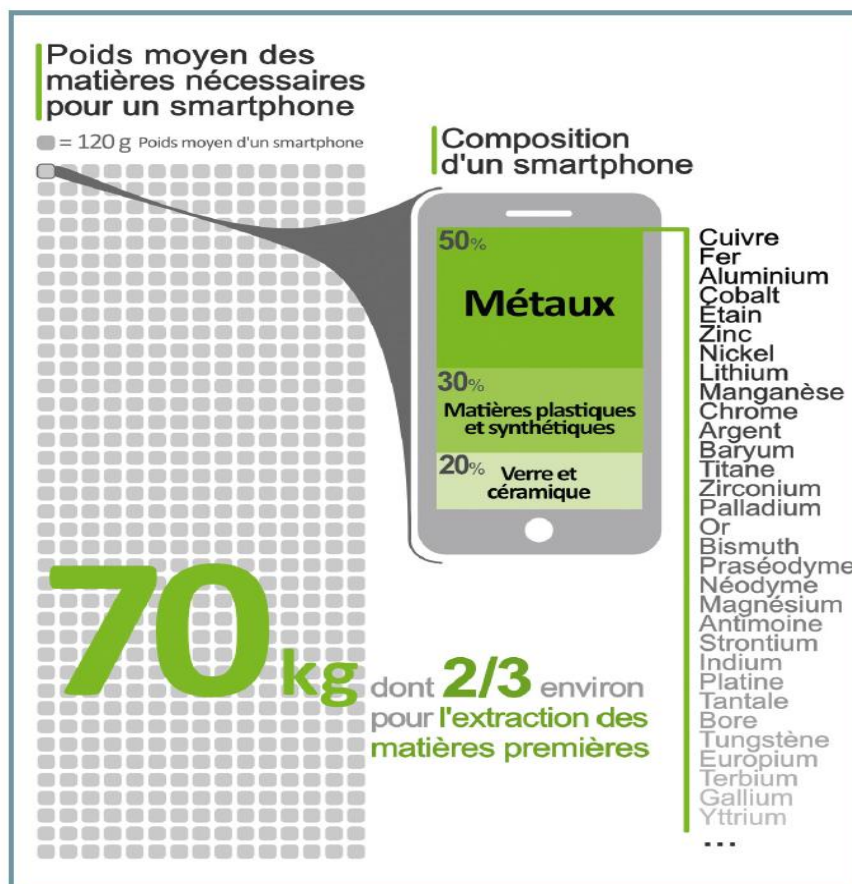


Smartphone

<https://www.insee.fr/fr/statistiques/4238589?sommaire=4238635>

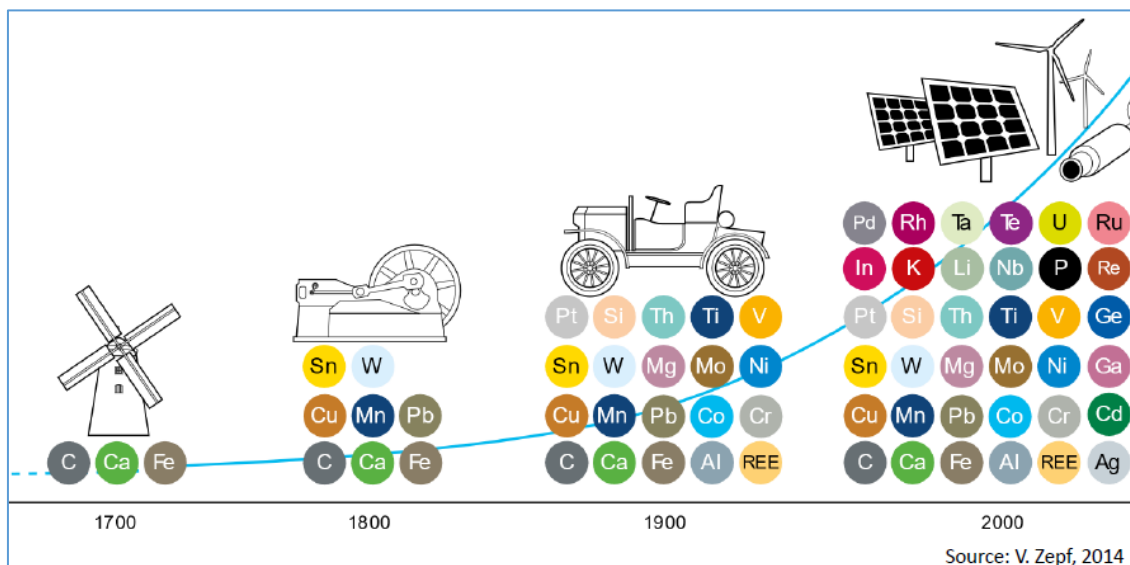
Commissariat général au développement durable - L'empreinte matières, un indicateur révélant notre consommation réelle de matières première - Avril 2018



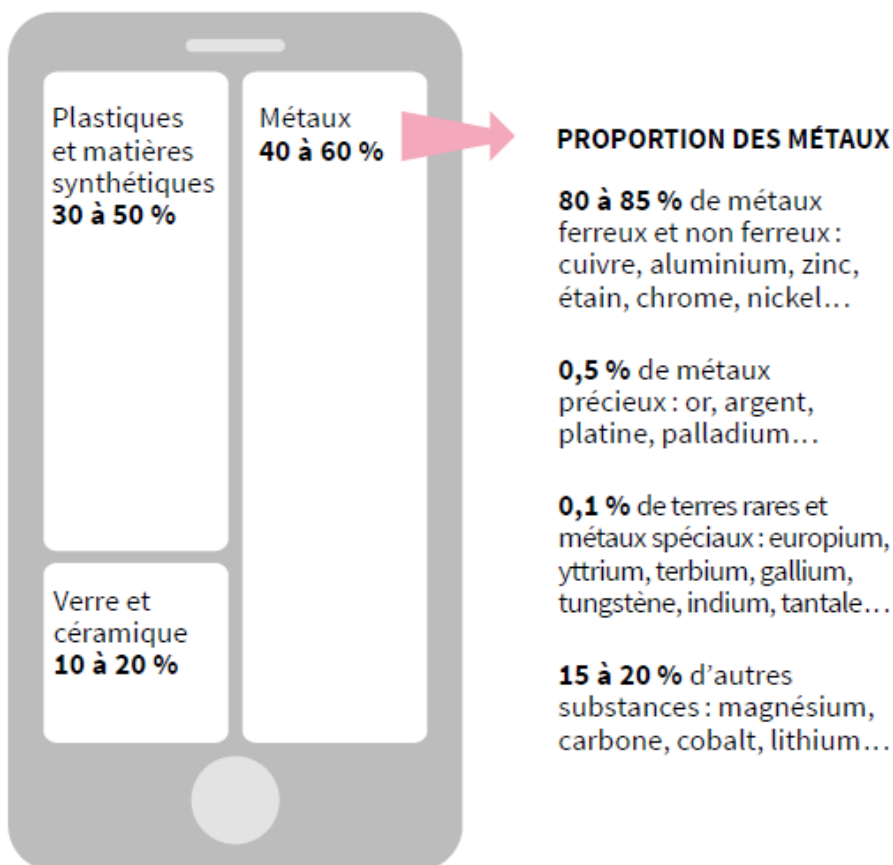
Sources : Ademe ; Sénat (rapport n° 850, 09/2016) ; Wuppertal Institut (2012), évaluation selon l'approche poids-matière de l'écologiste Friedrich Schmidt-Bleek
Infographie : Bertrand Gaillet

<https://ecoinfo.cnrs.fr/wp-content/uploads/2015/01/impacts-env-du-numerique-15-mars-2019.pdf>

Françoise Berthoud - Les impacts environnementaux du numérique - Ministère de la transition écologique et solidaire - Commissariat général au développement durable - Mars 2019

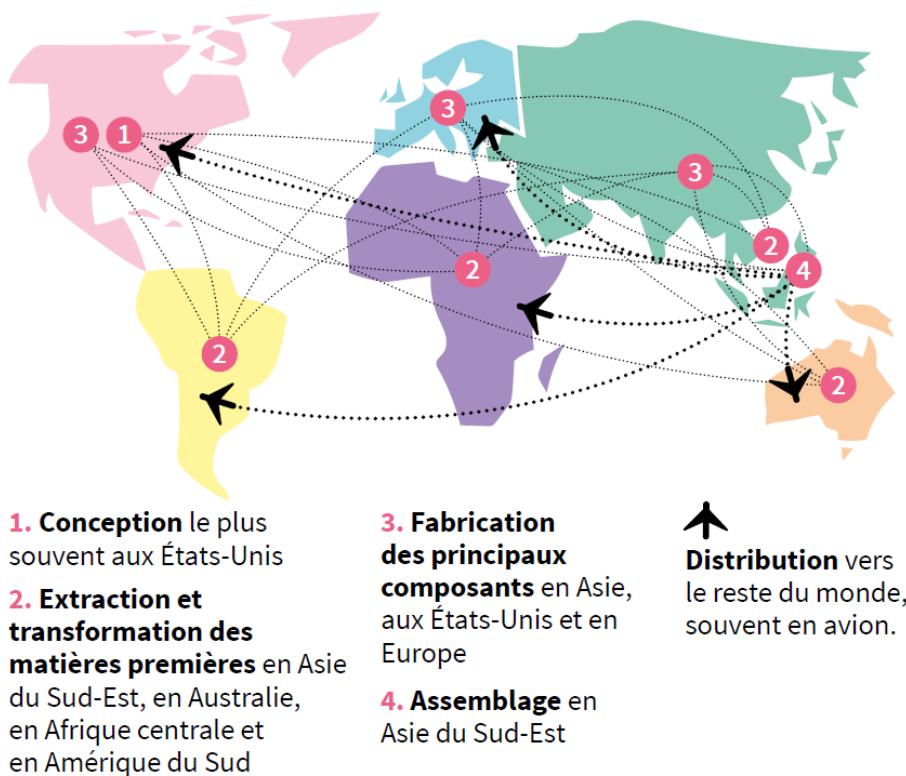


RÉPARTITION DU POIDS DES MATÉRIAUX DANS LA COMPOSITION D'UN SMARTPHONE



Source : Oeko-Institut, EcolInfo et Sénat

QUATRE TOURS DU MONDE POUR FABRIQUER UN SMARTPHONE



Display



A mobile device's glass screen is very durable because glassmakers combine its main ingredient, **silica** (silicon dioxide or quartz) **sand**, with ceramic materials and then add potassium.



Layers of indium-tin-oxide are used to create transparent circuits in the display. Tin is also the ingredient in circuit board solder, and cassiterite is a primary source of tin.



Gallium provides light emitting diode (LED) backlighting. **Bauxite** is the primary source of this commodity.



Sphalerite is the source of indium (used in the screen's conductive coating) and germanium (used in displays and LEDs).



Banner image courtesy of
freevector-archive.com

Electronics and Circuitry



The content of copper in a mobile device far exceeds the amount of any other metal. Copper conducts electricity and heat and comes from the source mineral **chalcopyrite**.



Tetrahedrite is a primary source of silver. Silver-based inks on composite boards create electrical pathways through a device.



Silicon, very abundant in the Earth's crust, is produced from the source mineral quartz and is the basis of integrated circuits.



Arsenopyrite is a source of arsenic, which is used in radio frequency and power amplifiers.



Tantalum, from the source mineral **tantalite**, is added to capacitors to regulate voltage and improve the audio quality of a device.

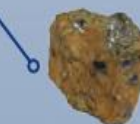


Wolframite is a source of tungsten, which acts as a heat sink and provides the mass for mobile phone vibration.

Battery



Spodumene and subsurface brines are the sources of lithium used in cathodes of lithium-ion batteries.



Graphite is used for the anodes of lithium-ion batteries because of its electrical and thermal conductivity.



Speakers and Vibration

Bastnaesite is a source of rare-earth elements used to produce magnets in speakers, microphones, and vibration motors.