U.S. Department of Energy
Office of Indian Energy

Energy Considerations When Designing and Constructing New Tribal Buildings

The most cost effective time to reduce energy consumption is during the design phase.

Cost efficient design pays off when considering a life cycle analysis.

Fond du Lac Band Strategic Energy Plan

The Fond du Lac Band has identified three primary types of options to move forward in achieving our energy goals.

These actions include:

- Energy Efficiency Options
- Energy Generation Options
- Institutional and Administrative Options

Leadership in Energy and Environmental Design (LEED)

FDL Resource Management is the first LEED building in Carlton County

Energy costs are reduced by installation of a 12.25-kW solar system, window placement for passive lighting, solar reflective tubes for interior light, interior lights are managed by occupancy and daylight sensors

High Performance Building Attributes

Energy efficiency
Durability of building materials
Life cycle performance
Occupant productivity
Sustainability

Six reasons to build an energy efficient building

- Comfort
- Health
- Energy Performance
- Durability
- Marketability
- Operating economy and financing

Fond du Lac New Construction MN Power Triple E Homes

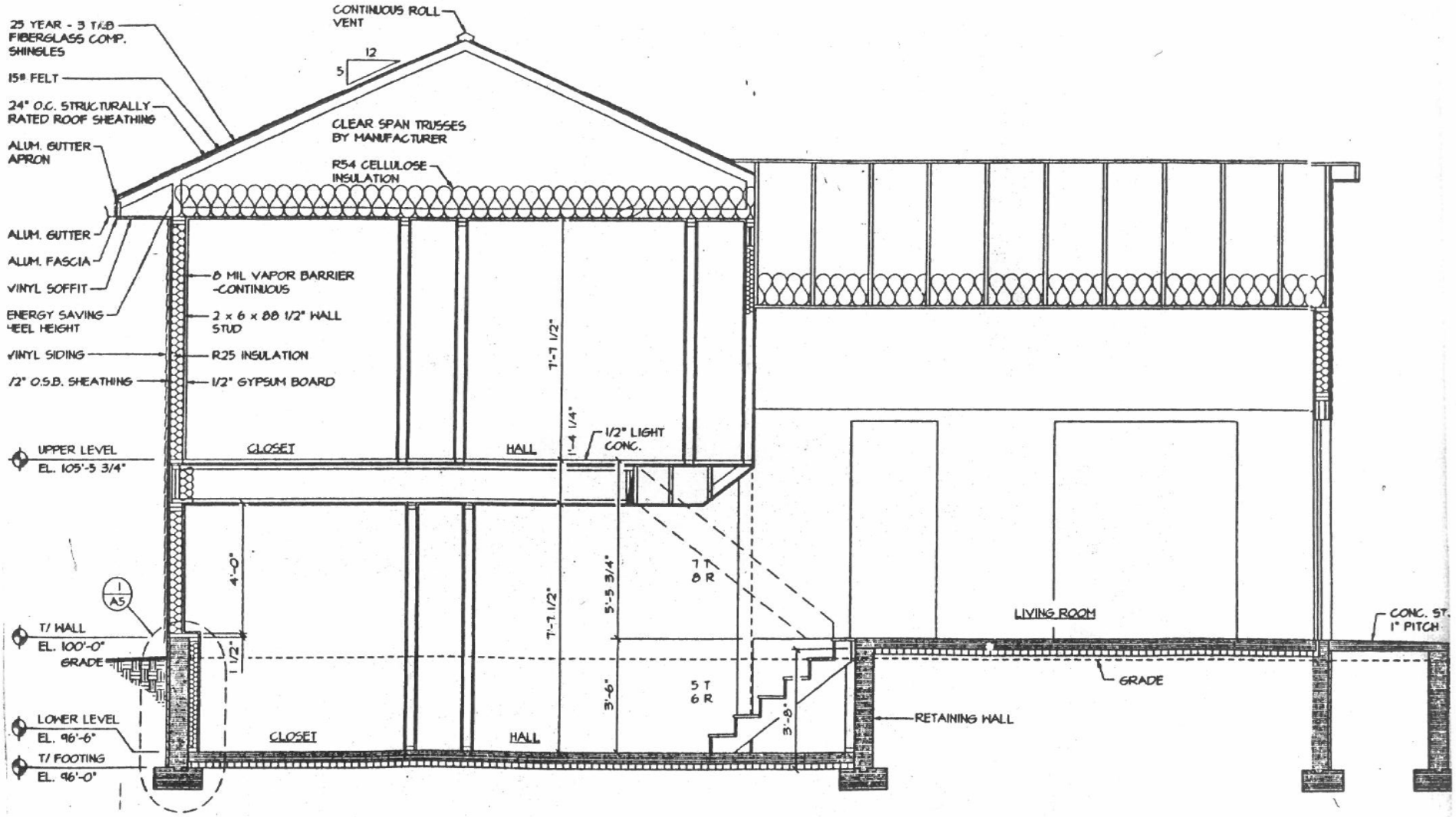
- Prescriptive performance standards
- Comfortable, healthy & durable homes
- Upgraded thermal efficiency specifications
- Meet increased air-tightness & heating performance standards

Building Standards

- Air Flow
- Heat Flow
- Moisture Flow
- Indoor Air Quality

Air Flow

- Exterior house wrap or foam insulation
- Interior polyethylene
- Airtight drywall approach
- Seal unintentional holes or bypasses from conditioned space to unconditioned space.



CROSS SECTION (A / A8)

SCALE: 3/8" = 1'-0"

Heat Flow

- Entire foundation wall must be insulated, exterior, interior or combination
- Framing should minimize use of wood without jeopardizing building integrity
- Insulation installed properly to ensure maximum R-value (no voids, gaps, compression, misalignment)

Heat Flow

- Size heating & cooling equipment properly
- Seal ventilation systems
- Where floor joists are used in duct system, need to be sealed
- Windows should have U-value of ≤ 0.35
- $U = 1/R$ and $R = 1/U$
- Window placement 50% south, 20% east, west, 10% north

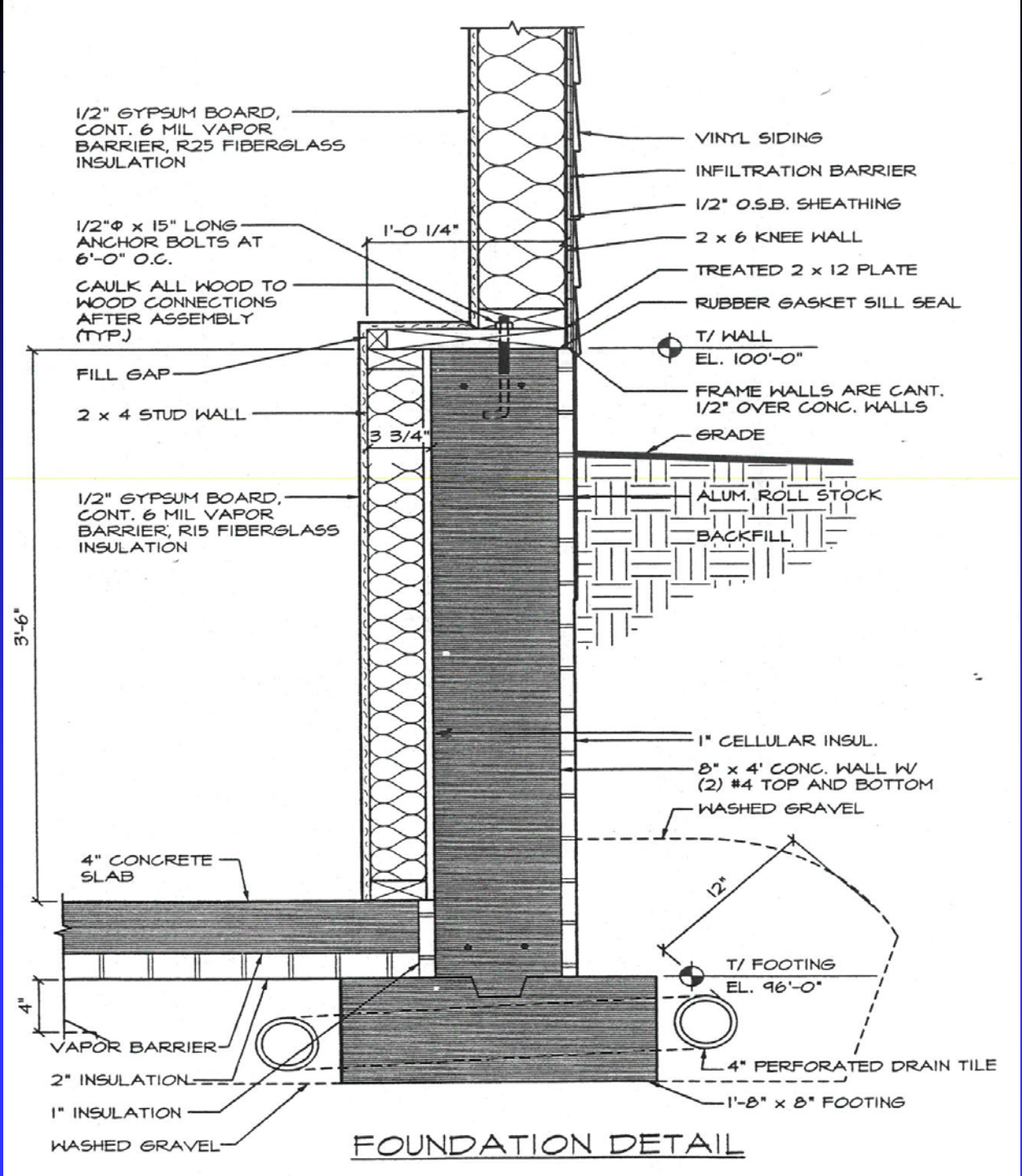
Moisture Flow

- Horizontal seams in house wrap should be overlapped, shingle fashion
- Building paper/house wrap should overlap top window flanges
- Vertical seams in house wrap should be overlapped
- Seal all side window flanges to house wrap or foam sheeting
- Building paper/house wrap must terminate above the fascia and soffit line

Moisture Flow

- Foam sheeting joints should be sealed
- Install pan flashing in all window & door rough openings; tilt to outside
- Continuous drainage plane on entire building shell exterior surface
- Sump pit installed must be airtight

Thermal breaks: isolate concrete from the cold. Sealing exterior wall sheeting stops air flow. Insulation does not stop air flow Vapor barrier stops moisture. Infiltration barrier stops air but allows water out.



Indoor Air Quality

- Ventilation system installed for overall house ventilation
- Continuous air flow of 10 cfm/person
- Variety of design ventilation equipment can be used (upgraded bathroom fans, central exhaust systems, balanced heat or energy recovery system)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EPA Energy Star Home Ally

- MN Power and Fond du Lac Reservation
- Each home built to meet or exceed guidelines
- At least 30% more efficient than model energy code


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Utility Partnership Key Objectives

- Fond du Lac Construction, FDL Housing, FDL Environmental Program and MN Power meetings
- Meet with architect to develop guidelines and specifications for EE housing
- Incorporate specs and plans into construction documents
- FDL Construction, FDL Housing committed to constructing homes to these guidelines


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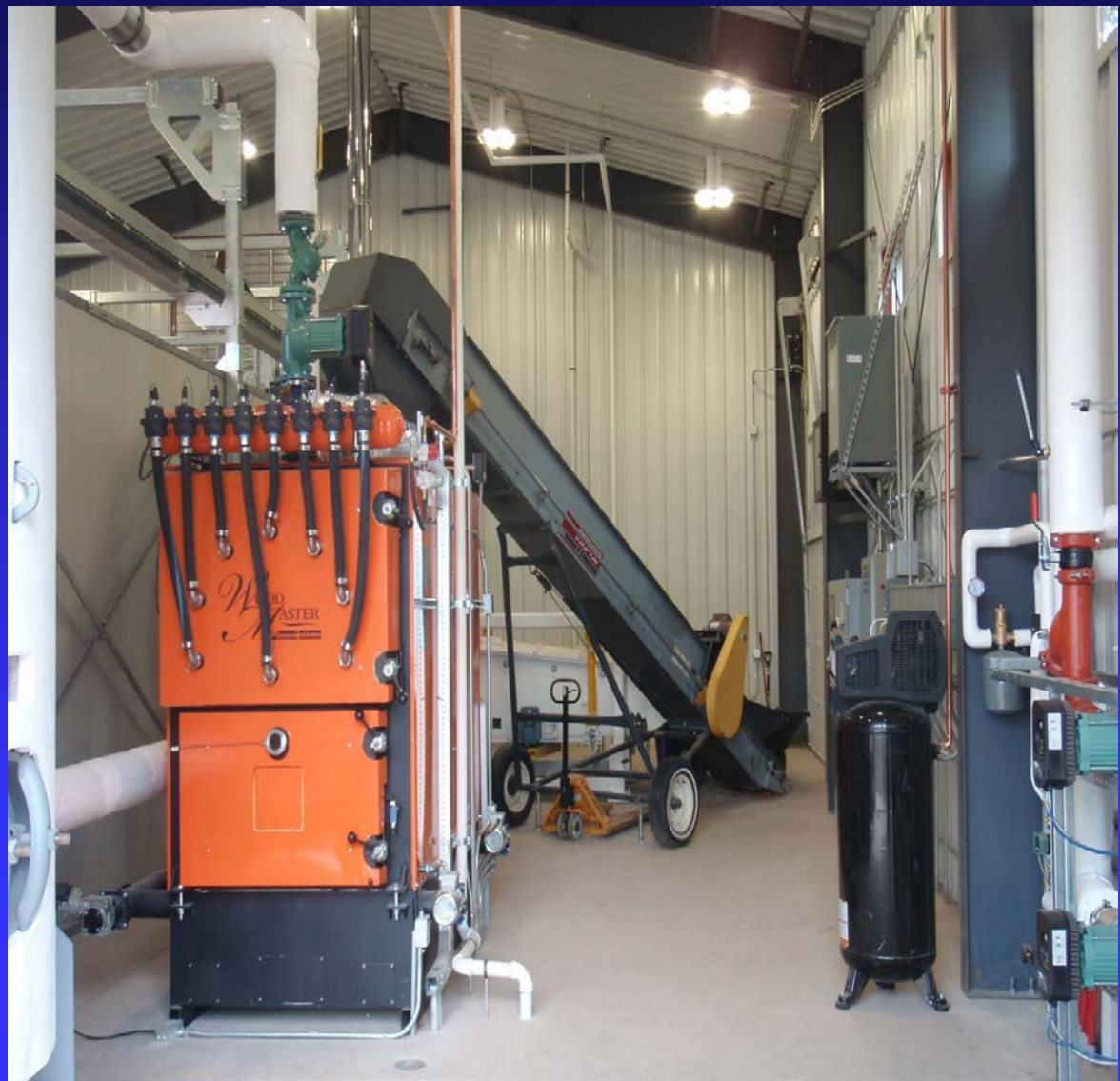
Program Implementation

- Framing inspections during construction
- Insulation and mechanical inspections prior to sheetrock installation
- Blower door test for air-tightness; diagnostic testing to balance mechanical systems; infrared camera for cold spots
- Software diagnostics to demonstrate level of home performance

Commercial Scale Renewable Energy-Sawyer Community Center Biomass Boiler

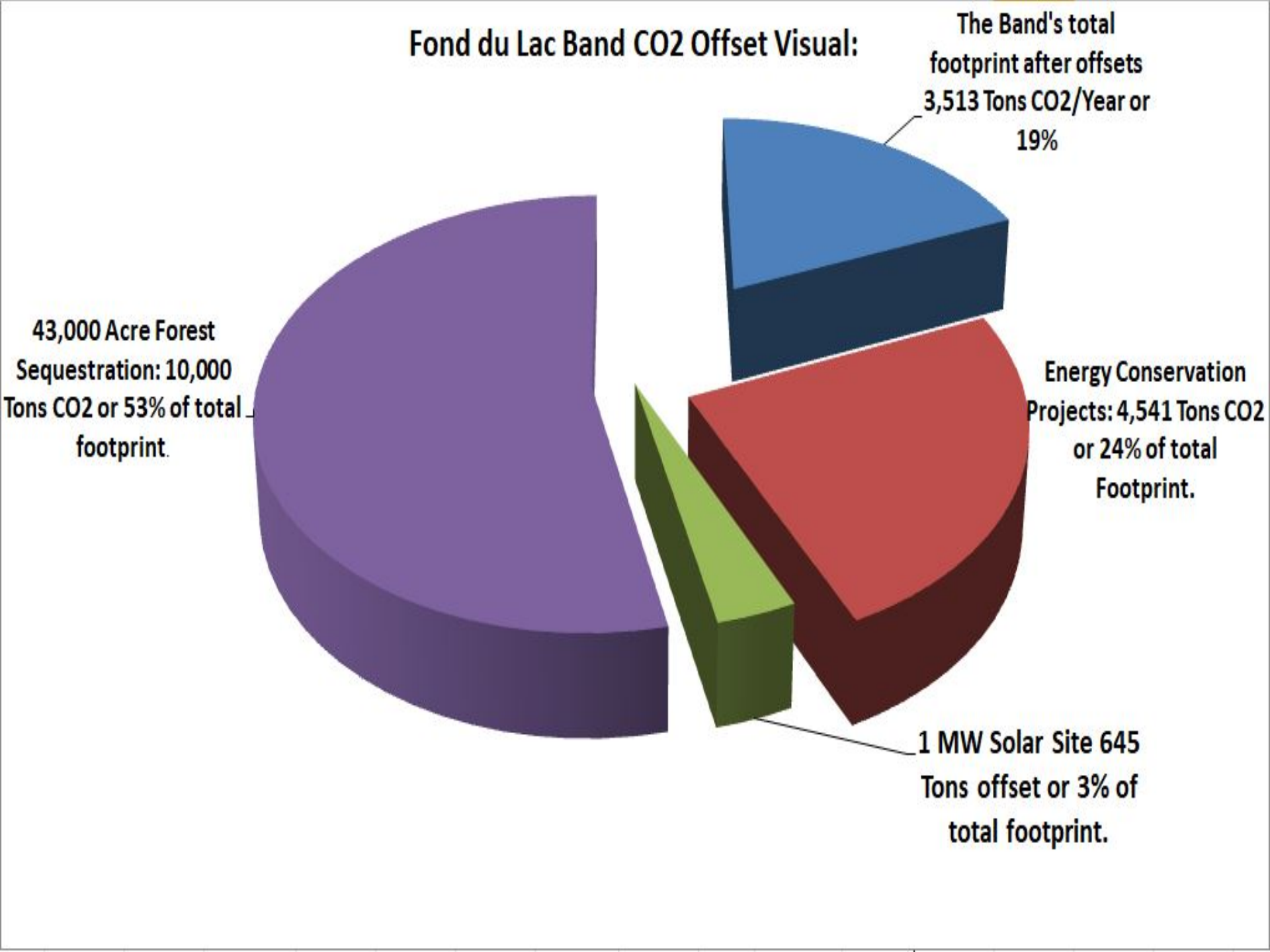
- 1.7 MMbtu biomass boiler.
- Wood chips will replace 88% of propane use.
- Reduce propane use by 13,295 gallons per year.
- Saving approximately 85 tons of CO2 per year.



Commercial Scale Renewable Energy
Sawyer Community Center Biomass Boiler

- Javo toploader wood chip feed system.
- In-floor air drying wood chips before they are fed into the boiler.
- 138 tons of wood chips per year

Fond du Lac Band CO2 Offset Visual:



Questions?

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