udomi competence in fuel cell systems

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Applications

- Grid independant power supplies for
  - Remote measuring sites (weather, wind, water quality, water level monitoring for rivers etc.)
  - Parking display system
  - Mobile traffic signs
  - Telecommunicaton equipment (satellite and wireless communication etc.)
  - Mobile surveillance systems, cameras on construction sites etc.

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Mobile Traffic Signs

- Problem:

  Batteries last for max. 20h of operation – then battery recharging is required
- Solution:

  2 x EFOY-PRO 2400 installed in OUTDOOR Box provide 5 days of continuous operation with a 10 liter Methanol cartridge

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Ice warning system

- Problem:

  No grid power available, solar power not sufficient
- Solution

  EFOY-PRO-2400 in combination with solar module provides reliant and affordable power.

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Speed Control System

- Problem:

  No grid power available
- Solution:

  EFOY-PRO 2400 as remote power supply
  - Methanol consumption: app. 10 liters/week

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Relais station for WIFI

- Problem:

  Quality of service: Solar and wind do only povide power for 90% if time.
- Solution

  EFOY-PRO-2400 in combination with solar module provides reliant power 365 days/year.

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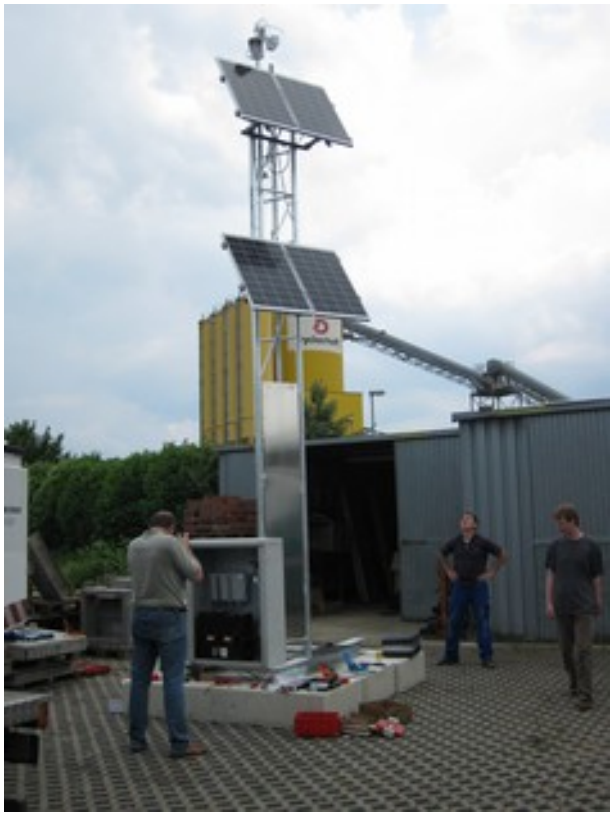
Traffic Monitoring with IP Cameras

- Problem:

  No grid connection available. PV only not possible (50 Watt cont.)
- Solution:

  EFOY-PRO-2400 in combination with 390 Watt Peak solar installation for all year operation



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LED sign for construction site

- Problem:

  No grid connection available. PV not sufficient in winter (50 Watt cont.)
- Solution:

  EFOY-PRO-2400 in combination with 180 Watt Peak solar installation for all year operation

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Offshore wind speed measuring

- Problem:

  No grid connection available. PV only not possible (50 Watt cont.)
- Solution:

  EFOY-PRO-2400 in combination with 390 Watt Peak solar installation for all year operation

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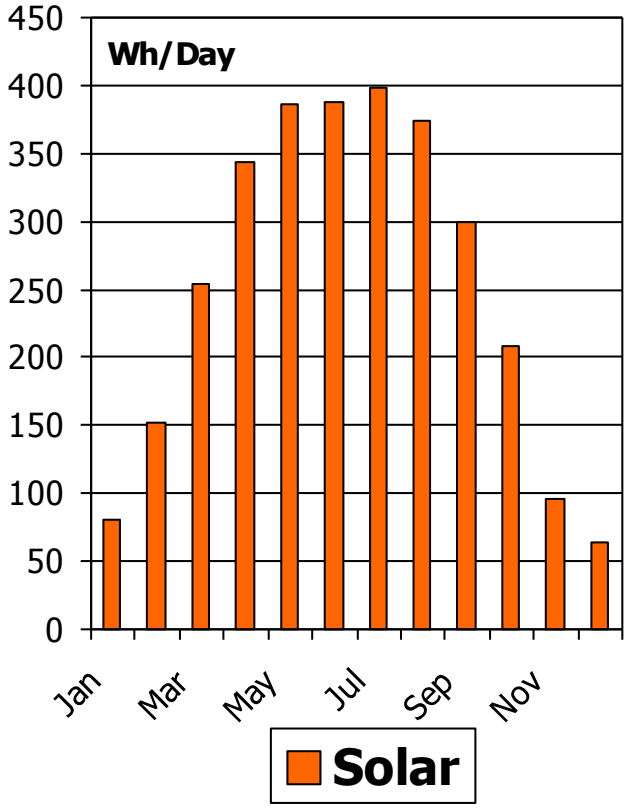
Problem

- Reliable all year power supply based on photovoltaic and battery is difficult
- For 1 Watt of continuous output power, app. 40 Watt peak solar installation is required in central Europe
- Solar modules are difficult to protect against theft and vandalism



Energy generated from a 100Wp Solarmodul, orientation south 30°, location Berlin.

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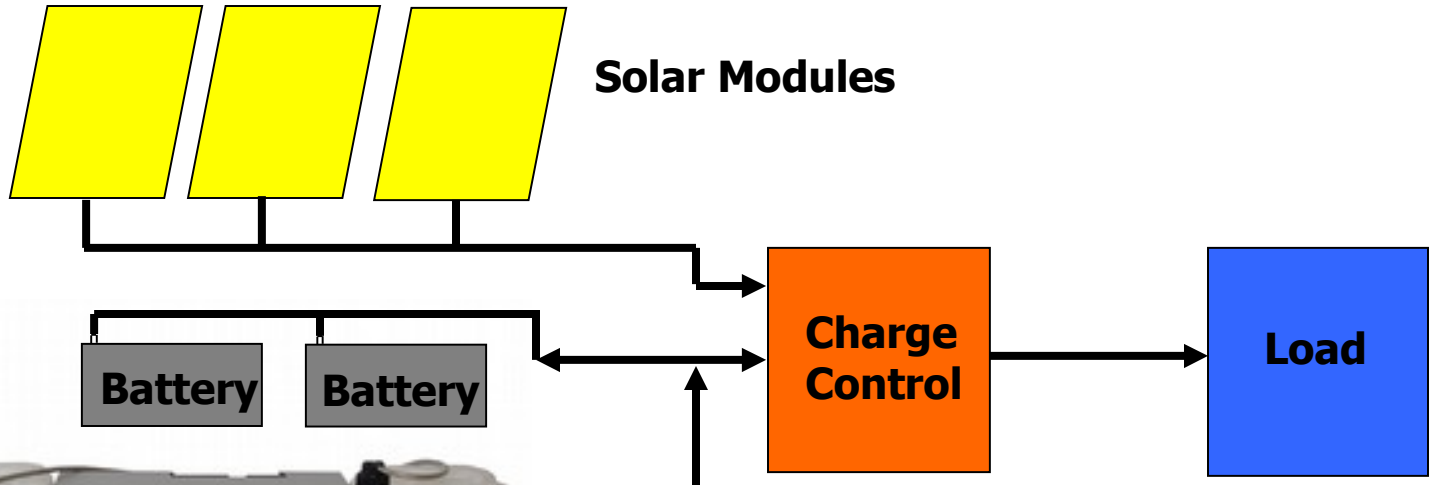
Solution: Fuel Cell – Solar – Hybrid System



EFOY-PRO Duo

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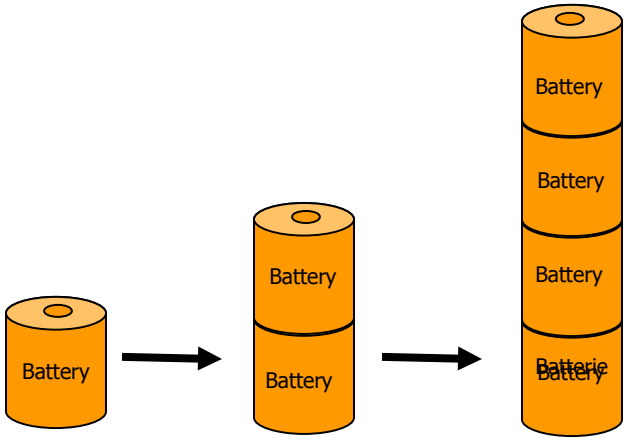
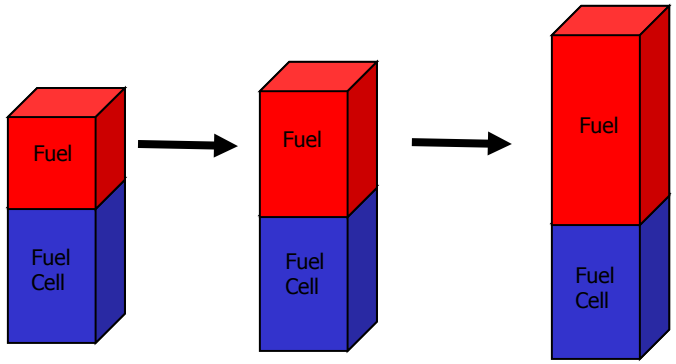
Fuel Cell versus Battery

- Battery



Doubling the capacity results in doubling volume and weight

- Fuel Cell



Since energy conversion and energy storage are separated, increasing the capacity can be achieved at lower volume and weight increases than with battery technology

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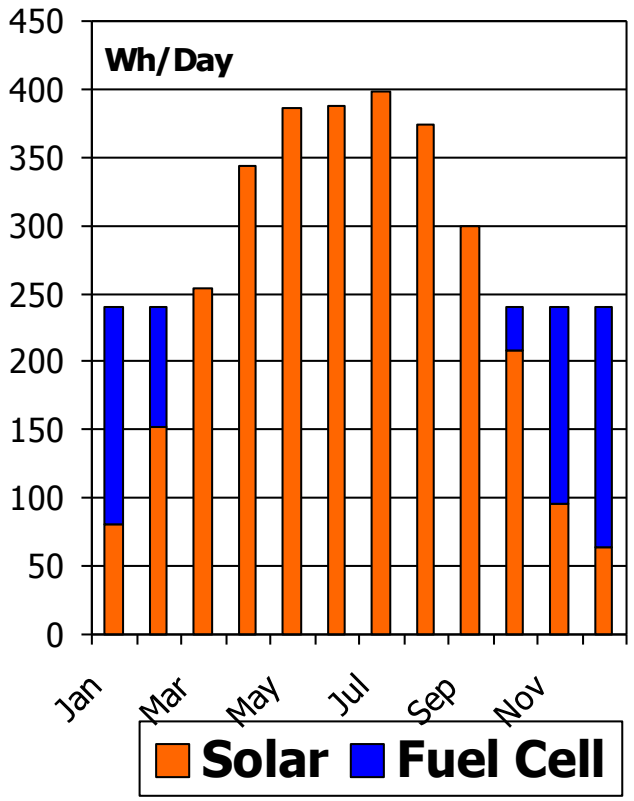
Dimensioning a fuel cell-PV hybrid system

- Dimensioning a fuel cell PV hybrid system for a remote measuring system with a power demand of 10 Watt continuous → 240Wh/day.
- Solar module installation
  - 10 x $P_{continuous}$ = 100Wp
- Fuel Cell EFOY-1200-PRO with max. 1200Wh/day



Energy generated from a 100Wp solar module, orientation south 30°, loction Berlin. Load 10 Watt (continuous) – 240Wh/day

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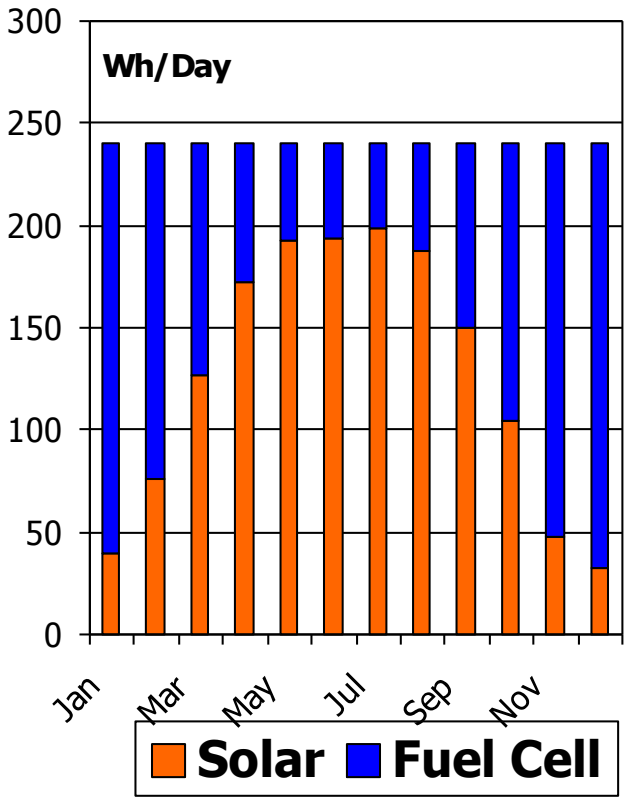
Dimensioning a fuel cell-PV hybrid system

- Dimensioning a fuel cell PV hybrid system for a remote measuring system with a power demand of 10 Watt continuous → 240Wh/day.
- Solar module installation
  - 5 x $P_{continuous}$ = 50Wp
- Fuel Cell EFOY-1200-PRO with max. 1200Wh/day



Energy generated from a 50Wp solar module, orientation south 30°, loction Berlin. Load 10 Watt (continuous) – 240Wh/day

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EFOY-PRO-SERIES

- Direct Methanol Fuel Cell system (DMFC)
- Power: 2 versions with 45 and 110 Watt (800, and 2400Wh/day)
- Voltage: 12/24VDC, automatic battery charger
- Duo version with 2 fuel connectors
- Fuel consumption: app. 0.9l Methanol/kWh

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EFOY-PRO-SERIES – 2nd Generation

EFOY-PRO-SERIES	800	800 DUO	2400	2400 DUO
Voltage	12/24 V	12/24 V	12/24V	12/24V
Current	max:3.75/2.1A min:1.88/1.05A	max:3.75/2.1A min:1.88/1.05A	max:9.17/6.7A min:4.58/3.3A	max:9.17/6.7A min:4.58/3.3A
Recommended Battery Size	40-160Ah 12V 10-100Ah 24V	40-160Ah 12V 10-100Ah 24V	60-350Ah 12V 30-175Ah 24V	60-350Ah 12V 30-175Ah 24V
Default Charging Parameters	On: 12.3/24.6V Off: 14.2/28.4V			
Noise	42/25 dB(A) (in 1m/7m distance)			
Ambient Temperatures	-20°C to +50°C			
Warranty	24 months or 4.500h			
Weight	8kg	8.3kg	9kg	9.3kg

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Methanol Cartridges

- Methanol cartridges:
  M5, 5liters, 4.3kg→5.5kWh
  M10, 10liters, 8.3kg→11.1kWh
  M28, 28liters, 25kg→31.1kWh
- Comparison: Lead acid battery with 230Ah/12V (70kg) stores max. 2.76kWh, only 50% can be used without damaging the battery (deep discharge)

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EFOY-OUTDOOR

The reliable OUTDOOR power supply for remote locations

ProCube

OUTDOOR-ALU-XL Box

OUTDOOR-CABINET-XL

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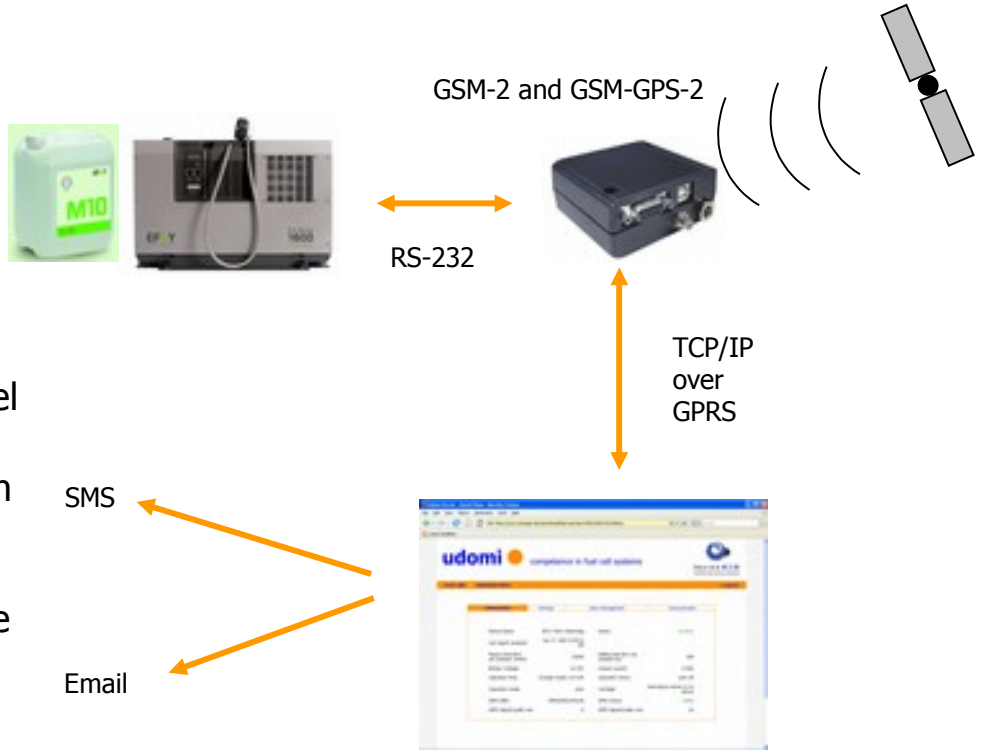
EFOY-ONLINE (GSM-2)

- Monitoring and control of EFOY fuel cell via Webbrowser
  - www.m2mgate.de/udomi/
  - Try demo access
    - user: demo
    - password: demo
- Sends SMS/Email automatically when fuel level is low or system error occurs
- Errors can be located and fixed online (in most cases it is not required to send service personal to fuel cell location)
- EFOY fuel cell can be reconfigured online
- Monthly communication traffic (GPRS) is typically below 1MB
- GSM-GPS-2 combines GSM-2 functions with GPS tracking. Allows user to find current location of EFOY system via Google Maps.



Automatic alarm when fuel level is low or system error occurs

Simple to use Webbrowser interface for monitoring and control

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Thank you for your interest!