OSIsoft®

# USERS CONFERENCE 2016

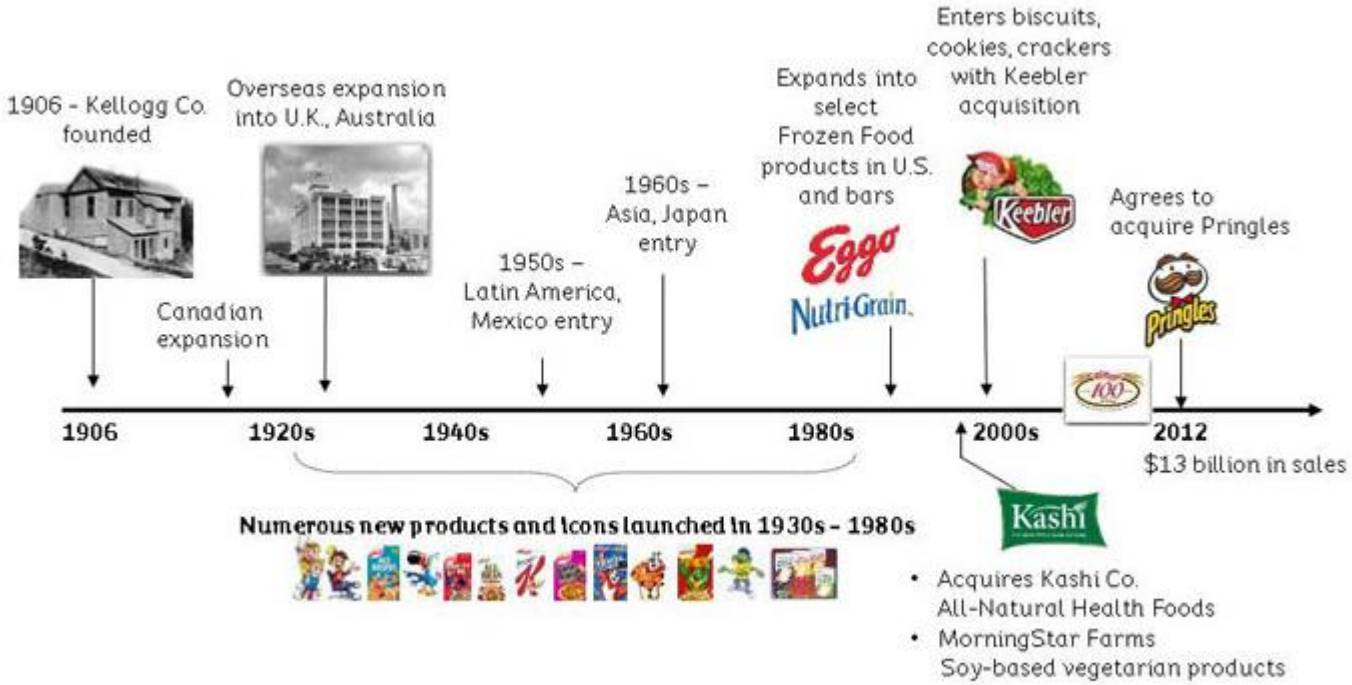
April 4-8, 2016 | San Francisco

## TRANSFORM YOUR WORLD

# Driving Sustainable Results in Energy Reduction

Presented by **John Gothberg**

# Our History



# Our Brands

# The Path to Improvement

- 1999-2000 Kellogg creates OAE (Operational Asset Effectiveness) group
- 2000 OSIsoft PI System is selected as the data infrastructure
- Developed tag naming/creation standards – Based loosely on BOM number of equipment
- Performance targets established
- 2005 Set 10 year energy reduction targets
  - Natural Gas
  - Electricity
  - Water/Sewer

# The Project for Improvement – A Baseline

- Approved Project Montage
  - Installed gas and air metering
    - Incoming utilities
    - Gas meters at processing lines
  - Installed Primary voltage metering (Big Picture)
  - Created hundreds of PI System tags and totalizers
  - Environmental monitoring

# The Sustainable Process

1. Develop Partnerships
   - People who understand your process
   - Business partners (Operations, CI, Engineering, Maintenance, FIF (Friends in Finance)
   - Engage the plant floor
2. Gather Data
   - Be creative with what you have.  Draw conclusions
   - Measure close to the source
   - Use smart people to calculate the opportunities
3. Identify the Opportunities
   - Pick low fruit and quick wins
   - Gather the partners
   - Challenge everything

# The Sustainable Process

4. Measure the Opportunities
   - Collect historical data
   - History (35 energy projects only 5 did not have/need PI System data)
5. Execute the Project
   - Data unlocks capital
   - Group projects
   - Be strategic.  Fuel the next project
6. Validate the Results
   - Put PI System to work
   - Communicate the results
   - Use the data to uncover unintended savings
7. Repeat

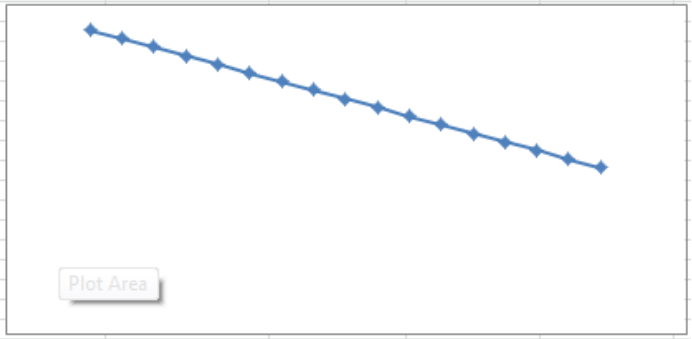
# Energy Projects $3.3MM Annually $1.8MM Rebates

| Plant | Year | Project Description | Annual Savings ($) | Annual Electrical Saving | Annual Natural Gas Savings | Annual Water Saving | Utility Rebate ($) | Colu |
|---|---|---|---|---|---|---|---|---|
| BC | 2005 | Bran And Rice Wet Scrubber Modificatior | 89,000 | | | | | |
| BC | 2006 | Bran Wet Scrubber Consolidations | 94,000 | 583 | 0 | 17,600,000 | | |
| BC | 2007 | Bran and Shred Wet Fines | 91,000 | 568,000 | 0 | 6,000,000 | | |
| BC | 2007 | B.100 Central Vacuum System Modificatic | 69,000 | | | | | |
| BC | 2007 | BFP #3 Modification | 44,000 | 182,171 | | | | |
| BC | 2007 | Shred Line Hot Water Recovery to Roto | 81,000 | 0 | 750 | 8,750,000 | | |
| BC | 2007 | DX Coated Product Wet Scrubbers | 59,000 | 236,000 | 955 | 3,800,000 | | |
| BC | 2008 | B.100 Lighting | 28,000 | 405,000 | 0 | 0 | $3,000 | |
| BC | 2008 | Boiler Stack Heat Recovery | 411,000 | | | | $6,000 | |
| BC | 2009 | Lighting | | | | | $39,000 | |
| BC | 2009 | Air Compressor Automation | 71,000 | 980,000 | 0 | 0 | $67,000 | |
| BC | 2009 | Rice Jetzone Heat Recovery | | | | | $25,000 | |
| BC | 2010 | Water Reclamation Phase 1 | 66,000 | 0 | 2,900 | 10,800,000 | | |
| BC | 2010 | Condenser Water Modifications | 140,000 | 1,938,000 | 0 | 0 | $6,000 | |
| BC | 2010 | Shred Fondant CHW Booster Pump | 35,000 | 493,000 | 0 | 0 | | |
| BC | 2010 | Chiller 8 | | | | | $108,000 | |
| BC | 2011 | Shred Frosting Vacuum Pumps | | | | | $17,000 | |
| BC | 2011 | HHW Pump Drives | 34,000 | 464,000 | 0 | 0 | $3,000 | |
| BC | 2012 | B. 90W Dessicant Unit | | | | | $10,000 | |
| BC | 2012 | Shred Cooling Tunnel AHU Modification | 149,000 | 679,000 | 11,000 | 0 | $93,000 | |
| BC | | HHW Amenities Booster Pumps | | | | | $9,000 | |
| BC | | PWHS Soft Cold Water Pumps | | | | | $5,000 | |
| BC | 2012 | B.100 Lighting Upgrades | 27,000 | 415,000 | 0 | 0 | $13,000 | |
| BC | 2012 | B.100 Compressed Air Cooling Loop | 20,000 | 240,000 | 0 | 1,000,000 | $12,000 | |
| BC | 2012 | Compressed Air Survey | | | | | $12,000 | |
| BC | 2013 | DA Vent Steam | | | | | $15,000 | |
| BC | | Bran Mod 4 Rotoclone | | | | | $6,000 | |
| BC | | Wheat Receivers | | | | | $9,000 | |
| BC | 2013 | Cooling Towers | | | | | $68,000 | |
| BC | 2013 | CHW System Modification | 41,000 | 644,000 | 0 | 0 | $17,000 | |
| BC | 2013 | Boiler Energy Optimization | 190,000 | 236,000 | 25,000 | 0 | $59,000 | |
| BC | 2014 | Compressed Air Valves | | | | | $60,000 | |
| BC | 2014 | Cond Return Improvements | 89,000 | 902,000 | 11,000 | 0 | $50,000 | |
| BC | 2014 | Cond Return Improvements Phase II | 76,000 | 0 | 10,000 | 832,000 | $32,000 | |
| BC | 2014 | Water Reclamation | 212,000 | 0 | 0 | 41,400,000 | $0 | |
| BC | 2014 | Chiller 9 | | | | | $84,000 | |
| BC | 2014 | 1.0 Processing HVAC (Phase I and II) | 392,000 | 2,705,000 | 37,000 | 0 | $314,000 | |
| BC | 2015 | Boiler Combustion Modifications | | | | | | |
| BC | 2015 | Cold Storage HVAC | | | | | $8,000 | pending |
| BC | 2015 | 2.0 Processing HVAC | 387,000 | 3,421,000 | 24,083 | 0 | $332,000 | pending |
| BC | 2015 | City Water Modifications | 82,500 | 0 | 1,719 | 14,242,000 | $7,000 | pending |
| BC | 2015 | Compressed Air Leak Audit | | | | | $18,000 | pending |
| BC | 2016 | 1.0 and 2.0 Packaging HVAC | 325,000 | | | | $251,000 | pending |
| BC | 2016 | Chiller 10 | | | | | | |
| BC | 2016 | Water Softeners | | | | | | |
| BC | 2017 | B. 100 Cooling Towers | | | | | | |
| BC | 2018 | Waste Water Treatment Plant | | | | | | |
| | | | **3,302,500** | | | | **$1,818,000** | |

# Energy Usage

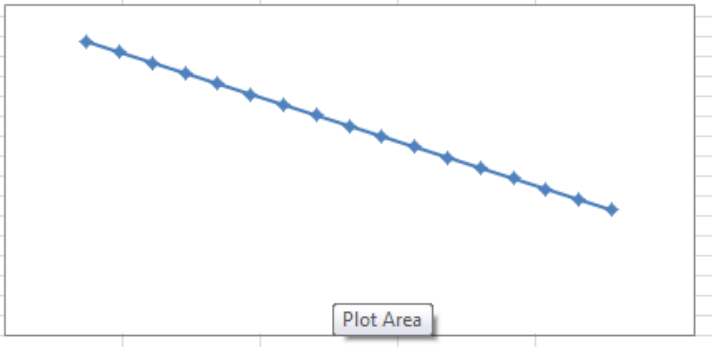
Electrical Usage Trendline

| | |
|---|---|
| 2004 | 949 |
| 2005 | 919.9 |
| 2006 | 890.8 |
| 2007 | 861.7 |
| 2008 | 832.6 |
| 2009 | 803.5 |
| 2010 | 774.4 |
| 2011 | 745.3 |
| 2012 | 716.2 |
| 2013 | 687.1 |
| 2014 | 658 |
| 2015 | 628.9 |
| 2016 | 599.8 |
| 2017 | 570.7 |
| 2018 | 541.6 |
| 2019 | 512.5 |
| 2020 | 483.4 |

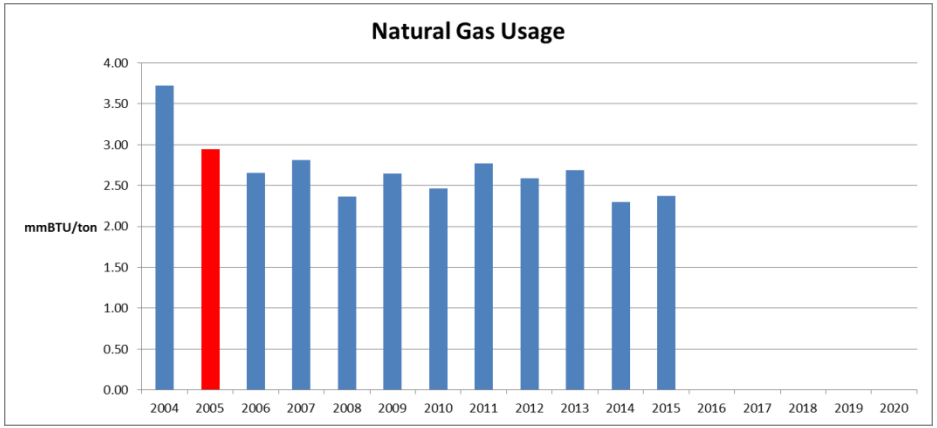


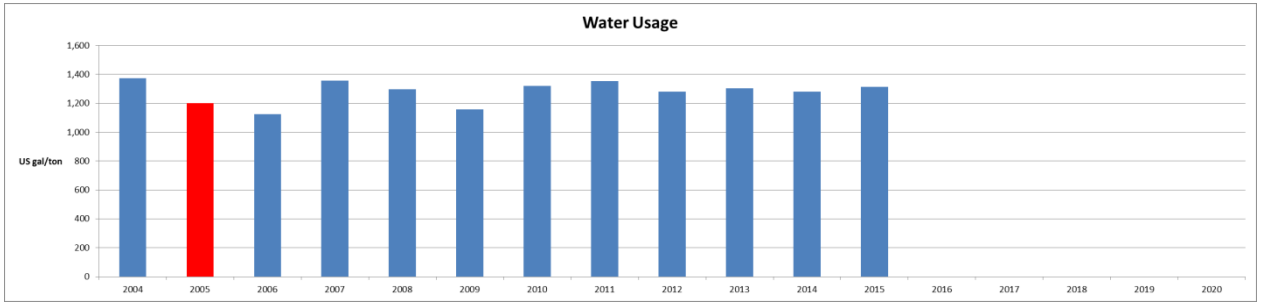

Natural Gas Usage Trendline

| | |
|---|---|
| 2004 | 7.45 |
| 2005 | 7.165 |
| 2006 | 6.88 |
| 2007 | 6.595 |
| 2008 | 6.31 |
| 2009 | 6.025 |
| 2010 | 5.74 |
| 2011 | 5.455 |
| 2012 | 5.17 |
| 2013 | 4.885 |
| 2014 | 4.6 |
| 2015 | 4.315 |
| 2016 | 4.03 |
| 2017 | 3.745 |
| 2018 | 3.46 |
| 2019 | 3.175 |
| 2020 | 2.89 |

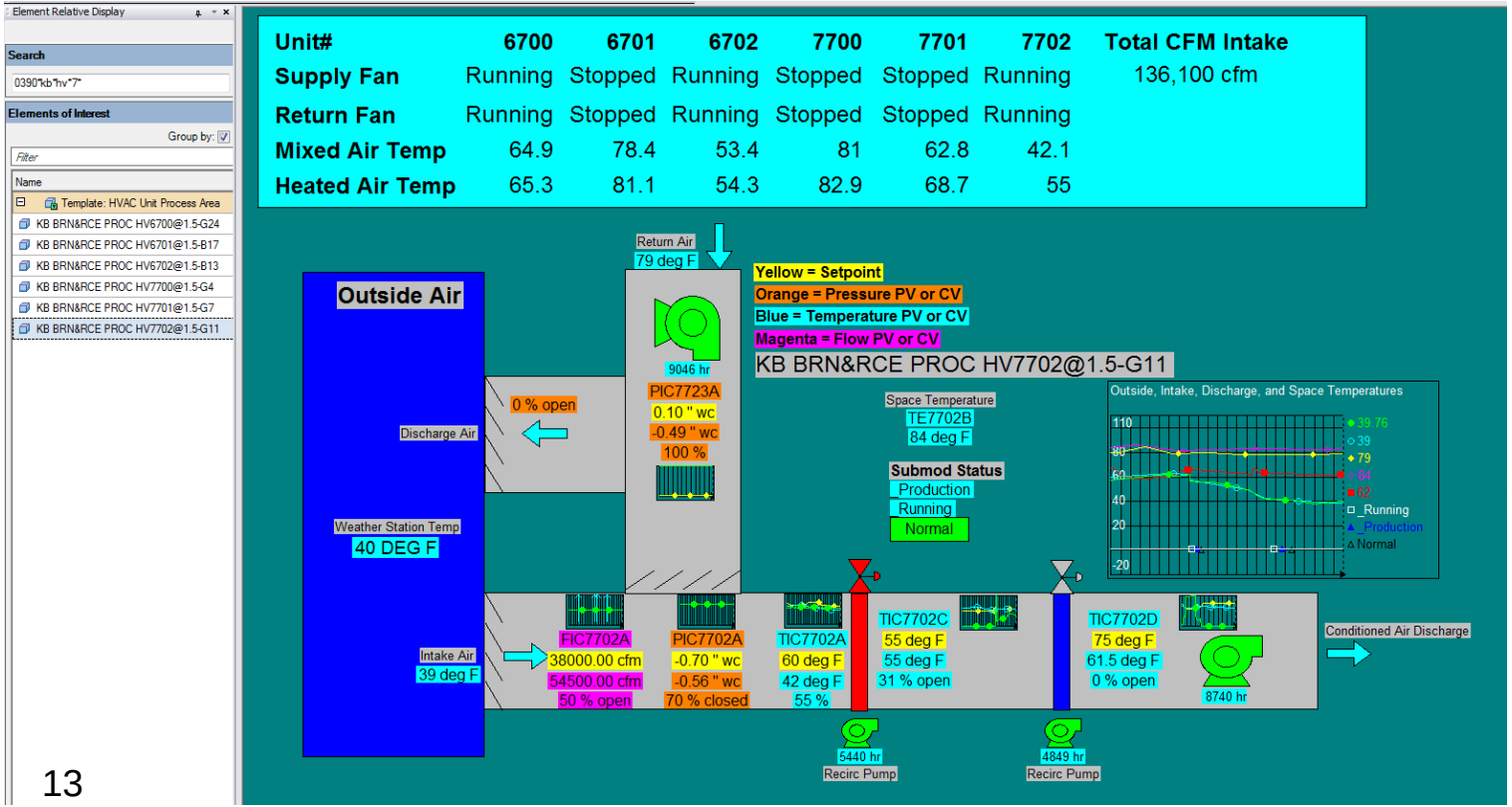



# Energy Usage (Tell the whole story)

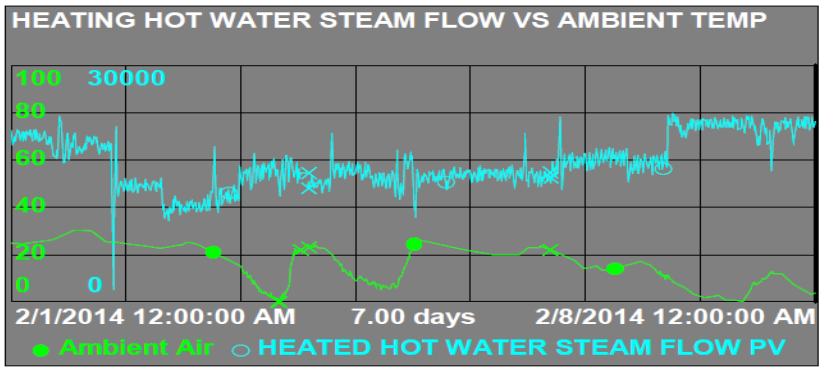



# HVAC Project Example



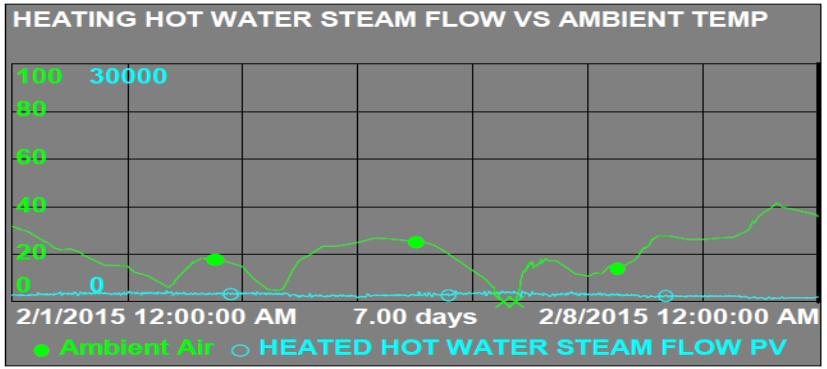

# HVAC Results




PRE-PROJECT (1ST WEEK IN FEB, 2014)

Heating load due to minimum HHW valve positions for freeze protection in six HVAC units.

Mechanical cooling was required to remove the "artificial" heat loads.



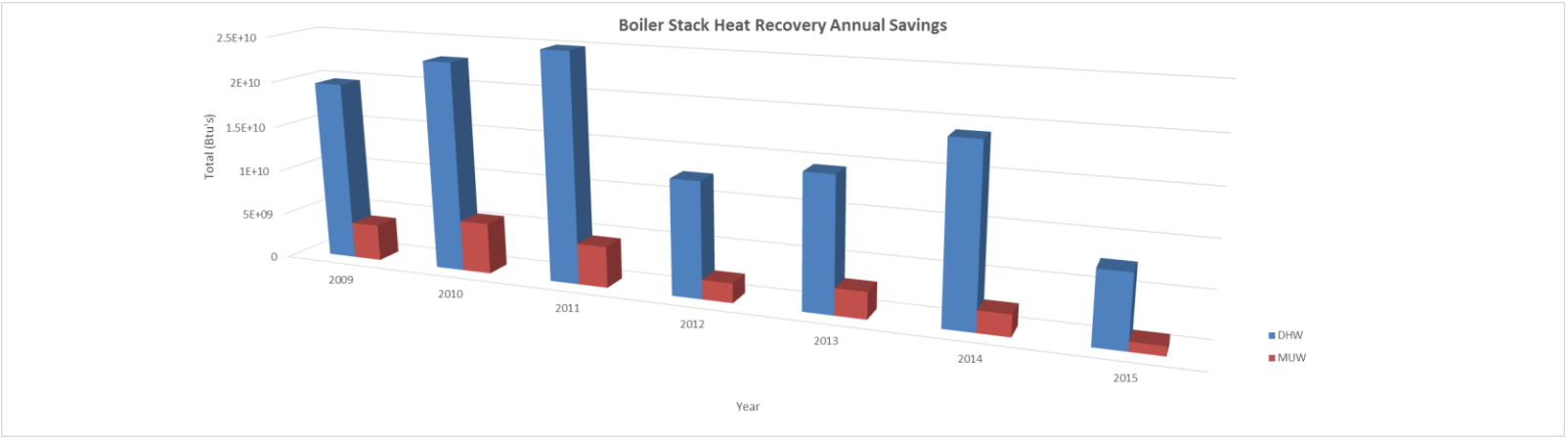

POST-PROJECT (1ST WEEK IN FEB, 2015)

HHW and CHW circulation pumps implemented for freeze protection vs minimum valve positions.

No mechanical cooling load. Outside air utilized to satisfy space conditions.

**RESULT - $40,000 ONE WEEK UTILITY SAVINGS**

# Boiler Heat Recovery




| Year | DHW (Btu) | MUW(Btu) | Total Cost Savings |
|---|---|---|---|
| 2009 | 19724409856 | 3988113472 | $142,275.14 |
| 2010 | 22995355648 | 5587236352 | $171,495.55 |
| 2011 | 24983941120 | 4490520576 | $176,846.77 |
| 2012 | 12547899392 | 2112881664 | $87,964.69 |
| 2013 | 14479712256 | 2879935488 | $104,157.89 |
| 2014 | 19049988096 | 2309167104 | $128,154.93 |
| 2015 | 7724687360 | 994043904 | $52,312.39 |
| **Total** | **1.21506E+11** | **994043904** | **$735,000.23** |

# Contact Information

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Kellogg Company

# Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

# Please remember to…

Complete the Online Survey for this session


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谢谢

Danke

Merci

Gracias

# Thank You

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Спасибо

Obrigado

**“Hope is not a business strategy.  Be relentless”**

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