

LA-UR-17-30638

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Title: NNP-LANL Utilities - Condition Assessment and Project Approach

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Intended for: Follow-up to Meeting with Naval Reactors visit to LANL in July 2017.

Issued: 2017-11-21

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LANL Utilities & Transportation Asset Management

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July 17, 2017



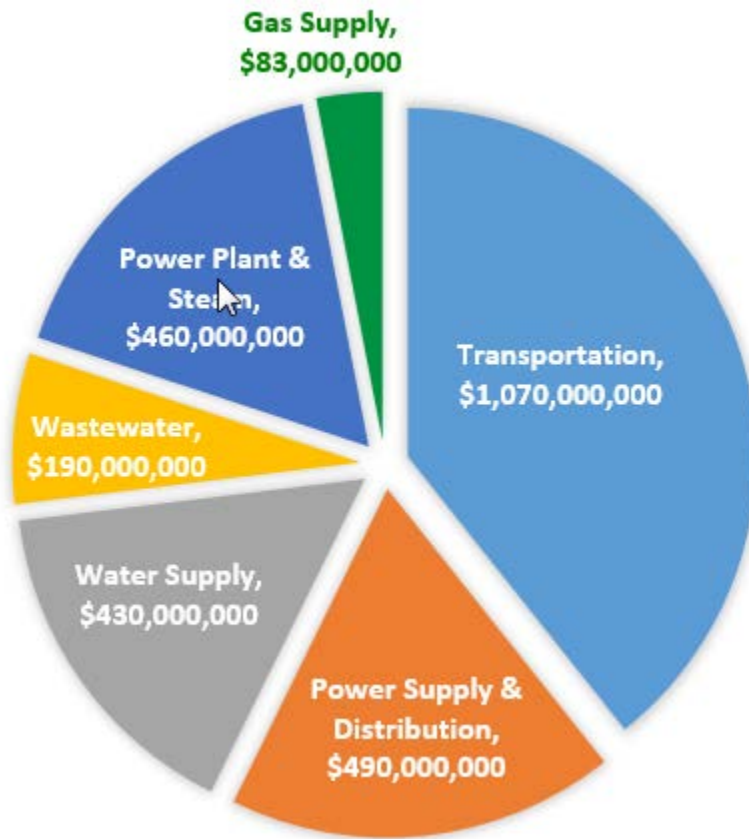
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Agenda



- **Utility Assets Overview**
- **Condition Assessment**
 - Observational & Performance Assessment
- **Project Nomination & Ranking**
 - Planning Cycle
 - Project Nominations and Ranking
 - Benefit Criteria
- **Project Funding**

Utility Assets Overview



Transportation:

84	miles	Primary & Secondary Roads
820	feet	Bridge
34,000	sq. yds	Parking Structures
698,000	sq. yds	Parking Lots

Utilities:

6,000,000	gallons	Water Tanks
580,000	feet	Water Piping
6,000	gpm	Water Pumps
900,000	gpd	Wastewater Treatment
330,000	feet	Wastewater Piping
16,000	gpm	Wastewater Pumps
371,000,000	BTU/hr	Steam Production
20	MW	Power Production
76,000	feet	Steam & Condensate Piping
360,000	feet	Gas Piping
335	each	Gas Regulating Stations
200	miles	Primary & Secondary Power Lines
3,450	each	Power Poles
192	MW	Substations
700	MW	Transformers

Replacement Value = \$2.7 billion as of 2017

Condition Assessment

- Roads & Bridge
- Water
- Wastewater
- Power & Steam
- Power Supply & Distribution
- Gas



Condition Assessment

- **Roads & Bridge**

- observational measure of pavement condition index (PCI) for roads
- captured in USACE MicroPAVER for roads and parking lots
- projects buy improvements in PCI based on starting condition
- road PCI is visible in GIS by segment
- bridge inspected annually
- needs are triaged by risk



Annual bridge inspection evaluation of superstructure

Pavement Condition	PCI Rating	
	From	To
Good	86	100
Satisfactory	71	85
Fair	56	70
Poor	41	55
Very Poor	26	40
Serious	11	25
Failed	0	10



Road inspection example

Condition Assessment

- Roads & Bridge

- **Water**

- biennial audio leak survey
- major leaks are repaired
- planning an update to technology for measurement of local corrosion damage
- corrosion specialist conducts root-cause investigation on excavated piping
- leak information is captured in GIS
- performance assessment by Water GEMS model combined with hydrant testing (developing)
- storage tanks are inspected annually via submersible



Example distribution water tank



Water tank interior after renovation

Condition Assessment

- Roads & Bridge
- Water
- **Wastewater**
 - Gravity sewer is camera inspected on 5-yr cycle
 - Observed defects are categorized and triaged by risk



Example sewer camera inspection



Sanitary Sewer Treatment Plant

Condition Assessment

- Roads & Bridge
- Water
- Wastewater
- **Power & Steam**
 - Annual boiler and pressure vessel inspections by NBIC certified inspection
 - Steam and condensate line thermographic inspections
 - Audio inspection of steam traps

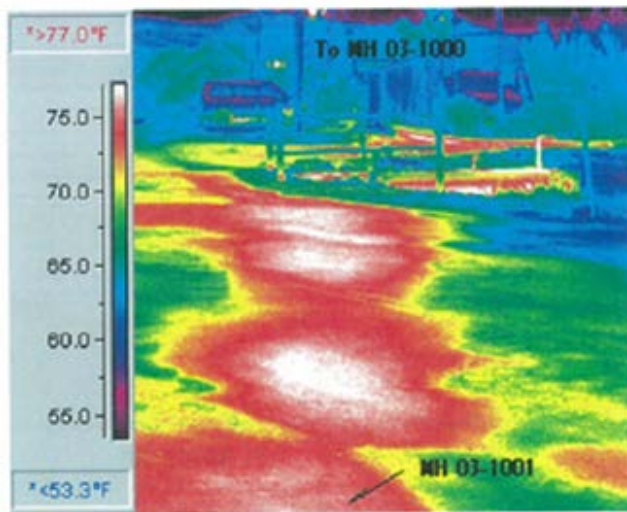


Image 22 , Report Sketch #17



Example steam system thermographic inspection and steam pit LIDAR survey

Condition Assessment

- Roads & Bridge
- Water
- Wastewater
- Power & Steam
- **Power Supply & Distribution**
 - Pole inspection by micro-bore, captured in GIS
 - Transformer & switchgear inspections 5-yr interval (Doble test, >750kVA)
 - Developing ETAP & PLSF, power flow and capacity models for performance assessment
 - Sag clearance assessment on transmission system



Substation and Distribution Switchgear



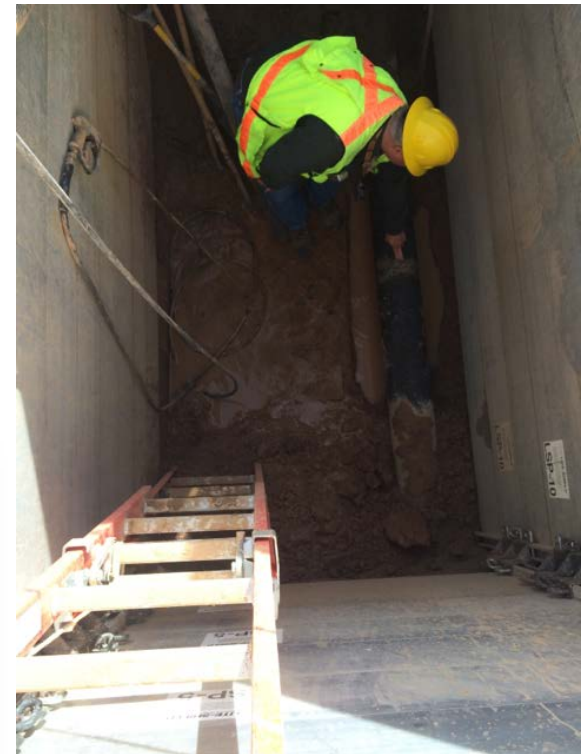
Example of wood pole micro-bore integrity inspection

Condition Assessment

- Roads & Bridge
- Water
- Wastewater
- Power & Steam
- Power Supply & Distribution
- **Gas**
 - Annual leak surveys – gas detector
 - Soil potential surveys – cathodic protection systems
 - Corrosion specialist conducts root-cause investigation on excavated piping

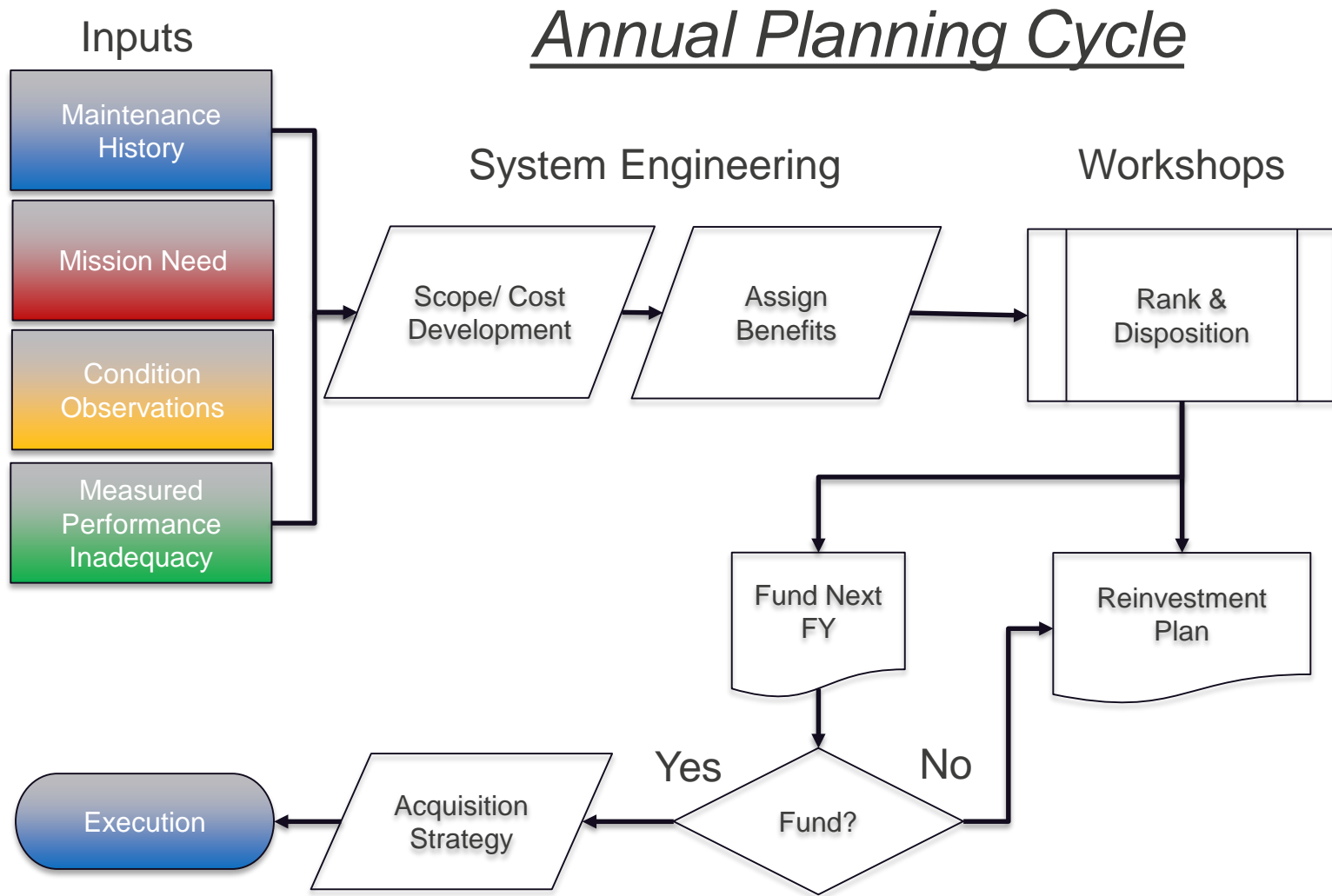


New gas main installation



Corrosion specialist inspections pipe condition on excavated piping

Utilities Project Nominations & Ranking



Utilities Project Nominations & Ranking

- **Utilities Approach (unique elements)**

- Focused on maintaining resiliency, serviceability, and system reliability as defined by industry benchmarks (e.g. SAFI, SADI)
- Condition data synthesized into quantitative condition score
- Information captured in geographic information system (GIS)
 - Working to develop models for each system to forecast system performance based on degradation, reinvestment, changing mission needs
- As-found condition score evaluated against “desired condition”
- Utilize project database (a SharePoint site)
 - One-page per project datasheet
 - Disposition projects (next year, within 5 yrs, beyond 5 yrs)
 - Funding cut line (projects below cut stay on list for later consideration)
 - Captures history of completed reinvestment
 - Captures deferred maintenance/repair need buy-down
 - Nominated projects ranked by (Benefit : Cost) ratio

Utilities Project Nominations & Ranking

- **Project Benefit Assignment (0-2 pts per criterion)**
 - Stage of development (design complete > new project idea)
 - Return on Investment (does project offset ongoing repair costs?)
 - Fulfills an external commitment
 - Life safety code compliance
 - Life extension (replacement > repair)
 - LANL workforce benefiting (more workers > fewer workers)
 - Risk/opportunity
 - Mission dependency

Benefit Points/Cost = Benefit : Cost Ratio

Least cost projects with greatest benefit rank higher

Utilities Project Execution

- **Annual reinvestment funding**
 - \$2.4M program for utilities
 - \$1.0M program for transportation
 - Covers a limited set of projects and managed by UI Division
 - 10% used for condition assessment & project definition
 - 90% spread across assets by need
- **Corrective maintenance funding covers minor replacements and repairs (separately funded)**
- **Larger projects**
 - Indirect funding by special allocation for 1-time projects
 - Institutional General Plant Projects (IGPP) by indirect funding, special allocation
 - Line Item Projects (DOE Order 413.1B process)
 - Energy Savings Performance Contracts