



PER QUÈ NECESSITEM

EL PROGRAMA

REUTILITZA?

Us imagineu treballar sense ordinador?

Us imagineu viure a BCN sense ordinador?

LA TECNOLOGIA MILLORA LA NOSTRA QUALITAT DE VIDA ...

x ... pero també genera greus problemes



- x Costos associats al cicle de vida:
 - o Cost de fabricació
 - o Cost d' utilització
 - o Cost de destrucció

ELEMENTS IN SMARTPHONE

1 H Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.065	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.887	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.972	35 Br Bromine 79.904	36 Kr Krypton 84.796
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.294
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.085	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [209]	86 Rn Radon [222]
87 Fr Francium [223]	88 Ra Radium [226]	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [263]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Meitnerium [266]	110 Ds Darmstadtium [268]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Nh Nihonium unknown	114 Fl Flerovium [289]	115 Mc Moscovium unknown	116 Lv Livermorium [293]	117 Ts Tennessine unknown	118 Og Oganesson unknown
Lanthanide Series		57 La Lanthanum 138.905	58 Ce Cerium 140.12	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.255	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967	
Actinide Series		89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [252]	100 Fm Fermium 257.085	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]	

KEY:

- Select substances of concern
- Rare earth element
- Conflict mineral
- Commonly used in advanced electronics

Selenium

Exposure to high concentrations causes Selenosis, which can cause hair-loss, nail brittleness, and neurological abnormalities (e.g. numbness and other odd sensations in the extremities).¹⁷

Beryllium

Exposure can cause lung cancer and chronic Beryllium disease. Symptoms of chronic beryllium disease include breathing difficulties, coughing, chest pain, and general weakness.

Mercury

Exposure through ingestion or inhalation can cause central nervous system damage and kidney damage.¹

Chromium (IV) - Hexavalent Chromium

Exposure can cause strong allergic reaction (linked to Asthmatic Bronchitis) and DNA damage to cells. Workers are exposed at disposal stage and Chromium (IV) can also be released into the environment from landfills and incineration.¹

Arsenic

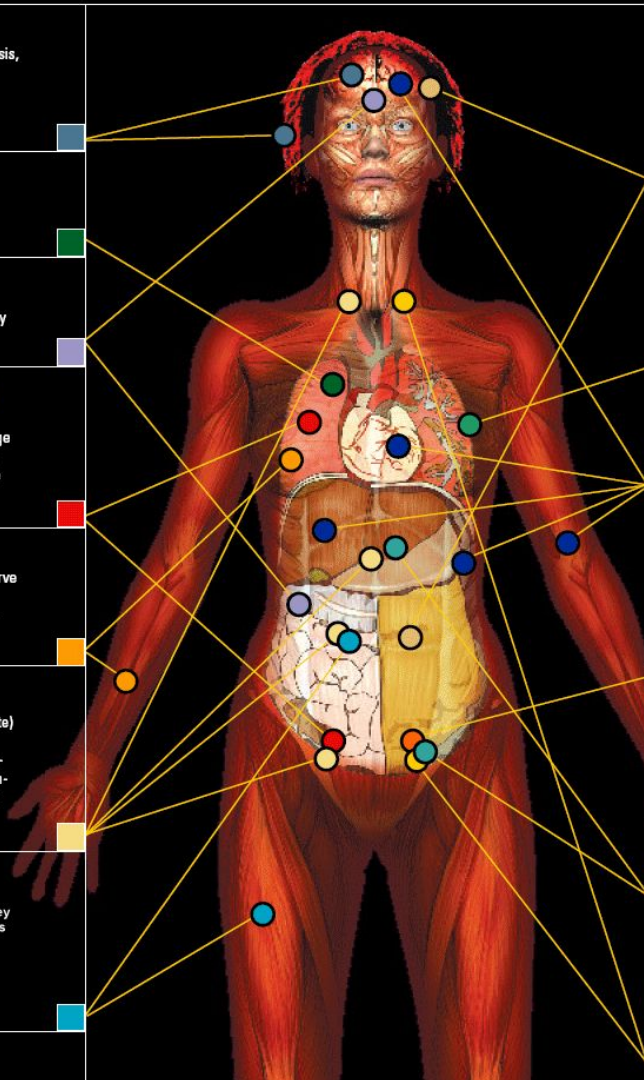
Long-term exposure may cause lung cancer, nerve damage and various skin diseases. Arsenic gas (AsH₃), used in tech manufacturing, is the most toxic form of arsenic.¹

Trichloroethylene (TCE)

Exposure to TCE (depending on amount and route) can cause liver and kidney damage, impaired immune system function, impaired fetal development, or death. Manufacturing workers and communities where TCE leaches into drinking water are at greatest risk.¹³

Cadmium

Long-term exposure to cadmium can cause kidney damage and damage to bone density. Cadmium is also a known carcinogen.



Lead

Lead exposure can cause brain damage, nervous system damage, blood disorders, kidney damage, and damage to fetal development. Children are especially vulnerable.

Polyvinyl chloride (PVC)

PVC is the most used plastic, found in everyday electronics. When burned it produces large quantities of hydrogen chloride gas, which combines with water to form hydrochloric acid (HCl). Inhaling HCl can cause respiratory problems. Production and incineration of PVC creates dioxins.¹¹

Barium

Exposure may lead to brain swelling, muscle weakness, damage to heart, liver and spleen, or increased blood pressure.¹

Brominated flame retardants (BFRs)

Suspected of hormonal interference (damage to growth and sexual development), and reproductive harm, BFRs are used to make materials more flame resistant. Exposure studies reveal BFRs in breast milk and blood of electronics workers, among others.¹

Polychlorinated biphenyls (PCBs)

Toxic effects of PCBs include immune suppression, liver damage, cancer promotion, nervous damage, reproductive damage (both male and female), and behavioral changes. PCBs were widely used (prior to 1980) in transformers and capacitors. Though banned in many countries, they are still present in e-waste.¹⁰

Dioxins and Furans

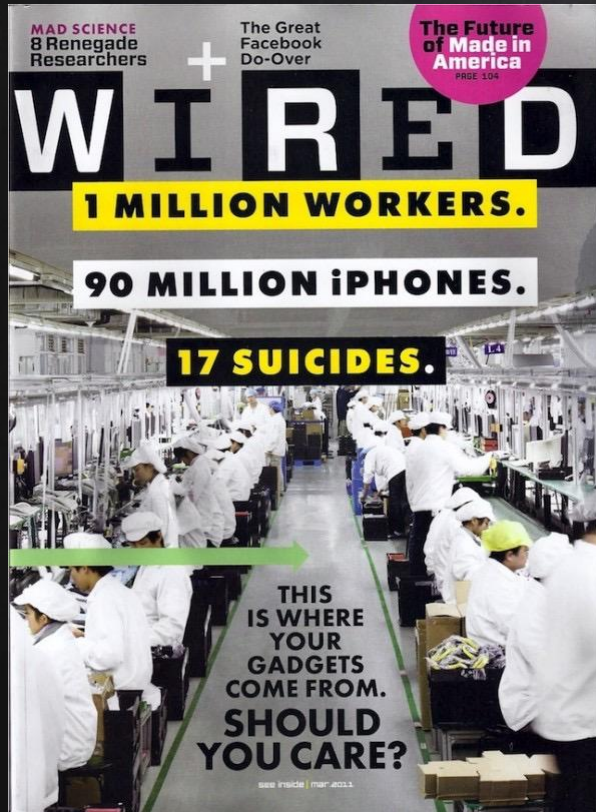
skin disorders; liver problems; impairment of the immune system, the endocrine system and reproductive functions; effects on the developing nervous system and some types of cancers.



<https://www.agora.universite-paris-saclay.fr/death-road-coltan/>



<https://indianexpress.com/article/business/economy/made-in-china-campaign-launched-with-make-in-india/>



Wired, March 2011

MANUFACTURING

MONEYWISE | Compiled by Deborah Sutton

Tuesday, December 23, 2014

BBC exposes inhumane working conditions in Apple factories

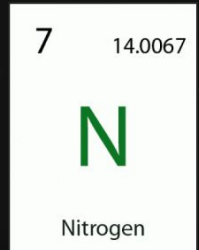


Apple product lovers may be rethinking their brand loyalty after the Dec. 17 airing of a BBC documentary on working conditions at their manufacturing operations in China and beyond. Apple denied the accusations and replied that it is “deeply offended” by the report.

“For its ‘Panorama’ documentary series, the BBC says it ‘secretly filmed from inside the

FABRICACIÓ

- x ... comparat amb el cost de fer servir?
- x Exemple: 32 MB RAM (2 gr.)
 - Electricitat generada per 1.6 kg de combustibles fòssils
 - 72 grams de químics
 - 3,200 litres d'aigua
 - 700 grams de nitrogen
- x **Cost energètic total de fabricació: 41 MJ**
- x **Consum durant quatre anys de vida: 15 MJ**



EMBODIED ENERGY / ENERGIA GRIS



Nevera: 4 %

Coche: 20 %



Smartphone: 70-90 %

AVERAGE LIFE CYCLE IN kgCO₂-EQ.

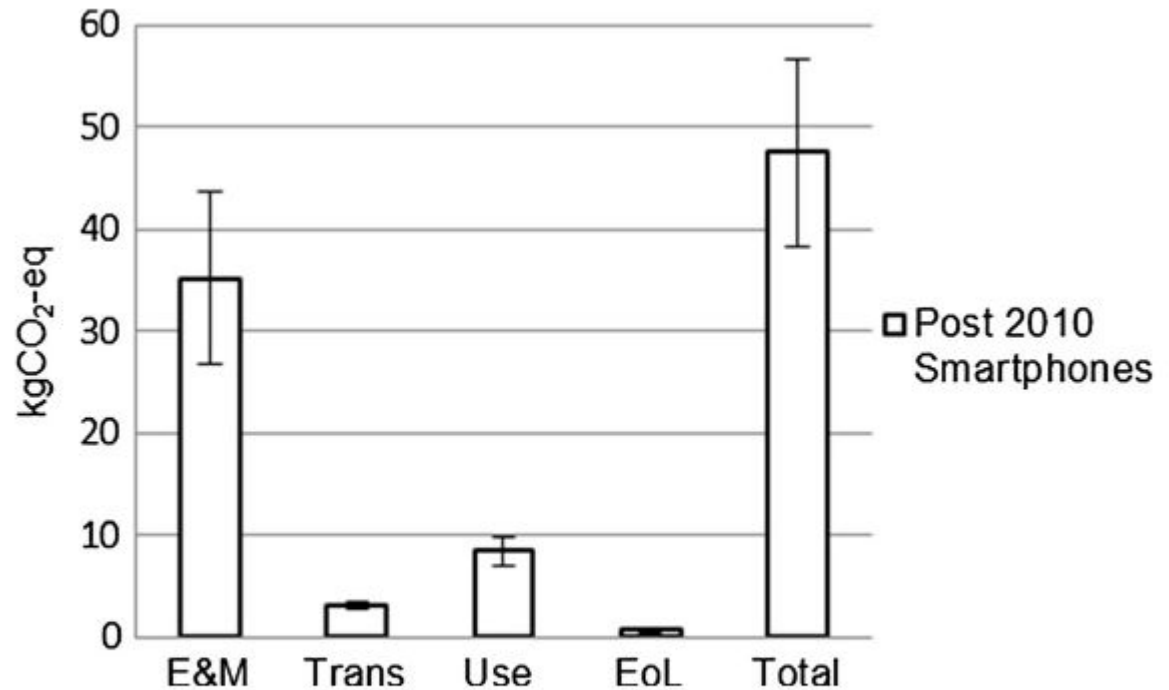


Fig. 2 Averaged life cycle phase distribution for smartphones made after 2010

Redefining scope: the true environmental impact of smartphones?

Suckling J Lee J

International Journal of Life Cycle Assessment

Publisher: Springer Verlag

2015 vol: 20 (8) pp: 1181-1196

PER QUÈ?

2018 *This Is What Happens In An* Internet Minute



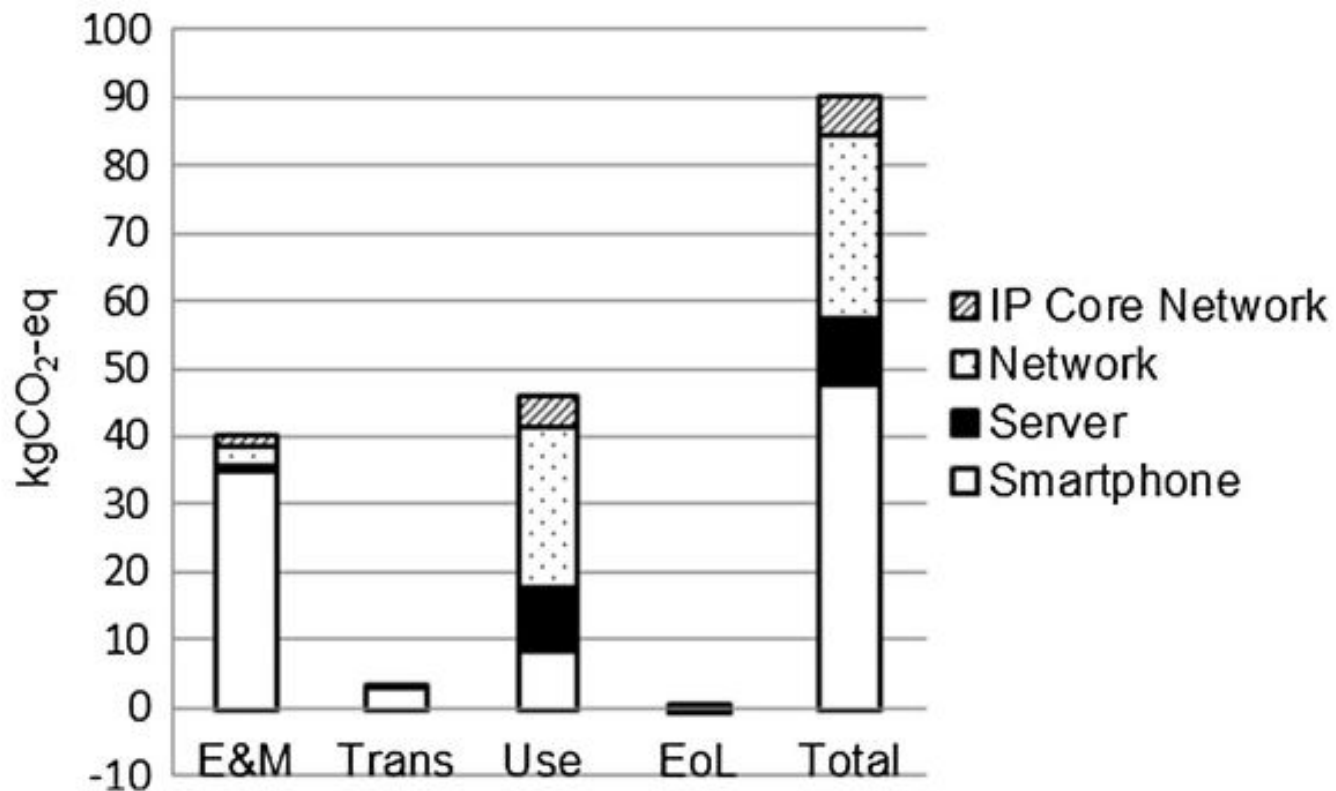
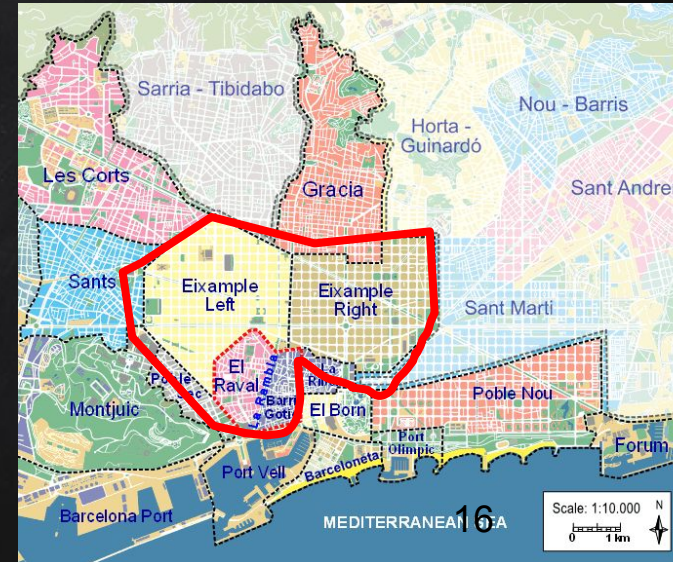


Fig. 5 GHG emissions across the life cycle of a smartphone (*white*) including contribution from a rack server (*black*), network (*dots*) and IP core network (*diagonal hashing*)

CONSUM D'UN DATA CENTER

✗ Un centre de dades típic consumeix uns 50 MW

El consum elèctric residencial dels habitants de Catalunya el 2014 va ser de 1.280 KWh per habitant i any



Us

x I quina és la vida útil d'un smartphone?

Obsolescència!



COST DEL FINAL DEL CICLE

x I, en acabar, què fem?



Sí, però ...

Cada any es generen al voltant de 50 MT de residus electrònics

<http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem>



COST DE DESTRUIR

- Només una petita part (<25%) es recicla
- Però fins i tot els millors abocadors d'escombraries no poden evitar filtrar elements pesats o verinosos



EL LLOC MÉS CONTAMINAT DEL PLANETA?



Agbogbloshie
Accra, Ghana







QUÈ PODEM FER?

1. Reduce Reuse Recycle: RRR
2. La quarta R: RETHINK!!!
3. Pressió Social
4. Green IT

[storyofelectronics.org]

http://storyofstuff.org/movies/story-of-electronics/?utm_source=storyofstuff.org



“TE PROMETO UN MÓVIL MÁS BARATO”



<https://www.youtube.com/watch?v=Lc4-2cVKxp0>

