Appendix to “Public perception of climate engineering and carbon capture and storage in Germany: survey evidence”

Table A-1: Survey items

| Question and items                                                                 | response scale                          |
|------------------------------------------------------------------------------------|-----------------------------------------|
| **Risk attitude**                                                                  |                                         |
| Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? | risk-averse (0) - risk-seeking (10) |
| **Seriousness of climate change**                                                  |                                         |
| Global warming is a serious problem.                                               | strongly disagree (0) - strongly agree (3) |
| **Ecological values (Cronbach’s α = 0.5756)**                                      |                                         |
| The Earth is like a spaceship with very limited room and resources.                 | strongly disagree (0) - strongly agree (3) |
| Humans were meant to rule over the rest of nature.                                 |                                         |
| The balance of nature is very delicate and easily upset.                           |                                         |
| Humans will eventually learn enough about how nature works to be able to control it.|                                         |
| If things continue on their present course, we will soon experience a major ecological catastrophe. |                                         |
| **Altruistic values (Cronbach’s α = 0.7224)**                                       |                                         |
| She thinks it is important for everyone to have equal opportunities in life.        | very dissimilar (0) - very similar (3) |
| She works to promote peace among diverse groups.                                   |                                         |
| Protecting society’s weak and vulnerable members is important to her.               |                                         |
| Caring for the well-being of people she is close to is important to her.            |                                         |
| **Egoistic values (Cronbach’s α = 0.7724)**                                         |                                         |
| She wants people to do what she says.                                               | very dissimilar (0) - very similar (3) |
| Being wealthy is important to her.                                                  |                                         |
| It is important for her to be the one who tells the others what to do.              |                                         |
| It is important for her to be the most influential person in any group.            |                                         |
| **Security values (Cronbach’s α = 0.7114)**                                         |                                         |
| Her personal security is extremely important to her.                                | very dissimilar (0) - very similar (3) |
| She avoids anything that might endanger her safety.                                 |                                         |
| It is important for her to live in secure surroundings.                            |                                         |
| Order and stability in society are important to her.                               |                                         |
| **Awareness**                                                                       |                                         |
| Have you ever heard about […] before or have you never heard about it before?      | No, I have never heard about it.         |
|                                                                                 | Yes, I have heard a little about it.     |
|                                                                                 | Yes, I have heard a lot about it.        |
| **Acceptance**                                                                     |                                         |
| We should use […] to counteract climate change.                                    | strongly disagree (0) - strongly agree (3) |
| **Attitudes**                                                                       |                                         |
| […] is the easy way out.                                                           | strongly disagree (0) - strongly agree (3) |
| Humans should not be manipulating nature in this way.                              |                                         |
Questions and items (continued) | response scale
---|---
Trust (Cronbach’s α = 0.7942) | do not trust at all (0) - trust completely (3)
How strongly do you feel that these groups will act in the interests of society and the environment?
- Federal government
- Companies involved in […] projects
- Environmental organisations
- Media
- Researchers studying at publicly funded research institutes
- United Nations
- European Union

Cognitive reflection | any number
Together, a bat and a ball cost $1.10. The bat costs $1.00 more than the ball.
How much does the ball cost?
If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
In a lake there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Religiousness | not religious at all (0) - very religious (3)
How religious are you?

Education | 7 degrees
What is your highest degree or school-leaving certificate?

Region | 16 states
Which Federal State do you live in?
Table A-2: Summary statistics

| Variables                              | SRM Domain |          |          |          |          |          |          |
|----------------------------------------|------------|----------|----------|----------|----------|----------|----------|
|                                        |            | mean     | standard deviation | mean     | standard deviation | mean     | standard deviation |
| acceptance                             | 0 - 3      | 1.21     | 0.93     | 1.56     | 0.93     | 1.20     | 0.74     |
| awareness                              | 0 (have never heard); 1 (have heard at least a little bit) | 0.22 | 0.52 | 0.60 |
| risk attitude                          | 0 - 10     | 5.39     | 2.26     | 5.36     | 2.20     | 5.37     | 2.31     |
| seriousness of climate change          | 0 - 3      | 2.51     | 0.71     | 2.51     | 0.71     | 2.51     | 0.70     |
| ecological values                      | standardised index | -0.029 | 0.61 | 0.017 | 0.61 | 0.001 | 0.61 |
| altruistic values                      | standardised index | -0.023 | 0.74 | 0.039 | 0.74 | -0.026 | 0.74 |
| egoistic values                        | standardised index | 0.001 | 0.77 | -0.024 | 0.74 | 0.032 | 0.80 |
| security values                        | standardised index | -0.002 | 0.74 | 0.019 | 0.73 | -0.025 | 0.73 |
| Attitudes - easy way out               | 0 - 3      | 2.17     | 0.84     | 2.09     | 0.85     | 1.69     | 0.85     |
| Attitudes - not manipulate in this way | 0 - 3      | 2.19     | 0.85     | 2.02     | 0.88     | 1.21     | 0.85     |
| trust                                 | standardised index | -0.021 | 0.67 | -0.059 | 0.67 | 0.095 | 0.66 |
| cognitive reflection test              | 0 - 3      | 0.98     | 1.03     | 1.06     | 1.03     | 1.05     | 1.03     |
| religiousness                          | 0 - 3      | 1.01     | 0.94     | 1.04     | 0.97     | 1.02     | 0.96     |
| female                                 | 0 (Male); 1 (Female) | 49% | 50% | 49% |
| high education                         | 0 (other); 1 (A level) | 36% | 35% | 36% |
| age                                    | 18 - 87    | 47       | 15.33    | 48       | 15.33    | 47       | 15.15    |
| region                                 | 0 (other); 1 (Schleswig-Holstein or Lower Saxony) | 14% | 12% | 13% |
| N                                      | 1161       | 1203     | 1162     |
### Table A-3: OLS regression results for SRM

| Acceptance of SRM          | (SRM-1)   | (SRM-2)   | (SRM-3)   | (SRM-4)   | (SRM-5)   | (SRM-6)   |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| info                        | -0.29**   | -0.20**   | -0.55**   | 0.20      | -0.29**   | -0.30**   |
|                             | (0.05)    | (0.06)    | (0.12)    | (0.24)    | (0.05)    | (0.05)    |
| awareness                   | -0.12**   | -0.11**   | -0.12**   | -0.12     | -0.12     | -0.11***  |
|                             | (0.06)    | (0.06)    | (0.06)    | (0.06)    | (0.06)    | (0.06)    |
| risk attitude               | 0.05**    | 0.05**    | 0.02      | 0.05      | 0.05**    | 0.05**    |
|                             | (0.01)    | (0.01)    | (0.01)    | (0.01)    | (0.01)    | (0.01)    |
| seriousness of climate      | 0.13**    | 0.13**    | 0.13**    | 0.21**    | 0.13**    | 0.13**    |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.05)    | (0.04)    | (0.04)    |
| Values                      |           |           |           |           |           |           |
| ecological                  | -0.00     | -0.01     | 0.00      | -0.01     | -0.00     | -0.00     |
|                             | (0.05)    | (0.05)    | (0.05)    | (0.05)    | (0.05)    | (0.05)    |
| altruistic                  | -0.03     | -0.04     | -0.03     | -0.04     | -0.03     | -0.03     |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| egoistic                    | 0.11***   | 0.11***   | 0.11**    | 0.11**    | 0.11**    | 0.11**    |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| security                    | 0.06      | 0.06      | 0.06      | 0.06      | 0.06      | 0.06      |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| Attitudes                   |           |           |           |           |           |           |
| is easy way out             | -0.14***  | -0.14***  | -0.14***  | -0.14**   | -0.15***  | -0.14***  |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| not manipulate this way     | -0.43***  | -0.43***  | -0.43***  | -0.42***  | -0.43***  | -0.43***  |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| Other Factors               |           |           |           |           |           |           |
| trust                       | 0.31**    | 0.31**    | 0.31***   | 0.31***   | 0.31***   | 0.31***   |
|                             | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    | (0.04)    |
| cognitive reflection        | -0.09**   | -0.09**   | -0.09**   | -0.09**   | -0.09**   | -0.09**   |
|                             | (0.02)    | (0.02)    | (0.02)    | (0.02)    | (0.02)    | (0.02)    |
| Socio-demographics          |           |           |           |           |           |           |
| religiousness               | 0.07**    | 0.07**    | 0.07***   | 0.07***   | 0.07***   | 0.07***   |
|                             | (0.02)    | (0.02)    | (0.02)    | (0.02)    | (0.02)    | (0.02)    |
| female                      | 0.11**    | 0.22**    | 0.11**    | 0.10**    | 0.11**    | 0.11**    |
|                             | (0.05)    | (0.07)    | (0.05)    | (0.05)    | (0.05)    | (0.05)    |
| high education              | -0.13**   | -0.13**   | -0.14***  | -0.13***  | -0.13**   | -0.14***  |
|                             | (0.05)    | (0.05)    | (0.05)    | (0.05)    | (0.05)    | (0.05)    |
| age                         | 0.00      | 0.00      | 0.00      | 0.00      | 0.00      | 0.00      |
|                             | (0.00)    | (0.00)    | (0.00)    | (0.00)    | (0.00)    | (0.00)    |
| region                      | -0.04     | -0.05     | -0.05     | -0.04     | -0.04     | -0.04     |
|                             | (0.06)    | (0.06)    | (0.06)    | (0.06)    | (0.06)    | (0.06)    |
| Interaction Terms           |           |           |           |           |           |           |
| female * info               | -0.21**   |           |           |           |           |           |
|                             | (0.09)    |           |           |           |           |           |
| risk attitude * info        |           |           |           |           |           |           |
|                             | 0.05**    |           |           |           |           |           |
|                             | (0.02)    |           |           |           |           |           |
| seriousness of climate      | -0.14**   |           |           |           |           |           |
|                             | (0.07)    |           |           |           |           |           |
| change * info               |           |           |           |           |           |           |
|                             | 0.00      |           |           |           |           |           |
|                             | (0.07)    |           |           |           |           |           |
| altruistic * info           |           |           |           |           |           |           |
|                             |           |           |           |           |           |           |
| egoistic* info              |           |           |           |           |           |           |
|                             |           |           |           |           |           |           |
| constant                    | 2.02***   | 1.95***   | 2.15***   | 1.82***   | 2.02***   | 2.00***   |
|                             | (0.18)    | (0.18)    | (0.19)    | (0.21)    | (0.18)    | (0.18)    |
| Observations                | 846       | 846       | 846       | 846       | 846       | 846       |
| Adjusted R²                 | 0.4775    | 0.4801    | 0.4802    | 0.4801    | 0.4769    | 0.4798    |

Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table A-3: OLS regression of SRM acceptance. Note: Acceptance is measured on a scale of 0 (strongly disagree) to 3 (strongly agree). All other variables are also measured on scales of 0 to 3. Exceptions are dummy variables (info, awareness, female, high education, region), risk attitude (scale is from 0 to 10), and age. Variables for values and trust are standardised indices.
| Acceptance of CCS-S | (CCS-1) | (CCS-2) | (CCS-3) | (CCS-4) | (CCS-5) | (CCS-6) |
|---------------------|--------|--------|--------|--------|--------|--------|
| info                | -0.17  | -0.13  | -0.08  | 0.14   | -0.16  | -0.17  |
|                     | (0.05) | (0.07) | (0.14) | (0.27) | (0.05) | (0.05) |
| awareness           | -0.02  | -0.02  | -0.02  | -0.02  | -0.02  | -0.02  |
|                     | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| risk attitude       | 0.03** | 0.03** | 0.04   | 0.03   | 0.03** | 0.03*  |
|                     | (0.01) | (0.01) | (0.02) | (0.01) | (0.01) | (0.01) |
| seriousness of climate | 0.14** | 0.14** | 0.14** | 0.18** | 0.14** | 0.14** |
| change              | 0.04   | 0.04   | 0.04   | 0.06   | 0.04   | 0.04   |
| security            | 0.11***| 0.11***| 0.11***| 0.10***| 0.10***| 0.11***|
|                     | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Attitudes           |        |        |        |        |        |        |
| is easy way out     | -0.14***| -0.14***| -0.14***| -0.15***| -0.15***| -0.14***|
|                     | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| not manipulate this way | -0.39***| -0.39***| -0.39***| -0.39***| -0.39***| -0.39***|
|                     | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Other Factors       |        |        |        |        |        |        |
| trust               | 0.32***| 0.32***| 0.33***| 0.33***| 0.32***| 0.32***|
|                     | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| cognitive reflection | -0.09**| -0.09**| -0.09**| -0.09**| -0.09**| -0.09**|
|                     | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Socio-demographics  |        |        |        |        |        |        |
| religiousness       | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
|                     | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| female              | 0.08   | 0.12   | 0.08   | 0.08   | 0.08   | 0.08   |
|                     | (0.05) | (0.07) | (0.05) | (0.05) | (0.05) | (0.05) |
| high education      | -0.10  | -0.10  | -0.10  | -0.10  | -0.10  | -0.10  |
|                     | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| age                 | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   | 0.00   |
|                     | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| region              | -0.21**| -0.21**| -0.21**| -0.21**| -0.21**| -0.21**|
|                     | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Interaction Terms   |        |        |        |        |        |        |
| female * info       | -0.08  |        |        |        |        |        |
|                     | (0.09) |        |        |        |        |        |
| risk attitude * info| -0.02  |        |        |        |        |        |
|                     | (0.02) |        |        |        |        |        |
| seriousness of climate |        |        |        |        |        |        |
| change * info       |        |        |        |        |        |        |
| altruistic * info   |        |        |        |        |        |        |
|                     |        |        |        |        |        |        |
| egoistic* info      |        |        |        |        |        |        |
|                     |        |        |        |        |        |        |
| Constant            | 2.22***| 2.20***| 2.18***| 2.09***| 2.21***| 2.22***|
|                     | (0.18) | (0.18) | (0.19) | (0.22) | (0.18) | (0.18) |
| Observations        | 897    | 897    | 897    | 897    | 897    | 897    |
| Adjusted R²         | 0.4412 | 0.4410 | 0.4409 | 0.4417 | 0.4427 | 0.4406 |

Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table A-4: OLS regression of CCS-S acceptance. Note: Acceptance is measured on a scale of 0 (strongly disagree) to 3 (strongly agree). All other variables are also measured on scales of 0 to 3. Exceptions are dummy variables (info, awareness, female, high education, region), risk attitude (scale is from 0 to 10), and age. Variables for values and trust are standardised indices.
Table A-5: OLS regression results for afforestation acceptance.

| Acceptance of afforestation | (Aff-1) | (Aff-2) | (Aff-3) | (Aff-4) | (Aff-5) | (Aff-6) |
|-----------------------------|---------|---------|---------|---------|---------|---------|
| info                        | -0.18***| -0.07   | -0.23** | 0.20    | -0.18***| -0.18***|
| (0.04)                      | (0.06)  | (0.11)  | (0.27)  | (0.04)  | (0.04)  | (0.04)  |
| awareness                   | 0.04    | 0.04    | 0.04    | 0.04    | 0.04    | 0.04    |
| (0.04)                      | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  |
| risk attitude               | 0.02    | 0.01    | 0.01    | 0.02    | 0.02    | 0.01    |
| (0.01)                      | (0.01)  | (0.01)  | (0.01)  | (0.01)  | (0.01)  | (0.01)  |
| seriousness of climate      | 0.13*** | 0.13*** | 0.13*** | 0.18*** | 0.13*** | 0.13*** |
| (0.04)                      | (0.04)  | (0.04)  | (0.05)  | (0.04)  | (0.04)  | (0.04)  |
| change                      | 0.11**  | 0.11**  | 0.11**  | 0.11**  | 0.11**  | 0.11**  |
| (0.04)                      | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  |
| Values                      |         |         |         |         |         |         |
| ecological                  | 0.11**  | 0.11**  | 0.11**  | 0.11**  | 0.11**  | 0.11**  |
| (0.04)                      | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  |
| altruistic                  | -0.02   | -0.02   | -0.02   | -0.02   | 0.01    | -0.02   |
| (0.03)                      | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.04)  | (0.03)  |
| egoistic                    | 0.05*** | 0.05*** | 0.09*** | 0.05*** | 0.05*** | 0.07*** |
| (0.03)                      | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.04)  | (0.04)  |
| security                    | 0.07**  | 0.06    | 0.07**  | 0.07**  | 0.07**  | 0.07**  |
| (0.03)                      | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  |
| Attitudes                   |         |         |         |         |         |         |
| is easy way out             | -0.11***| -0.11***| -0.11***| -0.11***| -0.11***| -0.11***|
| (0.03)                      | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  |
| not manipulate this way     | -0.26** | -0.25   | -0.25   | -0.26   | -0.25   | -0.25   |
| (0.03)                      | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  | (0.03)  |
| Other Factors               |         |         |         |         |         |         |
| trust                       | 0.24*** | 0.24*** | 0.24*** | 0.24*** | 0.24*** | 0.24*** |
| (0.04)                      | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  | (0.04)  |
| cognitive reflection        | -0.04   | -0.05   | -0.04   | -0.04   | -0.04   | -0.04   |
| (0.02)                      | (0.02)  | (0.02)  | (0.02)  | (0.02)  | (0.02)  | (0.02)  |
| Socio-demographics          |         |         |         |         |         |         |
| religiousness               | 0.05**  | 0.05**  | 0.05**  | 0.05**  | 0.05**  | 0.05**  |
| (0.02)                      | (0.02)  | (0.02)  | (0.02)  | (0.02)  | (0.02)  | (0.02)  |
| female                      | -0.03   | 0.09    | -0.03   | -0.03   | -0.03   | -0.03   |
| (0.05)                      | (0.06)  | (0.05)  | (0.05)  | (0.05)  | (0.05)  | (0.05)  |
| high education              | -0.06   | -0.05   | -0.06   | -0.06   | -0.06   | -0.06   |
| (0.05)                      | (0.05)  | (0.05)  | (0.05)  | (0.05)  | (0.05)  | (0.05)  |
| age                         | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    |
| (0.00)                      | (0.00)  | (0.00)  | (0.00)  | (0.00)  | (0.00)  | (0.00)  |
| region                      | -0.03   | -0.03   | -0.03   | -0.04   | -0.03   | -0.04   |
| (0.06)                      | (0.06)  | (0.06)  | (0.06)  | (0.06)  | (0.06)  | (0.06)  |
| Interaction Terms           |         |         |         |         |         |         |
| female * info               | -0.25***|         |         |         |         |         |
| (0.08)                      |          |         |         |         |         |         |
| risk attitude * info        |          |          |          |          | 0.01    | (0.02)  |
| seriousness of climate      |          |          |          |          | -0.11   | (0.07)  |
| change * info               |          |          |          |          | -0.06   | (0.06)  |
| altruistic * info           |          |          |          |          | -0.06   | (0.06)  |
| egoistic* info              |          |          |          |          | 0.04    | (0.06)  |
| constant                    | 2.23***  | 2.17***  | 2.26***  | 2.11***  | 2.24***  | 2.23***  |
| (0.16)                      | (0.17)  | (0.17)  | (0.19)  | (0.16)  | (0.16)  | (0.16)  |
| Observations                | 898      | 898      | 898      | 898      | 898      | 898      |
| Adjusted R²                 | 0.3202   | 0.3260   | 0.3196   | 0.3221   | 0.3202   | 0.3199   |

Standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Table A-5: OLS regression of afforestation acceptance. Note: Acceptance is measured on a scale of 0 (strongly disagree) to 3 (strongly agree). All other variables are also measured on scales of 0 to 3. Exceptions are dummy variables (info, awareness, female, high education, region), risk attitude (scale is from 0 to 10), and age. Variables for values and trust are standardised indices.
1) Information provided in the SRM video

Information provided in both the basic and the full information video

Sunlight warms the Earth and its atmosphere. Greenhouse gases in the atmosphere such as CO₂ ensure that some warmth remains close to the Earth's surface. This makes the Earth warm enough for humans, animals, and plants to live on.

Since the start of industrialisation around 1850, people have emitted a great amount of greenhouse gases by burning coal, oil, and gas. These gases trap more heat in the atmosphere and cause a gradual increase in the average global temperature.

Since 1900, the global temperature has risen by approximately 0.8°C. Almost all countries agree that the increase in the average global temperature should not exceed 2°C compared to pre-industrial levels. This is called the 2°C target.

By 2100, a further increase in temperature between 0.9 and 5.4°C is expected. The development depends strongly on the amount of greenhouse gases emitted in the future. To reach the 2°C target, the current level of emissions would have to be cut by more than half by 2050. By 2100, greenhouse gas emissions would have to be reduced to almost zero.

It is virtually certain that climate change will cause a rise in sea levels. The frequency of heat waves is very likely to increase as well as the number of heavy precipitation events in many regions. It is likely that, in the future, more areas will be affected by extensive droughts and that the frequency and intensity of tropical cyclones will increase. In addition, part of the emitted CO₂ is absorbed by the ocean, causing ocean acidification.

There are different ways of dealing with climate change.

We can reduce greenhouse gas emissions or adapt to the new climate by building dikes. Another option is to reduce global temperature by deploying solar radiation management (SRM).

Via SRM some sunlight is reflected before it can warm the Earth. One way of doing this is by spraying sulphate particles into the atmosphere at a high altitude.

A similar phenomenon can be observed in nature. When large volcanoes erupt, similar particles are distributed across wide areas of the Earth's atmosphere, cooling the Earth.

The particles remain in the higher regions of the atmosphere for approximately two years. To prevent the Earth from heating up again, spraying would have to go on until the cause of global warming has been removed. Because CO₂ remains in the atmosphere for a very long time, SRM might have to be used for several centuries. However, using SRM will not stop ocean acidification.
Additional information provided in the full information video

Currently, research is being done on the risks, the benefits, and the feasibility of SRM.

The use of SRM entails benefits as well as risks. One of the benefits is that global warming could be slowed more quickly than by reducing greenhouse gas emissions. This would buy additional time to remove the cause of climate change, i.e., the high concentration of greenhouse gases in the atmosphere. Massive and irreversible changes in the climate could be stopped before too much damage has been done. Also, it would be possible to stop climate change even if certain countries did not want to reduce their greenhouse gas emissions. Deploying SRM would be less expensive than reducing the consumption of fossil fuels.

The risks include a change in the amount of precipitation in most regions. Arid regions in particular would have to cope with even less rain. If the deployment of SRM was suddenly stopped, the global temperature would rise abruptly. The speed of this rise in temperature would lead to severe problems for humans and the environment. Because possible side-effects would be trans-boundary, the use of SRM could cause international conflicts. Once used, SRM could take away people’s motivation to change their lifestyle, and greenhouse gas emissions would continue to increase. There would also be the possibility of further unknown and unforeseeable risks arising.
2) Information provided in the CCS video

Information provided both in the basic and the full information video

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Since the start of industrialisation around 1850, people have emitted a great amount of greenhouse gases by burning coal, oil, and gas. These gases trap more heat in the atmosphere and cause a gradual increase in the average global temperature.

Since 1900, the global temperature has risen by approximately 0.8°C. Almost all countries agree that the increase in the average global temperature should not exceed 2°C compared to pre-industrial levels. This is called the 2°C target.

By 2100, a further increase in temperature between 0.9 and 5.4°C is expected. The development depends strongly on the amount of greenhouse gases emitted in the future. To reach the 2°C target, the current level of emissions would have to be cut by more than half by 2050. By 2100, greenhouse gas emissions would have to be reduced to almost zero.

It is virtually certain that climate change will cause a rise in sea levels. The frequency of heat waves is very likely to increase as well as the number of heavy precipitation events in many regions. It is likely that, in the future, more areas will be affected by extensive droughts and that the frequency and intensity of tropical cyclones will increase. In addition, part of the emitted CO₂ is absorbed by the ocean, causing ocean acidification.

There are different ways of dealing with climate change.

We can reduce greenhouse gas emissions or adapt to the new climate by building dikes. Another option is carbon capture and storage sub-seabed (CCS).

The CCS technology captures CO₂ from the industrial combustion of fossil fuels. The CO₂ is compressed and stored in suitable geological formations under the seabed. It is not released into the atmosphere. This process additionally uses approximately 25% of the energy generated, which increases the overall demand for fossil fuels.

On a small scale, CO₂ has already been stored in the ground for approximately 30 years. For the recovery of oil and gas, CO₂ is injected to facilitate this process. Experience with this method indicates a high level of storage safety.

Former oil and gas fields as well as sub-seabed saline aquifers are considered to be safe and permanently suitable deposits. Pipelines and ships carry the compressed CO₂ to the deposits. Then it
is pumped into tiny hollows of the sub-seabed deposit, where it has to be stored for several thousands of years. During this time it merges with the rock, rendering it permanently harmless.

Additional information provided in the full information video

Scientists think that further applied research on CCS would be useful. The processes, benefits, and risks are already well understood.

In the following you will learn more about some of the expected benefits and risks of CCS.

Two of the benefits of CCS are that both global warming and the acidification of the oceans would be slowed down. Furthermore, deploying CCS would be less expensive than an energy transition from fossil fuels to renewable energies.

One of the risks of CCS is that increased pressure might cause leakage of CO₂ from the well or from the deposits. This could lead to local acidification, which would endanger the biodiversity of the area in question.
3) Information provided in the afforestation video

Information provided both in the basic and the full information video

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Since the start of industrialisation around 1850, people have emitted a great amount of greenhouse gases by burning coal, oil, and gas. These gases trap more heat in the atmosphere and cause a gradual increase in the average global temperature.

Since 1900, the global temperature has risen by approximately 0.8°C. Almost all countries agree that the increase in the average global temperature should not exceed 2°C compared to pre-industrial levels. This is called the 2°C target.

By 2100, a further increase in temperature between 0.9 and 5.4°C is expected. The exact development depends strongly on the amount of greenhouse gases emitted in the future. To reach the 2°C target, the current level of emissions would have to be cut by more than half by 2050. By 2100, greenhouse gas emissions would have to be reduced to almost zero.

It is virtually certain that climate change will cause a rise in sea levels. The frequency of heat waves is very likely to increase as well as the number of heavy precipitation events in many regions. It is likely that, in the future, more areas will be affected by extensive droughts and that the frequency and intensity of tropical cyclones will increase. In addition, part of the emitted CO₂ is absorbed by the ocean, causing ocean acidification.

There are different ways of dealing with climate change.

We can reduce greenhouse gas emissions or adapt to the new climate by building dikes. Another option is large-scale afforestation.

As they grow, trees gradually absorb CO₂ from the atmosphere and store it in the wood. By logging mature trees and replacing them with new ones, CO₂ can be continuously absorbed from the atmosphere. To prevent the CO₂ from re-entering the atmosphere, the logged trees can be used as building material or simply buried.

To slow down climate change through afforestation, very large areas would have to be covered with trees. Especially suitable areas are the tropics, the Sahara Desert, and the Australian Outback.
**Additional information provided in the full information video**

Scientists agree that enough research has been done on the local effects. Further research is needed on the long-term effects on natural cycles.

Here are some of the expected benefits and risks of large-scale afforestation.

Two of the benefits of large-scale afforestation are that both global warming and acidification of the ocean would be slowed down. In addition, the quality of soil and water would be improved.

The risks include high water consumption for afforestation, which could lead to regional water scarcity. For afforestation agricultural areas would also have to be used. The afforestation of these areas could lead to food scarcity and thus increase food prices.

Also, large-scale afforestation would take longer to slow down climate change than the mitigation of greenhouse gas emissions.