

Business Case Analysis of IdaTech Fuel Cell Deployments

Green Power for Mobile, September 2010

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About IdaTech

IdaTech designs and manufactures extended run backup power fuel cell systems for telecommunications applications.



Fuel cells are an alternative backup power solution to diesel generators and large battery banks.



Telecommunication Applications

Grid Connected Sites - 500 W to 10 kW Applications

- Critical network nodes (BSC, BTS, MW, FTTx - optical fiber sites)
- Telecom exchanges i.e. rural areas
- Wireline
- Broadband



Telecom Backup Power Solutions

Fuel cells are:

- Reliable
- Low Maintenance
- Clean

Batteries can be:

- Expensive to maintain
- Unreliable after aging
- Temperature sensitive

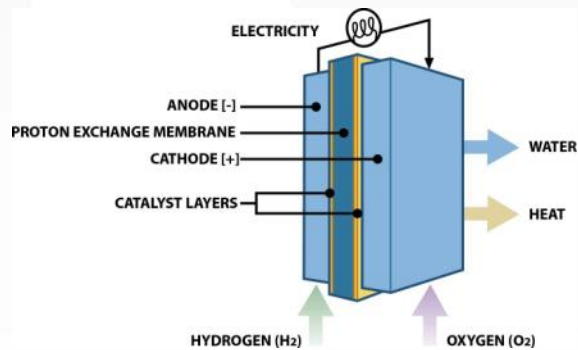
Generators can be:

- Unreliable
- Maintenance intensive
- Noisy



What Is A Fuel Cell?

A fuel cell is a solid state DC generator that converts chemical energy into electricity. Fuel cells are typically fueled by Hydrogen.



**Fuel cell system
with fuel processor:**

Fuel: Methanol-water



Fuel cell system:

Fuel: Hydrogen



What is a fuel processor?

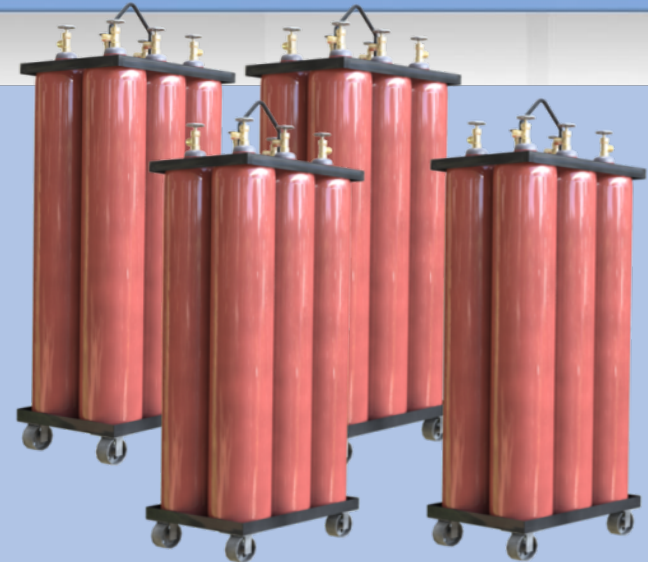
A fuel processor converts readily available fuel (like methanol-water) into hydrogen as needed, by the fuel cell stack.

Reformers Overcome the H₂ Barrier

40 hours of autonomy




OR

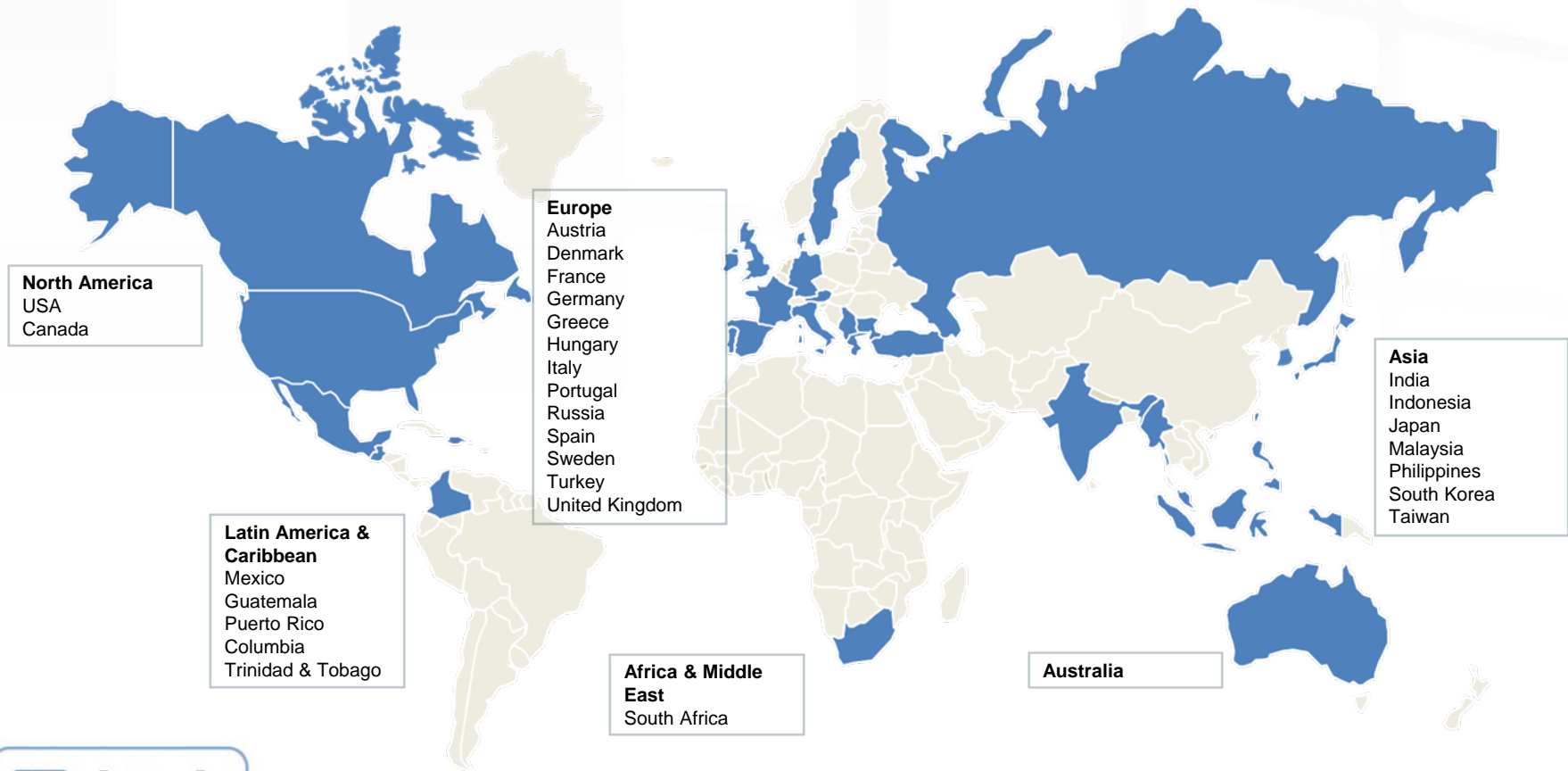


| Comparisons | Reformer based fuel cell system | Bottled hydrogen based fuel cell system |
|----------------|---|--|
| First cost | Up to 50% lower than bottled hydrogen, depending upon runtime. | Competitive at 8 hours runtime or less. |
| Operating cost | Essentially flat, based on fuel use. | Cylinder rental, frequent, high cost refueling beyond low power and low outage applications. |
| Logistics | Liquid: 225 Liters = 40 hours, easily stored, transported and refilled. Available globally. | Bulky, 24 cylinders at 64 kg each required for 40 hours. Specialty chemical with limited availability. |
| Footprint | About 6 square meters. | About 86 square meters. |
| Permitting | None required for less than 225 Liters. | Extensive codes and setback requirements. Regulations vary by locality. |

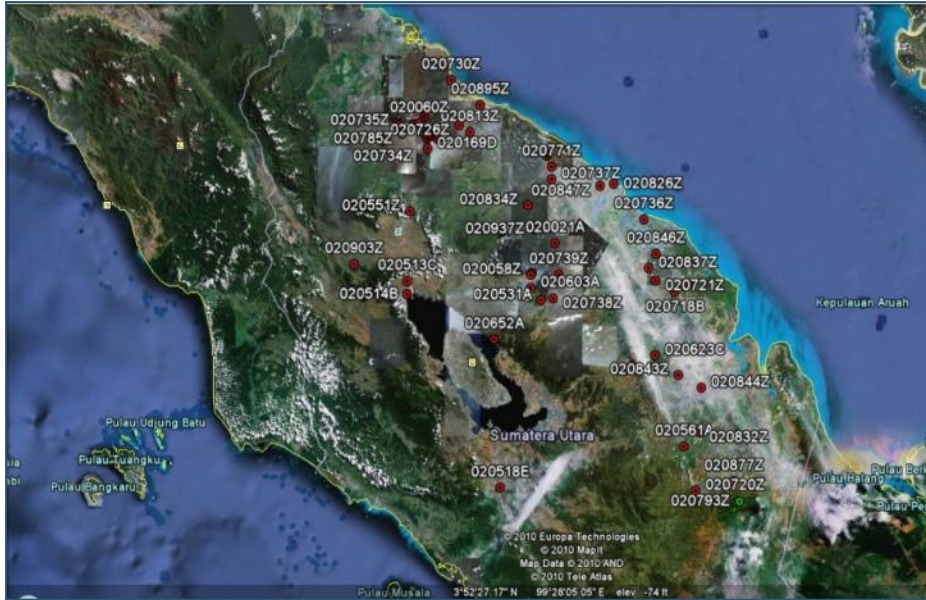
Industry Adoption

Over 800 ElectraGen™ Systems Installed in 30 Countries

 Countries where IdaTech's fuel cell systems have been installed



Business Case: Indonesia



Challenge:

- Poor grid quality (several hrs/week)
- Outdoor BTS (no air conditioner for batteries)
- Diesel theft issues
- Local community issues (generator noise)

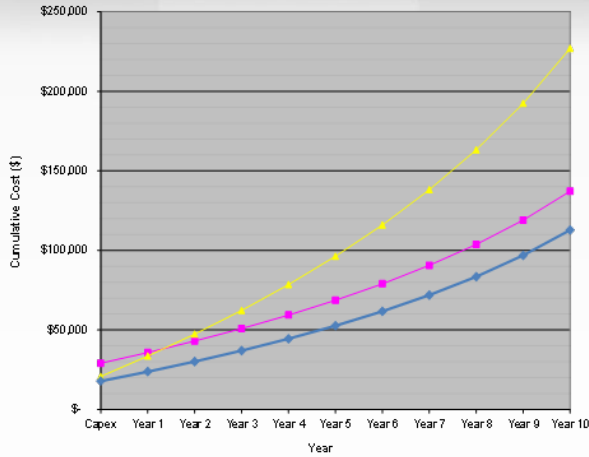
IdaTech partner: Cascadian

Solution:

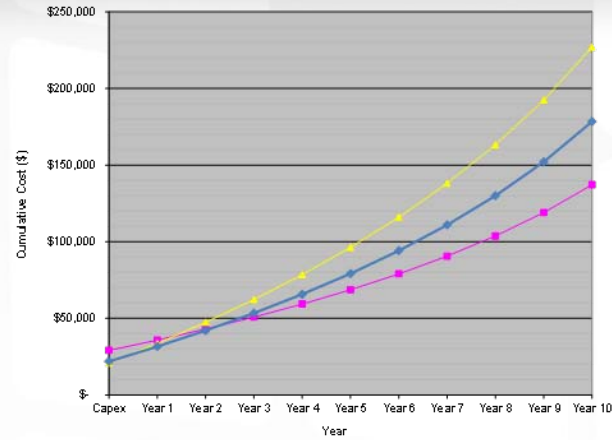
- 500 fuel cell systems being deployed
- Location: Sumatra and Java
- Load (average): 1kW @48Vdc
- Product: 2.5 kW ElectraGen™ H2-I
- Fuel: Hydrogen gas
- Site autonomy: 6 cylinders (42hrs)

Business Case: Indonesia

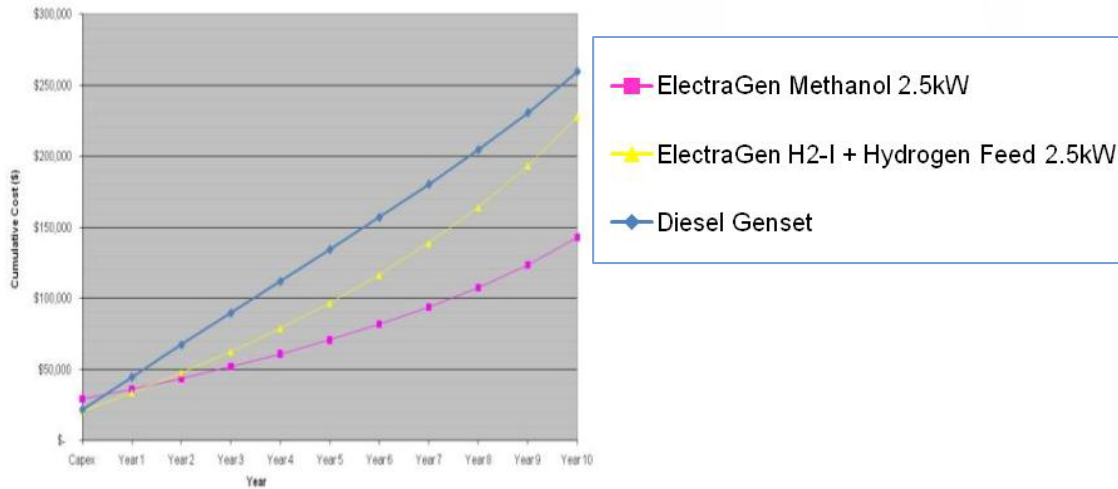
INITIAL TCO – PAPER FIGURES



TCO BASED ON FIELD DATA



TCO + INCREASED SITE AVAILABILITY



Factors

Initial TCO/ROI – not competitive

- Based on paper figures

Final TCO/ROI – very positive

- Based on real data



Business Case: Metro Manila - (SMART)



Small shelter

DC power: 54 A (2.7kW @48VDC)

Battery back-up: 4 x branches of 150AH

Genset: 25kVA

Air-conditioning units: (2 split units)2kVA-3kVA

Challenge:

- Poor grid quality (several hrs/week)
- High emissions
- High maintenance
- Unreliable backup power



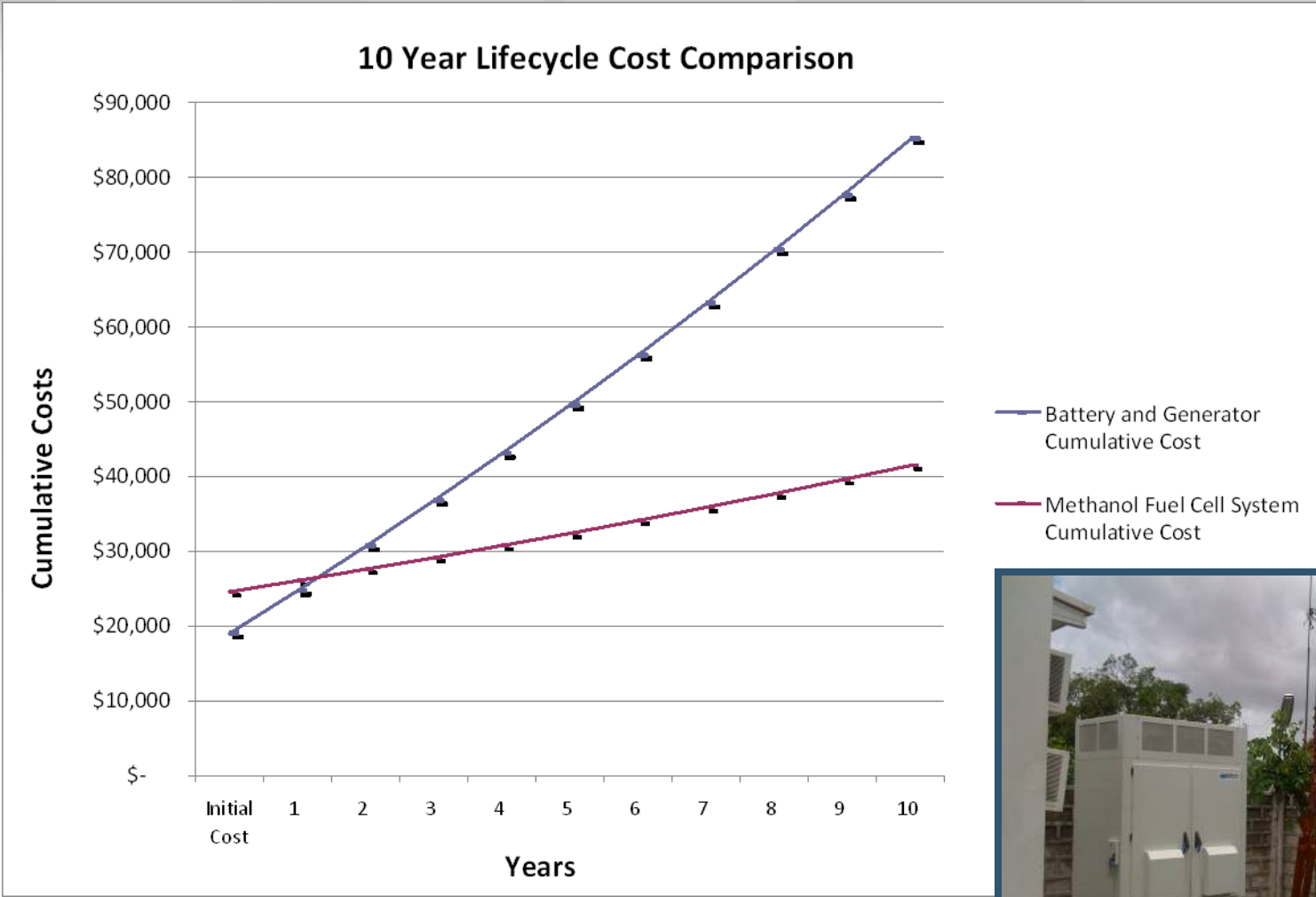
IdaTech and local partner



Solution:

- Location: Manila
- Load (average): 2.7kW @48VDC
- Product: 5kW ElectraGen™ XTI
- Fuel: Methanol-water (HydroPlus)

Business Case: Metro Manila - (SMART)



Business Case: Trinidad



Challenge:

- Poor grid quality (several hrs/week)
- Refueling issues
- Extended run (autonomous)
- Severe weather (tropical storms)

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IdaTech partner: Precision Power & Air

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Solution:

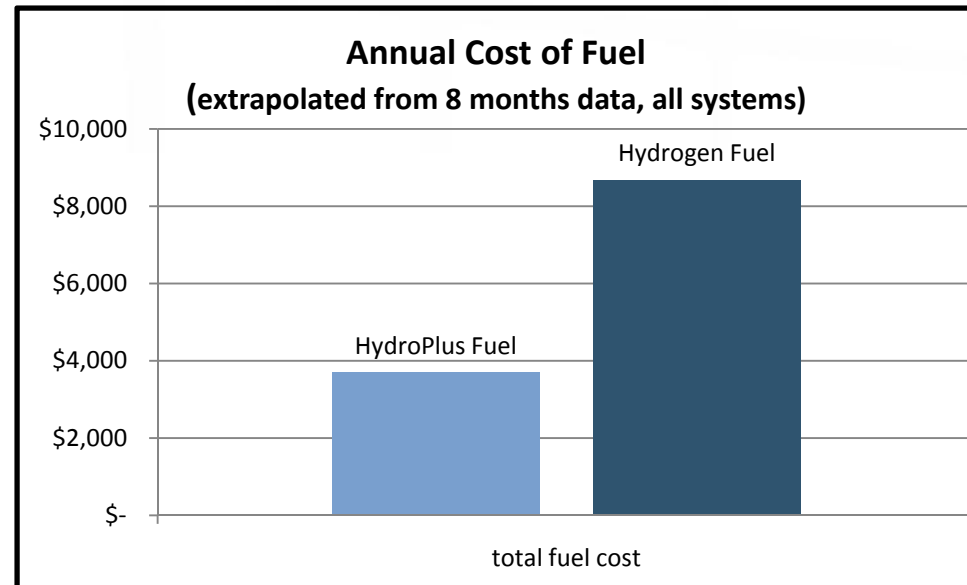
- Over 50 fuel cell systems deployed
- Location: Trinidad and Tobago
- Load (average): 2.1kW @48Vdc
- Product: 3 kW & 5kW ElectraGen™ XTI
- Fuel: Methanol-water (HydroPlus)

Business Case: Trinidad

Results:

- Liquid fuel cell systems out performed hydrogen systems during tropical storm in summer 2010.
- Hydrogen cylinders ran out of fuel while the ElectraGen™ systems continued to provide power to the sites.
- Total run time = 1166 hours
- Total energy generated = 2484 kW-h
- Highest demand site: 204 hours (approx. 25 hours per month)

through August 2010



HydroPlus

- Composition
 - 62% methanol & 38% de-ionized water
- Methanol is a common liquid
 - Global production in 2010 – 57 billion liters
- Common methanol applications
 - Windshield washer fluid (up to 50% methanol)
 - Fuel additive – Over 3.5 billion liters in China 2007
 - Solvent
 - Manufacture of plastics and building products
- Benefits of methanol based fuel
 - Easily transported liquid fuel
 - Water miscible, biodegradable and sulfur-free
 - Extremely low freezing point < -60°C
 - May be stored for years without degradation
- Renewable sources of methanol
 - produced by crude glycerol in mass production
 - waste CO₂, wood waste, and others are in development
 - Global production of bio-methanol now greater than 280 million liters annually



HydroPlus Supply Chain

- 33 vendors in 18 different countries where IdaTech is deploying fuel cells

Green Advantages of Fuel Cells

Why Are Fuel Cells **Green**?

- Low emissions: (methanol fuel cells vs. diesel genset)
 - 50% reduction in CO₂ emissions
 - More than 95% reduction in CO, NOx and SOx emissions
 - No particulate matter emissions
- At least 20% more efficient than a diesel generator
- Very quiet (background noise level)
- No hazardous fuel spill
- Renewable liquid fuel (bio-methanol fuel)

Summary

- IdaTech and its partners have deployed fuel cell systems in 30 countries
- ElectraGen™ backup power fuel cell systems yield customer savings and improved TCO with payback of 1-3 years vs. diesel generator
- Fuel cell systems are greener than diesel generators
- Methanol is more environmentally friendly compared to diesel and has renewable sources
- IdaTech's customers include 5 of the top 10 global telecom carriers
- IdaTech has partnerships with telecom suppliers in all regions for strong local support
- IdaTech continues to innovate and develop new products for new markets and power ranges

Thank You !



IdaTech[®]

Power For The Long Run