





Asia-Pacific Green Tech Forum  
November 10, 2010

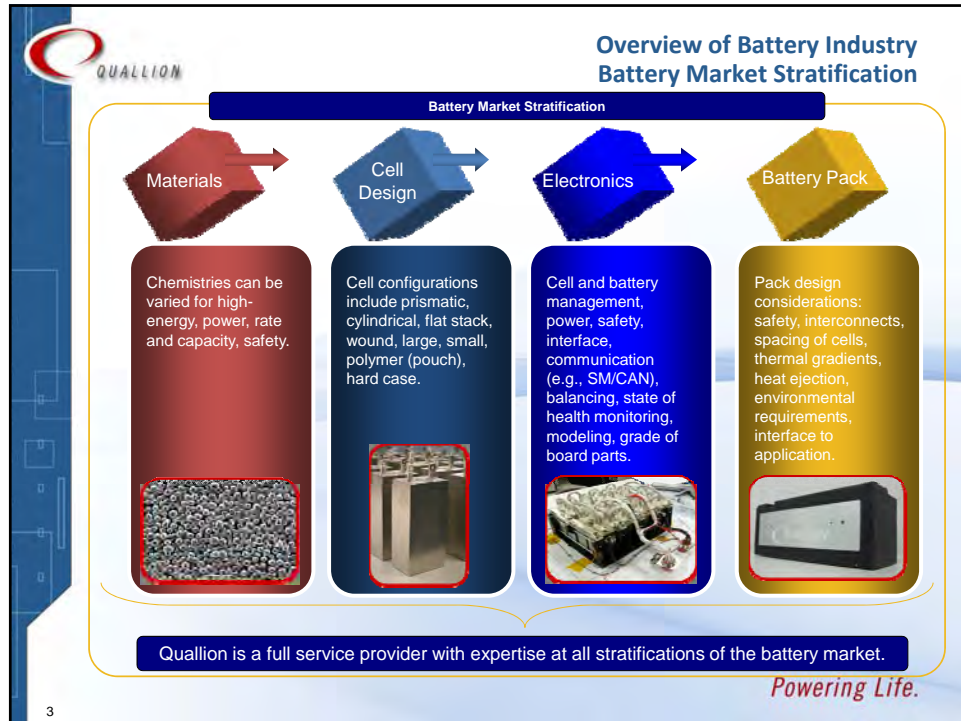





## Quallion PowerNET

November 2010

Powering Life.

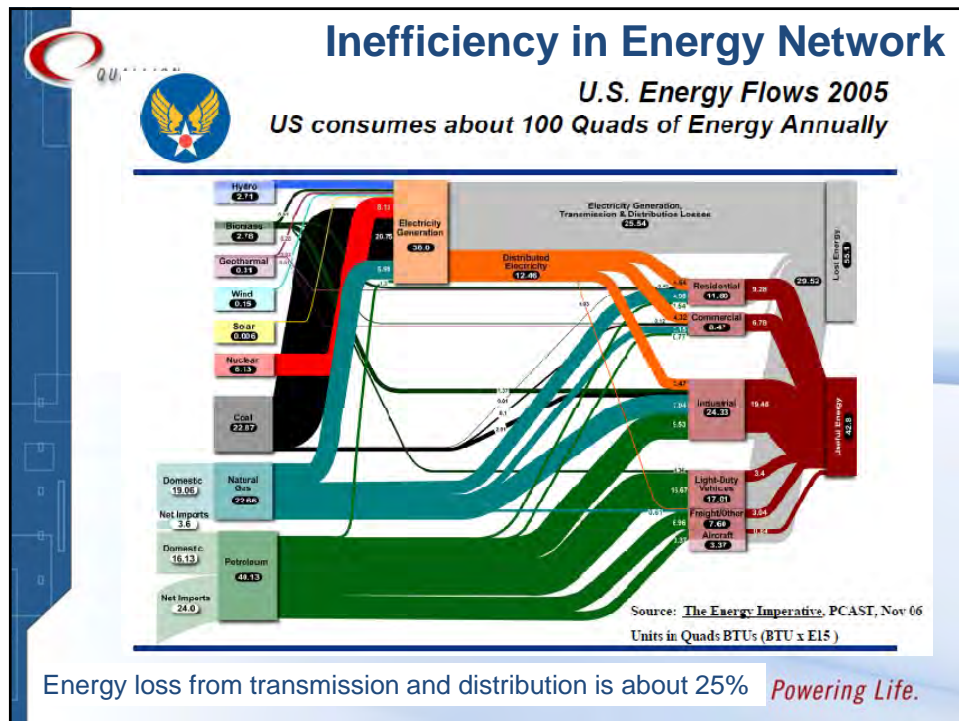





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## PowerNET Energy Efficiency

*A local energy solution in production and storage for maximum energy efficiency*

- Local energy production
  - Renewable sources:
    - Photovoltaic & windfarm
- Local energy storage
  - Energy storage system (ESS)
    - High-performance safe & reliable battery system

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## Strategic ESS Infrastructure

*Energy Storage System dispersed strategically throughout cities*

Example for an average size city:

Applications	Energy (kWh)	Units
ESS at Distribution Substation	5000	200
Diesel Back-up Replacement	500	2000
PHEV & EV Rapid Charger	150	200
ESS for Home Solar Back-up	10	300,000
<b>Total Est. ESS Capacity</b>	<b>5,030 MWh</b>	

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**Quallion Robust ESS Infrastructure**

*Feature 1: Unique Design accommodates both High Power & High Energy operations*

Quallion Matrix Patents:  
US7479346B1  
US7573233B1  
US7573234B1

Matrix™ High Power Module    Matrix™ Battery    Matrix™ High Energy Module

- High Power Module to absorb/provide rapid power demands
- High Energy Module to sustain large energy demands

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**Quallion Robust ESS Infrastructure**

*Feature 2: Common Control Interface System*

Grid Power Line

Grid Data Line

Data flow

Dual Control Interface Electronics

1<sup>st</sup>

2<sup>nd</sup>

Power Absorber Matrix™ ESS

BMU

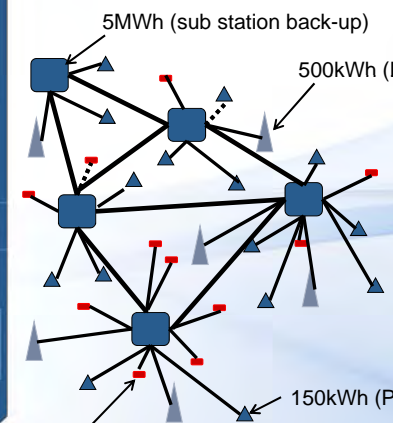
Quallion ESS

- Common interface electronics allows multiple ESS connection to form PowerNET
  - Power interface via dual safety switch
  - Data interface from battery BMU to Utility control room
- Redundant safety mechanism
  - Dual safety switch to protect ESS from terrorist attack
    - 1<sup>st</sup> switch is controlled by Utility Control Room
    - 2<sup>nd</sup> switch is isolated from outside and controlled by battery BMU. This switch is to protect battery from miss use or abuse

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**Quallion PowerNET**

*Multiple ESS are connected together to form a reliable and safe energy infrastructure*



- Connections of multiple ESS to form a large ESS web structure (Quallion PowerNET)
- The PowerNET is operated by the Utility control room to consistently sustain energy demands

5MWh (sub station back-up)

500kWh (Diesel back-up)

150kWh (PHEV rapid charger)

5-10kWh Home Solar back-up

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**Quallion PowerNET**

- Safe and reliable Quallion Matrix™ Battery
- HP-HE hybrid Matrix™ battery provides shock-absorber function
- Dual protection circuit provides redundancy in safety due to malfunction of the system or ill use
- Various ESS are connected to form one large ESS web (=PowerNET)
  - Peak shift
  - Demand response
  - Grid stabilization
- Secure data transmission
  - Firewall between battery electronics and Utility control room

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