



KTN

the
Knowledge Transfer
Network



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Background

Software optimisation and can reduce energy usage in compute, but in what area can the most savings be made?

Whilst we look at savings, we must also consider that different types of compute will have different drivers to reduce energy use; regulatory, industry, consumer etc.

We started by classifying the broad types of compute platform and narrowed it to 5...

Classes of platform

- Energy Harvesting – IoT sensor, smart card
- Battery – IoT sensor, stress gauge, smart meter
- Recharge – mobile phone, portable consumer devices
- Tethered – broadband router, smart home sensor
- Limited – data centres and networking

ARM data set

	units 2020	units 2014	% used in a		watts	watts 2020	watts 2014		Wh 2014	wh 2020	
			hours per day	day							
r Smart Mobile	3,050,000,000	2,900,000,000	4.800	20.0	6.000	3,660,000,000	3,480,000,000	5.172413793	83520000000	87840000000	
t DTV and STB	1,400,000,000	8,740,000,000	3.600	15.0	12.000	2,520,000,000	15,732,000,000	-83.98169336	3.77568E+11	60480000000	
b Connectivity Sensors	8,400,000,000	4,500,000,000	24.000	100.0	0.300	2,520,000,000	1,350,000,000	86.66666667	32400000000	60480000000	
t Consumer Ent	200,000,000	350,000,000	6.000	25.0	40.000	2,000,000,000	3,500,000,000	-42.85714286	84000000000	48000000000	
t Peripherals	1,400,000,000	1,100,000,000	12.000	50.0	10.000	7,000,000,000	5,500,000,000	27.27272727	1.32E+11	1.68E+11	
l Servers	100,000,000	50,000,000	24.000	100.0	100.000	10,000,000,000	5,000,000,000	100	1.2E+11	2.4E+11	
l Networking	1,800,000,000	1,350,000,000	24.000	100.0	45.000	81,000,000,000	60,750,000,000	33.33333333	1.458E+12	1.944E+12	
t Hard Disk SSD	700,000,000	650,000,000	14.400	60.0	10.000	4,200,000,000	3,900,000,000	7.692307692	93600000000	1.008E+11	
t Automotive tethered	950,000,000	612,000,000	1.200	5.0	6.000	285,000,000	183,600,000	55.22875817	44064000000	68400000000	
b Automotive Battery	4,000,000,000	2,448,000,000	7.200	30.0	0.300	360,000,000	220,320,000	63.39869281	52876800000	86400000000	
h SmartCards	12,000,000,000	8,500,000,000	0.024	0.1	0.001	12,000	8,500	41.17647059	204000	288000	
h Microcontrollers Scavenging	3,400,000,000	190,000,000	0.024	0.1	0.001	3,400	190	1689.473684	4560	81600	
b Microcontrollers Battery	10,200,000,000	570,000,000	2.400	10.0	0.200	204,000,000	11,400,000	1689.473684	273600000	4896000000	
t Microcontoleers Tethererd	3,400,000,000	190,000,000	24.000	100.0	0.400	1,360,000,000	76,000,000	1689.473684	1824000000	32640000000	
b Embedded Conn Battery	1,000,000,000	20,000,000	18.000	75.0	0.400	300,000,000	6,000,000	4900	144000000	7200000000	
t Embed Conn tetherer	4,000,000,000	80,000,000	24.000	100.0	10.000	40,000,000,000	800,000,000	4900	19200000000	9.6E+11	
b Other Battery	4,000,000,000	750,000,000	6.000	25.0	0.200	200,000,000	37,500,000	433.3333333	9000000000	48000000000	
Total	60,000,000,000	33,000,000,000				155,609,015,400	100,546,828,690		2.41312E+12	3.73462E+12	1.32149E+12
			82 % increase in units					55 % increase in consumption	2413.12 gWh	3734.62 gWh	1321.49 gWh
									54.7627284 % increase in useage		

Figures

- Harvesting - 0.0003696 gWh
- Battery - 86.016 gWh
- Recharge - 87.84 gWh
- Tethered - 2184 gWh
- Limited -1376.76 gWh

What could it mean?

By 2020 the compute in these areas will account for 3734.12 gWh of electrical energy consumption. A 55% increase from the 2014 data.

That would produce an additional 685,000 tonnes of CO₂.

That same energy budget could provide the annual electricity consumption for 330,000 UK homes.