



# Life-Cycle Cost Approach to Decision Making

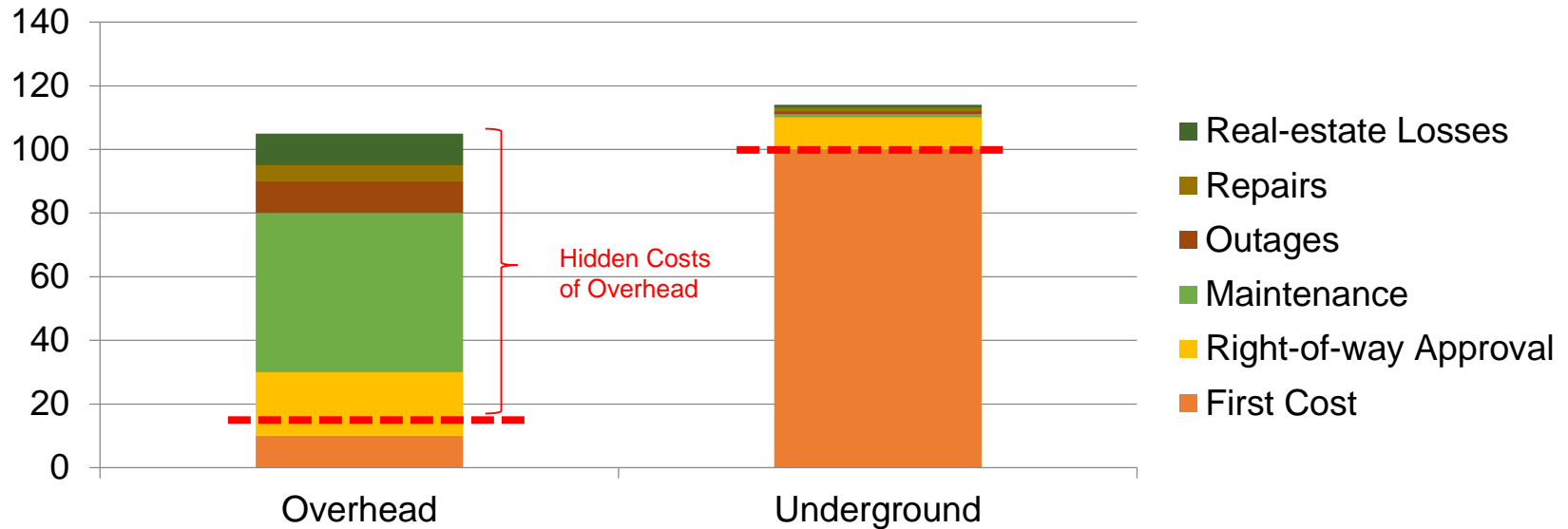
Power Delivery Intelligence Initiative



Power Delivery  
Intelligence Initiative

# What is Power Delivery Intelligence Initiative (PDI<sup>2</sup>)?

- PDI<sup>2</sup> is a working group whose aim is to collect and use data to provide an objective means to evaluate power infrastructure investments from the perspective of:
  - Life-cycle costs to determine when and where it makes sense to install underground – instead of, or in conjunction with overhead lines.
  - Strategic undergrounding to enhance grid resiliency
- The group will use that data to educate stakeholders, communicate methodologies to utilities and help utilities justify investment decisions based on data-driven analysis. For example:



# PDi<sup>2</sup>'s Scope

Geography priority is North America. Focus is on new infrastructure for HV transmission projects and strategic undergrounding for both transmission and distribution. Modeling projects will consider:

- Population density
- Areas prone to storms/repeated outages
- Land values
- Growing economic regions

The group proposes to underground cables in areas where overhead cables present limitations associated with:

- Reliability
- Availability of right-of-way
- Project timeline
- Aesthetics and real-estate value
- Physical security (theft/terrorism)

# PDi<sup>2</sup> Current Members



# Undergrounding – an Underutilized Solution

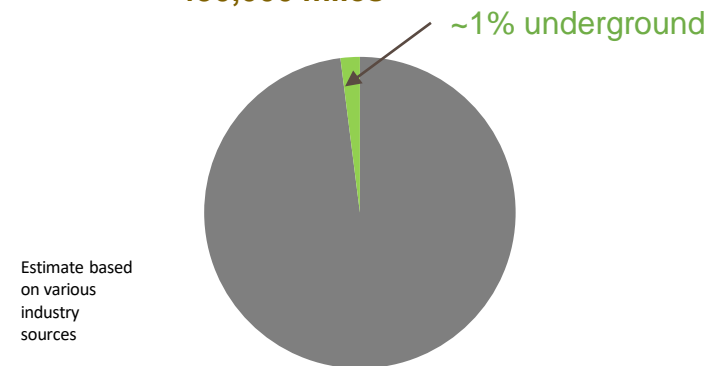
## What is driving this trend?

- 1) Initial capital investment costs for underground are often higher than overhead
- 2) Addressing storm damage is easier than preventing future damage
- 3) Limited formal policies to help with cost-recovery for underground

## Placing all facts on the table may shift this perception...

- Education and decisions based on full life-cycle cost comparisons
- Case-specific models which include:
  - Speed of implementation
  - First cost of systems
  - Cost of delaying the project
  - Cost of outages to the economy and tax revenues
  - Additional repair and maintenance costs

**Existing Transmission lines  
in North America  
450,000 miles**



# Focus on Life-cycle Impact: Example - Outages

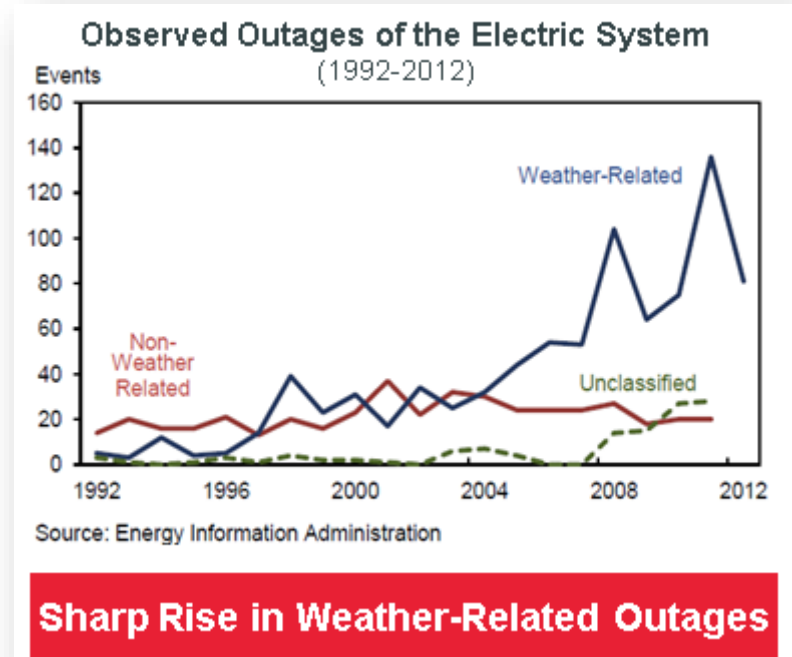
One outage can cost a utility up to \$14 million per day (1)

Power outages cost the economy between \$18 and \$33 billion every year (2)

Lawrence Berkley National Labs, published new preliminary findings in 2016 calculated much higher at nearly \$110B annually

More extreme weather patterns are causing an increase in weather related outages

- Super Storm Sandy
- Polar Vortices
- 2017 Hurricanes Harvey, Irma, Maria



(1) Study of Dominion Virginia Power

(2) Report from the White House on Aug 13 2013

# Driving a Forward-looking Approach

- Drivers impacting undergrounding:
  - Aging infrastructure
  - Need for new paths for electricity flow
  - New sources of generation (e.g. renewables)
  - More volatile weather
  - Political interests
  - Physical security (e.g. terrorism)
- The environment is right for a change in philosophy







# Value can be Realized with Coordinated Action

## Even a modest upside has a sizeable impact for the industry...

- Reduction in repairs, operations and maintenance over the life of the system
- Streamlined approval process – easier rights-of-way, better project timelines
- Improved reliability/resiliency – enhanced reputation, happier customers
- Increased volume for materials suppliers and cable makers

## While the downside of this initiative is very low...

- Our investment will be in resources to generate the data and models, align the industry message, and promotional activities (direct and indirect)

# Call to Action

- We see value in increasing our engagement in supporting the North American power industry to accelerate the ability to objectively evaluate all infrastructure solution options
- To further this initiative we invite key industry stakeholders to join our growing network
- Let's discuss ways in which your company can contribute to this initiative



# Organization and Your Participation

- Strict alignment to anti-trust guidelines is mandatory and non-negotiable
- Open membership aligned around a common theme and includes all interested members of the value chain
- Group is engaged in awareness building activity, member recruitment and data-driven projects
- Proposal for up to nine board level members – currently have three
- Membership in two additional categories
  - Partner
  - Associate

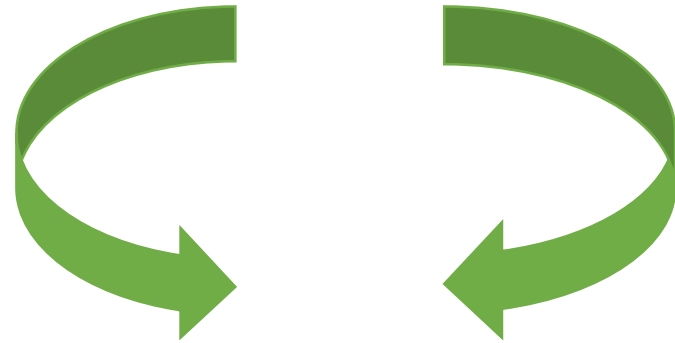


# Organization and Your Participation

Membership Level	Key Benefits	Cost/yr.
Board	<ul style="list-style-type: none"> <li>•Up to three people from a board member company can attend each meeting</li> <li>•One director elected who provides a single vote for direction and decisions of the group</li> <li>•Logo on the web site homepage and member page and inclusion in other promotional activity as appropriate</li> <li>•Members-only access to meeting minutes and important documents/information</li> </ul>	\$30,000
Partner	<ul style="list-style-type: none"> <li>•Opportunities to work on projects in lieu of higher fees</li> <li>•Logo in member section of web site</li> <li>•Attendance at meetings by board invitation</li> <li>•Members-only access to meeting minutes and important documents/information</li> </ul>	\$10,000
Associate	<ul style="list-style-type: none"> <li>•Act in an advisory capacity to the group</li> <li>•Attendance at meetings by board invitation</li> <li>•Logo in member section of web site</li> <li>•Members-only access to meeting minutes and important documents/information</li> </ul>	\$1,000

# Membership Targets

- Resin / Compound Manufacturers
- Cable Manufacturers
- Engineering Firms
- Installation Contractors
- Equipment / Accessory Manufacturers
- Utilities
- Public Utility Commissions



...anyone who could be impacted  
by this effort

# Membership Fees Support Multi-Phase Initiatives



<b>Purpose:</b>	Reinforce group's legitimacy, commitment, and reputation	Compile data and build models	Influence policymakers to adopt more undergrounding
<b>Budget Activities:</b>	<ul style="list-style-type: none"> <li>Execute communications strategies to reinforce brand, direct potential members/ influencers to website, and other tools to continue communicating progress against goals</li> </ul>	<ul style="list-style-type: none"> <li>Produce SOW for various projects and identify appropriate service partners and/or Partner member who can generate the data and build user-friendly models to help with the comparisons of OHL and UG</li> <li>Communicate results</li> <li>Three projects complete, two new projects underway.</li> </ul>	<ul style="list-style-type: none"> <li>Create and execute a communications plan to reach key policymakers to include the adoption and use of the new models when evaluating and making rate-case decisions</li> </ul>
<b>Budget:</b>	\$40K-\$60K/yearly	\$30K - \$60K/yearly	TBD
<b>Timeline:</b>	Ongoing	Ongoing	Ongoing

Note: Budgets are tailored each year to match membership dues collected

# Driving Awareness

## Brand Identity – complete

- Logo
- Trademark and logo mark filed, cleared, registered

## Ongoing communications

- Web site – [www.pdi2.org](http://www.pdi2.org)
- Literature
- Display unit for events
- LinkedIn
- Editorial placements
- Webinars
- Web blog
- Strategic promotions and relationships with:
  - Public Utilities Fortnightly
  - Transmission & Distribution World
  - Energy Central



# Membership Building

- Board member recruitment efforts – four new member organizations since original charter – membership now encompasses compounders, cable makers, engineering, accessories and installers
- Participate regularly at PES ICC
  - Tabletop Exhibit
  - Education Session (2019)
- AEIC meeting (2019)
- Presentation to Utility Forum at NEETRAC Management Board Meeting (January 2020)





# Thank You

[www.pdi2.org](http://www.pdi2.org)

# Benefits to Exploring Other Options

- Each mile of OH circuit is equivalent to 3 cable miles. For a cable manufacturer 1000 miles can have a value of \$ 700,000,000
- By assisting transmission system operators and decision makers with the creation of a framework for intelligent undergrounding of HV lines, there will be a sizeable positive financial impact to our industry

