



**CEC**

**Green Bio-Energy for  
Food Processing**

Presented by:

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# Dixon Ridge Farms

- ❑ **Grower and Processor of Organic Walnuts;**
  - The largest handler of organic walnuts in the US;
  - We grow organic walnuts on over 350 acres, transitioning another 200 and buy about 2,500 more acres of organic walnut production from 67 growers
  - Total organic is about 1% of total US Walnut Production
- ❑ **Family farming in California since 1867 and organic since 1990;**
- ❑ **We follow a sustainable, whole systems approach to organic processing and business.**





ORGANICALLY GROWN WALNUTS

# Our Energy Goal

***Total farm and processing net energy self sufficiency by 2012 for all types of energy***

We aim to achieve this goal while taking into account:

1. Carbon neutral or negative
2. Nitrous-oxide neutral or negative
3. Use non-food sources for energy
4. Energy costs should be reasonable
5. Transferable Technology



# Current Conservation Practices

## 1. Recycle

- Hulls/shells/wood/leaves - back into orchard soil
- Huller and Storm Water – recirculation & recharge pond
- Aluminum, paper, plastic, steel, etc
- Char-ash (nutrients) back into orchard



## 2. Lighting Improvements

- Motion activated, high efficiency T8 warehouse lights
- ROI is 9 months
- Last longer than Metal Halide or HID
- Better lighting



## Current Conservation Practices (cont)

### 3. Dryer Improvements

- Recirculation via building envelope
- Hot, fairly dry air is pulled from top of building; cold, wet air falls to floor & escapes out the doors
- Saves about 40% of drying fuel, ~\$32,000 in 4 weeks
- BioMax gas replaces ~15% of propane, saving ~\$12,000
- HEX heat saves ~ \$12,000 more

### 4. Freezer improvements - 1,800 & 12,000 sq. ft. freezers

- Air-lock vestibules with automatic doors that are interlocked
- Insulation - above R 80 even though “normal” is R 25
- Variable speed fan motors
- State of the Art controllers manage energy use
- Energy savings of 40 - 45%

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# Current Green Energy Production

## 1. Solar

- **3,500 square feet of PV panels, 17 KW**
- **Generates about \$3,500/year of electricity per year**
- **Very low maintenance**
- **Specifications on all new buildings include loading for solar panels of 6#/sq. ft.**
- **Future increase to over 90,000 sq. ft, 400 KW**
- **Side benefit of cooling by shading roof with panels**
- **Solar - perfect fit with freezer energy use and biomass**
- **PPA- we pay 80% of retail rate, no capital invested**



## Current Green Energy Production (cont.)

2. **Bio Max 50** – Manufactured by Community Power Corp (CPC); PIER Grant from California Energy Commission (CEC) of \$725,000
  - **Production** (as of 2/23/12)
    - **Hours:** 20,561 hours on generator, 28,310 hours on gasifier
    - **Producer Gas:** 1 million BTU per hour
    - **Propane:** Offsets about \$12,000/year during 4-week drying season
    - **Electricity:** Produces up to 50 kW or \$45,000-\$50,000/year
    - **Heating:** About 1 million BTU per hour used for buildings & dryers
    - **Local Use:** Use 100% of produced energy on site
    - **Fuel:** Uses about 820,000 pounds of biomass (walnut shells) per year
  - **Environmental Impact**
    - **Walnut shells:** renewable, non-food source of energy
    - **No Transportation Costs and Impacts for shell removal**
    - **Carbon Cycle:** Atmospheric CO<sub>2</sub> absorbed by trees produces walnuts, which provide food and shells for energy production, that will be used to dry and process walnuts, CO<sub>2</sub> back to air, C into soil
    - **No Waste:** Mix Char-ash in compost, apply back into orchard for long-term carbon sequestration and soil amendment
    - **Net negative release of carbon:** 1,000 year half-life of C in soil

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# Current Impediments

## 1. Emission Regulations and Fees

- Authorization to Construct (ATC) - 3 years
- Length of time to issue Authorization to Operate (ATO) – 1 year
- Costs—\$28,600 vs. \$400, BioMax vs. propane, Not due to emissions , operate at below 40 ppm NOx

## 2. Char/ash Soil Application

- We face potential oversight from the following agencies : USDA, NRCS, US EPA, CA EPA, Yolo and Solano County Dept. of Ag and Dept. of Health, Cal Recycle, CA OSHA, US OSHA, WRCB, CCOF, USDA, DFG
- Costs - about \$5,700 for testing



# Impediments (cont.)

## 3. Interconnection Rules

- Catch 22
  - » Rule 21/Net Meter (solar) prohibits bio-energy on same meter
  - » FIT prohibits interconnection with Renewable Generation Facility that took solar incentive money or CEC PIER grants
- Fees for FIT
  - » \$50,000- \$150,000?
  - » Don't know costs until we pay a \$5,000 non-refundable fee
  - » Game stopper -- **Not Economic**
- SB 489 (Wolk) Sponsored by CalCAN
  - » Passed and signed in 2011
  - » Allows **all renewables** to use Net Energy Metering Program
  - » **Solves the Catch 22 & FIT economic issues**



# Status Report

- ❑ **Energy Generation and Reduction (potential) – Per Year**
  - Electricity energy efficiency, 27% reduction, **saves \$60,000**
  - 20% reduction of electricity due to generation, **saves \$45,000**
  - Reduces propane use by 15% via producer gas, **saves \$12,000**
  - Reduce dryer heat needs by about 55% via Combined Heat and Power (CHP) and recirculation, **saves \$44,000**
  - ➔ Total reduction is about **53% of ALL energy used, saves \$161,000!**
  - ➔ Return On Investment is about **15% or 7 years!**
  - ➔ **Already have exceeded RPS goals of 33% by 2020!**
- ❑ **Costs**
  - ➔ Cost to produce electricity and propane onsite is about the same as current retail price, (not including APCD & PGE Fees)
  - ➔ May be revenue generating depending on GHG reduction market, excess energy generation sales and future energy costs



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# Future Projects

- ❑ **Bio Max 100, June 2012** - use rest of shells to produce an additional 100 kW
- ❑ **More solar panels on the roofs – possibly up to 90,000 sq ft**
- ❑ **Walnut Oil, 2012**
  - Press inedible walnuts into oil for biodiesel or walnut oil fuel
  - Estimated 12-14,000 gallons produced per year under current production
  - Would supply 75% of current diesel needed for farm equipment
  - Estimated cost of \$2.50 per gallon
- ❑ **Emissions reduction** - use algae to reduce CO<sub>2</sub> and NO<sub>x</sub>, algae used for fuel or fertilizer
- ❑ **Use CHP in Absorption chillers on HVAC and freezers**
  - Should save about \$18,000/year
- ❑ **Research Studies**
  - Carbon and Nitrous Oxide – UCD, NRCS, CEC, DRF
  - Char ash use –UCD, DRF, CPC
  - Energy efficiency improvements – PG&E, DRF, UCD
  - Energy production – UCD, CA Biomass Collaborative, DRF & CPC
- ❑ **We will be beyond energy self-sufficient!**



# Conclusion

- Stimulate short and long-term economy and job gains.
- Move the USA energy and food sector toward domestic self-sufficiency and greater security.
- Encourage maximum conservation and efficiency.
- Meet the goals of AB 32 and the Renewable Portfolio Standard.
- Diversifying energy types is good, stabilizing the market, power generation and costs.
- **Reduce GHG outputs and Climate Change impacts**
- **Reduce Costs of Operations**
- **These solutions can be implemented immediately**
- **GOALS CAN BE MET & AGRICULTURE CAN PLAY A HUGE ROLE**