GE's Durathon® Battery

Green Power for Mobile Regional Working Group Francophone Africa
07-08 November 2013,
Dakar, Senegal

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AGENDA

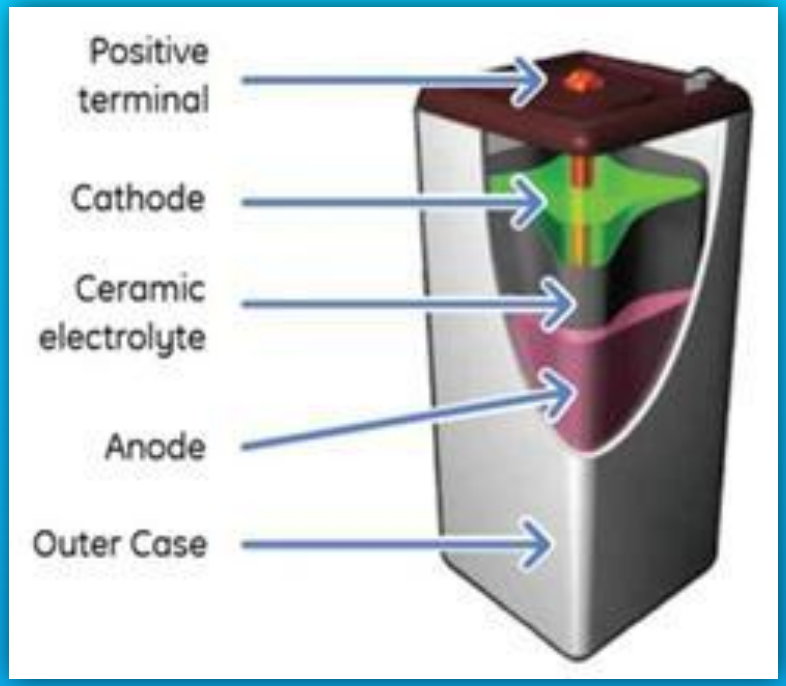
- Proposed solution and unique benefits
- Value to Customer
- Customer reference
- Lifecycle support

Technical and commercial benefits with Durathon and GE



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Durathon cell



Electrochemical Reaction

$$2NaCl + Ni \xleftrightarrow{2.58V\ /46Ah} NiCl_2 + 2Na$$

(discharged) (charged)

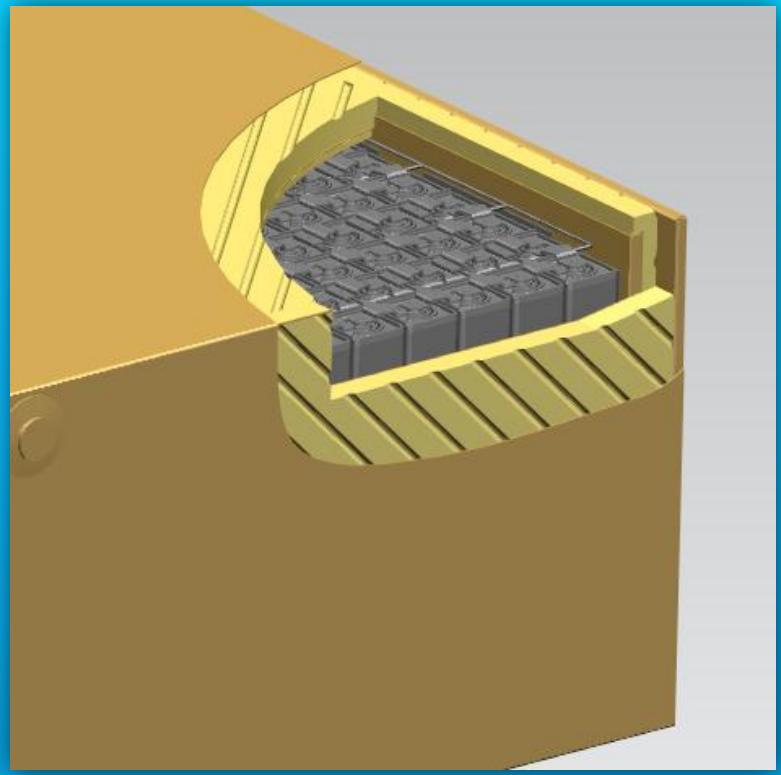
Basic Building Block Delivers Value

- No secondary chemical reactions means long life
- Mechanical strength not impacted by electrochemical reaction…so abrupt end of life is avoided
- High temperature operation means same performance and life over broad ambient temperature range
- Evacuated anode cavity prevents cell pressurization, even under extreme circumstances

Battery package

Robust Packaging

- Compact package allows high performance in small space
- Hardened mechanical design resists handling damage
- Single 48V block, weighing 120kg discourages theft
- Abundant construction materials (alumina, iron, nickel) are readily recycled
- Dormant battery condition has indefinite shelf life
- No maintenance required



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Battery management system (BMS)

Intelligent Control and Accessible Live Data

- Field replaceable for ease of service
- Protects battery from electrical conditions that might damage cells
- Alarms indicate issues with battery performance for on-site diagnosis
- Communication by MODBUS allows remote monitoring of battery condition, state of charge
- Digital outputs can be configured to communicate with other site controls



Durathon technology advantages



- Chemistry less prone to pressure build up
- Integrated BMS with protective controls for each module



- 15-20 year float life
- Designed for > 3200 cycles (80%DoD)
- Virtual indefinite shelf life



- High energy density: 150–200 Wh/l
- High specific energy: 90-125 Wh/kg



- Harsh temperatures (-40 to + 65 °C) have no measurable effect on performance



- No regular on-site maintenance
- Suitable for remote diagnostics
- Higher reliability



- Abundantly available raw materials
- Recycle program



- Cells in string fail short
- Redundancy through parallel architecture
- Integrated BMS with protective controls for each module



- Designed to communicate with standard site controllers



- Modular architecture allows for easy scaling if site loads increase over time

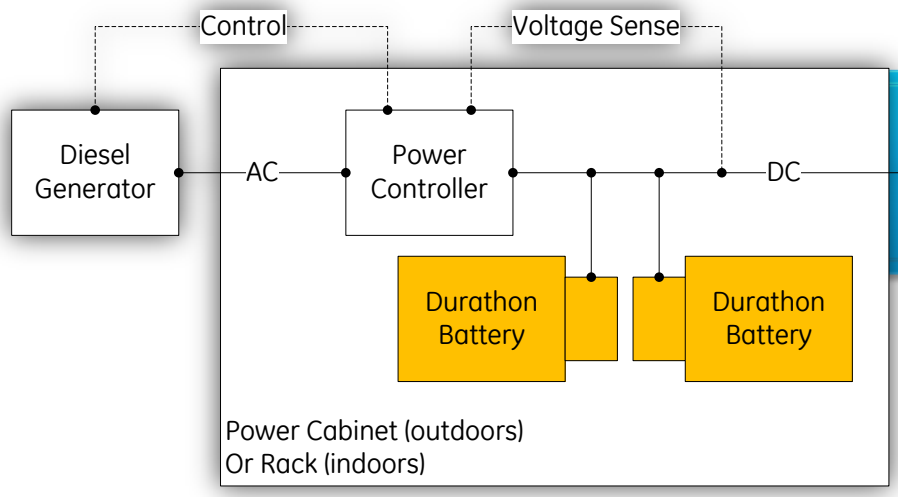


- No valuable components (like lead) for resale value
- 48 V output eliminates usage in household
- Module weights 120 kg; not easy to lift

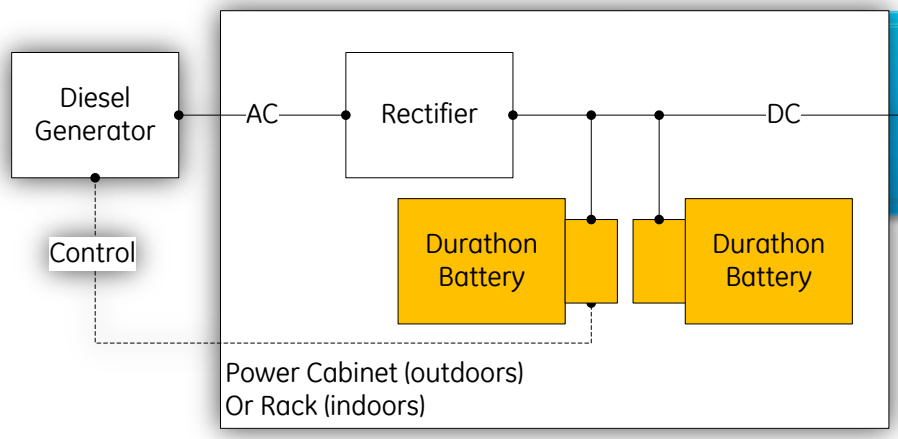
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GE Confidential & propriety

Durathon technical solution options for off-grid, retrofit sites



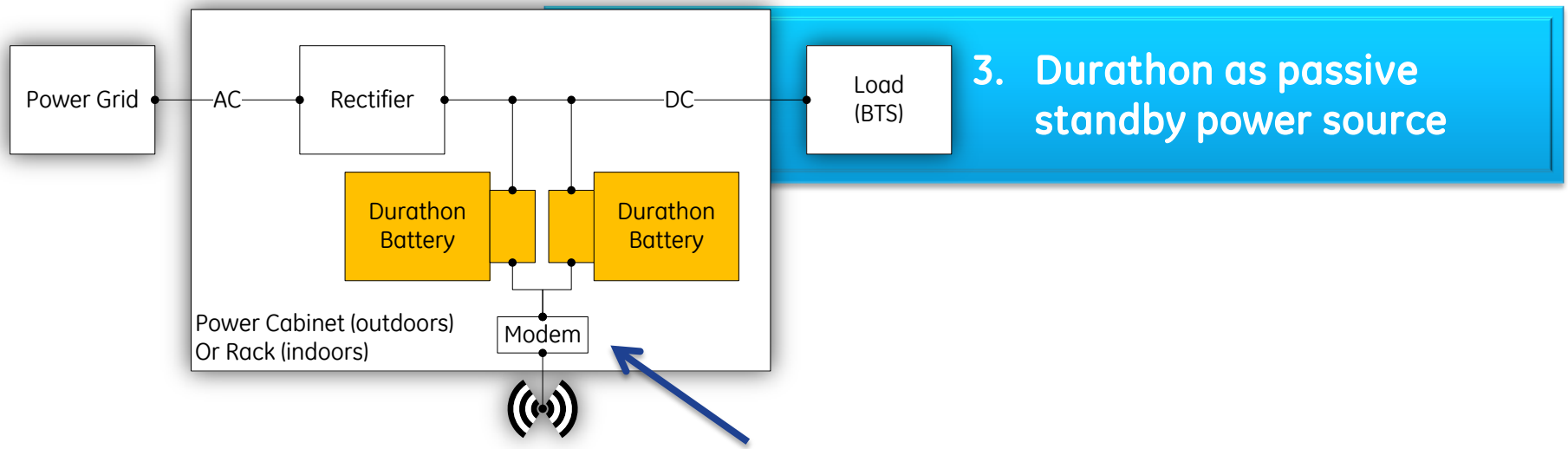
1. Existing power controller manages generator



2. Durathon BMS controls generator automation

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Durathon technical solution for grid-connected, retrofit sites



3. Durathon as passive standby power source

Modem allows alert to service provider of remaining runtime – to ensure appropriate response and ensure site uptime

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Typical installation at retrofit sites









Not recommended… but still handled extreme temp in Mongolia







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Lifecycle support

Strong GE commitment to Customer success throughout lifecycle



- GE reclaims batteries and recycles

- GE factory in New York

- EXW proposed
- CIF terms negotiable

- GE-trained Customer staff

- GE-trained local service provider executes testing

- GE-trained local service provider (Tier 1)
- GE staff (Tier 2)

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Thank You



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