Engineering Innovation Award

This award recognizes individuals or work groups who have developed innovative processes or programs.

Judging Criteria	Potential Entries Might Include
• Adaptability - Can it be adopted by other companies regardless of size? Geographic location? Public or Private? • Impact - Does it provide opportunity for new revenue or customer growth? Reduced cost of operation? Greater efficiency/productivity? More safety? Lower rates? • Creativity - Is this a new concept or the adaption of an existing concept? • What was the purpose of implementation from conception to completion? • Presentation - How did the presenter communicate the concept within the time allotted?	• Innovation in an engineering or design process or procedure that results in improved time or cost efficiencies during construction or maintenance activities. • Innovation in a construction process or standard that allows an operator to serve a new customer or group of customers. • Innovative partnerships with your sales and marketing counterparts that result in increased customer growth or the retention of existing customers. • Innovative partnerships with your human resources department that result in an enhanced ability to recruit and retain engineering talent for your organization.

Submissions Overview

Engineering Innovation Award Submissions - 15 Nominees		
Company Name	**Program Name**	**ID Number**
A.Y. McDonald	*Meter Set Assemblies (MSAs)*	EI-1
	Self-Contained Natural Gas Bypass Meter Bar	EI-2
CenterPoint Energy	*CenterPoint Energy Ounce-Ounce Regulator Program*	EI-3
CPS Energy	*CPS Energy's Renewable Natural Gas Project*	EI-4
Kinder Morgan	*New Compressor Station Environmental Risk Reduction Tool*	EI-5
Pivvot	*Pivvot Route*	EI-6
Southern Star	*Empowering People with Data*	EI-7
	Merging Data Analytics with Asset Management	EI-8
	Modernizing Work Practices	EI-9
Summit Utilities	*Summit Utilities Engineering Innovation via Digital Dailies*	EI-10
TC Energy	*Classification and Searchability of Records using Machine Learning*	EI-11
	Physics Based Modeling and Advanced Condition Monitoring of Gas Turbines in Pipeline Application	EI-12
	Plausible Profiles (PSQR) Corrosion Safety Assessment Model	EI-13
	Reality Capture for Drawing Remediation	EI-14
Xcel Energy	*Stress Corrosion Cracking Detection in ILI*	EI-15

Nomination EI-1	
SGA MEMBER COMPANY NAME	A.Y. McDonald
SGA MEMBERSHIP TYPE	SGA Associate Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Meter Set Assemblies (MSAs)*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-1-Meter%20Set%20Assemblies.png?_t=1623284239
PROGRAM DESCRIPTION	A meter set assembly is the result of the components that make up a gas meter set assembled into one unit, making the installation to a building/home a more streamlined/efficient process. The demand for meter set assemblies for utilities has increased over the years due to the fact that they provide time savings, cost savings in labor, consistency in assembling, and an added safety factor as the unit is tested prior to being in the field. In the past, A.Y. McDonald focused on manufacturing components that make up the gas meter set. Now, in addition to manufacturing those components, we also offer a finished meter set assembly.
RESULTS OF/RESPONSE TO THE PROGRAM	Installation of an A.Y. McDonald MSA allows gas utilities to experience time savings, cost savings in labor, consistency in assembling, and an added safety factor as the unit is tested prior to being in the field. A.Y. McDonald MSAs are tested electronically through the use of four tests, thus eliminating the chance of water getting into the regulator or water initiating rust prior to painting. These tests include the following: 1) The regulator is tested to assure it is the correct regulator and is set properly. 2) The inlet of the meter set assembly is pressurized at the maximum rated pressure for the regulator so leaks can be detected. 3) Joints after the regulator are tested by vacuum pressure significantly above the regulated pressure to ensure all joints seal well. 4) The outlet side of the meter set assembly is tested with the outlet valve at about 70 PSI.
RESULTING BENEFITS	Our motto is 'The Customer is the Boss' and the idea for A.Y. McDonald to provide MSAs came directly from the customer. Bringing this suggestion to life has allowed us to fulfill our motto while also making the industry safer. The journey to provide MSAs meant our company had to invest in the equipment, hire more production workers, and expand our TN production facility. While fulfilling the customers' need for this innovative solution was not easy, the investments we had to make allowed A.Y. McDonald to experience increased sales, more customers, and be able to provide additional job opportunities for Elizabethton, TN area.
PARTICIPATING EMPLOYEES	26+
ADDITIONAL SUPPORTING LINKS AND MATERIALS	• Blog post: https://www.aymcdonald.com/post/gas-meter-set-assemblies-created-the-ay-mcdonald-way • A.Y. McDonald (AYU) E-Learning Course: https://aymcdonaldu.com/#/online-courses/8a4997ea-bed0-4891-8d8a-b64698b9d2ef

Nomination EI-2	
SGA MEMBER COMPANY NAME	A.Y. McDonald
SGA MEMBERSHIP TYPE	SGA Associate Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Self-Contained Natural Gas Bypass Meter Bar*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-2-Self%20Contained%20Bypass%20Meter%20Bars.png?_t=1623284640
PROGRAM DESCRIPTION	Gas utilities are always looking for new ways to simplify the necessary services performed on a meter while also making the process safer. The self-contained natural gas bypass meter bar not only addresses this goal but completely exceeds all expectations by allowing natural gas meter maintenance and service of any kind without interrupting gas flow for the consumer. Since the product is self-contained, that also means that there is no need for additional hoses, regulators, bottles, or any special tools. In addition, every A.Y. McDonald bypass meter bar is designed with the strength and rigidity to support the meter set assembly.
RESULTS OF/RESPONSE TO THE PROGRAM	A.Y. McDonald gas utility customers appreciate that installing this product on a natural gas meter means no loss of pilot lights, no interruption in service or loss in flow capacity, meter change-outs can be performed any time, and the gas supply is always ready and regulated to the correct pressure. In addition, homeowners are no longer inconvenienced by having gas turned off for service, having to

	schedule appointments, or having a technician inside their home. A.Y. McDonald carries product options for residential, industrial, and multi-meter manifolds so gas utilities have the solution they need for the application they're working on.
RESULTING BENEFITS	Over the years, the demand for bypass technology keeps rising. By listening to our customers' needs, A.Y. McDonald is able to make their lives easier by offering the self-contained natural gas bypass meter bar. Our company's motto is 'The Customer is the Boss' and this invention greatly fulfills what A.Y. McDonald represents. The addition of self-contained natural gas bypass meter bars to A.Y. McDonald's natural gas product line has led to increased sales, more customers, and the ability to expand the team devoted to this product line. We take homage in the fact that this innovative solution means more options for the utility and a safer industry.
PARTICIPATING EMPLOYEES	26+
SUPPORTING DOCUMENTS	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Community%20Service/CS-2-Doc1-WY_KLa%20Watts%20Riverton.jpg?_t=1623275964
ADDITIONAL SUPPORTING LINKS AND MATERIALS	• Blog post: https://www.aymcdonald.com/post/the-residential-bypass-meter-bar-for-your-everyday-needs • YouTube video: https://youtu.be/w3AZM7FKtYQ

Nomination EI-3

SGA MEMBER COMPANY NAME	CenterPoint Energy
SGA MEMBERSHIP TYPE	Distribution SGA Gas Member
SGA MEMBER SINCE	2009
PROGRAM NAME	*CenterPoint Energy Ounce-Ounce Regulator Program*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-3-S~1.PDF?_t=1623284963
PROGRAM DESCRIPTION	Following the incident in Merrimack Valley, CenterPoint Energy formed a Utilization Pressure Evaluation Team to look at our own practices and procedures surrounding ounce systems as well as how we could address the risk of over-pressurizing our customers' house piping. While the majority of our low-pressure systems will be replaced over the course of our main replacement programs, our Oklahoma territory was projected to have approximately 20,000 customers remaining on low-pressure systems beyond 2024. Engineering leadership developed an idea to install individual ounce-ounce service regulators on the remaining Oklahoma low-pressure systems and operate the systems at slightly higher operating pressure but remain within the existing MAOP. The intent was for these regulators to protect the customers from any potential over-pressurization that may occur on the system. CenterPoint Energy collaborated with Fisher to test the 1" HSR with a larger orifice than what was previously commercially available. The results indicated that this regulator would meet the capacity requirements for our residential customers on low-pressure systems if the inlet (system operating) pressure was increased. Other models were also tested to handle our larger capacity needs, and CenterPoint Energy's Gas Measurement Department released a list of the recommended regulator options for a full ounce-ounce deployment.
RESULTS OF/RESPONSE TO THE PROGRAM	The February 2021 Winter Weather Event was a true test of the performance of these new regulators as we saw sub-zero temperatures in Oklahoma as well as peak usage for much of our territory. We did not experience any system issues or customer delivery concerns related to these new regulators, so this gives us great confidence in moving forward with our full deployment.
RESULTING BENEFITS	In 2021 CenterPoint Energy has initiated the first year of a four-year program to fully deploy these regulators for all customers on low-pressure systems that will not be replaced within 4 years. This is not a solution that will for work all low-pressure systems, but with our consistent 1 psig MAOP, this is the right fit for CenterPoint Energy Oklahoma. This ounce-ounce regulator program is unique in its ability to protect the customer. By removing the risk of over-pressurizing the customer's piping and appliances, we are working to ensure that the most devastating aspect of the Merrimack Valley incident – loss of life and injury – is avoided.
PARTICIPATING EMPLOYEES	11-25

Nomination EI-4

SGA MEMBER COMPANY NAME	CPS Energy
SGA MEMBERSHIP TYPE	Distribution SGA Gas Member

SGA MEMBER SINCE	2010
PROGRAM NAME	*CPS Energy's Renewable Natural Gas Project*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-4-RNG%20Graphic.jpg?_t=1623285233
PROGRAM DESCRIPTION	Established in 1860, CPS Energy is the nation's largest public power, natural gas, and electric company, providing safe, reliable, and competitively-priced service to 860,934 electric and 358,495 natural gas customers in San Antonio and portions of seven adjoining counties. As our core business, we, at CPS Energy, manage a diverse power generation portfolio and have been thoughtfully adding new energy solutions for decades. We have been achieving this while paying careful attention to our community's needs to make sure we balance Affordability, Reliability, Safety, Security, Resiliency and our Environmental Responsibility. CPS Energy is committed to finding ways to deliver safe, clean, reliable and renewable energy to our customers for a greener tomorrow. As part of this mission, we have partnered with San Antonio's VIA Metropolitan Transit and Australian-headquartered EDL to provide Renewable Natural Gas (RNG) created from local landfill waste to fuel VIA's fleet of over 500 CNG buses, beginning in 2021. EDL, a global producer of sustainable, distributed energy, will design, construct, own and operate an RNG production facility in the San Antonio area. The RNG will be delivered into CPS Energy's existing natural gas distribution system, which will provide delivery of the RNG to VIA's compressed natural gas (CNG) fueling station, the largest in the nation. VIA has a diversified active fleet portfolio consisting of 502 buses powered primarily by CNG fuel, with some diesel-electric hybrid, electric, diesel and propane vehicles in use. VIA's conversion to a CNG fleet began in 2017 and is designed to reduce NOx emissions by 97% from the diesel buses they replaced. The RNG to be supplied to VIA supports their efforts to be environmentally responsible by providing a negative- to low-carbon emission product to fuel its vehicles. RNG can be produced from a variety of waste streams including landfills, livestock waste and waste-water treatment. The decomposition of organic waste naturally produces a mixture of gases – mostly methane. When this methane is captured, cleaned and conditioned, it becomes RNG and is interchangeable with traditional natural gas. It can be safely added to our existing gas distribution system for use by our customers. The RNG for our project will be produced from biogas captured at a local landfill, thus converting local community waste into fuel for our local transportation system and creating a circular economy. Image linked above. RNG supports environmental sustainability because it is produced from the capture and reuse of methane that is already being naturally generated. Combusting RNG results in greenhouse gases (GHG) that are approximately 20 – 30 times less potent than methane that is released directly into the atmosphere. The use of RNG as a fuel source displaces fossil-sourced fuel supply, reducing the need for drilling or fracking. And RNG supports the resilience and sustainability of our fuel supply. This first-of-its-kind RNG project for CPS Energy highlights our strategy to think globally and act locally to bring innovative solutions to our community. The project is an important step forward to help reduce San Antonio's carbon footprint and progress to a cleaner future and is one of many CPS Energy initiatives directly aligned with the City of San Antonio's Climate Action & Adaptation Plan (CAAP) goal of full carbon neutrality by 2050. The introduction of RNG to our diverse energy portfolio is part of our creative Flexible PathSM strategy, which has been designed to leverage emerging environmental stewardship opportunities in support of our commitment to progress toward carbon neutrality, while we keep our customers' bills Affordable and our services Reliable.
RESULTS OF/RESPONSE TO THE PROGRAM	This project enables CPS Energy to support the promise of RNG for our community. RNG promotes clean air and reduces harmful emissions through capture of otherwise harmful methane emissions which are then converted to usable fuel. And from a gas supply chain perspective, by comparison to conventionally sourced natural gas, local capture and deliver of RNG is expected to result in low GHG emissions because of reduced methane losses during production and distribution. CPS Energy's participation in this project promotes a sustainable regenerative economy - locally. We provide the necessary connection to deliver a cleaner, reliable, renewable energy source generated from local waste to our customer, VIA, for use as bus fuel. We co-released an initial announcement describing our project partnerships with VIA and EDL in November 2020. The announcement was well-received by those from our community who provided feedback as a positive step in our progression toward the achievement of local climate goals. We expect the project will receive more recognition when construction is complete and commercial

	operations have been launched. At that time, we will be able to provide more in-depth exposure of the project, including a ribbon cutting ceremony and visual images to help the community appreciate the significance of the project to San Antonio.
RESULTING BENEFITS	Diversifies our Energy Portfolio - This project has added another energy innovation pathway to our portfolio of energy solutions, from which we serve our customers' needs and progress to a clean energy future. Provides Innovation Project Learning Opportunity - CPS Energy expects to receive and distribute approximately 600,000 MMBtu per year of renewable natural gas. While this volume will represent only approximately 2% of our total gas system volume, the opportunity to gain experience as a purchaser and distributor of renewable natural gas is enormously significant in supporting the next steps our organization will take with this form of clean energy and other innovation projects. Increases Energy Security - RNG will complement our other renewable energy alternatives, such and wind and solar energy. It can provide a reliable base load energy supply that is not as affected by weather or time or day as more intermittent sources. Provides Financial Benefit for our Customers - The financial elements of the project will benefit our customers in two ways. First, the gas that we will purchase as part of this project will be favorably priced, a benefit that flows directly to our customers. Second, our customers will also benefit from financial incentives to be realized in connection with renewable natural gas environmental attributes.
PARTICIPATING EMPLOYEES	26+

Nomination EI-5

SGA MEMBER COMPANY NAME	Kinder Morgan
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2009
PROGRAM NAME	*New Compressor Station Environmental Risk Reduction Tool*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-5-New%20Natural%20Gas%20Compressor%20Station%20Environmental%20Risk%20Reduction%20Tool.pdf?_t=1623285449
PROGRAM DESCRIPTION	With the number of new compressor stations being constructed throughout the country, Kinder Morgan developed a tool to assist in designing a natural gas compressor to reduce the overall burden of environmental compliance. The number of environmental regulations applicability to a natural gas compressor station is continually evolving. Project Managers also needed a tool to communicate all the environmental requirements associated with the construction and start-up of new stations. The New Compressor Station Environmental Risk Reduction tool was developed to build strategies to mitigate these issues. An interdisciplinary team of environmental professions, project managers, and estimators came together and formed the following goals and objectives for the tool: • Assuring Environmental Compliance through regulatory applicability determinations; • Addressing areas of concern and significant environmental compliance issues; • Utilization of design, equipment, best management practices, and procedures to achieve most desirable outcome; • Continuous improvement of the strategy; • Effectively communicate with shareholders. After the team conducted a post-construction compliance lability review of historical projects, they concluded that if adjustments were made in the planning phase and commissioning phase, applicability to some environmental regulations could have avoided altogether. These adjustments could also have significantly reduced the long-term environmental compliance burden to Operations. Overall environmental compliance during the construction phase of the project improved as shareholder communication was enhanced. The tool was organized into three phases: Planning/Design Phase, Construction Phase, and Commissioning Phase. In each stage of construction, the area was categorized by environmental matrix – Air, SPCC, Tanks – ASTs, Waste Generation, Water, and Equipment. Also, associated with

	each potential compliance risk, a regulatory driver and compliance solution were identified that met the overall objective.
RESULTS OF/RESPONSE TO THE PROGRAM	The New Compressor Station Environmental Risk Reduction has been utilized for approximately a year, with positive feedback from within the company. As part of the continual improvement process, feedback is solicited periodically and used to update and enhance to tool for future use. Feedback has also indicated that the tool is easily adaptable to specific projects and regions of the country. The Kinder Morgan Air Compliance Group has communicated suggestions for compressor units and permitting applicability, along with start-up liabilities associated with records and notifications. The Kinder Morgan Field Environmental Services Department has utilized the tool for communicating waste reduction strategies and minimizing the burden of compliance post-construction once the station is over to Operations. The Kinder Morgan Engineering Department is the primary end-users of this risk reduction tool. It has organized the environmental requirements for planning, construction, and start-up of the new compressor station into one document/tool. Overall, the tool has enhanced communication between shareholders on the project, not only for the benefit of personnel during construction but for operations post-construction.
RESULTING BENEFITS	All stakeholders involved during the construction of compressor stations have experienced increased communication of applicable environmental requirements. Improvements in communications will result in faster response times, better decision-making, and increased productivity. Kinder Morgan Operations have benefited from using the tool the most by accomplishing the main goal for the project – reducing the burden of environmental compliance. They can focus on the responsibilities associated with the safe and reliable operation of the compressor station. The commitment, time, and risk associated with environmental compliance were reduced or eliminated in the planning phase of the compressor station. Reducing compliance and regulations by making prudent choices with equipment selection and station design does not just affect one specific group within the company. The impacts and value can be seen and realized by many groups and employees within operations and support groups. The New Compressor Station Environmental Risk Reduction tool could be designed and scaled precisely for individual natural gas pipeline companies. Natural gas pipeline companies could expand the tool to include other disciplines, such as safety and health, reliability, and technical services.
PARTICIPATING EMPLOYEES	6-10
ADDITIONAL COMMENTS	The following interdisciplinary Kinder Morgan team participated in the development of the New Compressor Station Environmental Risk Reduction tool: Scotty Moates, Field Environmental Services – Team Lead Frank Porter, Field Environmental Services Wanda Brooks, Field Environmental Services Samantha Hon, Air Permitting and Compliance Tim McKellar, Environmental Project Management Mark Gerken, Engineering Estimator Project Management Department – Birmingham Office

Nomination EI-6

SGA MEMBER COMPANY NAME	Pivvot
SGA MEMBERSHIP TYPE	SGA Associate Member
SGA MEMBER SINCE	2018
PROGRAM NAME	*Pivvot Route*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-6-Doc1-Pivvot%20Routing%20Overview.pdf?_t=1623285908
PROGRAM DESCRIPTION	Pivvot's Route technology expedites the preliminary analysis of potential hydrogen, CO2 and other natural gas pipelines. Pivvot has curated hundreds of land, engineering, socio-economic, and environmental data into a single system and allows you generate least-cost routes in minutes (rather than days or weeks). Pivvot's proprietary algorithm, the "PLAE" allows users to weigh criteria and generate alternatives. Proposed routes are backed by defendable, detailed crossing and impact reports that inform permitting, cost estimation, and construction methodology.
RESULTS OF/RESPONSE TO THE PROGRAM	Pivvot Route is often requested by operators and engineers, and is becoming a standard in routing technology. With the downturn in crude oil and natural gas development, firms are using Pivvot Route

	to evaluate "green pipelines" including CO2 capture lines and hydrogen lines. It is widely used in the industry.
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PARTICIPATING EMPLOYEES	11-25
SUPPORTING DOCUMENTS	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-6-Doc2-Platform.Route.1.png?_t=1623285908
ADDITIONAL COMMENTS	Pivvot is now owned by Terracon, so our membership is transitioning to the Terracon corporate membership. Learn more at https://blog.pivvot.com/.

Nomination EI-7

SGA MEMBER COMPANY NAME	Southern Star
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Empowering People with Data*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-7-2021%20Southern%20Star%20Meas.%20Storage%20Innovation%20Award%20Submission.pdf?_t=1623286716
PROGRAM DESCRIPTION	The Measurement and Storage teams at Southern Star have partnered with the Business Analytics team to create a software platform which allows for quick and easy viewing of detailed information collected from field equipment. This platform allows users to see both instantaneous and historical data in trends. This platform is designed for the end users to be able to create new or modified views to fit whatever health check or troubleshooting needs they may have for a specific location. Automated emails/alerts can be created on any of the data available, providing immediate notifications of alerting conditions. Pictorial displays can be created with live data embedded as needed….again granting significantly easier to understand views of specific locations.
RESULTS OF/RESPONSE TO THE PROGRAM	Our teams have been able to see our equipment and facility information in an entirely different light with the views we can now see the data in. Users can more easily identify issues or unusual trends with how equipment is operating. More than 400 displays have been created in this platform and the bulk of them created by the end users. These displays allow for quick and easy comparison of data at the current time or a specific time in history. Users are now utilizing these tools daily to more efficiently and effectively monitor the health and performance of our facilities.
RESULTING BENEFITS	This tool has allowed for us to "illuminate the data" available, utilize it to identify issues, and decrease response times. Since implementation, we have found leaking valves, drifting set-points, bi-directional flow issues, and high and low differential conditions that were not previously readily identifiable. We have set up many alarms/alerts allowing us to respond and correct issues quicker than previously possible. These views are also allowing for improved monitoring of storage field performance, as well as dehydrator performance. This tool was invaluable during the polar vortex as all support staff and many field employees were viewing live and historical data continually watching for signs of developing issues. Several new views were created “on-the-fly” during the weather event enabling users to identify issues quicker and were able to dispatch employees immediately where concerns were found. Ultimately, all of these benefits are resulting in a more accurate and reliable pipeline system allowing Southern Star increased reliability for our customers.
PARTICIPATING EMPLOYEES	11-25

Nomination EI-8

SGA MEMBER COMPANY NAME	Southern Star
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Merging Data Analytics with Asset Management*

PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-8-Merging%20Data%20Analytics%20and%20Asset%20Management%20%283%29.pdf?_t=1623286931
PROGRAM DESCRIPTION	We created a tool to stand between our data analytics and asset management systems to create work orders based upon data analytics alarms and our asset management system. The Event Frame Management (EFM) tool was created to stand between our data analytics and asset management systems to create work orders based upon data analytics alarms. The OSI PIsoft data analytics system tracks multiple sensors and data points from our compressor fleet and places them into a data historian. When a data point is outside of parameters it logs an event frame with an alarm that is sent to our reliability engineers/specialists. Inside the Event Frame Management tool the recorded event frames are captured electronically and reviewed by the reliability team based upon criticality. If an alarm requires onsite technicians to repair or look further into the alarm, with the push of a button the EFM tool will create an inspection work order in our asset management system with criticality and timeframe for scheduling the inspection.
RESULTS OF/RESPONSE TO THE PROGRAM	Work order information captured upon investigation helps refine data analytics. Reliability Engineers and Specialists no longer have to create work requests manually for these efforts and additional data from work order completion is helpful for review and future enhancements. As a result of this EFM tool we have significantly reduced the amount of time required to build work orders for onsite review of critical alarms. In addition, we are able to capture additional data in the work orders from onsite inspections pertinent to the alarm that we generated from the OSI PIsoft program. Our reliability team has welcomed the reduction in effort to generate work orders that was previously done by hand. Our field technicians also have a standardized format with a work order to review the issue called out by the PIsoft system. The field technicians also have an embedded problem code in the work order to help guide them in their onsite inspection.
RESULTING BENEFITS	With completed EA-identified work order data, Southern Star can now review PI Event Frames against field inspection data. EAM provides historical work order data that can be used to reveal repeat issues on a particular asset or solutions for similar assets based upon similar PI Event Frames. EAM work order data can also be used to refine critical set points that create PI Event Frames to extend predictive maintenance while still ensuring asset reliability and efficiency. From a business perspective we now have a complete loop of information regarding our reliability alarms. When an inspection work order is generated from the EFM tool the information and problem code from the event frame alarm is embedded in the work order. The technician uses this information to guide their onsite inspection. Preset codes for Failure, Cause, and Action to repair are part of the work order closing process for the technician. As event frames are reviewed against completed work orders that information is being used to find recurring patterns of failure as well as refine critical set points for alarm creation. In addition, data trends are be used to improve reliability on assets of similar kind and run parameters. We now see an increase in reliability across our entire footprint as a result of this innovation.
PARTICIPATING EMPLOYEES	6-10

Nomination EI-9

SGA MEMBER COMPANY NAME	Southern Star
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Modernizing Work Practices*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-9-Engineering%20Innovation%20at%20Southern%20Star%20%282%29.pdf?_t=1623287146
PROGRAM DESCRIPTION	At Southern Star we modernized the manner in which work was assigned to employees through an enterprise asset management system and routing software. The purpose was to advance safety, increase efficiency, and focus on compliance in a systematic way so that a "Plan-Do-Check-Act" process could be used to continuously improve our processes. We integrated the routing software and the asset management system to provide us with the best possible understanding of how many orders could be completed in a typical week for each employee.

RESULTS OF/RESPONSE TO THE PROGRAM	Safety is promoted by providing the employee performing the work with a work order containing job hazard information for the employee to review. Wok orders can only be scheduled to an employee that meets the required qualifications. Work can be requested by anyone in the company and reviewed by leadership before being prioritized for assignment. Preventative maintenance (PMs) orders reoccur on a time frequency or use based frequency to be generated based on a due date. Both the work requests and PMs are assigned to the employees that are qualified and available for work. The routing software develops the most efficient route to sequence the order to be completed. We have made a number of changes since we implemented this and last year over 98,000 work orders were created in the asset management system. Reports are being generated to analyze data so additional changes can be made to continuously better our processes.
RESULTING BENEFITS	Southern Star is benefitting from the insight available through tracking work to specific assets. Our understanding of where improvements can be made in work processes and in asset maintenance has only begun. The software has helped our front-line leadership with the management of work in their area and has provided them access to a full list of orders for their area, who the orders have been assigned to, and when they can expect to have them completed.
PARTICIPATING EMPLOYEES	26+

Nomination EI-10	
SGA MEMBER COMPANY NAME	Summit Utilities
SGA MEMBERSHIP TYPE	Distribution SGA Gas Member
SGA MEMBER SINCE	2021
PROGRAM NAME	*Summit Utilities Engineering Innovation via Digital Dailies*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-10-Doc1.pdf?_t=1623287462
PROGRAM DESCRIPTION	Having digital access to construction progress quantities in real time and associating costs as they are incurred, is one of, if not the most, critical tools for project managers to prevent unapproved project cost overruns and detect issues before they arise. Summit's Digital Dailies improves Project Management processes and accuracy of information that impact much of the organization. Prior to 2020, Summit (SUI) had several reports we used to measure project progress and costs, but they were not cohesive or timely. They also required excessive manual manipulation which contributed to inaccuracies, not only in project costs, but to accruals, install to cost ratios, imbalanced overhead application, and inconsistent capital spend reporting. The 2020 implementation of SUI's Digital Dailies created an inspector-friendly user interface in the company's Work Order Field Application (WOFA) to collect real time quantity data that is aligned with estimates, and automatically transmits information daily from the field. We also incorporated report building to assimilate the data into an up-to-the-day cohesive project progress/cost report.
RESULTS OF/RESPONSE TO THE PROGRAM	SUI's Digital Dailies, collect real-time information as it occurs so that we can cross reference it in the projects budget.
RESULTING BENEFITS	This results in better internal project manager control and allows Project Managers to have a comprehensive, up to date and accurate understanding of project spend so they can track to budget and foresee potential overruns or cost issues. Most importantly, SUI's Digital Dallies save time, reducing costs and increasing efficiency.
PARTICIPATING EMPLOYEES	11-25

Nomination EI-11	
SGA MEMBER COMPANY NAME	TC Energy
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2012
PROGRAM NAME	*Classification and Searchability of Records using Machine Learning*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-11-~1.PDF?_t=1623287953

PROGRAM DESCRIPTION	Our team internally developed a smart records search tool to improve searchability of PDF records. The challenge has been that we have millions of records varying in quality, age, and styles; as a result, significant effort goes into finding useful records as some were not previously searchable. Through collaboration with our technical teams there was an opportunity to use Machine Learning and Artificial Intelligence to improve searchability of records. We started with a proof of concept that yielded positive results. Two main objectives within our design was using Machine Learning (ML) in order to categorize visually similar records, and Artificial Intelligence to extract printed and handwritten text from them.
RESULTS OF/RESPONSE TO THE PROGRAM	By training the ML model and leveraging AI, we improved search results, optimized the review process and narrowed down to target records more efficiently. One prime example with significant information are handwritten notes where traditional OCR is unable to extract the text. Our team had previously attempted to find the same records without the smart records search tool but were unable to find the same rate of success. With the prototype now successful, we continued to develop and improve the search tool by adding and training more records to increase model accuracy. The response has been very positive and eye-opening from traditional methods used; this has shifted our team's momentum to be more innovative in trying to tackle problems that impact our day-to-day work.
RESULTING BENEFITS	The primary benefit of the smart records search tool to our business is that we have been able to optimize the current records review process; significantly less time was spent on parsing through large sets of documents, which allowed our team to allocate more time to technical analysis and project optimization. With the tool now further developed and used operationally, this has resulted in over $10M dollars in cost avoidance to date for our company. In addition, the tool is also being leveraged to help other teams with their own respective document search efforts; this has promoted greater interdepartmental collaboration and transfer of knowledge.
PARTICIPATING EMPLOYEES	11-25

Nomination EI-12

SGA MEMBER COMPANY NAME	TC Energy
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2012
PROGRAM NAME	*Physics Based Modeling and Advanced Condition Monitoring of Gas Turbines in Pipeline Application*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-12-Doc1-SGA%20Awards%20Consolidated_2021_HS.pdf?_t=1623288161
PROGRAM DESCRIPTION	Recent advances in data analytics and physics-based modeling have enabled smarter, more efficient monitoring techniques for complex machinery like gas turbines, Compressors, Pumps Motors and Engines. Current work has leveraged these recent advances to develop a proof of concept of an advanced monitoring system based on physics based modeling and Neural Networks, for early and rapid fault detection within the various Turbine Models that are very commonly used for natural gas transportation in a pipeline. The work demonstrates a proof of concept with real validated case studies and is in early stages of implementation within TC Energy's Real Time Asset Monitoring systems. In addition to using advanced analytics and first principle-based modeling for fault detection, a holistic automated Expert-based Learning System for Fault Classification was also developed to capture the institutional and operational knowledge and add a layer of automation for fault detection and classification. Current work gives TC energy capability to analyze and operationalize the institutional knowledge in machinery space that is vendor agnostic. Current work used sound first principle-based approach through use of a physics-based models to extract the fingerprints of a fault from measured data. Then, changes are be predicted in measured unit parameters (i.e., pressures, temperatures, flows, heat balance etc.) resulting from a fault over a wide range of ambient and operating conditions. The innovation lies in the fact that physics-based models are created in a way that mimics the real operating scenario for a machine, and then Neural Networks are used to learn from the physics-based models. The use of Neural Networks speeds up the process of computation so that these powerful models which are essentially digital twins of the real machine, can be implemented in the real time monitoring systems to give meaningful insights into anomalies and health metrics of the machine that will greatly help optimize maintenance tasks as well as proactively address anomalies before they manifest into full blown unplanned outages or safety related incidents.

	As part of the current work, proof of concept was successfully executed on most commonly employed Gas Turbines in the natural gas pipeline industry. The concept has also been incorporated within TC Energy's Real time asset monitoring system. To facilitate the proof of concept and implementation several innovative ideas came to fruition, the team successfully developed a model interface to seamlessly integrate the Physics Based Model of the Gas Turbine and Neural Networks (NN) model. The model interface can train the NN model from the physics based model and available real operational data of the Gas Turbines. Then the interface can independently predict the performance of the performance of the Gas Turbine, detect anomalous operation and compute health index of the Gas Turbine split by various sections (for Egg: Cold Section, Combustors, Turbine or Hot Section). The Modeling Interface and tools developed also seamless generates equations, and necessary file configurations to be integrated into TC Energy's Real Time Monitoring system. This work successfully demonstrated how neural network physics-based models can be used for real-world monitoring of critical assets.
RESULTS OF/RESPONSE TO THE PROGRAM	Physics Based Modeling and Advanced Condition Monitoring: Operations Engineering teams were able to integrate the Hybrid physics-based Neural Network models within existing Real Time Monitoring System and use concepts from the current work to detect and action anomalies within select gas turbine units. The current concept of this hybrid model can be easily scaled to multiple classes of machinery in addition to Gas Turbines, some examples include Large Pipeline Pumps, Electric Motors, Engines and Compressors. TC Energy is in early stages of expanding this concept into multiple Business Units and classes of machinery. Based on the concept testing, performance on real datasets and instances, the results of current work has been very well received across various teams within TC Energy. Very Positive results from early development work have prompted our engineering teams to implement and test these advanced models and concepts real time, which has started to show some great early results. Expert-based Learning System for Fault Classification: One challenge we face as an industry is capturing the knowledge of an aging workforce with decades of experience operating gas turbines and diagnosing failures as they occur. Employee turnover is always accompanied with some loss of knowledge. With this diagnostic tool, we can capture SME knowledge in a way that can then be passed down to new employees who may not have years of industry experience. Since the tool is agnostic to the asset itself, it can be deployed across several different assets at several different sites while maintaining the same standard of knowledge in all use cases, allowing for ease of shared knowledge across as sites. In the current work the expert based diagnostic tool was developed and validated for a number of case studies involving gas turbine failure modes, and is evolving with additional intelligence being built into it. The tool is being built into the real time monitoring system of TCE to facilitate continuous learning in a digital space as well as capture institutional knowledge.
RESULTING BENEFITS	1. Current work has given TC energy a holistic approach to marry the physics-based methods to vast amounts of Data in Complex machinery Space. 2. Provide a Concept, tool and methodology to analyze, detect and action anomalies on Large Pipeline Gas Turbines both real-time as well standalone. 3. Provide TC Energy the Capability to build models, be self-sufficient in machinery space that is Vendor Agnostic. Vendor solutions to such advanced need is not flexible, and about 50-60% more expensive than what was accomplished in current work. In most cases as an operator, TC energy does not have access to proprietary Turbine models. 4. Provide a architectural frame work and proof of concept for capturing institutional knowledge, digitize it and implement continuous learning through the expert diagnostic tool. The expert diagnostic tool was proof tested on the current gas turbine project and is being continually improved.
PARTICIPATING EMPLOYEES	6-10
SUPPORTING DOCUMENTS	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-12-Doc2-Expert-based%20Learning%20Diagnostic%20Tool_simple%20example.pdf?_t=1623288161
ADDITIONAL COMMENTS	There are 2 documents linked above: 1. Talks about the Physics based modeling, high level concept, and proof of concept results. 2. Talks about the automated diagnostic tool and case studies to prove the concept.

Nomination EI-13	
SGA MEMBER COMPANY NAME	TC Energy
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member

SGA MEMBER SINCE	2012
PROGRAM NAME	*Plausible Profiles (PSQR) Corrosion Safety Assessment Model*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-13-Brochure_Plausible%20Profiles%20Corrosion%20Assessment%20Model.pdf?_t=1623288415
PROGRAM DESCRIPTION	This is a nomination for the development of TC Energy's novel corrosion assessment model called "Plausible Profiles (Psqr) model", a strategic innovation with high business and safety value. Metal-loss corrosion is the most dominant integrity threat to energy pipelines. In TC Energy's Canadian Pipeline system, corrosion accounts for a majority of the integrity budget and the historical pipeline failures. Inline Inspection (ILI) based corrosion management has proven to be the best way to manage corrosion. During ILI based corrosion management the remaining strength of a pipeline is assessed by inputting properties and measured conditions of an operating pipeline into an assessment model. Consequently, models are fundamental to all decisions to ensure the continued safe operation of a pipeline. A more accurate model enables the selection of the right integrity actions that address critical conditions and avoid failures while also reducing unnecessary actions due to inaccuracy. Consequently, models have a very high impact on preventing failures and impact an integrity program's effectiveness by reducing expensive actions that do not reduce risk. The Psqr model is a more accurate and precise tool and the latest development in TC Energy's quantitative risk-based approach to pipeline integrity. It has led to significantly increased levels of pipeline integrity and reliability; which is evident in the continuous reduction of incident rates since its inception. Using ILI measurement of metal loss, the model is used to decide if remediation is required, what the repair must be, whether pressure restrictions are required, and the level of restriction. This model enables all these decisions to be made more accurately, thus increasing public and company personnel safety while significantly reducing unnecessary work. The current industry-accepted model, known as RSTRENG, was published by Kiefner and Veith in 1989 and is incorporated by reference in Federal regulations worldwide. The Psqr methodology is the first industry wide improvement to that model in the ensuing 30 years. RSTRENG, is an accurate model with lower bias and scatter than its predecessors. The RSTRENG model overestimates interaction of wide corrosion features, resulting in unnecessary excavations that do not improve safety. Such actions lead to increased unnecessary downtime and repairs and increased exposure of the pipeline to first- and second-party damage. Psqr model builds upon the fundamentals of the effective area methods by employing a novel approach to improve the characterization of the corrosion shape over RSTRENG (more details in the attached brochure). RSTRENG idealizes the corrosion as the worst single river bottom profile, Psqr idealizes corrosion using multiple plausible profiles representing interaction of corrosion features at failure initiation more accurately. This improvement was not feasible 30 years ago when computational power could not handle multiple profiles efficiently. Understanding the opportunity afforded by today's computational power and the high sensitivity of integrity decisions to the idealization of the corrosion profiles, this improvement was strategically developed. This enables ILI-based excavation decisions, repair decisions, and derate calculations to be made more accurately and precisely, thus increasing safety for the public and leading to significant savings in maintenance cost.
RESULTS OF/RESPONSE TO THE PROGRAM	Results of the innovation: The novel approach of the model improves upon the current industry accepted RSTRENG model to provide a more accurate representation of corrosion features in pipelines, allowing operators to make better decisions, thus increasing safety for the public and company personnel while significantly reducing unnecessary work. This leads to the execution of a smaller number of more focused and genuinely required maintenance activities ultimately resulting in a lower cost to customers, reduced environmental impact, and improved safety of pipeline operations. It has been shown to reduce unnecessary digs and reduce the overall number of digs by over 50%. This work boldly challenges the status quo thinking that limits progress on many fronts, particularly that: 1. "More integrity actions bring better safety," which has been challenged by this work to show that "the right integrity actions, not more, deliver safety". 2. "One has to always spend more money to achieve better safety," whereas investment in this strategic initiative has shown that with higher accuracy and precision, one can achieve better safety while spending less operationally with the upfront investment in prudent work, which will reduce risk more effectively. Avoiding corrosion digs that do not improve safety frees up budget for other critical activities driven by other threats necessary to reduce risk. 3. "Using the most conservative model brings the greatest safety," which has been debunked by using the above arguments (and the analogy of a laser achieving more safety with less conservatism over a hacksaw or axe).

	Response to the innovation: The development of this model involved an immense collaboration effort beginning in 2015. Numerous internal meetings were conducted to get peer review, accommodate business needs, comply with regulatory environments, get stakeholder buy-in, and develop user-friendly tools. A Pipeline Research Council Internal (PRCI) review was completed by 8 internationally renowned industry experts including the RSTRENG model originator, John Kiefner. It concluded, "the Psqr model is more accurate and precise than existing models. The model avoids over-conservatism without compromising safety." The PRCI project was also used to share this model implementation in software with the industry as operators should not compete on safety. The work has been shared through PRCI, CEPA, IPC, EPRG, APGA, ASME, API, and US and Canadian Regulators. Over 30 external industry presentations have been made, leading to buy-in from the industry and acceptance that this model is an
RESULTING BENFITS	These intensive engagement and collaboration efforts are culminating with the Psqr methodology being submitted to the foundational industry standards relied upon by pipeline operators. Edits have been approved for inclusion in the next draft of; ASME B31G "Manual for Determining the Remaining Strength of Corroded Pipelines" and CSA Z662 "Canadian Standards Association Oil and Gas Pipeline Systems". This will result in improved models for use by the entire pipeline industry for years to come and supported and included in the primary codes and standards relevant to the topic. The work demonstrates the transformational leadership and innovation that includes adopting a bold and inspiring vision, challenging norms that impede industry progress, influencing and engaging worldwide with Industry partners at all levels to produce results that lead to increased safety, business efficiency and lower environmental impact for a more sustainable industry as a whole. In summary, the benefit has been to improve safety for the entire pipeline industry through improved decision accuracy, which substantially reduces the unnecessary work that does not lead to safety. This is accomplished by leveraging modern computing and improving our foundational decision models. In TC Energy alone, in 2 years, over 500 unnecessary excavations driven by corrosion have been prevented, while safety performance has improved as demonstrated by a significant reduction in failures.
PARTICIPATING EMPLOYEES	11-25
ADDITIONAL SUPPORTING LINKS AND MATERIALS	Challenging our assumptions for transformational benefits: https://f.io/IYgHU3NN Publications: o Zhang, S. et al. 2018, "A More Accurate and Precise Method for Large Metal Loss Corrosion Assessment". Proceedings of the 2018 12th International Pipeline Conference, September 24 – September 28, 2018, Calgary, Alberta, Canada IPC2018-78233 o Zhang, S. et al. 2020, "Plausible Profile (Psqr) Corrosion Assessment Model: Refinement, Validation and Operationalization". Proceedings of the 2020 13th International Pipeline Conference, September 28 – October 2, 2020, Calgary, Alberta, Canada, IPC2020-9448 o Kariyawasam, S. et al. "Improving Safety and Economy Through a More Accurate and Precise Burst Pressure Model". APGA-EPRG-PRCI 22nd Joint Technical Meeting of Pipeline Research, Brisbane, Australia, April 29-May 3, 2019 o Kiefner, J. et al. "PR218-183607-Z01 Peer Review of the Plausible Profile (Psqr) Corrosion Assessment Model". Project Number EC-2-9, Contract PR218-183607, Final Report to the Corrosion Technical Committee, Pipeline Research Council International, September 24, 2019. o Kariyawasam, S. et al. "Technical Report - Plausible Profiles (Psqr) Corrosion Assessment Model", Final Report to the Corrosion Technical Committee, Pipeline Research Council International, April 9, 2020.

Nomination EI-14	
SGA MEMBER COMPANY NAME	TC Energy
SGA MEMBERSHIP TYPE	Transmission SGA Gas Member
SGA MEMBER SINCE	2012
PROGRAM NAME	*Reality Capture for Drawing Remediation*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-14-~1.PDF?_t=1623288653
PROGRAM DESCRIPTION	Drawings are the foundation of our business, aside from being an asset record, drawings are used in every decision we make whether it be brainstorming new ideas, displaying system functions, making

	critical operating decisions, or communicating physical change. Focusing on our highest risk to update our drawings which was our field and travel exposure, we took the opportunity to see what technology was available to better support the drawing update process. Creating 3D scans of facilities via Point Cloud Survey and High-Resolution Imagery best aligned with our needs to create new Piping and Instrumentation Diagrams and update existing drawings to current TC Energy and Industry Standards. We implemented this technology over the course of a year and the impact to our project was substantial.
RESULTS OF/RESPONSE TO THE PROGRAM	Reality capture technology enabled critical drawings to be verified/updated/created by virtually walking down a station. The average cost per site we visited reduced by an average of $60,000. Our manhour requirements dropped by 780 hours per site. On an annual program level, we were able to increase the number of sites by 1.5 times, decrease field hours by 7,200 hours, and show savings of over $525,000 which allowed us to complete the additional sites. Also, the 3D scans we now have is laying the foundation on an enterprise level digital twin which will enable us to collaborate and collect data from additional teams within TC Energy.
RESULTINNG BENEFITS	Reality capture technology has reduced labor hours, increased project value, increased site completion, and has created a company baseline for virtual station data capture and sharing in the future. By utilizing this innovation, we have been able to bring this technology to other teams such as projects and facilities planning which enables us to collaborate across the organization and minimize travel costs and time. The technology has proven to be scalable and to use as stand-alone with a project or in conjunction with a mass effort for all assets. Both the drone and scanning services are available from multiple certified survey and engineering firms and there is an opportunity to bring this technology in-house with licensed and localized support.
PARTICIPATING EMPLOYEES	11-25

Nomination EI-15	
SGA MEMBER COMPANY NAME	Xcel Energy
SGA MEMBERSHIP TYPE	Distribution SGA Gas Member
SGA MEMBER SINCE	2010
PROGRAM NAME	*Stress Corrosion Cracking Detection in ILI*
PRIMARY LINK	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-15-~1.PDF?_t=1623288946
PROGRAM DESCRIPTION	Stress corrosion cracking (SCC) is a form of environmentally assisted cracking and in general is the result of stress, environmental and chemical conditions including pH, in a material that is susceptible to cracking. Circumferential SCC (C-SCC) occurs when longitudinal stress, typically from ground movement or localized bending, is the major stress component. Limited assessment alternatives available for gas pipelines make management of the CSCC threat extremely challenging, potentially allowing anomalies to grow to a severity impacting safe and reliable operation of a pipeline. Selective digging approaches have been successful in identifying circumferential SCC. However, this approach is insufficient to predict the severity of C-SCC or confirm that all C-SCC indications have been examined. Since the major stress that results in C-SCC is longitudinal or along the axis of the pipeline, critical defects are typically greater than 80% of wall thickness and hydrostatic testing, which increases hoop stress, is not an effective method for detection. In 2018 Xcel Energy and Novitech Inc. undertook a multi-year project to develop an advanced MFL ILI system to reliably detect and quantify C-SCC in susceptible pipeline systems. The resulting ILI system can successfully discriminate C-SCC occurrences from other pipe anomalies such as metal loss, as well as rank C-SCC severity into three categories: subcritical, significant, and severe.
RESULTS OF/RESPONSE TO THE PROGRAM	The resulting ILI system has been implemented on over 200 miles of natural gas transmission pipelines 6, 8, and 10-inches in diameter and has successfully confirmed 78 C-SCC anomalies out of the 81 identified by the tool (3 false positives). The ILI system has a POD and POI >90% for C-SCC >30% in depth and 0.8 inches of circumferential width.
RESULTING BENEFITS	This innovation provides natural gas pipeline operators a reliable diagnostic system for the identification, management and repair of C-SCC. Prior to the development of this technology no assessment options existed to allow natural gas pipeline operators to identify and repair C-SCC anomalies prior to them reaching a severity that impacted the safe and reliable operation of the pipeline.

	For Xcel Energy, in one specific scenario, this technology allowed the company to return a pipeline to full operation that was previously isolated at a reduced pressure with the only alternative being to pipeline replacement.
PARTICIPATING EMPLOYEES	2-5
SUPPORTING DOCUMENTS	https://southerngas.org/wp-content/wpdm-assets/2021-SGA-Awards-Program/Engineering%20Innovation/EI-15-~2.PDF?_t=1623288946