

AGENDA

Agriculture, Forests, Fisheries, Rural Communities and Tribes Work Group

October 16, 2017

10:00 AM – noon

Hearing Room 50 State Capitol (ground level)

AGENDA

- Welcome and Introductions
- Work Group Discussion Topics:
 - Offset Program Design
 - Other Topics – Homework Responses
- Public Comment
- Next Steps
- Adjourn

This meeting will be livestreamed. You may access the livestream at:

https://www.oregonlegislature.gov/citizen_engagement/Pages/Legislative-Video.aspx. You may also participate in this meeting by teleconference by calling 1--877-848-7030, meeting # 7714152.

Meeting materials are posted at: <https://www.oregonlegislature.gov/helm/Pages/affrct.aspx>.

California Air Resources Board Offset Credit Issuance Table

(10/11/17)

ARB Offset Credits Issued

Project Type	ODS	Livestock	U.S. Forest	Urban Forest	MMC	Rice Cultivation
Compliance	8,862,980	2,280,449	47,412,377	--	1,998,414	--
Early Action	6,336,710	1,695,029	13,276,494	--	2,879,684	--

Table includes all offset credits issued including offset credits placed in ARB's Forest Buffer Account, offset credits returned to an Early Action Offset Program's forest buffer pool, and offset credits subsequently invalidated.

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD5001	EOS ARB ODS 2013-1	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR992
CAOD5002	ECC ODS Destruction 2012	Compliance	Environmental Credit Corp.	Ozone Depleting Substances	ACR170
CAFR5003	Blue Source – Bishop Improved Forest Management Project	Compliance	Heartwood Forestland Fund IV, Limited Partnership	U.S. Forest	CAR973
CAOD5004	EOS ARB ODS 2013-2	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR172
CAOD5007	Wabashco Clean Sweep 1	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR179
CAOD5009	EOS ARB ODS 2013-5	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR1000
CAFR5011	Yurok Tribe/Forest Carbon Partners CKGG Improved Forest Management Project	Compliance	Yurok Tribe	U.S. Forest	CAR993
CAFR5012	Hanes Ranch Forest Carbon Project	Compliance	Hanes Ranch Incorporated	U.S. Forest	ACR182

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD5013	ECC ODS Destruction 2013	Compliance	Environmental Credit Corp.	Ozone Depleting Substances	ACR176
CALS5014	Blue Mountain Biogas	Compliance	Blue Mountain Biogas, LLC (RP4) & Alpentel Energy Partners, LLC (RP1-3)	Livestock	CAR997
CAOD5015	EOS ARB ODS 2013-6	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR181
CAFR5016	Miller Forest	Compliance	Steve Miller and Florence Miller Co-Trustees of the Edward Miller Trust	U.S. Forest	ACR189
CAOD5017	EOS ARB ODS 2013-3	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR995
CAOD5018	A-GAS RemTec 2013-1	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1011
CALS5019	Wakker Digester	Compliance	WTE Wakker, LLC	Livestock	CAR989
CALS5020	Deer Run Digester	Compliance	WTE Deer Run, LLC	Livestock	CAR982
CALS5021	Dairyland Digester	Compliance	WTE Dairyland, LLC	Livestock	CAR969
CAOD5022	DPC Domestic ODS Destruction Project #14	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1012

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAL5023	Big Sky Dairy	Compliance	DF-AP#1, LLC	Livestock	ACR190
CAOD5024	DPC Domestic ODS Destruction Project #15	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1016
CAL5025	Ideal Family Farms Digester Project	Compliance	Ideal Family Farms, LLC	Livestock	CAR1002
CAOD5026	DPC Domestic ODS Destruction Project #16	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1025
CAOD5027	RR ACR 2013	Compliance	RapRec Refrigerants, Inc.	Ozone Depleting Substances	ACR196
CAFR5028	Round Valley Indian Tribes Improved Forest Management Project	Compliance	Round Valley Indian Tribes	U.S. Forest	ACR173
CAFR5029	Green Assets-Brookgreen Gardens Improved Forest Management Project	Compliance	Brookgreen Gardens	U.S. Forest	ACR192
CAL5030	WTE-S&S Ag Enterprises, LLC	Compliance	WTE-S&S Ag Enterprises, LLC	Livestock	CAR965
CAOD5031	Wabashco Clean Sweep 2	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR198
CAL5032	New Energy One Livestock Project	Compliance	New Energy One, LLC	Livestock	CAR1022
CAOD5033	ECC ODS Destruction 11-2013	Compliance	Environmental Credit Corp.	Ozone Depleting Substances	CAR1029

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAFR5034	Finite Carbon – The Forestland Group CT Lakes	Compliance	Connecticut Lakes Realty Trust	U.S. Forest	ACR199
CAOD5035	EOS ARB ODS 2013-7	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR193
CAOD5036	DPC Domestic ODS Destruction Project #17	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1047
CAFR5037	Virginia Highlands I	Compliance	Heartwood Forestland Fund IV, Limited Partnership	U.S. Forest	CAR1032
CAOD5039	A-GAS RemTec 2013-4	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1051
CAL5040	Scenic View Dairy Methane Reduction Project	Compliance	Scenic View Dairy, LLC	Livestock	CAR1035
CAL5041	Brook View Dairy Methane Reduction Project	Compliance	Brook View Dairy, LLC	Livestock	CAR1036
CAL5042	Sunny Knoll Farms Anaerobic Digester	Compliance	Sunny Knoll Farms	Livestock	CAR1033
CAFR5043	Blue Source – Goodman Improved Forest Management Project	Compliance	Goodman Forest, LLC	U.S. Forest	ACR202
CAL5044	T&M Bos Dairy	Compliance	ClimeCo Corporation	Livestock	CAR1055
CAL5045	T&M Herrema Dairy	Compliance	ClimeCo Corporation	Livestock	CAR1056

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAL5046	T&M Hidden View Dairy	Compliance	ClimeCo Corporation	Livestock	CAR1057
CAL5047	T&M Windy Ridge Dairy	Compliance	ClimeCo Corporation	Livestock	CAR1058
CAOD5048	EOS ARB ODS 2013-8	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR1021
CAOD5049	EOS ARB ODS 2014-1	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR195
CAOD5050	DPC Domestic ODS Destruction Project #19	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1059
CAOD5052	2014-P4	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR206
CAFR5055	Buckeye Forest Project	Compliance	Sustainable Conservation, Inc.	U.S. Forest	CAR1013
CAOD5056	RR ACR 2014	Compliance	RapRec Refrigerants, Inc.	Ozone Depleting Substances	ACR208
CAOD5059	ECC ODS Destruction 2-2014	Compliance	Environmental Credit Corp.	Ozone Depleting Substances	CAR1068
CAL5060	Van-Erk Digester Project	Compliance	Van Erk Dairy, LLC	Livestock	CAR1064
CAOD5062	A-GAS RemTec 2013-5	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1069

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAFR5063	Finite Carbon – Berry Summit IFM	Compliance	Berry Summit, LLC	U.S. Forest	CAR1067
CAOD5065	EOS ARB ODS 2014-2	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR1026
CAOD5066	DPC Domestic ODS Destruction Project #20	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1071
CAOD5067	A-GAS RemTec 2014-1	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1072
CAOD5068	EOS ACR 213	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR213
CAOD5069	EOS ACR 214	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR214
CAOD5070	Wabashco Clean Sweep 3	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR221
CALS5071	ABEC New Hope LLC	Compliance	California Bioenergy, LLC	Livestock	CAR1065
CAFR5072	White Mountain Apache Tribe Forest Carbon Project	Compliance	White Mountain Apache Tribe	U.S. Forest	ACR211
CAOD5073	EOS CAR 1074	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	CAR1074
CALS5074	CSE Arizona Facility	Compliance	CSE Operating I, LLC	Livestock	CAR1076

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAL5075	Linde	Compliance	CSE Operating II, LLC	Livestock	CAR1077
CAFR5076	Trinity Timberlands University Hill Improved Forest Management Project	Compliance	Trinity Timberlands, LLC	U.S. Forest	CAR1046
CAL5077 New Reporting Period	Stotz Southern Generation	Compliance	Solar & Renewables Management, LLC	Livestock	CAR1078
CAOD5078	DPC Domestic ODS Destruction Project #21	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1087
CAOD5079	A-GAS RemTec 2014-2	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1089
CAL5081	Roeslein Alternative Energy of Missouri, LLC – South Meadow	Compliance	Roeslein Alternative Energy of Missouri, LLC	Livestock	CAR1083
CAL5083	Roeslein Alternative Energy of Missouri, LLC – Ruckman	Compliance	Roeslein Alternative Energy of Missouri, LLC	Livestock	CAR1085
CAFR5084	Finite Carbon – Potlatch Moro Big Pine CE IFM	Compliance	Potlatch Forest Holdings, Inc.	U.S. Forest	CAR1086
CAFR5089	Finite Carbon – The Forestland Group Champion Property IFM	Compliance	Heartwood Forestland Fund III	U.S. Forest	CAR1088
CAOD5092	A-GAS RemTec 2014-3	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1093
CAL5094	George DeRuyter and Sons Dairy Methane Reduction Project	Compliance	George DeRuyter and Sons Dairy, LLC	Livestock	CAR1080

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CAFR5095	Ashford III	Compliance	Nisqually Land Trust	U.S. Forest	CAR1094
CAFR5096	Brushy Mountain	Compliance	Coastal Forestlands, Ltd., a California Limited Partnership	U.S. Forest	CAR1095
CAOD5099	Wabashco Clean Sweep 4	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR225
CAMM5100	Verdeo Marshall County VAM Abatement Project	Compliance	Verdeo McElroy, LLC	Mine Methane Capture	ACR226
CAL5101	Vander Haak Dairy COP	Compliance	ClimeCo Corporation	Livestock	CAR1101
CAFR5105	Green Assets – Middleton Avoided Conversion Project	Compliance	Middleton Place, LLC	U.S. Forest	CAR1109
CAL5107	The Dry Creek Dairy Biofactory Project	Compliance	Ag Power DCD, LLC	Livestock	ACR232
CAL5108	Double A Dairy	Compliance	Ag Power Jerome, LLC	Livestock	ACR233
CAL5109	Dairy Dreams Methane Reduction Project	Compliance	Dairy Dreams, LLC	Livestock	CAR1097
CAL5120	Fair Oaks Dairy Farm LLC GHD-Designed Digester	Compliance	Fair Oaks Dairy Farm, LLC	Livestock	CAR1120
CAL5121	Fair Oaks Dairy Farm LLC Cyclus-Designed Digester	Compliance	Fair Oaks Dairy Farm, LLC	Livestock	CAR1121

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CAL5122	Bridgewater Dairy LLC	Compliance	Bridgewater Dairy, LLC	Livestock	CAR1122
CAL5123	Central Sands Dairy, LLC	Compliance	Central Sands Dairy, LLC	Livestock	CAR1123
CAL5124	Willow Point Dairy, LLC	Compliance	Willow Point Dairy, LLC	Livestock	CAR1124
CAL5125	Riverview Farm Anaerobic Digester Project	Compliance	Riverview, LLP	Livestock	CAR1125
CAL5126	West River Farm Anaerobic Digester Project	Compliance	Riverview, LLP	Livestock	CAR1126
CAL5127	District 45 Dairy	Compliance	Riverview, LLP	Livestock	CAR1127
CAL5128	Farm Power Lynden Anaerobic Digester	Compliance	Farm Power Northwest, LLC	Livestock	CAR1128
CAFR5130	Finite Carbon – MWF Brimstone IFM	Compliance	MWF Brimstone Forest Company, LLC	U.S. Forest	CAR1130
CAL5131	Pacific Rim Dairy Digester	Compliance	Pacific Rim Energy, LLC	Livestock	CAR1108
CAL5132	RES Ag – DM4-3 LLC	Compliance	RES Agriculture NC1, LLC	Livestock	CAR1132
CAL5133	RES Ag – DM2-1 LLC	Compliance	RES Agriculture NC1, LLC	Livestock	CAR1133

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CALS5134	Alliance Dairy	Compliance	Alliance Dairies	Livestock	ACR234
CALS5135	Synergy Biogas, LLC	Compliance	Synergy Biogas, LLC	Livestock	ACR235
CALS5138	Willet Dairy	Compliance	Willet Dairy, LLC	Livestock	ACR238
CALS5139	Edaleen Cow Power, LLC	Compliance	Edaleen Cow Power, LLC	Livestock	ACR239
CAOD5140	EOS ACR 240	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR240
CAFR5141	Garcia River Forest – ARB	Compliance	The Conservation Fund	U.S. Forest	CAR1098
CALS5142	Fiscalini Farms Anaerobic Digester	Compliance	Fiscalini Properties, L.P.	Livestock	CAR1142
CALS5144	Patterson Farms COP	Compliance	ClimeCo Corporation	Livestock	CAR1137
CALS5146	WTE-Dallmann, LLC	Compliance	WTE-Dallmann, LLC	Livestock	CAR1143
CAFR5149	Forest Carbon Partners – Glass Ranch Improved Forest Management Project	Compliance	Ronald Glass	U.S. Forest	CAR1103
CAFR5150	Forest Carbon Partners – Gabrych Ranch Improved Forest Management Project	Compliance	GM Gabrych Family Limited Partnership	U.S. Forest	CAR1104

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CALS5151	Cottonwood Dairy Livestock Gas Capture Project	Compliance	Gallo Cattle Company, A Limited Partnership	Livestock	CAR1151
CALS5152	Aurora Ridge Dairy	Compliance	Aurora Ridge Dairy, LLC	Livestock	CAR1152
CALS5153	Holsum Elm Dairy	Compliance	Holsum Dairies, LLC	Livestock	CAR1153
CALS5154	Holsum Irish Dairy	Compliance	Holsum Dairies, LLC	Livestock	CAR1154
CALS5155	Maple Leaf Dairy West	Compliance	Maple Leaf Dairy, Inc.	Livestock	CAR1155
CALS5156 New Reporting Period 3-year Invalidation Timeline	Maple Leaf Dairy East	Compliance	Maple Leaf Dairy, Inc.	Livestock	CAR1156
CALS5169	TMF Biofuels Dairy Digester	Compliance	TMF Biofuels, LLC	Livestock	CAR1169
CAFR5170	Willits Woods IFM	Compliance	Coastal Ridges LLC, a California Limited Liability Company	U.S. Forest	CAR1140
CAMM5173	Elk Creek Coal Mine Methane Destruction & Utilization Project	Compliance	North Fork Energy, LLC	Mine Methane Capture	ACR243
CALS5175	Storms Hog Power, LLC	Compliance	Storms Hog Power Partners, LLC	Livestock	CAR1145
CALS5176	Vanderhyde Dairy	Compliance	Dairy Energy, Inc.	Livestock	CAR1146

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CAOD5177	Wabashco Clean Sweep 5	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR244
CAMM5178	Solvay Chemicals, Inc. Waste Mine Methane Project	Compliance	Solvay Chemicals, Inc.	Mine Methane Capture	CAR1105
CALS5180	Green Valley Dairy Methane Reduction Project	Compliance	Green Valley Dairy, LLC	Livestock	CAR1106
CALS5181	Gardeau Crest Dairy	Compliance	Gardeau Crest Farms, LLC	Livestock	ACR241
CAOD5185	A-GAS Americas 2015-1	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1171
CAOD5188	EOS ACR 252	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR252
CAOD5189	EOS ACR 253	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR253
CAOD5190	DPC Domestic ODS Destruction Project #22	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1172
CAOD5191	Wabashco Clean Sweep 6	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR254
CAFR5195	Finite Carbon – Passamaquoddy Tribe IFM	Compliance	Passamaquoddy Joint Tribal Council	U.S. Forest	CAR1175
CAFR5198	Finite Carbon – The Forestlands Group Highlands IFM	Compliance	Heartwood Forestland Fund IV, Limited Partnership	U.S. Forest	ACR248

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAFR5199	Wyoming Improved Forest Management Project	Compliance	Heartwood Forestland Fund IV, Limited Partnership	U.S. Forest	ACR249
CAFR5200	Brush Creek	Compliance	Steve Miller and Florence Miller Co-Trustees of the Edward Miller Trust	U.S. Forest	ACR200
CAOD5201	A-GAS Americas 2015-2	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1179
CAFR5204	Finite Carbon – Tennessee River Gorge Trust	Compliance	Tennessee River Gorge Trust, Inc.	U.S. Forest	ACR256
CAFR5205	Green Assets – Lukens Avoided Conversion Project	Compliance	Lukens Island Timber Enterprises, LLC	U.S. Forest	ACR265
CAFR5206	Green Assets – Milbury Avoided Conversion Project	Compliance	Milbury Plantation, LLC	U.S. Forest	ACR266
CAOD5211	EOS ACR 271	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR271
CAFR5212	Bewley Ranches	Compliance	Ross Bewley	U.S. Forest	ACR262
CAOD5215	Wabashco Clean Sweep 7	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR275
CAOD5216	EOS ACR 285	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR285
CAOD5222	ClimeCo ODS Destruction 16 and 17	Compliance	ClimeCo Corporation	Ozone Depleting Substances	CAR1182

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CAL5223	Rosendale Anaerobic Digester	Compliance	UW-Oshkosh Foundation Rosendale Biodigester, LLC	Livestock	ACR283
CAFR5225	Finite Carbon – Colville IFM	Compliance	Confederated Tribes of the Colville Reservation	U.S. Forest	ACR255
CAFR5232	Blue Creek	Compliance	Western Rivers Forestry	U.S. Forest	ACR282
CMM5244	Corinth Abandoned Mine Methane Recovery Project	Compliance	Keyrock Energy, LLC	Mine Methane Capture	VCSOPR2
CAL5245	Open Sky Ranch Dairy Digester	Compliance	Open Sky Ranch, Inc.	Livestock	CAR1178
CAOD5260	Coolgas 2015-3	Compliance	Coolgas, Inc.	Ozone Depleting Substances	CAR1219
CAOD5261	EOS ACR 311	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR311
CAOD5262	EOS ACR 312	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR312
CAL5263	High Island Dairy	Compliance	Davis Family Dairies, LLC	Livestock	ACR313
CAOD5264	Wabashco Clean Sweep 8	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR314
CAOD5277	EOS ACR 315	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR315

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CAOD5278	EOS ACR 316	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR316
CAFR5280 New Project	Mailiard Ranch	Compliance	Mailiard Ranch, a California Limited Partnership	U.S. Forest	CAR1180
CAFR5281	Usal Redwood Forest – IFM	Compliance	Usal Redwood Forest Company, LLC	U.S. Forest	CAR1139
CAOD5282	Coolgas 2016-1	Compliance	Coolgas, Inc.	Ozone Depleting Substances	CAR1222
CALS5284	Spruce Haven Farm COP	Compliance	ClimeCo Corporation	Livestock	CAR1184
CAOD5287	DPC Domestic ODS Destruction Project #27	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1243
CALS5289	Homestead Green Energy	Compliance	Origin Climate Inc.	Livestock	ACR259
CAOD5290	Perfect Cycle ODS-2	Compliance	Perfect Score Technologies, LLC	Ozone Depleting Substances	CAR1242
CAOD5298	A-Gas Americas 2017-1	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1249
CAFR5317	Finite Carbon – Lyme Grand Lake Stream IFM	Compliance	GLS Woodlands, LLC	U.S. Forest	CAR1217
CAOD5318	A-Gas Americas 2017-2	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1252

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CAOD5320	A-Gas Americas 2017-3	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1254
CAOD5321	DPC Domestic ODS Destruction Project #28	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1251
CALS5332	Yippee Farms	Compliance	Arlin Benner	Livestock	CAR1232
CAOD5333	ClimeCo ODS Destruction 18 and 19	Compliance	ClimeCo Corporation	Ozone Depleting Substances	CAR1250
CAOD5334	DPC Domestic ODS Destruction Project #23	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1234
CAOD5335	DPC Domestic ODS Destruction Project #25	Compliance	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1235
CAOD5336	A-Gas Americas 2016-2	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1236
CAOD5338	ClimeCo ODS Destruction 20	Compliance	ClimeCo Corporation	Ozone Depleting Substances	CAR1258
CAOD5339	Coolgas 2016-3	Compliance	Coolgas, Inc.	Ozone Depleting Substances	CAR1239
CAOD5340	A-Gas O'Hare	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1240
CAMM5342	Baker Mine AMM	Compliance	Wabashco, LLC	Mine Methane Capture	ACR342

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CAOD5343	Wabashco Clean Sweep 9	Compliance	Wabashco, LLC	Ozone Depleting Substances	ACR343
CAOD5344	A-Gas Americas 2017-4	Compliance	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR1263
CAOD5348	Coolgas 2016-4	Compliance	Coolgas, Inc.	Ozone Depleting Substances	CAR1248
CALS5349	Kettle Butte Digester	Compliance	Origin Climate Inc.	Livestock	ACR349
CAOD5350	Tradewater ODS 1	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR350
CAOD5351	EOS ACR 351	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR351
CAOD5352	EOS ACR 352	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR352
CAOD5354	Tradewater ODS 2	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR354
CAOD5356	EOS ACR 356	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR356
CAOD5357	EOS ACR 357	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR357
CAOD5358	EOS ACR 358	Compliance	EOS Climate, Inc.	Ozone Depleting Substances	ACR358

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD5359	Tradewater ODS 3	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR359
CAOD5363	Tradewater ODS 4	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR363
CAMM5367 New Project	Elk Creek Permit Area Abandoned Mine Project	Compliance	North Fork Energy, LLC	Mine Methane Capture	ACR367
CAOD5370	Tradewater ODS 5	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR370
CAOD5379	Tradewater ODS 6	Compliance	Tradewater, LLC	Ozone Depleting Substances	ACR379
CAFR0001	Willits Woods	Early Action	Coastal Ridges LLC, a California Limited Liability Company	U.S. Forest	CAR661
CAFR0002	Finite Carbon Farm Cove Community Forest Project	Early Action	Downeast Lakes Land Trust	U.S. Forest	CAR657
CALS0003	Coyne Farms	Early Action	Environmental Credit Corp.	Livestock	CAR813
CAOD0004	RR 2012 1	Early Action	RapRec Refrigerants, Inc.	Ozone Depleting Substances	CAR959
CAOD0005	ECC-ODS-PA-001	Early Action	Environmental Credit Corp.	Ozone Depleting Substances	CAR784
CAOD0006	ECC-ODS-PA-003	Early Action	Environmental Credit Corp.	Ozone Depleting Substances	CAR947

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ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CALS0007	Fessenden Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR831
CALS0008	Miedema Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR836
CALS0009	Ridgecrest Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR855
CALS0010	Will-O-Crest Farms Livestock Project	Early Action	Environmental Credit Corp.	Livestock	CAR885
CALS0012	Riverview Farm Anaerobic Digester Project	Early Action	Camco International Group, Inc.	Livestock	CAR449
CALS0013	Central Sands Dairy LLC	Early Action	Camco International Group, Inc.	Livestock	CAR479
CALS0014	West River Farm Anaerobic Digester Project	Early Action	Camco International Group, Inc.	Livestock	CAR450
CALS0015	District 45 Dairy	Early Action	Camco International Group, Inc.	Livestock	CAR775
CAOD0016	EOS-JA-09-01	Early Action	EOS Climate, Inc.	Ozone Depleting Substances	CAR604
CAOD0017	EOS-CAR2011 Domestic	Early Action	EOS Climate, Inc.	Ozone Depleting Substances	CAR804

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD0018	EOS-CAR2012 Domestic	Early Action	EOS Climate, Inc.	Ozone Depleting Substances	CAR946
CAOD0019	DPC Domestic ODS Destruction Project #11	Early Action	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR981
CALS0020	Bridgewater Dairy LLC	Early Action	Camco International Group, Inc.	Livestock	CAR474
CALS0021	Willow Point Dairy, LLC	Early Action	Camco International Group, Inc.	Livestock	CAR463
CALS0023	Fair Oaks Dairy Farm, LLC Cyclus-Designed Digester	Early Action	Camco International Group, Inc.	Livestock	CAR477
CALS0024	Fair Oaks Dairy Farm, LLC GHD-Designed Digester	Early Action	Camco International Group, Inc.	Livestock	CAR478
CAOD0025	RR 2012 1	Early Action	RapRec Refrigerants, Inc.	Ozone Depleting Substances	CAR959
CAFR0026	Blue Source – Pungo River Forest Conservation Project	Early Action	David Dicktel	U.S. Forest	CAR659
CAFR0027	Blue Source – Noles South Avoided Conversion Forest Project	Early Action	Michael A. Noles	U.S. Forest	CAR802
CAFR0028	Blue Source – Noles North Avoided Conversion Forest Project	Early Action	Michael A. Noles	U.S. Forest	CAR688

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAFR0029	Blue Source – Alligator River Avoided Conversion	Early Action	Mattamuskeet Ventures I, LLC	U.S. Forest	CAR497
CAFR0030	Blue Source – Francis Beidler Improved Forest Management Project	Early Action	National Audubon Society	U.S. Forest	CAR683
CAFR0031	Blue Source – Pocosin Lakes Forest Conservation Project	Early Action	Brinkley Melvin	U.S. Forest	CAR676
CAL0032	Pagel's Ponderosa Dairy	Early Action	Origin Climate Inc. (formerly TerraPass Inc.)	Livestock	CAR532
CAL0034	Green Valley Dairy	Early Action	Origin Climate Inc. (formerly TerraPass Inc.)	Livestock	CAR504
CAL0035	Scenic View Dairy	Early Action	Origin Climate Inc. (formerly TerraPass Inc.)	Livestock	CAR418
CAL0036	Brook View Dairy	Early Action	Origin Climate Inc. (formerly TerraPass Inc.)	Livestock	CAR419
CAOD0039	Perfect Cycle ODS-1	Early Action	Perfect Score Technologies LLC	Ozone Depleting Substances	CAR945
CAFR0040	Garcia River Forest	Early Action	The Conservation Fund	U.S. Forest	CAR102
CAFR0041	Big River / Salmon Creek Forests	Early Action	The Conservation Fund	U.S. Forest	CAR408
CAFR0042	Gualala River Forest	Early Action	The Conservation Fund	U.S. Forest	CAR660

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CALS0043	Vanderhyde Dairy	Early Action	Camco International Group, Inc.	Livestock	CAR944
CALS0044	Green Meadow Farm	Early Action	Camco International Group, Inc.	Livestock	CAR412
CALS0046	Hidden View Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR489
CAFR0047	Finite Carbon – Potlatch Moro Big Pine CE	Early Action	Potlatch Forest Holdings, Inc.	U.S. Forest	CAR648
CALS0048	Bos Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR440
CAFR0049	The Van Eck Forest	Early Action	Fred M. van Eck Forest Foundation for Purdue University	U.S. Forest	CAR101
CAOD0050	PCS Domestic ODS Destruction Project #7	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR954
CAOD0051	PCS Domestic ODS Destruction Project #6	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR952
CAOD0052	DPC Domestic ODS Destruction Project #8	Early Action	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR960
CAOD0053	RemTec International ODS Destruction Domestic Project #1	Early Action	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR818
CAOD0054	RemTec ODS Destruction Domestic Project #2	Early Action	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR974

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CALS0055	Double A Dairy	Early Action	Camco International Group, Inc.	Livestock	CAR956
CALS0056	Herrema Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR487
CAFR0057	Virginia Conservation Forestry Program – Rich Mountain	Early Action	The Nature Conservancy	U.S. Forest	CAR696
CAFR0058	Virginia Conservation Forestry Program – Clifton Farm	Early Action	The Nature Conservancy	U.S. Forest	CAR686
CAOD0059	EOS-2013 Domestic	Early Action	EOS Climate, Inc.	Ozone Depleting Substances	CAR990
CALS0060	Windy Ridge Dairy	Early Action	Environmental Credit Corp.	Livestock	CAR488
CAOD0061	DPC Domestic ODS Destruction Project #12	Early Action	Diversified Pure Chem, LLC	Ozone Depleting Substances	ACR183
CAOD0062	DPC Domestic ODS Destruction Project #13	Early Action	Diversified Pure Chem, LLC	Ozone Depleting Substances	CAR1003
CAFR0063	Green Assets – Middleton Avoided Conversion	Early Action	Middleton Place, LLC	U.S. Forest	CAR749
CAFR0064	Yurok Tribe Sustainable Forest Project	Early Action	Yurok Tribe	U.S. Forest	CAR777

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD0065	WSO 2011 1	Early Action	Wilshire Stanford Offsets, LLC	Ozone Depleting Substances	CAR795
CAOD0066	WSO 2011 2	Early Action	Wilshire Stanford Offsets, LLC	Ozone Depleting Substances	CAR906
CAOD0067	Pure Chem Domestic ODS Destruction Project #4	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR832
CAOD0068	Pure Chem Domestic ODS Destruction Project #5	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR833
CAOD0069	ECC-ODS-CA-002	Early Action	Environmental Credit Corp.	Ozone Depleting Substances	CAR786
CAFR0070	Finite Carbon – Berry Summit	Early Action	Berry Summit, LLC	U.S. Forest	CAR1004
CAL50071	Grotegut Dairy Farm, Inc.	Early Action	Grotegut Dairy Farm, Inc.	Livestock	CAR612
CAOD0072	EOS ACR 2013	Early Action	EOS Climate, Inc.	Ozone Depleting Substances	ACR184
CAFR0073	McCloud River	Early Action	Bascom Pacific, LLC	U.S. Forest	CAR429
CAOD0074	RemTec International ODS Destruction Domestic Projects #2	Early Action	Reclamation Technologies, Inc.	Ozone Depleting Substances	CAR883
CAL50075	Patterson Farms	Early Action	Environmental Credit Corp.	Livestock	CAR602

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAOD0076	Pure Chem Domestic ODS Destruction Project #2	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR781
CAOD0077	Pure Chem Domestic ODS Destruction Project #3	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR805
CAOD0078	Honeywell ODS Destruction Project	Early Action	Honeywell International, Inc.	Ozone Depleting Substances	CAR901
CAFR0080	Finite Carbon – The Forestland Group Champion Property	Early Action	Heartwood Forestland Fund III	U.S. Forest	CAR645
CALS0081	Edaleen Cow Power, LLC	Early Action	Camco International Group, Inc.	Livestock	CAR980
CALS0082	Dairy Dreams	Early Action	Dairy Dreams, LLC	Livestock	CAR994
CALS0083	The Dry Creek Dairy Biofactory® Project	Early Action	Camco International Group, Inc.	Livestock	CAR402
CAOD0084	PCS Domestic ODS Destruction Project #6	Early Action	Pure Chem Separation, LP	Ozone Depleting Substances	CAR952
CALS0086	CSE AZ Facility I	Early Action	CSE Operating I, LLC	Livestock	CAR799
CAFR0087	Finite Carbon – Brosnan Forest	Early Action	Norfolk Southern Railway Company	U.S. Forest	CAR658

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAFR0088	Finite Carbon – Shannondale Tree Farm	Early Action	Shannondale Carbon, LLC	U.S. Forest	CAR780
CAOD0089	Coolgas US ODS Project 1	Early Action	Coolgas, Inc.	Ozone Depleting Substances	CAR905
CAOD0090	Coolgas US ODS Project 2	Early Action	Coolgas, Inc.	Ozone Depleting Substances	CAR948
CAOD0091	Coolgas ODS 2013 Project #1	Early Action	Coolgas, Inc.	Ozone Depleting Substances	CAR1023
CAOD0092	Refex ODS California 2010	Early Action	Refrigerant Exchange Corp.	Ozone Depleting Substances	CAR628
CALS0093	Southern Generation	Early Action	Solar & Renewables Management, LLC	Livestock	CAR806
CALS0094	Willet Dairy	Early Action	Camco International Group, Inc.	Livestock	CAR977
CAMM0095	Vamox® Demonstration Project at JWR Shaft No. 4-9	Early Action	Biothermica Coal Carbon Inc.	Mine Methane Capture	CAR577
CALS0096	Synergy Biogas, LLC	Early Action	Camco International Group, Inc.	Livestock	CAR957
CALS0097	Gardeau Crest Dairy	Early Action	Camco International Group, Inc.	Livestock	CAR978

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAMM0098	Verdeo McElroy VAM Abatement Project	Early Action	Verdeo McElroy, LLC	Mine Methane Capture	CAR793
CALS0099	The B6 Dairy Farm BioFactory® Project	Early Action	Cargill, Inc.	Livestock	CAR593
CAFR0100	Rips Redwoods	Early Action	Rips Redwoods, LLC	U.S. Forest	CAR1015
CAMM0101	Green River Trona Mine Methane Destruction and Utilization Project	Early Action	Solvay Chemicals, Inc.	Mine Methane Capture	CAR629
CAFR0102	Virginia Conservation Forestry Program – Tazewell – Elk Garden	Early Action	The Nature Conservancy	U.S. Forest	CAR697
CAFR0103	Finite Carbon – MWF Brimstone IFM Project I	Early Action	MWF Brimstone Forest Company, LLC	U.S. Forest	CAR582
CALS0104	Storms Hog Power, LLC	Early Action	Camco International Group, Inc.	Livestock	CAR1014
CAFR0105	Alder Stream Preserve	Early Action	Northeast Wilderness Trust	U.S. Forest	CAR655
CAFR0106	Howland Research Forest	Early Action	Northeast Wilderness Trust	U.S. Forest	CAR681
CALS0107	Holsum Elm	Early Action	Holsum Dairies, LLC	Livestock	CAR599

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CALS0108	Holsum Irish Dairy	Early Action	Holsum Dairies, LLC	Livestock	CAR601
CALS0109	Alliance Dairies	Early Action	Camco International Group, Inc.	Livestock	CAR1001
CALS0110	Aurora Ridge	Early Action	Aurora Ridge Dairy, LLC	Livestock	CAR607
CALS0111	Maple Leaf Dairy East	Early Action	Maple Leaf Dairy, Inc.	Livestock	CAR762
CALS0112	Maple Leaf Dairy West	Early Action	Maple Leaf Dairy, Inc.	Livestock	CAR1007
CALS0113	WTE-Dallmann, LLC	Early Action	WTE-Dallmann, LLC	Livestock	CAR1010
CALS0114	Fiscalini Farms Anaerobic Digester	Early Action	Fiscalini Properties, LP	Livestock	CAR589
CAMM0115	Cambria 33 Abandoned Mine Methane Capture and Use Project	Early Action	Vessels Coal Gas, Inc.	Mine Methane Capture	559
CAFR0116	Finite Carbon – NEFF	Early Action	New England Forestry Foundation, Inc.	U.S. Forest	CAR672
CALS0117	Aurora Ridge	Early Action	Aurora Ridge Dairy, LLC	Livestock	CAR607

ARB Offset Credits Issued

ARB Project ID #	Project Name	Type of Protocol	Offset Project Operator	Project Type	Project Documentation
CAMM0118	Corinth Abandoned Mine Methane Recovery Project	Early Action	Keyrock Energy, LLC	Mine Methane Capture	573
CALS0119	Sunnyside Farms Inc	Early Action	ClimeCo Corporation	Livestock	CAR606
CAMM0120	Elk Creek Coal Mine Methane Destruction & Utilization Project	Early Action	Vessels Coal Gas, Inc.	Mine Methane Capture	CAR891
CAMM0121	Coal Mine Methane Capture and Use Project at the North Antelope Rochelle Coal Mine Complex	Early Action	Peabody Natural Gas, LLC	Mine Methane Capture	13
CALS0122	Farm Power Lynden Anaerobic Digester	Early Action	The Climate Trust	Livestock	CAR794
CAFR0123	Usal Redwood Forest	Early Action	Usal Redwood Forest Company, LLC	U.S. Forest	CAR730
CALS0124	Cottonwood Dairy Livestock Gas Capture Project	Early Action	Grey K Trading Limited	Livestock	CAR393
CALS0126	Cottonwood Dairy Livestock Gas Capture Project	Early Action	Grey K Trading Limited	Livestock	CAR393

Value of Forest Carbon
Offset Projects in Oregon
(Weisberg, The Climate
Trust)

10/16/17

Representative Helm, Senator Dembrow, Ms. Reiley and Ms. Patrino,

Dylan Kruse at Sustainable Northwest mentioned to The Climate Trust that it would be useful to have estimates of the size and distribution of the value of forest carbon offset projects in Oregon to inform the 1070 work groups. We did find one study on the forest carbon offset potential in Western Oregon, Gregory Latta et als' [Evaluating land-use and private forest management responses to a potential forest carbon offset sales program in Western Oregon](#). The paper does not specifically address the size and distribution of forest carbon offset value, but Dr. Latta was kind enough to re-run the economic model behind the paper for us to answer those questions.

According to that model, over the first ten years of a cap-and-trade program forest carbon projects in the Western Cascades would generate between \$667 million and \$1.93 billion of offset credits. The model assumes 66.7 million credits would be generated at a \$10 carbon price or 77 million credits at a \$25 carbon price. (I narrowed this summary to those prices because our price projections for the California market anticipate prices in that range.)

Assuming credit generation is directly proportional the the number of acres enrolled, here is a breakdown of where that forest carbon value occurs by county:

Country	Forest Carbon Value (@ \$10/credit)	Forest Carbon Value (@ \$25/credit)
Benton	\$19,124,888	\$56,517,824
Clackamas	\$20,600,813	\$54,816,101
Clatsop	\$46,310,499	\$125,925,785
Columbia	\$29,061,914	\$83,322,442
Coos	\$45,070,778	\$149,976,944
Curry	\$41,480,298	\$130,233,536
Douglas	\$123,029,595	\$372,735,676
Hood River	\$6,993,241	\$16,333,792
Jackson	\$58,110,066	\$175,532,881
Josephine	\$35,109,823	\$92,430,808
Lane	\$78,133,638	\$236,146,815
Lincoln	\$46,707,952	\$107,787,524
Linn	\$44,186,241	\$128,248,619
Marion	\$14,677,181	\$36,835,691
Multnomah	\$1,395,661	\$4,781,853
Polk	\$13,101,591	\$34,256,657
Tillamook	\$23,598,513	\$62,794,651
Washington	\$10,218,089	\$32,211,125
Yamhill	\$10,378,180	\$24,243,933
Totals	\$667,288,963	\$1,925,132,655

Unfortunately, I cannot find equivalent data for Central or Eastern Oregon and the dynamics there are very different. (Many forests there likely need to remove carbon to return to a healthy state and those projects that do qualify would probably be under the "high stocking reference" component of the forest protocol that this model cannot accommodate.)

There are, of course, a huge number of assumptions here. Most importantly, we do not know what an Oregon forest protocol would look like. As [we wrote about before](#), without changing the definition of "sustainable forest management" currently in the California protocol, enrollment will be limited. Greg also reminded me that the model assumes "perfect information and foresight and thus no risk as well as totally rational landowner behavior." We know, in practice, risk has been a major factor limiting participation in carbon markets. (Exactly why we founded our investment fund, Climate Trust Capital.)

Please let me know if that raises any additional questions. Dr. Latta could be an excellent resource for further analysis or discussion as well. Thanks!

My best,
Peter



Peter Weisberg
Senior Portfolio Manager
P 503 238 1915 x 207 | M 909 973 4990
Portland, Oregon USA

Presentation on
Estimating Contribution
of Carbon Offset Sales
Programs
(Latta, University of
Idaho)

10/16/17

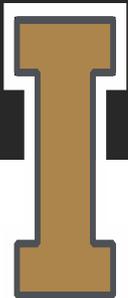
Estimating contribution of carbon offset sales programs

Gregory Latta
glatta@uidaho.edu

University of Idaho

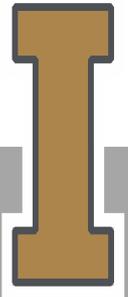
presented for:
SB1070

Clean Energy Jobs Work Group on Ag, Forests, Fisheries, Rural Communities, and Tribes
October 16, 2017



OUTLINE

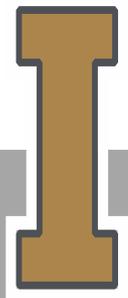
- Background on national work
 - 9 slides we will just bounce through to set context
- Regional work
 - Why you should be wary of numbers from hucksters like me
- Q & A
 - Time pending – academics are poor at time management



RECOGNIZE THAT YOU ARE NOT THE FIRST TO TACKLE THIS ISSUE

Federal Carbon Market Legislative History

Bill Number and Title	Introduced	Reported by Committee	Passed	Sponsor
108th Congress				
S. 843 Clean Air Planning Act of 2003	9-Apr-03			Sen. Thomas Carper [D-DE]
110th Congress				
S. 280 Climate Stewardship and Innovation Act of 2007	12-Jan-07			Sen. Joseph Lieberman [I-CT]
S. 1766 Low Carbon Economy Act of 2007	11-Jul-07			Sen. Jeff Bingaman [D-NM]
S. 2191 Lieberman-Warner Climate Security Act of 2007	18-Oct-07	5-Dec-07		Sen. Joseph Lieberman [I-CT]
111th Congress				
H.R. 2454 American Clean Energy and Security Act of 2009	15-May-09	21-May-09	26-Jun-09	Rep. Henry Waxman [D-CA30]
S. 1733 Clean Energy Jobs and American Power Act	30-Sep-09	5-Nov-09		Sen. John Kerry [D-MA]

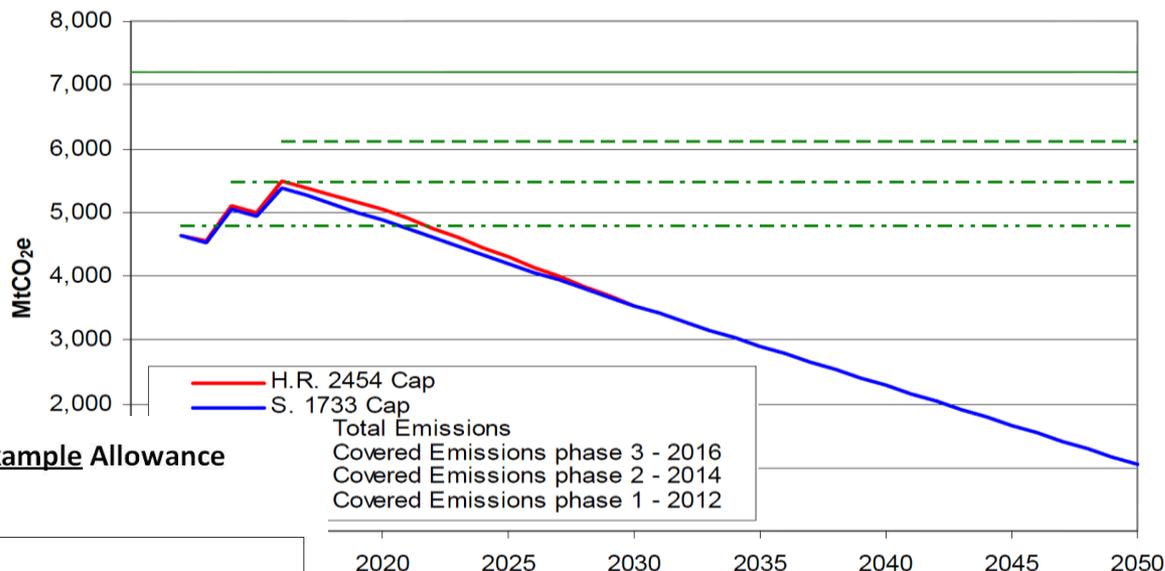


THEY ARE ALL KIND OF THE SAME

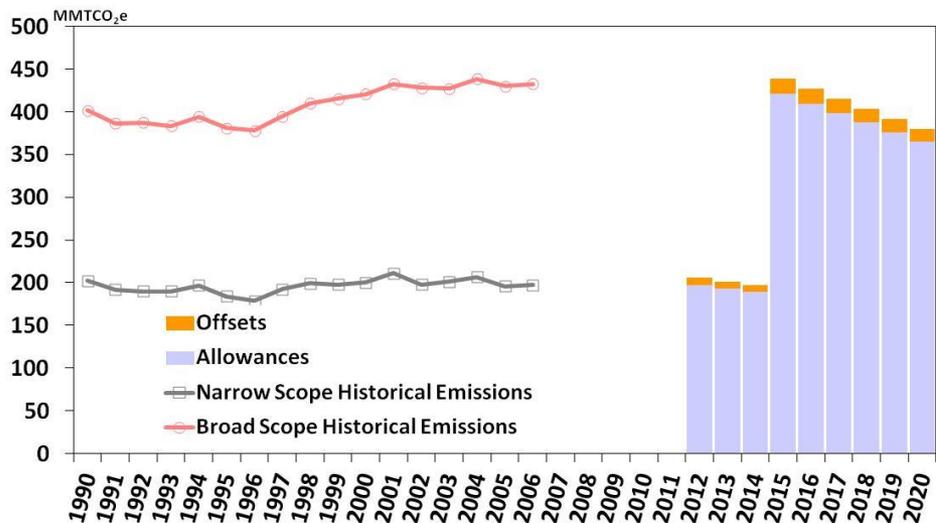
Emissions Cap Which Then Is Dropped Over Time

Figure 1 – S. 1733 and H.R. 2454 Cap Levels

Federal



Historical Emission Trends Relative to Example Allowance and Offset Levels



Regional
(California)

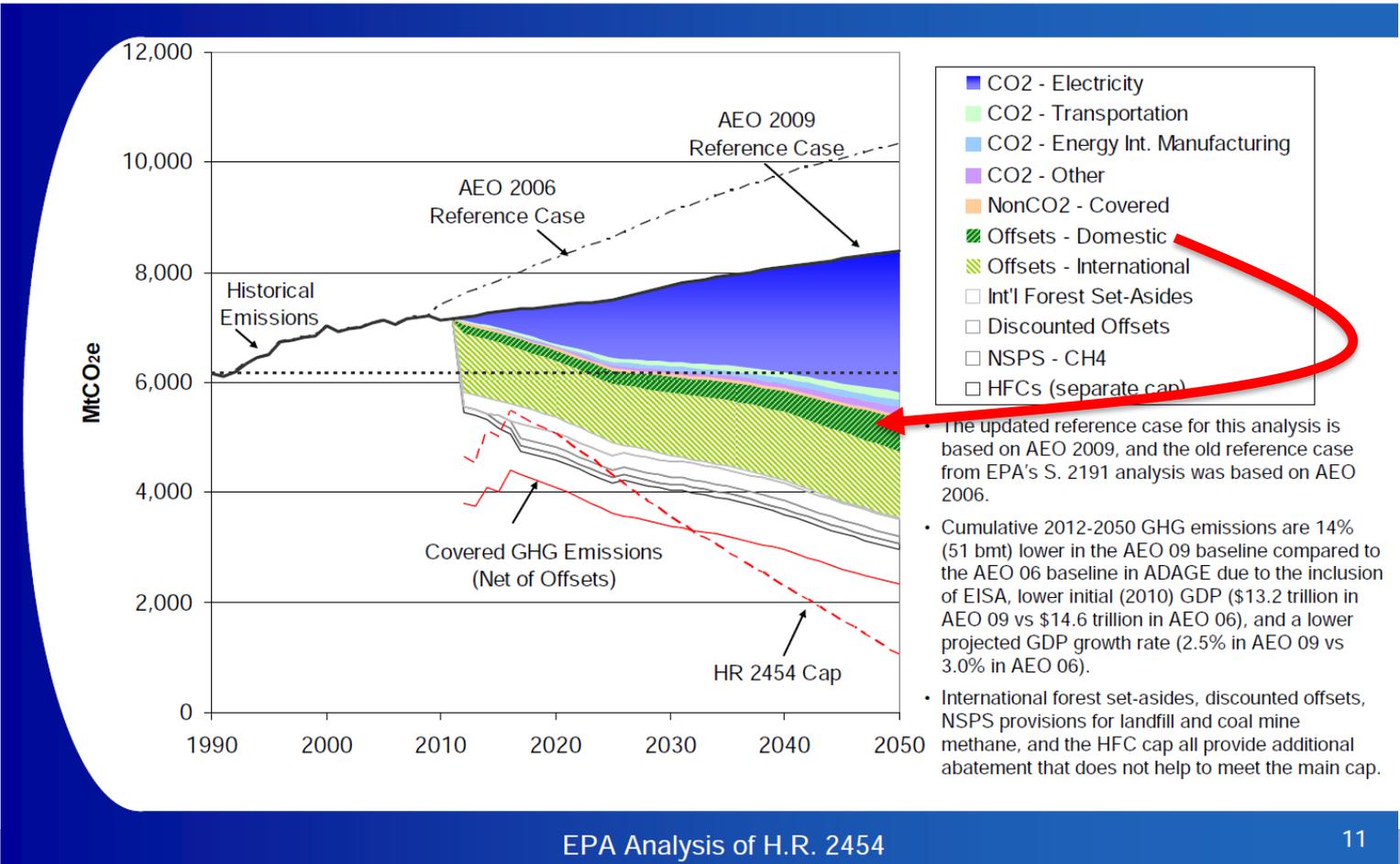
http://www.epa.gov/climatechange/economics/pdfs/EPA_S1733_Analysis.pdf
<http://www.arb.ca.gov/cc/capandtrade/meetings/121409/capcalc.xls>

OFFSETS ARE TYPICALLY A SMALL PART OF A LARGER SOLUTION

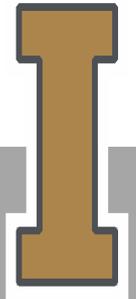


Total US GHG Emissions & Sources of Abatement

Scenario 1 - Reference & Scenario 2 – H.R. 2454 (ADAGE)



- The updated reference case for this analysis is based on AEO 2009, and the old reference case from EPA's S. 2191 analysis was based on AEO 2006.
- Cumulative 2012-2050 GHG emissions are 14% (51 bmt) lower in the AEO 09 baseline compared to the AEO 06 baseline in ADAGE due to the inclusion of EISA, lower initial (2010) GDP (\$13.2 trillion in AEO 09 vs \$14.6 trillion in AEO 06), and a lower projected GDP growth rate (2.5% in AEO 09 vs 3.0% in AEO 06).
- International forest set-asides, discounted offsets, NSPS provisions for landfill and coal mine methane, and the HFC cap all provide additional abatement that does not help to meet the main cap.





EPA MODELS AND CORRESPONDING GHG MITIGATION

S. 280 Sectors		Economy-wide Computable General Equilibrium (CGE) Models		Models Used to Provide Inputs to CGEs				Partial Equilibrium Model (Uses CGE Outputs)
		ADAGE	IGEM	NCGM	FASOM	GTM	MiniCAM	IPM
Domestic	Electricity Generation	All GHGs	All GHGs					CO ₂
	Transportation	All GHGs	All GHGs					
	Industry	All GHGs	All GHGs	CH ₄ , N ₂ O, F-gases				
	Commercial	All GHGs	All GHGs					
	Agriculture (& Forestry)	All GHGs	All GHGs		CO ₂ , CH ₄ , N ₂ O			
	Residential	All GHGs	All GHGs	CH ₄ , N ₂ O				
International Credits*				CH ₄ , N ₂ O, F-gases		CO ₂	CO ₂ , CH ₄ , N ₂ O, F-gases	

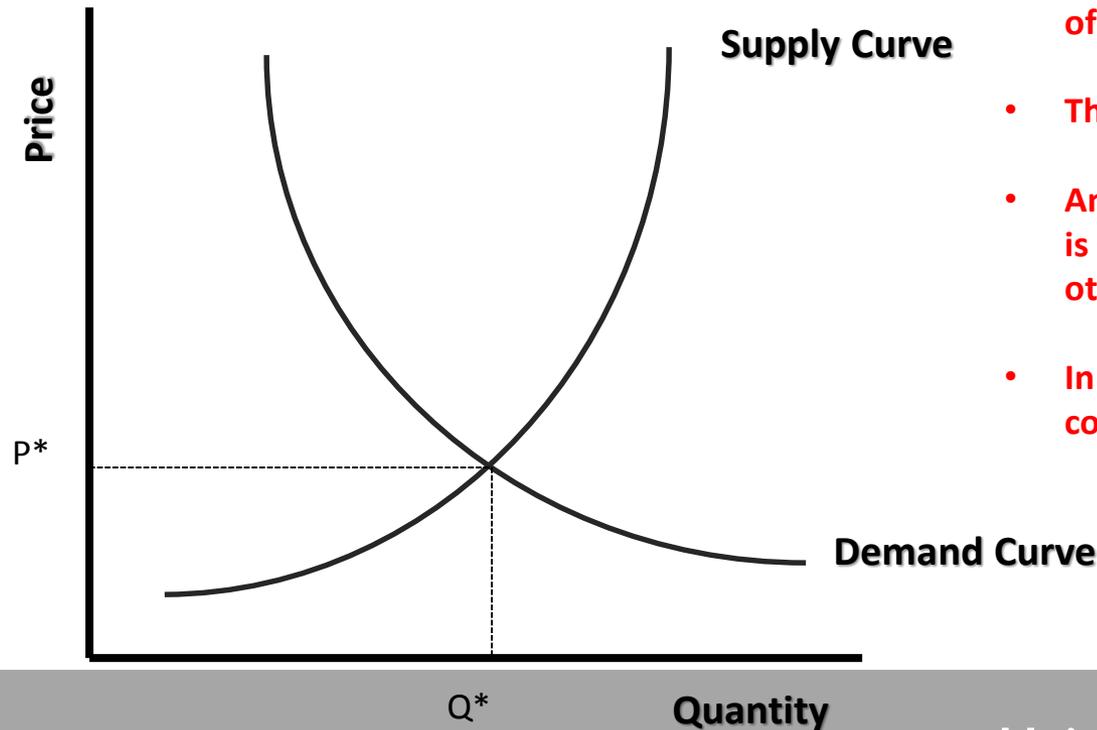
* International allowance and domestic offset markets were analyzed using EPA's spreadsheet tool which combines results from the NCGM, FASOM, GTM and MiniCAM models.

- ADAGE** Applied Dynamic Analysis of the Global Economy (Ross, 2007)
- IGEM** Intertemporal General Equilibrium Model (Jorgenson, 2007)
- IPM** Integrated Planning Model (EPA, 2007)
- NCGM** EPA's non-CO₂ GHG spreadsheet tools for estimating projections and mitigation of CH₄, N₂O, and F-gases (EPA, 2005)
- FASOMGHG** Forest and Agriculture Sector Optimization Model, GHG version (EPA, 2005)
- GTM** Global Timber Model (Sohngen, 2006)
- MiniCAM** Mini-Climate Assessment Model (Edmonds, 2005)

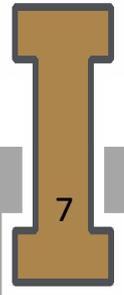
WHY USE A MARKET MODEL?

- Equilibrium model

- Price endogenous (one to many regions, one to many industries or sectors, one to many products)



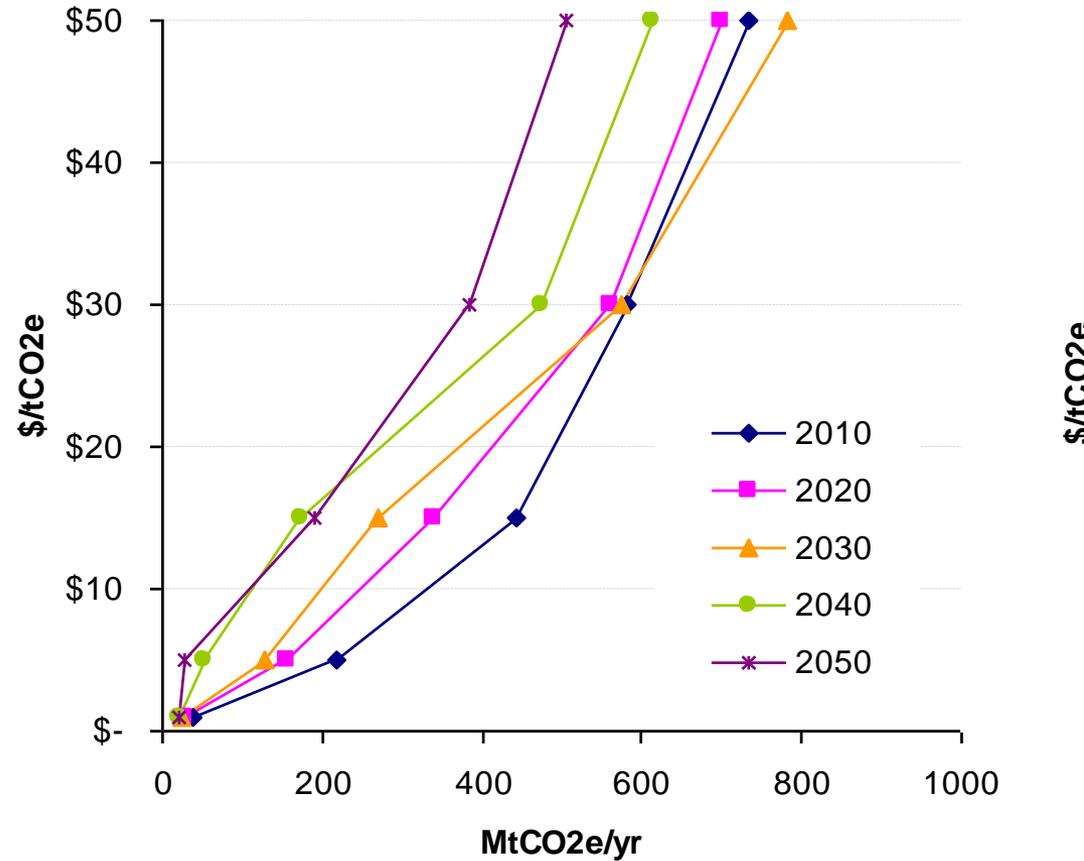
- Offsets change the costs of supply
- Then demand changes
- And that demand change is carried through to other markets
- In a theoretically consistent manner



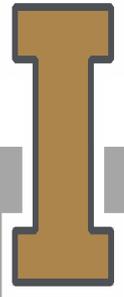
DOMESTIC FOREST AND AGRICULTURE INPUTS TO LARGER EPA ANALYSIS

Figure 1: Total Domestic Forest and Agriculture Of (avg MtCO₂e yr⁻¹)

Marginal Abatement Cost Curves (MACs) - mitigation supply curves



U.S. EPA, 2009. *Updated Forestry and Agriculture Marginal Abatement Cost Curves. Memorandum to John Conti, EIA, March 31, 2009.*



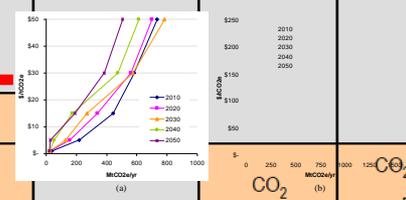
(a)



EPA MODELS AND CORRESPONDING GHG MITIGATION

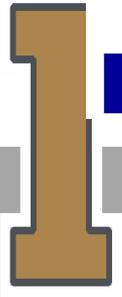
S. 280 Sectors		Economy-wide Computable General Equilibrium (CGE) Models		Models Used to Provide Inputs to CGEs				Partial Equilibrium Model (Uses CGE Outputs)
		ADAGE	IGEM	NCGM	FASOM	GTM	MiniCAM	IPM
Domestic	Electricity Generation	All GHGs	All GHGs					CO ₂
	Transportation	All GHGs	All GHGs					
	Industry	All GHGs	All GHGs	CH ₄ , N ₂ O, F-gases				
	Commercial	All GHGs	All GHGs					
	Agriculture (& Forestry)	All GHGs	All GHGs					
	Residential	All GHGs	All GHGs	CH ₄ , N ₂ O, F-gases				
International Credits*				CH ₄ , N ₂ O, F-gases			CO ₂ , CH ₄ , N ₂ O, F-gases	

Figure 1: Total Domestic Forest and Agriculture Offset MACs for constant (a) and rising (b) prices (per MCO₂e yr⁻¹)



* International allowance and domestic offset markets were analyzed using EPA's spreadsheet tool which combines results from the NCGM, FASOM, GTM and MiniCAM models.

- ADAGE** Applied Dynamic Analysis of the Global Economy (Ross, 2007)
- IGEM** Intertemporal General Equilibrium Model (Jorgenson, 2007)
- IPM** Integrated Planning Model (EPA, 2007)
- NCGM** EPA's non-CO₂ GHG spreadsheet tools for estimating projections and mitigation of CH₄, N₂O, and F-gases (EPA, 2005)
- FASOMGHG** Forest and Agriculture Sector Optimization Model, GHG version (EPA, 2005)
- GTM** Global Timber Model (Sohngen, 2006)
- MiniCAM** Mini-Climate Assessment Model (Edmonds, 2005)



THE MARGINAL ABATEMENT COST CURVES

With C prices:

- Harvest falls
- Prices rise

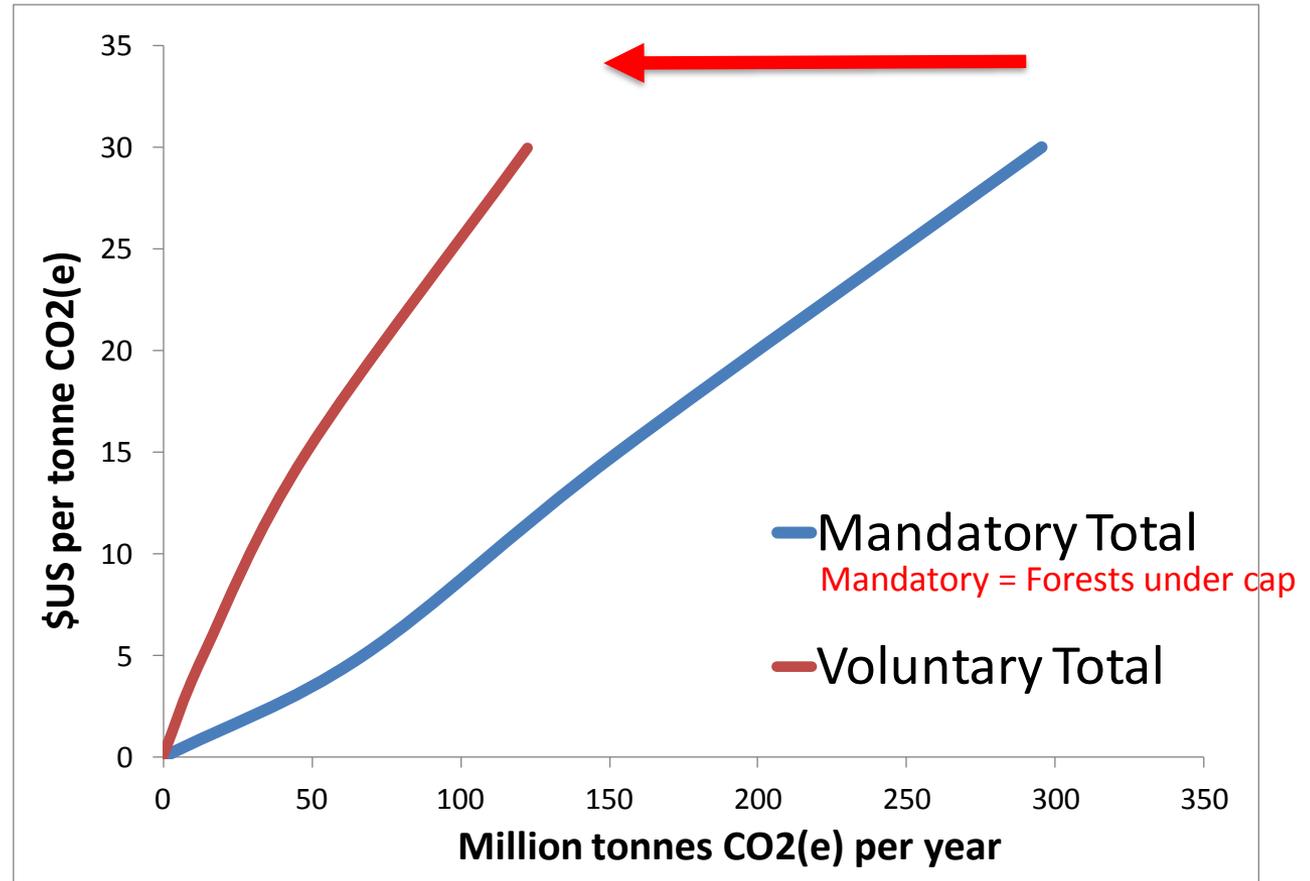
So when voluntary:

In C program

- Harvest falls
- Prices rise

Out of C program

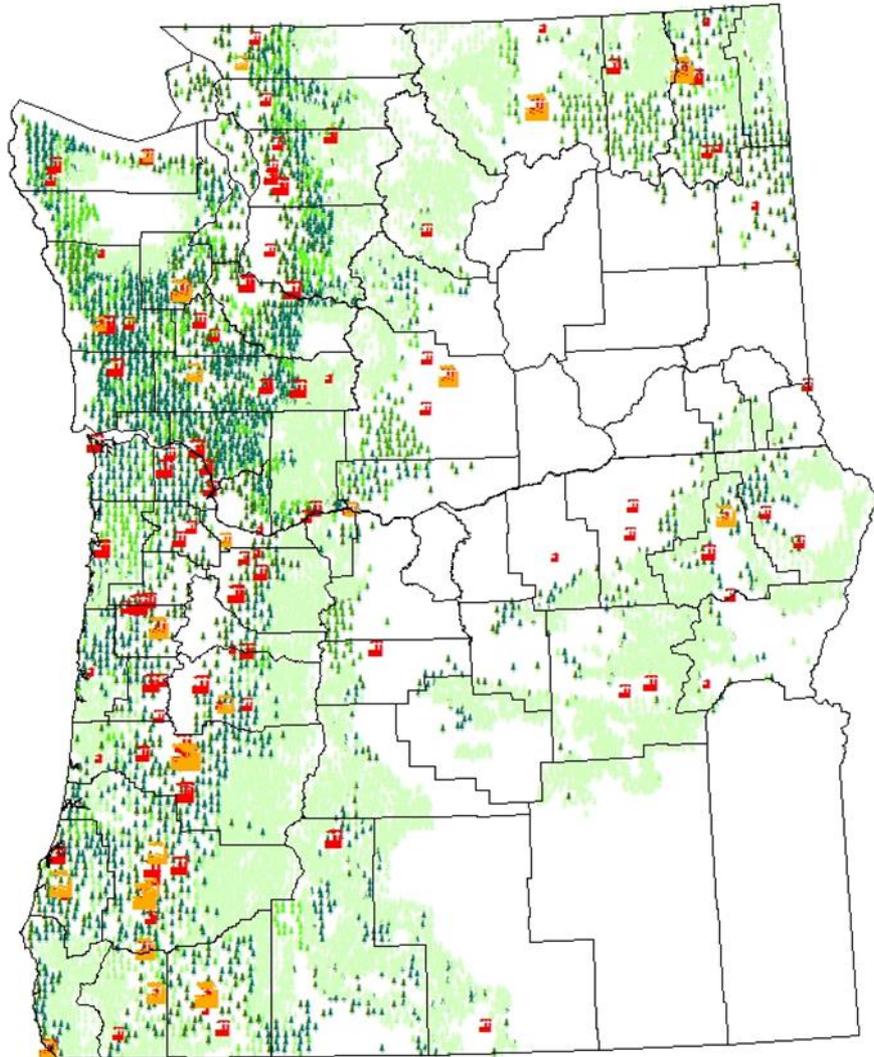
- People harvest more taking advantage of the higher price



Both Mandatory and Voluntary are a tax/subsidy system (you get paid to sequester, you pay when you emit)



REGIONAL WORK – SPATIAL REPRESENTATION



PNW Regional Log Market Model

Plywood Mill Demand
1000' s m3 per year

- 40 - 45
- 45 - 75
- 75 - 115
- 115 - 175
- 175 - 210

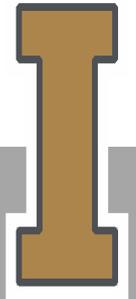
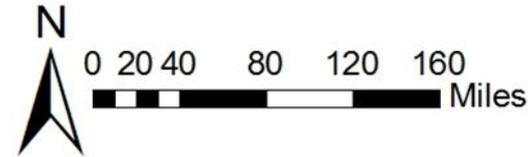
Sawmill Demand
1000' s m3 per year

- 0 - 50
- 50 - 150
- 150 - 275
- 275 - 550
- 550 - 900

Timberland Supply

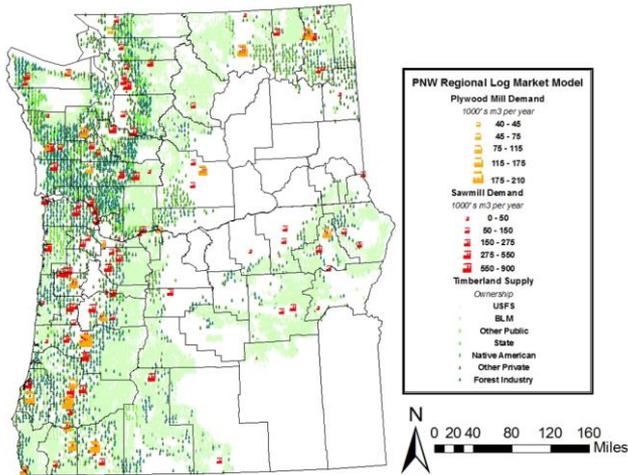
Ownership

- USFS
- BLM
- Other Public
- State
- Native American
- Other Private
- Forest Industry



REGIONAL WORK

Model of Regional Log Market



MILLING CENTER Y



TIMBERLAND A

TIMBERLAND B



MILLING CENTER X

- Market balance must be found across all milling centers and log sources
- Log buyers trade-off sources to minimize costs
- Log sellers trade-off destinations to maximize net returns
- Optimizes all time periods at once



SO BACK TO THE NUMBERS YOU WERE GIVEN

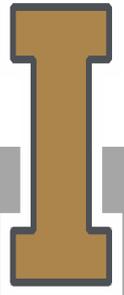
Looks Fabulous (*sign me up*), but as you can guess from the prior slides they come with a host of caveats

Private Landowner Participation

CO2_Price	C_In	C_Out	Participation
0	-	6,469,550	0%
1	334,552	6,134,999	5%
5	1,845,675	4,623,875	29%
10	2,390,395	4,079,155	37%
25	3,100,907	3,368,643	48%
50	3,440,477	3,029,073	53%

Private Landowner Offset Payments

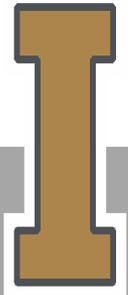
Country	Forest Carbon Value (@ \$10/credit)	Forest Carbon Value (@ \$25/credit)
Benton	\$19,124,888	\$56,517,824
Clackamas	\$20,600,813	\$54,816,101
Clatsop	\$46,310,499	\$125,925,785
Columbia	\$29,061,914	\$83,322,442
Coos	\$45,070,778	\$149,976,944
Curry	\$41,480,298	\$130,233,536
Douglas	\$123,029,595	\$372,735,676
Hood River	\$6,993,241	\$16,333,792
Jackson	\$58,110,066	\$175,532,881
Josephine	\$35,109,823	\$92,430,808
Lane	\$78,133,638	\$236,146,815
Lincoln	\$46,707,952	\$107,787,524
Linn	\$44,186,241	\$128,248,619
Marion	\$14,677,181	\$36,835,691
Multnomah	\$1,395,661	\$4,781,853
Polk	\$13,101,591	\$34,256,657
Tillamook	\$23,598,513	\$62,794,651
Washington	\$10,218,089	\$32,211,125
Yamhill	\$10,378,180	\$24,243,933
Totals	\$667,288,963	\$1,925,132,655



SO BACK TO THE NUMBERS YOU WERE GIVEN

Looks Fabulous (*sign me up*), but as you can guess from the prior slides they come with a host of caveats

- Large payments go to high stocks on program (*is there additionality you could enroll just some of your stands there?*)
- Plots enroll vs. forests ()
- Carbon transactions costs are averaged – for small acreage owners this might dramatically underestimate costs (*and thus returns and participation*)
- There is NO RISK in this modeling
 - In terms of forest growth and markets
 - In terms of carbon market existence and pricing



Country	Forest Carbon Value (@ \$10/credit)	Forest Carbon Value (@ \$25/credit)
Benton	\$19,124,888	\$56,517,824
Clackamas	\$20,600,813	\$54,816,101
Clatsop	\$46,310,499	\$125,925,785
Columbia	\$29,061,914	\$83,322,442
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Totals	\$667,288,963	\$1,925,132,655

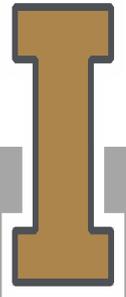
CLOSING THOUGHTS

While it is great that landowners could benefit from carbon revenue remember:

- The ultimate goal is a reduction in GHG emissions
- If a carbon offset program produces no additional offsets and it is used to offset real emissions then you will fail to achieve the policy target
- **Additionality** (*that the offsets are truly additional to what would have happened in the absence of the program*) **Leakage** (*that nearby forest owners don't just emit more now because you delayed harvest*) and **Permanence** (*that the avoided emissions remain avoided for lack of a better term*) will always be an issue
- A well designed offset quantification methodology can minimize these issues
- Fyi – I haven't calculated it with precision yet, but the truly additional (full sector participants and non-participants) carbon sequestration

The research on these issues and how they related to offset quantification methodology is poor (*but we are working on it*)

- *We have an ongoing Additionality and Leakage study*
- *We have another looking at Permanence (varying offset contract length)*



SOME RELEVANT LITERATURE

- That we talked about today

- Western Oregon:

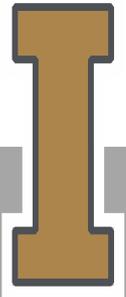
- Latta, G.S., Adams, D.M., Bell, K.P., and J.D. Kline. 2016. Evaluating land-use and private forest management responses to a potential forest carbon offset sales program in western Oregon (USA). *Forest Policy and Economics* 65(1): 1-8.

- National:

- Latta, G., D. Adams, R. Alig and E. White. 2011. Simulated effects of mandatory versus voluntary participation in private forest carbon offset markets in the United States. *Journal of Forest Economics* 17(2): 127-141.

- Others

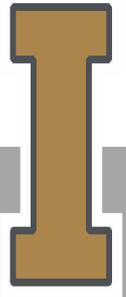
- Im E.H., D.M. Adams, G.S. Latta. 2010. The impacts of changes in federal timber harvest on forest carbon sequestration in western Oregon. *Canadian Journal of Forest Research* 40: 1710-1723.
 - Im, E., D.M. Adams and G.S. Latta. 2007. Potential impacts of carbon taxes on carbon flux in western Oregon private forests. *Forest Policy and Economics* 9(8):1006-1017.
 - Baker J.S., B.A. McCarl, B.C. Murray, S.K. Rose, R.J. Alig, D. Adams, G. Latta, R. Beach, and A. Daigneault. 2010. Net farm income and land use under a U.S. greenhouse gas cap and trade. *Policy Issues (PI7)* 7:1-5
 - Adams, D. R. Alig, G. Latta and E. White. 2011. Regional impacts of a program for private forest carbon offset sales. *Journal of Forestry* 109(8): 444-453.



BONUS SLIDES

Both bonus slides from:

Latta, G., D. Adams, R. Alig and E. White. 2011. Simulated effects of mandatory versus voluntary participation in private forest carbon offset markets in the United States. *Journal of Forest Economics* 17(2): 127-141.

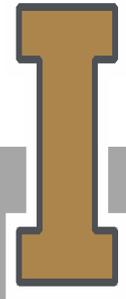
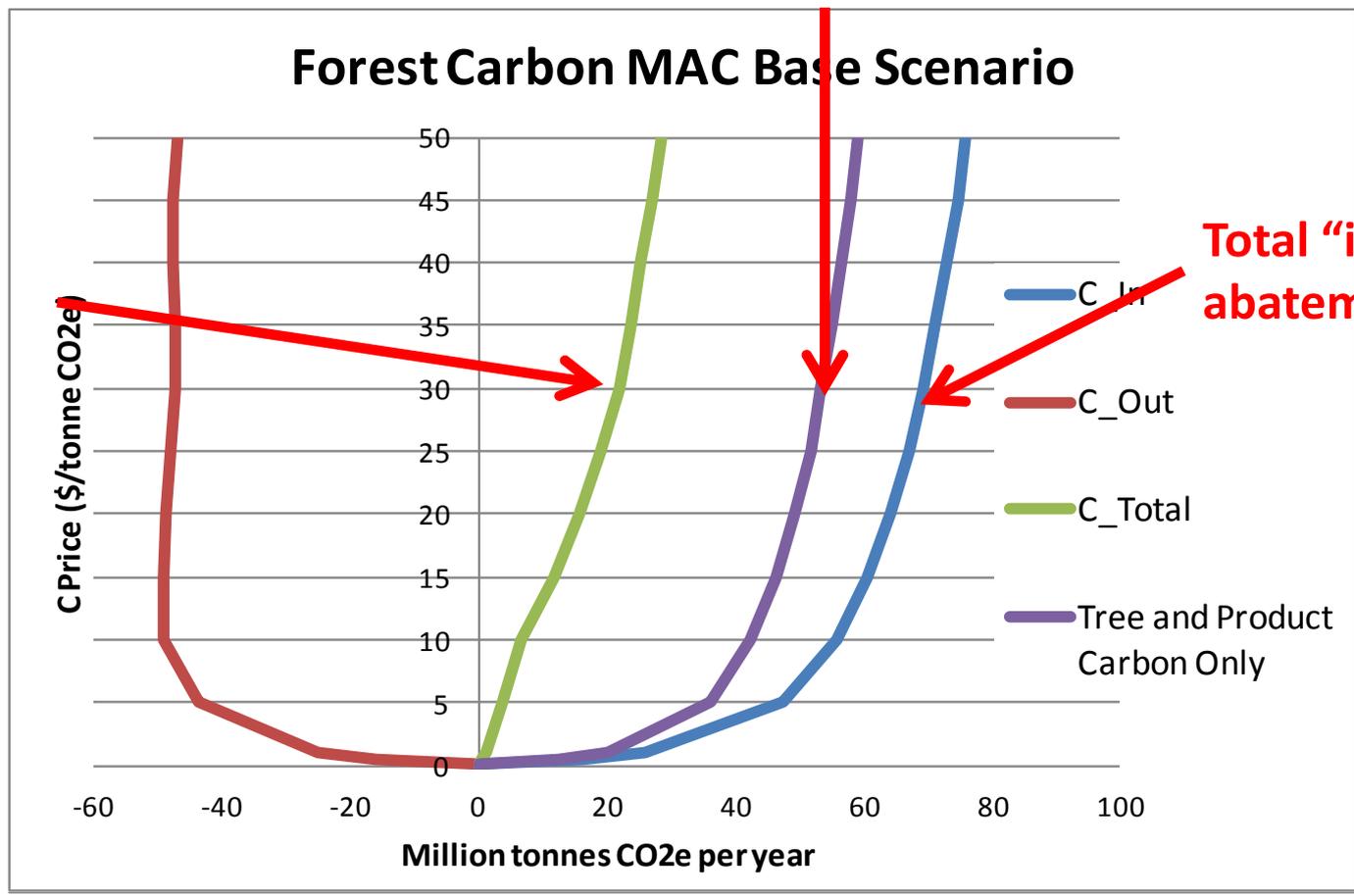


IMPROVED FOREST MANAGEMENT RESULTS

What you paid them for

What you really got

Total "in" abatement



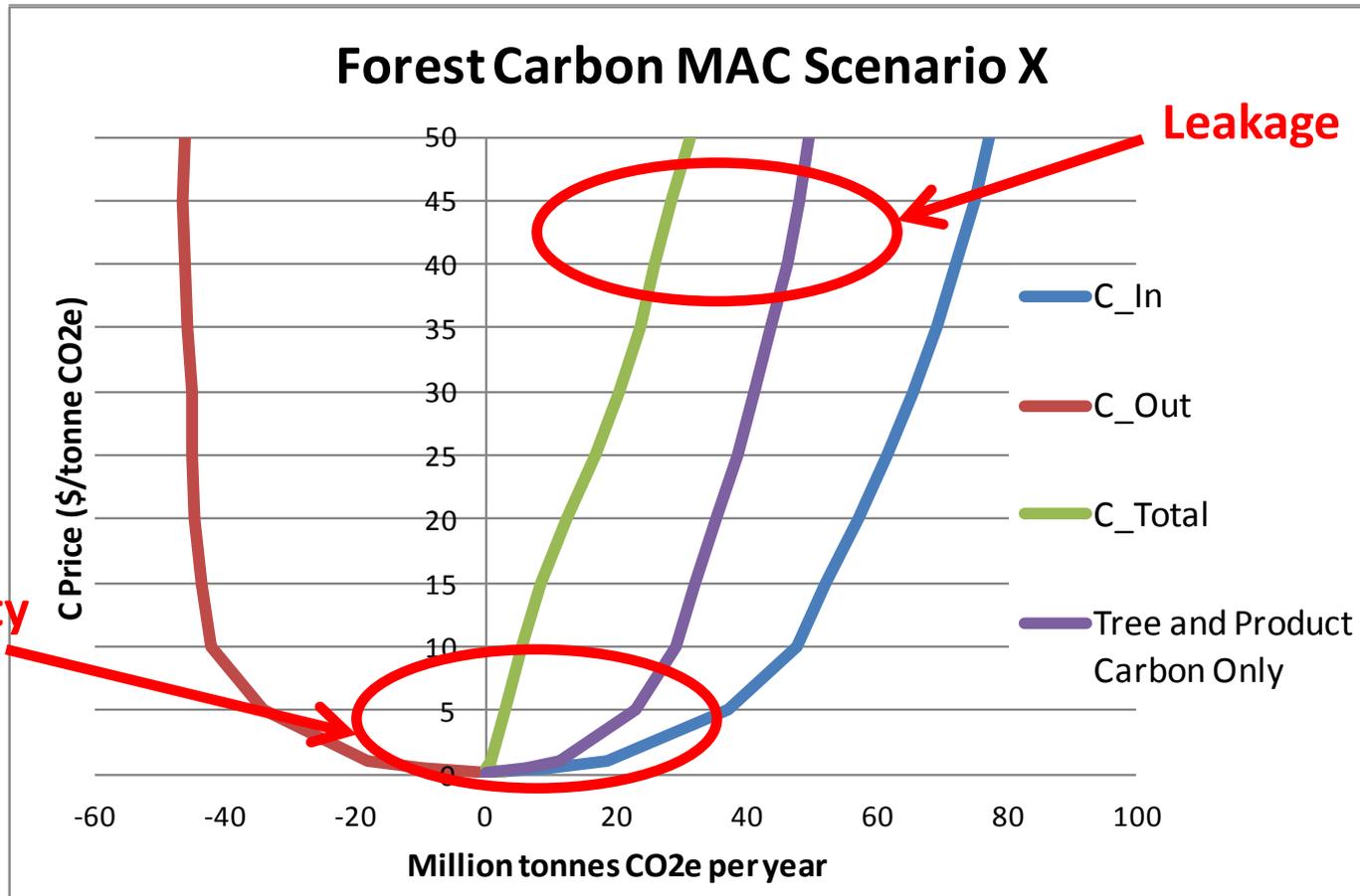
C_Total = All Carbon Pools (both in and out of C market) = The net mitigation at a given price

C_In = All Carbon Pools (In C market)

C_Out = All Carbon Pools (Out of C market)

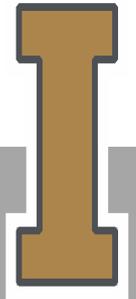
Tree and Product Carbon Only = The mitigation that the buyers paid for

IMPROVED FOREST MANAGEMENT RESULTS



Additionality

Leakage



C_{Total} = All Carbon Pools (both in and out of C market) = The net mitigation at a given price

C_{In} = All Carbon Pools (In C market)

C_{Out} = All Carbon Pools (Out of C market)

Tree and Product Carbon Only = The mitigation that the buyers paid for

Update on Carbon
Markets, 2017 Idaho
Master Forest Stewards
Fall Meeting
(Latta, University of
Idaho)

10/16/17



Update on Carbon Markets

2017 Idaho Master Forest Stewards Fall Meeting

Gregory Latta

Research Assistant Professor of Forest Economics

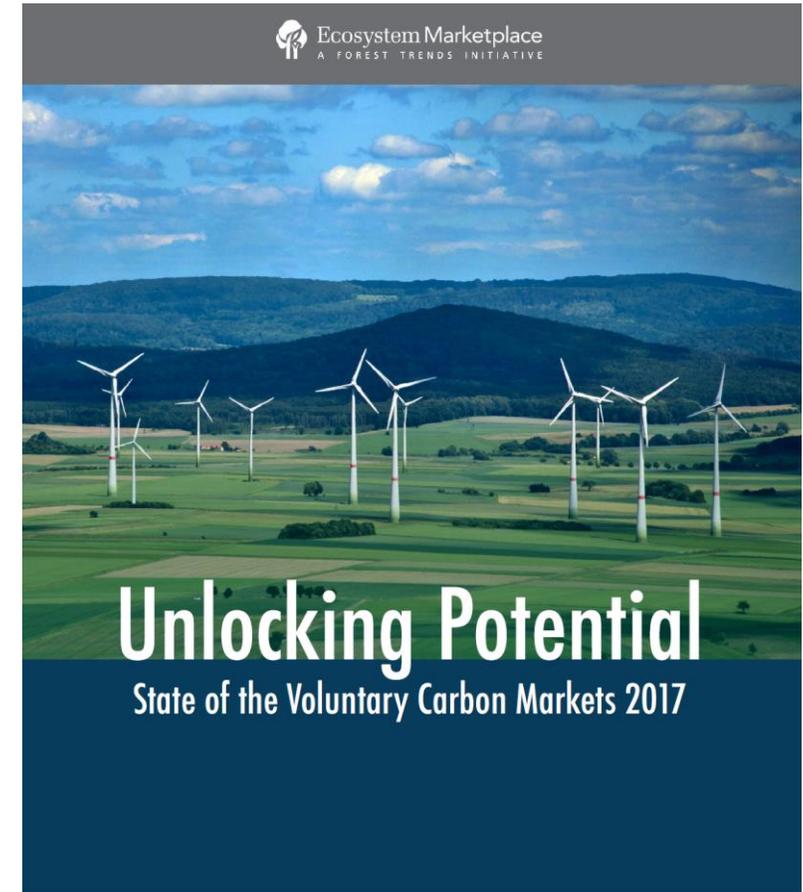
What are current Prices and Quantities

Voluntary market prices can be all over the place

Table 2: Transacted Volume, Value, and Average Price by Project Category, 2016

	VOLUME	AVERAGE PRICE	VALUE
RENEWABLES	18.3 MtCO ₂ e	\$1.4	\$25M
FORESTRY AND LAND USE	13.1 MtCO ₂ e	\$5.1	\$67M
METHANE	5.6 MtCO ₂ e	\$1.8	\$10M
EFFICIENCY AND FUEL SWITCHING	4.5 MtCO ₂ e	\$2.9	\$13M
HOUSEHOLD DEVICE	3.4 MtCO ₂ e	\$5.2	\$18M
TRANSPORTATION	1.9 MtCO ₂ e	\$0.3	\$1M
GASES	1.4 MtCO ₂ e	\$5.7	\$8M
OTHER	0.5 MtCO ₂ e	\$4.0	\$2M

Notes: Based on 717 transactions representing 48.8 MtCO₂e in 2016.



Supporter



Sponsors



What are current Prices and Quantities

Voluntary market prices can be all over the place

CALIFORNIA CARBON DASHBOARD  *in beta*
The latest on emissions policy and cap and trade in the world's 14th largest emitter

CARBON PRICE

\$/Tonne CO₂e



5-day moving average price and volume of California Carbon Allowance Futures over time from [ICE End of Day Reports](#). Daily trading volume units are 1000 allowance futures. [Download data](#).

What are current Prices and Quantities

Project as of yesterday (September 21, 2017)

Registered
at
Climate
Action
Reserve

Row Labels	Count of Project Name	Sum of Total Number of Offset Credits Registered
Avoided Conversion	6	1,548,512
Avoided Conversion - ARB Compliance	1	131,768
Avoided Grassland Conversion	6	
Coal Mine Methane - Drainage	2	931,263
Coal Mine Methane - VAM	2	278,177
Conservation-Based Forest Management	5	5,062,124
Forestry - MX	1	
Improved Forest Management	26	10,741,562
Improved Forest Management - ARB Compliance	86	22,496,977
Landfill Gas Capture/Combustion	116	26,689,855
Livestock - ARB Compliance	68	2,022,066
Livestock Gas Capture/Combustion	65	2,716,648
Mine Methane Capture - ARB Compliance	1	424,076
Nitric Acid N2O- Secondary Catalyst	5	10,749,244
Nitric Acid N2O- Tertiary Catalyst	1	534,849
Organic Waste Composting	7	527,374
Organic Waste Digestion	2	118,999
Ozone Depleting Substances - Article 5 Imports	5	4,009,926
Ozone Depleting Substances - U.S.	30	6,465,385
Ozone Depleting Substances - U.S. - ARB Compliance	52	4,469,383
Reforestation	7	
Reforestation - ARB Compliance	6	
Grand Total	500	99,918,188

What are current Prices and Quantities

Project as of yesterday (September 21, 2017)

**Registered
at
American
Carbon
Registry**

Row Labels	Count of Project ID	Sum of Total Number of Credits Registered
Agricultural Land Management	5	39,982
Carbon Capture & Storage (CCS)	5	21,780,080
Coal Mine Methane	6	1,275,447
Energy Efficiency	2	439,035
Forest Carbon	84	56,962,945
Fuel Switching	3	255,129
Industrial Gas Substitution	1	7,984,006
Industrial Process Emissions	9	1,012,189
Landfill Gas Capture & Combustion	12	5,671,631
Livestock Waste Management	19	558,803
Ozone Depleting Substances	47	4,682,375
Renewable Energy	5	677,691
Transport / Fleet Efficiency	36	934,709
Wastewater Treatment	1	100,000
Grand Total	235	102,374,022

What are current Prices and Quantities



Row Labels	Count of Project Name	Sum of Total Number of Offset Credits Registered
Active ARB Project	112	21,245,216
Avoided Conversion - ARB Compliance	1	131,768
Improved Forest Management - ARB Compliance	18	14,435,602
Livestock - ARB Compliance	51	1,877,442
Mine Methane Capture - ARB Compliance	1	424,076
Ozone Depleting Substances - U.S. - ARB Compliance	41	4,376,328
Active Registry Project	17	8,299,054
Improved Forest Management - ARB Compliance	11	8,061,375
Livestock - ARB Compliance	5	144,624
Ozone Depleting Substances - U.S. - ARB Compliance	1	93,055
Early Action	110	26,897,095
Avoided Conversion	6	1,548,512
Coal Mine Methane - Drainage	2	931,263
Coal Mine Methane - VAM	2	278,177
Conservation-Based Forest Management	5	5,062,124
Improved Forest Management	19	10,499,529
Livestock Gas Capture/Combustion	48	2,177,913
Ozone Depleting Substances - U.S.	28	6,399,577
Not ARB Eligible	147	42,696,630
Avoided Grassland Conversion	6	
Forestry - MX	1	
Landfill Gas Capture/Combustion	116	26,689,855
Livestock Gas Capture/Combustion	2	575
Nitric Acid N2O- Secondary Catalyst	5	10,749,244
Nitric Acid N2O- Tertiary Catalyst	1	534,849
Organic Waste Composting	7	527,374
Organic Waste Digestion	2	118,999
Ozone Depleting Substances - Article 5 Imports	5	4,009,926
Ozone Depleting Substances - U.S.	2	65,808
Not Eligible	29	780,193
Improved Forest Management	7	242,033
Livestock Gas Capture/Combustion	15	538,160
Reforestation	7	
Proposed Project	85	
Improved Forest Management - ARB Compliance	57	
Livestock - ARB Compliance	12	
Ozone Depleting Substances - U.S. - ARB Compliance	10	
Reforestation - ARB Compliance	6	
Grand Total	500	99,918,188

Row Labels	Count of Project ID	Sum of Total Number of Credits Registered
Early Action	4	287,542
Forest Carbon	2	
Ozone Depleting Substances	2	287,542
Listed - Active ARB Project	71	25,294,446
Coal Mine Methane	3	1,044,599
Forest Carbon	15	19,340,413
Livestock Waste Management	12	514,601
Ozone Depleting Substances	41	4,394,833
Listed - Active Registry Project	12	31,522,187
Coal Mine Methane	1	230,848
Forest Carbon	11	31,291,339
Listed - Proposed Project	53	
Coal Mine Methane	2	
Forest Carbon	42	
Livestock Waste Management	5	
Ozone Depleting Substances	4	
Not ARB Eligible	95	45,269,847
Agricultural Land Management	5	39,982
Carbon Capture & Storage (CCS)	5	21,780,080
Energy Efficiency	2	439,035
Forest Carbon	14	6,331,193
Fuel Switching	3	255,129
Industrial Gas Substitution	1	7,984,006
Industrial Process Emissions	9	1,012,189
Landfill Gas Capture & Combustion	12	5,671,631
Livestock Waste Management	2	44,202
Renewable Energy	5	677,691
Transport / Fleet Efficiency	36	934,709
Wastewater Treatment	1	100,000
Grand Total	235	102,374,022



Thank You

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Comparison of Cap-and-
Trade Programs;
California, Ontario,
Quebec, and Oregon
SB 1070

(10/17/17)

**Comparison of Cap-and-Trade Programs:
California, Ontario, Quebec and Oregon SB 1070***

	California's cap-and-trade program	Ontario's cap-and-trade program	Quebec's Carbon Market	Oregon Senate Bill 1070
Population	38 million	14 million	8 Million	4 million
Gross Regional Product	US \$2.6 trillion	US \$763 billion	US \$380 billion	US \$227 billion
Participating Jurisdictions	California, Quebec & Ontario	California, Quebec & Ontario	California, Quebec & Ontario	Designed to connect with California, Quebec & Ontario
Greenhouse Gases Covered	Carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), sulfur hexafluoride (SF ₆), perfluorocarbons (PFCs), nitrogen trifluoride (NF ₃), other fluorinated greenhouse gases	Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride and other such contaminants as may be prescribed by regulation	Carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), sulfur hexafluoride (SF ₆), perfluorocarbons (PFCs), nitrogen trifluoride (NF ₃), other fluorinated greenhouse gases	"Greenhouse gas" includes, but is not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and nitrogen trifluoride
Sectors Covered	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015	Electricity (including imports), industry, and certain fuel suppliers and distributors	Electricity (including imports) and industry in 2013; plus ground transportation and heating fuels in 2015	Air contamination source as defined in ORS 468A.005, electricity (including imports), fossil fuels that generate greenhouse gases when combusted, all beginning in 2021
Emissions Threshold	Emitters of at least 25,000 metric tons CO ₂ e annually, except for electricity imports for which the threshold is essentially 0	A facility or natural gas distributor that emits 25,000 tons or more of greenhouse gas emissions per year, or a fuel supplier that sells more than 200 litres of fuel per year	Emitters of at least 25,000 metric tons CO ₂ e annually, except fuel importers for which threshold is much lower to prevent small importers crossing the Western border avoiding the program	25,000 metric tons for all sources (a higher threshold for imported power than CA and a higher threshold for fuel importers than Quebec)
Target	Approximately 40% below 1990 emissions by 2030	37% below 1990 by 2030 Interim targets may be established	37.5% below 1990 levels by 2030	45% below 1990 levels by 2035
Status	First auction on November 14, 2012; compliance obligations began January 1, 2013	Compliance obligation began January 1, 2017. Linkage with Quebec and California is now established to begin in 2018	Compliance obligations began January 1, 2013	n/a
Allocation Method¹	Mixed – some free allocations for industry;	Enabling legislation authorizes Minister to distribute allowances registered participants in	Free allocation for some sectors, auctions for others	Similar to California; mixed – some free allocations for

¹ See information on recent changes to leakage calculations in California on page 3.

* This chart was published in the [California Cap-and-Trade Program Summary](#) by the Center for Climate and Energy Solutions (January, 2014) and has been updated to reflect recent changes in WCI jurisdictions and the provisions of Oregon Senate Bill 1070 by the Oregon Legislative Policy and Research Office staff (October, 2017).

	full auction for fuels, consignment for utilities	accordance with regulations either free of charge or at auction. Requires Minister to describe by 1/1/2021 how free allowances will be phased out.		industry; full auction for fuels, consignment for utilities
Price Floor at Auction	\$10 per metric ton for both 2012 and 2013 before rising 5% per year (plus inflation) starting in 2014	Will need to be identical to CA & QC	\$10 per metric ton price floor starting in 2012 and rising 5% for each year thereafter (plus inflation)	Will need to be identical to CA & QC
Affiliations	Helped establish Western Climate Initiative in 2007	Joined Western Climate Initiative in 2008	Joined Western Climate Initiative in 2008	Joined Western Climate Initiative in 2008
Linkage Status	Linked with Quebec starting in 2014	Linking with California and Quebec in 2018	Linked with California in 2014	Would enable linking with WCI
Offset Limit	Offsets can now account for 8% of a regulated entity's compliance obligation; changing to 4% for 2021-2025, and 6% for 2026-2030. Post-2020, one-half of offsets must come from inside CA.	Can account for 8% of a regulated entity's compliance obligation	Can account for 8% of a regulated entity's compliance obligation	Can account for 8% of a regulated entity's compliance obligation, however this can be reduced for entities in impacted communities
2013 Offset Use Limit - Millions of Offset Credits	13	N/A	2.1	N/A
Types of Offset Categories	<ul style="list-style-type: none"> 1) U.S. forest and urban forest project resources; 2) Livestock projects; 3) Ozone depleting substances projects; 4) Urban forest projects 	<p>Developing 11 new offset protocols tailored to Ontario. Has retained Climate Action Reserve to develop up to 13 protocols; 3 priority projects types: landfill gas capture and destruction, ozone depleting substances capture and destruction, and mine methane capture and destruction. Other protocols to include: afforestation and reforestation, anaerobic digestion (organic waste and manure), conservation cropping, emission reductions from livestock (enteric), forest (avoided conversion and improved forest management), grassland, N₂O reductions from fertilizer management, organic waste management, refrigeration systems, urban forest</p>	<ul style="list-style-type: none"> 1) Covered manure storage facilities – CH₄ destruction; 2) Landfill sites – CH₄ destruction; 3) Destruction of ozone depleting substances (ODS) contained in insulating foam recovered from appliances. Developing 11 new offset protocols tailored to the environmental and economic landscape in Quebec 	Directs Oregon to develop standards in a manner that allows DEQ to explore and encourage opportunities for development in Oregon

Leakage – Recent Changes in California

For background on emissions leakage, see “[Considerations for Designing a Cap-and-Trade Program in Oregon, Department of Environmental Quality, February 14, 2017, pages 38-39.](#)”

The original metrics for determining emissions leakage risk (trade exposure and emission intensity) in California have been modified by recent changes to the regulation, as discussed below. The final regulation order which contains all recent changes made to the cap-and-trade program can be found here: <https://www.arb.ca.gov/regact/2016/capandtrade16/ctfinro.pdf> For a specific discussion of the changes California Air Resources Board staff considered and implemented to industry assistance factors due to the leakage studies conducted, see this attachment: <https://www.arb.ca.gov/regact/2016/capandtrade16/attachb.pdf>

The formula for allocation to prevent leakage is generally summarized as:

$$\text{Allocation} = \text{AF} \times \text{B} \times \text{C} \times \text{O}$$

Where:

- AF is the assistance factor given to a particular level of leakage risk;
- B is the industry benchmark
- C is the cap adjustment factor to reflect the declining overall emissions cap; and
- O is the entity-specific output

The assistance factor declines over time for some industries that are deemed low or medium risk for leakage. Three studies of potential emissions leakage in California were completed in 2016 and staff have made some changes to the metrics used to determine leakage risk for the program post-2020. The primary change appears to be that staff are now calculating assistance factors and leakage risk based on a summation of an international assistance factor to minimize potential international leakage and a domestic assistance factor to minimize potential domestic leakage. Both components range between zero and 100 percent and are summed to yield the total assistance factor for a sector. Determining each part of the new assistance factor formula requires a separate set of calculations which are based, in part, on the studies of emissions leakage that California ARB commissioned.