Investing in Reliability for Energy Delivery, including Transmission

Bringing Energy Delivery to the Next Level in Asset Management

NAVIGANT CONSULTING

Today's utility has to tell a different story

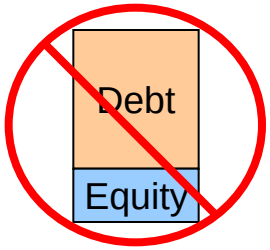
The shift is from global energy traders to regional asset owner/managers

Who we are NOT:

- Asset-less 'trading' company

- Global acquirer of risky assets

- Highly leveraged and un-hedged

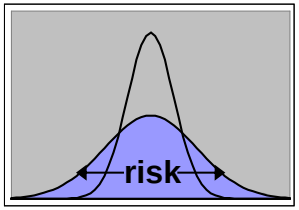


Who we ARE:

- Owner/manager of utility assets

- Selected acquirer of 'related' assets

- Prudent manager of all risks



Spending prioritization has become a board-level issue

Boards want to see what is driving the business' needs for cash

"The board of directors has asked to see the process by which we make decisions about major commitments of capital"

– A major multi-region investor-owned utility

"The board wanted to get behind the presentation of the budget and look at the drivers of cost and where it was taking us"

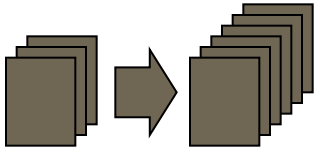
– A large southwestern municipal

"The board is not satisfied with a process where we all get in a room and use our best judgment. They want to see a method."

– A major northeast investor-owned utility

Spending prioritization is the core of asset management

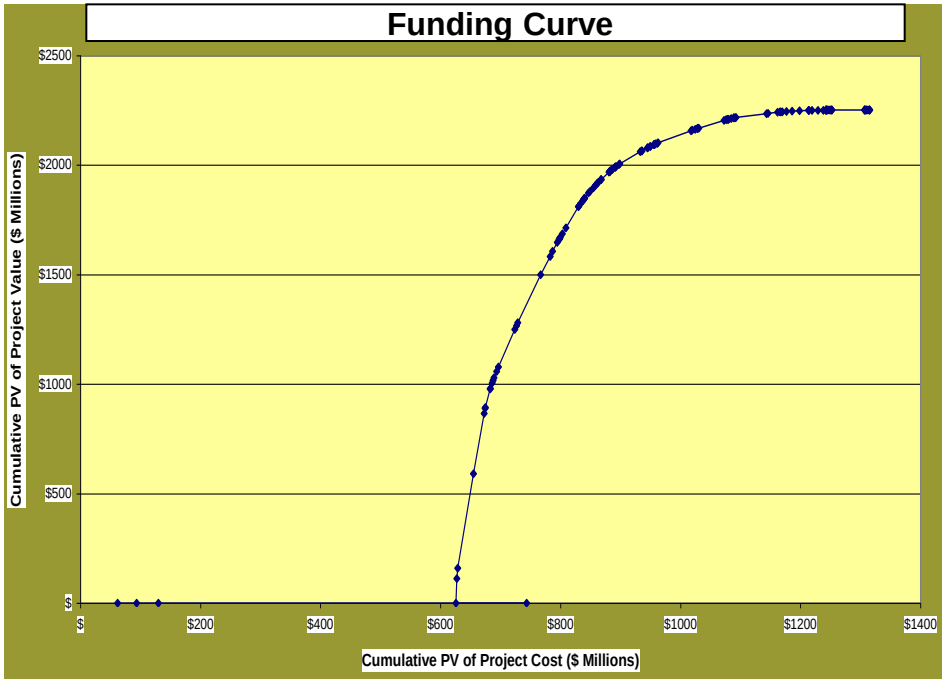
The 'decision tool' ranks each major project/option by its 'bang per buck'

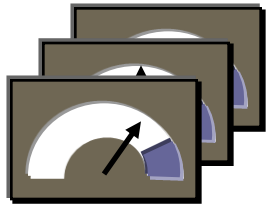


Option Development

Developing cost-effective alternatives for possible funding

- Additions
- Upgrades
- Replacement
- Maintenance
- Standards
- Systems





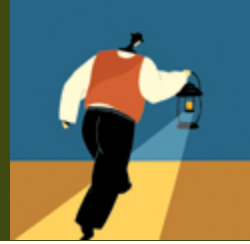
Results Monitoring

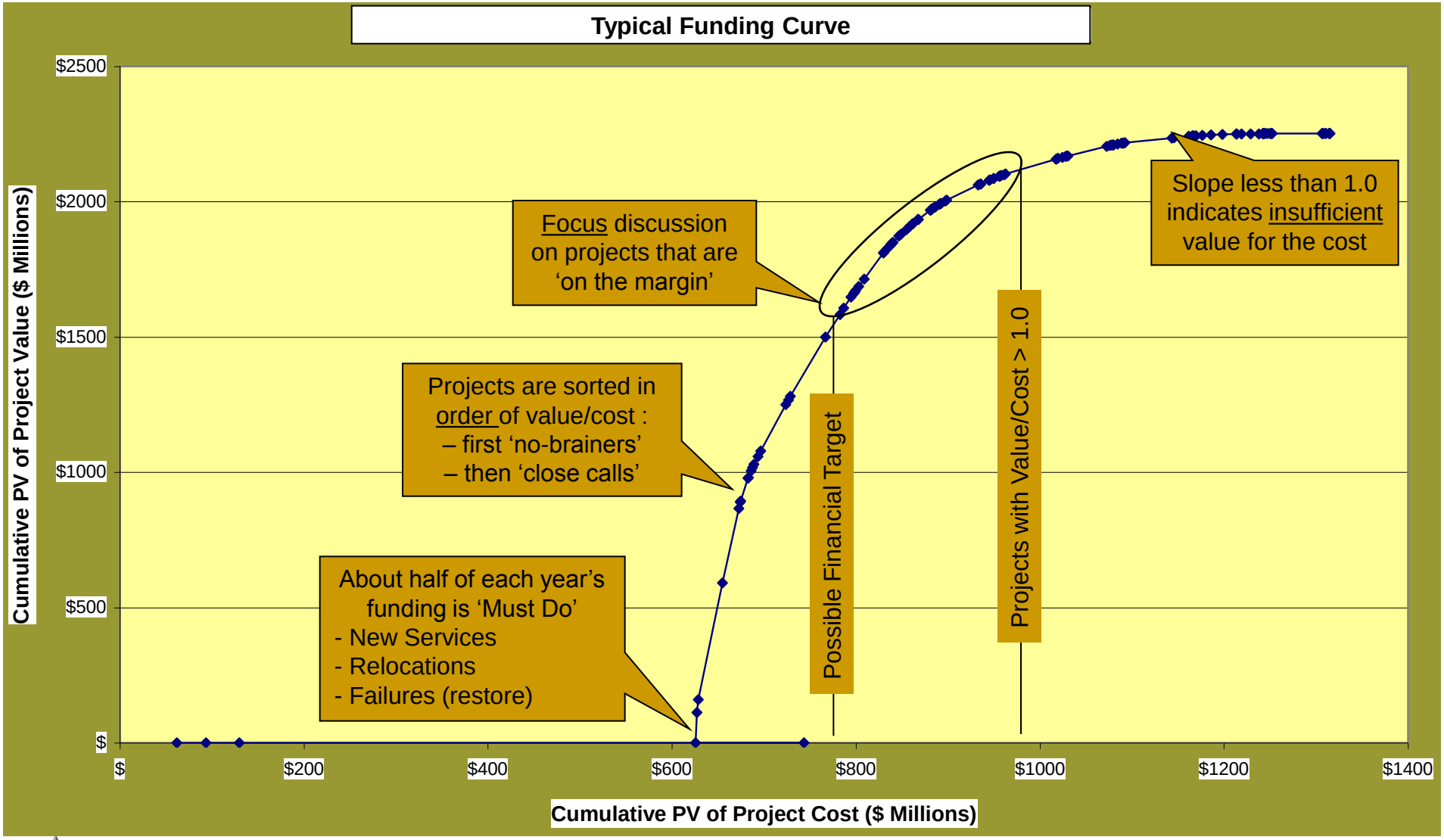
Measuring & managing the drivers of the funded projects and processes

- Benchmarking
- Unit costs
- Failure rates
- Event impacts
- Value added

Within this context, all projects can compete for resources

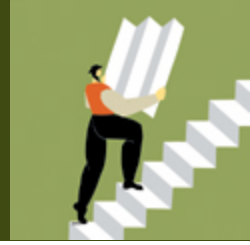
Transmission projects compete with distribution, IT, etc.





Each project is modeled from cost to impacts to value

Providing an activity basis for all projects and categories of spending



Start by entering cost by year…

…then model units and unit costs…

…then model immediate impacts on value 'drivers'…

…e,g, one component of value is collateral damage avoided cost

		2003	2004	2005	2006
13kV Switchgear Refurbishment	**D0225**				
Annual Project Cost	D0225	$500,000	$510,000	$520,200	$530,604
Refurbishment Cost per Breaker	D0225	$5,000	$5,100	$5,202	$5,306
Breakers Replaced per Year		100	100	100	100
Cumulative Breakers Replaced		100	200	300	400
Collateral Damage Avoided Cost - Circuit Breakers					
Old (Replaced) 13kV Circuit Breaker Failure Rate	D0225	3.0%	3.0%	3.0%	3.0%
New 13kV Circuit Breaker Failure Rate		0.1%	0.1%	0.1%	0.1%
Reduction in Failure Rate		2.9%	2.9%	2.9%	2.9%
Number of Circuit Breaker Failures Avoided per Year	D0225	2.9	5.8	8.7	11.6
Collateral Damage Cost per Failure (Weighted Average	D0225	$100,000	$102,000	$104,040	$106,121
		$290,000	**$591,600**	**$905,148**	**$1,231,001**

For each project, the value from each of the components is added up by year, discounted to present value, and compared to the present value of the projects' cost, to get a value/cost ratio, which determines its ranking in the funding curve:

PV of project value / PV of project cost = Value/Cost ratio

$2,200,000 / $2,000,000 = 1.10

Value to the company includes avoiding 'reactive' costs

Companies pay real dollars to deal with customer satisfaction issues

What would your company be likely to have to spend if this were the front page of your main city's newspaper?

What would you spend now to avoid having to spend later?

Chicago Tribune

Chicagoland South

50c NEWSSTAND

Friday, August 13, 1999

DOWNTOWN BLACKOUTS

Power fails, sparks fly

"They have neglected their infrastructure for too long... We are sick and tired of them, and they had better change."

Mayor Richard Daley

Image courtesy of CLTV

"This level of service under these conditions is a disgrace to us. It's a personal disgrace to me. I will not tolerate it, and you will not have to."

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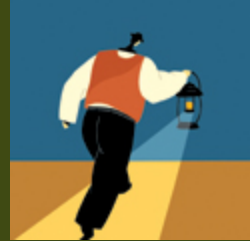
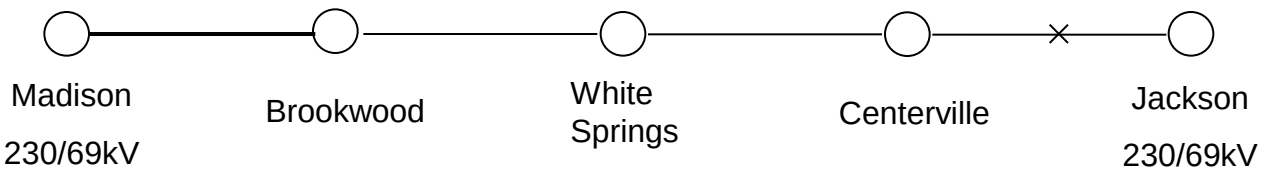
Transmission line load relief projects avoid outages

A 'quick calculation' example shows how the model works at a high level



Project: Reconductor the 4-mile 69kV line from Madison to Brookwood

Reason: Loss of Jackson-Centerville line (1st contingency) causes 15% overload on Madison-Brookwood line



Cost: $800,000 = $200,000 per mile * 4 miles of re-conductored 69kV line

Benefit: Avoid an 8% chance of having to shed 13-50 MVA of load for 2 hours during summer contingency

Quick calculation: $1,000,000 of benefit; $800,000 of cost; Benefit/cost ratio = 1.25

Outages Per Year	Exposure Factor	MW At Risk	Outage Hours	EMWH Saved	Value per MWH	Annual Benefit	Present Value
.4	.2	25	2	4.0	$25,000	$100,000	$1,000,000

Note: The quick calculation above shows the key drivers, but the model handles more complex details:

- Multi-year – Discounted present value of costs and benefits over time
- Load growth – Higher load growth leads to more overload over time, hence higher benefits
- Voltage drop – Can be modeled by asking how much load must be dropped to restore 93%
- Line loss – Reconductoring or cap banks can affect line losses

Investing in transmission reliability must be optimized

There are some very cost-effective investments, and some not so

For questions or further information, contact:

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