E-Lighter®

Realizing a diesel powered solution for the battery burden
Contents

Customers perspective:
• Energy challenge with soldier modernization
• The Dutch approach
• Considered solutions

E-Lighter® solution by Fokker:
• Fokker technologies
• Realising a solution: the E-Lighter®

Working together for a successful solution:
• Taking the time required to mature the technology
• Involving end users in the E-Lighter® product development
Energy challenge with soldier modernization:

Operational Need e.g. SA → Electrical equipment providing needed capabilities → Energy => Batteries

Up to and over 10 Kg per soldier!
Energy challenge with soldier modernization: The Dutch approach

1. Ensure that electronic equipment is energy efficient:
   LOW POWER!
   Can reduce up to 50% of battery weight

2. Standardization; reducing different types of batteries
   Spares can be shared;
   Easier to implement new and lighter batteries

3. Weight efficient power sources:
   Technologies providing the energy (Wh) at the lowest weight (Kg)
   Without increasing logistic footprint!
   (Single fuel concept)
## Considered solutions

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Logistics</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li-Ion</td>
<td>±</td>
<td>+</td>
<td>Rechargeable</td>
</tr>
<tr>
<td>Zn-Air</td>
<td>+</td>
<td>-</td>
<td>Non-rechargeable</td>
</tr>
<tr>
<td>PV</td>
<td>+</td>
<td>+</td>
<td>Only for stationary usage/applications</td>
</tr>
<tr>
<td>Fuel Cells</td>
<td>+</td>
<td>-</td>
<td>Additional fuel logistics</td>
</tr>
<tr>
<td>E-Lighter® (2015)</td>
<td>+</td>
<td>+</td>
<td>Runs on logistic diesel fuel</td>
</tr>
</tbody>
</table>
### E-Lighter® weight performance (indicative)

**Action of ½ week; Air Assault Brigade; Squad**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Battery Weight</th>
<th>E-Lighter Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x</td>
<td>24 kg</td>
<td>11 kg</td>
</tr>
<tr>
<td><strong>Weight savings</strong></td>
<td><strong>13 kg</strong></td>
<td><strong>56%</strong></td>
</tr>
</tbody>
</table>

**Action of ½ week; Royal Marines; Squad**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Battery Weight</th>
<th>E-Lighter Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4x</td>
<td>53 kg</td>
<td>21 kg</td>
</tr>
<tr>
<td><strong>Weight savings</strong></td>
<td><strong>31 kg</strong></td>
<td><strong>59%</strong></td>
</tr>
</tbody>
</table>
E-Lighter® - Contract

September 2011:

Contract awarded by the NLD MoD to Fokker Aerostructures for the final development of the E-Lighter® towards a proven product, with a procurement option for serial production.
E-Lighter® solution by Fokker
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Fokker Aerostructures
Strong and innovative partner in Defense, both aircrafts and land based systems
Realizing a solution: the E-Lighter®
Product overview

• Power source for dismounted soldier
• Delivers 15 Watt @ 8-18 V
• Fuel: Diesel (JP8 is possible)
• SMBus-protocol
• Operates in every orientation
• Simple to operate (on/off)
• Safe
• Easy refueling
Realizing a solution: the E-Lighter®
Product overview (2)

- Dry weight: 1.1 kg
- Weight for 48 hours: 2.5 kg
- Volume: 1.7 l (without refuel bags)
- Environment: Full MIL-STD-810, climate categories A1-C1
- Noise: Non detectable at 10 m
- IR: Low
- Water immersion: Resistant
Realizing a solution: the E-Lighter®
E-Lighter® kit
Realizing a solution: the E-Lighter®
Expected use

Powering equipment or charging batteries

Low power
E-Lighter as squad charger.
On or multiple E-Lighters per squad.

High power
E-Lighter as personal charger/power source; one E-Lighter per person.
Realizing a solution: the E-Lighter®
Strong point 1: Weight performance

<table>
<thead>
<tr>
<th>Energy</th>
<th>Runtime @ 15W_{av}</th>
<th>Weight E-Lighter</th>
<th>weight Battery (180Wh/Kg @2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 Wh</td>
<td>12 h</td>
<td>1,3 Kg</td>
<td>1 Kg</td>
</tr>
<tr>
<td>360 Wh</td>
<td>24 h</td>
<td>1,6 Kg</td>
<td>2 Kg</td>
</tr>
<tr>
<td>720 Wh</td>
<td>48 h</td>
<td>2,2 Kg</td>
<td>4 Kg</td>
</tr>
<tr>
<td>1080 Wh</td>
<td>72 h</td>
<td>2,8 Kg</td>
<td>6 Kg</td>
</tr>
</tbody>
</table>

E-Lighter operationally interesting when carrying more than 2 kg of (spare) batteries
Realizing a solution: the E-Lighter®
Strong point 2: Simplifying logistics

Fits easily within military logistic supply chain

But, if necessary, can also function without one
TRL 7/8 qualification and field tests

- User Evaluation
- Dust
- IR
- Life
- EMC
- Vibration
- Temperature
- Drop
Working together for a successful solution
Involving end users in the E-Lighter product development
Questions?