ARTICLE 6.4 MECHANISM

A6.4-SB007-AA-A14

Information Note

Draft elements for the recommendation on activities involving removals

Version 02.0

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), at its fourth session, requested the Supervisory Body of the mechanism established by Article 6, paragraph 4, of the Paris Agreement (Article 6.4 mechanism) to elaborate and further develop recommendations on activities involving removals, for consideration and adoption by the CMA at its fifth session (CMA 5) (December 2023). It further requested the Supervisory Body, while developing the recommendations, to consider the views of Parties and admitted observer organizations received in response to its request contained in decision 7/CMA.4, paragraph 19, broader inputs from stakeholders provided in a structured public consultation process [1] and the mandate provided to the Supervisory Body contained in paragraph 24(a)(ix) of the rules, modalities and procedures for the Article 6.4 mechanism (RMPs).

2. Purpose

2. The purpose of this document is to advance the work to elaborate and further develop draft recommendations on activities involving removals, including appropriate monitoring, reporting, accounting for removals and crediting periods, addressing reversals, avoidance of leakage, and avoidance of other negative environmental and social impacts, in addition to the activities referred to in chapter V of the RMPs ("Article 6, paragraph 4, activity cycle").

3. Current work

3. This document includes:

   (a) Text reproduced from the "Recommendations on activities involving removals under the mechanism established under Article 6, paragraph 4, of the Paris Agreement" contained in the annex to the addendum of the Supervisory Body's annual report to CMA 4 (hereinafter referred to as the SB 003 recommendations);

   (b) New proposals based on public input were received in response to the calls for public input, including the call for structured consultation that was opened following SB 005. In that regard, it should be noted that:

      (i) New proposals are neither the recommendations of the secretariat nor those of the informal working group on removals, but are rather options prepared to facilitate structured discussion by the Supervisory Body. All the options may need further analysis and assessment if the Supervisory Body is disposed to pursue them;

[1] See decision 7/CMA.4, paragraphs 21 and 22, for the request, contained in document FCCC/PA/CMA/2022/10/Add.2, available at: https://unfccc.int/documents/626570.

(ii) The secretariat synthesised, paraphrased and grouped the information in the submissions for easy readability and flow of information. In that process, despite the best efforts, some relevant information may have been unintentionally omitted or not correctly represented. Also, it was difficult to fit some information under the prevailing elements and categories. Moreover, due to some submissions being received late and paucity of time, some contributions may not have been considered. Future iterations of this document will take into account this additional input. Readers are encouraged to consult the full submissions available on the "Calls for input" page of the Supervisory Body's public website[2] to fully understand the background and context in which proposals are made in the submissions. These are also listed in the appendix.

4. Additionally, all input received in response to the SB 005 calls for public input on removals is summarized in a separate document titled "Compilation of inputs received in response to the public consultation on activities involving removals" (document A6.4-SB006-AA-A09).

5. Tables 1 and 2 contain the list of inputs received for easy reference.

6. In-text citations in this document (an acronym and reference number, e.g. ROK,57; HLB,1) are included to enable easy access to the original submission. The reference section of this document also includes hyperlinks to the submissions.

Table 1. List of Parties who responded to the CMA call for public input

Submission date	Party	Acronym	Reference number
22/05/2023	Russian Federation	RU	53
09/05/2023	United Kingdom	UK	54
02/05/2023	Papua New Guinea on behalf of Coalition for Rainforest Nations	PN	55
17/04/2023	Norway	NW	56
07/04/2023	Republic of Korea	ROK	57
23/03/2023	Colombia on behalf of Chile, Colombia, Guatemala, Panama, Paraguay, and Peru	CO	58
15/03/2023	European Union on behalf of European Union	EU	59
01/06/23	Brazil on behalf of Argentina, Brazil and Uruguay (ABU)	ABU	60

Table 2. List of stakeholders who responded to the calls for public input

Submission date	Stakeholder	Acronym	Reference number
04/10/22	Hayes Limnology Lab: Ocean alkalinity enhancement using electrolysis	HLB	1
06/10/22	Planetary Technologies: Ocean alkalinity methods	PT	2

[2] See https://unfccc.int/process-and-meetings/the-paris-agreement/article-64-mechanism/calls-for-input.

Submission date	Stakeholder	Acronym	Reference number
10/10/22	GCC: Inputs on Annex 5 to the SB002 annotated agenda	GCC	4
11/10/22	Winrock: ACR & ART input-6.4 removals public comment	ACR	8
11/10/22	Wetlands International: Inputs on removal activities	WI	9
11/10/22	Verdane: Response to UNFCCC Article 6.4 call	VA	10
11/10/22	TREEO: Review Article 6.4 mechanism	TREEO	11
11/10/22	TNC: Removals and REDD-plus	TNC	12
11/10/22	Timber Finance Initiative: Engineered timber as carbon storage	TFI	13
11/10/22	The HBAR Foundation: Response of THF to UNFCC Calls for Input on A6.4M	HBAR	14
11/10/22	Stockholm-Exergi: Contribution by Stockholm Exergi in response to UNFCCC's Call for input 2022	SE	15
11/10/22	Running Tide: Article 6.4 input for ocean-based carbon removal	RT	17
11/10/22	Perspectives: Input on removal activities under A6.4 Mechanisms	PCR	18
11/10/22	Orsted: Peatlands and BECCS	OD	19
11/10/22	Instituto Acao Verde: Deforestation Double Counting	IAV	22
11/10/22	ICLRC: Response to call for input 2022-Activities involving removals	ICLRC	24
11/10/22	GCCSI: Submission to the A6.4 Supervisory Body Call for Inputs 2022 - SB002-A05	GCCSI	25
11/10/22	Evident C-capsule: Inputs on removal activities	ECP	27
11/10/22	Drax: Response to the A6 consultation	DG	29
11/10/22	DAC Coalition: Recommendations from Direct Air Capture Coalition	DACC	30
11/10/22	Climeworks: Response to the documents regarding removals under Article 6.4	CW	31
11/10/22	Clean Air Task Force: CATF Article 6.4 Comments	CATF	32
11/10/22	Cercarbono: Additionality and double counting	CCO	33
11/10/22	Center for Clean Air Policy: CCAP Submision Annex 5 to the SB002	CCAP	34
11/10/22	Carbon Recycling: Contributions to the Information Note document	CRCY	36
11/10/22	Carbon Finance Labs: UNFCCC Article 6.4 Contribution	CFL	38
11/10/22	Carbon Engineering: Role of DACCS removal activities	CE	39

Submission date	Stakeholder	Acronym	Reference number
11/10/22	Carbon Business Council: Inputs on removal activities	CBC	40
11/10/22	CARBFIX: Subsurface mineralization of CO_2	CARBFIX	41
11/10/22	BeZeroCarbon: Consultation response	BZC	43
11/10/22	Bellona: Response to CDR call for input	BF	46
11/10/22	Arcusa S: Call for input 2022 - activities involving removals under the Article 6.4 Mechanism	SA	47
11/10/22	ALLCOT: Inputs on Land-Based Removals	ALLCOT	48
13/10/22	Center for International Environmental Law: CIEL Submission on Article 6.4 Removals (late submission)	CIEL	50
14/10/22	IETA: Removals input for 6.4SB (late submission)	IETA	51
27/10/22	MDB Working Group comments on the annotated agenda of the third meeting of the Supervisory Body	MDB WG	53
15/03/23	Office of the United Nations High Commissioner for Human Rights (OHCHR) on behalf of The Office of the UN High Commissioner for Human Rights	OHCHR	60
10/04/23	Action Group on Erosion Technology and Concentration (ETC group) on behalf of Action Group on Erosion Technology and Concentration (ETC Group)	ETC	61
21/03/23	Oeko-Institut e.V. Institute for Applied Ecology on behalf of Stockholm Environment Institute, University of Edinburgh and Oeko-Institut	OI	62
17/03/23	Bellona Foundation (BF) on behalf of Bellona Foundation	BF	63
16/03/23	Center for International Environmental Law (CIEL)	CIEL	64
16/03/23	Heinrich Böll Foundation (HBF)	HBL	65
15/03/23	Global Carbon Capture and Storage Institute on behalf of The Global CCS Institute	GCCSI	66
15/03/23	LIFE Education Sustainability Equality (LESE) on behalf of Women and Gender	LESE	67
15/03/23	Carbon Capture and Storage Association (CCSA)	CCSA	68
15/03/23	ActionAid International on behalf of CLARA submission, submitted by ActionAid International	CLARA	69
15/03/23	International Emissions Trading Association (IETA)	IETA	70
15/03/23	WWF	WWF	71
15/03/23	Institute for Agriculture and Trade Policy (IATP)	IATP	72
15/03/23	Friends of the Earth International on behalf of Friends of the Earth International	FOE INT	73

Submission date	Stakeholder	Acronym	Reference number
15/03/23	Institute for Governance and Sustainable Development (IGSD)	IGSD	74
15/03/23	The University of Texas at Austin	UT	77
14/03/23	Indigenous Education Network of Turtle Island (IENTI/IEN) on behalf of Indigenous Environmental Network (IEN)	IEN	78
14/03/23	Carbon Market Watch (CMW) on behalf of Carbon Market Watch (CMW)	CMW	78 (a)
14/03/23	Plymouth Marine Laboratory (PML)	PML	79
14/03/23	Environmental Defense Fund (EDF) on behalf of Environmental Defense Fund, Conservation International, The Nature Conservancy, Wetlands International, Rare, Ocean Conservancy, Ocean & Climate Platform, National Wildlife Federation	EDF	80
20/04/23	Stockholm Exergi	SE	81
31/03/23	Drax Group	DG	82
27/03/23	Friends of the Earth Germany/ BUND	FOE + BUND	83
22/03/23	Friends of the Earth England, Wales and Northern Ireland	FOE UK	84
17/03/23	Carbon Finance Lab	CFL	85
17/03/23	AirCapture and Denominator	AD	86
17/03/23	IEAGHG	IEAGHG	88
22/05/23	Jack Roberts	JR	89
22/05/23	Jason Demeny	JD	90
22/05/23	Thoralf Gutierrez (Sirona Tech)	TG	91
22/05/23	Richard Edwards (Clo Carbon Cymru)	CLO	92
22/05/23	Paul Halloran (University of Exeter)	UOEX	93
22/05/23	CarbonRun	CR	94
22/05/23	Inplanet GmbH	IP	95
17/03/23	Inplanet GmbH	IP	95
22/05/23	Prof. Ning Zeng (University of Maryland)	UMD	96
22/05/23	Tim Isaksson	TI	97
22/05/23	Planetary Technologies	PT	98
22/05/23	Paolo Piffaretti (Carbonx)	CX	99
22/05/23	David Andersson (ECOERA AB)	ECOERA	100
22/05/23	Adam (Zopeful Climate)	ZC	101
23/05/23	Hanna Ojanen (Carbonculture)	CCULT	102
22/05/23	Tony S. Hamer (GHG PATS)	PATS	103

Submission date	Stakeholder	Acronym	Reference number
23/05/23	Carbon-Based Consulting LLC	CB	104
23/05/23	Carbon Removal India Alliance (CRIA)	CRIA	105
23/5/2023	BlueSkies Minerals Inc.	BS	106
24/05/23	Carbon Business Council	CBC	107
24/05/23	Kaja Voss (Inherit Carbon Solutions AS)	ICS	108
24/05/23	Lead authors of the State of Carbon Dioxide Removal Report	SCDRR	109
24/05/23	Cella	CLLA	110
24/05/23	Stockholm Exergi	SE	111
24/05/23	Plymouth Marine Laboratory	PML	112
24/05/23	Injy Johnstone	IJ	113
24/05/23	OpenAir	OAIR	114
24/05/23	OXO Earth	OXO	115
26/05/23	Keep Our Sea Chemical Free	KOSCF	116
27/05/23	Marginal Carbon AB	MC	117
24/05/23	Charm Industrial	CHI	118
24/05/23	Carbon Finance Labs	CFL	119
24/05/23	Dr. Robert Chris	DRCS	120
25/05/23	Stockholm Environment Institute; University of Edinburgh; Oeko-Institut	SEI+	121
27/05/23	Linden Trust for Conservation	LTC	122
29/05/23	1PointFive	1.5	123
24/05/23	Seafields	SF	124
24/05/23	Microsoft Inc.	MS	125
24/05/23	Climeworks AG	CW	126
27/05/23	Equatic	EQ	127
28/05/23	IEAGHG	IEAGHG	128
29/05/23	Business Council for Sustainable Energy	BCSE	129
30/05/23	Business Council for Sustainable Energy	BCSE	129
31/05/23	Running Tide	RT	130
25/05/23	Negative Emissions Platform and other co-signatories	NEP	131
10/06/23	Phil Kithil	PK	132
11/06/23	CCU Alliance	CCU	133
12/06/23	Timber Finance	TFI	134
25/05/23	Air Capture	AC	135

Submission date	Stakeholder	Acronym	Reference number
25/05/23	Mati Carbon Removals	MCR	136
25/05/23	Center for Negative Carbon Emissions	CNCE	137
25/05/23	CarbonPlan	CP	138
25/05/23	Captura	CAPT	139
25/05/23	UNDO	UNDO	140
25/05/23	Neustark AG	N-AG	141
25/05/23	44.01	44.01	142
25/05/23	IETA	IETA	143
25/05/23	Carbon Direct.Inc	CD	144
25/05/23	The Doers Club	TDC	145
25/05/23	Drax Group	DG	146
25/05/23	Carbfix	CARBFIX	147
25/05/23	Puro.earth	PURO	148
25/05/23	CO2RE Hub	CO2RE	149
25/05/23	Swiss Lenten Fund	SLF	150
25/05/23	Coalition for Negative Emissions	CNE	151
25/05/23	Climate Analytics GmbH	CA	152
25/05/23	Climate Action Platform Africa	CAPA	153
25/05/23	The Bioenergy Association of Finland	BEAF	154
25/05/23	Zero Emissions Platform	ZEP	155
25/05/23	Leefmilieu	LU	156
25/05/23	Carbon Gap	CG	157
25/05/23	Orsted	ORST	158
25/05/23	The Bellona Foundation	BF	159
25/05/23	Fern	FERN	160
25/05/23	Carbon Capture and Storage Association	CCSA	161
25/05/23	Dogwood Alliance	DA	162
25/05/23	CCS+ Initiative	CCSI	163
25/05/23	Stripe Climate & Shopify	SCS	164
25/05/23	Carboniferous	CF	165
25/05/23	National Wildlife Federation	NWF	166
24/05/23	KLIMPO	KLIMPO	167
25/05/23	Direct Air Capture Coalition	DACC	168
25/05/23	Octavia Carbon	OC	169

Submission date	Stakeholder	Acronym	Reference number
25/05/23	Aspiration	ASPI	170
25/05/23	Global CCS Institute	GCCSI	171
24/05/23	Carbon Capture Inc.	CCI	172
25/05/23	Biofuelwatch	BW	173
25/05/23	Carbon Capture Coalition	CCC	174
25/05/23	Environmental Defense Fund	EDF	175
24/05/23	Paebbl	PBL	176
25/05/23	EFI Foundation	EFIF	177
25/05/23	Recarb	RB	178
25/05/23	World Resources Institute	WRI	179
25/05/23	Clean Air Task Force (CATF)	CATF	180
24/05/23	Edison Electric Institute (EEI)	EEI	181
25/05/23	Ocean Visions	OV	182
25/05/23	John M. Fitzgerald	JMF	183
26/05/23	Prof. William R Moomaw (Tufts University)	WRM	184
26/05/23	PD Forum	PDF	185
25/05/23	CIBOLA Partners	CIBO	186
25/05/23	Heirloom	HM	187
25/05/23	Perspectives Climate Research GmbH	PERSP	188
25/05/23	Carbon Engineering	CE	189
26/05/23	Boston Consulting Group	BCG	190
25/05/23	Mary S. Boot, Partnership for Policy Integrity and Chad Hansen, John Muir Project	PPI	191
25/05/23	Nasdaq Stockholm	NSQ	192
09/06/23	Michael Hayes	MHS	200
12/06/23	Blueskiesminerals.inc	BSM	201
14/06/23	Seal Research Trust	SRT	202
15/06/23	CarbonRun	CR	203
15/06/23	Roberto Rochadelli (fupef)	RBI	204
15/06/23	Sky Harvest Carbon (Will Clayton)	SH	205
15/06/23	NovoCarbo	NC	206
15/06/23	Capture6	CAP6	207
16/06/23	Finnwatch	FNW	208
16/06/23	ECOERA	ECOERA	209

Submission date	Stakeholder	Acronym	Reference number
16/06/23	OpenAir	OAIR	210
16/06/23	Carbon Business Council	CBC	211
16/06/23	Rick Berg (Nori.inc)	NORI	212
16/06/23	Thomas Hoffmann (Decarbo Engineering GmbH)	THN	213
16/06/23	Timber Finance	TFI	214
16/06/23	CarbonPool	CPOOL	215
17/06/23	OceanForesters	OF	216
17/06/23	Takachar	TAK	217
18/06/23	Carbo Culture	CCE	218
18/06/23	Rewind.earth	REW	219
18/06/23	Clean Air Tech Limited	CATL	220
18/06/23	Elitelco	ELI	221
18/06/23	Otherlab	OLAB	222
18/06/23	Carbon Click, S.A. de C.V	CCL	223
19/06/23	Arca	ARC	224
19/06/23	AirMiners	AMN	225
19/06/23	Seaweed Generation	SWG	226
19/06/23	Max Planck Institute for Biogeochemistry	MPI	227
19/06/23	Carbon Mineralization Flagship Center	CNF	228
19/06/23	Green East Master Ltd	GEM	229
19/06/23	The Charles Darwin Rescue Plan	CDR	230
19/06/23	International Biochar Initiative	IBI	231
19/06/23	CarbonHemp Blo.Inc	CHB	232
19/06/23	CCS+ Initiative	CCSI	233
19/06/23	Microsoft	MS	234
19/06/23	ecoLocked GmbH	ELG	235
19/06/23	University of Hamburg	UOH	236
19/06/23	German Biochar Association	GBA	237
19/06/23	Omega Terraform	OT	238
19/06/23	Carbon Lockdown Project	CLP	239
19/06/23	Carbofex Oy	CFO	240
19/06/23	Everest Carbon Inc	ECI	241
19/06/23	Dead Battery Depot.ltd	DBD	242
19/06/23	CROPS Carbon International LTD	CROPS	243

Submission date	Stakeholder	Acronym	Reference number
19/06/23	Stockholm Exergi	SE	244
19/06/23	Carbonfuture	CFUT	245
19/06/23	C-Capsule	CCPLE	246
19/06/23	Captura	CAPT	247
19/06/23	44.01	44.01	248
19/06/23	XPRIZE	XPZ	249
19/06/23	Skyrenu Technologies	STECH	250
19/06/23	Carbuna AG	CAG	251
19/06/23	The Bellona Foundation	BF	252
19/06/23	Noya PBC	NPBC	253
19/06/23	Equatic	EQ	254
19/06/23	IATA and Airbus	IATA	255
19/06/23	Rivotto	RTTO	256
19/06/23	U.S. Biochar Coalition	USBC	257
19/06/23	FEWCOOP SA	FEWCOOP	258
19/06/23	Cella Mineral Storage, Inc	CLLA	259
19/06/23	Rethinking Removals Doers Club	RRDC	260
19/06/23	Eyob Tenkir Shikur	ETS	261
19/06/23	Kita	KITA	262
19/06/23	The Zero Emissions Platform	ZEP	263
19/06/23	Black Bull Biochar (BBB)	BBB	264
19/06/23	DEMOcritUS	DEMO	265
19/06/23	RedCarbon	RC	266
19/06/23	IEAGHG	IEAGHG	267
19/06/23	Octavia Carbon	OC	268
19/06/23	Carbon Gap	CG	269
19/06/23	John M. Fitzgerald	JMF	270
19/06/23	Drax Group Plc	DG	271
19/06/23	ARCTECH USA	AU	272
19/06/23	Mati Carbon Removals	MCR	273
19/06/23	Direct Air Capture Coalition	DACC	274
19/06/23	Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science	GRI/LSE	275
19/06/23	Sitos Group, Inc	SGI	276

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19/06/23	Crown Monkey	CM	277
19/06/23	Jim Ransom	JR	278
19/06/23	Terrra	TERRA	279
19/06/23	The European Biochar Industry Consortium	EBIC	280
19/06/23	Inventive Resources, Inc	IRI	281
19/06/23	STX	STX	282
20/06/23	HBAR Foundation	HBAR	283
20/06/23	Inversion Point Technologies Ltd	IPT	284
20/06/23	Oeko-Institut, Greenhouse Gas Management Institute, Stockholm Environment Institute, University of Edinburgh Business School, Infras, Carbon Limits, and Calyx Global	OI	285
20/06/23	remove	ROVE	286
20/06/23	Carbon Capture and Storage Association	CCSA	287
20/06/23	Running Tide	RT	288
20/06/23	ActionAid International	AAI	289
20/06/23	Carbon Recycling	CRCY	290
20/06/23	Planboo	PBOO	291
20/06/23	Spark Climate Solutions	SCL	292
20/06/23	From the Ground Up	FGU	293
20/06/23	TecnoFiltro SCS	TFSCS	294
20/06/23	Planetary Technologies	PT	295
20/06/23	Levitree, Inc	LVI	296
20/06/23	Partanna	PNNA	297
20/06/23	Earth’s Blue Aura	EBA	298
20/06/23	Greg H. Rau	GHR	299
20/06/23	Daniel Schwaag	DS	300
20/06/23	JPMorgan Chase & Co	JPM	301
20/06/23	Climeworks	CWORKS	302
20/06/23	International Coordinating Council of Aerospace Industries Associations	ICCAIA	303
21/06/23	Ted Christie-Miller (BeZERO)	BEZERO	304
21/06/23	Sylvera	SYLV	305
22/06/23	Pachama	PACHA	306
22/06/23	Conservation International	CI	307
23/06/23	Carbon Market Watch	CMW	308

Submission date	Stakeholder	Acronym	Reference number
24/06/23	Austrian Biomass Corbonisation Society	ABCS	309
25/06/23	PYREG GmbH	PYREG	310
26/06/23	IETA	IETA	311
23/06/23	Climate Analytics	CA	312
27/06/23	South pole	SP	313
29/06/23	Global CCS Institute	GCCSI	314
19/06/23	Carbon Capture Machine	CCM	315
19/06/23	Climate Land Ambition and Rights Alliance	CLARA	316
30/06/23	Center for International Environmental Law	CIEL	317
30/06/23	Carbon Engineering	CENG	318
30/06/23	Vertree	VRT	319
02/07/23	Carbon Twist	CTWIST	320
02/07/23	Project Developer Forum	PDF	321
03/07/23	Puro.earth	PURO	322
03/07/23	ReGen	REGEN	323
03/07/23	UBQ Materials	UBQ	324
03/07/23	Locus Solutions	LOCUS	325
03/07/23	GROVE VENTURES, Hetz Ventures, Firstime, VINTAGE, Jibe Ventures, GOOD COMPANY, fresh.fund, Epsilon, PLANETech (joint submission)	GROVE	326
04/07/23	Inversion Point Technologies (also submitted on 20 June, see below)	IPT	327
04/07/23	Albo Climate	ALBO	328
05/07/23	Bomvento	BOMV	329
05/07/23	Aspiration	ASPI	330
05/07/23	Environmental Defense Fund (EDF)	EDF	331
06/07/23	Deep Ocean Stewardship Initiative (DOSI)	DOSI	332
06/07/23	SYNCRAFT Engineering GmbH	SYNCR	333
06/07/23	IGNITE THE SPARK	IGSP	334
06/07/23	Civil society organizations (open letter from 127 signatories)	OPCSO	335
10/07/23	Atmosfair gGmbH	ATMO	336
08/07/23	Indigenous Environmental Network (IEN)	IEN	337
05/07/23	RedCarbon	RC	338
03/07/23	Carbon Business Council	CBC	339

Submission date	Stakeholder	Acronym	Reference number
17/07/23	Cornwall Carbon Scrutiny Group	CCSG	340
18/07/23	Government of Quebec	QB	341
20/07/23	New Zealand	NZ	342
21/07/23	Forair	FA	343
24/07/23	NatureBridge	NB	344
27/07/23	Stockholm Exergi	SE	345
27/07/23	SkyHarvest	SH	346
28/07/23	Kita	KITA	347
28/07/23	Perspective Climate Research	PCR	348
31/07/23	International and Comparative Law Research Centre	ICLRC	349
31/07/23	Carbon Recycling	CRCY	350
31/07/23	44moles	44M	351
31/07/23	Isometric	ISOMETRIC	352
31/07/23	Carbfix	CARBFIX	353
31/07/23	C-Capture and International REC Standard	CCPLE + RECS	354
31/07/23	CarbonPool	CPOOL	355
31/07/23	SaveClimate Campaign	SCC	356
31/07/23	Osservatorio Parigi	PARIGI	357
31/07/23	Climeworks	CW	358
01/08/23	Negative Emission Platform	NEP	359
01/08/23	Carbon Market Watch	CMW	360
01/08/23	Drax Group	DG	361
01/08/23	Bellona Foundation	BF	362
01/08/23	STX Group	STX	363
01/08/23	neustark	NEUST	364
01/08/23	Carbon Finance Labs	CFL	365
01/08/23	1PointFive	1.5	366
01/08/23	Sylvera	SYLV	367
01/08/23	Agreena	AGREE	368
01/08/23	Direct Air Capture Coalition	DACC	369
01/08/23	Carbon Capture and Storage Association	CCSA	370
01/08/23	Zero Emissions Platform	ZEP	371
01/08/23	Planetary Technologies	PT	372

Submission date	Stakeholder	Acronym	Reference number
01/08/23	NBS Brazil Alliance Team	NBS	373
02/08/23	re-green	REGREEN	374
02/08/23	Cella Mineral Storage	CLLA	375
04/08/23	Carbon International	CARBI	376
08/08/23	National Forest Science	NFS	377
08/08/23	Puro.earth	PURO	378

4. Subsequent work and timelines

7. Further work will be carried out to develop draft recommendations based on the guidance that will be received from the Supervisory Body.

5. Recommendations to the Supervisory Body

8. The Supervisory Body may wish to consider this document and provide guidance for further work.

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1. Procedural background

1. The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), by its decision 3/CMA.3 “Rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement”, paragraph 6(c), requested the Supervisory Body of the mechanism established by Article 6, paragraph 4, of the Paris Agreement (Article 6.4 mechanism), to elaborate and further develop, on the basis of the rules, modalities and procedures of the Article 6.4 mechanism, recommendations on activities involving removals, including appropriate monitoring, reporting, accounting for removals and crediting periods, addressing reversals, avoidance of leakage, and avoidance of other negative environmental and social impacts, in addition to the activities referred to in chapter V of the annex (Article 6, paragraph 4, activity cycle), to be considered at its fourth session (November 2022).[1]

2. In response to this request, the Supervisory Body agreed on the recommendations on activities involving removals under the Article 6.4 mechanism contained in the annex to the addendum of its annual report to CMA.4.

3. The CMA, by decision 7/CMA.4, paragraph 19, invited Parties and admitted observer organizations to submit, via the submission portal, by 15 March 2023, their views on activities involving removals and requested the Supervisory Body to consider the views of Parties and observers in elaborating and further developing recommendations on activities involving removals, while taking into account the mandate provided to the Supervisory Body contained in paragraph 24(a)(ix) of the rules, modalities and procedures, and considering broader inputs from stakeholders provided in a structured public consultation process.

4. At its fourth meeting (7−10 March 2023), the Supervisory Body requested the secretariat to prepare an updated version of the document “Information note: Activities involving removals under the Article 6.4 mechanism”, taking into account the guidance and questions contained in annex 2 to the SB 004 meeting report[2] and the views of Parties and observers submitted in response to the call for submissions pursuant to decision 7/CMA.4, paragraph 19.

5. At its fifth meeting (31 May 2023 – 03 June 2023), the Supervisory Body considered the information notes “Removal activities under the Article 6.4 mechanism”[3] and “Summary of the views submitted by Parties and observers on activities involving removals”[4] and agreed to launch a call for structured public consultation based on the information note

[1] Document FCCC/PA/CMA/2021/10/Add.1 available at: https://unfccc.int/documents/460950.

[2] Annex 2 of the SB 004 meeting report titled “Information note: Guidance and questions for further work on removals (v.01.0) is available at: https://unfccc.int/sites/default/files/resource/a64-sb004-a02.pdf.

[3] Annex 9 to the annotations of the SB 005 meeting, available at https://unfccc.int/sites/default/files/resource/a64-sb005-aa-a09.pdf.

[4] Annex 10 to the annotations of the SB 005 meeting, available at https://unfccc.int/sites/default/files/resource/a64-sb005-aa-a10v1.pdf.

"Guidance and questions for further work on removals",[5] to be open from 5 to 19 June 2023.

2. Purpose

6. The purpose of this document is to advance the work to elaborate and further develop draft recommendations, on the basis of the RMP, on activities involving removals.

7. The Supervisory Body notes that the elements of recommendations reflected herein are considered for application to activities involving removals in general and do not, at this time, include detailed requirements for specific types of activities involving removals, such as land-based and engineering-based activities unless noted. In order to develop detailed requirements, more work will need to be undertaken by the Supervisory Body, including specific work areas where indicated.

8. The following conforms to the outline of relevant guidance and questions contained in annex 2 to the SB 004 meeting report. While every effort has been made to accurately reflect and summarize stakeholder inputs regarding those elements, these elements are non-exhaustive and should be read in combination with the summary of submissions pertaining to each topic in (A6.4-SB006-AA-A09).

3. Definitions

3.1. SB 003 Recommendation extract

9. For the purpose of these recommendations, "removals" are processes or outcomes of processes to remove greenhouse gases from the atmosphere through anthropogenic activities and durably store them in geological, terrestrial or ocean reservoirs, or in products.

3.2. Key issues

10. Should "removals" be defined "for the purpose of this guidance"?. SB 003 defined terms by their function in substantive guidance; the literature-derived definition of removals could be misunderstood as indicating the eligibility of specific categories. SB 004 had discussed the below:

    (a) Single definition—of "removals":

        (i) As processes and outcomes {SB 004 draft};

        (ii) Removals as outcomes {only};

        (iii) With/out examples of storage {SB 004 draft employs examples};

    (b) Additional definitions needed?

    (c) No definition.

[5] Annex 2 of the SB 005 meeting report, available at: https://unfccc.int/sites/default/files/resource/a64-sb005-a02.pdf.

3.3. New Proposals

11. Removals as processes (including removal activities) and outcomes.

12. Definition refers to removal process or activity e.g. [IPCC AR6: various] [SE, 15] [ECP, 27] [CO, 58] [OA, 114] [CBC 107] [NPBC, 253] [OAIR, 210] [IEAGHG, 267] [CBC, 211] [SGI,276] [NC, 206] [CC, 247] [SCL, 292] [EU, 59] [AC, 135] [SCS, 164] [SCDR, 109] [GHR, 299] [OI, 285] [CWORKS, 302] [SE, 244][6]

13. For the purpose of these recommendations, IPCC definitions of "removals" are applied e.g. [SE, 15] [ECP, 27] [CO, 58] [OA, 114] [CBC 107] [NPBC, 253] [OAIR, 210] [IEAGHG, 267] [CBC, 211] [SGI, 276] [NC, 206] [VRT, 319].[6]

14. Definition refers to removals as outcomes e.g. [IETA, 311; noting definition in IPCC SR1.5] [XPZ, 249][6]

15. Anthropogenic activities removing CO_2 from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological, geochemical or chemical CO_2 sinks, but excludes natural CO_2 uptake not directly caused by human activities. [IPCC Working Group III contribution to the Sixth Assessment Report Technical Summary]

16. The withdrawal of greenhouse gases (GHGs) from the atmosphere as a result of deliberate human activities. These include enhancing biological sinks of CO_2 and using chemical engineering to achieve long-term removal and storage. Carbon capture and storage (CCS), which alone does not remove CO_2 from the atmosphere, can help reduce atmospheric CO_2 from industrial and energy-related sources if it is combined with bioenergy production (BECCS), or if CO_2 is captured from the air directly and stored (DACCS). [IPCC AR6 WGIII Report Glossary]

17. Anthropogenic activities removing carbon dioxide (CO_2) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical CO_2 sinks and direct air carbon dioxide capture and storage (DACCS), but excludes natural CO_2 uptake not directly caused by human activities.[7] [IPCC AR6 WGIII Report Glossary]

18. Compared to the definition used in the IPCC Special Report on 1.5 degrees and the IPCC Working Group III Annex 1: Glossary, the definition outlined above has replaced "direct air capture" with a technology-neutral reference to "chemical CO_2 sinks".

[6] References to submissions under this section 3.3 is not a complete listing. While an attempt was made to include as many references as possible, some might have been left out untintentionally.

[7] IPCC AR6 WGIII Report Glossary p 1,796 includes the following note: In the 2006 IPCC Guidelines for National GHG Inventories (IPCC 2006), which are used in reporting of emissions to the UNFCCC, 'anthropogenic' land-related GHG fluxes are defined as all those occurring on 'managed land', i.e. 'where human interventions and practices have been applied to perform production, ecological or social functions'. However, some removals (e.g. removals associated with CO2 fertilisation and N deposition) are not considered as 'anthropogenic', or are referred to as 'indirect' anthropogenic effects, in some of the scientific literature assessed in this report. As a consequence, the land-related net GHG emission estimates from global models included in this report are not necessarily directly comparable with LULUCF estimates in national GHG Inventories.

19. Removals are anthropogenic activities removing carbon dioxide (CO_2) from the atmosphere or ocean and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. [CC, 247]

20. IETA agrees with the following definition from the IPCC SR1.5, namely that carbon dioxide removals (CDR) refer to "anthropogenic activities removing CO_2 from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological, geochemical or chemical CO_2 sinks, but excludes natural CO_2 uptake not directly caused by human activities." We suggest that the Article 6.4 mechanism focus on outcomes of removal activities. [IETA, 311]

21. Removals are processes or outcome of processes via anthropogenic activities to reduce atmospheric levels from greenhouse gasses (GHGs) already emitted, inclusive of any activities necessary in order to ensure that the "removed" greenhouse gas is kept from re-entering the atmosphere and reversing the removal, for example via durable storage in geological, terrestrial, or ocean reservoirs, or in products. [SCL, 292]

22. For the purpose of these recommendations, "removals" are activities that (a) increase the natural uptake of carbon in biogenic reservoirs; (b) accomplish long-term storage of carbon in geological or other non-biogenic reservoirs. [EU, 59; also see below: "Types of removals activities"]

23. Removals are activities that measurably and demonstrably reduce atmospheric carbon dioxide concentration while avoiding social and economic harm, encompassing a wide range of approaches that meet a broad set of criteria such as attaining Technology Readiness Levels (TRL) based on an expert assessment (e.g. as provided in State of CDR report) e.g. [AC, 135] [SCS, 164] [SCDR, 109]

24. Carbon dioxide removal (CDR) refers to human activities that 1) remove carbon dioxide (CO_2) from the atmosphere or 2) remove CO_2 from natural emissions to the atmosphere (such as from soils, certain regions of the ocean and geologic reservoirs) and 3) durably sequester from the atmosphere the removed CO_2 or products thereof for a climate-relevant period of time. [GHR, 299]

25. Greenhouse gas removal enhancement are anthropogenic activities that cause an increase in removals exceeding any increase in emissions caused by the activity. [OI, 285]

26. Removals are defined based on "storage permanence" or "ongoing monitoring" and "an active anthropogenic intervention". [CWORKS, 302]

27. CDR shall be considered a functional outcome, rather than an enumerated set of activities or processes: Any process, regardless of pathway, which results in a net reduction of CO_2 concentrations in the atmosphere shall be considered carbon dioxide removal. Net carbon dioxide removals shall be established by a comprehensive, cradle-to-grave life cycle analysis. [XPZ, 249]

Scope of greenhouse gas removals

28. Definition refers to carbon dioxide removal (CDRs) or 'Greenhouse Gas Removals' (GGRs) e.g. [UK, 54] [PTV, 18] [JF, 183] [IPT, 284] [GRI/LSE, 275]

29. Definition refers to atmospheric / carbon / dioxide / concentration / CDR e.g. [IETA, 70] [BF, 46] [WI, 9] [IETA, 311] [EU, 59] [CC, 247] [AC, 135] [SCS, 164] [SCDR, 109] [GHR, 299] [XPZ, 249] [OLAB, 222] [CW, 31] [CBC, 107] [SE, 244] [CCAP, 246] [ZEP, 263]

30. Definition refers to all relevant / atmospheric GHGs / concentration e.g. [OI, 285] [SCL, 292] [AMN, 225] [CMW, 308] [GRI/LSE, 275]

31. Definition refers to measures involving removal of methane from the atmosphere [LOCUS, 325] [CTWIST, 320] [REGEN, 323] [UBQ, 324] [GROVE, 326] [IPT, 327] [ALBO, 328] [IGSP, 334] [RC, 338] [IGSP, 334

32. Definition refers to measures involving removal of N2O from the atmosphere [BOMV, 329]

33. Removals are a measure to lower the concentration of CO_2 in the atmosphere. [SE, 244]

Types of removals activities

34. The definition of removals should be technology neutral, neutral regarding whether removed GHGs are stored or destroyed, {and} avoid prescribing specific durations for storage. [OI, 285]

35. Removals are defined in a scientific perspective and should be technology neutral. [KITA, 262]

36. For the purpose of these recommendations, “removals” are activities that:

    (a) Increase the natural uptake of carbon in biogenic reservoirs: This may include living biomass, dead organic matter), soil organic carbon and harvested wood products (IPCC pools). It may involve different types of activities, such as afforestation/reforestation or restoration of degraded ecosystems;

    (b) Accomplish long-term storage of carbon in geological or other non-biogenic reservoirs: This may include, inter alia, direct air capture and storage (DACCS), bioenergy carbon capture and storage (BECCS), storage of carbon in products or enhanced weathering. [EU, 59]

37. Marine or ocean-based geoengineering are not included in IPCC definition on account of moratoria in place under other treaty processes. [CA, 152]]

38. IPCC definitions include enhancement of terrestrial- and ocean-based sinks through anthropogenic interventions such as forest management, afforestation and reforestation, coastal wetland restoration, and soil-carbon sequestration. [CATF, 32]

39. CDR includes enhancement of natural biological, geochemical or physical CO_2 sinks, the creation of artificial removal and sequestration methods, or some combination of the preceding. CDR excludes 1) natural CO_2 uptake not directly caused by human activities, and 2) removal of CO_2 directly from an anthropogenic CO_2 source emitting to the atmosphere. [GHR, 299]

40. Nature based carbon removal might be those approaches that store carbon in living ecosystems, including ocean and soil carbon, food production, and so forth, thereby specifically including co-benefits of natural habitat and biodiversity restoration. [OLAB, 222]

Contextual considerations and relevant provisions.

41. Key criteria for high-quality CDR include additionality, durability, net-negativity, verification, and equity and community engagement. [CBC, 107]

42. Removals… should take into account how each removals technology relates to leakage, permanence, social impacts, governance impacts, and changes to biodiversity [KITA, 262]

43. Removals are defined based on notions of permanence/durability, additionality, leakage, as well as co-benefits independent of any specific pathways. [PT, 295]

44. Removals are a measure to lower the concentration of CO_2 in the atmosphere. [SE, 244] A permanent removal is a measure where, based on scientific consensus, the likelihood of reversal is very close to zero if industry best-practices are applied. A non-permanent removal is a postponed emission. [SE, 244]

45. Non CO_2 project emissions shall be considered in the definition of removals. [PML, 112]

46. Removals are defined as the process that effectively subtracts carbon dioxide from the atmosphere, resulting in the extraction of carbon from the atmosphere for a period of 100 years or longer such that the risk of reversal or Event of Carbon Default (EOCD) is minimised to the greatest extent possible. Removals should not be considered exclusively as a pathway towards storage, but also as an avenue to make use of captured carbon in a manner that continues to keep it out of the atmosphere in the long term. [CCAP, 246]

47. Removals are defined based on the principles that CO_2 is physically removed from the atmosphere, the removed CO_2 is stored out of the atmosphere in a manner intended to be permanent, upstream and downstream greenhouse gas emissions associated with the removal and storage process are comprehensively estimated and included in the emission balance and the total quantity of atmospheric CO_2 removed and permanently stored is greater than the total quantity of CO_2 emitted to the atmosphere. [ZEP, 263]

48. Carbon removals is the intentional movement of carbon from the fast carbon cycle to the slow carbon cycle, where the total fast carbon removed exceeds the total slow carbon emitted within a given project boundary. [RT, 288]

49. The definition of removals is focused on defining what activities are allowed or not allowed under the 6.4 mechanism. [CLARA, 316]

50. Imposing a temporal boundary requirement that carbon removals occur going forward, subsequent to installation of carbon removals technology, is necessary to ensure that the technology actually draws down the concentration of CO2. [CLARA, 316]

4. Requirements

51. Activities involving removals under the Article 6.4 mechanism shall meet the requirements contained in sections 4.1 to 4.7 below, in addition to the requirements contained in the annex to decision 3/CMA.3 “Rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement”, and any further relevant decisions of the CMA.

4.1. Monitoring

4.1.1. SB 003 Recommendation extract

52. Activity participants shall monitor removals through quantification and estimation based on an appropriate combination of field measurements, remote sensing, measurement through instrumentation, and/or modelling.

53. Calculation of removals shall be stated with the associated uncertainties, and these uncertainties shall be within the limits to be specified in the methodologies applied.

54. If the uncertainty of calculation of removals exceed the specified limits, the calculated values shall be adjusted in a conservative manner.

55. Calculation of removals may employ conservative default values that allow flexibility in monitoring.

56. In order to address the risk of reversals and to ensure full compensation of reversals if they occur, monitoring shall also be conducted after the end of the last crediting period of activities involving removals in accordance with the methodological provisions to be developed by the Supervisory Body.

4.1.2. Key Issues

57. SB 004 discussed that Monitoring should cover:

    (a) Quantification and estimation and their basis;

    (b) Statement of uncertainties and limits of methodologies;

    (c) Exceeding uncertainty limit requires adjustment in a conservative manner;

    (d) Flexibility in monitoring via conservative default values;

    (e) Monitoring after end of crediting period per provisions.

4.1.3. New Proposals

4.1.3.1. Quantification and estimation and their basis

58. Methodologies should ensure robust monitoring by:

    (a) Requiring the establishment of an operation and management plan for activity monitoring that addresses the assignment of responsibilities of various parties and the operational process of monitoring;

    (b) Specifying the monitoring approach(es) for all parameters needed for the quantification of emission reductions or removals;

    (c) Ensuring that the approaches related to the use of measurements, sampling, data from third parties (e.g. studies, statistics, satellite data), or default values are robust, statistically representative, or conservative;

(d) Ensuring that the choice of the approaches, data, measurement methods, or default values appropriately addresses uncertainty and leads to a conservative estimate of emission reductions or removals;

(e) Requiring appropriate quality assurance and quality control measures, such as cross-checking the monitoring results with other sources of data;

(f) Requiring a plan or procedure for conservative treatment and deduction of emission reductions or removals in case of unexpected interruption or errors in monitoring equipment or procedures;

(g) Alternative monitoring approaches may be used when the mitigation activity is in conflict zones or is inaccessible, or during periods of a pandemic. [OI, 285]

59. Monitoring Reporting and Verification (MRV) systems have the potential to improve over time as new scientific knowledge becomes available and administrative capacity is developed. There should be a defined process for incorporating such improvements. This may include scheduled reviews and revisions requiring updates to procedures, for example every five years. Measurement methods should be the subject of continuing research in the interim with the ambition to reduce the margin of uncertainty. This will be especially relevant where uncertainties are largest. This includes biogenic sinks, biochar, enhanced weathering and marine sinks. [BF, 252]

60. The principles for monitoring include accuracy, completeness, consistency, transparency, etc, in line with the IPCC guidelines and guidance. [ECP, 27]

61. Clear differentiations between reductions and removals, noting the different (but complementary) roles the two mitigation approaches have to fulfil should be done. [CWORKS, 302]

62. Robust monitoring, reporting, and verification (MRV) tools in establishing trust and credibility in carbon dioxide removal (CDR) processes as well as the dire need for improved digitisation & automatisation to speed up certification is important. This combination of third-party standards and scalable, accurate digital MRV facilitates a robust process for ensuring trust in engineered CDR activities. [CFUT, 245]

63. Data required for the issuance of carbon removal certificates should be limited to measurable and verifiable data of the CDR event of activity itself. Monitoring of co-factors including environmental and social safeguards, contribution to SDGs, monitoring of reversal events should be periodic. [CW, 126]

64. Field measurements are important, especially at the beginning and at the end of the monitoring period to capture the totality of C stock changes, and that these estimations should be verified. [ECP, 27]

65. The core elements to consider when identifying the applicable monitoring and reporting scope should be based on the type of removal activity. Core elements to consider to be able to determine an appropriate monitoring and reporting scope include:

(a) How actual carbon removal occurs (e.g. tree growth for reforestation);

(b) The conditions for making the removal permanent (e.g. proof of soil application for biochar);

(c) Factors affecting removal permanence (e.g. soil conditions such as temperature for biochar or tree survival rate for reforestation activities);

(d) Factors affecting net carbon removals of the activity (e.g. taking into account any emissions that might result from the removal activity itself being performed). Considering these elements, and how they can be most effectively and efficiently measured, should guide in the identification of the applicable scope for monitoring and reporting. [STX, 282]

66. Monitoring requirements for geological storage should rely wherever possible on existing regulatory regimes, where such regimes meet agreed minimum requirements, to avoid a complex layered structure of domestic legal and Article 6.4 requirements e.g. [IETA, 51] [ZEP, 263] [CCSA, 287]

67. Whilst the CDM can act as a useful precedent, Article 6.4 and carbon markets more broadly must evolve beyond in-person and manual audits where possible. Increasingly, digital technologies are being used to streamline data collection and processing for MRV processes. The remote verification of data can fast-track issuance of tradeable carbon assets, significantly reducing payment cycles for project developers and increasing their share of value generation, instead of verifiers or auditors. [CBC, 40]

68. Combining the use of a professional digital tool for monitoring with satellite images can help the project developers avoid the high costs that should be allocated to DOEs. The verification events can also take place but they will be less expensive and less detailed as the digital tool can simplify and shorten the process of verification. [HBAR, 14]

69. Whilst manual data collection and in-person surveys will continue to play a key role, particularly for nature-based removals, their importance should not be assumed for engineered removals and seen as a benchmark for quality where a greater role for automated data collection through IoT, mobile technology and online applications is envisaged. [WI, 9]

70. Technology-enabled continuous monitoring (i.e. digital MRV/ dMRV) wherever possible to ensure that the real climate impact of removal activities (including temporary removals) is evaluated and tracked over time with high accuracy is recommended. [GRI/LSE, 275]

71. All methodologies eligible under the Mechanism should require the use of best available DLT-enabled dMRV, including transparent, auditable field measurements in combination with remote-sensing, IoT, and satellite data, with audit trails linked to decentralized identifiers for corresponding actors that issue verifiable credentials and verifiable presentations linked to tokenized climate assets, interoperable across climate account systems. [HBAR, 283]

72. The SB should (1) require that CDR methodologies newly developed for the Article 6.4 Mechanism be digitally native; (2) undertake to digitize, in a reasonable time or for Article 6.4 purposes, all existing libraries of analog methodologies in use or owned by the UNFCCC using best available technology (BAT); and (3) to release a technical support document enabling carbon registries and CDR project developers interested in participating in Mechanism activities to convert eligible CDR methodologies in the VCM from analog to digital format, along with guidance on any/all upgrades necessary to align with Mechanism requirements. [HBAR, 283]

73. Some approaches require special considerations in MRV, so the requirements should be flexible enough to encourage all legitimate technologies. For example, monitoring of carbon stocks would be impractical for the Ocean Alkalinity Enhancement pathway, which shows great promise. [TREEO, 11]

4.1.3.1.1. General aspects of quantification and estimation

74. High quality monitoring, reporting, and verification (MRV) is the key deliverable for any carbon removal project and essential for building trust in carbon markets.The Carbon Business Council recently published an Issue Brief outlining the key criteria for high-quality MRV. [CBC, 211]

75. SB should take steps to engage with the EU Carbon Removal Certification Framework process, the work of the U.S. Department of Energy Office of Fossil Energy and Carbon Management, Japan's Joint Crediting Mechanism, and other key global public sector efforts (multilateral and bilateral) to create and advance a cohesive MRV framework across carbon markets – and avoid a fragmented, patchwork outcome that will be difficult for all stakeholders to navigate. [CBC, 211] [CBC, 339]

76. The storage of CO_2 in geological reservoirs is regulated by the CO_2 Storage Directive (CCS Directive6) in European Union Member States, Iceland, Norway and Liechtenstein (European Economic Area, EEA), and by the 2010 CO_2 Storage Regulations in the UK7, which establish a legal framework for the safe geological storage of CO_2. Both storage legal frameworks include provisions for site selection and characterisation which are designed to minimise the risk of leakage, conditions for permitting, as well as monitoring and reporting requirements to verify storage, including remediation obligations in case of reversals. [ZEP, 263]

77. Monitoring should include the possibility that Ocean Alkalinity, and perhaps other approaches in the future, will be best verified through modeling, indirect measurement, or other approaches as determined by the best scientific consensus at the time. [ALLCOT, 48]

78. MRV approach involving measuring changes in the chemical composition of samples before and after the carbonation processs makes it possible to quantify the amount of CO_2 sequestered in the form of carbonates. [STECH, 250]

79. Measurement of CO_2 removed should be accurate to the tonne. Proof of sequestration and measurement should be provided at issuance of the carbon credit. [REW, 219]

80. Requirements of the recommendations do not include reporting on activities themselves. They address only reporting on Monitoring. However, all certification procedures include reporting on implementation and requirements to the project documentation. [TREEO, 11]

81. Build on the past successes in centralising the provision of dMRV (e.g. by Global Forest Watch), which can achieve economies of scale and increase overall environmental activities. [GRI/LSE, 275]

82. By creating "tiered" ongoing monitoring requirements based on the expected stability of the carbon storage, the Supervisory Body can ensure that projects focus on (and invest in) the areas most likely to impede long-term storage and climate benefit; as an example, ongoing monitoring requirements for a reforestation project may help to proactively reduce wildfire risk factors in the area where the project is conducted. On the flip side, lowering

ongoing monitoring requirements for a low reversal risk approach such as Ocean Alkalinity Enhancement can allow the project to focus on (and invest in) reducing quantification uncertainties in the calculation of removals. [RT, 288]

83. The Supervisory Body should consider the impacts the timing of verification might have on the financing of projects. Requirements for verification that may delay verification may also delay when a project receives compensation for CDR and impacts the financing of the project. The project proponent should have some ability to verify more frequently or earlier than recommended if they carry the cost of verification as the verification schedule heavily dictates the business model. This is especially true for emerging technologies that are still working through the hurdles of scaling where the production of carbon stock may initially be slower than expected. [CW, 31]

4.1.3.1.2. Statement of uncertainties and limits of methodologies

84. Given the inevitable uncertainties, conservative parameter values should always be used to reduce the risk of removals being overestimated, and thus give greater confidence that certified removals have actually occurred. For example, it may be prudent to estimate a probability distribution of the amount of carbon held in a sink, then assume a percentile of the distribution rather than the mean or median value. [BF, 252]

85. To ensure defined timeframes and related procedures for monitoring and reporting of removals is sufficient to ensure integrity in the ex-post carbon calculations as well as feasible to perform one should consider the distinctive characteristics of removal activities. These characteristics, for example, should include the timeline of implementation, carbon absorption over time, risks of rversals and potential need for re-evaluating the baseline over time. [STX, 282]

4.1.3.1.3. Exceeding uncertainty limit requires adjustment in a conservative manner

86. Applying conservative default factors to address uncertainty assumes that the estimate of uncertainty reflects systematic errors. However, almost always, the estimation of uncertainty mostly reflects random errors, i.e. normal variation of C stocks due to inherent natural conditions. This variability is usually mid-high for land-based removals and this is normal. Activity proponents shall follow IPCC Aguidelines and guidance to reduce any systematic error in the estimation of C stocks at times 1 and 0, and to report uncertainties, without the need for adjusting the final removals estimate based on uncertainty. This would result in a loss of accuracy and create an artificial reduction of eligible A6.4 removals. Rather, the estimation of C stocks shall be technically assessed to ensure there is no bias in the estimates. [ECP, 27] [ALLCOT, 48]

4.1.3.1.4. Flexibility in monitoring via conservative default values

87. Default factors to account for measurement uncertainty need to ensure that the environmental integrity of the resultant credits remains high, and that approaches support robust accounting against NDCs. [IETA, 51]

88. Adopting conservative default parameters (that tend to underestimate actual removals), which can be over-ridden by measured values for an individual sink is recommended. For example, in the earlier Australian Carbon Pricing Mechanism 3, high default parameters were used for assumed emissions of methane from coal mines. In many cases emitters could benefit from measuring actual emissions and being charged on this basis, rather

than the default. This led to more widespread measurement of methane emissions. [BF, 252]

4.1.3.2. Periodic update of monitoring plan

89. The activity proponent shall periodically update a project's monitoring plan, at a minimum:

    (a) every five years [NB, 344] [CCPLE+RECS, 354] [CRCY, 350] [PARIGI, 357] [CMW, 360] [BF, 362] [NBS, 373] [REGREEN, 374] [CLLA, 375] [CARBI, 376] [PURO, 378] [SYLV, 367]

    (b) at the end of each crediting period [NEUST, 364]

    (c) The monitoring plan should be updated every five years and/or at the end of the crediting period, whichever is sooner. [KITA, 347] [CFL, 365], [1.5,366] [STX, 363]

    (d) at the host country NDC review process { note: this is to confirm the ITMOs authorization process for the next NDC period will not require changes in the monitoring plan}. [CRCY, 350]

    (e) following any reversal event (activity-level risk assessment must also be reassessed after a reversal event).

    (f) whenever a cause arises, not just mechanically at fixed intervals. [SE, 345] [SH, 346] [SCC, 356] [NEP, 359] [STX, 363] [CW, 358]

    (g) as per CDM CCS M&P. [PCR, 348]

    (h) As per existing national and regional regulations. [CCSA, 370], [ZEP, 371]

90. Updating the monitoring plans is a requirement [CMW, 360]

91. National Authorities or the SB should establish a guideline that reflects the best practices for monitoring and update it periodically. The monitoring plan should be reviewed by national authorities and/or the SB and activity proponent should update it only if it is not aligned to the latest guideline. Through such reviews, made publicly accessible, the activity proponents are held accountable. [44M, 351]

92. A third party, where activity proponents are responsible for providing the information/data as requested by the third party, should be responsible for the monitoring of the project and update of monitoring plans. [NB, 344]

4.1.3.3. Monitoring after end of crediting period per provisions

93. Exact monitoring requirements will vary across different carbon capture and sequestration technologies and the frequency of monitoring reports might decrease over time if the risk of reversal decreases, but some form of monitoring and reporting should always be required unless and until a sequestration provider can demonstrate permanent carbon disposal/removal. [44.01, 248]

94. The monitoring period should begin with the initial capture of CO_2, continue through its storage and sequestration, and only finish if/when the CDR provider can demonstrate that

it is no longer possible for the CO_2 to be re-released back into the atmosphere, for example after CO_2 has been mineralised. [44.01, 248]

95. Monitoring must be continuous during the monitoring period. Some form of monitoring mechanism is required which is able to identify removals on short notice. All monitoring data for reversals should be made public in near real-time by all projects. [SE, 244]

96. On the frequency of monitoring, we propose that two “full” measurements are conducted encompassing the full crediting period. “Simplified” monitoring, i.e. remotely-sensed forest cover should be allowed within the crediting period to ensure permanence and to understand if corrective actions are needed. In case the activity proponent seeks to verify removals before the conclusion of the crediting period, then a second “full” measurement should be conducted to estimate C stock changes and, from this, removals. [ECP, 27]

97. It is also not commonplace to require permanence monitoring beyond the project term/end date. We suggest broader stakeholder comment is sought prior to prescribing such approaches. [OD, 19]

98. Both frameworks (CCS Directive, UK CO_2 Storage Regulations) require operators to carry out monitoring based on an approved monitoring plan which is updated every 5 years “to take account of changes to the assessed risk of leakage, changes to the assessed risks to the environment and human health, new scientific knowledge, and improvements in best available technology”. Operators are also required to report to competent authorities at least once a year. The frameworks also specify a minimum period of 20 years before all legal obligations relating to monitoring and corrective measures can be transferred to competent authorities. [ZEP, 263]

99. Timeframes and related procedures for monitoring and reporting should be designed in line with the logic of the European CCS directive for activities involving geological storage. [CWORKS, 302]

100. If the permanence of a removal activity is dependent on human intervention or management (e.g. the perpetual maintenance of a particular practice), the monitoring period should run at least as long as these activities—and the removals they provide—are required. If monitoring stops, the removed CO_2 should be assumed to be re-emitted to the atmosphere and treated in the same way as a reversal. [BF, 252]

101. All types of monitoring and reporting should be at least annual as this is similar to any company reporting their activities as part of regulation. The simplified annual report would be used in the years where a full monitoring report is not available. [KITA, 262]

102. For land-based credits, the end of the monitoring period represents the opening of an entirely new chapter for the concerned land area. No third party takes responsibility for continued monitoring and anything can happen. A nature-based removal must therefore always be considered reversed at the end of the monitoring period. The monitoring period for land-based approaches should thus correspond to the time-frame the project is committed to keep the land as a removal. [SE, 244]

103. For permanent removals (BECCS/DACCS) as well as generically for CCS, the permanence is confirmed by the scientific consensus and the fact that the CO_2 is sent permanently from the biosphere/atmosphere to the geosphere. During the Monitoring period, reversals should be monitored and addressed according the applicable jurisdiction as well as counted as an emission by the storage company. At the end of the Monitoring

period, there should be a transfer of responsibility to the host nation. If there is a reversal after the transfer of responsibility, the host nation should count the reversal as an emission and take measures according the applicable jurisdiction. [SE, 244]

104. Mechanism methodologies shall require that all removal activities monitor the achieved carbon stocks through their quantification using field measurements or remote-sensing, or a combination of both. This would allow for innovations associated with higher frequency more transparent means of monitoring for events of default and carbon performance. This would also allow for better predictive modelling of effective performance of new innovative ways of sequestering or capturing carbon for varying durations with varying performance expectations. [CFL, 38]

105. For land-based activities and other project activities such as DACCS and BECCS the first monitoring report should be within 5 years. For activities such as biochar and in some cases of CCUS (CCUS such as production of concrete using CO2 could have sectoral scope of manufacturing industry and/or construction)- it may be within 2-3 years of project registration. [PDF, 321]

106. Simplified reporting for DACCS and BECCS may be once every 5 years post crediting period to ensure no reversal has occurred. This could end when there is sufficient data to support that CO2 plume is stable and reservoir is stable. For land-based activities such as forestry, it may continue till 100 years to conclusively report about no reversals. [PDF, 321]

107. Monitoring should not be limited to taking place following an observed event that could lead to a reversal nor should it stop with the last crediting period. Monitoring is essential to avoid not only reversal, but also other negative environmental and social impacts. And all of these impacts could take place after the end of the crediting period [CIEL, 317]

108. The responsibility and requirement for monitoring should be with the project proponent for a period of at least 100 years. [CMW, 360] [KITA, 347] [SCC, 356]

109. The timeframe of at minimum as 25 years based on a crediting period of 15 years as indicated previously by the SB and the Integrity Council for Voluntary Carbon Markets (ICVCM)'s guidance of a minimum 40 years. [PARIGI, 357]

110. Monitoring is required only during the crediting period, because in some cases, the maintenance of carbon stocks after the crediting period may be out of control for the project proponent. [NBS, 373], [REGREEN, 374]

111. A dynamic accounting system could be used in which all removal credits are continuously monitored until they are no longer being used for a climate mitigation claim. Nature-based removals should be required to continue to be monitored for reversal events as long as they are being used for a climate mitigation claim within a carbon credit framework, possibly at a reduced frequency (every 5 years) after the crediting period. [NB, 344]

112. The proponents should be required to monitor reversals for more than 1,000 years after the crediting period, because the credits were sold to offset emissions that will be in the atmosphere for at least that long. A 1,000-year monitoring period is, of course, infeasible and unenforceable. [SH, 346]

113. Minimum 15 years of monitoring post-crediting, provided by a public entity with an economic lifetime longer than the specific project or its developers. Longer timeframes where national regulations are lacking. [CFL, 365], [1.5,366]

114. The number of years during which reversals need to be addressed should be based on project type (i.e., depends on required permanence and the typical timescale that type of project is modelled on). Allowing the host Parties to define the timeframe should be avoided, as it would add an extra layer of complexity for buyers that try to compare projects in their sourcing processes. [SYLV, 367]

115. Monitoring requirements may be stopped if "all available evidence indicates that the stored CO2 will be completely and permanently contained" as it is stated in Article 18 in the EU Directive on the geological storage of carbon dioxide. [CARBFIX, 353] [CW, 358] [ISOMERIC, 352]

116. Monitoring should be required 15 years after the last active crediting period, or a timeframe specified by the host Party (e.g. communicated in LoA or earlier). [NEUST, 364] [CARBI, 376]

117. The approach has to be differentiated depending on the type of removal activity. … at the end of the Monitoring period, the acquirer of land-based credits must prolong the credits or acquire new credits if it wishes to maintain the climate position achieved based on the original purchase of the land-based credit. It follows that for land-based credits, the time-frame for addressing reversals is during the Monitoring period, as the CO2 should be considered released after that period. For permanent removals, the permanence is confirmed by the scientific consensus and the fact that the CO2 is sent permanently from the biosphere/atmosphere to the geosphere. Permanent removals should be monitored indefinitely. [SE, 345]

118. For storage in biological systems (e.g. forests, soils, aquatic ecosystems etc.), it could be minimum 30 years after the end of the last crediting and for geological storage, 20 years following CDM M&P. [PCR, 348]

119. All monitoring activities should ensure the continued existence and durability for a removal. Monitoring should continue until the reversal risk is eliminated or deemed negligible. [CCPLE+RECS, 354]

120. The EU CCS Directive provides a model for risk transferring for geologic storage after the close of the injection site "if and when all available evidence indicates that the stored CO2 will be completely and permanently contained." In addition to this, the handover of responsibility is to be accompanied by a financial contribution to cover the expected cost of monitoring for 30 years. For other forms of carbon storage, private insurance (e.g., for enhanced weathering, whose primary risk is that removals may occur slower than anticipated), or a [non-]governmental trust (e.g., for storage in biotic sinks that will require ongoing maintenance). [BF, 362]

121. The host parties should set their own timeframe specific to their own CDR methodologies. [CLLA, 375]

122. If the ITMOs are issued as permanent achievement, the DNA will be responsible for their replacement in case of intentional or unintentional reversal occur in the future. The arrangements for these replacements shall be set by the DNA and may involve the participation/co-responsibility by the project proponents, investors, or the depositary of the ITMOs after their issuance. Anyway, these arrangements will not be under the regulatory domains of the SB, and more at the A6.2 and NDC implementation processes. [CRCY, 350]

4.2. Reporting

4.2.1. SB 003 Recommendation extract

123. Activity participants shall prepare monitoring reports after monitoring operations and summarize the calculated amount of removals resulting from the monitoring.

124. Monitoring reports shall contain:

(a) A description of the monitoring operations and methods used, and the resulting calculated removals along with the associated uncertainties in the calculation;

(b) Field data, including remotely sensed data, or if the data set is too voluminous, a summary of the data and an indication of how the complete data set may be accessed;

(c) Records and logs of observed events that could potentially lead to the reversal of removals as well as a summary of any reversal notifications that were submitted during the monitoring period;

(d) Estimates of any reversals that occurred during each monitoring period;

(e) Information on how any reversals that occurred were addressed in accordance with requirements to be developed by the Supervisory Body;

(f) Information on how the environmental and social impacts were assessed and addressed by applying robust environmental and social safeguards, following provisions to be developed by the Supervisory Body;

(g) Information on how the activity involving removals is fostering sustainable development, following provisions to be developed by the Supervisory Body.

125. If the purpose of the monitoring is to ensure and demonstrate the continued existence of removals, simplified monitoring and reporting may be allowed, subject to provisions to be developed by the Supervisory Body.

126. Initial and subsequent monitoring shall be carried out, and the associated monitoring reports submitted, within maximum time frames to be specified by the Supervisory Body. Monitoring and reporting may also be required within a specified period of time following an observed event that could potentially lead to a reversal, in accordance with provisions to be developed by the Supervisory Body.

4.2.2. Key Issues

127. SB 004 had discussed the below:

128. Report preparation should summarize results of monitoring reversals.

129. Monitoring report contents should include: {inter alia: Sub-list from paragraph 3.2.12}

(a) Operations, methods, results;

(b) Data sets and summary data exceptions;

(c) Records and logs, including potential reversal events and notifications;

(d) Estimates of occurred reversal(s);

(e) How reversal(s) addressed;

(f) How environmental, social impacts assessed & safeguards applied, per provisions;

(g) How SD fostered, per provision.

130. Simplified monitoring for non-verification events per provisions.

131. Maximum timeframes TBD by 6.4SB Specified for, e.g.:

(a) Initial monitoring;

(b) Subsequent monitoring;

(c) Report submissions;

(d) If event observed that could potentially lead to a reversal {"may also be required"};

Specified timeframe(s):

(e) Maximum timeframe = X year(s);

(f) Minimum timeframe = X time(s) within each crediting period (SB 004 discussion).

4.2.3. New Proposals

132. A quarterly report covering all operational data may be published to ensure data transparency [MHS, 200]. Reporting should be done at least annually. [KITA, 262]

133. Simplified annual reporting could be applied for certain types of projects for which monitoring and reporting is more difficult, such as nature-based solutions, for the years which a full monitoring report is not made available. [KITA, 262]

134. Reversal events may be reported in two separate reports: an early incident report issued immediately following the event and a full investigation and corrective actions report within a month of the incident. [KITA, 262]

135. Technology-enabled continuous monitoring (i.e. digital MRV/ dMRV) to ensure that the real climate impact of removal activities (including temporary removals) is evaluated and tracked over time with high accuracy is recommended. For nature-based solutions (NbS) dMRV monitoring should be mandatory. For activity types not amenable to automatic monitoring, monitoring reports should be submitted on a schedule sufficient to capture variation in ecological dynamics and maintain overall integrity. The Supervisory Body may develop risk-based reporting protocols for removals with higher reversibility risk or low MRV certainty. [GRI/LSE, 275]

136. DMRV (Digital MRV) is a software solution or service capable of data collection, processing, analysis, or synthesis for any MRV application, including project development, validation, verification, and registration. DMRV platforms may use remote sensing techniques, machine learning or artificial intelligence algorithms, mobile device applications, smart sensors, and other digital technologies. [PACHA, 306]

137. Timeframes should be tailored to the category and type of removal activity taking into account country context such as lack of availability of land sector inventories. [CA, 312]

138. For land based activities and other project activities such as DACCS and BECCS, the first monitoring report should be within 5 years. For activities such as biochar and in some cases of CCUS (CCUS such as production of concrete using CO_2 could have sectoral scope of manufacturing industry and/or construction) it could be within 2-3 years of project registration. Subsequent monitoring - monitoring report ideally should be submitted at least once every 5 years. [SP, 313]

139. Monitoring report should be submitted within the first 2 to 5 years and at least once every 2 years there on. [NEUST, 364] [SYLV, 367] [CARBI, 376]

140. For projects that receive approval to issue credits multiple times in a single year, monitoring reports can be done annually to avoid undue administrative burden. [KITA, 347]

141. Monitoring report should be submitted annually or in sync with the issuance frequency. [CFL, 365], [1.5,366] [SE, 345]

142. The requirement of the timing of an initial report should depend on the relative volumes produced over time by that project type and the associated monitoring costs. [NB, 344]

143. Monitoring of ER reversals should occur on a daily or monthly, not annual basis, so as to quickly undo the damage caused to the atmosphere by such ER reversals. [CPOOL, 355]

144. The first monitoring report should be submitted within the first year of activity. Subsequent monitoring reports should be submitted annually. [PARIGI, 357]

145. Industrial CDR facilities should submit the first monitoring report in 5 years. Thereafter, submission could be made every 2 years [CW, 358]

146. The first monitoring report can be submitted between 5 and 10 years after the implementation of the activity. {Note: The interval of 10 years after implementation is reasonable for NBS removals and is a good timeframe to ARR project based on forest growth and the variability resulting from restoration method and ecosystem type. Before 10 years, the trees may be too small to be measured. The interval of 10 years for the next verification events is also reasonable since the stock change in a short time is difficult to measure due to the low growth rate of forests}. [NBS, 373], [REGREEN, 374]

147. Performance monitoring reports are submitted annually and carbon removal credits (Carbon Dioxide Removals Credits, CORCs) issued after the removal has occurred. [PURO, 378]

148. The frequency at which monitoring report should be submitted may be determined by the level of estimated reversal risk: every 2-3 years for activities with high reversal risk; every 5 years for those with no reversal risk. [CMW, 360]

149. Independent of the activity type, the monitoring report should be submitted before the end of the NDC implementation period in which the ERs covered by that monitoring report were achieved since all authorised A6.4ERs must be used within the same NDC implementation period as when the mitigation outcomes occurred. [CMW, 360]

150. Monitoring reports should be delivered for all projects within the first two years of activity implementation as risks are higher at initial implementation including that of reversals. The frequency of the subsequent monitoring reports should reflect the risks of reversal of CO2 storage. [DG, 361]

151. The initial monitoring report should be submitted within one year of implementation to provide proof of validity of the monitoring plan. The frequency of additional detailed monitoring reports may vary with the type of removal activity, with the primary variable being the fragility of the carbon sink. [BF, 362]

152. The appropriate interval at which monitoring reports should be submitted should be determined according to the types of removal activities, depending on the timeframe between activity implementation and significant removal generation as well as risks affecting project performance. [STX, 363]

153. Emerging technologies require close monitoring during and after activity implementation. Initially, while DAC processes evolve and accounting methodologies become established, reporting would take place frequently (for example, within two years of activity implementation and for at least biennially during the crediting period) and monitoring plans would be updated frequently during this time. [DACC, 369]

154. The timing of the submission of monitoring reports should be defined case-by-case, possibly set by the host country DNA. [CRCY, 350]

155. There should be no requirement for monitoring plan to be submitted at either a fixed point in time or at a fixed interval of time. Project validation ensures that the baseline is correct, and it is recorded. Monitoring should happen whenever it is convenient, cost-effective, and practical for the project proponents. The monitoring data, and their continuity and integrity, will be verified during the verification of the monitoring report whenever it is submitted. The relevant monitoring requirements would be specified in the methodology. [SCC, 356]

156. Credits are issued ex-post only, to ensure the integrity of climate impa ct. [SH, 346]

157. After the first report, a new monitoring report should be submitted at least once every five years. The exact time period should depend on the available technology to track statistically significant carbon fluxes specific to the activity. The time period required should be as short as possible. Again, removals should only be issued after each newly published monitoring report, to ensure only emissions removed and quantified are sold. [44M, 351]

158. Where possible, monitoring reports should be submitted earlier. Uncertainty discounting involves quantification of potential uncertainties in the net negativity and future leakages of a carbon removal approach and credits would be issued after discounting for this uncertainty. Such approach ensures that credits issued are a conservative estimate of the amount of carbon removed. [ISOMERIC, 352]

159. Activity-specific requirements need to be established that reflects the varying storage duration and risk of reversals of the different activity types. [NEP, 359]

160. Frameworks for monitoring and reporting should be activity specific, reflecting different storage timescales (permanence vs temporary) and reversal. [ZEP, 371]

161. Different types of removal activities using different sequestration mechanisms would require vastly different amount of monitoring requirement to achieve the same high confidence of sequestration. [PT, 372]

162. Reporting must be transparent with all reports made publicly available, at a minimum, on the Article 6.4 mechanism's website. Additionally, reports must be easily accessible, including, for example, that they should be readable on mobile devices as well as

computers, in multiple languages including in the languages of the area in which the project/activity is taking place, and easy to find. [CIEL, 317]

163. Reporting should be comprehensive. The default should be to be over-inclusive about the type of information included in reports. This is a non-comprehensive list of elements reports should include:…{a list is included}. [IEN, 337]

164. Projects to move to digital solutions for monitoring and reporting enabling real-time information and ask that the 6.4SB recommendations support this approach. [PURO, 322]

165. Technologies like blockchain should not be mandatory or preset. Rather a well-defined set of requirements for the technology to be used should be defined and the technology itself kept open. [ATMO, 336]

4.2.3.1. Simplified annual reporting

166. Simplified annual reporting should be required unless it can be demonstrated that the stored CO2 will be completely and permanently contained. [CARBFIX, 353] . [CFL, 365], [1.5, 366] [SH, 346] [PARIGI, 357] [BF, 362] . [NB, 344]

167. Simplified annual reporting must not replace detailed and regular monitoring reports verified by an independent third-party. [CMW, 360]

168. In cases where a project is submitting monitoring reports annually or biennially, simplified reporting would be redundant while if the monitoring reports are submitted every three to five years for a nature-based solution, submitting simplified reporting may be cumbersome (e.g., ARR). As dMRV become more readily available, simplified annual reporting may be feasible. [KITA, 347], [CFL, 365], [1.5, 366] [NEUST, 364] [SYLV, 367] [CARBI, 376] [PURO, 378] [STX, 363] [44M, 351] [SE, 345]

169. Continued storage of the removals should be verified periodically, not necessarily annually, until 100 years of storage is verified. Each methodology should specify the frequency at which this should be reported, and the conditions under which such period can be longer or shorter. [SCC, 356] [CRCY, 350]

4.2.3.2. Addressing the residual risk of reversals beyond the monitoring timeframe

170. As it may be difficult to place a 100-year obligation on the project developer (at least without the inclusion of insurance to manage situations of bankruptcy etc.) an independent and expert Reversal Commission should be created who can act as both investigators and as an ongoing buffer pool of the last resort. Contributions to the Reversal Commission should be funded as a levy on a carbon credit, with the levy rate adjusted based on the risk of reversal of the project type which the SB or Reversal Commission could revise annually as scientific understanding evolves. The objectives of a Reversal Commission are two folds: 1) to undergo the monitoring once the period past 25 years past the crediting period has ended; and 2) to compensate for the reversals using their own buffer stock of durable removals [PARIGI, 357]

171. To address the residual risk of reversals beyond the monitoring timeframe, a “post-project monitoring period” could be established that commence at the end of the final crediting period and be performed on an annual basis for a time period determined by the risk of non-permanence or substituted with appropriate domestic regulatory monitoring arrangements. For example, projects with geological storage subject to robust regulatory

requirements for monitoring of said storage should have either a de minimis or no post project monitoring period at all within the context of the 6.4 mechanism. However, projects utilising less durable storage should be subject to a longer post-project monitoring period, with more detailed reporting requirements. [DG, 361]

172. By requiring reversal notification reports and simplified reporting beyond the crediting period the risk of not accounting for occurred reversals is already greatly mitigated until the end of the monitoring timeframe. The cancellation of the ERs deposited in the buffer pool should then be sufficient to address the residual risk of reversals beyond the monitoring timeframe. [STX, 363]

173. The monitoring period could be extended with a procedure similar to the monitoring, i.e. activity proponent monitors reversals, VVBs are responsible for approving monitoring (see also [their response to] paragraph 8 [of the Questions). [SYLV, 367]

174. To prevent the residual risk of reversals, the project proponents may monitor the permanence of the carbon stocks using remote sensing and/or secondary data for a period of 10 years for NBS removals. This could be demonstrated through a simplified verification by an accredited third party in the 5th and 10th years after the monitoring timeframe. [NBS, 373], [REGREEN, 374]

175. Residual Risk of Reversals should apply for only 5 years. Oversight by two post-reversals-period audits after the return period, one in year 2 and one in year 5. [CARBI, 376]

176. A performance-based monitoring timeframe could be enacted a priori and whether a burden of monitoring for project developers can be eased, can be considered if another entity is willing to take on a “highly limited” possibility of reversals. This logic is enshrined within the European CCS Directive, where a project operator can apply to transfer the liability towards national entities. Such entities will be held responsible for further losses, in case they accept to incorporate said activity towards its accounts in the first place [CW , 358]

177. Such requirements should be made activity specific depending on the removal process and timeframe. For example, mineralization does not need additional measures while geological storage, the host party could specify it. [NEUST, 364]

178. Post-closure requirements to address the risk of reversal is methodology specific. For example, with geological storage this covered by legislation in some regions. [PURO, 378]

179. Such responsibility could be taken up by a government or other body (similar to a decommissioning fund) once the project stops generating credits. Such fund can be used to safely maintain the project in the long term with long term MRV plans operationalized of its own in place. [KITA, 347]

180. For continued monitoring in perpetuity, the change of entity needs only happen when an entity no longer can function or goes bankrupt. The responsibility of ‘oversight’ should always rest with the SB. The responsibility for enforcement of liability in the event of not receiving the required monitoring report should rest either with the host Party or with the Party acquiring and retiring the credits. [SCC, 356]

181. Two possible solutions to resource the monitoring efforts in the long run: i) introduction of a top-off fee at issuance that goes to the host Party, and serves to cover the costs of future monitoring and compensation, amount to be set depending on the level of reversal risk of

the activity; ii) the UNFCCC secretariat to support the Parties in monitoring for reversals following the end of the monitoring period of a project. The Secretariat could establish and manage a long-term monitoring system operating on satellite imagery (and/or other methods depending on activity type), funded through a share of proceeds levied on the issuance of credits that involve carbon storage, which could be tied to the expected durability / risk rating of an activity. [CMW, 360]

182. Liability should follow the beneficiary, and/or the party best placed to manage reversal risks, with appropriate arrangements and safeguards for the long-term (i.e. potentially indefinite) nature of the obligations. [NZ, 342]

183. Instead of withholding a "pool" of removals from being sold, buyers should buy enough removals to build their own buffer, depending on how heavily they depend on the removals to reach their climate goals. [44M, 351]

184. If the ITMOs are issued without an expiration date and without any limitation as to what is the final uses they may have, there will be a need to the host country to report in the national inventory at any time in the future the reversals, if and whenever it takes place. [CRCY, 350]

4.3. Accounting for removals

4.3.1. SB 003 Recommendation extract

185. Removals to be credited shall be those in excess of the baseline while deducting any activity and leakage emissions.

186. Any carbon pools and greenhouse gases may be optionally excluded from accounting if such exclusion results in a more conservative calculation of net removals.

187. If an activity involving removals also results in emission reductions, relevant guidance shall be applied through a relevant methodology or a combination of methodologies applicable to the activity in accordance with the provisions to be developed by the Supervisory Body.

4.3.2. Key Issues

188. SB 004 discussed that following issues should be considered:

(a) Credited removals exceed baseline while deducting for emissions and leakage;

(b) Exclusion of pools if results in more conservative calculation of net removals;

(c) Activities also involving reductions: Guidance applied via methodology(ies) per provisions.

4.3.3. New Proposals

189. The core elements to consider when accounting for carbon removals include how its permanence can be ensured, potential leakage risks to consider and the need for re-evaluation of the baseline over time. These elements differ across removal activity categories due to, for example, the specifics of the conditions of carbon removal and its permanence as well as leakage risks. [STX, 282]

190. Accounting will need to include Lifecycle emissions and their scope for each project activity to be accounted and Paris aligned baselines as per RMP paras 33 and 36. [CA, 312]

191. The 6.4 Supervisory Body will need to ensure that any baseline approaches for the land sector, that are based on actual or historical emissions, are adjusted downwards to ensure alignment with paragraph 33, which requires alignment to the long-term goals of the Paris Agreement. The guidelines should indicate how these elements are to be assessed, including rules for accounting across multiple sectors and for different feedstocks. [CA, 312]

192. Specific criteria for determining the baseline of forestry projects must be defined, as the general baseline criteria defined under the guidance for article 6, paragraph 4 do not apply to the forestry context. In the modalities and procedures approved at COP26 (Decision 3/CMA3), the definition of the baseline, contained in paragraph 36 of the referred decision, contemplates alternatives that do not seem fit for the purpose at hand, with the possible exception of the “historical approach (c). [ABU, 60]

193. While most standards guarantee a permanence in the credit for 100 years, periods of "at least several centuries" may be considered in in line with the recommendations of the European Union rather than an arbitrary period of 1000 years. [NC, 206]

194. Where it is relevant, mechanism methodologies should differentiate between reductions and removals in the equations included. In case of BECCS only fraction of biomass that is demonstrated to be sustainable biomass is eligible as removals. [SP, 313]

195. A6.4 registry may provide an optional label for A6.4ERs that are classified as removals, calling them as A6.4 CDR/A6.4 RR. [SP, 313]

196. We suggest that surrender of 6.4ERs equal to the amount of reversals is a good model, for both landbased and engineering-based removals, please refer to CCS CDM M&Ps in Decision 10/CMP.7. [IEAGHG, 267]

197. The accounting framework should prioritise measures that address reversals on a tonne-for-tonne basis rather than a tonne-year basis. This recognizes the importance of ensuring that the carbon benefit generated by the removal activity is permanent. [CG, 269]

198. Aligning baselines across scales, from projects to the jurisdictional (i.e., national, state, or provincial) level, is critical for upholding environmental integrity in crediting. [EDF, 331]

199. Accounting for removals should effectively involve a whole life cycle analysis (source to sink) and should include greenhouse gas release or lost carbon sequestration services associated with environmental impacts. [DOSI, 332]

200. For engineered removals such as CCS - DACCS, BECCS, CCUS, there could be projects that involve multiple sources of CO2. Removals, in this case could be based on the source of CO2 (or percentage). E.g., in case of CCS in Waste of Energy plants, a fraction of waste would be biogenic in nature, in such scenarios guidance at methodology levels would be required to differentiate between reductions [PDF, 321]

201. Removals and reductions are two different currencies as are ex-ante and ex-post carbon credits. We ask that A6.4 credits are either reductions or removals and not a mixture. [PURO, 322]

4.4. Crediting period

4.4.1. SB 003 Recommendation extract

202. At renewal of crediting period, activities involving removals shall apply the latest version of the applicable methodology.

4.4.2. Key Issues

203. Crediting period—Apply latest applicable version of methodology(ies) (SB 004 discussion).

4.4.3. New Proposals

204. The length of the crediting period should be project type specific. When using historical baselines, the time between historical baselines and the start of the crediting period should be minimal. [SYRA, 305]

205. The crediting period should reflect the duration of a carbon removal activity (i.e. how long the CO_2 will remain sequestered). For permanent removal, this period should last forever, once permanent carbon removal has been demonstrated and verified. For temporary or reversible sequestration, the crediting period would need to be renewed periodically in line with monitoring data confirming the CO_2 was still sequestered. [44.01, 248]

206. The monitoring period should exceed the crediting period to avoid non-permanent activities. The monitoring period should determine whether reversals were detected and can, thus, be addressed. [CCSI, 233]

207. At renewal of crediting period, activities involving removals shall apply the latest version of the applicable methodology. New versions of methodologies should highlight and explain any changes from previous versions of applicable methodologies to provide visibility for all stakeholders, implications for monitoring and measurement, and how the project is adapting to respond to real-world learnings. [SE, 244]

208. For long-term CDR in managed forest, each pool (forest growth, forestry operations, industrial wood, construction timber, biochar production and soil stocking) should have its own crediting period. [RBI, 204]

209. Eligible removals issued under an applicable methodology should represent the best available science at that time. However removal activities that have been “issued” are not required to retroactively update methodology. [RT,288]

210. The crediting period will be perpetual. Credits are issued when there is a physical removal from the atmosphere and not before. The monitoring will need to continue in perpetuity, credits need to be monitored in perpetuity to remain valid because they need to be permanent. [BF, 252]

211. A renewable crediting period of 15 years may be used. [DG, 271]

212. Crediting period [should be] as defined in the RMPs which is twice renewable crediting period of 15 years which could help access to project finance for durable carbon removals. [PURO, 322]

213. The crediting period should be based upon the removal activity (category - land based/ engineered) and also specific project activity (e.g., biochar or DACCS). [PDF, 321]

4.5. Addressing reversals

4.5.1. SB 003 Recommendation extract

214. Activity participants shall minimize the risk of non-permanence of removals over multiple nationally determined contribution implementation periods and, where reversals occur, ensure that these are addressed in full, following requirements to be developed by the Supervisory Body.

4.5.2. Key Issues

215. Reversals—Minimize risk over multiple NDC periods and address in full per provisions Accounting for permanence:

(a) Permanence period:

(i) Duration: [<40] [40] [50] [60] [100] [>100] years;

(ii) General period applies to all removals activities;

(iii) Activity type-specific durations;

(b) Accounting and crediting approach.

216. Credits issued for removals achieved and verified since the previous verification per general guidance for accounting for removals:

(a) And discounting for crediting period shorter than permanence period;

(b) No discounting.

217. Measures to address reversals

(a) Permanence buffer

(i) Allocation of buffer credits: based on:

a. Activity risk rating {if yes: procedures, template for up-front risk assessment; whether ex ante rating is fixed or periodically reassessed + updated; whether rate calculation takes account of permanence period discount—option above}

b. Default rate applicable to all activities {if yes: determine default %}

(b) Buffer design:

(i) Activity-specific buffer;

(ii) Buffer pools contributions from all removals activities;

(iii) Option to (instead/also) purchase, contribute credits from other activities.

218. Reversal compensation and buffer management procedures:

(a) For intentional vs unintentional reversals;

(b) If activity's buffer cancellations exceed contributions;

(c) For replenishment;

(d) For un-tapped buffer credits {Return to proponent? Cancel?};

(e) Commercial insurance {standalone option or to complement buffer; if yes, needs procedures for insurers: standard for + accreditation by SB, and for guarantee statements}**;**

(f) Direct replacement guarantee {standalone option or to complement buffer; if yes, needs procedures for guarantor: standard for + accreditation by SB, and for guarantee statements};

(g) None—covered by issuance deductions based on permanence and crediting period {extended application of accounting and crediting discount option, above} (SB 004 discussion).

4.5.3. New Proposals

4.5.3.1. Permanence period

219. A permanence period of 50 years should be applied. [GCC, 4]

220. Credible standards require projects and programs to report on reversals. At least one carbon standard (Verra) is developing a long-term monitoring system to detect reversals for 50 to 100 years after the carbon project/program has ceased to operate, and to compensate the atmosphere accordingly. [EDF, 80]

221. We agree that it will be important to specify a minimum duration of storage; we typically have seen 100 years as achieving this goal rather than 200 to 300 years, but support any of them. [BCG, 190]

222. While national governments must ultimately decide for how long they can impose an enforceable obligation on activity proponents to fully compensate for reversals, we would urge the adoption of longer time frames, e.g. 100 years after the year when the emission reductions or removals occurred. This is because, from a private investment perspective, an obligation to compensate for reversals for 100 years approximates an indefinite commitment. [OI, 285]

223. Carbon dioxide must be sequestered durably for at least 100 years (noting that sequestration in long-lived products is acceptable, and reversals within 100 years must be estimated and accounted for. [XPZ, 249]

224. Noting the adherence to GWP at a 100-year timescale, we believe that minimum storage duration should not be 200 to 300 years, but rather 100 years. [ECP, 27]

225. The four options presented for permanence (40, 50, 60 or 100 years) are all far too short. A minimal climate-relevant timescale for storage from permanent CDR is at least two to three centuries. [CMW, 78]

4.5.3.2. Reversal risk assessment

226. The risks of reversals may be:

(a) "Natural, unintentional" due to natural occurrences or disturbances such as forest fires or weather events that could potentially release stored carbon back into the atmosphere; or

(b) "Natural, intentional" due to human actions that intentionally interfere with natural carbon removal methods, such as deforestation or land-use changes; or

(c) "Unnatural, unintentional" due to a technological failure or accident that leads to unintentional carbon release; or

(d) "Unnatural, intentional" due to deliberate human actions, like the misuse of removed carbon, for instance, using carbon captured for long-term storage as a fuel source.

227. Activity participants shall show that the above risks have been minimised (e.g. by diversifying removal methods, promoting ecosystem resilience through adaptive management, and ensuring that removal projects are strategically located to minimise exposure to these disturbances, maintaining rigorous safety protocols, regular equipment checks, and backup systems in engineered removal facilities, guidelines on acceptable uses of captured carbon have been established and regularly audited. [CCAP, 246]

228. Treatment of uncancelled buffer ERs, including after the end of the last crediting period of the contributing activity should be made refundable to award project proponents and incentivize safe operations. [CWORKS, 302]

229. Risks of reversals can be minimised through contractual permanence measures such as:

(a) Commitment periods for projects in human relevant timeframes;

(b) Combination of modelling and field testing. [BEZERO, 304]

230. Carbon stored in biospheric reservoirs as a result of either CO_2 emission reductions (e.g. avoiding emissions from forests or soils) or removals (e.g. absorbing CO_2 in newly planted forests or restored soils) should either be maintained indefinitely or, at some later point in time, substituted with permanent mitigation (e.g. in the form of fossil fuel emission reductions or removals with permanent geological storage). Ultimately, national governments shall bear responsibility for addressing reversals and ensuring permanence such that the costs governments bear in maintaining permanence are internalized by market actors. This requires devolving responsibility for addressing reversals to market actors in ways that are robust and enforceable over (very) long time periods, and/or require market actors to replace temporary carbon storage with permanent mitigation in a timely manner. [OI, 285]

231. For long-term CDR in managed forest, timeframe for addressing reversals should apply for each pool (forest growth, forestry operations, industrial wood, construction timber, biochar production and soil stocking) and attached to the crediting and monitoring period. To avoid loss the discount of credits should be at least equal to the variation coefficient, or estimated error. [RBI, 204]

232. Durably storing means, all available evidence, such as data, analysis and history matching, indicates that the injected carbon dioxide will be completely and permanently stored such that, under the proposed or actual conditions of use, no significant risk of seepage or risk to human health or the environment exists. [CW, 31]

233. The European Commission proposal for a Regulation establishing a Union certification framework for carbon removals defines “permanent carbon storage” as “a carbon removal activity that, under normal circumstances and using appropriate management practices, stores atmospheric or biogenic carbon for several centuries, including bioenergy with carbon capture and storage and direct air carbon capture and storage”. [ZEP, 263]

234. The EU’s carbon removal certification framework lists two principles for permanence: certainty in quantification and corresponding liability regime/ insurance mechanism to address reversal. [CCE, 218]

235. Taking into account existing regulations (e.g. CCS Directive (EEA) and the 2010 CO_2 Storage Regulations (UK)), activity participants should be required to have an approved corrective measures plan to be implemented in case of leakages, surrendering emission allowances equivalent to leaked emissions. Liability frameworks for other types of carbon removal activities shall be comparable to one in place for geological storage.Activity participants shall remain liable for leakages for the minimum period of 20 years, after which the responsibilities of monitoring and corrective measures are transferred to the national authorities. [ZEP, 263]

236. In the event of a reversal, the following aspects need to be addressed:

    (a) Audit and Verification: Post-reversal, an exhaustive audit and verification process including assessing the reasons behind the reversal and scrutinizing potential risks associated with the CDR technology in use, taking into account factors such as the type and context of utilization shall be done;

    (b) Adjustment of Risk Mitigation Measures: Mitigation strategies may need to be re-evaluated and adapted as needed to prevent further reversals. Depending on the specific CDR method, this might involve improving control measures, storage conditions, or handling procedures to ensure compliance with prescribed methodologies;

    (c) Re-Education and Training: Education and training programs should be revisited to help personnel better understand the reasons behind the reversal and to prevent similar future instances. This could be particularly necessary if the reversal was due to improper handling or usage of the technology;

    (d) Regulation Compliance: The project's adherence to local and international regulations shall be reassessed;

    (e) Stakeholder Engagement: Stakeholders need to be informed about the reasons behind the reversal, the corrective measures taken, and the strategies put in place to avoid similar incidents in the future;

    (f) Project Continuity and Financial Stability should be assessed to ensure its continuity Repeated Reversals if the project experiences multiple instances of carbon reversal, it may indicate fundamental issues with the technology or its implementation; [CCAP, 246]

237. In the event of a physical reversal, the credit should become void and need to be remediated or replaced by a new credit. Liability mechanisms can ensure removal permanence via the obligation to perpetually monitor and manage high-risk carbon sinks and rectify any reversals should they occur. [CG, 269]

238. Risk buffers are important as a hedge against uncertainty, but they should not be used to justify considering the remaining credits which are not assigned to the buffer pool to be "permanent". Buffer pools are an effective tool for the party liable in the event of a reversal to self-insure, but ultimately all reversals need to be remediated with replacement removal and storage. Where buffer pools are established, this should be on an ex-post basis, focusing on monitoring stored carbon rather than predicting reversals. An insurance policy could be used where monitoring takes place to ensure that carbon remains stored, such as on an annual basis. Moreover, in order to ensure that insurance policies meet climate needs, replacement removal activities must take place where a reversal has occurred, rather than a financial replacement. [CG, 269]

239. Removal of methane or other more powerful climate forcing agents, either near source or ambient, as a back-up for CO_2 removal reversals and performance bonds that can be liquidated to pay for that service may be specified. [JMF, 270]

240. The use of buffers is not a requirement for projects with geological storage because of the negligible risk of reversal. [DG, 271]

241. Activity proponents should consider, measure, and address all risk categories of non-permanence, including internal risk (i.e. project risk such as management or financial risk), external risk (e.g. political risk) and natural risks (fires, pests, droughts, etc.). Quantification of those risks should be based on the latest available. [CMW, 308]

242. Risks of reversals differ for different types of mitigation activities and best practices include:

    (a) The risk assessment should follow a pre-defined methodology, taking into account the likelihood and significance of risks of reversals, the measures taken by project owners to manage these risks and their capacity to do so;

    (b) The application of the risk assessment should be validated by a designated operational entity;

    (c) The risk assessment should be used to exclude from eligibility projects with a significant unaddressed reversal risk;

    (d) The mitigation activity proponents should be required to update the risk assessment in case of reversals;

    (e) The mitigation activity proponents should be required to have legal titles to the land and/or relevant carbon reservoirs on the land (e.g. timber rights), or legally binding agreements should require the mitigation activity proponent's consent to undertake any measures that may lead to intentional reversals. [OI,285].

243. The Supervisory Body may require the use of legal covenants or agreements (e.g. conservation easements, trusteeships) that restrict or prevent land management practices that would result in reversals (whether by the mitigation activity proponent or other parties), or the Supervisory Body may establish provisions that the existence of these measures leads to a lower specific risk assessment. [OI,285].

244. While national governments may impose an enforceable obligation on activity proponents to fully compensate for reversals adoption of longer time frames, e.g. 100 years after the year when the emission reductions or removals occurred is recommended as shorter time horizons are more likely to result in inefficient pricing. [OI, 285]

245. Note that multiple regulatory carbon crediting programs in Canada, the United States, and Australia have adopted a requirement (or option, in the case of Australia) for 100-year carbon storage commitments. This timeframe constitutes the current best practice among existing carbon crediting programs. [OI, 285]

246. The appropriate timeframe, risks and how to address them depend on the technology. In the case of timber construction, it is a project completed after 1 to 5 years that creates a one-time storage and should be handled with a non-permanence risk buffer or emission reduction offset. Potential risks include non-completion of the project demolition of the building within 100 years from construction without reuse of materials and natural disasters. Furthermore, the regions, locations, and legal conditions have to be considered in the permanence analysis. [TFI, 214]

247. Where the risk of reversal is high, a payment should be made annually in tonne-year currency as long as no reversal occurs. [REW, 219]

248. The informative note circulated by the SB presents good examples of how to reconcile the need to stimulate removals with the principle of environmental integrity, especially through equivalence methods based on temporal criteria, discount rates and the factor of atmospheric CO2 decay, according to IPCC references. [ABU, 60]

249. Tonne-year approach relates the benefit of removals directly to the effect on temperature, which is fundamental in the context of climate change. It will be important to clarify, at the project level, how the application of conversion factors will work (temperature effect and discount rate at economic level)

250. Tonne-based approach requires the use of additional mechanisms to be discussed and agreed in order to guarantee permanence. It tends to have higher transaction costs, due to the need to ensure adequate treatment of the risk of non-permanence, but it can allow for greater leverage of projects. Among the three approaches, it is the most complex, but it can also be useful, provided adjustments are made. [ABU, 60]

251. Some reversals are avoidable (e.g. land being converted for other uses, or being over-harvested), while others are beyond human control (e.g. natural disasters and changing climates) and should be minimised. Risk assessment should be conducted at the activity-level because reversal risks are very dependent on the project type, the location and other activity-specific features. It should be conducted by the project proponent during the registration of the project and reviewed by a third-party entity with a confirmed knowledge of the subject and re-confirmed/reviewed by a third party in each verification report published after each monitoring report released by the project proponent. [SYRA, 305]

252. Assessments should be specific to activities rather than a sectoral or broad categorical assessment of risk. A host country should be informed of the amount of credits that have been transferred and the risk profile associated with that quantity of credits. Insurance, diversification, and other risk management measures should be applied by host countries. Assessment should be conducted by qualified experts in the activity to assess risk, with protections in place to avoid conflicts of interest. Once quantified, these risks should be

assessed through actuarial techniques, and the management of risks should be addressed through the range of available risk management approaches. [CI, 307]

253. The level of risks of reversals assessment should be activity-specific. The identification of risks should take place prior to certification/accreditation and be updated regularly. Activity proponents should be responsible for risk assessment, subject to the approval of competent authorities. In the event of reversal, ER credits must be cancelled, up to the amount of the net reversal, and the necessary adjustments must be made in national registries. [ZEP, 263]

254. All types of risks or reversals can be identified, assessed, and minimized via insurance products, for which risk assessments should be done at the activity level and at least annually. Completion of the risk assessment(s) is the responsibility of the insurer. [KITA, 262]

255. General risk factors include financial failure, technical failure, management failure, rising land opportunity costs, regulatory and social instability, and natural disturbances. Project-specific risk factors vary by project type. [ASPI, 330]

256. Risk assessments must be conducted in advance of the project's registration and be included in the PDD and the Monitoring Plan. The risk analysis should be revisited at regular intervals (5 years) except in the case of a reversal event in which case the risk category and Minimum Buffer Contribution shall be immediately re-assessed and re-verified. [ASPI, 330]

257. The activity proponent is responsible for carrying out the risk assessment and a VVB must assess whether it has been conducted correctly. [ASPI, 330]

258. During the project design process, project developers and technical consultants evaluate the different risks the project faces throughout its lifetime. These risks can include natural risks, financial risks, socio-political risks, and other external risks. Once these risks are identified, the project will design and implement mitigation measures to minimize the potential impacts of these risks. For nature-based carbon sequestration projects, these risks inform a calculated risk profile for the project and assign a percentage of credits to go to the buffer pool maintained by the carbon standard (i.e. carbon credit issuer/registry). If there is damage to the project, the standard can use the credits in the buffer pool to make up for the difference. We'll then work with the project partner to determine the appropriate steps to take to restore the project or identify mitigation mechanisms for any future risks . [ASPI, 330]

259. Method used to quantify a risk adjustment in the number of credits issued from a project should be specific to the type of project activity. [ISOMERIC, 352] [SYLV, 367]

260. An activity level risk assessment should be done based on both the durability of the removals and the risk of reversal associated with the particular activity. [CARBFIX, 353] [DG, 361] [KITA, 347] [NEUST, 364] [STX, 363] [NBs, 373], [REGREEN, 374] [PURO, 378]

261. Risk calculation can reasonably include standardized formulas and ranges based on the identified risk profile of the individual project for a given removal activity type. [BF, 362]

262. A standard risk rating would be appropriate for removal types that have similar risks of reversal and are not affected by unique geographic or socioeconomic circumstances, for

example, direct air capture sequestered into concrete. For activities that have specific geographic or socioeconomic circumstances that could cause reversal, unique to each project, the buffer contributions should be dependent on the individual activities risk assessment, for example, reforestation activities. [NB, 344] [44M, 351]

263. "11 (b) A standard rate determined by the 6.4SB" is the fastest way to agree in the current situation. [NFS, 377]

264. Risk rating should start from a default risk depending upon activity type/ category/ sector, then be adjusted upwards or downwards for depending upon the specific circumstances of the activity. Each methodology should provide for the method of calculating activity-specific adjustment, whereas a global default risk rating for different types of activity can be pre-determined by the SB. [SCC, 356] [CCPLE+RECS, 354] [CMW, 360]

265. A minimum standard rate should be set for each activity type that can be revised and adjusted as needed. Based on an individual's activity's risk assessment, project developers can be encouraged to top up the buffer pool as necessary, and as well as an incentive to induce more purchasers. [PARIGI, 357]

266. These should be rated by a regulatory body established to review and acknowledge recognized risk raters analogous to the OCR recognized credit raters found in the US. https://www.investopedia.com/terms/b/bondrating-agencies.asp These rating agencies use agreed statistical approaches to risk yet have the latitude to interpret data within some qualitative bounds. This allows for innovation and divergence of opinion while limiting ratings to "recognized authorities". [CFL, 365], [1.5,366]

267. Risk of a certain rating can be made risk equivalent using insurance products, back stops or other mechanism for fungible equivalence to the compliance delivery standard that may be proscribed. Fungible equivalence means environmental effect in GWP year terms that is equivalent on a duration of effect, likelihood of outcome and impact expected. [CFL, 365], [1.5,366]

268. Best practice should be used whenever possible.. [CFL, 365], [1.5,366]

269. the 6.4 SB should develop a standard base rate for risk calculations that could present a smaller threshold for evaluating risk of reversal . [CLLA, 375]

270. [Across all three solutions and buffer pools in general, there is no principal agent that must bear the risk of miscalculation creating an inherent conflict of interest that jeopardizes the climate integrity of any credit issued under a buffer pool schema. This cannot be addressed by buffer pools. [SH, 346]

271. A standard assessment does not sufficiently address the probability of the risk occurring (e.g., of natural disasters and technology breakdowns), its variability due to the differences in geographies, project types and the changing nature of risk (for example, due to impacts of climate change over time). Critically, standardized rates for buffer pool contributions are often set arbitrarily (e.g., 10% buffer), creating unintended arbitrage opportunities and distorting incentives, as the riskiest project buffer pool contribution is the same as the most prudent project's buffer pool contribution. [CPOOL, 355]

272. For permanent storage, buffer contributions should reflect the project specific risk profile. This contribution should also take into account of existing regulations in the host country, For example, in Europe, a geological storage operator is regulated by the EU ETS and

legally required to compensate for reversals via the purchasing of European Union allowances (EUA). Mandating additional buffer contributions will result in double coverage of the same risk and thus additional financial burdens to advance mitigation activities. [CW, 358]

273. No buffer should be instituted for permanent geological removals where the storage site is constructed, operated and monitored in accordance with the most stringent rules, such as the EU 2009/31/EC directive on the geological storage of carbon dioxide, the UK's storage of carbon dioxide regulations and the US EPA's Class VI rules. [SE, 345]

274. The term "buffer" does not necessarily need to be applied to removal activities as there are other risk management tools, such as insurance, that could replace and/or work in collaboration with buffer entities. [KITA, 347], [CFL, 365], [1.5,366]

275. Buffer contributions should not apply to all kinds of removals activities. In the case of removals involving geological storage, the risk of reversal is negligible. If the likelihood of reversal in a project is extremely low, any buffer contributions beyond the degree of real risk may act as a barrier to deployment, particularly for capital intensive projects. A more proportionate tool would be to rely on the existing regulatory framework within the host country, assessing whether it provides appropriate monitoring requirements, incentives to maintain storage and remediation mechanisms, to avoid duplication. [DG, 361]

276. DAC, which is an engineered and industrial approach to removals, has minimal to no risk of reversals, even at this early stage of development. Buffer pools for DAC significantly increases capital requirements by requiring DAC operators to hold credits in reserve, it will hinder the growth of the DAC industry as a whole. Given the minimal risk of reversal, DAC removals should require lower or no risk buffers. [DACC, 369]

277. Guidance should not be overly prescriptive with rules around long-term prohibition on and use change and/or intentional reversals (e.g. by deforestation of plantation forests). Landowners or project proponents who wish to reverse removals for which credits have been issued should be able to do so, provided they surrender credits equal to the volume of any resulting reversal (plus additional penalties in some cases). [NZ, 342]

278. potential benefits of insurance including the following:

    (a) efficiencies of scale around risk modelling, data analysis and MRV;

    (b) increased liquidity by enabling additional management of risk-assessed buffer contributions;

    (c) third-party assessment of fungibility between credits; and

    (d) a financial backstop, enabling resilience in the face of outlier loss and protecting against default. [KITA, 347]

279. Any reversal taking place in the future will be acknowledged by the host country inventory as emissions and will need to be covered in the NDC implementation process and the host country progressive contribution to the global stock take. [CRCY, 350]

4.5.3.3. Updating reversal risk assessment

280. A periodic review and possible update of activity baselines and monitoring plans every 5 years should be undertakene. Risk assessments would not need to be updated as the

buffer contribution will have already been set and financial transactions completed based on the original buffer pool estimate. A risk assessment would only inform of the likelihood of a reversal and possible mitigation options, but it should not change the crediting yields of the project itself at this stage. Once the initial buffer contribution is determined and credits are pre-sold or used as collateral in a financial transaction, any adjustments of the buffer contribution, regardless of how risks change, could violate the original contracts. [NB, 344]

281. Events that might trigger such circumstances include: (i) reversals, (ii) the advent of new monitoring technology (e.g., availability of higher resolution satellite data in the forestry context), (iii) regular reassessment of any buffer pool's sizing versus its potential liability and retirement rate, (iv) change in geopolitical circumstances. There is an inherent risk in ex-ante credit issuance; there are many risks that may affect the project's ability to deliver the purported impact that are unforeseeable at the outset of the project, when the buffer pool is sized. Issuing credits prior to delivery of the impact unnecessarily creates a liability that must be borne by someone. [SH, 346]

282. Following options to be implemented alone or in combination.

    (a) A fixed schedule of reporting linked to the methodology / lifecycle with mandatory quantitative and qualitative data verified by a third party.

    (b) Dynamic reporting linked to a risk metric or loss above a threshold that has a mandatory reporting period.

    (c) The project publishes sufficient details on the activity (project areas, planned activity, loss locations etc.) such that third parties can offer digital MRV services that can be paid for by buyers or later made public. [KITA, 347]

283. Baselines may be updated in case of new policies altering the overall economic emissions trajectory, including, for example, of grid emission factors. Risk assessment and rating may be reviewed in case of occurrence of extreme events or alteration in key risk factors (see [the response to] paragraph11 [of the Questions]). [PCR, 348]

284. Activity baseline should be updated according to the general methodological principles/requirements. Risk assessment update should be required whenever relevant new information comes to light or when a reversal happens that is larger than or different from what was already foreseen in original risk assessment. [SCC, 356]

285. Monitoring plan update should be required when new risk factor comes to light that is not already included in monitoring plan, or when a verification event reveals a need for revision of monitoring plan. Voluntary update of the monitoring plan should also be allowed whenever a new opportunity/ cause has arisen such that the project proponents wish to leverage for lowering cost of monitoring or doing more effective monitoring. [SCC, 356]

286. Risk ratings/categories should be reassessed based on each new monitoring report. When removals are issued consecutively after each monitoring report the number of reversals issued should reflect the most recent assessment of reversal risks. Risk ratings should not be allowed to fluctuate beyond a certain threshold to ensure activity proponents can reliably forecast potential income through the activity and hence whether it will be financially feasible. [44M, 351]

287. Baseline updating for certain activity types should be tied to the size of the removal industry itself and conducted periodically. For example, if the SB will be considering the counterfactual usage of certain biomass feedstocks there should be a periodic re-evaluation of how certain feedstocks are used. This becomes particularly important if the carbon removal industry will create a new revenue stream for certain types of feedstocks which could lead to direct or indirect land use effects. [ISOMERIC, 352]

288. Certain activity types (e.g. BiCRS) should be required to undergo periodic re-evaluation of potential market drive leakages being brought about through the introduction of new revenue streams from carbon removal activities. These re-evaluations should ideally be geographically scoped and become more pressing the larger the overall market is. [ISOMERIC, 352]

289. For permanent removals, in case reversals are identified, there should be a review of the storage project and its monitoring. This is already covered by the existing laws and rules and no extra rules should be created that would duplicate them. [SE, 345]

290. For (a) Verified reversals of removals, annual reporting should be the norm, and enable it to feed through to published risk ratings enabling purchaser information . For (b) at minimum renewal of the crediting cycle should be a milestone to reassess all documents. The 6.4 SB should retain the right to 'call-in' a project type or category for assessment before this, should best practice shift to avoid unnecessary lock-in of harmful project types. [PARIGI, 357]

291. Methodologies and project monitoring plans should be periodically reviewed to ensure alignment with the latest scientific findings. Verified reversals of removals shall trigger an overall re-assessment of the project to demonstrate: i) how the project can continue to operate without facing similar reversal events; ii) how the project has addressed reversals in full; iii) how the project has incorporated future risks. For geological sequestration, updates should be made in each of the following project phases: pre injection, during the crediting period/injection, post closure requirements. [CW, 358]

292. The review should occur on a regular basis, regardless of specific triggers or milestones to ensure that the process is consistent across activities and that an activity with a longer crediting period (i.e., fewer milestones) does not result in less frequent review. Complementary to the regular periodic review, [CMW, 360] lists specific triggers and milestones that could give rise to additional review:

293. region-, country- and/or activity- specific circumstances, such as natural disaster for example: unprecedented drought, intense rainfall and heightened probability of landslides; invasive species or diseases or other risks are newly introduced; increase in seismic activities.

294. Publication of relevant studies (e.g. in scientific journals) that project an increase in a given risk or that indicate a risk has previously been underestimated.

295. A reversal event should require an update of risk assessment. [CMW, 360]

296. Risk assessments and monitoring plans should be reviewed and updated after any extreme weather event, such as fire activity, drought, typhoon, regardless of whether that event could reasonably be expected for the region, e.g., due to climate change, or outbreak of disease. Economic and sociopolitical shocks should also be taken into consideration (e.g., price shocks or political instability in a region) as these may disrupt

governance and increase risk of human-led reversal. Activities that are deemed to be at a higher risk should be required to update their baselines and risk assessment more often. [BF, 362]

297. milestones that should trigger updating baselines, beyond updates occurring on a regular basis (e.g., every 1-3 years) include any change in ownership or management; change in methodology; change in the magnitude of production/sale of credits. Periodic reviews and updates are necessary to allow for calibration of appropriate MRV, baselines, and risk assessments as data availability and models will improve as removal activities scale. Furthermore, changes in relevant legislation (e.g., monitoring requirements, mandated practices that change what should be considered "baseline activities") are also triggers that should cause a review and updating baselines and risk assessments and monitoring plans. [BF, 362]

298. whether a review/ update would be required depends on the project activity type. For example, baseline updates make sense for project types that base the monitoring ERs on them. However, updating the baseline for plantation project does not seem necessary once the project has been implemented. Unless some trigger significantly changes the baseline for subsequent inclusions of project instances, the baseline does not need to be updated. In regards with engineered removals, it should be evaluated per project type, for example, for a biochar project, if the type of use application changes during the project lifetime, a project design update is needed and that could be a trigger to review the baseline. The risk assessments should be updated at every monitoring event to include possible new risks or exclude/reduce risks that are no longer to be considered. [STX, 363]

299. some triggers that should be considered to review project design, performance, risk rating...are loss events (planned or unplanned), updates on the methodology applied, innovation or updates in the technology applied to the project (if applicable). The project owner should pay extra attention to loss events that occurred during monitoring periods notifying and following the procedures set by the 6.4SB. [STX, 363]

300. [three options that can be implemented alone or in cooperation:

    (a) A fixed schedule of reporting points linked to the methodology / lifecycle with mandatory quantitative and qualitative data verified by a third party (or at least some fraction is verified).

    (b) Dynamic reporting linked to a risk metric or loss above a threshold that has a mandatory reporting period.

    (c) The project publishes mandatory details on the activity (project areas, planned activity, loss locations etc.) sufficient such that third parties can offer digital MRV services that can be paid for by buyers or later made public. 305. [CFL, 365] [1.5, 366]

301. Reviews of baselines, risks, and monitoring should occur on fixed schedules and in response to trigger events such as: start of crediting period; verified reversals; milestones per methodology; changes in ownership or project parameters. Advance public reporting and dMRV can also strengthen oversight. In relation to 12 (a), material thresholds for reversals in excess of statistically expected variance should force an event of report. Most likely a 2 standard deviation variance should trigger a report and re-assessment of the project. [CFL, 365] [1.5,366]

302. In relation to 12 (b), risk is unlikely to be a linear temporal function. Project types likely vary in terms of risk profile. It is important that regulation acknowledges the need to adapt risk profiling and monitoring to be in line with different types of projects and the ongoing discovery of changes to the temporal risk horizons. As new technologies, monitoring, and understanding emerge, more accurate risk weightings over the lifetime of a project may be assigned. [CFL, 365] [1.5,366]

303. Significant events including political (e.g., regime change), physical (e.g., significant loss of carbon stock), or governance (i.e., project has changed hands / is at risk / there are disputes etc). [SYLV, 367]

304. Updating the activity baselines, risk assessments (thus, risk ratings), and monitoring plans may be an option for the project developer if necessary. For example, the baseline scenario may remain the same during the project crediting period, while the monitoring plan can be updated to reflect best practices and more precise methods. [NBS, 373], [REGREEN, 374]

305. risk assessments and monitoring plans should be reviewed at the start of each crediting period. Furthermore, an activity proponent would need to notify the A6.4 of any changes to their activity during the crediting period that would have a significant impact on operations. [PURO, 378]

306. Post-reversal-period audits should pick this up (see also [the response to] paragraph 10 [of the Questions]). [CARBI, 376]

307. Third-party verification for removal activity may have different incentives for certifying successful removal methodologies and MRV approaches. Gold Standard, Verra, Puro, C-Capsule, and CCS+ are all private sector initiatives that have completed their own removal rating and verification processes. However, some removal project developers, like Charm Industrial and Project Vesta, have developed their own rating and monitoring plans. Different interests inherently will have different modes of codifying verification processes for proof of safe, durable removal. Reversal risk calculations should be performed at the initiation, midterm, and conclusion of a removal project's timeline in order to mitigate overall risk of undermining durability. [CLLA, 375]

308. The role of the SB is not related to the accounting of the removals and reversals in the national communications, because these are followed and enforced by the A6.2 and the Katowice Transparency Framework for transparency in the NDC implementation process, and the BTRs. [CRCY, 350]

4.5.3.4. Reversal risks management

4.5.3.4.1. Timeframe for reversal notification reports

309. The submission of notification of a possible reversal of removals should be required within 60 days, with a confirmation of the reversal (monitoring report) required within 120 days of the observed event. [NB, 344]

310. First or preliminary notification should be within 30 days of the observed event and a detailed, quantified report on the event within 90 days of the observed event. [SCC, 356]

311. Notification should be faster than 30 days and a full report within 6 months. However, a system relying on self-reporting by project proponents against their financial best interests is inherently problematic and must be reconsidered. [SH, 346]

312. Project developers should be required to submit notification of a reversal within 30 days of a reversal being known. A follow-up submission of a full monitoring report should be submitted by the project developer within 6 months where a significant reversal event occurred. [KITA, 347], [CFL, 365], [1.5,366]

313. To allow flexibility based on project types and reversal magnitude, initial digital notification within 30 days of a detected reversal and a full report within 1 year for reversals exceeding a threshold such as 20% loss or 2 standard deviations from project baseline . [CFL, 365], [1.5,366]

314. The reversal notification reports should be submitted as soon as possible, such as within 30 or 60 days. A full monitoring report should be required within 3 months. [BF, 362]

315. Reversal notification should be submitted within 30 days of the observation, and follow-up within 6 months to ensure that end-users have sufficiently long-lead time to adjust to ensure the reversal is addressed, and any claims made on the back of them do not cause legal and/or reputational risk to them. [PARIGI, 357]

316. The initial notification of the observed event should be submitted as soon as possible but no later than 90 days from the observation and should include, at minimum, the date of the event, the location and a short description of the event. [STX, 363]

317. The notification should be made within 100 days of the observation and a full monitoring report within 1 year. [NEUST, 364]

318. Separate guidelines may be need for different technologies. For example, an afforestation project may require more time to submit a full monitoring report after a significant reversal event is detected due to its remote and/or geographically spread nature compared to a Direct Air Capture plant that is location defined. [KITA, 347]

319. Reversal notifications should be submitted as soon as the activity proponent or the national authority has been notified of occurred reversals and has verified the news, e.g., within 24 hours. The follow-up submission of a full monitoring report should occur within one year to quantify the exact amount reversed. [44M, 351]

320. The reversal notification without quantification should be given as soon as possible, and no later than 30 days after discovery of the start of the potential reversal event. The follow-up, full monitoring report should be submitted within 3 months of the submission of the notification. In case the reversal event is still ongoing, the proponent should be required to continue to submit follow-up monitoring reports every 3 months until the reversal ceases, at which point, a final monitoring report should be submitted. [CMW, 360]

321. In case the reversal event occurs while a DOE is in the process of verifying ERs, or while ERs are in the process of being certified for issuance by the SB, then the reversal notification must occur immediately upon discovery of the potential reversal event. Discovery of a potential reversal event during the verification/certification process must temporarily suspend these processes until the reversal event is adequately assessed and corrective actions are taken where necessary. [CMW, 360]

322. The activity proponent should immediately notify a reversal that occurs within their project boundary, also referred to as an Event of Carbon Default (EOCD). Where an EOCD has been identified, the activity proponent should appoint, at its expense, an independent third party to verify the characteristics of an EOCD to determine the magnitude and causal factor(s). An EOCD Report should be submitted no later than sixth months after the EOCD has occurred. [CCPLE+RECS, 354]

323. The notification may happen within 120 days after the reversal event, and a full monitoring report should be submitted within 1 year. [NBS, 373], [REGREEN, 374], [CARBI, 376]

324. A notification reversal should be submitted within 90 days of observation. A full monitoring report should be released within one year of notification upon completion of a thorough analysis. [CLLA, 375]

325. Reversal notification reports should be notified as soon as possible with a full monitoring report within 1 year. [PURO, 378]

326. Reversal notification reports must be made within 60-90 days of an observed event digitally and followed-up with an updated monitoring report within three months of the notification being served. [DG, 361]

327. If ER reversal events are detected, the monitoring entity would a) notify the project proponent so that the proponent may take mitigating actions immediately, and b) trigger the insurance claim to replace the reversed ER credits with new ER credits from its reserves. [CPOOL, 355]

328. Reversal notifications should focus on the actual reversal events ex-post to gain detailed insights on the processes of the reversal and the quantification of the reversal event rather than expanding to include events that could potentially lead to reversal. A full monitoring report could include a section on “near misses” and outline what events could have led towards reversals over the reporting period. To ensure a timely reflection of reversal events, reversal events should be fully quantified, third party validated and reported in the subsequent monitoring report, within 6 months of the reversal event [CW, 358]

329. The activity proponent should be required to inform of any observed event that could lead to a reversal as soon as it is noticed or within a few days. All the quantification/mitigation details may be reported in the following monitoring report, indicating whether it was avoidable or unavoidable, which would be key to determining if it was an intended reversals and to penalise them accordingly (see also [response to] paragraph14 [of the Questions]). [SYLV, 367]

330. Requirements for “reversal notification” follow that of the CO2 Storage Directive (CCS Directive) which requires, “in the event of leakages or significant irregularities, the operator immediately notifies the competent authority, and takes the necessary corrective measures”. [CCSA, 370], [ZEP, 371]

331. Planned harvesting activities should not be considered as a "reversal" event to be notified, because variations in carbon stocks due to harvesting will be calculated in each verification event. [NBS, 373], [REGREEN, 374]

4.5.3.4.2. Basis for use of simplified / standardized elements

332. Activity type or category could provide the basis for the use of simplified/standardized elements vs activity-specific elements for determining risk rating. Some activity types do not have reversal risk factors that are materially different or unique, but for those of which the factors are different or within factors have unique characteristics that would inform the risk rating level. The risk assessment itself and the monitoring plan should be consistent for all activities within a particular activity type. [NB, 344] [ISOMERIC, 352] [NBS, 373], [REGREEN, 374]

333. Activity type and risk rating level. Activity type could be the minimum with risk rating level superseding those minimums where a substantial risk is anticipated. [KITA, 347]

334. The risk rating level of the activity type should be the basis. For example, reporting for longer-term geological storage is likely to be significantly more pro forma than that of other types. [PARIGI, 357]

335. The real-world circumstances should be the basis for simplified or standardized elements. According to the storage timeframes outlined by the IPCC, removal methods could be broadly categorized by activity types (e.g., terrestrial vs. geological storage). [CW, 358]

336. As removal activities involve often involve a combination of system components, a modularized requirements may be made. For example:

    (a) removals involving standing biomass (e.g., reforestation, bioCCS): standards for caretaking and sustainability of the forest;

    (b) removals that consume electricity (e.g., DACCS, grinding of rock for enhanced weathering): standards for additional and renewable energy generation;

    (c) removals that require transport of CO2 (e.g., bioCCS, DACCS): requirements for pipeline transport safety and minimized landscape disruption.

    (d) removals with limited human intervention to maintain storage (e.g., enhanced weathering, mineralization) can have more passive monitoring requirements that focuses on preventing disruption rather than upkeep of storage . [BF, 362]

337. Given the uncertain nature of risk rating, the use of a numeric risk threshold is not recommendable as a primary means to determine whether MRV requirements can be simplified, particularly given the susceptibility of many risks to climate change (e.g., increased heat could affect risks such as the stability of biomass, the rate of enhanced weathering, and transport conditions of CO2 pipelines) [BF, 362]

338. Projects with a large number and variety of risk factors should be assessed whether it should be certified as a removal activity at all. Such risk is not limited to physical risk (e.g., choosing an unstable geologic site for CO2 storage or a drought-prone area for a forest) but also risk of being unable to accurately quantify and monitor stored carbon (e.g., carbon stored in soil or carbonate precipitation rate of enhanced weathering) and governance risk (e.g., track record of the responsible entity; capability of the liable party; strength of local institutions). [BF, 362] [CW, 358]

339. A robust monitoring plan with verified implementation, a responsible entity with a proven track record, and a clearly identified and capable liable party could be a reason to allow

the use of simplified reporting. Audits should be conducted regularly to ensure that high standards are maintained to allow the continued use of the simplified reporting. [BF, 362]

340. The likelihood is greater for shorter-term activities to be impacted by reversals, particularly those removal solutions that are subject to natural disturbances or climate variability. Permanent storage of CO2, on the other hand, is not usually exposed to natural hazards and therefore less prone to reversals. By creating separate streams for shorter-duration CDR activities and highly durable removals, targeted risk management strategies can be adopted for each category and better reflect on the requirement to address all reversals in full. [NEP, 359]

341. Low-risk and low-frequency monitoring based on robust evidence or literature require simplified reporting. Balance must be sought between the burden of reporting in terms of frequency, cost, and complexity and the scale and magnitude of the risk presented. Small risk, light reporting. Large risk should require heavy reporting. Risk should be weighted proportionally to the duration of exposure, likelihood of event (failure/reversal etc.), and magnitude of event (scale of failure). [CFL, 365], [1.5,366]

342. It Is difficult to set universal MRV standards for compliance due to the variable nature of each removal projects' activity-specific methodology. Standardized verification of removal and durability should be evaluated on a methodology-specific basis, with set standards applicable to each mode of removal. [CLLA, 375]

343. No simplified rules can be applied to permanent removals. [SE, 345]

344. Given the wide variation in the risk of reversal between CDR activities, activity-level risk assessments is desirable. The measures and actions taken to mitigate the risk of reversal should span across different stages: before the project starts (e.g., in the rules/ methodologies for the validation audit of a project), during its operation (e.g. regular monitoring), and even after it has been implemented (e.g. post-closure requirements) to allow for a mechanism that complies with the RMPs adopted in Glasgow. [NEUST, 364]

345. There is no need for the SB to regulate this system of accounting outside the project boundary, the project alone is not contributing to the global stock take. The project is just a part of the national contributions from the host party, and from the involved stakeholders, involved public or private institutions. The implications of the project to the NDCs outcomes (host or user parties) are enforced by the Katowice Modalities and Procedures for the NDCs and global stock takes, by means of the BTR and annual inventories of all parties to the Paris Agreement. [CRCY, 350]

4.5.3.4.3. Intentional vs unintentional reversals

346. The standard procedure should be the same regardless of whether the reversal is intentional or unintentional. [NB, 344] [SH, 346] [NBS, 373] [CLLA, 375] [CARBI, 376] [PURO, 378]

347. Intentional and unintentional reversals should be treated differently. Where there is an intentional reversal, the project proponent must be required to rectify the situation, for example, by retiring some of their own credits, providing money directly to the SB (or other appointed body), or buying credits from another project with similar characteristics. [KITA, 347], [CFL, 365], [1.5,366] [CCPLE+RECS, 354] [PARIGI, 357] [NEUST, 364]

348. The notions of intentional or unintentional do not apply to permanent removals. There is always a climate consequence if there is an emission from the geological storage site, and in the case of the EU ETS, there will be a requirement to acquire EUAs. [SE, 345]

349. Intentional reversals should not be compensated via insurance solutions nor via buffer pools as both options would generate moral hazard and facilitate undesirable behaviour. Preventing intentional reversals would require specifying a host country liability, where the reversal once found intentional is accounted for in the national emissions balance. [PCR, 348]

350. Intentional reversal should be compensated by direct replacement of the lost credits with real credits from market, that is, credits from emission reductions, or credits from irreversible removals (e.g., mineralized carbon). Credits in the market that are based on reversible removals cannot be used for direct credit replacement purpose. [SCC, 356]

351. Every removal has unique characteristics associated with the expected vs. unexpected rates of reversal. The important task is to address and declare both of these risks using robust methods, including the nature and the scale of the reversal. Quantified Risk has 3 dimensions: likelihood, duration, and impact. This allows for treatment of risks and instruments using “factors” relative to the expected environmental effect of the carbon. [CFL, 365], [1.5,366]

352. Only like-for-like types of credits (same or higher inherent-permanence category) can be used to compensate for unintentional reversal under buffer pools as otherwise the risk structure of the buffer pool deteriorates over time. (See also [the response to] paragraph 14 [of the Questions]). [PCR, 348]

353. Intentional reversals must not be allowed to take advantage of any risk-sharing scheme, such as buffer pools or insurance, but rather should be seen as a violation of contract and be sufficiently penalized, including the full rectification of the reversal. [BF, 362]

354. Reversals should be treated differently depending on their cause. Whether reversals are intentional/planned should be assessed by an independent third-party. If it was found to be intentional, the activity proponent should be required to re-sequester the reversed amount within a given timeframe or finance the removal of said amount through an already established activity of different independent activity proponents, proposed by the national authority. If reversals are deemed unintentional/unplanned the reversal should be communicated to the removal owner. The owner should not be compensated for said reversal. The risk of reversal should be communicated before the purchase of removals and the buyer should ensure its own buffer is in place. By ensuring buffers are maintained independently by the buyers, investing in a diversity of activities, with differing risk ratings would lower the risk and in turn ensure a variety of activities are supported through the Article 6.4 Mechanism. [44M, 351]

355. Intentional reversals (resulting from project proponents’ intention) should not be compensated from the risk buffer. Instead, they should be compensated by replacement of credits from outside the buffer pool, e.g., real (unencumbered) credits purchased from the market, such as credits from irreversible removals or credits from emission reductions. Risk buffer should be used for events that are beyond the control of the project participants. Credits in the buffer pool are not real credits. They may represent short storage period and thus worth little mitigation value that are only good for filling gaps that

are created in continued storage of the removals underlying the credits already in the market. [SCC, 356]

356. If intentional /planned reversal occurs during the crediting period, it should be reflected in the quantification. After a crediting period, intentional reversals must be eliminated altogether. Unintentional reversals should also be reflected in the amount of A6.4ERs credited as long as they happen during the crediting period. Post crediting period, they should be addressed via separate procedures, but in a manner that incentivizes long term storage and effective management and monitoring of unintended reversals. Additional pools could be incorporated, as long as a clear responsibility and liability to address a reversal in full is maintained. [CW, 358]

357. Different approaches should be taken for intentional versus unintentional reversals. In the event of any reversal, the corresponding amount of ERs should be drawn from the buffer pool. In case of unintentional reversals, the project proponent must replenish the buffer pool equivalent to any reversals in excess of the share of ERs it initially contributed. In case of intentional reversals, the project proponent must fully replenish the buffer pool equivalent to all reversals. Moreover, in the event of an intentional reversal, the mechanism registry account of the project proponent must be frozen such that all issuances/ transfers/ retirements of any credits from the project proponent, including those from other projects and previously issued ERs, are halted until all reversals are fully addressed, a follow-up investigation is conducted to determine the reason and nature of the intentional reversal, and appropriate disciplinary/corrective measures taken. Such measures may include, for example, banning the proponent from Article 6.4, to cancel any unused credits issued, and to replenish the buffer with the equivalent of any of their credits that have been used previously. In addition, a public notification/tag should be made available on the mechanism registry regarding the project proponent (and any activities they are involved in) that has caused an intentional reversal, including the outcome of the investigation. [CMW, 360]

358. An Intentional reversal implies that an activity is not a removal and unless replaced with carbon storage equivalent or greater net quantity and quality, should be considered a violation of contract and strictly penalized on top of requiring the rectification of the reversal, e.g., by another party. However, in some cases, it may make sense to allow for certified removals to transfer locations, e.g., if a particular area of forested land becomes ecologically unstable or interferes with economically or socially just activities. In this scenario, the removal certification could be transferred to another carbon sink, assuming that the carbon in that sink is of equal or greater quality and stability, of similar or more recent vintage, and that the quantity of net removal does not diminish even with the additional activities of establishing the new sink. All removals have risk of unplanned/unintentional reversal with profiles that vary primarily by the characteristics of the carbon storage sink. The mechanism and quantity of insurance needed to protect against these risks will therefore vary, but in all cases any reversals must be rectified by additional removals of equal or greater quality and net quantity. It must be noted that not all risks are insurable; some may be too high or too uncertain. If an unintentional reversal risk is uninsurable, the removal activity should not be certified. [BF, 362]

359. An assessment should be carried out to highlight possible planned/intentional and unplanned/unintentional risks and measures should be taken to minimize those identified risks. A buffer pool should be created to ensure the maintenance of the carbon benefits. Intentional and unintentional reversals should not be treated in the same manner. Different procedures should be taken for planned and unplanned, for example, updating the project

information and numbers for the affected part if a catastrophic natural disaster happens, but updating the whole project if a planned reversal occurs. Another example is giving the option to compensate for the loss by taking the same number of ERs reversed from the buffer pool or from other project owned by the same entity if an unintentional reversal occurs. Regarding planned and/or intentional reversals, they should be analyzed case by case to plan accordingly and apply the appropriate management as some of these planned/intentional situations are out of the project owner's control. [STX, 363]

360. Different approaches should be taken. Buffer pools are suitable to compensate for unintentional reversals for which the activity proponent should not be penalised beyond cancelling credits from the buffer pool. For intentional reversals, a mechanism is needed to penalise intentional reversal and deters such behaviour. [SYLV, 367]

361. In case a buffer pool is established, direct credit replacement should also be required such that the project proponent replenishes the buffer pool continuously after a reversal occurs. The details of direct credit replacement are complex and may raise following questions:

    (a) would the project proponent be required to replace credits from their own project only, or from a project of the same activity type, or a different activity type with a lower reversal risk rating?

    (b) Would there be provisions to require that the replacement credits are acquired from a different country/region in case the two projects are both of the same activity type? [CMW, 360]

362. By creating separate streams for shorter-duration CDR activities and highly durable removals, the SB can adopt targeted risk management strategies for each category and better reflect on the requirement to address all reversals in full. For our solution, the probability of reversal is low and highly controllable and controlled thus the utility of a buffer pool is questionable. It is also based on an iron clad life-cycle assessment validated by external parties and end-project boundaries. In case of leakage, a replacement of credits is applied. [NEUST, 364]

4.5.3.4.4. Buffer pool approaches

363. Buffer pools do not constitute a robust way of guaranteeing the permanent storage of carbon in a sink. At best, they can strengthen the credibility of guaranteeing storage for a medium duration of time, if properly constituted and managed. It is not credible to expect buffer pools to be operated for more than a few decades, as there are many factors (political, economic, etc.) that could lead to the discontinuation of the buffer pool management. "Monitoring and compensation" approaches that rely on buffer pools and claim to guarantee the durability of storage for 100 years or more are simply not credible from an institutional point of view. In addition, buffer pools can only be used to compensate for reversals if these reversals are observed. They are therefore inherently limited by the monitoring period tied to the projects that are covered by the buffer pool. If the Supervisory Body chooses to rely on buffer pools to address reversals, these should be clearly communicated as a medium-term risk-mitigation strategy, and not as a long-term durability guarantee. [CMW, 308]

364. Buffer pools have been implemented to address risks of reversals for removal activities in several independent crediting standards as well as during the CDM (for projects involving carbon geostorage). The risk assessments should be developed before the registration of

the project by activity proponents, updated over time, and carefully reviewed by third-party designated operational entities (DOEs) to ensure contributions to the buffer pool are adequate. The level at which the buffer contribution should be determined requires further consideration. It may be possible to set the buffer contribution at:

(a) The mechanism level (probably to be avoided give the wide variation in durability between sinks and reservoir types);

(b) The level of specific type of sink and reservoir; or

(c) The level of specific activities. [IETA, 311]

365. Buffer pools should also consider, rather than duplicate existing domestic regulations that require collateral for addressing reversals. IETA has developed a set of principles to govern the development of tradable reductions and removals through the High-Level Criteria for Carbon Geostorage Activities. IETA recommends that the SB further deliberates on the potential of similar "regulatory safeguards" approaches to be applied to other types of sinks and reservoirs. IETA feels that there is an urgent need for a more wide-ranging discussion of how the risks and rewards associated with removal activities be effectively balanced across project developers, host countries and buyers, cognisant of the need to maintain environmental integrity of the Paris Agreement and to avoid moral hazards. [IETA, 311]

366. A non-permanence risk buffer, whether pooled or specific to an activity, would serve as a safeguard against the risk of carbon reemission. The adoption of an insurance model, where registrants can contract with insurance bodies (commercial or sovereign) to provide independent risk management services against the risk of Event of Carbon Default (EOCD). This would act as a guarantee for replacement of removals where reversals occur. Such an insurance account should be regularly monitored by the Article 6.4 SB, ensuring effective risk management and adding an extra layer of security against non-permanence. [CCAP, 246]

367. Non-permanence risk buffer (pooled or activity-specific) is a common approach to address risks of reversals. As with any insurance mechanism, buffer reserves can only be effective if it is clear who bears the primary liability for addressing reversals when they occur (i.e. who is being insured, which should be either the primary seller or the buyer of credits); for how long they bear this liability; and what the level of risk is for reversals over the time period being insured. Furthermore, as with any insurance mechanism, it is not possible to insure against risk where doing so creates a moral hazard. Buffer reserves may be effectively deployed to insure against stochastic risks like natural disturbances, for example, but are not a robust way to insure against intentional reversals, such as might occur if a landowner decides to back out of a reforestation project and clear the land for development instead. In such cases, the landowner must bear the liability to replace any carbon that is lost with an equivalent quantity of alternative mitigation, without recourse to buffer reserve credits. To be effective, governments and/or crediting programs must have the willingness and means to enforce this liability. For further detail related to establishing robust non-permanence risk buffers, please consider the criteria identified in Section 3.2 of the rating methodology developed by the Carbon Credit Quality Initiative: https://carboncreditquality.org/methodology.html. [OI, 285]

368. Buffer pool approaches to removals are inadequate in cases where potential reversals include emissions of 100% of stored CO_2-equivalent – in such cases, buffer pools must

equal 100% of issued credits, unless the accounting methodology explicitly accounts for temporary storage, in which case no buffer pool is necessary because emissions are also credited. In contexts in which there are limited physical potential for reversals (e.g. some carbon sequestration in the built environment, most geological storage technologies), buffer pools should equal the expected value of future reversals (evaluated conservatively at some confidence interval of the distribution of possible future values, rather than the mean). As an alternative to the buffer pool approach, full liability for reversals could be located with either the credit issuer/project proponent or the buyer. In principle, the liability for reversal risk could rest with either the buyer of credits (buyer-liability) or the seller of credits (seller-liability). In the latter case the host country, in effect, would assume the leakage risk. However, experience of afforestation and reforestation projects under the Clean Development Mechanism shows that a buyer-liability regime may substantially reduce demand for carbon credits generated from relevant activities. [GRI, 275]

369. Insurance schemes may offer an alternative to buffer pools. This could include shared responsibility whereby selling platforms have initial liability, but this is underpinned by government-backed carbon insurance schemes that sellers must procure. There is precedent for this in the UK government's FloodRE reinsurance scheme, which ensures flood insurance is available in high-risk areas that may be classed as uninsurable (Mercer and Burke, 2023). [GRI/LSE, 275]

370. While risk buffers help to mitigate against the risk of reversal, our view is that they fall short of providing adequate system-wide insurance of all the risks posed in their current design. Project-specific risk assessments vary considerably - for example standardisation and robust assessments of all natural, internal and external risks are required:

    (a) Project-specific risk assessments typically support the identification and mitigation of key risks. However, recent data indicates that even such best-practice measures may have resulted in under-resourced buffer pools. For example, natural risks, such as fires, have led to the California Air Resources Board's buffer pool to indicate that 95% of the credits deposited to insure against fire risk have already been depleted;

    (b) Disclosure and information risk. We find significant gaps in disclosure of these reports in the VCM: 74% (25 out 34) of NBS projects with a BeZero Carbon Rating present at least one risk of reversals report (NPRR) although only 3 projects present NPRR for all the vintages (9%). [BEZERO, 304]

371. Buffer pools are a well understood structure, and whilst some mechanisms may not require buffers; for others insurance products may be a more suitable form of redress in event of reversal. Other insurance products may be developed by the private sector and can be complementary to any buffer contributions. The Supervisory Body should consult expert scientific opinion to determine non-permanence risks for each removal mechanism. [VRT, 319]

372. A buffer pool and insurance could work separately or together. They could be complementary for a project where the buffer pool covers low-risk but high probability events like climatic variations while the insurance covers high-risk but low probability events like a catastrophic wildfire. [ASPI, 330]

373. Ideally, there should two separate non-permanence risk buffer (pooled) - one for land-based activities(e.g., forestry, ALM, mangroves, other wetlands) and other for engineered

solutions (as of now - only for DACCS and BECCS or any other form of geological sequestration - like sub surface mineralisation). [PDF, 321]

374. These proposed measures {buffer pools} are unlikely to be able to actually address the problem of major reversals. [CIEL, 317]

375. These proposed solutions {do not address} the problem of impermanence. Non-permanence buffers: tension between economic feasibility and ensuring the buffer is large enough; increasingly difficult to predict the reversibility risk, in particular of land-based carbon sequestration with a fast-changing climate; buffer pools often undercapitalized. Insurance: increasingly more difficult to actually achieve additional removals, problems with insuring that these removals actually can take place after reversals; Bottom line: none of the proposed approaches to deal with reversals can actually address the problem. [CLARA, 316]

376. Buffer pools do not constitute a robust way of guaranteeing the permanent storage of carbon in a sink. Risk assessments determining the share of buffer pool contributions are not necessarily set in a scientifically robust manner in certain systems, which can lead to undercapitalisation of the pool, as for the case of California's buffer pool. At best, buffer pools can strengthen the credibility of guaranteeing storage for a medium duration of time, if properly constituted and managed, but they cannot guarantee permanence. Before further consideration, a concept paper on the subject could be prepared, analysing risks and drawing on a range of literature. [CMW, 360]

4.5.3.4.5. Design of buffer pool and its operation

377. Methods for determining the level and composition of any buffer pool need to take account of both uncorrelated risks applying to a single project or small groups of projects, for example local legislative changes, and correlated or systemic risks, for example large scale forest dieback or widespread increases in forest fires, including as those risk change over time. Risk assessment must account for climate change and not be based only on historical data. Buffers also need to take account of uncertainties in MRV. Any uncancelled buffer should be retained against the risk of future reversals. [BF, 252]

378. Buffer contributions should be reflecting the overall risk profile of activities. {For activities involving geological sequestration, previous work under the CDM should be taken into account. For activities involving geological sequestration, the Article 6.4 mechanism should seek alignment with national requirements for the permitting of injections. Relevant legislations are e.g. in place in the US (EPA UIC class VI wells) or Europe (CCS Directive):

    (a) Risks of reversals assessment should be conducted at activity level;

    (b) Risk assessment(s) should be conducted upfront, following a reversal event, and upon each renewal of the crediting period;

    (c) Entity(ies) responsible for risk assessment(s), e.g. activity proponent, 6.4SB. actuary. The 6.4SB is encouraged to define activity specific risk assessments included within methodologies. Activity proponents should thereby become required to undergo the risk assessment in case they want to be issuing A6.4ER. [CWORKS, 302]

379. Methods for determining the level of buffer pool contributions should be science-based and allow for periodic updates. Composition of buffer pool, including in relation to ER

vintages and contributing activity types or categories Buffer pools should be designed activity specific. [CWORKS, 302]

380. Intentional reversals, such as the deliberate mishandling of carbon, and unintentional reversals, like a forest fire, each bring unique challenges to risk management and should be treated accordingly in terms of buffer pool contributions and mitigation strategies. [CCAP, 246]

381. In order to ascertain the extent of contributions towards the buffer pool, it is imperative to understand the inherent risks of reversals of the removal activities. Composition of buffer pool, including in relation to ER vintages and contributing activity types or categories should be noted. The buffer pool's composition should be reflective of the various types of removal activities and the corresponding risks of reversals. [CCAP, 246]

382. Buffer pool allocations should be based on scientific assessment and empirical evidence of reversals for different forms of sinks. For geological storage, if there are obligations under law to address reversal emissions, then there should be no need for further measures. After the Monitoring period, only host nation obligations and reporting and accounting should apply. The notion of intentional reversals is immaterial for geological storage. Significant intentional reversal would result in loss of license to operate under credible jurisdictions and methodologies, which is a strong enough incentive not to make a distinction. [SE, 244]

383. For a project with short implementation period, such as timber construction (i.e. product-based), activity-specific non-permanence risk buffer is the right choice. [TFI, 214]

384. Buffer pools are typically only used for NBS projects, which have a more material risk of reversal than TBS. However, with the development of CDR projects with geological storage and their exposure to losses risks, there is room to further investigate a percentage risk buffer based on the ground formation or the project location with a timeline threshold (i.e. less than 200 years. etc.). If the reversal exceeds the carbon project's contributions to the buffer pool or the project is terminated, the liability of the project should vary. In this instance, buffer pools need to be complemented with other measures (for example, purchasing carbon credits from other projects). The buffer pool approach already exists for NBS so it's the most common and easiest to put in place for CDR; only deep-in analysis of the ground in combination with permanence timeline sequestration is required. [SYRA, 305]

385. The implementation of the approaches should consider the following:

    (a) Methods for determining the level of buffer pool contributions:

        (i) The level of buffer pools should be determined based on the risk of reversal for a specific project and the measures in place to overcome this risk;

        (ii) The overall risk of reversals should be based on both natural and anthropogenic risks;

        (iii) Different parameters should be used per project type, for example: NBS CDR projects: risk of droughts and wildfires; TBS CDR projects: the geological formation, the depth of the CO_2 injection and how the CO_2 is injected (liquid, gas or solid);

(b) Composition of buffer pool: for NBS CDR projects, the buffer pool needs to be evaluated at each vintage and the relevant ERs stored on an account for potential reversal risk later;

(c) Only unintentional reversals should be eligible for the release of ERs from the buffer pool. Intentional reversals should be cancelled from the total number of ERs issued by the project (over-crediting risk). Anthropogenic reversals that happen repeatedly, should be penalised severely and even conclude in the termination of the project;

(d) Specifications for ERs that cancelled for compensate for reversals, including in relation to ER vintages and contributing activity types or categories. Ideally, reversals should be compensated with ERs from the same project type. If not possible, the ERs used to compensate should align as much as possible with the project ERs. Project type, vintages and location are the most relevant aspects to align;

(e) In case 100% of the buffer pool gets cancelled, an alternative way of compensating for the reversals should be defined. For example, the purchase and use of credits from a similar project. In this situation, the buffer pool needs to be reassessed for the next crediting period. The objective is to avoid the buffer pool to be fully used up again. [SYRA, 305]

386. Adequately sized buffer pools tend to effectively address the risk of reversals, by withholding an amount of credits from being traded and setting them aside to form a “buffer pool” which is later used when a reversal occurs. In many cases, the amount withheld is not based on any actuarial assessment of the risk of reversal and it can vary. However, to be most efficient, the percentages of credits allocated to the buffer should match the actuarial risk of reversal for all activities covered by the buffer. The allocation should then take into account how reversals are detected, quantified, and reported. [CI, 307]

387. A high level of transparency regarding how percentages applied for natural, internal and external risks are reached is required. Any cap placed on the maximum level of risk allowable should be disclosed/highlighted in the risk assessment documentation. Similarly, where the approach required a minimum risk buffer allocation in cases where projects assess low risk, this or the lack of a minimum allocation should be specified. Any project documentation detailing how risk buffer allocations are calculated be made publicly available. This allows a greater level of disclosure that brings greater indication that project risks are mitigated appropriately. [BEZERO, 304]

388. The design of buffer pools for 6.4 could be based on existing buffer pool structures by Verra, Gold Standard, Plan Vivo, CAR, ACR and others that have been evolving over the last decade plus. [NB, 344]

389. The existing buffer pool approach can be used to facilitate risk management and compensation of reversals in the short-term. However, innovation in risk management is needed through an effective risk framework of new actors including rating agencies, actuaries and insurers/reinsurers. The solution is to disaggregate roles and responsibilities roles by appointing independent, third-party actors to rate and underwrite against risk of reversal. In this scenario, the activity proponent could pay a fixed premium to the insurer for the transfer of risk and for a guarantee that if a reversal were to occur, the insurer would compensate (with equivalent cash or carbon) for the reversal. Transferring administration

of buffer pools to independent, third-party insurers would remove issuers from liability concerns relating to the recourse for carbon default, claim settlement and dispute resolution. Their presence would increase user confidence for project developers exposed to risk of reversal and buyers concerned about the longevity of their CDR claims. Transition towards financial risk management best-practice would de-risk investments into voluntary and compliance carbon instruments and increase stakeholder confidence. There are various models for third-party insurers such as:

(a) Centralised: mandatory buffer pool contribution applied at each issue request; managed by the Issuer. Expected Effect used to determine the percentage of credits allocated to the buffer pool (e.g., 96% Expected Effect = 4% credits). Centralised buffer pool would be underwritten by a third-party insurer to cover the risk of carbon bankruptcy.

(b) Decentralised: buffer pools can only be managed by a third-party insurer, removing mandatory buffer contributions from the issuer. Risk management would be delegated to third party insurers subject to periodic audits to ensure appropriate quantity and quality of credits in case of an Event of Carbon Default (EOCD).

(c) Hybrid: Centralised Approach with opt-out function for the activity proponent to contract with an Insurance Body to manage risk of an EOCD. Combining self-insurance with conventional insurance would give actors autonomy to choose their preferred approach to effective risk management. As per the aforementioned approaches, all buffer pools should be periodically audited by the A6.4SB to monitor the integrity of replacement certificates. [CCPLE+RECS, 354]

390. Buffer pools can be made more robust by using a diverse set of removals in their composition, as well as diversifying their locations and ensuring that, particularly for land-based removals, they adhere to high standards of integration with their local ecosystems. Buffer pools should be continuously replenished to ensure that they are not quickly used up. Buffer pools must be calibrated to account for changes in reversal risks, both for the original removal and the buffer pool itself, due to climate change, rather than relying solely on historical data. In some cases, buffer pools alone may not provide sufficient insurance against reversal risks. [BF, 362]

391. Buffer could be combined with insurance to provide complete coverage. Buffer contributions of 20% from projects are sufficient to cover the majority of reversals, which are more common but minor. This pool could serve as a first loss to claims any larger than a threshold of, for example 10 or 15%, where insurance covers the remaining loss up to the entire 100%. Such insurance is of the order of 5%-10% a year of the value of carbon at risk. Buffer contributions above the threshold ensure the buffer is replenished and remains liquid, even in the case of multiple total project failures. The insurance premium can be paid by some combination of the buffer operator from fees on sales or by an additional buffer contribution from developers. [KITA,347]

392. The buffer pool should be managed by the UNFCCC, and the requirements to request the use of the buffer pool should also be defined by the UNFCCC. Even if a catastrophic event occurs in a specific project, the buffer pool of the UNFCCC, which represents the collective buffer deposit from all projects, should compensate the buyer of the ERs. Placing all the insurance requirements' responsibility on the project developer may be infeasible for NBS removals. [NBS, 373], [REGREEN, 374]

393. The initial level of contribution should be enough to cover all types of reversal risks over the next 100 years of storage. If direct credit replacement from buffer is desired, then the buffer should only contain real credits, that is credits based on irreversible storage or credits from emission reduction activities. Replenishment of credits in the buffer: Credits in the buffer should be cancelled whenever a reversal is reported and the activity becomes ineligible for further issuance until the lost removals are recovered. If the buffer goes bankrupt, the liable Party will need to manage by e.g., insurance or replenishment of the buffer at their own cost. [SCC, 356]

394. Buffer pool should be administered by an independent entity who should instruct the registry administrator to move and cancel credits as needed. Risk monitoring should also be carried out by an independent entity, and not as self-monitoring by the project proponents, to avoid conflict of interest and possibilities of gaming. If any of these actors cease to function or exist before 100 years, then liability for ensuring compensation of reversals should lie with the host Party or the Party acquiring the credits. [SCC, 356]

395. The buffer pool should be adjusted to risk by the project with lower thresholds, which could be adjusted every crediting period based on the results of non-permanence risk assessments, carried out during each monitoring period. It needs to be decided whether there would be a common buffer pool for all 6.4 projects or they would be kept separate. In terms of the size of the buffer pool, one can use VCM examples as a reference point. As of the end of November 2022, Verra's VCS has 65 million credits available in the buffer, just over 6% of the 1 billion credits issued. There have not been many instances where the buffer pool has been drawn on. In case the buffer pool is used up, there are several alternatives to cancelling credits from the buffer pool that could be considered, which are: corresponding reduction of future sales; cancellation of unsold credits; purchase of an "equivalent" number of carbon credits from a different project in the same registry. [SYLV, 367]

396. Buffer composition should be assessed at the level of the entire market to ensure sufficient coverage, i.e., enough available credits (minted but not transacted) to cover reversals. Especially in natural systems, given the likeliness of shifts in climate at the regional level, the buffer contribution should be reassessed regularly (every 2 years) on a project type level at methodology level, but would not make sense to reassess on a project level as the credits not committed to the buffer pool at the outset of the project will likely already be transacted. [NB, 344]

397. A standardized risk assessment tool should be developed to be applied in the same manner for all the projects. In doing so, [STX, 363] suggests following elements are considered:

    (a) Internal risks (financials, management, longevity...)

    (b) External risks (stakeholders' engagement and some other stakeholders related risks, land ownership, country specific political risks, legal risks)

    (c) Natural risks (if applicable/only for Nature based)

    (d) Planned/intentional reversal risks. [STX, 363]

398. The project owners should calculate the amount to be deposited in the buffer pool by using the tool, so it is necessary to develop thresholds and values for all considered risks in the assessment. As a reference, Nature based project risk ratings range between 10-20%.

The risk assessment should be updated periodically, depending on what makes sense for the project type, and it should be verified by a third party. [STX, 363]

399. Buffer pools could, for example, be treated as annuities, with similar risk and processes applying to both. [CARBI, 376]

400. Technical paper provided by SBSTA (FCCC/TP/2014/2) shows general factors to be considered when applying a permanence buffer of credits backed up by host party guarantee (para. 69-73) and details on accounts, liability, monitoring and verification in the event of a reversal (para. 78-82). It is also necessary to refer to "modalities and procedures for carbon dioxide capture and storage in geological formations as clean development mechanism project activities" (Decision 10/CMP.7), which applies non-permanent treatment options similar to the above options. Carbon dioxide capture and storage (CCS) CDM projects apply a combination of buffers and Party guarantees (Annex paras. 24-28, Decision 10/CMP.7). [NFS, 377]

401. Buffer pools based on static risk frameworks and a one-time, upfront contribution are insufficient to manage ER reversal risk. According to [CPOOL, 355], buffer pools:

(a) Do not hold capital to manage unexpected outcomes

(b) Do not reflect the continuing variety and innovation of project types, risks and geographies through granular and differentiated risk assessments and corresponding determinations of the appropriate buffer contributions on the individual project level, or

(c) Do not capture the dynamic nature of the underlying risks, which change over time driven by factors such as the changing climate regulatory requirements, and new technologies. [CPOOL, 355]

402. Therefore, buffer pools will not have the required amount of ERs to compensate for scenarios in which serious unexpected risks materialize and cumulate or if the risk profile of a project changes over time. Recent experiences of buffer pools demonstrate acute failure. Buffer pools create a false sense of security, since they claim to make up for ER reversal events, but do not have rigorous measurement of the impact of the reversal event or quantification of the ensuing loss and cannot cater for unexpected outcomes. The accuracy and sufficiency of the buffer pools is not tested and the contribution levels are not differentiated enough to incentivize investment in risk mitigation of the underlying projects. [CPOOL, 355]

403. Buffer pools are one of many risk management mechanisms. Other means of measuring and transferring risk among actors should be studied, including insurance, back-stops, performance guarantees and other approaches. Buffer pools are a "more of the same" approach to risk which may actually increase risk concentration whereas allowing the off-taker to bundle or aggregate assets with risk characteristics that meet a statistically expected environmental performance and portfolio effect due to managed correlation exposure may be a better means of managing risk. 10 tons with an insurance policy using 10 diversified tons on call with a 1% likelihood of failure diversifies project activities, drives innovation, and enables diversification of exposures. Buffer pools play an important role but have limitations. Other mechanisms like insurance should be explored to enable innovation in risk modeling, diversification, incentives, and financial resilience. Bundled buffered-insured portfolios could provide comprehensive coverage efficiently. [CFL, 365], [1.5, 366]

404. There have been several unsuccessful buffer pool management models and no successful models proven to-date. By choosing a buffer pool mechanism, the choice is being made to allow an avoidable risk for which no one is accountable. [SH, 346]

405. Allow insurance mechanisms to substitute for buffer contributions. [DG, 361]

406. The durability of DAC removal can be a reversal risk tool. Companies seeking to purchase nature-based removals for business or marketing reasons, or to satisfy UN Sustainable Development Goals, can buy DAC-based buffer pools, removal options, or reversal insurance to hedge against reversal risk. Criteria could be developed based on which removals can be assessed for quality and fit-for-purpose products for buffer pools and reversal insurance. [DACC, 369]

407. Either all credits must be equal, or they must be divided into groups within which everything is equal. There needs to be a minimum top-down design to determine the equivalency measures/groups or a sufficient authority that answers all questions of equivalency. Once that is done, pricing and liquidity are much easier to handle (but they are the second and third most important factors). Next required guidance is standardized contracts followed by establishment of clear lines of ownership, obligation and capital flows. All of these elements combined will make loss calculation and claims processes quicker, lower risk and lower cost. [KITA,347]

408. All credits subject to an EOCD must be remediated by cancelling a volume equivalent to the magnitude of EOCD. Robust standards should be created to avoid non-fungibility of buffer credits and associated compensation. Currently, Issuers have loosely defined or have not set criteria to determine which credits should be cancelled from the buffer pool in the event of a reversal, meaning high durability credits could be replaced with lower durability credits. Clearly defined fungibility criteria must be set for how credits subject to a reversal event can be compensated for: 1) Expected Effect 2) Vintage 3) Methodology 4) Location. Fungibility is key for facilitating actions to be taken at scale. Fungibility occurs quantitatively by collapsing unique projects into 1 or 2 key determinant factors (e.g. durability period and Expected Effect). Clearly defined fungibility criteria would enable a more robust and transparent mechanism to address loss events and effective end-user claims. [CCPLE+RECS, 354

409. For permanent storage options, where the risk of leakage is less than one percent, buffer pools may become an over-regulation. If a buffer pool is deemed essential, a refundable buffer pool approach should be explored under which, credits allocated to the buffer pool, where no reversal occurs, can be reimbursed. This way, the system remains adaptable, provides a (monetary) incentive for safeguarding permanent storage approaches and promotes the efficient utilisation of carbon credits without impeding progress. Regarding the tools used to mitigate the risk of reversals, especially in relation to risk buffer pools, the SB should rely on rigorous scientific models. [NEUST, 364]

410. For permanent removals that do not result in reversals, any systems of buffer pools or insurance has no value. During the Monitoring period, reversals should be monitored and addressed according to the applicable jurisdiction as well as counted as an emission by the storage company. At the end of the Monitoring period, there should be a transfer of responsibility to the host nation of the geological storage. If there is a reversal after the transfer of responsibility, the host nation should count the reversal as an emission and take measures according the applicable jurisdiction. Applying this approach within the EU, as an example, would rely on the ETS and CCS directives which prescribe that any CO2

emitted from a storage site should be compensated by the purchase of an EU ETS EUA (Annex I activity). [SE, 345]

411. Buffer pools imply double coverage of risks for geological sequestration in certain national contexts and should be restricted to places where national authorities do not cover the risks sufficiently. In case a buffer is used, it should reflect project specific risks and allow for minimal pooling across activity types/categories. Low risk CDR methods should not be penalized by overarching buffer requirements. Furthermore, buffers accounts for CDR activities should only be replenished with CDR credits, as CDR and emission reductions are not fungible. [CW, 358]

412. A concept paper should be prepared, covering all these elements of buffer pool design, drawing on a range of literature and analysing the risks and complexities of different options. Furthermore, as the resilience of a buffer pool is directly linked to the robustness of the risk assessment/ measurement process, it should be conservative and continually updated. [CMW, 360]

413. Once the A6.4ERs are authorized as first transferred ITMOs they cannot be part of the agreed national determined contribution (NDC) of the host country any more, because the international transfer has been authorized. This NDC corresponding adjustment is permanently registered, acknowledging the outcome has been achieved within the country, but the NDC has not accounted it as own mitigation contribution. If, at any point in time in the future, during the crediting period or beyond it, the regulatory conditions or any natural event is detected, such as the host country DNA reports these removed carbon stocks have been lost and the reversals emissions are reported, the A6.4ERs certificates and ITMOs are reported as having lost their currency backing. The final users are required to make the necessary changes in their inventory reporting, according to the system they have in place to make their emissions/removals reporting. [CRCY, 350]

4.5.3.4.6. Treatment of uncancelled/unused buffer ERs

414. Uncancelled ERs should not be automatically cancelled. They should either be returned to the activity proponent or kept in a buffer pool to continue to ensure that project against reversal events beyond the project crediting lifetime. Based on the performance of the project and a risk assessment completed at the end of the crediting period, the amount of credits that need to be maintained in the buffer pool should be reassessed, with some portion of credits returned to the activity proponent depending on the reversal risk at that point in the project lifetime. [NB, 344]

415. Returning the uncancelled ERs to the activity proponent would incentivize good performance. This could be done mid-lifecycle if good risk management is evident, at the end of the activity lifecycle (including any post monitoring requirements), or in line with the host Party NDC timeframe. However, if this timeframe is too long and markets trend towards a newer vintage preference, the incentive is diminished, in which case a cash payment could be provided instead, and the remaining ERs cancelled. [KITA,347] [CFL, 365] [1.5,366]

416. Alternatively, Verra's approach could be considered in which a project becomes eligible to release buffer credits where non-permanence risk rating in the current verification report remains the same or decreases from the previous verification. Release from the buffer occurs when a verification report is presented to the Verra registry and VCU issuance requested. This may only occur where a verification report is issued at least 5 years after

issuance date of the verification report previously submitted. This essentially equates to only releasing credits once every 5 years. [KITA,347]

417. Uncancelled ERs should be returned to the activity proponent in cases where permanence is highly likely, based on a performance assessment. Such returns should follow a flexible rather than pre-determined timeline. [CW, 358] [DG, 361] [CARBI, 376] [PURO, 378]

418. They should be automatically cancelled. “Incentivising Performance” needs to be met with legal liability for default (again which can be supported with an insurance model). [PARIGI, 357]

419. Unused ERs in the buffer pool should be automatically cancelled once monitoring has stopped. No uncancelled buffer ERs should be returned to the proponent. Cancelling unused buffer pool ERs ensures that reversals are better accounted for, given that buffer pools and related insurance systems are already unlikely to be able to guarantee permanence on a required timescale of several centuries. Regularly cancelling unused buffer pool ERs also reduces the risk that the buffer pool incorrectly appears over-capitalised. [CMW, 360]

420. A portion of uncancelled ERs should be cancelled to account for the extended duration in which the offset emissions remain in the atmosphere which is not measured nor monitored after the crediting period. The remaining uncancelled ERs should be returned to the proponent at the end of such monitoring period. This assumes there will be uncancelled ERs, which has been empirically unproven in other buffer pool schemas. The alternative, that there is a negative account balance in the buffer pool, cannot be remediated and the liability is born by the common global citizen. Ongoing management of the buffer pool, including accounting for credits by proponent, by project, and by issuance over decadal timelines, will carry an ongoing cost which too must be funded upfront by the project proponents in order for the system to be sustainable. [SH, 346]

421. The ERs deposited in the buffer pool could be recovered at the end of the project lifetime if no reversal event occurred. Nevertheless, a minimum percentage of ERs should remain within the buffer pool to offset reversals that may occur in the future. To incentivize performance, it could be considered to recover a determined percentage of the deposited ERs if no reversal event happened. The ERs recovered are to be discounted from the buffer pool and there should be a cap to maintain the minimum percentage of ER in the buffer pool. It should have a positive impact on the insurance scheme (if applied), since it is being demonstrated that the performance is complying with the requirements. [STX, 363]

422. To work as a permanent solution for the risk of reversal, the buffer pool of a specific project should be partially returned at each verification event. In the final verification (end of crediting period), a portion of the buffer pool may be returned to the project proponent, while another part may be retained by the UNFCCC to be used as a guarantee for any reversals. Using this approach, the project proponent should not be required to have a back-up insurance (like bank insurances), as it is leaving ERs in the UNFCCC buffer pool. [NBS, 373], [REGREEN, 374]

423. ERs are neither cancelled nor returned to the proponent under normal circumstances. If most projects do not suffer from reversal, the buffer pool grows over time (contributing to overall mitigation in global emissions). In case of reversals, corresponding volumes are cancelled. [PCR, 348]

424. Uncancelled credits should stay in the buffer, thus strengthening the capacity of the buffer over time. [SCC, 356]

425. The credits contributed into the buffer pool should not be returned to the contributors just as the insurance premium collected is not refunded by insurance companies. Coverage of risk is a service that is already delivered to the contributors. The rate of contribution in the future may be reduced for the entities with good track record of avoiding reversals, just as insurance premium does. [SCC, 356]

426. Uncancelled ERs should be held as insurance for future unintentional reversals, as well as insurance against losses of non-certified carbon stores (e.g., through disease or forest fires in old growth forest or by extended drought). These remaining buffer pools may be necessary to handle the reversals that other buffer pools have not been able to redress by themselves. [BF, 362]

427. It depends on the buffer pool model. For example, if a multi-project pool model is utilised, no returns should be done. Compensating activity proponents for avoiding reversals and not using the buffer pool could be done in a different way than by returning ERs. [SYLV, 367]

428. This is not a matter for the methodological framework by SB. [CRCY, 350]

429. Whether the options for treatment and timing are mutually exclusive or could be applied in combination (e.g. returning some but not all ERs to proponent).

430. Treatment and timing of returning ERs from a buffer can be applied in combination. For example, buffer contributions from a project could be lowered or even refunded to reward good risk management and lower than expected losses, once the buffer is above a certain level that maintains sufficient liquidity and capacity. [KITA,347]

431. No need for combinations (see also [the response to] paragraph 18 [of the Questions].). [PCR, 348]

432. Based on the performance of the project and a risk assessment completed at the end of the crediting period, the amount of credits that need to be maintained in the buffer pool should be reassessed, with some portion of credits returned to the activity proponent depending on the reversal risk at that point in the project lifetime. [NB, 344]

433. All uncancelled credits should stay in the buffer. [SCC, 356]

434. The only case some should be returned are where there is ongoing demonstrable low-risk of reversal, such as mineralization. All other types should be subject to automatic cancellation. [PARIGI, 357]

435. No ERs from the buffer pool should be returned to the project proponent, even after the end of the crediting period or monitoring period (see also [the response to] paragraph 18 [of the Questions].). [CMW, 360]

436. The project owners should decide according to their preferences what option to apply for the ER recovery (during project lifetime or at the end of the project cycle). [STX, 363]

437. This problem should be approached from a higher level. The risks and risk management of either buffer or insurance should be matched as efficiently as possible following the principles from accounting that match insurance to assets. Broad principles such as

matching risks duration, nature, and likelihood to instrument or approach should be pursued. [CFL, 365], [1.5,366]

438. In case returns is applied, it should be limited to cases where there is no net loss of carbon stock at the next crediting/permanence (or monitoring period), once the non-reversal is guaranteed over the right timeframe. [SYLV, 367]

439. To work as a permanent solution for the risk of reversal, the buffer pool of a specific project should be partially returned at each verification event. In the final verification (end of crediting period), a portion of the buffer pool may return to the project proponent, while another part may be retained by the UNFCCC to be used as a guarantee for any reversals. Using this approach, the project proponent should not be required to have a back-up insurance (like bank insurances), as it is leaving ERs in the UNFCCC buffer pool. [NBS, 373], [REGREEN, 374]

440. Periodically only. I see no benefit in using end-of-cycle "true-ups". [CARBI, 376]

441. It could be based on the risk assessment updates and the demonstration that no events occurred. It could also be based on activity cycle milestones, but these milestones should be determined by 6.4SB considering the differences among the different project types. [STX, 363]

442. Risk associated to a specific project type with the activity risk assessment. [NB, 344]

443. Permanence guarantees/ likelihood, as presented in the CCS modalities could be the basis. A similar logic should be installed for projects that are not relying on geological sequestration, but present an equally safe and permanent storage approach (E.g. ex situ mineralization). [CW, 358]

444. There should be no basis for returning ERs to proponents, especially for them to be resold- at this point they are not additional and thus do not meet the standards of environmental integrity. [PARIGI, 357]

445. ERs should not be returned to proponents. [SH, 346], [PCR, 348] (For [PCR, 348], see also [the response to] paragraph 18 [of the Questions].

446. No ERs should be returned to project proponents from the buffer pool (see also [the response to] paragraph 18 [of the Questions].). [CMW, 360]

447. At each verification event, the individual activity's risk assessment should be used to estimate the percentage of ERs to be returned to the project proponent. [NBS, 373], [REGREEN, 374]

448. Credits should be returned to the project after the end of the monitoring period. It should not overlay the existing requirements such as EU ETS and EU CCS Directive as it could lead to a greater/double financial burden on CDR companies. [NEUST, 364]

449. Two issues are being conflated here - the scientific principle for quantifying the risk and the third party review/governance board. This is the entire reason the insurance industry is regulated and separate from the assets they register. [CFL, 365], [1.5,366]

4.5.3.4.7. Update and stress testing of buffer pool

450. Buffers should report their coverage levels publicly at least once a year. Along with procedures for buffer contributions, required time frames and any significant losses should all be documented. [KITA,347] [CFL, 365] [1.5,366]

451. Risk-reporting standards and best practices from the asset management industry should be adopted. For example, limiting and reporting on buffer concentration risks within single projects or regions and systematic risks, such as natural catastrophe risks, climate change or political risks. Once the buffer constituents and risk exposure are reported, stress testing under different loss scenarios transparently demonstrates the robustness of the buffer. Regular public reporting on buffer coverage, risks, and stress testing results following asset management industry best practices will ensure transparency and integrity. Adopting risk quantification and modeling standards from insurance can further strengthen oversight. [CFL, 365] [1.5,366]

452. Buffer contributions and stress-testing should occur seasonally to be in line with scientific practice and the precautionary principle of international law given the climatic extremes in future. [PARIGI, 357]

453. The procedures for periodic review and ongoing management of buffer contributions are essential to guarantee an appropriate buffer pool to serve as insurance against reversals. [NBS, 373], [REGREEN, 374]

454. It should regularly undergo stress-testing at least every 3 years to assess the pool's resilience for a range of plausible reversal risk scenarios affecting the activities linked to the pool. Some events, such as occurrence of a high rate of reversals, may require more frequent review. The specific rate of reversals that would trigger a stress test and review could be determined based on analysis of existing practices in carbon crediting and other contexts (the European Central Bank, for instance, conducts annual stress tests). In addition to regular stress-testing, the composition of the buffer pool, including the share of credits by vintage, region and country, activity type, crediting methodology, and specific activity, should be published annually. [CMW, 360]

455. A higher contribution rate may be required in the beginning (> 50 percent in certain cases) and subsequently adjusted downwards if, individually and collectively, the reduced rate is not likely to jeopardize the capacity of the buffer. [SCC, 356]

456. Risk assessment updates should be performed by the proponent at every verification event to evaluate the impact of possible events that occurred and to evaluate if a certain risk is no longer present within the project and/or new risks must be considered. [STX, 363]

457. A differentiation between short durability and high-quality permanent storage allocated credits would be desirable. [NEUST, 364]

458. Procedures should include independent inspection by the SB if auditing reports indicate possible doubt. Stress-testing should be invoked based on a more than 10% departure from predicted sequestration rate in any single annual return period. [CARBI, 376]

4.5.3.4.8. Role of third-party actors including insurance

459. The implementation of buffer pools is a type of risk pooling instrument. [IETA, 311]

460. Insurance by third parties could potentially provide a similar risk pooling service,however to date, insurance providers have offered policies to underwrite credit non-delivery risk on registered project activities, but to the best of our knowledge have not systematically offered policies that underwrite the risk of carbon reversals from carbon sinks and reservoirs of registered project activities (e.g. against the loss of stored carbon from forests or geological stores). Such approaches were previously considered for forestation activities (so-called “iCERs”), which did not achieve widespread support among Parties (e.g. at COP6-bis). They may be complex instruments that could be tied to other forms of insurance products relating to carbon reservoirs (e.g. forest fire risk; geological well risks) that require specialist knowledge to define and elaborate on. However, as such approaches mature and the number of providers who can showcase well-functioning insurance products expand, the SB might reassess their potential. [IETA, 311]

461. Other forms of insurance or guarantees (commercial, sovereign, or otherwise) also be effective in addressing risks of reversals. However, for these instruments to be effective, they would need to meet the same essential criteria as buffer reserves, i.e. clear assignment of primary liability for reversals to market actors, clearly defined risk obligations over discretely defined time horizons, and the avoidance of any moral hazard. Sovereign guarantees, in particular, could be valuable as a backstop to cover reversal liabilities where it is not possible to enforce obligations on private market actors (e.g. if an actor ceases to exist or goes out of business), but should not be the primary means to address reversals because of the moral hazard this would create. [OI, 285]

462. Another approach for addressing reversals in full would be to implement temporary crediting (as was adopted for A/R projects under the Clean Development Mechanism). The effectiveness of temporary crediting approaches depends on the enforceability of credit replacement obligations on the part of buyers. Temporary crediting approaches could also, in principle, be combined with buffer reserves or other insurance mechanisms to cover residual risks where replacement obligations are not enforceable. [OI, 285]

463. Mandatory in-kind insurance ensures that any reversals are immediately compensated for with replacement carbon removals and credit holder remains responsible for the removals to remain sequestered. It also resolves the crediting time component that arises from the uncertainties about the permanence of removal by placing higher insurance charges for higher reversal risks. Key features are listed below:

    (a) It is feasible as losses are measurable, accidental, large losses are possible, and premiums are affordable, just as in other insurable products;

    (b) Any reversals are immediately compensated for with a new removal from the insurance pool, which allows a removal to be credited indefinitely, thus eliminating the need to regulate permanence;

    (c) It is affordable and holds the credit holder liable for as long as it holds the credit; a short (annual) contract to allow new information and changes to be reflected in the insurance price;

    (d) Improves transparency of credit price due to information requirements for insurance;

    (e) Only modest changes are needed to existing insurance regulations. [CPOOL, 215]

464. Insurance of reversal should be made a requirement. [REW, 219]

465. Insurance / guarantees for replacement would be similar to the letter of credit process (when a bank guarantees the risk of default of a company or of another bank). This will need new actors on the market to be involved: insurers and banks. [SYRA, 305]

466. Insurance mechanisms are designed to incorporate information about the statistical risks to an asset, using actuarial techniques. Insurance is one way to guarantee that the liability for any reversal will be addressed in full, and the insurance industry has established ways of assessing risks and developing insurance tools to account for them. Parties may even require proof of insurance as a precondition for authorization of transacting credits, as a way to minimize their own liabilities. [CI, 307]

467. A combination of buffer and insurance products may be considered to cover the reversal risk in totality to enhance the financial resilience of existing buffer schemes, enable high-quality new buffer schemes, increase market liquidity, and build trust. [KITA, 262]

468. Insurance for carbon credits, independent of the buffer, can provide a creditworthy financial wrapper; a smoothing strategy to help manage downside risk of unexpected failure (where actual losses are higher than those modelled); confidence that investors (i.e. carbon buyers) will receive expected returns; and certainty of contractual expectation for underlying asset owners (i.e. carbon sellers). In implementing such an approach, following may be considered:

    (a) The level of buffer pool contributions: insured projects may be allowed to have lower buffer contributions;

    (b) Intentional reversals should be compensated for by the entity that initiated the reversal;

    (c) The treatment of uncancelled buffer ERs: {for geologically sequestered removal projects, the American Carbon Registry accounts for reversals after the end crediting period: 'Reversals post-Project Term are compensated as outlined in the legally binding Risk Mitigation Covenant, filed in the real property records of each county, parish, and other governmental subdivision that maintains real property records, which prohibits any intentional reversal unless there is advance compensation to ACR.' Analogous to a decommissioning fund of a nuclear power plant, an organization could take on the responsibility of the fund and the management of the remaining buffer pool credits};

    (d) ERs cancelled for reversal compensation should be tagged as such in a registry. For transparency, the registry could provide specific information such as the project, the reversal event and if intentional or unintentional, the size of the reversal, the date of the reversal;

    (e) Insurance could play a role if buffer cancellations exceed contributions by managing downside risk of unexpected failure (where actual losses are higher than those modelled). [KITA, 262]

469. Insurance related to reversals should cover not only the cost of re-sequestering any escaped CO_2 but also any potential environmental and safety impacts. This may require a mix of insurance products, for example a buffer pool of carbon credits to address potential reversals combined with a standard insurance product to compensate local communities and/or governments for ecological damage. [44.01, 248]

470. Where alternative reversal mitigation options are applied (such as the replacement of credits from another project), from where projects and vintages credits are sourced from should be declared. If other insurance mechanisms are utilised, transparency regarding the sources of insurance and how such mechanisms would be applied in the case of a reversal are necessary. [BEZERO, 304]

471. It is also important to consider what would happen if a massive reversal event impacting a large-scale activity (or several activities) wipes out the buffer pool, and the project proponent cannot afford to replace all the reversed ERs with ERs from another activity. In such a scenario, a need may arise for legally-enforceable guarantees that the reversed ERs will be replaced. This would imply attributing clear liability over very long time-frames, which is neither clear to determine, nor realistic to guarantee, nor even perhaps possible to enforce. These lead to the question of whether activities with a high reversal risk should even be credited. Can the SB legally require proponents or insurance companies to address reversals if they refuse or are unable to? And if that fails and the liability falls to the host Party, is it fair or even possible for the SB to require the Party to address the reversals? [CMW, 360]

472. A separate add-on commercial insurance would need to be paid for by the project proponent (and perhaps indirectly reflected in the price of the ER and thus passed partially on to the buyer), and is not a simple or compelling solution given the multi-century time frames required as well as the fact that many reversal risks are likely to increase in the future due to climate change, consequently threatening underwriters' long-term financial resilience. For example, in May 2023, State Farm, the largest car and home insurer by premium volume in the US, halted the sale of new home insurance policies in California due in part to "rapidly growing catastrophe exposure" as a result of wildfires. In addition, the risk of a large-scale reversal event (or events) capable of wiping out the entire buffer pool should not be underestimated. If this were to occur it must clearly constitute a trigger to review and completely overhaul its rules on reversals and permanence, but at that stage it may be too late to correct the damage. If buffer pool is to be used as an approach to purportedly guarantee permanence, a robust risk assessment/management approach both standard and activity-level risk ratings that is regularly updated is essential to ensure the resilience of a buffer. If direct credit replacement in combination with insurance/guarantees is considered, a thorough analysis on the risks posed by these different options should be considered. [CMW, 360]

473. Any insurance mechanism must be designed around replacement of removals that is the cost of providing equivalent amount of removal today, rather than financial compensation which is the cost of the original removals in the past. Insurance could be used, for example, as a backup to a well-designed buffer pool (that accounts for climate change risks), e.g., requiring that the buffer pool operator take out reversal replacement insurance from a third-party actor, so as to spread liability. In cases where the risk is quantifiable and stable, governments can potentially act as the insurance provider (e.g., as in national mortgage insurance schemes). One important aspect of any buffer pool or insurance scheme is that it needs to account for the difference between gross carbon storage and net carbon removals. For example, a stand of trees storing 1200 tonnes of carbon may result in only 1000 tonnes of net removal, due to emissions from cultivation, decomposition, monitoring, etc. However, if that stand burns down, and those 1200 tonnes of carbon are re-released into the atmosphere, the correct amount that must be replaced is 1200 tonnes of net removal, which, assuming similar associated emissions would require 1440 tonnes of gross removals. [BF, 362]

474. Insurance companies possess expertise in modelling of risks such as natural disaster and technology breakdown and are best placed to insure ER reversal risk and hold a risk based insurance reserve strengthened by additional capital from risk based capital requirements in order to pay out in ER credits on a one for one basis. Even in the event of unexpected outcomes, insurance companies' reserves are closely regulated and continuously stress tested by insurance regulators to ensure that they are sufficient to compensate for the risks carried by the insurance company. The composition of ERs in an insurer's reserves will also reflect a prudent, diversified portfolio of ERs mirroring the investment management principles implemented by regulated insurers today. In contrast, unregulated carbon credit buffer pools undergo no such testing they are simply an approximation. [CPOOL, 355]

475. A backstop guarantee from the host Party raises new set of problems since it risks passing on all liability to the host Party rather than distributing it between the proponent, the buyer and other private actors. It also raises equity questions since many host Parties may be developing countries with conditional NDCs and more limited resources compared to developed countries, who are likely to be the main source of demand, whether towards their NDC or for use by their companies (OIMP). Therefore, when units are authorised for NDC use, the SB should formulate rules passing on the responsibility for future monitoring and compensation to the acquiring Party, ideally in full, since this can mitigate some of the equity issues detailed (though not all). The buyer Party would hence be liable if a reversal is detected in a project from which it has purchased a unit. This will incentivise the acquiring Party to purchase credits from activities with a lower reversal risk. When units are authorised for OIMP, a different method must be explored for distributing the liability between the buying entity and other private actors, such that the backstop guarantee does not fall entirely to the host Party. [CMW, 360]

476. An insurance scheme could be developed to allow the recover' of reversals. The credits for the insurance could be allocated from the buffer pool account. The insurance scheme could be mandatory depending on the project type and optional for all project types. [STX, 363]

477. Direct replacement guarantees/insurance could be used for reversals beyond the buffer. The risk tool could provide a risk profile based on the aggregated probability specific to the project. A probability threshold could be set by the SB above which it is considered "likely" and should be planned for directly with buffer pools allocated to cover the magnitude of likely loss events specific to the project. Below threshold (lower probability) loss events could then be covered by direct replacement guarantees and/or insurance. [SYLV, 367]

478. The buffer pool should be used to address the reversals as its works like a "insurance" for all projects. Specific bank insurance requirement could make many projects financially unfeasible, as insurances for NBS removal projects may be very costly. [NBS, 373], [REGREEN, 374]

479. For New buffers, insurance can help manage near-term delivery risk of buffers, which is the risk that they do not hit critical scale and/or become insolvent in the timeframes required for their carbon stores to grow. Low-supply, high-durability carbon removal solutions currently lack sufficient buffers. Low supply of this market and differences between types of solutions (for example, biochar vs enhanced weathering vs direct air capture) create difficulties. For new CDR methods, insurance helps prevent too much systematic risk building up (buffer with just one type of CDR). Instead, the risk is shared

across the whole insurance industry hence raising integrity for the whole sector. For existing buffers, insurance can play a supportive role:

(a) It can provide a protective wrapper around the buffer to increase financial resilience and a backstop in the case of catastrophic loss. In a market where the buffers have not yet been widely tested, protection from the insurance industry could be a beneficial tool in the instance of a large -scale loss event.

(b) Climate Action Reserve and American Carbon Registry allow third-party insurance for project developers to enable lower 'premium' payments into the buffer pool. If insurance becomes more widely adopted, it could play a part in increasing market liquidity

(c) Insurers could utilize their long-term asset management experience and risk assessment and claims payment processes, to provide third-party administration of the buffers. Potential benefits could be wider assessment and collaboration in terms of fungibility of carbon for paying 'insurance claims' from the buffer pools to enable more like-for-like replacements, and cost efficiencies in terms of MRV. [KITA,347]

480. Insurance should not be required today as there are no comprehensive insurance products that cover all aspects of this specific request. However, the requirement of insurance could be introduced in the future. As carbon insurance evolved, it can even be used to protect project developers from default by a buyer or investor on a forward purchase with a pay at delivery approach and to protect post project permanence. [KITA,347]

481. While some Carbon Standards, e.g., Climate Action Reserve and American Carbon Registry, allow third-party insurance for project developers to enable lower 'premium' payments into the buffer pool, insurance is not yet a commonly proposed tool. This historically useful approach to risk has crowded out the innovation space for traditional risk management to emerge leading to little incentive for insurance companies to develop insurance products, dMRV specific to this space, and as such there is little insurance currently available. It is important to recognize that an evolved regulatory environment can enable global best risk practices to be applied to carbon risk management with significant outcomes for safer, better carbon risk management. [CFL, 365], [1.5,366]

482. Current practice relies heavily on buffers, limiting innovation in risk management. Insurance brings expertise, data analytics, financial resilience and incentive alignment that could strengthen the system. [CFL, 365] and [1.5,366] recommend:

(a) Allowing flexible, risk-based use of buffers, insurance, guarantees and other mechanisms of risk transfer, diversification, management, monitoring, and governance.

(b) Developing clear guidance on supplemental and mandatory use cases

(c) Ensuring reversals are fully addressed but encouraging diverse protection mechanisms. (See also [their responses to] paragraphs 11 and 14 [of the Questions].) [CFL, 365], [1.5,366]

483. Buffer pool credits are not real credits but are provisional credits, as are the credits in the market that are based on the same storage period. These will become real after the

required length of storage, 100 years for example, is verified. The buffer pool credits can only fill the gaps in continued storage of removals that form the basis of the credits in the market. In the case of no monitoring or walk out by the project proponents, for example, the credits issued must be replaced with permanent real credits such as those from emission reductions or from irreversible removals. [SCC, 356]

484. Insurance is very nascent but needed. Legal liability that is attached with an insurance claim triggering and recovery procedures are vital. [PARIGI, 357]

485. Examples of reversal risk tools in place are:

(a) California's forest offset buffer pool for their cap-and-trade system (substantially undercapitalized relative to the risk of wildfire).

(b) The EU's CO2 Storage Directive allows for the transfer of liability for reversals from geologic CO2 storage to the competent authority, provided all available evidence indicates that the stored CO2 will be completely and permanently contained, and a financial contribution sufficient to cover 30 years of monitoring after the closure of the storage site. [BF, 362]

486. The current practice is the creation of a buffer pool account that is common for all the projects and is integrated by all the discounted credits due to risk management. The removals percentage to be discounted for each project could be a fixed value or could be dependent on a risk assessment. A normal value is around 20% of removals deposited within the buffer account, and these removals cannot be used to be sold in the market. Another tool is an insurance scheme, that allows the project owner to recover some reversals according to specific requirements and criteria. [STX, 363]

487. The risk assessment should be mandatory for all project types, and the insurance scheme could be mandatory depending on project type and threshold given and could be optional for all project types. [STX, 363]

488. Direct credit replacement and insurance are commercial options that are the responsibility of the entities engaging in a transaction on a deal-by-deal basis and should not be the responsibility of the standard or governing body. [NB, 344]

489. Whilst buffer pools have remained the 'status quo' for safeguarding against non-permanence in the voluntary carbon market (VCM), there have been calls for their reform. Issuers have been criticised for adopting the partisan role of risk creator, risk rater and underwriter. In mature financial systems and compliance markets these roles are clearly disaggregated to avoid conflicts of interest. A lack of regulation has also led to arbitrary buffer pool contributions, with little or no scientific justification and/or reference to actuarial or historical data. Another key risk for the self-insurance approach in the VCM is undercapitalisation of buffer pools. In the event that the volume of reversal events exceeds the supply of certificates in the buffer pool, the issuer would encounter 'carbon bankruptcy' i.e. not enough certificates to cover the demand for Event of Carbon Default (EOCDs). [CCPLE+RECS, 354]

490. Today, insurance is not used as a tool to adequately address carbon reversal risk because any insurance maintained by a project developer today produces, in the event of a claim, a cash payout to the project developer. This cash payout may be used to restore damage to the underlying asset, or to mitigate other operational losses, but it does not actually

address the damage, which is that an ER reversal results in the emission of a previously sequestered ton of CO2 back into the atmosphere. [CPOOL, 355]

491. For CCS, which is eligible under the EU ETS, reversal events require a storage operator to address all reversals in full via the cancellation of a corresponding amount of EUA. Additionally, there are provisions to transfer the liability towards national authorities, upon their acceptance. To permit activities in the first place an assessment of financial safeguards, insurances etc., present a firm and central requirement. Within the UNFCCC, the Durban decisions made an incentive for effective long-term storage by allowing buffer credits to be reimbursed to project proponents, upon proof of permanence or a transfer of liabilities to competent authorities. Within voluntary carbon markets, some standards rely on the governmental regulations for geological storage and do not impose further buffer requirements. Others have been requesting buffer deductions that are perceived as overregulation and an additional burden for project developers, as risks are thus hedged twice, once via the VCM operator and once via relevant and competent national authorities. Regardless of the approach, permanence hedging covers all, intentional and unintentional as well as during and beyond crediting period reversals. [CW, 358]

492. the potential risk management approaches for carbon removals drawing on examples from insurance and credit markets include:

(a) Risk retention: Self-insurance by project developers through withholding credits as a buffer; retention pools funded by fees on credit issuance managed by an industry remote regulatory body or recognized re-insurer type entities. Example: catastrophe reserves held by insurance companies to cover large losses

(b) Risk transfer:

(i) Private solutions: insurance policies for specific perils like reversals; insurance wraps for entire projects or portfolios; securitization and credit risk transfer products (CDOs, CDS). Example: mortgage insurance transfers risk from banks to insurers.

(ii) Public-private solutions: public backstops and reinsurance for private market; risk pools with blended public-private capital; public loans or guarantees for higher risk projects. Examples: flood insurance, deposit insurance.

(c) Risk modeling and quantification: collect data and build models to enable risk-based pricing; apply lessons from insured loss models in property insurance; develop open-source models and data repositories. Examples: catastrophe models, credit scoring systems.

(d) Prevention and resilience: improved measurement and monitoring technologies; design buffers and portfolios for diversification; engineer reversal resistance into projects. Examples: building codes, credit risk modelling.

(e) Governance and oversight: st standards for buffer, insurance, disclosures; require stress testing and public reporting; audits and reviews of reversal response plans. Example: Financial regulations like Basel III.

(f) Incentive alignment: return unused buffers to incentivize performance; lower contributions for projects reducing reversal risks. Example: insurance premium discounts for risk mitigation. [CFL, 365], [1.5,366]

493. Project participants should be given the freedom to choose a tool or combination thereof, subject to justification and any additional requirements set by the host party. We note the significant potential and applicability of insurance instruments both as a standalone option and in combination with other tools. In many contexts, insurance instruments used for removals appear to be devoid of many limitations of other instruments used to guarantee the delivery of carbon sequestration projects, such as buffer pools or temporary carbon credits. For example, unlike buffer pools, insurance instruments do not require freezing a significant amount of carbon credits generated by a project and thus incentivize project activities, nor do they lead to major disputes about the nature or longevity of temporary carbon credits, as may happen when structuring a project based on temporary carbon credits. Insurance instruments, differentiated by project location and other specific conditions, provide the most flexibility and risk orientation to address reversal risk and may be used to address other risks in removals beyond reversal. Additionally, with insurance instruments involved, the financial burden connected with the use of any guaranteeing instrument, be it a buffer pool or temporary carbon credits, may be distributed among the project participants more fairly. Lastly, neither buffer pools nor temporary carbon credits provide a solid solution for cases where a project ceases to exist entirely for any unforeseen reason, something which would not affect an insurance-based approach. [ICLRC, 349]

494. Insurance is a market mechanism that should be enabled but not provided by 6.4SB. It should be led/provided by the private sector with 6.4SB ensuring the enabling environment for private insurers to be able to operate. Direct ER replacement, additionally should be an option within a commercial agreement between transacting agents within 6.4, but not a service provided by 6.4SB due to the complexities of cross-project dynamics in replacing credits across a global market. [NB, 344]

495. There must be a way to ensure that insurers are able to handle system level risks, such as mass forest dieback, which could potentially overwhelm an insurance market, e.g., government to be an insurer of last resort in some cases where the risk is still acceptable. Governments would need to ensure the existence of legal infrastructure necessary for credible long-term private law contracts. [BF, 362]

496. Durability of projects should be reflected in the design of insurance. High-durability projects do not need to be audited at the same frequency or with the same mechanisms as lower-durability projects with potentially high anticipated reversals. Insurance practices should be relative to the certainty of the carbon’s long-term removal. [PT, 372]

497. To function, buffer and insurance solutions both require: i) long-term contractual agreements, ii) monitoring period extending at least 20 years after the last credit issuance, and iii) clarity of liability in case of bankruptcy of the proponent, which should fall back to the host country government. [PCR, 348]

498. To implement insurance instruments as a tool for activities involving removals under Article 6.4, several considerations need to be addressed by the SB, including: i) the risks covered by insurance policy; ii) duration of an insurance contract (policy) between an insurance provider and a project participant; iii) possible recipients of the insurance award; iv) possible uses of the insurance award; v) eligibility criteria for insurance providers. Parties could also consider establishing a special fund overseen by the SB (or an independent third party appointed under the UNFCCC). This fund would collect insurance awards paid for applicable projects under relevant circumstances, and allocate the resources received following the approved guidelines. [ICLRC, 349]

499. To ensure that insurance serves as an efficient instrument for increasing the quality of activities involving removals, [ICLRC, 349] lists the following aspects to be considered:

(a) insurance policies must be customized to address the unique risks associated with different activity types;

(b) given the long-term nature of many removals projects, insurance coverage should extend over the project's entire lifecycle, including the monitoring and verification phases, as well as the sequestration phase itself (for a certain amount of time), to ensure the mitigation of the risks mentioned above;

(c) insurance providers, project participants, and scientific communities should collaborate to share data and knowledge regarding the risks, challenges, and successes activities involving removals, which could lead to more accurate risk assessment and premium pricing;

(d) regulators and host countries can play a vital role by providing incentives and regulatory support (e.g., in the form of tax breaks, grants, or favourable policy frameworks) for insurance providers and project participants engaged in greenhouse gas sequestration initiatives. [ICLRC, 349]

500. The need and direct responsibility for direct ER replacement, including insurance or guarantees attributed to the project developer, may be unfair and place all the project risk on the project developer. The use of the buffer approach serves to minimize and share the risk of a specific project, as all projects will retain a portion of the ERs in a buffer pool to be used for replacement to the buyer in case of loss events. [NBS, 373], [REGREEN, 374]It is important that the reversal risk rules established under the Article 6.4 mechanism do not result in extra obligations on storage operators already complying with national requirements, as this could significantly impact their revenue streams. [CCSA, 370], [ZEP, 371]

501. As a carbon mineralization company, it is critical for us to illustrate the low-risk reversal rate of our novel injection technology. The use of direct negative emissions credit replacement or buffer pools is not something we anticipate having to utilize in the development of our company. As we continue to develop our robust verification methodologies, insurance for credits will be increasingly prevalent for all of our stakeholders, including third-party verification and crediting entities, credit customers/purchasers, and technology partners. [CLLA, 375]

502. A thorough analysis should be conducted on these subjects, drawing on a range of literature and analysing the risks and complexities of these options. In addition, feasibilities of various options should be studied, to potentially deliver on longer-term monitoring, for example: i) by applying a top-off fee at issuance that goes to the host Party, and which serves to cover the costs of future monitoring and compensation (the fee could be set depending on the level of reversal risk); ii) and/or by establishing a long-term monitoring system through satellite imagery (and other methods as relevant depending on activity types), managed by the Secretariat, and funded through a share of proceeds levied on the issuance of credits that involve carbon storage, which could be tied to the expected durability /risk rating of an activity. [CMW, 360]

503. The risks associated to reversals should not be a necessary part of the A6.4 methods to determine the A6.4ERs achieved by a project activity based on removals: the methods are used only to determine the ERs associated with the net removals achieved at any

point in time during the crediting period. The reversals may be expected to occur at any point in time at the future, and if they occur, the associated emissions, not only accruing to the CO2 removals achieved by the project activity, but also the emissions from the CO2 removals that have taken place before the start of the project activity, will be monitored and reported as an AFOLU related emissions occurring at the host country, which is not attributable to the project activity, but caused by another drivers of the AFOLU emissions causing agents (e.g. deforestation for intentional or non-intentional causes, like for example land-use changes legally decided and implemented, wild fires, droughts, storms, floods, etc.). These emissions will be reported by the host country at its national inventory and at the Biannual Transparency Report – BTR as part of the NDC implementation process under the Katowice Modalities and Procedures, and at the global stock takes and technical reviews for the national communications that are implemented regularly to all parties of the Paris Agreement. [CRCY, 350]

4.6. Avoidance of leakage

4.6.1. SB 003 Recommendation extract

504. Activity participants shall minimize the risk of leakage and adjust for any remaining leakage in calculations of net removals following relevant provisions to be developed by the Supervisory Body.

4.6.2. Key Issues

505. Leakage Avoidance—Minimize leakage and adjust for any remaining per provisions (SB 004 discussion)

4.6.3. New Proposals

506. Mechanism methodologies shall consider the following principles to avoid leakage:

(a) Mechanism methodologies shall consider all potential sources of leakage associated with the type of mitigation activities and not limit the consideration to a particular boundary (i.e. not be limited to national boundaries); [CMW, 308] [OI, 285]

(b) All material sources of leakage shall be included in the quantification of emission reductions or removals, except where the omission of leakage sources is conservative; [OI, 285]

(c) The estimation of leakage emissions shall be robust and conservative in light of the uncertainties, taking into account the choice of assumptions, models, parameters, data sources, measurement methods, and other factors; [OI, 285]

(d) The consideration of leakage sources shall include, where relevant: upstream or downstream emissions; emission increases due to direct or indirect shifting of activities, services or products; and ecological leakage (e.g. mitigation activities affecting emissions in nearby areas that are hydrologically connected); [OI, 285]

(e) Mechanism methodologies shall establish requirements to minimize any material sources of leakage (e.g. through requirements that avoid leakage); [OI, 285]

(f) Any material remaining leakage shall be estimated and deducted in the quantification of emission reductions or removals. [OI, 285]

507. Carbon leakage has two definitions: (1) it can refer to the relocation of emission-intensive activities from jurisdictions with a higher cost to emit CO2 to jurisdictions with a lower cost to emit, and (2) Carbon leakage can also refer to an increase in fossil emissions outside the boundary of the project caused by the project activity itself. The Article 6.4 Mechanism should be focused on with minimising any potential increase of fossil emission outside the boundary of a project, the second definition of carbon leakage as stated above. [PURO, 322]

508. Avoiding leakage is difficult but steps can be taken to mitigate it. The first key step is careful project design and planning that takes into account potential sources of leakage. This should involve conducting a comprehensive assessment of the local socio-economic and environmental context to understand where leakage may occur. … To mitigate this the project design should include initiatives to support sustainable livelihoods and alternative employment to logging. Linked to that is stakeholder engagement. When people understand and benefit from a project, they are more likely to support it and to refrain from activities that could cause leakage. This could go beyond employment opportunities to direct sharing of revenues from sales of carbon credits. [ASPI, 330]

509. Another way to reduce leakage is by implementing projects on a larger scale. These larger scale projects can cover the entire area in which the leakage may occur, making it easier to control or at least quantify. For instance, in REDD+ projects instead of focusing on a single tract of forest the project could cover an entire jurisdiction such as a county or state, making it harder for deforestation activities to simply switch to another area. [ASPI, 330]

510. Policies and regulation have a role to play in creating disincentives for activities that increase emissions. For example, if a DACCS project were to draw significant amounts of power from the grid, government policies that support the deployment of renewables to make up the shortfall can prevent the deployment of fossil fuels to supply that electricity. [ASPI, 330]

511. One method to quantify leakage is to use mathematical models that predict how emissions might change in response to a project. The most accurate method is through direct monitoring and verification. This often involves the use of remote sensing technologies to detect changes in land use beyond the project boundaries that might point to increased emissions. [ASPI, 330]

512. Another approach is to compare emissions in the project area to a control group and any differences in emissions between the project area and the control area could be attributed to leakage. [ASPI, 330]

513. In some cases market effects must be taken into account. Projects that produce goods or stop the production of certain goods can cause leakage if the production of goods shifts to a different area in order to meet market demand. [ASPI, 330]

4.7. Avoidance of other negative environmental and social impacts

4.7.1. SB 003 Recommendation extract

514. Activity participants shall minimize and, where possible, avoid negative environmental and social impacts of an activity involving removals, including impacts on biodiversity, land and

soils, ecosystem health, human health, food security, local livelihoods, and the rights of indigenous peoples, following requirements to be developed by the Supervisory Body while acknowledging that the enforcement of environmental and social protection laws is a national prerogative of the host Party.

4.7.2. Key Issues

515. At COP27, stakeholders questioned, e.g. optional nature of impact avoidance, key elements missing from possible impacts list, national prerogative caveat and its basis.

516. Minimize and, where possible, avoid per provisions including possible impacts on:

(a) Biodiversity;

(b) Land and soils;

(c) Ecosystem health;

(d) Human health;

(e) Food security;

(f) Local livelihoods;

(g) The rights of the indigenous peoples;

while acknowledging that enforcement of E&S protection laws is a national prerogative (SB 004 discussion).

4.7.3. New Proposals

517. The Supervisory Body shall establish [specific requirements] [a check list of the minimum requirements] for environmental and social safeguards that must be considered by activity proponents in identifying, monitoring and mitigating potential negative environmental and social impacts]. [EU, 59] { the input contains a hierarchical list of requirements}.

518. The Supervisory Body may develop a non-eligible list of activities involving removal activities which do not fulfil the requirements for environmental and social impacts (e.g. short-term rotation monoculture plantations). [EU, 59]

519. In addition to general requirements contained in “Article 6.4 mechanism activity standard”, each mechanism methodology may, taking into account specificities of different removal activity categories or types, develop and include additional requirements for robust environmental and social safeguards. [PACHA, 306]

520. All removal activities are not homogenous or equal as some removal activities do pose harm and risk to human health–especially women’s health and wellbeing–and the environment, as well as violate international or domestic laws, including international human rights commitments. A positive list and/or a negative list on removal activities should be developed specifically for Article 6.4 mechanism. [LESE, 67]

521. The negative list shall comprise removal activities with unproven and high-risk technologies, and could result in negative environmental and social impacts and violations of human rights, including Indigenous Peoples’ rights. [LESE, 67]

522. Depending on the circumstances, jurisdiction, or activity type, the extent to which activities should actively monitor and report on demonstrable social and environmental co-benefits – rather than merely avoiding harms – may also merit consideration. [CCSA, 287]

523. Methodologies should include a monitoring system to measure the avoidance of other negative environmental and social impacts over time and the actions to maximize social welfare throughout the activity implementation. [CFL, 38]

524. An independent body to investigate grievances flagged by peoples and communities negatively affected by carbon crediting projects, and the right of stakeholders such as civil society organisations to appeal decisions of the Supervisory Body should be established. [CG, 269]

525. While the independent grievance redress mechanism will not help avoid negative environmental and social risks, it can play a role in providing remedy if those risks are not avoided and harm occurs. [AAI, 289]

526. The draft recommendations on removals presented by the Supervisory Body to the CMA at COP27 included worrying language related to the avoidance of negative environmental and social risks. This paragraph introduced a caveat on national prerogatives that could undermine both the Supervisory Body's ability to set rules and also the integrity of the Paris Agreement by allowing activities that harm the environment or people from being approved if a country says that it does not enforce a specific environmental or social protection. [CIEL, 50]

527. The CMA requested the SB to "further develop" recommendations on avoidance of other negative environmental and social impacts (para 6(c), decision 3/CMA.3). What we observe is a repetition of the same provisions. This is insufficient and not conducive to sustainable development. We believe that a completely different approach needs to be developed to address environmental and social safeguards. We believe the role of LCIPs should be radically different and play a major role in the design, implementation and monitoring of A6.4 removal activities. [PERSP, 18]

528. We propose that it is insufficient to "minimize impacts, if possible". Further, Local Communities and Indigenous Peoples (LCIPs) should not simply be consulted, but take ownership of A6.4 activities in a larger framework of local sustainable development. [ALLCOT, 48]

529. SB should move away from the traditional concept of "consultation with stakeholders" to requiring "full engagement with LCIPs". "Not only is this a moral and ethical imperative, but it is also strategic to promote sustainability" of land-base removals. Working with local and indigenous organizations must be based on the principles of partnership, program ownership, long-term commitment, flexibility and a multiplicity of actions and solutions. Unless the SB builds these elements into the mechanism there will be an extremely high risk of affecting LCIPs through "green- or land- grabbing". [CCAP, 34]

530. Whilst acknowledging that the enforcement of environmental and social protection laws is a national prerogative of the host Party, it is important to ensure that all activities under the Article 6 Mechanism are aligned with international principles on environmental and social considerations. If a country or region does not have specific guidelines or processes, an impact evaluation before project initiation may be a feasible option. Such evaluation should be verified by a third-party assessor and may lead to the modification or rejection of the project. [IETA, 51]

531. The International Association for Impact Assessment begins its description of Social Impact Assessment with the following: 1. The goal of impact assessment is to bring about a more ecologically, socio-culturally and economically sustainable and equitable environment. Impact assessment, therefore, promotes community development and empowerment, builds capacity, and develops social capital (social networks and trust). 2. The focus of concern of SIA is a proactive stance to development and better development outcomes, not just the identification or amelioration of negative or unintended outcomes. Assisting communities and other stakeholders to identify development goals, and ensuring that positive outcomes are maximized, can be more important than minimizing harm from negative impacts. [JMF, 270]

532. To address this, the SB may draw from the Information Note (paras 178-195). Additionally, we would like to propose the following principles to the SB when improving this section. {the input contains a total of 46 principles/criteria to be applied}. [CCAP, 34]

533. It is recommended to build on the approaches developed in the VCM and REDD+ national programs for how to address these risks. The working group should consider whether i) certain existing methodologies, e.g. CCBs, could be suggested as an accepted approach/methodology to deal with environmental and social risk, and ii) whether it may recommend a list of risks/safeguards (following the REDD+ Cancun safeguards approach) that all removal methodologies would need to address and iii) explore how the requirement for addressing social and environmental risk in removal projects could interoperate with Safeguard Information Systems that countries are developing for REDD+. These approaches require more study – it is advisable for the SB to continue working on the matter of social impacts and safeguards throughout 2023. [IETA, 51]

534. The avoidance of negative environmental and social impacts should consider the full value chain, not just within the operations of the activity, with the same activity boundary as mentioned in the previous point. [SE, 15]

535. Impact assessments, both before and after activities commence, can play a key role in ensuring that environmental and social safeguards are being met. The potential for negative impacts will vary depending on the context and unique circumstances of the activities. Post-activity evaluation and reporting can help document issues and increase credit integrity for other crediting efforts in the future, as new best practices and potential pitfalls are identified and shared. [EDF, 331]

536. Meaningful impact assessments rely on investing in and understanding local environmental and social contexts, particularly of groups whose livelihoods and cultures are deeply intertwined with the landscapes where NCS activities take place. [EDF, 331]

537. Activities may have wide-ranging impacts that must be taken into account. For example, as it scales, direct air capture will require significant land, energy, and other resources. If deployed at the level most modeling indicates is required, one estimate characterizes direct air capture as responsible for a quarter of global energy demand by 2100, and another suggests it could account for 9-14% of electricity in 2075. The type of energy used to power direct air capture matters too—the environmental calculus is very different if these plants are powered by natural gas than if they are powered by renewable energy. [EDF, 331]

538. Any activities credited under the Article 6.4 mechanism must adequately monitor, report, and verify the emissions, calculated on a lifecycle basis, associated with the project and

adequately mitigate the environmental impacts (including impacts on biodiversity, land use, and air and water quality) associated with the activity. [EDF, 331]

539. Third-party monitoring and/or participatory monitoring are essential as monitoring should not only be done by the entity that proposed or implemented the removal activity or even the buyer of the credits. Participatory monitoring involves engaging with those in the area where the project is taking place (i.e., near the forest being conserved or reforested), for example Indigenous Peoples. Similarly, third-party monitoring involves having independent people, some of whom may be living in the project/activity area, but also experts who can review the activity and verify the claims being made. Both are vital as it avoids relying solely on self-reporting or monitoring only by those who stand to benefit from the activity taking place. This is all the more critical in the face of recent studies that have shown that offset credits are not always what they seem and have not actually done what was claimed. [CIEL, 317]

540. CO2 Removal Supplier shall be able to demonstrate Environmental and Social Safeguards and that the Production Facility activities do no significant harm to the surrounding natural environment or local communities. This may be done through one or several of the following:

    (a) Environmental Impact Assessment (EIA)

    (b) Environmental permit

    (c) Other documentation approved by the Issuing Body on the analysis and management of the environmental and social impacts

    (d) When applicable, the Production Facility activities shall be developed with informed consent from local communities and other affected stakeholders and have a policy in place to address potential grievances [PURO, 322]

541. Before any project is initiated, a comprehensive Environmental, Social Impact Assessment (ESIA) should be conducted. This process identifies potential environmental and social risks and impacts (both positive and negative) associated with a proposed project, and provides a plan to mitigate potential negative impacts. [ASPI, 330]

542. In cases where the project does not go as planned, effective monitoring can help to detect any negative impacts at an early stage and take corrective action. Grievance mechanisms provide a way for individuals and communities affected by a project to voice concerns or complaints and have their issues addressed. [ASPI, 330]

543. Negative environmental and social impacts may not occur during a crediting period but arise later in the life of a project/activity and monitoring could help to avoid or minimize these. Thus, a monitoring period cannot be limited to a crediting period [CIEL, 317]

544. Stakeholder Engagement and Free, Prior and Informed Consent (FPIC) are crucial to ensure the rights and interests of local communities are respected. Projects should involve meaningful consultation with all relevant stakeholders, especially indigenous peoples and local communities who are directly impact ed by the project. FPIC is a principle protected by international human rights standards that states that all communities have the right to give or withhold consent to proposed projects that may affect their lands. resources, or territories. [ASPI, 330]

545. Increasing use of satellite and other technological methods of monitoring on or near Indigenous Peoples' territories {is concerning} (Mitchell et al., 2017). These types of monitoring systems violate Free, Prior and Informed Consent (FPIC) because Indigenous Peoples are rarely informed that their territories will be monitored by technologies they are unaware exist. [IEN, 337]

546. Projects should aim to achieve multiple benefits beyond carbon sequestration or emission reduction. This can include benefits like improving local livelihoods, conserving biodiversity, protecting water resources, or maintaining cultural heritage. Projects should ensure that the benefits (not just the costs) are shared with local communities. This could involve financial payments, employment opportunities, or improvements to local infrastructure. Certain areas, such as those with high biodiversity, culturally important lands, or densely populated areas, may be at higher risk for negative impacts. Avoiding projects in these areas can be a way to minimize potential harm. [ASPI, 330]

547. Since crediting is fundamentally an effort to provide incentives to suppliers for the implementation of NCS activities, the ethical and effective distribution of these incentives is a core element of high-integrity crediting. Practical considerations that suppliers should take into account when designing equitable processes and outcomes include, but are not limited to:

    (a) Direct allocation of funds and/or other benefits to IPLCs, and especially women, whenever possible.

    (b) Where direct allocation of funds is not possible, processes to ensure that the costs of transactions and intermediary services are transparent, and fully understood and agreed upon in advance by all parties.

    (c) Recognition of the critical role IPLCs play in forest protection, and compensation levels that fairly value these contributions.

    (d) Fair and effective dispute resolution mechanisms that are perceived as fair and impartial. [EDF, 331]

548. Establishment of a robust and accessible independent grievance redress mechanism that can provide remedy to those harmed by any activities registered by the Article 6.4 Supervisory Body, and address fraud, misrepresentation, or greenwashing related to the generation, use, or exchange of an Article 6, paragraph 4, emission reduction (A6.4ER) is critical especially if negative environmental & social impacts are not avoided [CIEL, 317]

549. It is also essential that an independent grievance mechanism is in place prior to any article 6.4 mechanism activities taking place, to help provide a remedy if those risks that are not avoided and harm occurs. For this grievance process to be effective, the 6.4 independent grievance redress mechanism must be aligned with the UN Guiding Principles on Business and Human Rights effectiveness criteria, including that it be legitimate, accessible, equitable, transparent, predictable, rights-based, and a source of continuous learning. [CLARA, 316]

550. In many cases there are international standards such as the UN's REDD+ Safeguards or the world Bank's Environmental and Social Framework provide guidelines for avoiding and mitigating negative impacts. These can include measures to protect biodiversity, ensure the rights of local communities, and prevent displacement or land grabbing. [ASPI, 330] [EDF, 331]

551. Ensuring that all activities respect human rights and the rights of Indigenous Peoples is core to avoiding negative environmental and social impacts as well as having sustainable outcomes. And it is critical that there are not caveats on national prerogatives, such as those included in the recommendations presented to the CMA at COP27, that could undermine both the Supervisory Body's ability to set rules and also the integrity of the Paris Agreement by allowing activities that harm the environment or people from being approved if a country says that it does not enforce a specific environmental or social protection. [CIEL, 317]

5. References

Table 3 Parties that responded to the CMA call for public input

Submission date	Party	Acronym	Reference number	Document URL
22/05/2023	Russian Federation	RU	53	https://shorturl.at/houY5
09/05/2023	United Kingdom	UK	54	https://shorturl.at/cquDS
02/05/2023	Papua New Guinea on behalf of Coalition for Rainforest Nations	PN	55	https://shorturl.at/pACH3
17/04/2023	Norway	NW	56	https://shorturl.at/hjVY0
07/04/2023	Republic of Korea	ROK	57	https://shorturl.at/nMZ24
23/03/2023	Colombia on behalf of Chile, Colombia, Guatemala, Panama, Paraguay, and Peru	CO	58	https://shorturl.at/jwW03
15/03/2023	European Union on behalf of European Union	EU	59	https://shorturl.at/gEY25
01/06/23	Brazil on behalf of Argentina, Brazil and Uruguay (ABU)	ABU	60	https://bit.ly/44w4CCh

Table 4. Stakeholders that responded to the calls for public input

Submission date	Stakeholder	Acronym	Reference number	Document URL
04/10/22	Hayes Limnology Lab: Ocean alkalinity enhancement using electrolysis	HLB	1	https://bit.ly/40Cu7kx
06/10/22	Planetary Technologies: Ocean alkalinity methods	PT	2	https://bit.ly/3XadYQB
04/10/22	GCC: Inputs on Annex 5 to the SB002 annotated agenda	GCC	4	https://bit.ly/40Cu7kx
06/10/22	Winrock: ACR & ART input-6.4 removals public comment	ACR	8	https://bit.ly/3XadYQB

Submission date	Stakeholder	Acronym	Reference number	Document URL
10/10/22	Wetlands International: Inputs on removal activities	WI	9	https://bit.ly/40HbE6A
11/10/22	Verdane: Response to UNFCCC Article 6.4 call	VA	10	https://bit.ly/3K9v0vp
11/10/22	TREEO: Review Article 6.4 mechanism	TREEO	11	https://bit.ly/3YC8lMe
11/10/22	TNC: Removals and REDD-plus	TNC	12	https://bit.ly/3x4BoMw
11/10/22	Timber Finance Initiative: Engineered timber as carbon storage	TFI	13	https://bit.ly/40xawCi
11/10/22	The HBAR Foundation: Response of THF to UNFCC Calls for Input on A6.4M	HBAR	14	https://bit.ly/3I9SmzB
11/10/22	Stockholm-Exergi: Contribution by Stockholm Exergi in response to UNFCCC's Call for input 2022	SE	15	https://bit.ly/3DNo7vp
11/10/22	Running Tide: Article 6.4 input for ocean-based carbon removal	RT	17	https://bit.ly/3x7rvxO
11/10/22	Perspectives: Input on removal activities under A6.4 Mechanisms	PCR	18	https://bit.ly/3Ia9zsk
11/10/22	Orsted: Peatlands and BECCS	OD	19	https://bit.ly/40yUYy5
11/10/22	Instituto Acao Verde: Deforestation Double Counting	IAV	22	https://bit.ly/3DSjYXr
11/10/22	ICLRC: Response to call for input 2022-Activities involving removals	ICLRC	24	https://bit.ly/3I5SFeC
11/10/22	GCCSI: Submission to the A6.4 Supervisory Body Call for Inputs 2022 - SB002-A05	GCCSI	25	https://bit.ly/3x6y6IF
11/10/22	Evident C-capsule: Inputs on removal activities	ECP	27	https://bit.ly/3YEn49r
11/10/22	Drax: Response to the A6 consultation	DG	29	https://bit.ly/3x5deRV
11/10/22	DAC Coalition: Recommendations from Direct Air Capture Coalition	DACC	30	https://bit.ly/3lh4aa6

Submission date	Stakeholder	Acronym	Reference number	Document URL
11/10/22	Climeworks: Response to the documents regarding removals under Article 6.4	CW	31	https://bit.ly/3ljxZH0
11/10/22	Clean Air Task Force: CATF Article 6.4 Comments	CATF	32	https://bit.ly/3RKAs9E
11/10/22	Cercarbono: Additionality and double counting	CCO	33	https://bit.ly/40CC4Gp
11/10/22	Center for Clean Air Policy: CCAP Submision Annex 5 to the SB002	CCAP	34	https://bit.ly/3JVyAsH
11/10/22	Carbon Recycling: Contributions to the Information Note document	CRCY	36	https://bit.ly/3DRdqrO
11/10/22	Carbon Finance Labs: UNFCCC Article 6.4 Contribution	CFL	38	https://bit.ly/40JszFp
11/10/22	Carbon Engineering: Role of DACCS removal activities	CE	39	https://bit.ly/3IgnITE
11/10/22	Carbon Business Council: Inputs on removal activities	CBC	40	https://bit.ly/3HI8yq5
11/10/22	CARBFIX: Subsurface mineralization of CO_2	CARBFIX	41	https://bit.ly/3YCZzNZ
11/10/22	BeZeroCarbon: Consultation response	BZC	43	https://bit.ly/3x5DD27
11/10/22	Bellona: Response to CDR call for input	BF	46	https://bit.ly/3ln9Mjj
11/10/22	Arcusa S: Call for input 2022 - activities involving removals under the Article 6.4 Mechanism	SA	47	https://bit.ly/3lh7QZs
11/10/22	ALLCOT: Inputs on Land-Based Removals	ALLCOT	48	https://bit.ly/3Xl8hPz
11/10/22	Center for International Environmental Law: CIEL Submission on Article 6.4 Removals (late submission)	CIEL	50	https://bit.ly/3XjZ4XQ
11/10/22	IETA: Removals input for 6.4SB (late submission)	IETA	51	https://bit.ly/3xbZcxS
13/10/22	MDB Working Group comments on the annotated agenda of the third meeting of the Supervisory Body	MDB WG	53	https://bit.ly/3ljtzjA

Submission date	Stakeholder	Acronym	Reference number	Document URL
14/10/22	Office of the United Nations High Commissioner for Human Rights (OHCHR) on behalf of The Office of the UN High Commissioner for Human Rights	OHCHR	60	https://bit.ly/40GSsG8
27/10/22	Action Group on Erosion Technology and Concentration (ETC group) on behalf of Action Group on Erosion Technology and Concentration (ETC Group)	ETC	61	https://bit.ly/3NorLBk
15/03/23	Oeko-Institut e.V. Institute for Applied Ecology on behalf of Stockholm Environment Institute, University of Edinburgh and Oeko-Institut	OI	62	https://shorturl.at/axJPT
10/04/23	Bellona Foundation (BF) on behalf of Bellona Foundation	BF	63	https://shorturl.at/bezFJ
21/03/23	Center for International Environmental Law (CIEL)	CIEL	64	https://shorturl.at/ciuB7
17/03/23	Heinrich Böll Foundation (HBF)	HBL	65	https://shorturl.at/girL5
16/03/23	Global Carbon Capture and Storage Institute on behalf of The Global CCS Institute	GCCSI	66	https://shorturl.at/xCVZ5
16/03/23	LIFE Education Sustainability Equality (LESE) on behalf of Women and Gender	LESE	67	https://shorturl.at/hFU09
15/03/23	Carbon Capture and Storage Association (CCSA)	CCSA	68	https://shorturl.at/fozV2
15/03/23	ActionAid International on behalf of CLARA submission, submitted by ActionAid International	CLARA	69	https://shorturl.at/aezSW
15/03/23	International Emissions Trading Association (IETA)	IETA	70	https://shorturl.at/RWY57
15/03/23	WWF	WWF	71	https://shorturl.at/wFL15
15/03/23	Institute for Agriculture and Trade Policy (IATP)	IATP	72	https://shorturl.at/coIX5

Submission date	Stakeholder	Acronym	Reference number	Document URL
15/03/23	Friends of the Earth International on behalf of Friends of the Earth International	FOE INT	73	https://shorturl.at/sFRUZ
15/03/23	Institute for Governance and Sustainable Development (IGSD)	IGSD	74	https://shorturl.at/aqy27
15/03/23	The University of Texas at Austin	UT	77	https://rb.gy/fwzn4
15/03/23	Indigenous Education Network of Turtle Island (IENTI/IEN) on behalf of Indigenous Environmental Network (IEN)	IEN	78	https://rb.gy/rliin
15/03/23	Carbon Market Watch (CMW) on behalf of Carbon Market Watch (CMW)	CMW	78 (a)	https://rb.gy/18qiq
14/03/23	Plymouth Marine Laboratory (PML)	PML	79	https://rb.gy/03i3m
14/03/23	Environmental Defense Fund (EDF) on behalf of Environmental Defense Fund, Conservation International, The Nature Conservancy, Wetlands International, Rare, Ocean Conservancy, Ocean & Climate Platform, National Wildlife Federation	EDF	80	https://rb.gy/p2aah
14/03/23	Stockholm Exergi	SE	81	https://rb.gy/2kwcr
14/03/23	Drax Group	DG	82	https://bit.ly/3MU9hHd
20/04/23	Friends of the Earth Germany/ BUND	FOE + BUND	83	https://bit.ly/3NdOa43
31/03/23	Friends of the Earth England, Wales and Northern Ireland	FOE UK	84	https://bit.ly/43HiyJJ
27/03/23	Carbon Finance Lab	CFL	85	https://bit.ly/45QmfyE
22/03/23	AirCapture and Denominator	AD	86	https://bit.ly/43Ei3js
17/03/23	IEAGHG	IEAGHG	88	https://bit.ly/43los3x
17/03/23	Jack Roberts	JR	89	https://bit.ly/3NaOjp6
17/03/23	Jason Demeny	JD	90	https://bit.ly/3OVS1Er
22/05/23	Thoralf Gutierrez (Sirona Tech)	TG	91	https://shorturl.at/mqvLU

Submission date	Stakeholder	Acronym	Reference number	Document URL
22/05/23	Richard Edwards (Clo Carbon Cymru)	CLO	92	https://shorturl.at/cgrJU
22/05/23	Paul Halloran (University of Exeter)	UOEX	93	https://shorturl.at/gv036
22/05/23	CarbonRun	CR	94	https://shorturl.at/moLUZ
22/05/23	Inplanet GmbH	IP	95	https://shorturl.at/kwKPT
22/05/23	Inplanet GmbH	IP	95	https://shorturl.at/cST15
22/05/23	Prof. Ning Zeng (University of Maryland)	UMD	96	https://shorturl.at/xKW89
22/05/23	Tim Isaksson	TI	97	https://shorturl.at/aoMQS
22/05/23	Planetary Technologies	PT	98	https://shorturl.at/cdfTY
22/05/23	Paolo Piffaretti (Carbonx)	CX	99	https://shorturl.at/fyFM3
22/05/23	David Andersson (ECOERA AB)	ECOERA	100	https://shorturl.at/dHRV5
22/05/23	Adam (Zopeful Climate)	ZC	101	https://shorturl.at/xyzDO
22/05/23	Hanna Ojanen (Carbonculture)	CCULT	102	https://shorturl.at/svZ05
23/05/23	Tony S. Hamer (GHG PATS)	PATS	103	https://shorturl.at/efBKL
22/5/2023	Carbon-Based Consulting LLC	CB	104	https://shorturl.at/ehzN3
23/05/23	Carbon Removal India Alliance (CRIA)	CRIA	105	https://shorturl.at/guLX1
23/05/23	BlueSkies Minerals Inc.	BS	106	https://shorturl.at/ntxFS
23/5/2023	Carbon Business Council	CBC	107	https://shorturl.at/cyER8
24/05/23	Kaja Voss (Inherit Carbon Solutions AS)	ICS	108	https://shorturl.at/FRW15
24/05/23	Lead authors of the State of Carbon Dioxide Removal Report	SCDRR	109	https://shorturl.at/jnL47
24/05/23	Cella	CLLA	110	https://shorturl.at/aDEH1
24/05/23	Stockholm Exergi	SE	111	https://shorturl.at/fwIV5
24/05/23	Plymouth Marine Laboratory	PML	112	https://shorturl.at/aezDH
24/05/23	Injy Johnstone	IJ	113	https://shorturl.at/iIV46
24/05/23	OpenAir	OAIR	114	https://shorturl.at/tvyU6
24/05/23	OXO Earth	OXO	115	https://shorturl.at/dgACL
24/05/23	Keep Our Sea Chemical Free	KOSCF	116	https://shorturl.at/aqrS5
26/05/23	Marginal Carbon AB	MC	117	https://shorturl.at/KW458
27/05/23	Charm Industrial	CHI	118	https://shorturl.at/hjGR7

Submission date	Stakeholder	Acronym	Reference number	Document URL
24/05/23	Carbon Finance Labs	CFL	119	https://shorturl.at/iBFN0
24/05/23	Dr. Robert Chris	DRCS	120	https://shorturl.at/egqFK
24/05/23	Stockholm Environment Institute; University of Edinburgh; Oeko-Institut	SEI+	121	https://shorturl.at/gILT7
25/05/23	Linden Trust for Conservation	LTC	122	https://shorturl.at/aqwU6
27/05/23	1PointFive	1.5	123	https://shorturl.at/eOQV0
28/05/23	Seafields	SF	124	https://shorturl.at/eOQV0
25/05/23	Microsoft Inc.	MS	125	https://shorturl.at/guxA4
24/05/23	Climeworks AG	CW	126	https://shorturl.at/tuS04
24/05/23	Equatic	EQ	127	https://shorturl.at/bsGOV
24/05/23	IEAGHG	IEAGHG	128	https://shorturl.at/nBKSY
27/05/23	Business Council for Sustainable Energy	BCSE	129	https://shorturl.at/bINWY
28/05/23	Business Council for Sustainable Energy	BCSE	129	https://shorturl.at/vwP49
25/05/23	Running Tide	RT	130	https://shorturl.at/bitEP
25/05/23	Negative Emissions Platform and other co-signatories	NEP	131	https://shorturl.at/lrRY8
25/05/23	Phil Kithil	PK	132	https://shorturl.at/HNRWZ
25/05/23	CCU Alliance	CCU	133	https://shorturl.at/bzFN2
25/05/23	Timber Finance	TFI	134	https://shorturl.at/iwKPW
25/05/23	Air Capture	AC	135	https://shorturl.at/lwIJP
25/05/23	Mati Carbon Removals	MCR	136	https://shorturl.at/wFGU6
25/05/23	Center for Negative Carbon Emissions	CNCE	137	https://shorturl.at/enoGI
20/05/23	CarbonPlan	CP	138	https://shorturl.at/efoKU
25/05/23	Captura	CAPT	139	https://shorturl.at/cuHMU
14/05/23	UNDO	UNDO	140	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Captura.pdf
25/05/23	Neustark AG	N-AG	141	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_UNDO.pdf
25/05/23	44.01	44.01	142	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_NeustarkAG.pdf

Submission date	Stakeholder	Acronym	Reference number	Document URL
25/05/23	IETA	IETA	143	https://unfccc.int/sites/default/files/resource/SB005_call_for-input_4401.pdf
25/05/23	Carbon Direct.Inc	CD	144	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_International%20Emissions%20Trading%20Association%20%28IETA%29.pdf
25/05/23	The Doers Club	TDC	145	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Carbon%20Direct%20Inc.pdf
25/05/23	Drax Group	DG	146	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Doers%20Club.pdf
25/05/23	Carbfix	CARBFIX	147	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Drax%20Group.pdf
25/05/23	Puro.earth	PURO	148	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Carbfix.pdf
25/05/23	CO2RE Hub	CO2RE	149	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Puro%20Earth.pdf
25/05/23	Swiss Lenten Fund	SLF	150	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_CO2RE%20Hub%20.pdf
25/05/23	Coalition for Negative Emissions	CNE	151	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_SwissLenten_Fund.pdf
25/05/23	Climate Analytics GmbH	CA	152	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Coalition%20for%20Negative%20Emissions.pdf
25/05/23	Climate Action Platform Africa	CAPA	153	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Climate%20Analytics%20gGmbH.pdf
25/05/23	The Bioenergy Association of Finland	BEAF	154	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Climate%20Action%20Platform%20Africa.pdf

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25/05/23	Zero Emissions Platform	ZEP	155	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Bioenergy%20Association%20of%20Finland.pdf
25/05/23	Leefmilieu	LU	156	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Zero%20Emissions%20Platform.pdf
25/05/23	Carbon Gap	CG	157	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Leefmilieu.pdf
25/05/23	Orsted	ORST	158	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_CarbonGap.pdf
25/05/23	The Bellona Foundation	BF	159	https://unfccc.int/sites/default/files/resource/SB005-call_for_input_%C3%98rsted.pdf
25/05/23	Fern	FERN	160	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_The%20Bellona%20Foundation.pdf
25/05/23	Carbon Capture and Storage Association	CCSA	161	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Fern.pdf
25/05/23	Dogwood Alliance	DA	162	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Carbon%20Capture%20and%20Storage%20Association.pdf
25/05/23	CCS+ Initiative	CCSI	163	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_DogWood%20Alliance%20.pdf
25/05/23	Stripe Climate & Shopify	SCS	164	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_CCS%2B%20Initiative.pdf
25/05/23	Carboniferous	CF	165	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Stripe%20Climate%20%26%20Shopify.pdf
25/05/23	National Wildlife Federation	NWF	166	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Carboniferous.pdf

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25/05/23	KLIMPO	KLIMPO	167	https://unfccc.int/sites/default/files/resource/SB005_call_for-input_National%20Wildlife%20Federation.pdf
24/05/23	Direct Air Capture Coalition	DACC	168	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_KLIMPO.pdf
25/05/23	Octavia Carbon	OC	169	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Direct%20Air%20Capture%20Coalition.pdf
25/05/23	Aspiration	ASPI	170	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Octavia%20Carbon.pdf
25/05/23	Global CCS Institute	GCCSI	171	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Aspiration.pdf
25/05/23	Carbon Capture Inc.	CCI	172	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Global %20CCS%20Institute.pdf
24/05/23	Biofuelwatch	BW	173	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_CarbonCapture%20Inc.pdf
25/05/23	Carbon Capture Coalition	CCC	174	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Biofuelwatch.pdf
25/05/23	Environmental Defense Fund	EDF	175	https://unfccc.int/sites/default/files/resource/SB005_call_for-input_Carbon%20Capture%20Coalition.pdf
25/05/23	Paebbl	PBL	176	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Environmental%20Defense%20Fund.pdf
24/05/23	EFI Foundation	EFIF	177	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Paebbl.pdf
25/05/23	Recarb	RB	178	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_EFI%20Foundation.pdf

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25/05/23	World Resources Institute	WRI	179	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_EFI%20Foundation.pdf
25/05/23	Clean Air Task Force (CATF)	CATF	180	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_World%20Resources%20Institute.pdf
25/05/23	Edison Electric Institute (EEI)	EEI	181	https://unfccc.int/sites/default/files/resource/SB005_call_for_inputCleanAirTaskForceCATF.pdf
24/05/23	Ocean Visions	OV	182	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Edison%20Electric%20Institute%20%28EEI%29.pdf
25/05/23	John M. Fitzgerald	JMF	183	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Ocean%20Visions.pdf
25/05/23	Prof. William R Moomaw (Tufts University)	WRM	184	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_JohnMFitzgerald.pdf
26/05/23	PD Forum	PDF	185	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Prof%20William%20R%20Moomaw%20Tufts%20University.pdf
26/05/23	CIBOLA Partners	CIBO	186	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_PD%20Forum.pdf
25/05/23	Heirloom	HM	187	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_CIBOLA%20PARTNERS%20v2.pdf
25/05/23	Perspectives Climate Research GmbH	PERSP	188	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Heirloom.pdf
25/05/23	Carbon Engineering	CE	189	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Perspectives%20Climate%20Research.pdf
25/05/23	Boston Consulting Group	BCG	190	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Carbon%20Engineering.pdf

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26/05/23	Mary S. Boot, Partnership for Policy Integrity and Chad Hansen, John Muir Project	PPI	191	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Boston%20Consulting%20Group.pdf
25/05/23	Nasdaq Stockholm	NSQ	192	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_MaryBooth_ChadHansen.pdf
25/05/23	Michael Hayes	MHS	200	https://unfccc.int/sites/default/files/resource/SB005_call_for_input_Nasdaq%20Inc..pdf
09/06/23	Blueskiesminerals.inc	BSM	201	https://unfccc.int/sites/default/files/resource/MichaelHayes.pdf
12/06/23	Seal Research Trust	SRT	202	https://unfccc.int/sites/default/files/resource/BlueSkiesMinerals.pdf
14/06/23	CarbonRun	CR	203	https://unfccc.int/sites/default/files/resource/SealResearchTrust.pdf
15/06/23	Roberto Rochadelli (fupef)	RBI	204	https://unfccc.int/sites/default/files/resource/CarbonRun.pdf
15/06/23	Sky Harvest Carbon (Will Clayton)	SH	205	https://unfccc.int/sites/default/files/resource/RobertoRochadelli.pdf
15/06/23	NovoCarbo	NC	206	https://unfccc.int/sites/default/files/resource/Sky_Harvest_Carbon.pdf
15/06/23	Capture6	CAP6	207	https://unfccc.int/sites/default/files/resource/Novocarbo.pdf
15/06/23	Finnwatch	FNW	208	https://unfccc.int/sites/default/files/resource/Capture6.pdf
16/06/23	ECOERA	ECOERA	209	https://unfccc.int/sites/default/files/resource/Finnwatch.pdf
16/06/23	OpenAir	OAIR	210	https://unfccc.int/sites/default/files/resource/ECOERA.pdf
16/06/23	Carbon Business Council	CBC	211	https://unfccc.int/sites/default/files/resource/OpenAir.pdf
16/06/23	Rick Berg (Nori.inc)	NORI	212	https://unfccc.int/sites/default/files/resource/CarbonBusinessCouncil.pdf

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16/06/23	Thomas Hoffmann (Decarbo Engineering GmbH)	THN	213	https://unfccc.int/sites/default/files/resource/NoriInc.pdf
16/06/23	Timber Finance	TFI	214	https://unfccc.int/sites/default/files/resource/DecarboEngineering.pdf
16/06/23	CarbonPool	CPOOL	215	https://unfccc.int/sites/default/files/resource/TimberFinance.pdf
16/06/23	OceanForesters	OF	216	https://unfccc.int/sites/default/files/resource/CarbonPool.pdf!
17/06/23	Takachar	TAK	217	https://unfccc.int/sites/default/files/resource/OceanForesters.pdf
17/06/23	Carbo Culture	CCE	218	https://unfccc.int/sites/default/files/resource/Takachar.pdf
18/06/23	Rewind.earth	REW	219	https://unfccc.int/sites/default/files/resource/CarboCulture.pdf
18/06/23	Clean Air Tech Limited	CATL	220	https://unfccc.int/sites/default/files/resource/Rewindearth.pdf
18/06/23	Elitelco	ELI	221	https://unfccc.int/sites/default/files/resource/CleanAirTech.pdf
18/06/23	Otherlab	OLAB	222	https://unfccc.int/sites/default/files/resource/Elitelco.pdf
18/06/23	Carbon Click, S.A. de C.V	CCL	223	https://unfccc.int/sites/default/files/resource/Otherlab.pdf
18/06/23	Arca	ARC	224	https://unfccc.int/sites/default/files/resource/CarbonClick.pdf
19/06/23	AirMiners	AMN	225	https://unfccc.int/sites/default/files/resource/Arca.pdf
19/06/23	Seaweed Generation	SWG	226	https://unfccc.int/sites/default/files/resource/AirMiners.pdf
19/06/23	Max Planck Institute for Biogeochemistry	MPI	227	https://unfccc.int/sites/default/files/resource/SeaweedGeneration.pdf
19/06/23	Carbon Mineralization Flagship Center	CNF	228	https://unfccc.int/sites/default/files/resource/MaxPlanckInstitute.pdf
19/06/23	Green East Master Ltd	GEM	229	https://unfccc.int/sites/default/files/resource/CarbonMineralizationCenter.pdf

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19/06/23	The Charles Darwin Rescue Plan	CDR	230	https://unfccc.int/sites/default/files/resource/GreenEastMaster%2C.pdf
19/06/23	International Biochar Initiative	IBI	231	https://unfccc.int/sites/default/files/resource/CharlesDarwinRescuePlan.pdf
19/06/23	CarbonHemp Blo.Inc	CHB	232	https://unfccc.int/sites/default/files/resource/InternationalBiocharInitiative.pdf
19/06/23	CCS+ Initiative	CCSI	233	https://unfccc.int/sites/default/files/resource/CarbonHempBlockchain.pdf
19/06/23	Microsoft	MS	234	https://unfccc.int/sites/default/files/resource/CCS%2BInitiative.pdf
19/06/23	ecoLocked GmbH	ELG	235	https://unfccc.int/sites/default/files/resource/Microsoft.pdf
19/06/23	University of Hamburg	UOH	236	https://unfccc.int/sites/default/files/resource/EcoLocked.pdf
19/06/23	German Biochar Association	GBA	237	https://unfccc.int/sites/default/files/resource/UniversityHamburg.pdf
19/06/23	Omega Terraform	OT	238	https://unfccc.int/sites/default/files/resource/GermanBiocharAssociation.pdf
19/06/23	Carbon Lockdown Project	CLP	239	https://unfccc.int/sites/default/files/resource/OmegaTerraform.pdf
19/06/23	Carbofex Oy	CFO	240	https://unfccc.int/sites/default/files/resource/CarbonLockdownProject.pdf
19/06/23	Everest Carbon Inc	ECI	241	https://shorturl.at/ghkV5
19/06/23	Dead Battery Depot.ltd	DBD	242	https://shorturl.at/eBES3
19/06/23	CROPS Carbon International LTD	CROPS	243	https://shorturl.at/erGT2
19/06/23	Stockholm Exergi	SE	244	https://shorturl.at/qGMRV
19/06/23	Carbonfuture	CFUT	245	https://shorturl.at/aeCMY
19/06/23	C-Capsule	CCPLE	246	https://shorturl.at/uMOQT
19/06/23	Captura	CAPT	247	https://shorturl.at/luJK3
19/06/23	44.01	44.01	248	https://shorturl.at/cKS28
19/06/23	XPRIZE	XPZ	249	https://shorturl.at/qBQW3
19/06/23	Skyrenu Technologies	STECH	250	https://shorturl.at/dpPS1
19/06/23	Carbuna AG	CAG	251	https://shorturl.at/dALNU

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19/06/23	The Bellona Foundation	BF	252	
19/06/23	Noya PBC	NPBC	253	https://shorturl.at/dmrCF
19/06/23	Equatic	EQ	254	https://shorturl.at/dvHV8
19/06/23	IATA and Airbus	IATA	255	https://shorturl.at/xV078
19/06/23	Rivotto	RTTO	256	https://shorturl.at/avwNP
19/06/23	U.S. Biochar Coalition	USBC	257	https://shorturl.at/avxV7
19/06/23	FEWCOOP SA	FEWCOOP	258	https://shorturl.at/adlGL
19/06/23	Cella Mineral Storage, Inc	CLLA	259	https://shorturl.at/eqHK4
19/06/23	Rethinking Removals Doers Club	RRDC	260	https://shorturl.at/hnBUV
19/06/23	Eyob Tenkir Shikur	ETS	261	https://shorturl.at/uIVY9
19/06/23	Kita	KITA	262	https://shorturl.at/iCOY2
19/06/23	The Zero Emissions Platform	ZEP	263	https://shorturl.at/pqxK7
19/06/23	Black Bull Biochar (BBB)	BBB	264	https://unfccc.int/sites/default/files/resource/Kita.pdf
19/06/23	DEMOcritUS	DEMO	265	https://unfccc.int/sites/default/files/resource/ZeroEmissionsPlatform.pdf
19/06/23	RedCarbon	RC	266	https://unfccc.int/sites/default/files/resource/BlackBullBiochar.pdf
19/06/23	IEAGHG	IEAGHG	267	https://unfccc.int/sites/default/files/resource/RedCarbon.pdf
19/06/23	Octavia Carbon	OC	268	https://unfccc.int/sites/default/files/resource/IEAGHG.pdf
19/06/23	Carbon Gap	CG	269	https://unfccc.int/sites/default/files/resource/OctaviaCarbon.pdf
19/06/23	John M. Fitzgerald	JMF	270	https://unfccc.int/sites/default/files/resource/CarbonGap.pdf
19/06/23	Drax Group Plc	DG	271	https://unfccc.int/sites/default/files/resource/JohnM_Fitzgerald.pdf
19/06/23	ARCTECH USA	AU	272	https://unfccc.int/sites/default/files/resource/DraxCorporateLimited.pdf
19/06/23	Mati Carbon Removals	MCR	273	https://unfccc.int/sites/default/files/resource/ARCTECH.pdf

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19/06/23	Direct Air Capture Coalition	DACC	274	https://unfccc.int/sites/default/files/resource/MatiCarbonRemovals.pdf
19/06/23	Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science	GRI/LSE	275	https://unfccc.int/sites/default/files/resource/DirectAirCaptureCoalition.pdf
19/06/23	Sitos Group, Inc	SGI	276	https://unfccc.int/sites/default/files/resource/GranthamResearchInstituteonClimateChangeandtheEnvironment.pdf
19/06/23	Crown Monkey	CM	277	https://unfccc.int/sites/default/files/resource/SitosGroup.pdf
19/06/23	Jim Ransom	JR	278	https://unfccc.int/sites/default/files/resource/CrownMonkey.pdf
19/06/23	Terrra	TERRA	279	https://unfccc.int/sites/default/files/resource/Jim_Ransom_TeamIOB.pdf
19/06/23	The European Biochar Industry Consortium	EBIC	280	https://unfccc.int/sites/default/files/resource/Terrra.pdf
19/06/23	Inventive Resources, Inc	IRI	281	https://unfccc.int/sites/default/files/resource/EuropeanBiocharIndustryConsortium.pdf
19/06/23	STX	STX	282	https://unfccc.int/sites/default/files/resource/InventiveResources.pdf
19/06/23	HBAR Foundation	HBAR	283	https://unfccc.int/sites/default/files/resource/STX.pdf
20/06/23	Inversion Point Technologies Ltd	IPT	284	https://unfccc.int/sites/default/files/resource/HBAR_Foundation.pdf
20/06/23	Oeko-Institut, Greenhouse Gas Management Institute, Stockholm Environment Institute, University of Edinburgh Business School, Infras, Carbon Limits, and Calyx Global	OI	285	https://unfccc.int/sites/default/files/resource/InversionPointTechnologies.pdf
20/06/23	remove	ROVE	286	https://unfccc.int/sites/default/files/resource/Oeko-Institut_GGMI_SEI.pdf
20/06/23	Carbon Capture and Storage Association	CCSA	287	https://unfccc.int/sites/default/files/resource/remove.pdf

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20/06/23	Running Tide	RT	288	https://unfccc.int/sites/default/files/resource/CarbonCapture_StorageAssociation.pdf
20/06/23	ActionAid International	AAI	289	https://unfccc.int/sites/default/files/resource/RunningTide.pdf
20/06/23	Carbon Recycling	CRCY	290	https://unfccc.int/sites/default/files/resource/ClimateLandAmbitionandRightsAlliance.pdf
20/06/23	Planboo	PBOO	291	https://unfccc.int/sites/default/files/resource/Carbon_Recycling.pdf
20/06/23	Spark Climate Solutions	SCL	292	https://unfccc.int/sites/default/files/resource/Planboo.pdf
20/06/23	From the Ground Up	FGU	293	https://unfccc.int/sites/default/files/resource/SparkClimateSolutions.pdf
20/06/23	TecnoFiltro SCS	TFSCS	294	https://unfccc.int/sites/default/files/resource/FromTheGroundUp.pdf
20/06/23	Planetary Technologies	PT	295	https://unfccc.int/sites/default/files/resource/TecnoFiltro%20SCS.pdf
20/06/23	Levitree, Inc	LVI	296	https://unfccc.int/sites/default/files/resource/Planetary_Technologies_Kelland.pdf
20/06/23	Partanna	PNNA	297	https://unfccc.int/sites/default/files/resource/Levitree.pdf
20/06/23	Earth’s Blue Aura	EBA	298	https://unfccc.int/sites/default/files/resource/Partanna.pdf
20/06/23	Greg H. Rau	GHR	299	https://unfccc.int/sites/default/files/resource/EBA.pdf
20/06/23	Daniel Schwaag	DS	300	https://unfccc.int/sites/default/files/resource/Planetary_Technologies_Rau.pdf
20/06/23	JPMorgan Chase & Co	JPM	301	https://unfccc.int/sites/default/files/resource/Made_of_Air.pdf
20/06/23	Climeworks	CWORKS	302	https://unfccc.int/sites/default/files/resource/JPMorgan_Chase.pdf
20/06/23	International Coordinating Council of Aerospace Industries Associations	ICCAIA	303	https://shorturl.at/fxRV7
20/06/23	Ted Christie-Miller (BeZERO)	BEZERO	304	https://shorturl.at/cAQ37

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21/06/23	Sylvera	SYLV	305	https://shorturl.at/ilG12
21/06/23	Pachama	PACHA	306	https://unfccc.int/sites/default/files/resource/Sylvera.pdf
22/06/23	Conservation International	CI	307	https://unfccc.int/sites/default/files/resource/Pachama.pdf
22/06/23	Carbon Market Watch	CMW	308	https://unfccc.int/sites/default/files/resource/ConservationInternational.pdf
23/06/23	Austrian Biomass Corbonisation Society	ABCS	309	https://shorturl.at/quG36
24/06/23	PYREG GmbH	PYREG	310	https://shorturl.at/xPWY2
25/06/23	IETA	IETA	311	https://shorturl.at/uILV6
26/06/23	Climate Analytics	CA	312	https://shorturl.at/kuwCY
23/06/23	South pole	SP	313	https://shorturl.at/klLTU
27/06/23	Global CCS Institute	GCCSI	314	https://shorturl.at/yEF69
29/06/23	Carbon Capture Machine	CCM	315	https://shorturl.at/dZ479
19/06/23	Climate Land Ambition and Rights Alliance	CLARA	316	https://shorturl.at/cfrT1
30/06/23	Center for International Environmental Law	CIEL	317	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_Center%20for%20International%20Envt%20Law.pdf
30/06/23	Carbon Engineering	CENG	318	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Carbon%20Engineering.pdf
30/06/23	Vertree	VRT	319	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Vertree.pdf
02/07/23	Carbon Twist	CTWIST	320	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_CarbonTwist.pdf
02/07/23	Project Developer Forum	PDF	321	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_PD%20Forum.pdf
03/07/23	Puro.earth	PURO	322	https://unfccc.int/sites/default/files/resource/sb006_pubic_conslutations_removals_Puro.earth_.pdf

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03/07/23	ReGen	REGEN	323	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_ReGen.pdf
03/07/23	UBQ Materials	UBQ	324	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_UBQ%20Materials.pdf
03/07/23	Locus Solutions	LOCUS	325	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Locus%20Solutions.pdf
03/07/23	GROVE VENTURES, Hetz Ventures, Firstime, VINTAGE, Jibe Ventures, GOOD COMPANY, fresh.fund, Epsilon, PLANETech (joint submission)	GROVE	326	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Grove%20Ventures_et_al_0.pdf
04/07/23	Inversion Point Technologies (also submitted on 20 June, see below)	IPT	327	https://unfccc.int/sites/default/files/resource/sb006_pubic_conslutations_removals_Inversion%20Point%20Technologies%20Ltd.1.pdf
04/07/23	Albo Climate	ALBO	328	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Albo_Climate.pdf
05/07/23	Bomvento	BOMV	329	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Bomvento.pdf
05/07/23	Aspiration	ASPI	330	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Aspiration.pdf
05/07/23	Environmental Defense Fund (EDF)	EDF	331	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Environmental%20Defense%20Fund.pdf
06/07/23	Deep Ocean Stewardship Initiative (DOSI)	DOSI	332	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_Deep%20Ocean%20Stewardship%20Initiative.pdf

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06/07/23	SYNCRAFT Engineering GmbH	SYNCR	333	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_SYNCRAFT%20Engineering%20GmbH.pdf
06/07/23	IGNITE THE SPARK	IGSP	334	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_Ignite%20The%20Spark.pdf
06/07/23	Civil society organizations (open letter from 127 signatories)	OPCSO	335	https://unfccc.int/sites/default/files/resource/SB006_call_for_input_open%20letter%20from%20127%20civil%20society%20organisations.pdf
10/07/23	Atmosfair gGmbH	ATMO	336	https://unfccc.int/sites/default/files/resource/SB006_public_consultations_on_removals_atmosfair%20gGmbH.pdf
08/07/23	Indigenous Environmental Network (IEN)	IEN	337	https://unfccc.int/sites/default/files/resource/SB006_call_for_input_IEN.pdf
05/07/23	RedCarbon	RC	338	https://unfccc.int/sites/default/files/resource/SB006_call_for_input_RedCarbon.pdf
03/07/23	Carbon Business Council	CBC	339	https://unfccc.int/sites/default/files/resource/SB006_call_for_input_Carbon%20Business%20Council.pdf
17/07/23	Cornwall Carbon Scrutiny Group	CCSG	340	https://unfccc.int/sites/default/files/resource/CornwallCarbonScrutinyGroup.pdf
18/07/23	Government of Quebec	QB	341	https://unfccc.int/sites/default/files/resource/Government%20of%20Quebec%20submission%20Part%201%20%28English%29.pdf
20/07/23	New Zealand	NZ	342	https://unfccc.int/sites/default/files/resource/NewZealand.pdf
21/07/23	Forair	FA	343	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Forair.pdf
24/07/23	NatureBridge	NB	344	https://webcms.unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20NatureBridge.pdf

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27/07/23	Stockholm Exergi	SE	345	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Stockholm%20Exergi.pdf
27/07/23	SkyHarvest	SH	346	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Sky%20Harvest.pdf
28/07/23	Kita	KITA	347	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Kita%20new.pdf
28/07/23	Perspective Climate Research	PCR	348	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Perspectives%20Climate%20Research.pdf
31/07/23	International and Comparative Law Research Centre	ICLRC	349	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20International%20and%20Comparative%20Law%20Research%20Center.pdf
31/07/23	Carbon Recycling	CRCY	350	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Carbon%20Recycling.pdf
31/07/23	44moles	44M	351	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%2044moles.pdf
31/07/23	Isometric	ISOMETRIC	352	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20Isometric.pdf
31/07/23	Carbfix	CARBFIX	353	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Carbfix.pdf
31/07/23	C-Capture and International REC Standard	CCPLE + RECS	354	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removals%20C-Capsule%20and%20International%20REC%20Standard.pdf

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31/07/23	CarbonPool	CPOOL	355	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_CarbonPool.docx.pdf
31/07/23	SaveClimate Campaign	SCC	356	https://unfccc.int/sites/default/files/resource/SB006_public_consultation_removal%20SaveClimate%20Campaign.pdf
31/07/23	Osservatorio Parigi	PARIGI	357	https://unfccc.int/sites/default/files/resource/SB006_PublicCconsultation_removals_OsservatorioParigi.pdf
31/07/23	Climeworks	CW	358	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Climeworks.docx.pdf
01/08/23	Negative Emission Platform	NEP	359	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Negative%20Emission%20Platform.pdf
01/08/23	Carbon Market Watch	CMW	360	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Carbon%20Market%20Watch.pdf
01/08/23	Drax Group	DG	361	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Drax%20Group.pdf
01/08/23	Bellona Foundation	BF	362	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Bellona%20Foundation.pdf
01/08/23	STX Group	STX	363	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_STX%20Group.pdf
01/08/23	Neustark	NEUST	364	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_neustark.pdf

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01/08/23	Carbon Finance Labs	CFL	365	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Carbon%20Finance%20Labs.pdf
01/08/23	1PointFive	1.5	366	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_1PointFive.pdf
01/08/23	Sylvera	SYLV	367	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Sylvera.pdf
01/08/23	Agreena	AGREE	368	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Agreena.pdf
01/08/23	Direct Air Capture Coalition	DACC	369	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Direct%20Air%20Capture%20Coalition.pdf
01/08/23	Carbon Capture and Storage Association	CCSA	370	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Carbon%20Capture%20and%20Storage%20Association.pdf
01/08/23	Zero Emissions Platform	ZEP	371	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Zero%20Emissions%20Platform.pdf
01/08/23	Planetary Technologies	PT	372	https://unfccc.int/sites/default/files/resource/SB006_PublicConsultation_removals_PlanetaryTechnologies.pdf
01/08/23	NBS Brazil Alliance Team	NBS	373	https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Funfccc.int%2Fsites%2Fdefault%2Ffiles%2Fresource%2FSB006_Public%2520consultation%2520on%2520removals_NBS%2520Brazil%2520Alliance%2520Team.pdf.xlsx&wdOrigin=BROWSELINK

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02/08/23	re-green	REGREEN	374	https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Funfccc.int%2Fsites%2Fdefault%2Ffiles%2Fresource%2FSB006_Public%2520consultation%2520on%2520removals_re.green_.pdf.xlsx&wdOrigin=BROWSELINK
02/08/23	Cella Mineral Storage	CLLA	375	https://unfccc.int/sites/default/files/resource/sb006_Public%20consultation%20on%20removals_Cella%20Mineral%20Storage.pdf
04/08/23	Carbon International	CARBI	376	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_National%20Institute%20of%20Forest%20Science.pdf
08/08/23	National Forest Science	NFS	377	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_National%20Institute%20of%20Forest%20Science.pdf
08/08/23	Puro.earth	PURO	378	https://unfccc.int/sites/default/files/resource/SB006_Public%20consultation%20on%20removals_Puro.earth_.pdf

Document information

Version	*Date*	*Description*
02.0	28 August 2023	Published as a late annex to the annotated agenda of SB 007. This version takes into account the guidance provided by the Supervisory Body at SB 006 (SB 006 meeting report, para. 23). Note: This document is published without editorial review.
01.1	7 July 2023	Editorial revision to correct the document symbol number.
01.0	5 July 2023	Published as an annex to the annotated agenda of SB 006.

Decision Class: Regulatory
Document Type: Information Note
Business Function: Methodology
Keywords: A6.4 mechanism, data collection and analysis, emission removal activities, methodologies, regulatory framework

Related documents:

28 August 2023	A6.4-SB007-AA-A13 - Information note: Compilation of the public inputs on removal activities under the Article 6.4 mechanism (version 02.0)
4 July 2023	A6.4-SB006-AA-A09- Information note: Compilation of public inputs received on removals (version 01.0)
3 June 2023	A6.4-SB005-A02 – Information note: Guidance and questions for further work on removals (version 02.0)
17 May 2023	A6.4-SB005-AA-A09 – Information note: Removal activities under the Article 6.4 mechanism (version 04.0)
17 May 2023	A6.4-SB005-AA-A10 – Information note: Summary of the views submitted by Parties and observers on activities involving removals (version 01.0)
10 March 2023	A6.4-SB004-A02 - Information note: Guidance and questions for further work on removals (v.01.0)
28 February 2023	A6.4-SB004-AA-A04 - *Information note*: Removal activities under the Article 6.4 mechanism (version 3.0)
07 November 2022	A6.4-SB003-A03 - *Recommendation:* Activities involving removals under the Article 6.4 mechanism (version 1.0)
25 October 2022	A6.4-SB003-AA-A03 - *Draft recommendation*: Removal activities under the Article 6.4 mechanism (version 2.0) A6.4-SB003-AA-A04 - *Information note*: Removal activities under the Article 6.4 mechanism (version 2.0)
15 September 2022	A6.4-SB002-AA-A05 - *Draft recommendation*: Requirements for the development and assessment of mechanism methodologies pertaining to activities involving removals (version 1.0) A6.4-SB002-AA-A06 - *Information note*: Removal activities under the Article 6.4 mechanism (version 1.0)
08 July 2022	A6.4-SB001-AA-A05 - *Concept note*: Removal activities under the Article 6.4 Mechanism (version 1.0)