Topics

juwi solar Inc (JSI)
Siting Renewable Energy
Solar vs. Wind Land Use
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Appropriate PV/Wind Land Use/Zoning

12MW DC Wyandot Solar – Wyandot County, OH

2.2MW DC Mars Solar – Hackettstown, NJ
juwi solar Inc. (JSI) – Corporate Overview

juwi solar Inc.

Based in: Boulder, Colorado
Employees: 60+
Business Unit: Solar Photovoltaic (>90 MW)

Majority Shareholder: juwi Holding AG

Based in: Wörrstadt, Germany
Founded/CEOs: 1996, Fred Jung and Matthias Willenbacher
Employees: >1,750 for all divisions
Business Units:
• Wind (950 MW)
• Solar PV (1 GW)
• Bioenergy (2 MW)

• PV plant developer and engineering, procurement and construction (“EPC”) contractor
• Track record of working successfully with major utilities across the U.S.
• 90+ MW of Solar PV Power Plants in the US since 2009
• Over $335mm of Project Financing
• JSI and juwi AG have over 1,500 installations and 1 GW of solar PV plants
North American Projects

>90 MWs Installed between 2009 and 2012

**US Projects:**
1. Cactus Garden, 670kW
2. Highwoods, 1.5MW
3. Mars Solar, 2.2MW
4. Mill Creek, 3.8MW
5. Wyandot Solar, 12MW
6. Jacksonville Solar, 15MW
7. Blue Wing Solar, 16MW
8. Queen Creek Solar, 25MW
9. Milford Solar, 15MW

March 2013
Concentrating Solar Power (CSP)

- Power Tower
- Parabolic Trough
- Dish Sterling
Small Scale Renewable Considerations

- Solar access
- Solar aspect
- Community programs for rooftop PV
- Small scale wind in residential zones
Siting Renewable Energy Projects

Considerations

- **Technology** wind, solar (concentrating, photovoltaic fixed/tracking), or geothermal
- **Interconnection** to the electrical grid, access to distribution or high voltage transmission lines
- **Size/capacity** of project (i.e. residential, commercial or utility scale)
- **Site conditions** resource, topography, greenfield/brownfield, zoning/land use, wetlands/washes/streams, floodplain, vegetation, endangered threatened species
## Solar vs. Wind Land Use

Different renewable technologies have different impacts on project site and community:

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Solar Farm Visual Impact

Approximately 6 feet tall
Reflectivity

- PV modules absorb light
- Thin-film module shown here absorbs 90% of incident light on panels.
- PV modules similar to smooth water in reflectivity
- Tracking and fixed-tilt systems constructed at airports, indicating no hazard of glare or blinding to pilots

- juwi solar installation shown here on airport property on Wyandot County airport, approved by FAA

Photovoltaic modules are less reflective than structural glass
Solar Farm Facts

No traffic
- No on-site employees. Several maintenance vehicle trips per week.

Non-toxic
- Recyclable PV modules, enclosed in glass, do not cause exposure to toxic materials

Low voltage
- Far lower voltage than transmission lines. EMF comparable to household appliances (at 10’ from inverters).
Residential Compatibility
juwi Ground Mounted Systems

Mars Solar Garden, Hackettstown, NJ
- 2.2MW system adjacent to numerous residential properties to the east has experienced no complaints.

Blue Wing Solar, San Antonio, TX
- 16MW fixed-tilt, thin-film system faces slightly west of south, toward a neighbor’s residence.
- Neighbor has no issues with glare, was glad to have solar farm built as previous owner sought to build a trailer park.
Inverters/power stations may generate a low hum of 45 decibels at 10 meters (less than a refrigerator)
Solar Farm Community Benefits

**Employment** – For large plants, 120+ workers on-site during peak construction times; more than 100,000 construction labor hours

**Economic Development** – More than $2,000,000 in local purchases during construction in addition to local wages paid

**Air Emissions** – Produces ZERO air emissions

**Water** – PV plants require no water to operate and produce ZERO wastewater

**Stormwater** – precipitation can pass between modules and support vegetation beneath the arrays. PV plants generally have a neutral-to-positive impact on stormwater runoff at a site

**City/Fire services** – PV plants have no on-site employees or traditional buildings and require very limited city services and impact on public infrastructure
Blue Wing Solar – Project Example

16.0MW DC San Antonio, TX, USA

Construction Period: 1Q10 – 4Q10; 215,000 ground-mounted solar modules on 115 acres

Land Use/Permitting Highlights

- Zoned Farm and Ranch (FR)
- No consideration for solar in zoning code
- City Planning Dept. wrote Rule Interpretation Decision allowing ground-mount PV within certain zoning districts, including FR

Challenges

- 1/3 within City of San Antonio, 2/3 in unincorporated Bexar County, but within Extra-Territorial Jurisdiction
- Landscape buffering
Badger 1 Solar – Project Example

19.3MW DC Tonopah, AZ, USA

Construction Period: 1Q13 – 4Q13; single-axis tracking on 118 acres, of 172 acre site

Land Use/Permitting Highlights
- Within Maricopa County – allows solar within most zoning districts with Special Use Permit
- Comprehensive Plan requires Industrial land use designation
- Rural-43 zoning (residential)

Challenges
- 12 months for zoning/land use approvals, then 2+ months for building permits
- Comprehensive Plan Amendment
- Toilets (water supply) required
Land Use & Zoning Mistakes

Solar and Wind Farms ≠ Industrial Land Use

Industrial zoning and land use characteristics:
- Access to major transportation corridors, water, sewer = EXPENSIVE
- Often urban, smaller parcels = EXPENSIVE, too small
- Employment
- Nuisances (noise, traffic, pollution)

Tonopah/Arlington Area Plan:
- INDUSTRIAL: “major employment centers,” Uses permitted in this category include warehousing, storage, distribution activities, and manufacturing

PV should not be restricted to Public Utilities zoning
Solar farm ≠ traditional power plant, PV does not need:
- Massive amounts of water for cooling
- On-site personnel
- Fuel delivery via rail or road
Appropriate PV/Wind Zoning/Land Use

*Requiring change of land use/zoning for solar amounts to spot zoning*

Avoid “stranded” industrial zoned land out of conformance with comp plan

PV is a good neighbor, temporary land use, not an industrial land use

Allow PV and wind in most zoning and land use designations (particularly agricultural and rural) with:

- Special use permit,
- Conditional use permit,
- Solar/Wind overlay district,
  OR similar
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