



The Premier Energy Training Workshop
and Trade Show for Federal Agencies

A River of Energy Solutions

Strategies for Infrastructure Reliability

Utilities Infrastructure Track

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Utilities Reliability

- **The Business Case for utilities investment**
 - **Risk & liability - Industry & Army data**
 - **Benefits**
 - **Capability & resourcing**
- **Utilities Privatization (UP) investment option**

See also Session 6, Infrastructure Track
- **Other strategies to improve reliability**

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Industry Utility Risk Data

Electric

- Average age of transformer failure is 18 years
- At 50 years, transformers have a 50% failure rate
- 40% of failures are maintenance-related
- Transformer procurement lead time is 750 days
- Transformer costs double every 12 years

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Industry Utility Risk Data

Water / Wastewater

- Average for plant equipment failure is 60-yrs (water), 50-yrs (wastewater)
- After 25 years, sewer pipe failure frequencies is 68%
- In well maintained systems, probability of pipe failure ~ 100% at 30-yrs
- Potential high cleanup costs for sewer line failures
- Old plants cannot attain new performance standards

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Industry Utility Risk Data

Natural Gas

8 lives, 50 homes lost (\$850M)

(AP): *“Experts say the California disaster epitomizes the risks ... pipe was more than 50 years old — right around the life expectancy for steel pipes... section had an ‘unacceptably high’ risk of failure ...*

Explosion, Sep 2010 San Bruno CA



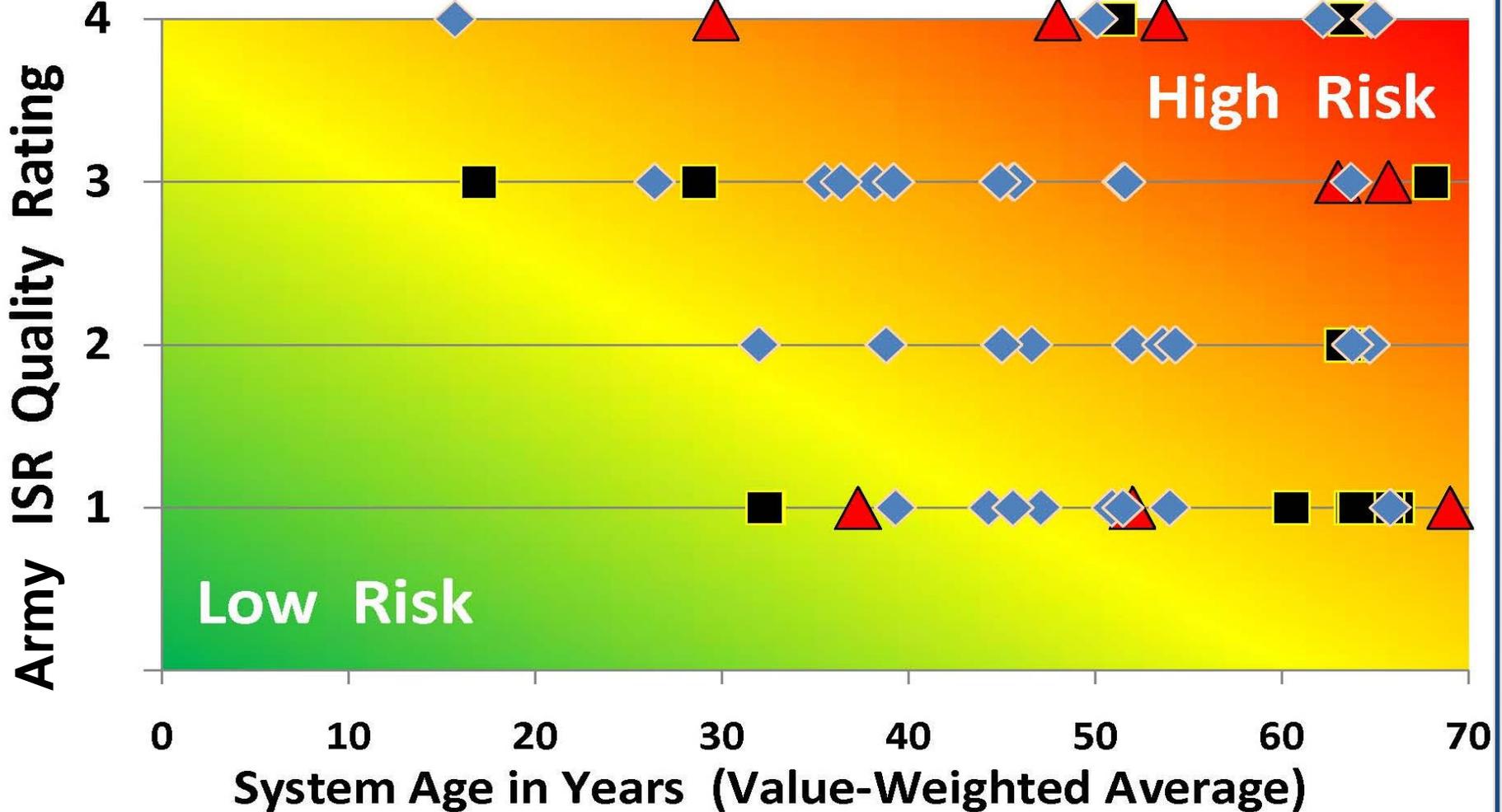
2,840 significant gas pipeline accidents since 1990, more than a third causing deaths and significant injuries.”

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Industry & Army Risk Assessments

for 56 UP Evaluations FY10-16: ■ Electric Energy ▲ Gas Safety ◆ Water/Wastewater Environment





Utility Risks & Liabilities

Unlike costs, risks cannot be deferred

Electric – energy risks

- Energy Security [it's not secure if it's broken or obsolete]
- Energy Conservation Goals

Water / Wastewater – environmental & health risks

- Maintain environmental compliance as good stewards
- Tightened discharge standards (e.g. Chesapeake, Puget Sound)

Natural Gas – safety risks

- Increasing risk of catastrophic failures from aging infrastructure

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A Difficult Business Case - Cost

Direct maintenance cost is budgeted, but not:

- **Risk of catastrophic failure**
- **Government self-insurance liabilities**
- **Emergency response to outages**
- **Premium costs for emergent repairs**
- **Mission impacts from service interruptions**
- **Data losses, opportunity losses**
- **Fines, penalties, adverse PR, morale,**

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Infrastructure Investment Benefits

- **Energy savings**
 - More efficient equipment
 - Reduced distribution losses
- **Improved serviceability**
- **Better stock support – reduced lead time**
- **Improved controls & response capabilities reduce outage durations**
- **Design opportunities for redundancy / loop**

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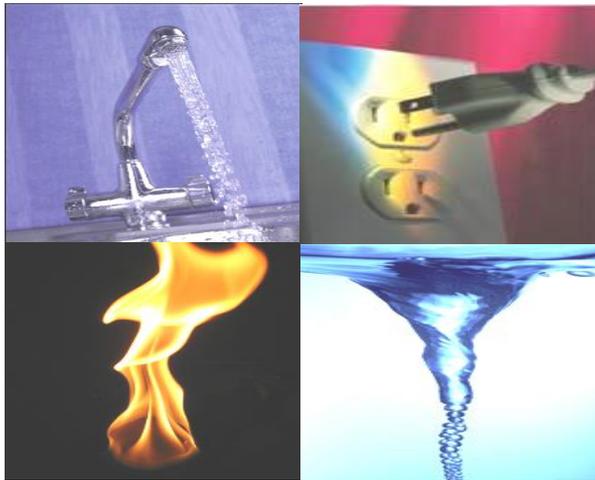


Why Privatize?

- **Focus on core competencies:**
“ ... Privatization allows installations to focus on core defense missions and functions by relieving them of activities that can be done more efficiently and effectively by others.” 2005 OSD guidance
- **Life-cycle cost avoidance & cost stability**
- **Leverage private capital & technical capabilities**
- **Reduce risk & liability** [energy, safety, environmental]
- **More efficient, reliable, responsive and sustainable services**



Utilities Privatization (UP)



UP evaluates whether UP Provider is lower cost to bring a utility up to industry standards & operate at that level vs life-cycle “should cost”.

UP = Conveyance + Utility Service Contract
using 10 USC 2688 50-yr DoD contract authority

Army UP Program Results - 147 Privatized Systems:

40 Electric, 38 Gas, 32 Water, 34 Wastewater, 3 Heat/Power

- **28% avg “cost-avoidance” since FY99 (\$1.9B NPV)**
- **86% of evaluations complete (305 out of 355 U.S. systems)**

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UP Process

- We seek a win-win partnership with a technically capable, experienced, and financially secure company
- Open competitive bidding process
- Privatization decided by long-term, life-cycle costs to:
 1. OWN, Operate & Maintain
 2. Complete Initial Project Investments/Upgrades
 3. Execute Scheduled Periodic Replacements
- Leverage private financing (up to life of the asset)



UP vs Contract O&M

- **Where O&M is contracted out**
 - No long-term or vested interest – incentives deterioration
 - Owner retains environmental liability
- **The UP Provider *OWNS* the system**
 - Owner/operator bears environmental liabilities
 - Government does not operate or make connections
 - Minimal Govt inspections for non-Govt assets
 - UP Provider is driven by self-interest, as well as contract, industry standards, EPA, OSHA, insurers, lenders ...



UP Pre-Award Planning

- **Typical Initial Capital Upgrades within 5-years:**
 - Major system replacements / overhauls
 - Phased line replacements based on age/condition
 - Upgrade from obsolete low voltage electrical distribution
 - Improve controls with SCADA or UMCS
 - Metering
- **Army requires amortization for larger projects**



Strategies to Improve Reliability

- **Plant optimization** – review SOPs, limits, capabilities
- **Re-Capitalize** – Govt, utility company, UP private funds
 - Limited Government project funding
 - Rate-based or tariff investment, ESPC/UESC, amortized
- **Periodic Utility System Assessments**
 - Projected requirements vs system capacity & capability
 - Leak detection, power factor correction, IR surveys
 - Develop project priorities

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Strategies to Improve Reliability

- **Maintenance Management**
 - Software systems
 - Scheduled overhaul/replacement vs emergency response
 - Preventive maintenance [tree trimming, exercise valves]
- **Process Controls** - Lean Six Sigma, Total Quality Mgmt
 - Collect & analyze performance and outage data
 - Identify root causes, common/special causes
 - Modify SOPs, triggers, and incident response

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Questions?

U. S. Army Headquarters, Office of the Assistant Chief of Staff
for Installation Management, Public / Private Initiatives Division