

Memorandum



CITY OF DALLAS

DATE February 10, 2012

TO Members of the Transportation and Environment Committee:
Linda L. Koop (Chair), Sheffie Kadane (Vice Chair), Sandy Greyson,
Delia Jasso, Vonciel Jones Hill, Pauline Medrano

SUBJECT Solar Energy

On February 13, 2012, staff will present an informational briefing to the Committee on solar energy. Please find attached a copy of the presentation, and feel free to contact me if you need additional information.

A handwritten signature in blue ink that reads "Jill Jordan".

Jill A. Jordan, P.E.
Assistant City Manager

- c: The Honorable Mayor and Members of the City Council
Mary K. Suhm, City Manager
Thomas P. Perkins, Jr. City Attorney
Rosa Rios, Acting City Secretary
Craig Kinton, City Auditor
Judge C. Victor Lander, Administrative Judge
A.C. Gonzalez, First Assistant City Manager
Ryan S. Evans, Assistant City Manager
Forest Turner, Assistant City Manager
Joey Zapata, Assistant City Manager
Jeanne Chipperfield, Chief Financial Officer
Edward Scott, Director, Controller's Office
Frank Libro, Public Information Office
Theresa O'Donnell, Director, Sustainable Development and Construction
Rick Galceran, Director, Public Works
Stephanie Cooper, Assistant to the City Manager – Council Office

Solar Energy

Transportation & Environment
Committee Presentation

February 13, 2012



Overview

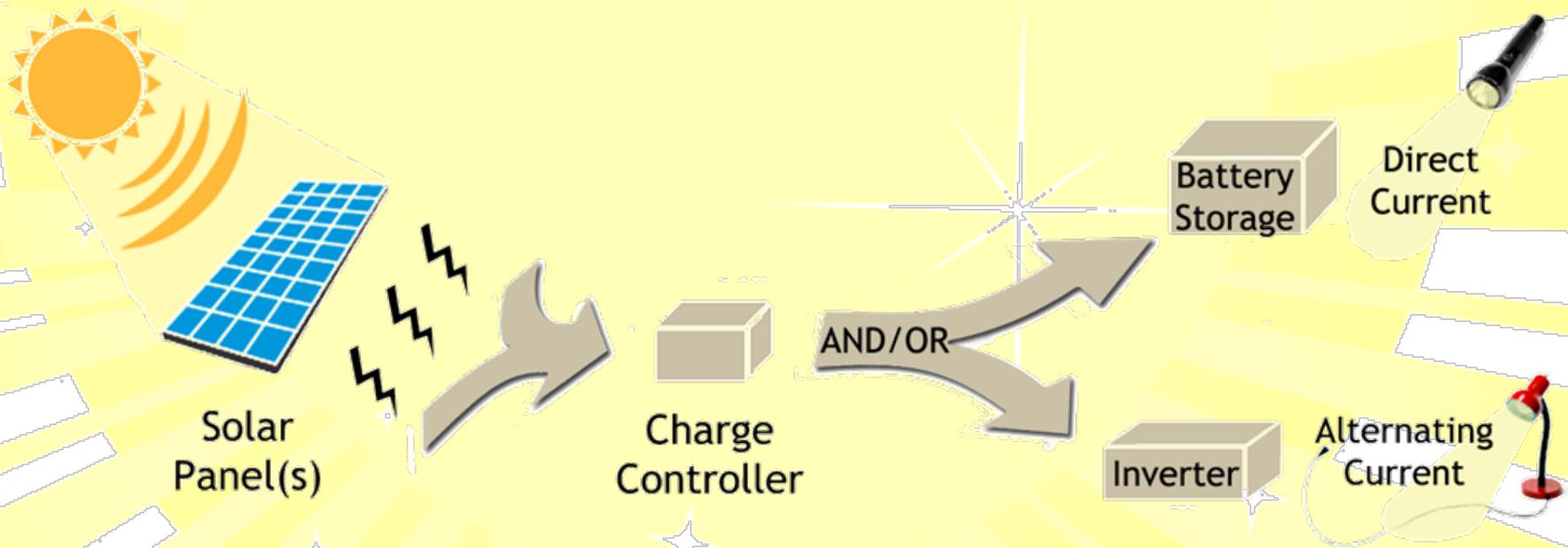
- Types of Solar
- Solar Potential
- Solar in Dallas
- Case Studies
- Costs
- Funding Opportunities
- Going Forward

Types of Solar

- Photovoltaic System (PV)
- Concentrated Solar Power (CSP)
 - Tower
 - Trough
- Solar Furnace / Water Heater (SWH)

Photovoltaic System

- Generates electricity directly



Photovoltaic System

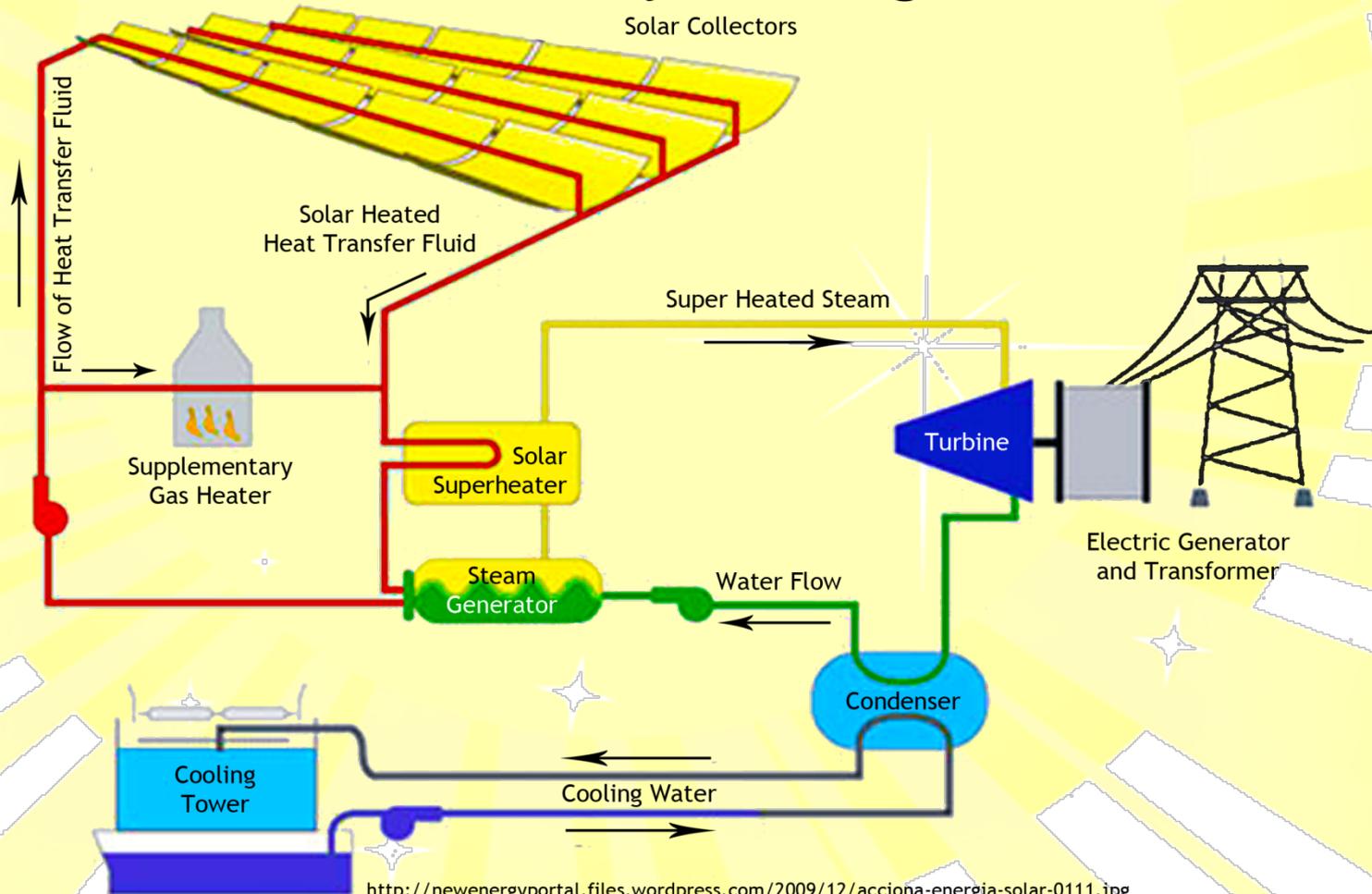


Photovoltaic System

- Grid-connected installs*
 - Projects where energy generated by photovoltaic systems were tied back into the electricity grid grew in 2011
 - Q3 grew 140% over Q3 2010
 - 449.2 MW
 - Largest quarter in the history of the U.S. market
 - Utility market installed >200 MW in Q3 2011
 - U.S. has now reached 3.1 GW
 - Ten times the size of the U.S. capacity in 2005
 - >1 GW installed in the first three quarters of 2011
 - First time U.S. has surpassed 1 GW annually

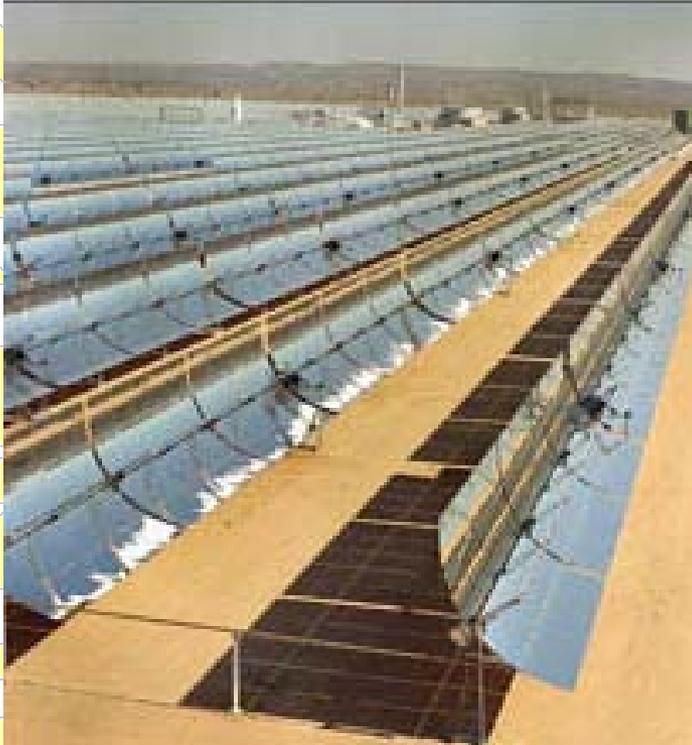
Concentrated Solar Power

- Generates electricity through turbine



Concentrated Solar Power

Trough System

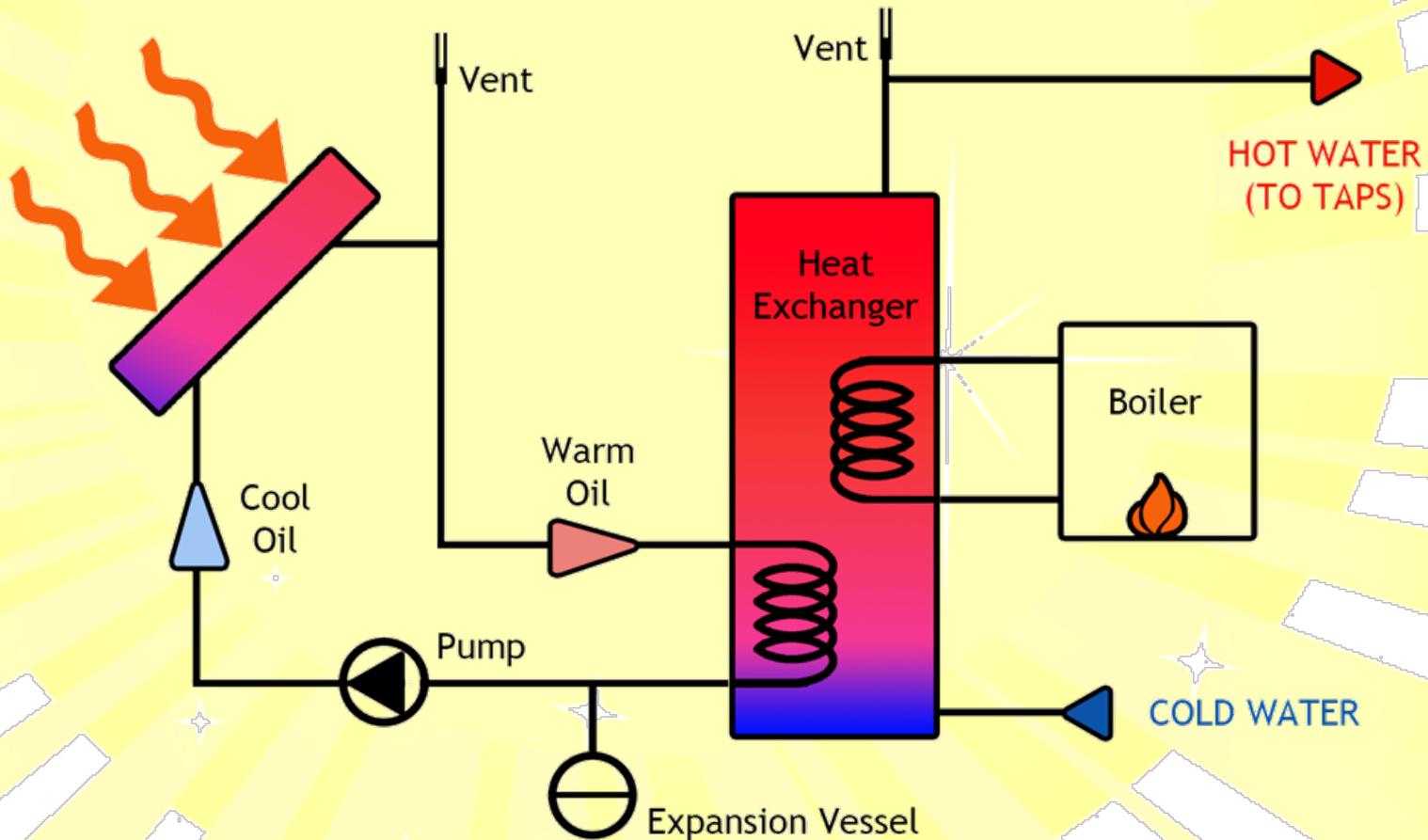


Tower System



Solar Furnace / Water Heater

- Generates hot water

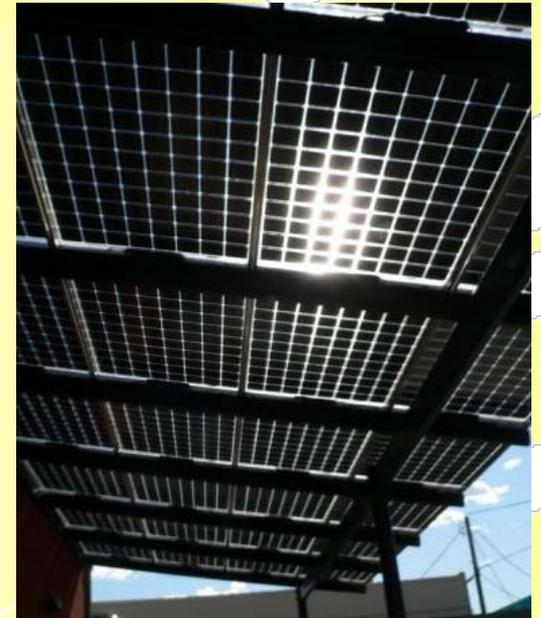


Solar Furnace / Water Heater



Solar Application

- Type and size of system determines area needed
- 200 MW CSP trough in West Texas : 1,000 acres
 - 30 MW photovoltaic in Central Texas : 168 acres
 - Solar power plant (PV or CSP)
 - One facility generating all the electricity
 - Generally located in remote, unpopulated areas
 - Distributed solar power system
 - Multiple small systems tied together
 - Generally located on rooftops, parking structures and covers, sun shades and awnings or window films

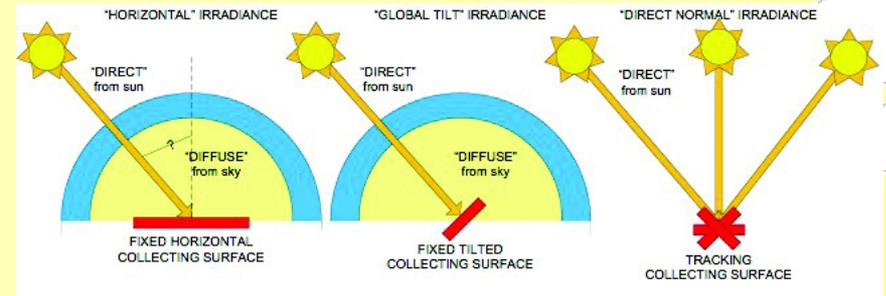


Benefits of Solar

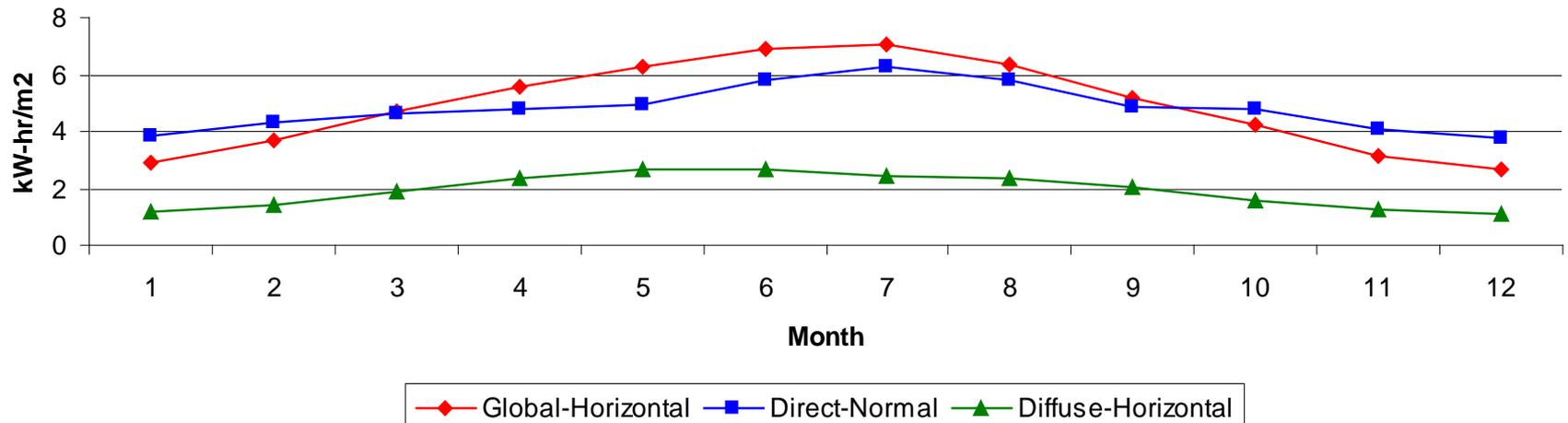
- Solar is clean
 - Zero emissions
 - No waste
 - Can reduce grid demand for carbon fuels
- Solar is safe
 - No moving parts
 - No hazardous materials
- May qualify toward SIP
- Solar is constant
 - The sun will shine; Texas has a great solar profile

Solar Potential

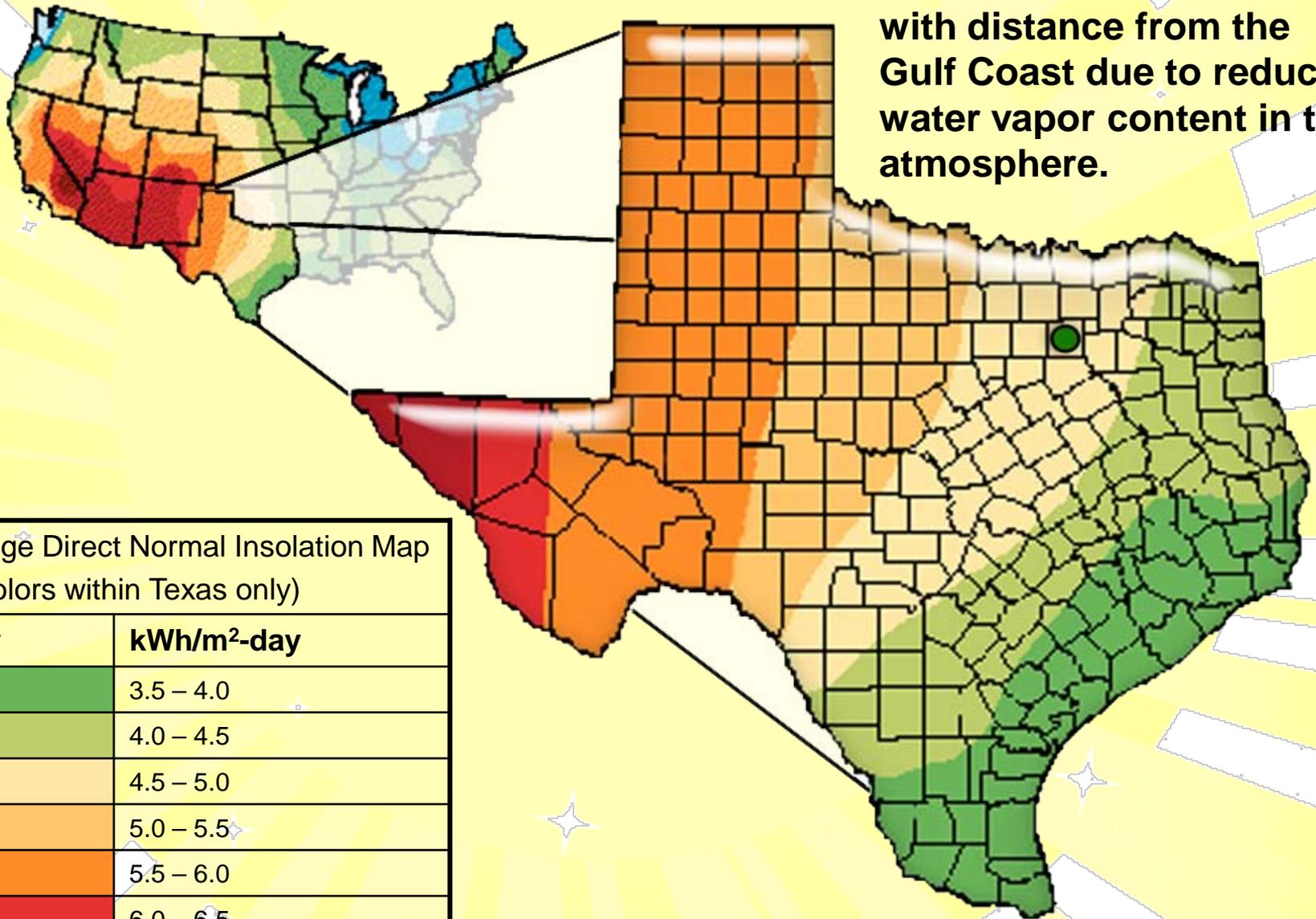
- Texas' solar profile allows for applications state wide



Monthly Average Daily Solar Radiation, 30 Year Average, Fort Worth



In general, sunshine levels increase rather uniformly with distance from the Gulf Coast due to reduced water vapor content in the atmosphere.



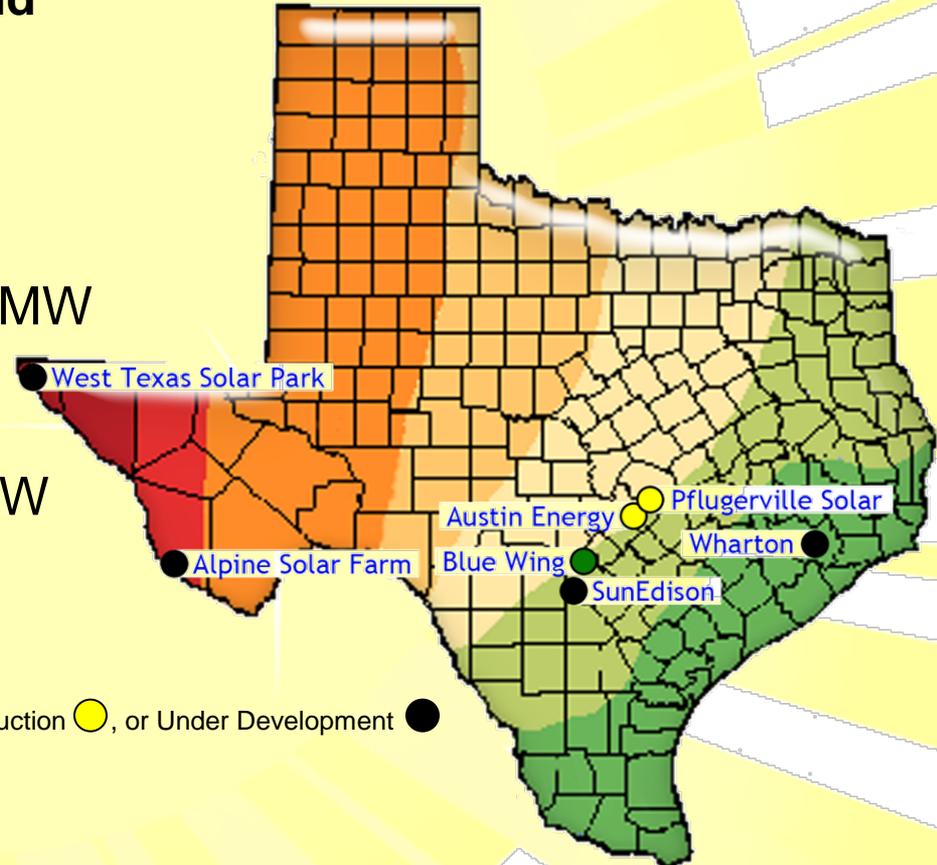
Average Direct Normal Insolation Map
(for colors within Texas only)

Color	kWh/m ² -day
Green	3.5 – 4.0
Light Green	4.0 – 4.5
Yellow	4.5 – 5.0
Orange	5.0 – 5.5
Dark Orange	5.5 – 6.0
Red	6.0 – 6.5
Dark Red	6.5 – 7.0

Solar in Texas

Ground-mounted utility-scale solar power plants larger than 1 MW that directly feed into the transmission grid

- Blue Wing Solar Project, 16 MW*
- Austin Energy PV Project, 30 MW
- Pflugerville Solar Power Plant, 60 MW
- Alpine Solar Farm, 50 MW
- West Texas Solar Park, 300 MW
- Wharton Generating Station, 10 MW
- SunEdison, 30 MW



Solar Energy Industries Association

Utility Scale Solar Projects in the United States On-Line ●, Under Construction ●, or Under Development ●

Updated December 6, 2011

Blue Wing is the fifth largest solar project in U.S.. CPS plans to expand to 400 MW due to lowering costs of solar.

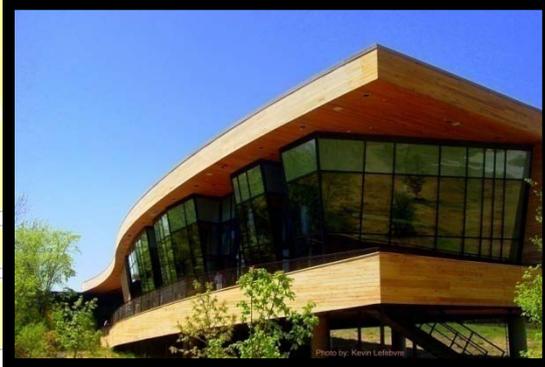
<http://www.renewableenergyworld.com/rea/news/article/2011/07/50-mw-of-solar-make-that-400>

<http://www.solarelectricpower.org/solar-tools/sepa-utility-solar-rankings.aspx>

Distributed Solar in Dallas

- Trinity River Audubon Center (3.28 kW DC PV)
- Prairie Creek Library (7.7 kW PV array)
- Dallas City Hall (18.6 MBTU/year SWH)
- J. Erik Jonsson Central Library (SWH)
- Dallas Convention Center (900 kBTU/day SWH)
- Oak Cliff Municipal Complex (SWH)
- Hensley Field (PV)
- Great Trinity Forest Way
 - Solar powered highway light project (to be advertised in late February)

Case Study: Audubon Center



- Funded through U.S. EPA Dallas Sustainable Skylines Initiative \$50,000 grant
- COD contributed no funds for the solar panels
- Lifetime data: generated 4,640.0 kWh

Case Study: Cedar Hill

- In July, 2011, the City of Cedar Hill completed installation of a \$1.2M Solar PV system on top of the Government Center.
- Project goal was to harness the energy received by the earth from the sun with a system totaling 152.64 kilowatts.
- Financing:
 - \$952,000 from DOE
 - \$160,000 from ONCOR
 - \$26,000 from City of Cedar Hill
- City savings projected at up to \$21,000 annually
 - Reduces energy consumption by ~8%
 - Reduces CO2 emissions by 279,098 pounds/year



<http://www.dallasnews.com/news/community-news/cedar-hill/headlines/20111125-cedar-hill-government-center-goes-solar-powered-with-help-of-grants-utility-funds.ece>
<http://www.pegasusnews.com/news/2011/mar/11/cedar-hill-government-center-solar-energy-dec-2011/>

Case Study: Duncanville

- Roof mounted, grid tied solar PV on three buildings totaling 185.85 kW
 - City Hall/Police Station (53.55 kW)
 - Recreation Center/Library (88.2 kW)
 - Senior Center (44.1 kW)
- Financing
 - \$1.1M from DOE (Distributed Renewable Energy Technology Stimulus Grant, administered by SECO)
 - City comes up with 20% (~\$280,000)
 - \$260,000 from ONCOR
 - \$21,000 from City of Duncanville
- City savings projected at \$26,141 annually
 - Reduces CO2 emissions by 376,391 pounds/year



Grant Use in Dallas

- City of Dallas received approximately \$19.1M in ARRA funds for energy efficiency and energy conservation measures.
 - Energy Efficiency and Conservation Block Grant (EECBG) funds
 - \$11M allocated for retrofitting City buildings
 - 145 City buildings retrofitted with energy efficiency measures
 - \$428K for Green Building Office
 - Funding staff and materials for the Green Building Office
 - \$351K used for weatherization activities in residential areas
 - 37 homes weatherized by Housing
 - Weatherization Assistance Program (WAP)
 - \$7.3M allocated for energy efficiency upgrades
 - 648 single family home
 - 326 multi-family units

Costs for Solar

- Price is dropping*
 - From 2009 to 2010, residential and commercial PV system prices dropped 17%
 - First half of 2011, prices dropped an additional 11%
- 2011 average cost nationwide was \$6.20 / watt
 - Price per watt drops as system gets larger

*Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) Report

http://www.bing.com/fordelectric/home-and-lifestyle/article-the-sun-rises-on-solar-power.aspx?WT.mc_id=msn

Going Forward

- Funding Opportunities

- Qualified Energy Conservation Bonds (QECCBs)

- Debt instruments from Texas Bond Review Board as part of American Recovery and Reinvestment Act (ARRA)
 - Tax Credit Bonds to be sold to investors
 - Reduce issuer's borrowing costs through a subsidy from the U.S. Treasury
 - QECCB issuer pays the investor a taxable coupon and then receives a rebate from the U.S. Treasury
 - \$13.1M allocated to City of Dallas for possible issuance
 - Each State was required to allocate issuance capacity to municipalities with populations >100,000 based on the municipality's percentage of total state population

- Grant funds

- Look for grant opportunities

Going Forward

- Funding Opportunities (continued)
 - ✦ – Power Purchase Agreements (PPA)
 - Third-party developer owns, operates, and maintains system
 - Host customer agrees to site the system on its property
 - Host customer purchases the system's electric output
 - Future bond programs
 - Routinely include solar applications on future CIP projects, especially public safety buildings

Going Forward

- Construction Opportunities
 - Pricing for systems depends on multiple considerations
 - Existing infrastructure
 - Will structures need to be built to support system, land acquired, etc.
 - How much energy is needed/wanted from the system
 - What equipment will be operated by the system directly
 - How much peripheral equipment will the system support to operate
 - What type of current will be used: AC or DC
 - What is the available space for the structure/configuration
 - Will panels be weather tight or just providing shade (for parking structures)
 - What clearance/height limitations and/or building code restrictions exist
 - System types:
 - On-site (local) or large array (solar farm)

On-Site (Local) Systems

- Install on-site solar panels to offset City electricity and save money
- Can be tied together, into grid or store excess for later use
 - Tie together allows smaller systems to power larger facilities
 - Tie in to grid allows for net metering
 - Monthly use versus sell to grid; if sell more than used, City gets credit
 - Storage allows for energy independence
- Scalable
 - Can be placed on existing property and structures

Potential Solar Locations

- Dallas Convention Center roof
 - Oct '10 – Sep '11: Approx. 32 MWh used
 - Currently negotiating roof replacement over A, B, C, D and E halls; ~500,000 square feet
 - Current roof has 150 pound per square foot weight limit
 - New roof is currently addressing leaks, not fortifying structure
- Dallas Farmers Market
 - Oct '10 – Sep '11: Approx. 1.7 MWh used
- Dallas Police stations
 - Oct '10 – Sep '11: Approx. 16 MWh used
 - Solar parking covers can provide shade to protect car electronics
- Dallas Love Field
 - Oct '10 – Sep '11: Approx. 31 MWh used
 - Atop parking and/or facilities or solar farm at multiple sites
 - Solar street lights along Cedar Springs

Potential Solar Locations

- Dallas Executive Airport
 - Oct '10 – Sep '11: Approx. 1 MWh used
- Dallas Public Library system
 - Oct '10 – Sep '11: Approx. 14 MWh used
- Dallas Parks
 - Oct '10 – Sep '11: Approx. 27 MWh used (not including Zoo)
 - Solar on pavilions and trail covers
- Southside Wastewater Treatment Plant
 - Oct '10 – Sep '11: Approx. 34 MWh used
 - Approximately 70 acres of land available
 - Solar could enable site to operate independently (bio-gas + solar)
- Oak Cliff Municipal Complex
 - Oct '10 – Sep '11: Approx 4.9 MWh used
 - Solar parking covers provide shade to protect vehicles

Large Array (Solar Farm)

- City of Dallas can construct on existing property
 - Energy can be used at nearby City facilities (saves money)
 - Photovoltaic or concentrated solar project
 - Requires connectivity to facilities
 - City can produce energy for wholesale to grid (generates revenue)
 - ONCOR would buy energy generated at large array
 - Pricing depends on usage and congestion rates
- Third party can construct on City property
 - Power Purchase Agreement
 - Incentives available to help offset third party costs
 - Solar and Wind Energy Device Franchise Tax Exemption
 - Solar and Wind Energy Device Franchise Tax Deduction
 - Solar and Wind Powered Energy Devices Tax Valuation Exemption
 - Renewable Energy Production Tax Credit

Planning for the Future

- City of Dallas is now Number 3 on the EPA Green Power Partnership Top 20 Local Government
 - Houston: 438,000,000 kWh wind (35% total energy use)
 - Austin: 406,000,000 kWh wind (100% total energy use)
 - Dallas: 295,883,744 kWh wind (40% total energy use); solar could add to this profile and
- City has several projects/facilities where solar could be incorporated
- With proper financing, the City of Dallas has the opportunity to both save money and raise the City's green profile