



Evaluation of Approaches to Reduce Greenhouse Gas Emissions in Washington State

Task 4 – Final Evaluation Report

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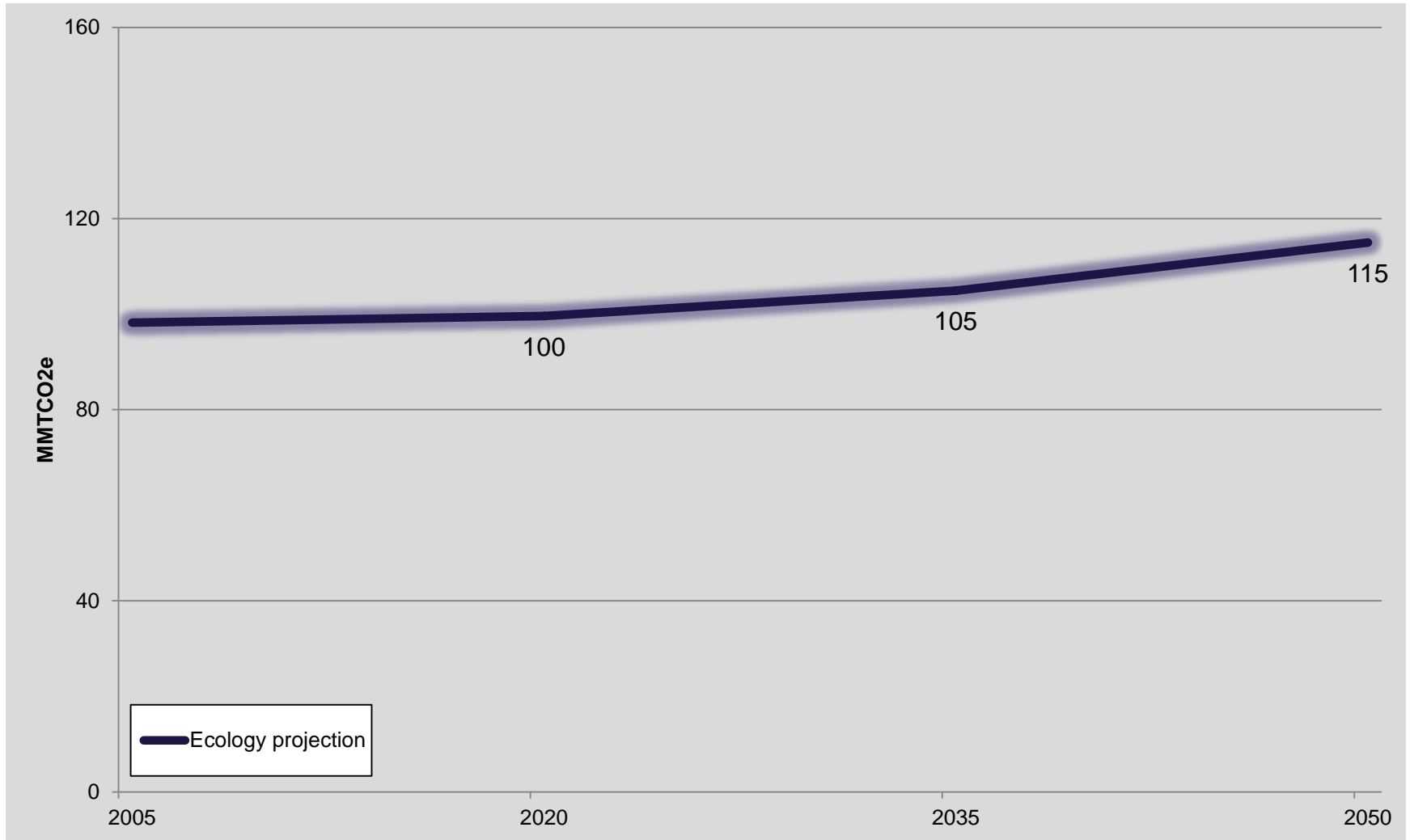
Task 4 Methodology: Developing the Clean and Expected Projection

- › Ecology emissions projection included reductions from several existing policies:
 - › Renewable fuel standard (federal)
 - › Energy Independence Act (I-937)
 - › Purchasing of Clean Cars (Pavley)
- › Projection was modified by Leidos to *exclude* reductions from these policies, with the effect of increasing projected emissions.
- › This represented a *clean*, unconstrained projection absent any policy impacts
- › From the *clean* projection, emission reductions attributable to the following policies were netted out to project the *expected*, current trajectory of Washington emissions
 - › Renewable fuel standard (federal)
 - > Washington State Energy Code
 - > GHG Emissions Performance Standards
 - > Energy Independence Act (I-937)
 - > Energy Efficiency and Energy Consumption Programs for Public Buildings
 - > Conversion of Public Fleet to Clean Fuels
 - > Purchasing of Clean Cars (Pavley)
 - > Purchasing of Clean Cars (LEV III)
 - > Growth Management Act
- > Due to policy interactions, the sum of reductions from these policies is 1% - 7% less than the simple sum of reductions

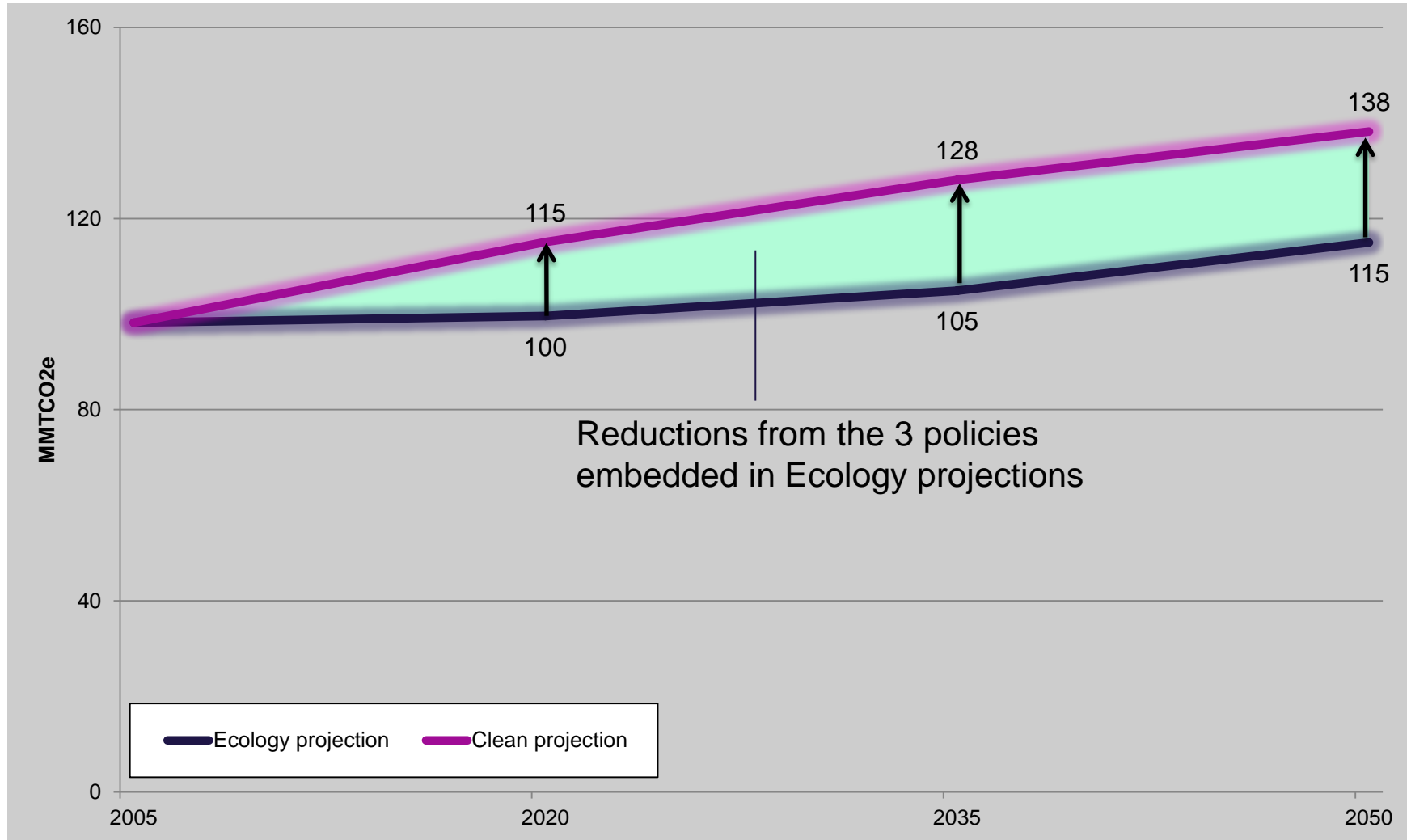
Task 4 Methodology: Developing the Potential Projections

- > From the *expected* trajectory, emission reductions from *potential* policies were subtracted to forecast WA emissions if analyzed policies were adopted
 - > Cap and Trade
 - > Carbon Tax
 - > Low Carbon Fuel Standard
 - > Zero Emissions Vehicle Mandate
 - > 5% Renewable Fuel Standard
 - > Public Benefit Fund
 - > Property Assessed Clean Energy
 - > Appliance Standards
 - > Feed-in-Tariff, 375 MW Cap
- > Many are scalable, and could be structured to generate more or fewer GHG reductions given different funding levels or stringency
- > Two scenarios considered, one with cap and trade and another with a carbon tax as the central component of a reduction program
- > Different policies apply or step-up in different years, so interactive effect varies by year and results in a range of diminishment
 - > Cap and trade: 17% - 28%
 - > Carbon tax: 24% - 34%

Department of Ecology Projection



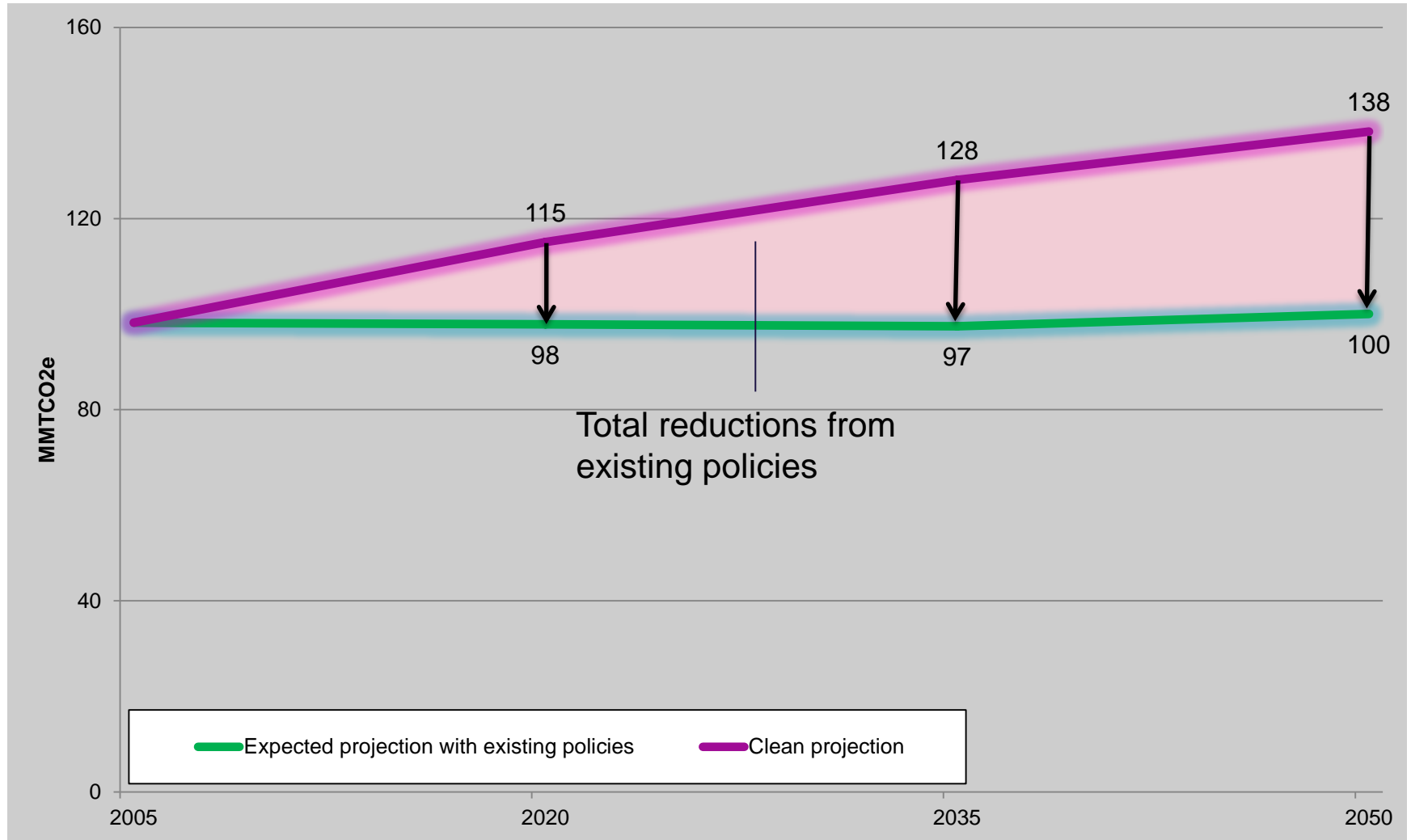
Clean Projection (Excluding Existing Policy Impacts)



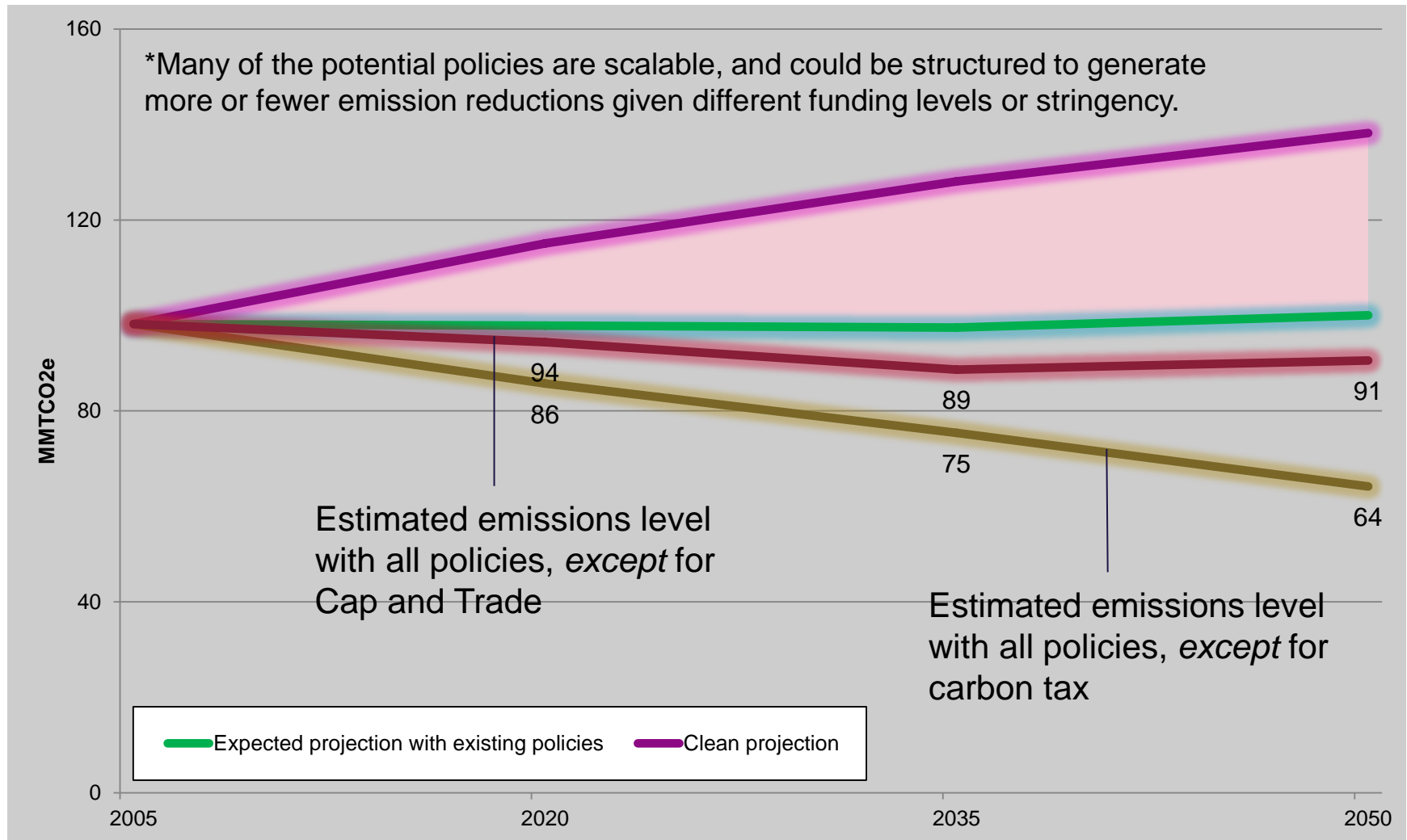
Additional Reductions Required to Meet Targets

	GHG Emissions (MMTCO ₂ e)		
	2020	2035	2050
Projected GHG emissions <i>without</i> federal and state policy	115.1	128.1	138.2
Estimated reductions from existing state policies ^a	-15.8	-29.0	-36.5
Estimated reductions from existing federal policies ^a	-1.4	-1.6	-1.6
Projected GHG emissions <i>with</i> federal and state policy	97.9	97.5	100.1
GHG emissions target	88.4	66.3	44.2
Additional reductions required to meet target	9.5	31.2	55.9

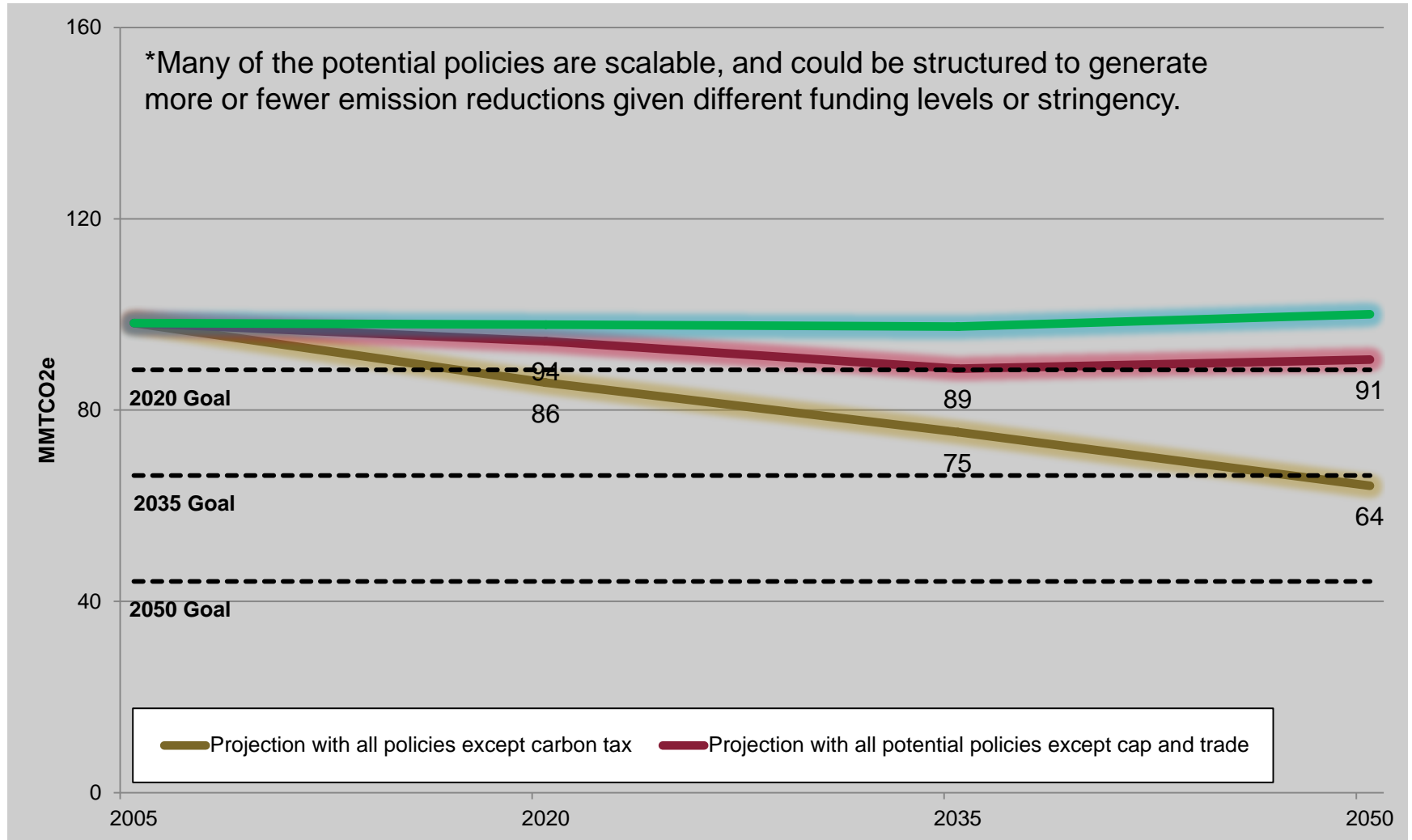
Expected Projection (Including Existing Policy Impacts)



Potential Projections (Including Potential Policy Impacts)



Potential Projections with Potential Policies, Relative to Goals



Backup Slides

Which Policy Estimates Have Changed?

Existing Policy	Changed	Not Changed
Renewable Fuel Standard		◆
Washington State Energy Code	◆	
GHG Emissions Performance Standards		◆
Appliance Standards		◆
Energy Independence Act (I-937)	◆	
Energy Efficiency and Energy Consumption Programs for Public Buildings		◆
Conversion of Public Fleet to Clean Fuels		◆
Purchasing of Clean Cars		◆
Growth Management Act		◆

Summary of Existing Policy Interactions

Existing Policy	Interaction with Other Existing Policies
State RFS	Completely negated by federal RFS
Washington State Energy Code	Natural Gas emissions savings do not overlap with other existing policies; Electricity emission savings increase in the presence of I-937 because electricity savings are assumed to erode demand fulfilled by existing natural gas and coal-fired generation, whereas without I-937, electricity savings are assumed to avoid the need for new gas-fired generation which is characterized by a lower emission factor.
Emissions Performance Standard (EPS)	Emission reductions due to improved fossil generation emission performance are diminished because a portion of the impacted fossil generation is displaced by increased renewable generation and conservation due to I-937.
Energy Independence Act (I-937)	Emission reductions from displaced fossil generation due to I-937 are diminished because the emission performance of fossil generation is improving due to the EPS. I-937 reductions are also diminished because Energy Code policy decreases demand, which decreases the amount of renewable generation required to meet the percentage based RPS targets.
Energy Efficiency and Energy Consumption Programs for Public Buildings	Negligible reductions and overlap with other existing policies
Conversion of Public Fleet to Clean Fuels	Negligible reductions and overlap with other existing policies
Purchasing of Clean Cars	Diminished by GMA as a result of reduced annual VMT over time (in the Task 1 analysis of reductions from Purchasing of Clean Cars, diminishment is implicitly captured and reductions are presented exclusive of interaction with GMA)
Growth Management Act (GMA)	Diminished by the Purchasing of Clean Cars improvement of emission performance on a per mile basis across the vehicle fleet.
Federal RFS	Completely subsumes state RFS; no overlap with other existing policies

Summary of Interactions Analysis on Existing State and Federal Policies

Existing Policy	GHG Emission Reductions (MMTCO ₂ e)			Sector Addressed
	2020	2035	2050	
State Renewable Fuel Standard	0.03	0.04	0.05	Transportation
Washington State Energy Code	0.9	5.1	11.0	Electricity, RCI
GHG Emissions Performance Standards	0.0	2.9	2.9	Electricity
Energy Independence Act (I-937)	7.9	10.9	10.9	Electricity
Energy Efficiency and Energy Consumption Programs for Public Buildings	0.03	0.04	0.04	Electricity, RCI
Conversion of Public Fleet to Clean Fuels	0.03	0.04	0.05	Transportation
Purchasing of Clean Cars	5.5	10.0	11.7	Transportation
Growth Management Act	1.6	2.4	2.6	Transportation
Federal RFS	1.4	1.6	1.6	Transportation
Percent Overlap due to Policy Interactions	1%	7%	7%	
Interactive Sum of Reductions from Existing policies	17.2	30.6	38.1	

Summary of Potential Policy Interactions with Existing state and Federal Policies

Potential Policy	Interaction with Existing Policies
Cap and Trade	Emission reductions attributed to cap and trade exclude all reductions from existing policies
Carbon Tax	Existing policy and energy forecast incorporated in model base case
Low Carbon Fuel Standard	Partially diminished by Federal and State renewable fuel standard
Zero Emissions Vehicle Mandate	LEV III vehicle emission standards incorporated into baseline in quantification of potential
5% Renewable Fuel Standard	Partially diminished by Federal and State renewable fuel standard
Public Benefit Fund	Quantified as applying to the approximately 20% of electric demand not met by I-937 covered utilities.
Property Assessed Clean Energy	Policy quantification assumed to apply only to conservation and renewables not covered by I-937.
Feed-in-Tariff, 375 MW Cap	80% subsumed by I-937. FIT serves as a mechanism to meet I-937 goals for covered utilities, and is additional for non-covered utilities (approximately 20% of state).

Summary of Interactions of Potential Policies Under Estimation Scenarios

Potential Policy	Cap and Trade Scenario	Carbon Tax Scenario
Cap and Trade	Excludes reductions from existing policies in covered sectors	Excluded
Carbon Tax	Excluded	Price signal achieves reductions additional to existing policy
Low Carbon Fuel Standard	100% interaction: all emission reductions are subsumed by cap	Partial diminishment: LCFS has a higher cost than the carbon tax, and interacts with ZEV and RFS
Zero Emissions Vehicle Mandate	Emission reductions are subsumed by cap	Partial diminishment: ZEV has a higher cost than the carbon tax; and ZEV emission reductions interact with LCFS
5% Renewable Fuel Standard	Emission reductions are subsumed by cap	Partial diminishment: RFS emission reductions interact with LCFS
Public Benefit Fund	Emission reductions are subsumed by cap	Partial diminishment: PBF costs range from higher, to lower than cost of tax , and may interact with PACE and FIT
Property Assessed Clean Energy	Emission reductions are subsumed by cap	No additional interaction with <i>potential</i> policies
Feed-in-Tariff, 375 MW Cap	Emission reductions are subsumed by cap	No additional interaction with <i>potential</i> policies

Percent Overlap due to Interactions

	2020	2035	2050
Cap and Trade Scenario			
Reduction due to Interactions	17%	28%	21%
Interactive Sum of Reductions (MMTCO ₂ e)	13.4	26.0	42.6
Carbon Tax Scenario			
Reduction due to Interactions	24%	33%	34%
Interactive Sum of Reductions (MMTCO ₂ e)	3.3	8.8	9.5

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