Water Use in Utility Power Generation

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OG&E Operations

Largest electric utility in Oklahoma

Regulated electric utility: > 830,000 customers

Generating capacity of 6,771 megawatts:
• 7 power plants,
• 3 wind farms
• 2 solar sites

Service territory: 30,000 square miles in Oklahoma and western Arkansas
Water Use in the U.S Electric Utility Industry

Investment of > $100 Billion/yr in infrastructure with long-term planning horizons

>80% of all electricity produced in the U.S utilizes steam generation however from a diverse set of sources

Water needs within a steam generator:
- Cooling: ~ 97% return to source
- Steam production
- On-site process management: reuse e.g Mustang

Water withdrawal for thermoelectric power has dropped steadily since the 1980s and continues
- Greater efficiency in newer generators by 25-40%
- Increased diversity in fuels and technology

Water reuse has been a long-standing practice in the industry by design

Source: Department of Energy, Energy Information Administration 2012
2016 Generation (MWh) by Fuel

- **U.S.**
  - Coal: 34%
  - Gas: 30%
  - Nuclear: 7%
  - Hydro: 1%
  - Renewable: 8%
  - Other: 20%

- **OG&E**
  - Coal: 54%
  - Gas: 41%
  - Nuclear: 5%
  - Hydro: 4%
  - Renewable: 0%
  - Other: 0%

- **Southwest Power Pool**
  - Coal: 48%
  - Gas: 34%
  - Nuclear: 5%
  - Hydro: 7%
  - Renewable: 18%

Source: Edison Electric Institute, Southwest Power Pool, OG&E
National Electric Utility Water Use Relative to Others

Municipal & Domestic
- 47 Billion gals/day
- 58% consumption

Thermoelectric
- 139.8 Billion gals/day
- 3% consumption

Agriculture
- 138.2 Billion gals/day
- 78% consumption

Thermoelectric Consumption Accounts for Only 4% of All Consumption

Oklahoma Utility Power Plant Freshwater Withdrawal

Source: Oklahoma Water Resources Board
Does not include GRDA or non-freshwater withdrawal

Weather, generation /technology changes, market prices, customer growth
Questions?
Water Cycles in Typical Steam Generation Facility

1. Steam Cycle

Fuel:
- Coal
- N. Gas
- Nuclear

2. Non-Contact Cooling

Water Source: re-circulated

3. Process

Water - reuse