



# **Economics of Solar in the Sunshine State: A Portfolio Approach**

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# **Solar energy can and should be a critical component to a diversified, reliable and cost efficient energy policy**

## **Benefits of Solar Generation**

- **Reliable source of generation**
- **Proven track record of working in Florida with multiple years of operating experience**
- **Requires no water**
- **Free fuel**
- **No emissions or greenhouse gases**
- **Provides hedge against fossil fuel**
- **Provides hedge against water availability & pricing**
- **Minimal operations and maintenance expense**
- **Low permitting costs**
- **Low construction/execution risk**

**When considering long term water availability and fossil fuel fluctuations, solar generation offers a competitive option for the state's energy portfolio**



# Fuel diversity is imperative to maintain energy security

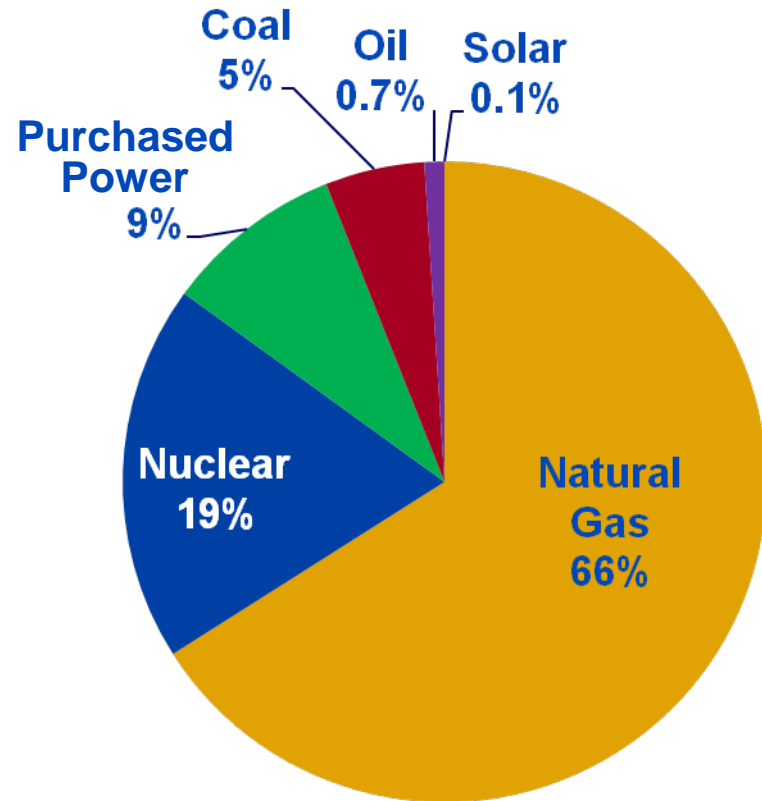
## FPL 2011 Fuel Mix

- **Current fuel mix has a large weighting towards natural gas**

- Clean and efficient
- Only two major pipelines in Florida
- Majority of gas comes from the Gulf of Mexico area
- Florida has no indigenous production or storage

- **Future projections currently indicate a continued increase in the use of natural gas**

- By 2017, FPL is expected to increase use of natural gas by more than 8,000 GWh



Source: FPL 2012 Ten Year Site Plan

Improving the diversity of FPL's energy portfolio will mitigate the risk of supply disruptions, reduce price shocks, and reduce technology risk



# Solar power is another way to effectively hedge natural gas prices which have shown volatility over the years

## Natural Gas Historical and Forward Prices



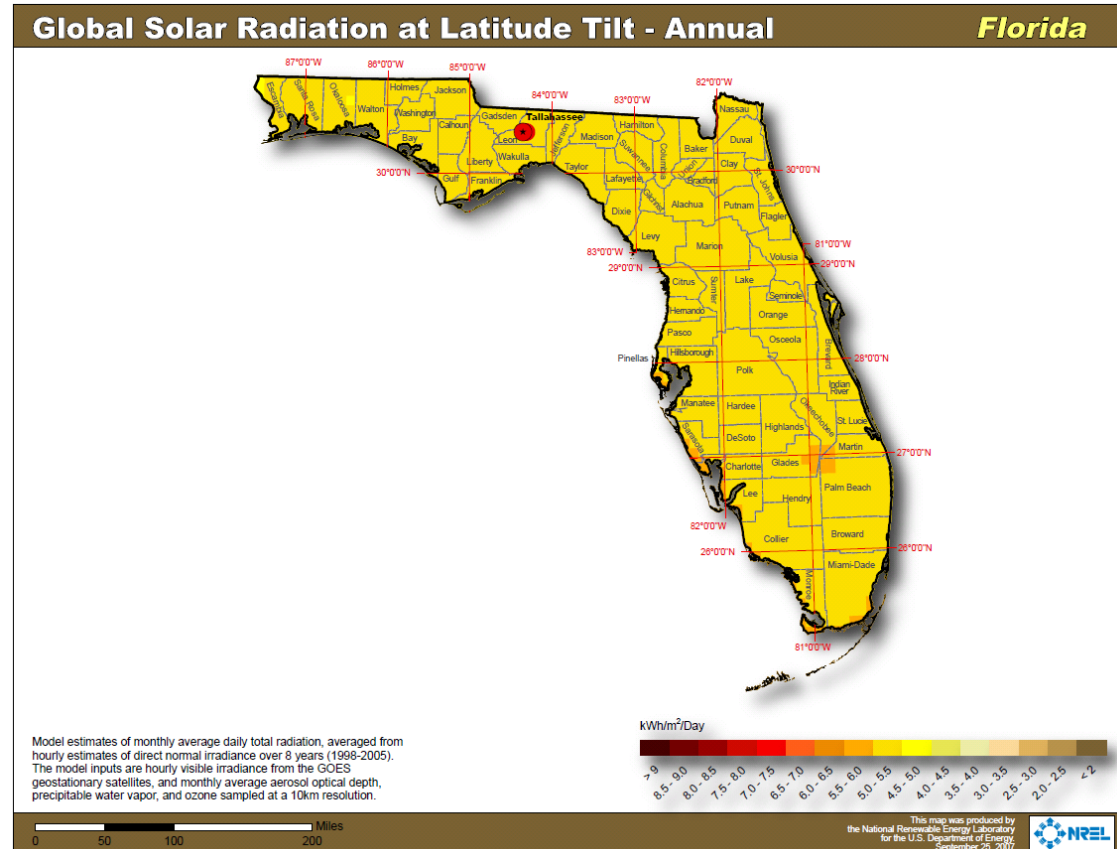
Sources: FutureSource.com – Monthly settlement prices for Henry Hub; FPL internal analysis



# A portfolio approach for deploying solar energy reduces risk and provides a more balanced and accurate view of solar economics

## Solar: “The Portfolio Approach”

- The solar industry continues to evolve
- Cost competitiveness is becoming the most significant factor
- Solar provides diversification of state energy resources, while hedging against fossil fuel fluctuations and water availability and pricing

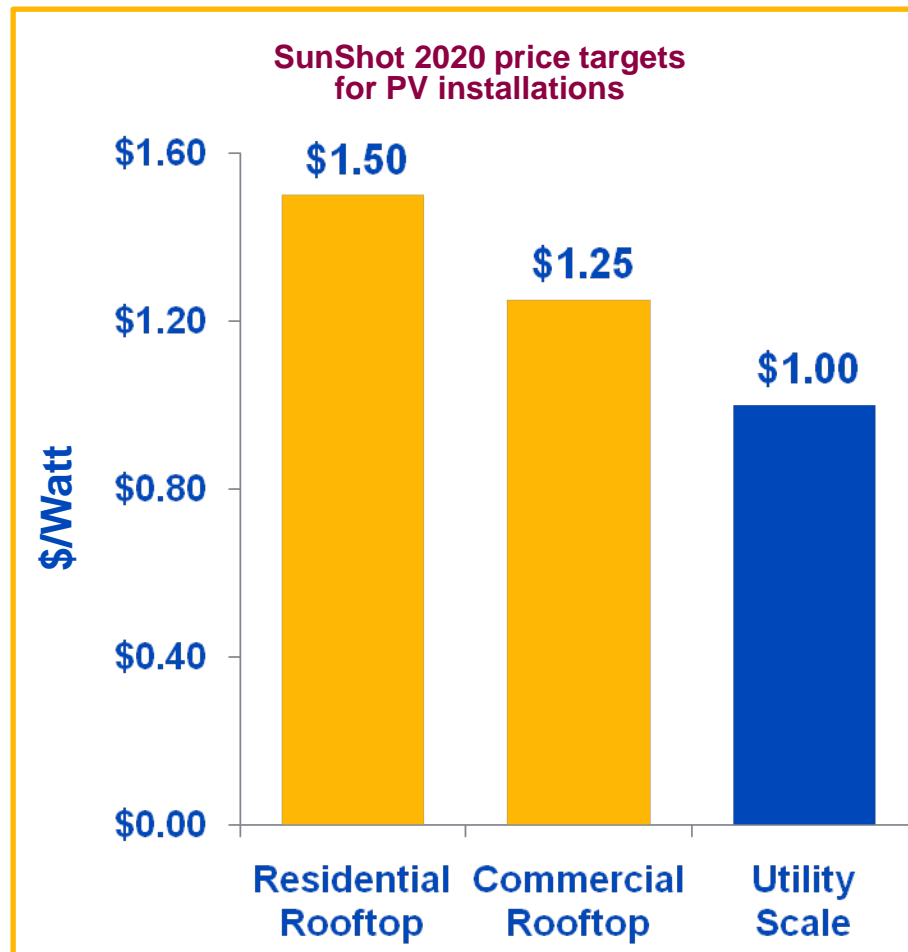


Despite favorable solar resources, Florida continues to trail other states that are aggressively pursuing solar energy

# So, where is the market headed with solar economics? DOE's SunShot Initiative targets a 75% reduction in cost of solar deployment from 2010 to 2020

## DOE SunShot Initiative

- Deployment of solar technologies in the contiguous U.S. is projected to continue to increase over the next 2 to 4 decades
- According to DOE, Solar could potentially meet 14% of the nation's electricity demand by 2030 and 27% by 2050



Source: U.S Department of Energy



# Many economic considerations go into determining the feasibility of deploying cost effective solar energy

## Specific Factors to Consider in Solar Economics

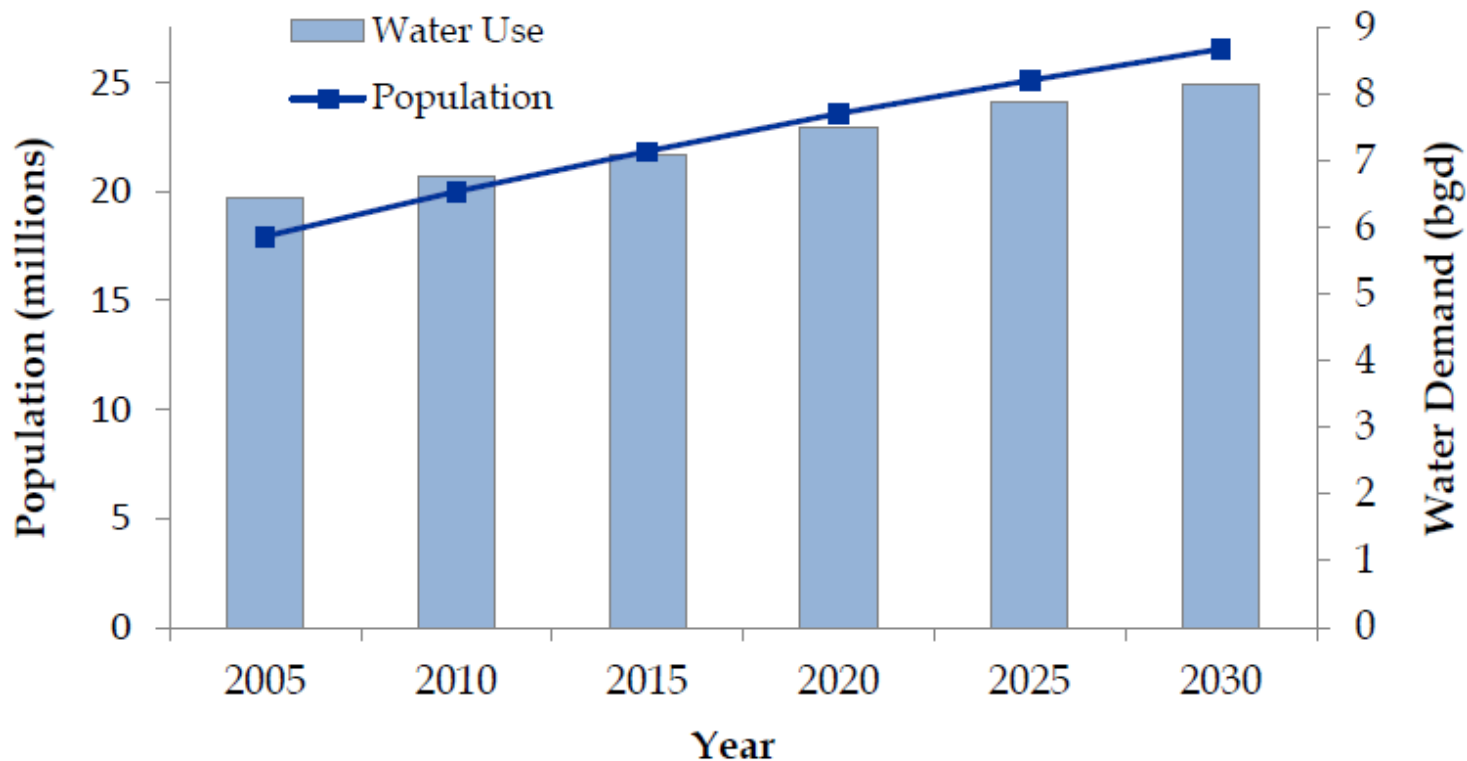
- **Capital Cost**
- **Operations & Maintenance Cost**
- **Avoided Fuel and Emissions Cost**
- **Avoided Water Consumption Cost**
- **Customer Impact (1,000 kWh residential bill)**
- **Capacity Factor**
- **Degradation of equipment/output**
- **Levelized Cost of Production**

**As economics of solar continue to improve worldwide, Florida should move quickly to capitalize on this market**

# Florida's water demands are anticipated to greatly increase by 2030 (approximately 30% increase from 2005 levels)

## Statewide Water Demand and Population Projections

- **Alternative Water Supply projects costing ~\$3.6 billion required to meet future demands**
  - Solar generation is one potential hedge against this cost

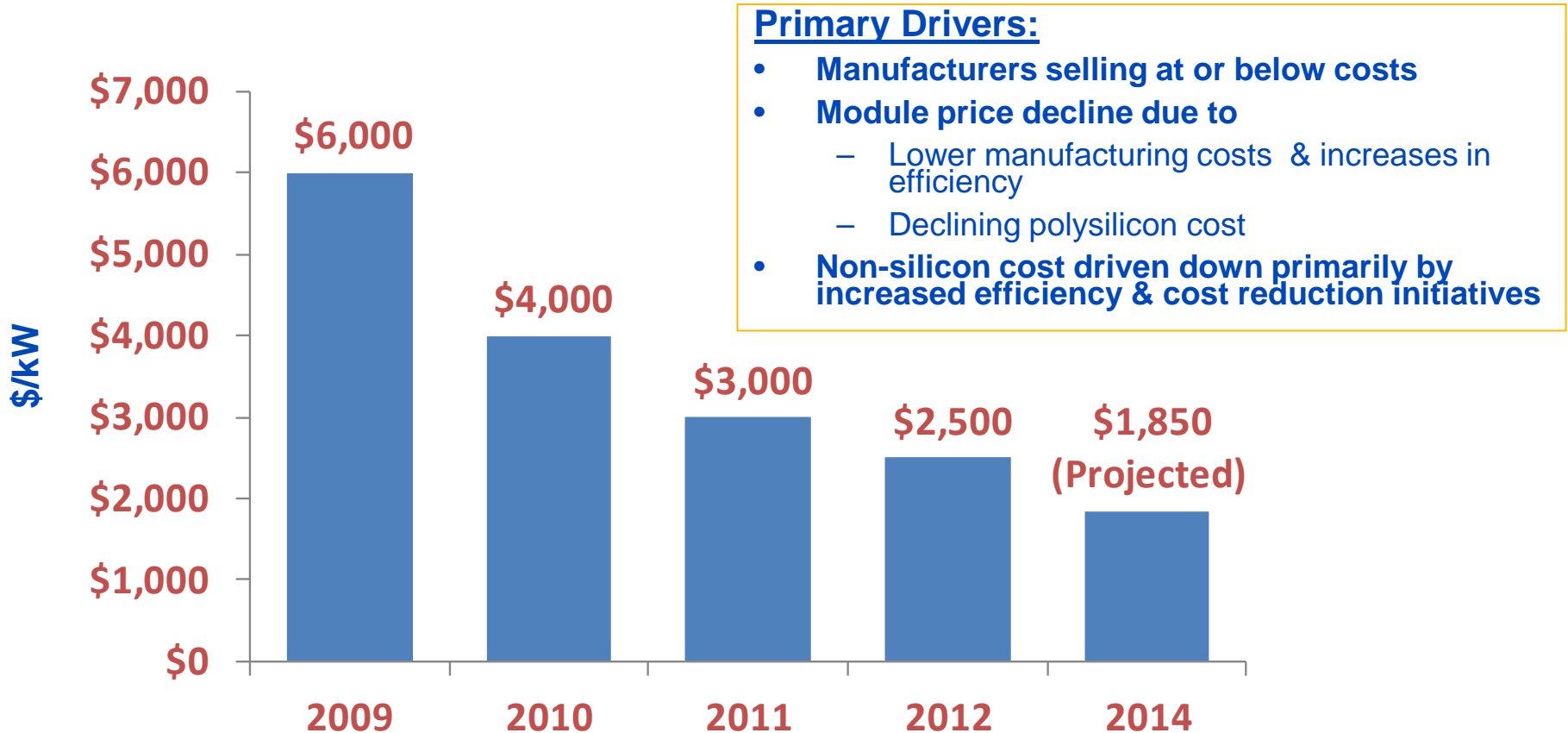


Source: Florida Department of Environmental Protection, 2011 Annual Regional Water Supply Planning Report



In line with the DOE initiatives, Florida continues to witness the declining cost of solar as technology improves, panel prices drop, and balance of plant reductions are realized

## FPL's Estimated Cost Trend – Florida Utility Scale PV (100 MW)

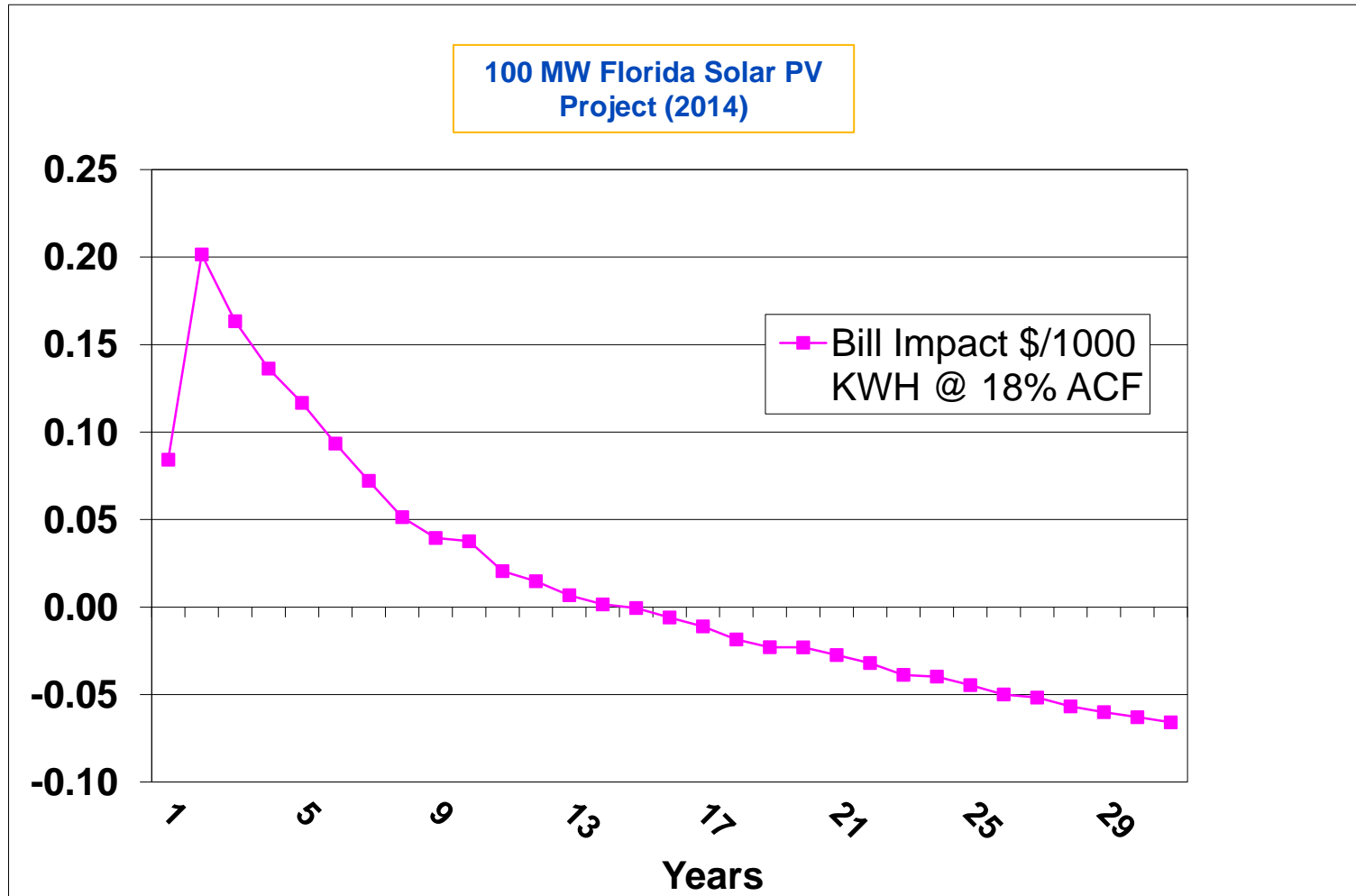


**Our projected pricing is in line with the DOE SunShot initiative**



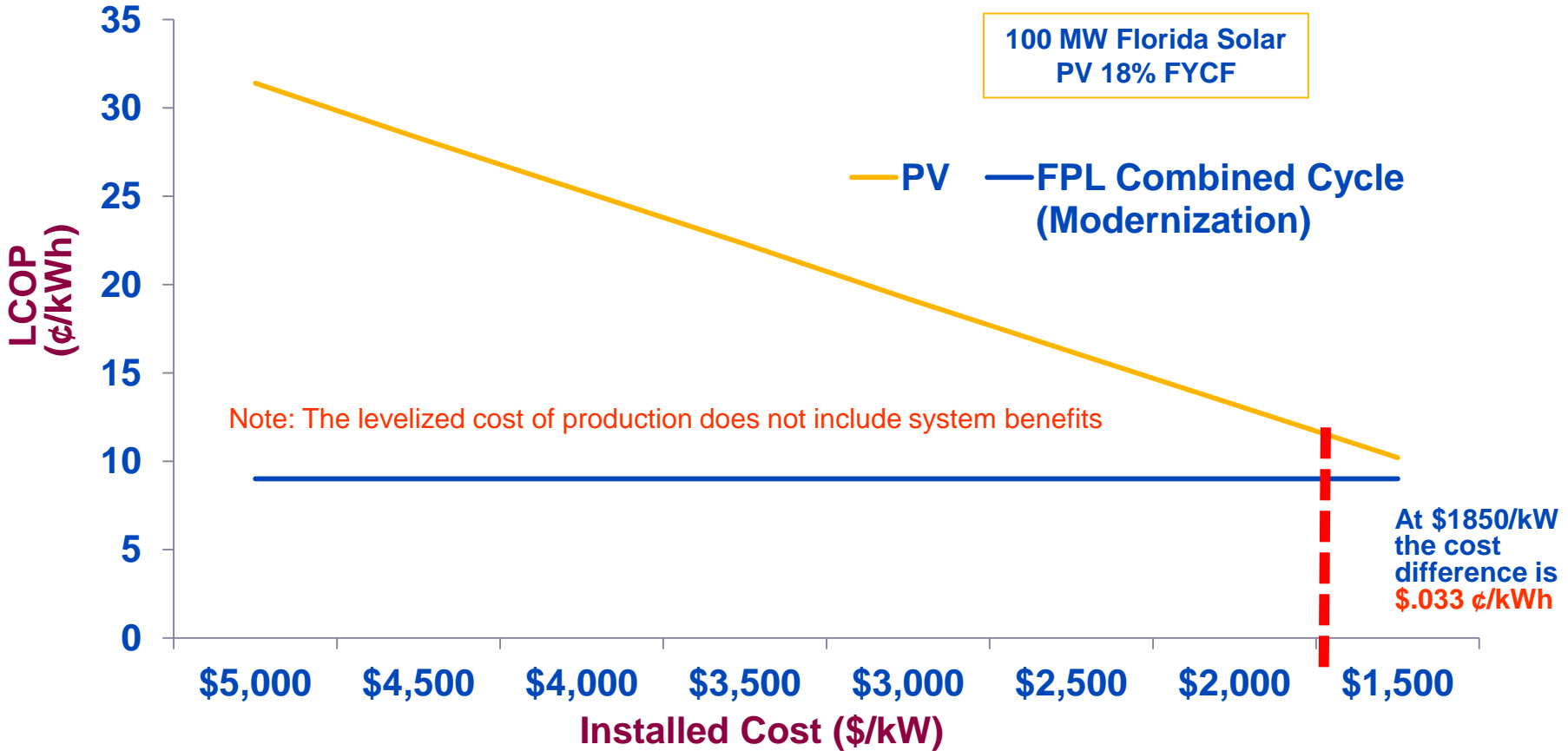
# A large scale solar PV project would have a minimal effect on FPL customer bills

## Monthly Solar Cost Impact to FPL Residential Customer



# The gap between solar and natural gas production costs is narrowing

## Levelized Cost of Production Solar PV vs. Gas-fired Combined Cycle Unit



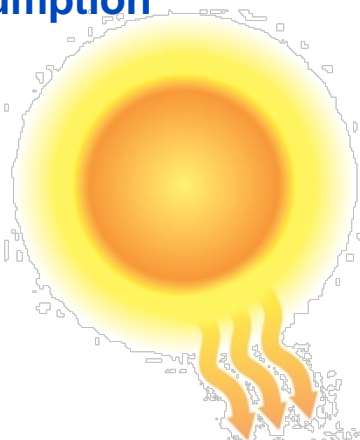
Note:  
Comparing levelized costs of production (LCOP) for dissimilar resources (such as photovoltaic vs. gas-fired combined cycle units) is not a valid method of selecting the most-economic resource. It is used here to illustrate the declining trend in PV costs. The LCOP does not account for the impact of a given resource on the existing generation system. These system impacts can be significantly different for different technologies depending on their expected generation output, the “firmness” of the resource, capacity factor, etc.



# Going forward, Florida has an opportunity to gain significant economic and environmental benefits by growing the clean energy sector of its economy

## Expected Benefits of a theoretical 100 MW Solar Plant

Oil consumption  
avoided  
**700,000  
barrels**



Greenhouse gas  
emissions avoided  
**3 million tons**

Projected  
local tax  
revenues  
**\$50 million**

Water use avoided  
**50 million gallons/yr**

Average monthly bill  
impact/1000 kWh  
**6 cents\***

Job creation  
**4,000**



CO<sub>2</sub> Equivalent cars  
removed from the  
road each year  
**17,600**

Natural gas  
consumption avoided  
**40 billion ft<sup>3</sup>**



# The advantages of solar far outweigh its disadvantages

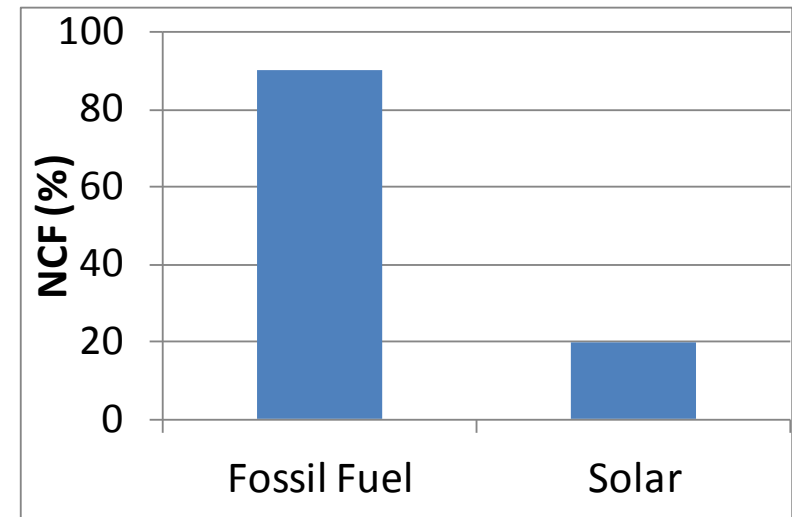
## Advantages and Disadvantages of Solar as Compared to Fossil Fuel

### Advantages

- **No water needed**
  - Infrastructure, cost, availability
- **No fuel**
  - Infrastructure , cost
  - Helps avoid burning fossil fuels such as imported oil
- **Fuel Diversity**
- **No emissions**
  - Clean, renewable, no greenhouse gases or other air pollutants
- **Minimal O&M expense**
- **Hedge against fossil fuel and water**
- **No waste/no noise**
- **Advances energy independence and security**
- **Low profile**

### Disadvantages

- **Intermittent resource**
- **Higher cost per kWh in some areas of Florida**
- **Lower net capacity factor (NCF) than fossil fuel**



# **When factoring in fossil fuel consumption and future water availability, investing in solar generation makes economic sense for Florida**

## **Summary and Conclusions**

- **Declining solar costs provide a bright outlook for continued implementation of renewable energy generation in the U.S.**
- **The economics of utility scale solar in Florida are improving, but remain challenged with current low gas prices**
- **Solar generation can provide Florida with a cost effective, clean and reliable source of generation, it diversifies the state energy portfolio, and hedges against fuel and water availability and price**
- **Solar could be implemented here in a smart and methodical manner, providing Floridians with a stable and affordable source of electricity**
- **New solar projects would generate jobs, utilize existing Florida ports and leverage our skilled workforce**
- **In addition to instate benefits, Florida could capitalize and position itself as a generator and exporter of solar goods and products to Latin America and the Caribbean**



# Ensuring a Better Environment for Future Generations

