Photovoltaics II

Conversion of light to electricity

Energy 2013
ITP / NYU / Feddersen

Previously

For later:

Balance of system
Tracking methods
Concentrating systems
Solar lighting
Solar thermal

also:
Kardashev scale
Space based solar power
Dyson swarms

Balance of system
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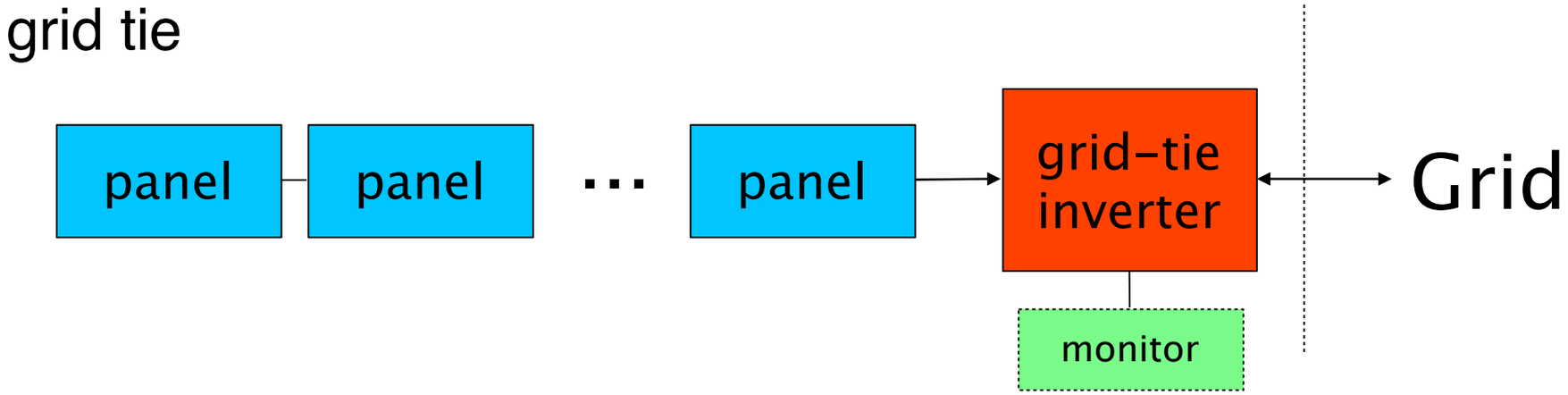
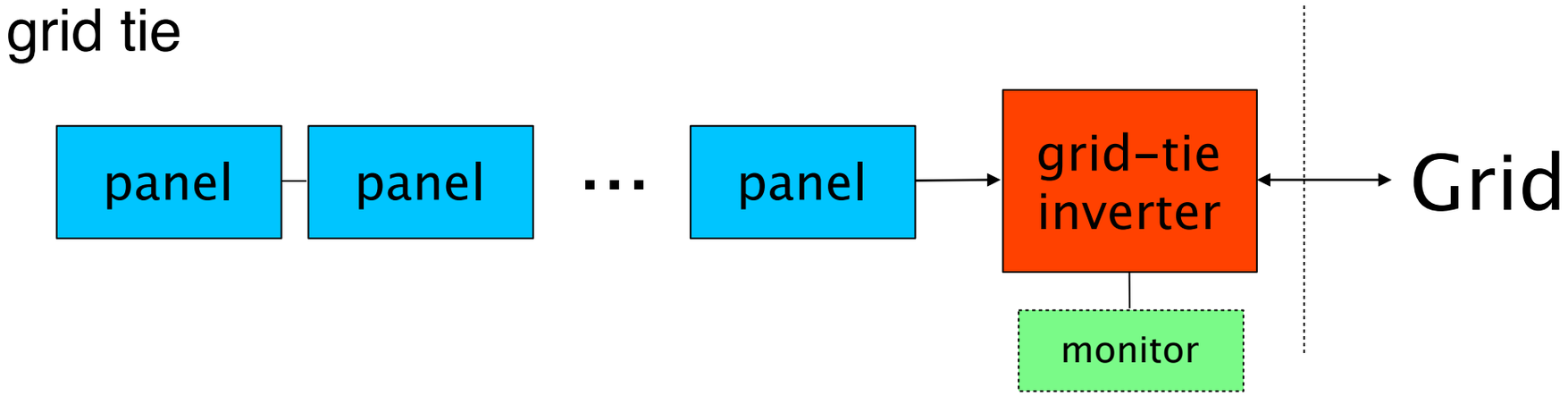
Balance of system: grid tie

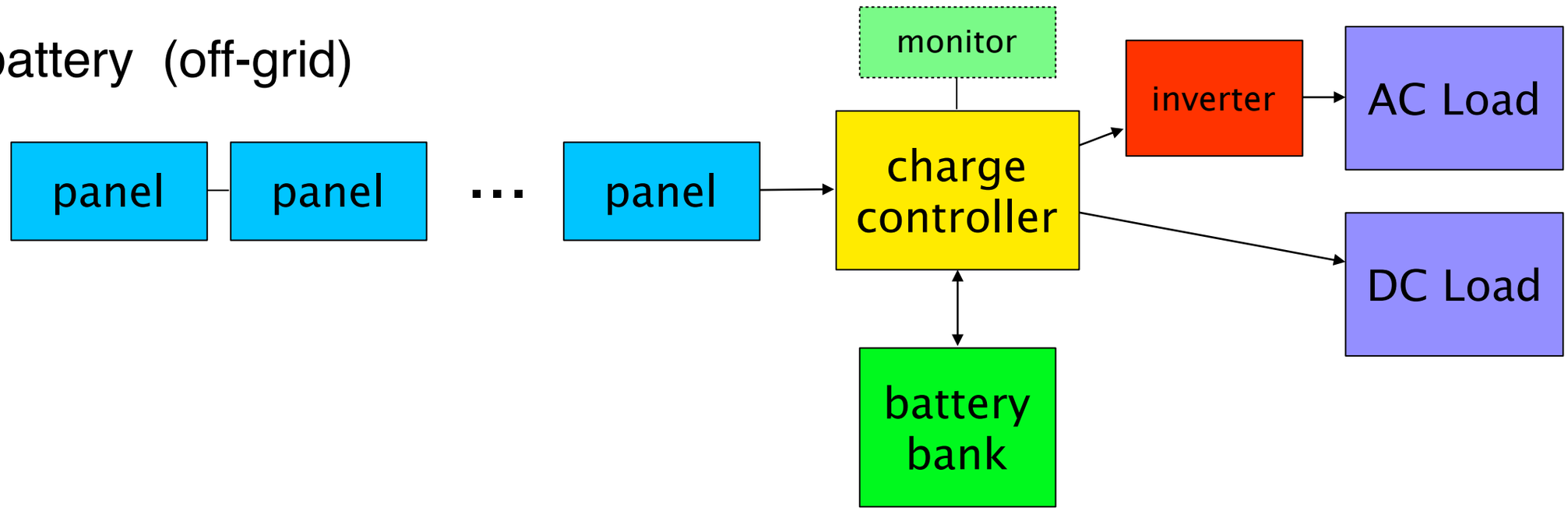


Balance of system: grid tie vs. battery

grid tie



battery (off-grid)



Balance of system: grid-tie inverter

Inverters at “Riverhouse” Battery Park City

Balance of system: grid-tie inverter

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Home > Products > Grid-Tied Inverters > SUNNY BOY > SUNNY BOY 5000-US / 6000-US / 7000-US / 8000-US

SUNNY BOY 5000-US / 6000-US / 7000-US / 8000-US

Versatile performer with UL certification

The Sunny Boy 5000-US, 6000-US, 7000-US and 8000-US inverters are UL certified and feature excellent efficiency. Graduated power classes provide flexibility in system design. Automatic grid voltage detection* and an integrated DC disconnect switch simplify installation, ensuring safety as well as saving time. These models feature galvanic isolation and can be used with all types of modules-crystalline as well as thin-film.

Extended operating temperature range to -40 °C available. Please specify when ordering.

* US Patent US7352549B1

INTEGRATED AFCI

WHERE TO BUY

Overview | Technical data | Downloads

	Sunny Boy 5000-US	Sunny Boy 6000-US	Sunny Boy 7000-US	Sunny Boy 8000-US
	208 V AC 240 V AC 277 V AC	208 V AC 240 V AC 277 V AC	208 V AC 240 V AC 277 V AC	240 V AC 277 V AC
Input (DC)				
Max. recommended PV power (@ module STC)	6250 W	7500 W	8750 W	10000 W
Max. DC power (@ cos φ = 1)	5300 W	6350 W	7400 W	8600 W
Max. DC voltage	600 V	600 V	600 V	600 V
DC nominal voltage	310 V	310 V	310 V	345 V
MPP voltage range	250 V – 480 V	250 V – 480 V	250 V – 480 V	300 V – 480 V
Min. DC voltage / start voltage	250 V / 300 V	250 V / 300 V	250 V / 300 V	300 V / 365 V
Max. input current / per string (at DC disconnect)	21 A / 20 A 36 A @ combined terminal	25 A / 20 A 36 A @ combined terminal	30 A / 20 A 36 A @ combined terminal	30 A / 20 A 36 A @ combined terminal
Number of MPP trackers / fused strings per MPP tracker	1 / 4 (DC disconnect)	1 / 4 (DC disconnect)	1 / 4 (DC disconnect)	1 / 4 (DC disconnect)
Output (AC)				
AC nominal power	5000 W	6000 W	7000 W	7680 W 8000 W
Max. AC apparent power	5000 VA	6000 VA	7000 VA	7680 VA 8000 VA
Nominal AC voltage / adjustable	208 V / yes 240 V / yes 277 V / yes	208 V / yes 240 V / yes 277 V / yes	208 V / yes 240 V / yes 277 V / yes	240 V / yes 277 V / yes
AC voltage range	183 – 229 V 211 – 264 V 244 – 305 V	183 – 229 V 211 – 264 V 244 – 305 V	183 – 229 V 211 – 264 V 244 – 305 V	211 – 264 V 244 – 305 V

Inverters at “Riverhouse” Battery Park City

charge controller

battery

inverter

AC load

Balance of system:
battery system

MORNINGSTAR
The world's leading solar controllers and inverters.

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Morningstar Corporation ▸ Product Selector

[+] LANGUAGES

Product Selector

Please use filters on the right side to search for products.

Inverters

SureSine

SI-300-115V (60 Hz)
SI-300-115V-UL (60 Hz)
SI-300-220V (50 Hz)

MPPT Charge Controllers

TriStar MPPT 600V

TriStar MPPT

TS-MPPT-45
TS-MPPT-60

SunSaver MPPT

SS-MPPT-15L

Product Selector

Type of regulation

Solar Current

Load Current

Load Control

Meter Option Available?

Data Port Available?

Battery System Voltage

☐ 12 ☐ 24 ☐ 36 ☐ 48 ☐ 8 ☐ 8-64

Submit

http://www.morningstarcorp.com/product-selector/

charge controller

battery

inverter

AC load

Balance of system:
battery system

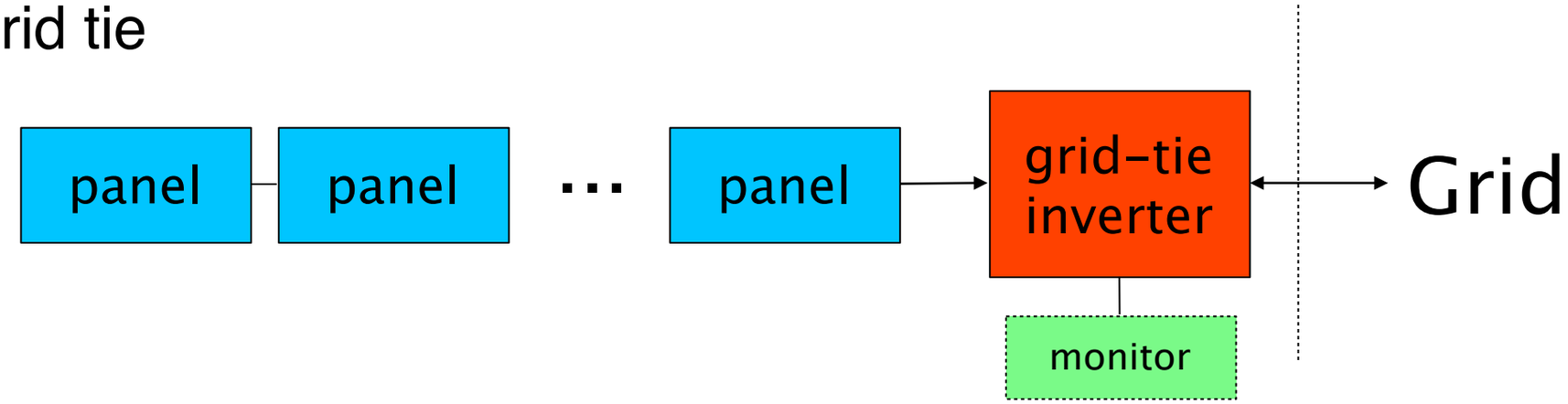
inverter
AC load

battery

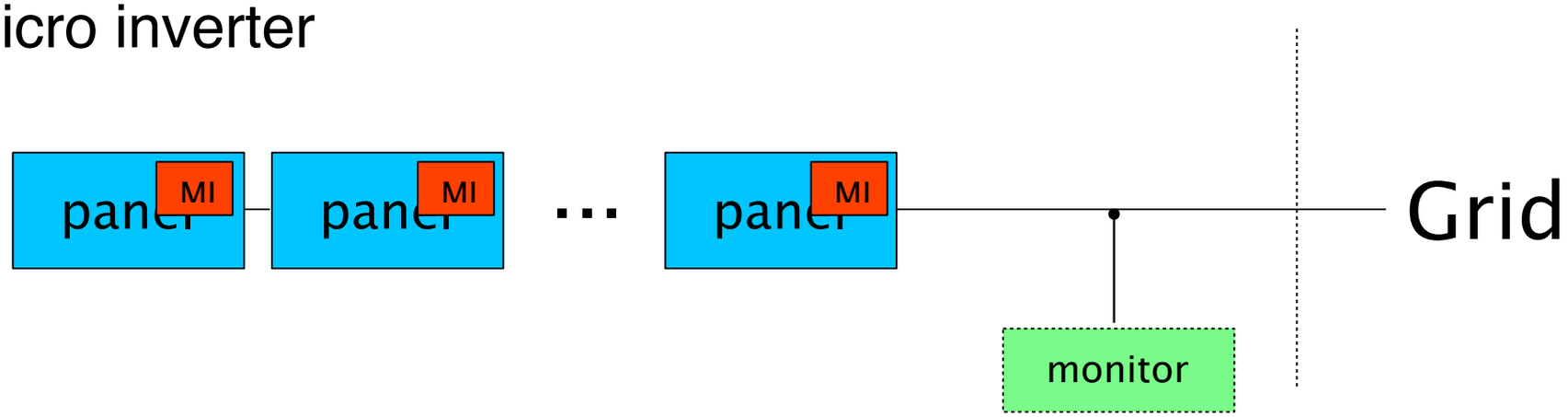
Balance of system:
battery system

Balance of system:
grid tie (traditional) vs. micro inverter

grid tie



micro inverter



Balance of system:
micro inverter

Balance of system: micro inverter

Balance of system: micro inverter

40 MW goal

PSE&G Installed Solar Projects	Location	Size MW-dc	Service Date
Pole-attached solar units	Statewide	26.92	as of February 1, 2012
PSE&G Trenton Solar Farm	Trenton, NJ	1.26	September, 2010
Barringer High School	Newark, NJ	0.65	October, 2010
Central High School	Newark, NJ	0.50	October, 2010
Park Avenue Elementary School	Newark, NJ	0.51	October, 2010
PSE&G Silver Lake Solar Farm	Edison, NJ	2.02	November, 2010
Camden St. Schools	Newark, NJ	0.91	December, 2010
PSE&G Edison Training & Development	Edison, NJ	0.71	December, 2010
CenterPoint Properties	Bayonne, NJ	1.75	December, 2010
PSE&G Linden Solar Farm	Linden, NJ	3.20	December, 2010
PSE&G Central Division Headquarters	Somerset, NJ	0.92	December, 2010
PSE&G Yardville Solar Farm	Hamilton TWP, NJ	4.30	February, 2011
Matrix Realty Building A	Perth Amboy, NJ	1.69	February, 2011
Matrix Realty Building B	Perth Amboy, NJ	1.17	February, 2011
Matrix Realty	South Brunswick, NJ	2.98	June, 2011
Rider University	Lawrenceville, NJ	0.74	October, 2011
Mills Creek	Burlington TWP, NJ	3.82	November, 2011
Kearny Landfill Solar	Kearny, NJ	3.00	December, 2011
Thorofare Solar Farm	West Depford, NJ	0.72	December, 2011
Summit Associates	Edison, NJ	2.22	December, 2011
TOTAL PSE&G		**59.99 MW-dc**	
GRAND TOTAL Installed		86.60 MW-dc	

Balance of system: micro inverter

40 MW goal, currently 39.75

PSE&G Installed Solar Projects	Location	Size MW-dc	Service Date
Pole-attached solar units	Statewide	26.92	as of February 1, 2012
PSE&G Trenton Solar Farm	Trenton, NJ	1.26	
Barringer High School	Newark, NJ	0.65	
Central High School	Newark, NJ	0.50	
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TOTAL PSE&G		**59.99 MW-dc**	
GRAND TOTAL Installed		86.60 MW-dc	

PSE&G Installed Solar Projects	Location	Size MW-dc	Service Date
Pole-attached solar units	Statewide	36.50	as of March 2013
Barringer High School	Newark, NJ	0.65	October, 2010

PSE&G Installed Solar Projects	Location	Size MW-dc	Service Date
Pole-attached solar units	Statewide	39.75	as of January 2014
Trenton Solar Farm	Trenton, NJ	1.26	September, 2010
Barringer High School	Newark, NJ	0.65	October, 2010
PSE&G Linden Solar Farm	Linden, NJ	3.20	December, 2010
PSE&G Central Division Headquarters	Somerset, NJ	0.92	December, 2010
PSE&G Yardville Solar Farm	Hamilton TWP, NJ	4.30	February, 2011
Matrix Realty Building A	Perth Amboy, NJ	1.69	February, 2011
Matrix Realty Building B	Perth Amboy, NJ	1.17	February, 2011
Matrix Realty	South Brunswick, NJ	2.98	June, 2011
Rider University	Lawrenceville, NJ	0.74	October, 2011
Mills Creek	Burlington TWP, NJ	3.82	November, 2011
Kearny Landfill Solar	Kearny, NJ	3.00	December, 2011
Thorofare Solar Farm	West Depford, NJ	0.72	December, 2011
Summit Associates	Edison, NJ	2.22	December, 2011
Black Rock/Matrix Reality	South Brunswick	2.97	March, 2012
PSE&G Metro Division Headquarters	Clifton, NJ	0.73	July 1, 2012
Community Food Bank of NJ	Hillside, NJ	1.07	August 2012
Hackensack Solar Farm	Hackensack, NJ	1.06	Winter 2012
TOTAL PSE&G		**75.40 MW-dc**	

Balance of system:
micro inverter

NJ total installed PV capacity surpassed 1GW in February 2013

http://www.nj.gov/bpu/pdf/announcements/2013/20130319.pdf

Text

Balance of system
Tracking methods
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also:
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Space based solar power
Dyson swarms

Tracking

single axis
(elevation)

Tracking

single axis
(azimuth)

Tracking

dual axis

~10kW

Tracking

dual axis

elevation axis

azimuth axis

Tracking

dual axis - mixed
“Riverhouse” BPC

azimuth
east and west sides

elevation
south side

Challenge:

Tracking systems 1) require **space between arrays** and 2) introduce **mechanical parts** that require energy and maintenance.

Cost of tracking system must compete with cost of simply adding more fixed panels.

Ways to simplify mechanics or minimize number of actuators are interesting.