

Disaster Planning & Critical Infrastructure for Telecoms

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**IS YOUR BACKUP
POWER READY FOR
HURRICANE SEASON?**



Trending: Hurricanes are Getting Worse

- Hurricane Scientists are confident strongest storms will get stronger by end of century with an intensity increase of 2-11% (IPCC, 2007)
- 50-100% chance that human caused climate change will increase intensity of tropical cyclones by 2100 (IPCC 2013)
- Hurricane damage doubling every 10 years without the effect of climate change (Pielke, 2008)

The screenshot shows a webpage from The Weather Channel. The top navigation bar includes 'WEATHER', 'MAPS', 'SEVERE', 'VIDEO & PHOTOS', 'ACTIVITIES', 'HEALTH', and 'TRAVEL'. A search bar is on the right. The main content area features a video player with the title 'Wunderground Productions Video' and the text: 'Hurricane damage is getting worse, due to: -Increasing intensity of storms from warming ocean temperatures (climate change) -Increased population along coast -Rising sea levels affecting storm surge (climate change)'. To the right of the video is an article titled 'Are Hurricanes Getting Worse?' with a 'Weather Underground' logo and a 'REAL TIME' badge at the bottom.

Trending: The Arrival of Constant Availability

Between 2005 and 2013, personal communications went through what is now referred to as “The Mobile Mindshift”

Perpetual connectivity or constant availability have become the new norm

Connectivity went from being a “perceived privilege”
to a “perceived right”



Infrastructure Resilience is Critical

- For Customer Safety and Satisfaction
- Backup power is no longer an afterthought
- Everyone is modernizing/hardening their network

What are the 2 most popular solutions for Backup Power?



Generators



Batteries

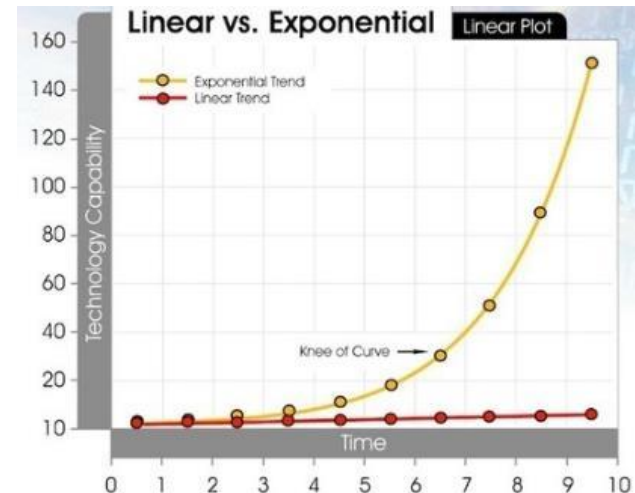


BUT....

- Batteries and Generators are previous generation technologies
- They are the popular choice due to inertia, not because of their technological breakthroughs
- Their technology has been linear not exponential
- They don't follow Moore's Law
- They have been used because there's been no good **ALTERNATIVE SOLUTION**



“I want you to find a bold and innovative way to do everything exactly the same way it's been done for 25 years.”



Problems with Previous Generation Technology

- **Batteries:**
 - High replacement cost
 - Battery degradation, short life
 - Unpredictable and short runtimes
 - Frequent failures/replacements
 - Continuous maintenance/conditioning
 - Temperature sensitivity
 - Space/weight limitations
- **Generators :**
 - Reliability/failure to start
 - High maintenance costs
 - Air emissions regulations
 - Permits and costs
 - Runtime allotments



A Turning Point for the Fuel Cell Industry

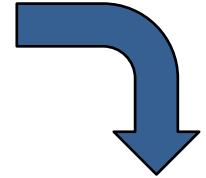
- **Fuel cells are in the news a lot lately – Automotive Industry Buzz**



- **Fuel cells are not new, they were discovered in 1839**
- **Now, with technological advancements, fuel cells successfully deployed in a variety off applications & industries around the world:**
 - Automotive, Residential
 - Telecommunications, Critical Infrastructure
 - Emergency Response, Public Safety
 - Military and Homeland Security

Fuel Cells?

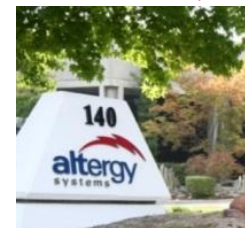
- What is a Fuel Cell?
 - Convert hydrogen into electricity
 - Hydrogen – Abundant, Inexhaustible, Renewable
- Fuel Cells Discovered in 1839
 - Their Promise is Great – Abundant Clean and Green Power
 - No combustion
 - When consumed, By-product is water
 - High efficiency (2 to 3 X more than central generation)
 - Quiet
 - Reliable
 - Low maintenance
 - Long runtimes
 - Generate power at point of use
 - Ideal replacement for batteries, generators, solar, wind, grid
- So why aren't fuel cells omnipresent??
- Typically:
 - Too expensive
 - Fragile and complicated
 - Difficult to scale
 - Despite \$ invested in industry, still hand built



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Alteryg Founded to Commercialize Fuel Cells

- **Alteryg - Founded in 2001 to commercialize fuel cells**
 - From the beginning turned away from traditional fuel cell designs
 - Realized that these approaches could not produce commercially viable products
 - Starting from scratch, Alteryg overcame the problems inherent in traditional fuel cell designs
- **Alteryg's Revolutionary Design:**
 - Enables low cost, mass production of fuel cells
 - Breaks the cost barrier to commercialization
 - Provides for durable, robust construction
 - Facilitates scalable/modular – 1kw to 100kw
 - Produced on world's first and only automated, robotic fuel cell assembly line
 - Supports simple operation
 - Allows simple and fast installation
 - Meets stringent certification and listing requirements
 - Suitable for almost any application that needs power

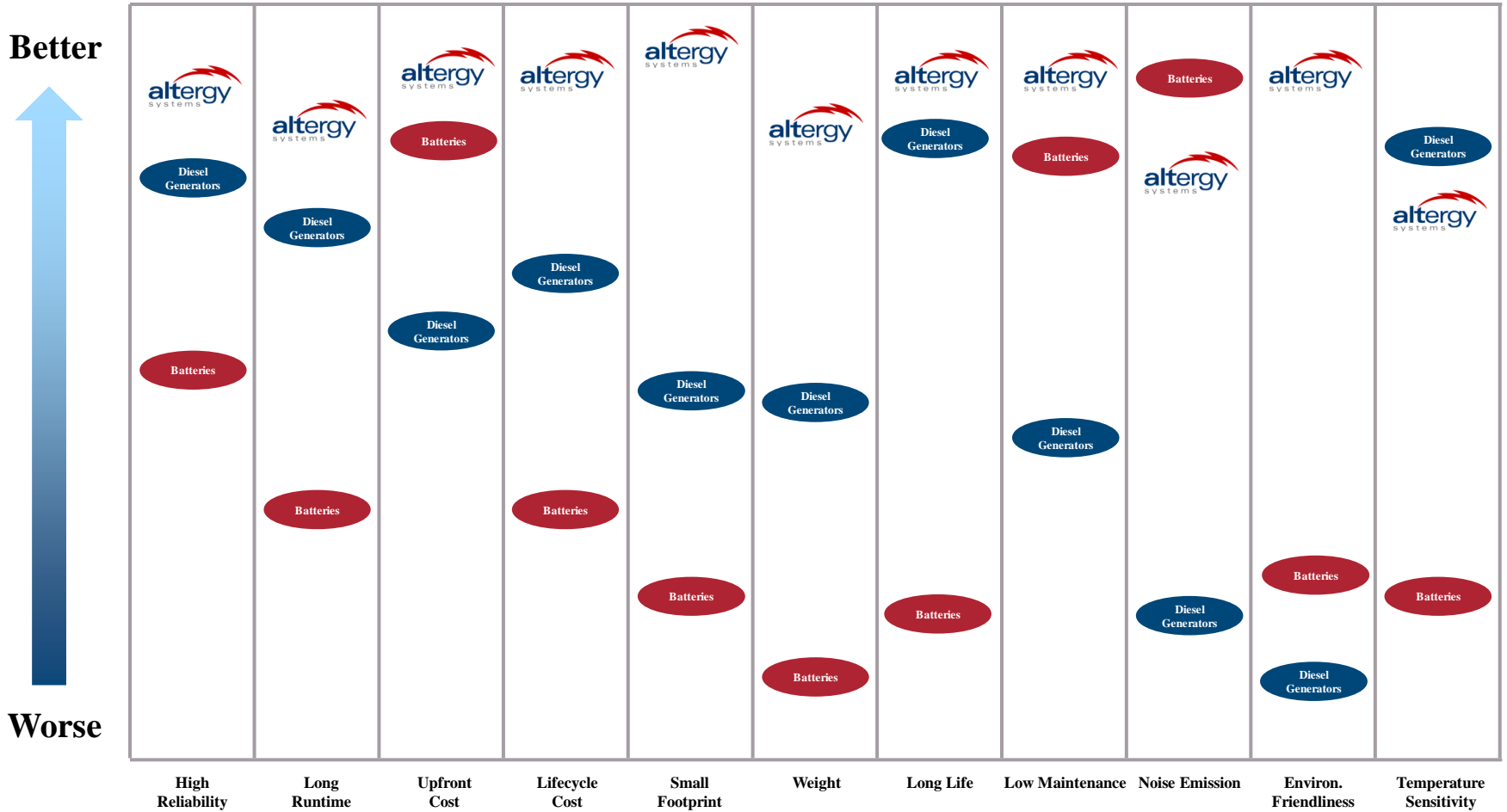


Reliability Extends to Severe Weather

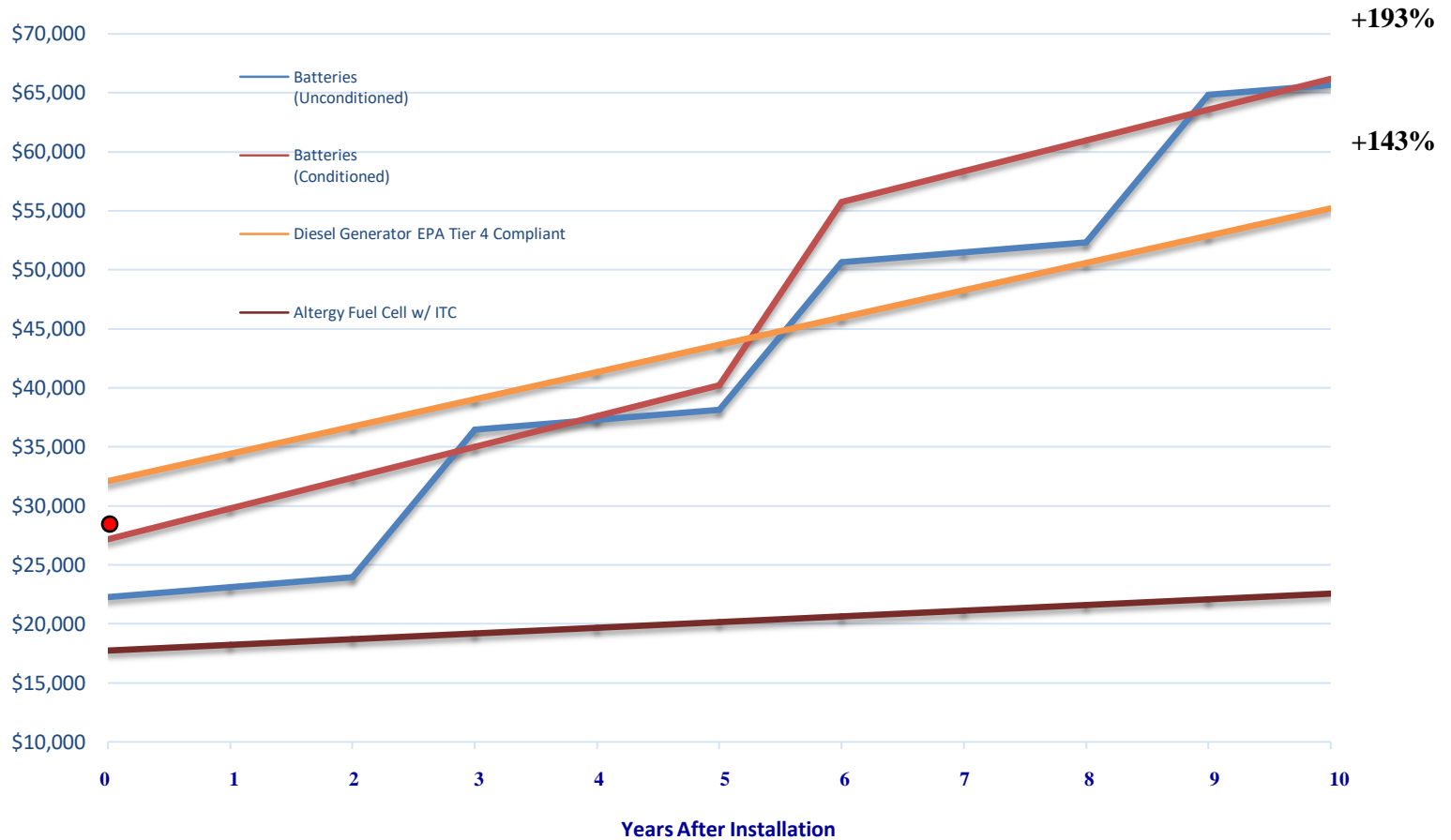
- Allergy fuel cells reliability is not only proven by maintaining network operations during typical power outages...
- but also through treacherous weather conditions:
 - Hurricane Sandy, Joaquin and Matthew
 - Napa earthquake
 - Northeast derecho (June 2012, affected 6 states, 3.6M lost power. 911 down)



Customer Identified Backup Power Requirements

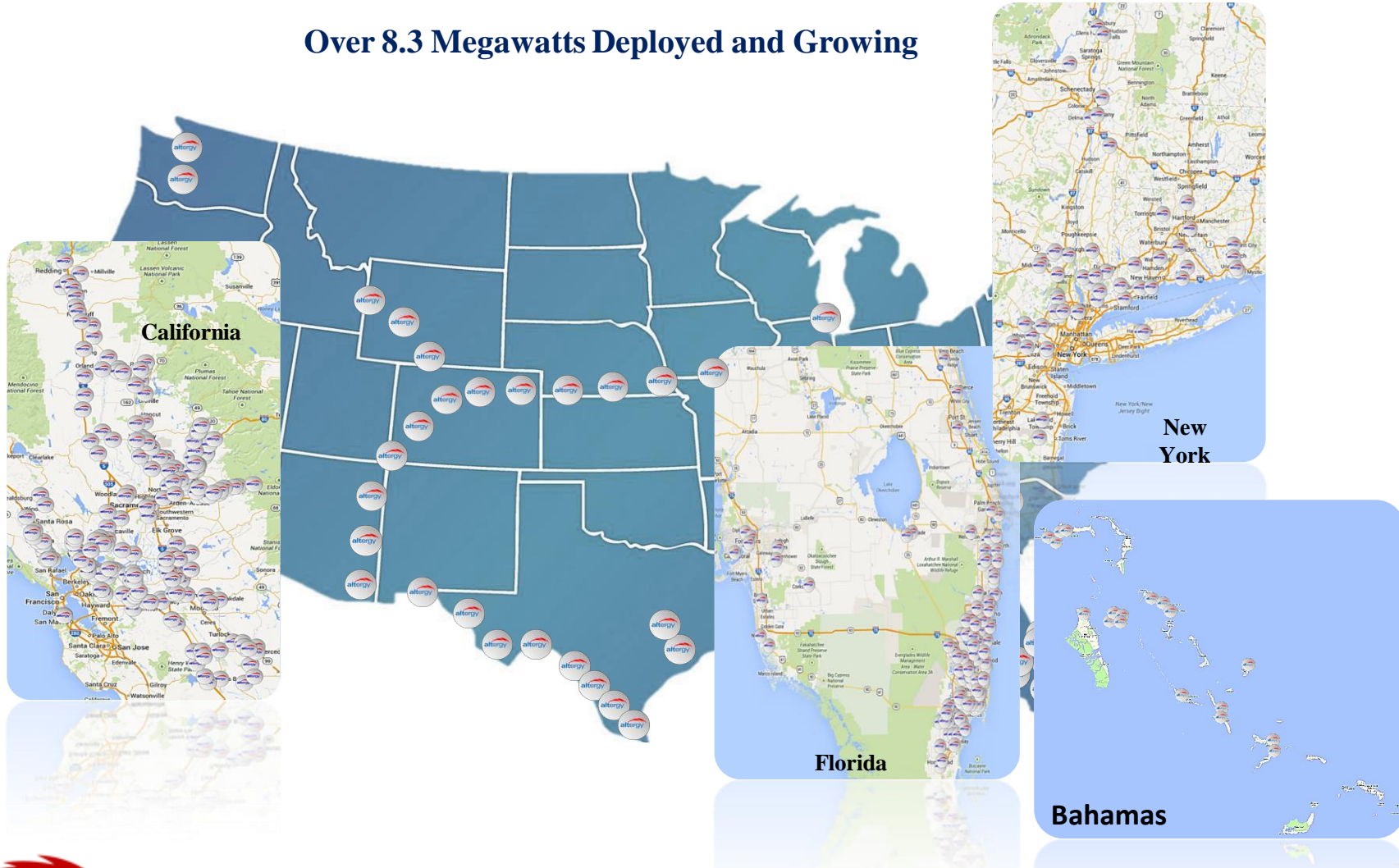


The Best Value in Backup Power



Alteryx's Presence

Over 8.3 Megawatts Deployed and Growing



Major Cable Customer Deployment



55kW for all AC & DC Site Requirements

Major Cable Customer Deployment



Solution replaces battery requirement, Increases runtime and frees up internal building space

Deployment Flexibility

Life Safety Application - Rooftop Placement



Ground Level fill-in-place

High Security Solutions

Steel Reinforced Pre-Cast Concrete Buildings

Fully integrated with 30 days of back-up power prior to shipping

Additional Runtime is available upon request

Multiple Fuel Cell Engine Design Provides for N+1 Security

Provides Ride Through and Extended Runtime In one Small Package

- High quality Pre-Cast Concrete
- Aesthetically pleasing and functional
- High Security and safe
- Cost competitive
- Space to incorporate radio equipment
- Resists Mold and Mildew
- Bullet, hammer and Pry bar Resistant
- Bolted & welded as opposed to nailed



Alteryg – The New Standard in Backup Power

Reformer Based Telecom Installations



POWERING TELECOM APPLICATIONS EVERYWHERE WITH MODERN TECHNOLOGY



- Longer runtimes
- More compact footprint
- More cost efficient.



Our latest solution, the FPS-EX, available now.

Hydrogen – Simplest, Most Abundant Element

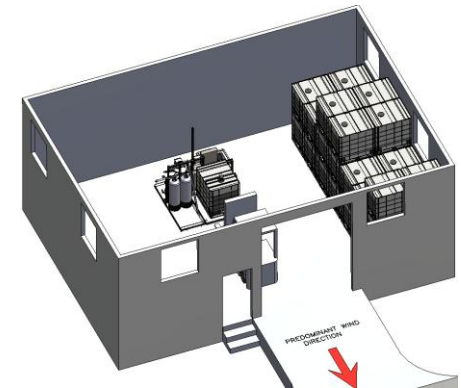
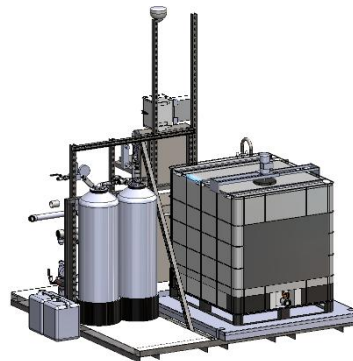
- A clear, odorless gas. Excellent energy carrier
- Non polluting - when consumed its only emission is pure water
- Lightest element - highest energy content per weight
- Economically competitive – can be 60% less expensive than diesel fuel
- Safe - 50 year use history and safety record
- Produced in any country, from variety of sources
- Used in oil production, chemical, foods, electronics industries
- Transported by truck, rail, barge and pipeline or made on-site

» Widely available



Alteryg's Freedom Fuel Programs

- Alteryg's Freedom Fuel Program provides fuel infrastructure to support customer.
- Eliminates the need to import blended fuel from outside customer market or country!
 - *Eliminates or reduces Import Duties*
 - *Creates jobs in the local market*
 - *Provides self-sufficient ecosystem – always prepared for storms & natural disasters*
 - *Not dependent on outside vendors and market fluctuations*
 - *Fuel inventory “at-the-ready” and on demand*
 - *1 system can support ~400 cell sites*
 - *Fuel cost reduced to a fraction of the cost when compared to importing fuel*



Build Blending Plant – Create Jobs

- **Financial Model Example**

- Today the open market spot price for Methanol is \$0.75/gallon
- Adding import duties of 45% increases the cost of Methanol to \$1.09/Gallon (*However in many places Methanol can be imported with no import duties because Methanol is a renewable resource*). For the benefit of this financial example I will include the duties charge.
- The blend equation is 62% methanol & 38% water – we calculate the cost for purified water at \$0.10 per gallon of water sourced locally.
- The total cost of a gallon of Methanol and water to make a blended product is $\$1.09 + \$0.10 = \$1.19$ making 5.2 liters of product – “Blended Fuel”
- 5.2 liters of blended product/fuel divided by $\$1.19 = \0.23 per liter (USD)
- Adding transportation of methanol to blending plant and transportation of blended fuel to the end customer cell site add 25% - ($\$0.23 \times 25\% = \0.29 / liter)
- At 80% production capacity the blending plant can support ~400 sites using the Alteryg methanol based fuel cell system.
- Each Alteryg methanol based fuel cell system holds 380 liters of blended fuel providing 380 kWh hours of runtime.
- When compared to pre-blended imported fuel @ $\$7.00 \text{ gal.} \times 45\% \times 25\% = 12.69 / 3.8l = \$3.34/\text{liter}$ ($\$3.34 \text{ kWh}$)

\$0.29 per kWh – Landed*

*2/7/2015 – Price provided by Methanex price page <https://www.methanex.com/our-business/pricing>

Powering Your World - Let Alteryg Finance the Project

- **Alteryg is an Approved Manufacturer for the Export – Import Bank of United States**
 - Low cost finance application - \$50.00
 - Medium & Long-term Loan Programs – up to 10 years
 - 15% deposit down payment
 - An additional 30% of the financed amount can be added for local labor & training
 - A commitment fee of 0.5% + the current US Treasury Rate (5yrs – 1.25%)* 1.75% rate
 - Plus a local bank charge (Depends on the local lending rate)
 - Quick approval process
- **Identify sites/locations**
 - Determine sites loads, voltages and power form
 - Determine runtime requirements
- **Typical Configuration**
 - Methanol based 5kW fuel cell system with ~380 liter fuel tank
 - Extended Bridge battery system with wireless modem communication



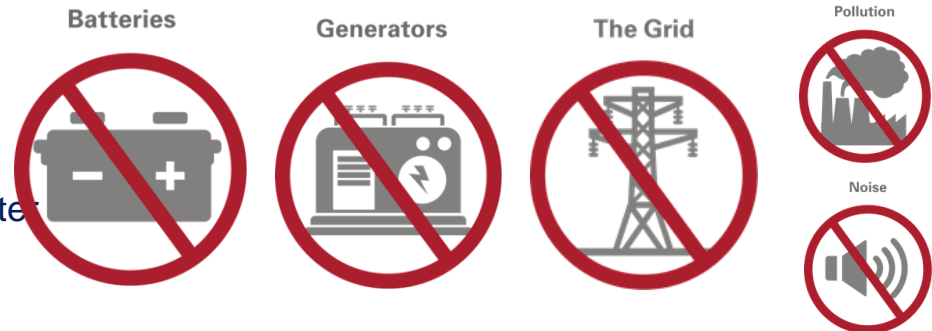
* US Treasury Rate as of 2/7/2016 - <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>

** Add Shipping, initial fill and installation

Exceeding Expectations While Lowering Cost

- **Telecom/Data equipment has advanced significantly**
 - Traditional backup and primary power equipment has not
- **Alteryg's *Freedom Power* products exceed telecom/data requirements**
 - √ Proven field reliability
 - √ Modular/expandable
 - √ Green, zero emission, low noise
 - √ Long life
 - √ Low maintenance
 - √ Small footprint
 - √ Long runtimes
 - √ Lightweight
 - √ Suitable for outdoor, indoor, rooftop, ground, and shelter installation
 - √ Factory assembled and tested
 - √ Easy and fast installation
 - √ Experienced team/track record

- **Reliable**
- **Proven**
- **Sustainable**
- **Lowest Cap X and Lowest TCO**
- **“Freedom”**



Thank You & Questions

**Visit us at Booth #29
Enter to Win an Amazon Echo Show!
Drawing at 1pm today!**

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