Scenario Explorer instructions

From the "Home" page click the "Scenario Explorer" menu option

The data for the "Moderate" scenario will be automatically loaded.

You can select another scenario to explore via three options. From the "Scenario" dropdown list (upper left of the page)

By clicking the "Scenarios" tab and clicking a radio button. Many of the scenarios have "tool tips" (look for the "dashed underlines" under the scenario names.

By clicking the "Scenario List" tab and clicking a radio button. Note that this tab provides information about the various scenarios to assist you with your exploration.

Scenario Explorer

Click here to view instructions for using the Temperature Explorer

Scenario Explorer | Scenarios | Scenario List | Options | Scenario Summary

(Total CO2 emissions were about 41.6 GTCO2 in 2024 were about and are not expected to change much in 2025. In 2025 the atmospheric concentration of CO2 is expected to hit about 427 PPM and the average global temperature increase will likely be at least 1.5°C. Keet this in mind when reviewing any of these scenarios.)

Select a Scenario To Explore and go to the 'Scenario Explorer' tab

Scenario	2025 Anthro	2025 CO2 PPM	2025 Temp incr	2050 Anthro	2050 CCS	2050 DAC	2050 Feed-backs	2050 Net CO2	2050 CO2 PPM	2050 Cum CO2	2050 Total RF	2050 Temp Incr	2100 Anthro	2100 CCS	2100 DAC	2100 Feed-backs	2100 Net CO2	2100 CO2 PPM	2100 Cum CO2	2100 Total RF	2100 Temp Incr
○ 1.5° C (En-ROADS)	44	426	1.51	20	0.0	-15.0	6.8	12	431	718	3.55	1.85	2	0.0	-16.0	10.4	-4	364	773	2.49	1.47
○ AR6 1.5°C	28	422	1.37	15	-12.9	0.0	0.6	2	429	333	3.05	1.60	9	-16.9	0.0	0.4	-8	391	120	2.44	1.43
○ AR6 2.0°C	36	427	1.37	25	-10.1	0.0	0.7	16	467	710	3.56	1.79	13	-20.4	0.0	0.7	-7	445	811	3.27	1.89
○ AR6 2.5°C	38	428	1.38	35	-4.1	0.0	0.8	31	487	918	3.88	1.91	17	-16.0	0.0	1.0	2	516	1677	4.11	2.34
○ AR6 3.0°C	37	426	1.38	37	-0.7	0.0	0.8	37	490	977	4.01	1.97	32	-4.6	0.0	1.3	29	604	2682	5.29	2.94
○ AR6 3.5°C	43	429	1.38	50	-2.3	0.0	0.9	49	515	1216	4.26	2.03	52	-7.7	0.0	1.8	46	693	3634	6.25	3.40
○ AR6 4.0°C	44	430	1.38	53	-0.6	0.0	0.9	53	522	1283	4.51	2.13	63	-0.5	0.0	2.3	65	758	4253	7.20	3.86
○ AR6 4.5°C	47	431	1.37	64	-0.4	0.0	1.0	64	537	1460	4.70	2.18	86	-0.3	0.0	2.8	88	860	5316	8.08	4.21
○ AR6 5.0°C	48	430	1.39	75	-0.6	0.0	1.1	75	551	1598	4.95	2.26	108	-0.4	0.0	3.5	111	970	6349	8.88	4.49
○ BAU (En-ROADS)	44	426	1.49	47	0.0	0.0	12.2	59	535	1407	4.84	2.25	50	0.0	0.0	26.6	77	889	4831	8.35	4.32
○ Mod CDR 1.5	42	426	1.51	30	0.0	-3.0	6.5	34	490	1176	4.18	2.05	5	0.0	-34.0	9.5	-19	372	536	2.48	1.46
○ Mod SRM 1.5	42	426	1.51	30	0.0	0.0	3.3	33	485	1144	4.09	2.01	5	0.0	0.0	0.0	5	449	1789	3.33	1.93
○ Mod Tmp Acc 1.5	42	426	1.60	30	0.0	-3.0	5.6	33	488	1165	4.32	2.12	5	0.0	-50.0	6.9	-38	318	-110	1.81	1.08
● Moderate	42	426	1.50	30	0.0	0.0	9.0	39	497	1215	4.41	2.15	5	0.0	0.0	17.0	22	504	2428	4.62	2.63
○ SSP1-19	29	425	1.38	9	-6.0	0.0	2.2	5	434	397	3.03	1.58	-1	-10.0	0.0	1.5	-10	392	246	2.22	1.30
○ SSP1-26	34	425	1.37	21	-5.3	0.0	2.5	18	459	675	3.44	1.74	7	-12.2	0.0	2.3	-3	445	979	3.02	1.79
○ SSP2-45	45	429	1.36	40	-3.7	0.0	3.1	40	505	1179	4.18	2.02	29	-19.7	0.0	4.3	13	553	2351	4.72	2.66
○ SSP3-Baseline	51	432	1.36	66	-1.4	0.0	3.6	68	542	1565	4.68	2.16	87	-1.1	0.0	10.6	96	859	5657	8.15	4.25
○ SSP4-34	42	429	1.36	33	-8.4	0.0	2.7	27	481	921	3.69	1.83	15	-19.5	0.0	3.1	-2	487	1582	3.83	2.19
○ SSP4-60	44	429	1.37	51	-2.2	0.0	3.4	52	519	1289	4.45	2.11	26	-5.4	0.0	7.0	28	661	3487	6.39	3.51
○ SSP5-34	44	429	1.38	43	-20.7	0.0	3.1	26	492	1021	4.02	1.97	34	-37.8	0.0	3.4	-1	492	1586	3.95	2.26
○ SSP5-Baseline	50	431	1.38	80	-1.1	0.0	4.1	83	560	1717	5.10	2.30	110	-0.7	0.0	13.5	123	1002	6998	9.12	4.57

Click on the "Options" tab to view and/or change the values that the model uses to calculate the cost. For example, for "Carbon Removal" costs for removing CO2 from the atmosphere, the model defaults to a value of $100/ton in 2025 and $30/ton in 2100. Costs are currently significantly higher right now, but there is hardly any removal. The Department of Energy is hoping that costs can be reduced to $100/ton by 2030. (NOTE: Expert opinion on costs is needed here!)
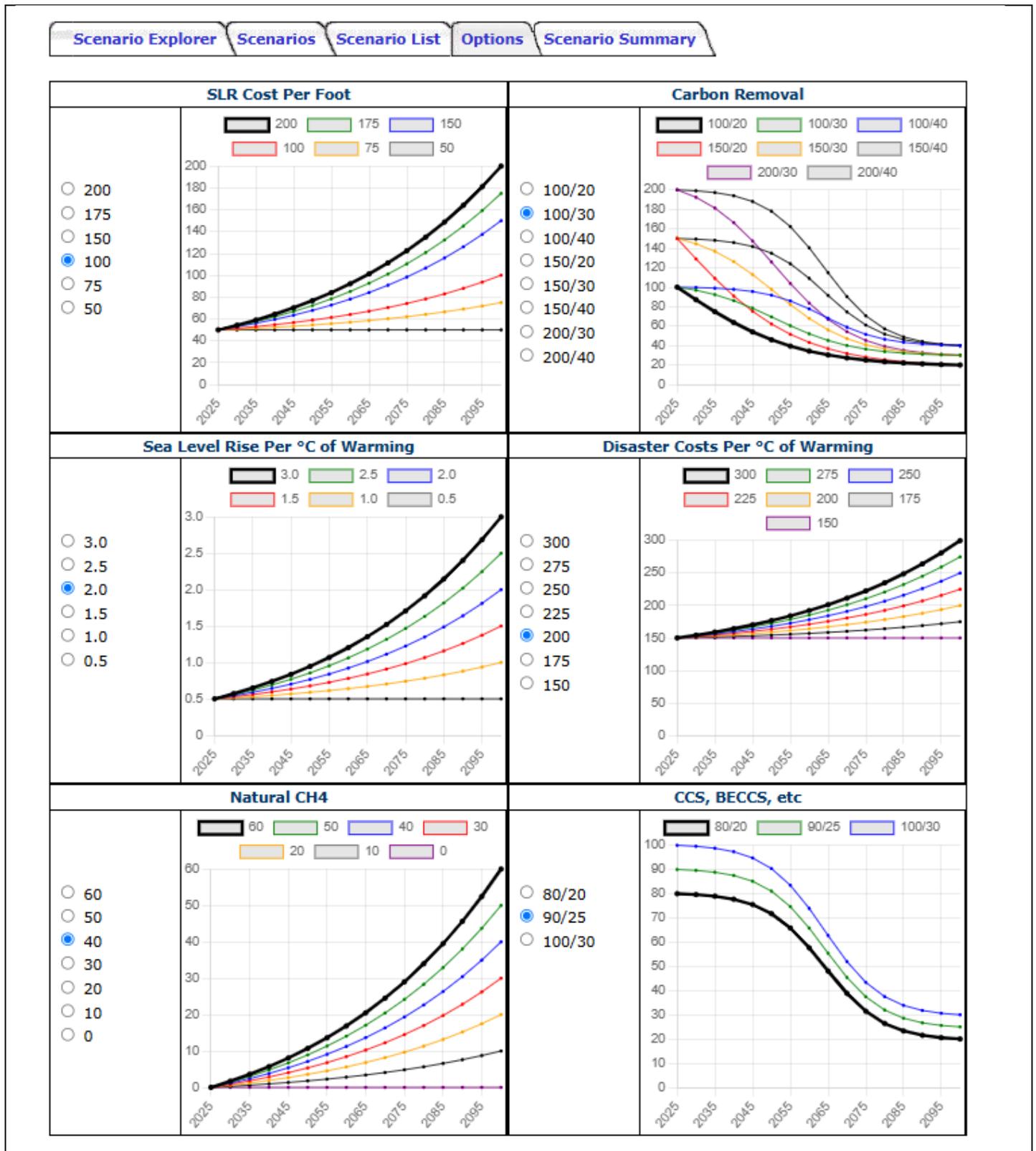
Click on the "Scenario Summary" tab to see a summary of the calculations. This can be used to validate the model's calculations.

Item	Units	Values														
		2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100
Anthropogen. CO2	GTCO2	42	45	43	40	35	30	25	20	15	10	5	5	5	5	5	5
Carbon Rmvs (Scen)	GtCO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCS, BECCS, etc.	GtCO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feedbacks	GtCO2	5.0	5.8	6.6	7.4	8.2	9.0	9.8	10.6	11.4	12.2	13.0	13.8	14.6	15.4	16.2	17.0
Total Net CO2	GtCO2	47	51	49	47	43	39	35	31	26	22	18	19	20	20	21	22
CO2 PPM	PPM	426	444	461	476	488	497	504	508	510	510	508	507	506	505	504	504
CO2	W/m-2	2.35	2.57	2.77	2.96	3.10	3.21	3.28	3.33	3.35	3.35	3.33	3.32	3.30	3.29	3.29	3.29
CH4	W/m-2	0.58	0.60	0.60	0.60	0.60	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.60	0.60	0.59
N2O	W/m-2	0.22	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38
Total Other GHGs	W/m-2	1.19	1.19	1.10	1.11	1.06	1.05	1.02	0.99	0.97	0.93	0.94	0.88	0.90	0.85	0.87	0.86
Aerosol	W/m-2	-1.0	-0.9	-0.9	-0.8	-0.8	-0.7	-0.7	-0.7	-0.7	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5
Albedo	W/m-2	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	0.00	0.00	0.00
Total	W/m-2	3.34	3.66	3.86	4.11	4.26	4.41	4.51	4.56	4.60	4.59	4.62	4.57	4.61	4.58	4.61	4.62
Temperature Incr.	°C	1.50	1.65	1.75	1.90	2.01	2.15	2.26	2.35	2.43	2.48	2.54	2.56	2.60	2.60	2.63	2.63
Solar Rad. Mgt.	W/m-2	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	0.00	0.00	0.00
Temp Incr (SRM)	°C	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	0.00	0.00	0.00
Carbon Removal	$B/Yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea Level Rise Costs	$B/Yr	38	46	55	67	80	97	116	139	165	195	231	270	321	376	447	526
CCS, BECCS, etc	$B/Yr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Disaster Costs	$B/Yr	226	249	268	294	315	341	364	385	406	423	443	456	477	490	510	526
Total Costs	$B/Yr	263	295	323	361	395	438	480	523	571	617	674	726	798	866	957	1053

The model provides multiple ways to change some of the underlying assumptions that are used in the calculations. Click on the checkboxes to the left of the "Options:" text to make the desired changes.

Options: ☑ CDR ☑ Feedbacks ☑ Aggressiveness ☑ Acceleration

Feedback Emissions in 2100 .... 7.0 GTCO2/°C

'Aggressiveness' For Mitigation (Default: 5)

For All	(1-10)		
CH4	(1-10)	N2O	(1-10)
Other	(1-10)	Aerosols	(1-10)

Adjustment For Temperature Acceleration

Albedo Change in 2023 .... 0.00 W/m-2

Albedo Increase Per Decade 0.00 W/m-2

Temperature Increase Per Decade .... 0.26 °C

Carbon Dioxide Removal (CDR)

Start Year .... 2045 Peak Year 2075

There are over 100 "data elements" that can be viewed. Check one or more of the checkboxes under the "Items For Display" text to view the corresponding data items.

Scenario	Items For Display				Items For Input				Options: ☐ CDR ☐ Feedbacks ☐ Aggressiveness ☐ Acceleration
Moderate ▾	CO2	CO2e	RF	SRM	Cost	CO2	RF	SRM	Cost
Click the 'Scenarios' tab above to view the available scenarios	☑	☐	☐	☐	☐	☐	☐	☐	

Item	Units	Input Values															
		2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100
⌄ Anthropogen. CO2	GTCO2	42▾	45▾	43▾	40▾	35▾	30▾	25▾	20▾	15▾	10▾	5▾	▾	▾	▾	▾	▾
⌄ Anthropogen. CO2	GTCO2	42	45	43	40	35	30	25	20	15	10	5	5	5	5	5	5
⌄ Carbon Rmvs (Scen)	GtCO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⌄ CCS, BECCS, etc.	GtCO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
⌄ Feedbacks	GtCO2	5.0	5.8	6.6	7.4	8.2	9.0	9.8	10.6	11.4	12.2	13.0	13.8	14.6	15.4	16.2	17.0
⌄ Total Net CO2	GtCO2	47	51	49	47	43	39	35	31	26	22	18	19	20	20	21	22
⌄ Cum Anthro. CO2	GtCO2	42	260	478	685	872	1035	1172	1285	1372	1435	1472	1497	1522	1547	1572	1597
⌄ Cum Feedback CO2	GtCO2	5	32	63	98	137	180	227	278	333	392	455	522	594	669	748	831
⌄ Cum Carb Rem CO2	GtCO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⌄ Cumultative CO2	GtCO2	47	292	541	783	1009	1215	1399	1563	1705	1827	1927	2019	2116	2216	2320	2428
⌄ Airborne Fraction	Percent	45	55	53	50	44	37	30	21	11	0	0	0	0	0	0	0
⌄ Ocean & Land Sink	GtCO2	25.85	22.79	23.22	23.59	24.25	24.56	24.52	24.13	23.38	22.29	20.84	21.14	21.43	21.71	21.97	22.23
⌄ CO2 To Atmosph	GtCO2	21.15	28.01	25.88	23.82	18.95	14.44	10.29	6.48	3.03	-0.07	-2.82	-2.32	-1.81	-1.29	-0.75	-0.20
⌄ PPM Added/Yr	PPM	2.71	3.59	3.31	3.05	2.43	1.85	1.32	0.83	0.39	-0.01	-0.36	-0.30	-0.23	-0.17	-0.10	-0.03
⌄ CO2 PPM	PPM	426	444	461	476	488	497	504	508	510	510	508	507	506	505	504	504
⌄ Natural CH4	TG	0	1	2	4	5	7	9	11	14	16	19	23	26	30	35	40
⌄ Temp/RF Ratio		0.45	0.45	0.45	0.46	0.47	0.49	0.50	0.51	0.53	0.54	0.55	0.56	0.57	0.57	0.57	0.57
⌄ Temperature Incr.	°C	1.50	1.65	1.75	1.90	2.01	2.15	2.26	2.35	2.43	2.48	2.54	2.56	2.60	2.60	2.63	2.63

Click on the "Down Arrow" to the left of the data item to view additional information about the item. If the "Down Arrow" is green the additional information will include graphs

Item	Units	Input Values															
		2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100
⌄ Anthropogen. CO2	GTCO2	42▾	45▾	43▾	40▾	35▾	30▾	25▾	20▾	15▾	10▾	5▾	▾	▾	▾	▾	▾
⌃ Anthropogen. CO2	GTCO2	42	45	43	40	35	30	25	20	15	10	5	5	5	5	5	5

- Anthropogenic (human caused) CO2 emissions, including those from the burning of fossil fuels, manufacturing cement, and land use changes
- User can enter values

This graph compares the projected value (heavy black line) to the range of values from some of the SSPs.

This graph compares the projected value (heavy black line) to other 2050 scenarios.

Item	Units																
⌄ Carbon Rmvs (Scen)	GtCO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⌄ CCS, BECCS, etc.	GtCO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
⌄ Feedbacks	GtCO2	5.0	5.8	6.6	7.4	8.2	9.0	9.8	10.6	11.4	12.2	13.0	13.8	14.6	15.4	16.2	17.0
⌄ Total Net CO2	GtCO2	47	51	49	47	43	39	35	31	26	22	18	19	20	20	21	22
⌄ Cum Anthro. CO2	GtCO2	42	260	478	685	872	1035	1172	1285	1372	1435	1472	1497	1522	1547	1572	1597
⌄ Cum Feedback CO2	GtCO2	5	32	63	98	137	180	227	278	333	392	455	522	594	669	748	831
⌄ Cum Carb Rem CO2	GtCO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⌄ Cumultative CO2	GtCO2	47	292	541	783	1009	1215	1399	1563	1705	1827	1927	2019	2116	2216	2320	2428

There are about 11 "data elements" that whose values can be changed. Check one or more of the checkboxes under the "Items For Input" text to view the dropdown lists for corresponding data items.
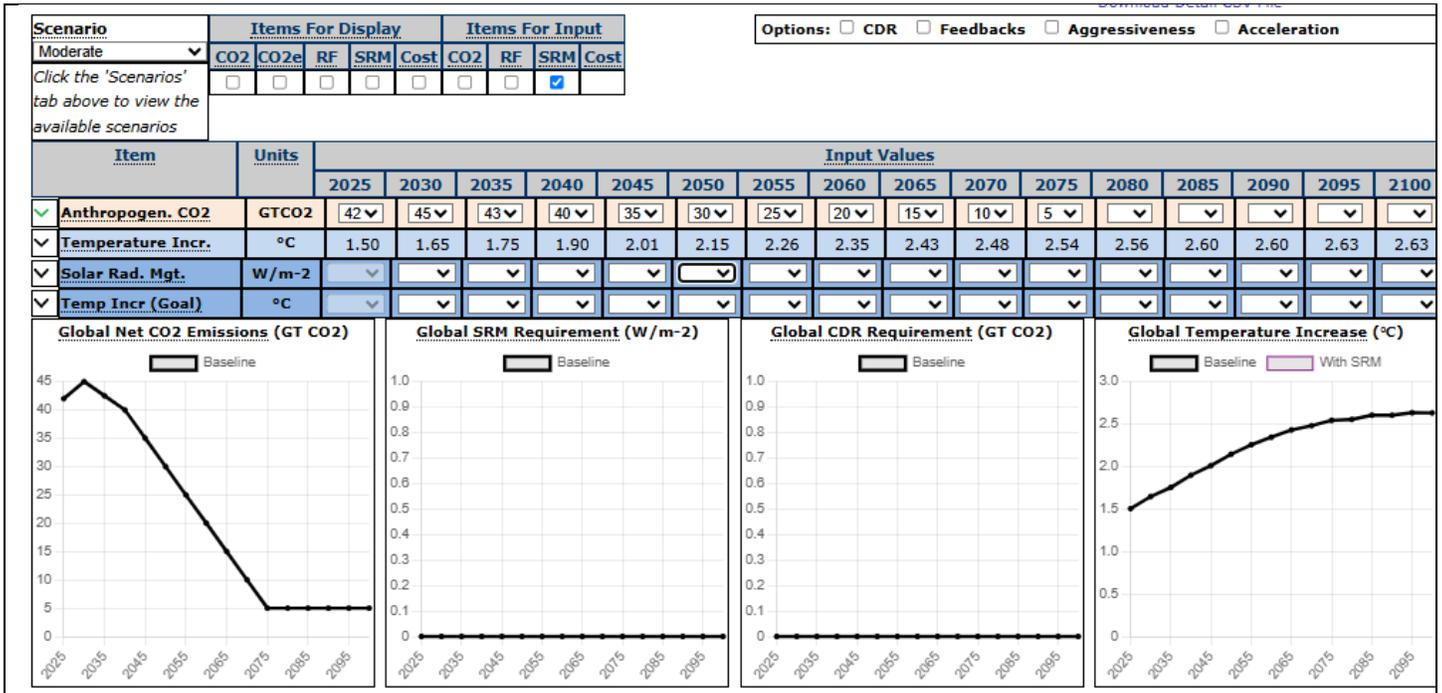
When values for the "Temp. Incr" items are changed, the model will calculate the global CO2 removal requirement and the corresponding SRM requirement.
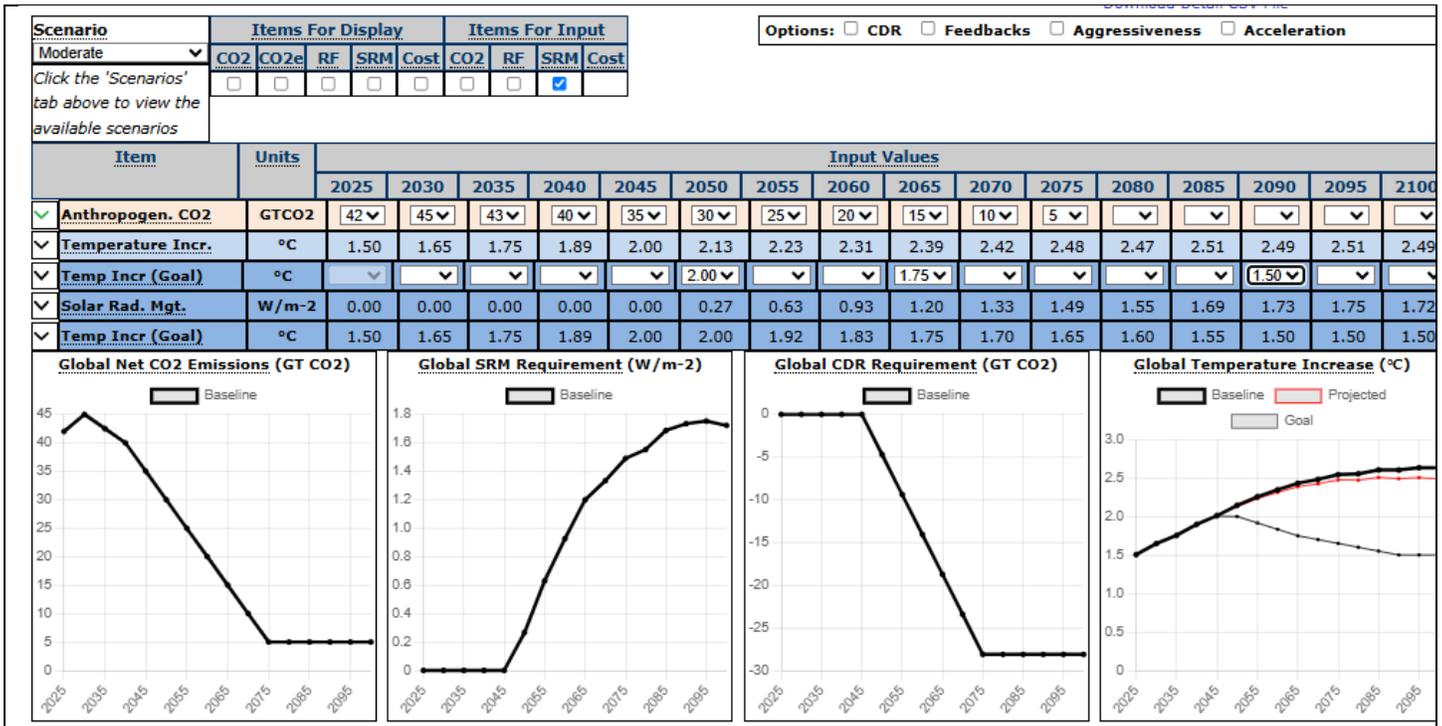
When values for the "Solar Rad. Mgt." items are changed, the model will calculate the global CO2 removal requirement and the corresponding temperature increase. You can use this feature to determine the amount of SRM needed to reach a specific temperature goal based on the corresponding scenario's emissions pathway.

Scenario	Items For Display				Items For Input				Options: ☐ CDR ☐ Feedbacks ☐ Aggressiveness ☐ Acceleration
Moderate ▾	CO2	CO2e	RF	SRM	Cost	CO2	RF	SRM	Cost
Click the 'Scenarios' tab above to view the available scenarios	☐	☐	☐	☐	☐	☐	☐	☑	

Item	Units	Input Values															
		2025	2030	2035	2040	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100
✓ Anthropogen. CO2	GTCO2	42▾	45▾	43▾	40▾	35▾	30▾	25▾	20▾	15▾	10▾	5▾	▾	▾	▾	▾	▾
✓ Temperature Incr.	°C	1.50	1.65	1.75	1.89	2.00	2.13	2.23	2.31	2.39	2.43	2.48	2.47	2.51	2.49	2.51	2.49
✓ Solar Rad. Mgt.	W/m-2	▾	0.30▾	0.60▾	0.80▾	▾	▾	1.30▾	▾	▾	1.70▾	▾	▾	▾	▾	▾	
✓ Solar Rad. Mgt.	W/m-2	0.00	0.30	0.60	0.80	0.97	1.13	1.30	1.43	1.57	1.70	1.70	1.70	1.70	1.70	1.70	1.70
✓ Temp Incr (SRM)	°C	1.50	1.51	1.48	1.52	1.54	1.58	1.58	1.57	1.56	1.50	1.54	1.52	1.54	1.52	1.53	1.52

Global Net CO2 Emissions (GT CO2)

Global SRM Requirement (W/m-2)

Global CDR Requirement (GT CO2)

Global Temperature Increase (°C)