

# *Generating Renewable Energy at Airports*

Airports Going Green Conference  
Chicago, IL  
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# *Presentation Overview*

- Geothermal
- Solar power (sunlight to electricity)
- Innovative financing
- Keys to success



# *Renewable Energy Market Drivers*

- Climate change
- Public sector and utility incentives and rebates
- Environmental leadership: Walk the talk



# *Geothermal Airport Systems*

- Means “earth heat”
- Used since Roman times
- Same principle



# *Airport Examples*

- JFK Police Annex
- Juneau Airport
- Paris' Orly Airport (under construction)



## *How the Systems Work*

- Supplement heating and cooling
- Closed loop systems
- Circulate propylene glycol
- In winter transfers heat from earth to building
- In summer transfers heat from building to ground



## *Orly System Unique*

- Sits on hot water table
- Heating only
- Water flows directly into building system
- Due for completion in 2010



# *Solar: Free-Standing Projects*

- DIA
- Fresno-Yosemite
- Nellis AFB
- Charlotte-Douglas (planned)
- Metropolitan Washington Airport Authority (planned)









## *What They Have in Common*

- Land (5-10 acres)
- Lots of sun
- Outside funding
- Innovative 3<sup>rd</sup> party financing
- Environmental leadership



## Financial Incentives for Renewable Energy

Federal =  State =  Utility =  Local =  Non-Profit =

State	Personal Tax	Corporate Tax	Sales Tax	Property Tax	Rebates	Grants	Loans	Industry Support	Bonds	Production Incentives
Federal	3	4	0	0	0	3	5	1	0	1
Alabama	1				2	1	1 1			1
Alaska						1	2			1
Arizona	3	1	1	2	6		2	1		
Arkansas										
California				2	6 36 3	1	2 1 4			1 1
Colorado			2 1	2	7 1	1 1 2	1 3 2			
Connecticut			2	1	1 2	3	2	2		
Delaware					1	2				
Florida		2	2	1	1 8 1	1	5	1		2
Georgia	1	1	1		8		1			2
Hawaii	1	1			2		1 2 1	1		
Idaho	1		1	1		1	1		1	1
Illinois			1	2	1	2 1			1	1
Indiana				1	4	1	1			
Iowa	1	1	1	3	11	1	2 1			
Kansas				1	2			1		
Kentucky	1	2	1		7		1 1 1			1
Louisiana	1	1		2			2			
Maine			1		1	1	1			1
Maryland	3	3	2	5 7	3 1		3			
Massachusetts	2	3	1	1	2 4	2	1	1		1
Michigan				2	1	2		3		1
Minnesota			2	1	2 22	1 2	5 3			1 1
Mississippi					4		1 2			1
Missouri		1			6		1 1			
Montana	3	1		3	4	1	1	2		1
Nebraska			1		2		1			
Nevada			1	4	1		1			
New Hampshire				1	1 4		1			
New Jersey			1	1	4		2 1	1		1
New Mexico	4	3	2	1			1	1	1	3
New York	3	1	1	2 1	5 4 1	2	2	2		1
North Carolina	1	1	1	2	4	1	1 1			3 1
North Dakota	1	1		2			2			
Ohio		1	1	2 1	5 1	6	1 1 1	1		
Oklahoma		1		1	1		4 1	1		





# *Power Purchase Agreements*

- Contract between financing company and host-site
- Obtains state, federal grants, rebates, renewable energy credits
- Company owns, operates, and finances system—sells electricity to customer



# *Power Purchase Agreements*

- Company finances process (permits, design, procurement, installation)
- Company owns and operates system
- Issues PPA with term lengths and option to buy (site host)



# *Power Purchase Agreements*

- Customer provides site
- Access for operations and maintenance
- No capital outlay
- Customer pays only for energy used
- Fixed energy price
- Option to purchase



# *Roof-top Applications*

- San Francisco
- Long Beach
- Burbank
- Austin-Bergstrom
- Many others





# *Integrated Solar Roof-top Systems*

- More cost-effective
- 20-30% more efficient than crystalline panels
- Must be integrated into roof design/ replacement
- Requires advanced planning



# *Keys to Success*

- Sun
- Outside funding
- Innovative 3<sup>rd</sup> party financing
- Willingness to accept longer payback periods
- Environmental leadership

