



POWER WITH PURPOSE
Dramatically improving solar economics and energy capture

sundrumsolar.com

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GOOD ENERGY FOR GOOD PEOPLE
Dramatically improving solar economics and energy capture

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PROJECT OVERVIEW | RESIDENTIAL SPACE, WATER, AND POOL HEATING

OBJECTIVES

- Offset **up to 100% of heating and cooling demand**
- Provide **maximum power with limited roof space**
- Maximize **efficiency and cost savings**

SPECIFICATIONS

- Location:** Washington, D.C., USA
- Year:** 2016
- Demand:** 2,100 sqft home + 500 sqft pool
- Size:** 32 SunDrum modules (46 PV panels)
- Power:** 15.5 kW

SOLUTION SUMMARY

SunDrum Solar nested **32 SunDrum Collectors** behind **46 PV panels** to offset **92% of space, water, and pool heating demand** and **100% of space cooling demand** (via heat pump integration) **year-round** for a residential home.

In the first 12 months, SunDrum Solutions reduced billed energy consumption from 80 MWh to 7 MWh.

WHY SUNDRUM SOLAR?

SunDrum Systems combine **photovoltaic (PV), solar thermal, and heat pump technology** to meet electrical and thermal demand simultaneously.

WHAT IS SUNDRUM SOLAR?

The **award-winning, patented SunDrum Collector** mounts behind PV panels to supercharge any solar system. Collectors cool the panels (improving performance) and capture usable thermal energy. Heat pump integration supports a wide range of heating and cooling applications.

HOW SUNDRUM SOLUTIONS DIFFER

- More solar power captured**
3x more power per panel than PV
- More useful heat**
Space & water heating, up to 160°F
- Better financial returns**
Faster payback than PV or solar thermal
- Made in the U.S.A.**
Predictable timelines, increased rebates



91% reduction

Heating and cooling costs



2,490 therms

Annual energy output



10 tonne CO2e

Annual emissions reduction



Rooftop Solar Array



Project Aerial View



CASE STUDY

BAKERSFIELD HOTEL



PROJECT OVERVIEW | HOTEL HYBRID SOLAR

OBJECTIVES

- Offset high **heat demands**.
- Maximize **usable energy from available roof space**
- Provide **24/7 heating from solar energy**

SPECIFICATIONS

- Location:** Bakersfield, CA, USA
- Year:** 2017
- Demand:** Hotel space, pool, & water heating
- Size:** 42 SunDrum modules + 18 PV panels
- Power:** 27 kW (thermal) + 15 kW (electrical)

SOLUTION SUMMARY

SunDrum Solar nested **42 SunDrum Collectors** behind **60 conventional PV panels** to generate **5x more solar energy** than a conventional PV array. The **award-winning, patented SunDrum System** supplies on-demand, 24/7 solar energy to supply the hotel's pool and water heating needs. With incentives, the system paid for itself in **less than 4 years**.

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Predictable timelines, increased rebates



13 tonne CO2e

Annual emissions reduction



2,400 therms

Annual energy output



4 years

100% payback in < 4 years



60 Rooftop Panels (42 with SunDrum Collectors)



Integrated Control System

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CASE STUDY

MAUI BREWING COMPANY



PROJECT OVERVIEW | BREWERY HYBRID SOLAR

OBJECTIVES

- Reduce brewery **environmental impact**
- Reduce **operational cost & variability**
- Meet **thermal and electrical demands**

SPECIFICATIONS

- Location:** Kihei, HI, USA
- Year:** 2011
- Demand:** Water heating (160°F) + chilling (40°F)
- Size:** 220 SunDrum modules
- Power:** 248 kW

SOLUTION SUMMARY

SunDrum Solar installed **220 SunDrum Collectors** behind conventional PV panels to offset brewery water heating & cooling demand. Heat pump integration supported **simultaneous heating and cooling** using **only solar energy**, maximizing **cost control** and **environmental benefit**.

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HOW SUNDRUM SOLUTIONS DIFFER

More solar power captured

3x more power per panel than PV

More useful heat

Space & water heating, up to 160°F

Better financial returns

Faster payback than PV or solar thermal

Made in the U.S.A.

Predictable timelines, increased rebates



390 metric tons

Annual emissions reduction



53,000 therms

Annual energy output

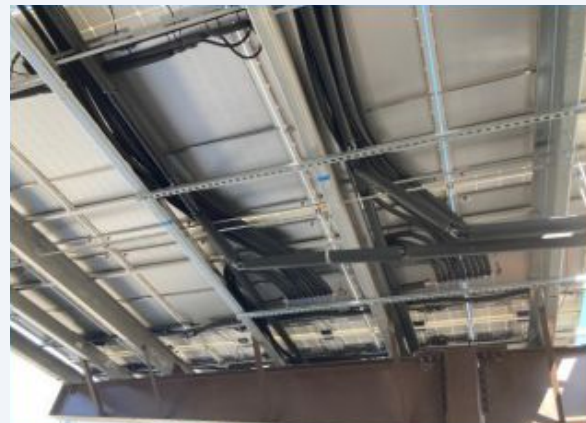


COP = 16

Heat pump efficiency



Hybrid Solar System



Array with Header and Home Run

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CASE STUDY

SAN FRANCISCO MULTIFAMILY



PROJECT OVERVIEW | MULTIFAMILY HYBRID SOLAR RETROFIT

OBJECTIVES

- Retrofit **existing solar array** to add **solar thermal**
- Provide **efficient, scalable hot water heating**
- Maximize **usable energy from available roof space**

SPECIFICATIONS

- Location:** San Francisco, CA, USA
- Year:** 2021
- Demand:** Multifamily water heating
- Size:** 34 SunDrum modules
- Power:** 27 kW (thermal)

SOLUTION SUMMARY

SunDrum Solar nested **34 SunDrum Collectors** behind an **existing PV solar array** to provide continuous heating at high efficiency for a multifamily complex. The **award-winning, patented** SunDrum Systems captures thermal energy - be it day or night, cloudy or sunny - to ensure **24/7 water heating**.

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3x more power per panel than PV
- More useful heat**
Space & water heating, up to 160°F
- Better financial returns**
Faster payback than PV or solar thermal
- Made in the U.S.A.**
Predictable timelines, increased rebates



COP = 6

Heat pump efficiency



2,400 therms

Annual energy output



Retrofitted

No additional roof space required



SunDrum Mounted Under Existing PV



Rooftop Solar Array

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PROJECT OVERVIEW | MILITARY BARRACKS WATER HEATING

OBJECTIVES

- Offset **dormitory & laundry hot water needs**
- Provide **scalable, 24/7 water heating**
- Maximize **heating across seasons**

SPECIFICATIONS

- Location:** North Chicago, IL, USA
- Year:** 2019
- Demand:** Barracks & laundry hot water
- Size:** 1,300 SunDrum modules
- Power:** 1.0 MW thermal + 2.8 MW electrical

SOLUTION SUMMARY

SunDrum Solar nested **1,300 SunDrum Collectors** behind an existing **7,000 PV-panel array** to provide **over 4,000 therms per month of water heating capacity** for a large military barracks. The integrated heat pump provided **strong performance in both winter and summer months**, significantly reducing steam use across six dormitory hot water systems and a central laundry facility.

WHY SUNDRUM SOLAR?

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Space & water heating, up to 160°F
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Faster payback than PV or solar thermal
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Predictable timelines, increased rebates



All-season

Thermal energy generation



65,000 therms

Annual energy output

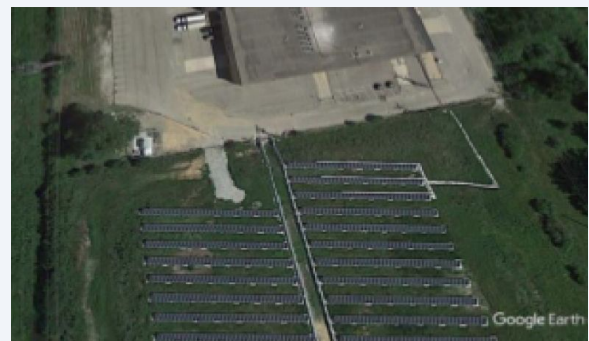


1,045 tonne CO2e

Annual emissions reduction



Dormitory Arrays



Landfill Array (Laundry)



CASE STUDY

NET-ZERO ADU



PROJECT OVERVIEW | SUSTAINABLE ACCESSORY DWELLING UNIT (ADU)

OBJECTIVES

- Minimize **ADU cost of ownership**
- Offset **up to 100% of anticipated energy demand**
- Maximize **sustainability and efficiency**

SPECIFICATIONS

- Location:** San Jose, CA, USA
- Year:** 2019
- Demand:** 100% of ADU heating & cooling demand
- Size:** 10 SunDrum modules (12 PV panels)
- Power:** 9.5 kW thermal + 6.5 kW electrical

SOLUTION SUMMARY

SunDrum Solar nested **10 SunDrum Collectors** behind **12 PV panels** to offset **100% of the electrical, space heating and cooling and hot water costs** for a sustainable ADU project. For homes with limited roof space, SunDrum Collectors dramatically improve solar energy collection and increase useful energy to the client.

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3x more solar power per panel than PV
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Space & water heating, up to 160°F
- Better financial returns**
Faster payback than PV or solar thermal
- Made in the U.S.A.**
Predictable timelines, increased rebates



92% reduction
Lifetime energy costs



324 therms
Annual thermal energy output



4,000 kg CO2e
Annual emissions reduction



ADU Street View



South-Facing Hybrid Panels

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CASE STUDY

ELKS LODGE POOL HEATING



PROJECT OVERVIEW | COMMUNITY CENTER POOL HEATING RETROFIT

OBJECTIVES

- Minimize **pool heating cost and variability**
- Eliminate **natural gas consumption**
- Maximize **net energy savings**

SPECIFICATIONS

- Location:** Palo Alto, CA, USA
- Year:** 2019
- Demand:** 3,300 sqft pool
- Size:** 120 SunDrum modules
- Power:** 78 kW

SOLUTION SUMMARY

SunDrum Solar nested **120 SunDrum Collectors** underneath an **existing PV array** to cost-effective **reduce pool heating demand** and net expenditure on energy and heating..

Collectors were installed on an existing solar canopy array with **no changes required to PV mounting, appearance, or warranties.**

WHY SUNDRUM SOLAR?

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WHAT IS SUNDRUM SOLAR?

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HOW SUNDRUM SOLUTIONS DIFFER

More power captured

3x more solar power per panel than PV

More useful heat

Space & water heating, up to 160°F

Better financial returns

Faster payback than PV or solar thermal

Made in the U.S.A.

Predictable timelines, increased rebates



85% reduction

Annual natural gas consumption



13,000 therms

Annual thermal energy output



72 tonne CO2e

Annual emissions reduction



Existing Lodge Carport PV Arrays



Collectors Visible Under Carport

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CASE STUDY

WAILEA INN



PROJECT OVERVIEW | HOTEL HYBRID SOLAR FOR POOL, WATER, & SPACE HEATING

OBJECTIVES

- Minimize **heating cost & variability**
- Provide **24/7, high-efficiency heating**
- Support **pool & water heating demand**

SPECIFICATIONS

- Location:** Maui, HI, USA
- Year:** 2019
- Demand:** 100% of hot water and pool heating
- Size:** 40 SunDrum modules
- Power:** 56 kW

SOLUTION SUMMARY

SunDrum Solar nested **40 SunDrum Collectors** behind **40 PV panels** to reduce **hotel pool and hot water heating demand**. The temperate Kihei climate supports high-efficiency heating year-round, while the integrated heat pump provides continuous heating during inclement weather and at night.

WHY SUNDRUM SOLAR?

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- More power captured**
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- More useful heat**
Space & water heating, up to 160°F
- Better financial returns**
Faster payback than PV or solar thermal
- Made in the U.S.A.**
Predictable timelines, increased rebates



1,000 sqft

Limited roof space required



1,900 therms

Annual thermal energy output



31 tonne CO2e

Annual emissions reduction



Rooftop Solar Panels



Wailea Inn Pool

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CASE STUDY

AUGUSTA HOTEL



PROJECT OVERVIEW | HOTEL HYBRID SOLAR WITH STRONG ROI

OBJECTIVES

- Minimize **heating cost & variability**
- Provide **on-demand, high-efficiency heating**
- Meet **entire range of heating demands**

SPECIFICATIONS

- Location:** Augusta, GA USA
- Year:** 2017
- Demand:** 100% of hot water heating
- Size:** 40 SunDrum modules (160 PV panels)
- Power:** 56 kW

SOLUTION SUMMARY

SunDrum Solar nested **40 SunDrum Collectors** underneath a **160-panel rooftop PV array** to meet this hotel's hot water needs. SunDrum Collectors, with the integrated heat pump, were able to bring tank temperatures to 110°F - 120°F consistently at high efficiency levels, and as high as 140°F on hot summer days without heat pump use.

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Space & water heating, up to 160°F
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Faster payback than PV or solar thermal
- Made in the U.S.A.**
Predictable timelines, increased rebates



≥ 120°F

Hot water temperature attainable



24/7

Hot Water Available

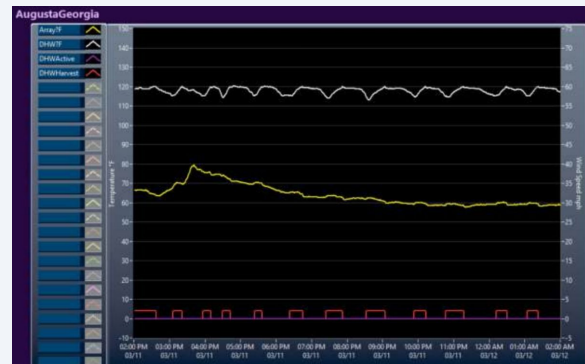


5x more

Total Energy Than PV Alone



Rooftop Solar Array



Water Temperature Maintained 110°F - 120°F

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CASE STUDY

INN AT SCHOFIELD BARRACKS



PROJECT OVERVIEW | HOTEL HYBRID SOLAR WITH STRONG ROI

OBJECTIVES

- Minimize **heating cost & variability**
- Provide **high-efficiency heating**
- Meet **entire range of heating demands**

SPECIFICATIONS

- Location:** Wahiawa, HI USA
- Year:** 2013
- Demand:** 100% of hot water heating
- Size:** 282 SunDrum modules
- Power:** 183 kW

SOLUTION SUMMARY

SunDrum Solar worked alongside a PV installer to design a system to offset **over \$7,500/mo in energy costs** for the Oahu-based hotel. By adding **282 SunDrum Collectors** to 40% of the panels, PV performance was increased, return-on-investment improved, and the hotel was able to meet a larger share of its total heating demand.

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\$45,000

Energy Savings, First 6 Months



\$1.1 million

Value of Lifetime SunDrum Savings

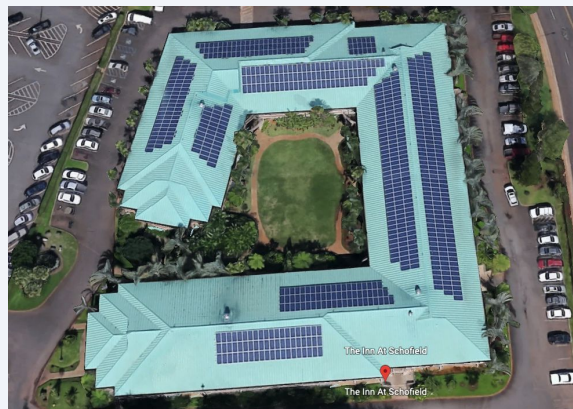


2.5 Years

Time to Project Breakeven



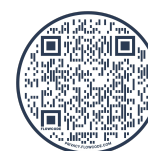
Hotel Roof



Large Solar Installation Onsite

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PROJECT OVERVIEW | UNIVERSITY AQUATICS CENTER HYBRID SOLAR

OBJECTIVES

- Maximize **pool sustainability**
- Offset **thermal demand**
- Promote **innovative design**

SPECIFICATIONS

- Location:** Providence, RI USA
- Year:** 2013
- Demand:** Pool heating
- Size:** 168 SunDrum modules
- Power:** 161 kW

SOLUTION SUMMARY

SunDrum Solar installed a large, **168-panel combined PV-and-thermal array** on the roof of the Brown University Aquatics Center. Each PV panel was equipped with a SunDrum Collector, improving panel performance while heating the pool directly. Made in nearby Hudson, MA, the Collector system provides 100% of the pool's heating needs for most of the year.

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Predictable timelines, increased rebates



6%

Increase in PV panel Performance



Hudson, MA

Manufactured in the USA



650 Watts

Heat Energy Captured per Collector



Katherine Moran Coleman Aquatics Center



Large Rooftop Solar Installation



CASE STUDY

TIP O'NEILL BUILDING



PROJECT OVERVIEW | FEDERAL BUILDING HYBRID SOLAR

OBJECTIVES

- Maximize **sustainability**
- Offset **thermal demand**
- Promote **innovative design**

SPECIFICATIONS

- Location:** Boston, MA
- Year:** 2011
- Demand:** Building hot water
- Size:** 144 SunDrum modules
- Power:** 69 kW thermal + 30 kW electric

SOLUTION SUMMARY

SunDrum Solar installed a large, **69 kW thermal array** on the roof of the Tip O'Neill Federal Building in Boston, MA - at the time, the largest hybrid solar installation in the country, and the first such installation on a federal or commercial building. The U.S. General Services Administration (GSA) lauded the project as a step toward reducing environmental impact while saving taxpayers money.

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Predictable timelines, increased rebates



4,993 trees

Equivalent CO2e emissions benefit



Hudson, MA

Manufactured in the USA



29,000 kg

Annual CO2e Emissions Reduction



Tip O'Neill Building



Building Solar Installation

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PERFORMANCE ANALYSIS

OBJECTIVES

- Maximize **sustainability**
- Offset **thermal demand**
- Promote **innovative design**

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Equivalent CO2e emissions benefit



Hudson, MA

Manufactured in the USA



29,000 kg

Annual CO2e Emissions Reduction



Tip O'Neill Building



Building Solar Installation

HARVESTHP™ LOW TEMPERATURE OPERATION

SunDrum® Solar's HarvestHP™ system is capable of producing energy in cold weather conditions, provided the solar array temperature is above 32°F. The heat pump will accept energy from the solar array and deliver it to the load at the desired temperature. This allows the system to operate on demand and continue to deliver energy when sunlight is less favorable. If desired, customers can choose a higher minimum array temperature to increase the heat pump's COP and reduce electricity consumption.

To demonstrate this capability, a system installed in New England was observed in February while a cold front passed through. The temperature data acquired from the system controller is shown in Figure 1, while the outdoor air temperature is shown in Figure 2. This system is programmed to run the heat pump (Harvest mode) when there is demand if the solar array temperature is above 32°F. If the array temperature drops below 32°F, Harvest mode is not allowed to run again until the array reaches 34°F.

As indicated by the red rectangle Figure 1, Harvest mode started running at about 8:30 AM when array temperature exceeded 34°F as sunlight warmed the collectors. The system used Harvest mode to heat the storage tank from about 95°F to 118°F and maintain its temperature during the afternoon. As the air temperature continually dropped (see Figure 2), the tank was put under an increased load since it serves both DHW and HVAC heating, requiring the system to run until the outside temperature dropped below 14°F and array temperature fell below 32°F around 2:30 PM.

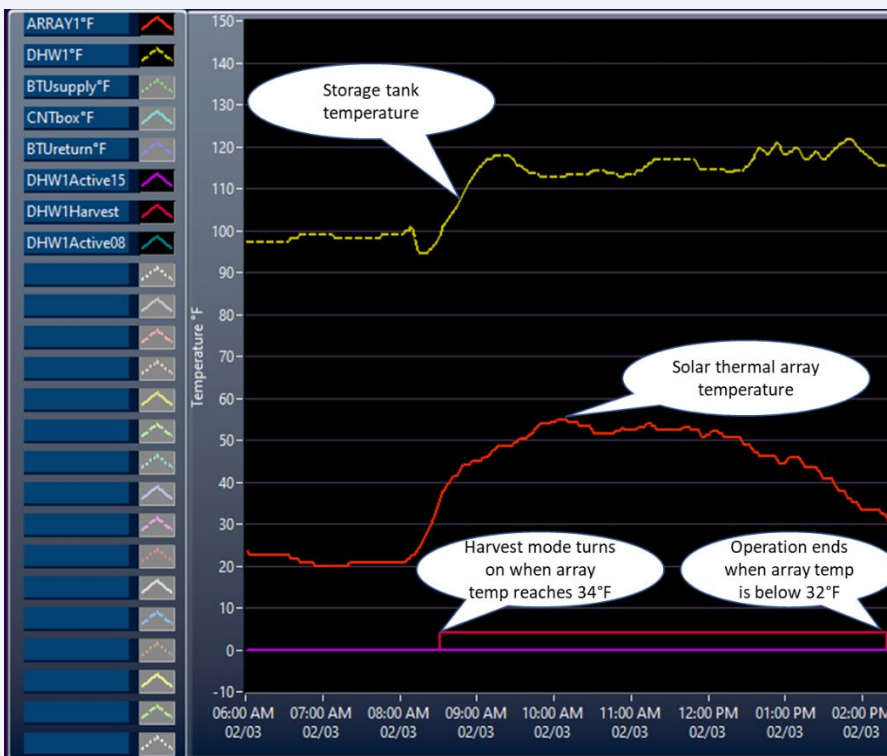


Figure 1
HarvestHP™ System temperature data (02/03/2023)

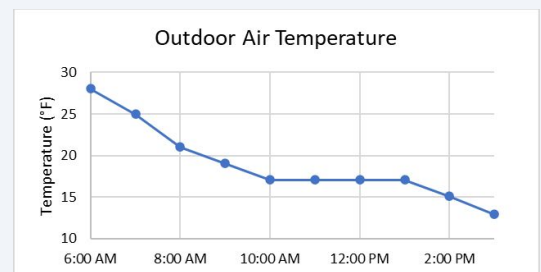
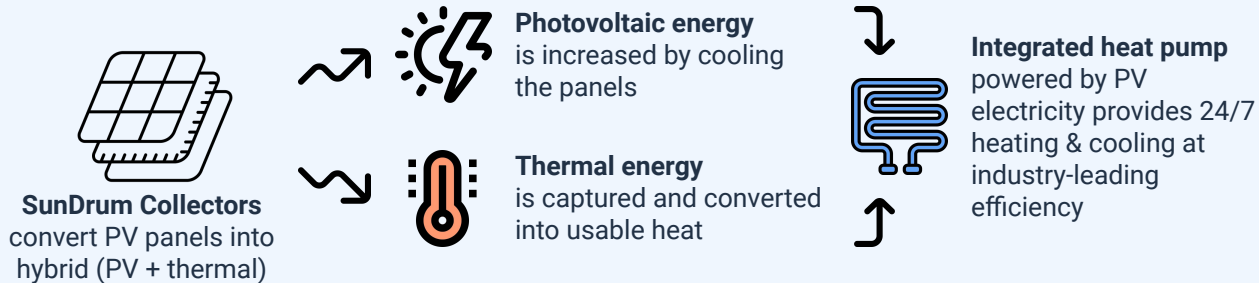


Figure 2
Outdoor air temperature

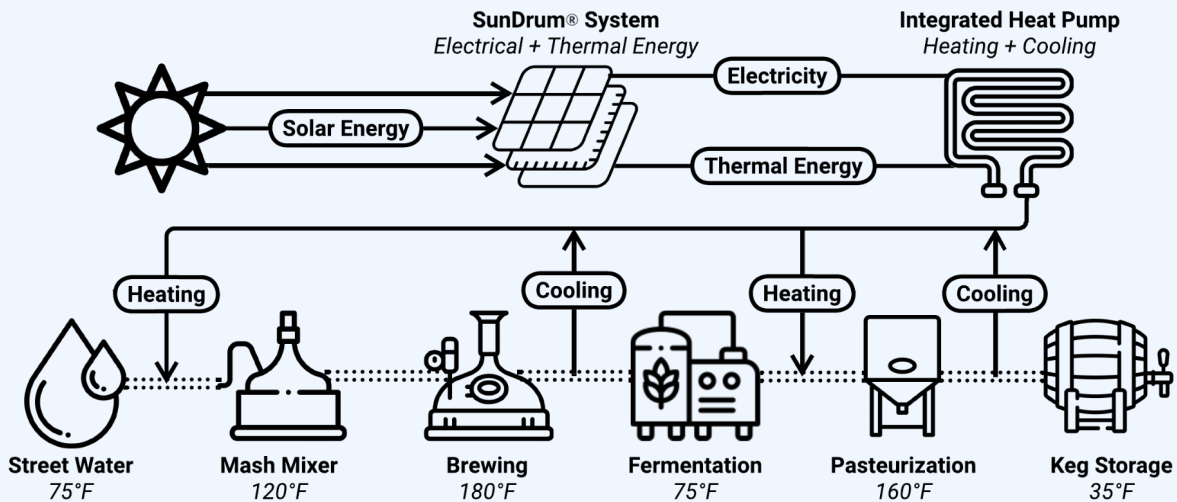
SUNDRUM SOLAR TECHNOLOGY

The award-winning, patented SunDrum Collector mounts directly behind PV panels, cooling the panels and sending captured heat to an integrated heat pump. SunDrum combines **three leading renewable** technologies.



APPLICATION

SunDrum Solutions maximize solar energy and leverage complementary loads to increase system efficiency, output, and ROI.



BENEFITS



Made in USA

Produced in our own factory



High Heat Production

Up to 160°F



24/7 Heating

Exceptional heat pump efficiency



Valuable incentives

Offset more than half of cost



Strong Financials

Positive ROI in a few years



Fully Retrofittable

Works with new or existing solar

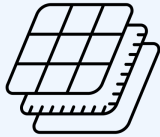
SUNDRUM SOLUTIONS FOR BIOGAS

IMPROVE OPERATIONAL COSTS AND SUSTAINABILITY



SUNDRUM SOLAR TECHNOLOGY

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SunDrum Collectors convert PV panels into hybrid (PV + thermal)



Photovoltaic energy is increased by cooling the panels



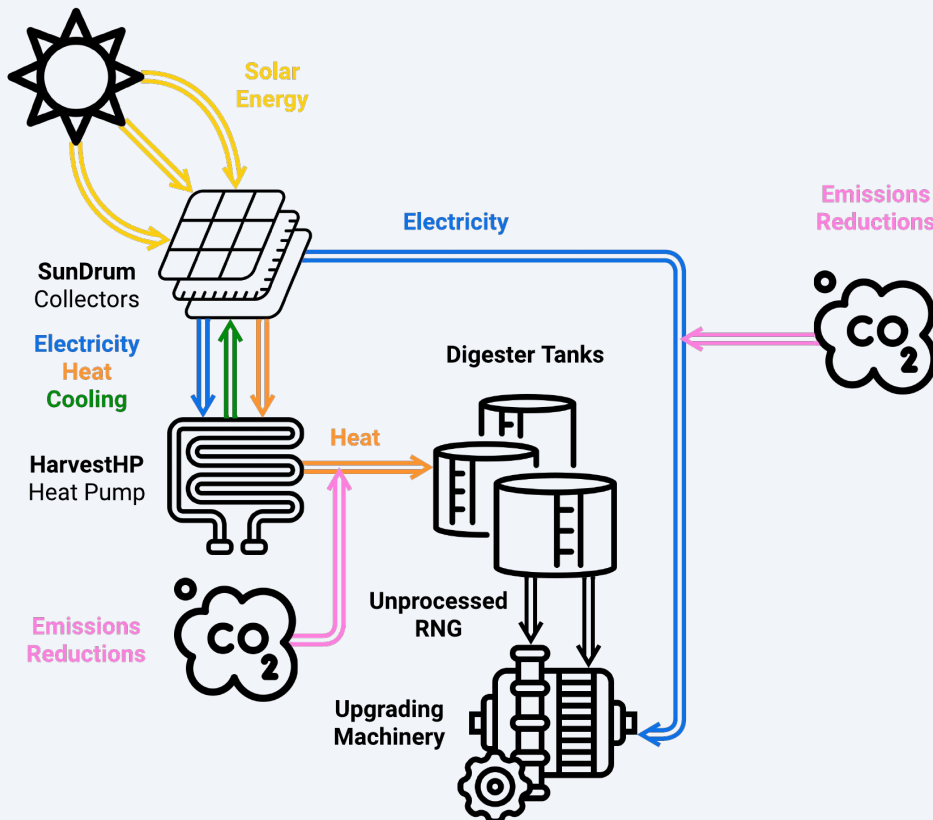
Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating & cooling at industry-leading efficiency

APPLICATION

SunDrum Solutions reduce carbon intensity (and so increase renewable gas value) by offsetting emissions related to grid electricity consumption and fossil fuel heating.



Increased CI Score

Reduced carbon emissions



Valuable incentives

Offset more than half of cost



24/7 Heating

Whether sun is shining or not



Fully Retrofittable

Works with new or existing solar

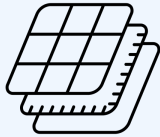
sundrumsolar.com

SunDrum Solar, LLC | 469 River Road, Hudson, MA 01749
info@sundrumsolar.com | 508-740-6256



SUNDRUM SOLAR TECHNOLOGY

The award-winning, patented SunDrum Collector mounts directly behind PV panels, cooling the panels and sending captured heat to an integrated heat pump. SunDrum combines **three leading renewable** technologies.



SunDrum Collectors convert PV panels into hybrid (PV + thermal)



Photovoltaic energy is increased by cooling the panels



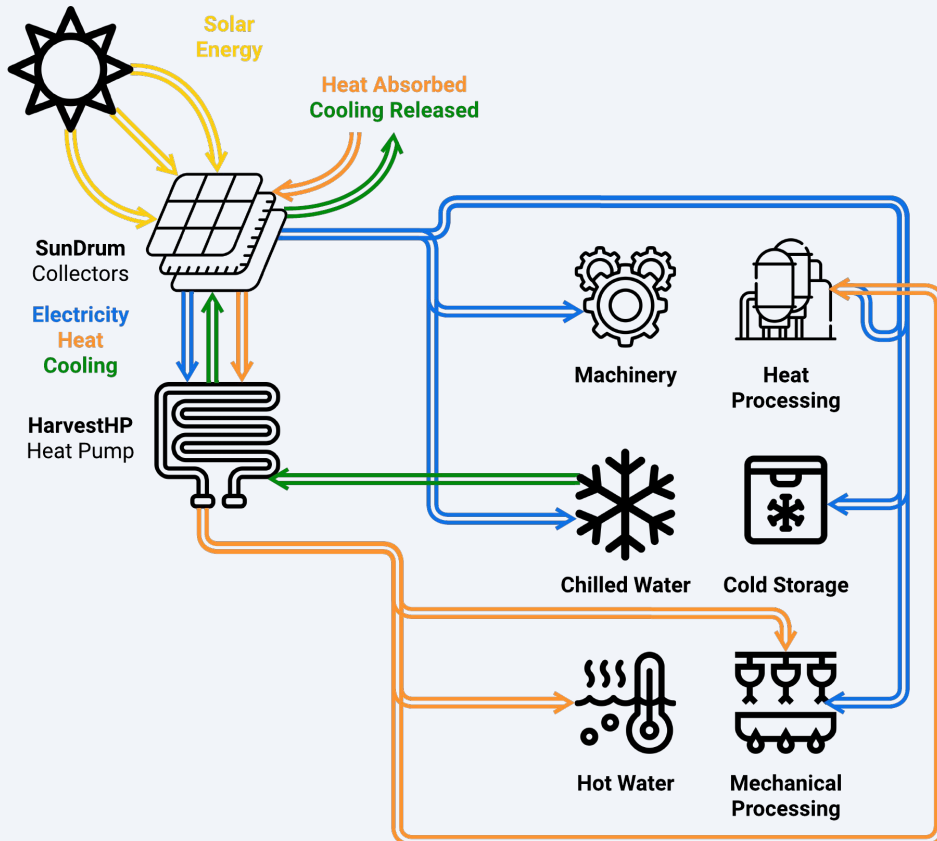
Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating & cooling at industry-leading efficiency

APPLICATION

SunDrum Solutions minimize operational costs and reduce energy price risk, increasing predictability and profits.



Incentives Offset Cost
ITC, REAP, MACRS



High Heat Production
Up to 160°F



24/7 Heating
High-efficiency heat pump



Fully Retrofittable
Works with new or existing solar

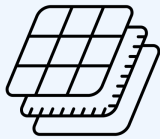
SUNDRUM SOLAR FOR HOSPITALITY

IMPROVE YOUR BOTTOM LINE



SUNDRUM SOLAR TECHNOLOGY

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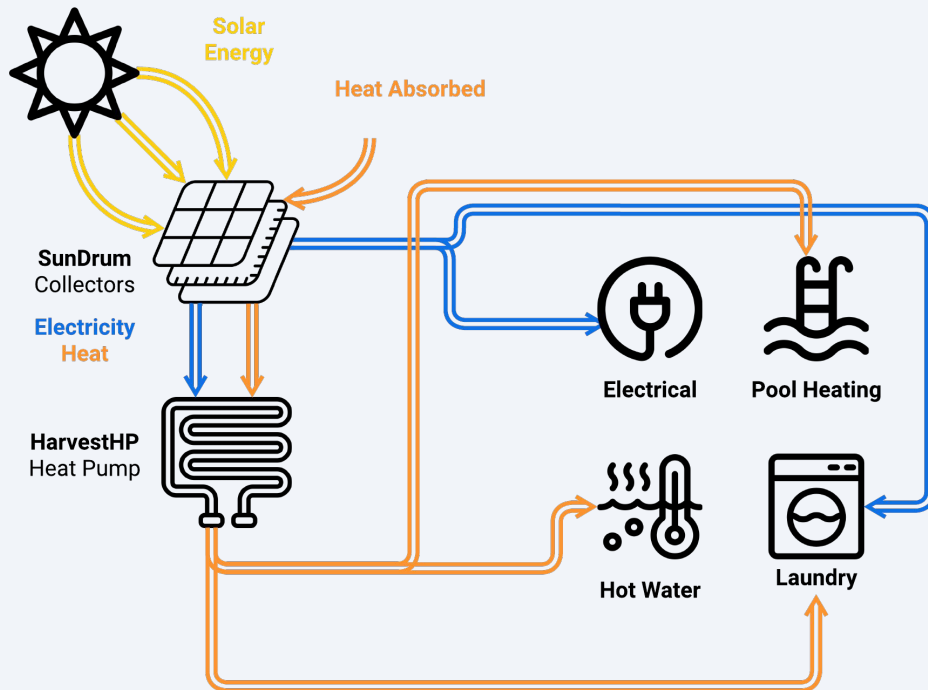
Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating at industry-leading efficiency

APPLICATION

SunDrum Solutions deliver more renewable energy in less space than PV panels alone, powering hotel heating, cooling, and electrical needs.



Incentive Opportunities

ITC, MACRS, SB504



More Power Per Sqft

3x more power per panel



24/7 Heating

Whether sun is shining or not



Fully Retrofittable

Works with new or existing solar

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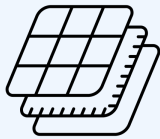
SUNDRUM SOLAR FOR MULTIFAMILY

IMPROVE OPERATIONAL COST CONTROL



SUNDRUM SOLAR TECHNOLOGY

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SunDrum Collectors convert PV panels into hybrid (PV + thermal)



Photovoltaic energy is increased by cooling the panels



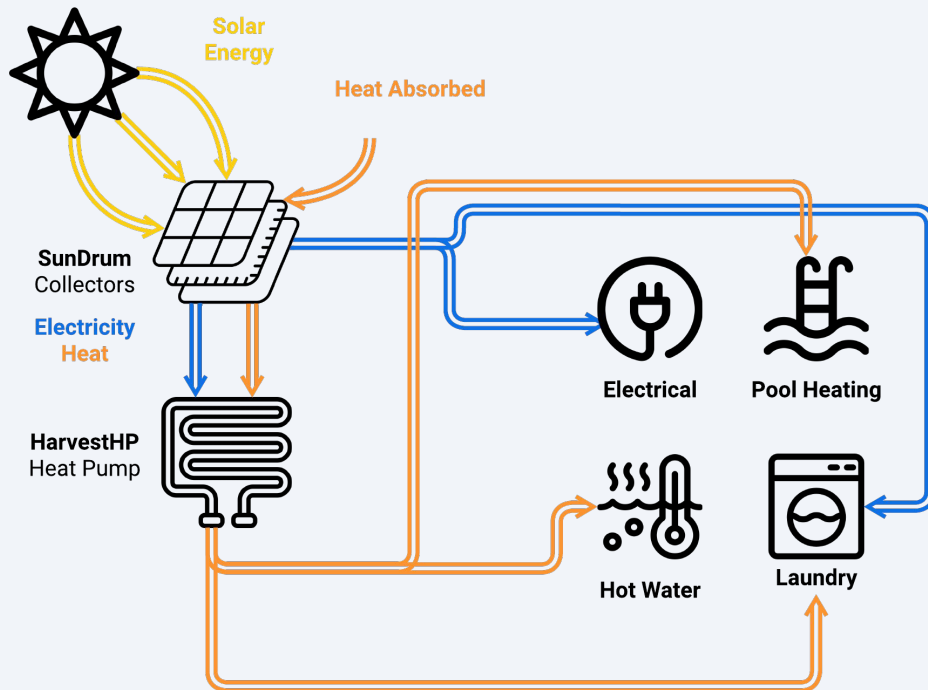
Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating at industry-leading efficiency

APPLICATION

SunDrum Solutions deliver more renewable energy in less space than PV panels alone, powering hotel heating, cooling, and electrical needs.



Incentive Opportunities

ITC, MACRS, SB504



More Power Per Sqft

3x more power per panel



24/7 Heating

Whether sun is shining or not



Fully Retrofittable

Works with new or existing solar

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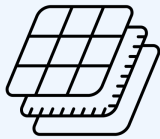
SUNDRUM SOLAR FOR RESIDENTIAL

IMPROVE OPERATIONAL COST CONTROL



SUNDRUM SOLAR TECHNOLOGY

The award-winning, patented SunDrum Collector mounts directly behind PV panels, cooling the panels and sending captured heat to an integrated heat pump. SunDrum combines **three leading renewable** technologies.



SunDrum Collectors convert PV panels into hybrid (PV + thermal)



Photovoltaic energy is increased by cooling the panels



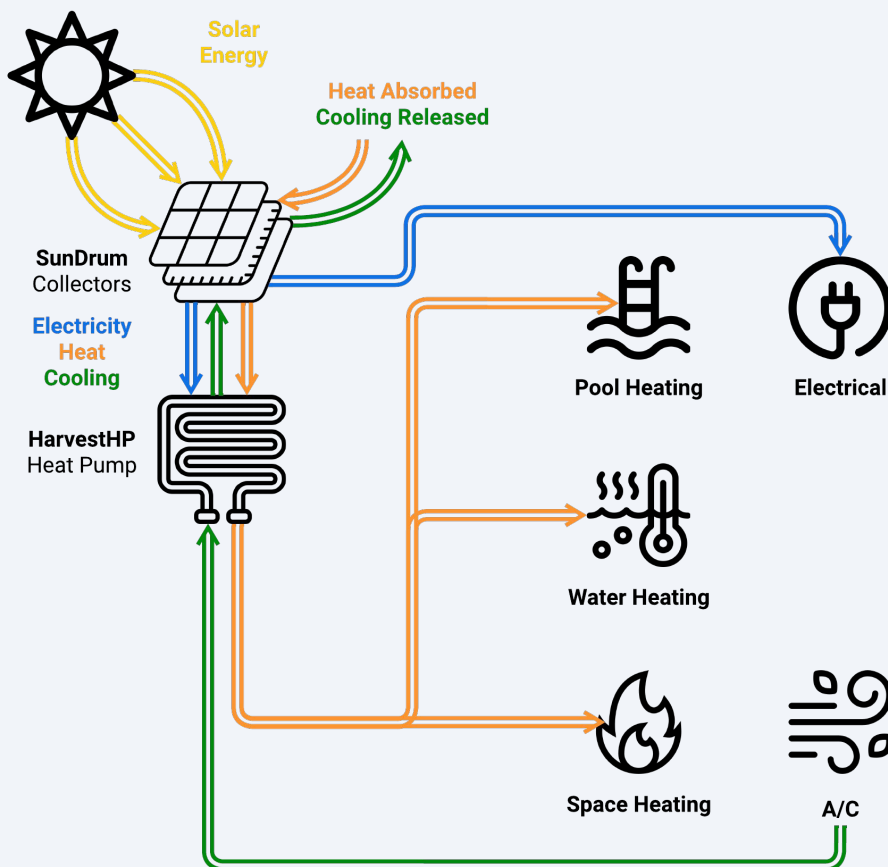
Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating & cooling at industry-leading efficiency

APPLICATION

SunDrum Solutions deliver more useful energy in less space than PV panels alone.



Valuable incentives
Offset 30% of project cost



More Power Per Sqft
3x more power per panel



24/7 Heating
Whether sun is shining or not



Fully Retrofittable
Works with new or existing solar

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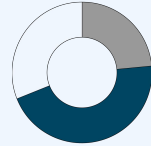
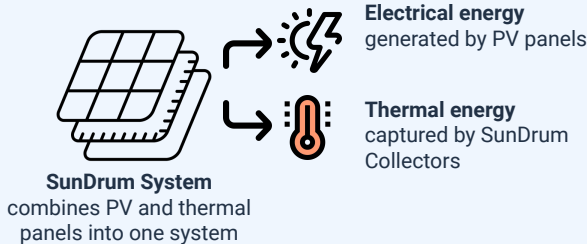
SUNDRUM SOLAR = ENHANCED PV

MORE USEFUL ENERGY IN LESS SPACE



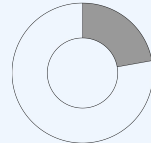
HOW SUNDRUM SOLAR WORKS

SunDrum Solar combines **solar PV (photovoltaic)** and **solar thermal** to solar power



SunDrum Collector System

PV Electricity **466 Watts**
Solar Thermal **900 Watts**
Total Power 1,366 Watts



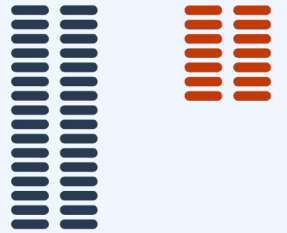
Conventional Photovoltaic System

PV Electricity **440 Watts**
Solar Thermal **0 Watts**
Total Power 440 Watts

MORE POWER IN LESS SPACE

SunDrum Solutions hybrid systems are ideal for those with limited roof space and high heat demand.

Residential Pool Heating

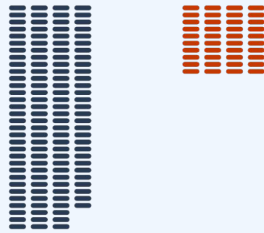


Conventional
32 PV panels
720 sqft

SunDrum
14 hybrid panels
315 sqft

56% less space

Midsize Hotel Space + Water

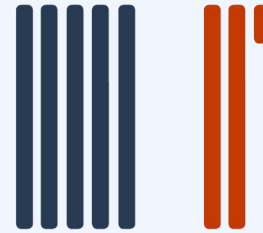


Conventional
125 PV panels
2,813 sqft

SunDrum
40 hybrid panels
900 sqft

68% less space

Craft Brewery

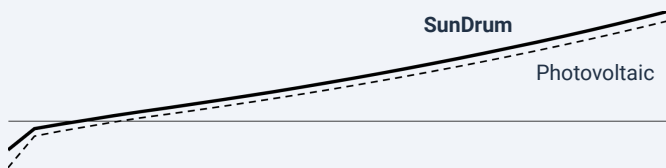


Conventional
3,000 PV panels
67,500 sqft

SunDrum
1,300 hybrid panels
29,250 sqft

57% less space

IMPROVED ROI



SunDrum Systems generate **greater savings** with **less upfront cost** than photovoltaic systems with the same power generation capacity

- Greater savings potential**
\$1,000s per year in heating savings
- State & federal incentives**
Offset 50-90% of gross cost with tax rebates
- Rapid system payback**
3-5 years to payback with a well-scoped system

APPLICATIONS

SunDrum Systems outperform conventional solar in a wide range of heat-intensive applications including:

- Home Water Heating
- Home Pool Heating
- HVAC
- Hospitality
- Multifamily
- Dormitory
- Brewery
- Food Processing
- Industrial

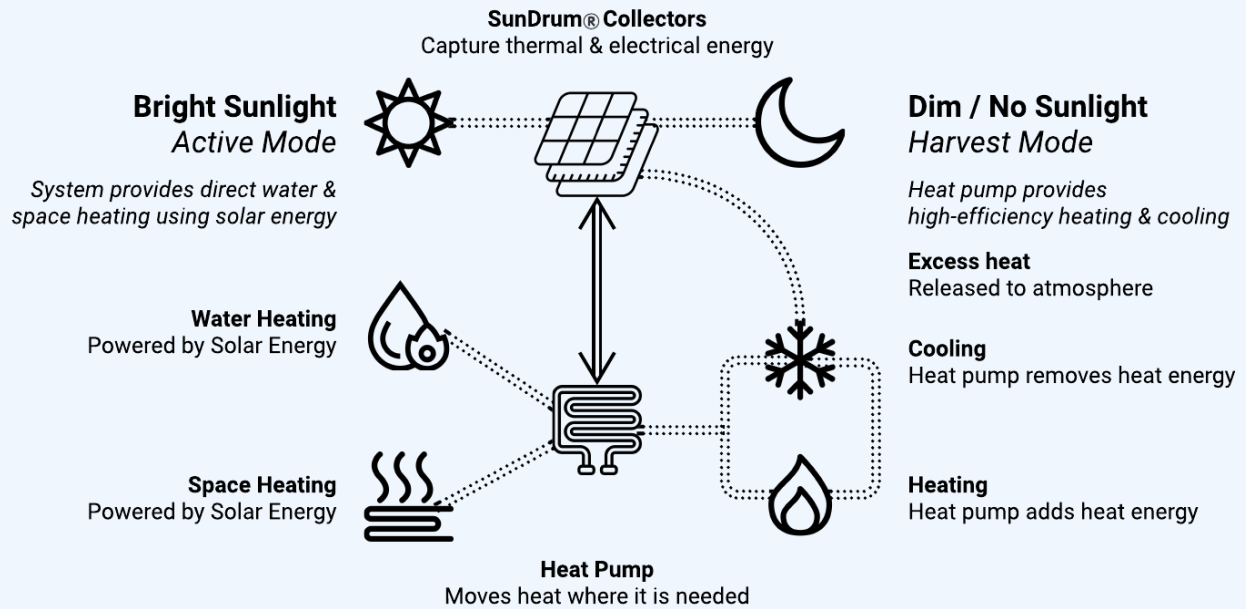
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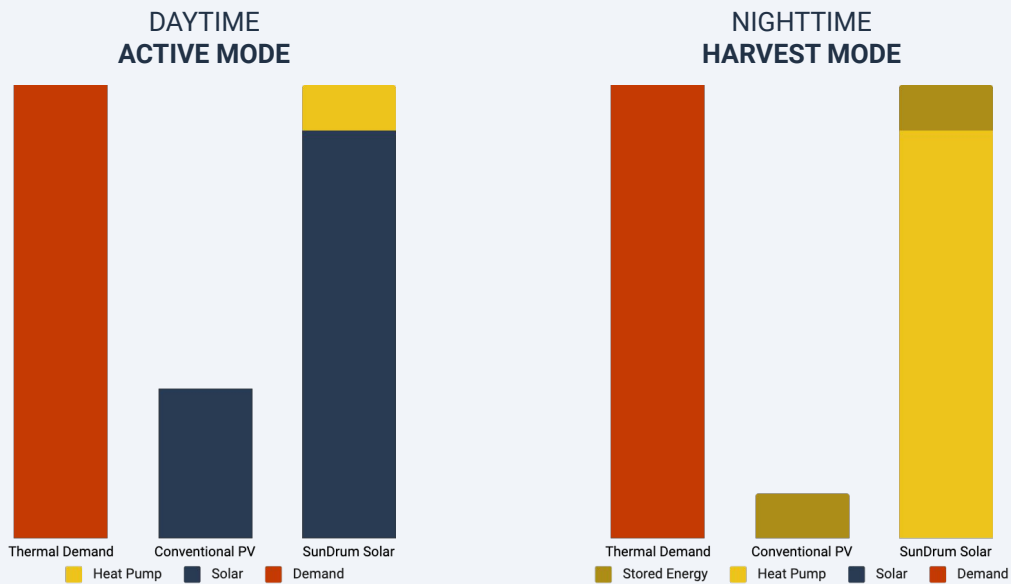


HARVESTHP TECHNOLOGY

Heating available whether the sun is shining or not



HOW DOES HARVESTHP GENERATE MORE HEAT?



During the day, a SunDrum System operates in **active mode**, capturing 3x more solar power than conventional PV. At night, a SunDrum System operates in **harvest mode**, continuously generating heat using a highly efficient heat pump.

More Power. 24/7. When, where, and how you need it.

WHAT IS SUNDRUM SOLAR?

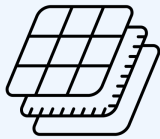
MAXIMIZING THE VALUE OF SOLAR ENERGY



SUNDRUM SOLAR TECHNOLOGY

Retrofittable Hybrid Solar with Heat Pump Integration

The **award-winning, patented SunDrum Collector** mounts directly behind PV panels, cooling **the panels** and sending captured heat to an integrated heat pump. SunDrum combines **three leading renewable** technologies.



SunDrum Collectors convert PV panels into hybrid (PV + thermal)



Photovoltaic energy is increased by cooling the panels



Thermal energy is captured and converted into usable heat



Integrated heat pump is powered by PV electricity and provides space & water heating and cooling - even when the sun isn't shining.

APPLICATIONS



Domestic hot water
Pool + home



Space heating
24/7 with heat pump



Commercial hot water
As high as 160°F



Space Cooling
High-efficiency A/C



Chilled water
As low as 40°F

SUNDRUM SOLAR BENEFITS

SunDrum Solar supports a wide range of residential, commercial, and industrial applications, often providing better financial returns and greater environmental impact than conventional solar systems.



Increased Total Power
3x more power per panel



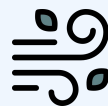
Combined PV + Thermal
Heat + electricity in less space



Fully Retrofittable
Works with 80% of PV panels



24/7 Heating
Even when the sun isn't shining



Integrated cooling
Space, water & industrial



Improved PV power
6% increase in PV generation



Made in USA
We own our factory



Strong Financials
Improved project ROI vs. PV



Valuable incentives
Federal and State generous offsets

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SUNDRUM SOLUTIONS INCENTIVES

DRIVE COST-EFFECTIVE SAVINGS



INCENTIVES OVERVIEW

Significant reimbursement at time of purchase

PROJECT 1 MIDSIZE HOTEL

GROSS COST	100%
ITC REBATE	40% OFFSET
MACRS	16% OFFSET
INCENTIVE TOTAL	56% OFFSET
NET COST	44% OF GROSS

PROJECT 2 RURAL BREWERY

GROSS COST	100%
ITC REBATE	40% OFFSET
MACRS	16% OFFSET
REAP	25% OFFSET
INCENTIVE TOTAL	81% OFFSET
NET COST	19% OF GROSS



INCENTIVE TAX CREDIT (ITC)

SunDrum is eligible for an increased commercial ITC (40%) because our panels are produced in the U.S.A. Projects operating in income-eligible regions may receive 50% or 60% ITC rebates.

40% REBATE

Most Businesses

60% REBATE

Income-Eligible Projects

MACRS ACCELERATED DEPRECIATION

MACRS Depreciation allows commercial projects to be fully depreciated within the first six years of project operation, generating significant savings via associated tax deductions.

20-30% SAVINGS

Depending on tax rate

RURAL ENERGY FOR AMERICA PROGRAM (REAP) GRANT

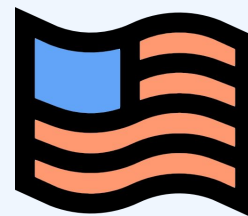
The REAP program provides grants and low-interest loans for up to 40% of project costs for farming projects or projects operating in rural areas.

40% REBATE

For eligible projects

OTHER GRANT OPPORTUNITIES

SunDrum systems are generally eligible for any state, local, or utility incentives related to renewable energy. Exact incentive amounts will vary by project.



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LIMITED WARRANTY

SunDrum Solar SDM100 Collector is warranted to be free from defects in materials and workmanship for 10 years from the date of warranty activation, when installed by an Authorized SunDrum Dealer in accordance with SunDrum's installation instructions. Within this period, SunDrum will, at its sole option, either repair or replace any components which fail in normal use, subject to the limitations and exclusions set forth herein. Such repairs or replacement will be made at no charge to the customer for parts or labor; provided that the customer shall be responsible for transportation cost.

SunDrum Solar accessories are warranted to be free from defects in materials and workmanship for 2 years from the date of warranty activation, when installed by an Authorized SunDrum Dealer in accordance with SunDrum's installation instructions. Within this period, SunDrum will, at its sole option, either repair or replace any components which fail in normal use, subject to the limitations and exclusions set forth herein. Such repairs or replacement will be made at no charge to the customer for parts or labor; provided that the customer shall be responsible for transportation cost.

LIMITATIONS AND EXCLUSIONS

This warranty does not cover failures resulting from freeze damage, fire, flood, lightning, hurricane, tornado, hailstorm, windstorm, earthquake, or other acts of God, vandalism, explosions, exposure to harmful materials, including but not limited to acetic, caustic, or highly mineralized water or other fluids, operation of the collector under excessive pressure or excessive flow rates, abuse, negligence, accident, misuse, falling objects or unauthorized alterations or repairs or any other cause beyond the control of SunDrum Solar.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

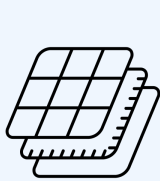
IN NO EVENT SHALL SUNDRUM BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

SunDrum retains the exclusive right to repair or replace the product or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local SunDrum authorized dealer.

SUNDRUM SOLAR TECHNOLOGY

The **award-winning, patented SunDrum Collector** mounts directly behind PV panels, cooling **the panels** and sending captured heat to an integrated heat pump. SunDrum combines **three leading renewable** technologies.



Photovoltaic energy is increased by cooling the panels



Thermal energy is captured and converted into usable heat



Integrated heat pump powered by PV electricity provides 24/7 heating & cooling at industry-leading efficiency

RECORD BREAKING PERFORMANCE

SunDrum Solar, LLC has achieved a solar industry one hour peak delivery record of 86% for a hybrid solar system, which generates both photovoltaic and thermal (PVT) solar energy. This record breaking performance was enabled by the combination of a high performance standard Photovoltaic (PV) panel and the unique SunDrum SDM100 thermal collector.

After adjustment for all system losses, a record of 86% was used by the home during the peak hour of 2-3PM when 870W of thermal energy and 200W of electrical energy was delivered by each solar panel fitted with the SunDrum Solar Collector. This performance sets a new record for a fixed, non tracking, hybrid array.

Traditionally, solar system designs convert energy into either electricity with a PV panel or to heat water with a solar thermal collector. The most efficient stand alone PV systems can convert electricity. The majority of PV panel escapes as waste heat. Standard solar thermal systems are more efficient than PV panels but are limited to heating water.

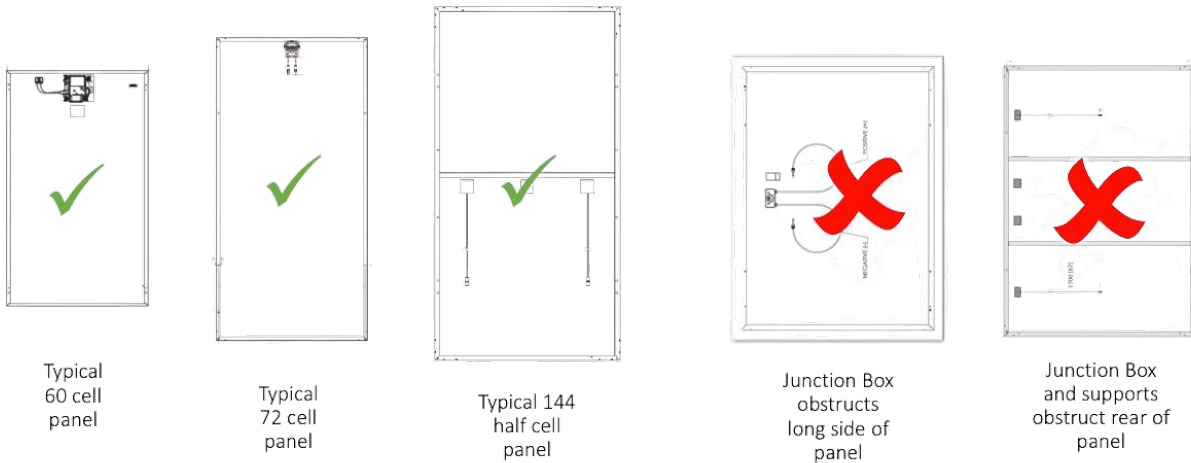
The SunDrum SDM100 thermal collector is a thin, flat, lightweight design which attaches to the underside of a standard PV panel to create a hybrid module. The heat generates both electrical and thermal energy in the same footprint. Further, it cools the PV panel, improving its efficiency 5-10%. The SunDrum thermal collector is compatible with most major PV panels on the market today and can be retrofitted beneath existing PV systems or on new installations.

This efficiency record is one of several achievements for SunDrum Solar which completed the largest on-roof commercial PVT system in the United States on the Inn at Schofield Barracks, in Oahu, Hawaii.

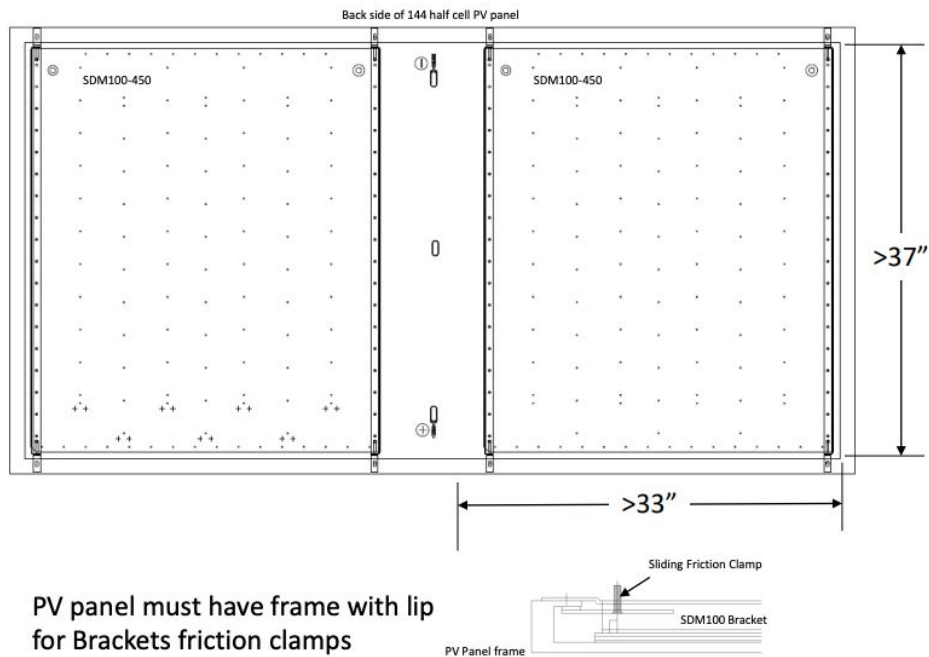
SunDrum Solar, LLC, designs, develops and sells hybrid solar energy collectors for residential and commercial markets. The company, based in Hudson, Massachusetts, has been selling the SunDrum system since 2008.

SUNDRUM SOLAR COMPATIBILITY

SunDrum Solar is compatible with most major photovoltaic manufacturers.



Rear of panel needs to be free of obstructions



PV panel must have frame with lip for Brackets friction clamps



CONTACT

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