Thermal Energy Storage
Embrace the Architect

Guy Frankenfield – DN Tanks

CampusEnergy2020
THE POWER TO CHANGE
FEBRUARY 10-14 • SHERATON DENVER DOWNTOWN • DENVER, CO

INTERNATIONAL DISTRIBUTION ENERGY ASSOCIATION

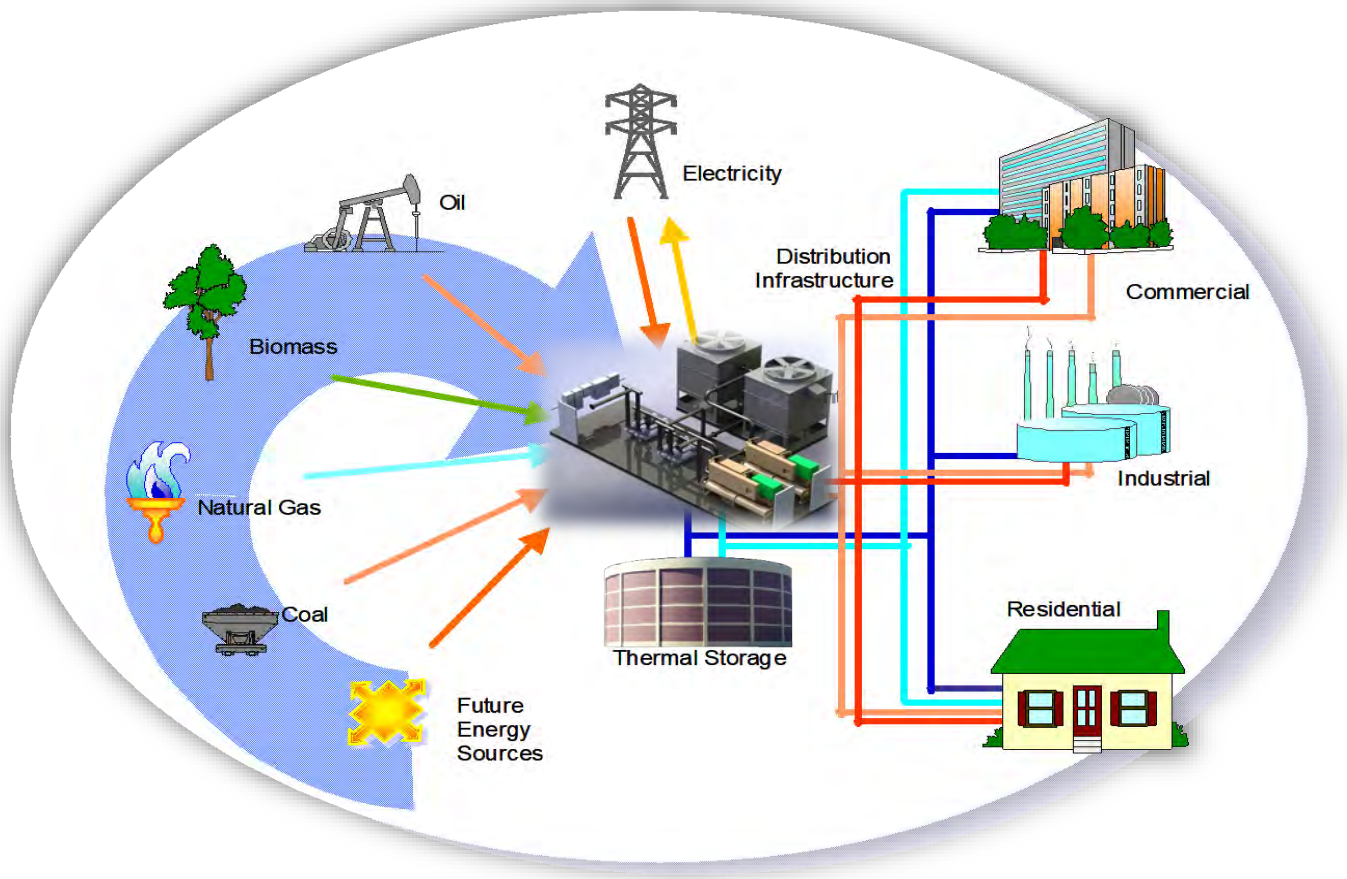
The 3 R's when developing a TES project

ROI

Resiliency

'Rchitecture

NOT going to discuss how TES tanks solve problems like reducing energy costs, or adding cooling capacity



…and we are not going to discuss

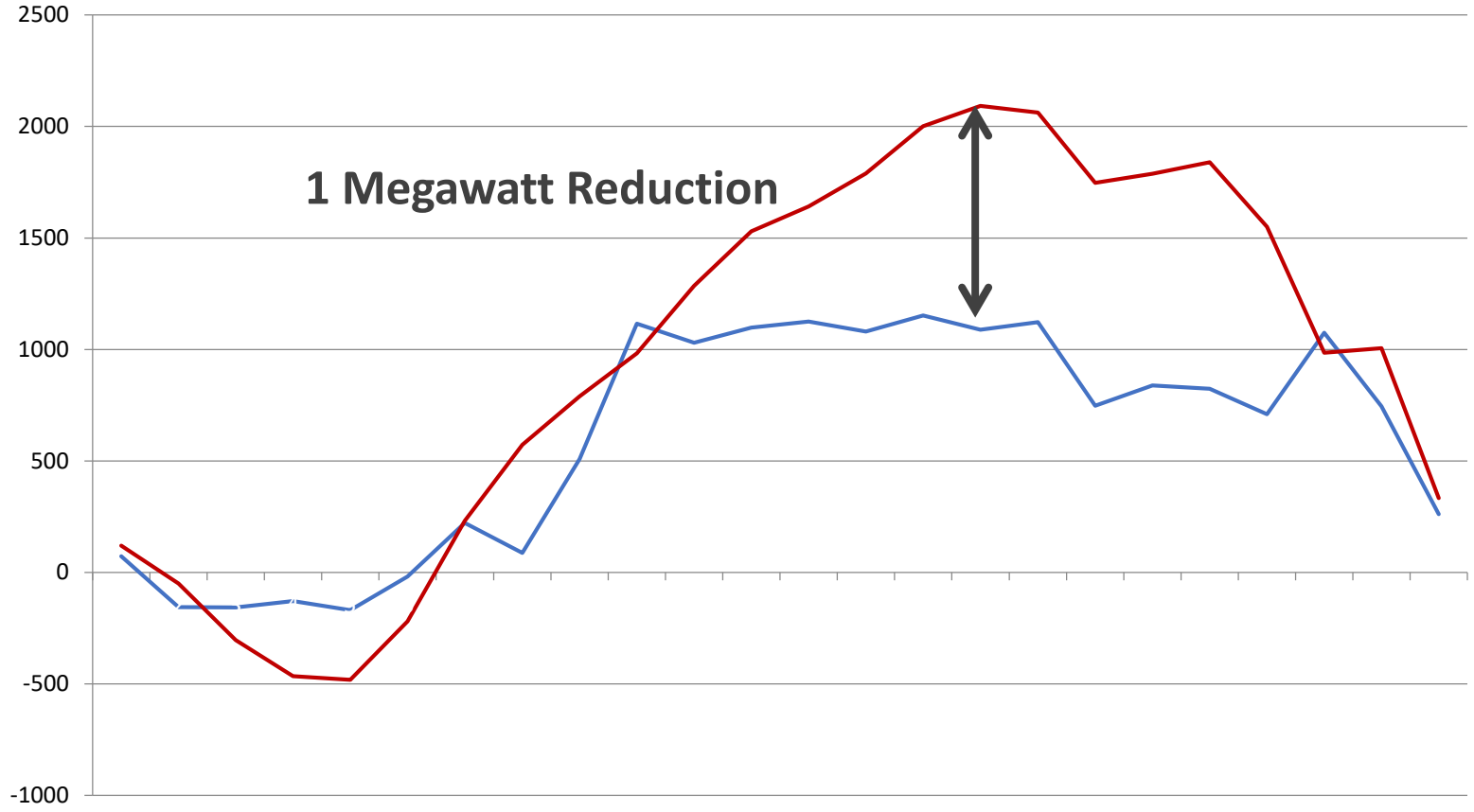
Return on Investment

- **Energy Cost Savings and Incentives**
  - kW Savings – electric demand reduction
  - kWh Savings – time of use consumption rates
  - kWh Reduction – operating during cooler ambient conditions
  - Incentives from the utility – if available
- **Cost Avoidance** – when expanding the campus, add a TES tank instead of more chiller equipment

Resiliency

- **Mission Critical Back-up**
  - Reservoir of chilled water ensures no downtime
  - Dual purpose fire water storage tank
  - Useful life of 50+ years

… and we are not going to discuss the efficient way that a TES tank can shift megawatts of electric power



Instead – this presentation will focus on importance of **‘Rchitecture** with respect to TES tank projects

Engineers and Architects don’t always agree

Maybe because some designs aren’t easy to engineer

Maybe because some designs aren’t easy to build

…or maybe because some designs just can’t be taken seriously

…but more often than not, the Engineer fears that the Architect's design will bust the budget!

But when done right

Architecture can make a structure **iconic**

Architecture has persisted as one of
the most profoundly important reflections of culture

What makes it iconic?

Some of the most recognizable structures can be drawn with a **single line upon a page**

A singular, striking gesture can culminate in a structure that is highly **memorable**

Iconic structures can make a statement about an organization, city, or even an entire region

A structure can serve as a metaphor

The Taj Mahal was designed and built for Mumtaz Mahal, the favorite wife of the Mughal emperor, and has stood as a **symbol of love** for three and a half centuries

“The pursuit of the iconic requires great willingness …

to put up with inevitable setbacks and the potential **budget-busting** complications as the Architect strives to create something completely unique.”

Many of the world's most iconic structures have been shaped in large part by teams of innovative **engineers, working in collaboration with architects** to find ways to realize their visions.

So what does architecture have to do with Thermal Energy Storage tanks?

TES tanks are **BIG**

so they are visible

from a long way off

If a tank can be seen – then an Architect cares 

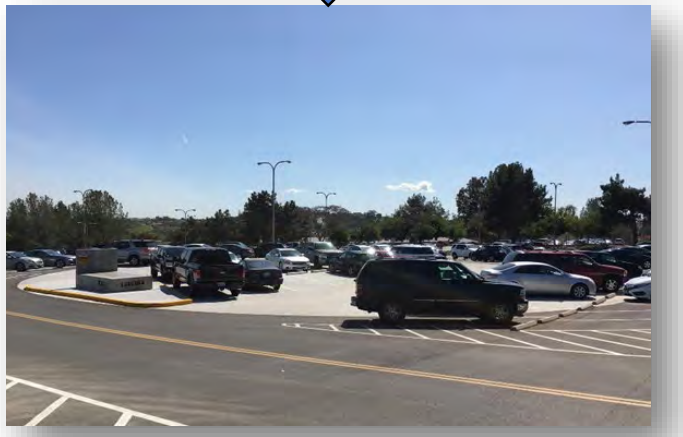
Some TES tanks never get built

ROI did not meet the owner's requirements

Aesthetics did not meet the owner's requirements:

- "It's too ugly."
- "Looks industrial."
- "What will parents and students think if they see it?"

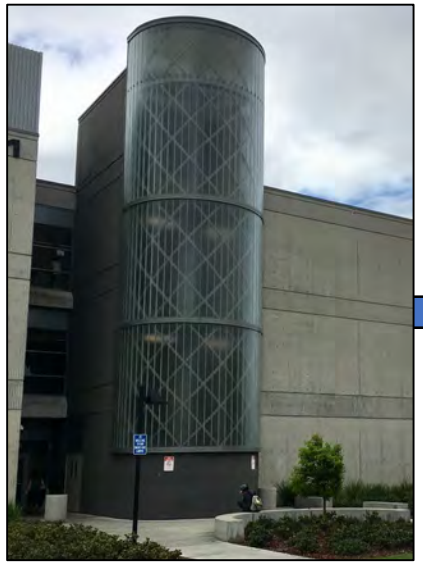
One answer is hide the tank!



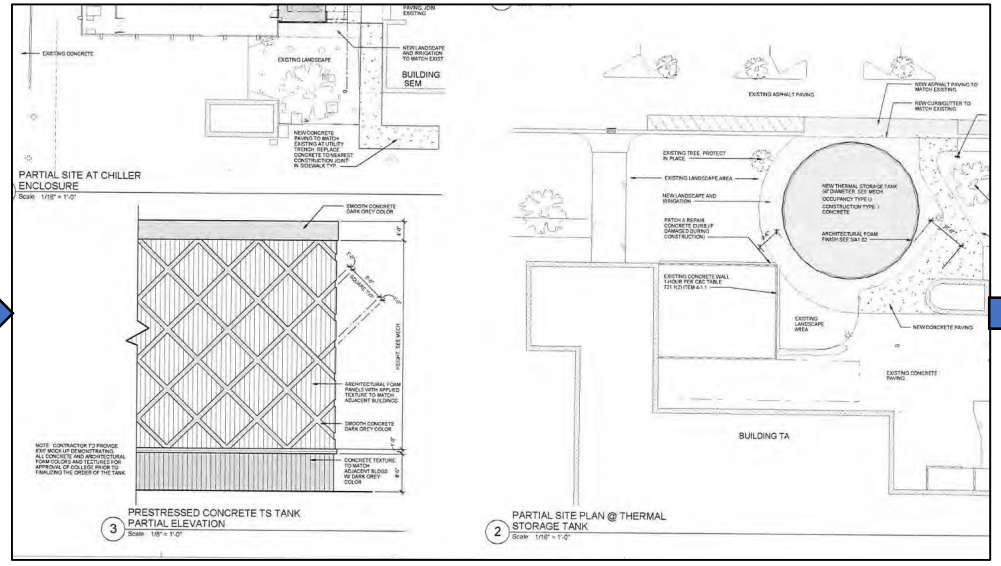
But more often than not, TES tanks are exposed and in full view of passersby

Engineers and Architects can collaborate to make a successful TES tank project

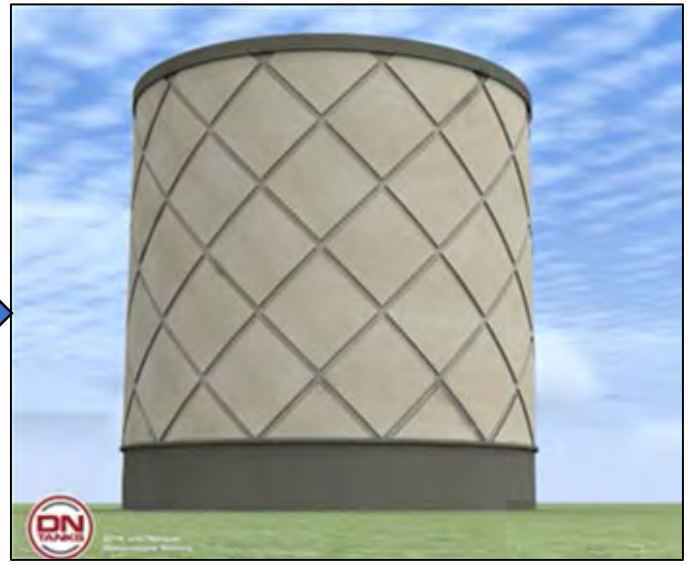
Engineers, Architects, and Owners Collaborate



Stairwell



Drawing – Engineers and Architects



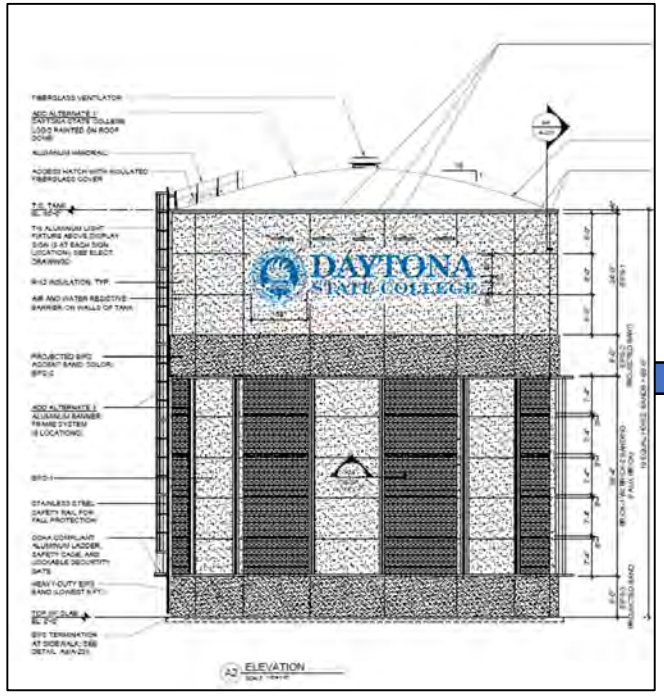
Rendering

Reduces energy costs, and the appearance emulates the campus architecture

Cypress, CA – Cypress College

- 10,000 ton-hours TES capacity
- 7 megawatt-hours equivalent energy storage
- 1.4 megawatts of peak power reduction

Engineers, Architects and Owner Collaborate to make a visible "**sustainability**" statement



Collaborative Drawing

Rendering by the Architect

Drawings and Renderings Courtesy of Crom LLC / Pond & Co.

Reduces energy costs, provides resiliency and expresses the values of the owner

Daytona Beach, FL – Daytona State College

- 20,000 ton-hours of TES capacity
- 19 megawatt-hours equivalent energy storage
- 2.1 megawatts of peak power reduction

Picture Courtesy of Crom LLC / Pond & Co.

Reduces energy costs by reducing peak capacity, provides resiliency and is **memorable**


Courtesy of the State of California

Sacramento, CA – California Dept. of General Services

- 52,000 ton-hours of TES capacity
- 36 megawatt-hours equivalent energy storage
- 5.0 megawatts of peak power reduction


Courtesy of DC Pro Engineering

Muscat, Oman – Technical College

- 13,750 ton-hours of TES capacity
- 12 megawatt-hours of equivalent energy storage
- 2.5 megawatts of peak power reduction

Reduces energy costs by reducing peak capacity, provides resiliency, and is pleasing to the eye

Salt Lake City – University of Utah

- 27,800 ton-hours of TES capacity
- 19 megawatt-hours equivalent energy storage
- 3.8 megawatts of peak power reduction

TES tanks are “Award Winning” in appearance

St. Paul, MN – District Energy St. Paul

- 37,400 ton-hours of TES capacity
- 29 megawatt-hours equivalent energy storage
- 8.2 megawatts of peak power reduction

Madison, WI – State of Wisconsin Capital Power Plant

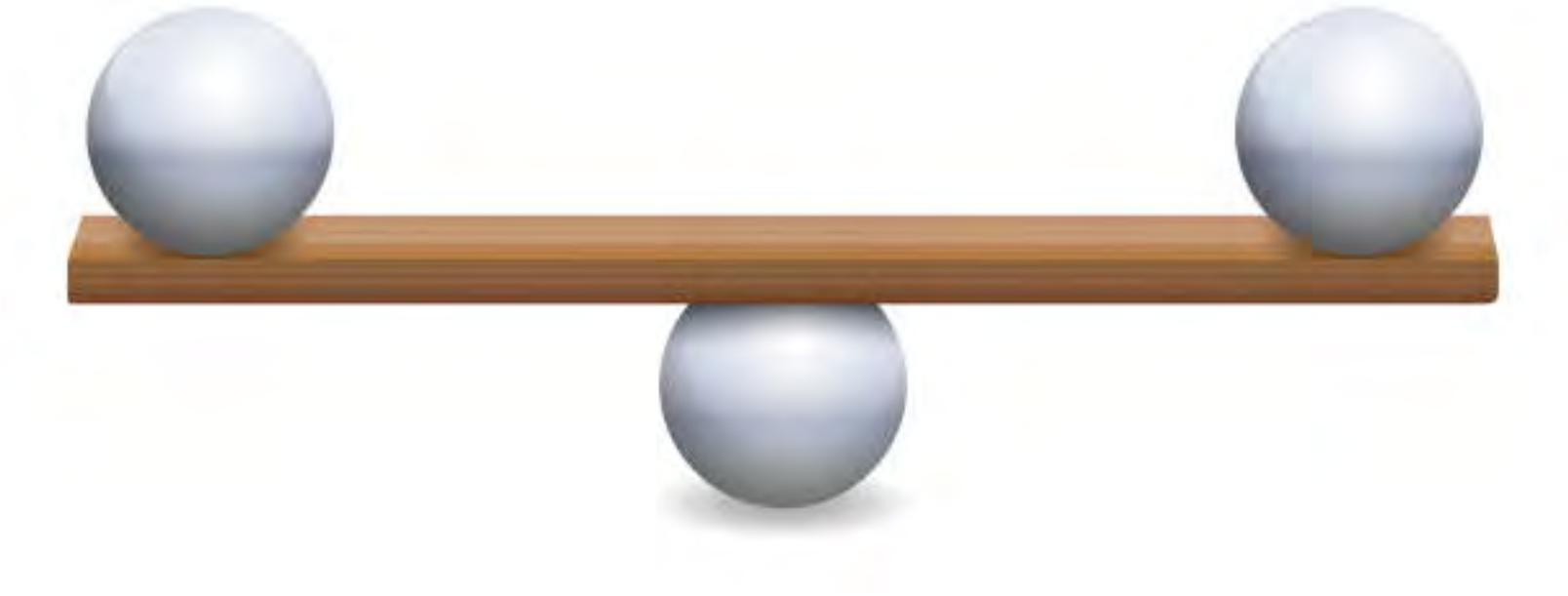
- 9,500 ton-hours of TES capacity
- 7 megawatt-hours equivalent energy storage
- 1.0 megawatt of peak power reduction

Intangible values of enhancing the appearance of a TES tank

- Instills pride within the owner
- Is interesting to see by passersby
- Becomes a memorable landmark
- Makes a statement about the owner's values
- Does NOT detract from the campus appearance

Can help make the project happen

Looks Awesome vs. $'s



An enhanced architectural finish on a TES tank can be the difference between a project moving forward – or not

When developing a TES project – remember

ROI

Resiliency

‘Rchitecture

Thank you, Architects

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