



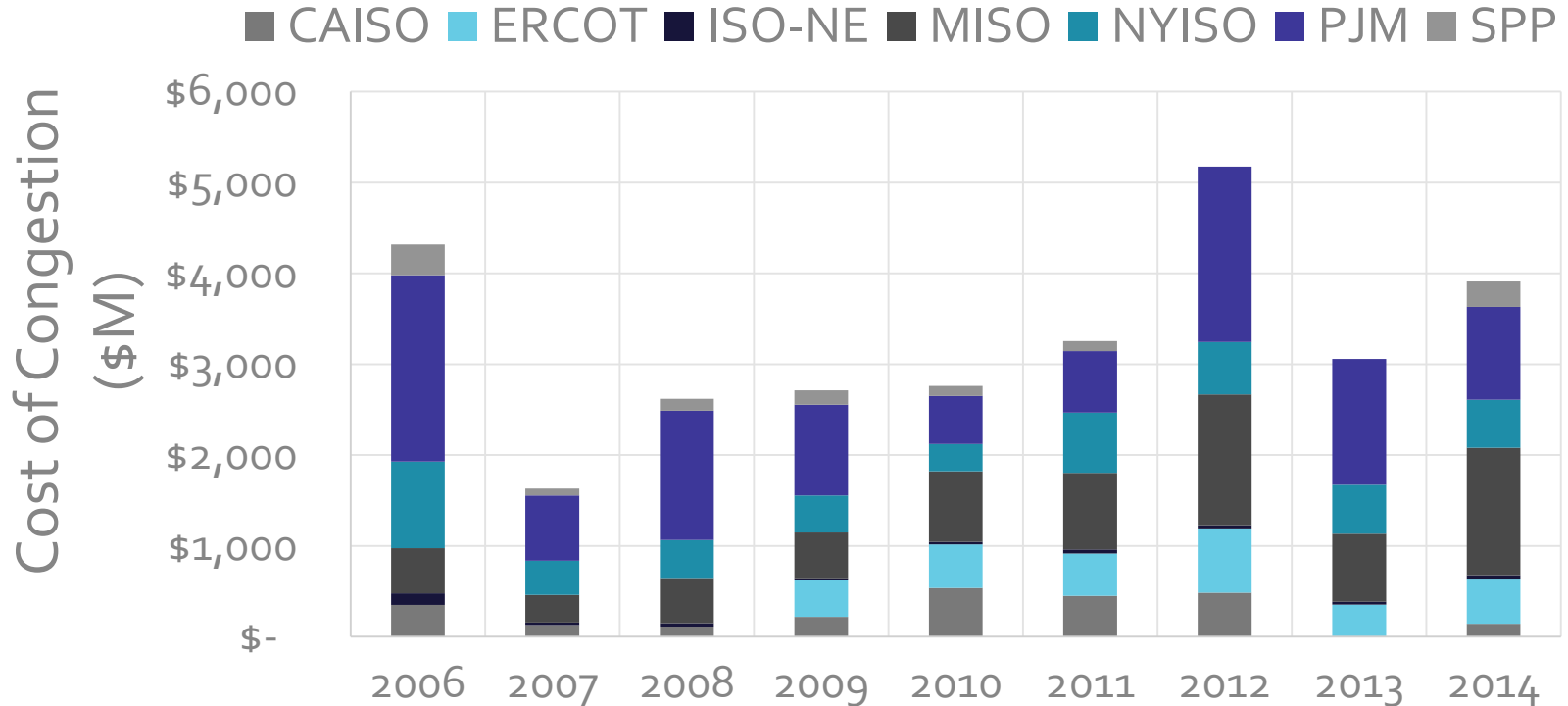
WATT

November 7, 2017

Introducing WATT

Working for Advanced Transmission
Technologies

High Congestion

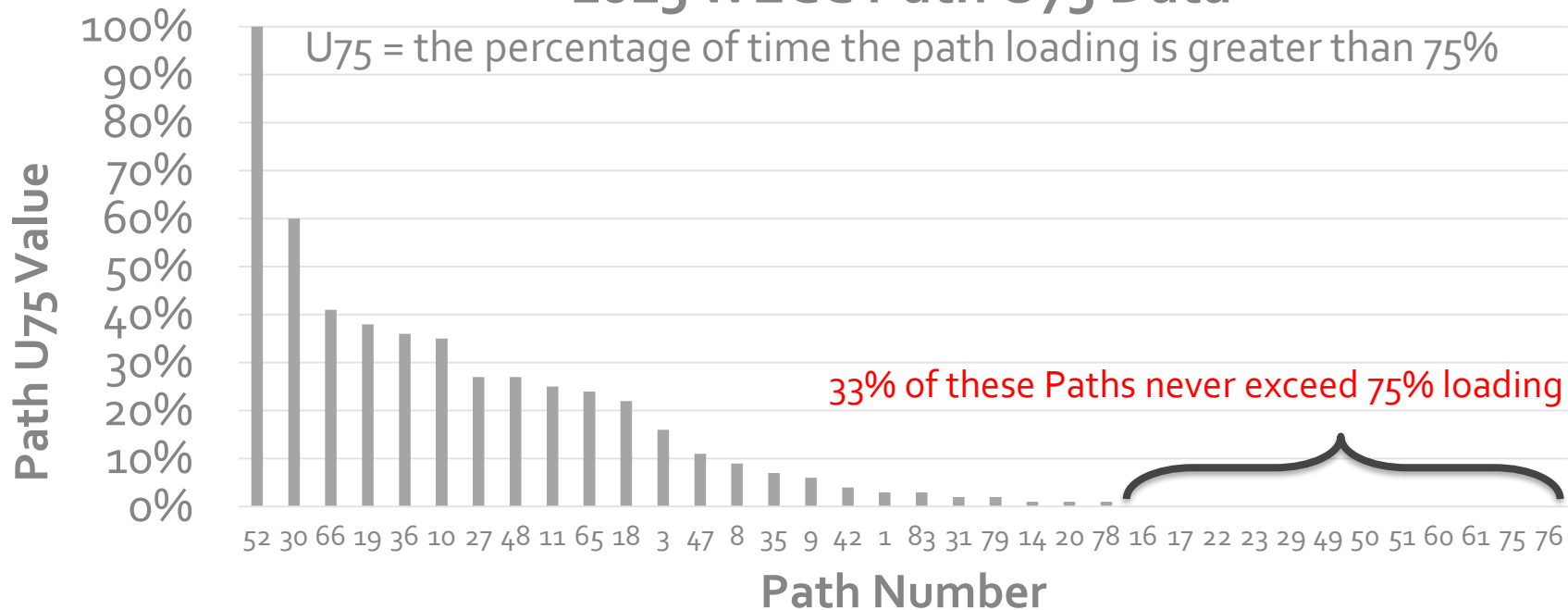


Data Sources: Multiple sources. Go to www.advancedtransmission.org for more information



Low Utilization

2015 WECC Path U75 Data



Data Source: <https://www.wecc.biz/Reliability/2016%20SOTI%20Final.pdf>

More on the U75 metric can be found here: https://www.wecc.biz/Reliability/2010_WI_TransPath_UtilizationStudy.pdf

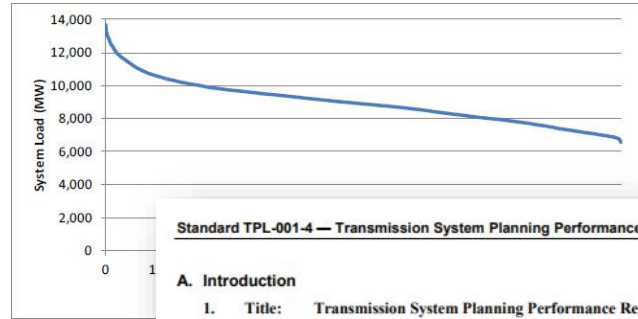


High Congestion & Low Utilization

Apparent Paradox Explained

3 Contributing Factors

1. Plan for peak but load is rarely at peak
2. Security constraints, planning & operating standards leave headroom for reliability and resiliency
3. The system has yet to embrace advanced transmission technologies that deliver more watts



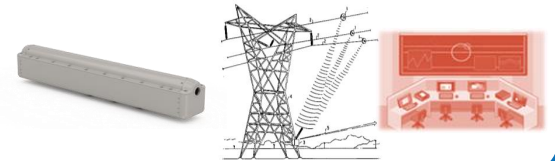
Source: <https://hut.concentrating-solar.com>

Standard TPL-001-4 — Transmission System Planning Performance Requirements

A. Introduction

1. **Title:** Transmission System Planning Performance Requirements
2. **Number:** TPL-001-4
3. **Purpose:** Establish Transmission system planning performance requirements within the planning horizon to develop a broad spectrum of System
4. **Applicability:**
 - 4.1. **Functional Entity**
 - 4.1.1. Planning C
 - 4.1.2. Transmissi
5. **Effective Date:** Required the first day of the first c

Advanced Transmission Technologies



Advanced transmission technologies can unlock much of this unused capacity and provide reliability and economic benefits today

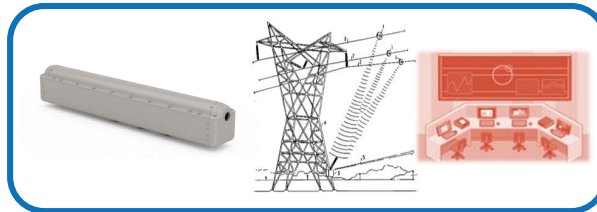


Three Types of Transmission Tools

New Build



Advanced Technologies



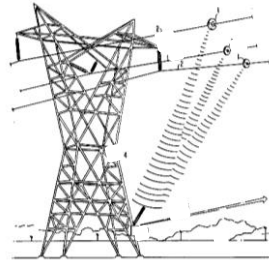
Change Demand



Advanced Power Flow Control



Dynamic Line Rating



Advanced Topology Control



Get more out of the current grid

Members



- Coalition of advanced transmission technologies that increase the utilization of the transmission system
- Coordinate our education and outreach
- Advocates for the removal of barriers to increased adoption of advanced transmission technologies
 - Education
 - Utilities are penalized for innovation
 - Transparency in transmission planning process

Get more out of the current grid

Members



GENSCAPE™

LINDSEY



SMART WIRELESS

windsim



Benefits of WATT Technologies

Economic, Reliability and Clean Energy Benefits

More Transmission Capacity

- Up to 2x capacity from real-time measurements (DLR) under low temperature and high wind conditions
- Up to 1.25x capacity from optimized system configuration and flow control settings under peak demand conditions

Less Congestion

- Reduce the \$6 billion/year in congestion cost by 1/3, saving consumers \$20 billion over ten years in the US alone

Higher Reliability

- Detect instances when the current calculated limits do not comply with reliability standards
- Relieve transmission overloads without need to shed load

Improved Renewables Integration

- Reduced renewables curtailment (waste)
- Adapt the system operation to the changing system conditions (wind, solar)



Barriers to Adoption

Why are these beneficial technologies not being used

Awareness

- Many planners, utility executives, regulators, and stakeholders are unfamiliar with advanced transmission technologies and their benefits

No Incentive to Innovation

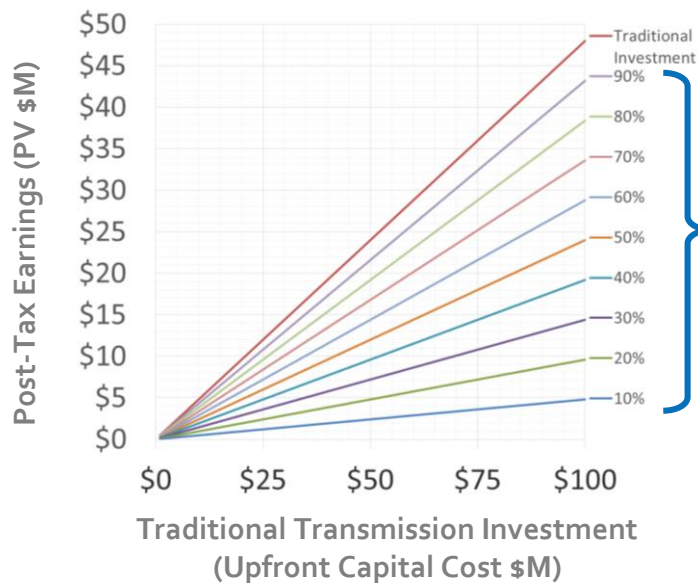
- In most industries, *innovation* takes *risk*, *extra* work and *effort*, but pays off **big**.
- Not the case for transmission
 - *Risk is highly discouraged* – Reliability is above all else
 - Utility staff are overworked with little time to dedicate to new initiatives
 - There is not big payoff for innovation

Are Advanced Transmission Solutions being Considered?

- The grid is *typically* operated in a static and passive way
 - Fixed ratings – based on planning calculations
 - Fixed settings – power flow controls are rarely employed, even when available
 - Fixed topology/configuration – normal (planning) open/close breaker status are used
- Most planning regions do not require utilities to propose alternative projects
- Fewer yet require those alternatives to be publically viewable
- *Advanced Transmission Technologies tend to not be used in operations, and it is impossible to know if utilities are considering them in planning*



Little Incentive to Innovate



Advanced Transmission Technologies

solve problems for a fraction of the costs of tradition transmission investments. This graphic shows how this reduction in capital costs results in a penalty to the utility through decreased revenue.

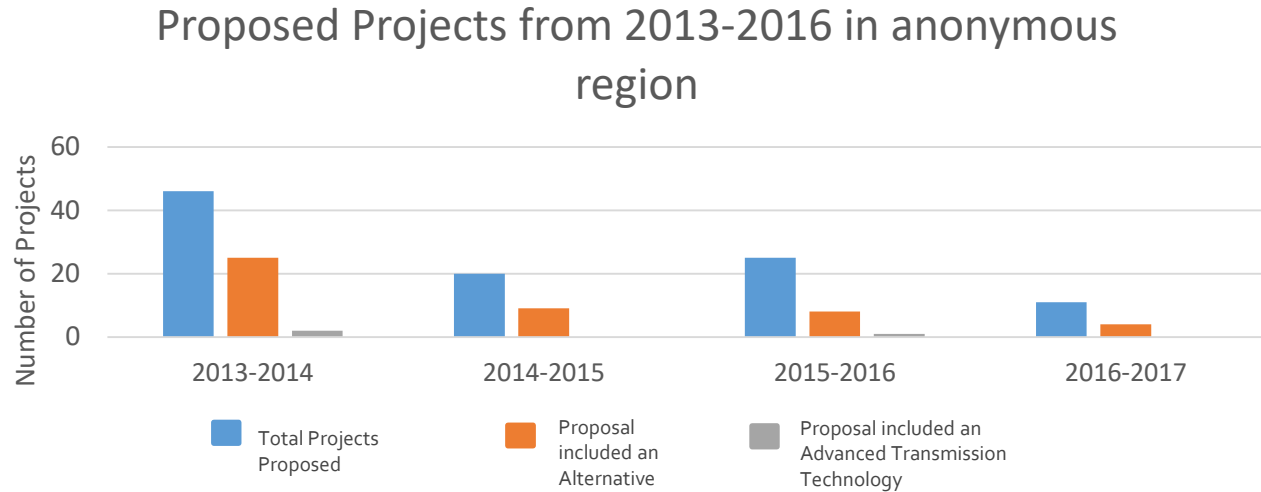
- The vertical axis is a measure of how much revenue a utility earns on a project.
- The horizontal axis represents the cost of traditional transmission investment cost.

For example, for a \$50M traditional investment, a utility earns just under \$25M in present value post-tax earnings. For an advanced transmission solutions that is 50% of the capital cost of the tradition solution (\$25M), the utility earns just under \$12M in post-tax earnings (present value). The utility loses ~\$12M in earnings when they choose the advanced technology solution.

This is no incentive for innovation; there is a penalty for saving money.



Rarely is advanced transmission considered



More often than not, projects are proposed without any alternatives suggested.

In the past 4 years, of the 102 projects proposed only 3 projects included an Advanced Transmission Technology in the alternative.



Solutions to Barriers

Awareness

Remove the penalty to utility innovation

- Allow utilities to share in the benefits when they
 - Use advanced transmission technologies, AND
 - Create significant savings for consumers

Consider all alternative: wires, non-wires, and advanced technologies

- Provide multiple alternatives to each reliability need
- Make these alternatives publically available for review and discussion
- *Provide enough data available to appropriate stakeholders that experts can suggest additional alternatives such as advanced transmission technologies*





WATT

Working for Advanced Transmission Technologies

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