Partners in Project Green

A Program of Toronto and Region Conservation Authority

ELC & SME Consortium

Solar for Large Commercial & Industrial Facilities

April 28th, 2022

We respectfully acknowledge that we are situated on the Traditional Territories and Treaty Lands, in particular those of the Mississaugas of the Credit First Nation, as well as the Anishinaabe of the Williams Treaty First Nations, the Huron Wendat, the Haudenosaunee, and the Metis Nation.

As stewards of land and water resources within the Greater Toronto Region, Toronto and Region Conservation Authority appreciates and respects the history and diversity of the land and is grateful to have the opportunity to work and meet on this territory.

Additional Resources

- yrnature.ca/acknowledging_land
- edgeofthebush.ca
- native-land.ca
- Text 1-855-917-5263 with your City and Province to learn whose traditional territory you're on
(standard text messaging rates may apply)

Agenda

Time	Item	Speakers
1:00 – 1:10 PM	**Updates, Reminders, & Intro**	Matt Brunette, Partners in Project Green
1:10 – 1:40 PM	**Solar PV & Net-Metering**	Phil McNee, Demand Renewables
1:40 – 2:10 PM	**Solar Thermal**	Mohammed Murad, Phoenix Solar Thermal Carlo Semeraro, Absolicon Solar Collector AB
2:00 – 2:30 PM	**Question & Answer Period**	All

Introduction

Upcoming ELC Sessions

Date	Topic	Speakers
May 19, 2022 1:00 – 2:00 PM	**Deep Energy Retrofits**	Tristian Truyens, Entuitive
June 8, 2022 1:00 – 2:30 PM	**Building and Process Controls**	Mark Byvelds, Siemens Canada Louis Steyert, E'nergys
TBD	**ELC Site Visit****	ELC Member

**Virtual or in-person. Please contact Matt Brunette if you are interested in hosting an ELC Site Visits this year

Updates and Reminders

- New PPG website is live & membership renewal
- ELC Slack pilot is live until end of May
- IESO feedback in May:
  - Framework mid-term customer review
  - IEEP stage 1 for proposals now open until Aug 2022
- HARvEST heat recovery technology – potential session and tour

Today’s Speakers

Phil McNee, CEO & Co-Founder, Demand Renewables

phil.mcnee@demandrenewables.com

613-297-0476

Mohammed Murad, Interim General Manager, Phoenix Solar Thermal

m.murad@phoenixsolarthermal.com

289-205-2592

Carlo Semeraro, Chief Sales Officer, Absolicon Solar Collector AB

carlo@absolicon.com

+46 611 50 51 16

Solar for Large Commercial & Industrial Facilities

DEMAND RENEWABLES COMMERCIAL SOLAR

BUILDING A BRIGHTER FUTURE

Demand Renewables
1-833-NO HYDRO (664-9376)
www.demandrenewables.com
customerservice@demandrenewables.com

DEMAND THE BEST

DEMAND RENEWABLES SOURCES ONLY TOP TIER RENEWABLE ENERGY EQUIPMENT.

OUR RELATIONSHIPS ALLOW US TO WORK DIRECTLY WITH INDUSTRY LEADING MANUFACTURERS, ENSURING EACH CLIENT RECEIVES THE HIGHEST PERFORMING EQUIPMENT AT THE BEST PRICE POINTS IN THE MARKET.

USING WORLD LEADING TECHNOLOGY GUARANTEES A HIGHLY EFFICIENT AND LONG LASTING SOLAR INSTALLATION.

OUR GOAL IS TO NOT JUST DELIVER A LONG LASTING SYSTEM BUT THE SYSTEM THAT HAS THE LOWEST MANUFACTURING AND INSTALLATION CARBON FOOTPRINT

CONFIDENTIAL - © DEMAND RENEWABLES

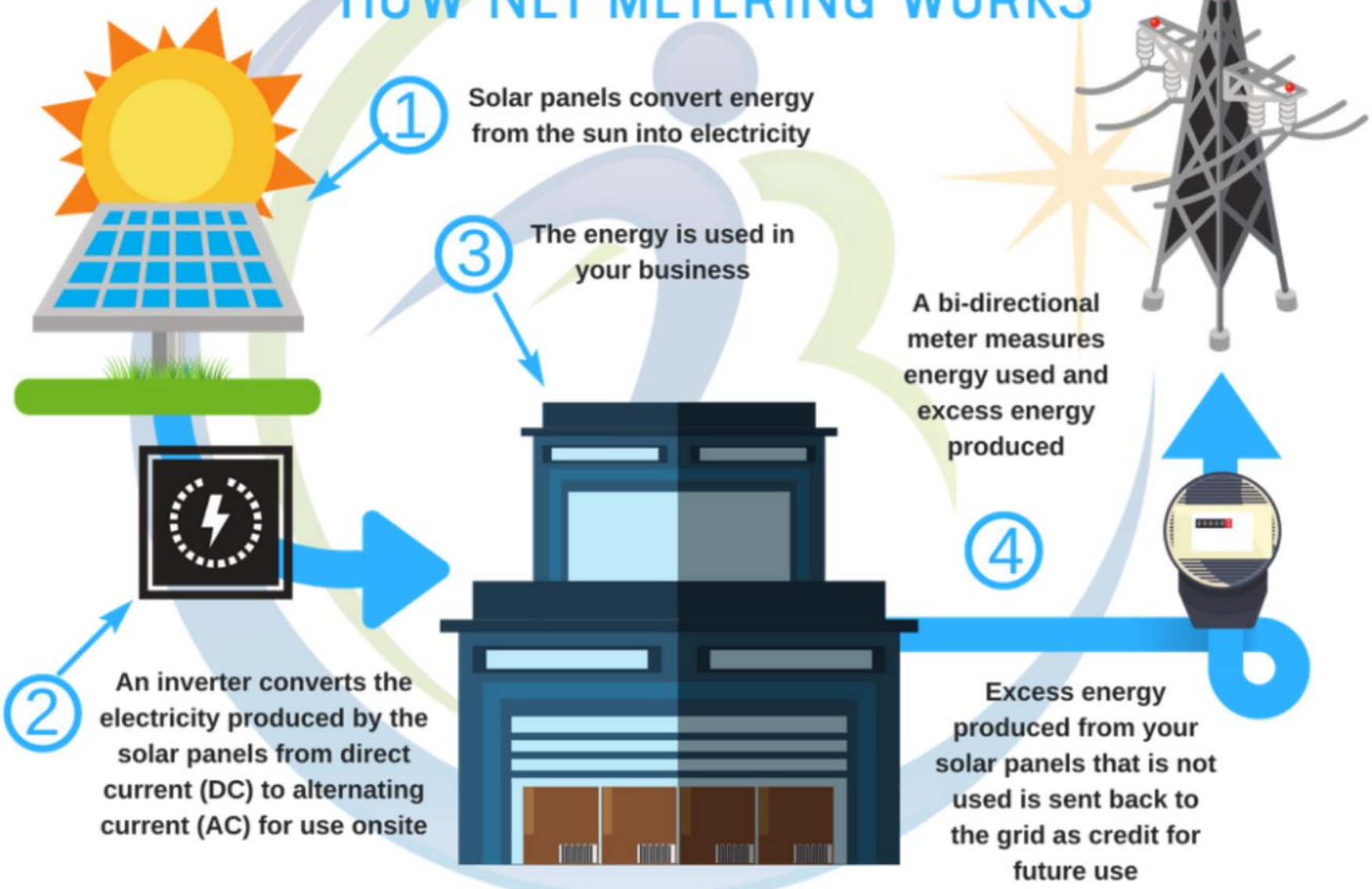
DEMAND PERFORMANCE

Demand Renewables uses real world data and the most advanced modeling software in the solar industry to generate PV production estimates and bankable shade reports.

This modelling software was developed with the U.S. Department of Energy, and has been used worldwide to assess more than 300,000 solar electric projects to date.

Each custom Engineered proposal is carefully modeled, and production numbers generated can be considered an accurate estimate of future PV production.

HOW NET METERING WORKS



solaredge architects of energy™ ADVANTAGE - INVERTER AND OPTIMIZERS

- Accurate information about present and past performance of each individual PV module enabling the client to detect, pinpoint, and troubleshoot faults efficiently and accurately. This enables real-time management of operations and site profitability analysis.
- With traditional inverters, output of all panels is affected by the weakest panel and there are substantial energy losses due to unevenly dirty and shaded panels. Get maximum power out of each Panel and Inverter with the SolarEdge System.
- Smart algorithms continuously track the power, voltage, and current of all modules and inverters.
- Class leading safety features, including rapid shutdown, safe voltage dc, and arc fault protection.
- Removes the need for expensive annual onsite IV curve tracing to determine where issues such as blown diodes & arc faults are happening within the array. *IV curve tracing is only needed every 5 years on a sample of the array to keep records for linear warranty claims.
- Superior System Warranties - 25 years Power Optimizer Warranty, 20 years Inverter Extended Warranty automatically included
- * Demand Renewables provides a sample of the array in year 1.

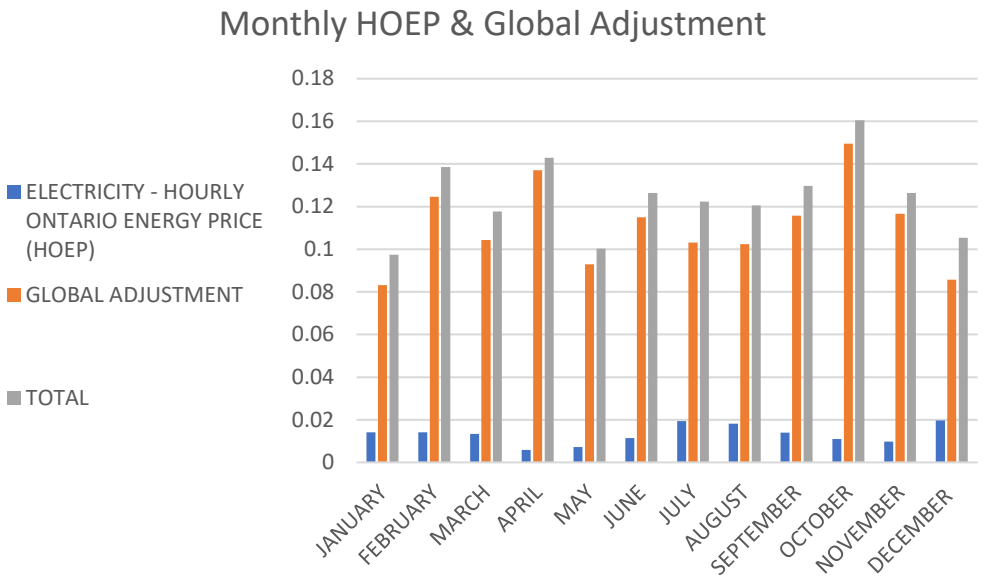
Hydro Classification – Large Energy Consumers

•**Class B**: Consumers with a peak demand of 50 kilowatts (kW) up to five megawatts (MW) typically pay the global adjustment (GA) through their regular billing cycle.

•**Class A**: Customers who participate in the Industrial Conservation Initiative (ICI), pay global adjustment (GA) based on their percentage contribution to the top five peak Ontario demand hours over a 12-month period. Customers participating in this initiative are referred to as Class A.

Electricity Charge/Frais d'électricité
From/Du 2020-10-31 To/Au 2020-11-30 (30 Days/Jours)
351,915.95 kWh @ $0.00975 /kWh
Global Adjustment/Rajustement global 351,915.950000 kWh @ $0.1167 /kWh

From/Du 2020-10-31 To/Au 2020-11-30 (30 Days/Jours)
Delivery/Frais de livraison
Regulatory Charges/Frais réglementés



Billing Multiplier/Multiplicateur de facturation	1200.00	
	00:00-24:00	**07:00-19:00**
Billing Demand/Demande de facturation	634.08	620.16
kW Demand/Demande kW	634.08	620.16
kVa Demand/Demande kVa	690.53	674.21
Power Factor/Facteur de puissance	91.82%	91.98%

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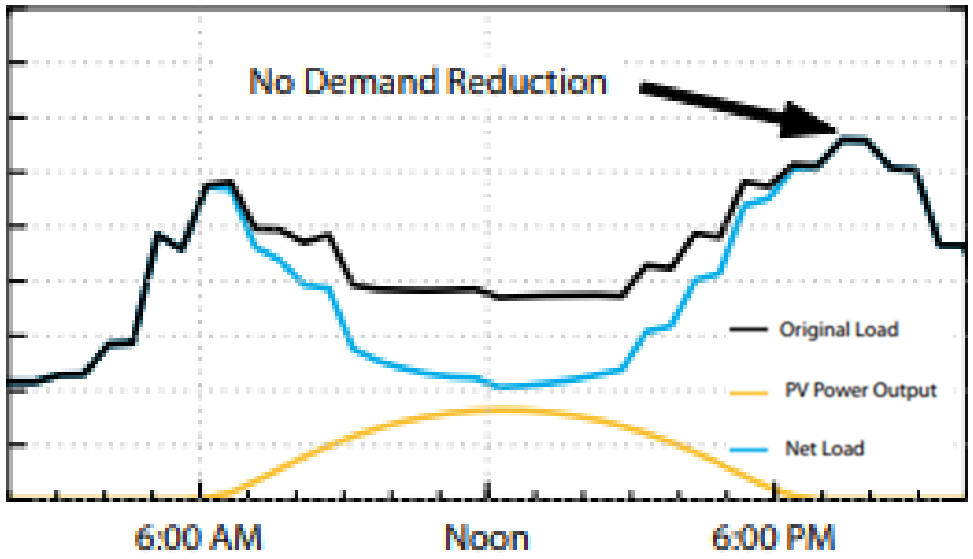
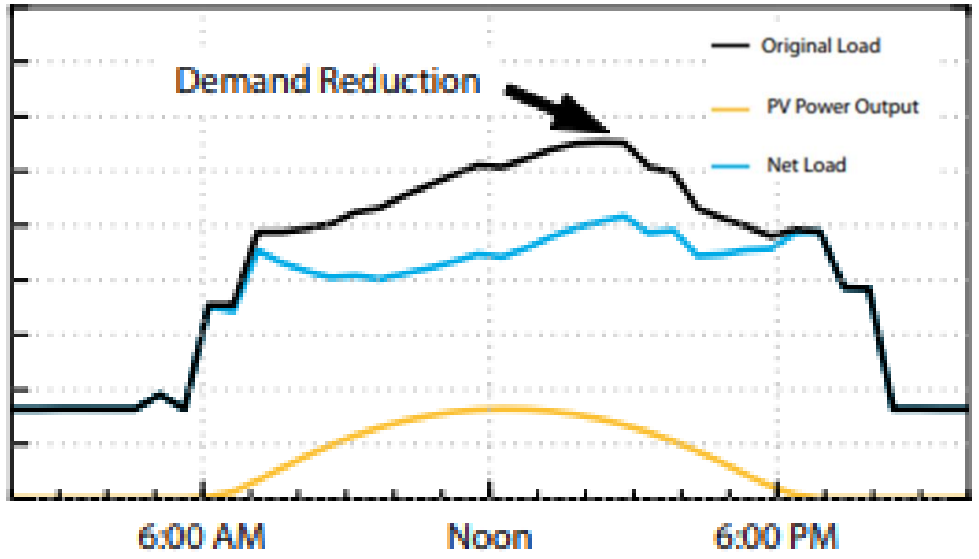
Delivery Rates – Hydro Ottawa

Delivery	
Transmission Network	$3.1059/kW
Transmission Connection	$1.9644/kW
Hydro Ottawa Variable and Other Charges	$4.7934/kW[5]
Rate Rider for Disposition of Global Adjustment – Non RPP Class B Customers	$0.0026/kWh[6]
Hydro Ottawa Fixed Charge	$200.00/month
Low Voltage Services Charge	$0.01964/kW





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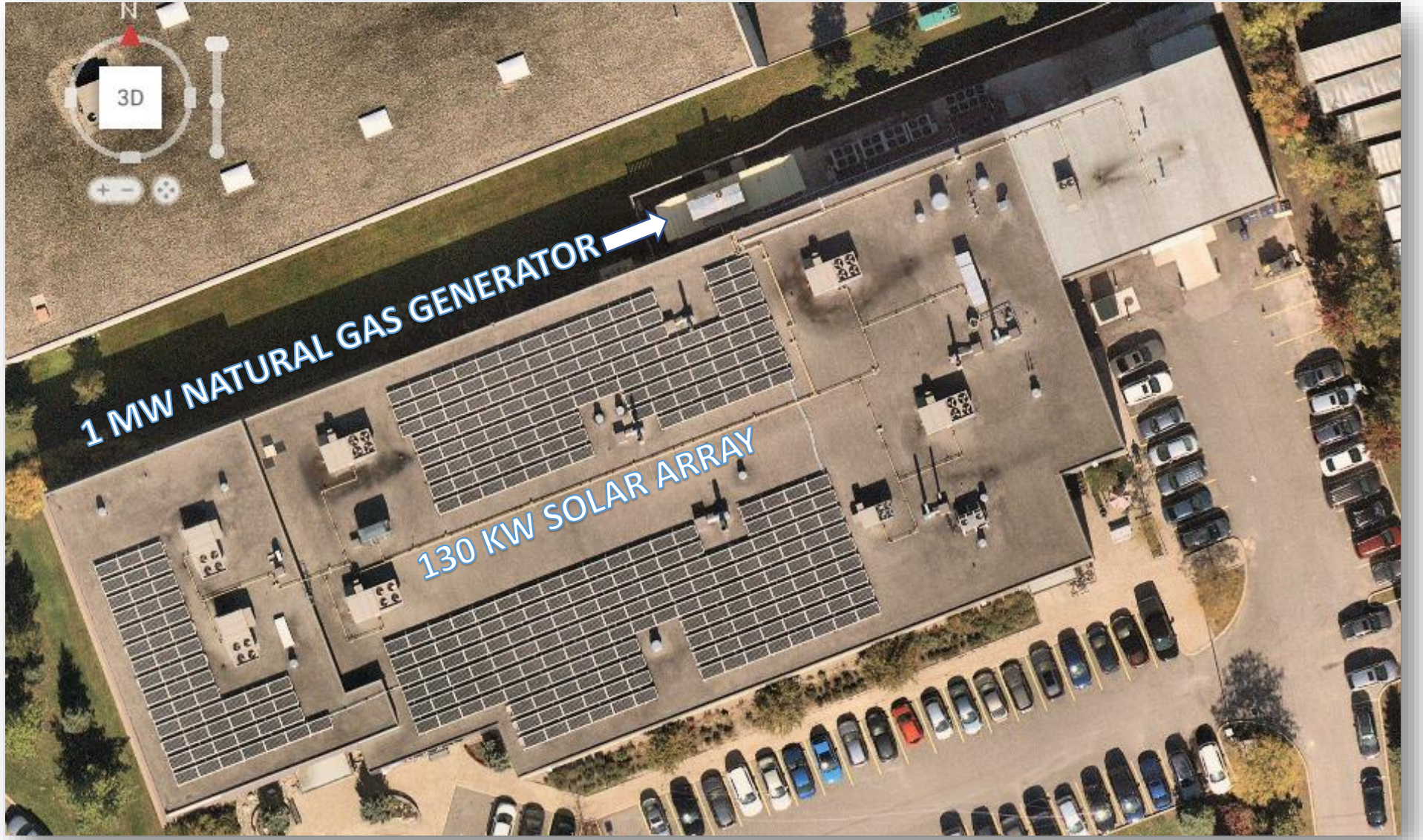
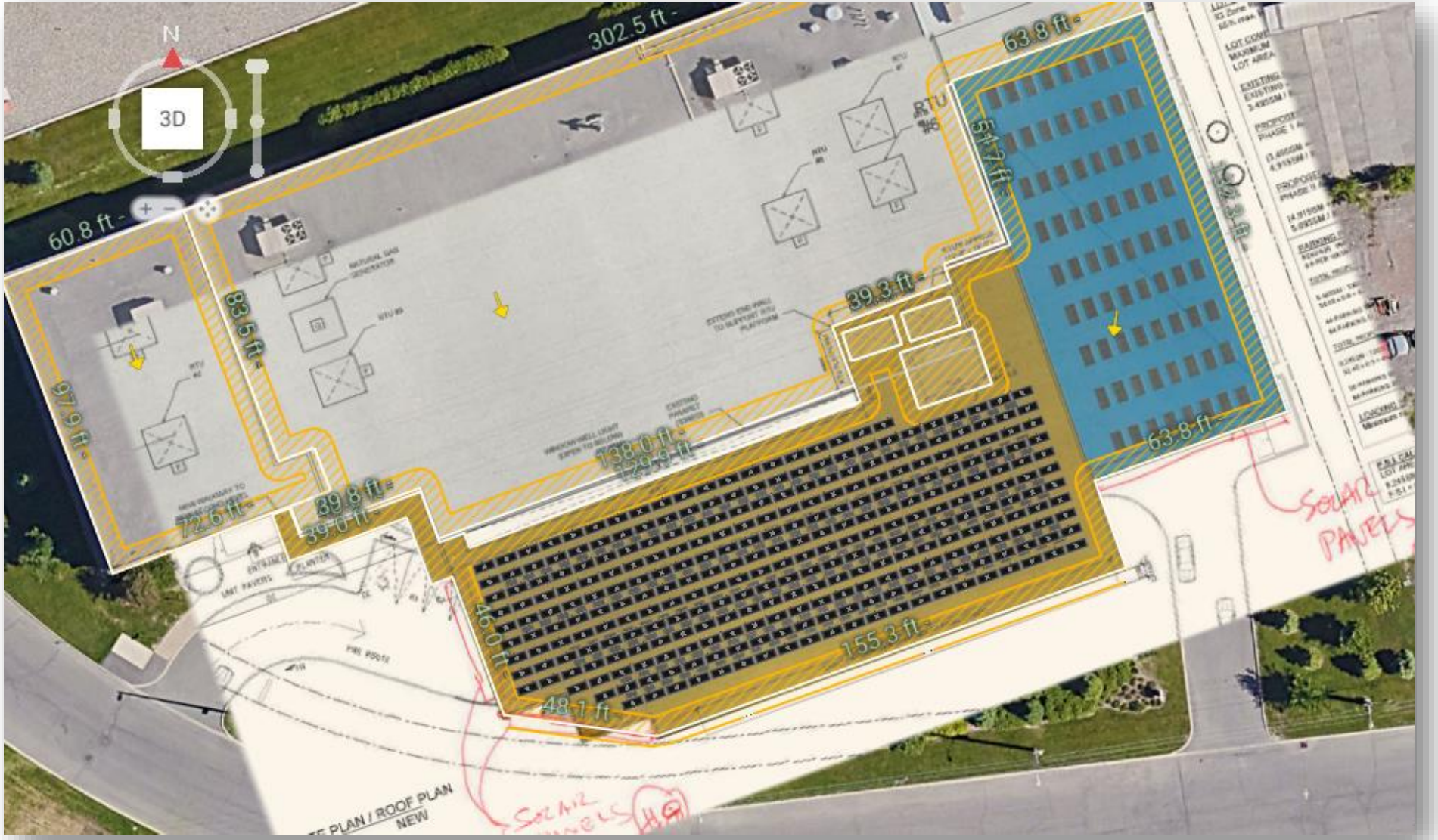
IRIDIAN PHASE 1 – SYSTEM LAYOUT 2D VIEW



IRIDIAN PHASE 2 – SYSTEM LAYOUT 2D VIEW



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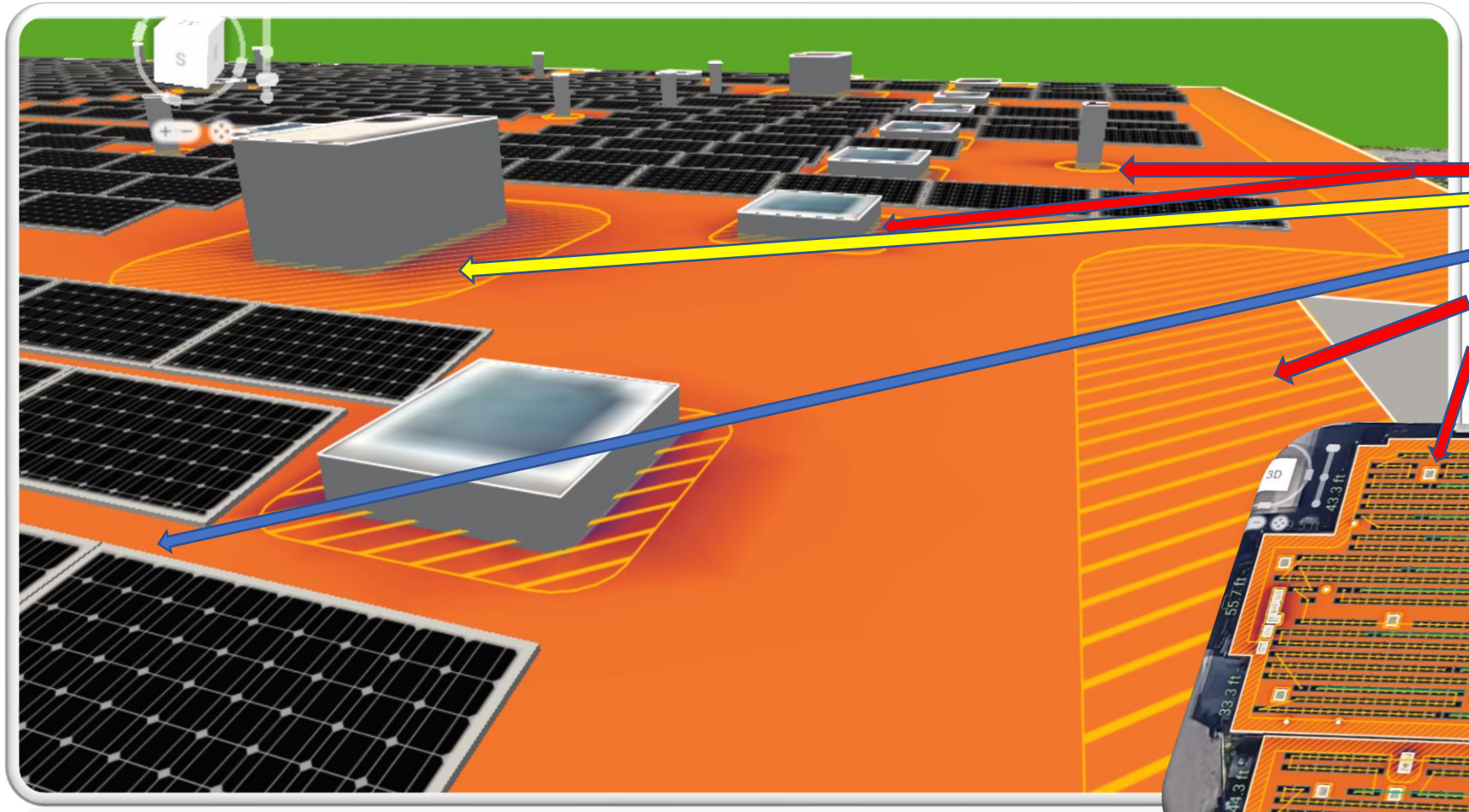
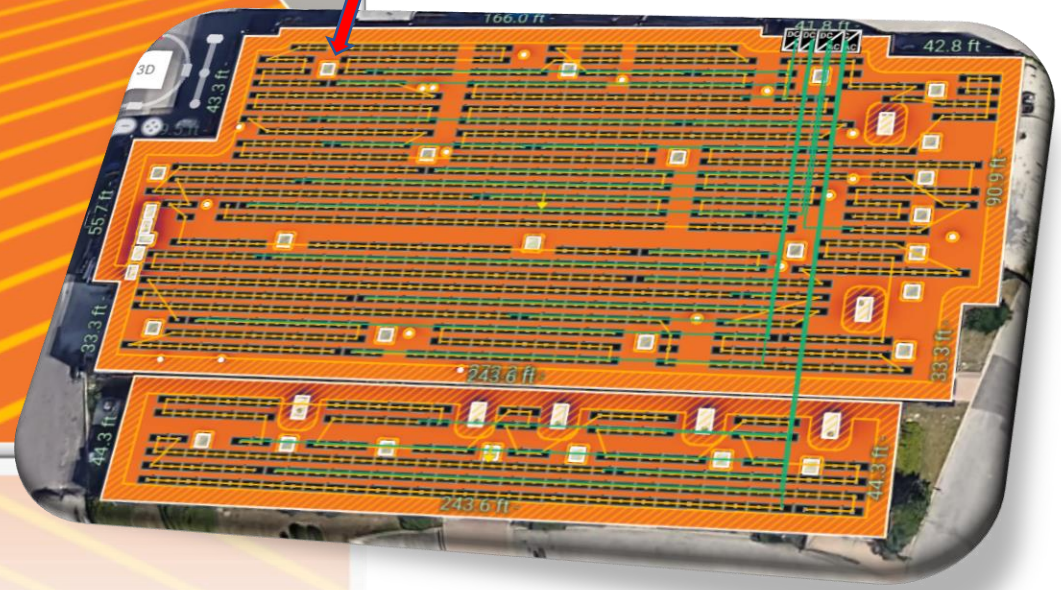
IRIDIAN PHASE 2 – SYSTEM LAYOUT 3D VIEW

DEMAND RENEWABLES BEST PRACTICES – INSTALLATION



- 24” SETBACK – PIPES & SKYLIGHTS
- 72” SETBACK – LARGE EQUIPMENT
- 20” INTER ROW SPACING
- 72” WALKWAY – BUILDING EDGES
- 48” WALKWAY TO ALL RAISED OBSTRUCTIONS



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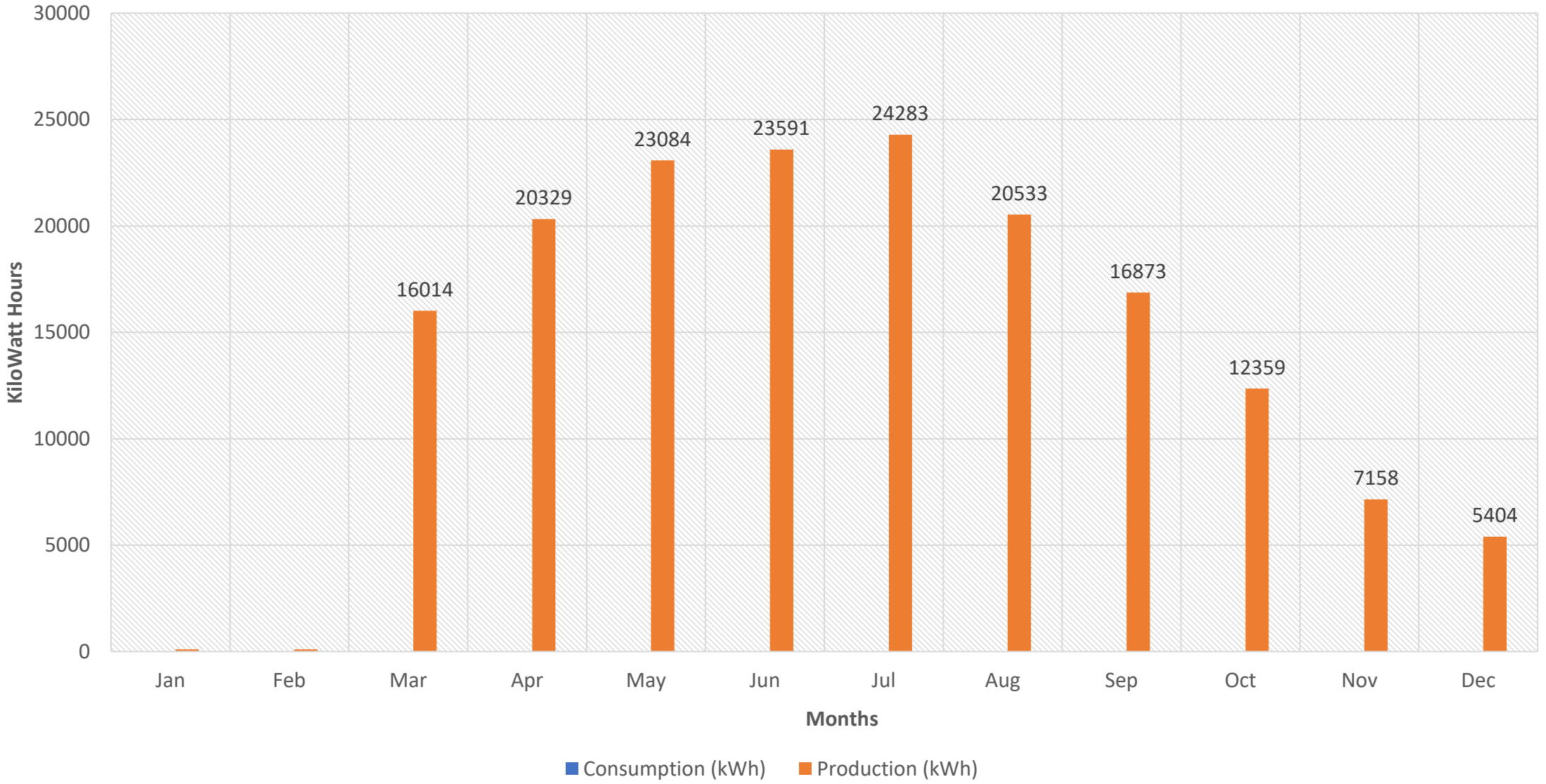
Production



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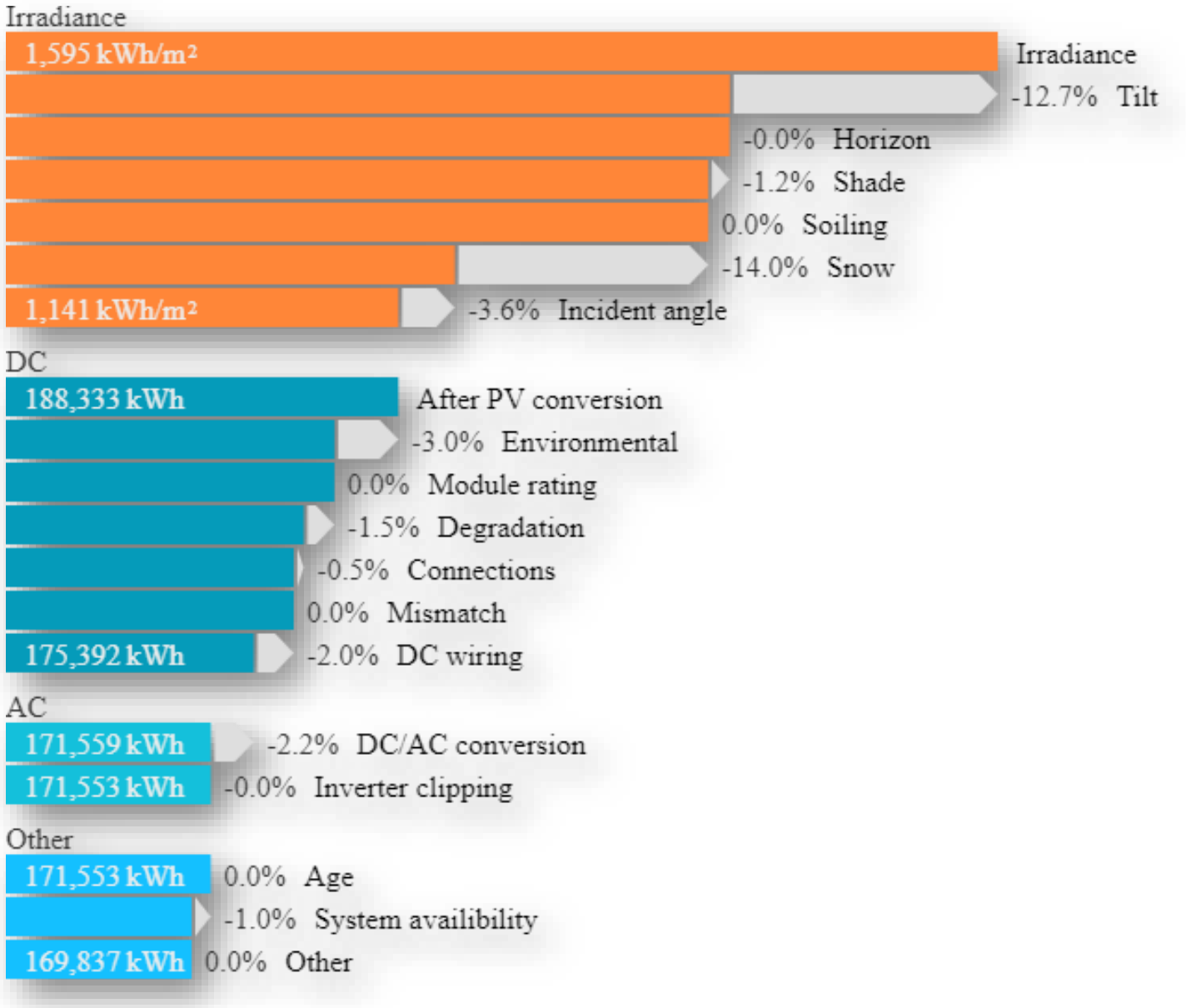
PROJECTED SYSTEM LOSSES



- Installers & end users trust Aurora's cell string-level simulation engine, geo located irradiance and local weather data sets to give them the best predictions.
- Aurora is the first to include sub-module analysis in simulations. Aurora's enhanced simulation engine also incorporates inverter-specific MPPT algorithms and efficiency curves.
- Performance loss-tree diagrams help to understand what is affecting your system performance. See in precise detail how much your system is losing from shading, suboptimal tilt and orientation, or inverter clipping.
- Detailed definition of losses are located at the end of the presentation.

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CARBON FOOTPRINT

Doing business with Demand Renewables ensures that not only will your project produce clean energy for years to come, but that every process from manufacturing to installation is as carbon friendly as possible.

- 169,837 kWh's of clean energy produced in year one alone, offsetting 12,737 kilograms of carbon emissions. This system will have a lifetime carbon offset of over 300 metric tons.
- QCELLS modules have a Class Leading Energy Payback Time (EPBT). The modules manufacturing footprint will be offset faster than any other panel available in the Canadian market.
- SolarEdge Inverters are designed with fewer raw materials than previous inverter technology. They have recently opened a manufacturing facility in Mexico to service the North American market, this will reduce the impact on the planet that comes with international manufacturing & shipping.

DEMANDRENEWABLES

PERFORMAPV ENGINEERED SOLUTIONS

QUESTIONS & COMMENTS

Phil is the Chief Executive & Co-Founder of Demand Renewables. Demand is a commercial and residential solar EPC with installations across the Province. They have a diverse range of commercial clients in manufacturing, agriculture, real estate and even the utilities.

Phil is a senior citizen in the solar market and is extremely passionate about climate change, with the weather events that happened in Canada last year, Phil welcomes the opportunity to discuss ways that you can help.

Solar Thermal as a Strategy to Reduce CO_2 Emissions

Prepared By:

Mohammed Murad *(General Manager)*
Phoenix Solar Thermal

Carlo Semeraro *(Chief Sales Officer)*
Absolicon

PHOENIX SOLAR THERMAL INC.

SOLAR THERMAL AS A SERVICE

Outline

1. Introduction
   Phoenix Solar Thermal & Absolicon
2. Present Situation in Canada
   Phoenix Solar Thermal
3. Solar Thermal Technology
   Absolicon
4. Implementation/Execution Options
   Phoenix Solar Thermal

PHOENIX SOLAR THERMAL INC.

Est. 2021

CEM ENGINEERING

Thermal Power Engineering & Consulting Firm

Est. 2001

ABSOLICON SOLAR COLLECTORS

Solar Thermal Technology Developer

Est. 2002

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Problem Statement

Climate Change

We must all do our part, to limit temperature increase

Internal Pressure

Present and future Boards of Directors expect large decreases in CO2 footprint from their subsidiaries

Natural Gas Price Volatility

Marginal/spot price affected by LNG exports, more and more

Political Risk

Could $170/tonne be increased a lot by future governments post-2030? Could relief on carbon tax end prematurely?

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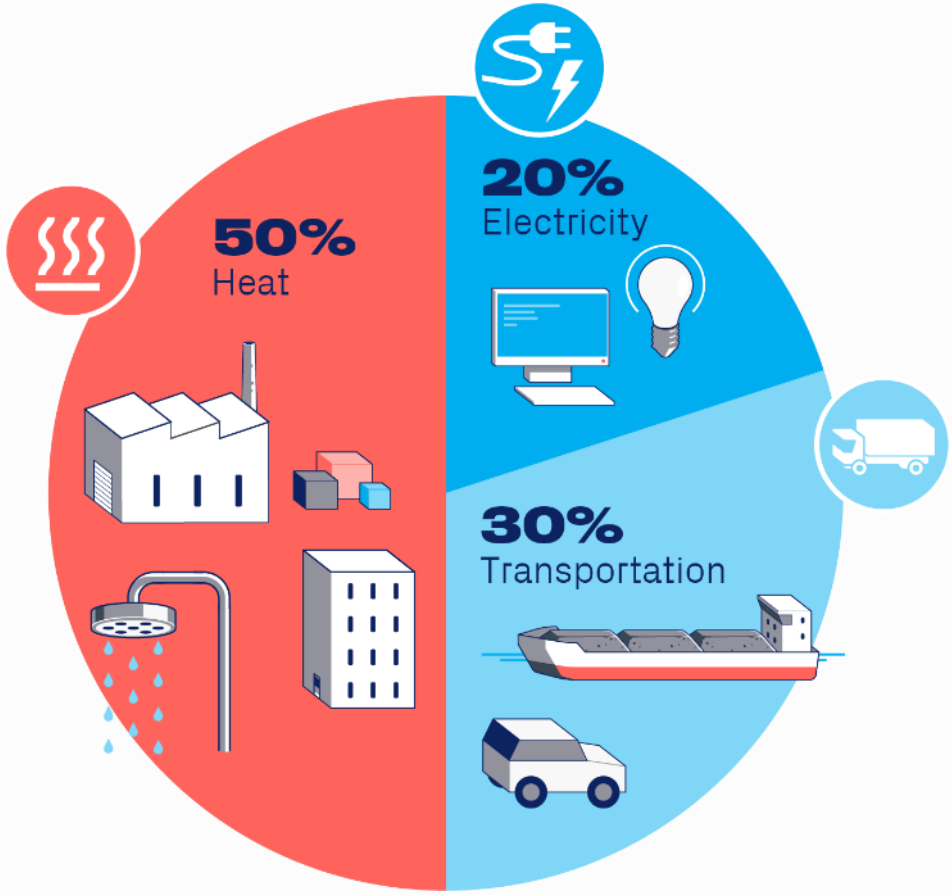
HALF OF SOCIETY'S ENERGY USAGE IS HEAT

SOLAR THERMAL ENERGY

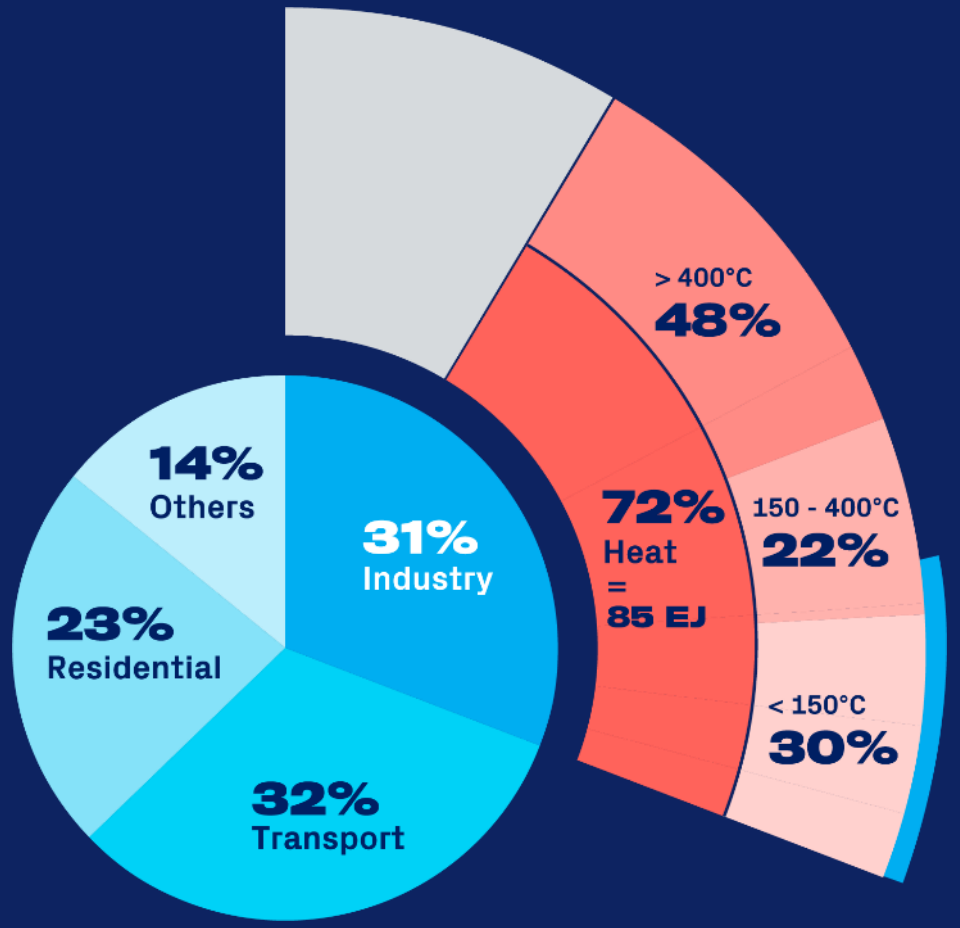
Absolicon solar technology produced in Absolicon Production line cover 40 % of the total industrial heat demand, equivalent of 35 EJ = 10 000 TWh. This provides the industry with a unique opportunity to replace costly fuels and lower their emissions considerably and creates an advantageous market for solar production.

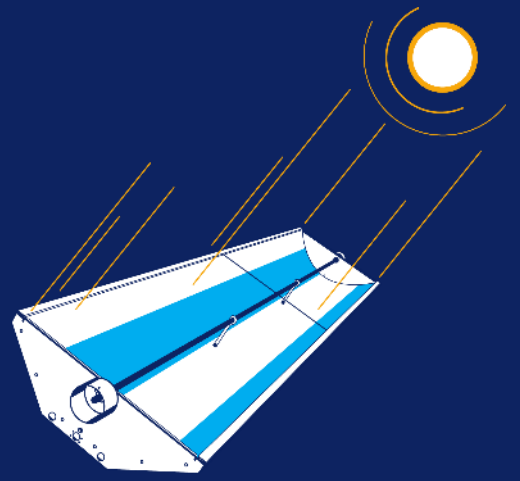


Source: IEA / IRENA.

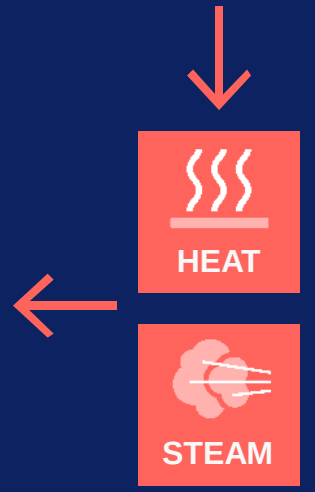
INDUSTRIAL ENERGY DEMAND

The industrial sector accounts for about 31% of the world's total energy consumption and 70% of the industry's energy demand is heat for industrial processes.





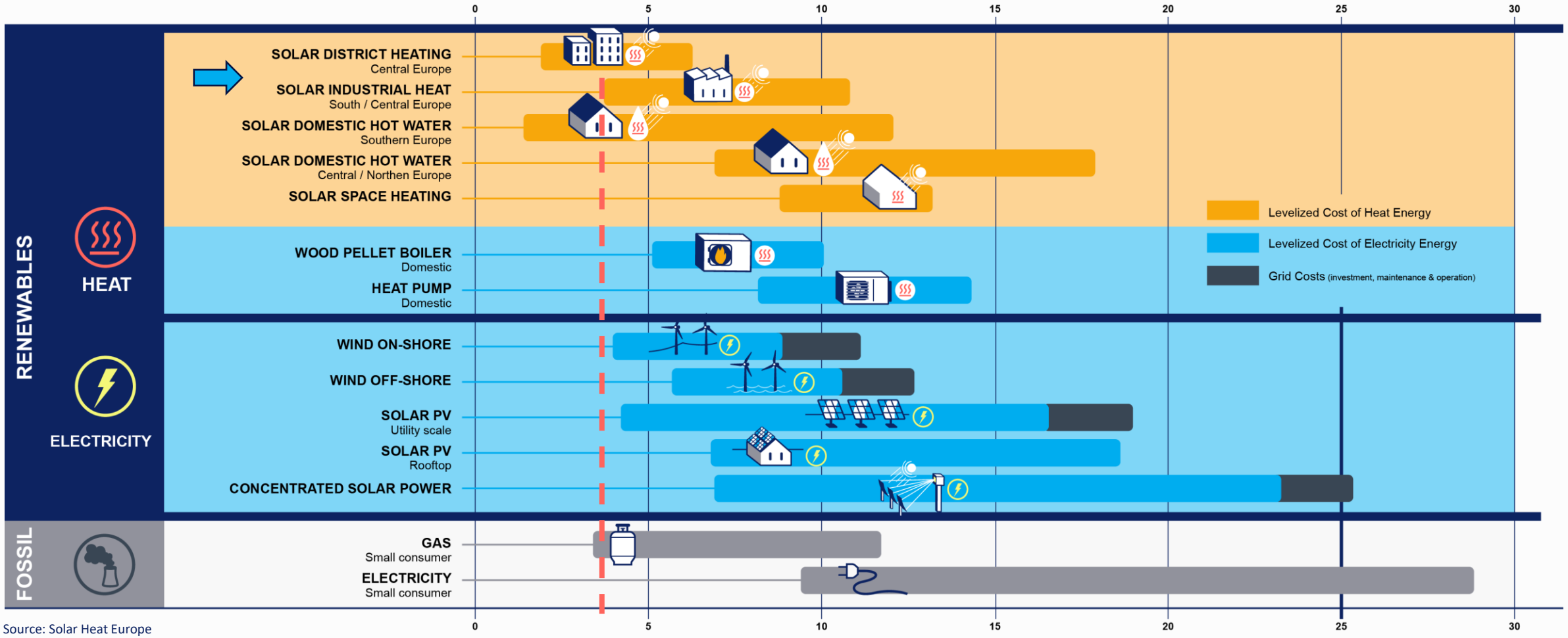
Absolicon T160 solar collector is suitable for temperatures up to 160°C



Total final energy consumption 2018: 382 EJ. Source: IEA / IRENA.

LEVELIZED COST OF ENERGY

- per kWh in €-cent

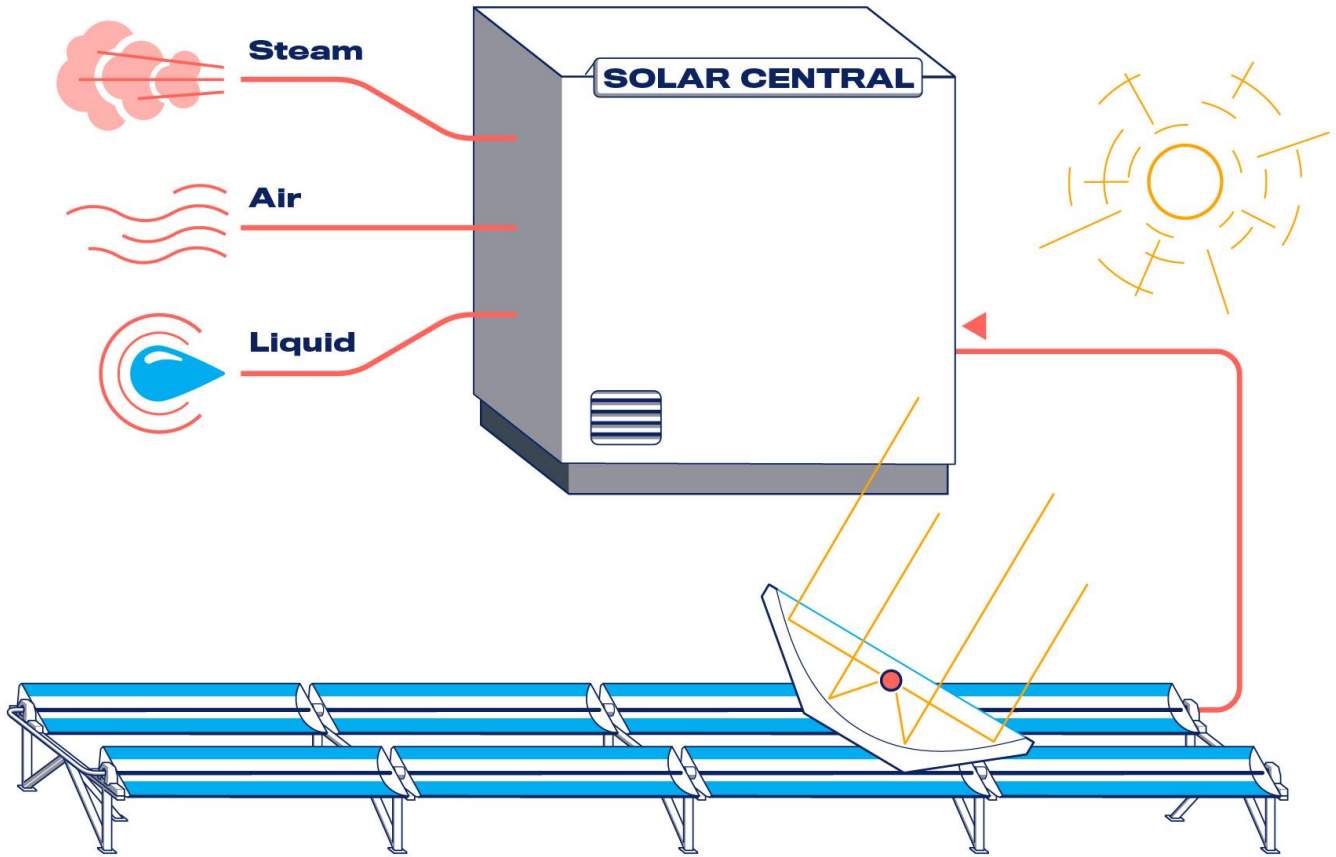


Source: Solar Heat Europe

DESIGNED TO RUN INDUSTRIAL PROCESSES EMISSIONS FREE

Absolicon solar collector T160 runs industrial processes with temperatures up to 160°C. Absolicon T160 has the highest ever measured optic efficiency, 76,4%.

WHAT WE ARE PROVIDING



T160 TECHNOLOGY

HEAT
up to 160°C

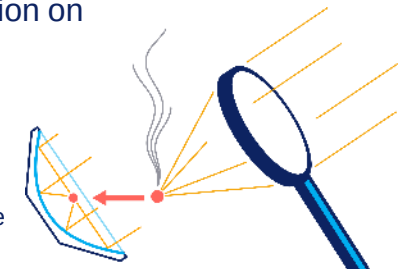
STEAM
up to 8 bar

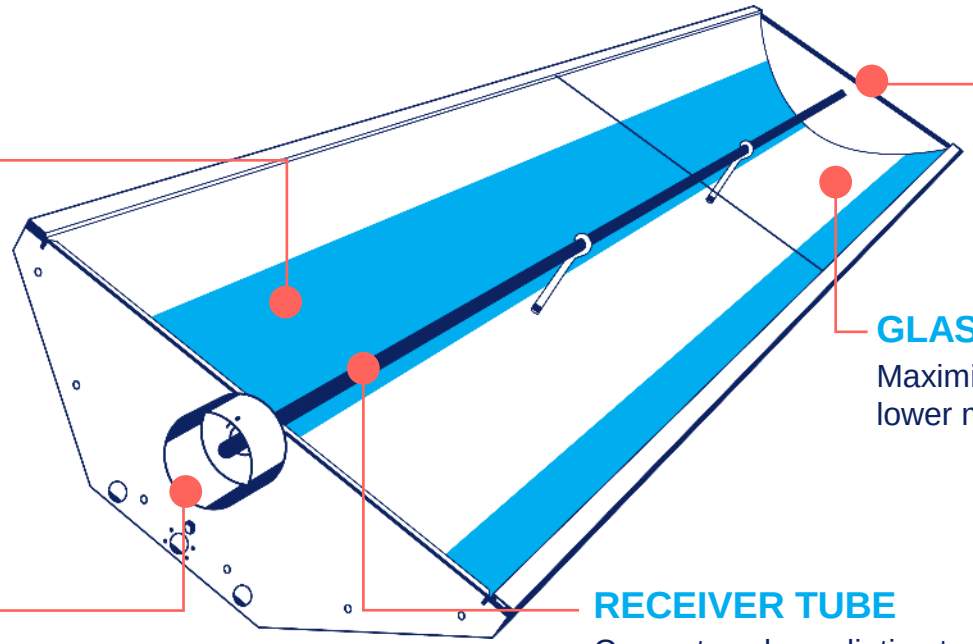
REFLECTOR

Focuses the irradiation on the receiver tube.

76 OPTICAL EFFICIENCY

Like a magnifying glass the reflector focuses the light.





GLASS COVEAR

Maximized transmittance and lower maintenance.

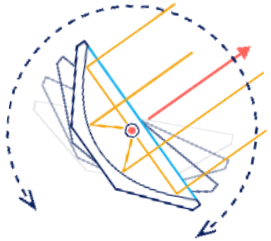
- **Hardened glass**
  For tough conditions
- **Self cleaning**
  With coated surface
- **Anti reflective**
  To maximize transmittance

TRACKING

Makes the collector follow the sun to maximize performance.

Tracking system developed by

SIEMENS



RECEIVER TUBE

Converts solar radiation to heat.

- **Stainless steel tube**
  For a durable and long lifetime
- **Selective coating**
  For efficient absorption
- **No radiation loss**
  The heat stays inside

T160 SPECIFICATION

OPERATING TEMPERATURE
40-160°C (100-320°F)

MAX STEAM PRESSURE
up to 8 bar (115 PSI)

PRESSURE RATING
16 bar (232 PSI)

COLLECTOR SIZE (LXWXH)
5,514 x 1,095 x 347 mm

WEIGHT
148 kg

DYNAMIC LOAD
90 kg/m^2

OPTICAL EFFICIENCY
76 %

EXPECTED LIFETIME
25 years

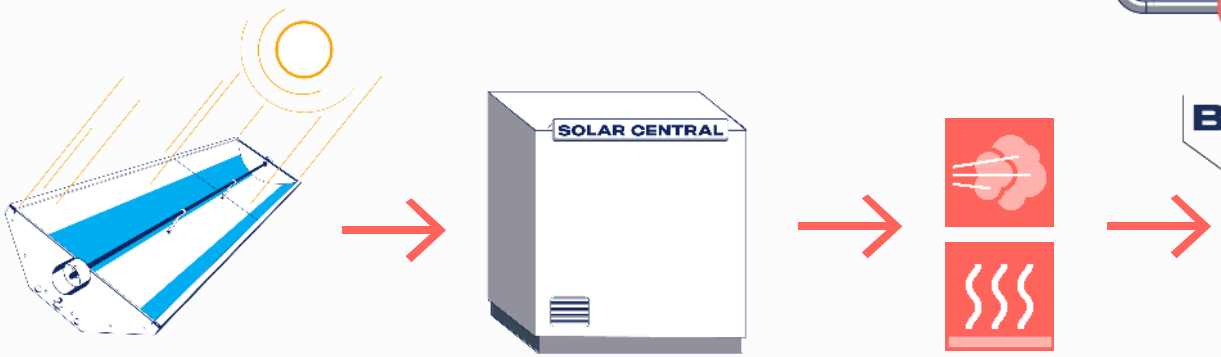
PEAK ENERGY GENERATION
700 W/m^2 aperture area
under optimum conditions

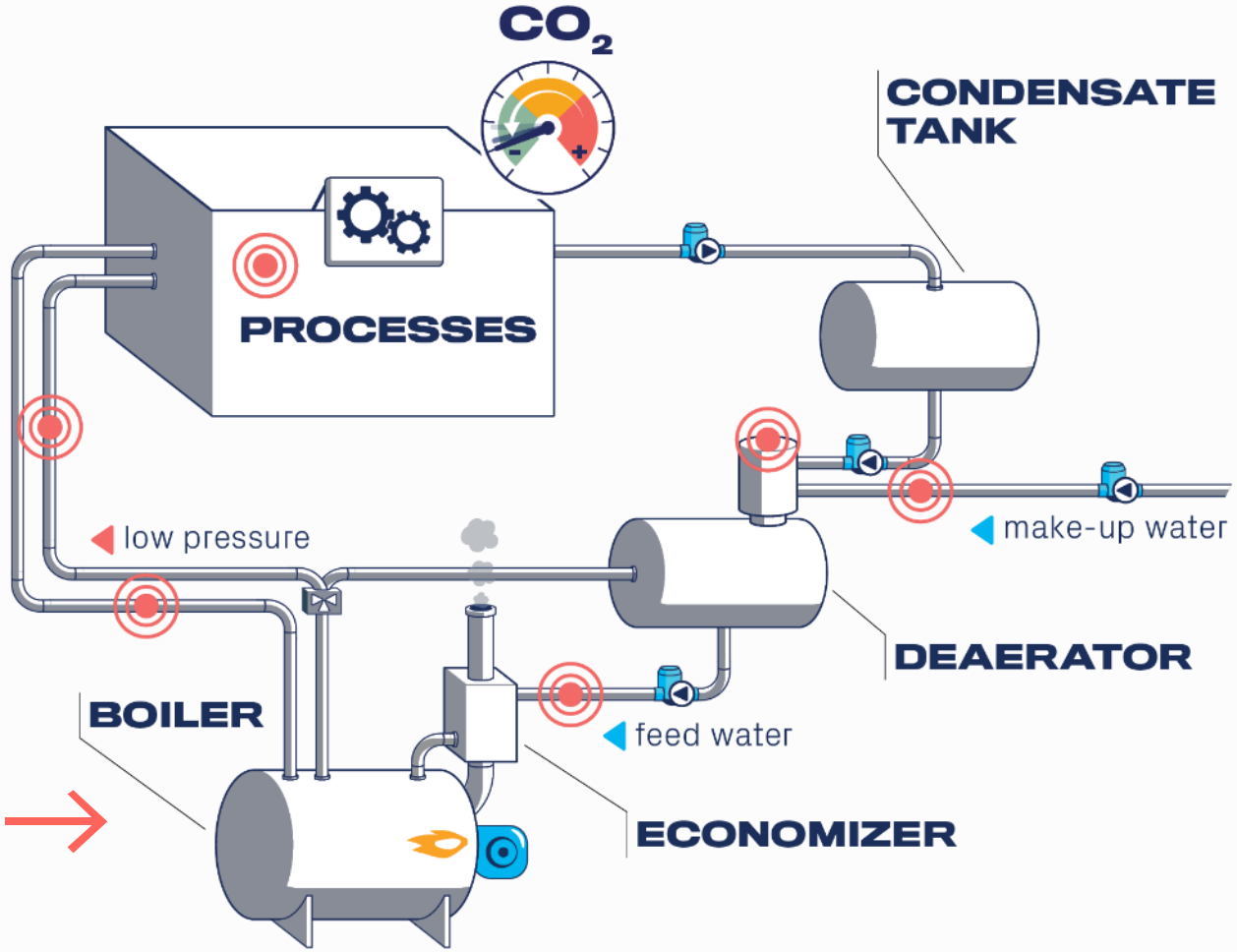
MULTIPLE INTEGRATION POINTS

Supply heat, steam, and cooling processes with the same system.

Solar heat can be integrated at multiple integration points into the existing heating system.

The highest possible solar system efficiency is achieved by prioritizing low-temperature integrations points.

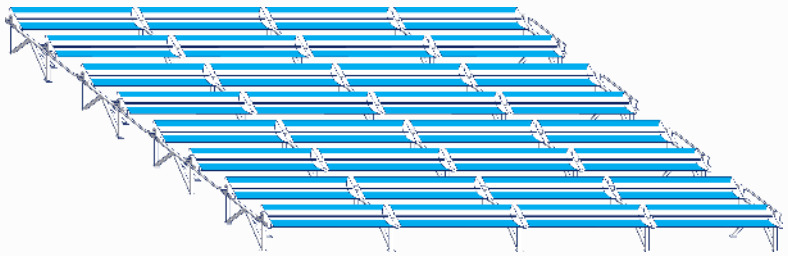




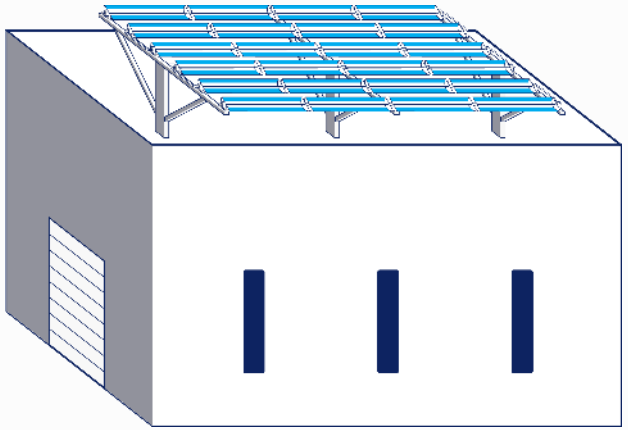
FLEXIBLE MOUNTING

- The field is easily mounted to suit the available space area

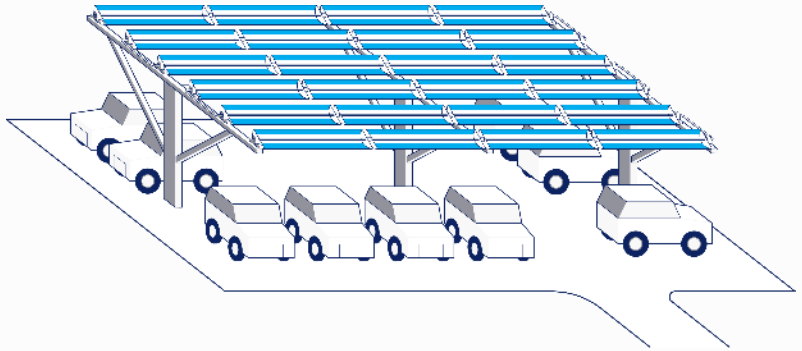
ON GROUND



ON ROOFTOP

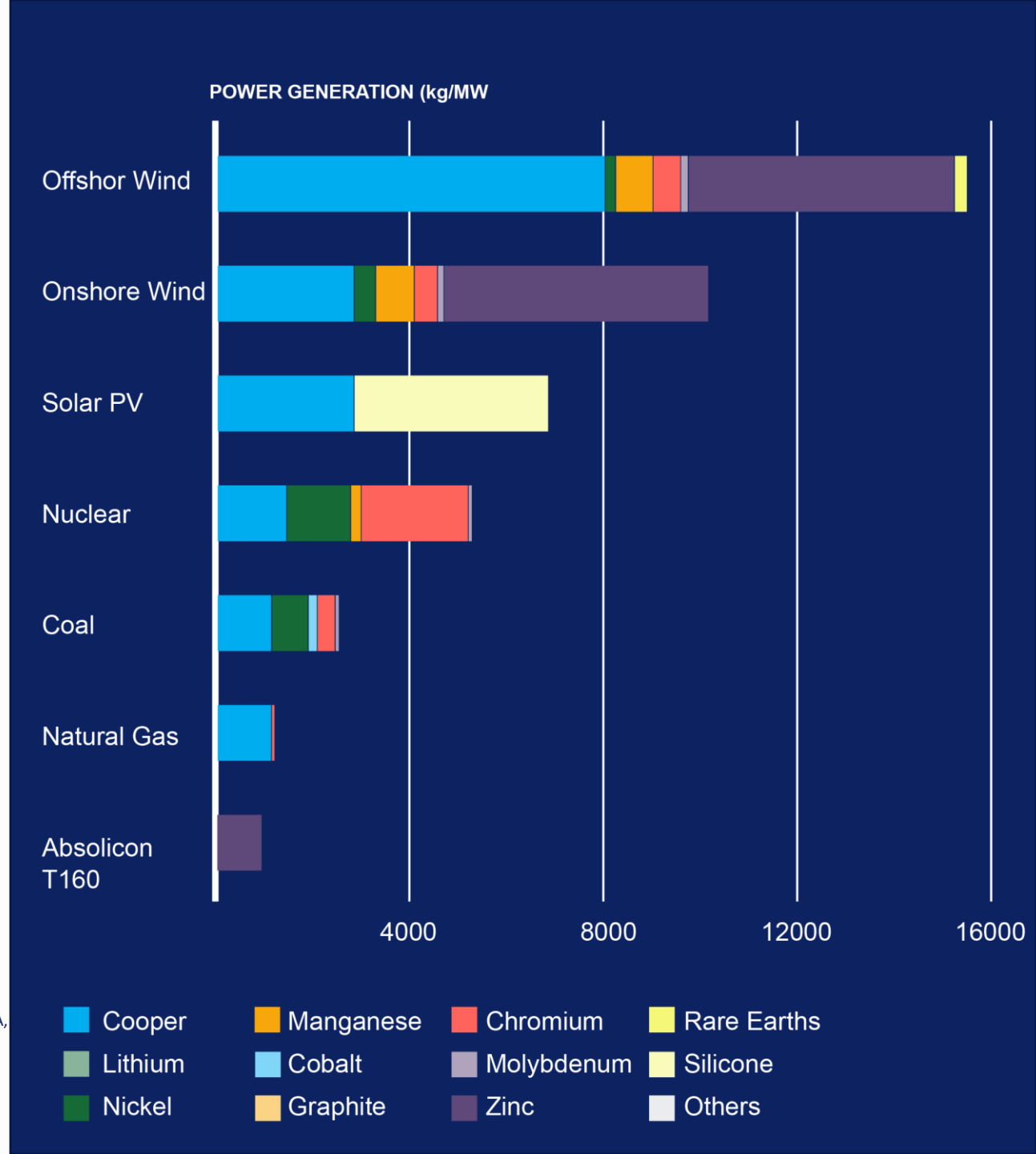


OVER PARKING



THE T160 SOLAR COLLECTOR HAS THE CONDITIONS FOR A GLOBAL ENERGY SHIFT

- Building PV plants, wind farms requires more critical minerals than their fossil fuel based counterparts.
- A fast and global large scale ramp of renewable energy generation facilities will cause supply chain bottlenecks due to inadequate critical minerals mining infrastructure
- The Absolicon T160 requires extremely low amounts of critical minerals per MW of heat generation.
- Combined with an energy payback of 4-5 months, the Absolicon T160 have unique conditions for a fast and global large-scale energy transformation



Source:
The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions, World Energy Outlook Special Report, IEA, May 2021.
https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

T160 CERTIFICATIONS

REGISTRATION NO: 011-7S2902C

Solar Keymark
The main quality label for solar thermal

The Solar Keymark is a voluntary third-party certification mark for solar thermal products, demonstrating to end-users that a product conforms to the relevant European standards and fulfils additional requirements.

CERTIFICATION NO : 10002145

Solar Rating & Certification Corporation (ICC-SRCC™)

Solar Rating & Certification Corporation is the leading certifier and standard developer of solar heating and cooling products in North America

Solar Impulse Efficient Solution Label

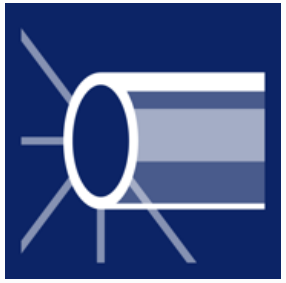
Absolicon T160 Solar Collector is awarded the "Solar Impulse Efficient Solution label" for clean and profitable solutions. Assessed by independent experts, the Solar Impulse Efficient Solution label, serves as a credible marker of quality.

OPTIMIZED AND PATENTED

The design and technology of Absolicon T160 Solar collector and Production line is protected by a total of ten granted or applied patent families for solar technology.

New patents are continuously produced from Absolicon's research and development.

Holder®
A unique holder to maximize yield



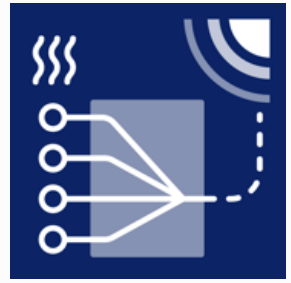
Receiver®
Converts solar irradiation to heat

Reflector®
Focuses the irradiation on receiver

Back Rib
Support the parabolic reflector

Glass
Maximized transmittance

Tracking®
Tracks the sun during the day



Solar Central
Controls the collector field

Robotic
Semi-autmatic robotized manfacturing

HÖGSLÄTTEN_SWEDEN

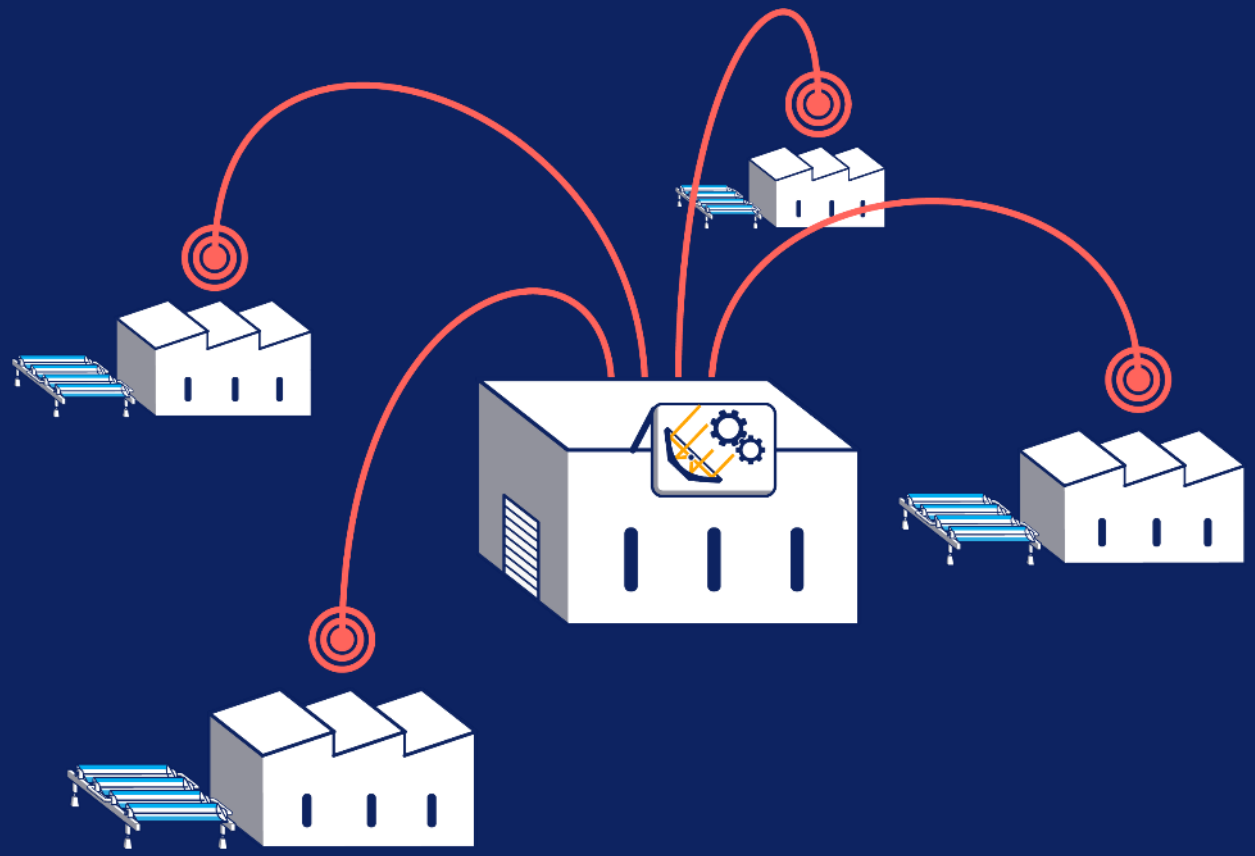
COLGATE_GREECE

IBERAFRICA_KENYA

BOMANS_SWEDEN

REGIONAL PARTNERS SUPPLY LOCAL MARKETS

- Use of local raw material & adapting the material choices to the conditions of your local region with higher profitability.
- Producing locally provides optimized costs in logistics, production & installations.
- Operating close to the customer minimize transports, resulting in reduced emissions and simplified delivery & service.
- Worldwide production of solar technology transfers knowledge & creates local quality jobs.



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Option 1 – Solar Thermal as a Service

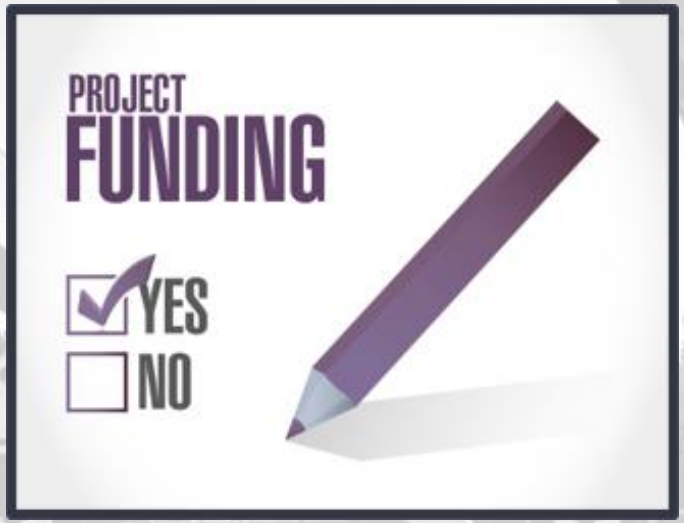
You provide us with ground or roof area

We will:

Design and build the solar field
Finance all costs
Maintain and Operate

You only pay for the effective heat produced by the field during the term

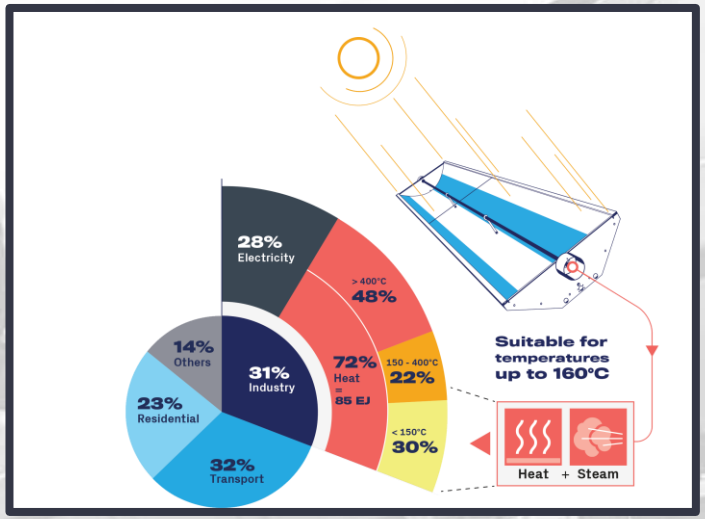
Option 2 – Construct on EPC/Turnkey Basis



You get capital approved internally

We will:

Manufacture Panels
Design and construct system/field
Commission system



You pay in accordance with verifiable milestones


Partners in
Project Green
A Program of Toronto and Region Conservation Authority

Thank you.