



# 2023 Sustainability Report





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# OUR STEWARDSHIP MISSION: DIALING IN 3 AREAS OF FOCUS



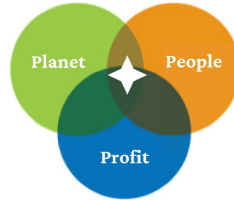
**MINIMIZE WASTE IN OUR  
OPERATIONS (Planet)**



**MAXIMIZE OUR ENVIRONMENTAL  
CONTRIBUTION (Profit)**



**PROMOTE SUSTAINABILITY IN  
OUR COMMUNITIES (People)**



 Prosperity

*Stewardship Team (Green Team) launched in 2019!*

Inovateus has always believed that growing a sustainable and prosperous company happens incrementally, and over time. And with that, one must have great patience. A strong commitment toward stewardship and sustainability lays a foundation, and a strategically unified team working toward a common goal, and vision, creates a roadmap to prosperity. A collective mindset on people, the planet, and then profit, that is what leads to prosperity. The team has also learned well over the years, more profit, leads to much greater opportunities to give back to the community, and the planet.

To keep ourselves working towards a collective mission, we have come up with 3 overarching stewardship and sustainability goals:



One gigawatt (1 GWdc) of solar-plus energy storage delivered to the energy market



Carbon neutral operations



Become a renewable energy industry thought leader and educator, growing stewardship and sustainable practices across the U.S

To Achieve by the end of 2025!





# 4 Key Metrics Tracked Annually

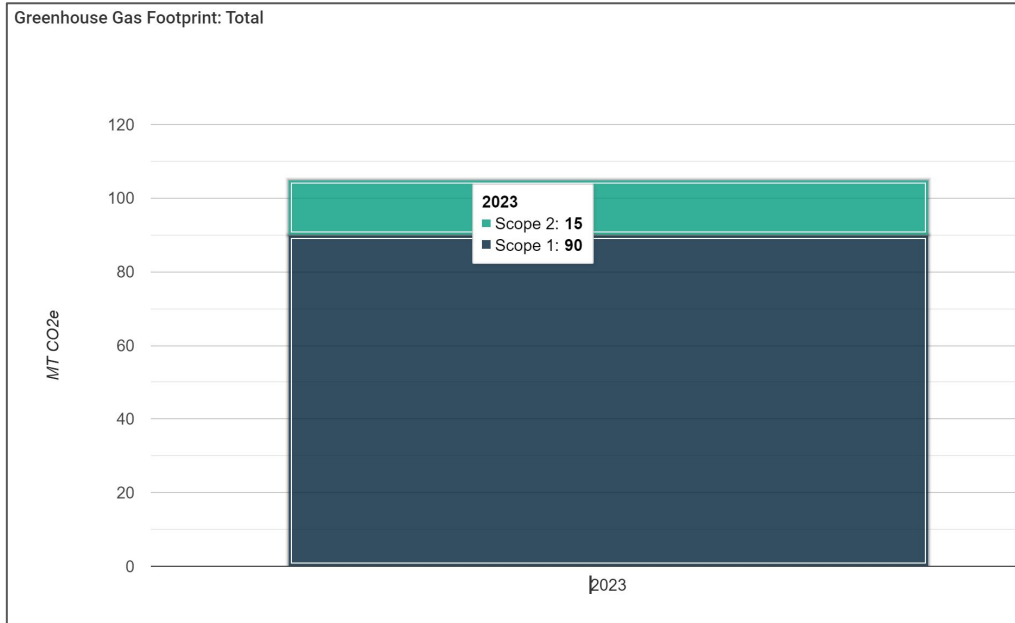
\*2023 EOY Status\*

<p><b>1.) Construction Waste Diverted/Recycled</b></p> <p>2023 Recycling = 1,164.48 Tons Since 2019 = 73% Recycle Rate</p>	<p><b>3.) Pollinator Habitat Planted or Under Development</b></p> <p>2023 Acres = 220 Since 2019 = 490 Acres</p>
<p><b>2.) Total Megawatts of Renewable Energy Built or Developed Since 2008 (MWdc)</b></p> <p>515 MWdc Is equivalent to <b>489,106</b> Metric Tons tons of CO<sub>2</sub> Abatement/Avoidance Annually for project owners</p>	<p><b>4.) Sustainability Focused Educational Resources Delivered Since 2019</b></p> <p>2023 Resources = 6 Since 2019 = 88 Resources (blogs, videos, webinars or in-person training)</p>

\*In addition to metric .2), direct greenhouse gas (GHGs) emissions are mitigated through Inovateus owned systems. 10,473.15 MWh ac generated at Orange and Walton, NY solar sites in 2023. (avoids 2,817.2 MT CO<sub>2</sub>e)



# 2023 Carbon Footprint Project



- 2023 was the first time Inovateus Solar calculated its Greenhouse Gas Footprint, calculating Scope 1 & 2 carbon footprint, MT CO<sub>2</sub>e. **Position Green** online software was used, in collaboration with majority owner and partner **Galway Sustainable Capital**.
- Owned/leased vehicles and purchased building electricity made up the majority of calculated emissions.
- 2024-2025 efforts to reduce footprint underway and include: fuel efficient travel, and adding solar to the building.

**2023 MT CO<sub>2</sub>e = 105**

\*Scope 1 = 90, Scope 2 = 15

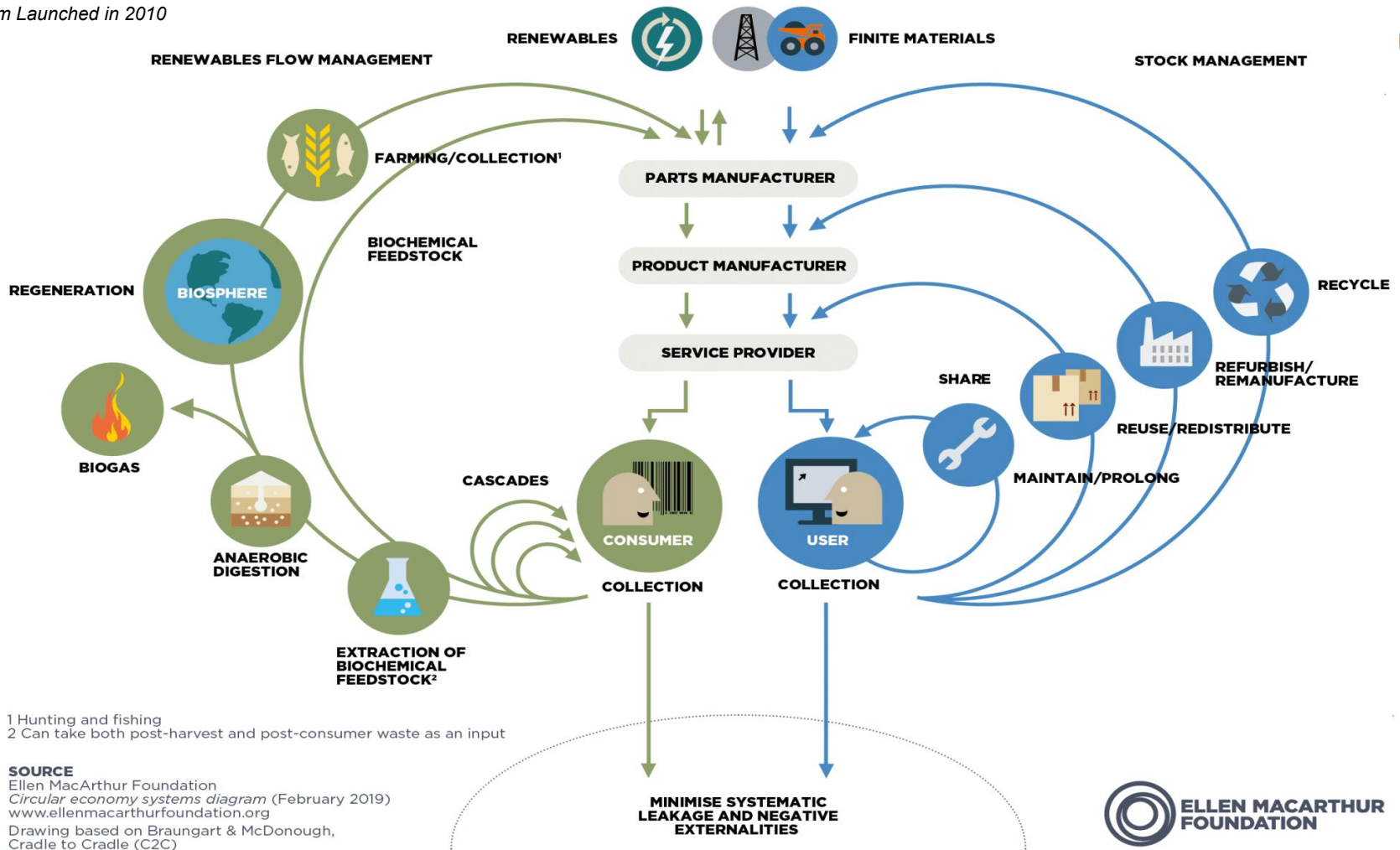
# ACHIEVING OUR MISSION: SUSTAINABLE SOLAR DEVELOPMENT GOALS

With the help and inspiration of industry best practices and extensive research, the Inovateus Team developed seven pillars we designate as Sustainable Solar Development Goals (SSDG).

These are to be practiced internally, with key partners, stakeholders, and the industry as a whole.

These 7 goals cover solar from a circular or turnkey approach.





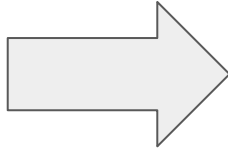
1 Hunting and fishing  
2 Can take both post-harvest and post-consumer waste as an input





# A Great Inspiration, The Circular Economy Concept

- Life Cycle Analysis
- Cradle to Cradle
- Biomimicry
- Natural Capitalism
- Regenerative Design
- Blue Economy
- Industrial Ecology
- Performance Economy



## 3 BASIC Principles:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems



# 7-SSDG's



1. **Green Procurement** (Supply Chain)
2. **Optimal System Design and Performance** (Engineering)
3. **Best Safety & Quality** (Construction)
4. **Project Vitality** (Community Engagement/Education)
5. **Eco-Friendly Habitat** (Vegetation Management)
6. **Zero Waste Initiative** (Materials Management)
7. **End-of-Life-Planning** (Decommission / Recommission)



# SSDG-1: Green Procurement (Supply Chain)

**“Source equipment responsibly and stay up-to-date on best supply chain practices to minimize carbon footprint.”**

→ The ‘*Green Revolution*’ is inspiring organizations to rely on procurement teams to drive sustainability throughout their supply chains. Inovateus has certified and/or launched:

- ❑ Green Purchasing Professional Certification (American Purchasing Society)
- ❑ Green Plan Implemented to Guide Procurement and Engineering/Design Teams





## Important Partner Requirements for Inovateus:

- Environmental Management System in place (**ISO 14001:2015**)
- Aware of Ultra Low-Carbon Solar Alliance + Global Electronics Council
  - **EPEAT Ecolabel** if possible
- Up-to-Date with Solar Supply Chain Traceability Protocol + Solar Equipment Buyers Guide by
- Practicing Corporate Social Responsibility (**CSR**), or, Environmental, Social and Governance (**ESG**)
- Annual Sustainability Reporting in Place
- Diversity Equity and Inclusion Awareness (**DEI**)





## More Components of the Green Plan

- **Measuring the Carbon Intensity of Manufacturing.** Including the manufacturer's supply chain. Are the factories powered by solar or other types of clean energy? If not, how much of their factory's utility grid is made up of clean energy? Was the steel mined locally or from another country? All of these factors and more are important to the total environmental manufacturing cost.
- **The Recyclability of the Solar Products and Supply Chain.** Are the products made with toxic substances, like lead? If so, can these substances be separated and recycled or reused at the equipment's end of life? Are they made with aluminum, which is typically easier to recycle and reuse for other products?
- **The Environmental Impact of Equipment Packaging.** How much packaging was used? Is it recyclable? For example, can the wood pallets be locally reused, recycled, or composted?
- **The Carbon Impact of Delivery.** From the factory to the job site, what is the carbon cost of transportation? The closer the factory is to the job site, the better, but it's also important to know the proportional carbon intensity of the trucks and cargo ships used.
- **Evaluating Power Density.** By using the most powerful and most efficient solar modules such as bifacial panels, Inovateus can use fewer modules on a smaller plot of land, preserving land and leasing costs. In addition, high power modules can also reduce the cost and environmental impact of wiring, trackers, inverters, and other equipment.

## SSDG-2: Optimal System Design and Performance (Engineering)

“Produce more power per square foot. Pick the most suitable land, or buildings to reduce tree removal or soil disturbance.”



Solar projects can be more sustainable by producing more power per square foot, leading to a smaller project footprint. To use less land, Inovateus starts with the design and component selection.



- **Solar Design Aspects.** Producing the maximum kilowatt-hours for every solar project is the top priority. The Inovateus engineering team consistently meets or exceeds production projections in system design, yet they are always aware that their choices can greatly impact sustainability. Trackers vs. fixed system, high efficient equipment, and layout are all part of the master equation.
- **Selecting Low-Impact Components.** Long-standing supplier relationships allow Inovateus to design systems with components projected to be available to the market at project notice to proceed (NTP). These products include a variety of tracker options for racking, highly optimized inverter power (VAR power and frequency regulation), energy storage, and very efficient plus high wattage solar modules, as well as bi-facial options.



- **Reducing Cable Quantities.** In the interest of reducing wire lengths and cable costs, Inovateus often designs arrays to be built with centralized string inverters rather than dispersing more inverters throughout the array. By designing a distributed system of combiner boxes, Inovateus saves significant amounts of PV wire. Also, because the runs from combiners to inverters are DC instead of AC, our design team can eliminate an entire phase's worth of cable. In addition, when inverters are located immediately next to switchgears, cables between those pieces of equipment are significantly shortened.
- **Above-Ground Wire Management Options.** Above-ground wire management can reduce ground disturbance and labor intensity while also reducing installation time by at least 10%. Above-ground wires can also reduce wire size because we can use the free air cable sizing table in the National Electric Code.

*“By implementing all of these sustainable solar design options, project costs are fully optimized, and Inovateus can provide PV production at the best possible dollar-per-kWh without sacrificing our sustainability goals. Now that we’ve designed a sustainable system, our next post will discuss how Inovateus uses best sustainable practices for solar equipment procurement.”*





# SSDG-3: Best Safety & Quality (Construction)

**“Do it right the first time, with industry best safety and quality practices.”**

**The Inovateus motto for building solar arrays is “do it right the first time”- regarding industry best safety and quality practices. Inovateus and its subcontractors shall keep the work environment safe and build solar systems that perform and sustain.**

## **Quality**

- Being efficient in handling or testing equipment, and dealing with non-conforming equipment properly (i.e., replacing or recycling).
- Developing systematic documentation processes and procedures, and quality reviews (e.g., proper training, install instructions, design errors, and supplier or installer errors).

## **Safety**

- Inovateus has implemented and cultivated employee health and safety over the years. One great example, it is company policy that each meeting is started with the safety word of the day at all construction sites, as well as any virtual or in-person meetings. “Safety first, safety always” is the mentality at Inovateus no matter the activity.





## Third party organizations to improve safety and quality practices, compliance and ratings:

- **NABCEP Certified**
- **NAFI Certified**
- **National Electric Code (NEC) Compliant**
- **OSHA Compliant**
- **Professional Engineering (PE) and Project Management Professionals (PMP)**
- **Certified Green Purchasing Professional (CGPP)**
- **Safety Management Group / Experience Modification Rate (EMR)**
- **Interstate**

The team has developed their own Safety & Quality Manual following the elements of ISO 90001. It is also company policy that at the commencement of a construction project, a safety procedure review meeting will be held to develop a Site-Specific Safety Manual. This manual addresses all potential hazards of the project.



## Critical Health and Safety Metric Tracked in 2023:

**TRIR** (Total Recordable Incident Rate) = **1.19**

- OSHA Calculation Method of TRIR: Number of Labor Incidents x 200,000 / total number of hours worked in a year.
- According to OSHA, TRIR is a good way to measure occupational health and safety, and is useful for comparing working conditions in workplaces and industries.



# SSDG-4: Project Vitality (Community Engagement/Education)

**“Promoting positive change in local communities and the solar community through thought leadership and education.”**

- ❑ Inovateus has 3 Stewardship areas of emphasis, the third being: **“Promote sustainability in their communities.”**
- ❑ Inovateus has 3 Major Goals to hit by 2025, the third being: **“Become a renewable energy industry thought leader and educator, growing stewardship and sustainable practices across the U.S.”**
- ❑ Inovateus tracks 4 key metrics annually, the fourth being: **“Sustainability focused educational resources delivered.”**

Share the  
Knowledge  
with All!



## Vitality in Practice



- Educate and Share
- Volunteer / Philanthropy
- Plant Trees or Litter Pick-ups
- Speak with Students/Schools
- Host Community Meetings
- Hire Local Labor
- Leave the Land Better than Found
- Collaborate and Grow the Industry for the Better!

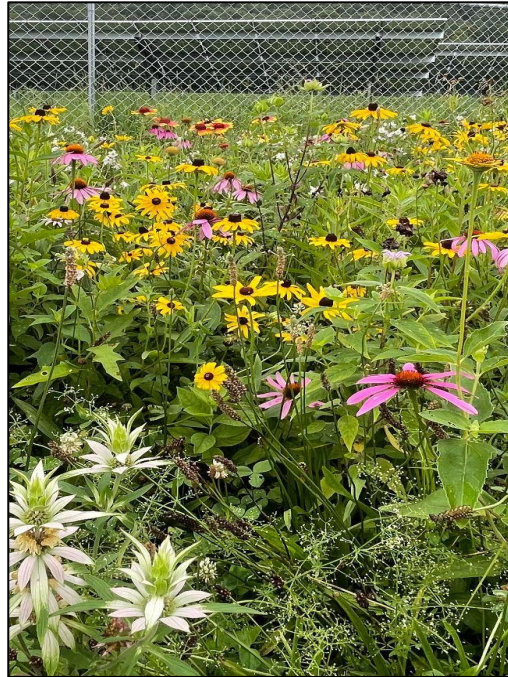




“In 2023, members from the Inovateus team visited with local schools to educate students about new solar trends such as - agrivoltaics, the evolution of solar technology and efficiency, recycling, and the future of solar and the national electric grid.”



## SSDG-5: Eco-Friendly Habitat (Vegetation Management)



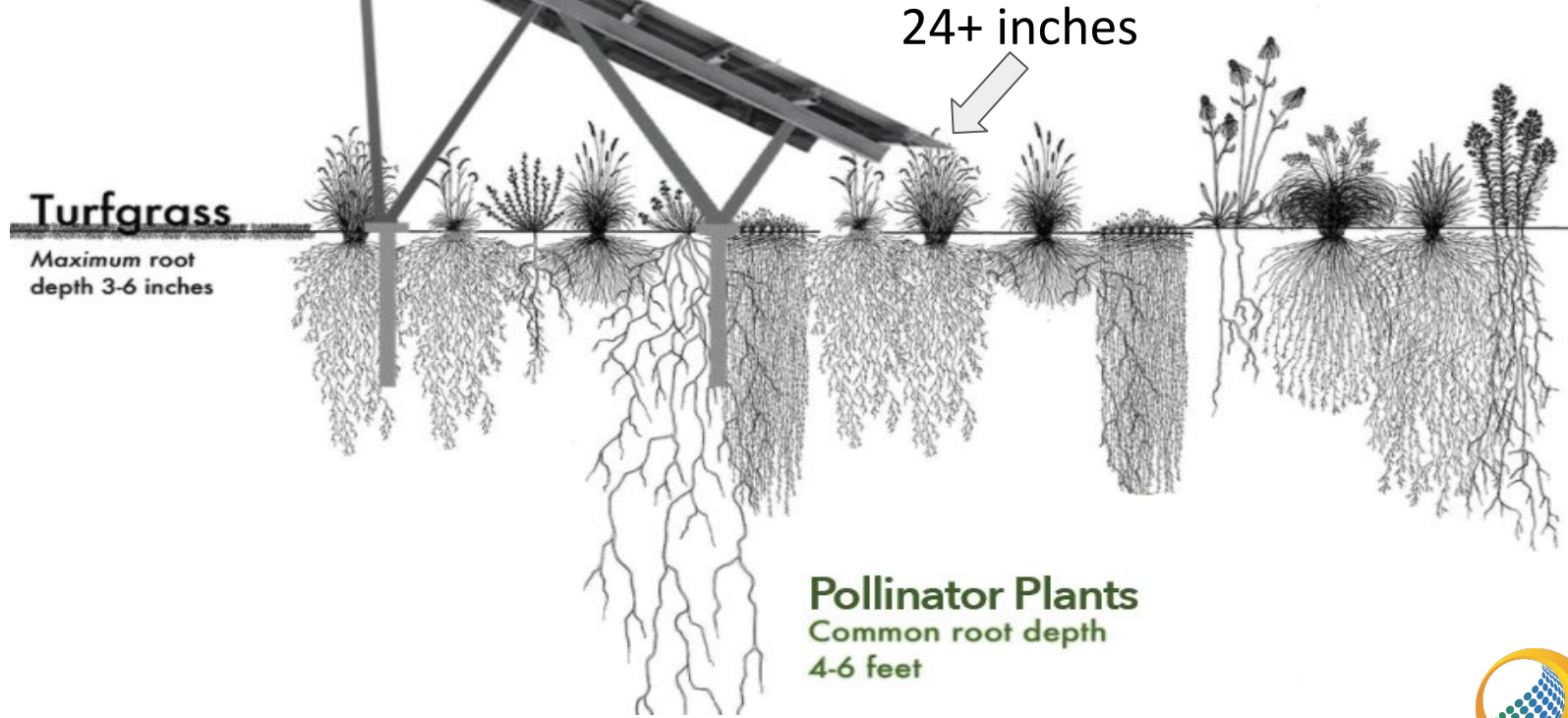
**“Plant pollinator habitat and vegetation buffers supporting butterflies, bees, flora and fauna.”**





# SOLAR SITE MANAGEMENT

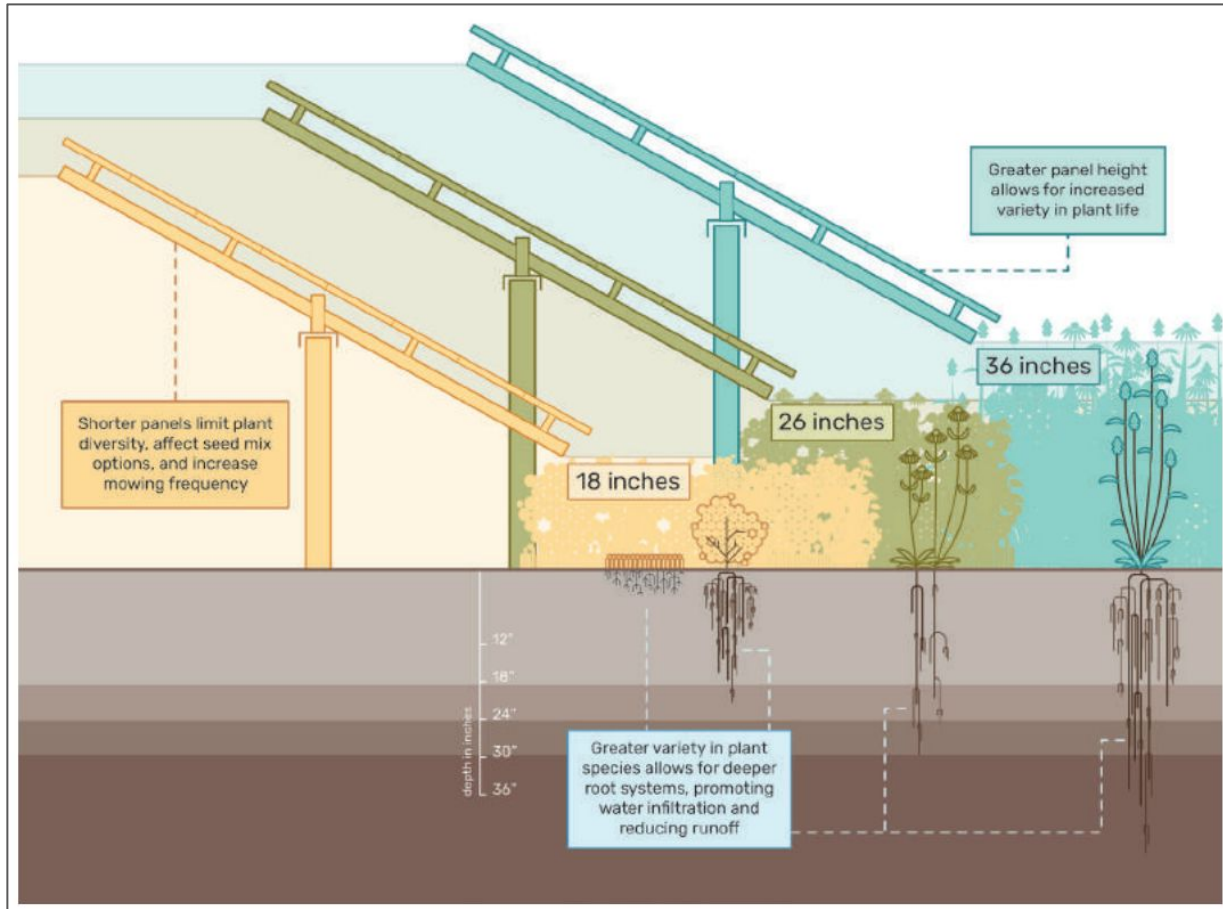
for soil, storm water, and pollinator benefits.





## The Story:

The higher the panel height from ground, the higher pollinator plants can grow, allowing for more eco-benefits!



- **Environmental Impacts:**
  - Provide habitat for native bees, butterflies, insects, sheep, and more wildlife.
  - Sequester more carbon (*think deeper and thicker roots putting carbon in the soil!*).
  - Help with stormwater runoff and water management.
  - Improve soil health and/or water quality.
  - Reduce fertilizer, herbicide, and pesticide applications, resulting in improved water and soil quality.
- **Operations + Maintenance & Projects Savings:**
  - The pollinator plants can decrease the ground temperatures under the solar panels, helping them to work more efficiently and actually produce more power.
  - Reduce lifetime system maintenance \$\$ costs, because you don't have to mow or chemically treat nearly as much, especially after three years of maturity.
- **Agricultural / Economic Support:**
  - Beekeepers can manage hives, or grazing companies can manage sheep inside and near these solar farm/pollinator fields, and farmers can grow fruits or vegetables. *Honey, Sheep, Fruits and Veggies!*
  - Supporting and growing habitat (population) for pollinating insects, in turn can increase yields to nearby farms relying on pollinating insects - research studies already show.
- **Aesthetics:**
  - Pollinators, crops or sheep simply make a solar farm look more holistic, beautiful and purposeful - especially when you notice nature thriving!





## Site Considerations

- **Environmental Disturbance** - Earth moving, tree or vegetation removal, or replanting / replace.
- **Ground Type/Conditions** - Farmland, Brownfield, gravel/rocks, wetland, soil.
- **Soil Type** - Residual Effects of Chemicals. Clay, sandy, loam, silt.
- **Geographical Location** - Plants that can do well in the region.
- **Solar Array Technology and Design** - Pollinators, Crops, Mixed?



# Design Considerations

- Bottom Row Clearance from Ground
  - Plant Height/Diversity
  - Pollinator or Crop?
- Row to Row Spacing - Trackers, Fixed-tilt, Wire Mngt.
  - Vegetation Management
  - Mowing/Grazing Efficiency
- Bifacial Module vs. Traditional Module
  - More or Less Sun Under the Solar Panels
  - Moisture Content
- Fencing Type & System/Property Boundaries
  - Eco-Friendly Solutions





This picture is the 19MWdc Logansport Solar project owned by Monarch Private Capital, who has a PPA with Logansport Municipal Utilities. Inovateus Solar performed the EPC work. The solar farm has a projected abatement of 615,823 MT CO2e over its 40-year operating life.



This project is one of the many Midwest solar projects part of the phase partnership and funded by the U.S. Department of Energy Solar Energy Technology Office (SETO), bringing together leading researchers and large-scale solar developers to investigate the ecological and economic benefits as well as performance impacts of co-located pollinator plantings at large, utility-scale photovoltaic (PV) facilities. Key stakeholders listed on the left. This project was also part of National Pollinator Week, and the City of Logansport will recognize June 26th as Bird & Pollinator-Friendly Solar Day to honor the 80 acres of pollinator-friendly habitat planted, a seed grant from The Bee and Butterfly Habitat Fund.



# More Resources, Networks, Education

\*Inovateus Solar utilizes each of these organizations and recommends them for resources and education, data, networking and communication.



Solar Farm Summit



Better Energy.  
Better World.





# SSDG-6: Zero Waste Initiative (Materials Management)

“Send less waste to landfills by maximizing material reuse and recycling at all solar construction sites.”

- [Wood](#) Pallets, Crates
- [Cardboard & Paper](#) Boxes, Protection, and Void Fill
- [Glass](#) or Damaged [Solar Panels](#)
- [Metal](#) Scrap from Racking, Banding, Conduit, Wire
- [Plastic](#) Banding, Wrap/Films, Conduit



72% Recycled since 2019

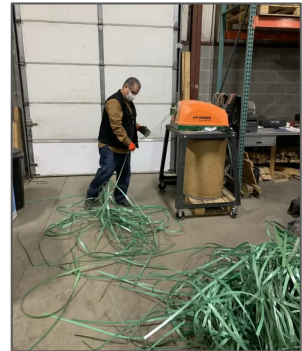






# Simple 5-Step Plan:

- **Sort and Separate** waste streams on-site, for temporary storage.
- **Place materials in Recycling Receptacles** and/or strategic laydown area.
- **Work with Local / Regional Recyclers** on the logistics of picking-up and negotiating rates.
- **Coordinate Smart Shipping** methods if possible, to reduce emissions for transporting.
- **Save \$\$'s** and **Collect Rebates**, depending on site location and material streams.





## The Basic Requirements:

- **Minimum of 75% recycling rate** of all construction waste, shipping and packaging materials. Tracked annually per project.
- **Track quantity (tonnage) of total recycling vs. total landfill.** Breakdown of material streams if possible, but not absolutely critical. Total volume/tonnage and % breakdown are most important. Monthly or quarterly reports preferred.
- **Keep the recycles organized in the laydown area, or recycling receptacles.** Landfill waste immediately goes in dumpsters. Safety, Quality, Cleanliness is key.
- **Broken solar modules + general solar equipment has to be recycled with an approved vendor.** Work with Inovateus on this.



# Resources, Networks, Education



Office of  
ENERGY EFFICIENCY & RENEWABLE ENERGY

**DSIRE**®

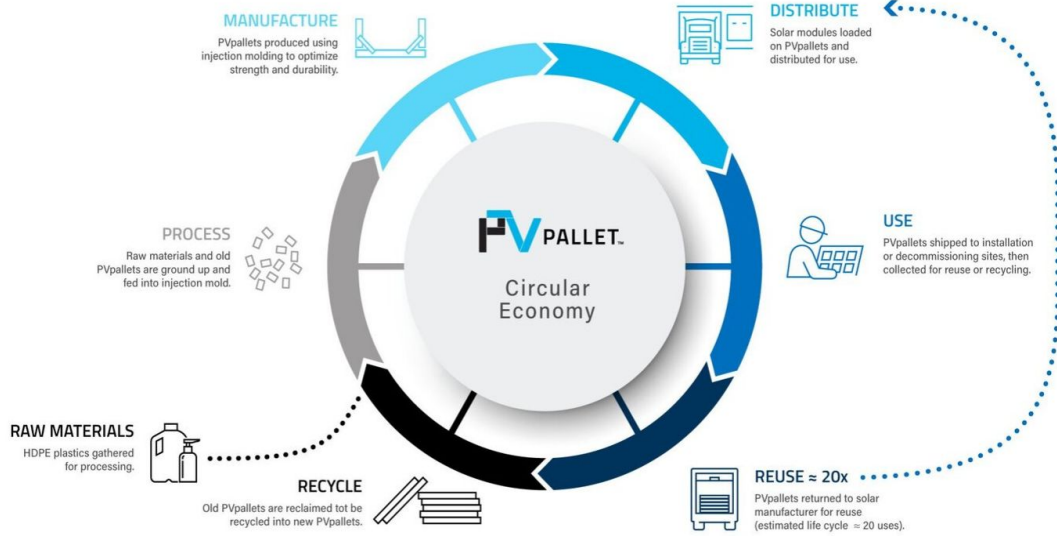
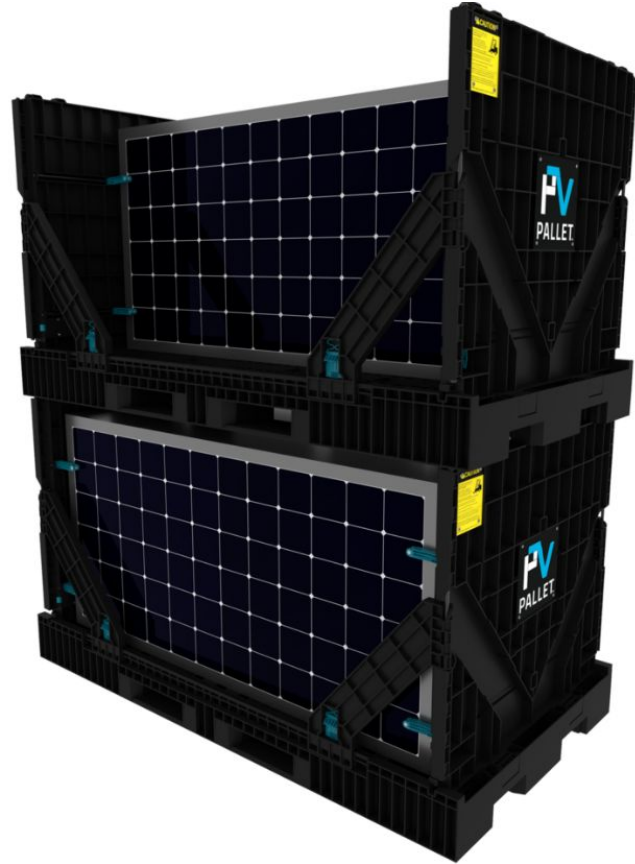
**Solar Energy  
Technology Offices**



\*Inovateus Solar utilizes each of these solar industry organizations and recommends them for resources and education, data, networking and communication.



# Circular Shipping Options with PVpallet!



The first reusable solar equipment pallet in the industry!



# SSDG-7: End-of-Life-Planning (Decommission / Recommission)

“Reuse, Refurbish, Recycle. Responsibly handle solar materials that get damaged, or reach the end of its useful life.”

- **Decide Decommission vs. Recommission.**

**Decommission** - Remove solar array for resale/donation/recycle, soil health improved for next project.

**Recommission** - Replace equipment with a New System / New Lease etc.



Source: SolarRecycle.org



# One-Page Strategic Plan:

## **Inovateus Solar Decommissioning Plan:**

The component parts of the System installed on the Leased Premises will be dismantled and will be recycled if suitable. All waste resulting from the decommissioning of the System will be transported by a certified and licensed contractor and taken to a landfill/recycling facility in accordance with all local, State, and federal regulations.

### **The initial plan for the repair and restoration of the site of the System will include the following:**

- The facility will be disconnected from the utility power grid.
- Individual PV panels will be disconnected from the on-site electrical system.
- Project components will be dismantled and removed using conventional construction equipment and recycled or disposed of safely.
- Individual PV panels will be unbolted and removed from the support frames and carefully packaged for collection and returned to a designated recycling facility for recycling and material reuse.
- Electrical interconnection, transmission, and distribution cables will be removed and recycled offsite by an approved recycling facility.
- PV Panel support steel and support posts will be removed and recycled off-site by an approved metals recycler.
- Electrical and electronic devices, including inverters, transformers, panels, support structures, lighting fixtures, and their protective shelters will be recycled off-site by an approved recycler.
- Any hazardous materials will be removed and disposed of in accordance with the current regulations.
- All concrete that is removed from the switchyard and on-site distribution system will be recycled off-site by a concrete recycler or crushed on site and used as fill material if the landowner desires.

**All physical material pertaining to the installation of the System, including but not limited to concrete posts installed to support the panels, will be removed to no less than a depth of six (6) feet below ground.**

- Fencing will be removed and recycled off-site by an approved metals recycler.
- Appropriate control measures to control topsoil erosion and sedimentation will be re-implemented during the decommissioning period and until the site is stabilized.

### **The restoration plan for the site of the System will include the following:**

- Any ditches used for temporary water transport within the Leased Premises will be removed for the site.
- Holes or ditches located on the Leased Premises that were the result of Lessee's removal of the System will be filled.





## WHAT'S IN A SOLAR PANEL?

Most components of a solar module can be recycled, including:

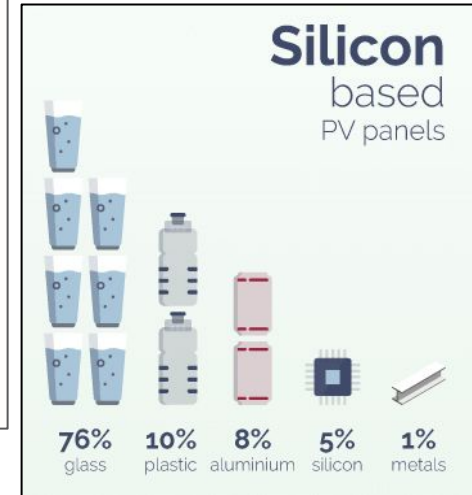
- Aluminum Frames
- Copper Wires
- Junction Box, Containing Metals

The remaining materials are called the "laminates" and they contain:

- Tempered Glass
- Silicon Cells Connected with Precious Metals
- Encapsulant
- Backsheet



Image Credit: [Clean Energy Reviews](#)



- \$10 billion + Recoverable Value by 2050
- Solar Panels, Racking, Wire/Conduit, Inverters, Combiners, Transformers
- Time to UPCYCLE materials and embrace a circular solar economy!







# Inovateus Solar™

DEVELOPMENT | ENGINEERING | PROCUREMENT | CONSTRUCTION

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