# Wuhan Conference

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# Agenda

Introduction and background

End user requirements

Market status and Adoption

Discussion

# Introduction and Background

# IdaTech – H2PT Background

| 1998-1999 | 2000 – 2003+ | 2004 - 2009 | 2010 - 2012 | 2013 - 2014 |
|---|---|---|---|---|
| **Formation** | **Reforming and H2 purification development** | **Advanced product development & deployment** | **ElectraGen™ product deployment, licensing** | **Strategic alignment with CHEM** |
| 1998, NW Power Systems founded<br><br>Purchased in 1999 by Idaho Electric Utility, renamed IdaTech | Developed foundation for hydrogen production (reforming) and purification critical to modern fuel cell products.<br><br>Developed fuel cell stack and systems integration capabilities. | Telecom backup and off grid power product development<br><br>Advanced system design and integration with US Government and Intl. partners.<br><br>Internal fuel cell stack development capability<br><br>Deployed ~300 systems. | Launched ElectraGen™ product line.<br><br>Built factory in Tijuana, Mexico<br><br>Sold ~1000 units worldwide.<br><br>Sold non-exclusive IP license and factory equipment to Ballard.<br><br>Began 3 year non-compete, ending 7/1/15. | Name change to H2 PowerTech (H2PT)<br><br>New factory established in Taiwan with CHEM<br><br>H2PT acquired by CHEM May 2014.<br><br>ME2 methanol fuel cell system begins production January 2015. |

- All commercial methanol fuel cell products based on licensed IP
- >15 years of experience and more than $240 million invested
- IP based on >380 patents awarded and pending
- Continuing core development for advanced fuel cell products

# Methanol Systems

Early Commercial Methanol System
(100's deployed)

Current Commercial Methanol System
(1000,s deployed)

# End User Requirements

# Who are the "End Users?"

Cellular network operators

Tower companies

# What do the End Users Want?

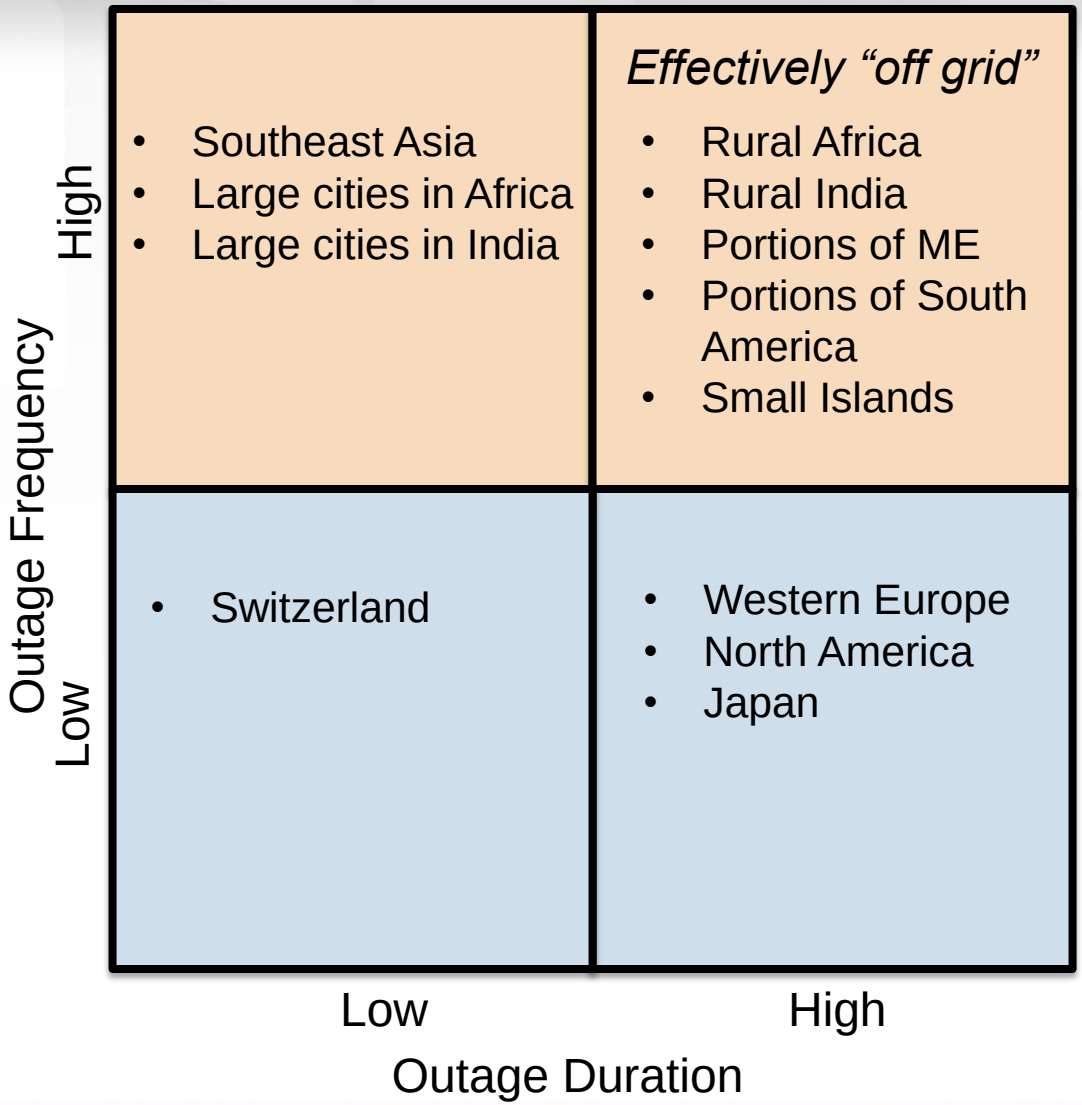
Reliable Power

At a reasonable cost

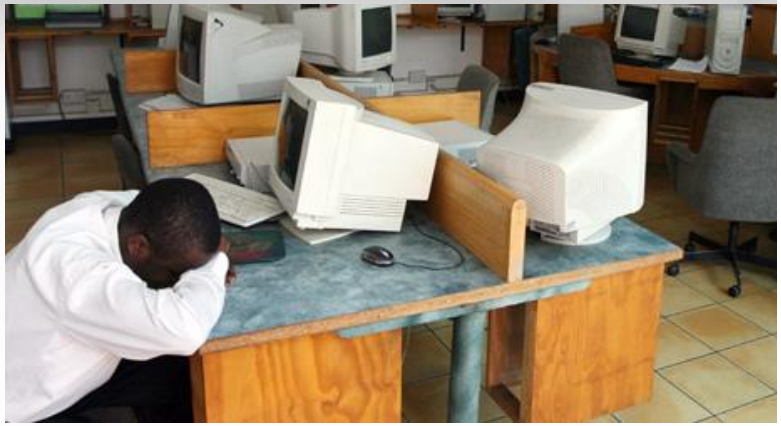
And “green”

*…as long as it does not compromise cost or reliability*

# Map of Applications



# Reliability



- Electric grid reliability varies vastly from country to country
- Electric grid is frequently non-existent in high growth areas
- Expectation of reliability varies greatly: USA ~ 99.99%, Nigeria ~90%.

*Please think about the last seven days. For how many of those days were there power cuts at your place of work? Please think about regular and irregular power cuts.*

Among employed adults aged 15 and older who say their workplace is on the electric grid

| | Total | Urban | Rural |
|---|---|---|---|
| | average days | average days | average days |
| Central African Republic | 5.1 | 5 | 5.4 |
| Nigeria | 4.8 | 4.9 | 4.6 |
| Liberia | 4.2 | 4.1 | 4.3 |
| Burkina Faso | 3.8 | 3.4 | 4.2 |
| Chad | 3.7 | 3.7 | 3.7 |
| Tanzania | 3.4 | 1.5 | 4 |
| Cameroon | 2.8 | 2.3 | 3.1 |
| Zimbabwe | 2.7 | 2 | 3.2 |
| Sierra Leone | 2.6 | 1.8 | 3.5 |
| Uganda | 2.3 | 2.1 | 2.3 |
| Senegal | 2.3 | 2.8 | 1.6 |
| Niger | 2.1 | 1.5 | 2.5 |
| Mali | 1.5 | 1.1 | 2.1 |
| Ghana | 1.4 | 1.3 | 1.6 |
| Botswana | 1.2 | 1 | 1.2 |
| Kenya | 1.1 | 0.8 | 1.2 |
| South Africa | 0.6 | 0.5 | 0.6 |
| Overall average for 17 countries surveyed | 2.7 | 2.4 | 2.9 |

Surveys conducted in 2010

GALLUP

# Cost

Batteries and diesel generators are the only widely used backup and continuous power technologies. They set the “bar” for most cost comparisons.

Cost of power to Telco often is not understood, or accounted for

- Grid connected: typically focus is on first / capital cost of diesel generators and batteries.
- Off grid: typically includes more cost, such as fuel and maintenance as well as first cost.

Power consumption at site is often over estimated, or can be greatly reduced with minor changes. This may create unnecessary site power requirements.

Impact of theft and related community issues is usually understated. In parts of Africa and India, “loss” of 50% of fuel is not unusual, but never admitted.

# Market Status and Adoption

# Market Status & Adoption

Thousands of systems deployed

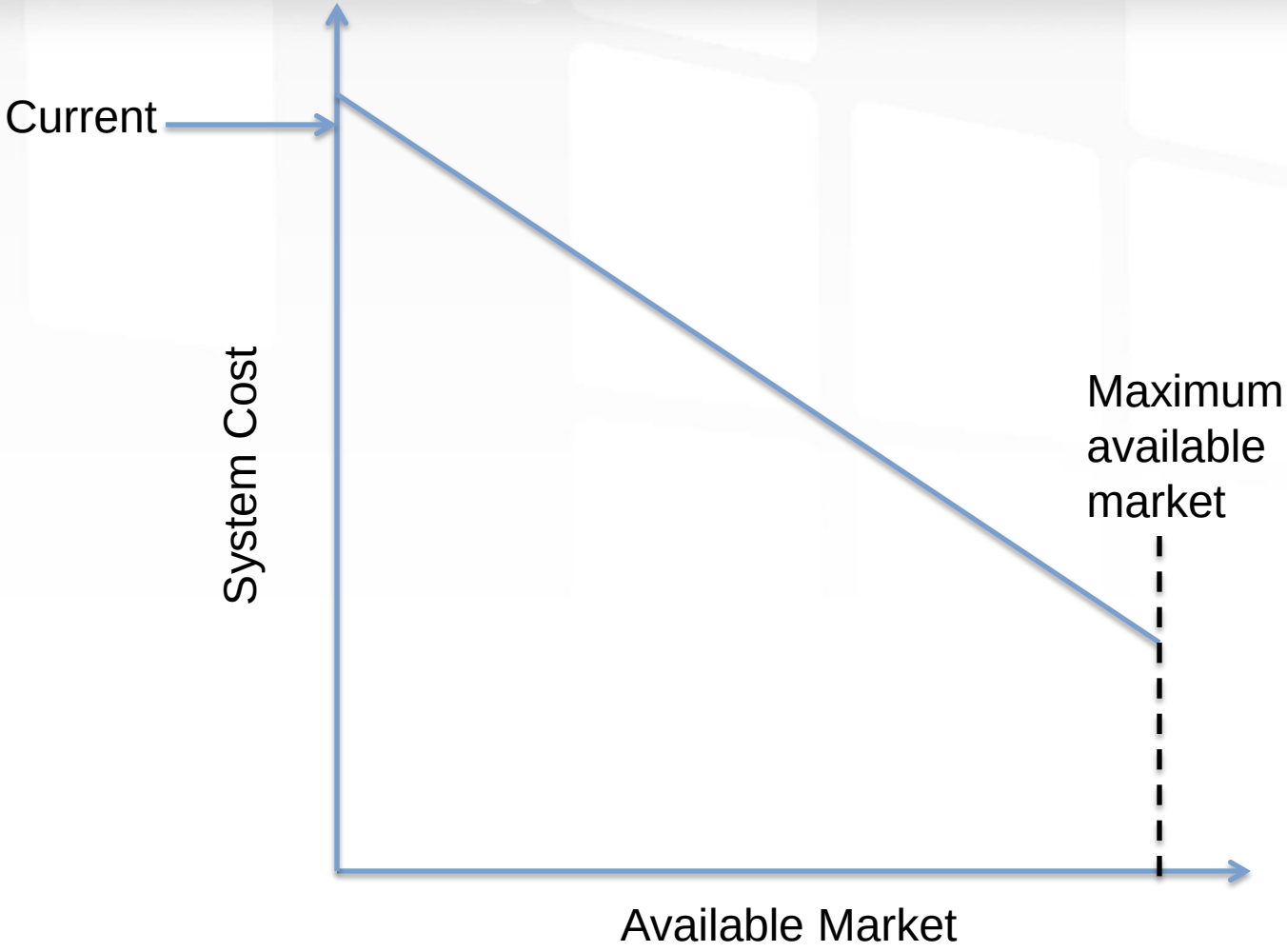
Reliability and durability proven over millions of hours

Methanol fuel supply proven around the world

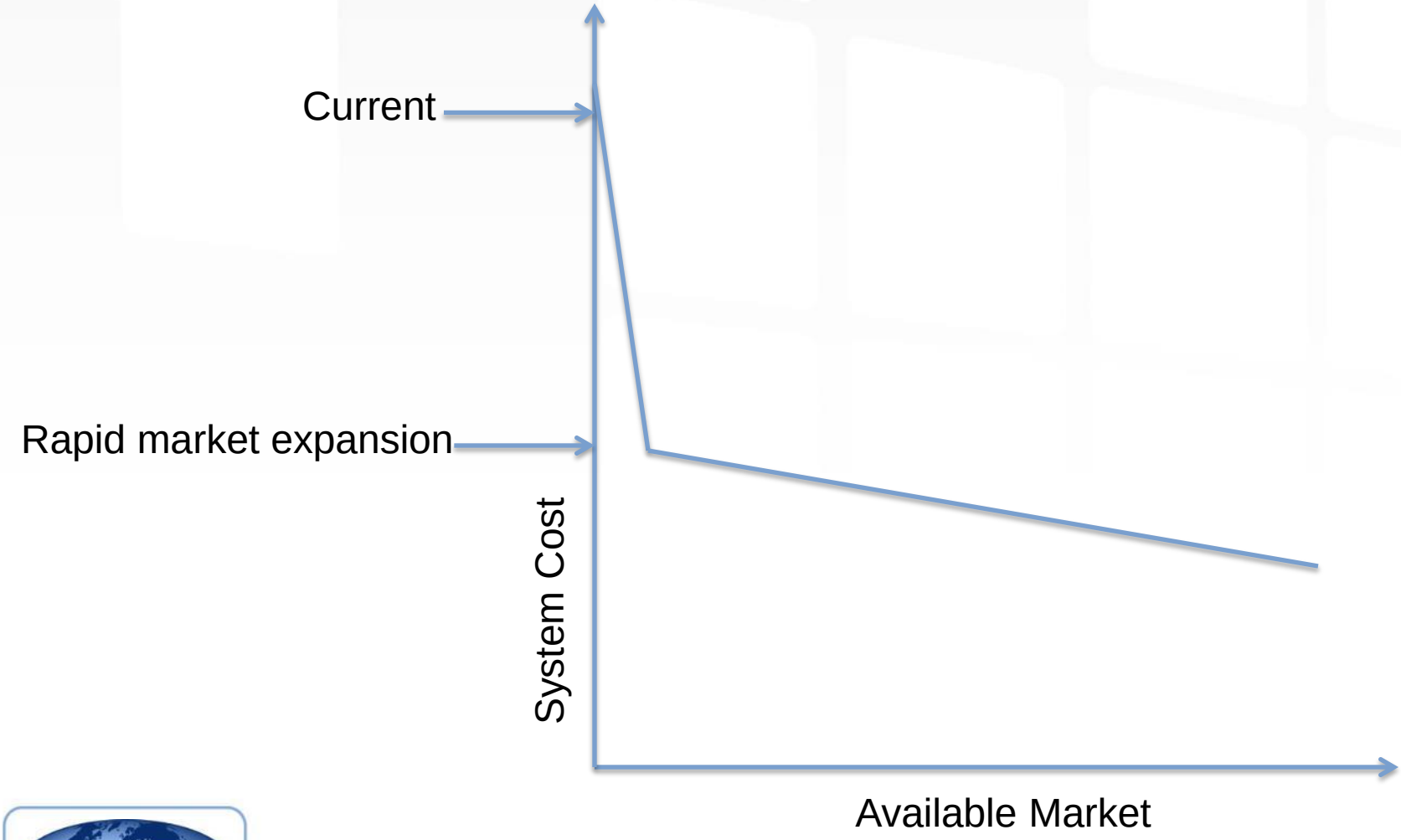
Most knowledgeable telcos aware and comfortable with fuel cell technology

*…yet sales are flat to declining*

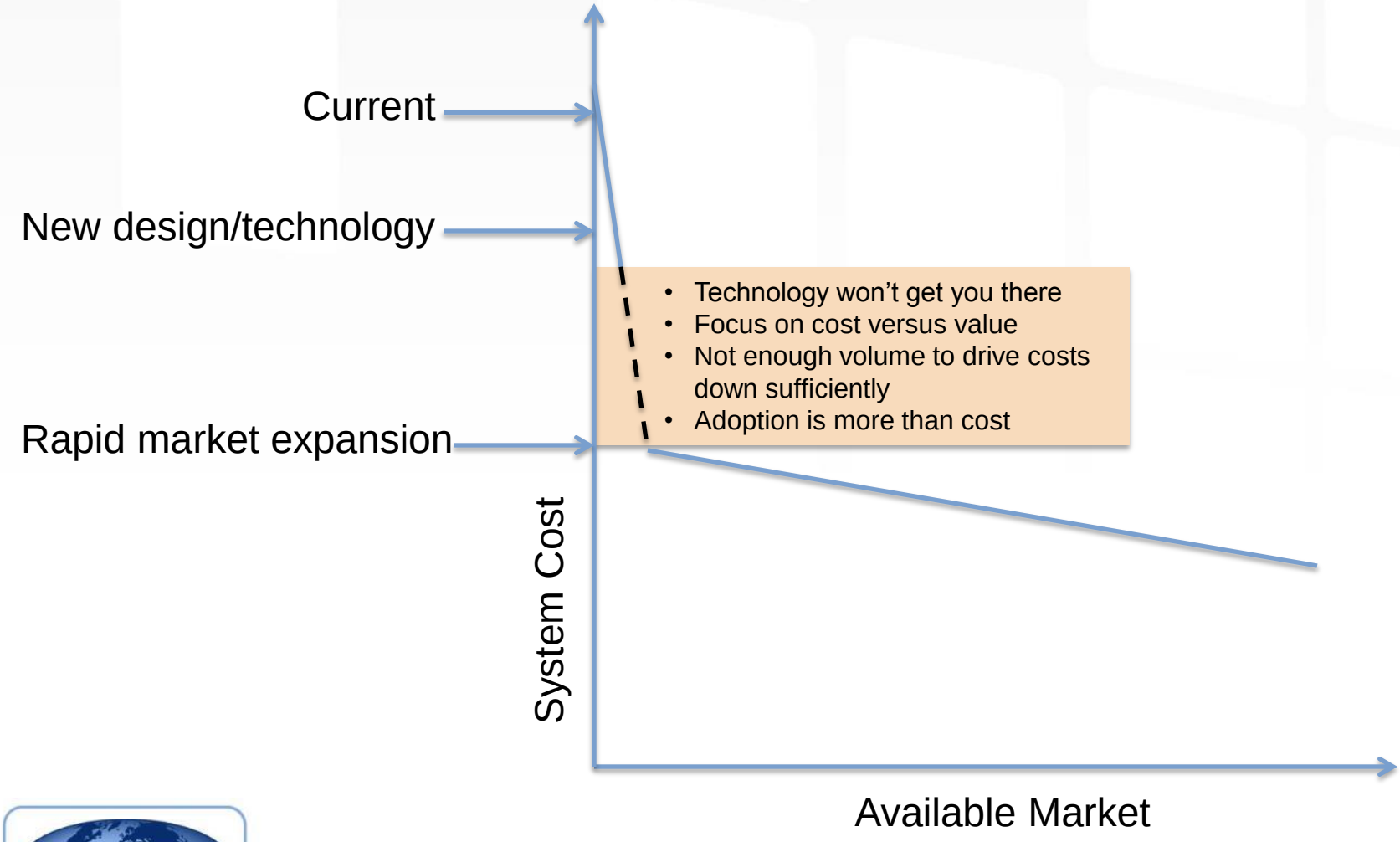
# Market Adoption Curve?



# More Realistic Curve

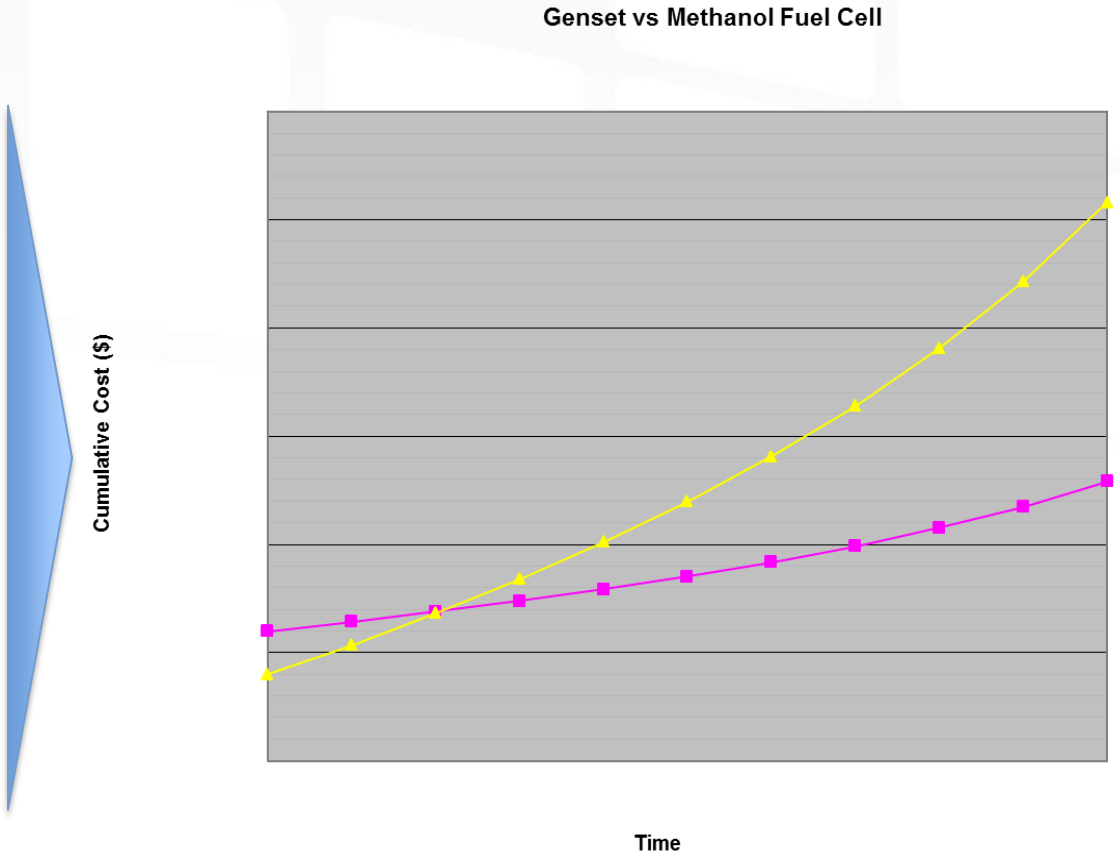


# Adoption Barrier

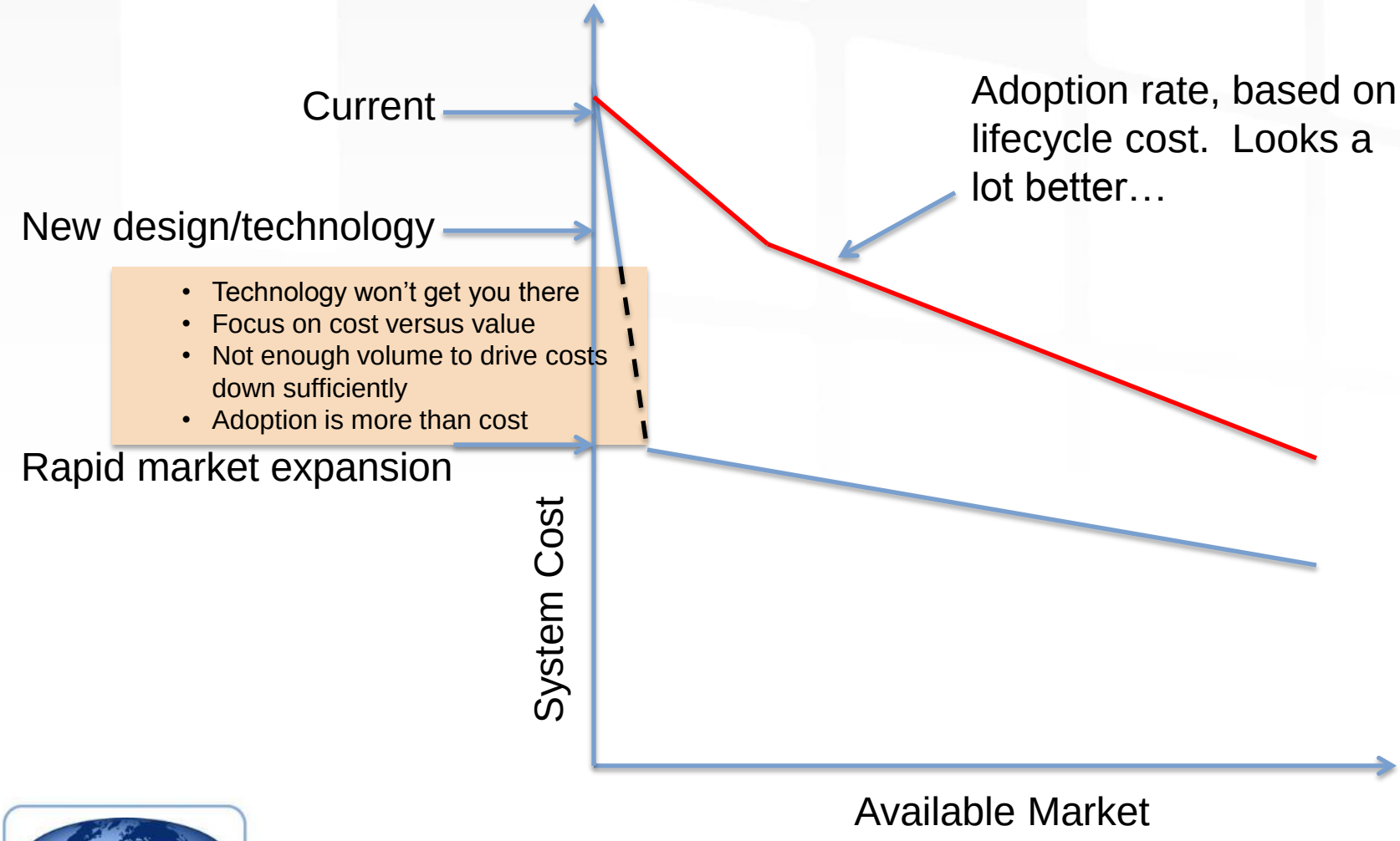


# Lifecycle Cost

True fuel cost
Maintenance cost
Replacement period
Apples to apples installed cost



# Lifecycle cost




- Technology won't get you there
- Focus on cost versus value
- Not enough volume to drive costs down sufficiently
- Adoption is more than cost

# Looks Good on Paper, But…

**Adoption Risk**

Is the payback guaranteed?

Where does the fuel come from?

Who will maintain it?

What if a larger (or smaller) system is needed later?

# Breaking Through Adoption Barrier

- Reliability based
- Fuel delivery
- Installation
- Maintenance
- Monitoring

- Focus on core business
- Improved network uptime
- Reduced capital intensity
- Reduced cost of operation

# Thank you