M-FIELD Energy LTD.

CLEAN, SUSTAINABLE ENGERGY







Salmo Formosanus





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AGENDA

- ABOUT M-FIELD
- FUEL CELL TECHNOLOGY
- TELECOM APPLICATIONS
- COMMUNICATIONS

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M-FIELD and Fuel Cell

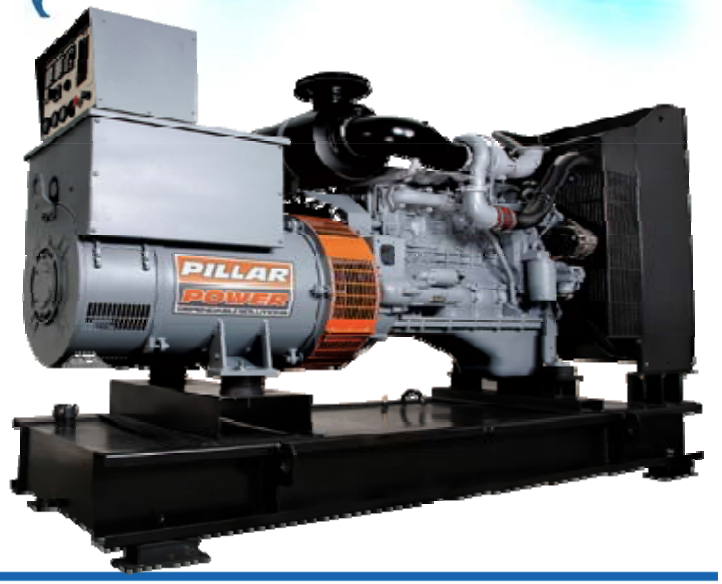
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Snapshots of Jemmytex:

- Founded in 1985
- Diesel generator manufacture and after-service
- ISO 9002 and ISO9001:2000 certificated
- R&D in Fuel Cell since 2000.
- 2008 Peru APEC Global CEO Summit Representative of Taiwan Clean Energy Industry.







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References



Office of the President Taiwan



Taiwan High Speed Rail



Taipei Inter. Airport



Guoguang Power Plant



Tai Yuen High-tech Industrial Park



Formosa Group.



National Taipei University



Most Luxury Residential Building



ChangGung Memorial Hospital

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M-FIELD
Eco-conscious alternative

Since 2009

Focus:

- Stationary Fuel Cell System Development
- Market Education
- International Project Coordination
- Training & Service



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ABOUT M-FIELD

Technology Background:

2000 Fuel cell R&D centre established.

2002 Imported Ballard's Nexa fuel cell module and began cooperation.

2003 Announced **1kW** fuel cell generator in Fuel Cell Today.

2003 Invited to Taiwan Fuel Cell Partnership.

2005 Developing **5kW** system supported by Government advanced research project.

2006 Funded by Government for 10kW fuel cell UPS R&D project.

2008 Accomplished **10kW** fuel cell back-up power development.

2009 Announced 10kW fuel cell UPS product.

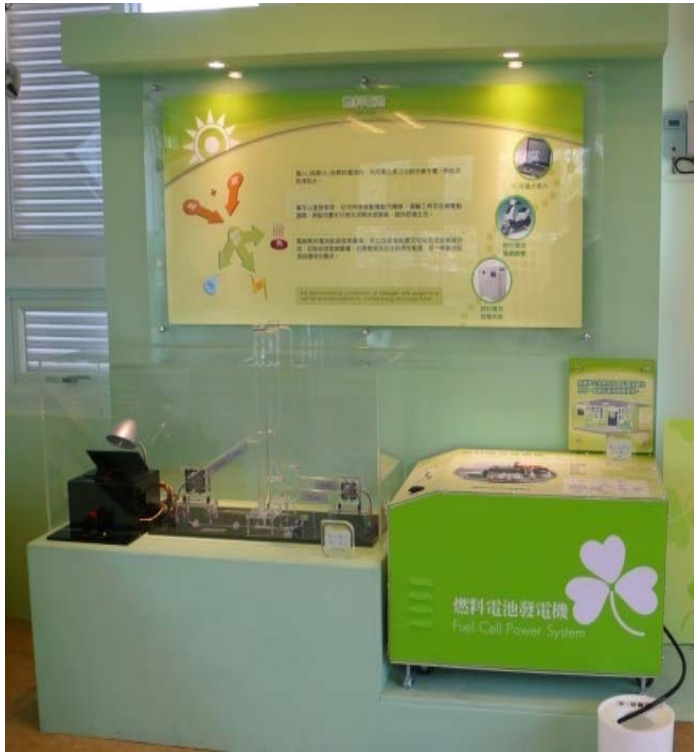
2010 Developing 3~30kW Residential **CHP** system.

2010 Developing **100**kW Industrial system.

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ABOUT M-FIELD

Demonstration Project and Product



Taiwan National Science & Technology Museum
Fuel Cell UPS Demonstration



ABOUT M-FIELD

Demonstration Project and Product

3-Year Test & Verify Project with Taiwanese Telecom for 10kW Fuel Cell UPS.









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Demonstration Project and Product

Awarding 30kW Fuel Cell

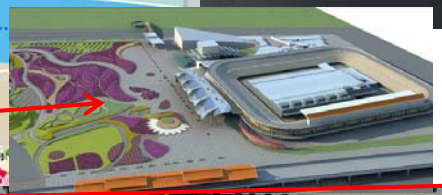
2010 Taipei International Flora Exposition













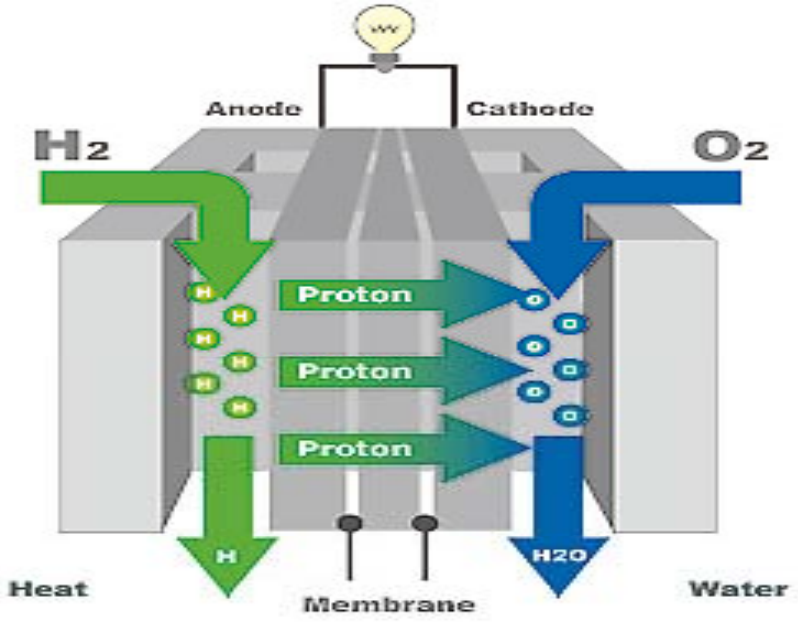


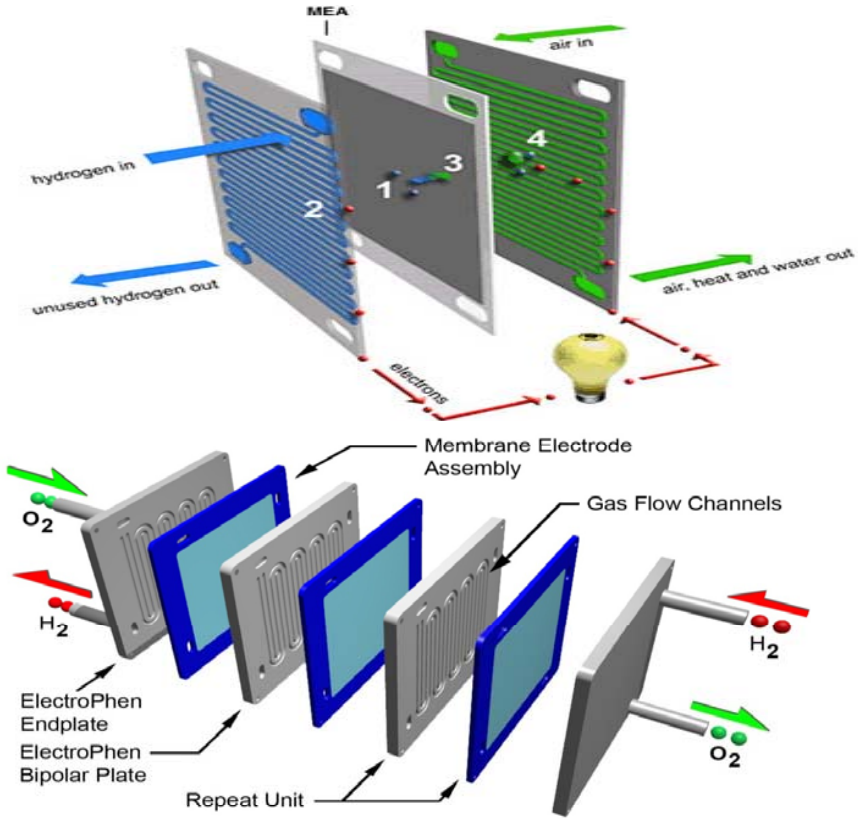
2010.11/6 ~ 2011.4/25

http://www.2010taipeiexpo.tw

FUEL CELL TECHNOLOGY

Reaction and Structure





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FUEL CELL TECHNOLOGY

Why Fuel Cell?

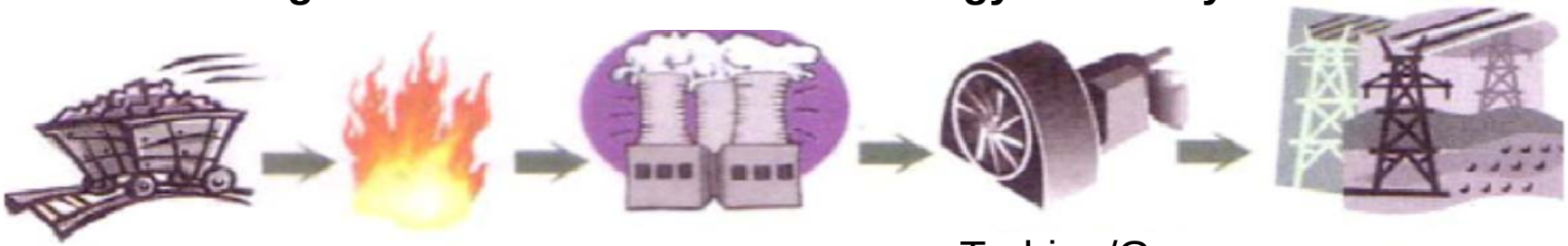
- Higher energy efficiency
- Clean and eco-friendly
- Installation simplicity and operation stability
- Easy maintenance

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FUEL CELL TECHNOLOGY

Higher Energy Efficiency:

Conventional generator with ICE: 22~45% energy efficiency



Fuel → Combustion → Steam → Turbine/Generator → Electricity

Fuel Cell: up to 60% energy efficiency, up to 90% for CHP



Fuel → Fuel Cell → Electricity

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FUEL CELL TECHNOLOGY

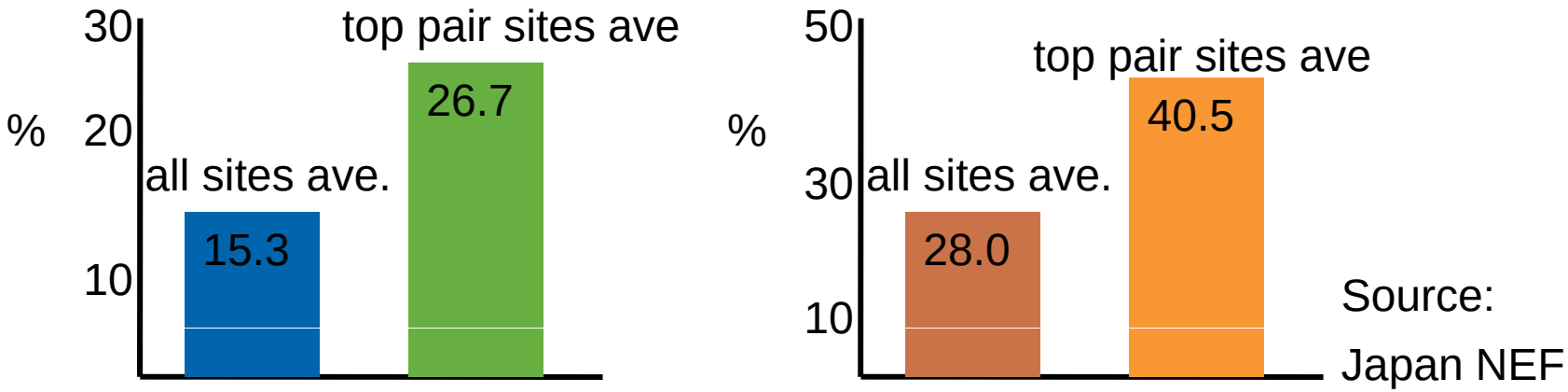
Clean and Eco-Friendly:

Green House Gas reduction(CO_2) :

- 1 tonne / kilowatt-year for CHP fed with NG.
- 8 tonnes / year for 10kw back-up power fed with renewable hydrogen.

(Source:Houston Advanced Research Center)

Primary Energy Reduction Rate ***CO_2 Reduction Rate***



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FUEL CELL TECHNOLOGY

Installation Simplicity and Operation Stability

Only works in day time



Consistent wind required



V.S.

24 / 365 standby power

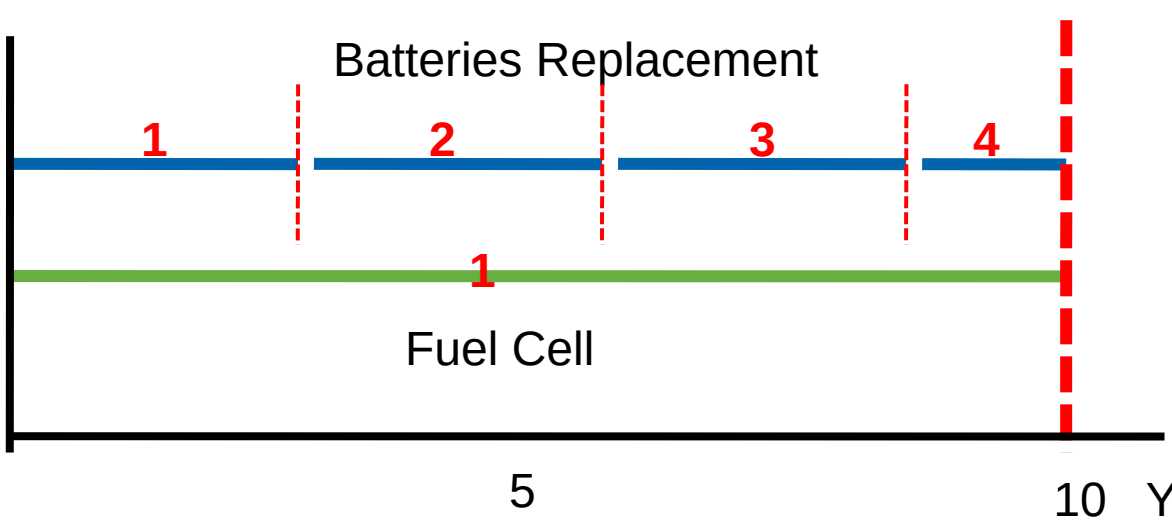


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FUEL CELL TECHNOLOGY

Installation Simplicity and Operation Stability

- Lead acid batteries replacement cycle: 3 years = high environment cost.
- Fuel cell : over 4,000 operating hours and 1,000 start-stop cycles durability for emergency back-up power.
- Static power generating process = less equipments worn-outs.





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MF-UTH SPEC

- **UPS function with maximum 10 kW power output**
- **Continuous power in distinct applications**
- **Remote, and off-grid power**
- **Easy maintenance and low emission, compared with traditional diesel engines**
- **Easy expansion or installation for individual customer requirements**

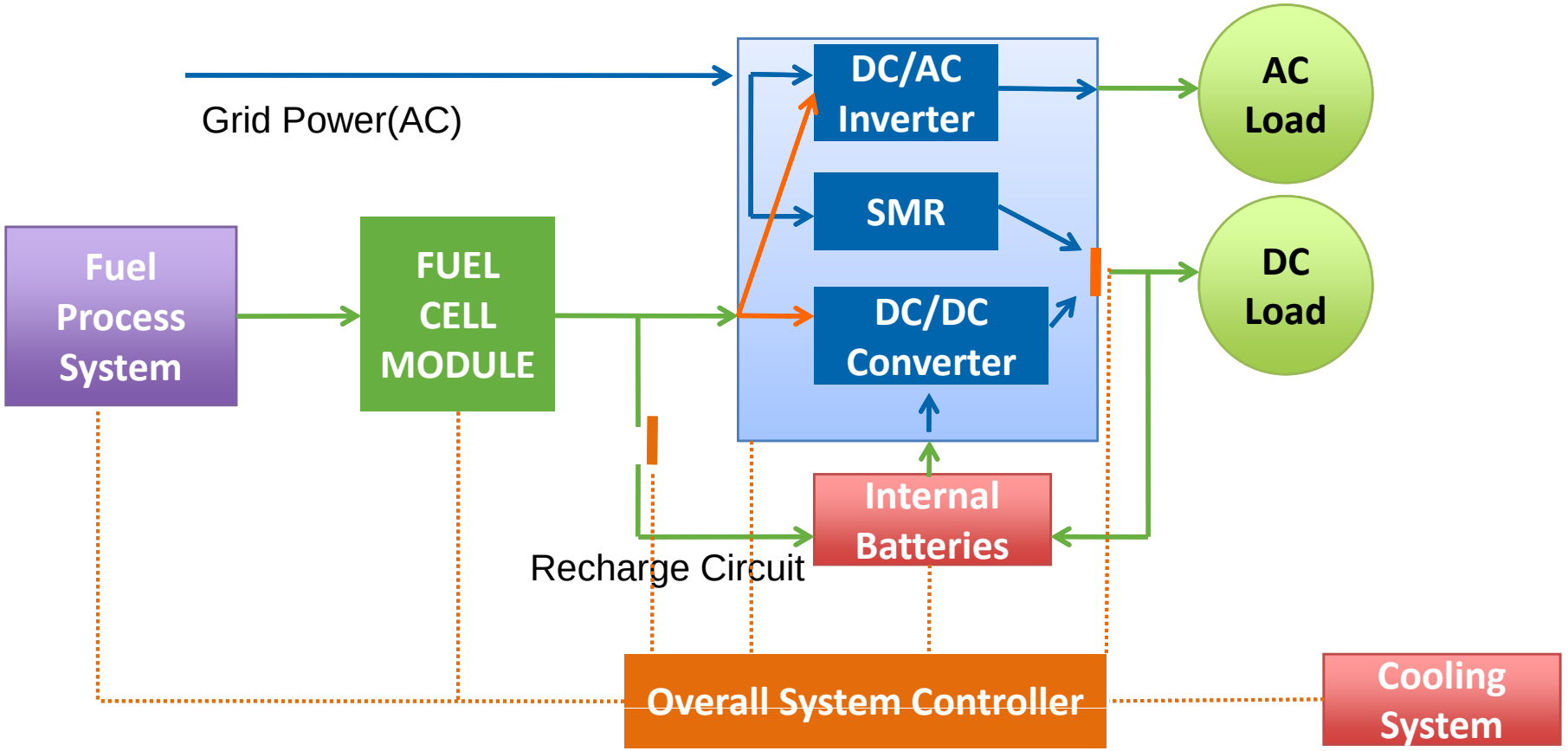


10kW Backup Power System			
Maximum Output	10kW	Oxidant Humidity	0~100% RH
Input Voltage	110VAC, 60Hz	Dimension	2050 x 1650 x 590 (mm)
Output Voltage	54 VDC, 110/220 VAC	Output Current Max	180A @ 54VDC, 48A @ 220VAC.
H2 Fuel Purity	>99.95%	Weight	400 kg/ 800 lbs
Fuel Pressure	7~14 bar	Cooling System	Air Cooling
Oxidant Composition	Air	Interface Language	English
Operation		**Environment Requirement**	
Hydrogen Consumption	12 L/kw/min	Ambient Temperature	-40°C ~ 50°C
Efficiency (LHV)	50%		

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V.2 MODULAR DESIGN

1.Fuel Process 2.Fuel Cell 3.Power Management 4.System Control 5.BOP



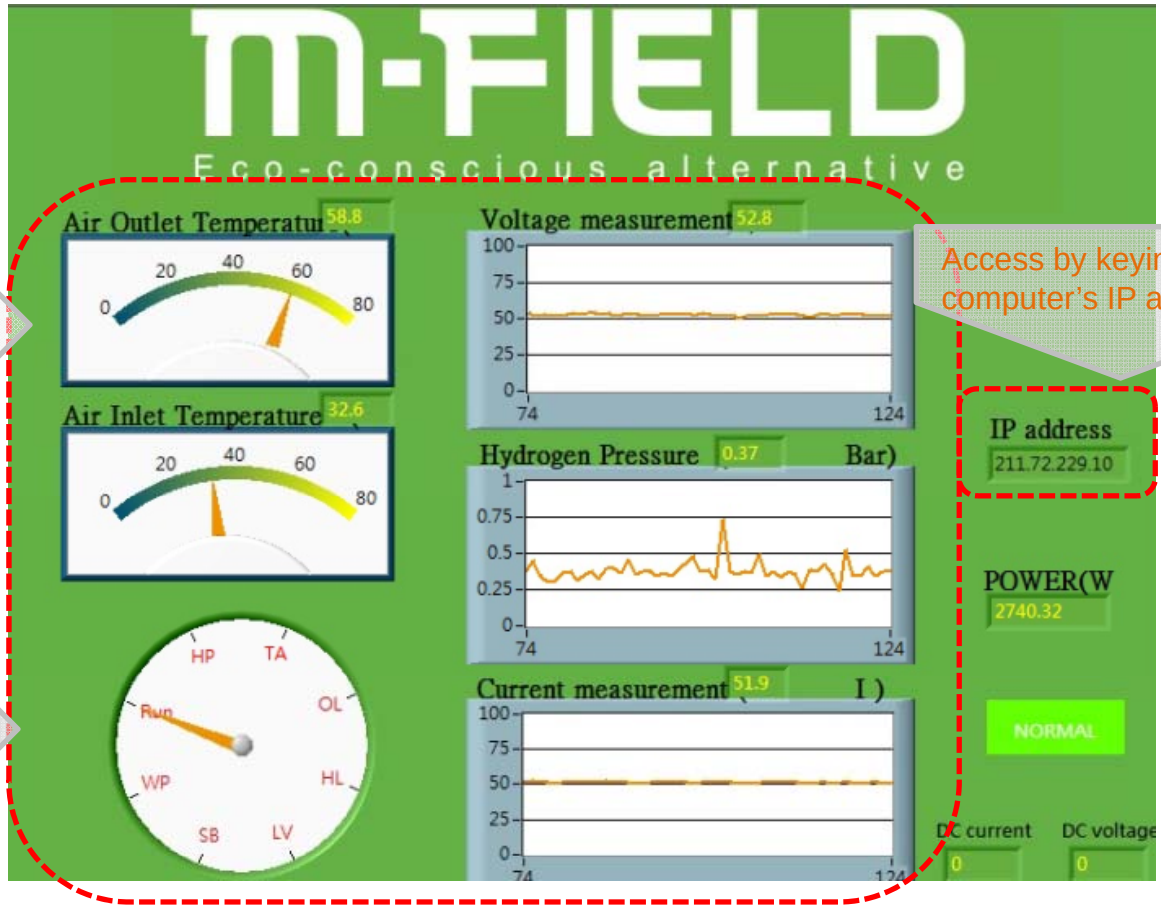
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Remote Monitoring Demo

You can monitor the system's operating condition remotely

Real time data saving

Access by keying in local computer's IP address



Telecom Applications

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Scenario I

Emergency Backup Power / UPS

- Stable city grid, however with catastrophic event threaten
- $2B annual spend on battery bank and diesel generator



Payback within 3~4 years for 8 hrs capacity and 12 starts/ yr (Ballard's data)

Damage by Catastrophic Globally

Decade	1950~1959	1960~1969	1970~1979	1980~1989	1990~1999
Number	20	27	47	63	89
Damage(M Euro)	32.7	58.7	105.6	164	505.6

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Hurricane Katrina

August 28,2005

Highest Wind 175mph (280Km/h)

Damage 90.1 billion USD

Deaths by state

Alabama	2
Florida	14
Georgia	2
Kentucky	1
Louisiana	1,577*
Mississippi	238
Ohio	2
Total	**1,836**
Missing	**705**



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Typhoon Morakot

-- South Taiwan August 08,2009

Rainfall **1403 mm/ 1day (2506 mm/ 2days)**

Damage 0.6 billion USD

Deaths 678

Missing 22

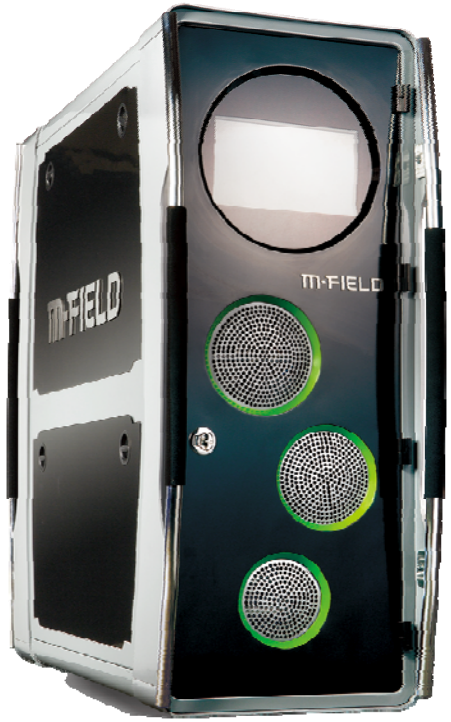






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M-FIELD Emergency Power Solution



+



UTH 10Kw UPS

72 Hrs Storage Cabin

Backup Power / UPS Scenario II

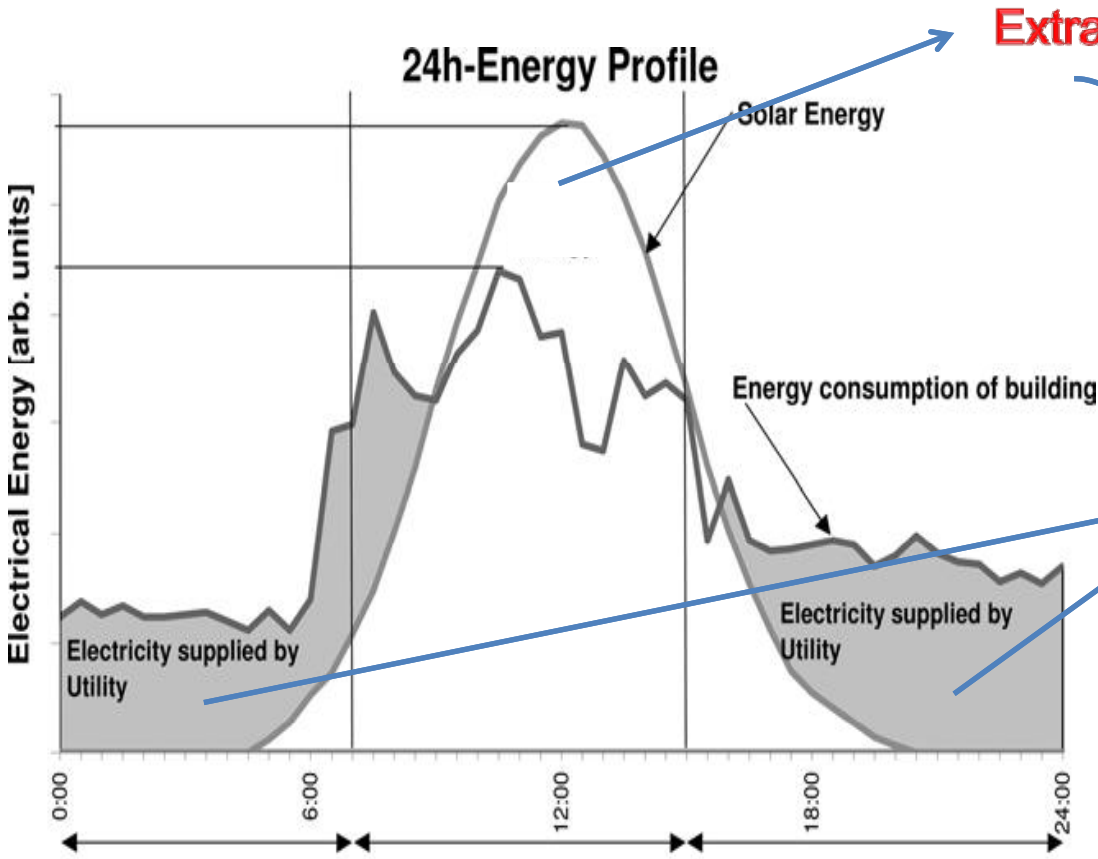
- Unreliable city grid with frequent outages (2~6 hrs/day)

Payback within 2 years for 6 hrs outages (Ballard's data)



Backup Power / UPS Scenario III

- Off-Grid with renewable energy combination (6 ~ 16 hrs/day)



Extra PV Energy

? REDUCE FOSSIL FUEL

Diesel Generator

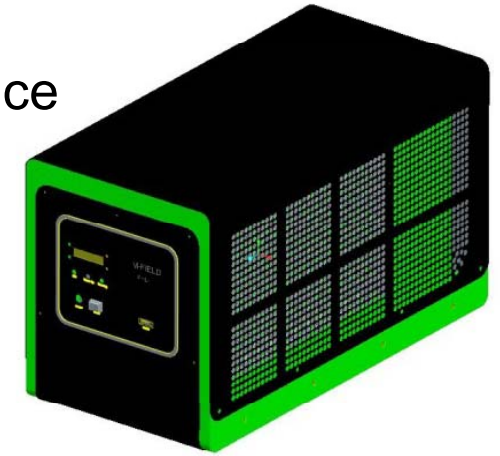


Photo captured from GSMA 2010 bi-annual report

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Backup Power / UPS Scenario III

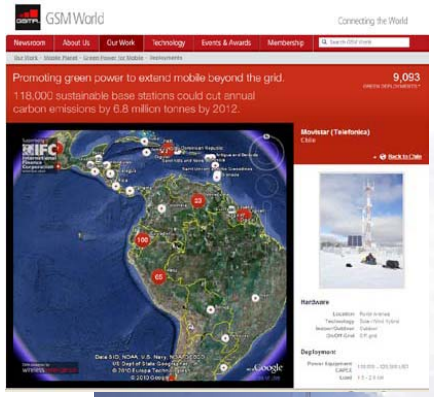
- Problems of Single PV system
  - Local demand and PV power supply does not match
  - Energy storage
- Advantage with the integration with FC
  - Electrolyzer used for production of hydrogen
  - Increase PV utilization
  - High energy storage density of H_2
  - No moving part, hence reduced maintenance cost
  - More reliable, More synergy in PV/FC hybrid system

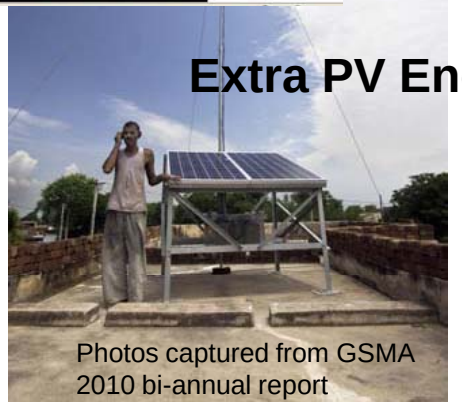


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Backup Power / UPS Scenario III

- An Idea – PV/ Wind/ FC Integration





Photos captured from GSMA 2010 bi-annual report

Extra PV Energy



Electrolizer



Hydrogen Storage

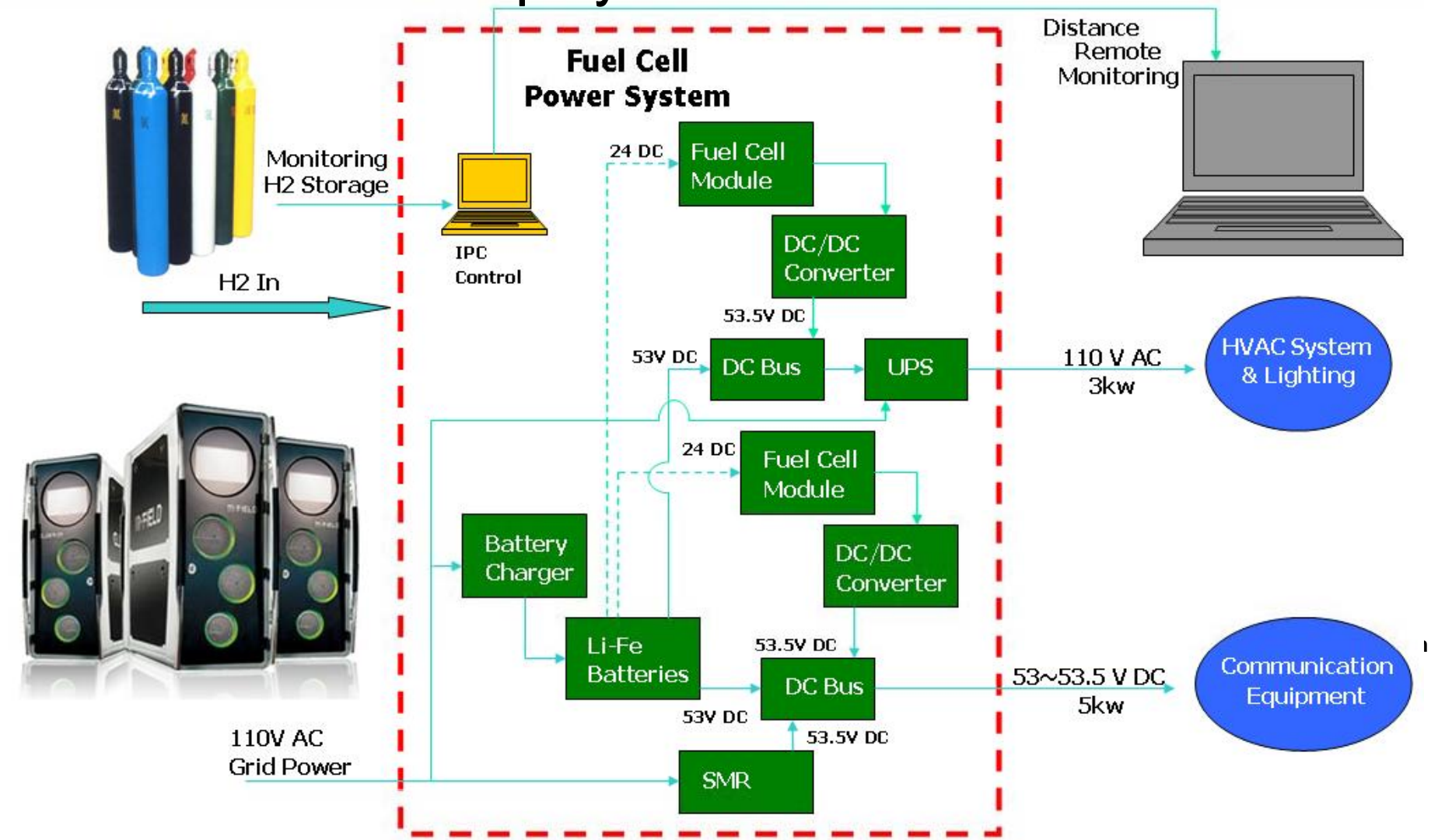


M-Field UTH 1.6kw

Fuel Cell could provide few hours Electricity, depends on hydrogen capacity, to reduce diesel consumption

M-FIELD ETH 0210

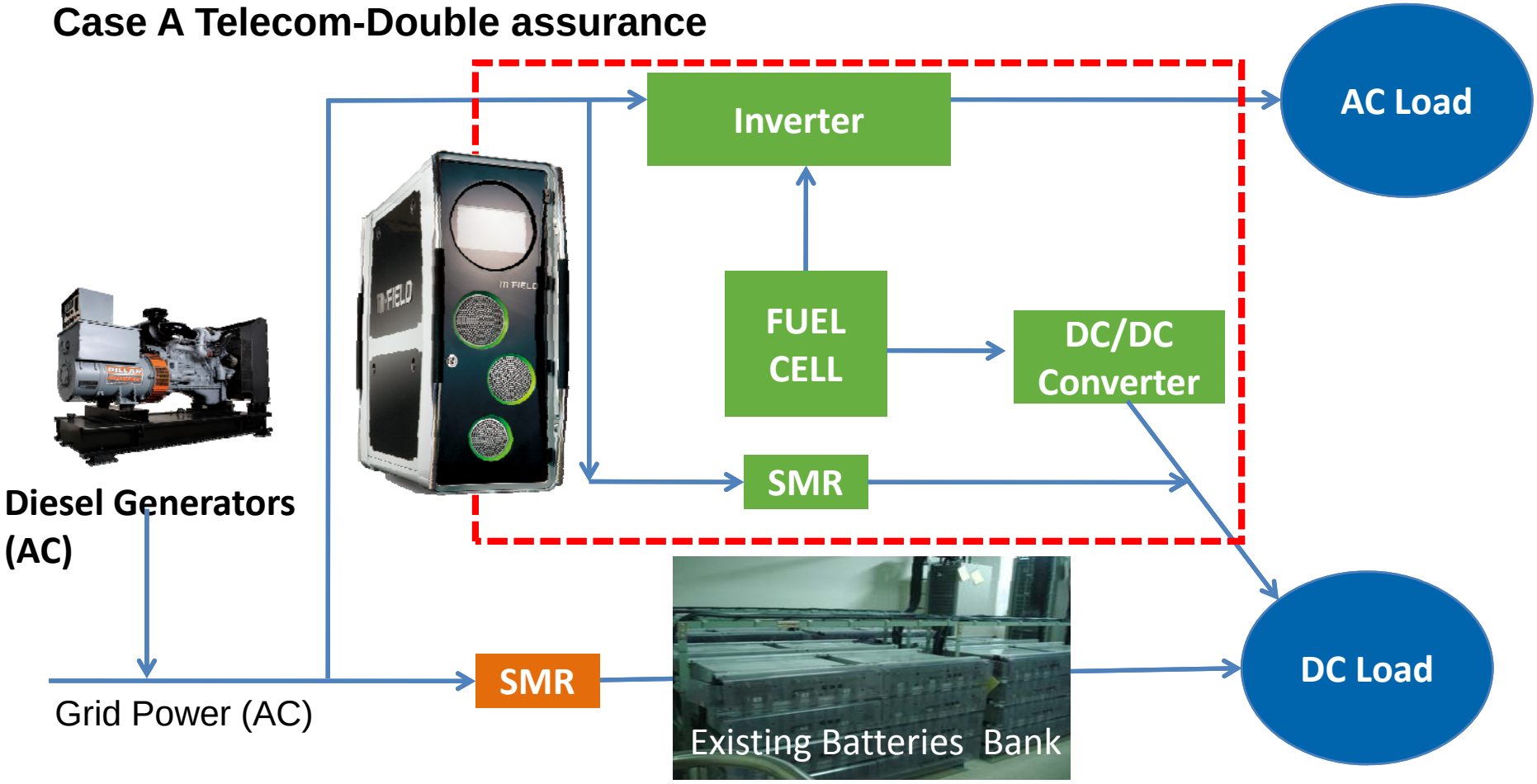
10 kW Telecom Backup System



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SIMPLE INSTALLATION AT VERIFICATION

Case A Telecom-Double assurance



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SIMPLE INSTALLATION AT VERIFICATION

Case B -Easy installation



Diesel Generators (AC)

Grid Power (AC)

FUEL CELL

Internal Batteries

Inverter



AC Load

SMR

DC Load

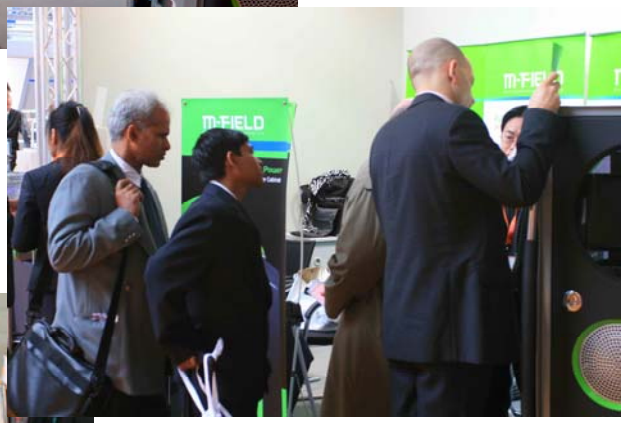


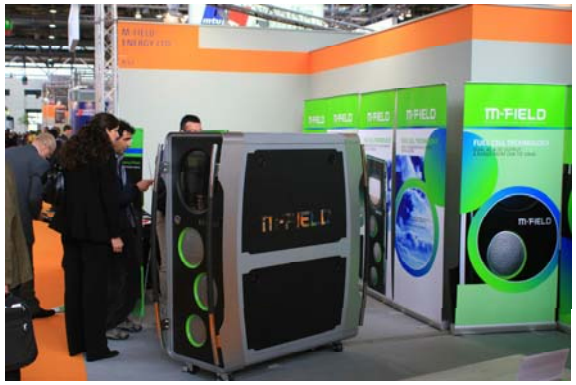
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GROUP EXHIBIT
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