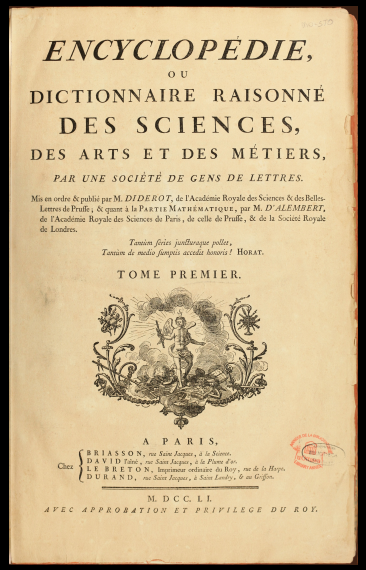
Planet Earth

Norberto Patrignani

XVIII Century

"*Sapere aude!*
Abbi il coraggio di servirti
della tua propria intelligenza
- è dunque il motto dell'illuminismo."
Immanuel Kant, 1784

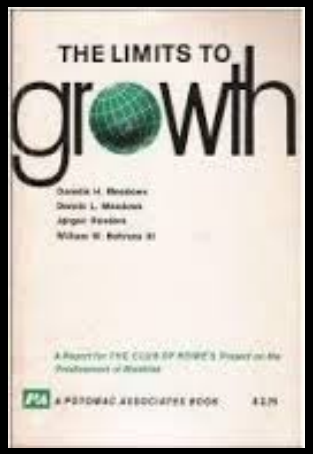
Enlightenment



The Sky
is the Limit

XX Century

Sustainability



The Earth
is the Limit

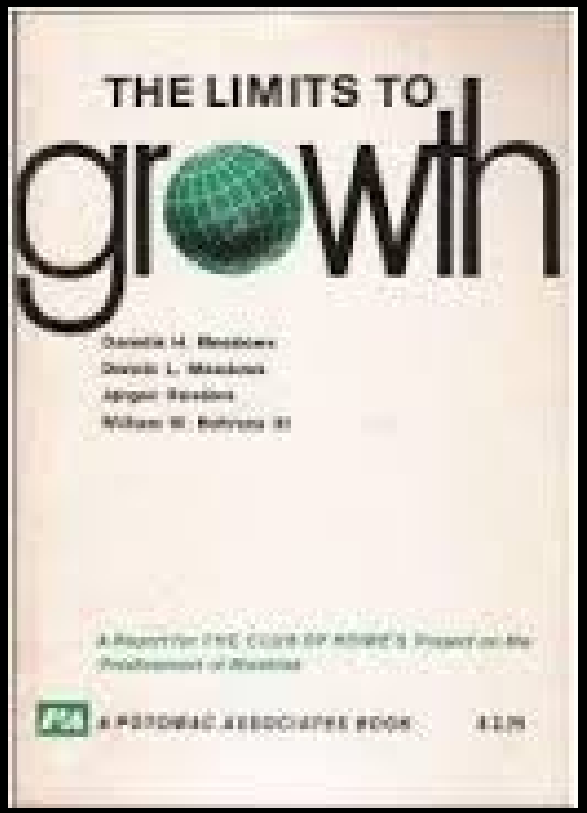
XXI Century

HyperConnectivity

The Self
is the Limit

Source: Adapted from Nicole DeWandre, RRI/SSH in ICT-related parts of WP14-15, InfoDay, 21 January 2014, Bruxelles

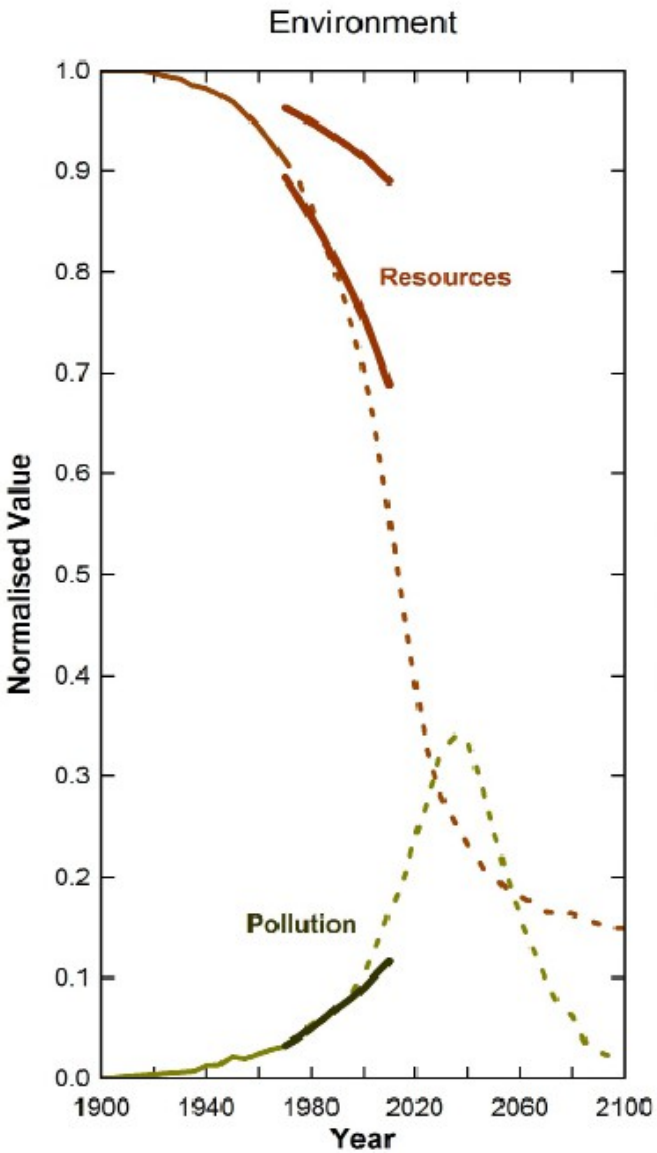
"Club di Roma, 1972"

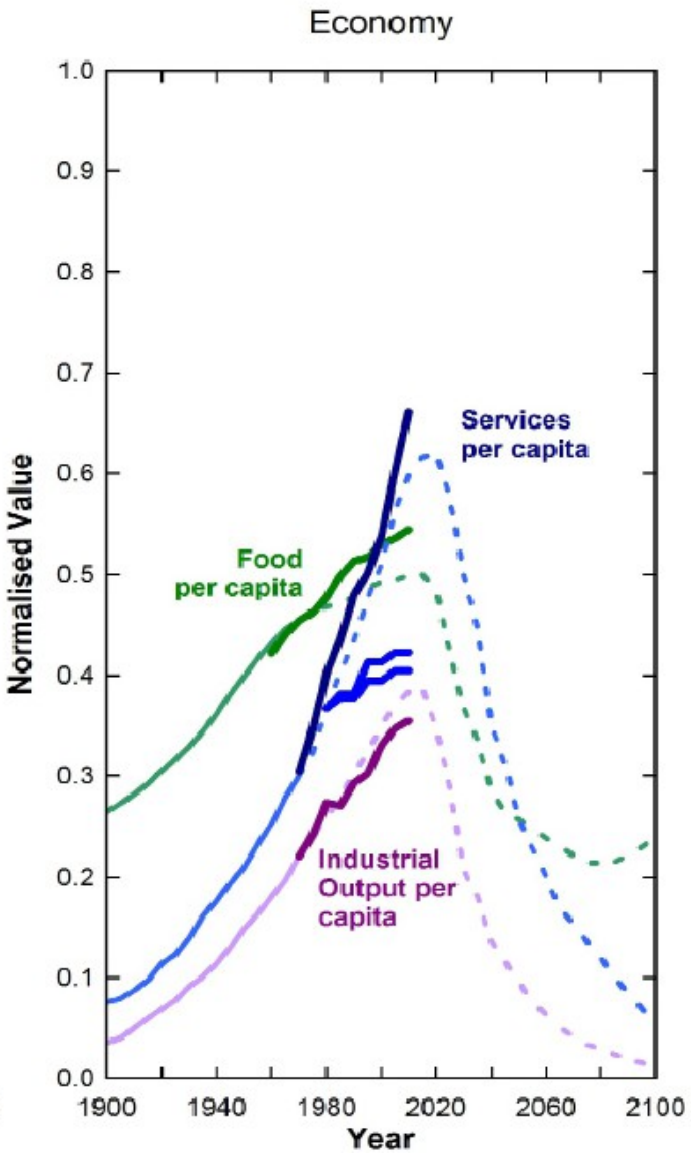


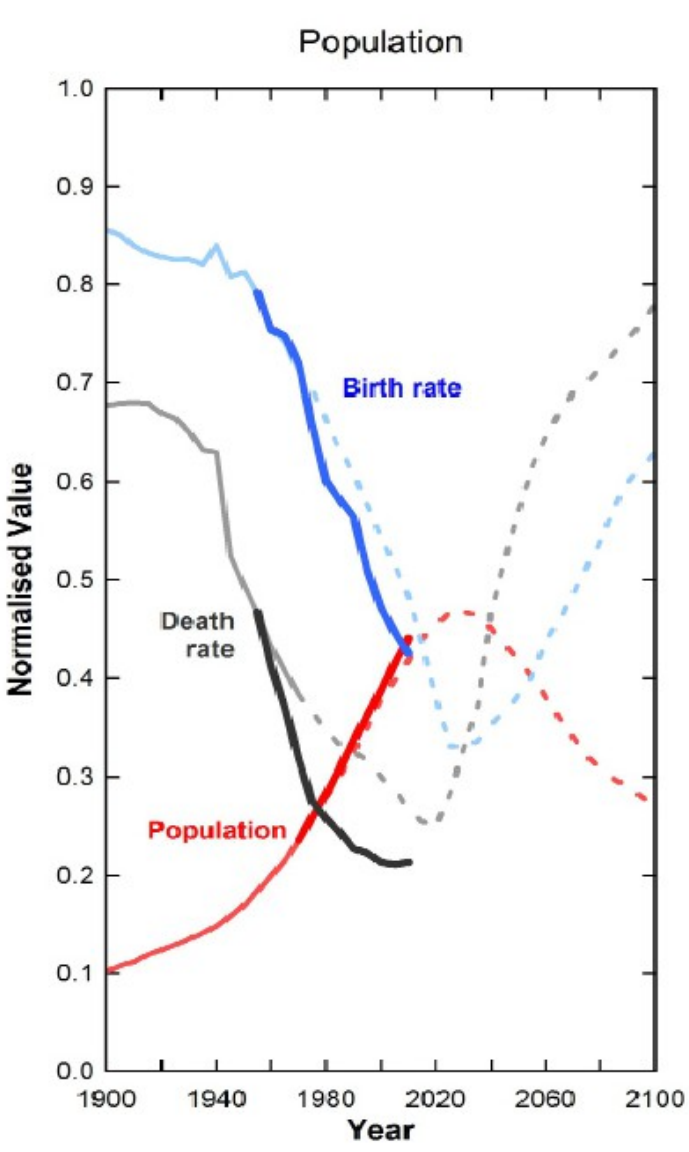
William W. Behrens III, Jay W. Forrester, Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, 1972

Source: "The Limits to Growth", Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, William W. Behrens III, Universe Books, 1972

The Limits to Growth scenario (Club of Rome, 1972) vs Historical Data

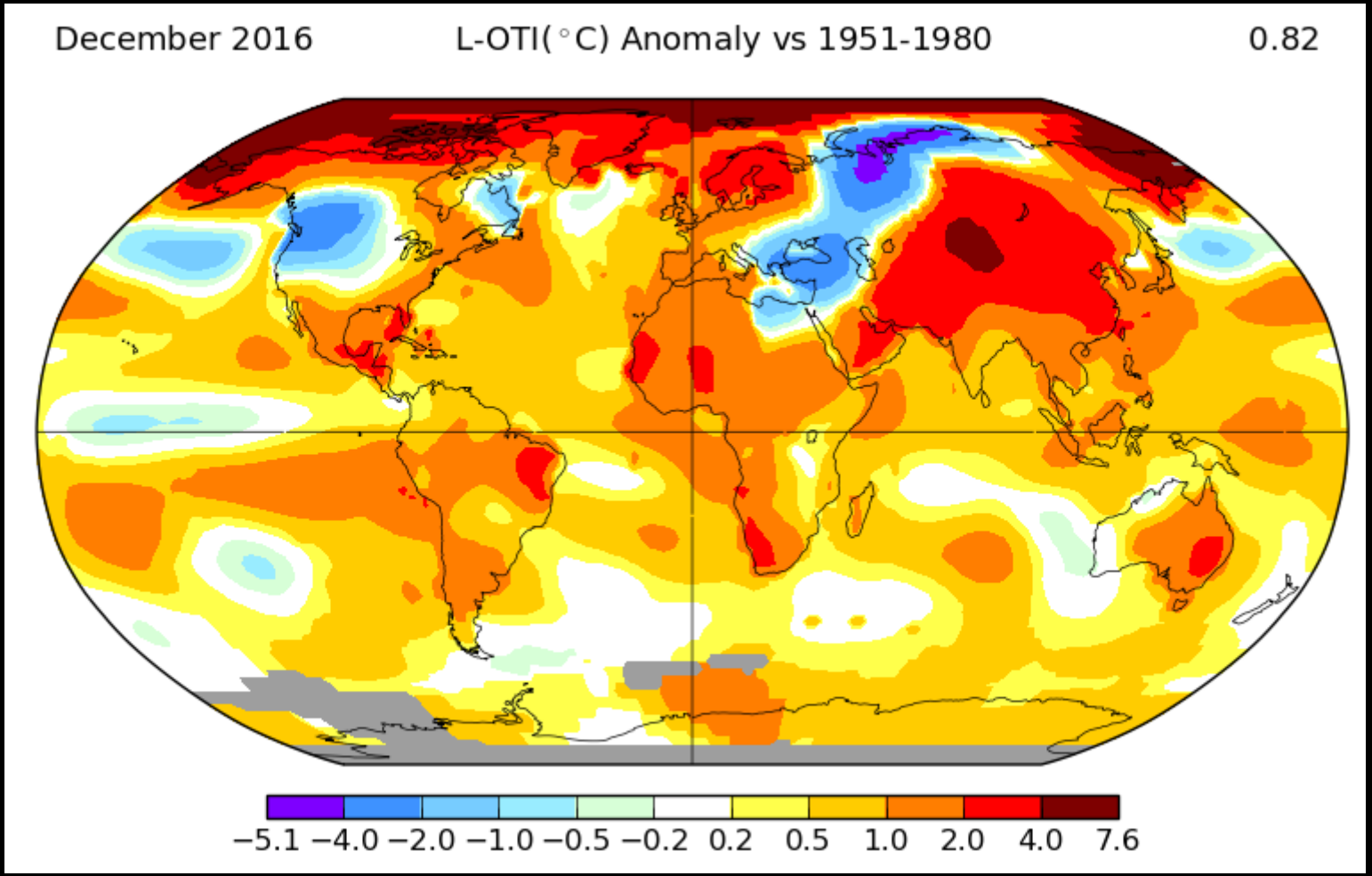






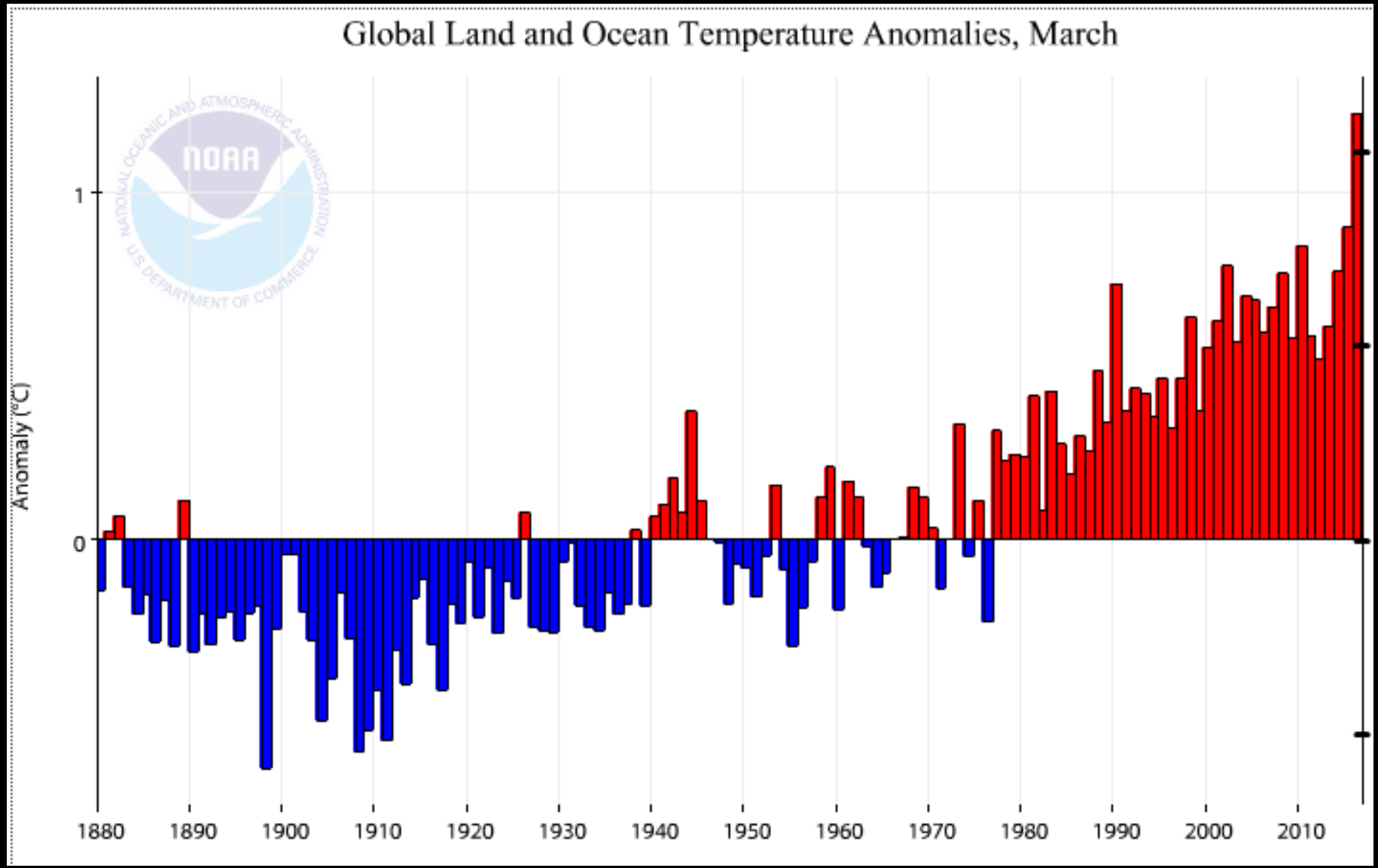
Source: G.Turner, "Is Global Collapse Imminent?", Research Paper n.4, August 2014, University of Melbourne

Global Warming



Source: NASA, January 2017

Planet Temperature
2016: +1.23 °C



Source: NOAA, National Oceanic and Atmospheric Administration, www.ncdc.noaa.gov, 2016

An atlas of pollution: the world in carbon dioxide emissions

Latest data published by the US Energy Information Administration provides a unique picture of economic growth – and decline. China has sped ahead of the US, as shown by this map, which resizes each country according to CO2 emissions. And, for the first time, world emissions have gone down

North America
6,411m tonnes of CO2 in 2009
Down 6.9% on 2008

2 US
5,425
million tonnes
7.0%
US emissions are down for the second year in succession – after almost uninterrupted year on year increases since these records began in 1980. The decline has matched the country's economic woes which have seen it only just emerge from recession.
Since 2000 the country's CO2 emissions have fallen by 7.5%

7 Canada 541 9.6%
13 Mexico 444 1.9%

Central & South America
1,273m tonnes of CO2 in 2009
Up 3.6% on 2008

14 Brazil 420 0.3%
30 Venezuela 162 1.4%
29 Argentina 167 1.2%
35 Chile 119
49 Colombia 70.1
64 Trinidad & Tobago 47.8

Europe
4,310m tonnes of CO2 in 2009
Down 6.9% on 2008

10 UK 520 7.8%
UK had been ranked 8th for emissions in 2008
6 Germany 766 7.0%
25 Netherlands 249 4.9%
21 Poland 286 4.3%
18 France 397 7.4%
19 Spain 330 8.4%
17 Italy 408 9.3%
24 Turkey 253 3.3%
39 Greece 100 4.4%
68 Norway 39.6
60 Sweden 50.6
59 Finland 52.2
62 Denmark 48.6
67 Ireland 40.2
34 Belgium 137 4.1%
41 Czech Rep 95.3
32 Slovakia 85.8
50 Austria 69.2
51 Hungary 60.0
44 Romania 80.5
66 Bulgaria 44.5
56 Serbia 52.2
55 Portugal 56.5
60 Switz. 45.8

Eurasia
2,358m tonnes of CO2 in 2009
Down 9.2% on 2008

4 Russia 1,572 7.4%
28 Kazakhstan 185 9.6%
36 Uzbekistan 115 2.7%
54 Turkmenistan 56.8
52 Belarus 60.6
22 Ukraine 255 23.2%
Biggest % drop in emissions
72 Azerbaijan 26.2

Africa
1,122m tonnes of CO2 in 2009
Down 3.1% on 2008

12 South Africa 450 6.7%
46 Nigeria 77.7
37 Algeria 114 4.5%
27 Egypt 192 2.5%
57 Libya 55.0
71 Morocco 36.5
78 Angola 24.0

Middle East
1,714m tonnes of CO2 in 2009
Up 3.3% on 2008

11 Saudi Arabia 470 3.2%
9 Iran 527 3.2%
26 United Arab Emirates 193 1.3%
38 Iraq 104
43 Kuwait 84.9
48 Israel 70.5
53 Syria 56.0
63 Oman 49.0
61 Qatar 64.9
75 Bahrain 30.1
70 Yemen 22.9

Asia & Oceania
13,264m tonnes of CO2 in 2009
Up 7.5% on 2008

1 China 7,711 million tonnes 13.3%
Only three years earlier, in 2006, China was in second place, and until recently had been very close to US emissions. But from 2008 to 2009, rapid growth has matched the country's 9-10% growth in GDP.
Since 2000 the country's CO2 emissions have risen by 170.6%

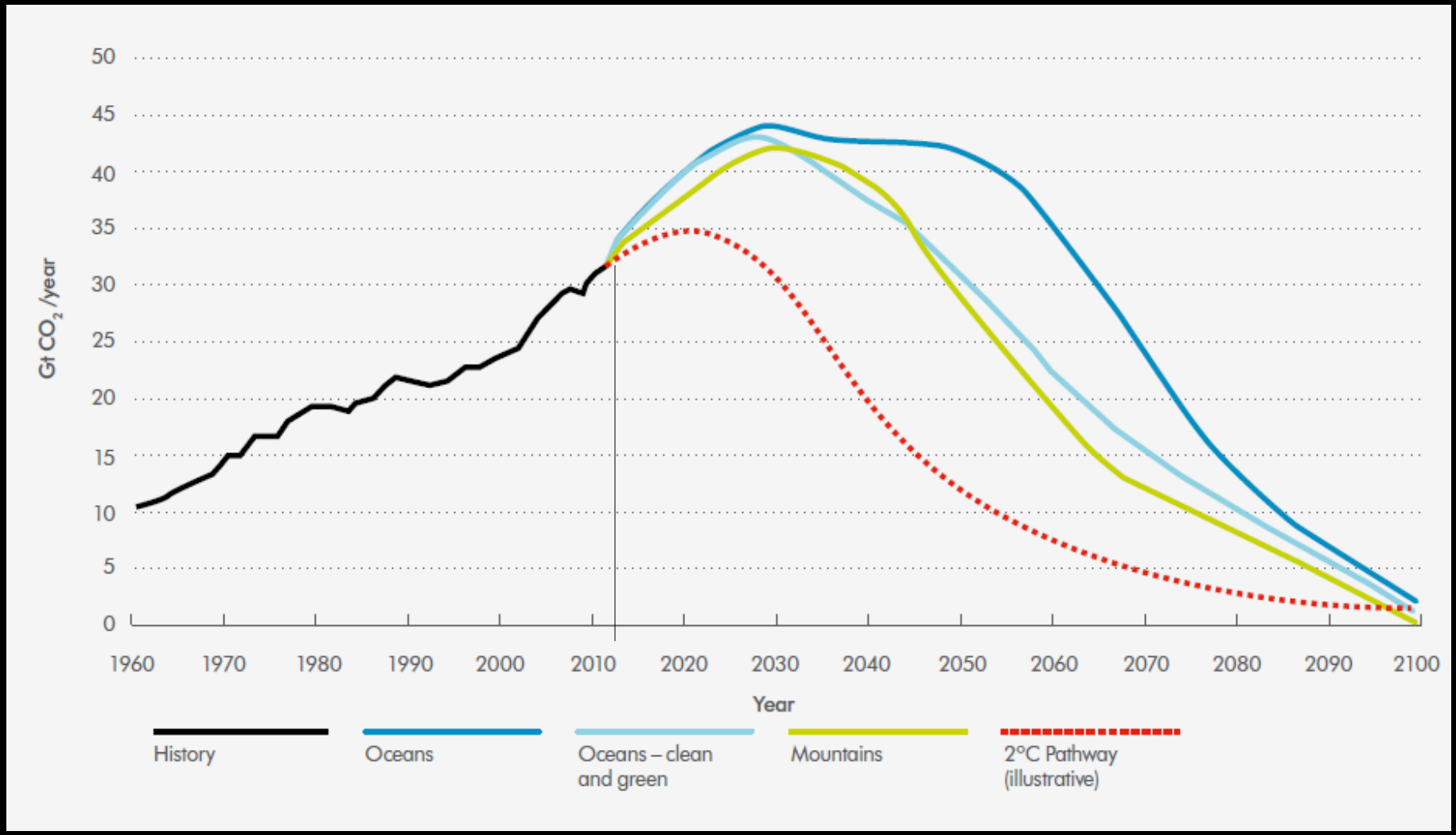
3 India 1,602 8.7%
India overtook Russia in 2009
8 South Korea 528 1.2%
5 Japan 1,098 9.7%
16 Indonesia 413 2.4%
15 Australia 418 1.5%
20 Taiwan 291 3.7%
23 Thailand 253 0.6%
45 North Korea 79.5
33 Pakistan 140 2.4%
42 Hong Kong 86.0
40 Vietnam 98.8 2.4%
47 Philippines 72.4
16 Bangladesh 55.1
32 Malaysia 148 0.2%
31 Singapore 161 3.6%
69 New Zealand 33.1

World
30,452m tonnes of CO2 in 2009
Down 0.1% on 2008

Detailed data
Full list of each country's CO2 emissions and movement in the world emissions league table

Source: US Energy Inf.Admin., 2014

Global CO_2 Emissions



"... Dipinte in queste rive
son dell'umana gente
<u>le magnifiche sorti e progressive</u>"
Giacomo Leopardi
La Ginestra, 1836

Source. www.shell.com/scenairos, 2013

Manufacturing
1st warning: 1985

Thursday morning, January 17, 1985

25 cents

San Jose Mercury News

Serving Northern California Since 1851

Morning Final C

High birth defects rate in spill area

Los Paseos residents 'convinced' toxic leak caused birth defects

By Mitchel Benson and Pamela Kramer
Mercury News Staff Writers

Four-year-old Brian Puppo wants to be a pilot.

"But I don't think he can . . . It would be too much of a health risk," said his mother, Susan, as she recalled the long list of health problems that have affected her son since birth and forced him to undergo open-heart surgery four times in his short life.

Susan Puppo and her husband, Rick, told Brian's story over and over again Wednesday after county and state health officials released a study of the Puppos' neighborhood that showed an excess of miscarriages, congenital heart abnormalities and total birth defects in 1980 and 1981.

The officials couldn't say definitely that a chemical leak that contaminated the South San Jose neighborhood's water supply was responsible for the birth defects and miscarriages.

But the Puppos don't care.

The couple is convinced it was that

Continued on Page 7A

Highlights of studies

- About twice as many miscarriages in the Los Paseos neighborhood in 1980-81 as in a nearby control neighborhood that has had no known water contamination.
- About three times as many birth defects in Los Paseos in 1980-81 as in the control neighborhood.
- More than twice as many major heart defects among infants born as a result of pregnancies in 1981 in the area served by the Great Oaks Water Co. as in the rest of Santa Clara County.
- The studies do not indicate the causes.

For the state health department's full summaries of the findings, see Page 6A.

Site near S.J.'s Fairchild plant shows cluster effect, state says

By Susan Yoachum and Mitchel Benson
Staff Writers

A study released by the state Wednesday confirmed that an unusually high number of birth defects and miscarriages occurred in a South San Jose neighborhood near a contaminated drinking-water well.

The study, conducted by the state Department of Health Services and the Santa Clara County Health Department, focused on pregnancies in the Los Paseos neighborhood, near the Fairchild Camera and Instrument Corp. plant, in 1980 and 1981.

A related study by the same agencies that also was released Wednesday showed that the rate of a specific form of birth defect, congenital heart malformation, was higher in the South San Jose area served by the Great Oaks Water Co. than in the rest of Santa Clara County.

The unusually high cluster of miscarriages and birth defects is only the second that state officials have ever con-

Continued on Page 10A

Semiconductor workers

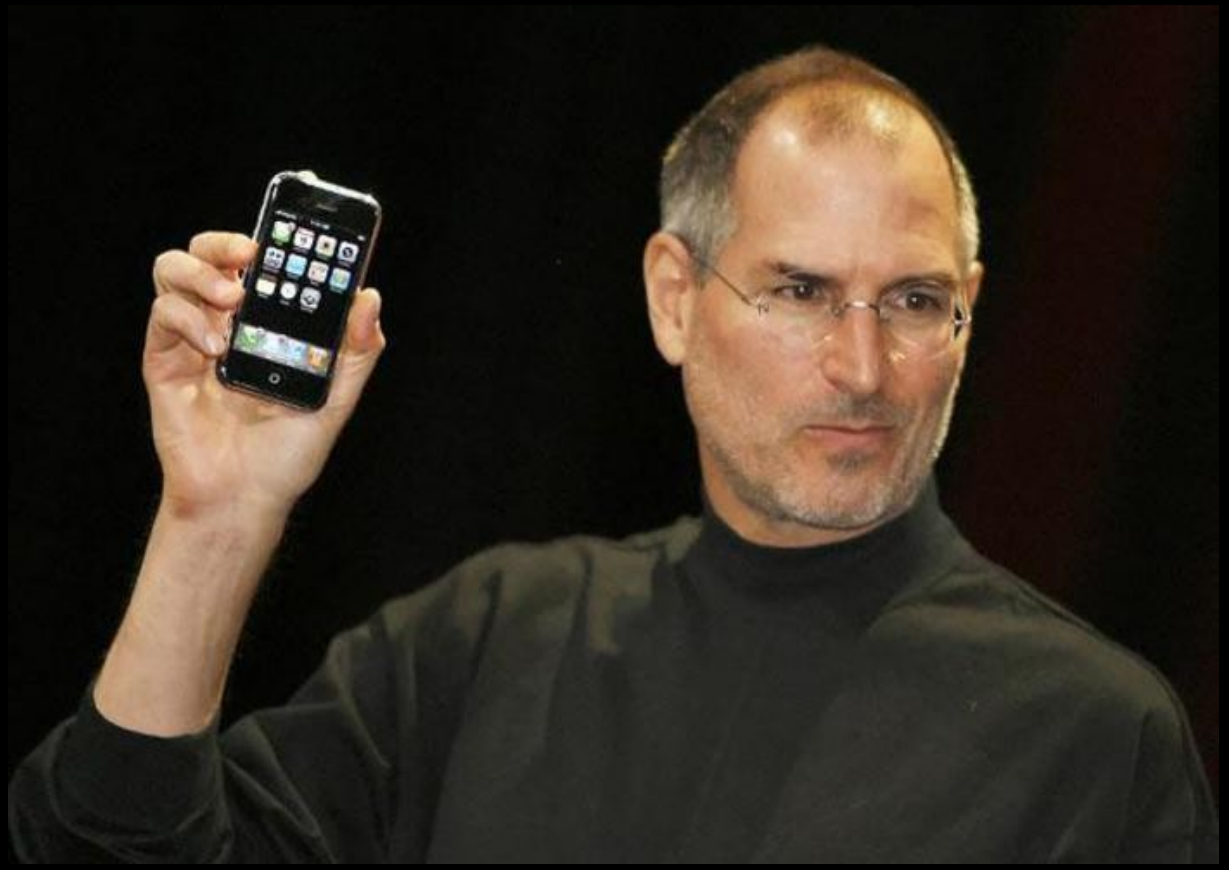
- Illness rate 3:1 more than other workers
- Women miscarriage rate 1,4:1 more than other workers

The high-tech revolution carries a high price for health, the environment and sustainable economic development.

High tech generate a host of toxic hazards during its lifecycle from design and production, to consumption and disposal.

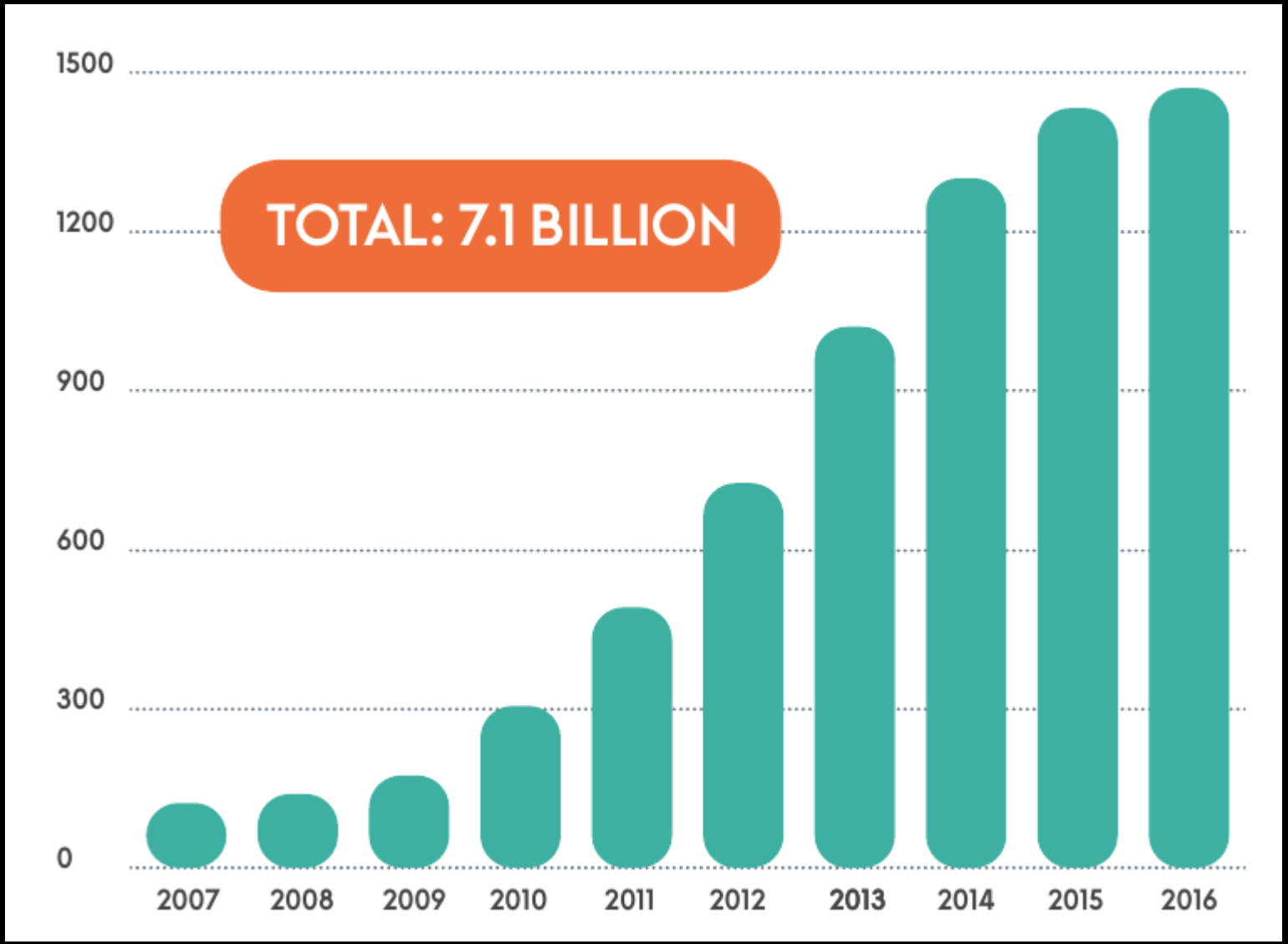
Vast resources are required to manufacture these products, including a wide array of highly toxic materials.

source: SVTC, Silicon Valley Toxics Coalition, October 2007



Steve Jobs introduces the iPhone
9 January 2007, San Francisco

2007-2017: 7.1 Billions Smart-Phones produced



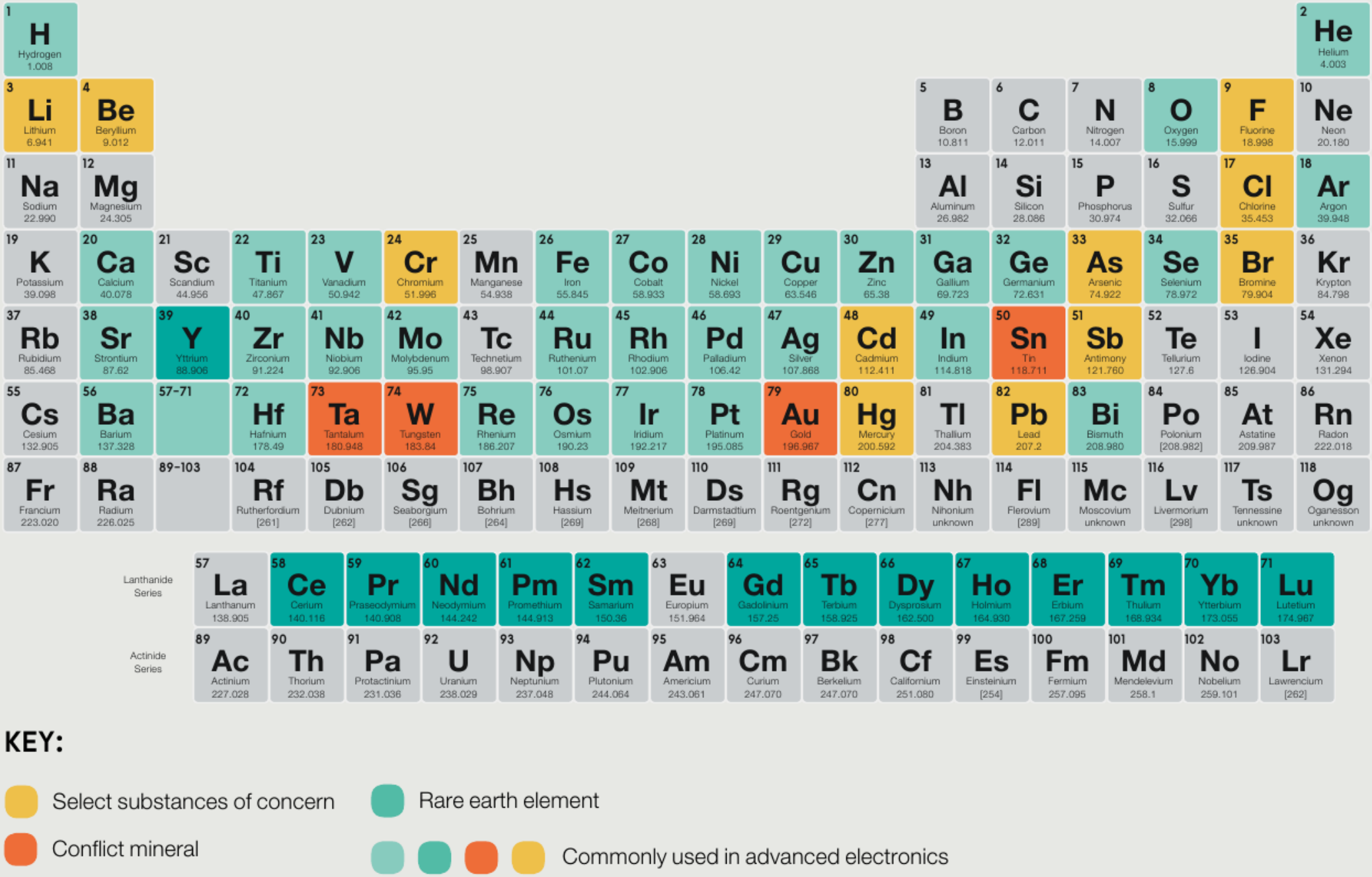
Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017
Source: Gartner, IDC

Smartphone Supply Chain

2014 (US):
50% smartphones replacement = 12 Months

Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017

Periodic Table of Smart-Phones



Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017

Smartphone Materials Footprint Since 2007

Material		Common Use	Content per smartphone (g)	Content in all smartphones made since 2007 (t)
Aluminium	Al	Case	22.18	**157,478**
Copper	Cu	Wiring	15.12	**107,352**
Plastics	-	Case	9.53	**67,663**
Cobalt	Co	Battery	5.38	**38,198**
Tungsten	W	Vibration	0.44	**3,124**
Silver	Ag	Solder, PCB	0.31	**2,201**
Gold	Au	PCB	0.03	**213**
Neodymium	Nd	Speaker Magnet	0.05	**355**
Indium *	In	Display	0.01	**71**
Palladium	Pd	PCB	0.01	**71**
Gallium	Ga	LED-backlights	0.0004	**3**

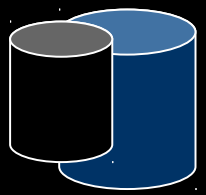
Only 16% recycled

* Indium = 14 years of supply remaining based on current rates of extraction levels

Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017

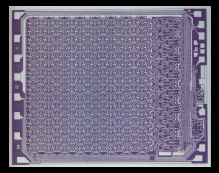
Manufacturing
Material Intensity (the 1,7 Kg chip)

1.7 Kg of
- fossil fuel
- chemicals

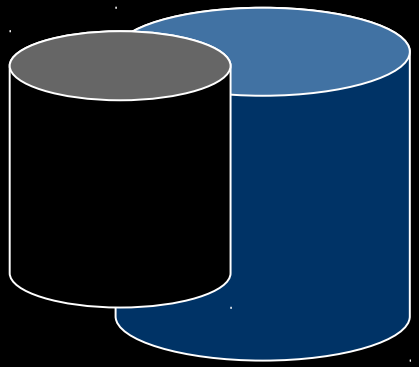


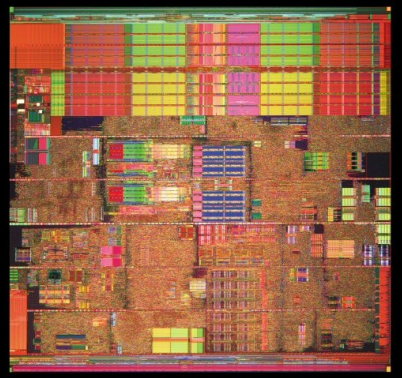
to produce

1700g : 2g = 850 :1



1 DRAM (2g) = 850:1





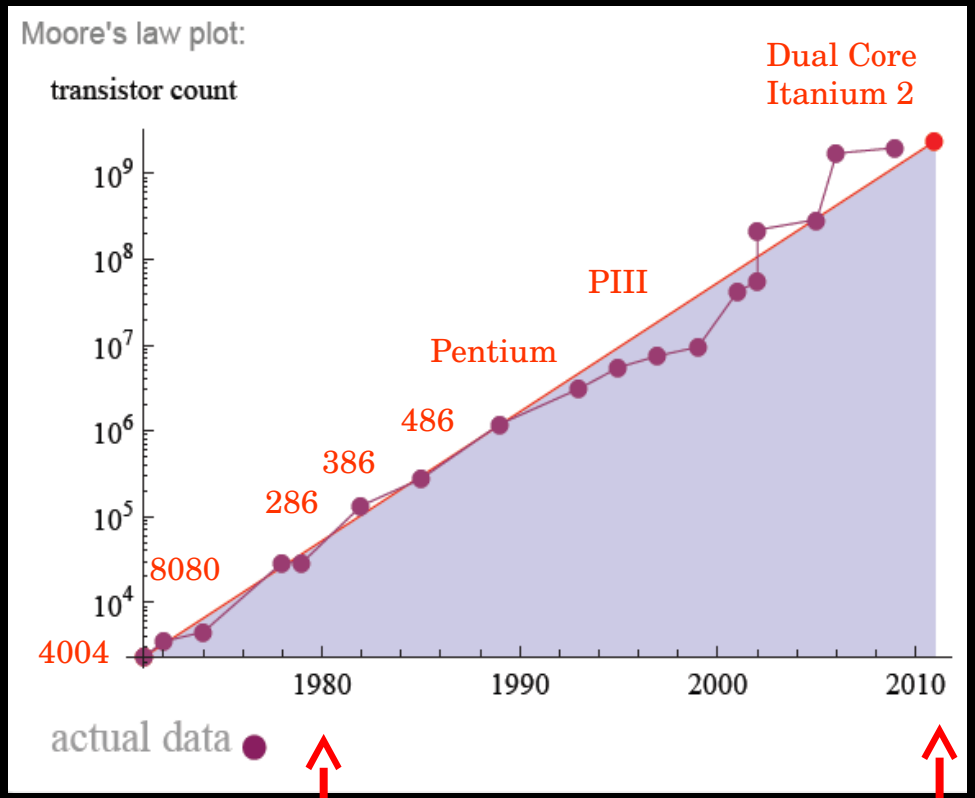
1 µPC = 3440:1

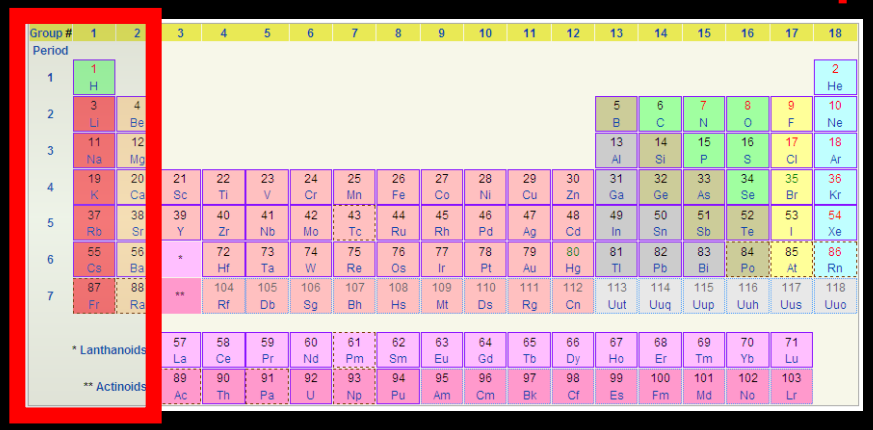
No other product has such *Material Intensity* (CAR = 2:1!)

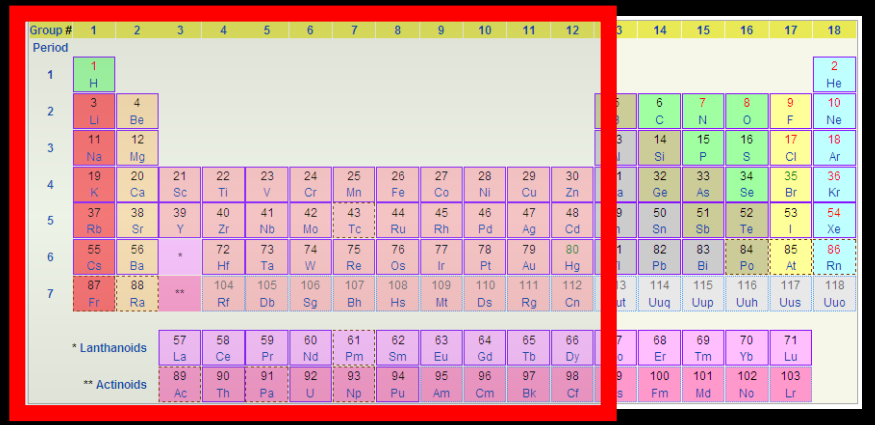
- Chip factories
  - *127 new fabs in planning & construction around the world*
  - *1 factory - 200mm fab (1-3 B$)*
  - *1 factory - 300mm fab (2x cost)*
  - *200mm to 300mm the largest transition in industrial history*

Source: SVTC, Silicon Valley Toxics Coalition, October 2007

Challenging Moore's Law



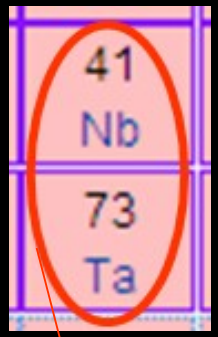




Computer chips made use of 11 major elements in the 1980s
but now use about 60 (two-thirds of the Periodic Table)

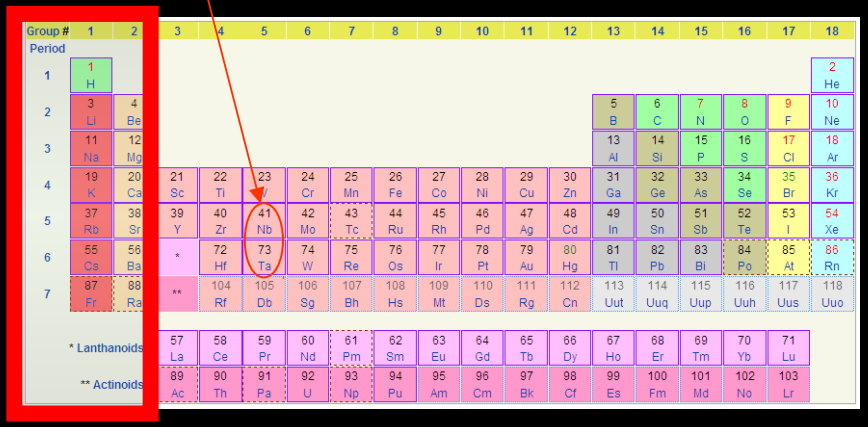
Source: "The Consumption Conundrum: Driving the Destruction Abroad", Oswald J. Schmitz, Thomas E. Graedel, April 2010, Yale University

Coltan

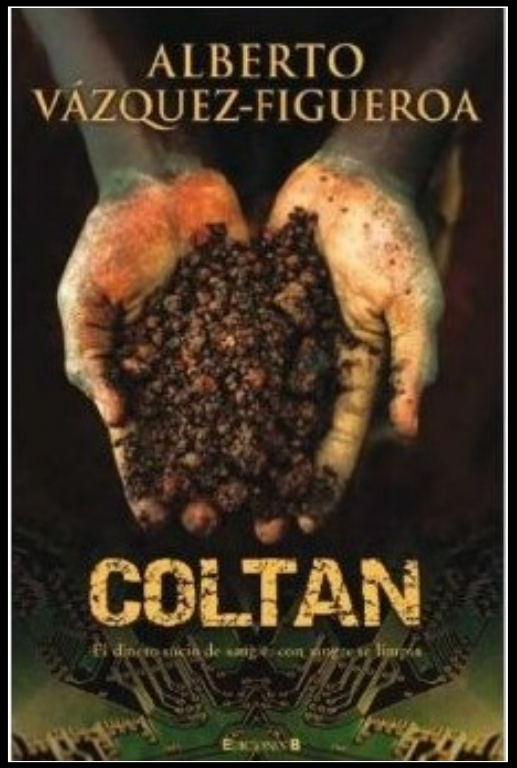


Niobium (Columbium) ⟶ COLumbite

Tantalum ⟶ TANtalite

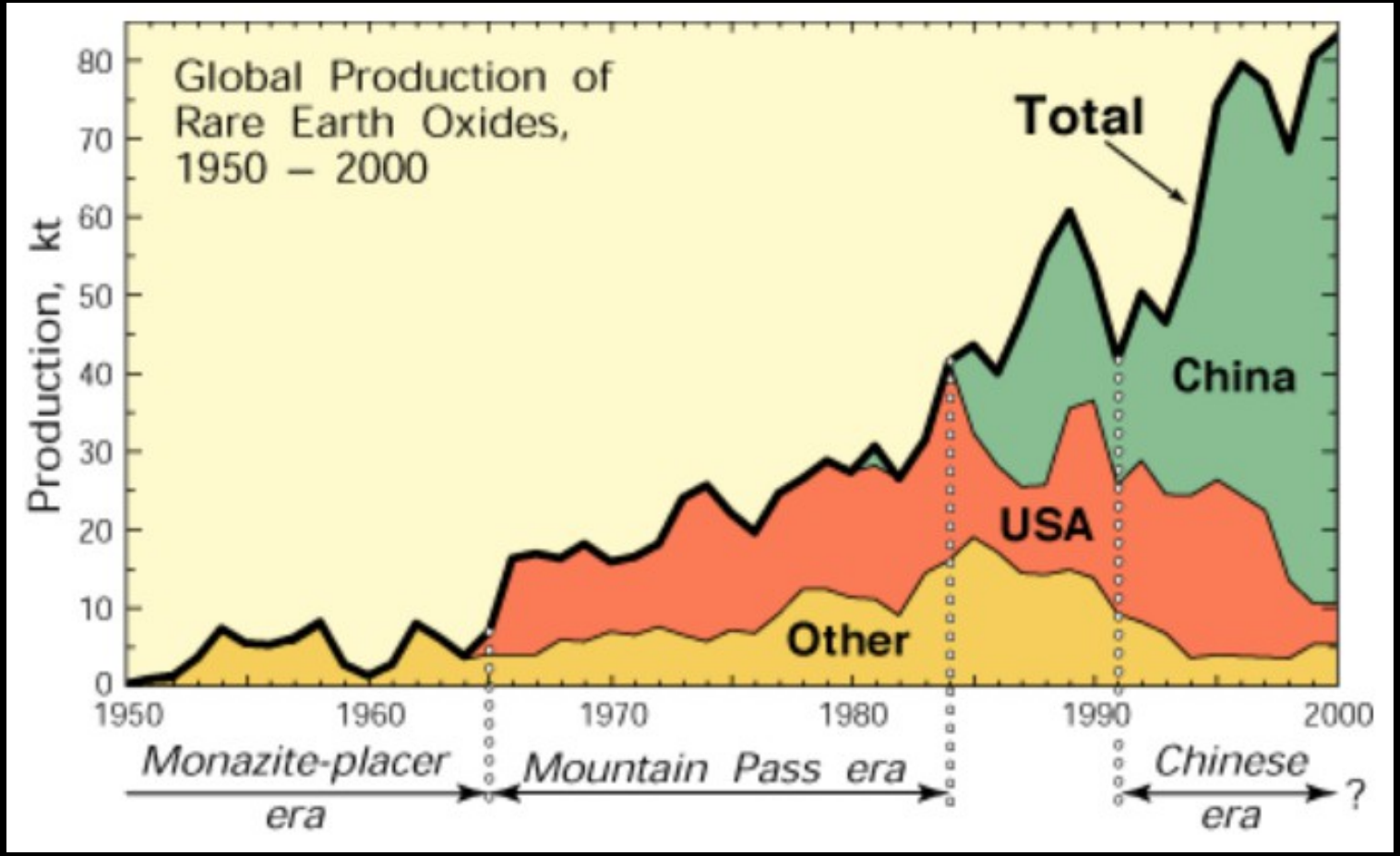


COLTAN



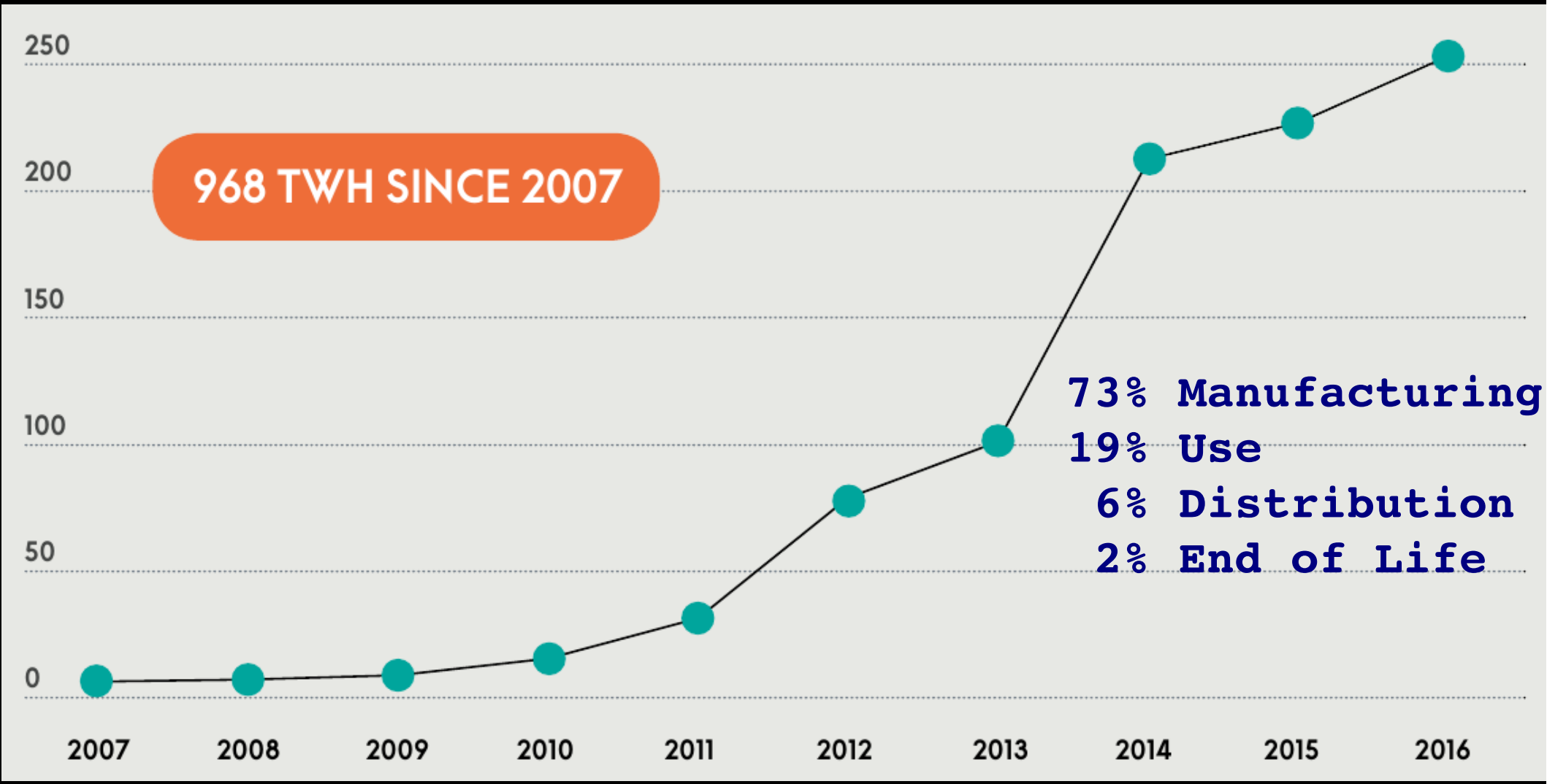
Source: Alberto Vazquez-Figueroa, "Coltan", Ediciones B, 2010)

Rare Earth Elements
Critical Resources for ICT



Source: "Rare Earth Elements - Critical Resources for High Technology", U.S. Geological Survey Fact Sheet 087-02

Smartphone Energy Footprint since 2007



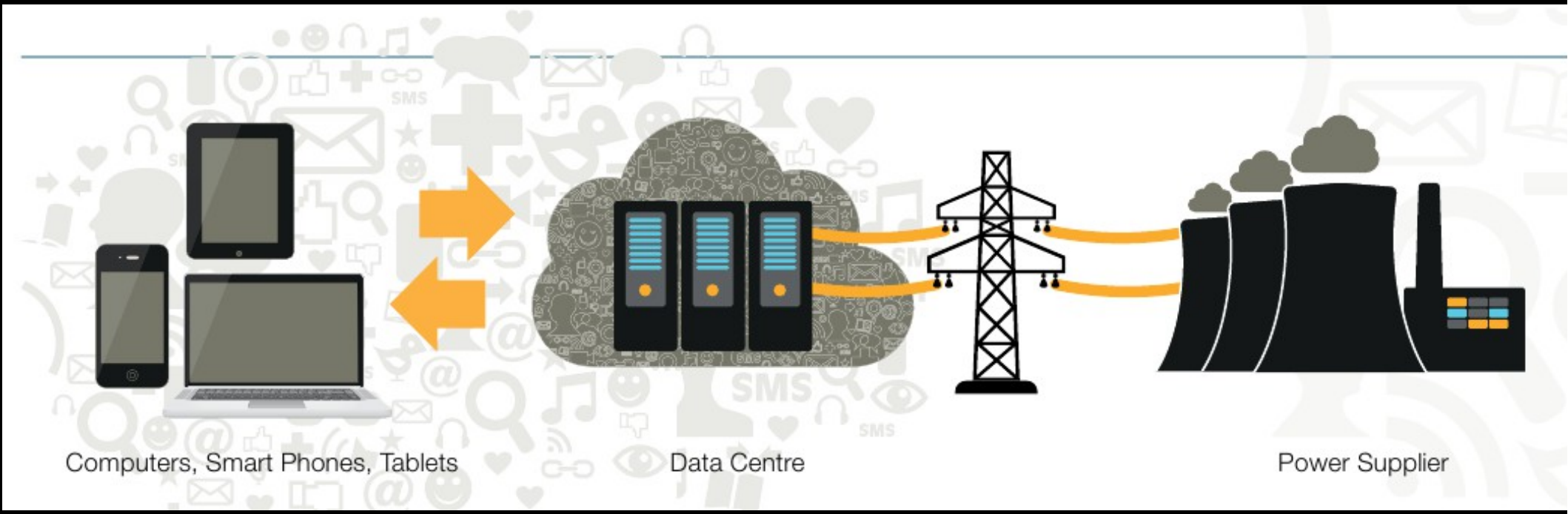
Consumi Elettrici Italia 2016: 310,2 TWh (Fonte: Terna)

Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017

NSA Data Center, UTAH

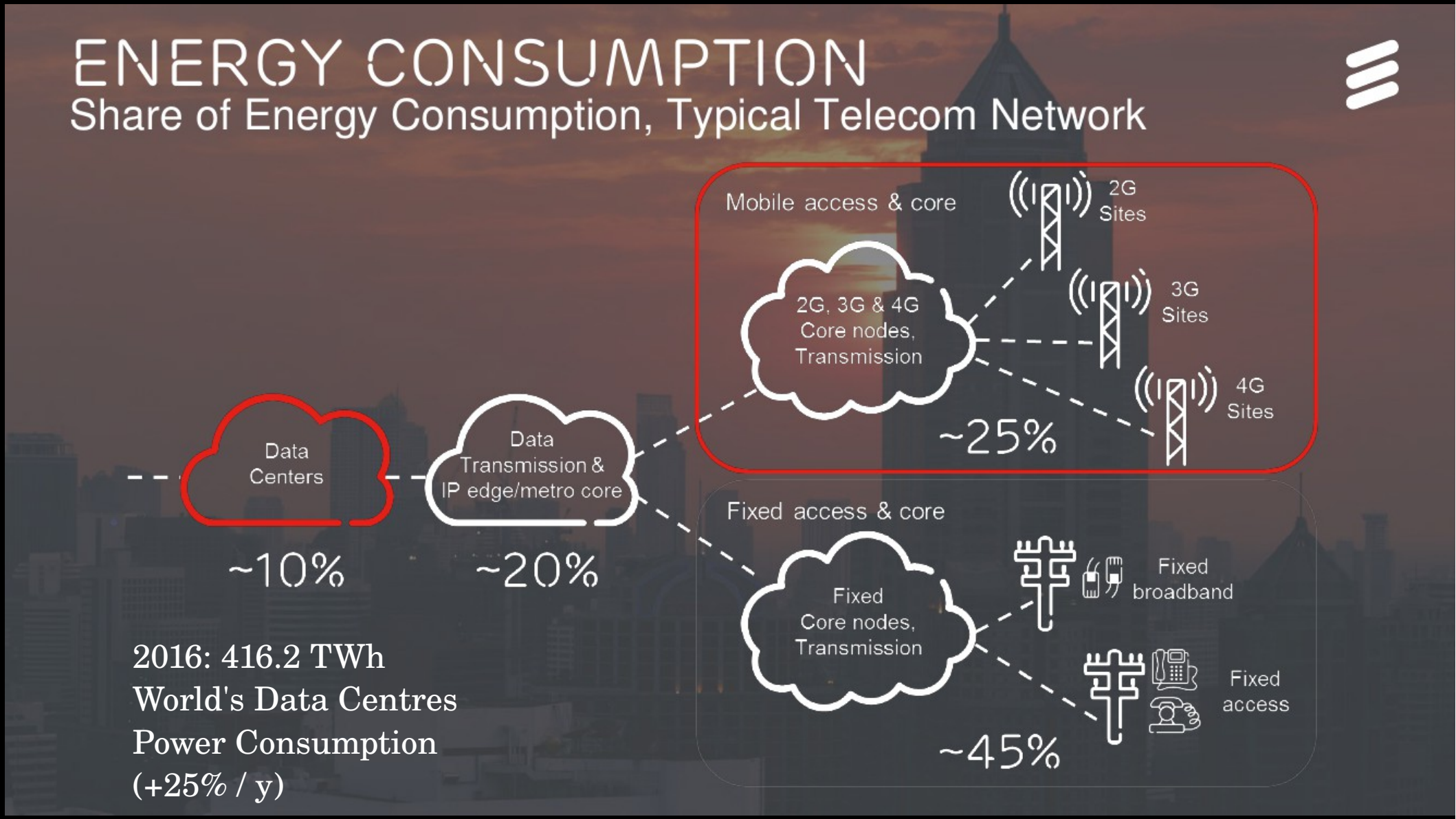
Source: Business Insider, 2014

How Clean Is Your Cloud?



Source: How Clean Is Your Cloud?, Greenpeace, 2012

Telecom Network Power Share



Source: Ericsson, 2016


Agbogbloshie (Accra), Ghana, Africa
COPYRIGHT © ANDREW MCCONNELL

Agbogbloshie (Accra), Ghana, Africa

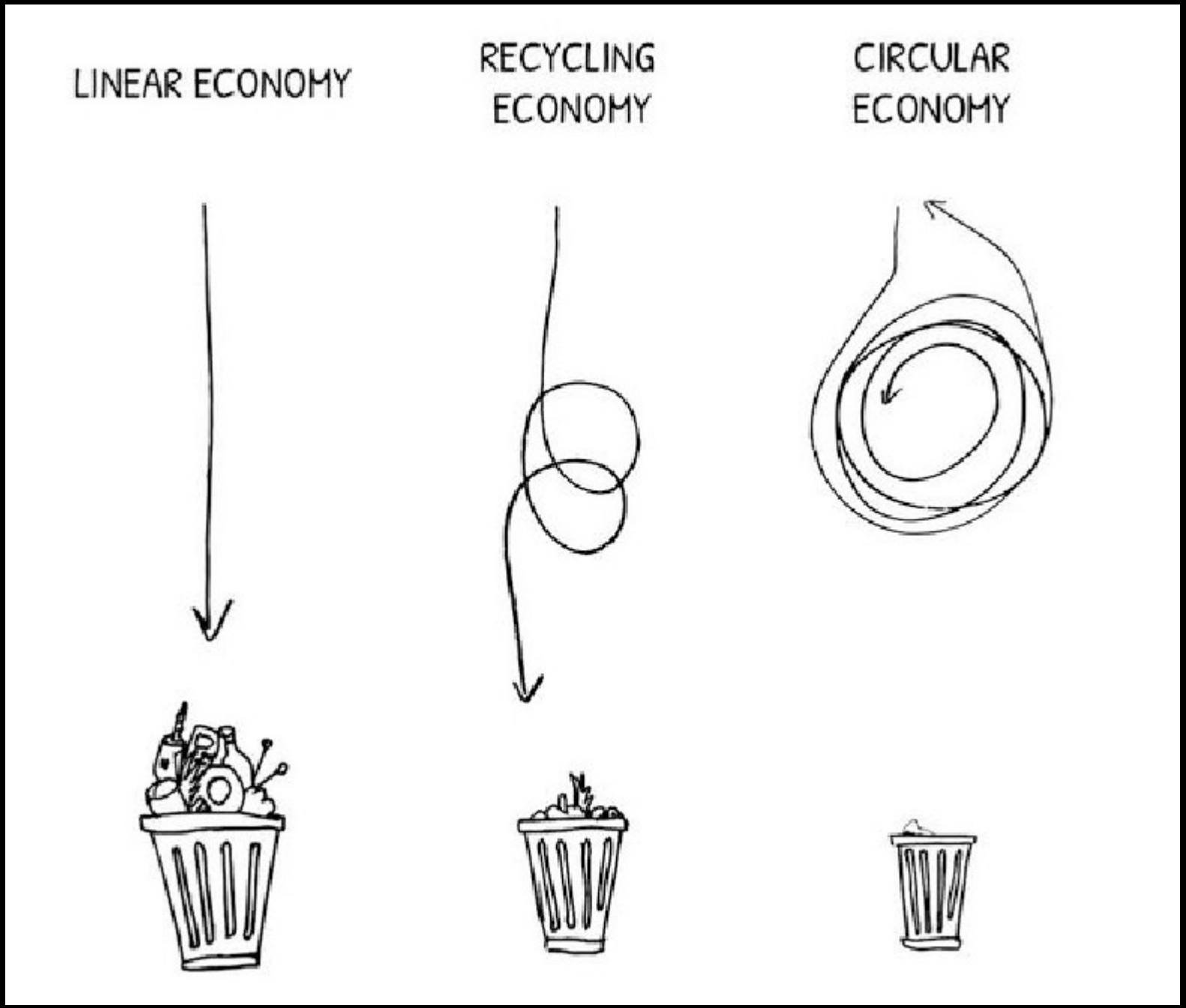
Source: Agbogbloshie: the world's largest e-waste dump, The Guardian, 2013

e-Waste: where do they go?

- US consumers replace roughly 133,000 PC/day !
- Only 20% recycled
- Wall Street Journal: "the world's fastest growing and potentially most dangerous waste problem": plastic, lead, cadmium, chromium, mercury

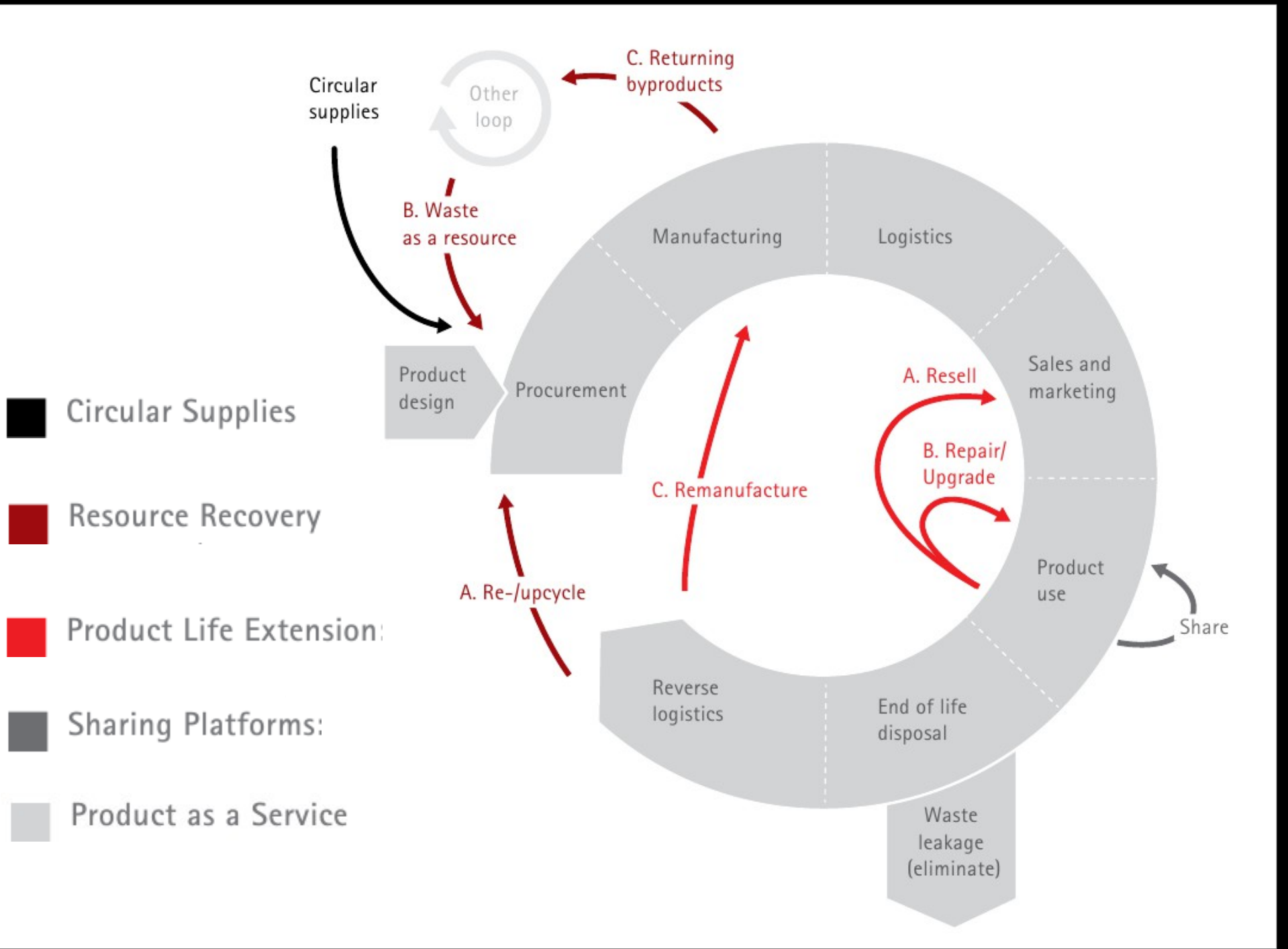
The health burden of e-waste falls on the world's poorest workers, who labor long hours without basic protections from toxic exposure

Source: Silicon Valley Toxics Coalition, 2007,
Wall Street Journal, September 23, 2004



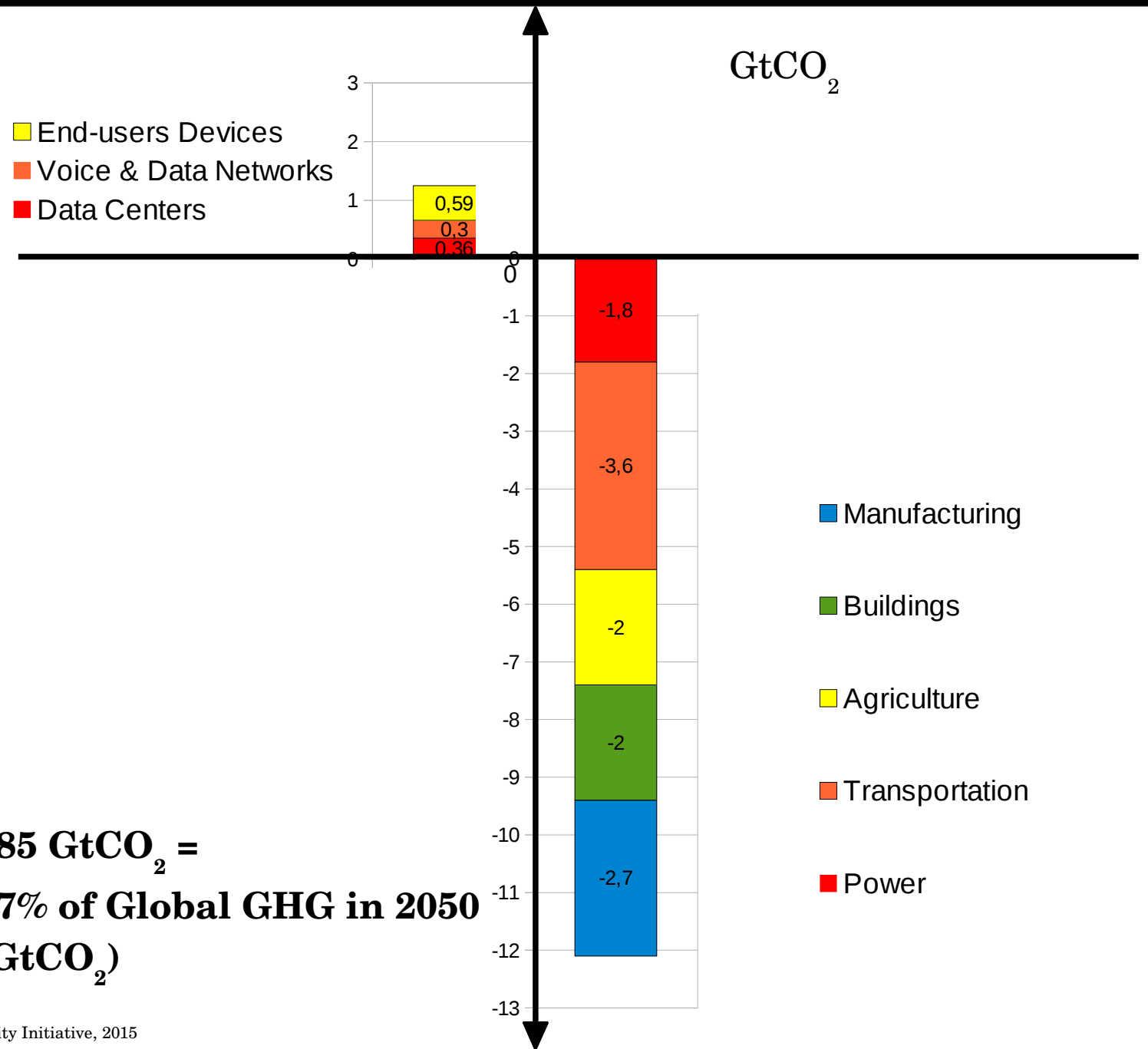
Source: World Economic Forum report: Intelligent Assets, Unlocking the Circular Economy Potential, 2016

Circular Economy



Source: *Circular Advantage*, Accenture, 2014

By 2030 ICT can reduce Global CO_2 Emissions: +1,25 -12,1 = -10,85 $GtCO_2$



-10,85 $GtCO_2$ =

-19,7% of Global GHG in 2050 (55$GtCO_2$)

Source: Global eSustainability Initiative, 2015

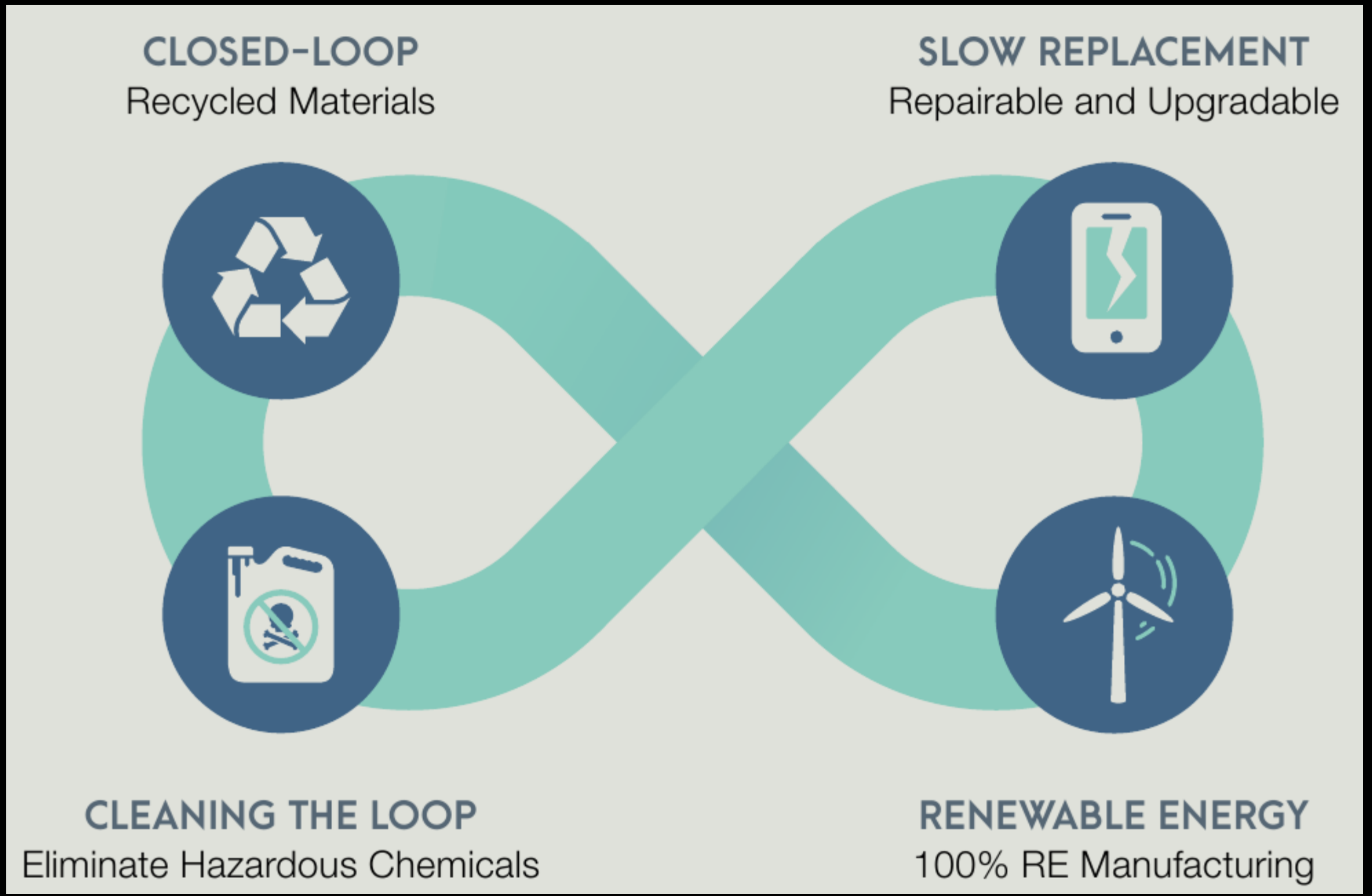
"Soesterberg principle"

Electronic sustainability committment:

"Each new generation
of technical improvements
in electronic products (Moore's law)
should include parallel and proportional improvements
(@Moore's law) in environmental, health and safety,
as well as social justice attributes"

Trans-Atlantic Network for Clean Production Meeting,
Soesterberg, The Netherlands, May 1999

The challenge for the next 10 Years



Source: FROM SMART TO SENSELESS: The Global Impact of 10 Years of Smartphones, Greenpeace, 2017