iPIPE 2.0
Intelligent Pipeline Integrity Program

North Dakota Oil & Gas Research Program
Bismarck, North Dakota
February 23, 2022

Darren Schmidt
iPIPE Program Manager and
EERC Assistant Director for Energy, Oil and Gas
“These projects are coming here because we embrace innovation.”
Governor Burgum, State of the State Address, February 16, 2022
## IPIPE FINANCIALS

### IPIPE 1.0 (2018–2022)

<table>
<thead>
<tr>
<th></th>
<th>NDIC Share</th>
<th>Commercial Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td>$2,600,000</td>
<td>$2,577,000</td>
</tr>
<tr>
<td>Expended</td>
<td>$2,186,998</td>
<td>$2,363,904</td>
</tr>
<tr>
<td>Member Cost Share</td>
<td></td>
<td>$640,956</td>
</tr>
<tr>
<td>Vendor Cost Share</td>
<td></td>
<td>$3,546,581</td>
</tr>
<tr>
<td>Total (12/31)</td>
<td>$2,186,998</td>
<td>$6,551,441</td>
</tr>
<tr>
<td></td>
<td>3:1 match</td>
<td></td>
</tr>
</tbody>
</table>

### iPIPE 2.0 (2022–2023)

<table>
<thead>
<tr>
<th></th>
<th>NDIC Share</th>
<th>Commercial Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td>$400,000</td>
<td>$1,450,000</td>
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<tr>
<td>Future Cost Share</td>
<td>TBD</td>
<td></td>
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</table>

3.6:1 match

### iPIPE 1.0 - $626,098 outstanding funds
- OSK Subcontract: $552,817
- TOKU Final Payment: $65,400
- Other costs: $7,881
RECOGNITION

• Media attention
  – 100+ mentions of iPIPE in the media
  – Feature article in Pipeline & Gas Journal
  – Feature article in SPE’s Journal of Oil & Gas Facilities
  – Feature article in Pipeline Technology Journal
  – Six-episode series focused on iPIPE on “The Pipeliners Podcast”

• Awards
  – API Industry Innovation Award (Nov 2018)
  – IOGCC Chairman’s Stewardship Award (Aug 2019)
MEMBER RECOGNITION

iPIPE MEMBERSHIP

Energy Transfer is involved in a number of organizations that are focused around the constant improvement of pipeline safety and operations. The intelligent Pipeline Integrity Program (iPIPE) is an industry-led consortium whose focus is to contribute to the advancement of near-commercial, emerging technologies to prevent and detect gathering pipeline leaks.

→ VISIT WEBSITE

Acclerating the flow of innovation down the iPIPE

In 2019, Enbridge joined the intelligent Pipeline Integrity Program (iPIPE), an association of companies in the upstream and midstream pipeline industry. The association works with entrepreneurs in the pipeline integrity space, driving innovation and accelerating the development of leak detection and prevention technologies.

Learn more
GROWTH
### Table 1. Technology Screening and Selection

<table>
<thead>
<tr>
<th>Date:</th>
<th>May 2018</th>
<th>Oct 2018</th>
<th>Oct 2019</th>
<th>Oct 2020</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Round</td>
<td>Second Round</td>
<td>Third Round</td>
<td>Fourth Round</td>
<td></td>
</tr>
<tr>
<td>Invited:</td>
<td>7</td>
<td>21</td>
<td>62</td>
<td>58</td>
<td>120+</td>
</tr>
<tr>
<td>Proposals:</td>
<td>7</td>
<td>10</td>
<td>14</td>
<td>24</td>
<td>55</td>
</tr>
<tr>
<td>Presented:</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>Selected:</td>
<td>2</td>
<td>4*</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

* Two selections were unable to agree upon terms, so contracting did not occur.
DIRECT-C Sensing of Hydrocarbons and Produced Water

Application
• Useful in focused areas.
• Attached on or near pipe and equipment.

Development
• Pushed technology beyond HC application exploring PW.
• Enhanced installation methods, product hardware, alarm algorithms, and remote communications.

Success
• In use in North Dakota.
• Achieved growth in eight states, Canada, and Europe.
INGU SOLUTIONS

**Application**
- Advanced in-line inspection.
- Advanced technology for gathering lines that are otherwise difficult to inspect.

**Development**
- Demonstrated Pipers capability in operational pipelines.
- Developed launch and receive methods.
- Validated repeatability between free-floating and cleaning pig deployments.

**Success**
- INGU has operated in North Dakota and inspected over 300 pipelines for over 100 customers in 15 countries building a network of nine agents.
SATELYTICS

Application
• Leak detection from space.
• Advanced processing and algorithms of satellite data to provide actionable alerts.

Development
“We often state that iPIPE was beneficial in providing copious amounts of data to train our algorithms. With 3 years of weekly monitoring, our algorithms were provided with an extensive training opportunity.”

Success
• Deployed commercially in North Dakota on the Pelican Pipeline system.
• Projects with BP: leak detection, chemical and carbon accounting.
Application
• Advanced risk identification.
• Leverage machine learning (ML) processes and technology to support pipeline and facility risk mitigation.

Development
• Explored application with customer and regional data.

Success
• Application identifies higher-risk areas of pipeline segments and ranks risk.
TOKU

Application
• Leak detection.
• Advanced pressure sensing applying ML.
• Ability to detect anywhere along a pipeline system.

Development
• Distinguish between operational signals such as pump-off versus leaks in gathering lines.
• Completed tests and advanced ML algorithms.
• Development of Illumass (customer monitoring package).

Success
• ML can distinguish similar signatures, operational vs. leaks.
• Can detect leaks in the presence of changes occurring simultaneously.
• Sensors presently in use in North Dakota.
Application
• Leak detection from space.

Development
• Advance the resolution, accuracy, and frequency of hyperspectral satellite data.
• Compare to manned overflights.

Success
• Achieved launch and learnings from Aurora mission.
• Focus ahead on next mission.
MOMENTUM

• Growing membership and enthusiastic membership.
• Flood of emerging technologies wanting to compete in selection process in 2022.
• Implementation of technologies explored.
• Venture capital firms helping to fund start-ups that iPIPE selected.
• Looking for technologies that fill gaps.
• Evolving space race.
• Working toward greater collaboration.

✓ SUCCESS FOR NORTH DAKOTA
✓ DEMONSTRATION OF NORTH DAKOTA LEADERSHIP
iPIPE 2.0 is working ahead of our competition

Green Energy & Science
Louisiana Investigates Massive Methane Cloud Seen From Space  February 14, 2022, 2:47 PM CST
The plume was the most severe concentration of the powerful greenhouse gas spotted by the Sentinel-5P satellite in the U.S. since October.

A Constellation of Satellites Hunting Methane Leaks Is Launching Soon
Stephen Rassenfass, JPT Emerging Technology Senior Editor  March 9, 2021
COLLABORATION

New Federal Regulations Add More Than 400,000 Miles of “Gas Gathering” Pipelines Under Federal Oversight

Monday, November 15, 2021

unregulated gas gathering pipelines. The final rule will—also for the first time—require pipeline operators to report safety information for all gas gathering lines, representing more than 425,000 additional miles covered by Federal reporting requirements.

Estimated effective date May 15, 2022

Image courtesy of Flyscan

iPIPE 2.0 – Can we fly once and collect better data with technology?
EXPECTED RESULTS (2022–2023)

• Technology selection event
• Complete at least two new projects
• Grow industry membership
• Annual member forum
• Continued monthly membership meetings
• Advance technology to commercial application and demonstrate commercial deployment

• Advance
  – In-line detection
  – Sensors
  – Satellite
  – Aerial
  – Drone
iPIPE 2.0 – the best is yet to come.
THANK YOU

Critical Challenges. Practical Solutions.