



En genopdaget batteriteknologi Teknologisk Institut 1. December 2015

Hvorfor er batterier vigtige i elforsyningen

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Hvad kan batterier gøre for elforsyningen?



- Lokale buffere
 - Batterier så husholdninger og virksomheder kan bruge egen strøm
 - Lokale lagre så forsyningsselskaber kan "peak-shave"
- Resilience
 - Holde kritiske installationer kørende
 - A community owned distributed storage of electricity
- Undgå store investeringer in grid infrastruktur
 - Ved at kunne klippe spidserne af forbruget kan en billigere infrastruktur benyttes
 - Elektriske biler og varmepumper vil forstørre tendensen
 - New York City sagen



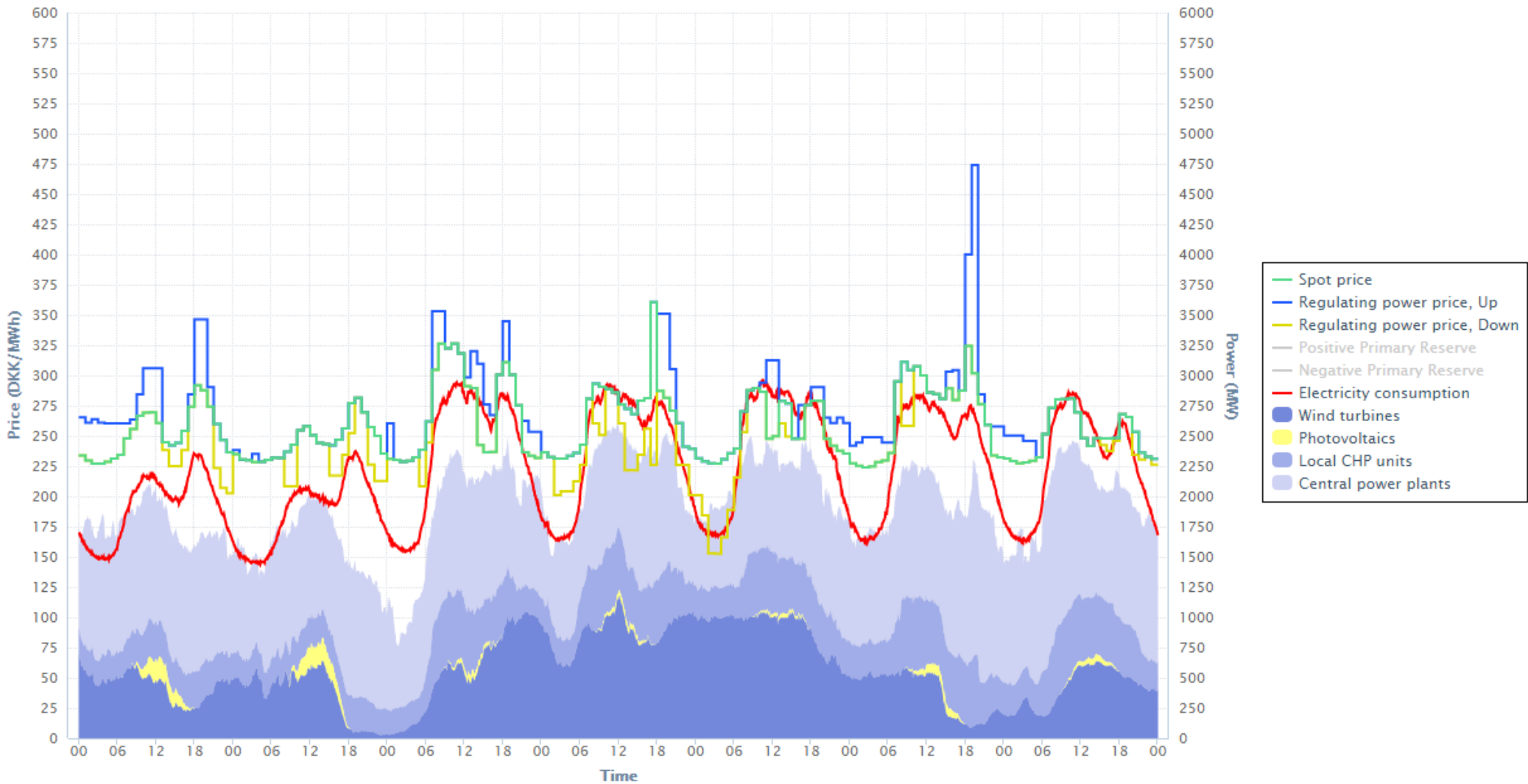
- Virtuelle kraftværker, der stabiliserer grid'et
 - Bosch' Braderup installation med Lithium-ion og Vanadium Redox batterier
- Stabilisering af fluktuationer i vind og sol
- Disse områder må vi lade de store spillere om



The primary Driver



West Denmark, Saturday, 2014-10-11 to Friday, 2014-10-17



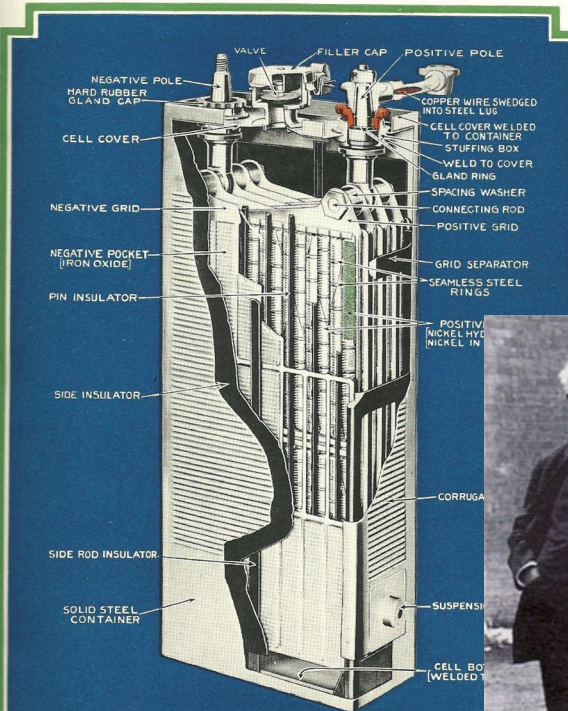
This graph is hosted and maintained by EMD International A/S

Thomas Edison opfandt Nikkel-Jern batteriet



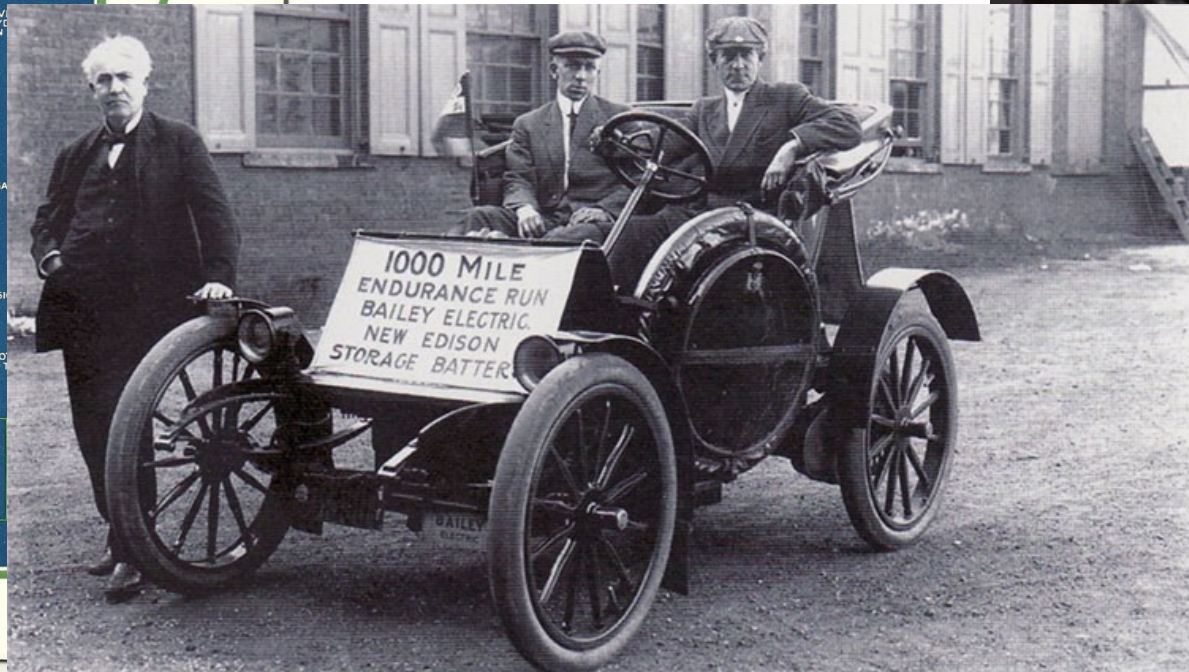
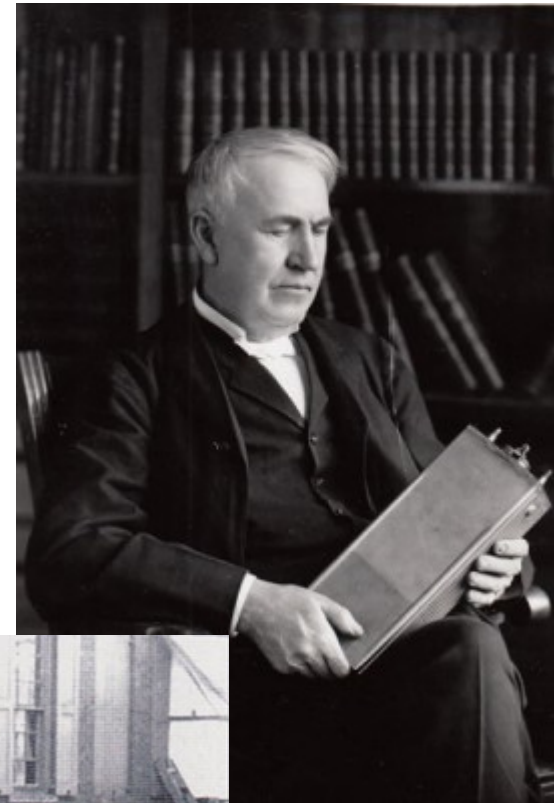
■ NiFe batteri 1901

The Edison Battery



Different
from
all
others

Edison Alkaline Storage Battery.
Being constructed of steel, it is the
strongest and longest lived battery made.



NiFe Battery History

The Edison nickel-iron battery (NiFe battery) is a storage battery with

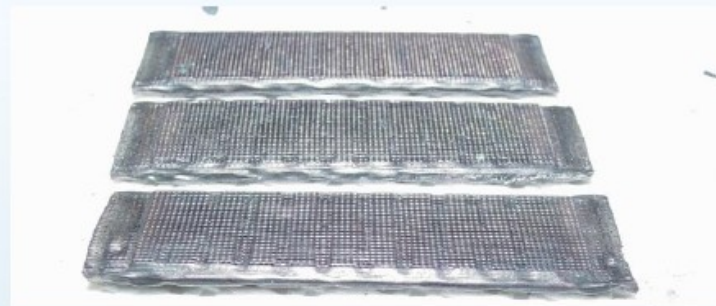
- NiOOH cathode and an Fe anode with a KOH electrolyte,
- Active materials are held in perforated pockets,
- Very robust battery - tolerant of abuse, (overcharge, overdischarge, and short-circuiting),
- Very long life - can be continuously charged and can last for more than 40 years.

Other battery tech have displaced the nickel-iron battery

- High costs in traditional pocket design
- Exide Corporation's decision to abandon the technology in 1975
- Exide remains the second largest manufacturer of lead acid batteries in the world.



Edison battery still in production



Steel pockets holding active material powder



Encell Builds on Proven, Formidable Edison Technology

- The Encell Battery Harnesses Energy From Rusting
- Thomas Edison Was Right
 - Encell Has Re-Engineered It!
 - Proprietary *Fused Iron Technology*™



- Encell Technology Delivers Unrivaled Life & Robustness, High Power Performance & Efficiency, Inexpensive and Simple to Implement.

Modern Concepts:
NiMH, NiCd



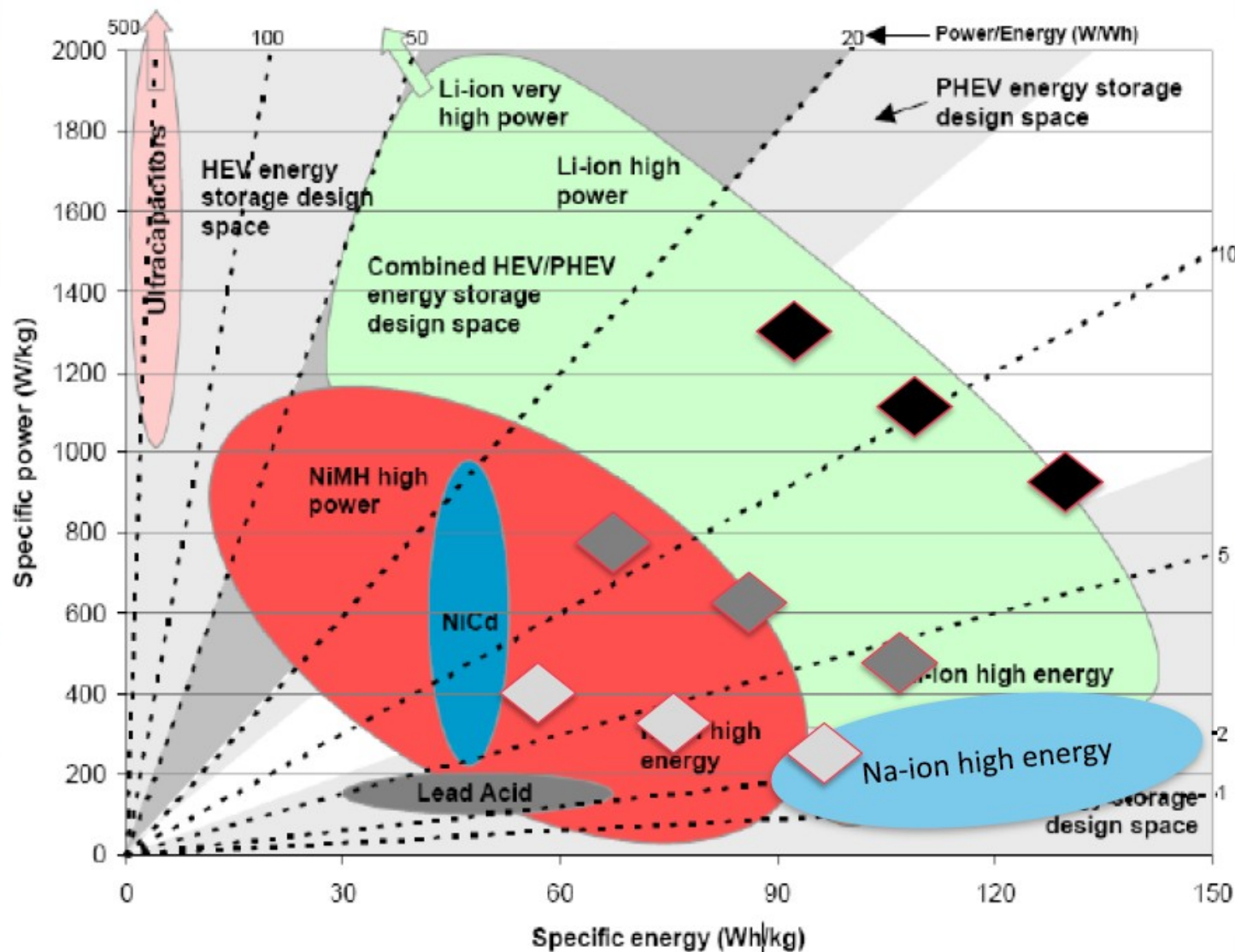
Proven,
Mature
Mfg. Process



Fused Iron Technology™ Generates 40+ Patents

- **Levetid** – Længste levetid af kendte batterikemier. Ikke nogen kendt mulighed for fejl af de aktive materialer. Edison batterier er set fungerende op til 80-100 år efter produktion.
- **Temperaturområde** – fin høj temperatur performance. Meget bedre end NiMH, LiIon, NiCd, bly og NiZn. Performance er fin ved 80° C.
- **Robusthed** – Den mest robuste af alle kendte batterikemier overfor misbrug. Kan klare ekstrem overladning, fuld afladning enda reversering af polaritet og kortslutninger uden at ødelægges. Elektroderne er også stabile mekanisk, de udvider sig ikke og frembringer ikke mekanisk stress.
- **Kompakt** – Har potentiale til at være mindre og lettere end andre kemier, har den næststørste teoretiske kapacitet efter LiIon (960AH/kg)
- **Effektivitet** – Har potentiale til at blive det mest effektive batteri pga. Dne kemiske reaktions natur.
- **Fremragende sikkerhed** - Sikreste: der er ikke nogen kendt termiske ustabilitet, kan ikke eksplodere eller brænde som følge af brug.
- **Miljø sikkerhed** – da der ikke bruges syre eller farlige metaller. Produktionen vugge-til-grav er også særdeles svagt belastende for miljøet. Råvarerne findes i rigelige mængder på planeten
- **Enkel styring** – der kræves kun simpel elektronik til at lade og aflade, derfor også lav tab i elektronikken
- **Pris** – pris lavere eller sammenlignelig med bly-batterier (PbAcid)

Encell NiFe Power/Energy Density



NiFe Technology
Rivals Li-Ion with:

- *Lower Cost,*
- *Better Life, &*
- *Better Safety*

ENCELL MGPP

-  R1.0
-  R2.0
-  R3.0

We are proud to introduce the MG1 series

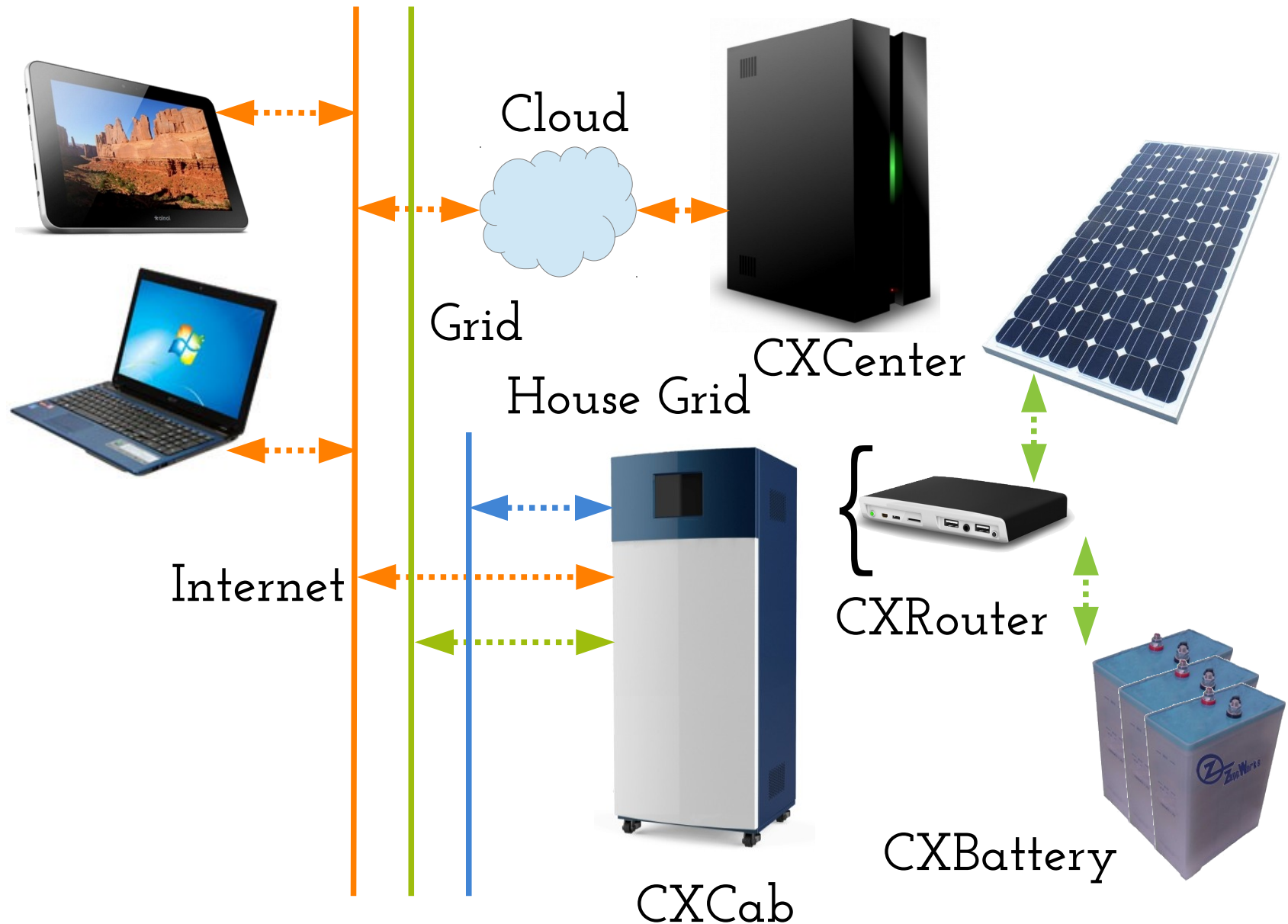
■ The Micro-Grid and Utility Battery From Encell

- ✓ MG1- Series (C/2 rated)
- ✓ 6 liters
- ✓ 10-14Kg
- ✓ 157mm x 108mm x 356mm
- ✓ 15,000+ 80% DOD cycles (20C)
- ✓ 4,000+ 80% DOD cycles (40C)
- ✓ 15 – 20 year life.
- ✓ Maintenance interval up to 1 year
Dependent on application
- ✓ Designed for BOM cost down

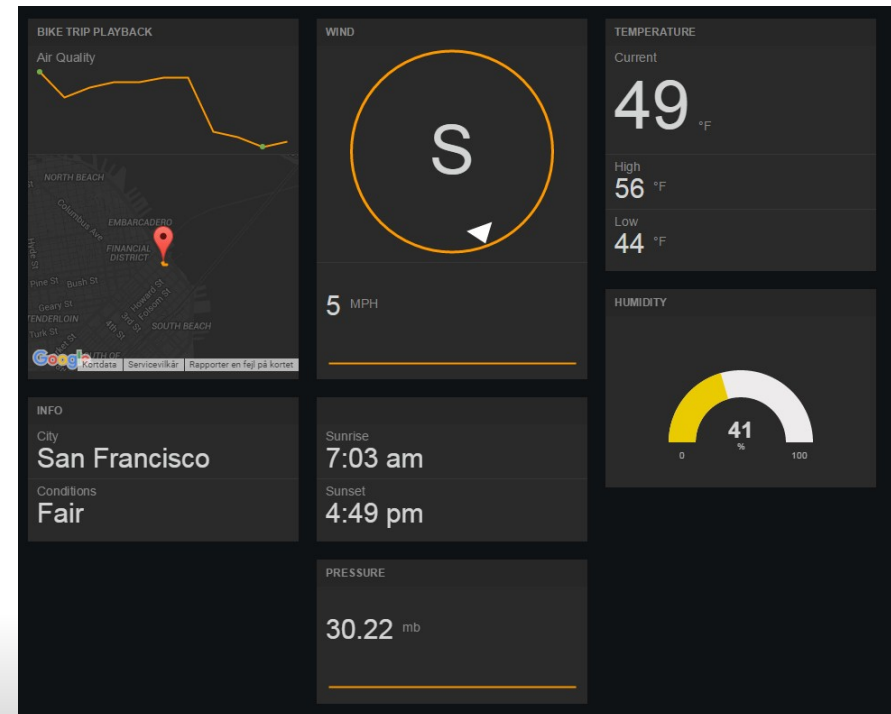


260Ah &
300Ah are
Available.
350Ah on test
400Ah -
Q1 2015.
500Ah Q3
(Revision 1.1)

CXP Local Energy Management Solution



- Open Source software på CXCenter for forsyningsselskaber at benytte sig af
- Open Source software på CXRouter (Linux, Java)
- Hardware for CXRouter < USD 10
- Sensorer indbygges i battericeller for effektiv monitorering
- Åben API så integrationer kan udføres
- Open Source Dashboard (FreeBoard)

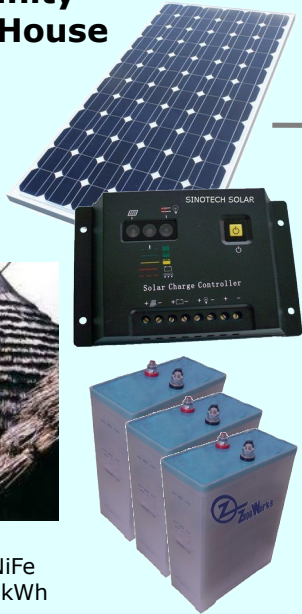


CxPower Third world concept



Community Power House CPH

\$1800



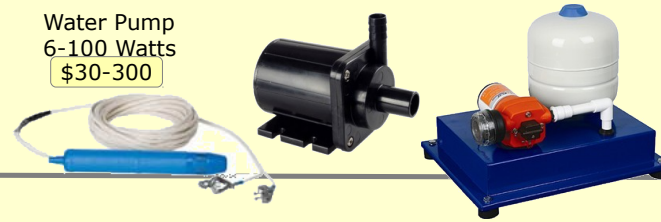
Community Appliances #2 12V

Water purifier
10-24 Watts

\$200-300



Water Pump
6-100 Watts
\$30-300



Refrigerator
16-20 Watts
\$100-300



Community Appliances #1 5V, 12V

Inverter 220V

\$30

220V



Printer



Scanner



Monitor



Camera



Charger NiMh

\$10



CXRouter control unit
3-8 Watts

\$100



\$50-100
3G/GSM Modem
3-12 Watts



Portable PowerPacks PPP

100-140 wH

50 wH



\$75 pcs



\$20 pcs

Personal Appliances 5, 12V

LED Light
2-6 Watts

\$10 pcs



Charge phone
2-6 Watts



Tablet
2-6 Watts

\$100-150



Radio
2-4 Watts

\$20



CXMedia
3-8 Watts

\$100



Monitor
10-18 Watts

\$100-300

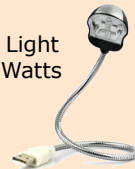


Fan



Carry home

LED Light
2-6 Watts



Charger NiMh

\$10



Tablet
2-6 Watts



Tablet speaker 2W



Audio Amp 2-20 Watts



\$30



Insect killer
4W

