

Measurements on energy monitoring devices

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Smart meters in Sweden

- New requirements on monthly meter readings initiated a rollout in 2007
- Main goal: improve billing information to consumers. From infrequent bills based on predicted energy consumption to monthly billing of measured energy consumption.



Smart meters in Sweden

- Real time feedback of energy usage to consumers was also considered, but not implemented in most cases
- Today a lot of third parties sell devices to measure and report energy consumption. Even some utility owners provide these (not using their own smart meters)



Test of Energy Monitoring Devices



Aim

- Show consumers which products can help them to understand their electricity consumption
- Learn more about energy consumption of these devices
- Evaluate user friendliness of installation and usage

Test methodology

- Laboratory:
 - Energy consumption of all parts
 - Gateways, transmitters, smartplugs and screens.
Including battery powered devices.
 - Measurement of response time



Test methodology

- Field test:
 - Installation time
 - User friendliness



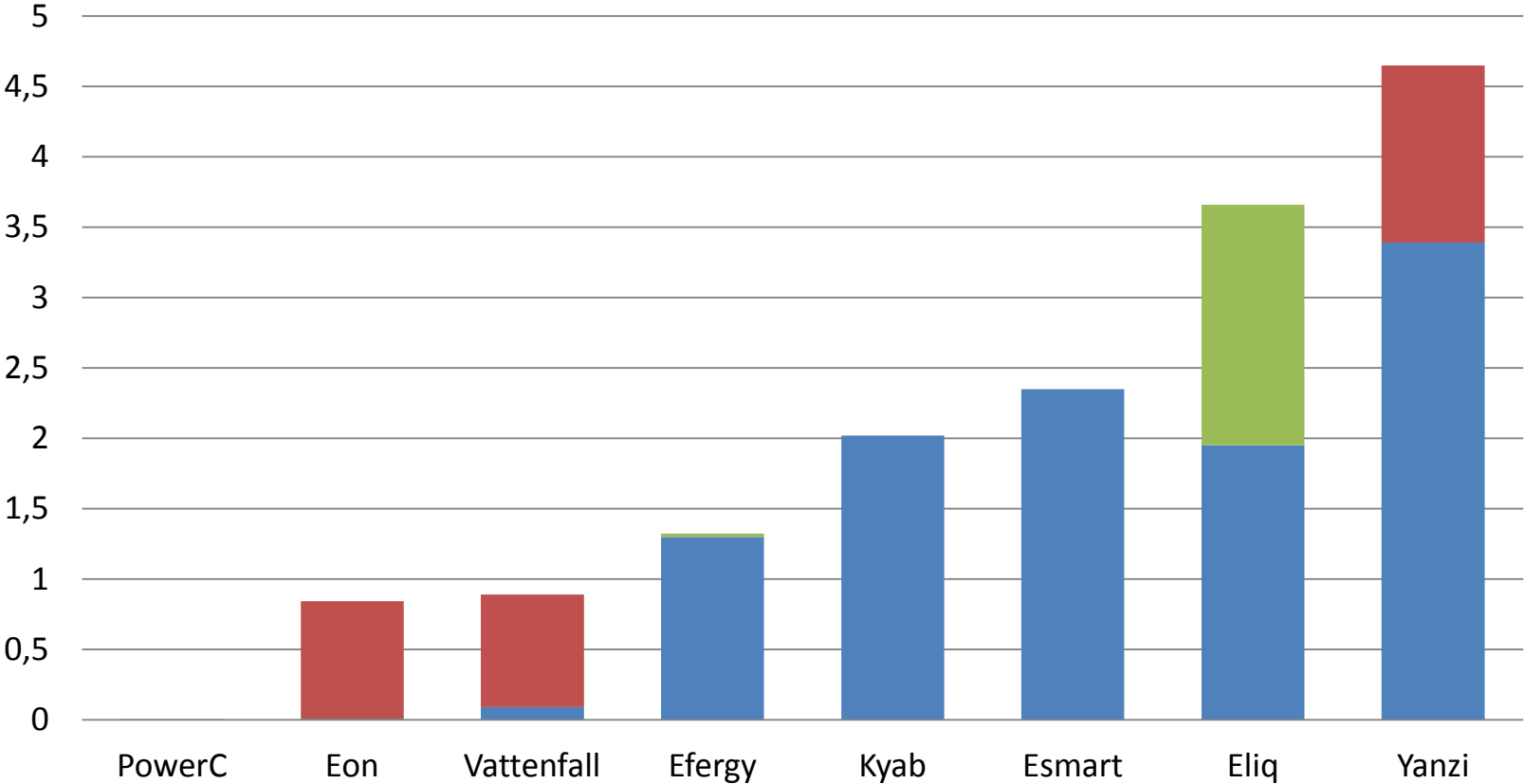
Results – Laboratory tests

- Energy consumption was measured over a few transmitting cycles and averaged over time
- Equipment: Yogokawa WT3000

Brand	Efergy	Eliq	Vattenfall	Kyab	Yanzi	PowerC	Esmart	Eon
Average energy consumption (red = battery)	1,32 W	3,66 W	0,89 W	2,02 W	4,65 W	0,01 W	2,35 W	0,84 W
kWh per annum	12	32	8	18	41	0	21	7
Hub/gateway	1,30	1,95	0,089	2,02	3,39	-	2,35	0,008
Transmitter	0,003	-	-	-	-	0,004	-	-
Display	0,022	1,71	-	-	-	0,006	-	-
Smartplug on	-	-	0,80	-	1,26	-	-	0,83
Smartplug off	-	-	0,80	-	0,67	-	-	0,77

Results – Laboratory tests

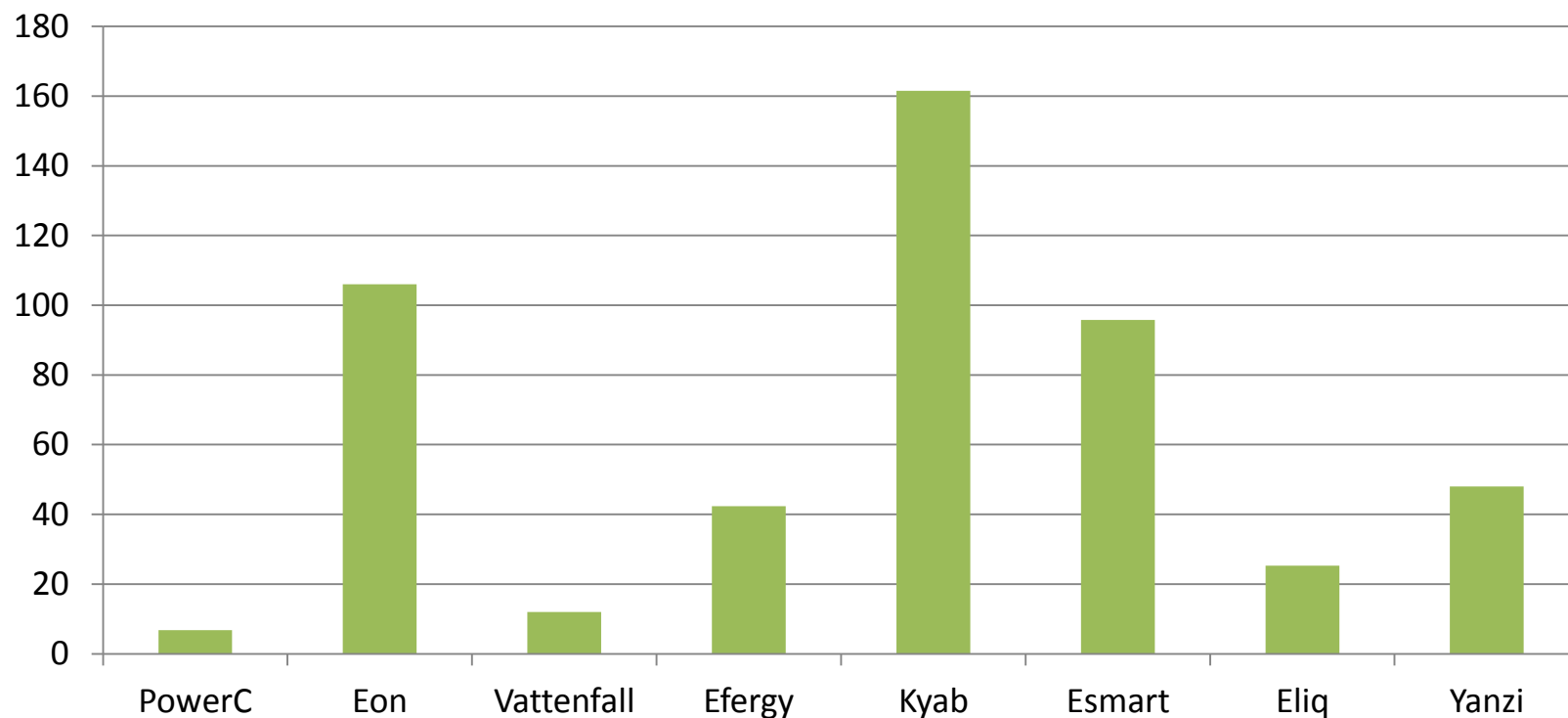
Energy consumption in Watt



■ Gateway ■ Smartplug (1 pcs) ■ Display

Results – Laboratory tests

Response time in seconds



Time difference between turning on an oven and the new consumption showing on the device.

Results – Field test

- Most devices were easy to use and install
- Some installations unnecessarily complicated (and took up to 20 minutes)
- Devices not really "smart", do not provide any help in identifying problems/opportunities
- Only 3 products had interactive functions (e.g. compare to others, set saving targets, energy coach, challenges)

Some recommendations

- Integrate energy saving advice into the user interface, both general and user specific advice
- Use more relative measures (energy consumption of neighbour or similar families) instead of just kWh.
- Offer the users help in identifying their different devices and how much each device uses.

Thank you for your attention!

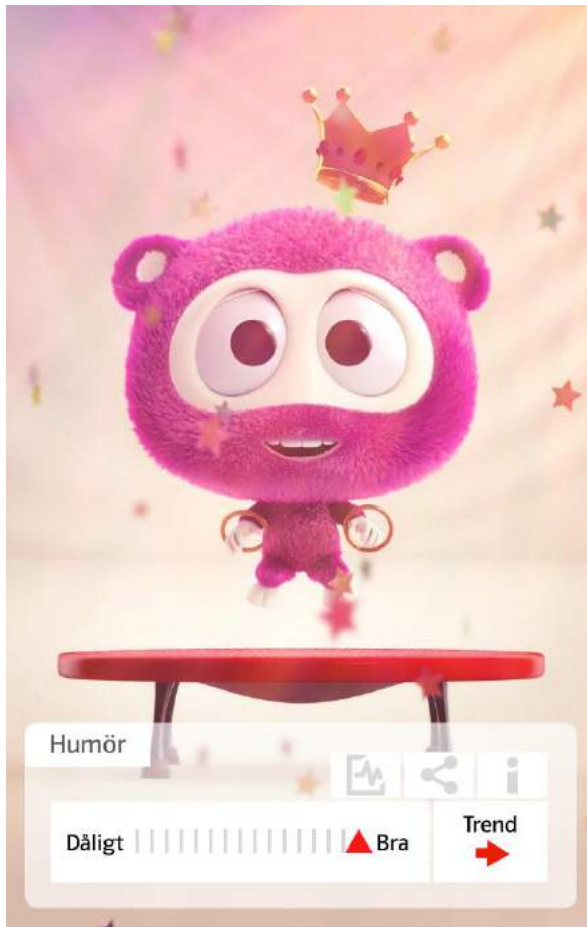
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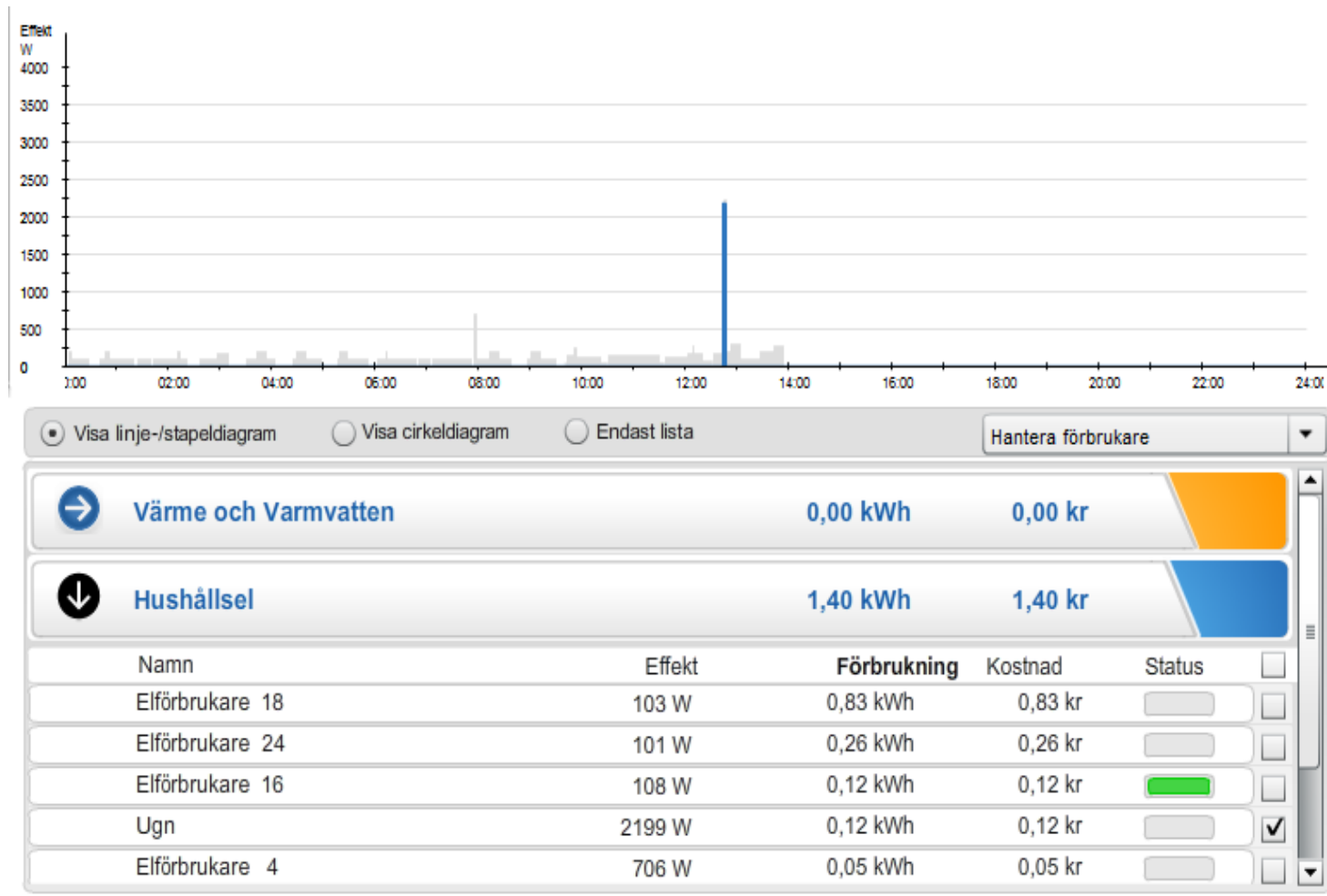
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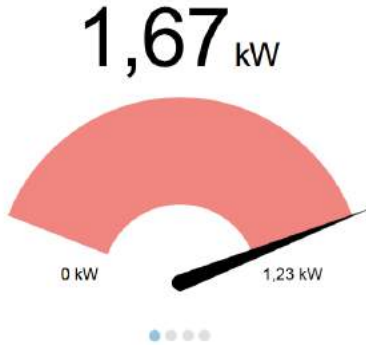
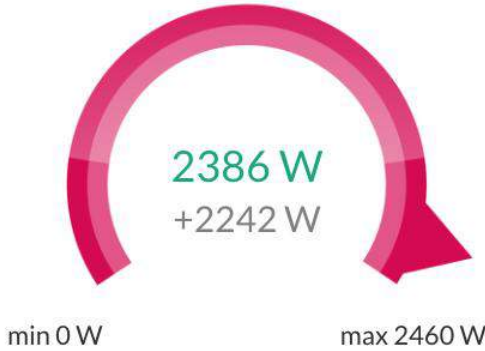
Examples of feedback - Bongo



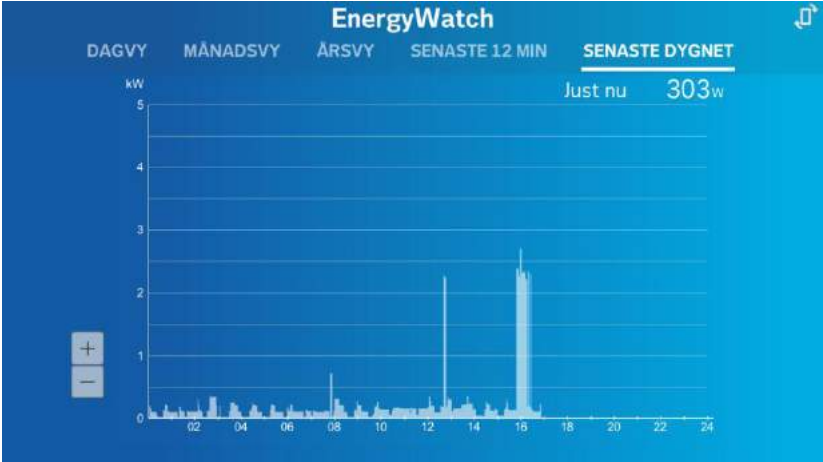
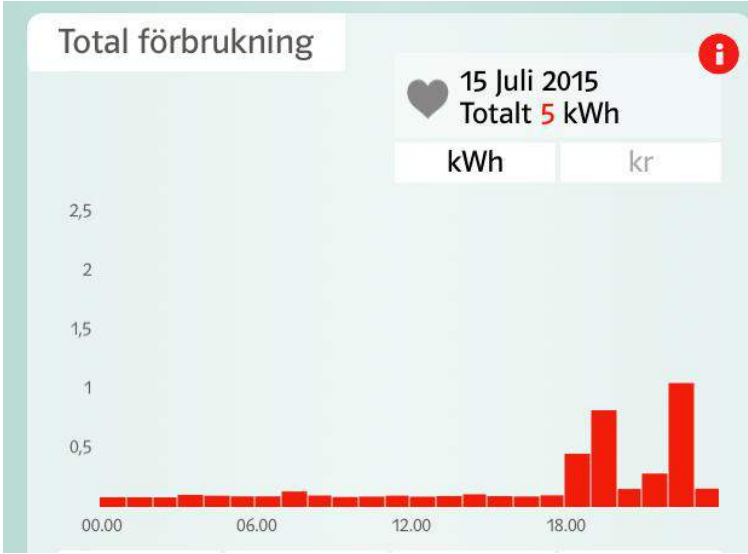
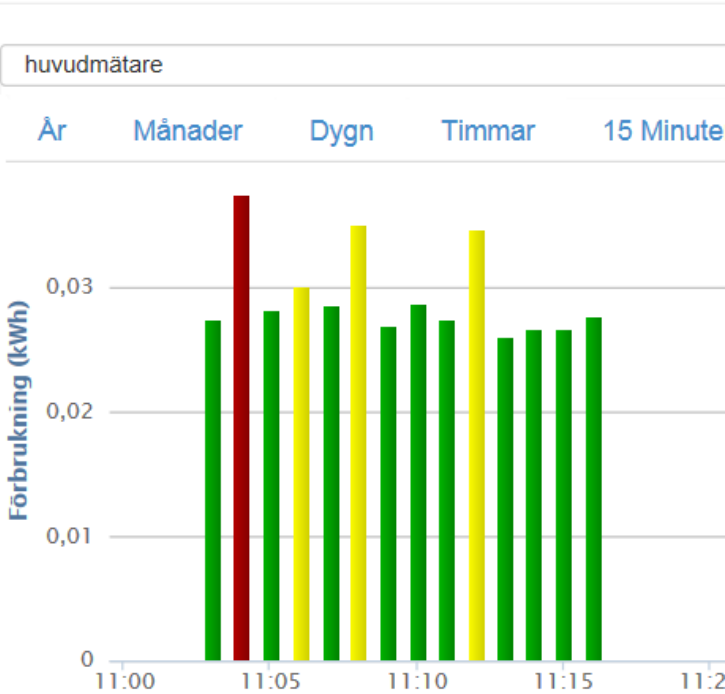
Examples of feedback – Identifying devices



User interface – current consumption



User interface – historic consumption



Brand	Efergy	Eliq	Vattenfall	Kyab	Yanzi	PowerC	Esmart	Eon
Product information								
Website	efergy.com	eliq.se	vattenfall.se	kyab.se	yanzi.se	powerconcern.se	esmart.se	eon.se
Product name	Engage Hub Solo & Efergy e2	ELIQ Energy Online & Display	Energywatch & Smart Plug	SaberHome	Yanzi Start	PMD 1050	Esmart Epro	100koll
Price (SEK)	1 200 kr	2 000 kr	EW. 1450 kr Smart Plug 499 kr	7 500 kr	3 000 kr	900 kr	3 875 kr + 750 kr/year	15 kr/month only for Eon customers
Allows for monitoring on								
App (mobile)	X	X	X			X		X
Website	X	X	X	X	X	X	X	X
Dedicated display	X	X				X		
Product description								
All except one product monitor the electricity consumption with a light- sensor that monitors the blinking LED-light on the electricity meter. (This light usually blinks with a 1000 pulses per kWh). Evaluation (0-100)	Sensor connects to a battery powered transmitter, which transmits the signal wirelessly to the display and the hub. The hub is connected to internet by cable.	Sensor/transmitter transmits the signal wirelessly to the touch-display and the hub. The hub is connected to internet by cable.	Sensor is connected to the hub with a wire. The hub is connected to the internet wirelessly.	Sensor connects to the hub with a wire. The hub is connected with the internet by cable.	Smartplug is connected wirelessly with the hub/gateway. Hub is connected to the internet by cable.	Sensor connects to a transmitter by cable. Transmitter connects wirelessly to the handheld display.	Sensor connects to the hub with a wire. The hub is connected with the internet by cable.	Sensor is connected to the hub with a wire. The hub is connected to the internet wirelessly. Smartplug is connected to the internet wirelessly.
	7	8	6	5	7	7	7	8
Energy consumption (W avg) (red = battery)								
per annum	1,32 W	3,66 W	0,89 W	2,02 W	4,65 W	0,01 W	2,35 W	0,84 W
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Installation time

