Power Delivery Intelligence Initiative
Stakeholder Focus Survey
Executive Summary
January 2018

Introduction

Power Delivery Intelligence Initiative (PDi^2), organized in April 2016, is a not-for-profit trade association serving the power industry. The group aims to collect and use data to provide an objective means to evaluate power infrastructure investments from the perspective of life-cycle costs to determine which power delivery solutions – overhead or underground – to employ. Member companies currently include material suppliers, cable makers and engineering companies. For more information, please visit www.pdi2.org.

Survey rationale

For its inaugural project, PDi^2 felt strongly that a brief survey, strategically targeted to utilities and engineering companies, would be important to validate its beliefs regarding the current state of thinking in the industry as it relates to infrastructure decisions. The focus of the survey was to obtain baseline information against a set of questions that would help:

- Confirm assumptions based on PDi^2's collective experience
- Discover thoughts counter to the group's assumptions
- Uncover notable or interesting responses

Survey implementation and demographics

This survey was specifically designed to be a quick snapshot – more like a focus-group than a highly detailed, all-inclusive exercise. However, PDi^2 did require selection of respondents be diverse in size and location as a parameter of implementation.

PDi^2 authored the eight questions used in the survey, and contracted Power Delivery Consultants, Inc. (PDC) to administer the survey. PDC was asked to select a small, focused sample of utilities and engineering companies that:

- Denote varying size – from small to large
- Represent every geographic sector of NA
- Specify or design both overhead and underground transmission circuits

The goal was 15 completed surveys. Eleven utilities and four engineering companies responded. Participating utilities varied in size from small (single state) to large (multi-state), investor-owned and one municipally-owned. They were spread over the East coast, mid-Atlantic, New England, South, Midwest, Mountain, Pacific and Canada. Seven of the eleven utilities primarily focus on transmission with 80 percent OHL projects and 20 percent UG. Four utilities were more heavily involved in distribution with projects 75 percent UG. Engineering companies surveyed were all large with design

and installation oversight capabilities on all aspects of electrical transmission and distribution for both OHL and UG.

Results

Overall, the responses confirmed PDi[2]'s assumptions regarding how infrastructure decisions currently are made. However, there were some differences based on geography that are noteworthy. A breakdown of each question is detailed below.

1. Adding up to 100 percent – please give percentages of voltage class(es) you design/install? (based on line miles)
   - ____ MV – 5kv to 46 kV
   - ____ HV – 69kv to 230 kV
   - ____ EHV – Above 230 kV

Utility	**Geography**	**Size**	**Q1. MV, HV, EHV (%)**	**Q6a. OH, UG (%) Project**	**Q6b. OH, UG (%) Miles**
1	Western Canada	Large	70, 25, 5	DNA	DNA
2	Mid-Atlantic	Large	0, 75, 25	5, 95	30, 70
3	South-Atlantic	Medium	100, 0, 0	50, 50	60, 40
4	New England	Small	0, 100, 0	90, 10	75, 25
5	Midwest, South and South-Atlantic	Large	0, 100, 0	95, 5	DNA
6	Midwest and South	Very large	0, 100, 0	99, 1	97, 3
7	Pacific	Small	90, 10, 0	20, 80	20, 80
8	East North-Central	Large	0, 85, 15	98, 2	99, 1
9	South-Atlantic	Large	0, 80, 20	93, 7	99, 1
10	South	Very large	0, 90, 10	DNA	DNA
11	Mountain	Small	99, 1, 0	10, 90	28, 72
Engineering Company			**MV, HV, EHV (%)**		
1			10, 70, 20	90, 10	98, 2
2			25, 75, 0	99, 1	99, 1
3			10, 60, 30	80, 20	90, 10
4			5, 75, 20	90, 10	95, 5

2. Please scale the following responses (5 meaning very important and 1 meaning not important at all) when thinking about how the type of installation decision (whether to go OH or UG) is made, what are the most important considerations?
    - ____ Knowledge and experience – what is most common practice for your organization and within both your knowledge and experience
    - ____ Operations and maintenance – what is easy to operate and maintain
    - ____ Constructability – what is the preferred method of installation from a construction perspective
    - ____ Approvability – what is likely to gain regulatory approval and cost recovery
    - ____ Reliability – what can provide the highest reliability for your customers
    - ____ Cost of project
    - ____ Other

Cost of project followed by constructability were listed as top considerations when averaging all utilities. When separating out responses by geography, Northern-based utilities considered approvability and reliability ahead of cost and constructability. Engineering companies selected approvability and constructability as top considerations. Verbatim comments stated that engineering companies will design and build whatever their clients can get approved.

3. Please scale the following responses (5 meaning very important and 1 meaning not important at all) when thinking about the cost of a project, what are the most important considerations?
    - ____ Engineering and procurement of materials
    - ____ Installation costs
    - ____ Permitting costs
    - ____ Operations costs
    - ____ Maintenance costs
    - ____ Repair costs
    - ____ Initial investment costs
    - ____ Cost recovery
    - ____ Total cost over the life of the system
    - ____ Other

Installation costs, followed closely by initial investment costs were top considerations for this question. Again, Northern utilities had a slight variation with initial investment as the prime consideration, followed closely with equally-weighted installation, maintenance, repair and cost recovery as important. Engineering companies echoed initial investment and installation costs as most important.

4. Please scale the following responses (5 meaning very important and 1 meaning not important at all) when thinking about the effect of public opinion on project decisions, what are the most important considerations:
    - ____ Desire for improved aesthetics/increased property values
    - ____ Perception of system reliability
    - ____ Security – theft, vandalism, cyber-threats, terrorism
    - ____ How cost of project affects monthly billing
    - ____ Land disturbance-traffic interruption, noise
    - ____ Congestion and environmental impact
    - ____ Local economic impact
    - ____ Other

For question 4, the average response of all utilities noted reliability as having the greatest impact on public opinion. This was followed closely by aesthetics, land disturbance and environmental impact. When separated out geographically, the South had environmental impact and land disturbance as the most important, and the North specified reliability first followed by aesthetics and environmental impact.

These geographical differences are interesting. Reliability as the foremost response in the North makes sense due to load density. Land issues dominating in the South is interesting as land is typically more plentiful. It is important to keep in mind, however, that this question does not relate to ease of project approvals (land acquisition) from the utility side, but what utilities think is a prime consideration when it comes to public opinion. Clearly, the survey respondents from the South believe the public is concerned with environmental impact and land disturbance when considering a new project.

Engineering companies listed aesthetics as most important, followed by environmental impact, reliability and economic impact.

5. Please scale the following answers (5 meaning very important and 1 meaning not at all important) when thinking about overall customer satisfaction, what do you believe is most important to them:
   - ____ System reliability (always have electricity when needed, even during weather events)
   - ____ Monthly cost of service (utility bills)
   - ____ Aesthetics/property value
   - ____ Personal and public safety (low EMF, minimum lightning problems, fallen lines, etc.)
   - ____ Environmentally friendly (availability of renewable resources)
   - ____ Other

Monthly cost was the clear leader in response to this question from both utilities and engineering companies. Aesthetics and reliability were nearly equally weighted as secondary important considerations across organizations and geographies. It was interesting to note when looking at both question 4 and 5, that in the court of public opinion, reliability clearly comes across as the most important consideration. However, when looking more narrowly at individual customer satisfaction, the monthly bill is believed to be the top consideration. This truly speaks to the correlation between rate setting and reliability – what is reasonable for the consumer to pay and how that money is allocated toward improved reliability.

6. Does your company primarily design/install/own & operate (please check appropriate box):
   - ____ Overhead lines
   - ____ Underground
   - ____ Both overhead and underground

See demographic chart for questions 6, 6a and 6b.

6.a If you answered both, what percentage of overall installations are overhead and what percentage are underground? (based on number of projects)
   - ____ Overhead lines
   - ____ Underground

6.b If you answered both, what percentage of overall installations are overhead and what percentage are underground? (based on miles of line)
   - ____ Overhead lines
   - ____ Underground

7. Please rank the following additional factors in order of importance (most important = 11, least important = 1) when making a decision to seek approval for a project:
    - _____ Initial cost
    - _____ Project permitting/application
    - _____ Ease of right of way acquisition
    - _____ Aesthetics/property value of land crossed and adjacent
    - _____ Public opinion/customer satisfaction
    - _____ Long-term operations
    - _____ Maintenance costs
    - _____ Costs related to power loss (repair, liability, reputation)
    - _____ Environmental impact
    - _____ Land-use permit
    - _____ Other (provide space for open-ended answer)

No surprises here. Initial cost was considered the primary factor – by a wide margin – for both utilities and engineering companies. In the North, permitting and public opinion followed a bit more closely after initial cost than for other regions. Ease of right-of-way also was a secondary consideration for engineering companies.

8. How do you finance undergrounding projects (please check all that apply)?
    - _____ Utility rate money
    - _____ Local tax
    - _____ Private funds
    - _____ Undergrounding fees
    - _____ Issue bonds
    - _____ Other

Utility rate money was the number one response. Verbatim comments indicated that money borrowed from banks or investors is typically repaid through rate increases – either shared across an entire customer base or by the local customers that benefitted from the project. UG fees and issue bonds were also included in the responses, but to a much lesser degree. It is likely that UG fees are associated with locations where customers demand UG and are willing to pay the cost difference between OHL and UG. Bonds are usually related to private parties that build lines or a municipality that also provides electrical services.

Summary

Overall, the responses confirmed PDi^{2}'s assumptions regarding how infrastructure decisions currently are made. This information will serve as a basis for additional work going forward. Our ultimate goal is data-driven decision making. Immediate future projects include an assessment of the reliability and resiliency impacts of flooding on transmission utility systems, and typical cost differences between equivalent OH and UG systems for utility transmission systems.

If you are interested in the survey raw data, please contact thowe@pdi2.org.