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# Saving without investment

Example of frequency converter use

# Background

- Municipal waste water operator
- Oversized pumps for normal use because of need to be prepared for emergency situations (flood)
- Already installed with frequency converters but they were only when starting and stopping pump to avoid pressure shocks.
- Project work found optimal frequency for normal flow

# Different ways to control water level

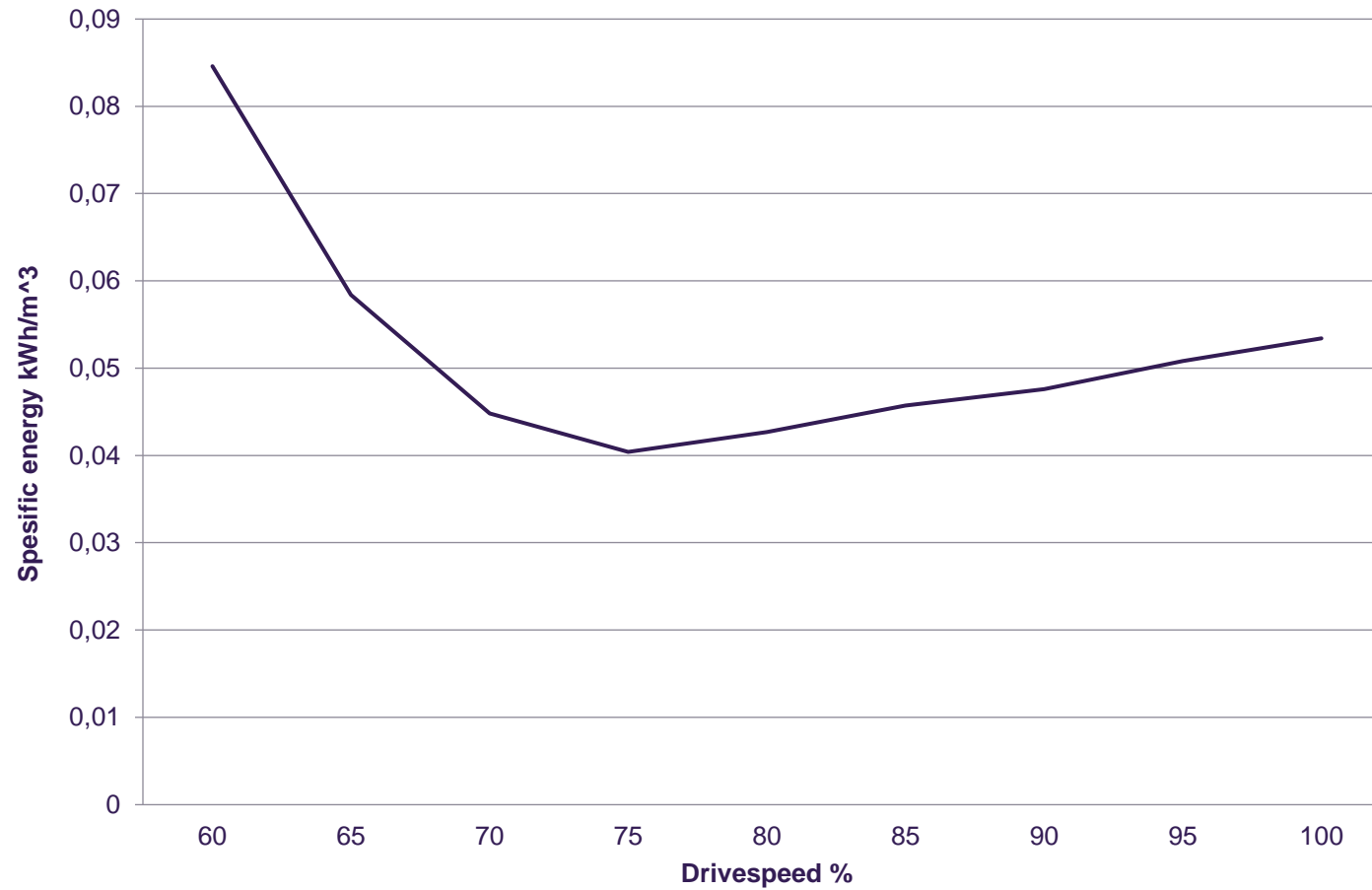
1. ON / OFF . Pump used at fixed speed and is turned on/off when needed.
2. Choke: Pump working at fixed speed, flow controlled with valve.
3. By-pass flow: Pump working at fixed speed, flow controlled by-pass valve.
4. Frequency control: Flow controlled by changing frequency of motor.

# Results of measurements

Calculating specific energy kWh/m<sup>3</sup> for different drive speeds/frequencies.

rpm	%	Hz	l/s	kW	kWh/m <sup>3</sup>	savings
750	50	25	2,866	1,777	0,1723	-
825	55	27,5	2,365	2,179	0,2559	-
900	60	30	9,055	2,758	0,0846	
975	65	32,5	16,998	3,578	0,0584	31
1050	70	35	30,828	4,977	0,0448	47
1125	75	37,5	45,241	6,581	0,0404	52,2
1200	80	40	53,051	8,161	0,0427	49,5
1275	85	42,5	61,048	10,05	0,0457	46
1350	90	45	70,703	12,13	0,0476	43,7
1425	95	47,5	78,537	14,35	0,0508	40
1500	100	50	87,375	16,81	0,0534	36,9

## Specific energy as a function of drive speed



# Some results

- For 14 kW pump
  - saving 35 %
- For 68 kW pump
  - saving 56 %



# Does this work always?

No 😊

- Like always you should design system for task at hand, which means spending time and money
- As often you just want to start building right away and save at design cost and skip designing part and end up with huge lifetime cost.
- This example is useful if you have system that has bad design to begin with or your system is oversized for reason. Like in this example.
- If your pump is optimally designed and there is no need to adjust speed, frequency converter will only consume electricity but have no actual use.

# Lesson learned

- Before rushing to store to buy new stuff, find a best way to use your current equipment.
- And same with a moving image, subtitles in english  
<https://www.youtube.com/watch?v=RUR70VG3FKY>

Thank you for your interest