Greening the Statehouse 2021

Designing Solar for Environmental Benefits

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Photo credit: NREL InSPIRE, Flickr

TRANSFORMING THE ENERGY SYSTEM TO BENEFIT THE ECONOMY AND ENVIRONMENT.

- INCREASE ENERGY EFFICIENCY AND PRODUCTIVITY
- DECARBONIZE ELECTRICITY PRODUCTION
- ELECTRIFY THE ECONOMY AND ADOPT ZERO- AND LOW-CARBON FUELS
- CAPTURE CARBON FOR BENEFICIAL USE AND PERMANENT STORAGE

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Our Work

Strategic Outreach with Local Communities for Utility-scale Renewable Energy Deployment

- **Prepare long-term planning efforts for wind and solar market development**
- **Community dialogue around future energy system needs and opportunities**
- **Investigate energy system co-benefits and optimization, including environmentally sensitive design best practices**

Scales of Solar Development

Community-Scale Solar

- 5 - 20 acres in size, similar to a rural residence or simple lot split
- Typically a single property owner
- Can be permitted by-right in certain districts and through a conditional use permit in other areas

Large-Scale (or Utility-Scale) Solar

- Principal use solar with a project size measured in hundreds or even thousands of acres.
- Frequently multiple property owners,
- Permitted through a conditional use permits where allowed

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Photo credit: Brian

Photo credit: Dennis Schroeder NREL

Benefits of Large-Scale Solar Development

- **Economic development -** local jobs & spending
- **Increased local property tax income –** that can be utilized for schools, public safety, etc. – all without creating additional service needs
- **Local power generation** – no shipping or purchasing of fuels
- **Reduces environmental risk** – mining, pipelines, coal ash, greenhouse gases, mercury and air toxics

Photo credit: Brian Ross, GPI

Utility-Scale Solar: Conventional Design

Historically, solar development has adopted the **industrial energy system model**

Intent: Standardize and maximize efficiency in energy production, minimize cost of construction and O&M

Cost: Lost opportunity of co-benefits, poor consideration for community and land use implications

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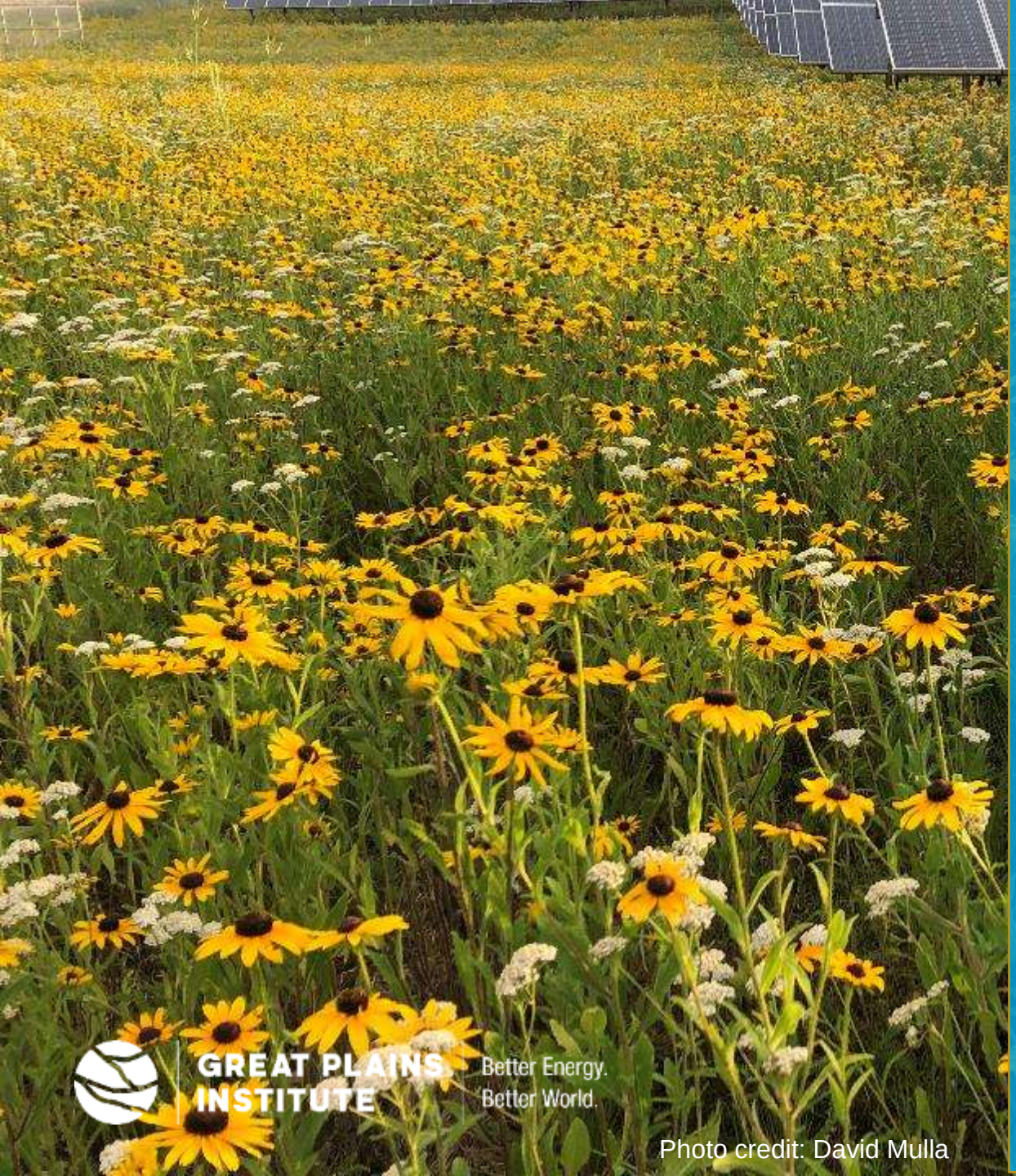

Photo credit: David Mulla

Environmentally Sensitive Design provides a conduit to align solar design principles with local community goals and values

- **I.e., a community with environmental conservation goals in their comprehensive plan, could use ESD principles to make a solar installation work like a meadow or native habitat.**

Environmentally Sensitive Design can provide many diverse environmental benefits.

Environmental Benefits can include:

1. Habitat (for flora and fauna)
2. Repurpose brownfields or contaminated waste sites
3. Stormwater management
4. Surface water quality
5. Drinking water quality
6. Restoring soil health
7. Carbon sequestration
8. Integration with Agriculture (Agrovoltaics, soil grazing, crop diversification)

Photo Credit: Brian Ross, GPI

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Environmentally Sensitive Solar Siting Design Practices

Solar land uses can enhance community assets while minimizing nuisances.

- **Agricultural opportunities** – Diversified income stream for agricultural operators, co-located ag production, pollinator benefits for nearby crops
- **Water quality protection** – Perennial ground cover that reduces runoff, soil conservation, vegetated wetland and waterway buffers
- **Habitat value** – Landscaping and vegetation that supports pollinators, small mammals, birds, reptiles

Advocate for Continued Environmental Conservation through Local Design

- When solar arrays are integrated with other land uses, or designed to harness specific co-benefits, there are additional site considerations:
  - **Solar array height**
  - **Fences or barriers**
  - **Screening and setbacks**

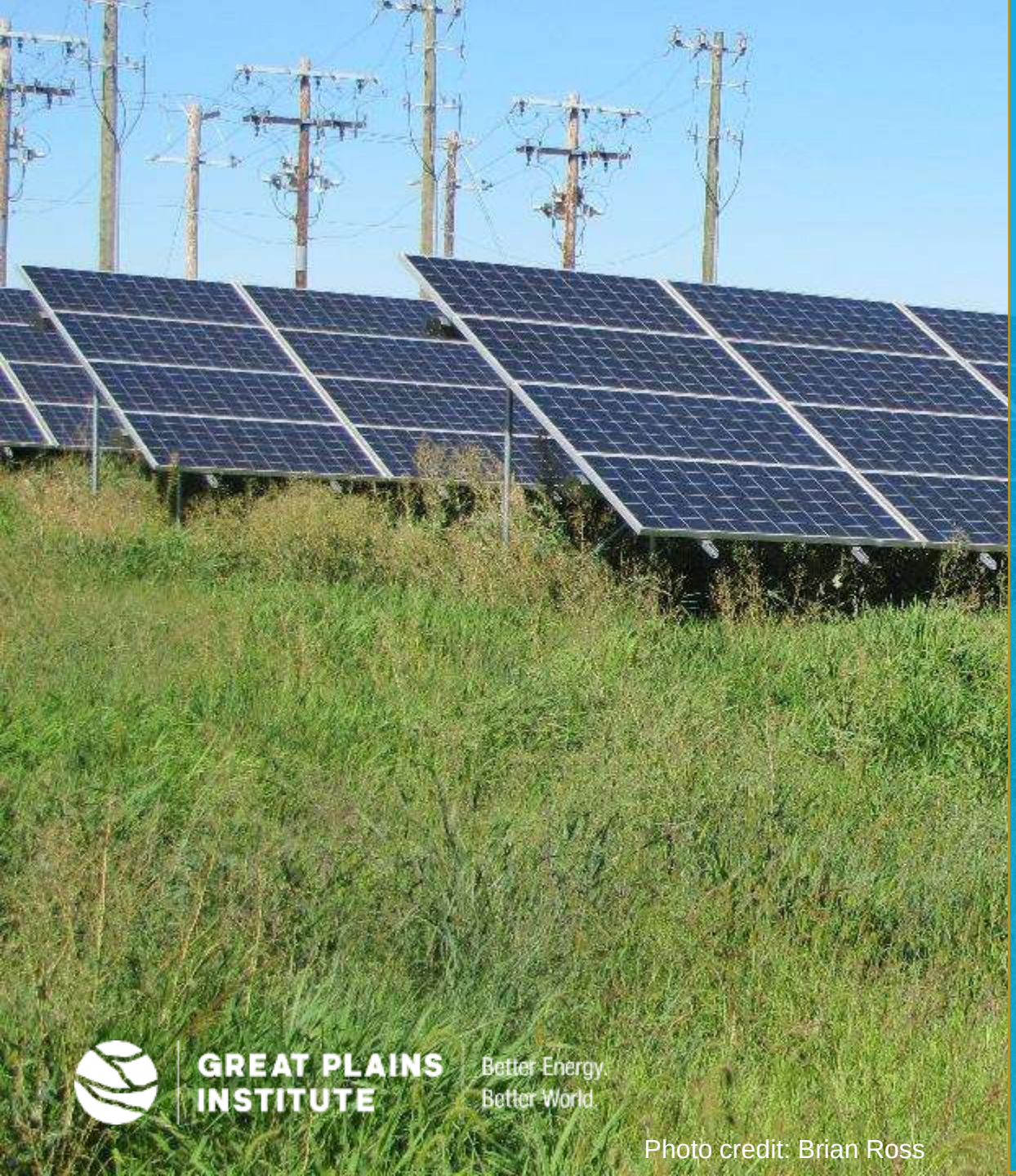
Photo Credit: David Mulla, University of Minnesota

Building Environmental Design Principles into Local Planning:

- Zoning or Ordinance
- Development Requirements or Review Processes

Conventional Site Preparation	Low-Impact and Conservation Design Site Preparation
Clearing and grubbing of soil and roots	Existing vegetation is left intact or is replaced with low-growing native vegetation species or crops.
Topsoil stripping and stockpiling	Existing topsoil is left in place to allow for the successful growth of native vegetation and to promote soil health post-decommissioning of the solar project.
Land grading and leveling using heavy machinery	Natural contours of the land are worked into the design and configuration of the solar project, with minimal if any land grading required.
Soil compaction using heavy machinery	Soil and vegetation are left intact to facilitate the growth of native vegetation, improved stormwater management through less runoff and erosion, and soil health.
Land footprint for the foundations of vertical support structures, often including concrete	Lower land footprint for foundations of vertical support structures, often driven piles.
Vegetation that supports habitat is discouraged and removed	Vegetation that supports habitat (e.g., pollinator species, other native fauna) is encouraged.
Operation and maintenance (O&M) activities include herbicide spraying, mowing of weeds, and other vegetation	Minimal O&M activities due to low-growing native vegetation species, could involve livestock grazing.

Source: National Renewable Energy Laboratory, 2019



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Moving Forward

- **Bring Environmentally Sensitive Solar Design to the Attention of Elected Government Officials**

- **Support Efforts to Maintain Local Authority in Siting and Permitting Solar Projects**

  Contact your state rep and state senator (bitly.com/INLegis) and let them know that you support county governments continuing to have the right to enact environmental-friendly/pollinator-friendly solar farm ordinances - with no veto power by private landowners.

Additional Resources and Information

- State of Indiana Model Solar Ordinance: https://betterenergy.org/blog/eri-gpi-release-model-solar-ordinance-renewable-energy-guide-to-facilitate-indiana-solar-and-wind-development/
- Fact Sheets: https://betterenergy.org/blog/utility-scale-solar-and-wind-siting-resources-for-states-and-counties/
- Solar Co-Benefits (General): https://betterenergy.org/blog/co-benefits-approach-to-solar/
  - Solar and Natural System Co-Benefits: https://betterenergy.org/blog/solar-energy-projects-natural-systems/
  - Solar and Agriculture Co-Benefits: https://betterenergy.org/blog/solar-energy-agriculture-pursuing-win-win-opportunities/, as well as https://betterenergy.org/blog/solar-plus-how-solar-integrated-agriculture-could-reduce-barriers-to-large-scale-solar-deployment/
  - Solar and Stormwater Management: https://betterenergy.org/blog/stormwater-management-in-solar-projects-barriers-and-best-practices/
- Resources for Community Engagement and Outreach:
  - Engaging Communities on Utility-Scale Wind & Solar Development in the Midwest: Part I, Market Drivers
  - Engaging Communities on Utility-Scale Wind & Solar Development in the Midwest: Part II, Local Considerations
  - Engaging Communities on Utility-Scale Wind & Solar Development in the Midwest: Part III, Local Readiness and Decision-Making

Photo Credit: Prairie Restorations

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