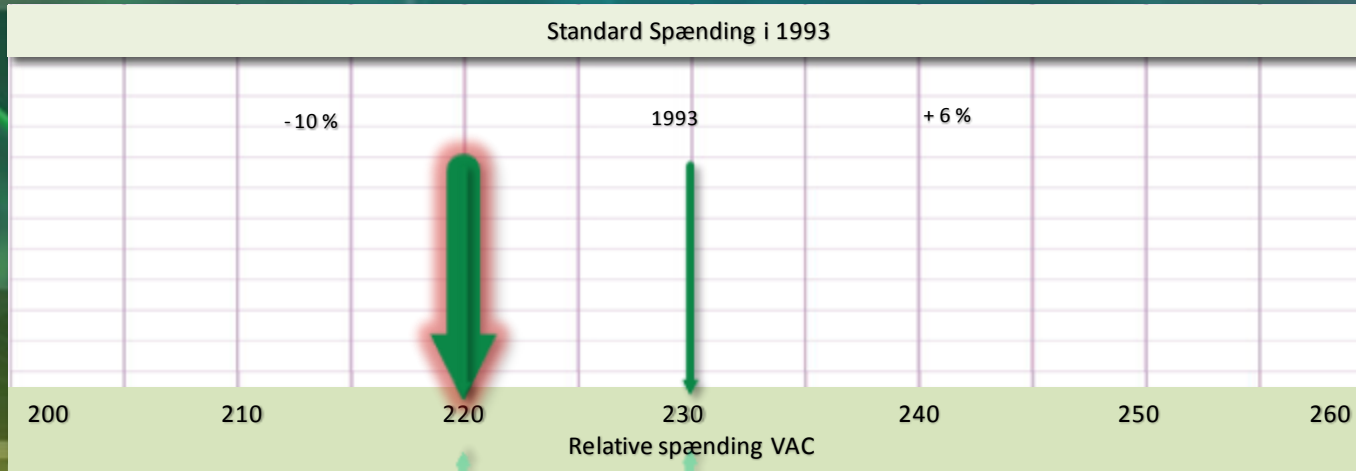
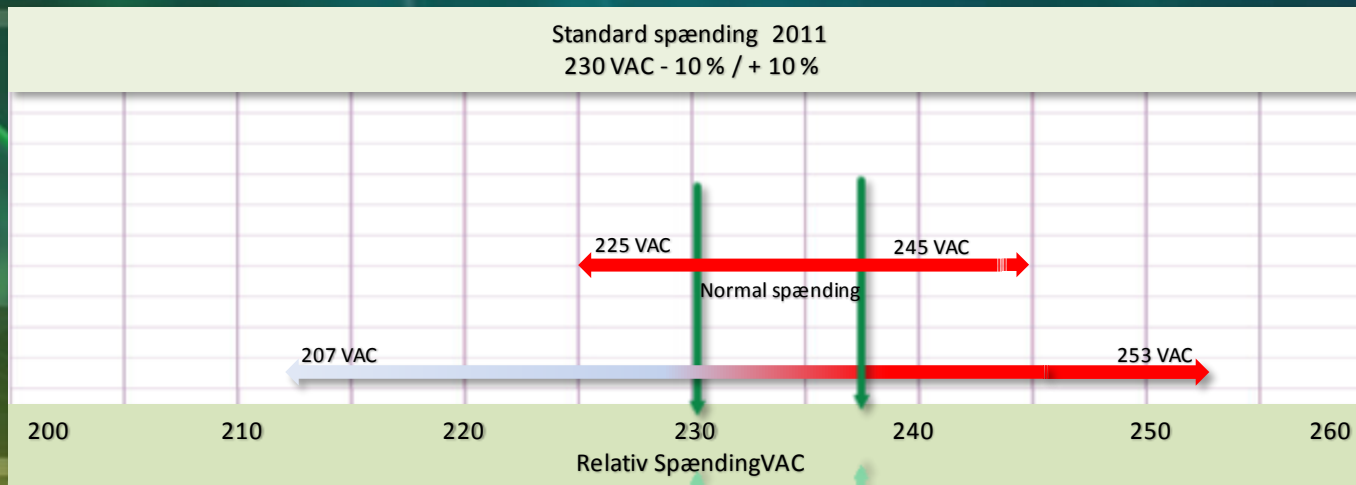


Kenn Andersen

Administrerende direktør PSS Energy A/S






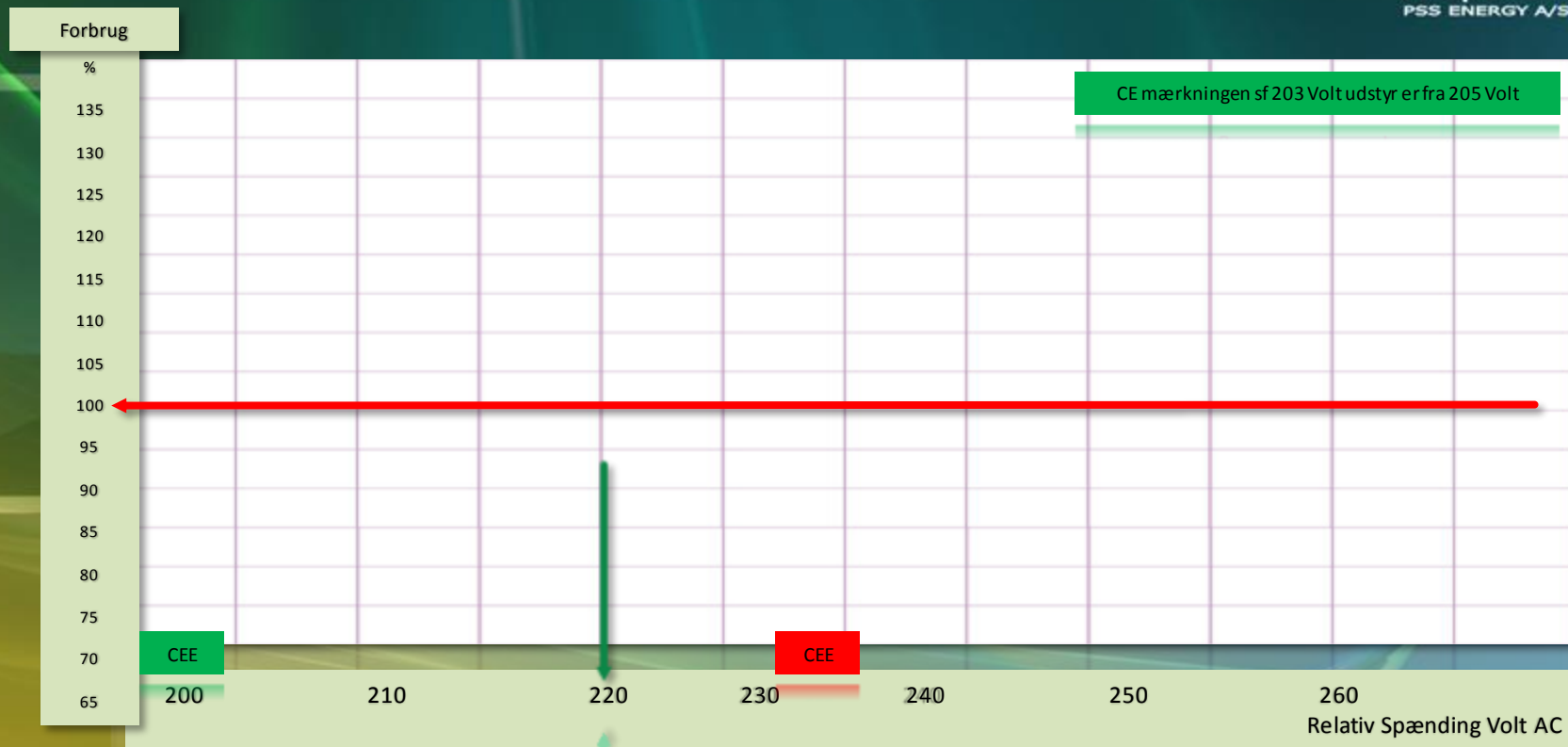


Hvor sparer spændingsoptimering energi?

Det tyske institut **VDE** har svaret

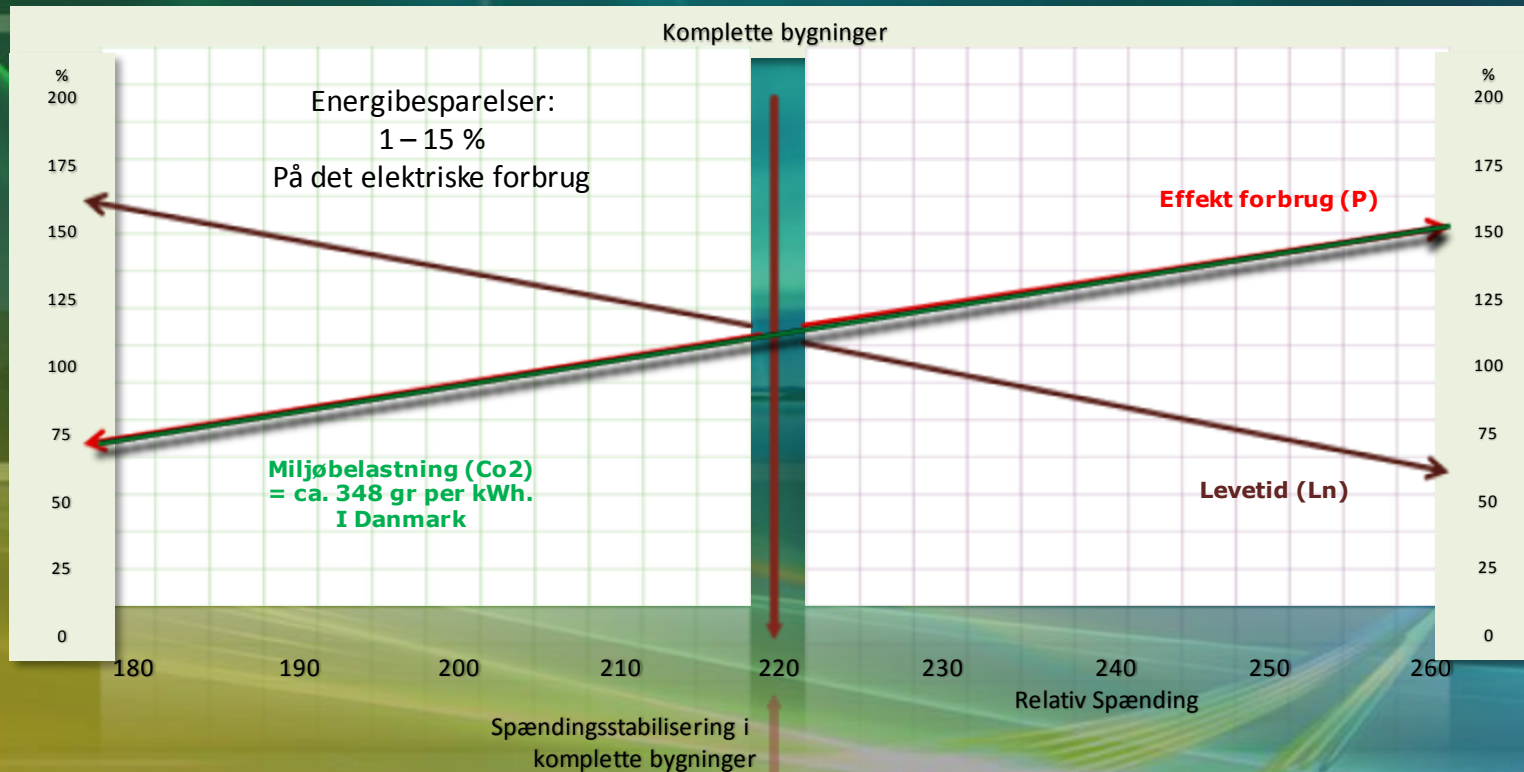
For at forstå svaret må vi se på bygningen og dele forbruget op i 3 typer

-  1. Spændingsafhængigt forbrug – gives α (alpha) værdi
-  2. Ampere konstant forbrug - gives en β (beta) værdi
-  3. Energi Konstant forbrug – gives en γ (gamma) værdi



Ifølge IEA, International Energy Agency, er ca 80 % af alt elektrisk udstyr i Europa lavet til at køre på 220 Volt

Spændingens indflydelse på forbruget og på miljøet

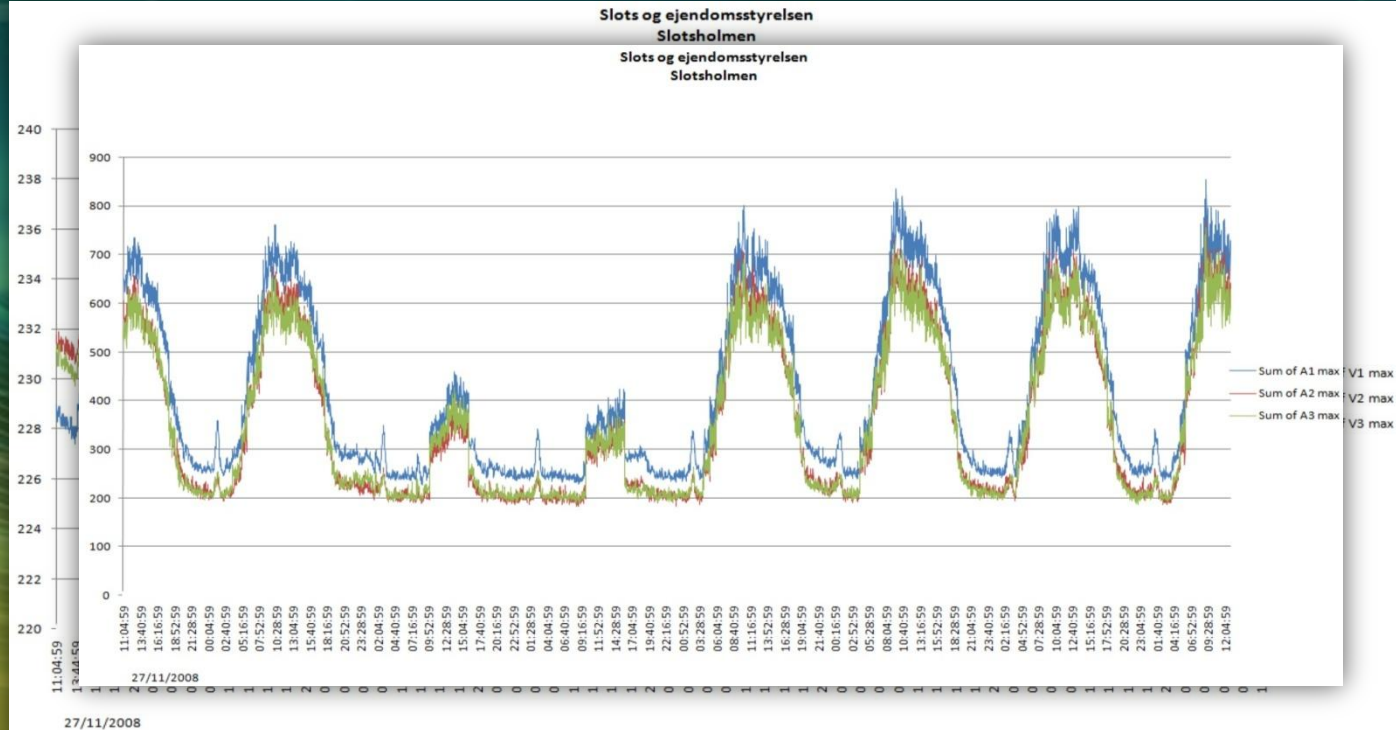


Alfa factor How large part of the consumption in a building is Voltage depended at 230V / 400V	Building year		
	Pre1987 in %	1987-2000 in %	after 2000 in %
General buildings	62	58	45
Offices	64	58	40
Production facilities	79	65	24
Shops	62	57	44
Hospitals	56	49	30
Schools	76	70	53
Swimming stadiums	74	56	30
Accomodations, guesthouses, hjem	46	41	28
Hotels	56	48	34
Food process industry	59	51	27
Farms	69	56	18
Airports	88	74	32
Logistics and storage	83	69	27

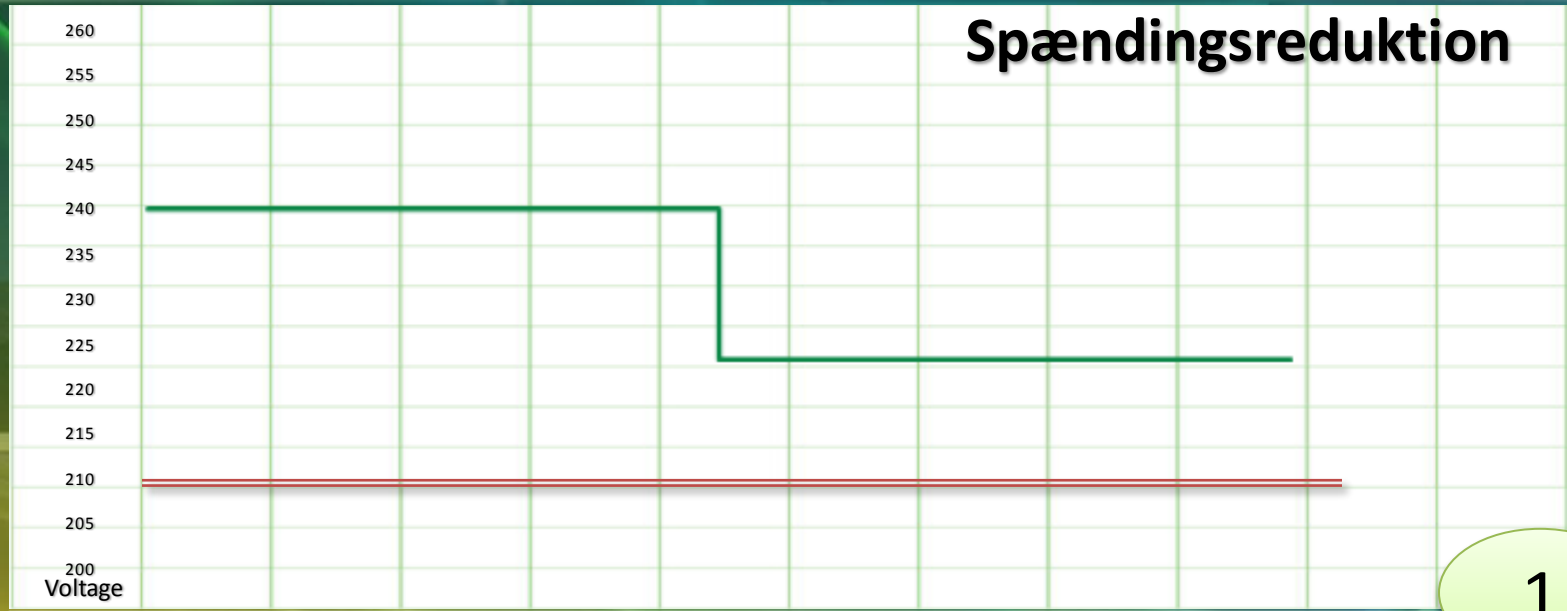
Alfa factor How large part of the consumption in a building is Voltage depended at 230V / 400V	Building year		
	Pre1987 in %	1987-2000 in %	after 2000 in %
Schools	76	70	53

70 % af en skoles forbrug (opført mellem 1987 og 2000) kan spændingsreguleres så der spares energi og CO2 udledningen reduceres

En skole bruger 500.000 kWh / årligt
 30 % = 150.000 kWh / årligt kan ikke spændingsoptimeres
 70 % = 350.000 kWh / årligt kan optimeres ca. 12 %
 mulig besparelse 42.000 kWh / årligt eller
 8,4 % af det totale forbrug 500.000 kWh / årligt

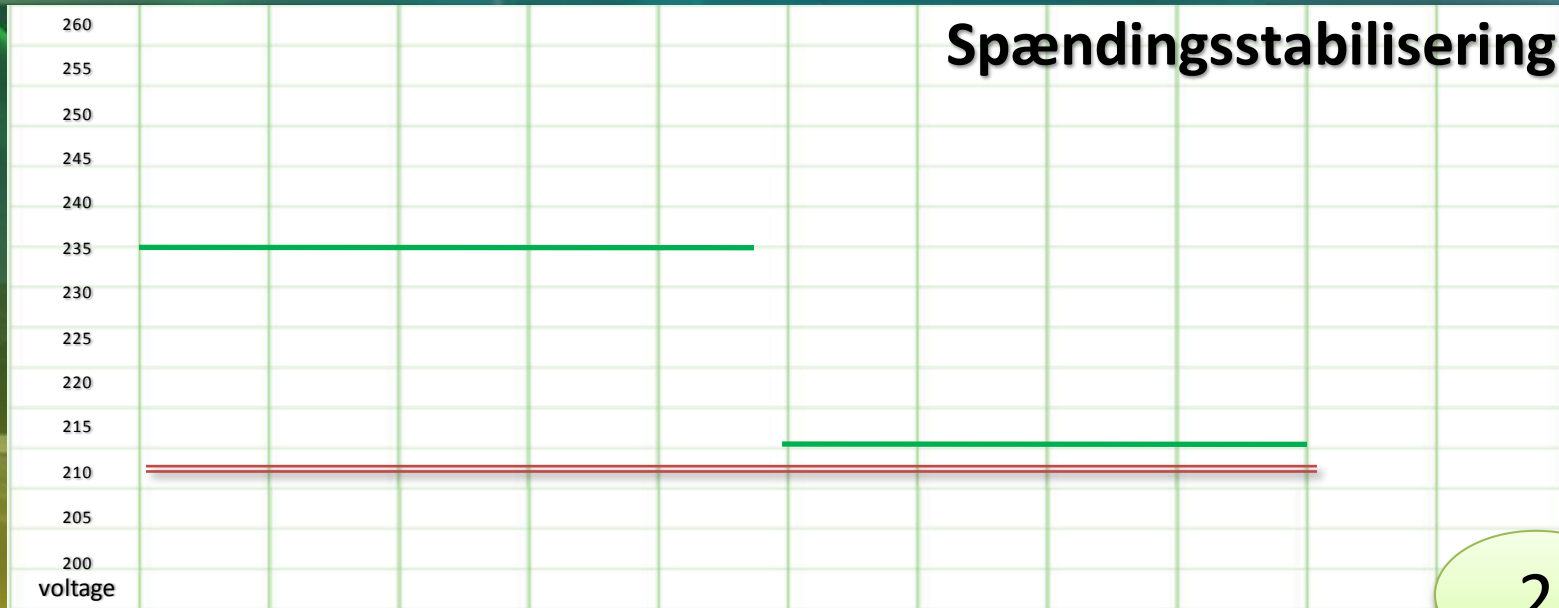


Spændingsreduktion



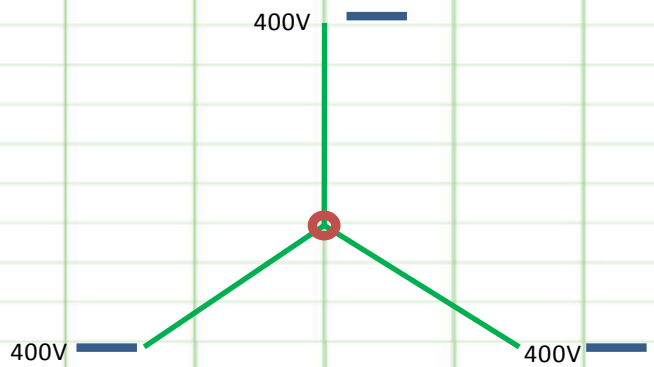
1

Spændingsstabilisering



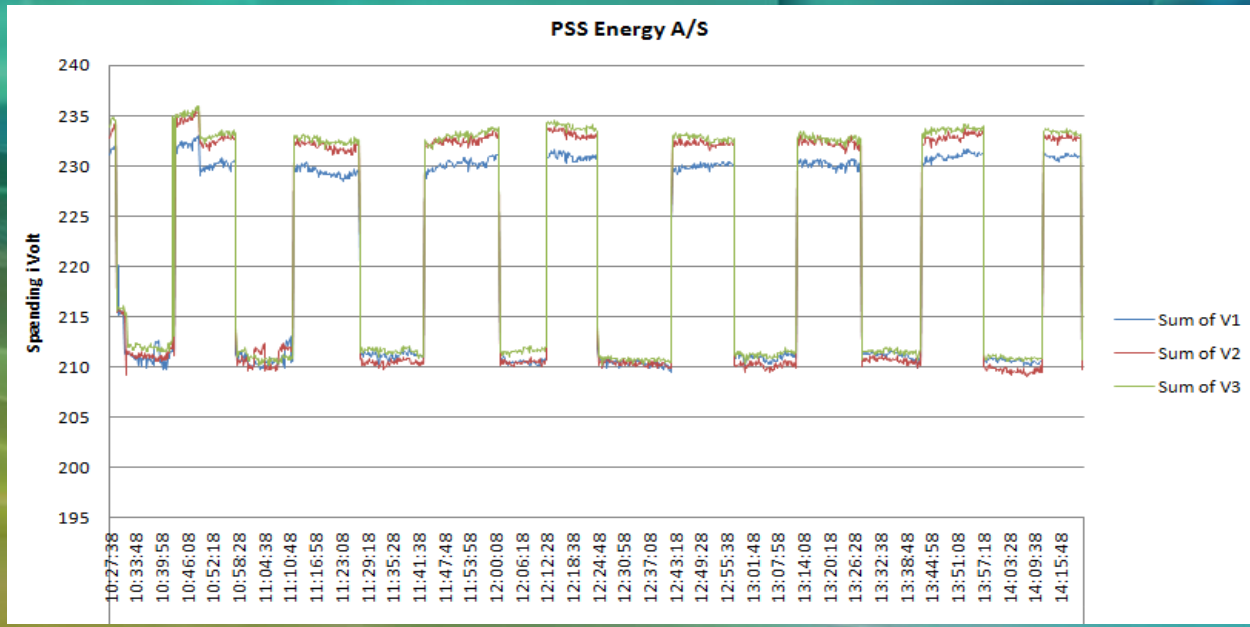
2

Spændingsoptimering



Verifikation

Spændingsregulering:
7 dage med 35 min. intervaller
Data opsamling hvert 2. min.
Systemet slås til og fra



Verifikation

Besparelsen udgør forskellen mellem forsyningsspændingen og den optimerede spænding

Århus Rådhus
 Wiring: 3P4W
 Volt Range: 300V
 Current Range: 1000A
 Sensor Type: 1000A
 VT ratio: 1
 CT ratio: 1
 Interval: 10 sec.
 26/05/2010
 START: 09:05

DATE	TIME	ELAPSED TIME	V1	V2	V3	A1	A2	A3	P	P1	P2	P3	PF	PF1	PF2	PF3	f	In
26/05/2010	09:06:05	000000:00:10	209.60	209.70	209.50	288.60	292.4C	290.5C173,8490C56,67900C59,2310C57,9380C	0.95	0.94	0.97	0.95	50.10	35.79				
26/05/2010	09:06:15	000000:00:20	209.80	210.00	209.40	291.70	295.0C	298.5C176,2640C56,85300C59,9670C59,4430C	0.95	0.93	0.97	0.95	50.10	37.40				
26/05/2010	09:06:25	000000:00:30	209.50	209.80	209.30	298.70	299.8C	305.7C180,4930C58,76000C60,8850C60,8470C	0.95	0.94	0.97	0.95	50.00	32.18				
26/05/2010	09:06:35	000000:00:40	209.60	209.90	209.40	286.90	292.8C	298.4C175,1920C56,52600C59,4300C59,2350C	0.95	0.94	0.97	0.95	50.10	32.95				
26/05/2010	09:06:45	000000:00:50	210.00	209.70	209.40	282.50	291.5C	302.2C174,1570C54,99400C59,1100C60,0530C	0.95	0.93	0.97	0.95	50.10	21.68				
26/05/2010	09:06:55	000000:01:00	209.50	209.40	209.50	300.90	307.7C	302.5C182,2130C59,31900C62,4990C60,3950C	0.96	0.94	0.97	0.95	50.10	27.93				
26/05/2010	09:07:05	000000:01:10	209.60	209.70	209.30	293.70	290.3C	292.6C175,4000C57,86500C59,0490C58,4850C	0.96	0.94	0.97	0.96	50.10	36.77				
26/05/2010	09:07:15	000000:01:20	209.70	209.40	209.40	291.80	302.2C	295.9C176,8500C56,29500C61,3820C59,1730C	0.95	0.92	0.97	0.96	50.10	35.12				
26/05/2010	09:07:25	000000:01:30	210.80	209.60	209.70	294.40	294.0C	291.0C175,8950C58,21100C59,7120C57,9710C	0.95	0.94	0.97	0.95	50.10	39.08				
26/05/2010	09:07:35	000000:01:40	210.40	209.40	209.40	313.40	314.5C	315.4C188,5390C62,18000C63,9460C62,4120C	0.95	0.94	0.97	0.95	50.10	38.19				
26/05/2010	09:07:45	000000:01:50	210.50	209.50	209.10	318.20	317.8C	322.2C192,4230C62,76100C64,6480C65,0130C	0.96	0.94	0.97	0.97	50.10	27.32				
26/05/2010	09:07:55	000000:02:00	210.30	209.80	209.40	322.60	312.1C	314.5C190,6560C64,31400C63,4480C62,8920C	0.96	0.95	0.97	0.96	50.10	39.35				
26/05/2010	09:08:05	000000:02:10	210.40	209.50	209.20	319.10	315.6C	320.0C191,7780C63,51300C64,2660C63,9980C	0.96	0.95	0.97	0.96	50.10	34.92				
26/05/2010	09:08:15	000000:02:20	210.20	209.20	209.20	319.60	322.1C	320.0C192,9120C63,41700C65,4290C64,0650C	0.96	0.94	0.97	0.96	50.10	17.91				
26/05/2010	09:08:25	000000:02:30	210.50	209.30	209.30	306.80	312.2C	313.2C187,0200C60,70600C63,3830C62,9300C	0.96	0.94	0.97	0.96	50.00	36.39				
26/05/2010	09:08:35	000000:02:40	210.50	209.40	209.30	308.10	313.4C	320.4C189,2550C61,15800C63,8540C64,2430C	0.96	0.94	0.97	0.96	50.10	32.07				
26/05/2010	09:08:45	000000:02:50	210.90	209.70	209.70	316.90	324.2C	333.0C196,8220C63,22500C66,4210C67,1760C	0.96	0.95	0.98	0.96	50.10	29.00				
26/05/2010	09:08:55	000000:03:00	211.20	209.90	209.90	309.80	318.8C	320.9C191,8030C61,83100C65,3100C64,6620C	0.96	0.95	0.98	0.96	50.10	43.28				
26/05/2010	09:09:05	000000:03:10	211.50	210.20	210.10	310.10	313.8C	322.8C190,3220C61,65000C64,3770C64,2930C	0.95	0.94	0.98	0.95	50.10	33.69				
26/05/2010	09:09:15	000000:03:20	211.10	209.90	210.20	315.50	331.6C	316.0C194,7830C63,00500C68,2100C63,5670C	0.96	0.95	0.98	0.96	50.00	50.40				
26/05/2010	09:09:25	000000:03:30	211.20	209.90	210.10	311.00	327.1C	315.5C192,4530C62,07000C67,0790C63,3030C	0.96	0.95	0.98	0.96	50.10	47.04				
26/05/2010	09:09:35	000000:03:40	211.20	210.00	210.00	308.90	315.2C	317.6C189,7530C61,52100C64,4710C63,7610C	0.96	0.94	0.97	0.96	50.00	34.03				
26/05/2010	09:09:45	000000:03:50	210.50	209.60	209.80	330.20	344.4C	332.0C202,9300C65,89200C70,3090C66,7280C	0.96	0.95	0.97	0.96	50.00	50.50				
26/05/2010	09:09:55	000000:04:00	210.70	210.00	209.80	339.00	323.7C	321.0C198,7230C67,92700C66,4130C64,3820C	0.96	0.95	0.98	0.96	50.10	52.69				



PSS ENERGY GROUP

BECAUSE - GOOD PLANETS - ARE HARD TO FIND