

COMMERCIAL SOLAR (PV)
DEVELOPMENT
OREGON

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Introduction

- Concerns over Goal 3
- Benefits of Solar/Factors to consider
- Oregon Solar Energy Market
- Site Prospecting/Selection
- Development Process
- Components
- Photos of PV and other land uses
- Cool Videos



Concerns over Goal 3 Process for Solar Development

- **Additional permitting burden is unwarranted given nature of development.** Goal 3 evaluation criteria is subjective and often results in appeals at the local level and state level. Plan amendments should be reserved for large permanent developments which potentially change the nature of land use in a county, not for ~100 acre solar projects which are compatible with existing agricultural uses.
- **Not all Goal 3 Lands are Created Equal.** Current method for evaluating Goal 3 does not take into consideration current use of land or intentions of land owner.
- **Thresholds Must Consider Nature of Impacts.** 12 acres of high-value farmland soils and 20 acres of non-high-value farmland soils are outdated thresholds based on a traditional, resource heavy, commercial utility facilities. Solar energy facilities, in comparison, have minimal environmental impacts when properly sited. Solar facilities have no air or wastewater and require little water or electricity during operation, which means there are no unnecessary increase in costs of community services (a common concern with the expansion of urban development into rural area).
- **Nature of the Use Preserves Lands for Future Agricultural Use.** Given a solar facility's minimal environmental impact and limited infrastructure, it is possible to decommission the facility at the end of its useful life and return the land to agricultural production.
- **Habitat Conservation Encourages Development on Agricultural Lands.** From a habitat conservation strategy, actively farmed agricultural lands are deemed disturbed and thus better suited for renewable energy development to avoid impacts to higher quality habitats.

Benefits of PV Solar

- Compatible with adjacent land uses
- Does not require significant modifications to the landscape (can be restored upon decommissioning)
- Environmental impacts minimal with proper siting
- No water use required
- Agricultural uses are possible in combination with infrastructure

Why Solar?

An Oregon Farmer's Perspective

- **Already harvesting solar power for food, why not electricity?**
 - $6 \text{ CO}_2 + 6 \text{ H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$
- **No conflict with current use (barley, grass, hazelnuts)**
- **Diversify operations**
 - “Solar farming and dirt farming: energy is end product of both”
- **Guaranteed \$/acre**
 - Can't get that with crops
- **Using natural resources locally = self-sufficiency**

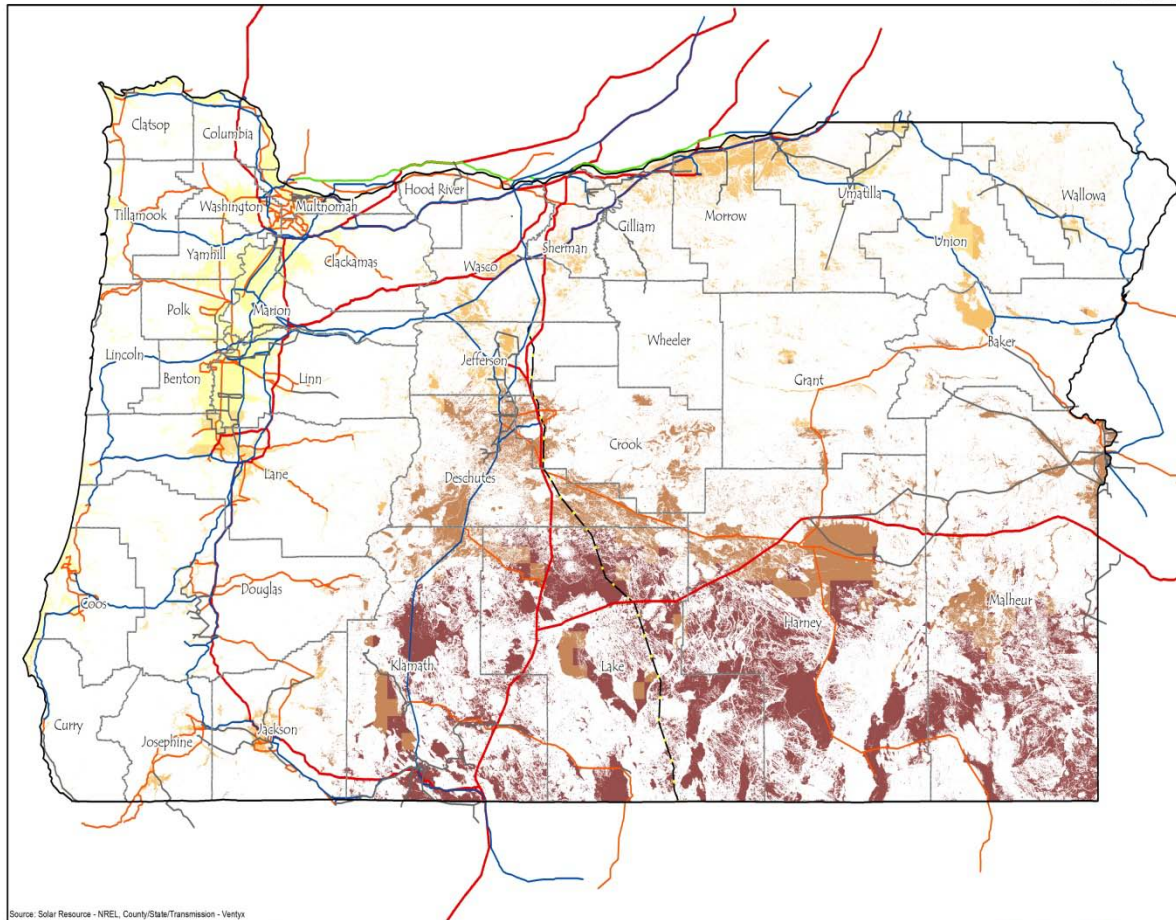
Other Benefits/Factors to Consider

- A significant portion of farm households rely on off-farm income, renewable energy can be that income and can work to preserve the farm and doesn't require a complete reorganization of a community like a housing development or retail development does.
- The success of a farm depends upon the economic success of the region. Renewable Energy provides a sustainable boost to local economies
- Many parcels of agriculture land are owned by people not interested in farming. They bought the land or inherited the land and have been waiting for an opportunity to sell or lease for some other use. In the meantime the land lays fallow, is full of weeds, used as dumping grounds or meth labs. Nevertheless the land is zoned as agricultural and would require a Goal 3 exception to develop. Solar can enable productive use of land that is zoned for agriculture but is not presently being used for anything, while retaining its capability for future agricultural uses

Oregon Solar Energy Market Drivers

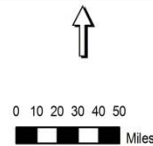
- **Oregon RPS**
 - Large utilities 25% renewable energy by 2025
 - Interim goals in 2011 (5%), 2015 (15%), and 2020 (20%)
 - Smaller utilities 5% or 10% renewable energy by 2025
- **Large utilities are meeting 2015 Oregon RPS, mainly with wind**
 - PGE expected around 80% wind, 20% hydro, and less than 1% solar for 2015
 - Pacific Power expected 98% wind for 2015
 - Large utilities will need to add around 1,000 aMW of new renewables by 2025
- **Oregon's "Solar Capacity Standard" - RPS carve-out for solar**
 - IOUs must acquire 20 MW by 2020
 - PGE (10.9 MW), PacifiCorp (8.7 MW), and Idaho Power (0.5 MW)
 - PGE has around 5.5 MW already
 - Qualifying system size - 500kw to 5 MW

OR solar potential map



Source: Solar Resource - NREL, County/State/Transmission - Ventyx

Transmission Line	Annual Direct Solar Radiation (kWh/m/day) Slope <=2%	County Boundary	State Boundary
Step-Up; Under 100	2.72 - 3.85	[Grey outline]	[Black outline]
100-161	3.86 - 4.75		
230-287	4.76 - 5.18		
345	5.19 - 5.60		
500	5.61 - 6.08		
DC Line			



State of Oregon
 Solar Resource and Transmission
 November 2010

Solar Energy Siting

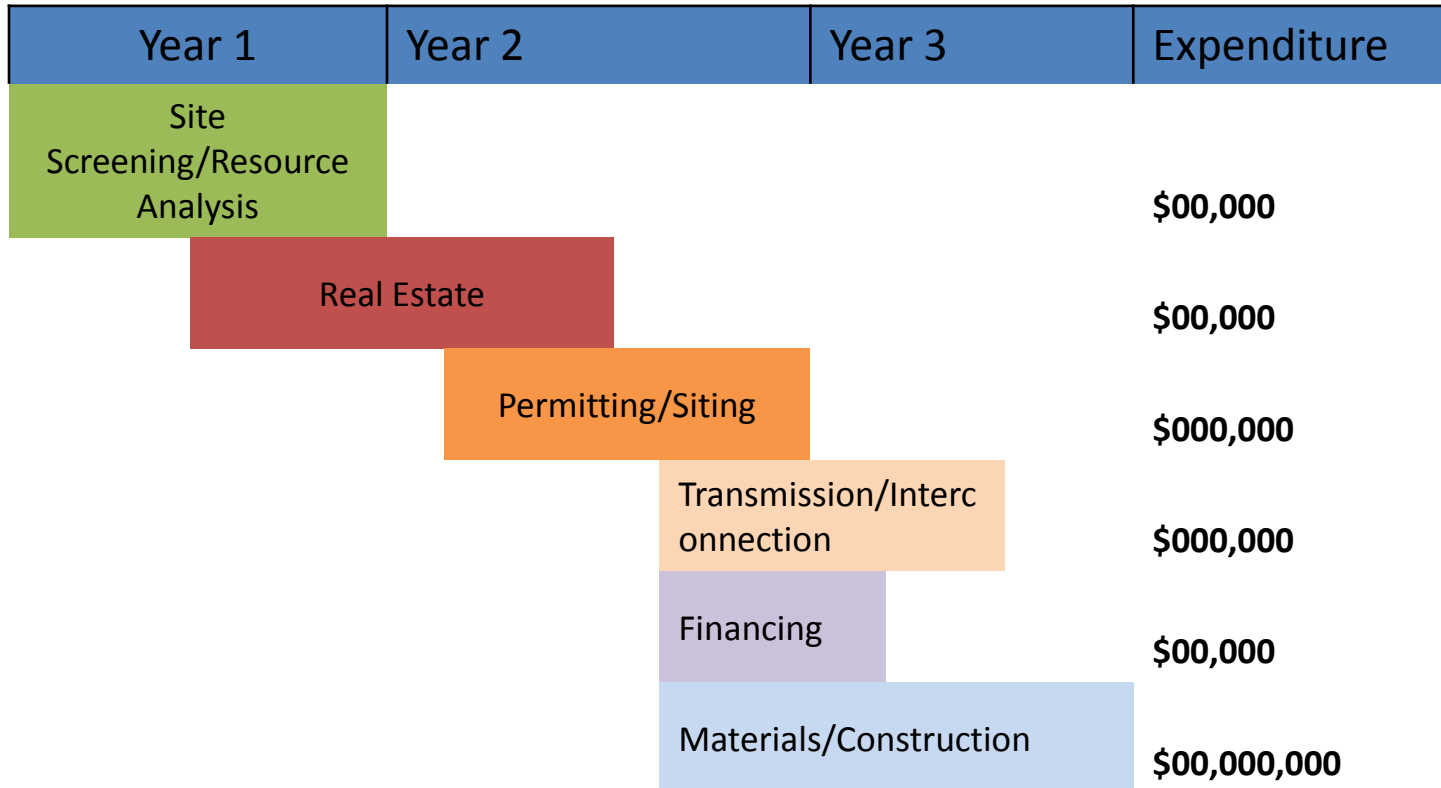
PROSPECTING AND SITE SCREENING CONSIDERATIONS

- Resource
- Land Ownership
- Permitting Authority
- Environmental
- Zoning
- Transmission
- Construction
- Market analysis



Development Process Timeline and Expenditure

Typical timeline for 10 MW solar project



Federal/public lands projects generally take longer and are often more expensive due to permitting requirements

Land Acquisition

- In general ~7 acres required for 1 MW of PV
 - Includes supporting facilities (roads, inverters, fencing, transformer)
 - Purchase option or lease
 - Secure larger tract of land than will be necessary for development for micrositeing. May “shrinkwrap” if leased.
 - Ex: Typical east-side lease: ½ section (320 acres) will only develop up to 100 acres
- Must secure land early in development process to exclude competition and provide enough land to microsite around constraints. **It is not uncommon to abandon at this stage** if other constraints are found in due diligence process.
- Developers usually lease a few parcels of land and then choose the best for development based on constraints and marketing factors. **Acres leased DOES NOT EQUAL built projects**

Components

- PV Panels (crystalline /thin film)
 - Panel sizes vary by manufacturer
(crystalline 6ft x 3ft) (thin film 4ft x 3ft)
- Inverters (1mw or 2mw)
 - 1mw Inverter 120" (H) x 130" (W) x 318" (D)
 - 2 mw Inverter 120" (H) x 130" (W) x 458" (D)
- Racking Systems
 - Tracking or fixed tilt
 - Pier or ballasted footing



Solar Construction



Components, cont.

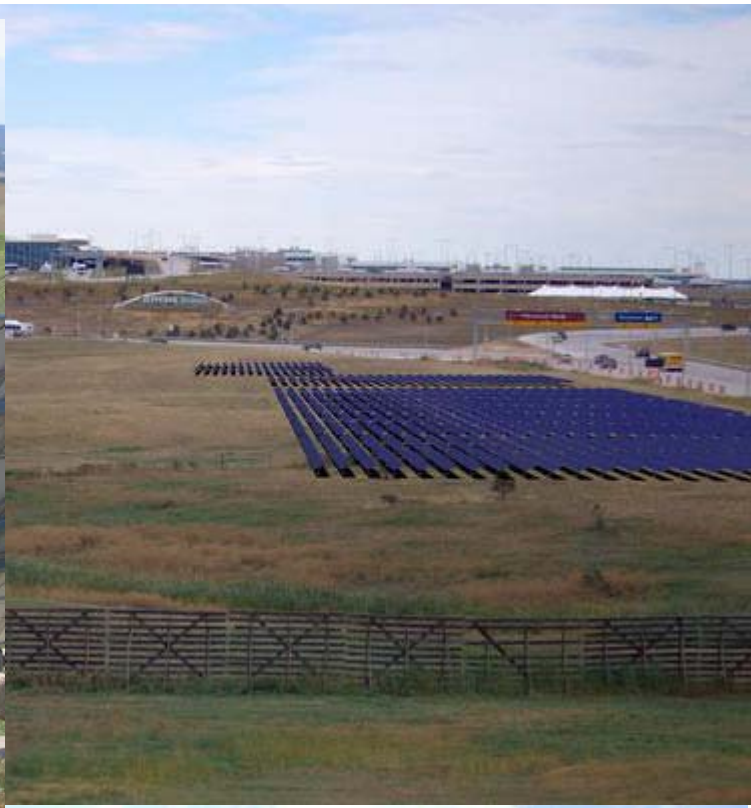
- Underground cabling
 - Trench ~3 ft deep or cable can be layed on ground surface in conduit
- Access roads
 - Use existing roads, minimal upgrades usually needed because components come on standard sized trucks
- Fencing
 - Needed around electrical equipment
- Transmission/Interconnection
 - May need generation tie line (overhead line) and minimal infrastructure to interconnect (transformer, circuit breaker)



Inverters



Transformer





<http://www.youtube.com/watch?v=hJobJ--fwAI>

<http://www.youtube.com/watch?v=WBx-7-dd87Q&feature=related>