WebTable 1. Interdisciplinary comparison of climate engineering strategies and comparative ratings (1 = poor strategy; 5 = effective strategy) are shown, with ratings in bold

Strategy[a]	**Technical potential for GT C sequestered (years to achieve)** (1 = low; 5 = high) (Field *et al.* 1998; Lal 2004; Pacala and Socolow 2004; Friedlingstein *et al.* 2006)	**Cooling potential ($W m^{-2}$)** (Morgan *et al.* 2006; Vaughan and Lenton 2011)	**Lifetime of effect (yrs)** (Vaughan and Lenton 2011)	**Ecological risks** (1 = high; 5 = low) (Betts 2000; McNeill 2000; Rosner 2004; Czimczik and Masiello 2007; Jackson *et al.* 2008; Shepherd *et al.* 2009; NRC 2013)	**Cost effectiveness**[b] (1 = low; 5 = high) (Murphy and Jaccard 2011)	**Public acceptance**[c] (1 = low; 5 = high)	**Institutional feasibility**[d] (1 = low; 5 = high) (Ostrom *et al.* 1999; Dietz *et al.* 2003; Dietz and Stern 2009; Morrow *et al.* 2009; Ostrom 2010; Biermann *et al.* 2012)	**Scope of ethical concerns** (1 = extreme; 5 = minimal) (Morrow *et al.* 2009; Elliott 2010; Gardiner 2011; Hale and Dilling 2011; Preston 2011)
Do nothing	Diminished background seq to 0 by 2100 **5**			Rapid increase in atmospheric CO_2, global warming, ocean acidification **1**	**5** (short term)	**5**	**5**	Extreme **1**
Abatement	**5**	As much as desired	N/A	None, if biomass fuels are grown on marginal, unforested lands where soils have previously been disturbed **5**	**2**	**4**	**4**	Minimal **5**
Reforestation/ afforestation	25 (50 yrs) **5**	0.37	10–100s	Decreased albedo in temperate/boreal forests, increased surface roughness and evaporation **4**	**4**	**5**	**4**	Moderate **4**
Plantations (conversion to forest cover)	14 (50 yrs) **5**	2.5	10s	Stream acidification, reduced stream flow, soil salinization, land-use change, energy requirement **3**	**4**	**5**	**4**	Moderate **4**
Soil management for C sequestration	14–25 (50 yrs) **5**	unknown	10–1000	Potential for improved agricultural productivity **5**	**3**	**4**	**4**	Moderate **4**
Biochar	Unknown **3**	0.4	0–1000	Fuel requirement, energy requirement, CO_2 byproduct **4**	**3**	**4**	**4**	Moderate **4**
Ocean iron fertilization	70–227 (100 yrs) **2**	0.2	10–100s	Change in marine food webs, algal toxin production, oxygen depletion **1**	**4**	**2**	**1**	Vast **2**
Geological CCS	25 (50 yrs) **4**		100–10 000s	Infrastructure/energy requirement to develop **4**	**3**	**4**	**4**	Significant **3**
Ocean CCS	Unknown **3**	0.025	100–10 000s	CO_2 leakage, ocean acidification, infrastructure/energy requirement to develop **3**	**3**	**3**	**3**	Vast **2**
Stratospheric aerosols	No carbon sequestered **4**	3–3.7	~3	Tropospheric pollution, changing weather patterns, does not decrease ocean acidification **2**	**5**	**1**	**1**	Extreme **1**

Notes: Ratings are based on information obtained from a literature review and involved a collaborative consensus among the authors, who provided expertise in the disciplines represented. Ratings are presented without weighting criteria or summing scores. Broader surveys of expert opinion for rankings, as well as inclusion of policy makers and the public, would be useful avenues for further research in this area (Morgan and Keith 1995; Rowe and Wright 2011; Rosa *et al.* 2012). For this multi-attribute trade-off analysis we do not sum or weight the scores, but present six scores for each strategy. Applying decision analysis methods that weight criteria differently, based on public or expert value systems, is a key direction for future prioritization of climate engineering strategies (Arvai *et al.* 2001). [a]Citations are in the main text, with additional citations for each criterion shown. [b]Explanation of cost effectiveness ratings provided in WebTable 3. [c]Explanation of public acceptance ratings provided in WebTable 2. [d]Institutional feasibility was calculated by evaluating the climate engineering options on five criteria: (1) low number of decision makers required to implement (1 point), high number of decision makers necessary to implement (0 points); (2) risks and benefits are aligned (1 point), risks and benefits are not aligned (0 points); (3) low level of uncertainty of harms and/or benefits (1 point), high level of uncertainty of harms/and or benefits (0 points); (4) high level of permanence of climate benefits of action (1 point), low level of permanence in climate benefits of action (0 points); and (5) high level of visibility and ease to monitor option (1 point), difficult to monitor option (0 points).

WebTable 2. Public acceptance rating explanation

	Perceived cost	*Perceived risk*	*Trust (in technology and actors)*	*Fairness (process and distribution of benefits)*	*Perception of "naturalness"*	*Likely reaction*[a]	*Source(s)*
Abatement	High (economic)	Low	High	High	High	Support/ tolerance	
Forest management	Unclear	Low	High	High	High	Support	(NERC 2010)
Soil management	Unclear	Low	Moderate	Moderate	High	Tolerance	
Biochar	Unclear	Low	Moderate	Moderate	Moderate	Tolerance	
Ocean fertilization	Moderate to low	High	Low	Low – oceans are international	Low	Resistance	(NERC 2010)
Geological CCS	High	Moderate – risk of leakage	Moderate	Moderate – national, but greater risk for stakeholders near sites	Low	Tolerance/ connivance	(Perrings and Hannon 2001; Midden and Huijts 2009; Sharp *et al.* 2009; Wallquist *et al.* 2010)
Ocean CCS	Unknown	High – risk of leakage, marine impacts	Moderate to Low	Low – oceans are international	Low	Tolerance/ connivance	(Kamishiro and Sato 2009; Amikawa *et al.* 2011)
Stratospheric aerosols	Low	High	Low – use of known "pollutants"	Low – distributive fairness	Low	Resistance	(NERC 2010; Mercer *et al.* 2011)

Notes: [a]Categorizing potential citizen reactions (Huijts *et al.* 2012) based on support, toleration, connivance, and resistance.

WebTable 3. Cost effectiveness rating explanation

	Uncertainty of cost	*Explanation and source(s)*
Abatement	Low to moderate	Moderate to high; ~$27 (Stern 2007) or $20–80 (Morris *et al.* 2012) per ton CO_2
Forest management	Moderate	"Low" cost (see Shepherd *et al.* 2009); $17–21 per ton CO_2 for global 50% reduction of deforestation by 2030 (Kindermann *et al.* 2008)
Soil management	Moderate	"Moderate" cost (see Shepherd *et al.* 2009)
Biochar	Moderate	"Moderate" cost (see Shepherd *et al.* 2009)
Ocean fertilization	High	"Low" cost (see Shepherd *et al.* 2009); $22–120 (Rickels *et al.* 2012) or $8–80 (Boyd 2008; Bertram 2010) per ton CO_2
Geological CCS	Moderate to high	Moderate cost; ~$30–60 per ton CO_2 (Hamilton et al. 2009)
Ocean CCS	High	Similar to Geological CCS
Stratospheric aerosols	Very high (Blackstock 2012)	Very low cost (Shepherd *et al.* 2009)

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