Water Conservation and Supply Risk

Chris McCune
Sr Corporate Account Manager
Nalco Water

Tim Barnhouse
Total Plant Assessment Team Lead
Nalco Water
Agenda

- Global Water Crisis
- Water Value & Risk Assessment
- Total Plant Approach
- Case Study
Unprecedented demand on the world’s limited fresh water supply

- Population growth, urbanization, growing middle class
- Increased demand for goods and services
- Unprecedented demand on world’s water supply
- Demand exceeding supply by 50% more people by 2050
- 4 billion more consumers in cities by 2025
- Requiring 2.5 times more water per capita than rural areas

47% of the global population will be living in areas of high water stress by 2030

40% within two decades
Global Business Water Risk Trends and Challenges

- Strictly water policies in developed and emerging economies
- Financial implications to industry
- Tighter ground water and quality requirements

- New UN Sustainable Development Goals have defined water targets
- Reputational risk exposure and license to operate issues

- Water scarcity risk mitigation plans and performance
- 81% of S&P 500 index companies issued corporate sustainability reports in 2015, more than ever before

- Lack of road map and tools to understand risk exposure
The world’s largest, fastest growing economies face increasing water risk

- 45% of total GDP ($63 trillion) will be at risk due to water stress by 2050, which is 1.5 times the size of today’s entire global economy*
- Water scarcity could lower the GDP of some countries by 6% by 2050**

Sources: Aqueduct, WRI, GWI, Trucost
*International Food Policy Research Institute
**World Bank
***Updated 2017
Significant Business Impact

In 2017, the global water crisis was cited as the third global risk for impact.*

70% of companies surveyed identify water as a substantive business risk

Global Water Crisis impact upon US-based Fortune 500 companies:

- **94%** face potential physical challenges
- **69%** face reputational risks
- **80%** affects their decisions on where to locate facilities
- **60%** affects business growth and profitability within five years

*After weapons of mass destruction (#1) and extreme weather events (#2)

Protein Consumption Expected to Increase While Water Supplies Decrease

Increasing Demand for Protein

- Global protein consumption predicted to **nearly double by 2050** as an increasingly affluent global population reaches over 9 billion by 2050.

Decreasing Water Supply

- Global supply and demand gap expected to be **40% by 2030**

- Water availability in cities could **decline by as much as two thirds by 2050**

- By 2020, **40 out of the 50** US states forecast severe water shortages

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2 World Bank 2017
1 Soneva Dialogue, The Global Protein Challenge 2016
3 McKinsey, Charting our Water Future
From Operations at Risk to Risk Mitigation

The Challenge
- Water price does not reflect its full value
- Water scarcity makes it harder to access water necessary to operate

The Solution
- Risk-adjusted water price = Market price + water risk premium
- Potential revenue at risk = Water required > water share

Business Implications
- Reduced profit margins
- Decreased production & loss in revenue

BUSINESS OUTCOME
- Actionable quantification of water-related risks in financial terms
- Informs efforts to assess and manage water risk
Total Plant approach
from influent to effluent across operation

REduce | Reuse | Recycle

Impact Virtually 100% of the Water in a Plant
Seek & find: discovering hidden opportunities
Total Plant Assessment from Ecolab

1. HOLISTIC VIEW OF YOUR OPERATION
2. ASSESS COMPLEX CONNECTIONS BETWEEN YOUR SYSTEMS
3. DELIVER SAVINGS OPPORTUNITIES

Over $3M in Savings Opportunities

ECCOLAB & NALCO
TOTAL PLANT ASSESSMENT

Energy Water Product Quality

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Average identified savings opportunities

Total Identified Savings Opportunities
≈ $2.8M

- **WATER**
  - 15-50%
  - Weighted avg ≈ 35%

- **ENERGY**
  - 10-40%
  - Weighted avg ≈ 25%

Results can vary based on numerous factors such as: current water and energy costs, size and age of facility, amount of current automation and previous emphasis on sustainability.
Reduce
Single Application

Reuse
Between Applications

Recycle
Post-treatment Recycle

- 15 to 20%
- 20 to 40%
- 60 to 85%

Complexity – Risks - Costs

BRAND
TALENT
FOOD SAFETY
PROCESS
ASSETS
COMPLIANCE

R1
R2
R3

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Plant Profile

- **Production**
  - Processing 7,300 Hog per day
  - Prepared foods operation, Ham, Sausage, Bacon, Hot Dogs

- **Key Metrix**
  - Water - 333.4M GPY
  - Electricity – 351,026 DHT
  - Production – 838.4M lbs of product
Plant Key Business Drivers

Challenge:

Organizational objective of driving sustainability initiatives across organization by 2020

- 20% water reduction by 2020 (67M gal based on 333M)
- 20% energy reduction by 2020 (70k based on 351k)
- 20% reduction in all waste
INTRODUCING A NEW WAY TO FACTOR WATER RISKS INTO BUSINESS DECISIONS

ASSESS & MONETIZE RISKS
Develop a site-level or enterprise risk profile

IDENTIFY OPPORTUNITIES
Assess operational opportunities for water conservation

VALUE & PRIORITIZE
Leverage data to make the business case, measure impact and determine eROI

ACTION PLAN
Execute water reduction strategies
TPA Identified Potential Savings

**OPERATIONAL SAVINGS IMPACT:**
- **WATER:** $1,447,351
- **ENERGY:** $1,007,043
- **WASTE:** $452,456
- **PRODUCTIVITY:** $15,000
- **CHEMICAL:** $79,529

**SUSTAINABILITY IMPACT:**
- **WATER:** 142,255 K
- **ENERGY:** 192,801 DTH
- **WASTE (LBS.)**: 1,390,693 KWH
- **PRODUCTIVITY (HRS)**
- **CHEMICAL**

**CO2 EQUIVALENT**: 12,317 METRIC TONS

**OVERALL **eROI** IMPACT:**
- **TOTAL ANNUAL SAVINGS**: $3,004,499

**WATER USAGE (GALLONS):**
- **CURRENT**: 333 M
- **FUTURE**: 191 M

**ENERGY CONSUMPTION (DTH):**
- **CURRENT**: 351,026
- **FUTURE**: 158,225

**SAVINGS:**
- **WATER**: 42.7% REDUCTION
- **ENERGY**: 54.9% REDUCTION

**TOTAL SAVINGS**: >$3.0M
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ACTION PLAN
Execute water reduction strategies

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Implemented Projects To Date

Implemented Projects

1. DC Tower Cycle Increase
2. Food Service Tower – add common sump in increase cycles
3. Tower 3 cycle increase
4. North 40 Tower cycle increase
5. Main plant boiler efficiency upkeep
6. Main plant boiler increase cycles
7. South Common – increase cycles
8. HAM Boiler – DA regulatory replace
9. Compressed Air Leak Repair

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<thead>
<tr>
<th>Project Description</th>
<th>Annual Impact</th>
<th>% of Goal</th>
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<tbody>
<tr>
<td>DC Tower Cycle Increase</td>
<td>15.7M</td>
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<tr>
<td>Food Service Tower</td>
<td>9.4K</td>
<td>13%</td>
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<tr>
<td>Tower 3 cycle increase</td>
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<tr>
<td>North 40 Tower cycle increase</td>
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Projects – Active and Approved

Implemented Projects

1. Recover water to screens
2. RO rejects to pens

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<th>Annual Impact</th>
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<td>26.8M</td>
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<td>9.4K</td>
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<td>76</td>
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<td>$438K</td>
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### Future Projects

#### Implemented Projects

1. Heat exchanger or pre boiler makeup
2. High Pressure CR vent
3. Softener brine recovery
4. Effluent reuse
5. Boiler economizer
6. Blowdown heat recovery for Ham Boiler

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<td>66.6M</td>
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<td>79.5K</td>
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<td>4K</td>
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<td>$1.6M</td>
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QUESTIONS

cmcccune@nalco.com