

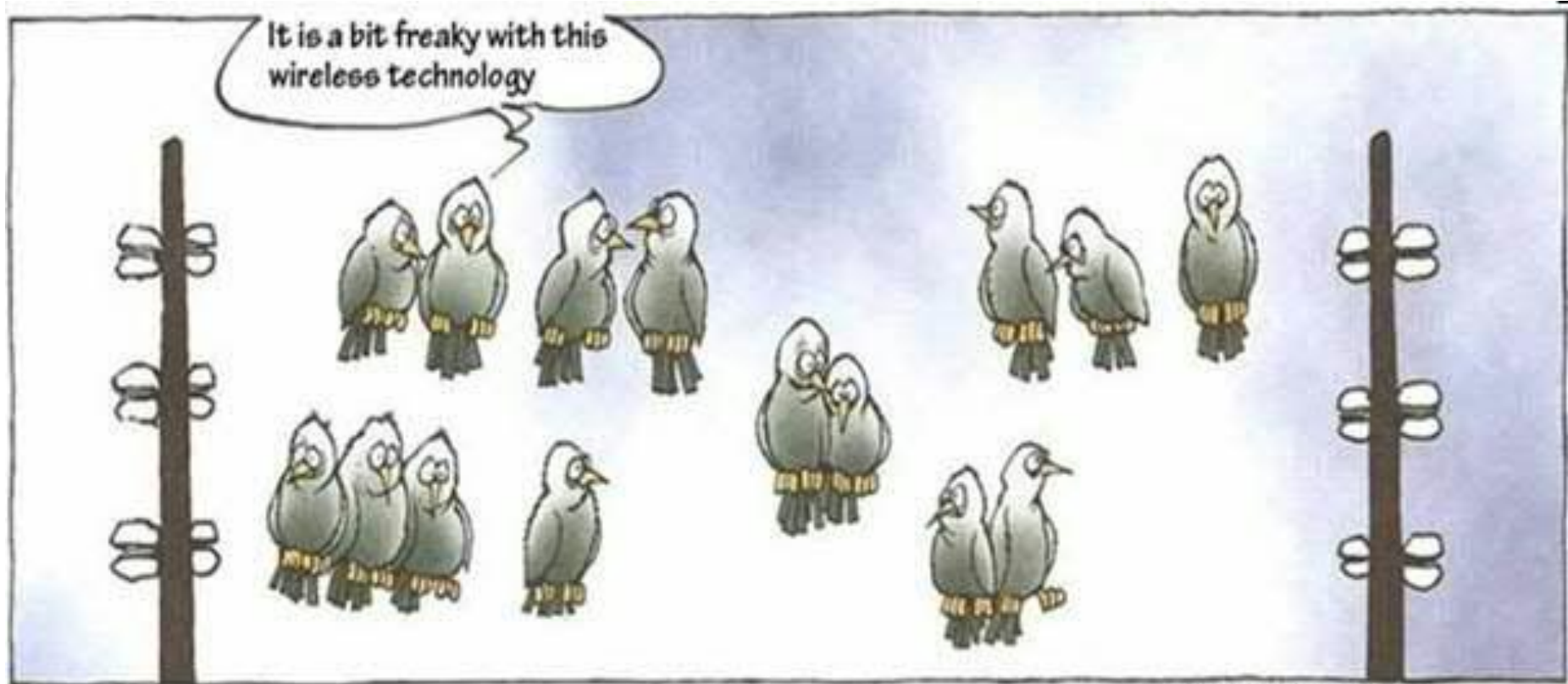


Madrid, 25 y 26 de mayo de 2015

ABB Automation Days Energy Harvesting for Wireless Instruments

Energy Harvesting for Wireless Instruments

No Wires → No Problems?



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Energy Harvesting for Wireless Instruments

Batteries: The primary source of power today

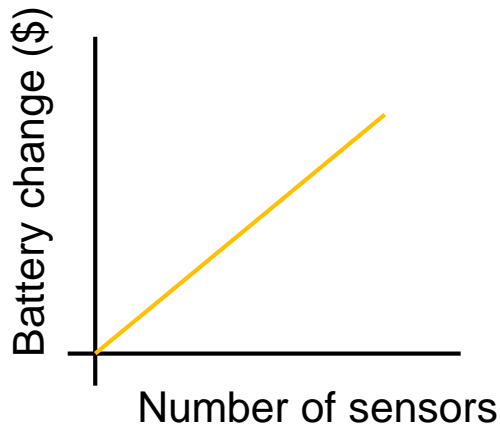


Power Source: **Batteries**

- (+) Sufficient power
- (+) Cheap
- (-) Finite energy

Drawbacks:

- Overall maintenance cost of changing batteries
 - Labour + material (Locating, changing, documentation.....)



Energy Harvesting for Wireless Instruments

Update rate and network size affect battery life

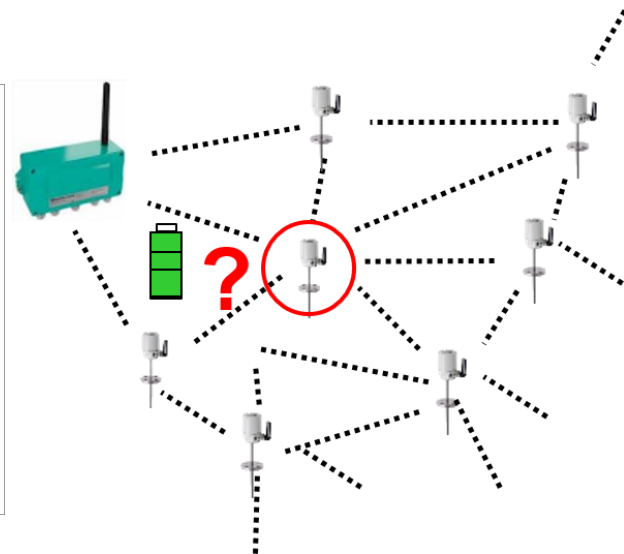
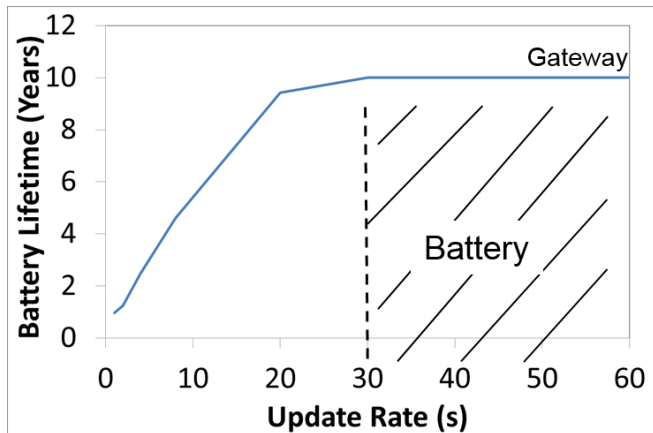


Current state of the art:

- 6 year battery life at 16 sec update rates and at 21°C

Application areas:

- Monitoring applications (update rates > 1 min)
- Low probability of sensor acting as a router (smaller network)



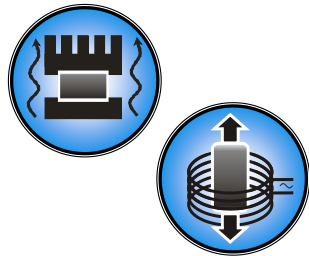
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No Wires → No Power Supply!



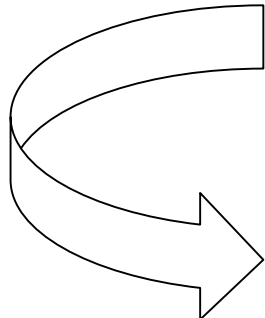
Batteries

- (-) Limited lifetime
- (+) “Unlimited” power



Pure Energy Harvesting

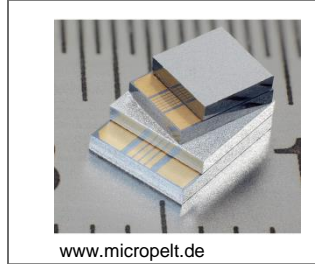
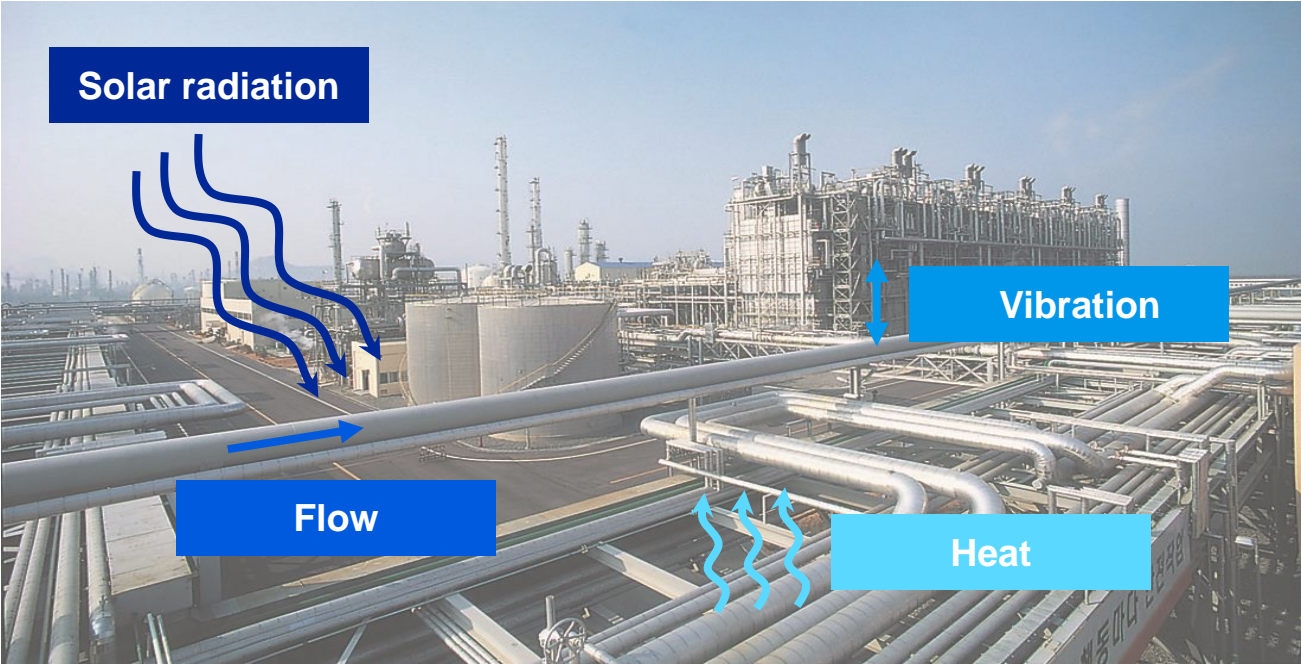
- (-) Limited power
- (+) “Unlimited” lifetime



Power
management

Energy Harvesting for Wireless Instruments

Industrial and Ambient Sources



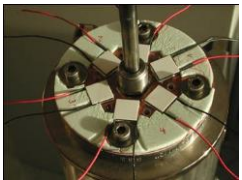
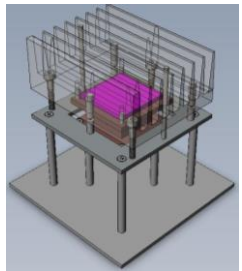
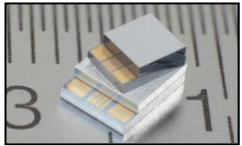
www.micropelt.de



www.hsg-imit.de

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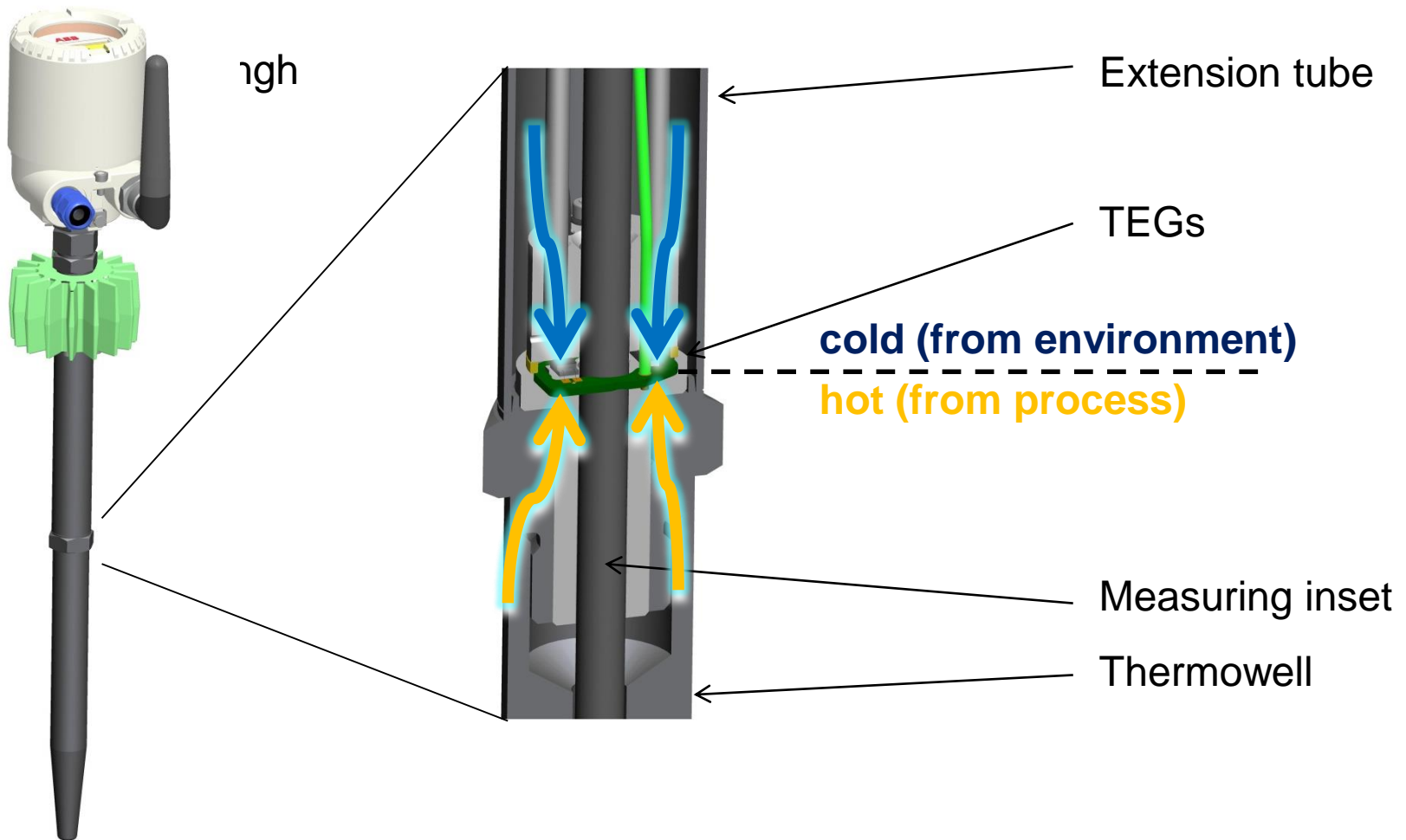
Thermoelectric Generators (TEGs)



- Characterization of both conventional- and micro-TEGs
- Conventional TEGs
 - Recommended for price-sensitive applications which allow for bigger module sizes.
 - Low output voltages require sophisticated power management.
- Micro-TEGs
 - High power density @ high output voltages.
 - Recommended for integrated designs and efficient power managements.

Energy Harvesting for Wireless Instruments

TEG Temperature Flow



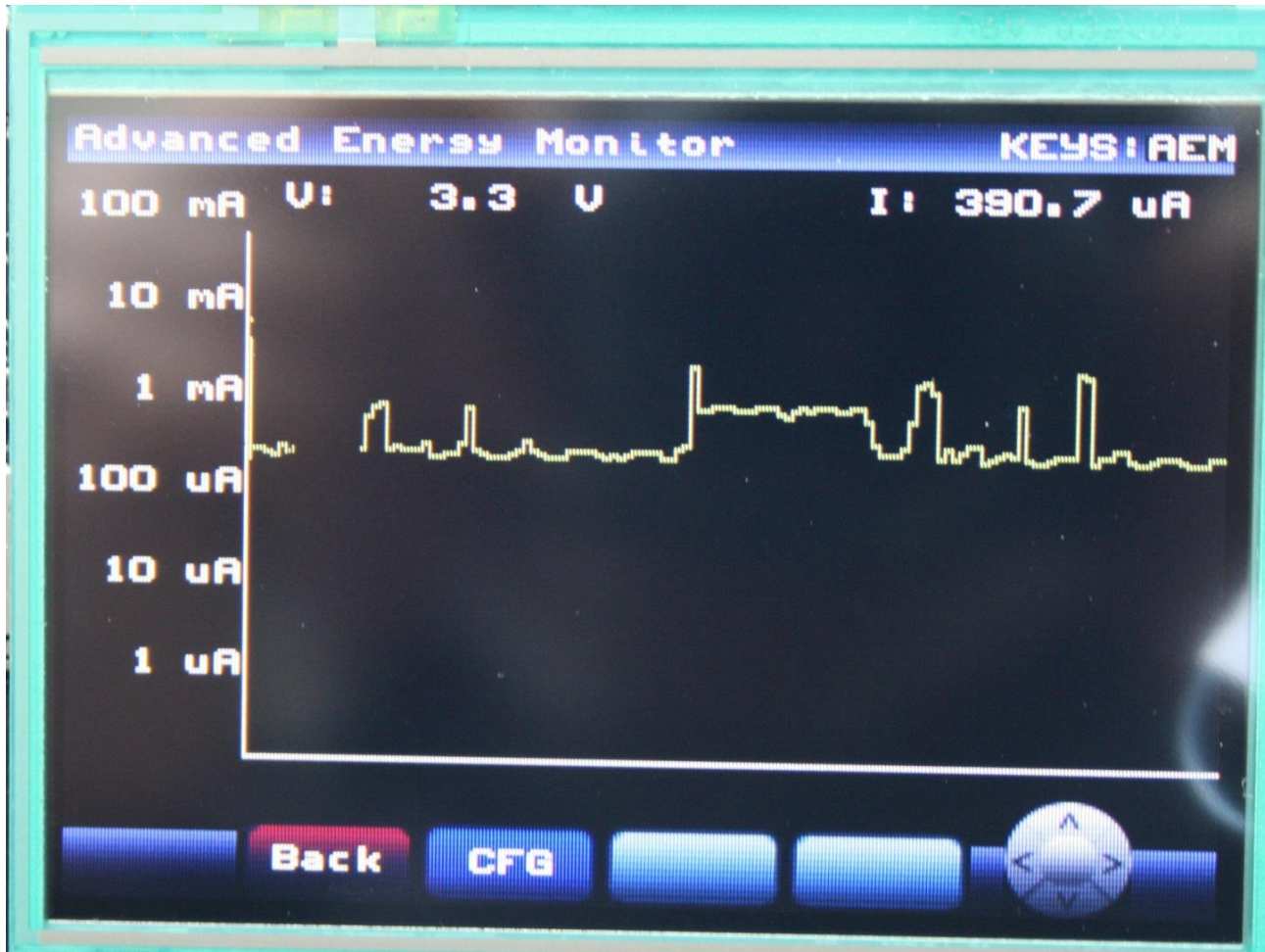
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Ultra low power design is the key

HART device
4mA @ 6V
24mW

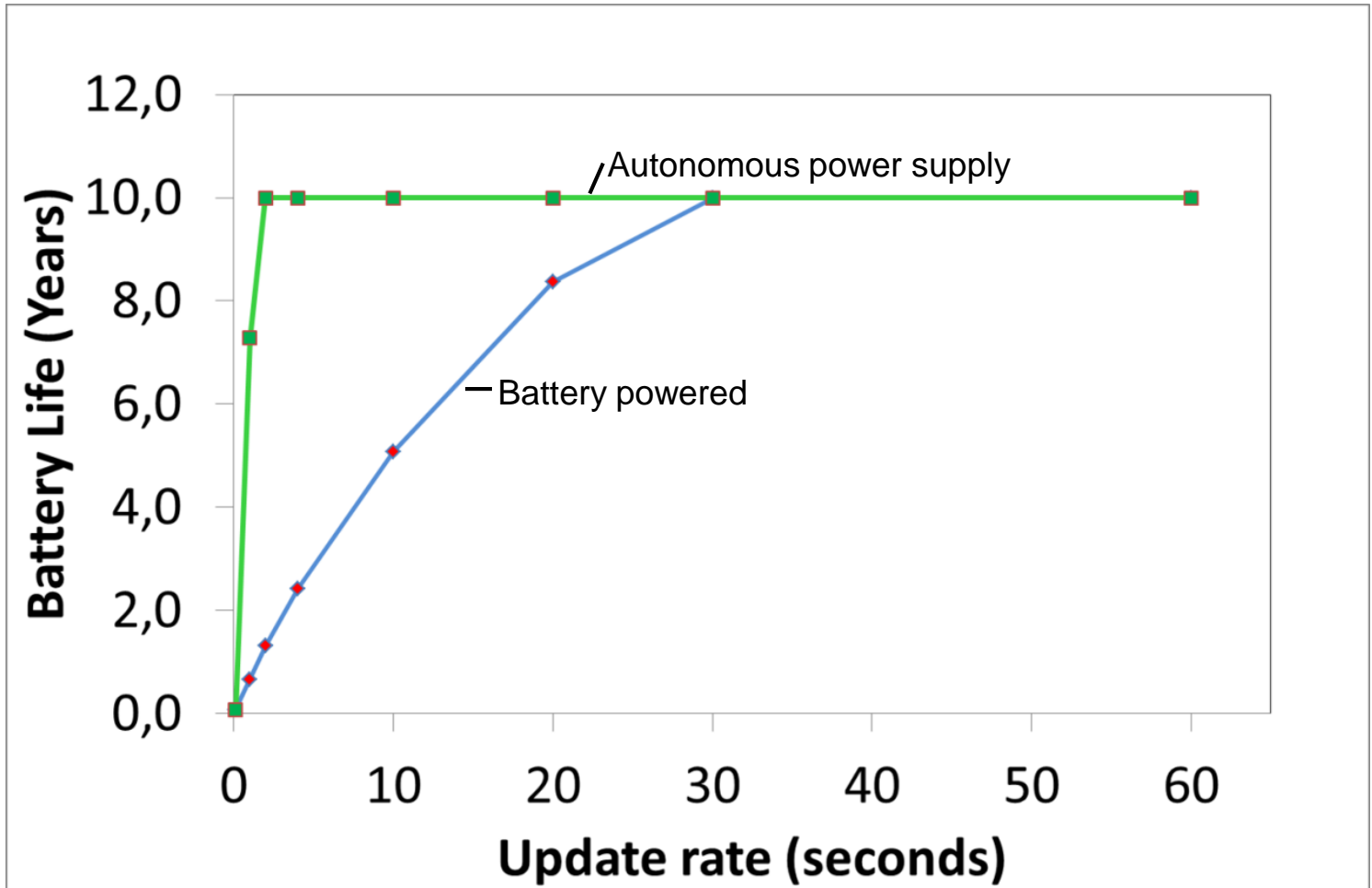
WirelessHART device
400µA @ 3V
1,2mW

Factor 20 in power
consumption

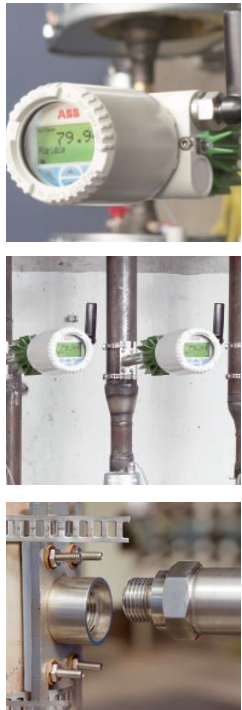


Energy Harvesting for Wireless Instruments

Enlarge life cycle of battery powered wireless devices



Energy Harvesting for Wireless Instruments Powered by the process – Energy Harvesting



Features

- Process heat use for energy ($\Delta T \approx 30$ K), use the backup battery from ($\Delta T \approx 10$ K)
- Battery life time > 10 years regardless of "communication load"
- Communication protocol
Wireless HART (2,4 GHz)
- Intrinsically safe in hazardous areas
(Zone 0, 1, 2)
- Commissioning via display, with HART handheld or control system
- Configurable with EDD, DTM, display
- Surface mount for non-invasive measurement and installation without interruption of production

Energy Harvesting for Wireless Instruments The ABB Choice

- In almost every plant we dissipate heat which is lost in atmosphere.
- Recovering the heat and using it to feed power to field devices is a smart, cheap and sustainable concept.



Power and productivity
for a better world™

