

# New Environmental Markets and Bioenergy Project Finance

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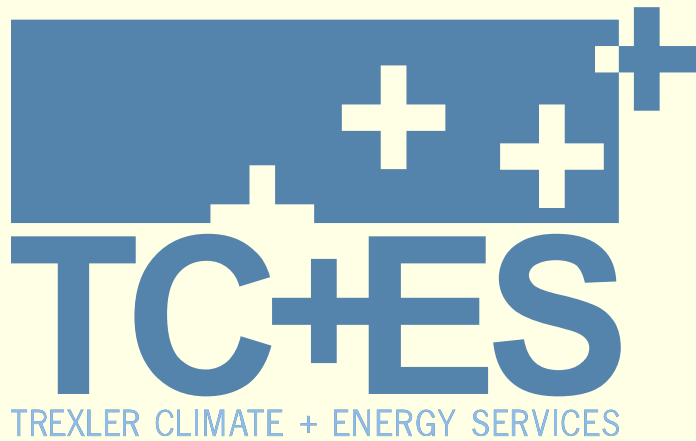
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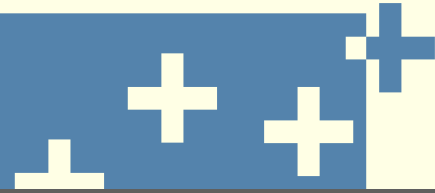
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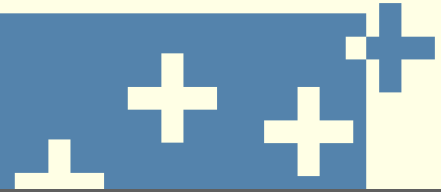
# 1. Setting the Stage





# The Renewables Wave

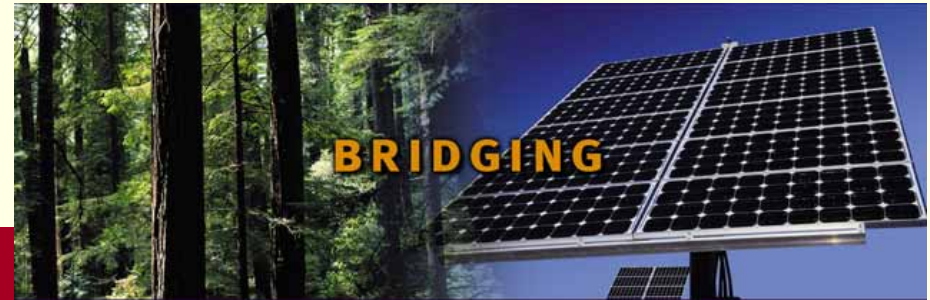
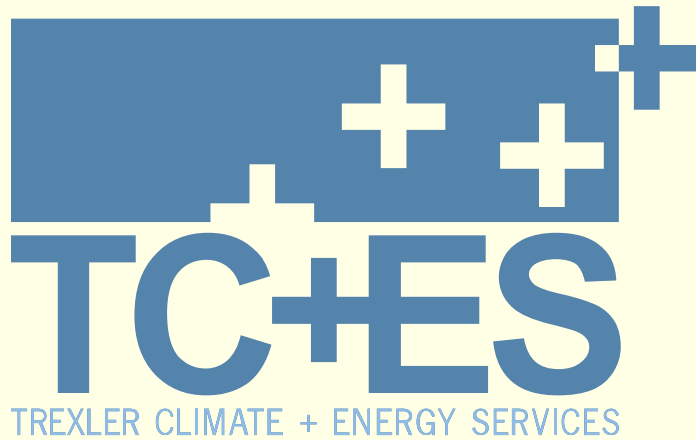
- Interest in Renewables Is Exploding
  - As a means toward energy security
  - As a means to slow climate change
  - In response to volatile natural gas prices
  - As a means to demonstrate sustainability
  - As a means of local economic development
- The Potential of Renewables Almost Unlimited
- But Important Barriers Remain
- What Role for Environmental Commodities?

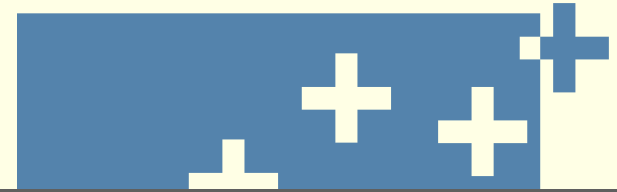


# Incentivizing Renewables

- Through Financial Incentives
  - Loan guarantees
  - Tax benefits
- Through Legislation
  - Renewable portfolio and fuel standards
  - Through cap and trade systems
- Through Voluntary Markets
  - Green energy sales
  - Renewable energy credits (RECs)
  - Greenhouse gas credits (carbon offsets)

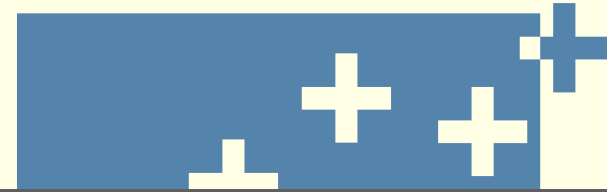
## 2. Bioenergy and Climate Change





# Bioenergy Linkages to Climate

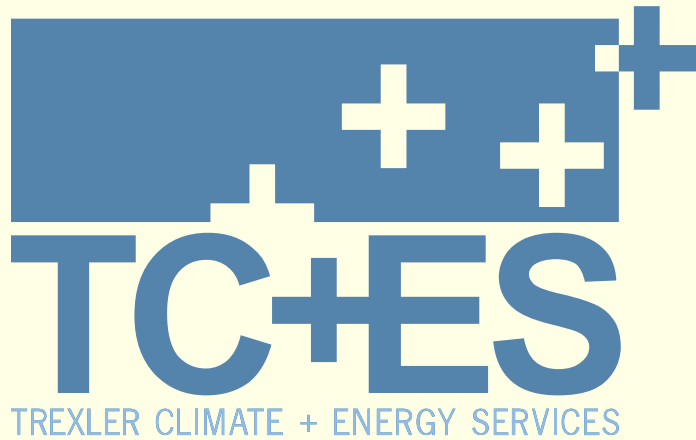
- Biomass to Electricity
  - Co-firing, gasification
- Biomass to Liquid Fuels
  - Biodiesel, ethanol, others
- Biomass as Carbon Sequestration
  - Soils, trees
- Biomass Management as Avoided Emissions
  - Avoided forest fires
- Overall Potential to Reduce GHG Emissions is Enormous

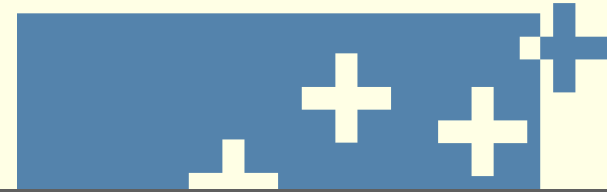


# Examples of the Potential

- Solar PV Irrigation Pump (25 kw) ~17 tons CO<sub>2</sub>/yr
- Small Wind Turbine (1 MW) ~1000 tons CO<sub>2</sub>/yr
- 10 MW Biomass Power Plant ~ 30,000 tons CO<sub>2</sub>/yr
- 10,000 Acres of Biofuel Crop @ 110 gal/acre ~8000 tons CO<sub>2</sub>/year
- 10,000 Acres of Algae Tubes @ 1,000 gal/acre ~ 800,000 tons CO<sub>2</sub>/yr
- Avoiding Forest Fire: 15,000 acres/yr ~ 1 MM tons CO<sub>2</sub>/yr

### 3. Understanding the Incentives





## What's Worked for Renewables?

- Rising Fossil Fuel Costs a Major Driver of Renewables, w/ Major Technology Investments
- Federal Tax Incentives, e.g. Production Tax Credits, Biofuels Tax Credits, Have Been Huge Driver of Renewables
- State Tax Incentives and Special Purpose Funds Have Facilitated a Lot of Projects
- State Portfolio Standards for Renewables Are An Increasingly Important Driver of Renewables
  - Electricity and now fuels

### 3. Incentive Structures

## A Bottom Line Example

Pepsi Cola Plant in Klamath Falls: 172-kW PV

Total Project Cost: \$1,095,000

Accelerated Depreciation: \$386,000

Oregon State Tax Credit: \$238,000

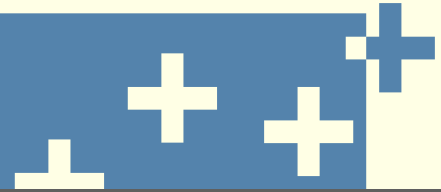
Energy Trust Funding: \$210,000

Projected Proceeds from Energy Output:  
\$170,000

Upfront Proceeds of 2.5 years of REC Sales  
\$22,500

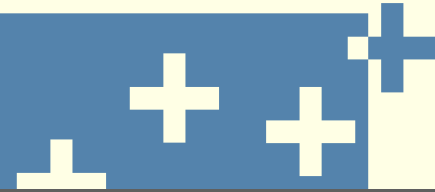
Residual Costs to Generator \$68,500

Source: 3-Phases Energy



## New Environmental Markets

- Several New Market Vehicles We're Hearing A Lot About
  - Green Energy Markets
  - Renewable Energy Credit Markets
  - Greenhouse Gas Credit Markets



# Market Growth

- Green Energy Market Growing Rapidly
  - 60% growth in green energy 2003 to 2004
  - Totaling 6.2 billion kWhs
- Renewable Energy Credit Market
  - Can be hard to distinguish from green energy
  - 25% the size of green energy market
  - 162% growth in one year
- Carbon Credit Markets Also Growing Rapidly
  - Combination of voluntary and regulatory drivers
  - International market now exists

## Commodity Market Value

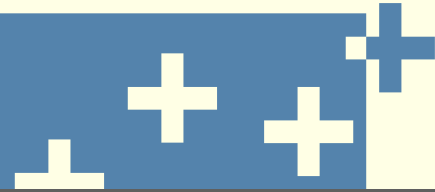
- Retail Costs Vary Widely
  - Green energy sells for 1–7 incremental cents/kWh
  - RECs sell from \$1 – \$20/MWh
  - Carbon credits sell for \$3 - \$10/ton
- Wide Variation Partially Due to Source
  - Solar commodities tend to have highest price
  - Biomass commodities considerably lower
- Making Sense of the Units
  - $\$.05/\text{kWh} = \$5/\text{MWh}$
  - $1 \text{ REC} = 1 \text{ MWh}$
  - $1 \text{ MWh} = .6 - 1.2 \text{ tons of CO}_2$

## Commodity Project Value

- Price Paid at Project Level Quite Limited
  - Green energy from nothing to several cents per kWh
  - RECs, average \$0.50 to \$1.25 nationally, \$2 in PNW
  - Carbon credits from \$2 – 10/ton of CO<sub>2</sub>
- Contract Terms Also Limiting
  - <5 years for most RECs, often 1-3
  - <5 years for voluntary carbon credits

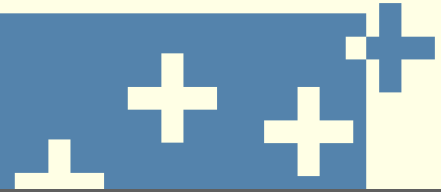
## Biomass Commodity Values

- Biomass Credits Tend to Have Lower Value
  - Lack the PR value of solar, wind
  - Still has negative public perception of old, dirty tech
- Yet Biomass Perhaps More Important in Addressing Objectives of Renewable Energy
  - In terms of liquid fuels
  - In terms of potential technology breakthroughs
- And Biomass Tends to Need More Support to Close Cost Gap
  - At least compared to wind



## Commodity Trends

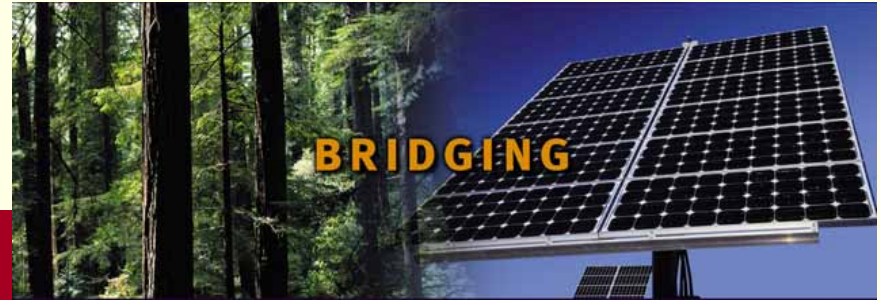
- Renewables Supply and Demand Key
  - Although green energy and REC demand growing, so is supply
  - Prices actually coming down over time, reflecting a glut of wind credits
  - Implications are bad for biomass projects
- Carbon Credit Markets Need Policy
  - Voluntary U.S. market values will remain low
  - But trading in EU ETS up to \$33/ton



## The Bottom Line for Bioenergy

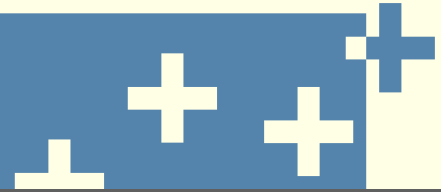
- Bioenergy Still at a Distinct Disadvantage in Terms of Cost
- Renewable Energy and Fuel Mandates, Tax Incentives, Having the Most Obvious Impact.
- Voluntary Markets for Green Energy, RECs, and GHG Credits Lagging Far Behind in Impact

## 4. Where Do We Go From Here?



## Moving Bioenergy Forward

- Some Renewables Very Well Established Now, and Dominating Renewable Energy Markets.
  - Can actually undercut efforts to incentivize other technologies, e.g. by lowering REC values.
- Need to Better Target Incentives In Order to Advance Bioenergy Sector



## An Integrated Example

- Biomass Power Generation in Klamath Falls
  - Use integrated strategy for political support, including on fuel supply
  - Take advantage of incentives and tax breaks
  - Create a Klamath REC and CO2 credit brand
  - Get credit for forest management CO2 benefits
- Much More Likely Overall to Succeed

## Moving Bioenergy Forward

- Need to Think Outside the Standalone Project Box.
- Integrated Projects Can Galvanize Stakeholders, Serve Multiple Purposes, Attract Widespread Interest.
- Southern Oregon Climate Sustainability Project Designed Around Accessing \$20 million in CO2 Mitigation Funding.
- Integrated Efforts Work Better Than Piecemeal Projects to Attract Incentives, Support, Resources.
- Business Alliance for Sustainable Energy (BASE) is Another Example of Community-led Effort.