatically alerted by the system, and the module was remounted to avoid the shading as shown in the power curves

Thank you

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