# Water and Energy Savings
# TEL FSI, INC

David Binstock

Mick Jost

Minnesota Technical Assistance Program

UNIVERSITY OF MINNESOTA

Driven to Discover℠

# Company Overview

- TEL FSI, INC
- Chaska, MN
- Semiconductor Production Equipment: Surface Preparation Systems
- Products Include: ORION, ZETA, ANTARES


***ORION: Single Wafer Cleaning System***

***ANTARES: Single Wafer Cryokinetic Cleaning System***

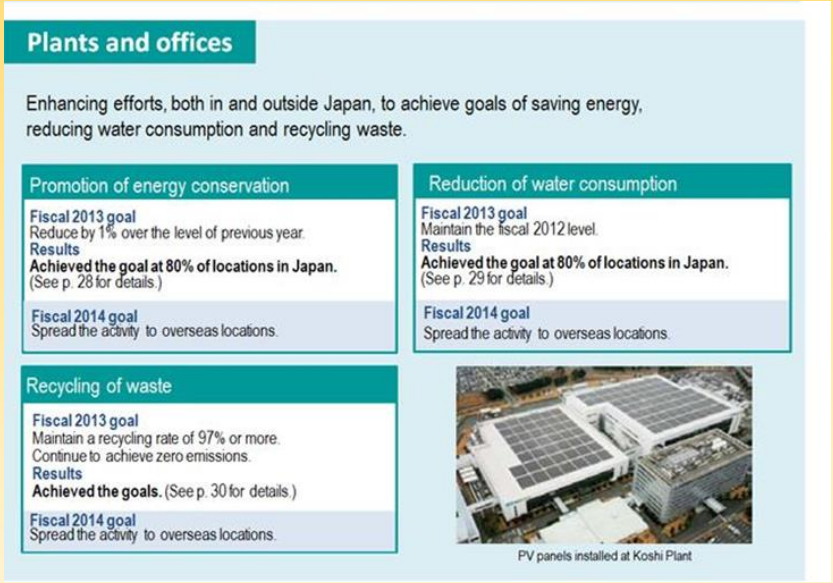
# Company Overview (cont'd)


***ORION: Single Wafer Cleaning System***

# Motivations for Change

## Water and Energy Reductions

- Corporate Goals
- Financial Savings
- SAC Unit Reductions



**Plants and offices**

Enhancing efforts, both in and outside Japan, to achieve goals of saving energy, reducing water consumption and recycling waste.

**Promotion of energy conservation**

Fiscal 2013 goal
Reduce by 1% over the level of previous year.
Results
**Achieved the goal at 80% of locations in Japan.**
(See p. 28 for details.)

Fiscal 2014 goal
Spread the activity to overseas locations.

**Reduction of water consumption**

Fiscal 2013 goal
Maintain the fiscal 2012 level.
Results
**Achieved the goal at 80% of locations in Japan.**
(See p. 29 for details.)

Fiscal 2014 goal
Spread the activity to overseas locations.

**Recycling of waste**

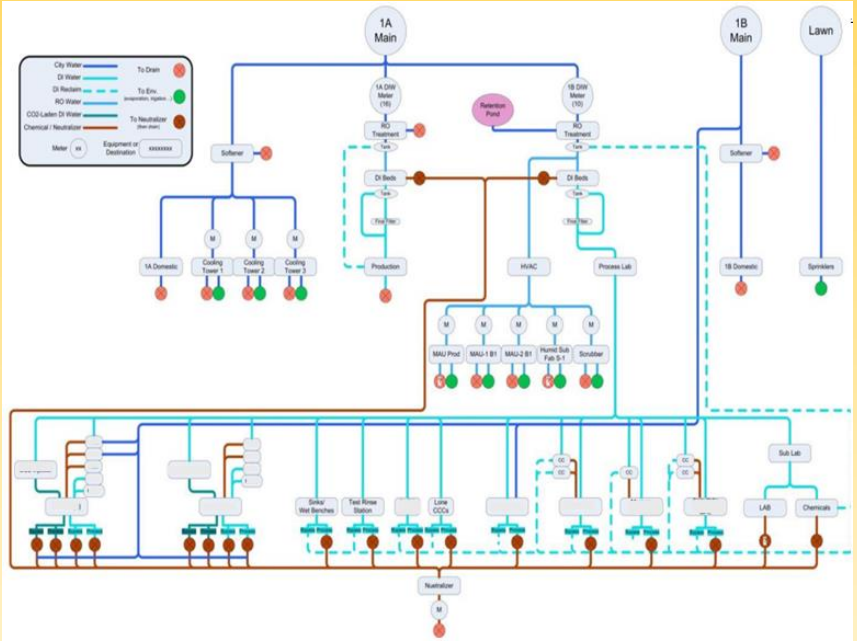
Fiscal 2013 goal
Maintain a recycling rate of 97% or more.
Continue to achieve zero emissions.
Results
**Achieved the goals.** (See p. 30 for details.)

Fiscal 2014 goal
Spread the activity to overseas locations.

PV panels installed at Koshi Plant

# Approach: Water

- Map out facility use
- Identify opportunities for reduction
- Justify with cost-savings analysis



# Process Investigation

- Water Use Data
- R&D Lab Use Estimations
- Discussion with employees
- Plumbing Investigation

# DI Water

- Deionized (DI or Ultra Pure Water)
- No contaminants
- High resistivity
- Used in Process Lab and Production

# DI Bypass

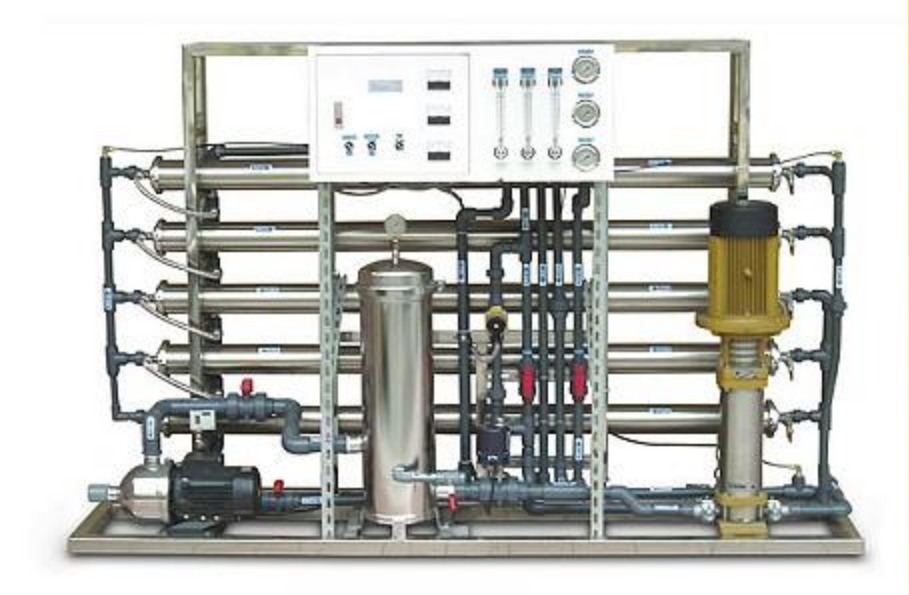
- Constant Flow to Prevent Fouling and Bacterial Growth

# DI Bypass (cont'd)

- Opportunities
  - Some lines sent to drain
  - Treated water unfit to reclaim
- Solutions
  - Re-plumb bypass lines
  - Specially treat water before reclaiming

# RO-Reject

- Reverse Osmosis Treatment Rejects 25% of water
- High in TDS



Reverse Osmosis Treatment Appartus
http://www.pure-pro.com/images/industrial-ro15000.jpg

# RO-Reject (cont'd)

- Opportunities
  - Wasted water
  - Repurpose? Reuse? Concentrate?
- Ideas
  - Use in water tower, irrigation
  - Increase RO efficiency
- Conclusion
  - No feasible solutions at this time

# Approach: Energy

- Identify energy intensive systems
- Identify opportunities for reduction
- Justify with cost-savings analysis
- Research other potential opportunities

# Compressed Air

- Used for:
  - Pneumatic Valves
  - Aspiration & Sump
  - N2 Substitute in Production
  - Air guns
- 4 Compressors
- 6% of Total Energy Costs

# Compressed Air (cont'd)

- Opportunities
  - Leaks
  - High System Pressure
- Solutions
  - Leak detection
  - Pressure reduction

# Roof-Top Units (RTUs)

- Consider replacements
- Newer models not much more efficient
- Conclusion: Retro-fit not recommended


http://www.drakemech.com/commercial/roof_top_heating_and_cooling_units/

# Renewable Energy

- Possible installation of
  - Wind
  - Solar
  - Geothermal
- Conclusion
  - Geothermal
  - Maybe Solar

# Suggested Actions

| Action | Water Savings | Payback (years) | Status |
|---|---|---|---|
| Reclaim DI Bypass | 14 – 23 % | 0.1 - 0.3 | Under Review |
| Treat & Reclaim Contaminated DI | 12 – 24 % | 0.5 – 1.2 | Recommended |
| **Action** | **Compressed Air Savings** | **Total Energy Savings** | **Status** |
| Repair Compressed Air Leaks | 30 – 50 % | 1.5 – 3.5 % | Under Review |
| Reduce System Pressure | 5% | 0.3% | Recommended |

# Personal Benefits

- Learned about:
  - Semiconductor Industry
  - Various Systems (water treatment, compressed air, etc.)
  - Workplace
- Project management skills
- Made an impact!

# Questions?