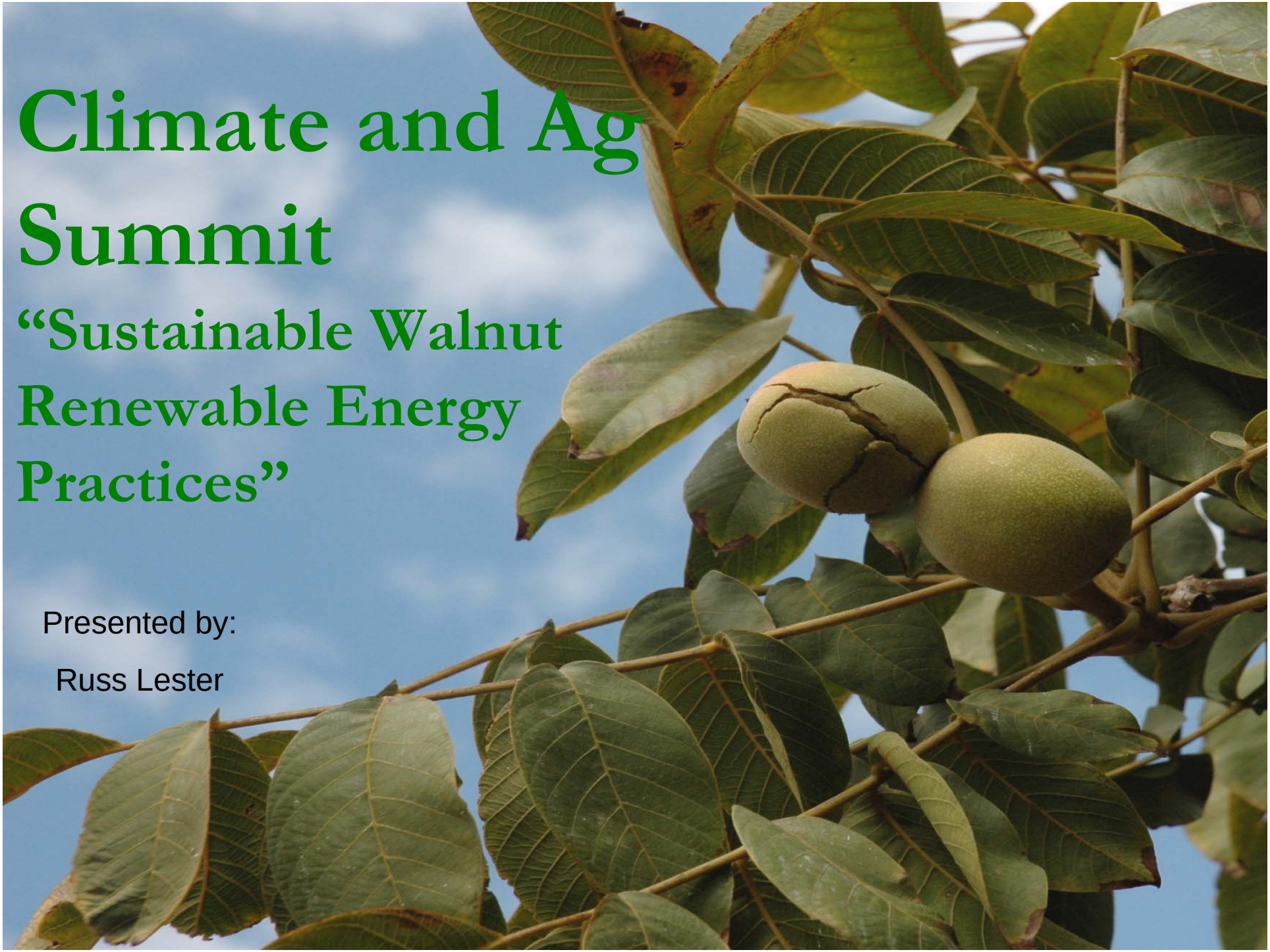

Climate and Ag Summit

"Sustainable Walnut Renewable Energy Practices"

Presented by:

Russ Lester

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Dixon Ridge Farms

- **Grower and Processor of Organic Walnuts;**
  - The largest handler of organic walnuts in the United States;
  - We grow organic walnuts on over 500 acres, and buy about 2,500 more acres of organic walnut production from 67 growers
  - Organic is less than 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 farming and business.**

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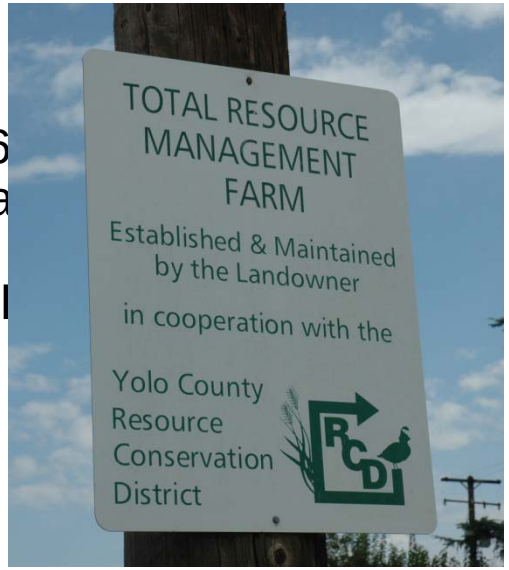
Current Conservation Practices

1. **Recycle**
   - Hulls/shells – spread back into orchard
   - Prunings – chipped and back into soil since 1976
   - Aluminum/paper/plastic/steel/etc - as much as ca
2. **No till / Mow production methods since 1980**
3. **Fertilize with Compost, rather than synthetic fertil**
4. **Irrigation – New type**
   - Overhead hoses - through tree branches
   - Drop rotary sprinklers – greenhouse style
   - Compatible with cover crops/organic production
   - VFD Electric Pump Motors
   - Operate at 8-25 PSI at pump vs. 35-50 PSI for drip and micro-sprinklers
5. **Freezer insulation - all at or above R 80 even though "normal" is R 25**
6. **Dryer Improvements**
   - Save 35-40% of drying fuel
7. **Land conservation / preservation**



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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

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Current "Green" Energy Production

1. **Solar**
   - **3,500 square feet of PV panels**
   - **Generates $3,500/year of electricity**
   - **Very low maintenance**
   - **Specifications on all new buildings include loading for solar panels of 6#/sq. ft**
   - **Future desire to increase to over 90,000 sq. ft**
   - **Side benefit of cooling by shading roof with panels**
   - **Solar addition is a perfect fit with freezer energy use**
   - **PPA- we pay 80% of retail rate**

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Current "Green" Energy Production (cont.)

2. **Bio Max 50** – Manufactured by Community Power Corp (CPC), Grant from California Energy Commission (CEC)

    - **Production**
        - **Propane:** Offsets $12-14,000/year during 5-week drying season
        - **Electricity:** Produces $30,000-$45,000/year
        - **Hot Water:** Hydronic
        - **Heating:** Use hydronic or hot air to heat our buildings & dryers
        - **Local Use:** Will use 100% of produced energy on site
        - **Fuel:** Uses about 820,000 pounds of walnut shell per year
    - **Environmental Impact**
        - **Walnut shells:** Are a renewable, non-food source of energy
        - **Carbon Cycle:** Atmospheric CO_2 absorbed by trees to produce walnuts, which provide food and shells for energy production that will be used to dry and process walnuts, CO_2 back to air
        - **"Waste":** Plan is to use "char-ash" in compost and apply back into orchard for long-term carbon sequestration and soil amendment
        - **Net negative release of carbon**: 1,000 year half-life in soil

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Status Report

- **Energy Generation and Reduction**
  - Generate about 20% of our electricity use
  - Offset about 40% of our propane use
  - Reduce dryer heat needs by about 70% via CHP and recirculation
  - ➔ Total is about 25% of all energy used
- **Costs**
  - ➔ Cost to produce electricity and propane onsite is about the same as retail price
  - ➔ May be revenue generating depending on GHG reduction market and excess energy generation sales

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Future Projects

- **More solar panels on the roofs – possibly up to 90,000 sq ft**
- **Walnut Oil, 2010**
  - Press inedible walnuts into oil for biodiesel or walnut oil fuel
  - Estimated 12-14,000 gallons could be produced per year under current production
  - Would supply 75% of current diesel needed for tractors, irrigation, trucks and generators
  - Estimated cost of $1.25/gallon
- **Change gas generator to a "diesel" generator, 2010**
  - 85% producer gas, 15% liquid fuel (diesel, synthetic-diesel, bio-diesel or vegetable oil)
  - 100 kW of electrical production
- **CPC Bio Max 100, late 2010 - use rest of shells available to produce 100 kW or 200 kW**
- **Use CHP in Absorption chillers on HVAC and freezers**
  - Should save about $18,000/year
- **CPC Liquid Fuel Module, 2009 trials, 2010 production**
  - Will generate approximately 25 gallons/day, 15,000 gallons/year of synthetic diesel
- **CPC Hydrogen Module, ?**
  - Possibly use for fuel cell energy for forklifts, vehicles, electricity generation
- **Research Studies**
  - Carbon and Nitrogen – UCD, NRCS, DRF
  - Char ash use – CPC, UCD, DRF
  - Energy efficiency improvements – UCD Energy Efficiency Center, PG&E, DRF
  - Energy production – UCD, CA Biomass Collaborative ?, DRF

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Current Impediments

1. Emissions
2. Char/ash Soil Application
3. Interconnection

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Global Issues

- Overcoming Centralized Power and Distribution thinking and marketing
- Security – centralized power plants and transmission is less secure
- Not all renewable power is green (or how it can be made “black”)
  - Large transmission lines impact farms and environment and are very costly
  - Transporting power great distances suffers large loses
  - Large solar in desert areas destroys a fragile environment, maintenance?
  - Algae ponds in the desert consume large quantities of water, destroy the environment and are not sustainable
- Transport of Bio Mass to centralized plants, not sustainable, cost-effective.

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Solutions

- Encourage small, distributed, renewable fueled generation.
- Encourage energy efficiency
- Encourage efficient and complete use of resources
- Transparent economics to show all costs of energy.
- Renewable fuels information clearinghouse, advocate, etc. needed
- One stop permitting - emissions, interconnection, by-products, etc.
- Permitting fees and costs scaled to size
- Simplified, fast and consistent method to rectify problems

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Conclusion

- Stimulate short and long-term economy and job gains.
- Move the USA and CA energy sector toward domestic self-sufficiency.
- Diversification of energy types is good, stabilizing the market, power generation and costs.
- These solutions can be implemented immediately
- **THESE GOALS CAN BE MET & AGRICULTURE CAN PLAY A ROLE**