

**Table S1.** Data and sources for Figure 1: energy capture in the biosphere and society (EJ yr<sup>-1</sup>)

Revolution	Date	Marine	Terrestrial	Biosphere total	Biomass	Fossil	Anthroposphere total
Anoxygenic photosynthesis (R1)	3 Ga	80 <sup>a</sup>	1 <sup>b</sup>	81	0	0	0
Oxygenic photosynthesis (R2)	1.5 Ga	1260 <sup>c</sup>	60 <sup>d</sup>	1320	0	0	0
Eukaryotic photosynthesis (R3)	350 Ma	1800 <sup>e</sup>	2500 <sup>f</sup>	4300	0	0	0
Paleolithic fire use (R4)	10,000 BC	1800	2000	3800	0.2	0	0.2 <sup>j</sup>
Neolithic revolution (R5)	1850 AD	1800	2000 <sup>g</sup>	3800	60	0	60 <sup>k</sup>
Industrial revolution (R6)	2000 AD	1800 <sup>h</sup>	2100 <sup>i</sup>	3900	222	396	618 <sup>l</sup>

**Notes:**

All carbon to energy conversions assume 37 MJ kgC<sup>-1</sup>.

<sup>a</sup> Estimate for Fe-recycling biosphere based on corresponding carbon flux of  $1.7 \times 10^{14}$  molC yr<sup>-1</sup> (1).

<sup>b</sup> Maximum productivity considering that terrestrial anoxygenic photosynthesis would be competing with marine anoxygenic photosynthesis for gaseous electron donors such as H<sub>2</sub>.

<sup>c</sup> COPSE model (2) gives ~0.7 of present [PO<sub>4</sub>] and marine productivity during Proterozoic.

<sup>d</sup> From estimate for the net primary productivity of cyanobacterial desert crust today 11.7 gC m<sup>-2</sup> yr<sup>-1</sup> (3) multiplied by global land area, giving ~1.5 PgC yr<sup>-1</sup>.

<sup>e</sup> COPSE model (4) gives 0.7-1.4 of present [PO<sub>4</sub>] and marine productivity over Phanerozoic time so opting for present value as best estimate.

<sup>f</sup> COPSE model (4) gives 1-1.4 of present terrestrial NPP since establishment of vascular plants 350 Ma so taking 1.2 of present as best estimate.

<sup>g</sup> Based on subtracting current terrestrial net carbon sink of ~2.7 PgC yr<sup>-1</sup> from 2000AD estimate.

<sup>h</sup> From satellite-based global marine NPP estimate of 48.5 PgC yr<sup>-1</sup> (5) which is very close to mean of global models of 50.7 PgC yr<sup>-1</sup> (6).

<sup>i</sup> From satellite-based global terrestrial NPP estimate of 56.4 PgC yr<sup>-1</sup> (5), which is fairly central in the range from models of 44.4-66.3 PgC yr<sup>-1</sup> (7).

<sup>j</sup> Based on (8)

<sup>k</sup> Own calculation based on (8, 9) and Clio Infra (2015) (data retrieved March 1, 2015, clio-infra.eu)

<sup>l</sup> Based on (10)

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