



# Innovations in Renewable Energy Financing

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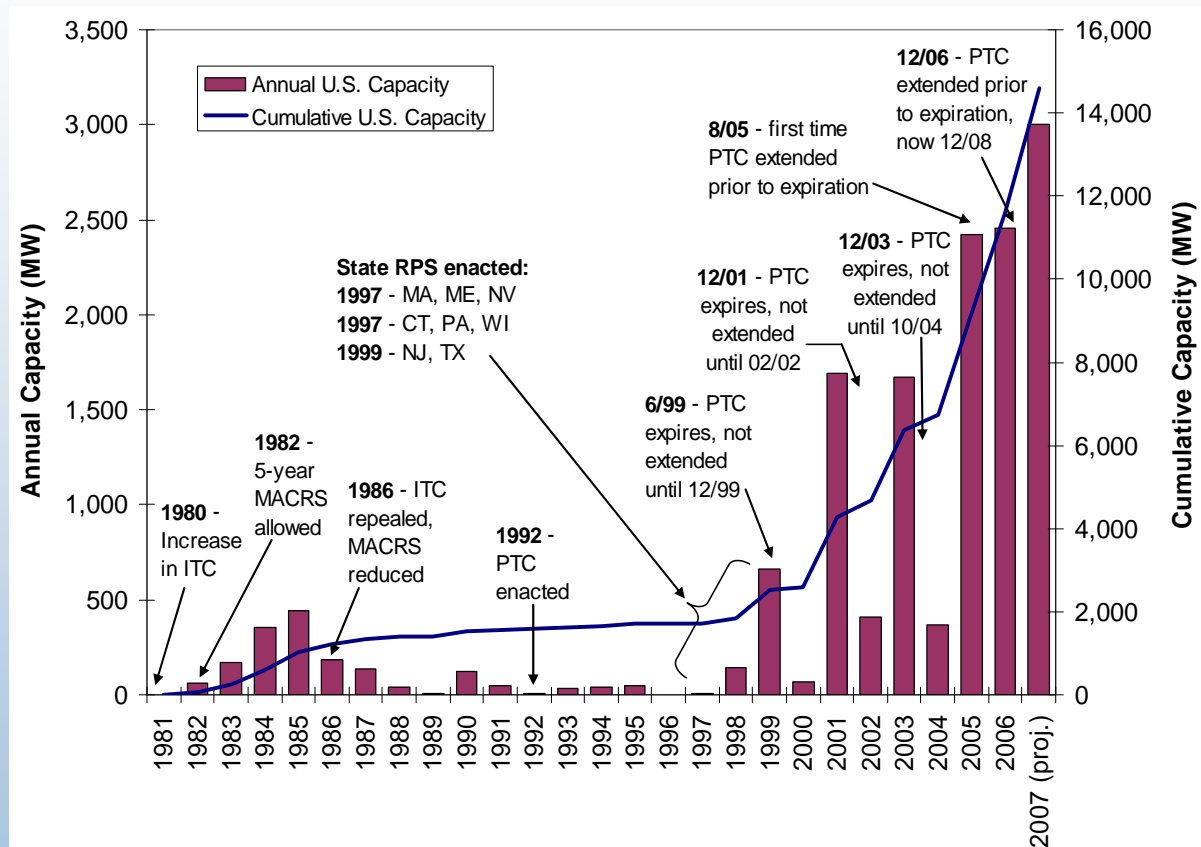
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# Project Overview

- Analysis Process
  - Background research on wind and solar markets and renewable project financing
  - Interview 34 industry leaders (06/06 – 01/07)
    - Included utilities, banks, private equity investors, legal advisors, renewable energy developers, independent power producers, and renewable attribute brokers.
  - Identify and communicate innovations in renewable project financing
- U.S. DOE's Office of Energy Efficiency and Renewable Energy funded this work

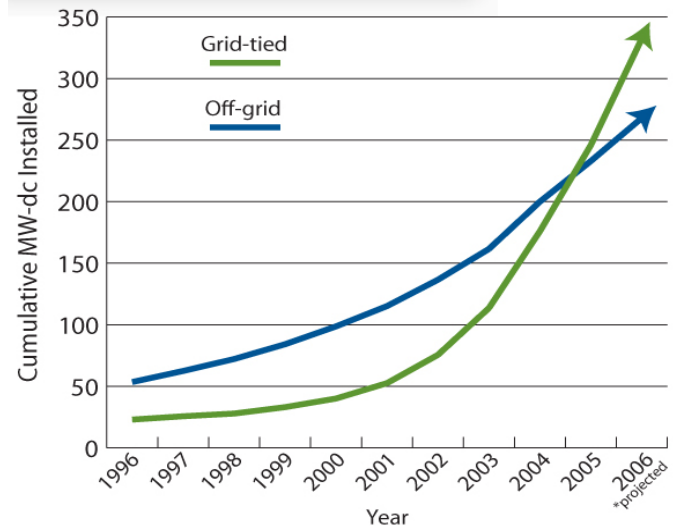
# Record Growth of Wind..



Sources: AWEA, 2007; Baratoff, 2007; Wiser, 2007

## And Solar

Cumulative US PV Installations by Year



Source: Larry Sherwood; IREC; PVNews

Source: SEIA, 2006

# Renewable Project Financing Evolution

- Traditionally use power purchase agreements (PPAs)
  - Typically with an electric utility who purchases some/all output
  - Usually at fixed price (may have escalator)
  - Most commonly long-term (10+ years for wind, 15-20 for solar)
  - Often required by debt lenders
- New industry trends emerging from a changing market
  - Utilities are interested in owning renewable projects
  - Higher and more volatile fossil fueled power prices
  - New market entrants (e.g. large financial firms)
  - Perceived price disparities between (i) long-term PPAs, (ii) spot prices and forward energy markets

# Utilities Include Wind in the Rate Base

## Some Drivers:

- Improved economics (compared to today's fossil fuel prices)
- Ability to earn rate-based profits
- Regulator support/pressure to diversify using renewables
- Cheaper to own than to sign a PPA
  - 10 to 12% ROE (Rate Base) vs. 15% to 20% ROE (PPA)
- Benefits keep accruing after 10-20 years (typical PPA length)
- Production tax credit (PTC) benefits for customers
- Diversifies generation portfolio (possibly improving its risk/return profile)
- Greater control over project operation and integration
- IOUs and public utilities owning projects – some examples:
  - MidAmerican Energy
  - Puget Sound Energy
  - Oklahoma Gas & Electric

# Merchant Wind Projects

- Projects without contracts are called “merchant”
- Developer expects spot price > PPA price, on average

## Potential drivers:

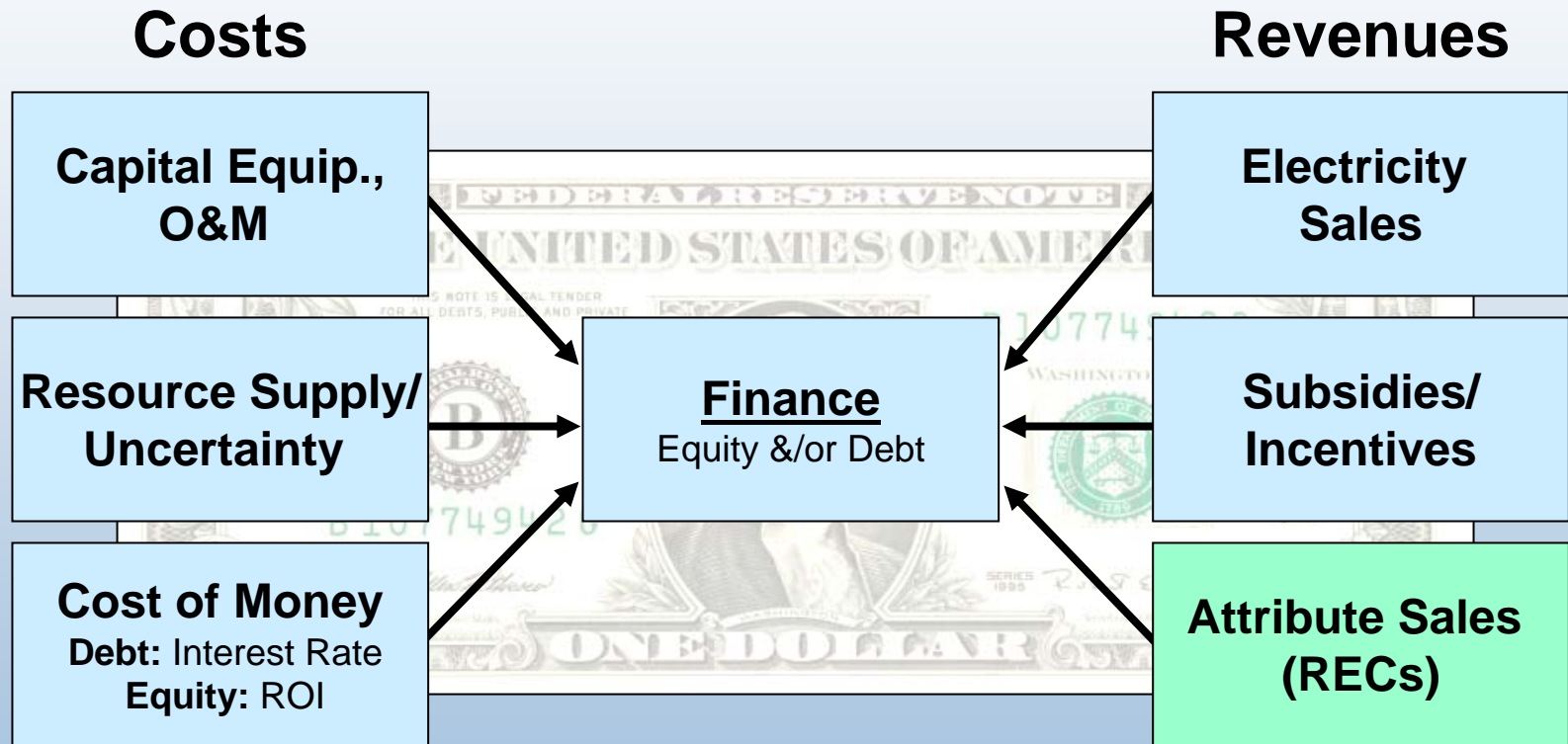
- Buyer’s proposed PPA price is “unreasonably” low
  - Seller can mitigate price risk through financial instruments
  - Seller is capitalized enough to take some merchant risk
  - Merchant projects tend to be heavily equity-financed
    - Lenders wary of merchant risk, thus they require PPAs
    - Potentially higher returns if not tied into a fixed-price PPA
  - Some key criteria driving potentially higher returns:
    - Natural gas powered units are on the margin much of the time
    - Liquid market for electricity and its derivatives
    - Active state/regional renewable energy credit (REC) market
- Examples: Texas, New York and PJM

# Merchant Wind Projects – Energy

Merchant projects are likely to partially hedge energy price risk in one of several ways:

1. PPA for fraction of energy
  2. Use of financial instruments
    - Contract for differences
    - Electricity or natural gas derivatives/options
  3. Start with a PPA, then convert to merchant
- 
- Example - 7.5 MW Atlantic-Jersey project
    - Half its power is under contract and half is sold onto the spot market
    - RECs are sold to NYSERDA
    - Project does not have any debt

# RECs as a Revenue Stream





# Merchant Wind Projects - RECs

- REC value depends on:
  - Mandatory RPS w/penalties (\$3-11) > voluntary RECs (\$1-4)
  - RPS solar set-aside increases value of SRECs (\$200 in NJ)
  - If supply shortage exists (\$50 in MA, CT ~penalty price)
  - Quality of renewable resources (location-dependent)
- Valuation for financing depends on perspective
  - Equity investors: REC revenue important; looks for disparities between spot market and long-term prices
  - Debt lenders: worthless without PPA with creditworthy entity
- Example - 54 MW Crescent Ridge (IL)
  - Selling power and RECs into a power pool “at attractive prices, higher than available PPA terms”

Source: Babcock & Brown, 2006

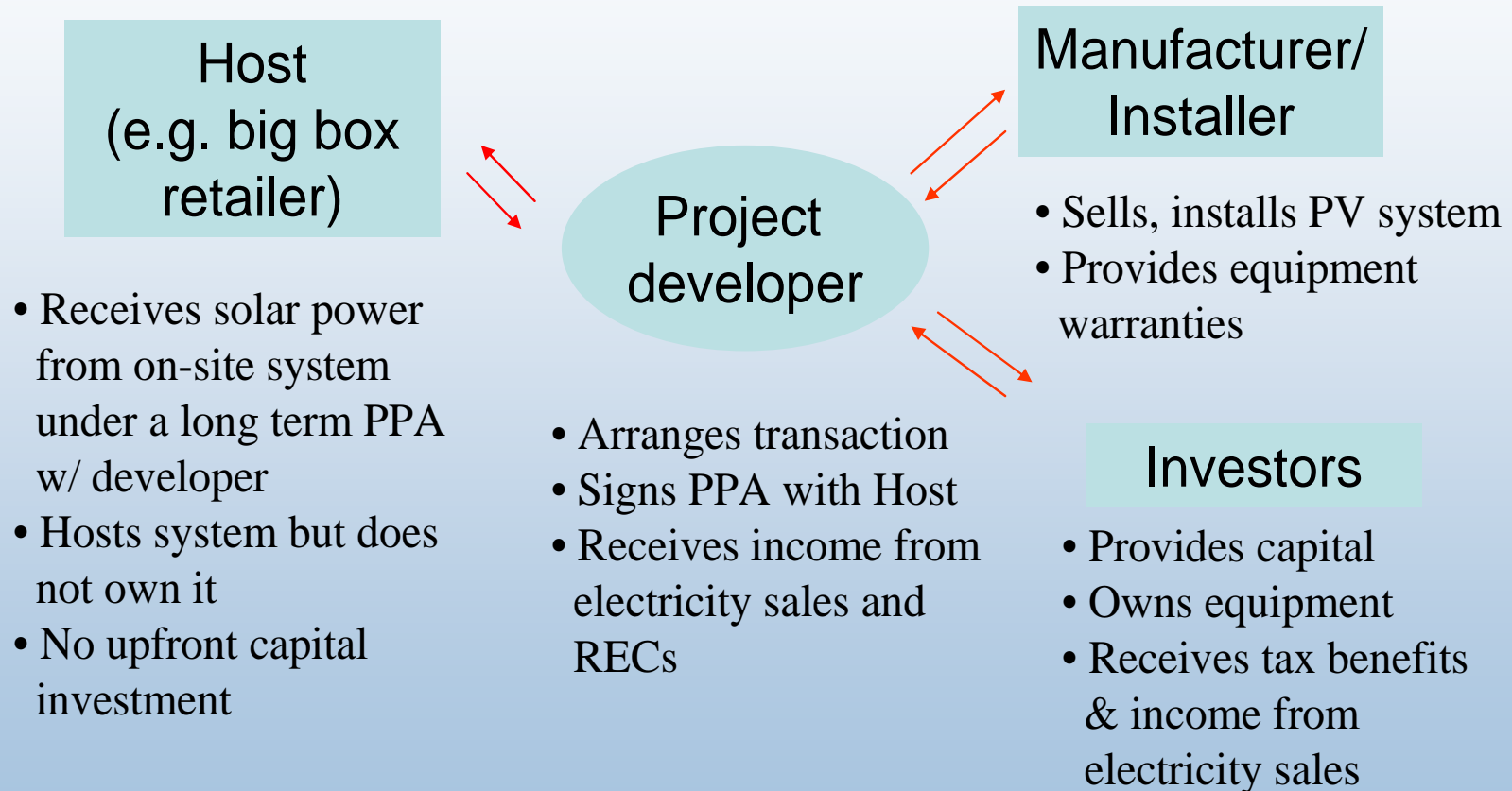
# Changing Players and New Alliances

- Large investors are investing in or buying wind developers
- Benefits of consolidation:
  - Broader access to financing channels
  - Access to corporate balance sheet financing
  - Greater leverage for wind turbine procurement
- Select examples listed

Investor	Owns Developer
Goldman Sachs	Horizon Wind (Zilkha)*
JP Morgan	Noble Env. Power
BP Alternative Energy	Greenlight Energy, Clipper Wind, and Orion Energy
IBERDROLA	PPM (Scottish Power), Community Energy,
AES Corp.	SeaWest Holdings
Babcock & Brown	Superior RE and G3 Energy

\* In March 2007, Goldman agreed to sell Horizon to EDP for a reported \$2.15 billion (source: Horizon, 2007)

# Solar PV Shared Services Model



Source: adapted from WRI, 2004

# Solar Shared Services Examples

- \$400MM MMA Renewable Ventures 2007 portfolio
  - \$39MM MMA Renewable Ventures in Q4 2006 alone
- \$60MM SunE Solar Fund I: SunEdison, Goldman Sachs, BP Solar
- \$26.1MM SunEdison Equity partnership: Goldman Sachs, MissionPoint Capital, Allco
- \$50MM multiple locations by UPC Solar
- 50 MW / year is estimate by Developing Energy Efficient Rooftop Systems (DEERS)
- 5 MW of solar on K-12 schools in California by Chevron, Bank of America and San Jose District

# Conclusions

- Evolving market trends shaping future renewable industry capitalization
- Specific financing innovations for wind and solar are resulting in:
  - Utilities are owning wind (not just signing PPAs)
  - Merchant wind is increasingly attractive
  - Derivatives partially mitigate risk
  - RECs are increasingly important
  - New market entrants are changing the competitive landscape

# Thank you for your attention!

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