RECOMMENDATIONS

Idaho Falls Power
Citizens Review Committee
Summer 2015

Committee Chair:	Arthur Kull		
Committee Members:	Thomas Baldwin	Lonnie Mollberg	John Snyder
	Donald Macdonald	Kurt Myers	Roderic Thomas
	Kris Millgate	Bri Rolston	

INTRODUCTION

Methodology

After Mayor Casper's orientation on February 7, 2015, the Idaho Falls Power Citizens Review Committee met with Idaho Falls Power general manager Jackie Flowers and decided the following:

- Meetings would take place every other Friday from 11 a.m. to 1 p.m. to accommodate the schedule of some members working at the INL.
- Documents needed to orient CRC members on the various facets of IFP's operations would be placed in a DropBox account.
- Operations reviews to follow the various functional areas of IFP's operations.

We also established a steering committee to monitor the CRC process. The Steering Committee was composed of CRC chair Arthur Kull, CRC vice-chair Kris Millgate and Flowers.

The committee fleshed out the functional areas to review and, after input from CRC members, developed a responsibility matrix by assigning committee members as leads on various recommendations established during the review.

The following is a breakdown of the various functional areas and leads:

- Budget/Capital Plan: John Snyder/Don Macdonald
- Business Model/Accounting/Revenue/Cost of Service: John Snyder
- Generation (IFP, BPA, load forecasting/planning, power purchase/sales agreements, operations, staffing, regulations): John Snyder
- Transmission/Distribution (design, operations, staffing, smart grid, storage, distributed generation, electric vehicles etc.): Rod Thomas
- Customer Service (billing system, response to inquiries, public relations, customer outreach, advertising, etc.): Kris Millgate
- Engineering: Tom Baldwin
- Signalization: Lonnie Mollberg
- New Technologies (net metering, fiber network, smart grid, storage technologies, etc.): Don Macdonald
- Security & Privacy: Bri Rolston

The functional areas were then broken down slightly differently after going through the review.

Executive Summary

The Citizens Review Committee (CRC) found that Idaho Falls Power (IFP) is a well-run organization with highly competent staff. The fact that IFP has the lowest power rate in Idaho speaks to this.

The recommendations presented here are a combination of ideas put forward by CRC, IFP staff, or a result of discussions between CRC and staff. Our recommendations are categorized by function. Within the function categories, we have a few recommendations we'd like to highlight here in this summary. They are divided by levels: policy level and executive level. Policy level recommendations are the responsibility of the city council. Executive level recommendations fall in the realm of the mayor and/or IFP staff.

Policy Level Recommendations

1-On a strategic level, we recommend IFP establish a long-term strategic plan. We suggest a plan projected out for up to 20 years so it is cohesive with the city's growth plan. The plan should also establish:

a) Power generation, transmission & distribution investment plan (Rec 5.1).
b) Coordination of the transmission and distribution infrastructure with other jurisdictions (Rec 6.1).
c) Power pricing mechanisms that take into consideration distributed generation and/or other emerging technologies (Rec 1.1).
d) Long-term parts replacement plan and budget (4.1).

2-We recommend a utility board be established to help IFP develop, maintain and implement a long-term strategy (Rec 1.2).

3- We recommend tackling any security weaknesses in the city's IT infrastructure immediately (Rec 2.1). Although we estimate that IFP's IT security is adequate, there may be a weakness in the links with the city's billing system. As demonstrated by the effects of an attack on the Sony Corporation, it could be devastating to the city.

4-We recommend the formation of an IT CRC for a thorough review of the IT infrastructure, both hardware and software (Rec 2.3).

5-We recommend expanding the city's fiber network. An opportunity exists in IFP's bandwidth by leveraging the fiber network for business development (Rec 8.1), and by connecting the Fiber Network to homes (Rec 8.2).

Executive Level Recommendations

1-On the organizational side, we recommend creating a plan of succession and bench depth for the management of power sales and power supply purchases (Rec 1.8).

2-We recommend a periodic review of key employee compensation levels (Rec 1.4).

3-We recommend a review of the interdepartmental service allocation mechanism, especially since that influences power pricing (Rec 3.1). The city's interdepartmental charges for services rendered are not

transparent and do not seem to reflect the actual amount of services. We also recommend the consolidation of utility billing from municipal services to IFP (Rec. 3.2).

4-We recommend several cost reduction considerations.

a) Seeking Renewable Energy Credits (Rec 1.6).
b) Enforcement of ordinance that requires cost of power extensions be charged to developers or commercial interests requiring extensions (Rec 1.7).
c) Implementation of Smart Grid technology to enable Voltage Conservation Reduction system wide (Rec 6.3).
d) Charging smart meter opt-outs the additional costs incurred (Rec 6.4).
e) Implementation of remote connect/disconnect on meters (Rec 6.5).
f) Elimination of third party media buys (Rec 9.4).

5-We recommend better coordination of traffic light programming between ITD, Public Works and IFP (Rec 7.1) due to several complaints about traffic flow disruptions. Traffic light controls are equipped with capabilities to adjust to traffic volume. We recommend they be used (Rec 7.2).

6-We recommend the following in order to improve customer service:

a) The use of a call center software to better coordinate responses to inquiries from customers (Rec 9.1).
b) Improve IFP's web presence (Rec 9.3).
c) Use Marketing Intelligence Programs for IFP customer messaging (Rec 9.5).
d) Consider alternative delivery programs such as pre-pay and level pay (Rec. 9.6).

There are additional recommendations not highlighted here.

CRC Recommendations

CRC Recommendations

1. Business Strategies/Operations Management

1.1 Develop Business Strategies to guide business decisions.

The advent of new technologies such as distributed generation or other may disrupt the current business model used by IFP. The CRC recommends IFP develop business strategies to account for such developments

Example: There are currently seven customers with solar panels that are involved in a net metering agreement. Should such distributed generation become a significant offset to IFP's purchase of power, IFP would still be responsible for the maintenance of the infrastructure of power distribution to those customers, since they would feed power to the distribution network during the day and draw during the night (and on cloudy days). The net of this would be that IFP would deliver less power overall, which would decrease its income from power sales while having to maintain the current distribution system. Other customers shouldn't be asked to pay for the maintenance of the infrastructure serving those on net metering, IFP should figure out how to charge net metering customers to cover infrastructure maintenance costs.

There may be other technologies that could cause similar disruptions if not addressed.

Some helpful documents and short videos can be found here:

- http://www.businessmodelgeneration.com/canvas/bmc
- https://www.udacity.com/course/viewer#!/c-ep245/l-48743167/m-48738150
- *Business Model Generation*, by Alexander Osterwalder & Yves Pigneux.
- Possible consultant: Melissa Kemp from Tucson, AZ: melissa@premiumorganization.com

1.2 Form a Utility Board.

As a $60 million enterprise, IFP needs the equivalent of a board of directors to act as a sounding board for IFP's management and city council regarding rates, rules, regulations and management issues. We feel that the city council, due to their many different areas of involvement, as well as the time needed to address issues in the city's utilities areas, needs a utility board to discuss and develop recommendations. We therefore recommend the city establish such a utility board to include IFP and water and sewer departments.

Attachment:
Anaheim, California Public Utilities Board documentation

1.3 Create a citywide safety officer position.

In reviewing the effort to develop and administer an employee safety program, we were made aware of the fact that each city division does it on its own. Any organization the size of Idaho Falls has a safety officer who coordinates policies and programs in the organization's divisions. The safety officer can be

part of risk management or HR functions, but often is reporting directly to the CEO depending on the emphasis needed.

1.4 Regularly review compensation of key IFP staff.

After hearing assistant general manager Bear Prairie's presentation about 1) his skills/background, and 2) the impact of his trading knowledge when negotiating and managing power purchases, we became very aware of the lack of bench depth/strength in that area (see Rec. 1.8). Shortly thereafter, an article in the Post Register reported the compensation issue for both the general manager Jackie Flowers and Prairie. That is when we realized that regular compensation benchmarking needs to be recommended for positions deemed critical within IFP.

Attachment:
April 3, 2015 memo from IFPCRC to mayor Casper regarding issue of critical staff compensation

1.5 Develop a plan for single integrated utility metering and communications infrastructure.

IFP customers with smart meters can view their power usage by logging on to https://www.myusage.com/. The display shows the daily usage in KWh per day over the last 30 days.

During the pilot phase of the smart meter project, some customers received metering units that could display the instantaneous usage of their system.

The CRC's recommendation is to extend that capability to all customers and to structure it in such a way that other metered utility usage, such as water, could be displayed via the internet, once the decision to meter water usage is made.

It appears, however, that the smart meters currently installed only transmit metering information every 15 minutes for commercial accounts and hourly for residential units. In order to extend the capability to display instantaneous consumption of power or water, additional equipment would be required. A cost/benefit analysis needs to be done to determine the feasibility of such a service.

1.6 Support regional efforts to qualify all hydropower for Renewable Energy Credits.

The Old Lower Plant (OLP) was damaged in the 1976 Teton Dam Flood. The Plant has been offline since 2011. The rebuild of the OLP began in 2014 and is expected to be completed in 2016. Two 1.5 megawatt generators are being repaired and the building repainted inside.

When queried about whether the operational improvements and increased capacity for the OLP would qualify the refurbished generators for creation of Renewable Energy Credits (REC), IFP management expressed concern that, since only efficiency improvements would qualify, the effort needs more research to determine the benefit once the plant is commissioned.

Qualification of these generators for REC would represent an additional revenue source for IFP, a contribution to the State of Idaho's compliance with the EPA's Clean Power Plan or both.

It is the understanding of the CRC that IFP management is pursuing this qualification for the OLP and is in discussions with regional electric utilities regarding the broader question of the qualification of hydropower in general for REC.

The CRC supports IFP management in their effort to qualify the OLP generator improvements and hydropower in general for REC.

1.7 Enforce ordinance that requires cost of power infrastructure extension be placed on the developer or commercial interest requesting service.

IFP cost-of-service pricing could be more transparent to customers and will need to be reviewed and possibly updated to accommodate increased commercial and industrial growth in the community and to accommodate the impact of increased distributed electrical generation.

This ordinance benefits all by providing transparent costs to residential developers and to commercial and industrial customers. They will know in advance what their costs will be from published rates for power line extensions. The public in general will have access to such rates and can make an informed comparison of cost-of-service pricing among the larger electricity customers.

The CRC was provided with a document entitled *Powerline Extension ORD v3* that proposed adoption of Chapter 14, Title 8, City of Idaho Falls code. The document was drafted with an unknown passage date during the year 2015.

The CRC recommends adoption of the proposed ordinance, if not already adopted, and expresses its concern that the ordinance be enforced.

Attachment:
Powerline Extension ORD v3 document

1.8 Establish a plan for succession and bench depth for power supply management.

Since IFP only generates 30% of the total power sold to customers, the organization relies on external power purchases for 70% of its demand. This is achieved through a mix of power sales, supply and transmission agreements with Bonneville Power Administration, Utah Associated Municipal Power Systems, Rocky Mountain Power and Idaho Power as well as power purchases on the open market. Total volume: ~$40 million.

Assistant general manager Bear Prairie has the expertise necessary to manage this power supply on a least cost basis. Should Bear Prairie leave the organization, the management of the power supply could be managed by a third party, such as The Energy Authority (TEA), at a cost of $850,000.

The CRC has determined that this function is too important to be outsourced and recommends that a staff structure be established that achieves both bench strength and bench depth to secure and develop the necessary expertise in house.

2. Information Technology

2.1 Establish citywide Information Technology security program.

Idaho Falls recognizes the need for information technology networking among its 11 divisions. Therefore, the city leveraged its assets with IFP to create and manage a citywide fiber optic network. This network creates tremendous business opportunities for the city (Rec 1.1).

The current network security provisions within IFP appear to the CRC to be adequate. However, the CRC has concerns about the security of connections between IFP and other city divisions and among the other 10 divisions. The CRC also has concerns about the potential for cyber attacks on IFP that would interrupt or compromise IFP's ability to provide power to critical city infrastructure and public services.

The CRC suggests:

- the new IT security program include a review of all external IT connections to determine the risks associated with these connections, both individually and collectively
- any high risk connection be terminated, or secured immediately to the extent possible
- all external connections be standardized to maximize security
- the IT security policies and provisions for all providers and contractors be reviewed
- the city request IT security guarantees from all existing providers and contractors
- the city develop standard IT security specifications for future providers and contractors

Given the potentially huge negative impact of cyber theft or attack, the CRC urges city management to take action on this recommendation **immediately**.

Given the potential damage caused by an interruption or loss of electricity to the city, and the IT interconnections with other city departments, the CRC suggests that an in-depth review of all city IT security policies, procedures and infrastructure be considered critical and urgent.

Like the Municipal Services CRC (recommendations 10 and 20), this Committee has concerns that city-wide risks from cyber threats are real and question whether city IT policies, procedures and infrastructure provide a reasonable and adequate level of security. A review would answer the question, but not address any deficiencies or solutions.

There is one action the city can take to improve IT security, regardless of the findings of a review. That would be to consolidate all relevant city utility billing/accounting functions, i.e., data capture, storage, access and use, within IFP.

IFP already has electronic data acquisition, storage and reporting infrastructure in place for electricity use, accounting and billing. The CRC believes IFP has a good level of cyber security in place for its functions.

2.2 Pursue security guarantee and standard bid specification language from providers and contractors.

The city, and its divisions, communicate through information technology networks with outside providers and contractors. Each entity is likely to have varying levels of security for their own data and

connections. Each of these IT connections presents an opportunity for cyber penetration of the city's intranet. In addition, there are likely to be a large number of such connections with varying levels of IT security.

Such guarantees would also help reduce risks associated with IT security insurance.

2.3 Establish a CRC for city's Information Technology function.

The city can take advantage of the large pool of citizens in Idaho Falls who are highly qualified in IT security. A CRC could provide expertise to review existing infrastructure, to review security policies/procedures, to make recommendations for improvements, to monitor progress on recommended improvements, to act as a resource for the mayor and council and to act as a liaison between the city and the community.

Because of the potential business opportunities and security concerns associated with the city's IT network, the CRC recommends this matter be given a high priority.

3. Budget/Accounting

3.1 Review the basis of all fund transfers between IFP and the city and modify these bases as necessary to provide greater transparency to division managers, elected city officials and the public.

IFP transfer of funds to and from the city (for services provided by each entity) is not transparent. For example, the basis for allocation of overhead transfers is not apparent to the CRC.

The Municipal Services Citizens Review Committee also commented on this issue saying, "The fixed allocation percentage method is not transparent to the department managers. It is arbitrary and may not have any bearing on the actual expense incurred. A single method based on measurable allocations should be applied in order to determine true department cost, such as the golf courses which are not being charged overhead expense at all."

The response from the Municipal Services Division says, "The committee's observations and suggestions are under review."

Because IFP is an enterprise that generates significant revenue to the city, over and above the internal fund transfers, the CRC believes any such changes will not have any material financial impact on IFP. However, such changes may improve division managers' and the public's understanding of, and appreciation for, the true costs incurred by each city division when providing services to other divisions.

Possible changes that may improve transparency:

- It may be helpful to division managers and the public to have all Idaho Falls city divisions' power bills paid back to IFP on a power-consumed basis.
- It may be helpful to change the fund transfer formula to reflect the cost of services provided.
- It may be helpful to implement service agreements, and work orders when appropriate, between city divisions.

3.2 Evaluate transfer of utility billing/accounting function to IFP.

The CRC also understands that, at the present time, all other city utility departments use flat-rate billing procedures. Therefore, it appears IFP could accommodate these additional functions without undue concern. The CRC also understands that IFP is cooperating with the city's water department to test integration of water meters with IFP's AMI system to allow remote read capability. If the city decides to begin metering and charging for level of water use, the combined billing/accounting functions would be beneficial.

The Municipal Services CRC also recommended the consolidated utility billing/accounting functions be relocated to the IFP Energy Center. The IFP CRC does not support use of the Energy Center *per se* for this function. The Energy Center serves about 2,000 visitors a year who tour the IFP facility. It is used by IFP to hold monthly safety meetings and for other conference/training needs. It served as the starting place for this committee's tour of IFP facilities. The visitors every year include school children. The Energy Center is an exceptional tool for educating the next generation of electricity consumers and producers.

CRC Findings and Comments Regarding the IFP Budget/Accounting Process.

The CRC review of the IFP budget and accounting processes was eye-opening. The CRC was exposed to the very complex financial world of a municipal electric utility division. Key findings were:

- IFP budget preparation is a lengthy, bottom-up procedure that has been improved in recent years and appears to the CRC to be functional, but could benefit from an effort to provide continuous improvements to the procedure, e.g., replace hand written budget request sheets with an electronic request system,
- IFP projections of revenues and expenses for the division require a highly motivated, skilled, highly trained, experienced workforce at *all* levels within the division, from the linemen to the general manager. IFP has invested heavily at all levels to ensure they have the workforce they need to perform at a world-class level. Therefore, employee retention at all levels must be given a high priority from the division and the city.
- IFP contributes well over $3 million annually to city operations in excess of charges the city makes for providing services to IFP. This is revenue that does not have to come from residents in the form of taxes.
- IFP maintains two reserve funds to mitigate the costs of future asset improvements to ratepayers, e.g., the Rate Stabilization Fund and the T&D (Transmission and Distribution) System Capital Fund. The existence and maintenance of these funds contributes to the credit-worthiness of the division and the city. Therefore they are an extremely valuable asset over and above their monetary value. These funds have been, and should continue to be, managed conservatively.

4. Capital Investment Plan

4.1 Strengthen existing Asset Management Program (AMP).

The improved plan should prioritize the replacement of aging infrastructure. Through the AMP process, IFP should address the question whether to maintain, repair or replace various assets. Based on the AMP process success, IFP should continue to operate under the following guidance:

- IFP should continue to adequately maintain its electric system moving forward so that equipment can reach and exceed its useful life. For overhead lines, this means periodic pole treating. For underground lines, this means continuing with the AMP features with respect to quarterly inspections & routine O&M.
- IFP should continue to track repairs to its system. Through statistical methods, assess the risk involving the two components of risk-the likelihood and the consequence of asset failure. The assessment of consequences should involve looking at the effects, such as social, economic, health and safety and environment of a failure or breakdown. The assessment should associate the risks with asset criticality coupled with the current asset condition.
- IFP should continue to prioritize replacement efforts to critical feeder sections using key performance indicators, such as the measured System Average Interruption Duration Index (SAIDI).
- IFP should continue to provide short-term and long-term action plans. The plans should be constructed in parallel largely because of the age of the system.
- City council should understand these action plans do impact the revenue requirements for the utility. IFP should be conscientious about implementing the plans over several years.
- IFP strategy should continue to improve the system reliability yet maintain electrical rates below rates of neighboring utilities.
- IFP should continue to ask for customer feedback (suggest every other year) with regards to electric reliability, value and the increased level of rates to support those two efforts.

IFP meets a number of service reliability criteria set forth by federal, state and region regulating agencies and power industry standards. In order to meet and maintain acceptable levels of reliability and service quality, the equipment and parts used in the generation and delivery of electric energy should be in good working condition. Equipment and parts will wear with usage and age over time. At times, equipment and parts will fail prematurely due to accidents, environmental effects, defects and sabotage. The electric power industry expects utility service providers to establish a well thought out plan for maintenance and replacement of key important equipment and parts used in the generation and delivery of energy. Plans are generally developed around the concepts of criticality, redundancy, expected life cycles, failure rates, availability of replacements and space, and cost of inventory. Plans should consider the fact that some equipment and parts have long delivery lead times from the manufactures and may not be manufactured in the USA.

The large majority of the distribution and transmission systems in the USA exceed 50 years and many of their components are operating at or near the end of useful life. Much of the replacement work needs to be performed while the existing infrastructure is energized or while hot. Hot work safety procedures require protection/reclosing devices to be modified to increase safety while exposing a wider number of customers to inadvertent loss of service. Preventative service can also require small outages at the beginning and end of work to switch power around the work zone. Replacement work such as rotten poles is also complicated by inaccessible or inadequate work areas due to right-of-way encroachments and/or customer blockage.

The CRC recommends IFP do the following:

- Provide a fiscally responsible parts, equipment and asset maintenance, repair and replacement policy that will enable IFP to maximize equipment utilization while maintaining a reliable and safe electric power system for its citizenry.
- Develop a strategy for tracking and assessing maintenance and failure events by location, circumstances, frequency, costs and required actions to understand sources of problems, commonalities and root causes and likely future events.
- Develop and publish a plan for end-of-life replacement of major assets so that budgets and resources can be allocated to implement replacements in a timely and cost effective way.

Possible Consultants and Suppliers:

- ABB Inc.
- Black and Veatch
- Ernst & Young

Attachments:
Risk-based asset replacement document
AEP Launches Asset Health Center document
Strategic Asset Management, A Primer for Electric Utilities document

4.2 Develop, implement and regularly update a Long Range Plan.

Management at IFP has done a remarkable job of adapting to changing technology, demand growth and customer needs since its founding.

The recent addition of a Capital Improvement Budget Procedure has allowed IFP management to be timelier and more focused in its planning for capital improvements and to better measure progress on engineering plans for these improvements.

The purpose of the new procedure is to ensure budget accuracy of capital improvement projects and to establish milestones for capital improvement plan development apart from the budgetary process.

The new procedure gets input from foremen who are closest to the everyday working needs of the utility. The Information Systems department provides input on fiber optics improvement needs. Contractors provide cost estimates for completing the work. Senior management provides the business case input. Long range planning input is provided by consultants on an ad hoc and irregular basis. For example, the division's last long range transmission development plan was developed in the 1970s and updated in 2009. The division's electrical engineer provides an assessment of proposed capital improvements.

While the implementation of this procedure has been beneficial, the CRC suggests that the process could be improved by migrating from handwritten paper Capital Improvement Requests to an electronic system.

While IFP management has done an excellent job of making decisions regarding capital improvements in the past, the CRC is concerned that the environment for long-range planning by utilities has changed dramatically and requires a more holistic and proactive approach today.

For example, the following quote is taken from Consolidated Edison of New York's 2012 Integrated Long-Range Plan:

"Con Edison's long-range plan is our guide to navigate the challenges of the next 20 years and help us continue to provide safe, reliable, clean, innovative and cost-effective energy services for a green and sustainable future. In such uncertain times, our plan must be flexible and able to deftly adapt to unexpected developments. New technologies, techniques and resources can change the energy landscape. We must prepare for how such changes may affect supply levels and prices. We must also be aware of and responsive to shifts in public policy, and local, national and worldwide events that can affect our business. Because of these variables, we must revisit our goals, monitor key signposts and correct our course as needed along the way."

In addition to capital improvements, changing business models for IFP need to be addressed in a Long-Range Plan (Rec. 1.1).

5. Generation

5.1 Create a 20-year load/resources growth plan.

There is a need for a general level of future Integrated Resource Planning (IRP) with some public involvement. This type of planning effort wouldn't be as detailed as with larger utilities such as Idaho Power or PacifiCorp, but is needed at a basic level. Most regulated utilities do an IRP planning cycle every two years to update based on technology changes and other system changes. IFP appears vulnerable to the future with Bonneville Power Administration (BPA) being the major energy and balancing services provider (with many other customers and system change impacts happening to BPA), especially if large load and economic growth potential happens in the BPA service regions. Because of this dependency, there is a need to look at multiple generation options along with open market options and trends, load growth changes and changes in available technologies and costs. Joint projects with other Utah Association of Municipal Power Suppliers (UAMPS) members may be possible, or local or distributed generation options. Combined Cycle Combustion Turbines (CCCTs) are probably too large for consideration, but Combined Heat and Power, Simple Cycle Combustion Turbine, solar (maybe customer incentivized), energy storage, biogas or waste to energy options, etc. may be considered.

5.2 Investigate distributed generation on problem feeders.

There is also a connection between distributed generation and distribution operations and upgrade issues. IFP has started analyzing the potential use of Conservation Voltage Reduction (CVR) and other options for voltage control. When distribution congestion becomes significant, line additions or size upgrades are the standard utility approach for addressing these issues. However, alternatives can be considered when development timelines for distribution upgrades are too lengthy or if routing/easement issues create challenges. Alternatives such as distributed generation and energy storage systems, peak shaving/Demand Response (DR), more smart grid load control systems and components, smart power conversion/voltage control devices, etc. can be considered both for addition of generation to the power system and for distribution voltage and congestion control.

6. Transmission & Distribution

6.1 Formalize coordination between city, county and other municipalities for the planning of all future infrastructure needs including road easements and power line connectivity.

Coordination of IFP power line access needs with other government entities is done on an informal basis. Such an approach can cause IFP and other entities it works with to miss opportunities to consolidate corridors of mutual advantage for road and power line construction. While the route of the 161 KV loop (between the Hitt substation and a new substation west of the Snake River) has been tentatively selected, its assurance and subsequent north loop construction is needed to support system reliability on the north side of the city. Where coordination with the county is extremely important is completion of the west side of the loop. The recent difficulty of negotiating power line access with west-side county residents illustrates the need for a strong working agreement with the county on road-power line corridor planning. A consolidated approach should provide increased negotiating power.

6.2 Investigate alternative technologies for T&D congestion in the northwest sector of the city.

Power needs have been increasing in the northwest sector of the city, especially with continued construction of the University Campus. Nearby power sources could improve the system reliability in this sector. Example sources to consider are solar, battery banks, upper dam generation, combined heat and power, biogas/waste energy options, natural gas generation. Such an investigation should consider cost effectiveness of the example options. Time of day generation could be another consideration.

6.3 Give high priority to implementing smart grid automation technology to enable Conservation Voltage Reduction (CVR) and improve voltage control and regulation system wide.

Advanced Metering Infrastructure (AMI) is an approach in which voltage at the delivery point can be adjusted to ensure sufficient voltage at the end of the line. Automatic adjustments at transformers can be made by feedback from smart meters at the end of the line relative to the upper and lower permissible operating voltages. A pilot test of one such delivery point to end point line showed that a power savings of $30,000 to $60,000 could be realized on the distribution feed from a transformer. There are 12 such substation transformers in the IFP system that would affect 37 distribution circuits. Implementation of a CVR over the AMI system could offer considerable cost savings by the above illustrated CVR.

Another use of CVR over the AMI is responding to the Pacificorp power reduction order as happened in December 2013. It might be possible to accomplish the power reduction by CVR adjustments within the voltage permissible limits over the individual delivery lines within the IFP system without shutting power delivery to IFP customers. If further power reduction would be needed, the AMI could help select which parts of the system to “drop off” with minimal impacts along with other appropriate criteria.

6.4 Charge residents who opt out of Smart Meters for the added cost to keep the old analog meters in service.

IFP’s program to convert all resident meters to remote reading digital AMI meters is essentially complete. At this time there are 93 meters on the opt-out list (79 smart meters with disabled radios, 14 electromechanical analog meters) for residents who object to smart meters. The IFP effort to give such residents an “opt-out” option is supported; however, this opt-out option represents an added cost to IFP

since they require a physical read to determine power consumption. These costs need to be identified and quantified so a fair reimbursement charge can be billed to the residents on the opt-out list.

6.5 Implement remote connect/disconnect on meters.

To connect or disconnect power service to a customer, municipal services performs the task of physically connecting or disconnecting the electrical meter. Meters are kept at the IFP warehouse. The need for such a remote capability is more related to customers who become an uncollected debt problem. By having remote connect/disconnect capability for "problem" customers, a timely shut off of power can get a more prompt response and likely payment in most instances. Reduction in use of Municipal Services personnel represents additional cost savings.

6.6 Investigate automated fault detection and restoration systems.

There is significant potential for implementation of automated fault detection/location and restoration systems to increase power distribution system reliability/availability, and reduce field restoration hours and cost. This technology would likely only have cost-benefit in certain areas of the distribution systems, but in the right cases and applications can significantly reduce outage times and response labor costs and increase system/operations awareness and reliability. IFP has indicated interest in this area and more detailed analyses of the potential and associated costs and savings should be investigated.

7. Traffic Network - Signalization

7.1 Improve coordination between jurisdictions (IFP, Public Works and ITD) to enhance traffic flow.

As some major streets in Idaho Falls fall under the jurisdiction of ITD and others fall under the jurisdiction of the city, there is potential for conflict in traffic signal coordination. The CRC encourages stronger coordination between the jurisdictions. Recognizing the state has ultimate responsibility of its major streets, deferring timing coordination to local control is still desirable.

Time delays for signalization can be, and often are, a very frustrating issue for the traveling public. It is often a contributing factor to the symptom knows as ‘road rage.’ Localized control of settings will minimize delays from adjoining arteries onto major streets according to specific knowledge of local traffic patterns according to time and date requirements. Real time sharing of data back to Boise will allow for emergency overriding of time delays and will minimize the lag in time required to effect emergency control.

7.2 Maximize traffic control capabilities of traffic lights.

A significant portion of the city’s population work for a minimal number of enterprises, which are located in select locations that are not localized. This results in flow patterns, and rates, that are traceable in terms of time of day and duration.

IFP needs to move from a solely maintenance function to a shared operations facilitation with ITD. Old analog software should be updated to a multiplex system of 1) magnetic loops, 2) radar functioning traffic control technology allowing for electronic devices to monitor flow rates v. established patterns to determine abnormalities caused by surges in non-normal demand. These devices can be mounted on existing poles or buried underground. Care must be exercised to assure operations due to the vagrancies of weather. Specified IFP public works personnel coordinate, in real time, with specified ITD personnel allowing for non-congested flow rates.

8. CIRCA – Fiber Network

8.1 Establish Citywide Fiber Network and Leverage For Business Development.

The world continues to advance into a more digitally connected economy. This allows for businesses to quickly connect to the world, readily set up supply and distribution infrastructures that can be digitally connected and establish data centers etc. Those cities that possess the requisite communications capabilities will find themselves at an advantage when it comes to opportunities to recruit, grow and develop businesses in this digital economy. Small to medium sized cities in more remote locations, such as Idaho Falls, will find it relatively more difficult to attract private sector interest and capital to develop the requisite infrastructure to support larger scale, digitally centered businesses. Some cities have exhibited leadership by moving to expand communications capabilities developed through their municipal utilities to leverage for economic development activities. One such example would be the city of Chattanooga, Tennessee. http://www.chattanoogagig.com/

The city, through IFP, has made an initial investment in a fiber optic network backbone. This investment was made to provide IFP with adequate communications bandwidth for evolving digital control systems used in the electric power industry and for use as a backhaul for the smart meter network. The initial investment demonstrated good foresight and provided for an over-build in capacity. The city generate a revenue stream by leasing that excess bandwidth to non-city entities and leverages it for other city uses as well. Idaho Falls should pursue a robust build out of its current fiber network to effectively create a citywide fiber optic network that is geared towards gigabit to terabit capacity and leverage this capability for economic development within the city.

8.2 Establish “Fiber to the Home” Capability.

The world continues down a path of being digitally connected. As it is essential for businesses to be digitally connected to be successful, it is equally important for individuals to be digitally connected. As with electric power and telephonic services, an internet connection is moving into the realm of being a public good, essential for survival in the modern world. From the basic conduct of everyday affairs to the provision of education and medical care, individuals must be connected.

The city, in conjunction with recommendation 8.1, should evaluate the option of providing fiber optic connection directly to the home as a part of a substantially enhanced citywide fiber network. This significantly expands the options available to individuals.

9. Customer Service

9.1 Implement automated call center software package.

The software provides more efficient service and tracking of that service. It also provides smoother hand offs at shift changes and allow various departments to address the service query and track progress.

9.2 Put Idaho Consumer–Owned Utilities youth rally notice in INL and STEM mailings.

Increasing notice distribution creates awareness of this opportunity for youth among parents who are already in engineer-related fields.

Idaho Consumer-Owned Utilities Youth Rally webpage on IF city website:
http://www.idahofallsidaho.gov/city/city-departments/idaho-falls-power/community-services/icua-youth-rally.html

9.3 Improve IFP web presence.

The CRC recommend evaluating the option to break IFP website out from city website and offer a link to IFP website on city website. The website needs navigation improvements for ease of use which requires a focus on changes that make site more user friendly and customer oriented.

IFP webpage within IF city website:
http://www.idahofallsidaho.gov/city/city-departments/idaho-falls-power.html

9.4 Consider eliminating third party agent for media buys.

IFP is not a retail oriented business with a large volume of ads and sales needing public notice and/or agent assistance. IFP doesn't have to recruit customers, but still offers safety awareness and PR type messages.

Eliminating third party for media buys will increase amount of money in advertising budget for media buys because agent commission is no longer a factor.

Most media outlets design print ads and/or produce video ads as part of the media buy. Media outlets can also help IFP directly with media buy and proper ad placement rather than putting those decisions through third party agent.

New PIO or current service staff may have time to pick up media buy duties now that all meters are converted.

9.5 Research marketing intelligence programs for IFP customer messaging.

Targeted messages narrow down audience and prioritize what the message is or should be. Marketing intelligence programs also determine the best media outlet or mechanism for raising interest in that message.

9.6 Consider alternative delivery programs such as pre-pay and enhanced level pay.

There is existing technology in Idaho Falls that allows pre-paid electric service. The implementation challenge is the billing system, which is currently being upgraded.

Level pay sign ups should be expanded to year round opportunity. Historically, customers have only been allowed to sign up for level pay in April due to winter peaking and lack of historic consumptive use data for estimating the year's level payment. With today's technology, better data exists.

Idaho Fall Power Responses	
CRC RECOMMENDATIONS	**IFP RESPONSE**
1. Business Strategies/Operations Management	
1.1. Develop business strategies to guide business decisions.	**Plan to pursue.** The electric industry is experiencing unprecedented change, disruptive technology in distribution and customer service segments will be a pressure point for the foreseeable future. Staff is evaluating emerging business models and will further explore in strategic planning in the upcoming year. As part of the 2015 proposed rate adjustment, first steps were made towards addressing some of the risks of disruptive technology.
1.2. Form a utility board.	**Policy Maker/Community Decision**. There are many viable governance structures for public power utilities. Functioning models exist where an appointed or elected utility board governs the utility or where an appointed utility board serves as the working board making recommendations to the elected City Council. From a management perspective, community dialog and evaluation of the different options is encouraged. The utility industry is facing unprecedented challenges. The issues are very complex and require significant time commitment to get up to speed and maintain proficiency (Cooperative boards generally spend a full day a month discussing utility policy versus our 1.5 hours per month). There are great risks associated with shallow or limited understanding or evaluation of options.
1.3. Create a citywide safety officer position.	**Citywide decision**. Idaho Falls Power has discussed coordinating with the Fire Department for safety officer functions, ongoing discussions will continue.
1.4. Regularly review compensation of key IFP staff.	**Plan to pursue.** Idaho Falls Power is updating it Financial & Risk Management Policies. The policy will require annual compensation review with the governing body of those positions with significant role in the Risk Management Policy.
1.5. Develop a plan for single integrated utility metering and communications infrastructure.	**Plan to pursue.** As with the business strategies, staff is beginning to formulate an "integrated services" framework that will continue to be developed in the upcoming fiscal year.
1.6. Support regional efforts to qualify all hydropower for Renewable Energy Credits.	**Ongoing.** As part of its membership in trade organizations (NWPPA, APPA), staff works to develop resolutions that support proper categorization of hydropower. Additionally, messaging is frequently carried to our Congressional Delegation. Staff has been involved with similar discussions through the Idaho Strategic Energy Alliance.
1.7. Enforce ordinance that requires cost of power infrastructure extension be placed on the developer or commercial interest requesting service.	**In progress.** The line extension fees are included in the FY16 budget fee resolution scheduled for public hearing with request for Council to adopt with the FY16 budget. Staff has started outreach to the development community and is working through final implementation logistics with the Community Development Department. It is anticipated that an updated ordinance and modification to the service policy will be brought forward in October with an effective date of January 1.

1.8. Establish a plan for succession and bench depth for power supply management.	**In progress.** The FY16 budget includes an additional full time employee that will work in 24/7 dispatch with a stronger emphasis on background in power scheduling and power markets. This person will oversee the 24/7 dispatch and work with the AGM to build depth in that group around power supply management. Additionally, staff will be doing a thorough review of options for the BPA contract in advance of the 2016 date to change products. Analysis will include a detailed risk analysis of all options.
2. Information Technology	
2.1. Establish citywide Information Technology security program.	**Policy Maker Decision.** As the only City department with mandatory, enforceable cyber security standards, we have spent a significant amount of time and resource updating procedures, systems, and staff to address current day risks. We support the recommendation of the CRC and would be happy to support the citywide effort as Council sees fit.
2.2. Pursue security guarantee and standard bid specification language from providers and contractors.	**Plan to pursue.** Staff will review this with the City Attorney and work to make adjustments to standard bid language.
2.3. Establish a CRC for city's Information Technology function.	**Policy Maker Decision.** We support the recommendation of the CRC and would be happy to support the citywide effort as Council sees fit.
3. Budget/Accounting	
3.1. Review the basis of all fund transfers between IFP and the city and modify these bases as necessary to provide greater transparency to division managers, elected city officials and the public.	**Plan to pursue.** Staff plans to pursue this discussion with the new Municipal Services Director, Mayor and Council liaisons in the first two quarters of the FY16 budget.
3.2. Evaluate transfer of utility billing/accounting function to IFP.	**Plan to pursue.** This is the second Citizen Review Committee to make this recommendation. Given the desire to pursue integrated services, enhanced customer service will be paramount to success. Significant changes in customer interface will continue to evolve the needs, we must be flexible in our ability to respond. Staff will present options related to organizational structure that will maintain current functionality (one bill for all city services) but will promote flexibility for responding to future needs and working to reduce overhead costs.
4. Capital Investment Plan	
4.1. Prioritize parts replacement plan.	**Ongoing.** Staff will work to incorporate elements into the existing Capital Improvement Plan and continue to benchmark with other utilities (APPA RP3). Staff will report to Council at least annually on data driven improvements. Staff will continue to strengthen its use of the preventative maintenance system, particularly once complete conversion to the new software (Cayenta) is complete.
4.2. Develop, implement and regularly update a Long Range Plan.	**Plan to pursue.** While the Capital Improvement Plan is well established with frequent updates, staff will expand the long term planning horizon (with 1.1 and 1.5 above) to evaluate longer term grid trends and needs. The foundation for this activity will continue to be set in FY16. Toward the end of FY16 or in FY17, a full plan/strategy will be completed.

5. Generation	
5.1. Create 20-year load/resources growth plan.	**Plan to pursue.** Although a formal Integrated Resource Plan is not required, making long term resource plan projections is good business practice and is consistent with the historic approach to provide the community's own generation. Idaho Falls Power does participate with UAMPS in resource evaluation and development. In FY16, we will initiate community discussions about resources in the next 20 years. This effort will be conducted with 1.1, 1.5, and 4.2 above.
5.2. Investigate distributed generation on problem feeders.	**Plan to pursue.** Staff is pursuing a grid modernization project that includes storage, hydro shaping, distributed generation and microgrid potential with the Idaho National Laboratory and Clean Coalition through an arrangement with UAMPS. This work will likely be completed in the next two years.
6. Transmission/Distribution	
6.1. Formalize coordination between city, county and other municipalities for the planning of all future infrastructure needs including roads, easements and power line connectivity.	**In progress.** Staff is active in the Community Development Department efforts to update long range planning studies that will be coordinated with the County and other jurisdictions. Additional conversations will need to be pursued with BMPO and other entities.
6.2. Investigate alternative technologies for T&D in the northwest sector of the city.	**Plan to pursue.** This area is the focus of the project referenced in 5.2.
6.3. Give high priority to implementing Smart Grid automation technology to enable conservation voltage reduction system wide.	**Plan to pursue.** Results from the Pacific Northwest Smart Grid Demonstration Project have refocused Idaho Falls Power on the opportunity to enhance capacity using grid modernization techniques and technology. Those results are being further evaluated to identify technology and update the Capital Plan for a system-wide modernization of conservation voltage reduction.
6.4. Charge residents who opt out of Smart Meters for the added cost to keep old analog meters in service.	**In progress.** The meter opt out fees are included in the FY16 budget fee resolution scheduled for public hearing with request for Council to adopt with the FY16 budget. Following that adoption, staff will work on final implementation logistics and outreach to opt out customers.
6.5. Implement remote connect/disconnect on meters.	**In progress.** Staff is working with Utility Credit to pilot the remote connect/disconnect deployment. It is anticipated that this will be completed in the first quarter of FY16.
6.6. Investigate automated fault detection/location and restoration systems.	**Plan to pursue.** While Idaho Falls Power did test technology in this area as part of its asset deployed in the Pacific Northwest Smart Grid Demonstration project, the feeder selected did not have any events that would allow us to fully test the technology. Staff will continue to investigate outage data to identify feeders that would be good candidates for this technology to both lessen outage time and lower number of meters impacted.
7. Traffic Network/Signalization	
7.1. Improve coordination between jurisdictions (IFP, Public Works and ITD) to enhance traffic flow.	**Citywide decision.** Idaho Falls Power only maintains the traffic signals of ITD, we do not set coordination timing. We will pass this recommendation on to Public Works as they are currently working with ITD to update coordination timing.

7.2. Maximize dynamic traffic control capabilities of traffic lights.	**Citywide decision.** Idaho Falls Power will discuss this recommendation with Public Works as they are the lead contact with the traffic engineer. We will request their review of this technology and recommendations, if any, for future capital plans or controller programming.
8. CIRCA-Fiber Network	
8.1. Establish citywide fiber network and leverage for business development.	**Plan to pursue.** The CRC aptly noted the success of our 13-year old dark fiber network and the untapped remaining potential of that network. In depth analysis of its future capabilities will be included in analysis of integrated services as part of 1.1 and 1.5 above.
8.2. Evaluate "Fiber to Home" capability.	**In progress.** In FY15, Idaho Falls Power issued a solicitation for engineering and business evaluation services to contemplate future fiber network use. This study will be done by second quarter FY16. Existing service providers and a community focus group will be involved in evaluating the options and making recommendations going forward.
9. Customer Service	
9.1. Implement automated call center software package.	**Plan to pursue.** As part of the integrated service initiative, Idaho Falls Power will be working strategically to enhance customer service by strengthening its customer interface based on a one-stop-shop approach. Adequate customer care tracking software will be critical to providing comprehensive tracking of in-progress customer service response.
9.2. Put Idaho Consumer-Owned Utilities youth rally notice in INL and STEM mailings.	**Plan to pursue.** Idaho Falls Power will make connections with the recommended entities in the first quarter of FY16 in preparation of the 2016 Youth Rally application cycle.
9.3. Improve IFP web presence.	**Citywide coordination required.** Currently the utilities website is limited by overall city website functionality. Staff is currently working to update the IFP specific content and make it more customer focused. Significant design changes, however, will be required to be coordinated with the citywide update effort.
9.4. Consider eliminating third party agent for media buys.	**Plan to pursue.** Idaho Falls Power will be restructuring its marketing approach in FY16 and these recommendations will be incorporated.
9.5. Research marketing intelligence programs for IFP customer messaging.	**Plan to pursue.** Idaho Falls Power will be restructuring its marketing approach in FY16 and these recommendations will be incorporated.
9.6. Consider alternative delivery programs such as pre-pay and level pay.	**Plan to pursue.** While the city does offer restricted level pay programs, the policy should be updated to reflect capabilities of existing technology. Some of the functionality needed for enhanced billing will not be available until the first phase of Cayenta integration is completed. Staff intends to pursue a full review of capabilities and functionality with 3.2.

Anaheim, California Public Utilities Board

PURPOSE:
The Public Utilities Board is appointed by the City Council and makes recommendations to the City Council concerning the operation of electric, water and other public utilities under the management of the Public Utilities Department.

RESPONSIBILITIES:
- Make recommendations concerning the establishment of rates, rules and regulations for the operation of the electrical and water utilities of the City.
- Make recommendations concerning the acquisition, construction, improvement, extension, enlargement, diminution or curtailment of all or any part of the electric, water and any other public utilities under the operation and/or management of the Public Utilities Department.
- Recommend financing, including the issuance of bonds for the electric and water utilities.
- Review annual budget of the Department and make recommendations accordingly.
- Establish a Public Utilities Hearing Board composed of three current members of the Public Utilities Board.
- Perform other related duties as outlined in the Municipal Code and such additional duties and functions as may be required from time to time by specific action and direction of the City Council.

MEMBERSHIP:
7 member commission. All members shall be qualified electors of the City. Members shall not hold any paid office or employment in the City government.

COMPENSATION:
None

TERM:
Two consecutive 4-year terms. May not concurrently serve on two or more City boards and commissions.

CONFLICT DISCLOSURE:
Members are required to complete and file, with the City Clerk, an annual Statement of Economic Interest, Form 700.

MEETINGS:
The 4th Wednesday of each month at 5:00 p.m. (CHW, 201 S. Anaheim Blvd, 11th Floor)

APPLICATION/SELECTION PROCESS:
Scheduled and unscheduled vacancies are advertised by the City Clerk. Applicants must complete and submit their application to the City Clerk (online at www.anaheim.net or at 200 S. Anaheim Blvd., Suite 217). Applications will be forwarded to the City Council for their consideration. At an agendized Council meeting, nominations are made from the Council floor and voted on by Council.

City of Idaho Falls – Idaho Falls Power Citizens Review Committee

Memo to: Mayor Rebecca Casper

From: Idaho Falls Power Citizens Review Committee

Subject: Compensation of Critical Idaho Falls Power Staff

Date: April 6, 2015

Dear Mayor Casper,

The front page article in the Post Register March 29, 2015 outlined a proposal, and subsequent tabling, for salary increases of critical Idaho Falls Power (IFP) staff. As the city's Idaho Falls Power Citizen's Review Committee, we would like to weigh in on the proposed compensation increases.

Here's what we've learned so far over the last few months of researching Idaho Falls Power:

- IFP consists of highly competent managers and staff. Their intimate knowledge of power generation, transmission and distribution, as well as experience in the power trading markets is critical to achieving the retail power rate of 6.25 c/KW the citizens of Idaho Falls currently enjoy.

- IFP managers and staff at all levels require experience and training unique to electric utilities and, more importantly, unique to Idaho Falls Power. As a result, IFP invests in training and continuing education programs for its employees at a cost of both time and money. Employee turnover at any position results in a higher than usual cost to IFP and the city.

- IFP exports and imports power to and from Bonneville Power Administration. This process requires a high level of power market knowledge and strong competency when negotiating and administering contracts.

- The 2014 Northwest Utilities Salary, Wage and Benefit Survey clearly documents that General Manager Jackie Flowers' compensation is the lowest in the region. The proposed increase would put her in the middle of the compensations reported. The Survey also documents that compensation at several lower management and staff levels is also not competitive

- Assistant General Manager Bear Prairie's knowledge of the power trading industry is such that it would cost IFP $850,000 to outsource his skills.

Everyone needs to be conscious of the fact that for the recruitment of IFP staff we are competing at the regional, if not national level. At the current compensation levels, there is a serious risk of losing our top talent.

The Citizens Review Committee therefore supports the proposed compensation increases, and recommends implementation of the increases as soon as possible.

Arthur Kull, Committee Chair

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF IDAHO FALLS, IDAHO, AMENDING TITLE 8, CHAPTER 5 BY THE ADDITION OF SECTION 35 TO ESTABLISH REGULATIONS AND FEES RELATIVE TO ELECTRIC POWER LINE EXTENSIONS; ADDITION OF RELATED DEFINITIONS; PROVIDING SEVERABILITY, CODIFICATION, PUBLICATION BY SUMMARY, AND ESTABLISHING EFFECTIVE DATE.

WHEREAS, Idaho Falls Power (IFP) frequently receives requests from owners, contractors, developers, and others for extension of electric power lines to various homes, facilities, lots, developments, and other structures and properties within the City; and

WHEREAS, IFP wishes to establish a uniform process in order to answer such requests; and

WHEREAS, the IFP also desires to establish uniform fees to be charged for such services; and

WHEREAS, the Council is of the opinion that these services and fees should be established by this ordinance and fee Resolution.

NOW, THEREFORE, BE IT ORDAINED BY THE MAYOR AND COUNCIL OF THE CITY OF IDAHO FALLS, IDAHO, THAT:

SECTION 1. Title 8, Chapter 5, Section 1 shall be amended as follows:

BACKUP SERVICE: Electric service, either single or three-phase, to a commercial building for the sole purpose of providing backup power.

CAPACITY: The average KW supplied the customer during the fifteen (15) minute period of maximum use during the month, as shown on the City meter.

COMMERCIAL: A building whose primary purpose is conducting business for profit.

COMMERCIAL DEVELOPMENT: A development requiring two (2) or more electrical services for the purpose of commercial operation.

COMMERCIAL SERVICE: Electric service, either single-phase or three-phase, to a permanent commercial structure.

COMPREHENSIVE PLAN: A plan which has been adopted by the Council pursuant to Idaho Code Title 67, Chapter 65 (the Local Land Use and Planning Act) for the purpose of guiding development in the City.

CONNECTED LOAD: The combined input rating of the customer's motors and other electric energy-consuming devices.

CUSTOMER: Any ~~person~~ individual, partnership, business entity, or corporation receiving or desiring to receive or provide electric service at a point of delivery located within the City or for whom electric service is delivered under agreement with any other electric utility.

ELECTRIC SERVICE: The availability of power and energy in the form and at the voltage specified in the application for electric service irrespective of whether electric energy is actually utilized.

FACILITIES: Any electrical equipment and/or materials, whether overhead or underground, owned by the City, which are used to generate, transmit, and distribute electrical power to a customer.

HIGH VOLTAGE DELIVERY: Electric service delivered at two thousand four hundred (2,400) volts or greater.

IDAHO FALLS POWER OR "IFP": The department of the City that operates and manages the electric light system of the city.

LINE EXTENSION: Any change or addition to the IFP electrical system, including service lines, distribution lines, Project Improvements, System Improvements, procurement of rights of way, easements, and permits for the primary purpose of providing electrical service requested by a customer.

LOW VOLTAGE DELIVERY: Electric service delivered at six hundred (600) volts or less.

OVERHEAD SERVICE: Any service supplied directly to the customer from aerially-connected service conductors.

POINT OF DELIVERY: The point where the customer's wires are joined to the equipment or facilities of the City unless otherwise specified in the application for electric permit and approved by the Chief Electrical Engineer or his designated agent.

POWER FACTOR: The relationship between real and reactive power drawn under actual operating conditions as determined by measurements made by the City.

PRIMARY DISTRIBUTION LINE: Any high voltage line two thousand four hundred (2,400) volts or greater normally used to distribute power to service areas of the City.

PROJECT IMPROVEMENTS: Any new installation of electrical facilities or upgrade of existing electrical facilities for the primary purpose of serving a residential or commercial customer, including but not limited to poles, cables, transformers, and appurtenant facilities.

RESIDENTIAL DEVELOPMENT: A subdivision containing two (2) or more lots for use as residential housing, as evidenced by a subdivision plat recorded with the Bonneville County Recorder's Office.

RESIDENTIAL SERVICE: Electric service which is one hundred twenty/two hundred forty (120/240) volt single-phase, to a permanent residential structure.

SECONDARY SERVICE: The materials and labor necessary to provide service from the secondary side of the transformer to the point of meter service on a building, home, or structure.

SERVICE MONTH: The period between successive meter readings, generally consisting of approximately thirty (30) consecutive days.

SYSTEM IMPROVEMENT: Any new installation or upgrade of electrical generation plants, electrical transmission lines, substations, and distribution main feeders, which are for the purpose of benefitting the electrical system as a whole.

TEMPORARY SERVICE: Electric service required for a specific period of time not to exceed one (1) year, at the end of which period the facilities will no longer be needed.

UNDERGROUND SERVICE: Any service supplied directly to the customer by means of conductors placed underground.

SECTION 2. Title 8 Chapter 5 of the City Code of the City of Idaho Falls, Idaho is hereby amended by the inclusion of the following new language:

8-5-35: (A) PURPOSE: The purpose of this Subsection is to establish regulations relative to the construction and extension of electrical power lines and facilities within the City where such are requested by customers served by IFP and to establish fees therefore.

(B) SERVICE REQUESTS:

(1) The following shall require a fee to be paid as established herein:

(a) Line Extension to Provide Temporary Service. IFP installation and removal of power for a temporary facility to an existing infrastructure within thirty feet (30') of underground tap point or one hundred twenty-five feet (125') from the closest overhead tap point. If such service requires pole installation or transformer placement, an additional fee shall be charged.

(b) Residential Service Line Extension:

(i) Within a Residential Development: IFP provision or extension of existing service lines to a residential structure within a new Residential Development. The fee for this service shall be

determined on a "per lot" basis and dependent upon density and the zoning for the lot.

(ii) Within Residential Development: IFP provision of Project Improvements or electrical service lines to a Residential Unit outside of a Residential Development. The customer requesting such project improvements and service lines shall pay all costs of such Project Improvements and all labor and material costs required, as determined by IFP.

(2) Commercial Service Line Extensions:

(a) Within A Commercial Development: IFP provision of Project Improvements within a commercial planned development in commercially zoned areas. The customer requesting such Project Improvements, shall pay, at the time of building permit issuance, all construction costs for Project Improvements necessitated by the development, based upon an approved engineering design from the developer. In such case, IFP shall supply and install the transformer and meter.

(b) Within A Commercial Development: IFP provision of a commercial electric utility connection within a commercial planned development. A customer requesting the commercial electric utility connection shall complete the trenching, install commercial electric service conduit and pay, in advance, a commercial hook-up fee. Following completion of such preparations, IFP shall make the connections at the transformer.

(c) Within A Commercial Development: IFP provision of Project Improvements or a commercial electric utility connection to a commercial structure that is not within a commercial planned development. The customer requesting such Project Improvements or commercial electric utility connection shall pay, in advance, all costs for construction of the Project Improvements, line extensions, and hook-up. Costs, based upon an approved engineering design accepted by IFP, shall be paid at the time of building permit issuance. In such case, IFP shall supply and install the transformer and meter.

(3) Requests For Backup Service: IFP installation and maintenance of backup service to a customer. The customer requesting installation and maintenance of backup service shall pay, in advance, the cost of all System Improvements, Project Improvements, transformer installation, metering, and service lines required to provide backup service.

(4) Requests For Relocation or Modification of Facilities:

(a) A customer shall pay all actual costs for the removal, relocation, modification, or underground installation of IFP facilities where there is no change to existing electric service.

(b) A customer shall pay the total estimated costs of Project Improvements necessary to accommodate the desired changes for the removal, relocation, modification, or underground installation of IFP facilities where there is a change in the nature of existing electric service.

(5) Secondary Service Connection: A customer requesting connection of electrical service to a building shall pay a one-time fee.

(C) GENERAL PROVISIONS:

(1) Any fees established by this Subsection shall be in an amount established from time to time by Resolution of the Council.

(2) All line extensions and facilities modifications, including conduit provided by the customer, shall become and are deemed IFP property upon installation.

(3) All line extensions and facilities modifications shall be made in accordance with standard construction requirements of the IFP Service Policy adopted by the Council.

(4) Line extensions or facilities modifications shall be made only after the customer has paid the fees and estimated costs established in this Subsection.

(5) Project Improvements where the single connected load is anticipated to be larger than 1 MW, shall require a negotiated interconnection agreement between the requester and IFP in addition to the fees and costs for the service. The agreement may take into consideration necessary IFP structure upgrades, such as substation capacity improvements.

(6) Except as provided in section (B)(4), (B)(5), and (C) of this Subsection, the provisions of this Subsection shall not apply to System Improvements.

(7) In areas identified for redevelopment in the Comprehensive Plan and at the sole discretion of IFP, fees for line extensions and facility modifications may be reduced or waived.

SECTION 3. Savings and Severability Clause. The provisions and parts of this Ordinance are intended to be severable. If any section, sentence, clause, or phrase of this Ordinance should be

held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other section, sentence, clause, or phrase of this Ordinance.

SECTION 4. Codification Clause. The City Clerk is instructed to immediately forward this Ordinance to the codifier of the official municipal code for proper revision of the Code.

SECTION 5. Publication. This Ordinance, or a summary thereof in compliance with Idaho Code, shall be published once in the official newspaper of the City, and shall take effect immediately upon its passage, approval, and publication.

SECTION 6. Effective Date. This Ordinance shall be in full force and effect from and after its passage, approval, and publication.

PASSED by the City Council and APPROVED by the Mayor of the City of Idaho Falls, Idaho, this _____ day of _____, 2015.

CITY OF IDAHO FALLS, IDAHO

_____
REBECCA L. NOAH CASPER, MAYOR

ATTEST:

_____
KATHY HAMPTON, CITY CLERK

(SEAL)

STATE OF IDAHO)
) ss:
County of Bonneville)

I, KATHY HAMPTON, CITY CLERK OF THE CITY OF IDAHO FALLS, IDAHO, DO HEREBY CERTIFY:

That the above and foregoing is a full, true and correct copy of the Ordinance entitled, "AN ORDINANCE OF THE CITY OF IDAHO FALLS, IDAHO,

AMENDING TITLE 8, CHAPTER 5 BY THE ADDITION OF SECTION 35 TO ESTABLISH REGULATIONS AND FEES RELATIVE TO ELECTRIC POWER LINE EXTENSIONS; ADDITION OF RELATED DEFINITIONS; PROVIDING SEVERABILITY, CODIFICATION, PUBLICATION BY SUMMARY, AND ESTABLISHING EFFECTIVE DATE."

(SEAL)

_____

KATHY HAMPTON, CITY CLERK

SERVICE POLICY

Effective March 2015

This Policy provides information on the Idaho Falls Power (IFP) procedures for new and existing services and what will be required of a Customer desiring electric service. This Policy is based in part on current Idaho Falls City Code. It is to be used only as a guide and shall not be considered to be complete with respect to all possible service configurations or special or extenuating circumstances. Questions pertaining to this policy should be directed to Richard Malloy (Engineering Manager) 208-612-8428 or Randy Westergard (Distribution Superintendent) 208-612-8448. **Any deviations from this Policy must receive prior IFP approval.**

CONTENTS

ELECTRIC SERVICE REQUESTS

METERING REQUIREMENTS

GENERAL INFORMATION REQUIRED FOR ALL ELECTRICAL SERVICE REQUESTS

Service Fees: Consistent with Idaho Falls Ordinance 8-5-35, all fees or costs, as applicable to line extensions for Residential or Commercial individual customers or developments shall be paid in advance of any installation of electrical infrastructure. Applicable fees are published in the Fee Schedule established by City Council Resolution.

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~~I.~~ A Customer desiring ~~Normally, the Customer's first step in obtaining~~ electrical service ~~is to~~must first secure a building permit from the City Building Department. However, for all three-phase projects, it is required that the Developer coordinate service plans directly with IFP prior to seeking a building permit. The customer shall provide information necessary for IFP to provide electrical service, including but not necessarily limited to: overhead or underground service, single-phase or three-phase service, the total connected load, the electric heat and air conditioning load, the required voltage, and the number and size of motors with ratings greater than ten (10) horsepower.

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~~II.~~ All commercial and industrial Customers shall provide directly to IFP the following, as applicable: A plot plan indicating the service entrance location, *proposed* transformer location (the final determination will be made by IFP), a completed transformer sizing sheet (attached to review sheet or by pdf from IFP design) all electrical requirements including as a minimum, number of phases, voltage, connected three-phase and single-phase loads. IFP's required easements for the electric lines will be included on this plot plan. In general, easements for electric service shall be twelve feet (12') in width. New utility easements less than 12' in width require prior approval from Idaho Falls Power design staff. It is the Customer's responsibility to have IFP's designated easements surveyed and dedicated to the City. IFP will also indicate the preferred transformer location. No service work, cable pulls, or connects will be made unless the site address is posted in a conspicuous place.

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~~III.~~ The Customer is solely responsible for the selection, installation and maintenance of all electrical equipment and wiring, other than the City's meters and apparatus, on the load side of the point of delivery. Additionally, all electric motor installations shall include effective protective apparatus or have adequate protective measures within the motor to accomplish equivalent protection as follows:

(1) Overload and over-current protection for each motor by suitable thermal relays, fuses, or circuit interrupting devices automatically controlled to disconnect the motor from the line to protect it from damage caused by overheating.

(2) Open-phase protection on all poly-phase installations to disconnect motors from the line in the event of opening of one phase.

(3) All poly-phase motors for the operation of passenger and freight elevators, cranes, hoists, draglines and similar equipment shall have reverse phase relays, or equivalent devices, for protection in case of phase reversal.

(4) Motors that cannot safely be subjected to full voltage at starting shall be provided with a device that ensures that, upon energization at full voltage, such motors will be disconnected from the line.

~~IV.~~ The Customer shall be responsible to install and maintain surge suppressors, auxiliary power units or other protective devices for the protection of computers, computer software and programming,

~~—~~televisions, or other equipment sensitive to voltage spikes, surges, sags, transients, noise interruptions or outages.

~~V.~~ The Customer shall install and maintain all suitable protective devices and equipment to protect themselves, life and/or property, from harm or injury from electric current because the City shall assume no duty to warn or to otherwise assist the customer in the selection of or use of electrical appliances, tools, equipment or facilities. Any building requiring over 1000 amps must contact Idaho Falls Power Engineering for approval of switchgear prior to installation.

SPECIFIC REQUIREMENTS BASED ON TYPE OF SERVICE

I. **Commercial Underground Service**:

The Customer shall do the following to prepare for service:

1. Determine location of loads, approximate size of loads and possible future needs. All three-phase underground installations shall be served with Y connected secondary only (*i.e.* 120/208 or 277/480).

2. Utilize previously recorded public utility easements or provide easements to the City for underground power cable, as indicated on the marked-up plot plan described above. If the indicated easement locations present problems, then the Developer is responsible to obtain permission for a different routing from IFP.

3. IFP requires all City-owned conductor to be in conduit, the customer shall provide and install all conduits as required from the IFP's designated service tap point(s) (source) through new or existing easements to the Customer's transformer pad outlined in at number I.4 below. Further, the Customer may be required to open an additional trench to place conduit from the transformer pad to an exit point from the Customer's property and to provide easements for same. Such may be necessary where the City wishes to loop feed through the Customer's property for purposes of service reliability and to supply future Customers. All PVC electric conduits shall be PVC Schedule 40. All elbows shall be PVC Schedule 40 large radius sweep (36") or as otherwise specified by IFP. No conduit run shall have more than 360 degree of bends. Maximum lengths of conduit runs shall be determined by IFP.

4. **Three-Phase Transformers.** The customer shall construct a concrete transformer pad per current IFP specifications in the location indicated on the marked-up plot plan described above. A minimum ten foot (10') clear area is required in front of the transformer pad and a minimum of two foot (2') clearance is required on the other three (3) sides of the pad. The final transformer location will be determined by IFP. IFP must be contacted for inspection of transformer form prior to the pad being poured. Pad design shall conform to Attachment #1, #1A, & #1B. The pad location shall be compacted to a minimum of ninety-five percent (95%) of maximum density prior to concrete placement. A transformer will not be installed on the pad until it has cured a minimum of seven (7) days. No more than eight (8) conduits on the secondary side of a transformer shall be installed.

Single-Phase Transformers. Transformer pads shall be provided by IFP but shall be installed by the Contractor/Developer in conformance with Attachment #2. The pad location shall be compacted to a minimum of 95% of maximum density prior to placement. The top of the transformer pad shall be installed a minimum of six inches (6") above final grade. A minimum ten foot (10') clear area is required in front of the transformer pad and a minimum of two foot (2') clearance is required on the other three (3) sides of the pad. The transformer location will be determined by IFP.

High Voltage Switch Cabinets Bases and Secondary Pedestals. High voltage switch cabinet bases and secondary pedestals shall be provided by IFP but shall be installed by the Contractor/Developer in conformance with Attachment #3. The top of the base transformer pad shall be installed a minimum of six inches (6") above final grade. A minimum ten foot (10') clear area is required in front of the high voltage switch cabinet bases and a minimum of two foot (2)' clearance is required on the other three (3) sides of the base. The location of the bases and pedestals will be determined by IFP.

5. **Trench and Conduit:**

To save all parties a tremendous amount of time, energy, and money, please contact the applicable IFP Design staff~~field inspectors~~ as noted on the approval drawings or through the main engineering office (208-612-8428) prior to starting any trench and conduit work. ~~(208-612-8438)~~.

a. Trench for primary conductor shall have a minimum depth of forty-eight inches (48") and maximum depth of sixty inches (60") below final grade. Minimum trench width shall be twenty-four (24") unless otherwise noted. Before final backfill, IFP shall be notified when the conduit is in place. IFP will inspect all conduit installations before backfilling for proper depth and installation. Failure to obtain an inspection prior to backfill may result in the re-excavation of the trench.

   IFP will specify the conduit size. Contact applicable IFP staff~~IFP inspector~~ upon completion of pulling a mandrel through the conduit to prove the conduit. Any additional or future costs due to broken, damaged, obstructed or poorly assembled conduits will be paid by the Customer.

b. Minimum primary conduit depth can be reduced to eighteen inches (18") of cover below final grade through basalt or other rock~~lava~~ upon prior approval of IFP. R~~, but r~~igid galvanized steel (RGS) conduit shall be provided and installed by the Customer where trench depth is less than forty-eight inches (48"). IFP will specify the conduit size.

c. IFP will provide the pole and all primary conductors, if crossing existing streets with overhead primary conductor to a pole located near the new service. The Customer shall provide and install the first length *i.e.* ten feet (10') of RGS conduit up the pole above the RGS elbow. All elbows at the base of the pole shall be large radius three foot (3') RGS steel. All conduits installed on IFP poles will be on approximately eight inches (8")

standoffs. If an underground road crossing is made, the Customer will provide all conduit and will bore conduit beneath the roadway or provide a trench in which to install conduit. The use of high density polyethylene (HDPE) continuous conduit shall be used at select road crossing locations with prior approval from IFP. Conduit shall be Perma-Guard/UL and fittings shall be Arnco Shur-Lock II or an approved equal approved by IFP. IFP will inspect all conduit installations before backfilling for proper depth and installation. Trenches across existing roadways must also be approved by the City Public Works Division.

d. Sand bedding is required, a minimum of six inches (6") sand bedding to be required above and below the conduit. An IFP staff~~Inspector~~ may determine that the native soil is suitable for bedding material. Additionally, bury/caution tape shall be buried two feet (2') above the top of conduit. IFP will inspect all conduit installations before backfilling for proper depth and installation. Prior to cable installation, trenches must be backfilled and pads must be in place.

e. In all cases the Customer shall be responsible for backfill and compaction of cable trenches and repair of street crossings. Per city standards, all electrical trenches shall be compacted to a minimum of ninety-five percent (95%) of maximum density to prevent settlement.

f. A minimum of one foot (1') clearance shall be maintained between primary high voltage cable and all other utilities and service voltage cables, except at crossings where a separation should exist to allow future repairs of either utility approximately two inches (2") minimum.

g. All conduit, including bell ends, shall be supplied and installed by the Developer/Contractor. Bell ends shall be installed at transformers, secondary pedestals, switch cabinets, and light pole locations. Attachment #10 contains installation guidelines. Conduits must be capped and labeled to identify routing.

6. The Ceustomer provides, installs and retains ownership of all commercial secondary service conductors and conduits from building (or load) to transformer (or source). When Customer can be met from an existing power pole, the Customer shall install all secondary cable to the pole and shall provide sufficient secondary cable to reach from the pole top connection point to the Customer's meter base or other point of connection. The Customer shall provide and install the first length (*i.e.* ten feet (10')) RGS conduit up the pole above the RGS elbow. All conduits installed on IFP poles will be on approximately eight inches (8") standoffs. Since the secondary trench and cable are the Customer's responsibility, no easements will be required by the City. All future maintenance, locating, and repair of secondary shall be the Customer's responsibility.

7. Customer shall provide and install necessary meter bases, current transformer (CT) boxes, and install IFP provided CTs in CT boxes. See Commercial Metering Requirements below.

   Following such installations, IFP will install meter, meter wiring, etc.; place a transformer on the concrete pad; pull primary cable through Customer installed conduit; and connect primary cables to the primary terminals of the pad-mounted transformer. IFP makes up secondary connections in the transformer and provides connectors for standard cable up to and including 500 kcm. If greater than

500 kcm cable is to be used, the Customer provides connectors and/or other special facilities. Finally, IFP connects the primary cable to its power system at the designated tap point after all requirements are met.

II. **Commercial Overhead Service**:

Customer shall do the following to prepare for service:

1. Determine location of service entrance, approximate size of loads and possible future needs.

2. Provide a meter base, standard power riser, weather head, and/or suitably anchored attachment point to allow connection to IFP's designated service tap point. Install IFP provided CTs.

3. Provide necessary easements to connect the Customer to IFP's designated tap point. Easements are required for primary only, except in rare cases where an easement for overhead secondary may be necessary if it crosses the property of others.

IFP will then provide metering equipment and aerial overhead conductor. Customer will install IFP provided CTs. Note that no Customer owned equipment will be permitted on IFP's poles.

III. **Residential Service**:

A. Underground

1. New underground residential electric systems shall be installed in front lot locations and shall be determined by IFP.

2. **Secondary**. In residential underground areas, the Customer (whether through the Developer, builder or individually) is required to open and close a thirty inch (30") deep trench, and install two and one-half inches (2½") schedule 40 PVC conduit to the meter base thirty-six (36") PVC radius elbows shall be used from IFP's designated pad-mounted transformer or service pedestal to the service point. At the building foundations, an appropriate smaller radius elbow as approved by IFP may be required to maintain conduit cover. Minimum conduit depth can be reduced to eighteen inches (18") of cover below final grade through lava upon approval of IFP, but RGS conduit must be provided and installed by the Customer where trench depth is less than thirty inches (30"). IFP will specify the conduit size. Conduit will have a maximum of 360 degree of bends per run. Conduit shall only be bent with approved methods (i.e. blanket warmer or rigid conduit bender, **NO TORCHES**.) Riser conduit shall be two and one-half inches (2½") RGS. Schedule 40 PVC is acceptable only if mounted within the framed wall. If surface mounted on the house, the riser to the meter base and adjacent elbow shall be RGS. IFP will inspect all conduit installations before backfilling for proper depth and installation. Meter base shall be framed and braced before the power cable will be pulled into the base. After IFP inspects conduit, an authorization for backfill sticker will be placed on

conduit or meter base. All trenches will be compacted to a minimum of ninety-five percent (95%) of maximum density to prevent settlement. It shall be the homeowner's responsibility to maintain integrity of secondary conduit at their expense.

3. **Service Entrance and Meter Base.** The meter shall be located within five feet (5') of the nearest front corner of the house to the existing transformer or pedestal. Conduit is to have a maximum of 360 degree of bends. Service shall conform with Attachment #4. Meter location requirements herein are to be used only as a guide and shall not be considered complete with respect to all possible service configurations or special extenuating circumstances. Any deviation of meter placement must have prior approval from IFP. The centerline of the meter should be five feet six inches (5'6") above the finished grade or walkway. If structural details prevent this, the centerline height shall be not less than five feet (5') or more than six feet (6').

4. **Primary**. Primary conduit and trench requirements are the same as for commercial service. At times, a primary extension may be required, in which case the Customer will open and close a forty-eight inches (48") deep trench below final grade and install conduit. Minimum trench width shall be twenty-four inches (24") unless otherwise noted. In general, easements for electric service shall be twelve feet (12') in width. It is the Customer's responsibility to have the designated easements surveyed and dedicated to the City. IFP will also indicate the preferred transformer and service pedestal locations. A horizontal and/or vertical separation is required between electrical facilities and/or other utilities.

   Exception: On residential extensions, IFP will provide transformer pads and service pedestals following IFP provision of such pads and pedestal and, before transformer pad or service pedestal is installed, the Customer/Contractor shall install one ten foot (10') length of two and one-half inches (2½") schedule 40 PVC secondary conduit with three feet (3') sweep and schedule 40 PVC riser if required from each transformer and/or pedestal on approximately a 45 degree angle into each lot to be served with electrical service.

5. **Power Cables.** IFP will provide and install the necessary primary and secondary cable in the Customer provided conduit to connect the Customer's service point to the City's pad-mounted transformer or pedestal. The Customer is required to establish a final grade compacted to a minimum of ninety-five percent (95%) of maximum density at each transformer and service pedestal on location large enough for placement of IFP's transformer pad and/or pedestal. *See Attachments #2 and #3.* The Customer should coordinate work with IFP. The Customer's service entrance equipment must be in place and approved by the electrical inspector before final hookup. Installed conduit shall be inspected by IFP to ensure proper conduit depth and installation. Cable will not be installed until the trench has been backfilled.

6. **High Voltage Transformers and Switch Cabinets.** The high voltage equipment shall not be enclosed in any manner which will restrict the dissipation of heat. A ten foot (10') minimum clearance and access must be maintained in front of the cabinet door. A two foot (2') clearance should be maintained on all other sides of the equipment. Fences or landscaping installed within this

clearance will be removed at the Owner's expense should servicing be required. *See Attachments 2 and 3.*

B. Overhead

1. The same procedures and requirements set out at II. NEW COMMERCIAL OVERHEAD SERVICE Section are applicable to NEW RESIDENTIAL SERVICE: Overhead.

2. Additionally, overhead service wire length has a maximum length of one hundred twenty-five feet (125').

IV. **Muli Family Units Service: Condos and Apartments**:

A. Underground

1. Conduits used to service the building will be determined by IFP. The same procedures and requirements set out in III.RESIDENTIAL SERVICE are applicable to multi-family units, condos, and apartments. Secondary conductor(s) will be terminated at one (1) point Customer's premises (*i.e.* main breaker, disconnect or similar tap point). IFP's conductor(s) shall not be used as a bus in gutters, etc.

2. The same procedures and requirements set out in I COMMERCIAL UNDERGROUND SERVICE are applicable to all new three-phase residential loads.

B. Overhead

1. The same procedures and requirements set out in II COMMERCIAL OVERHEAD SERVICE applicable to multi-family units, condos, and apartments, overhead.

V. **Construction and Temporary Service~~ceive~~**: There will be no hook-up labor and material charges for a construction service for a permanent facility. IFP will charge a fee for the installation and removal of power for a temporary facility to existing infrastructure (*e.g.* within thirty feet (30') of underground or one hundred twenty-five feet (125') from overhead tap point). This fee will be established by Resolution of the City Council and shall be paid at the City Building Department at the time of building permit application. Due to varied field conditions, the Customer will need to coordinate a site visit with IFP staff (208-612-8755) to determine installation requirements. If providing the service requires pole installation or transformer placement, an additional one-time fee shall be paid to IFP prior to the installation of the temporary service. Temporary Service request forms with current associated fees are available at the Building Department.

Examples of temporary facilities include a construction trailer or Christmas tree lot, which would require a line extension and/or transformer. Temporary power service shall be limited to one (1) year of continuous service.

The Customer must provide service pole and meter base, and have it approved by the City's electrical inspector. The service pole cannot be more than one hundred twenty-five feet (125') from the designated IFP tap point. The Service Pole shall be tall enough to allow for appropriate traffic clearance and be strong enough to support the service conductors.

VI. **Customer requested changes to existing services**:

Any customer may request a change to an existing service, including upgrades, expansion, extension or relocation, ~~but~~ shall pay in advance the costs in labor and materials to effect the change.

The Customer shall be responsible for costs incurred by IFP for the repair of any of its facilities damaged by the Customer or a third party working on behalf of the Customer. IFP will provide information and services in advance of maintenance or construction activities (such as dropping and reconnecting overhead service lines for tree trimming) at no charge, if scheduled during regular business hours.

VII. **Illumination: Public Rights-of-Way**

It shall be the Customer's/Developer's responsibility to provide illumination (street lights), along or within the public rights-of-way contained within a new development. All new light pole foundations and lighting conduits shall be constructed by the contractor in accordance with current City of Idaho Falls standard drawings and specifications. IFP will furnish to the Contractor for installation a bolt hole template, anchor bolts, nuts, washers, grounding butt plate, and ground wire. IFP will install poles and luminaires with the cost of materials paid by the Developer prior to installation.

Illumination: Security Lighting

IFP can provide security lighting for private property for a fixed monthly charge for each luminaire, based upon the type of luminaire and wattage. The rates are published in the fee ordinance. These lights can only be affixed to City owned poles with the cost of installation paid by the Owner / Customer. The City retains ownership of all facilities and equipment. For more information contact IFP Energy Services at 208-612-8436.

VIII. **Required Conductor Clearances**

Attachment #11 and #12 establish required clearances of overhead power lines to driveways, parking lots, alleys, areas of farm and construction equipment, pedestrian traffic, vehicular traffic, railroads, and water ways. Contact IFP for clearances not addressed in this Policy.

GENERALMETERING REQUIREMENTS

I. **SCOPE.** These general metering requirements cover only the common meter installations. Infrequent or special applications, which usually require the approval of IFP, are not included. Wiring diagrams and other meter information may be obtained from the IFP Metering Department. All meters are owned by IFP.

II. **LOCATION OF METERS.** The following requirements apply to the location of meters.

A meter shall not be located where it will be subjected to shock, vibration, or other damage.

Protection from ice, snow, rain or other damage shall be provided by the Contractor/Customer for metering equipment, when location so demands.

Meters shall be installed only in sockets which are plumb in all directions and securely fastened to the structure.

Commercial meters and metering equipment shall be installed at an outside location which will be kept readily accessible at all times for reading, inspecting, and testing. The meter SHALL NOT be contained inside a cabinet or utility closet.

All residential meters shall be installed at an outside location which will be readily accessible at all times for reading, inspecting and testing. Meters shall be front yard accessible.

Meters shall not be located where they might be damaged or become inaccessible by the movement or storage of materials or supplies.

The centerline of the meter should be five foot six inches (5'6") above the finished grade or walkway. If structural details prevent this, the center line height shall be not less than five feet (5') or more than six feet (6') in height. *See* Attachment #5.

In multiple meter installations such as apartment buildings or shopping centers, meters may be mounted in horizontal rows with the allowable maximum and minimum height from ground or walkway to the center line of the meter being six foot six inches (6'6") and four feet (4'), respectively.

In apartment or multiple-use buildings, meters shall not be installed above the first-story level or in the basement.

Meters shall NOT be mounted on IFP owned poles or padmount transformers.

III. **THREE-PHASE / SINGLE PHASE METER AND BASE.** All single-phase and three-phase meters shall be socket type. All new 200 amp residential or upgraded underground meter bases will be: Cooper's B-line UG204F or UG204 or Millbank's UF4015-KO or U015-O. IFP can accept an equivalent with prior approval.

IV. **DETERMINING SELF-CONTAINED OR CT METERING.** Use Table 1 to determine if the service should be metered with a self-contained or CT meter. The selection should be based on the actual connected kW.

TABLE 1.
SELF-CONTAINED VERSUS CT METERING

SINGLE PHASE – 120/240 VOLT	
MAIN SWITCH AMPACITY	METER TYPE
0 TO 400 AMPS 401 AMPS & ABOVE	SELF-CONTAINED CT SECONDARY

Use Table 2 to determine if the service should be metered with a self-contained or CT meter. The selection should be based on the actual connected kW.

TABLE 2.
SELF-CONTAINED VERSUS CT METERING

POLYPHASE		
METER VOLTAGE	SELF-CONTAINED METER MAXIMUM LOAD	CT METER MINIMUM LOAD
120/208 V - NETWORK	200 AMPERES	
120/240 V	200 AMPERES	201 AMPERES & ABOVE
120/208 V	200 AMPERES	201 AMPERES & ABOVE
240/480 V	200 AMPERES	201 AMPERES & ABOVE
277/480 V	200 AMPERES	201 AMPERES & ABOVE

V. **GROUNDING.** Meter bases or enclosures, conduit and meter frames attached to building shall be grounded to a service ground by the Contractor. Where self-contained meter bases are used, the neutral conductor shall be connected to the ground terminal in the base.

VI. **REMOVAL OF METERS.** Only authorized IFP personnel shall be allowed to remove meters from meter bases or the Customer's premises. When socket-type meters are removed, the socket must have a cover plate securely fastened and sealed in place.

VII. **METER IDENTIFICATION AT MULTIPLE METER INSTALLATIONS.** Prior to actual meter installation, the Customer or Contractor must provide the IFP Meter Department with a plan or diagram indicating which meter socket serves which unit. The Customer or Contractor shall mark the meter sockets with the applicable unit address by some permanent means at a location on or near meter base.

VIII. **GENERAL.** The Customer or Contractor must furnish meter bases and enclosures for all installations. All meter bases and enclosures will be installed by the Contractor and incorporated into the Customer's wiring. Meter bases must be listed and meet current City of Idaho Falls specifications and all applicable codes. Combination socket and disconnecting devices are approved for use, provided the base meets all other specifications and is wired on the line-side of the Customer's disconnecting device. Corrosion inhibitor shall be used on all connections to aluminum conductors. Protection from ice and other damage shall be provided by the Contractor/Customer for metering equipment, when location so demands. The Customer shall be responsible for the cost of repair for damage to the metering equipment occur due to lack of protection.

By-pass meter bases shall be in compliance with the Meter base section of this Policy. IFP will not provide new three-phase, three-wire self-contained service without a grounded neutral system.

IX. **MASTER METERING.** IFP's retail rates are intended for application to individual Customers or units of service and, except as specifically excepted hereinafter, master metering is prohibited. Master metered mobile home parks, multi-occupant residential buildings, commercial buildings and shopping centers connected prior to July 1, 2010, may continue to receive master metered service.

Mobile Home Parks built before July 1, 2010, whose space for tenants have been sub-metered by the park Owners, need not be individually metered by IFP. Mobile home park tenants will be charged the same rate for electric service as though they were directly metered and billed by IFP.

Multi-occupant residential buildings, commercial buildings and shopping centers may be master metered if the electric heating, ventilation, air conditioning or water heating systems are centrally located and cannot be controlled by the individual tenants.

A master-metered Customer may install sub-metering for individual spaces at the Customer's own expense. Any master metering system must be maintained by the building Owner and installed by licensed electricians. Master metered Customers may also utilize a reasonable allocation procedure to determine a tenant's usage for the purpose of reimbursing the master metered Customer. Such a procedure shall constitute an allocation and not a resale. The Customer shall indemnify IFP for any and all liabilities,

actions or claims for injury, loss or damage to persons or property arising from the allocation of service by the Customer.

IFP will not sell or otherwise provide meters or associated equipment required for sub-metering, nor test and maintain Customer owned meters.

SPECIFIC RESIDENTIAL METERING REQUIREMENTS

I. **SINGLE PHASE METERS.** All single-phase Customers with a main switch ampacity up to and including 400 amperes will be metered with a self-contained meter 320 amp meter base will be used on all loads from 200 to 400 amperes. Meter base of suitable ampacity will be used on all loads up to and including 200 amperes.

All new 200 amp residential or upgraded underground meter bases will be: Cooper's B-line UG204F or UG204 or Millbank's UF4015-KO or UF4015-O. IFP can accept an equivalent with prior approval.

SPECIFIC COMMERCIAL METERING REQUIREMENTS

I. **THREE-PHASE METERS.** All three-phase Customers with a main switch ampacity up to and including 200 amperes will be metered with a self-contained meter. All loads in excess of 200 amperes will be CT metered.

II. **SEQUENCE.** All meters or instrument transformers must be ahead of the Customer's disconnecting switch in sequence. Where multiple meter installations are required and a main switch is used, meters may be installed behind the main switch and ahead of the Customer's disconnect; no unmetered circuits will be connected to the main switch. Entrance wiring must be so arranged that metered circuits do not enter conduits, raceways or enclosures containing unmetered circuits except on IFP-owned pole meter loops. Use Table 1, SELF-CONTAINED VERSUS CT METERING, to determine if the service should be metered with a self-contained or current transformer meter. The determination should be based on the actual connected kW.

III. **CURRENT TRANSFORMER (CT) INSTALLATIONS.** CT installations shall not be more than 50' from the meter base, connected by a minimum one inch (1") conduit for metering conductors only. Underground metering conduit buried twenty-four inch (24") deep. Schedule 40 PVC with RGS above ground into meter base, [fragment]. CTs must be contained within a CT can.

See Attachment #7A (Free Standing CT Meter) if no building wall is available for mounting.

Enclosures for CTs shall be furnished and installed by the Customer. All enclosures shall be at least eleven inches (11") deep and of such size as to permit ready installation of current transformers on the size of wire

used. Table 2, enclosures for CTs will be used as a guide for the minimum nominal size of metal cabinet to be used. All enclosures and meter bases shall have provisions for installing security seals and shall be installed at an accessible location on outside of building. IFP will not allow any Customer equipment to be installed on, or holes drilled, in transformer. Enclosures for CTs will be used on both underground and overhead in instrument metered installations. Top of CT enclosure not to exceed six feet (6') above finished grade. Bottom of CT enclosure shall not be less than two feet (2') above finished grade. All CTs shall be solidly mounted. Buss type (bolted to buss bar) CT's are allowed. Any variances to the above shall be determined by IFP.

CT meter bases located within six feet (6') of the padmount transformer shall be grounded and bonded to transformer to prevent touch potential.

TABLE 2.
ENCLOSURE FOR CURRENT TRANSFORMERS (CTs)

SERVICE ENTRANCE CONDUCTOR AMPACITY	MINIMUM TRANSFORMER CABINET SIZE (W X H X D)
401 & ABOVE - 10	24" X 24" X 11"
400 & BELOW - 30	24" X 48" X 11"
401 - 800	36" X 48" X 11" (HINGED DOOR TYPE)
801 - 1000	36" X 48" X 14" (HINGED DOOR TYPE)
OVER 1000	NOTIFY IFP

IV. **INSTALLATION OF COMMERCIAL METERS.** All meters, self-contained meters, voltage, and current leads, used with instrument transformers, shall be installed by IFP Meter Department personnel.

METER BASES

I. **SCOPE.** These specifications cover all self-contained meter bases and transformer-rated meter bases. Protection from ice, snow, rain or other damage shall be provided by the Contractor-Customer for metering equipment, when location so demands. All commercial meter bases shall be of the lever bypass type on all permanent structures

II. **SINGLE-PHASE METER BASES.** Residential and commercial service installations over 200 amp, up to 400 amp, (320 amp meter base) single-phase, shall have factory installed lever-type bypass facilities. All single-phase self-contained commercial service installations shall have factory installed lever or USERC link bypass. Single phase meter bases over 400 ampere shall be CT instrument metered using six (6) point socket type meter base with drilled and tapped mounting plate for test switch provisions (Circle AW catalog #12-146 or equivalent).

III. **THREE-PHASE METER BASES 200 AMPERE AND BELOW.** Self-contained meter base installations on three-phase service shall be a seven (7) point terminal socket type meter base and shall have factory installed lever type bypass facilities.

IV. **THREE-PHASE METER BASES OVER 200 AMPERE.** Three-phase meter bases over 200 ampere shall be a CT instrument metered installation using thirteen (13) terminal socket type meter base with drilled and tapped mounting plate for test switch provisions. (Milbank UC3433-XL, or equivalent).

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V. **NETWORK METERING 200 AMPERES AND BELOW.** Self-contained meter base installations shall be a five (5) terminal socket type meter base with fifth terminal installed left center in meter base (9 o'clock position).

VI. **CURRENT AND POTENTIAL LEADS.** The Contractor shall furnish and install all meter bases and the RGS conduit (1"minimum) to the meter base for current and potential leads. IFP will furnish instrument transformers as needed. The Contractor shall provide the necessary enclosure and install the CTs (CTs will be made available by IFP Meter Department). All CTs will be solidly mounted in CT enclosures.

VII. **WORKING SPACE AROUND ELECTRICAL METERING EQUIPMENT.** Sufficient access and working space shall be provided around all metering equipment to permit ready and safe operation, maintenance and testing of such equipment, with a minimum of three feet (3') front working space, minimum of 6 feet 6 inches (6'6") head room and a minimum of three feet (3') wide plus permitting 180 degree opening of equipment doors or hinged panels.

CUSTOMER GENERATING EQUIPMENT INTERCONNECTION REQUIREMENTS / NET METERING

All new electric generation equipment that a Customer desires to connect to the IFP distribution system shall be approved by IFP prior to connection to the power system and require a signed agreement adhering to the following terms and conditions.

1. **Facility:**

a. Purchase of Energy: CUSTOMER-GENERATOR has constructed or intends to construct an electrical generating facility as described in Exhibit "A" attached hereto and incorporated into this Agreement by reference at CUSTOMER-GENERATOR's premises (the "Premises") located at _____, Idaho Falls, Idaho. CUSTOMER-GENERATOR agrees to sell and IFP agrees to buy all electrical energy generated at the Facility in excess of CUSTOMER-GENERATOR on-site load, all in accordance with the terms and conditions of this Agreement.

b. Facility Fuel Type and Size Limitations: Customer's Facility shall have a maximum output peak generating capacity of no more than 15 kilowatts (kW) for residential and 25 (kW) for commercial. Larger capacity systems will be allowed based upon the customer's historic usage. System sizing in this

case shall not exceed the average of the previous 12 months usage. The system shall generate electricity using one of the following fuel or equipment types: wind, solar, biomass, geothermal, hydro or fuel cell. (note: type and size allowed may vary based on city building department restrictions.)

c. Facility Description: The Facility shall be designed, constructed and operated in a manner such that it will interconnect and operate in parallel with IFP's electric supply system, all in a safe and efficient manner without disruption, impairment, damage or loss of operational efficiency to IFP's electric supply system, as determined by IFP. The operation of the Facility is intended primarily to offset part or all of CUSTOMER-GENERATOR's electrical requirements presently supplied by IFP. CUSTOMER-GENERATOR shall be responsible for the design, installation and operation of the Facility and shall obtain and maintain all required permits and approvals. This Agreement is applicable only to the Facility described in Exhibit "A" to this Agreement. Any modifications to the Facility, including installation of replacement Facility or parts, other than for routine maintenance, shall only be made following the prior written approval of IFP.

2. Term:

The agreement shall commence on the date established in the agreement and shall terminate at the expiration of sixty (60) days following the delivery of a notice by either party expressing such party's desire to terminate the agreement..

3. Net Energy:

"Net energy" is the difference between electrical energy consumed by the CUSTOMER-GENERATOR from IFP's electrical supply system and the electrical energy generated by the CUSTOMER-GENERATOR and fed back into the IFP electrical supply system.

4. Measurement of Net Energy:

Metering equipment shall be installed by IFP (solely at CUSTOMER-GENERATOR's expense) to measure the flow of electrical energy and to collect electric generating system information for research purposes.

5. Price and Payment Methodology:

a. Where Consumption Exceeds Generation: If electricity supplied by Idaho Falls Power during the billing period exceeds the electricity generated by the Customer during the billing period, the Customer:

i. Shall be billed for the applicable non-energy charges for the billing period under the Customer's appropriate retail rate classification, in accordance with normal metering practices, and City Ordinances and policies and,

ii Shall be billed for the net electricity supplied by Idaho Falls Power at the Customer's appropriate retail rate, in accordance with normal metering practices and City ordinances, resolutions and policies.

b. Where Generation Exceeds Consumption: If the electricity generated by the Customer exceeds the electricity supplied by Idaho Falls Power during the billing period the Customer:

i Shall be billed for the applicable non-energy charges for the billing period under the Customer's appropriate rate classification, and

ii Shall be financially credited for energy delivered to Idaho Falls Power during the billing period for the net energy received into Idaho Falls Power's electrical supply system at Idaho Falls Power's wholesale power price or other rate at such time as might be enacted through City ordinance, resolution or policy.

6. Installation Standards and Code Compliance:

a. CUSTOMER-GENERATOR shall provide the electrical interconnection on the CUSTOMER-GENERATOR side of the meter between the Facility and Idaho Falls Power's system. Solely the CUSTOMER-GENERATOR'S expense, Idaho Falls Power shall make reasonable modifications to Idaho Falls Power's system necessary to accommodate the Facility. The cost for such modifications shall be Idaho Falls Power's actual cost, with an estimate of such costs due and payable in advance of installation. The net metering Facility shall include solely at the CUSTOMER-GENERATOR'S expense, all equipment necessary to meet applicable safety, power quality, and interconnection requirements. These requirements are, or may include, Idaho Falls Power's policies, the National Electrical Code, National Electrical Safety Code, the Institute of Electrical and Electronic Engineers (e.g. IEEE 1547), Nationally Recognized Testing Laboratories (e.g. UL 1741) and utility best practices. Idaho Falls Power Engineering staff must approve each design drawing prior to construction. The drawings must comport to generally accepted engineering design practices and be submitted with the application. This review will be completed within 30 days of application. Upon completion of construction, the City Electrical Inspector and Meter Technician shall give final inspection and approval for the Facility to commence operation. On or within sixty days prior to each three year anniversary of this agreement the Customer shall provide additional certification by an independent qualified and licensed person or entity that the Facility remains in compliance with all applicable electrical and safety codes. Failure to file certification will result in disconnection of the generator (in accordance with item #8), suspension of the agreement and termination of any credit for energy delivered to Idaho Falls Power. When the certification is filed and the facility is found to be in compliance, the agreement will be reinstated from that date forward. There will be no true up of energy during the noncompliance period.

b. CUSTOMER-GENERATOR shall make an application to and receive approval from IFP before installing an interconnected Facility on CUSTOMER-GENRATOR property. Application forms for a Net Metering Facility are available at the City of Idaho Falls Building Department. The completed application and Facility system design drawing should be returned to the address listed on the application. The City of Idaho Falls Building Department will also require a

building permit and electrical permit along with an additional copy of the system design for review. Review by the City of Idaho Falls Building Department and IFP will occur simultaneously. IFP may withhold approval, if for any reason the requested interconnection would result in a negative monetary or physical impact on the City electrical system.

7. Operational Standards:

CUSTOMER-GENERATOR shall furnish, install, operate and maintain in good order and repair, without cost to IFP, all equipment required for the safe operation of the Facility operating in parallel with the IFP's electrical supply system. This shall include, but is not limited to, equipment necessary to (1) establish and maintain automatic synchronism with IFP's electric supply system, (2) automatically disconnect the Facility from IFP's electrical supply system in the event of overload or outage on IFP's electrical supply system, and (3) automatically disconnect if energy storage is utilized with the Facility (batteries), CUSTOMER-GENRATOR system must instantaneously isolate from, and not back feed onto, IFP's electrical system in the event of an overload or power system disruption. The CUSTOMER GENRATOR Facility shall not cause any adverse effects upon the quality or reliability of service provided to IFP's other customers. IFP reserves the right to require CUSTOMER-GENERATOR Facility modifications to comport with Idaho Falls electrical system change in needs or requirements or to negate any adverse impact the interconnected Facility has on other customers. The Facility shall not cause any adverse effects upon the quality or reliability of service provided to IFP's other customers. The CUSTOMER-GENERATOR shall operate its Facility in accordance with applicable rules and regulations. Any such changes would be effectuated at the three (3) year anniversary of the Agreement certification.

8. Disconnection:

CUSTOMER-GENERATOR shall furnish and install on CUSTOMER-GENERATOR side of the meter, a disconnecting device capable of fully disconnecting and isolating the Facility from IFP's electrical supply system. The disconnecting device shall be located adjacent to IFP's bi-directional metering equipment and shall be of the visible break type in a metal enclosure that can be secured by an IFP-owned padlock or other security device. The disconnecting device shall be accessible to IFP's personnel at all times and shall conform to National Electric Code standards. IFP shall have the right to disconnect, with or without notice, the Facility from IFP's electric supply system when necessary, in IPF's sole judgment, in order to maintain safe and reliable electrical operating conditions or to protect IFP's system from damage, disruption, interference, or to preserve system reliability or protect IFP's system from damage, disruption, interference, or to preserve system reliability or protect from other harm. Also, IFP shall have the right to disconnect, with or without notice, the Facility if, in IFP's sole judgment, the operation of the Facility at any time adversely affects the operation of IFP's electrical system or the quality and reliability of IFP's electrical service to other customers. The Facility shall remain disconnected until such time as IFP is satisfied, in its sole judgment that conditions justifying the disconnection have ended or have been corrected.

9. Maintenance:

Except for bi-directional metering equipment owned and maintained by IFP, all equipment on CUSTOMER-GENERATOR's side of the delivery point, including the required disconnecting switch, shall be provided and maintained in satisfactory operating condition by CUSTOMER-GENERATOR at his, her or its sole

expense and shall remain the property and responsibility of the CUSTOMER-GENERATOR. IFP shall bear no liability for CUSTOMER-GENERATOR's equipment or for the consequences of its operation.

10. Renewable Energy Credits:

The CUSTOMER-GENERATOR will release to IFP all renewable-energy credits (RECs), solar renewable-energy credits (S-RECs) or other renewable attributes as appropriate based on actual on-site electric generation from the Facility, during the term of this Agreement.

11. Indemnity & Liability:

CUSTOMER-GENERATOR shall defend, hold harmless, and indemnify IFP and its directors, Mayor, Council members, officers, employees, and agents against and from any and all loss, liability, damage, claim, cost, charge, demand, or expense (including any direct, indirect or consequential loss, liability, damage, claim, cost charge, demand, or expense, including attorney's fees) for injury or death to persons and damage to property arising out of or in connection with (a) the engineering, design, construction, maintenance, repair, operation, supervision, inspection, testing, protection or ownership of the Facilities, or (b) the making of replacements, additions, improvements or reconstruction of the Facilities. This indemnity shall apply, notwithstanding the active or passive contributory negligence of IFP, provided, however, IPF shall not be indemnified hereunder for its loss, liability, damage, claim, cost, charge, demand, or expense resulting from its percentage of negligence or comparative fault.

12. Governing Law:

a. The provisions of this Agreement shall be governed by and interpreted in accordance with the laws of the state of Idaho.

b. The delivery of electric service to CUSTOMER-GENERATOR's Facility shall be subject to all terms, conditions and provisions set forth in the City of Idaho Falls Electrical Ordinances, as the same presently exists or as may be amended hereafter. In the event of any conflict between the terms and conditions of this Agreement, then and in such event the Electrical Ordinances shall prevail.

13. Venue, Jurisdiction and Litigation Expenses.

It is agreed that this Agreement shall be construed under and governed by the laws of the State of Idaho. In the event of litigation concerning it, it is agreed that proper venue shall be the District Court of the Seventh Judicial District of the State of Idaho, in and for the County of Bonneville.

If a suit or action is instituted in connection with any controversy arising out of this Agreement, the prevailing party shall be entitled to recover, in addition to costs, such sums as the court may adjudge reasonable as attorney's fees, whether in initial litigation or upon appeal.

14. Severability:

Should any provision of this Agreement be or become void, illegal, or unenforceable, the validity or enforceability of the other provisions of this Agreement shall not be affected and shall continue in force. The parties agree, however, use their best endeavors to agree on the replacement of the void, illegal, or unenforceable provision(s) with legally enforceable clauses which correspond as closely as possible to the sense and purpose of the affected provisions and this Agreement as a whole.

Risk-based asset replacement

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EY
Building a better working world

Risk-based asset replacement

North American utilities are being encouraged to think beyond compliance when planning for critical asset replacement. Taking a risk-based approach increases the likelihood of successful rate case applications while avoiding catastrophic asset failure. **Matt Chambers** reports.

For many North American utilities, it has been half a century since their massive postwar capital investment programs. Now, many of these critical assets – electric grids, natural gas pipelines and water distribution systems – require urgent replacement to maintain safety and reliability.

According to the Department of Energy, power outages cost the US approximately US$80b annually while the financial consequences of catastrophic failure can threaten a utility's viability. Given the significance of this risk, utilities must supplement their traditional reliability-centered maintenance programs with two parallel activities:

1. A regulatory-accelerated replacement strategy
2. An operational risk management framework

Building a compelling case for investment

A regulatory-accelerated replacement strategy focuses on accelerating and prioritizing replacement and financial recovery, compressing what may have been a 50-year asset replacement plan into a much shorter period of, for example, 10 or 15 years.

Although fast-tracking asset replacement is essential to avoid failure of aging infrastructure, it also requires a far greater investment of funds. Utilities must build compelling, risk-based rate cases that assure regulators that this increased infrastructure investment aligns with the public's need for reliable energy supply.

We believe that many regulators are aware of this pressing need for investment. But, wary of burdening consumers with continual rate increases, they are increasingly encouraging companies to present evidence of the investment need in order to justify costs that will be passed on to ratepayers.

The California Public Utility Commission (CPUC) recently proposed new rules that would compel utilities to base future rate case applications on a risk-based decision-making framework. The CPUC said it "expect[s] an evolution in the way utilities identify safety and reliability risks and justify the value of investments and operations expenses."[1] However it is worth noting that many regulators, including the CPUC, have yet to update cost recovery mechanisms in line with this risk-based approach (see inset box).

1. "Proposed Decisions and Resolutions for Public Comment Results," *California Public Utility Commission website*, http://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=81600842, accessed 29 November 2013.

Lessons from San Bruno

PG&E's risk-based replacement strategy

Californian utility Pacific Gas & Electric (PG&E) – owner of the San Bruno gas pipeline that exploded in 2010 – recently conducted risk assessment that led to changes in the company's planned investment priorities in order to improve safety by optimizing risk reduction.

Announced on 30 October 2013 as part of the company's third-quarter financial earnings, the utility announced plans to replace fewer miles of natural gas pipelines than originally proposed, although the difficult terrain in which these miles are located means the costs to replace them will be comparable. But with CPUC's cost recovery mechanism based on number of miles, rather than the cost of replacement, PG&E stated that the work would leave it with unrecoverable expenses of about US$196m (with additional costs of US$30m in 2014).[2] This highlights the need to educate regulators as to the true cost of replacing infrastructure and putting legislative measures in place to ensure utilities do not bear all the expenses of a risk-based replacement strategy.

This evolution requires utilities to build a compelling case for investment by articulating their risk profile and creating awareness of the risks and mitigation plans. We are working with many companies to develop critical asset risk and investment plans that use both the current risk profile and proposed risk profile that would result from the replacement program to quantify the potential financial consequences of a potential asset failure.

Using data analytics to improve operations

In addition to prioritizing asset replacement, utilities need better ways to manage the short-term operational risk associated with aging assets. Most companies have an effective operational management framework in place, but in many cases, this framework includes inadequate monitoring and reporting mechanisms to alert management to signs of potential asset failure.

Given the significance of the risks, warning signs of potential failure must go beyond frontline operational staff. Executive management needs a clear line of sight into operational decisions to enable proactive decision-making when it comes to failing assets. Embedding advanced data analytics into existing enterprise asset management (EAM) systems allows for greater transparency and improved reporting. This means utilities can understand not only what has already occurred, but also why it happened and what may be lurking around the next corner.

Living on borrowed time

Utilities, and society at large, are living on borrowed time. The economic and public impact of a single, major infrastructure failure far exceeds the positive returns that risky assets left in the ground stand to provide. While reliability-centered maintenance programs remain important, utilities will also need to adopt a multifaceted solution that considers regulatory-accelerated replacement and operational risk. Most importantly, avoiding catastrophic asset failure will require companies to view asset replacement programs through a risk lens that enables proactive, long-term decision-making, rather than one that focuses only on compliance.

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Matt is a Principal in Ernst & Young LLP's Advisory practice with almost 20 years of experience assisting clients with improving their risk management infrastructure. He leads the US firm's performance risk management activities in the power and utilities sector and works with a number of energy clients in designing and implementing policies, processes and technology to manage the significant strategic and operational risks that impact long-term goals.

Read more in our article Five insights for executives: living on borrowed time

2. "PG&E Corporation announces third-quarter 2013 financial results," *Pacific Gas & Electric website*, www.pgecorp.com/news/press_releases/Release_Archive2013/131030press_release.shtml, 30 October 2013.

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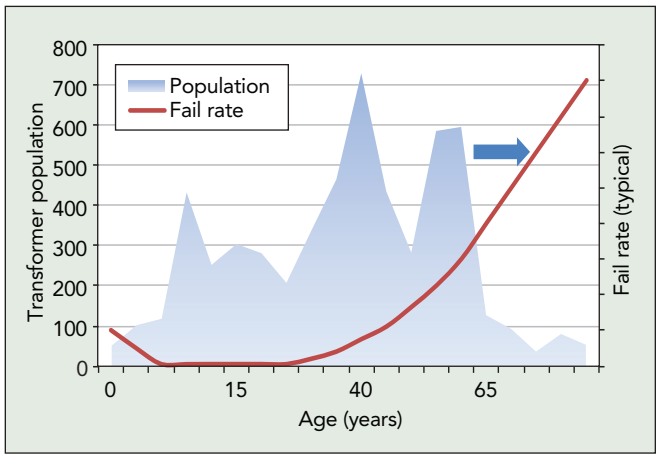
AEP Launches Asset Health Center

To fail or not to fail? The end-of-life gauntlet prompted a new approach to predictive asset management.

By **Jeff Fleeman**, *American Electric Power Transmission*

It is an age-old story playing out at utilities the world over: As asset populations grow and age, the resources required to tend to troubled assets have struggled to keep pace. A review of asset-age profiles by American Electric Power (AEP) revealed that 33% of its power transformers are at least 50 years old and approximately 18% are 60 years old or more.

Failure performance for transformers follows the typical bathtub curve. As this population marches onward toward the end of life and the (expected) steep rise in failure rate, an increasing share of these assets can be expected to either fail or demand great expense to extend their lives. This underscores the operational challenges presented by today's aging transmission infrastructure. In AEP's case, these challenges have catalyzed a new way of managing the health of vital assets across the utility's transmission business.



The age profile of AEP's transformer population combined with typical failure rate behavior underscore operational challenges posed by today's aging infrastructure.

Establishing an Asset Health Center

AEP is an integrated utility, operating in 11 states throughout the United States, with approximately 39,000 miles (62,764 km) of transmission lines and more than 900 transmission substations. Transmission power transformer and circuit breaker populations exceed 1,700 and 7,000, respectively.

AEP first outlined industry benefits of what it termed the "asset health center" concept in 2007. The utility then encouraged collaborative development of a platform that would integrate its existing infrastructure and systems together with new condition models to transform operational data into actionable decision-support information. Some call this type of integration "OT/IT convergence" for its melding of operational technology and information technology. AEP views it as an opportunity to transform its asset management processes by leveraging a smarter transmission grid.

Fast-forward to 2013 and AEP is now implementing this asset health center solution — the first of its kind — across its entire transmission network. By turning real-time and historical data, gathered from across the network, into meaningful and timely insights about asset health, AEP's asset health strategy is anticipated to benefit both customers and shareholders by helping the utility meet important objectives:

- Prevent failures to achieve system reliability, availability, performance and compliance goals
- Optimize workforce productivity and safety by targeting maintenance where it is most needed
- Support prioritized asset replacement investment decisions.

Strategically Addressing Asset Health

AEP faced a range of issues common to transmission operators with aging infrastructures. These challenges included asset replacement or repair decisions, moving beyond frequency-based inspection, attaining visibility of real-time operating conditions of vital assets, meeting evolving compliance requirements, actual and anticipated retirement of skilled technicians and engineers, and ever-present budgetary pressures to hold down operations and maintenance (O&M) costs. No stranger to innovation, AEP sought out a solution for addressing these and other asset-related challenges.

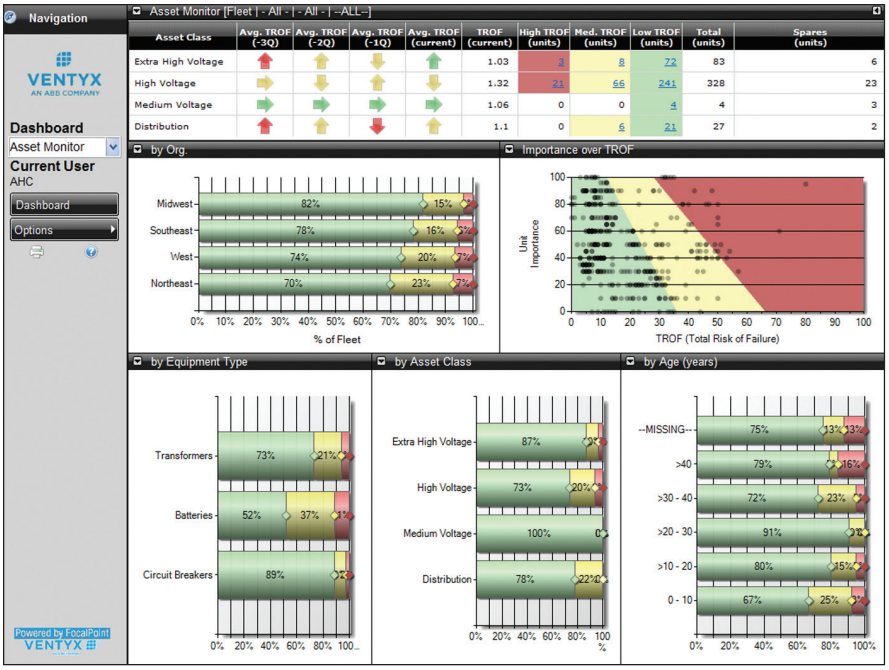
AEP found an opportunity in something many utilities regard as yet another challenge: the rising tide of data collected. Sensors and monitors, including intelligent relays, make operational data available at unprecedented rates — yet few

utilities are equipped to effectively harness this deluge of data and turn it into practical and actionable information. A combination of technologies would be required to do this, which is where AEP set its sights.

The path AEP wanted to take would allow it to meet specific goals:

- Automate collection and aggregation of data from smart sensors and equipment monitoring systems to achieve more timely insight into asset performance across the grid.
- Apply advanced analytics to both real-time and historical data to help drive decisions and actions that maximize asset health and performance.
- Advance its asset management capabilities through comprehensive business intelligence.

With this direction in mind, AEP reviewed available technologies and eventually selected an approach that involved collaboration with global power and automation vendor ABB. AEP and ABB developed a new system to take advantage of the collective expertise of both industry-leading companies.



ABB's asset health center evaluates data compiled from equipment databases and smart sensors to present actionable information, such as this dashboard displaying Total Risk of Failure, which ranks various assets across the fleet.

Moving to a Next-Generation Solution

Condition-based predictive maintenance concepts are not new. Many utilities also have conducted experiments in real-

Increased awareness of equipment trouble and failure risk will help AEP prioritize maintenance and replacement of assets, such as this circuit breaker, helping to reduce catastrophic equipment failures, customer outages, and related capital and O&M expenses.

time monitoring. Asset health solutions have been elusive because of the inability to identify a solution broad-based and rational enough to warrant committed action. Oftentimes, monitoring experimentation involves complex, costly and high-maintenance local systems that stand alone, dedicated to a single apparatus. This is not a scalable solution. It requires too dear a cost and frequent site maintenance of the monitoring solution.

When AEP conceptualized its new approach to an asset health center, it established a few guiding principles:

- Leverage existing infrastructure and information systems.
- Use sensing that targets failure modes and is simple, robust, affordable, and low or no maintenance.
- Focus intelligence at a central collection point.

Anatomy of the Asset Health Center

The asset health center now being implemented at AEP arose from the AEP-ABB Transmission Technology Alliance, an arrangement designed to leverage each company's expertise and interests to deliver innovative transmission system solutions. The resulting asset health center solution integrates both companies' equipment-based operational technology with information technology from Ventyx, ABB's industrial enterprise software group.

AEP's multiyear implementation project has begun, starting with the utility's extra-high-voltage transformers. The long-term vision is to proceed through AEP's entire asset portfolio to encompass all of its major asset types, including transformers, breakers and, at critical facilities, substation batteries.

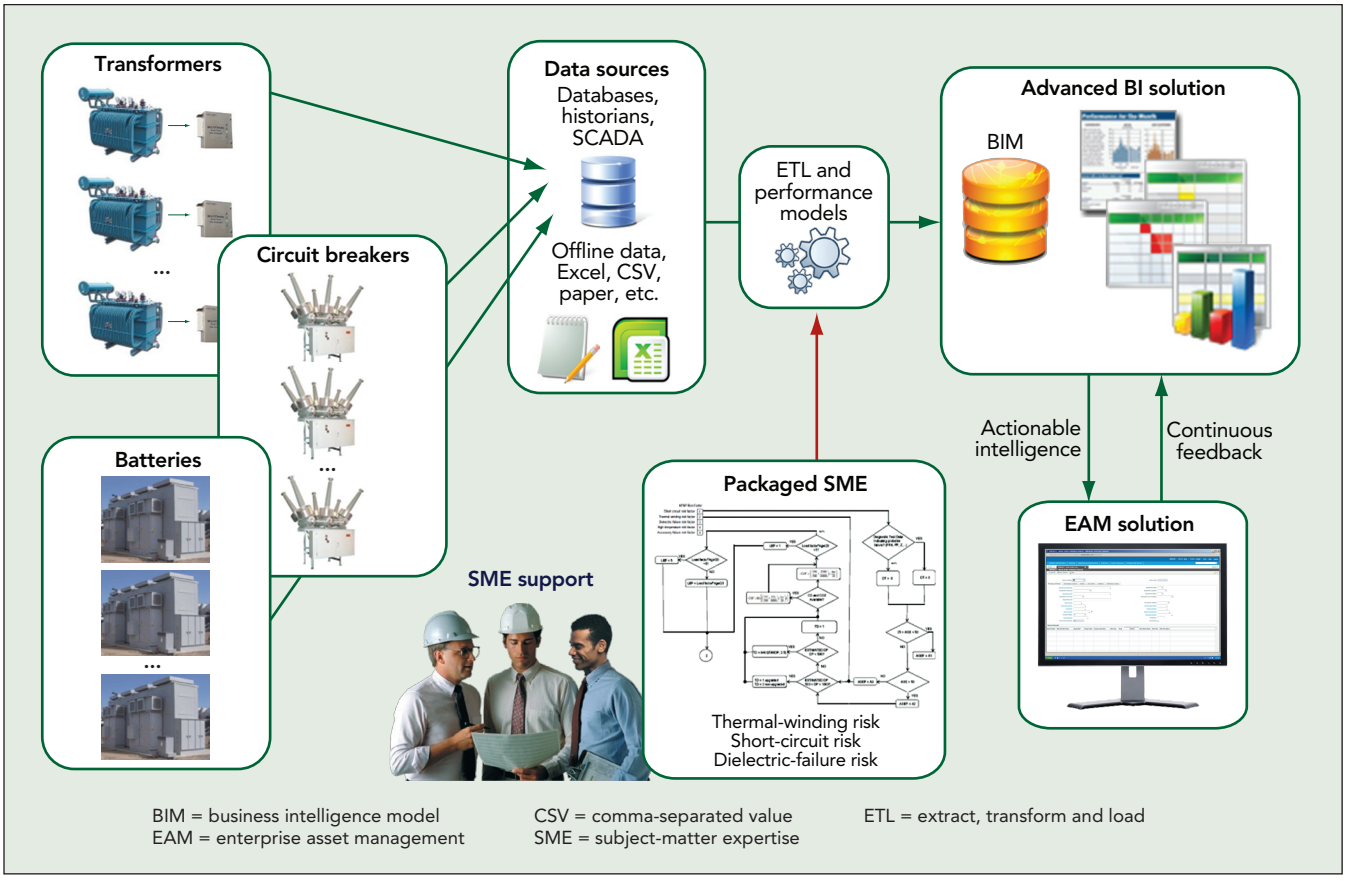
A salient feature of AEP's asset health center implementation is the ability to bring together the full range of disparate asset information, asset management algorithms based on deep subject-matter expertise and intelligent software solutions, all on a single platform that is extensible to cover all asset types. Data can come from any source, online or off-line, real time or batch. To try to accomplish this manually would be time prohibitive, even with highly skilled data technicians and analysts, and to attempt to automate it piecemeal using point solutions would result in disconnected processes, incomplete views and excessive data management costs.

In practice, AEP is leveraging its existing infrastructure and designs to deliver digital equipment history records, on-line monitoring and operational supervisory control and data acquisition data to the asset health center. There, asset condition monitoring and performance algorithms (for example, asset performance and risk of failure) can be applied and a full spectrum of business intelligence tools and techniques (for example, drill-down capabilities, key performance indicators and real-time information dashboards) put to use on comprehensive data sets to power a wide range of decision processes, both strategic and operational. To augment existing infrastructure, some new monitoring equipment is built in to new equipment and will be added as a retrofit to selected existing assets.

Achieving Projected Benefits

AEP had thoroughly outlined the expected benefits of the asset health center:

- *Fewer catastrophic equipment failures.* Equipment failures and their many consequences are expected to decline through timely asset condition visibility, predictive analytics and risk modeling.
- *Prioritized maintenance and replacement.* Grid-wide awareness of equipment trouble, failure risk or end of life help to prioritize repair and replacement, reducing both failures and O&M costs.
- *Optimized asset investment strategies.* Comprehensive and accurate asset condition information is expected to help optimize AEP's asset replacement strategy and time line.
- *Maximized network performance.* By unlocking the value of a smarter grid, AEP expects to maximize the performance and reliability of its transmission network.
- *Improved productivity.* Improved maintenance prioritization and planning are expected to help drive optimal use of skilled human assets and maintenance equipment.
- *Increased safety.* Better assessment of safety risks through improved visualization and analytics will help to protect AEP workers, the public and the environment.
- *Enhanced regulatory compliance and reporting.* Automated data capture, analysis and report generation will streamline compliance and regulatory reporting and audit preparations.
- *Increased operational efficiency.* The linkage of operations to condition-based maintenance and workforce management is expected to result in improved outage management and downtime.



The asset health center aggregates data from a variety of sources and applies advanced business intelligence and analytics to power a wide range of decision processes on a single platform.

Lessons Learned

The deployment of an asset health center at AEP is a continuing process, with the upfront planning and scoping accomplished and the initial implementation underway. Much has been learned thus far that is applicable to any organization undertaking such a project:

- *Set high-level goals.* So much of the success of a project like this depends on engaging stakeholders from across an organization to help set long-term objectives. AEP's goals include safety, compliance, operational excellence and financial performance. Such long-term objectives are necessary to scoping the project and measuring its success over time.
- *Identify clear business requirements.* It is necessary to prioritize the main business requirements to avoid project creep. AEP's priorities include managing and prioritizing maintenance needs, accelerating assessment of asset conditions, condition visualization, and prioritizing and managing capital investment.
- *Implement a comprehensive solution.* Asset health is not a silo; rather, it touches multiple operational business units and cannot be approached piecemeal. An asset health center will transform the way a utility approaches asset maintenance, and there are a lot of moving parts to be integrated into a whole. Thus, it is important to start with a whole solution that can bring together any information from any source and combine it with domain expertise, smart software (expert algorithms and business intelligence tools) and smart hardware (such as sensors and monitors).

Meeting the Challenge

Aging equipment is a long-term challenge for electric utilities. This will require focused and consistent efforts — along with innovative technology — to meet both current and coming challenges. Fortunately, technology now exists and is being implemented at AEP to enable an end-to-end asset health management system that manages the vast amounts of information utilities, like AEP, generate; analyzes it to provide actionable insights for managing assets across the grid; and shares knowledge in a meaningful way to maximize its value throughout the utility enterprise. TDW

Jeff Fleeman (jafleeman@aep.com) is director of advanced transmission studies and technologies at American Electric Power, where his responsibilities include system analysis, technology development, HVDC/FACTs, and asset performance and renewal programs. He holds BSEE and MSEE degrees from Ohio State University, chairs EPRI's Transmission & Substation Advisory Council and chaired EEI's Transmission Committee 2005-2007. He is a member of CIGRÉ, a senior member of IEEE and is a professional engineer.

Companies mentioned:
ABB | www.abb.com
American Electric Power | www.aep.com
Ventyx | www.ventyx.com

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Berst, Jesse
Strategic Asset Management for Electric Utilities

CONTENTS

ACKNOWLEDGEMENT

Events have converged to finally make strategic asset management for electric utilities possible. Utilities are now getting much more data about their equipment via meters, sensors and other intelligent devices. They are finally seeing the software that can pull together all that information and make sense of it. And we now have enough experience from asset management pioneers to know best practices.

As a result, strategic asset management is entering its next phase. We now have advanced analytics tools that help utilities pinpoint the asset health index of every important piece of equipment:

- To determine which of those assets are most critical to your operation
- To know just where to spend your maintenance dollars for maximum benefit
- To hand regulators a highly scientific report that proves which equipment needs to be replaced and when

Thanks to the support of the strategic asset management experts at UTILICASE, who made this publication possible, you'll learn in the pages that follow how your utility can glean the benefits of advanced analytics to develop a more strategic asset care program.

– Jesse Berst

Chapter 1

THE BENEFITS

Electric utilities are asset-intensive organizations. For many, asset investment can total billions of dollars. Yet a boggling number of those assets that play such a critical role in keeping the lights on in our homes and businesses are simply running out of time. Electric power's aging infrastructure both in North America and elsewhere in the world is one of the industry's biggest challenges today.

As a result, an urgent need exists for innovative solutions that can help utilities better manage the cost of adding or replacing infrastructure - while providing the reliability that customers demand and that regulators insist upon.

Next-generation tools

The good news is strategic asset management (SAM) – sometimes referred to as advanced asset management or advanced analytics - has progressed to the point that sophisticated new-breed software solutions are available. Among the benefits that utilities can realize from such solutions are:

- **A more comprehensive picture of asset health.** Most utilities already have a lot of data about their equipment. They simply lack the know-how and the software to pull it together from disparate sources to create value. With analytics they can forecast short- and long-term failures based on labs, tests, inspections, etc.

- **Prevention of catastrophic failure.** You can now get alerts in advance if critical equipment gets near danger zones.
- **Improved ROI on maintenance.** You now have a scientific way to decide whether to repair, refurbish, upgrade or replace equipment.
- **Better investments.** With analytics you can forecast future capital projects based on asset criticality, effective age and system impact.
- **More sophisticated risk analysis.** Knowing just which assets are most critical can have a significant impact on resource planning and operations.
- **Data serfs become knowledge workers.** Old-school asset management can be as much as 80% data-gathering and only 20% analysis and decision-making. With next-generation tools, you can reverse that ratio.

Keeping regulators happy

We typically think of advanced asset management as a way to get more value from equipment and to better manage its lifecycle. But word on the street is that it can also be a way to keep regulators happy.

That's because when it comes time to ask for replacement of aging equipment, utilities are starting to use this advanced or "new-breed" asset management software to prepare. They create a scientific analysis showing just which equipment is most critical and what the risks are if they fail to replace it. Regulators typically appreciate this kind of backup information to help them justify their decisions.

Energy experts at KPMG, a global audit, tax and advisory firm, point out that utility executives too often overlook data when making their smart grid business case – and that's a mistake. As Matt Smith, Chicago-based principal in KPMG's energy advisory services, notes:

> *"Data has the potential to be a key transformational driver in helping utilities optimize new opportunities from smart grid investments, with customer experience, utility operations and advanced power management as areas that can benefit. The challenge for utilities is how to identify and use that information to transform their business."*

Optimizing value

Beyond a smart grid business case, another way to think about the benefits of strategic asset management is to consider the value they bring to the greater organization. Granted, each utility will define value uniquely, depending on the demands of their customers and other stakeholders. But examples of value drivers might include:

- Rate impact to customers
- Reliability performance targets
- Environmental impact
- Safety records
- Profitability

By assessing the impact of these sorts of value-adds you will discover that value to the utility can be increased by a simple formula that manipulates the parameters – increasing performance, decreasing investment, decreasing risk.

Another outcome is that you also start to see practices that do not deliver significant value to the utility and its stakeholders. Practitioners of the "Lean Manufacturing" concept recognize that it is often removal of non-value added activities that can produce greater returns than focusing on value-added activities.

Here's an example of this from the electric utility world:

For a utility to improve outage key performance indicators (KPI) as measured by System Average Interruption Duration Index (SAIDI), a utility could:

1. *Replace equipment with more reliable equipment*
2. *Reduce the response time needed to reconnect customers*

Both could achieve the same reduction in SAIDI, but the second method would in most cases be much less expensive than the first.

Another example of this strategy was actually used by an Audi racing team to win a 24 hours of LeMans auto race. Rather than designing a heavier transmission that could withstand the rigors of a 24-hour race, the Audi team devised a solution that allowed them to – at pre-determined times – change the car's transmission within minutes, allowing the driver to be back on the track in the shortest time possible.

So as we've said, the benefits derived from strategic asset management will vary from utility to utility. The chart below summarizes some of the common benefits a utility might expect.

BENEFITS OF STRATEGIC ASSET MANAGEMENT

- Understanding risk tradeoffs with investment portfolios and performance objectives
- Understanding the business consequences of capital and sustainment budget alterations
- Having defensible long-term investment plans based on auditable objective evidence to support regulatory rate filings
- Investing in projects that bring the greatest value to stakeholders
- Achieving lower total life cycle costs through the reduciton of wasteful and often contradictory activities and investments
- Improving corporate performance as a result of aligned decision-making throughout the organization
- Meeting stakeholder demands with focus on system sustainability
- Optimized use of resources to deliver greatest value to the organization
- Improved response to emergencies by eliminating non-value added activities

Chapter 2

LAYING THE FOUNDATION

Before getting started on a SAM roadmap, there's a bit of a reality check that needs to occur. While many utilities will quickly recognize the potential benefits of strategic asset management, they may not be prepared for the organizational transformation that SAM requires. As a result, they may encounter unexpected roadblocks along the way. Let's look at two of the most common challenges:

1. Changing corporate culture from a silo-based departmental view into integrated corporate views.

It won't come as a surprise that one's position in a utility organization will influence how one views its assets. For example:

- Field crews and maintenance personnel regard assets as discrete pieces of equipment needing servicing and maintenance
- System operators see assets from a system performance, reliability and availability point of view
- System planners have a future system configuration point of view

- Financial planners view assets in financial terms, such as rate impact to customers, book value, etc.
- Executives associate corporate risks attached to assets

But those who have gone down this path already will tell you that strategic asset management will not work in utilities where siloed departments are off doing their own thing without a clue about what is going on in the department down the hall.

So in many utilities, strategic asset management may require a change in organizational mindset -- one that embraces a more holistic approach to conducting business that is focused on value delivery to achieve organizational goals.

And to do that right means laying the foundation with clear objectives so that there can be a coordinated effort – and buy-in – at all levels, from a utility's senior management to its front line workers. They all need to understand the big picture so they can align their individual roles and responsibilities and their department's mission with SAM practices that focus on those organizational objectives.

Put another way, coordinated, over-arching activities need to be in synch to effectively deliver on the benefits SAM offers, which as previously mentioned include:

- Portfolio management to ensure long-term viability
- Performance, cost and risk optimization at the system level
- Life cycle optimization of assets from acquisition to disposal

2. Establishing the necessary executive support to invest in asset management resources - including people, processes and technology.

It is one thing to get the buy-in mentioned earlier; it may be quite another to get a commitment on the resources necessary to reap the benefits of strategic asset management. To get to the point where advanced asset management is a key competency in an asset-intensive organization, it will likely require an investment in people, processes and/or technology to support the organization's SAM aspirations.

Consider why such investments may be necessary:

- **People –** Utilities will need the sort of actuarial analytical competence similar to that found in the insurance industry. The insurance actuarial analyst looks at the health of a client against statistical remaining life and risk factors to determine the insurance rate to charge an individual. A good asset manager also has to carry out similar analysis for assets under his or her care. This actuarial analytic skill set is typically not readily available within a utility and must be acquired.

- **Processes –** A utility will need to institutionalize processes that are capable of managing assets in a complete life-cycle. The diagram shows the typical steps involved in managing assets in a life-cycle manner. Optimization of costs, performance and risks need to take place over the entire process and not merely optimized for each part of the cycle. This life-cycle approach crosses traditional business boundaries inside the typical utility, leading to potential conflicts. For asset life-cycle management to succeed, those traditional business boundaries and barriers need to be removed.

Figure 1: Flow of life-cycle asset management

- **People + Processes –** Another difficulty in taking the life-cycle view is that it is often exacerbated by the long expected life of many utility assets, typically measured in decades. Decision-making staff may not have any incentives for taking the long-term view instead of the instant recognitions that come from taking a short-term view. An incentive and recognition process may be required to reward life-cycle decisions.

- **Technology –** Access to relevant data and information is the key to making transparent and defensible decisions. Yet in the typical utility, data doesn't reside in any single system but rather is found in disparate systems managed by different departments. These may include operational systems, maintenance systems, financial systems, geospatial information systems and ad-hoc systems. To serve the organization effectively, all of that data and information need to be readily available organization-wide and not bunkered in local domains. To achieve that will likely require a technology solution that streamlines communication and sharing.

Bottom line, to ensure the proper delivery of value to an organization, data and information must be treated as strategic corporate assets and supported as such.

"The business value locked within the explosion of smart grid data will enable transformation of the electric industry. A new breed of application will address tomorrow's challenging issues by delivering accurate, reliable results at a lower cost of ownership. The future belongs to big analytic applications analyzing big data."

– JD Hammerly, CEO and co-founder of The Glarus Group

Chapter 3

BUILDING A ROADMAP

When you're ready to get started down the strategic asset management path, experts will tell you that it's important to take a step-by-step approach. For example, asset management specialist UTILICASE advocates the six-step methodology detailed below.

6 steps to SAM

1. Be determined to succeed. As we discussed in the previous chapter, there has to be a commitment at all levels.

2. Clearly establish your points of pain and prioritize them. You cannot attack all of your pain points at the same time. Make a list, prioritize it and share it. Your list will likely include some of the following:

- T&D investments
- Budget reductions
- Equipment failure
- Loss of expertise
- Aging assets

3. Commit to a methodology that embraces a holistic view of the problems. Stop thinking in silos; see the big picture and then solve one problem at a time. Strategic asset management data is coming from every part of the utility so you have to look holistically.

4. Identify which systems own the data you need. Your IT and OT people should be involved. This is not an IT or OT problem you're working; it is a utility problem.

5. Gather all the standard tests, labs and outage information already available. You have to start consolidating the information – and you may be surprised how much of it there is. For instance:

- DGA test results
- Asset name plate data
- Outage data
- Inspection data
- Asset performance history

6. Implement analytics tools to deal with the resulting data flood. The result will include enhanced reliability, improved asset utilization and objective evidence to support requests and filings to regulators.

Why analytics?

At this point you may be asking if there isn't a way to have strategic asset management without the added expense of analytics tools. The experts will tell you that advanced analytics capabilities are absolutely fundamental to effective strategic asset management because they are the best way to:

- Extract the relevant data out of gigabytes of data and then transform that relevant data into useful, actionable information

- Quickly simulate hundreds of scenarios to find the ones that are most appropriate or relevant
- React and advise you when you don't even know you have a problem. Analytics never sleep
- Discover correlations or patterns to make holistic decisions. With analytics you can consider all aspects of a decision – the financial side, the maintenance side, the operations side, etc.
- Challenge your intuition; or put another way, confirm your good judgment
- Force you to capture people knowledge and keep it with the utility

Chapter 4

CASE STUDY

Smart Grid News presented a webinar in March 2012 that focused on Utilicase's SAM work with BC Hydro. (Click to watch a replay.) Below is a case study that features SAM analytics that Utilicase developed in collaboration with Hydro-Quebec.

Hydro-Québec TransÉnergie Uses Asset Management to Minimize the Impact of Aging Infrastructure

Hydro-Québec TransÉnergie is a leader in transmission system design, operation and maintenance. Its transmission system is the most extensive in North America, comprising 514 substations and more than 33,630 km of lines at various voltages. The division's fixed assets total $17.6 billion.

Hydro-Québec unbundled its operations in 1997 and created Hydro-Québec TransÉnergie. This division acts as transmission provider for Quebec and offers non-discriminatory access to Quebec's transmission system to all customers on the wholesale market in northeastern North America.

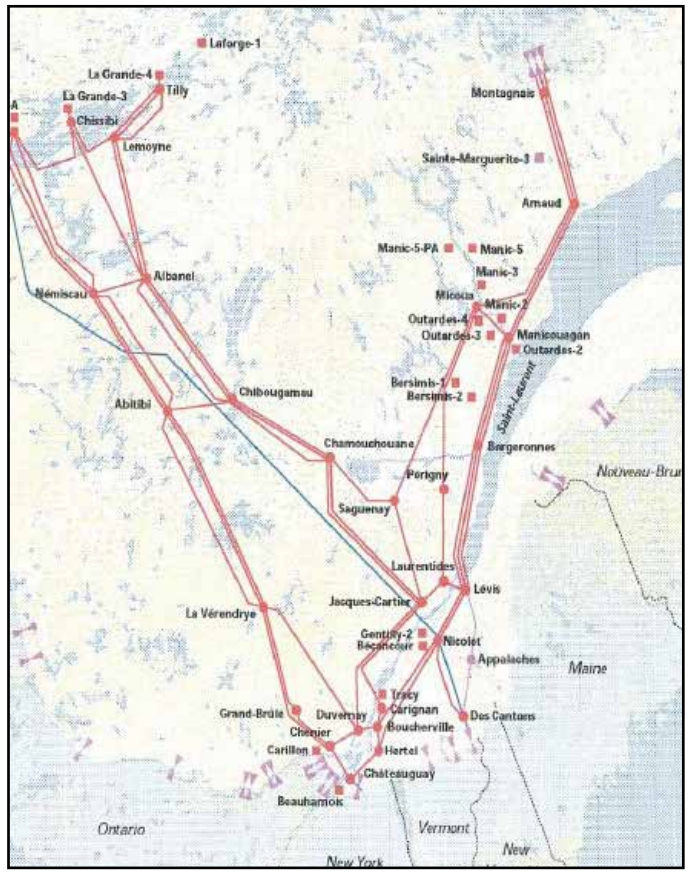


Figure 2: Hydro-Québec TransÉnergie service area

THE CHALLENGE: Aging Infrastructure

Like many utilities today, one of the major challenges facing Hydro-Québec TransÉnergie has been how to efficiently deal with its aging infrastructure. Much of the backbone of Hydro-Québec's transmission system was built in the 20-year period spanning 1960 to 1980. As an example, the installed generation capacity and the associated transmission system doubled in size over the period between 1970 and 1980. This situation is certainly not unique to Hydro-Québec. Utilities in Canada, the United States and Europe are facing similar challenges.

This chart illustrates the scope of the challenge that faced the Hydro-Québec TransÉnergie's maintenance staff in the mid-2000s.

TYPE OF EQUIPMENT	NUMBER OF UNITS	AVERAGE AGE (YEARS)	USEFUL LIFESPAN (YEARS)
Circuit breakers	8,000	23	30
Disconnect switches	32,000	25	40
Power transformers	2,100	30	40
Shunt reactors	300	22	35
Measurement transformers	18,300	20	30
Shunt capacitor banks	1,450	18	30

THE SOLUTION: Optimizing methodologies and data value

Hydro-Québec TransÉnergie brought in INTERPRO Solutions – now UTILICASE – to develop a set of countermeasures around its asset management challenges. They chose UTILICASE because it delivers specialized IT applications and services tailored to the needs of the electric utility environment. And because of the company's lengthy involvement in the industry, it understands the unique challenges that are inherent in such projects – for example, the need to simultaneously maintain quality of service, live within budget constraints and ensure adequate safeguards for employees and the public.

Below are highlights of the solutions developed for Hydro-Québec TransÉnergie and the purposes they serve:

Maintenance optimization: A maintenance optimization methodology strongly inspired by Reliability Centered Maintenance concepts was implemented. This led to a review of maintenance standards, with emphasis on both reliability and rigorous cost control. To ensure efficient implementation of these new procedures and standards in the field units, effort was focused on improving documentation of the maintenance procedures. This exercise also resulted in the additional benefit of identifying maintenance teams with the better procedures and their dissemination company-wide.

Software upgrade: To improve the planning, follow-up and documentation process for maintenance activities – and importantly to archive maintenance test results – new database and analysis software was implemented to provide a safe repository. This was essential if Hydro-Québec TransÉnergie was going to maximize the benefits from the massive quantity of data generated during maintenance testing. The data, presented in a user friendly format, can prove invaluable in facilitating the decision-making process related to aging infrastructure – for example, the rehabilitation or replacement and prioritization of investment. Additional advantages of the software upgrade included:

- **More uniform testing** – The new software tools facilitate the work of maintenance personnel by providing ready access to all necessary pre-test documentation and forms online. This not only leads to more uniform testing throughout the province but also better quality test data.

- **More value from data** – Once test data is downloaded into a central data repository, it can be sliced and diced and otherwise analyzed in a number of ways. For example, it can:
  - Show the evolution over time of the performance of selected equipment
  - Show the trend for a type of equipment as it ages
  - Establish limit values through the application of proven statistical methods
  - Allow for punctual and factual decisions on equipment rehabilitation or replacement

THE RESULTS: Improved insights drive better planning

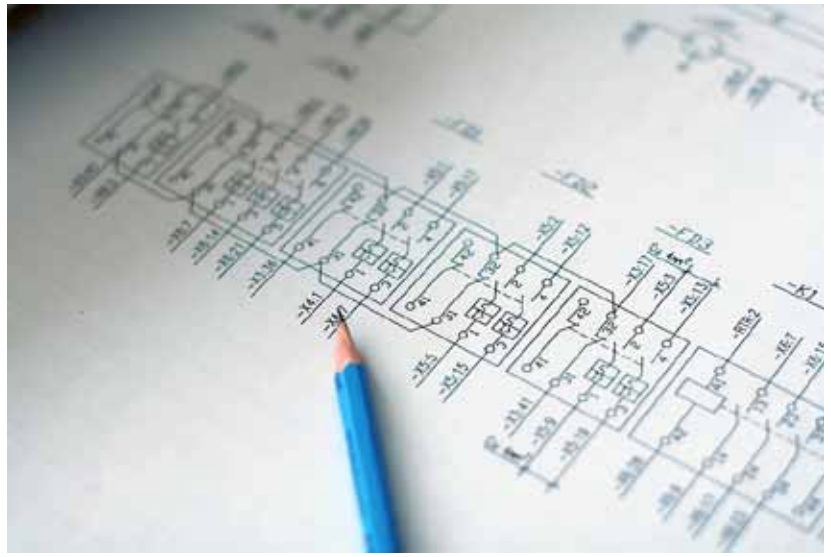
Hydro-Québec TransÉnergie has put in place a comprehensive plan for dealing with aging equipment and a key component of that plan is the customized EVA software bundle developed with INTERPRO Solutions/UTILICASE.

A closer look at this customized asset management package reveals how this approach drives better decision-making:

- **The Equipment module** constitutes the inventory of equipment along with its dominant characteristics. It supports grouping of equipment as systems and is able to manage the relationships and dependencies between systems and their constituent components. This module interfaces with the Hydro-Québec TransÉnergie Maintenance Management System and can create customized temporary inventories and support equipment characteristics cloning when the need arises. Available scroll-down menus are either by test or equipment type.

- **The Laboratory & Readings module** manages the acquisition of equipment field test data and allows for the direct transfer of this data from the originating field maintenance unit to a secure central data repository. Additionally, the information and instructions to field personnel in preparation of testing along with the test data result forms are available online via the web. Out-of-range test values are immediately flagged for additional verification by on-site personnel.

- **The Analysis module** provides statistical and analytical reports on equipment behavior, which become valuable decision support tools for re-orienting management parameters and, in turn, optimizing maintenance. It also constitutes a maintenance history log, can assist in the preparation of maintenance schedules based on historical data and provide a statistical failure comparison of preventive maintenance costs vs. repair costs after equipment failure.



The EVA asset management package allows for better maintenance planning in the context of Hydro-Québec TransÉnergie's aging equipment and will help the utility decide as the years go by which equipment has reached the end of its useful life cycle.

ABOUT UTILICASE

UTILICASE, formerly known as INTERPRO Consulting, was founded in 1994 and has successfully completed hundreds of mandates with companies across North America and internationally.

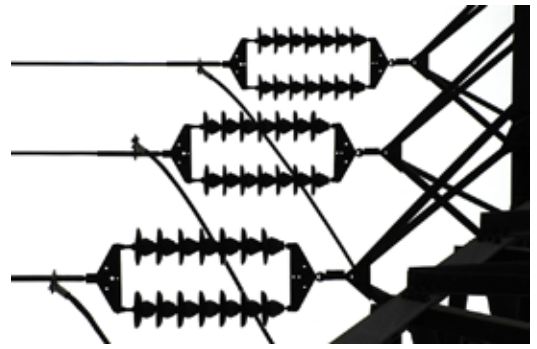
The company's mission is to provide expertise, business applications and IT solutions complying with the highest standards for strategic operations in the energy industry.

UTILICASE has developed a leading edge solution of Strategic Asset Management (SAM) for power utilities. Under the new paradigm of smart grid, power utilities must extend asset life while enhancing system reliability and overall operational performance. To help power utilities, UTILICASE has developed an offering that covers business consulting, technology gap analysis, development and execution of a SAM roadmap that can integrate UTILICASE's EPS-M product -- a new generation of Asset Care and Investment optimization tool.

Chapter 5

FAQs

Answers provided by UTILICASE experts



1. Does strategic asset management override plan maintenance from the equipment makers?

SAM is a strategic approach to maintenance while an actual maintenance plan is more tactical. SAM is intended to provide you with intelligence regarding your assets, their risks, degradations over time and investments in them. It works hand in hand with plan maintenance recommended by the manufacturer. Manufacturer-recommended maintenance plans to do not take actual operating conditions into account. SAM, meanwhile, provides solid information on efficiency and ways to improve it.

2 How are asset management analytics used for the development of operations, maintenance and capital improvement projects?

Analytics can make a difference in all three areas. Benefits include:

- ***Operational:*** Analytics can forecast transformer short-term failure by using information from DGA probes correlated with their use, health state and history to inform the control center of pending failure – avoiding a blackout.
- ***Maintenance:*** They also can help determine if a maintenance scheme has impact on asset health and to help pinpoint precisely which maintenance procedure to focus on for each asset, which results in lower maintenance costs and yielding the potential of longer asset life.

- ***Capital improvement:*** Analytics can help determine the best replacement scheme for an asset by factoring variables like load growth, overload, risk of failure and degradation to ensure that replacements are neither too soon nor too late. Combined with improved maintenance strategy, this will help extend equipment life cycles and cut costs significantly.

3. Which asset types could benefit the most from more intelligent asset management?

According to our experience, transformers (including tap changer), circuit breakers and poles seem to be utility favorites. But any asset can benefit from more intelligent asset management.

4. What are the latest technological advances that are influencing asset management practices?

Aside from the real-time benefits provided by the new generation transformer DGA, the new SAM paradigm is primarily supported by successful integration of well-known technologies (telecommunications, faster and parallel computation), lab experiments and statistical techniques and analytics intended to detect trends, patterns and unusual events.

5. How would the proposed advances in asset management improve the capability of the grid to incorporate variable generation?

The integration of renewable energy (variable generation) is complex and encompasses numerous elements of a utility, including asset management. The most notable improvement comes from improved grid availability for renewables and the ability to adjust maintenance timed to a generation schedule that can change very quickly.

6. Who is delivering advanced asset management solutions today and how is payback on those solutions measured?

Utilicase EPS-M solutions are a pioneer in SAM specialized for utilities. The ROI can be measured by five primary areas:

- **Failure prevention and enhanced reliability** (less down time and more utilization)
- **Enabling operational excellence** (more accurate assessment of asset conditions)
- **Risk mitigation** (the ability to identify critical assets with probably high failure rates)
- **Solid investment choices** (forecast future capital projects based on asset importance, age and system impact)
- **Eliminating guesswork** (forecast short- and long-term failures based on testing and inspections)

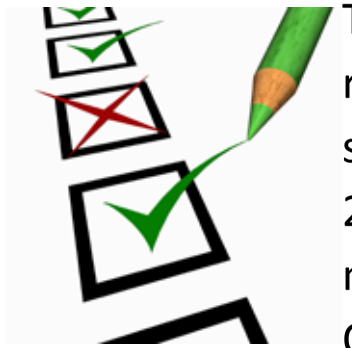
7. How can effective asset management help ensure successful adherence to reliability metrics like SAIDI, CAIDA and SAIFI?

Corporate reliability goals (such as those listed above) are at the heart of SAM. But SAM handles it differently. Typically, the traditional maintenance approach focuses on assets, then tries to consolidate the benefits. SAM uses a top-down approach, meaning it starts with the corporate responsibility goals, and then finds the assets that contribute to them and proposes specific action for those assets.

8. How long does it take to collect the data required to support and guide decisions and conclusions?

The goal is to avoid the 'study once and go,' repeated over and over. Instead, a method of constant improvement works best. The more data you collect over time, the better the decisions of EPS-M analytics. To provide value out of the box, implement analytics with a replay scenario based on past data you have already collected up to this point. Because real data is used per site, the results are site-related and very important for implementing site-dependent practices.

9. Which standards are most beneficial to achieving strategic asset management?



Two standards are emerging as a good foundation for achieving strategic asset management. The first is related to asset management directly, the PAS 55 standard. PAS 55 is the British Standards Institution's specification for the optimized management of physical assets, and it includes clear definitions and a 28-point requirement specification for establishing and verifying a connected, optimized and whole-life management system for all types of physical assets. It has been accepted by the International Standards Organization as the base for development of the new ISO 55000 series of international standards. The 2008 update was developed by 50 organizations from 15 industry sectors in 10 countries. However, PAS 55 is still in its infancy stage with North American utilities and its adoption rate is mostly unknown.

The second standard, the Common Information Model (CIM), relates to data modeling and is a key enabler to SAM. CIM should be your data foundation concerning any project related to SAM. The CIM model is relatively mature as it relates to asset and grid models, but the asset management elements of the standard are fairly new and will improve over the next couple of years. CIM has been recognized by the International Electrotechnical Commission (IEC). While the two standards are works in progress, we emphasize that a utility can still define and implement a SAM program roadmap now.

ADDITIONAL RESOURCES

From Smart Grid News...

- Advanced asset management webinar replays and slide deck
- Electric power system asset optimization (pdf)
- Just 3 simple steps to drive business value from smart grid data?
- Asset Management Channel news and resources
- Electric power system asset optimization (pdf)

From the web...

- Public Power: Data pileup drives move to asset management
- Electric Light & Power: Leveraging enterprise value with asset management
- IEEE: Asset management for the smart grid

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