

Profiles for the new FBC

Residential use case profile suggestions for occupancy, lighting load, plug load, and DHW

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Occupancy – ihmiset

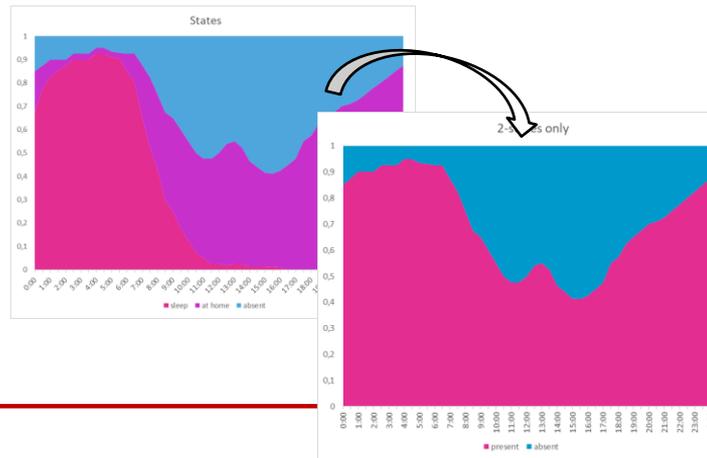
Current state

- Profile = 0.6, hourly distribution
- 3 W/m² load into the entire internal area (floor+walls)
- **Constant MET 1.2**
- 1 person/28 m²



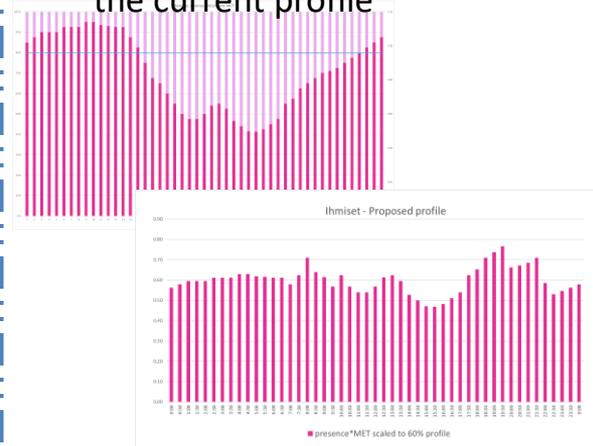
Reason and direction to renew

- MET variation is missing: sleeping 0.7... active 1.2 that leads to sizing mistakes
- Same 0.6 profile but weight in the MET
- Based on Aerts 2014 (3 states) → 2 states: absence (30%) / presence (70%)



Proposal

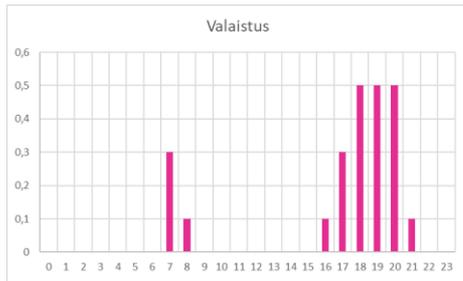
- 1: Presence/absence (p/a) with constant 0.96 (~1) MET
- 2: Variable MET reflecting the p/a ratio, scaled to 0.6 to keep the current profile



Lighting – valaistus

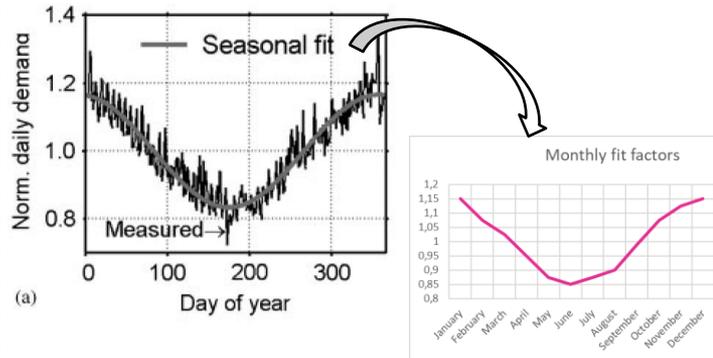
Current state

- Profile = 0.1, hourly distribution
- 6 W/m² load
- Constant montly distribution



Reason and direction to renew

- The least influential and least re-searched load but could be updated following a seasonal variation
- Montly correction factors (average = 1) from the Plug load proposal



Proposal

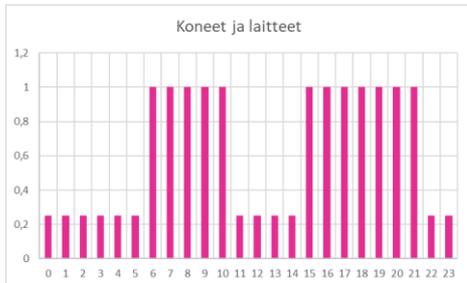
- 0.1 profile kept, only monthly correction is suggested:

January	1,15
February	1,075
March	1,025
April	0,95
May	0,875
June	0,85
July	0,875
August	0,9
September	0,99
October	1,075
November	1,125
December	1,15
AVERAGE	1,00

Plug loads – koneet ja laitteet

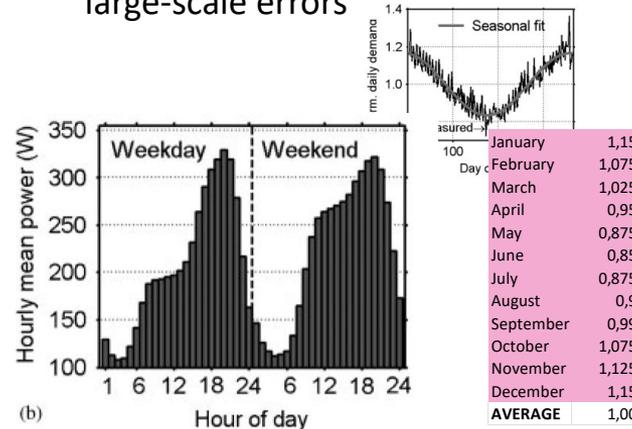
Current state

- Profile = 0.6, hourly distribution
- 3 W/m² load
- Constant weekly and monthly distribution



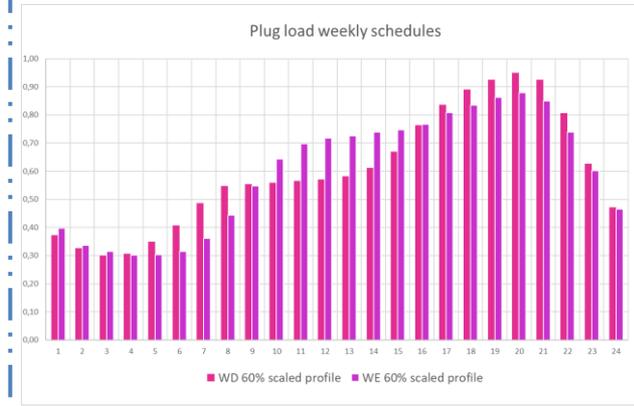
Reason and direction to renew

- Long-known, clear WD-WE differences
- A large seasonal variation annually (see at Lighting: Seasonal fit)
- When unconsidered, it may lead to large-scale errors



Proposal

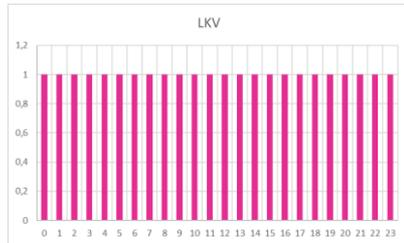
- 0.6 profile kept, both WD/WE and monthly correction
- Below the WE and WD hourly schedules separated:



DHW – lämmin käyttövesi

Current state

- Profile = 1, constant
- 35 kWh/m² annually, max 4200 kWh/year
- Constant daily, weekly and seasonal distribution



Reason and direction to renew

- Known large seasonal variation
- Peaks to be missed: sizing errors
- Mistake source for a STHC addition

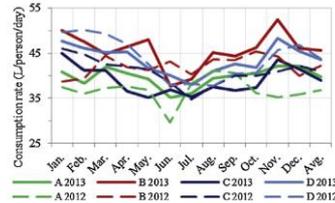


Fig. 9. Comparison of mean consumption rate of DHW for two consecutive years.

Big variation due to apartment size and occupant number: *the lesser the occupant the more the /person consumption.*

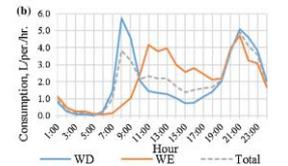
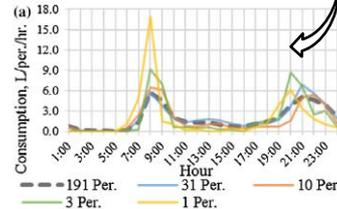
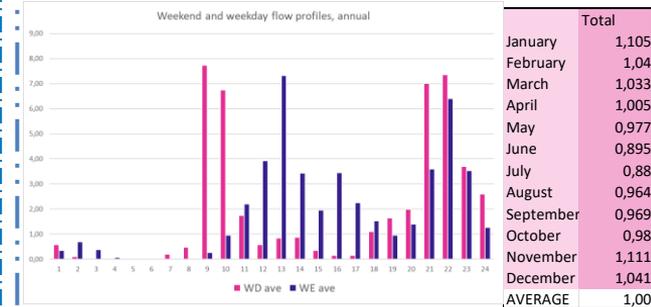


Fig. 11. Hourly average profile of DHW consumption for month of (a) August, (b) November and (c) January.



Proposal

- 2x single overall hourly flow profiles for the whole year: for WD and WE (based on 3 persons in one apartment data).
- To weight the seasonal variation, monthly correction factors to be used (research result).



Preps for the new EPBD – PV and profiled load

Solar generation

- [Article 10](#)
- Aims to **maximize the generation**, NOT the use matching, under certain feasibility conditions
- Concerns both solar electricity and solar thermal energy
- Significant difference can be expected when an electric battery is added, then the profiles influence more

Comparison to the flat profile

- SFH: the electric load variation is little (LVI + plug + lighting, ~0.5 kW)
- The difference in all cases (E-S-W, oversized and sized) is around 2-3 %

16 panels										
South, 45 deg										
105 %										
No battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	4746	3288	69 %	31 %	3047	102 %	64 %	68 %
	modifsch	4504	4746	3346	71 %	29 %	3103	102 %	65 %	69 %
Battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	4746	2131	45 %	55 %	2102	102 %	44 %	47 %
	modifsch	4504	4746	2171	46 %	54 %	2146	102 %	45 %	48 %
West, 45 deg										
75 %										
No battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	3365	1981	59 %	41 %	3120	104 %	93 %	69 %
	modifsch	4504	3365	1918	57 %	43 %	3056	104 %	91 %	68 %
Battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	3365	1007	30 %	70 %	2316	105 %	69 %	51 %
	modifsch	4504	3365	995	30 %	70 %	2290	105 %	68 %	51 %
East, 45 deg										
76 %										
No battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	3430	2046	60 %	40 %	3120	104 %	91 %	69 %
	modifsch	4504	3430	2182	64 %	36 %	3256	104 %	95 %	72 %
Battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	3430	1047	31 %	69 %	2326	105 %	68 %	52 %
	modifsch	4504	3430	1153	34 %	66 %	2443	105 %	71 %	54 %

Conclusion and Proposal

- The best matching (\neq maximization!) is achieved with a smaller array (below 50%, properly oriented) and combined with a battery
- The profile would be more visible in more dynamic building uses

8 panels										
South, 45 deg										
55 %										
No battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	2455	1224	50 %	50 %	3273	102 %	133 %	73 %
	modifsch	4504	2455	1302	53 %	47 %	3350	102 %	136 %	74 %
Battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	2455	346	14 %	86 %	2562	102 %	104 %	57 %
	modifsch	4504	2455	391	16 %	84 %	2618	102 %	107 %	58 %
4 panels										
South, 45 deg										
27 %										
No battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	1228	278	23 %	77 %	3555	102 %	289 %	79 %
	modifsch	4504	1228	351	29 %	71 %	3627	102 %	295 %	81 %
Battery	Loads	ete demand (kWh)	PV gen	sold	% sold	%matched	purch	% purch	% purch to PV	% purch to dem
	default	4504	1228	4	0 %	100 %	3340	101 %	272 %	74 %
	modifsch	4504	1228	5	0 %	100 %	3363	101 %	274 %	75 %