

Electrolyzer Installation Costs

Data from installed systems

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Electrolyzer Installation Workshop – DOE/HFTO and NREL

Project Objective

Gather actual costs from electrolyzer installations - \$/MW

- Everything but the electrolyzer
- Compare to targets and for discerning areas that would benefit from increased attention

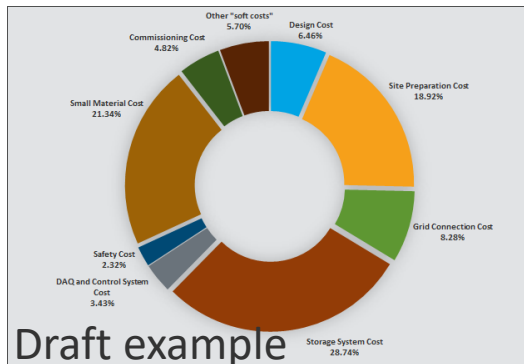


Template for Data Collection/Progress

Like CDP projects: We will collect, analyze, aggregate and present the **costs** associated with the **installation of electrolyzers** while not revealing which data pertains to which specific company.

Progress:

- Template developed to collect information
 - Level of detail for each category can be a lump sum or detailed breakdown (preferred)
- Contacted companies
- Exercised with NREL installation



NREL Transforming ENERGY

Electrolyzer Installation Costs

Site Specific Info

Categories	Parameter	Site Specific Info	Comments
	Site Name		
	City, State		
	Point of Contact		
	Date		
	Commission Date		

	Reviewed Detailed Tab	Cost Estimate from Detailed Tab	Method to Determine Cost	Lump sum Cost Estimate	Comments	Phase Completion Timeline (Y)
Land Cost	Yes	\$0.00	Detailed Cost			0
Design Cost	Yes	\$0.00	Detailed Cost			0
Site Preparation Cost	Yes	\$0.00	Lump sum Cost			0
Grid Connection Cost	Yes	\$0.00	Detailed Cost			0
Storage System Cost	Yes	\$0.00	Detailed Cost			0
Data Acquisition System and Control System	Yes	\$0.00	Detailed Cost			0
Safety	Yes	\$0.00	Detailed Cost			0
Financial Cost	Yes	\$0.00	Detailed Cost			0
Small Material Cost	Yes	\$0.00	Detailed Cost			0
Commissioning Cost	Yes	\$0.00	Detailed Cost			0
Other "soft costs"	Yes	\$0.00	Lump sum Cost			0

Cost from Each Estimate Type

Cost from Each Estimate Type	Electrolyzer Installation Cost
\$0.00	\$0.00

Optional: Please enter the cost overrun (if any)

Planned/Estimated Budget (\$)	Actual Expense (Basically Installation) (\$)
	\$0.00

Revision History | Installation Cost Summary | System Information | Land Cost | Design Cost | +

Template Summary Sheet



Electrolyzer Installation Costs

Categories	Parameter	Site Specific Info			Comments	
	Site Name					
	City, State					
	Point of Contact					
	Date					
	Commission Date					
	Reviewed Detailed Tab	Cost Estimate from Detailed Tab	Method to Determine Cost	Lump sum Cost Estimate	Comments	Phase Completion Timeline (
Land Cost	Yes	\$0.00	Detailed Cost			0
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Safety	Yes	\$0.00	Detailed Cost			0
Financial Cost	Yes	\$0.00	Detailed Cost			0
Small Material Cost	Yes	\$0.00	Detailed Cost			0
Commissioning Cost	Yes	\$0.00	Detailed Cost			0
Other "soft costs"	Yes	\$0.00	Lump sum Cost			0

Cost from Each Estimate Type	\$0.00	\$0.00
Electrolyzer Installation Cost		\$0.00

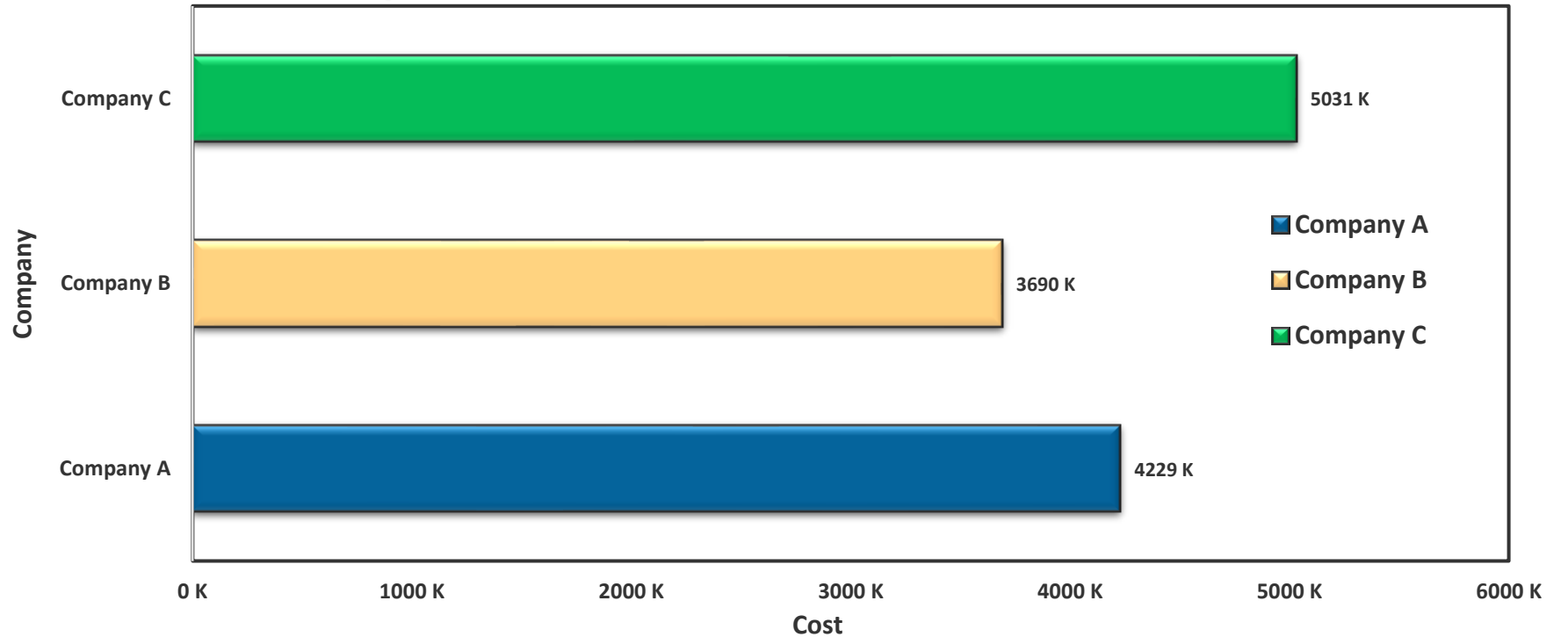
Optional: Please enter the cost overrun (if any)	Planned/Estimated Budget (\$)	Actual Expense (Basically Installation (\$))
		\$0.00

Template- Site Preparation Cost Sheet

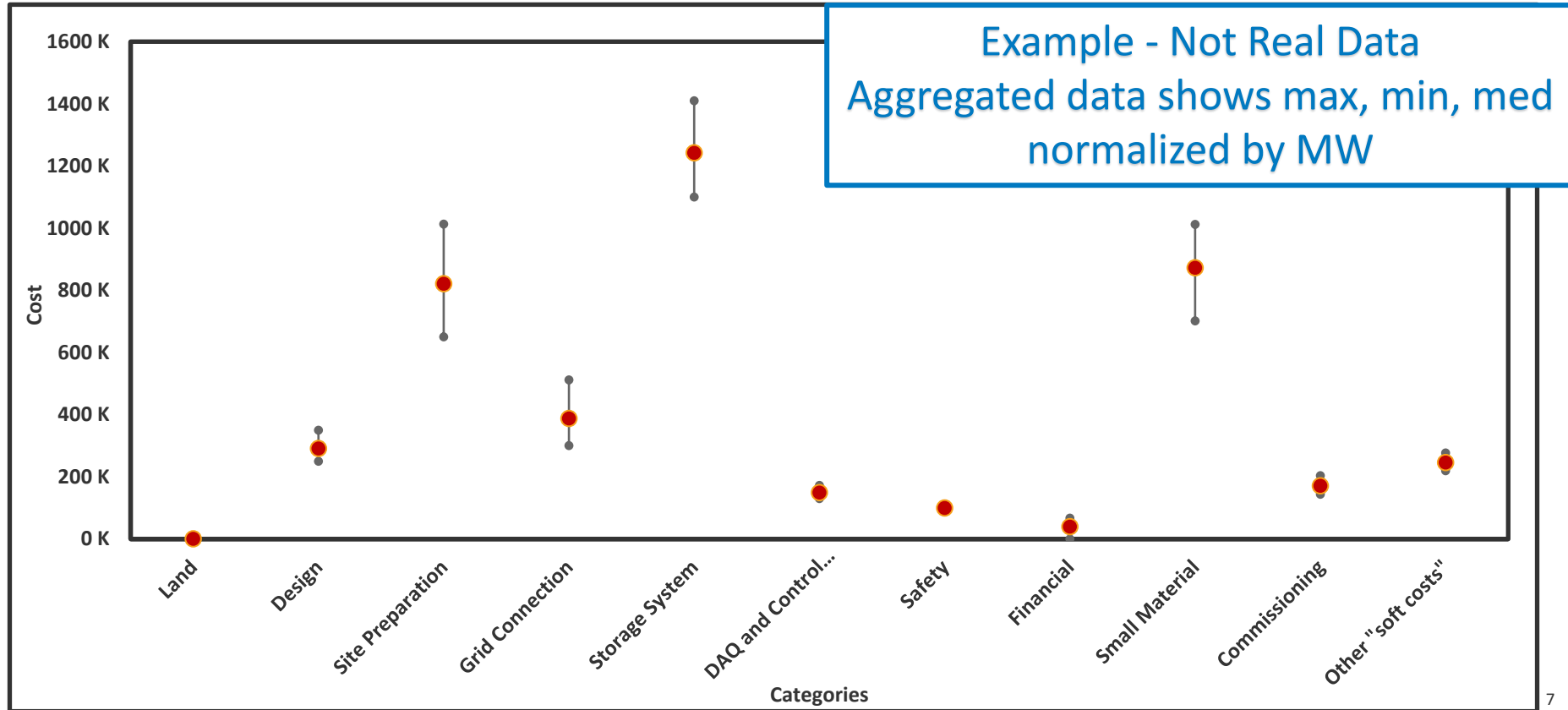
Sub-Categories		Parameter	No. of Personnel	Hourly rate (\$/hr.)	No. of Hours	Lump sum Contract Price		Site Specific Info
Construction		Earth Moving				\$0.00	Yes	\$0.00
		Electrical Conduit Installation					Yes	\$0.00
		Electrical Equipment Installation (Circuit breakers, TX etc.)				\$0.00	Yes	\$0.00
		Water and sewer line installation				\$0.00	Yes	\$0.00
		Building Cost				\$0.00	Yes	\$0.00
		Concrete pours				\$0.00	Yes	\$0.00
Equipment Connection		Total Cost						\$0.00
		Truck Shipping					Yes	\$0.00
		Crane Lifts				\$0.00	Yes	\$0.00
		Mechanical connection/anchoring of system				\$0.00	Yes	\$0.00
		Assembly of sub-systems provided by manufacturer (connecting vent masts, stack, etc.)					Yes	\$0.00
		Water connection				\$0.00	Yes	\$0.00
		Water purification system connection				\$0.00	Yes	\$0.00
		Waste connection					Yes	\$0.00
		Primary (high voltage) connection				\$0.00	Yes	\$0.00
		Auxiliary (low voltage) connection				\$0.00	Yes	\$0.00
		Cooling systems - Main coolant heat rejection system installation				\$0.00	Yes	\$0.00
		Cooling systems - Heat pump refrigerant system installation				\$0.00	Yes	\$0.00
		Total Cost						\$0.00
Regulatory Clearance and Permit Cost (if any)		Water, waste/sewer, electrical, construction, environmental regulatory clearance and permit cost						N/A

Installation Cost Comparison - Example

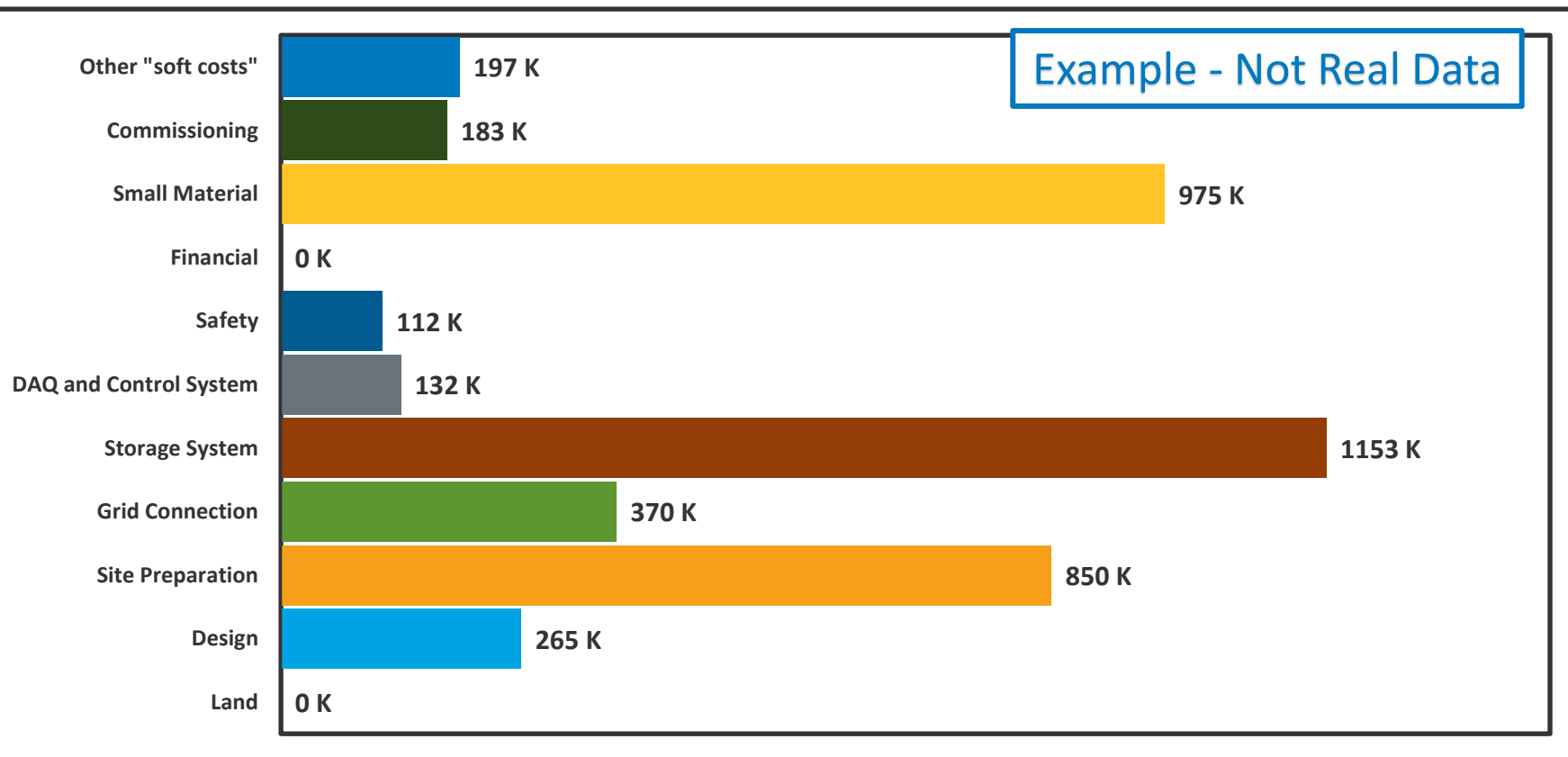
Example - Not Real Data MW Scale



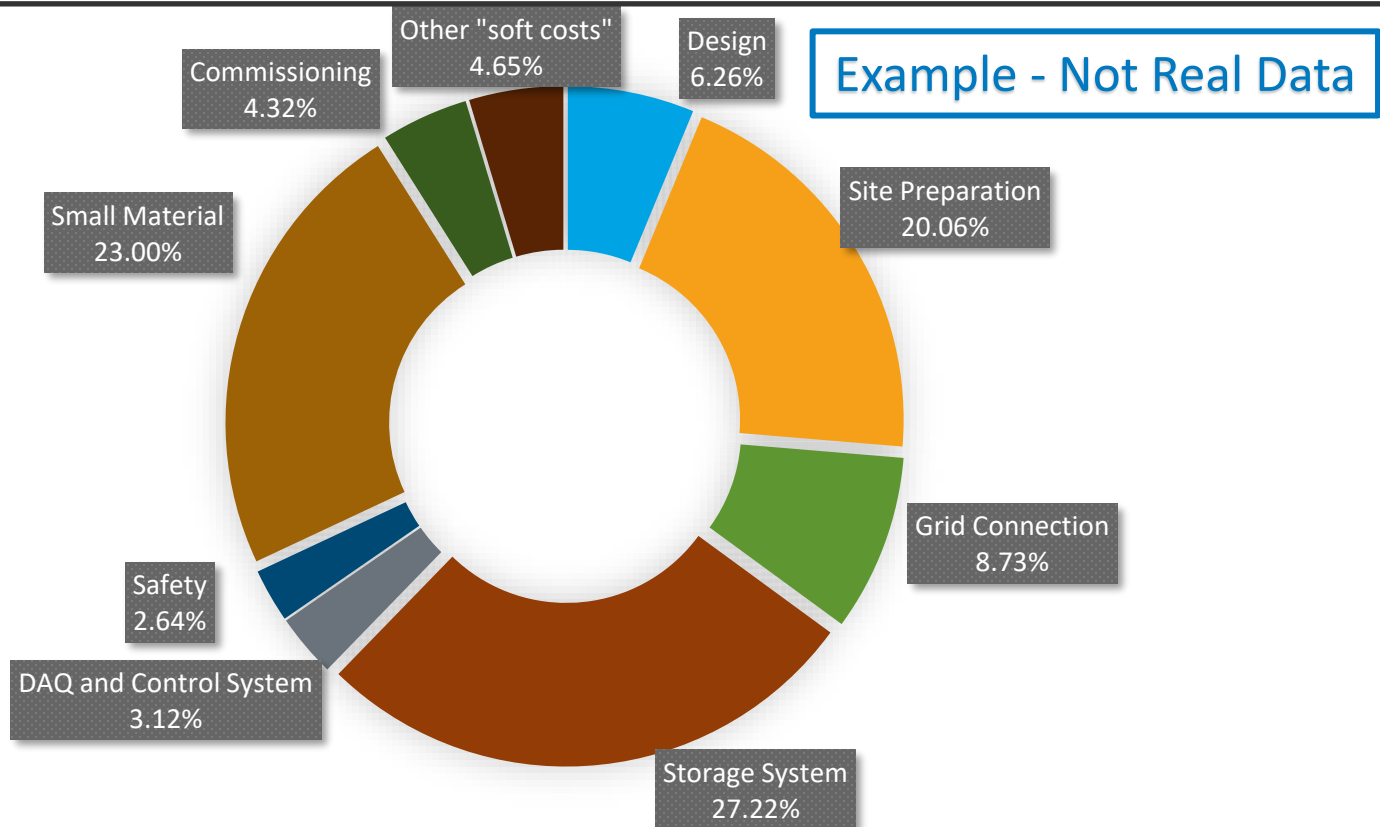
Installation Cost Ranges by Category - Example



Installation Cost Breakdown - Example



Installation Cost Breakdown - Example



Publication/Data Participation

- Aggregated data analysis results are reviewed with project partners before publication. Partners will see their individual data alongside aggregated data.
- Previous/current hydrogen data project CDPs available at:
www.nrel.gov/hydrogen/technology-validation.html
- Similar project will start soon for electrolyzer system operation, maintenance, and performance.
- Contact for templates and project data discussions:
`sam.sprik@nrel.gov`

Thank you

www.nrel.gov

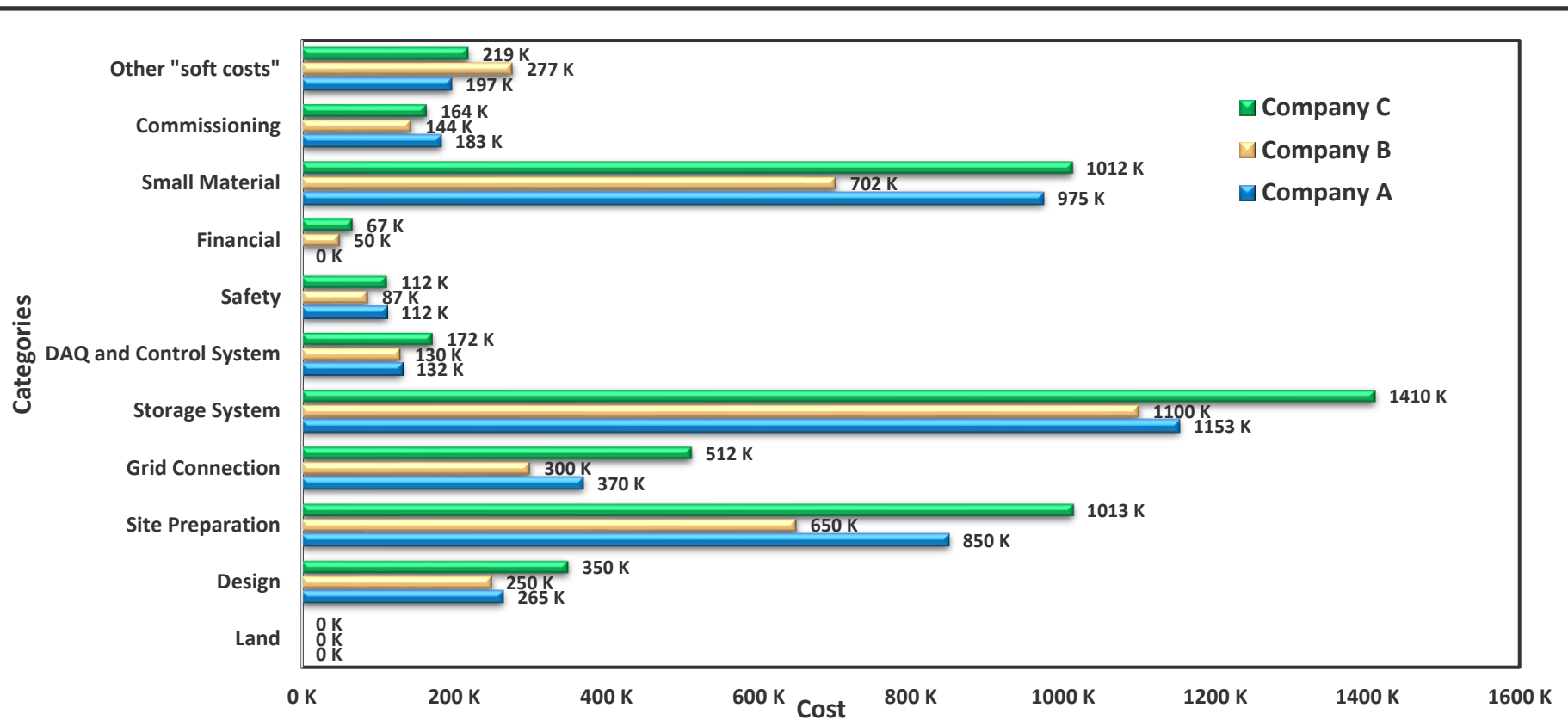


Back-up Slides

www.nrel.gov



Installation Cost Comparison



Electrolyzer Installation Cost Template Categories

- **System Information**
- **Land**
- **Design**
 - Construction – Civil, Electrical, Architectural
 - Site Integration
 - Safety Systems
- **Site Prep**
 - Construction
 - Equipment/Connections
- **Grid Connection**
- **Storage/Compression**
 - Tanks
 - Compressor
 - Valves and distribution
- **Data and Controls**
 - Design, Programming, Integration, Hardware
- **Safety**
 - Reviews, Sensors, Paperwork
- **Financial**
 - Interest, Fees, Insurance
- **Small Material**
 - Coolant system, Wire, Conduit, Water
- **Commissioning**
- **Other**
 - Contracts, Tools, PPE, Training, Spares, ...
- **Labor Union Metrics**