"Heating the Midwest with Renewable Biomass Conference"

Carlton, Minnesota

Presented by :

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Marvin Windows and Doors, Warroad, Minnesota

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Marvin Windows and Doors

- Background
  - 1912 – Marvin Lumber and Cedar established
  - 1930's – "window" production developed
- Brands
  - Marvin, Integrity and Infinity (Tecton manufactures Ultrex)
- "Marvin Company" Facilities
  - Warroad, MN
  - Grafton, ND
  - Fargo, ND
  - Baker City, OR
  - Ripley, TN
  - Roanoke, VA

Marvin Windows and Doors, cont.

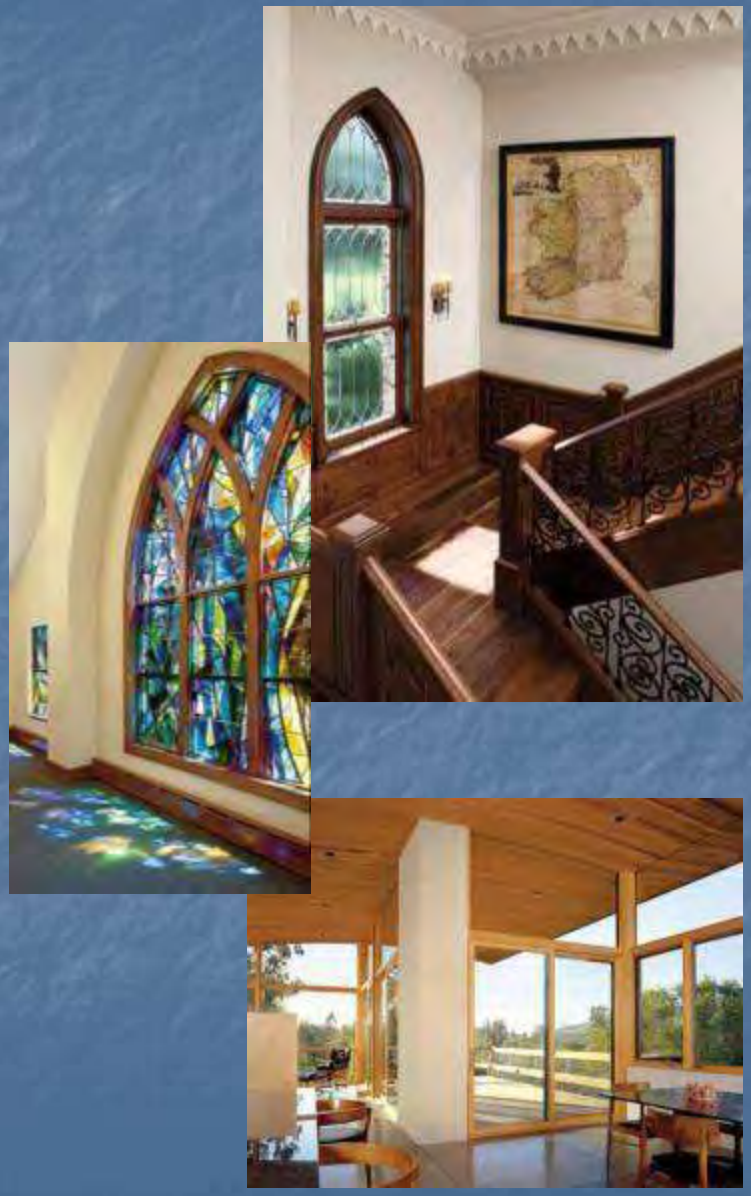
- Distribution
  - All 50 states, plus numerous international markets.
- Warroad, MN Location
  - Company Headquarters
  - >2 million sq. ft. floor space under roof
  - Approximately 2,000 employees in Warroad
- "Built around you"
  - Wood windows and doors are made to order
- Marvin Website

  http://www.marvin.com/

Our Mission

The Marvin family of companies produce windows, doors and allied products that customers perceive as having high quality and value.

In doing so, Marvin is able to grow market share, enjoy long-term profitability, provide employment opportunities and thereby strengthen the communities where it does business.



Boiler Info - General

- Boiler Complex
  - Houses 3 wood fired boilers, 1 natural gas boiler, and wood fuel storage room
  - 8,600 sq. foot building
- Boilers
  - Two 600 HP (output) wood fired boilers
    - Fuel Feed System: individual underfeed stokers
  - One 330 HP (output) wood fired boiler
    - Fuel Feed System: underfeed stoker
  - One backup natural gas boiler, 740 HP (output)

Boiler Complex

Boiler Complex – Fuel Storage

Short term fuel storage, conveying, screening, regrinding, and feeders for metering hoppers at each boiler.

Boiler Info - Steam

- Steam Generation
  - Low Pressure Steam: 12 psi
    - Provides heat for the entire manufacturing facility
    - Source of plant humidification
      - ~ 8 months/year to maintain production wood moisture content
    - Heat for production purposes. Examples:
      - Drying systems/Ovens for coatings operations
      - Steam for the desorption cycle in our wood treatment solvent reclamation process
  - Not a co-generation process
    - Does not generate electricity

Steam Use - Humidification

Live steam is used to humidify our plant. During the eight months heating season, we average 12,800 gallons of water per day or 106,800 lbs of steam per day to keep the humidity at 40%.

Steam Use - Wood Treatment Drying

Steam heat is used to dry wood moulding after a solvent based wood preservative is applied.

Steam Use - Solvent Recovery

Steam is used in our Solvent Recovery system for the wood treatment process, 68% of the mineral spirits / solvent is reclaimed with this process.

Steam Use - Coating Ovens

Steam is used to heat the drying ovens for primed and painted mouldings.

Biomass Info

Biomass – Wood

- 2 General Categories:

1) Wood Milling/Shavings

- Approx. 20 million board feet of rough lumber/year
- Approx. 60 million lineal feet run through the moulders/double ends to profile the window and door component parts
- Wood shavings generated is sold for poultry bedding.
  - Approx. 8,000 to 14,000 tons/year - sold
- Finger jointing and edge gluing used to maximize wood use.

Biomass Info, cont.

2) Wood Fuel

- For use in our wood fired boilers
- Approx. 10,000-14,000 tons/year

a) Purchased Wood Chips. Main Fuel…

- Chipped wood is cleaner and has more wood fiber
  - Less bark, needles, sand, dirt
- Typical Species: Pine, Tamarack, Spruce, and Aspen

b) Some additional ground up (clean) pallets and crates.

- Magnet removes nails/screws, and we recycle this metal.

Boiler - Wood Fuel

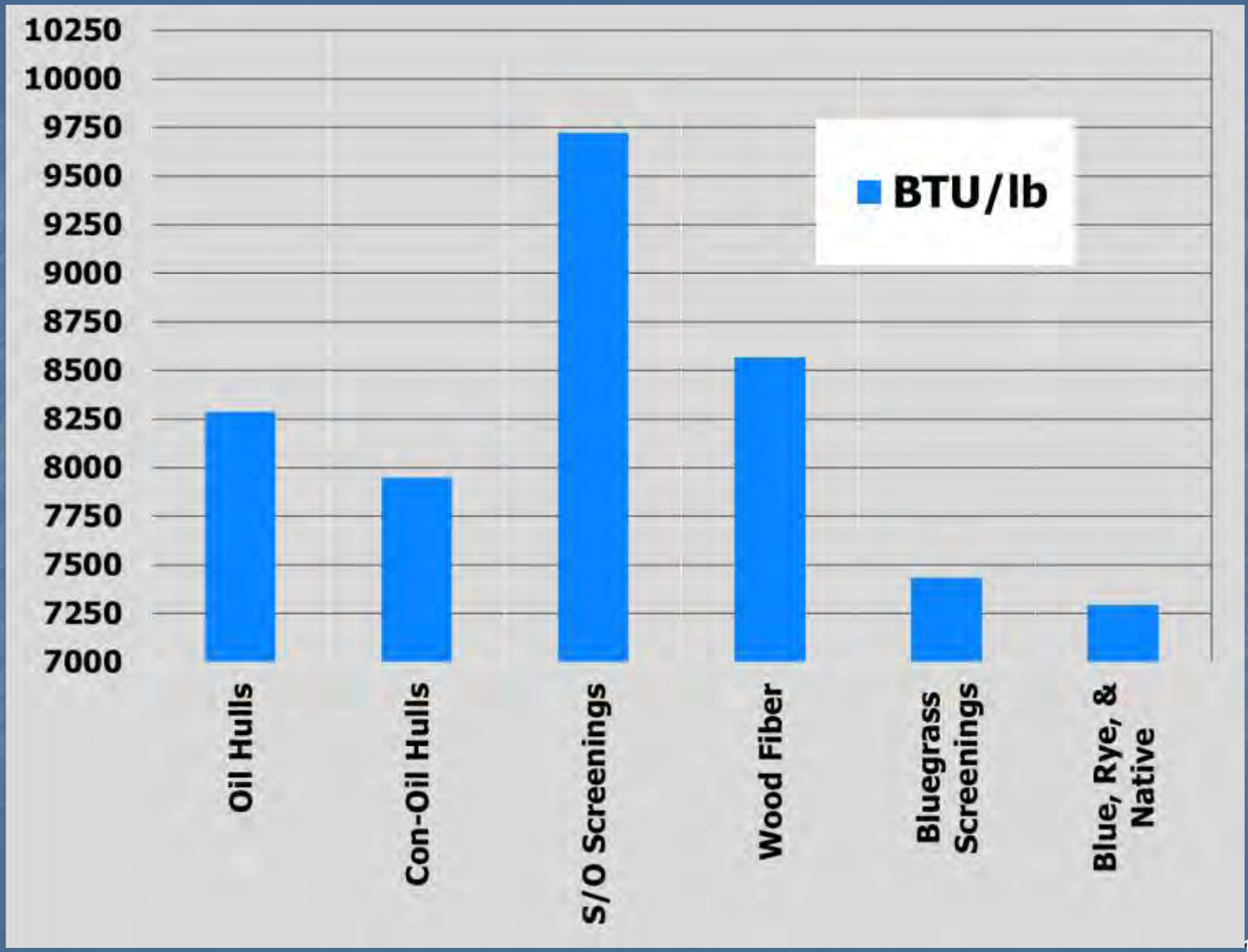
- **Typical wood chips / boiler fuel for Marvin boilers.**

Boiler Fuel Analysis (typical wood fuel)

Parameter	As Received	Dry
Moisture, Total %	29.54	
Ash %	0.65	0.92
Sulfur %	0.01	0.01
Gross Calorific Value BTU/LB	6036	8566
Carbon %	35.38	50.21
Hydrogen %	4.29	6.09
Nitrogen %	0.07	0.11
Oxygen (by diff) %	30.06	42.66

Biomass - Other Fuel Options?

- 2007 Study
  - Agricultural byproducts/biomass as possible supplements to wood? Possibilities:
    - Sunflower hulls and screenings
    - Bluegrass screenings
    - Rye grass screenings
    - Native grass screenings
  - Ash Content Concerns
    - Higher than wood fuel
    - Concerns with manual raking of ash from our boilers
    - Concerns with ash in flue gas, and thus increased particulate matter emissions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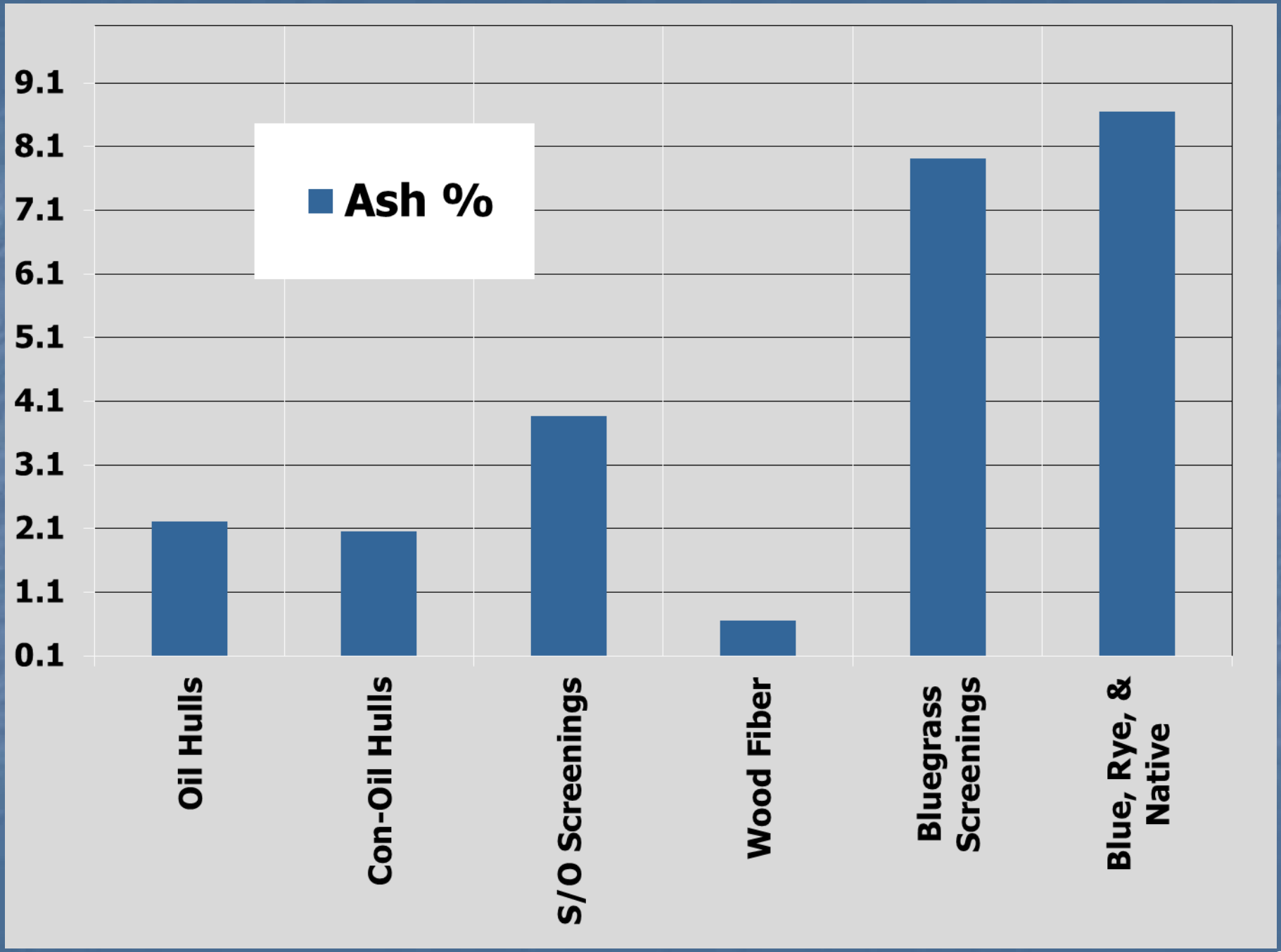
BTU/lb
Oil Hulls
Con-Oil Hulls
S/O Screenings
Wood Fiber
Bluegrass Screenings
Blue, Rye, & Native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Ash %
Oil Hulls
Con-Oil Hulls
S/O Screenings
Wood Fiber
Bluegrass Screenings
Blue, Rye, & Native

Environmental Issues - Boilers

- Air Permitting
  - Boilers (may) need to be included in your air permit
  - Emissions
    - Criteria pollutants (CO, VOC, PM, NOx, SOx)
    - HAP's (hazardous air pollutants)
    - GHG (greenhouse gases)
    - Stack Testing may be required
    - Emissions submitted in annual air emission reports
  - Emission Controls – Particulate Matter
    - 2 largest wood fired boilers have individual multiclones and a common 2-field electrostatic precipitator (ESP)
    - Smaller wood fired boiler has a multiclone

Environmental Issues - Boilers, cont.

- Boiler NESHAP
  - National Emission Standard for HAP's
  - 40 CFR 63, Subpart JJJJJJ (6 J)

    http://www.epa.gov/ttn/atw/boiler/boilerpg.html
  - Possible Requirements
    - Initial Notice of Applicability
    - Emission Limits
    - Biennial Tune-Ups
    - Energy Assessment
- Solid Waste – Ash Disposal
  - Proper disposal
    - pH levels

Ash Collection - Storage

Questions/Comments