

# Oregon Global Warming Commission Meeting

December 16, 2022



# Meeting Overview

- Commissioner Updates *(12:00-12:15)*
- Overview of the scenario actions scoring results; Q&A on how to apply to the Roadmap recommendations *(12:15-1:45)*
- Break *(1:45-2:00)*
- Public Comment *(2:00-2:20)*
- Continued discussion of the scenarios and action scoring results and how to apply them in the Roadmap recommendations *(2:20-2:50)*
- Follow-up discussion on other Roadmap recommendations *(2:50-3:50)*
- Next Steps *(3:50-4:00)*

# Roadmap to 2035

## Where are we now?



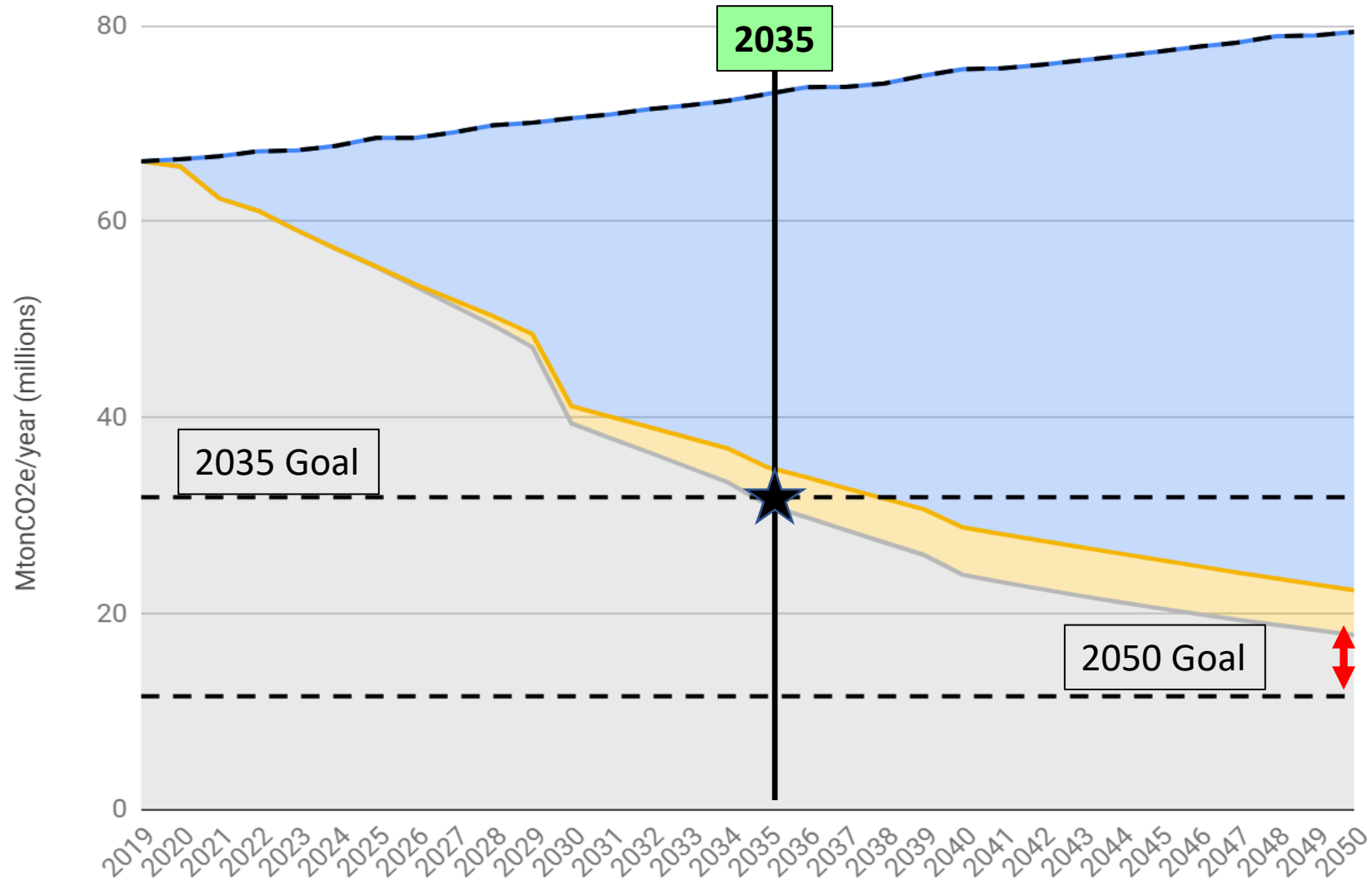
# Today's Outcomes

1. Review and discuss the scoring results and how they could be applied to the Roadmap recommendations
2. Additional input and direction on recommendations for the Roadmap

# Roadmap to 2035 Next Steps (December 8)

Next Steps	Date
Commission Meeting to discuss draft recommendation follow-up and present action scoring results	December 16
Written comments due on the action scoring results and related recommendations	January 5
Post updated draft recommendations to-date	January 9
Commission Meeting to continue discussion of action scoring results and related recommendations	January 12-13 (Exact date TBD)
Final written comments due on draft recommendations	January 23
Commission Meeting to finalize recommendations	January 30-February 3 (Exact date TBD)
Commission Subcommittee final review of report	February 13-17
<i>Roadmap to 2035</i> published and delivered to Legislature	By March 1

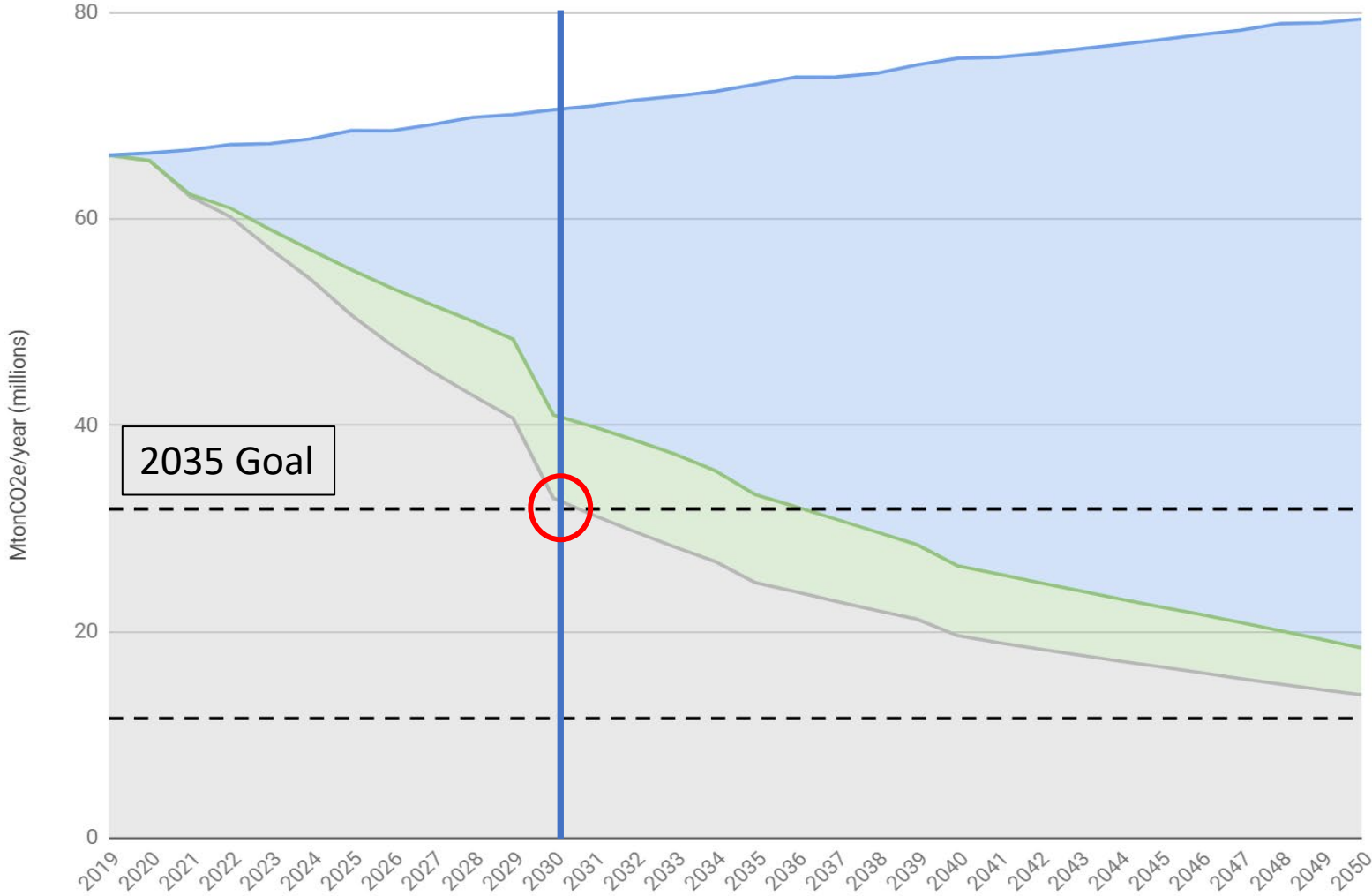
# Existing Programs & Regulations Meet the Goal



# Accelerate the Goal and Develop Scenarios

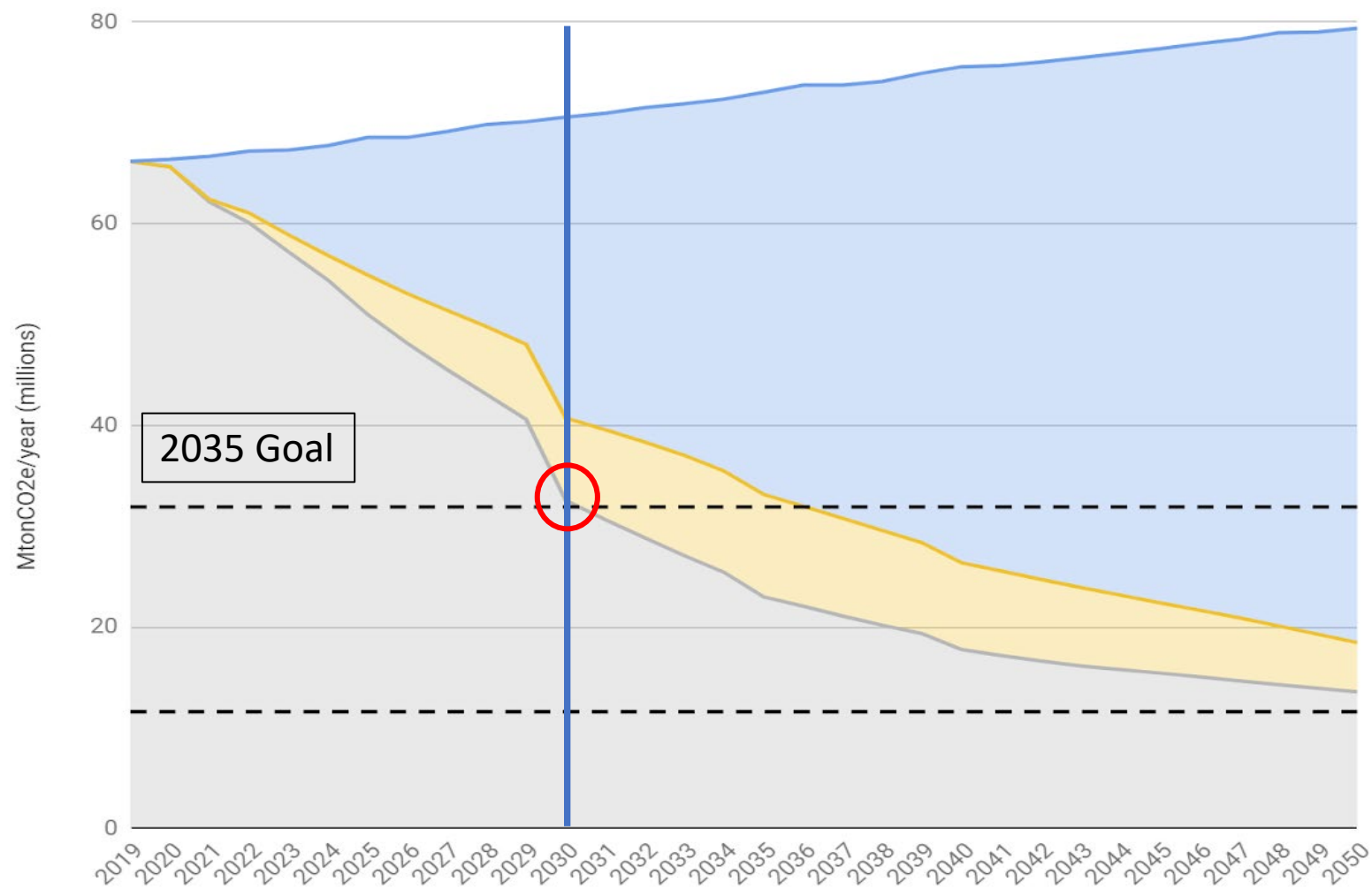
- OGWC chose to investigate accelerating achieving the goal by 2030
- Identified a set of actions sufficient to meet the goal by 2030
- Developed two scenarios:
  1. Electrification
  2. Hybrid
- Hybrid include alternative fuels (RNG and Hydrogen) and Electrification actions

# Electrification Scenario Meets the Accelerated Goal of 2030





# Hybrid Scenario Meets the Accelerated Goal of 2030



# Common Actions in Both Scenarios

Residential and Commercial energy code reduction of 60% by 2030	25% shift in urban areas to higher density residential dwelling types	10% shift mode shift in urban areas to passenger rail
Efficient heat pumps and water heaters in 100% of new homes and businesses by 2025	100% of new sales EVs by 2035	Carshare increases by 2035
Retrofit 95% of existing buildings reducing energy use by 50% by 2040	100% of new buses are EVs by 2035	Congestion pricing in urban areas resulting in 10% mode shift to transit by 2035
Existing buildings 100% heat pumps and water heaters by 2043	Mode shift 10% from MD to LD in urban counties by 2035	Water system 20% increase in efficiency by 2035
50% hot water heat pumps in commercial buildings by 2043	50% of off-road vehicle sales are EVs by 2035	Recycling Modernization Act*
Non-CPP Industrial load energy reduction of 50% by 2050	10% micro-mobility share by 2035	Food Waste Program 50% reduction by 2030
25% Reduced residential floorspace per building by 2035		Landfill Program*

# Embodied Carbon

- DEQ identified action with large GHG emissions reduction potential:
  - 42 MMTCO<sub>2</sub>e through 2050 (sector-based emissions)
  - 123.5 MMTCO<sub>2</sub>e through 2050 (includes consumption-based emissions)
- Potential action components
  - Use Environmental Product Declarations
  - Measuring and disclosing the whole lifecycle emissions of a building during the design process
  - Adaptive reuse of existing buildings and roads
- Opportunity for further study and analysis

# Unique Actions in Each Scenario

Electrification Only Actions	Hybrid Only Actions
100% electric new non-heating equipment sales for all buildings by 2035	70% Green hydrogen in industry by 2050
4 TWh of solar on new buildings by 2035	Use full potential of RNG 47.5 TBtus by 2050
16.3 TWh of rooftop solar by 2035	15% hydrogen injection into pipeline by 2035
25% of homes with energy storage by 2035	5% of homes with fuel cells by 2030
100% of diesel backup power replaced with electric battery storage by 2035	5% of fuel share from Pyrolysis of biomass by 2035
70% industrial electrification by 2050	

# Scenario Actions Scoring and Ranking

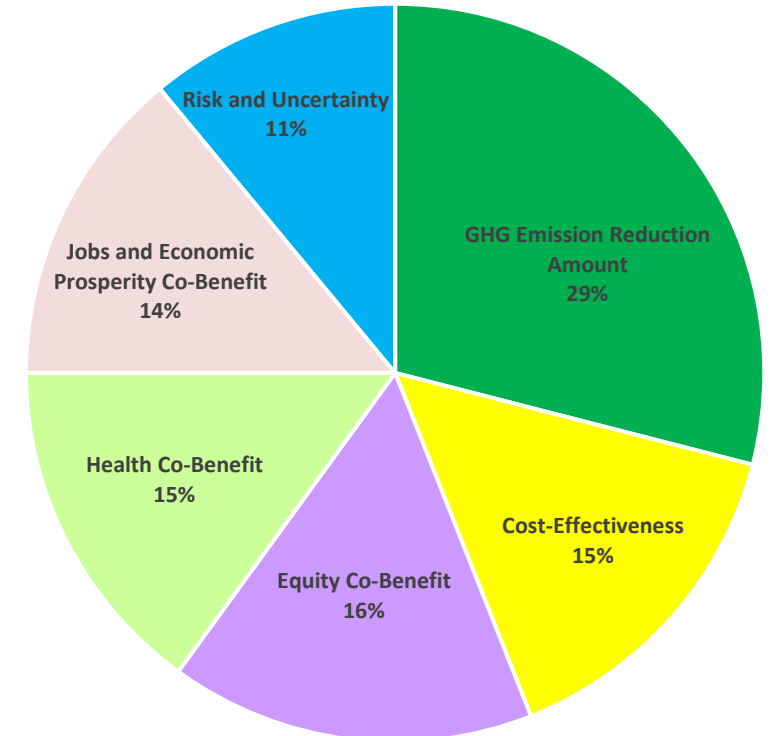
- Estimated the cost/benefit and GHG reductions of each action
- Marginal Abatement Cost Curve (MACC)
  - Each Actions Cost-Effectiveness (\$/MTCO<sub>2</sub>)
- Purely economic ranking
- Go beyond pure economics and include co-benefits in the evaluation
- Identified evaluation criteria including co-benefits

# Scenario Actions Scoring and Ranking

- Identified Six Evaluation Criteria

Evaluation Criteria	Weighting
GHG Reduction Amount	29
Cost-Effectiveness	15
Equity Co-Benefit	16
Health Co-Benefit	15
Jobs and Economic Prosperity Co-Benefit	14
Risk and Uncertainty	11

Evaluation Criteria Weighting (Points)



# Evaluation Criteria

Type	Criteria	Weighting	Definition	How Scored?	Data Source
MAC Curve Analysis	GHG Emission Reduction Amount	29	Relative amount of GHG emissions reduced	The higher the cumulative MTCO2 reduced, the higher the score	SSG TIGHGER Data: cumulative MTCO2 reduced
	Cost-Effectiveness	15	Relative net cost/benefit of emissions reductions, "bang for your buck"	The lower the \$/MTCO2, the higher the score	SSG TIGHGER Data: \$/MTCO2
Co-Benefits	Equity Co-Benefit	16	Relative level at which the action can serve environmental justice communities. Environmental justice communities include communities of color, communities experiencing lower incomes, communities experiencing health inequities, tribal communities, rural communities, remote communities (low population density and high geographic remoteness), coastal communities, communities with limited infrastructure and other communities traditionally underrepresented in public processes and adversely harmed by environmental and health hazards, including seniors, youth and persons with disabilities.	Assessed by looking at:  33% - <i>Reduction in air pollution.</i> Many environmental justice communities are typically exposed to more air pollution.  33% - <i>Potential to address other health inequities.</i> Many environmental justice communities experience more health inequities.  33% - <i>Relative level at which the action will help alleviate energy burden</i> (reducing the number of Oregonians paying more than 6% of their income on energy). Many environmental justice communities are particularly impacted by energy burden.	SSG TIGHGER Data: EPA-COBRA data  See "Reduction of other health risk factors/burdens" in the health co-benefit.  SSG TIGHGER Data: Energy burden reduction
				50% - <i>Avoided health impacts and associated cost savings from reduction in air pollution/co-pollutants</i> Health cost savings specifically from reduced mortality, heart attacks, hospital admissions, emergency room visits, asthma exacerbations, acute bronchitis, respiratory symptoms, restricted activity days, and work loss as a result of reducing air pollution. Reductions in air pollution include pollution from primary fine particulate matter (PM2.5) and precursors of secondary PM2.5, including nitrogen oxides (NOx), sulfur dioxide (SO2), ammonia (NH3), and volatile organic compounds (VOCs).  The higher the health cost savings, the higher the score.	SSG TIGHGER Data: cumulative estimated dollar amount from the EPA-COBRA analysis
	Health Co-Benefit	15	Potential to improve public health	50% - <i>Reduction of other health risk factors/burdens</i> Actions proven to reduce other health risk factors/burdens include: - increasing physical activity through land use improvements and active transportation, - improving home indoor air quality and comfort, or - improving nutrition through sustainable food systems  If action is one of these types, it receives full points. Otherwise, it receives no points.	TIGHGER action descriptions. Informed by high value climate and health actions in OHA 2018 Climate and Public Health in Oregon Report and consideration of indoor air quality risks from natural gas stoves. Only one action specifically relates to the latter.
	Jobs and Economic Prosperity Co-Benefit	14	Potential to create jobs and reduce costs for households and businesses	50% - <i>Number of cumulative person job years estimated to be treated over time as a result of implementing the action</i>  The higher the number of cumulative job years, the higher the score.  50% - <i>Decrease in household or business building energy cost (from the reduction in energy use) and transportation costs</i>  The higher the decrease in costs, the higher the score.	SSG TIGHGER Data: Cumulative person job years  SSG TIGHGER Data: Household or business building energy and transportation costs.
Other	Risk and Uncertainty	11	Likelihood the cost-effectiveness, GHG emission reductions, and co-benefits from the action will actually materialize given risks and uncertainties (confidence in the probability: low/medium/high)	The higher the likelihood (i.e. the less risk and uncertainty), the higher the score. Assessed by looking at:  40% - <i>Technical feasibility</i> - Technology proven and available at scale (yes/no); if yes, more likely to happen - Reliance on maximum technical potential (yes/no); if yes, possible won't be able to fully achieve  40% - <i>Political feasibility</i> - Behavior change needed (high/medium/low); the more behavior change needed, the more potential to be less politically acceptable/adhered to - Amount of direct costs/savings (high/medium/low); if more direct costs, potentially less politically feasible (even if reduce a lot of emissions or significant co-benefits)  20% - <i>Implementation timing</i> - Timing of action/benefits (near-term, mid-term, long-term). The longer the lead time, the higher potential to not happen or go off course.	Professional discretion SSG Modeling assumptions for each action  Professional discretion SSG TIGHGER data: Net Cost/Benefit data  Professional discretion based on action descriptions

# Evaluation Criteria

GHG Emission Reduction Amount	Cost-Effectiveness	Equity Co-Benefit			Health Co-Benefit		Jobs and Economic Prosperity Co-Benefit		Risk and Uncertainty		
29	15	16			15		14		11		
--	--	Reduction in Air Pollution	Alleviate Energy Burden	Address Health Inequities	Avoided Health Impacts	Reduce Other Health Risks	Number of Jobs	Energy & Transportation Savings	Technical Feasibility	Political Feasibility	Implementation Timing
100%	100%	40.0%	20.0%	40.0%	50%	50%	50%	50%	40%	40%	20%
29	15	6.4	3.2	6.4	7.5	7.5	7	7	4.40	4.40	2.20

Ended up making one modification on Alleviating Energy Burden



# List of Actions

#	<i>Electrification</i>	#	<i>Hybrid</i>
1	Reduced Res Floor Area	1	Reduced Res Floor Area
2	Higher Urban Res Density	2	Higher Urban Res Density
3	Res Code Reduction 60% by 2030	3	Res Code Reduction 60% by 2030
4	Com Code Reduction 60% by 2030	4	Com Code Reduction 60% by 2031
5	100% Elec HP & WH in New Res by 2025	6	100% HP & WH in New Res by 2025
6	100% Elec HP & 50% WH in New Com by 2025	5	100% HP & 50% WH in New Com by 2025
7	Wz in Existing Res by 2040	7	Wz in Existing R&C by 2040
8	Wz in Existing Com by 2040	8	Wz in Existing Com by 2040
9	Existing Res buildings 100% HP by 2043	9	Existing Res buildings 100% HP by 2045
10	Existing Res buildings 100% HPWH by 2043	10	Existing Res buildings 100% HPWH by 2045
11	Existing Com buildings 100% HP by 2043	11	Existing Com buildings 100% HP by 2045
12	Existing Com buildings 100% HPWH by 2043	12	Existing Com buildings 100% HPWH by 2045
13	Non-Heating Equip Elec in All Res by 2035		
14	Non-Heating Equip Elec in All Com by 2035		
15	Non-CPP Ind EE 50% by 2050	13	Non-CPP Ind EE 50% by 2050
16	MD/HD Zero Emission Plan	14	MD/HD Zero Emission Plan & 10% FCEV
17	10% Mode Shift MD to LD	15	10% Mode Shift MD to LD
18	10% Micro-mobility by 2035	16	10% Micro-mobility by 2037
19	Increase Amtrak Ridership	17	Increase Amtrak Ridership
20	Carshare Increases by 2035	18	Carshare Increases by 2037
21	Congestion Pricing	19	Congestion Pricing
22	Water Systems EE 20% by 2035	20	Water Systems EE 20% by 2037
23	Food Waste Program	21	Food Waste Program
24	Solar on New Buildings	22	Ind RH2 70% by 2050
25	Rooftop Solar	23	RNG Full Potential by 2050
26	Res 25% Energy Storage	24	RH2 Injection 15% by 2035
27	Backup Battery Storage	25	Home Fuel Cells 5% by 2030

# **Actions Not Analyzed**

## **Because of lack of data:**

- Electrification: Industrial Electrification 70% by 2050
- Hybrid: 5% of fuel share from Pyrolysis of biomass by 2035
- Common: 100% Transit Buses EVs by 2035
- Common: 50% offroad EVs by 2035

## **Included in PRAUD:**

- DEQ's Recycling Modernization Act
- DEQ's Landfill Program

# Detailed Data from SSG Model

#	Action	Cumulative Capital Cost	Cumulative Energy Savings	Cumulative O&M Savings	Cumulative Net Cost/Benefit	NPV of Net Cost/Benefit	Cumulative GHG Emission Reductions	Cost-Effectiveness (MAC)	Cumulative Health Benefits	Cumulative Number of Job Years	Cumulative Energy & Transportation Savings	Percentage of Energy Burdened Households
1	Reduced Res Floor Area	\$0	(\$3,600,000,000)	(\$14,400,000,000)	(\$18,000,000,000)	(\$7,320,900,000)	1,718,000	(\$4,261)	\$1,962,900,000	0	(\$18,000,000,000)	16.2%
2	Higher Urban Res Density	(\$27,500,000,000)	(\$2,800,000,000)	(\$9,000,000,000)	(\$39,300,000,000)	(\$20,906,500,000)	1,315,000	(\$15,899)	\$875,000,000	(149,677)	(\$39,300,000,000)	16.2%
3	Res Code Reduction 60% by 2030	\$7,900,000,000	(\$13,500,000,000)	\$300,000,000	(\$5,300,000,000)	(\$499,300,000)	8,044,000	(\$62)	\$2,669,000,000	38,162	(\$5,300,000,000)	16.2%
4	Com Code Reduction 60% by 2030	\$9,600,000,000	(\$8,230,000,000)	(\$710,000,000)	\$700,000,000	\$2,353,100,000	11,751,000	\$200	\$550,640,000	52,821	\$700,000,000	0.0%
5	100% Elec HP & WH in New Res by 2025	\$9,300,000,000	(\$10,400,000,000)	\$600,000,000	(\$500,000,000)	\$623,700,000	4,269,000	\$146	\$11,596,000,000	42,485	(\$500,000,000)	12.7%
6	100% Elec HP & 50% WH in New Com by 2025	\$348,000,000	(\$390,000,000)	\$230,000,000	\$100,000,000	\$54,400,000	1,123,000	\$236	\$1,470,100,000	1,742	\$100,000,000	0.0%
7	Wz in Existing Res by 2040	\$50,700,000,000	(\$60,000,000,000)	\$700,000,000	(\$8,600,000,000)	\$13,950,300,000	19,578,000	\$713	\$15,949,000,000	168,357	(\$8,600,000,000)	9.1%
8	Wz in Existing Com by 2040	\$40,400,000,000	(\$60,300,000,000)	(\$4,700,000,000)	(\$24,600,000,000)	\$9,493,100,000	21,128,000	\$449	\$2,234,900,000	122,917	(\$24,600,000,000)	0.0%
9	Existing Res buildings 100% HP by 2043	\$19,700,000,000	(\$13,300,000,000)	\$1,000,000,000	\$7,400,000,000	\$3,690,400,000	2,740,000	\$1,347	\$14,984,000,000	57,005	\$7,400,000,000	5.3%
10	Existing Res buildings 100% HPWH by 2043	\$100,000,000	(\$3,400,000,000)	\$300,000,000	(\$3,000,000,000)	(\$253,900,000)	4,470,000	(\$57)	\$207,000,000	643	(\$3,000,000,000)	0.0%
11	Existing Com buildings 100% HP by 2043	\$300,000,000	(\$1,600,000,000)	\$500,000,000	(\$800,000,000)	(\$140,400,000)	2,813,000	(\$50)	\$628,380,000	1,580	(\$800,000,000)	0.0%
12	Existing Com buildings 100% HPWH by 2043	\$1,700,000,000	(\$400,000,000)	(\$100,000,000)	\$1,200,000,000	\$699,000,000	617,000	\$1,133	\$13,000,000	7,937	\$1,200,000,000	0.0%
13	Non-CPP Ind EE 50% by 2050	\$3,900,000,000	(\$11,900,000,000)	\$0	(\$8,000,000,000)	(\$1,570,600,000)	13,621,000	(\$115)	\$9,807,900,000	21,089	(\$8,000,000,000)	0.0%
14	MD/HD Zero Emission Plan	\$600,000,000	(\$26,100,000,000)	(\$26,500,000,000)	(\$52,000,000,000)	(\$10,411,800,000)	12,337,000	(\$844)	\$259,000,000	(89,701)	(\$52,000,000,000)	0.0%
15	10% Mode Shift MD to LD	\$2,900,000	(\$1,600,000,000)	(\$1,500,000,000)	(\$3,100,000,000)	(\$797,100,000)	588,000	(\$1,356)	\$16,300,000	(185)	(\$3,100,000,000)	0.0%
16	10% Micro-mobility by 2035	\$100,000,000	(\$5,300,000,000)	not estimated	(\$5,200,000,000)	(\$2,904,500,000)	3,607,000	(\$805)	\$32,900,000	medium-low	(\$5,200,000,000)	0.0%
17	Increase Amtrak Ridership	\$1,040,000,000	(\$6,200,000,000)	\$38,000,000	(\$5,100,000,000)	(\$2,916,400,000)	5,488,000	(\$531)	\$50,000,000	medium-low	(\$5,100,000,000)	0.0%
18	Carshare Increases by 2035	\$2,060,000,000	(\$5,700,000,000)	not estimated	(\$3,600,000,000)	(\$1,910,800,000)	5,034,000	(\$380)	\$45,900,000	medium-low	(\$3,600,000,000)	0.0%
19	Congestion Pricing	\$627,000,000	(\$2,500,000,000)	\$925,000,000	(\$948,000,000)	(\$628,700,000)	2,073,000	(\$303)	\$18,700,000	medium-low	(\$948,000,000)	0.0%
20	Water Systems EE 20% by 2035	\$4,000,000	(\$1,800,000)	not estimated	\$2,200,000	\$1,700,000	2,286,000	\$1	\$45,000	medium	\$2,200,000	0.0%
21	Food Waste Program	\$0	\$0	\$0	(\$24,610,000)	\$0	2,572,000	(\$9,393)	\$0	medium	(\$24,610,000)	0.0%
22	Ind RH2 70% by 2050	\$0	\$7,080,000,000	\$0	\$7,100,000,000	\$1,960,000,000	18,863,000	\$11	low (2)	medium-low	\$7,100,000,000	0.0%
23	RNG Full Potential by 2050	\$0	\$5,400,000,000	\$0	\$5,400,000,000	\$1,628,300,000	22,617,000	\$72	\$0	medium-low	\$5,400,000,000	0.0%
24	RH2 Injection 15% by 2035	\$0	\$1,400,000,000	\$0	\$1,400,000,000	\$455,700,000	6,763,000	\$67	low (2)	medium-low	\$1,400,000,000	0.0%
25	Home Fuel Cells 5% by 2030	\$2,000,000,000	(\$4,200,000,000)	\$400,000,000	(\$1,800,000,000)	(\$69,900,000)	3,409,000	(\$21)	\$71,000,000	9,294	(\$1,800,000,000)	0.0%

# Evaluation Criteria

## Quantitative and Qualitative Application

GHG Emission Reduction Amount	Cost-Effectiveness	Equity Co-Benefit			Health Co-Benefit		Jobs and Economic Prosperity Co-Benefit		Risk and Uncertainty		
29	15	16			15		14		11		
--	--	Reduction in Air Pollution	Alleviate Energy Burden	Address Health Inequities	Avoided Health Impacts	Reduce Other Health Risks	Number of Jobs	Energy & Transportation Savings	Technical Feasibility	Political Feasibility	Implementation Timing
100%	100%	40.0%	20.0%	40.0%	50%	50%	50%	50%	40%	40%	20%
29	15	6.4	3.2	6.4	7.5	7.5	7	7	4.40	4.40	2.20

Qualitative Score based on High/Medium-High/Medium/Medium-Low/Low scale

# Scoring Bins for each Sub-criteria

GHG Emission Reduction Amount		
Min	Max	Score
0	1,000,000	1
1,000,001	1,500,000	2
1,500,001	2,500,000	3
2,500,001	4,000,000	4
4,000,001	7,000,000	5
7,000,001	10,000,000	6
10,000,001	15,000,000	7
15,000,001	16,000,000	8
16,000,001	17,000,000	9
17,000,001	20,000,000	10

GHG Emission Reduction Amount		
Min	Max	Score
0	1,000,000	1
1,000,001	1,500,000	2
1,500,001	2,500,000	3
2,500,001	4,000,000	4
4,000,001	7,000,000	5
7,000,001	10,000,000	6
10,000,001	15,000,000	7
15,000,001	16,000,000	8
16,000,001	17,000,000	9
17,000,001	20,000,000	10

#	Action	Cumulative GHG Emission Reductions	% of Largest	Final Score
8	Wz in Existing Com by 2040	17,791,000	100%	10
25	Rooftop Solar	17,757,000	100%	10
7	Wz in Existing Res by 2040	16,610,000	93%	9
4	Com Code Reduction 60% by 2030	11,751,000	66%	7
15	Non-CPP Ind EE 50% by 2050	10,987,000	62%	7
5	100% Elec HP & WH in New Res by 2025	10,182,000	57%	7
3	Res Code Reduction 60% by 2030	8,044,000	45%	6
19	Increase Amtrak Ridership	5,497,000	31%	5
16	MD/HD Zero Emission Plan	5,419,000	30%	5
20	Carshare Increases by 2035	5,042,000	28%	5
9	Existing Res buildings 100% HP by 2043	4,523,000	25%	5
10	Existing Res buildings 100% HPWH by 2043	4,414,000	25%	5
6	100% Elec HP & 50% WH in New Com by 2025	4,366,000	25%	5
18	10% Micro-mobility by 2035	3,615,000	20%	4
11	Existing Com buildings 100% HP by 2043	3,055,000	17%	4
24	Solar on New Buildings	2,648,000	15%	4
23	Food Waste Program	2,572,000	14%	4
22	Water Systems EE 20% by 2035	2,286,000	13%	3
21	Congestion Pricing	2,078,000	12%	3
26	Res 25% Energy Storage	1,900,000	11%	3
1	Reduced Res Floor Area	1,718,000	10%	3
2	Higher Urban Res Density	1,315,000	7%	2
17	10% Mode Shift MD to LD	595,000	3%	1
12	Existing Com buildings 100% HPWH by 2043	572,000	3%	1
27	Backup Battery Storage	482,000	3%	1
14	Non-Heating Equip Elec in All Com by 2035	103,000	1%	1
13	Non-Heating Equip Elec in All Res by 2035	55,000	0%	1

#	Action	Cumulative GHG Emission Reductions	% of Largest	Final Score
8	Wz in Existing Com by 2040	17,791,000	100%	10
25	Rooftop Solar	17,757,000	100%	10
7	Wz in Existing Res by 2040	16,610,000	93%	9
4	Com Code Reduction 60% by 2030	11,751,000	66%	7
15	Non-CPP Ind EE 50% by 2050	10,987,000	62%	7

# Scoring Bins for each Sub-criteria (qualitative)

Reduce Other Health Risks		
Level	Score	Points
High	10	7.5
Medium-High	8	6.0
Medium	6	4.5
Medium-Low	4	3.8
Low	2	2.3
None	0	0.0

#	Action	Level of Reduced Health Risks	Final Score
3	Res Code Reduction 60% by 2030	High	10
6	100% Elec HP & WH in New Res by 2025	High	10
7	Wz in Existing Res by 2040	High	10
9	Existing Res buildings 100% HP by 2043	High	10
10	Existing Res buildings 100% HPWH by 2043	High	10
13	Non-Heating Equip Elec in All Res by 2035	High	10
14	Non-Heating Equip Elec in All Com by 2035	High	10
18	10% Micro-mobility by 2035	High	10
21	Congestion Pricing	High	10
23	Food Waste Program	High	10
4	Com Code Reduction 60% by 2030	Medium-High	8
5	100% Elec HP & 50% WH in New Com by 2025	Medium-High	8
8	Wz in Existing Com by 2040	Medium-High	8
11	Existing Com buildings 100% HP by 2043	Medium-High	8
12	Existing Com buildings 100% HPWH by 2043	Medium-High	8
2	Higher Urban Res Density	Medium	6
17	10% Mode Shift MD to LD	Medium-Low	4
19	Increase Amtrak Ridership	Medium-Low	4
20	Carshare Increases by 2035	Low	2
1	Reduced Res Floor Area	None	0
15	Non-CPP Ind EE 50% by 2050	None	0
16	MD/HD Zero Emission Plan	None	0
22	Water Systems EE 20% by 2035	None	0
24	Solar on New Buildings	None	0
25	Rooftop Solar	None	0
26	Res 25% Energy Storage	None	0
27	Backup Battery Storage	None	0

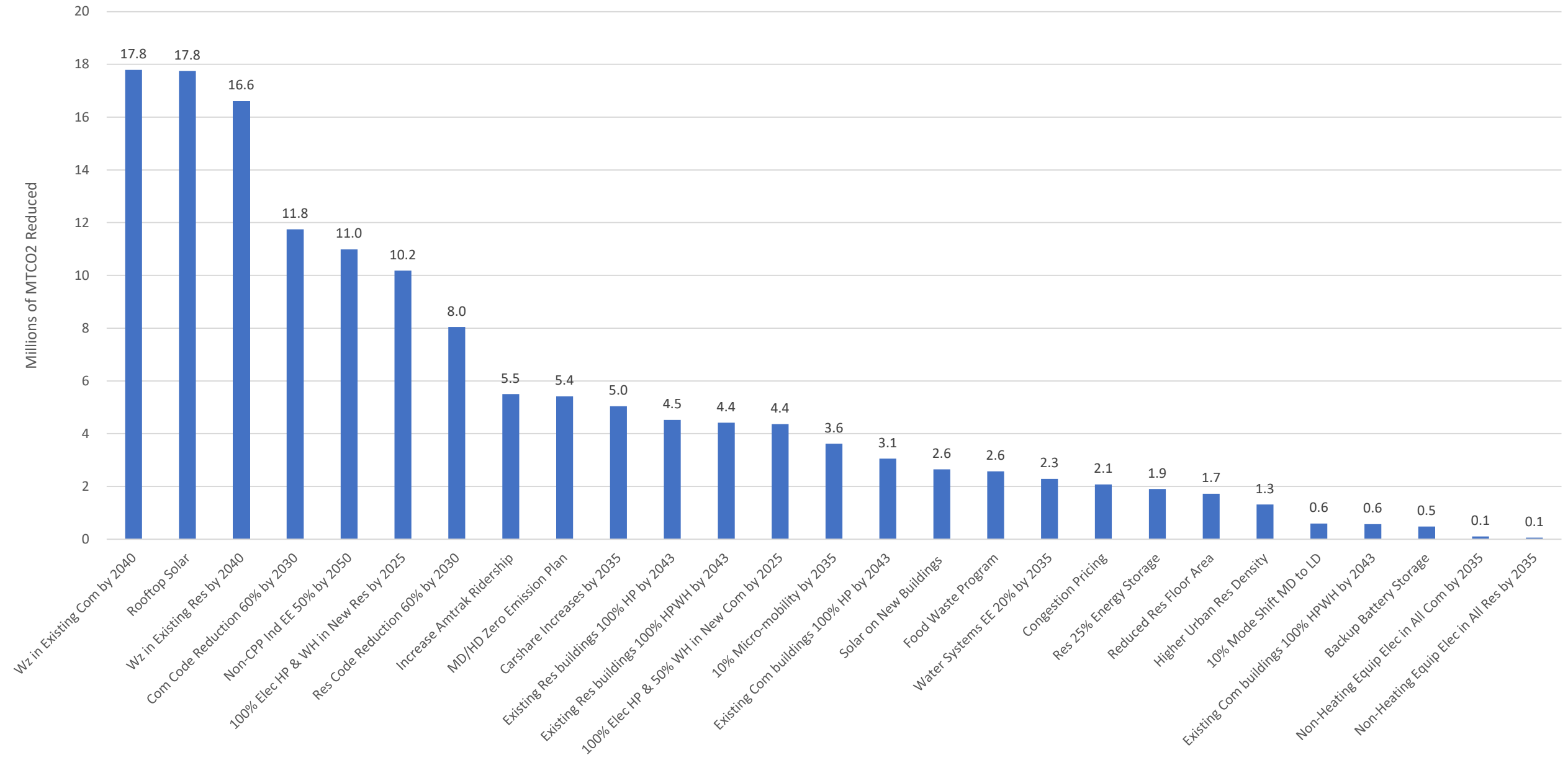
Reduce Other Health Risks		
Level	Score	Points
High	10	7.5
Medium-High	8	6.0
Medium	6	4.5
Medium-Low	4	3.8
Low	2	2.3
None	0	0.0

#	Action	Level of Reduced Health Risks	Final Score
1	Reduced Res Floor Area	None	0
2	Higher Urban Res Density	Medium	6
3	Res Code Reduction 60% by 2030	High	10
4	Com Code Reduction 60% by 2030	Medium-High	8
5	100% Elec HP & 50% WH in New Com by 2025	Medium-High	8
6	100% Elec HP & WH in New Res by 2025	High	10
7	Wz in Existing Res by 2040	High	10
8	Wz in Existing Com by 2040	Medium-High	8

# Scoring Calculator

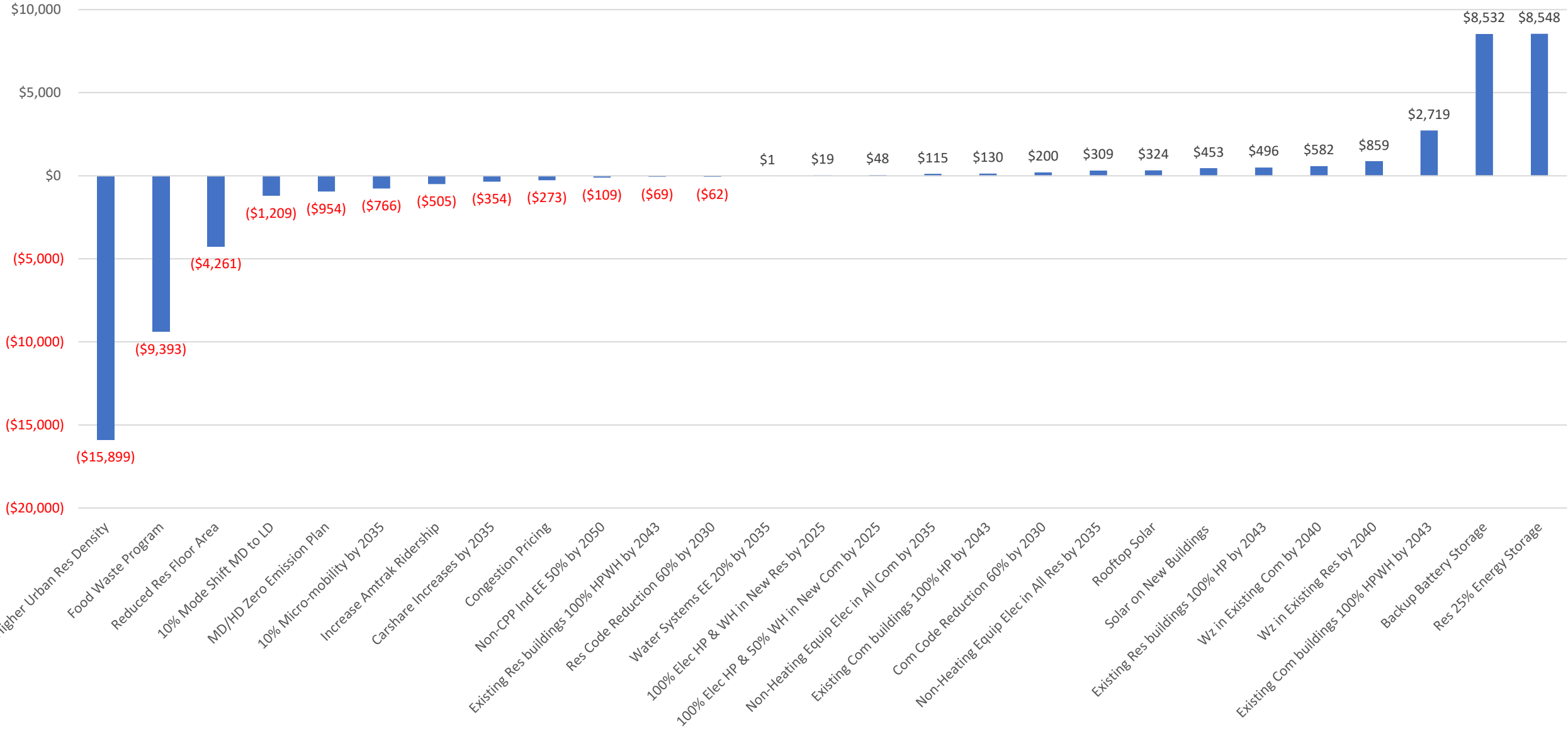
		MAC Curve Analysis		Co-Benefits Analysis							Risk & Uncertainty Analysis			Weighted Evaluation Criteria Scoring						Final Scoring & Ranking	
		GHG Reduction	Cost-Effectiveness	Equity Co-Benefit			Health Co-Benefit		Jobs and Economic Prosperity Co-Benefit		Risk and Uncertainty										
#	Action name	--	--	Reduction in Air Pollution	Alleviate Energy Burden	Address Health Inequities	Avoided Health Impacts	Reduce Other Health Risks	Number of Jobs	Energy & Transportation Savings	Technical Feasibility	Political Feasibility	Implementation Timing	GHG Reduction	Cost-Effectiveness	Equity Co-Benefit	Health Co-Benefit	Jobs and Economic Prosperity Co-Benefit	Risk and Uncertainty	Score	Rank
	Points Allocation	29.0	15.0	6.4	3.2	6.4	7.5	7.5	7.0	7.0	4.4	4.4	2.2	29	15	16	15	14	11	100	
	Sub-criteria Weighting	100%	100%	40%	20%	40%	50%	50%	50%	50%	40%	40%	20%	29%	15%	16%	15%	14%	11%	100%	
1	Reduced Res Floor Area	3	6	4	1	0	4	0	4	7	16	16	5	3	6	1.8	2	6	14	46.5	19
2	Higher Urban Res Density	2	10	3	1	6	3	6	1	9	14	18	0	2	10	3.8	5	5	13	54.7	13
3	Res Code Reduction 60% by 2030	6	5	5	1	10	5	10	6	5	20	14	10	6	5	6.2	8	6	16	70.9	4
4	Com Code Reduction 60% by 2030	7	3	3	1	8	3	8	6	4	20	10	10	7	3	4.6	6	5	14	62.8	7
5	100% Elec HP & WH in New Res by 2025	7	4	7	3	8	7	10	6	4	14	14	10	7	4	6.6	9	5	13	71.1	3
6	100% Elec HP & 50% WH in New Com 2025	5	4	3	1	10	3	8	4	4	14	12	10	5	4	5.4	6	4	12	56.6	12
7	Wz in Existing Res by 2040	9	3	10	5	10	10	10	10	6	16	14	5	9	3	9.0	10	8	13	85.5	1
8	Wz in Existing Com by 2040	10	3	5	1	8	5	8	8	8	16	14	5	10	3	5.4	7	8	13	77.4	2
9	Existing Res buildings 100% HP by 2043	5	3	8	8	10	8	10	6	3	18	10	0	5	3	8.8	9	5	11	65.2	6
10	Existing Res buildings 100% HPWH by 2043	5	5	2	8	10	2	10	4	5	18	16	0	5	5	6.4	6	5	14	62.5	8
11	Existing Com buildings 100% HP by 2043	4	4	4	1	8	4	8	4	4	18	12	0	4	4	5.0	6	4	12	53.4	14
12	Existing Com buildings 100% HPWH by 2043	1	2	2	1	8	2	8	5	3	18	10	0	1	2	4.2	5	4	11	38.0	24
13	Non-Heating Equip Elec in All Res by 2035	1	3	2	1	10	2	10	5	4	18	14	5	1	3	5.0	6	5	14	45.9	21
14	Non-Heating Equip Elec in All Com by 2035	1	4	2	1	10	2	10	5	4	18	14	5	1	4	5.0	6	5	14	47.4	18
15	Non-CPP Ind EE 50% by 2050	7	5	7	1	0	7	0	5	5	16	14	0	7	5	3.0	4	5	12	58.1	10
16	MD/HD Zero Emission Plan	5	5	2	1	0	2	0	1	10	12	18	0	5	5	1.0	1	6	12	46.0	20
17	10% Mode Shift MD to LD	1	5	2	1	4	2	4	2	4	16	10	5	1	5	2.6	3	3	11	35.8	25
18	10% Micro-mobility by 2035	4	5	2	1	10	2	10	4	5	20	12	5	4	5	5.0	6	5	14	57.6	11
19	Increase Amtrak Ridership	5	5	2	1	4	2	4	4	5	16	12	5	5	5	2.6	3	5	12	50.4	16
20	Carshare Increases by 2035	5	5	2	1	2	2	2	4	5	18	14	5	5	5	1.8	2	5	14	49.4	17
21	Congestion Pricing	3	5	2	1	10	2	10	4	4	18	10	5	3	5	5.0	6	4	12	52.2	15
22	Water Systems EE 20% by 2035	3	4	2	1	0	2	0	5	4	20	12	5	3	4	1.0	1	5	14	39.3	23
23	Food Waste Program	4	8	1	1	10	1	10	5	4	14	12	5	4	8	4.6	6	5	11	58.1	9
24	Solar on New Buildings	4	3	3	1	0	3	0	4	4	18	12	5	4	3	1.4	2	4	13	40.5	22
25	Rooftop Solar	10	3	5	10	0	5	0	6	5	18	14	5	10	3	4.0	3	6	14	66.5	5
26	Res 25% Energy Storage	3	1	1	10	0	1	0	5	1	14	8	5	3	1	2.4	1	3	10	29.8	26
27	Backup Battery Storage	1	1	2	10	0	2	0	4	3	12	10	5	1	1	2.8	1	4	10	26.1	27

# Ranking – GHG Emission Reductions Amount

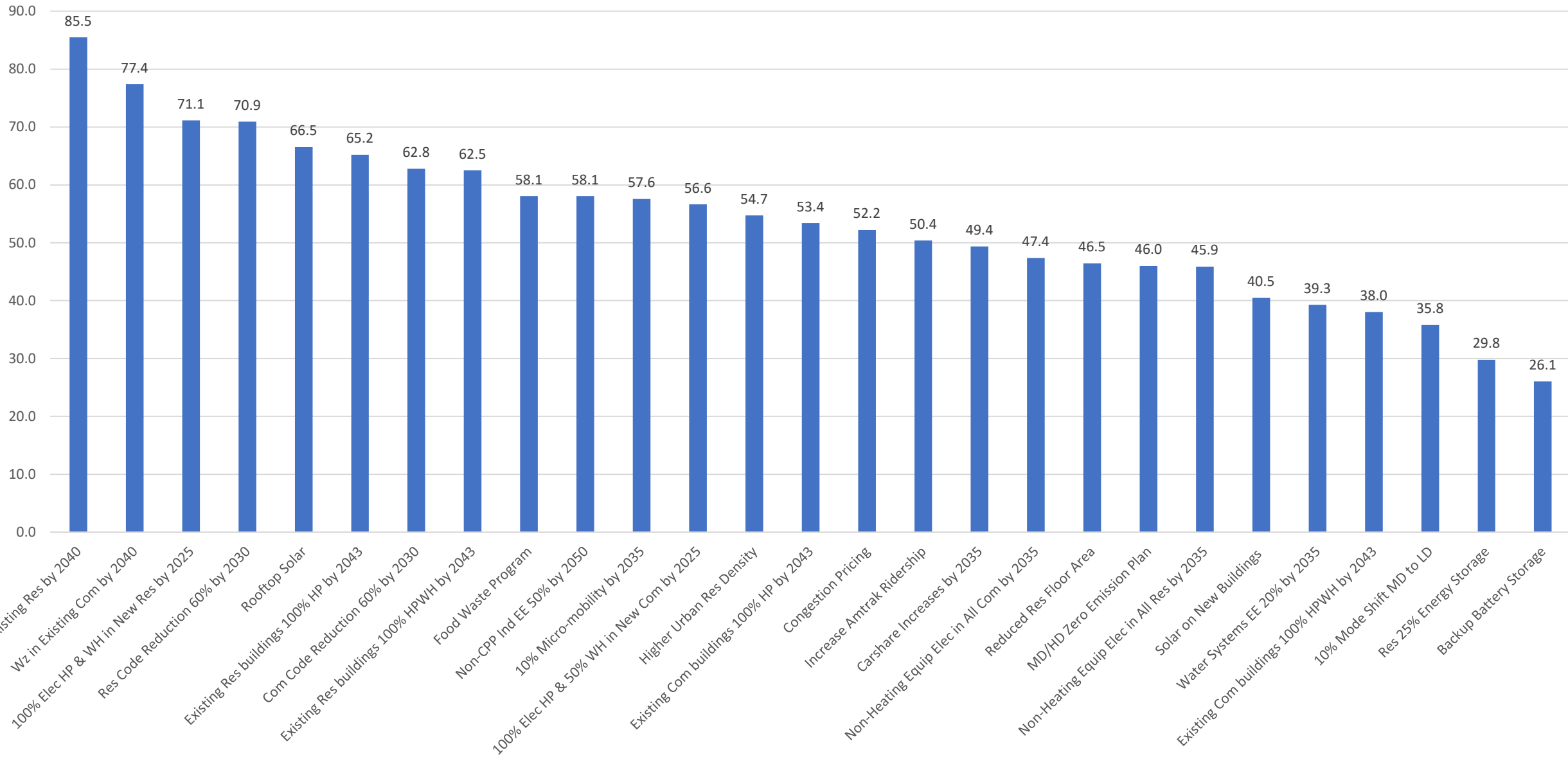




# Ranking – Cost-Effectiveness (\$/MTCO2)

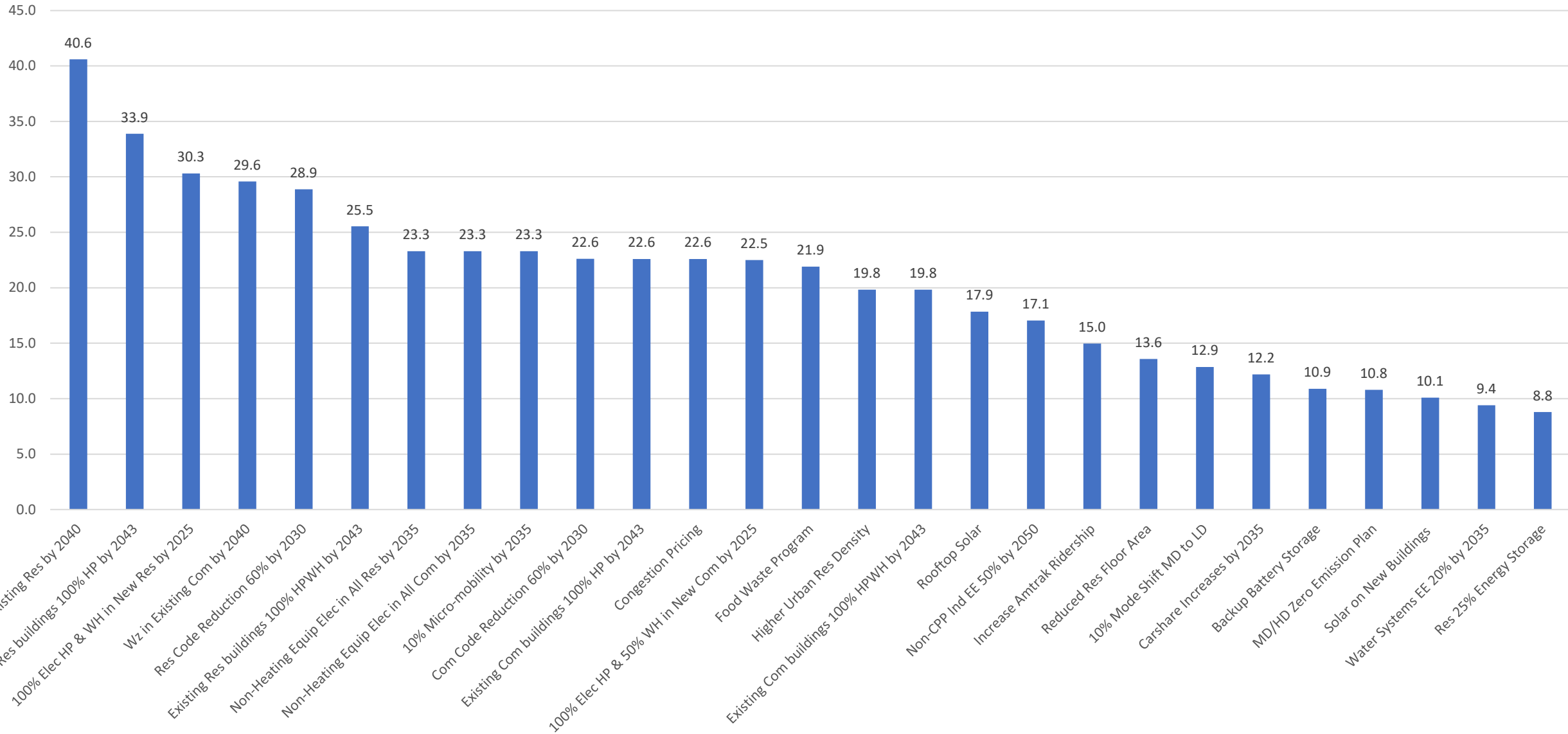


# Ranking – Evaluation Criteria Score



# Ranking – Co-Benefits Only

(out of 45 points maximum)



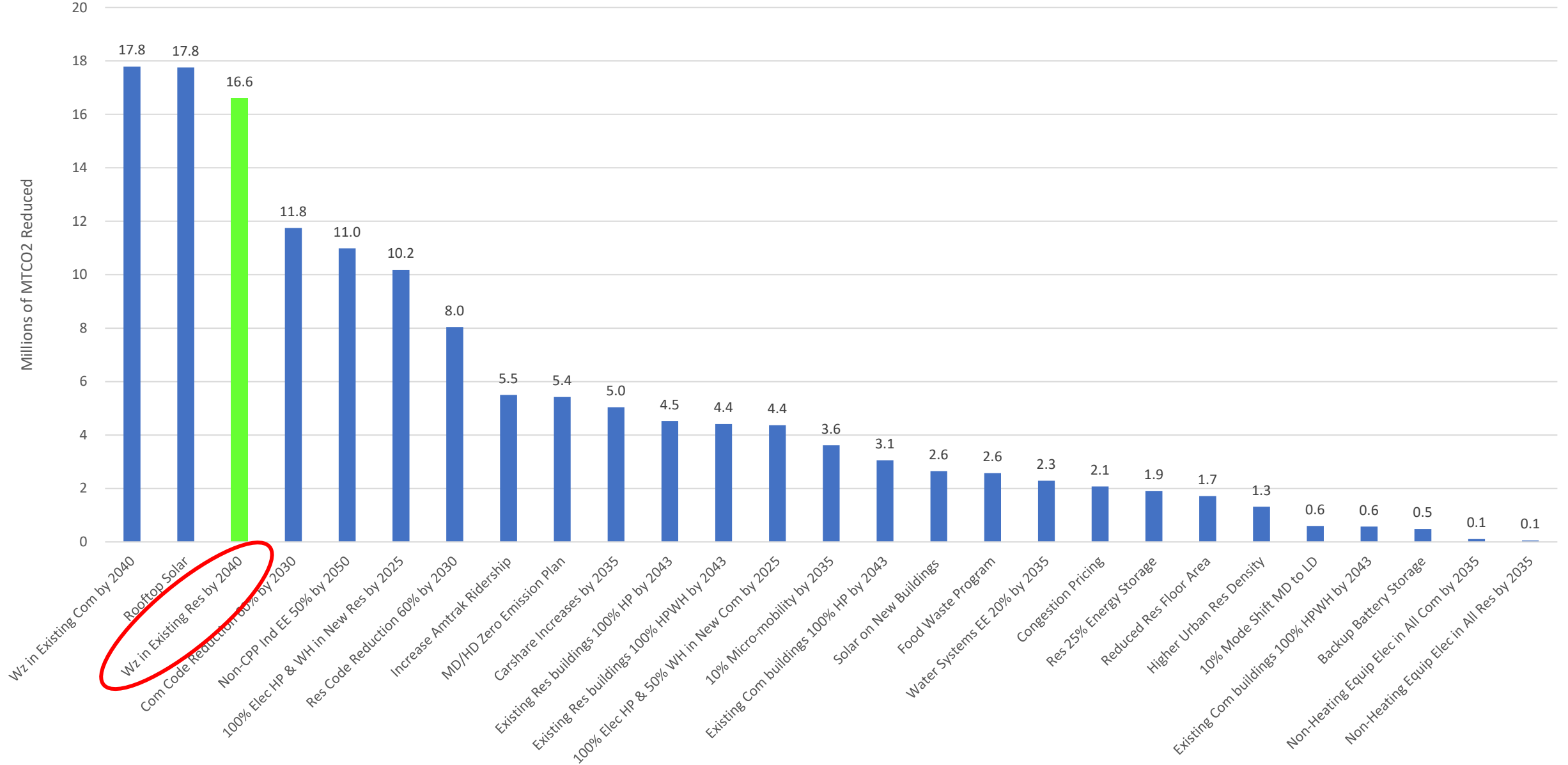
# How do we turn this data into information?

- While we need to implement all of these actions to meet the accelerated goal, we may not be able to start them all at once!
- Purpose of the Scoring and Ranking is to help prioritize implementation of the actions.
- So, what should be the priority order of actions for implementation?
- It depends on which lens you look through.

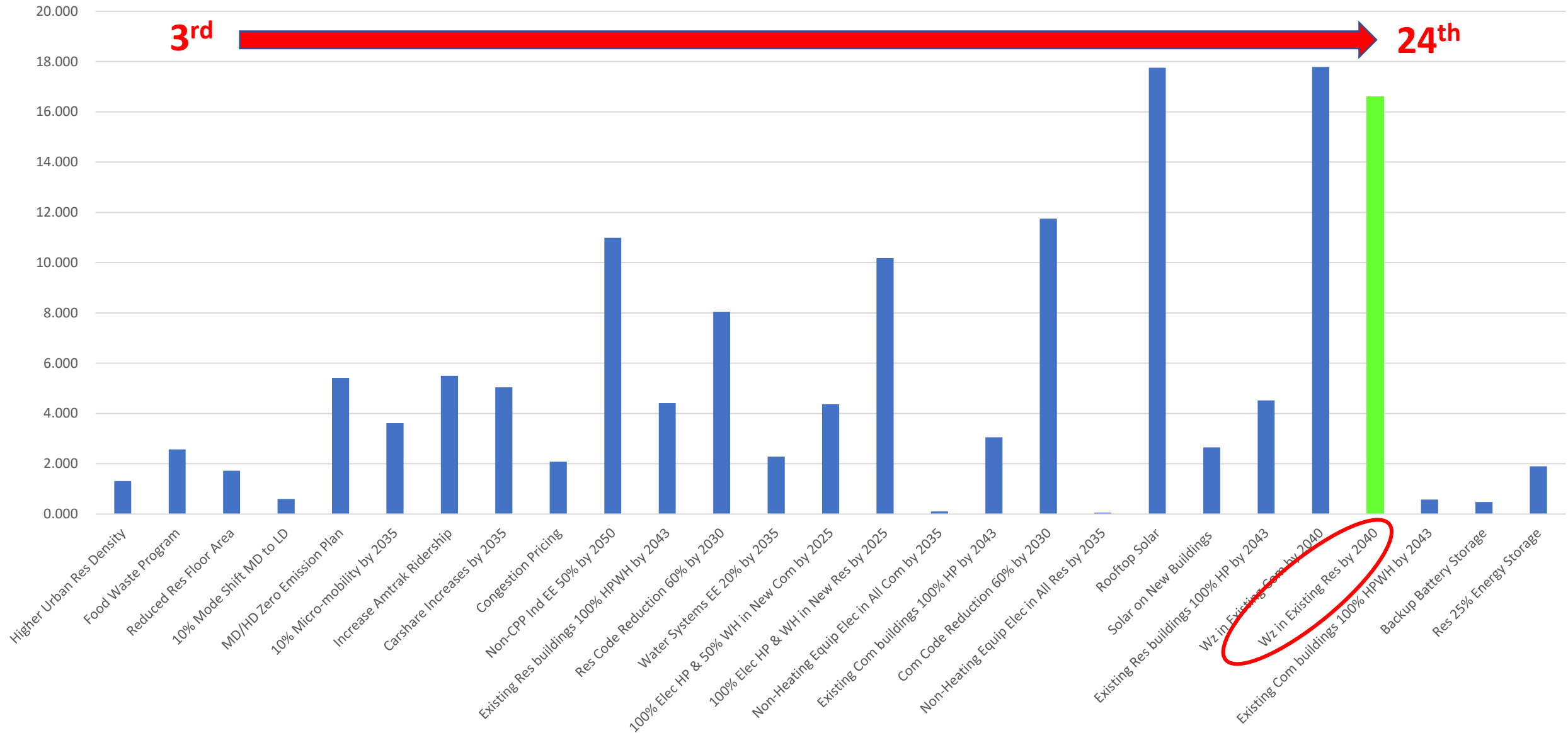
**How do we turn this data into information?**

*The action with the largest GHG Reduction Amount  
is not necessarily the most Cost-Effective  
nor the one  
with the highest Evaluation Criteria Score!*

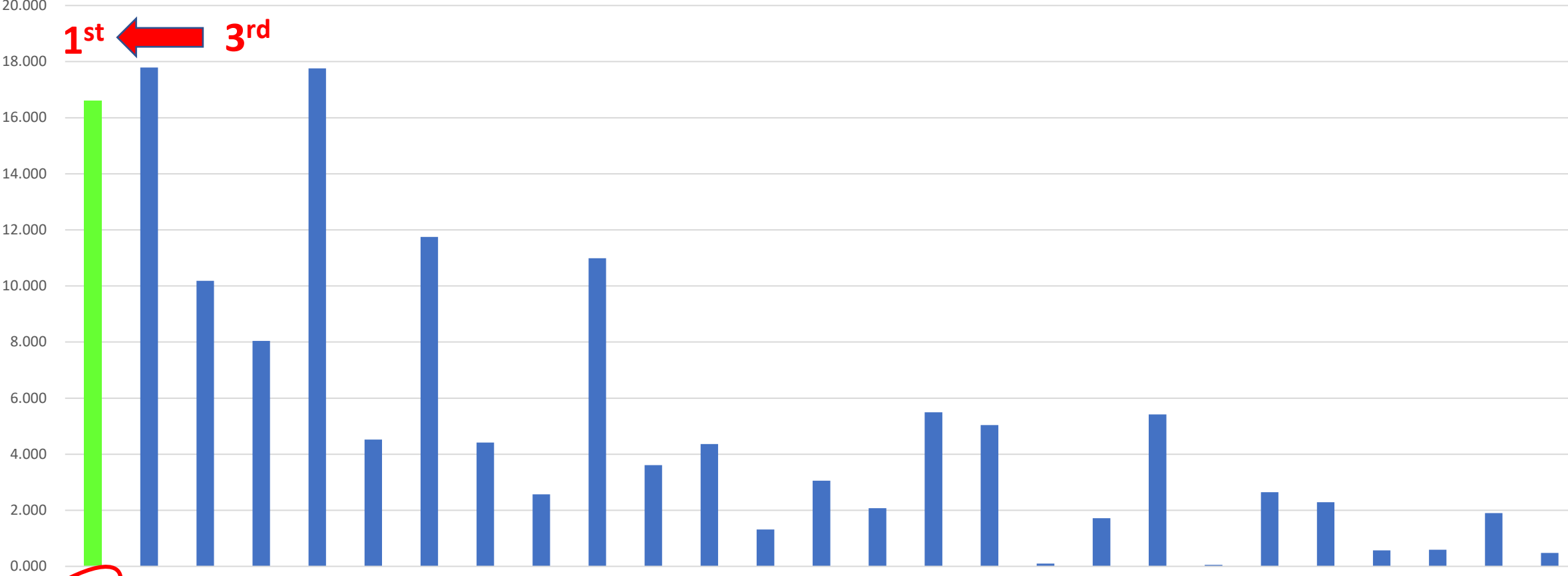
# Ranking – GHG Reduction Amount



# GHG Reduction Amount Resorted by Cost-Effectiveness



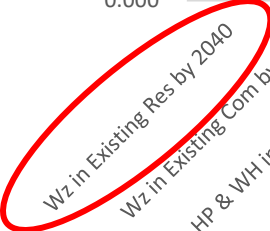
# GHG Reduction Amount Resorted by Evaluation Criteria Score



1st



3rd



Wz in Existing Res by 2040



# Changes: Cost-Effective to GHG Reduction Amount

#	Action	GHGE Reduction (MMTCO2)	GHG Ranking	Change from C/E	Direction from C/E	
1	Reduced Res Floor Area	1.718	21	-18	↓	
2	Higher Urban Res Density	1.315	22	-21	↓	
3	Res Code Reduction 60% by 2030	8.044	7	5	↔	
4	Com Code Reduction 60% by 2030	11.751	4	14	↑	
5	100% Elec HP & WH in New Res by 2025	10.182	6	9	↑	
6	100% Elec HP & 50% WH in New Com by 2025	4.366	13	1	↔	
7	Wz in Existing Res by 2040	16.61	3	21	↑	
8	Wz in Existing Com by 2040	17.791	1	22	↑	
9	Existing Res buildings 100% HP by 2043	4.523	11	11	↑	
10	Existing Res buildings 100% HPWH by 2043	4.414	12	-1	↔	
11	Existing Com buildings 100% HP by 2043	3.055	15	2	↔	
12	Existing Com buildings 100% HPWH by 2043	0.572	24	1	↔	
13	Non-Heating Equip Elec in All Res by 2035	0.055	27	-8	↓	
14	Non-Heating Equip Elec in All Com by 2035	0.103	26	-10	↓	
15	Non-CPP Ind EE 50% by 2050	10.987	5	5	↔	
16	MD/HD Zero Emission Plan	5.419	9	-4	↔	
17	10% Mode Shift MD to LD	0.595	23	-19	↓	
18	10% Micro-mobility by 2035	3.615	14	-8	↓	
19	Increase Amtrak Ridership	5.497	8	-1	↔	
20	Carshare Increases by 2035	5.042	10	-2	↔	
21	Congestion Pricing	2.078	19	-10	↓	
22	Water Systems EE 20% by 2035	2.286	18	-5	↔	
23	Food Waste Program	2.572	17	-15	↓	
24	Solar on New Buildings	2.648	16	5	↔	
25	Rooftop Solar	17.757	2	18	↑	
26	Res 25% Energy Storage	1.9	20	7	↑	
27	Backup Battery Storage	0.482	25	1	↔	
			<b>Magnitude of Change =</b>	<b>Down</b>	<b>Up</b>	<b>Neutral</b>
						(-5 to +5)

# Changes: Cost-Effective to GHG Reduction Amount

## Big Changes Up

#	Action	Change From C/E	GHG Reduction Rank	C/E Ranking
8	Wz in Existing Com by 2040	22	1	23
7	Wz in Existing Res by 2040	21	3	24
25	Rooftop Solar	18	2	20
4	Com Code Reduction 60% by 2030	14	4	18
9	Existing Res buildings 100% HP by 2043	11	11	22
5	100% Elec HP & WH in New Res by 2025	9	6	15
26	Res 25% Energy Storage	7	20	27

## Big Changes Down

2	Higher Urban Res Density	-21	22	1
17	10% Mode Shift MD to LD	-19	23	4
1	Reduced Res Floor Area	-18	21	3
23	Food Waste Program	-15	17	2
14	Non-Heating Equip Elec in All Com by 2035	-10	26	16
21	Congestion Pricing	-10	19	9
13	Non-Heating Equip Elec in All Res by 2035	-8	27	19
18	10% Micro-mobility by 2035	-8	14	6

# Changes: Cost-Effective to Evaluation Criteria Score

#	Action	Eval Criteria Score	Eval Criteria Ranking	Change from C/E	Direction from C/E	
1	Reduced Res Floor Area	46.5	19	-16	↓	
2	Higher Urban Res Density	54.7	13	-12	↓	
3	Res Code Reduction 60% by 2030	70.9	4	8	↑	
4	Com Code Reduction 60% by 2030	62.8	7	11	↑	
5	100% Elec HP & WH in New Res by 2025	71.1	3	12	↑	
6	100% Elec HP & 50% WH in New Com by 2025	56.6	12	2	↔	
7	Wz in Existing Res by 2040	85.5	1	23	↑	
8	Wz in Existing Com by 2040	77.4	2	21	↑	
9	Existing Res buildings 100% HP by 2043	65.2	6	16	↑	
10	Existing Res buildings 100% HPWH by 2043	62.5	8	3	↔	
11	Existing Com buildings 100% HP by 2043	53.4	14	3	↔	
12	Existing Com buildings 100% HPWH by 2043	38.0	24	1	↔	
13	Non-Heating Equip Elec in All Res by 2035	45.9	21	-2	↔	
14	Non-Heating Equip Elec in All Com by 2035	47.4	18	-2	↔	
15	Non-CPP Ind EE 50% by 2050	58.1	10	0	↔	
16	MD/HD Zero Emission Plan	46.0	20	-15	↓	
17	10% Mode Shift MD to LD	35.8	25	-21	↓	
18	10% Micro-mobility by 2035	57.6	11	-5	↓	
19	Increase Amtrak Ridership	50.4	16	-9	↓	
20	Carshare Increases by 2035	49.4	17	-9	↓	
21	Congestion Pricing	52.2	15	-6	↓	
22	Water Systems EE 20% by 2035	39.3	23	-10	↓	
23	Food Waste Program	58.1	9	-7	↓	
24	Solar on New Buildings	40.5	22	-1	↔	
25	Rooftop Solar	66.5	5	15	↑	
26	Res 25% Energy Storage	29.8	26	1	↔	
27	Backup Battery Storage	26.1	27	-1	↔	
<b>Magnitude of Change =</b>				<b>Down</b>	<b>Up</b>	<b>Neutral</b>
					(-5 to +5)	

# Changes: Cost-Effective to Evaluation Criteria Score

## Big Changes Up

#	Action	Change From C/E	Eval Score Rank	C/E Ranking
7	Wz in Existing Res by 2040	23	1	24
8	Wz in Existing Com by 2040	21	2	23
9	Existing Res buildings 100% HP by 2043	16	6	22
25	Rooftop Solar	15	5	20
5	100% Elec HP & WH in New Res by 2025	12	3	15
4	Com Code Reduction 60% by 2030	11	7	18
3	Res Code Reduction 60% by 2030	8	4	12

## Big Changes Down

17	10% Mode Shift MD to LD	-21	25	4
1	Reduced Res Floor Area	-16	19	3
2	Higher Urban Res Density	-12	13	1
16	MD/HD Zero Emission Plan	-15	20	5
20	Carshare Increases by 2035	-9	17	8
19	Increase Amtrak Ridership	-9	16	7
22	Water Systems EE 20% by 2035	-10	23	13
23	Food Waste Program	-7	9	2
18	10% Micro-mobility by 2035	-5	11	6
21	Congestion Pricing	-6	15	9

# Changes: Cost-Effective to Co-Benefits Scores Only

#	Action	Score	Co-Benefits Only Ranking	Change from C/E	Direction from C/E	
1	Reduced Res Floor Area	13.6	20	-17	↓	
12	Existing Com buildings 100% HPWH by 2043	19.8	16	-15	↓	
8	Wz in Existing Com by 2040	29.6	4	8	↑	
4	Com Code Reduction 60% by 2030	22.6	10	8	↑	
13	Non-Heating Equip Elec in All Res by 2035	23.3	7	8	↑	
10	Existing Res buildings 100% HPWH by 2043	25.5	6	8	↑	
7	Wz in Existing Res by 2040	40.6	1	23	↑	
5	100% Elec HP & WH in New Res by 2025	30.3	3	20	↑	
9	Existing Res buildings 100% HP by 2043	33.9	2	20	↑	
3	Res Code Reduction 60% by 2030	28.9	5	6	↑	
11	Existing Com buildings 100% HP by 2043	22.6	11	6	↑	
25	Rooftop Solar	17.9	17	8	↑	
14	Non-Heating Equip Elec in All Com by 2035	23.3	8	11	↑	
18	10% Micro-mobility by 2035	23.3	9	7	↑	
15	Non-CPP Ind EE 50% by 2050	17.1	18	-8	↓	
19	Increase Amtrak Ridership	15.0	19	-14	↓	
27	Backup Battery Storage	10.9	23	-19	↓	
23	Food Waste Program	21.9	14	-8	↓	
17	10% Mode Shift MD to LD	12.9	21	-14	↓	
22	Water Systems EE 20% by 2035	9.4	26	-18	↓	
21	Congestion Pricing	22.6	12	-3	↔	
26	Res 25% Energy Storage	8.8	27	-14	↓	
6	100% Elec HP & 50% WH in New Com by 2025	22.5	13	-11	↓	
24	Solar on New Buildings	10.1	25	-4	↔	
2	Higher Urban Res Density	19.8	15	5	↑	
16	MD/HD Zero Emission Plan	10.8	24	3	↔	
20	Carshare Increases by 2035	12.2	22	4	↔	
			<b>Magnitude of Change =</b>	<b>Down</b>	<b>Up</b>	<b>Neutral</b>
						(-5 to +5)

# Changes: Cost-Effective to Co-Benefit Scores Only

## Big Changes Up

#	Action	Change From C/E	Co-Benefits Score Rank	C/E Ranking
7	Wz in Existing Res by 2040	23	1	24
5	100% Elec HP & WH in New Res by 2025	20	3	23
9	Existing Res buildings 100% HP by 2043	20	2	22
14	Non-Heating Equip Elec in All Com by 2035	11	8	19
4	Com Code Reduction 60% by 2030	8	10	18
8	Wz in Existing Com by 2040	8	4	12
10	Existing Res buildings 100% HPWH by 2043	8	6	14
13	Non-Heating Equip Elec in All Res by 2035	8	7	15
25	Rooftop Solar	8	17	25
18	10% Micro-mobility by 2035	7	9	16
3	Res Code Reduction 60% by 2030	6	5	11
11	Existing Com buildings 100% HP by 2043	6	11	17

Big Changes Down				
27	Backup Battery Storage	-19	23	4
22	Water Systems EE 20% by 2035	-18	26	8
1	Reduced Res Floor Area	-17	20	3
12	Existing Com buildings 100% HPWH by 2043	-15	16	1
17	10% Mode Shift MD to LD	-14	21	7
19	Increase Amtrak Ridership	-14	19	5
26	Res 25% Energy Storage	-14	27	13
6	100% Elec HP & 50% WH in New Com by 2025	-11	13	2
15	Non-CPP Ind EE 50% by 2050	-8	18	10
23	Food Waste Program	-8	14	6

# Common Actions in Both Scenarios

<b>Residential and Commercial energy code reduction of 60% by 2030</b>	<b>Mode shift 10% from MD to LD in urban counties by 2035</b>	<b>10% shift mode shift in urban areas to passenger rail Amtrak</b>
<b>Efficient heat pumps and water heaters in 100% of new homes and businesses by 2025</b>	<b>100% of new buses are EVs by 2035</b>	<b>Carshare increases by 2035</b>
<b>Retrofit Weatherization of 95% of existing buildings reducing energy use by 50% by 2040</b>	<b>10% micro-mobility share by 2035</b>	<b>Congestion pricing in urban areas resulting in 10% mode shift to transit by 2035</b>
<b>Existing buildings 100% heat pumps and heat pump water heaters by 2043 (50% HPWH in Commercial)</b>	<b>MD/HD Zero Emission Plan</b>	<b>50% of off-road vehicle sales are EVs by 2035</b>
<b>Non-CPP Industrial load energy efficiency of 50% by 2050</b>	<b>Food Waste Program 50% reduction by 2030</b>	
<b>Water system 20% increase in efficiency by 2035</b>	<b>25% Reduced residential floorspace per building by 2035</b>	<b>25% shift in urban areas to higher density residential dwelling types</b>

# Common Actions Draft Recommendation

- A lot of work to implement the common actions.
- Most tend to score high, have large GHG emission reductions, are cost-effective, and have co-benefits.
- Most are “No Regrets” actions.
- **Draft Recommendation**: move them forward to figure out implementation
- **Prioritization discussion**

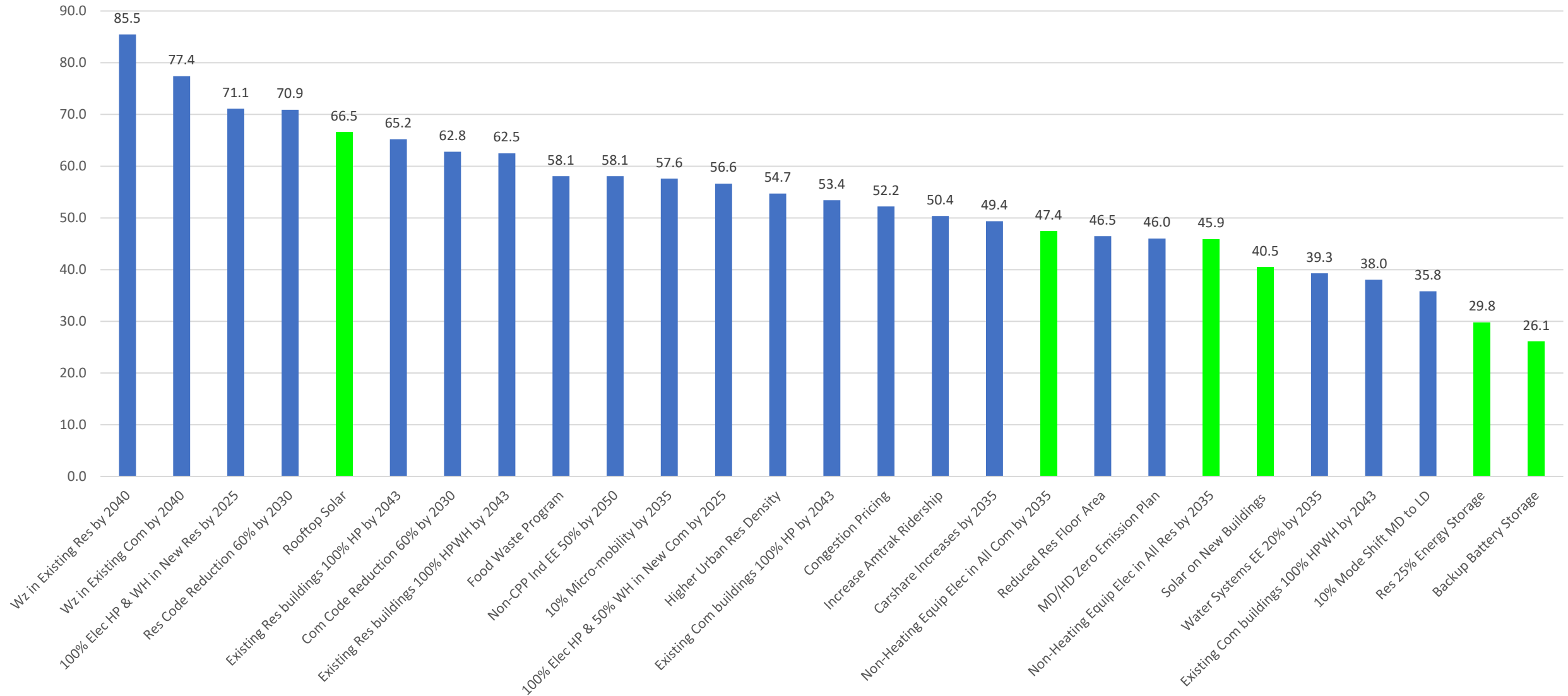


# Unique Actions in Each Scenario

Electrification Only Actions	Hybrid Only Actions
100% electric new non-heating equipment sales for all buildings by 2035	70% Green hydrogen in industry by 2050
4 TWh of solar on new buildings by 2035	Use full potential of RNG 47.5 TBtus by 2050
16.3 TWh of rooftop solar by 2035	15% hydrogen injection into pipeline by 2035
25% of homes with energy storage by 2035	5% of homes with fuel cells by 2030
100% of diesel backup power replaced with electric battery storage by 2035	5% of fuel share from Pyrolysis of biomass by 2035
70% industrial electrification by 2050	

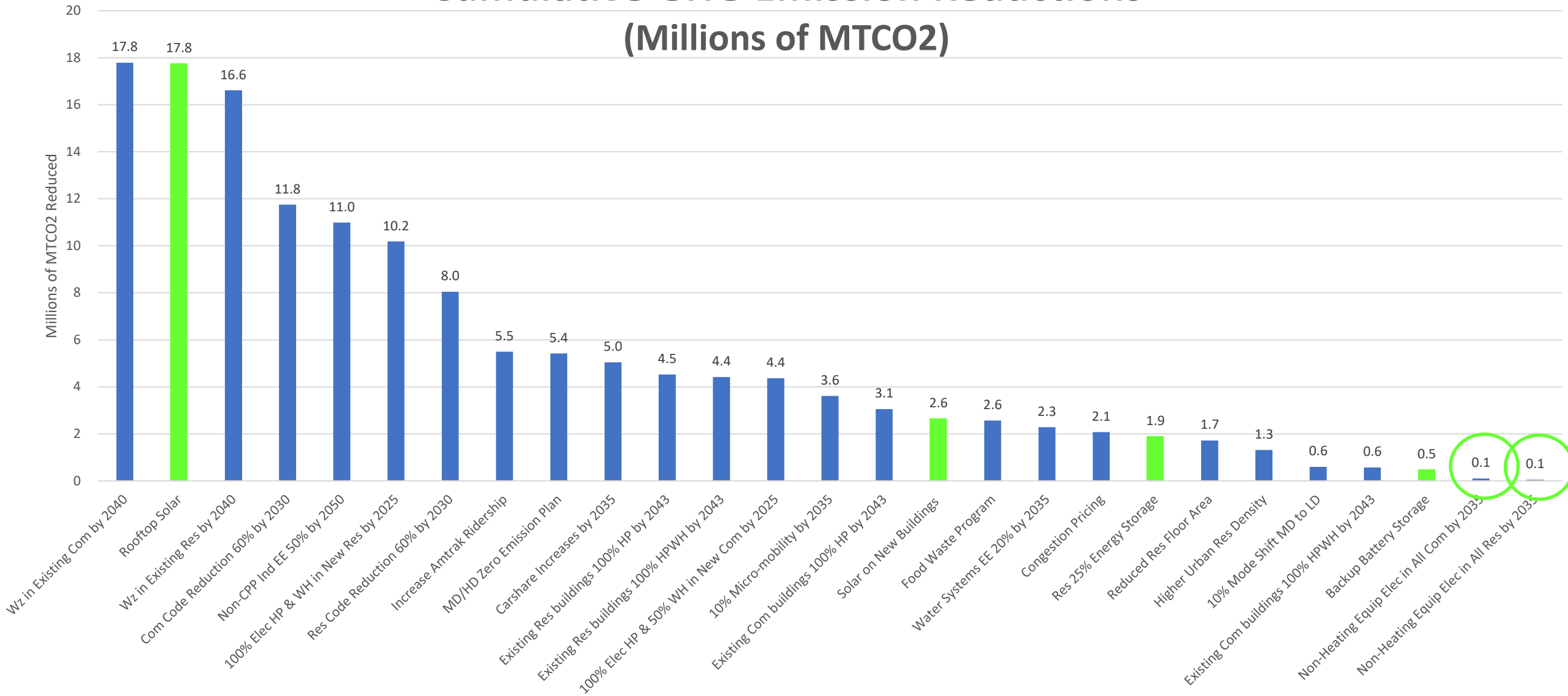
# Electrification Unique Actions

## Evaluation Criteria Score Ranking



# Electrification Unique Actions

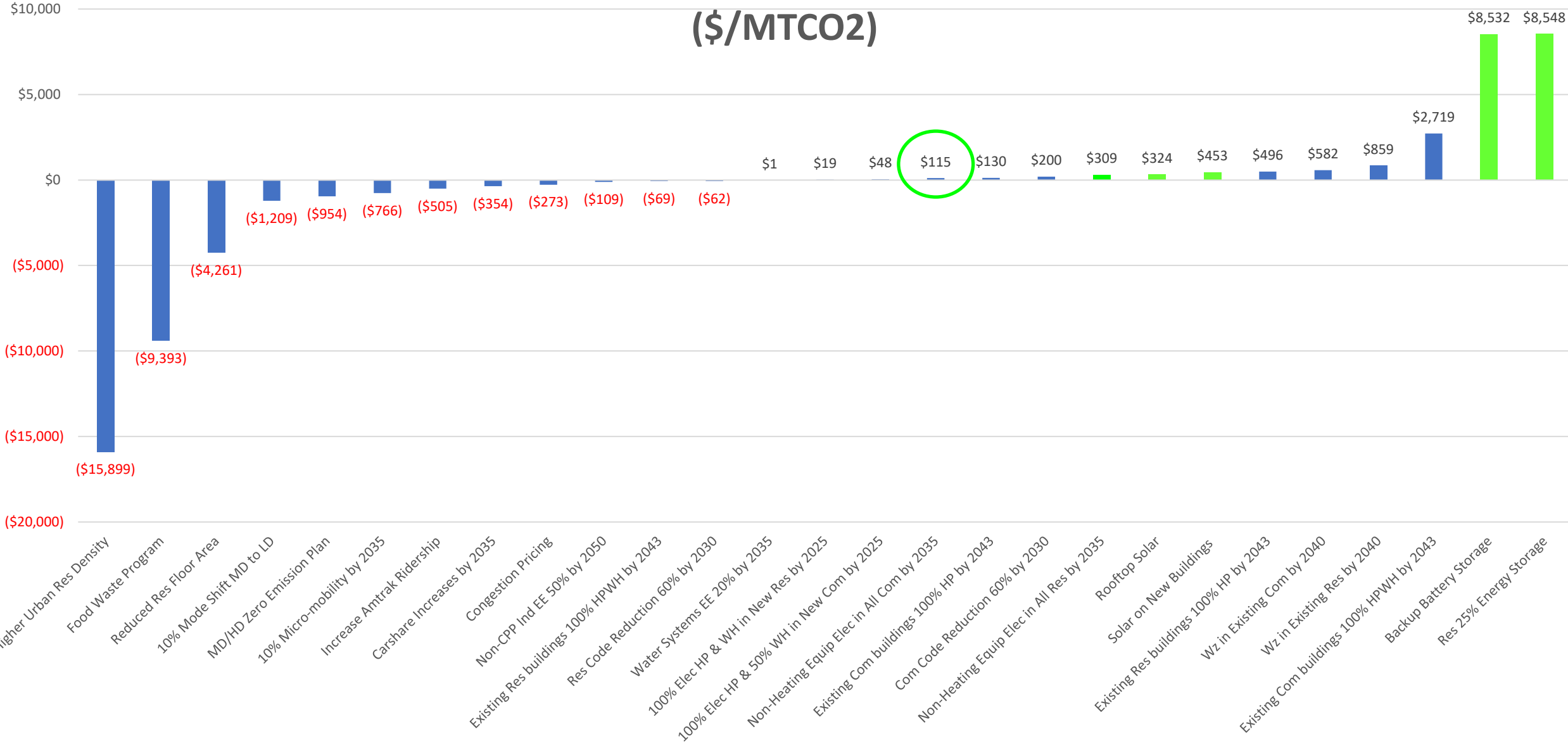
## Cumulative GHG Emission Reductions (Millions of MTCO2)



# Electrification Unique Actions

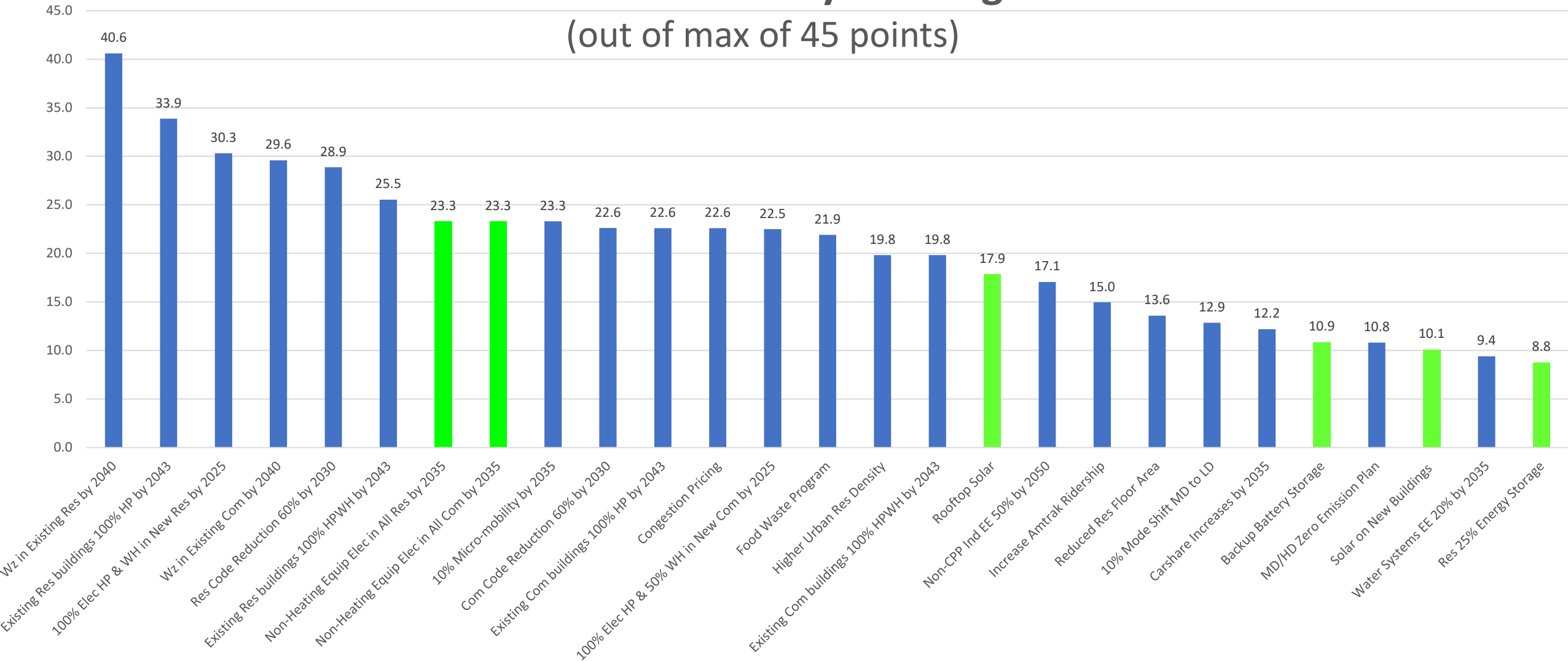
## Cost-Effectiveness Ranking (MACC)

(\$/MTCO<sub>2</sub>)



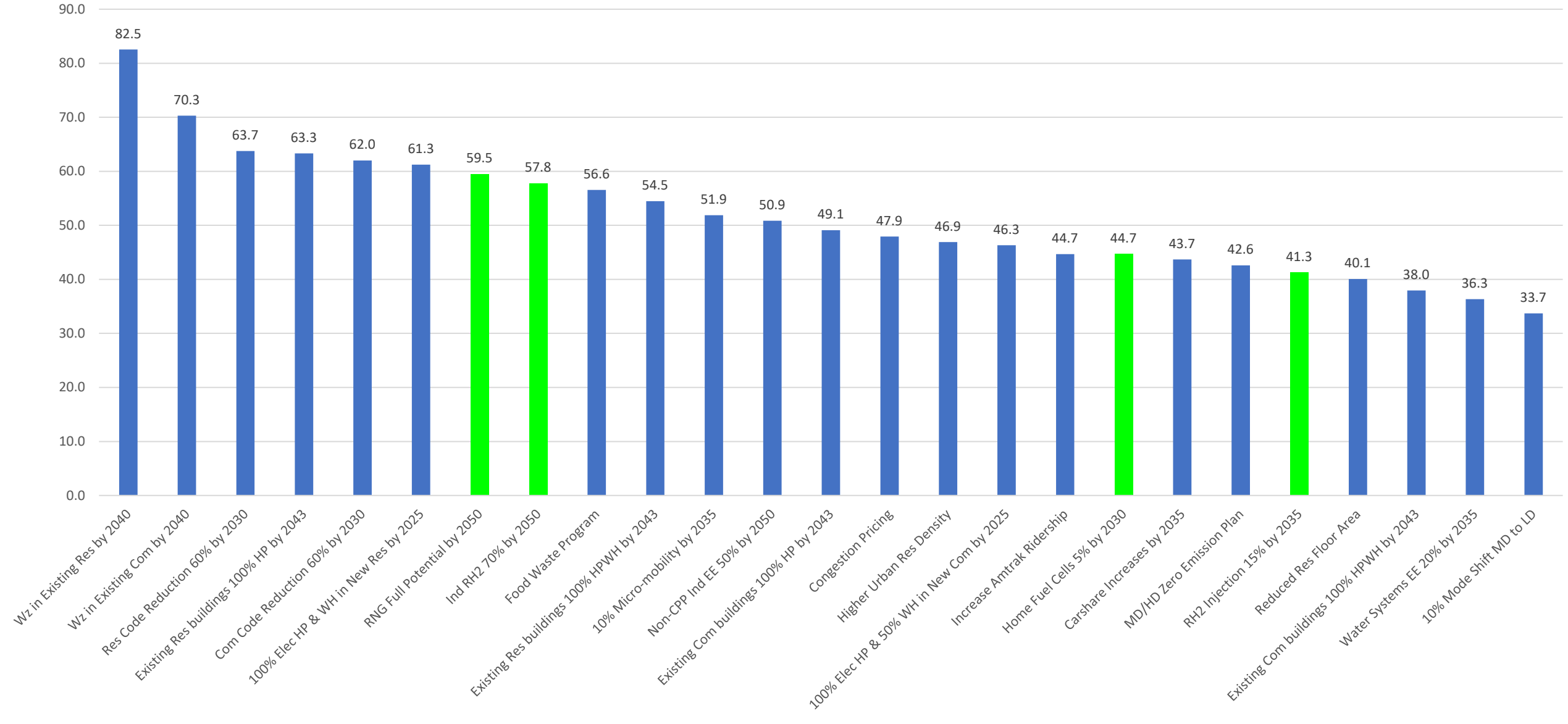
# Electrification Unique Actions

## Co-Benefits Only Ranking (out of max of 45 points)



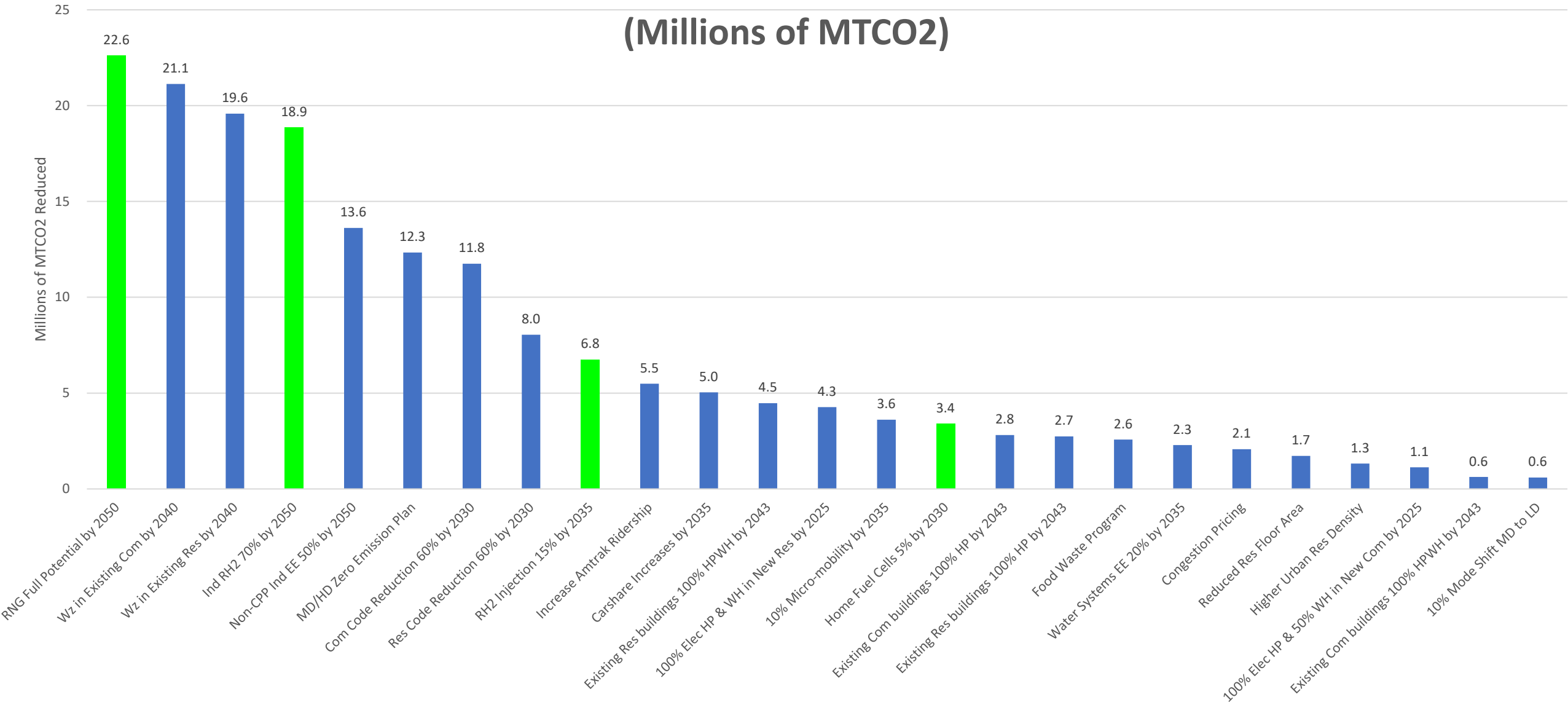
# Hybrid Unique Actions

## Hybrid Evaluation Criteria Score Ranking



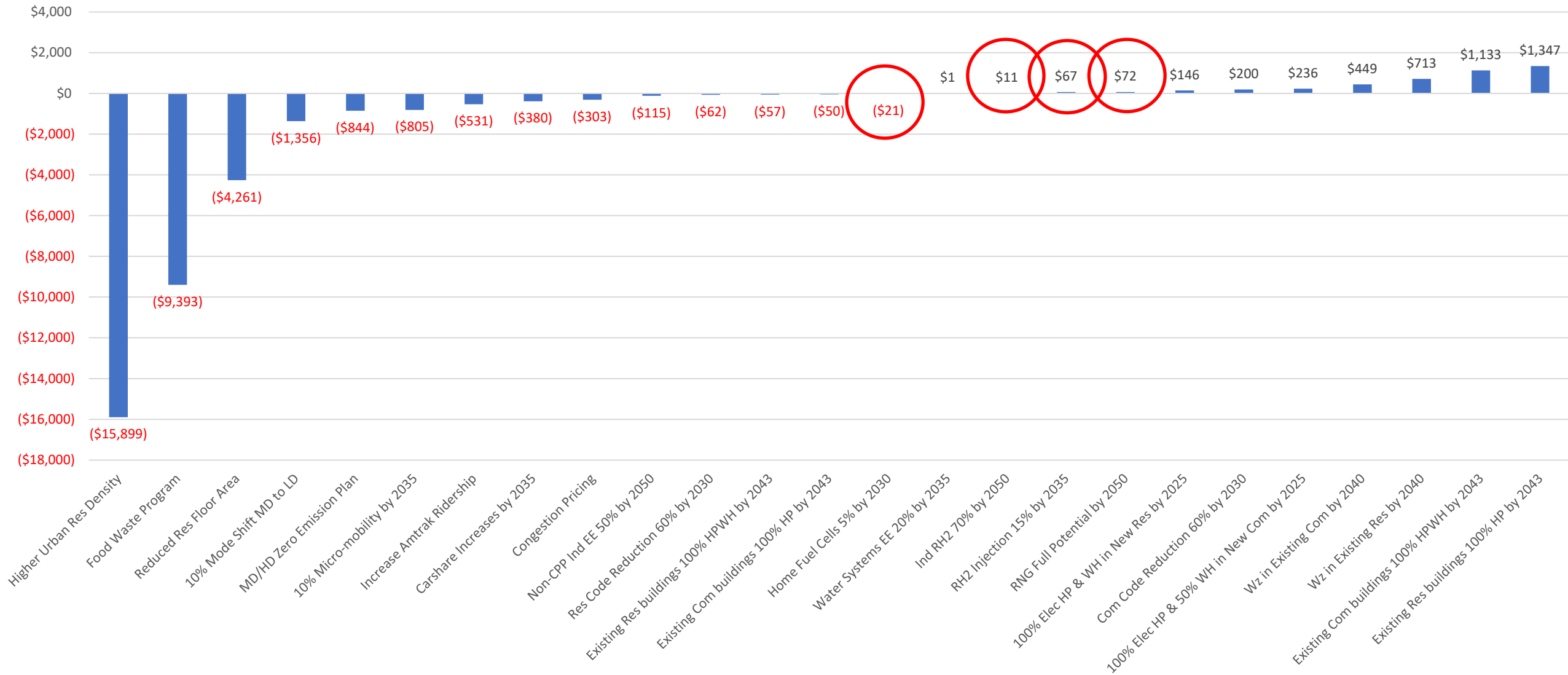
# Hybrid Unique Actions

## Cumulative GHG Emission Reductions (Millions of MTCO2)



# Hybrid Unique Actions

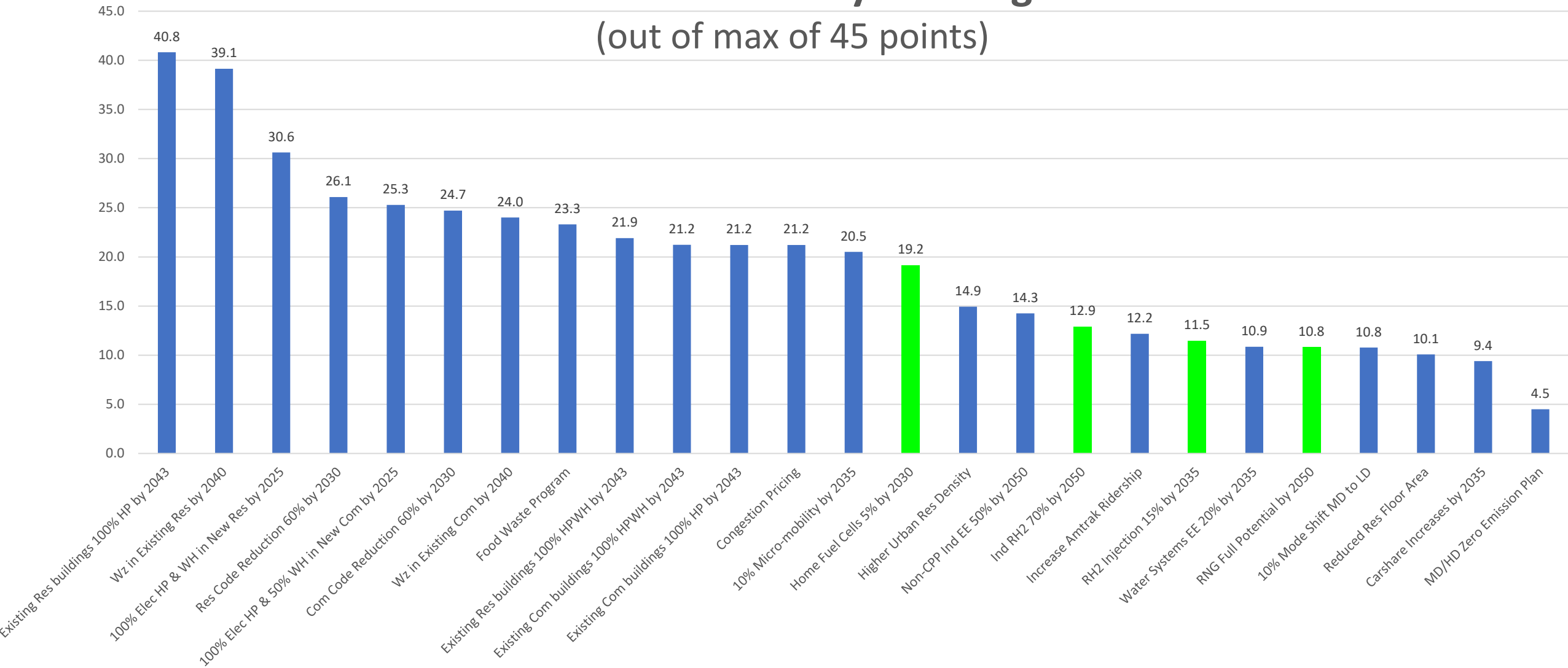
## Cost-Effectiveness Ranking (MACC)





# Hybrid Unique Actions

## Co-Benefits Only Ranking (out of max of 45 points)



# Unique Actions Draft Recommendation

- **Some do well in the analysis:**
  - Rooftop Solar
  - RNG
  - Industrial Renewable Hydrogen
- **Others do not:**
  - Residential Energy Storage
  - Replacing Diesel Backup with Batteries
  - Non-heating Appliances All Electric
- **Draft Recommendation:** move them forward for further study and to figure out implementation
- **Prioritization discussion**



**BREAK**

# Common Actions Draft Recommendation

- A lot of work to implement the common actions.
- Most tend to score high, have large GHG emission reductions, are cost-effective, and have co-benefits.
- Most are “No Regrets” actions.
- **Draft Recommendation**: move them forward to figure out implementation
- **Prioritization discussion**

# Unique Actions Draft Recommendation

- **Some do well in the analysis:**
  - Rooftop Solar
  - RNG
  - Industrial Renewable Hydrogen
- **Others do not:**
  - Residential Energy Storage
  - Replacing Diesel Backup with Batteries
  - Non-heating Appliances All Electric
- **Draft Recommendation:** move them forward for further study and to figure out implementation
- **Prioritization discussion**

Draft Recommendation  
Follow-Up

# Framework for Draft Recommendations

1. Support continued implementation of climate programs and regulations adopted and under development.
2. Adopt updated state greenhouse gas reduction goals.
3. Recommend a set of actions for legislative or executive branch action (e.g., authorization and funding) that helps the State meet the accelerated greenhouse gas reduction goal.
4. Fund future studies to continue to guide climate action over time.
5. Strengthen governance and accountability for Oregon climate action.
6. Position the state to take full advantage of federal investments in climate action.

# Outline of Draft Recommendations

1. **Support implementation of existing policies and programs**
2. **Update State GHG emission reduction goals**
  - a) 2035 goal
  - b) 2050 goal
3. **New climate actions** (*to be discussed at December meeting*)
4. **Fund future studies**
  - a) TIGHGER updates and enhancements
  - b) Public engagement on equitable implementation
  - c) County level data
  - d) Consumption-based emissions
5. **Strengthen governance and accountability**
  - a) OGWC resources
  - b) **Additions to OGWC agency nonvoting members**
  - c) Agency reporting to OGWC
  - d) Dashboard
  - e) EO 20-04 general agency directive to prioritize climate actions
  - f) EO 20-04 general agency directive prioritize equity
6. **Maximize Federal funding**



# Recommendation 2 Follow-Up: GHG Goals

- Commission discussion from November meeting:
  - Interest in recommending updated goals based on best available science
  - Look at what other states are doing
  - Ensure that goals are updated based on best available science in the future
- Staff follow-up draft recommendations (see memo):
  - I. Establish that it is the policy of the state to direct legislative and agency action at a level and pace that is consistent with pathways to **limit global warming to 1.5°C**.
  - II. **Update Oregon's sector-based greenhouse gas emission reduction goals to reflect the best available science** consistent with limiting warming to 1.5°C and align with other state and national goals.
  - III. Direct the Oregon Global Warming Commission to **study and recommend a net zero/net negative goal** based on the potential to increase carbon sequestration through land sector actions. The net zero/net negative goal should be separate from and in addition to the sector-based emission reduction goals above.
  - IV. **Better enable periodic updates to Oregon's climate goals based on best available science.**

GREENHOUSE GAS REDUCTION GOALS		OREGON EMISSIONS (MMTCO2e)					
SOURCE	TARGET	BASELINE	2030	2035	2040	2045	2050
<b>ORS 468A.205</b>	75% below 1990 by 2050	57	-	-	-	-	14
<b>Oregon EO 20-04</b>	45% below 1990 by 2035; 80% by 2050	57	-	31	-	-	11
<b>TIGHGER Scenario Projections</b>	42-43% below 1990 levels by 2030; 56-60% below by 2035; 66-69% below by 2040; 71-73% below by 2050; 76% below by 2050	57	33	23-25	18-20	16-17	14
<b>Oregon DEQ CPP Targets</b>	50% below 2017-2019 levels by 2035; 90% below by 2050	64		32			6
<b>IPCC 1.5°C Special Report</b>	45% below 2010 by 2030; net zero by 2050	63	35	-	-	-	NZ
<b>IPCC 6<sup>th</sup> Assessment (1.5°C Pathway)</b>	43% below 2019 by 2030; 84% by 2050	65	37	-	-	-	10
<b>Federal Goals / U.S. NDC</b>	50% below 2005 by 2030; net zero by 2050	68	34	-	-	-	NZ
<b>Washington</b>	45% below 1990 by 2030; 70% by 2040; 95% by 2050	57	31	-	17	-	3
	Net zero by 2050						NZ
<b>California</b>	40% below 1990 by 2030; 80% below 1990 by 2050.	57	34	-	-		11
	Net zero by 2045						NZ
<b>Colorado</b>	50% below 2005 by 2030; 90% below 2005 by 2050	68	34	-	-	-	7
<b>New York</b>	40% below 1990 by 2030; 85% below 1990 by 2050	57	34	-	-	-	9
	Net zero by 2050						NZ

NOTE: See memo for more details and associated footnotes

# Sector-Based Goal Options

## **Option 1: Set Goals for 2030, 2040, & 2050**

*(Science, TIGHGER Scenarios, and WA goals as guide)*

- at least 45% below 1990 levels by 2030;
- at least 70% below 1990 levels by 2040; and
- at least 95% below 1990 levels by 2050.

## **Option 2: Set Goals for 2035 & 2050**

*(Science, TIGHGER Scenarios, and CPP 2050 as guide)*

- at least 60% below 1990 levels by 2035; and
- at least 90% below 1990 levels by 2050.

# Recommendation 5(b) Follow-Up: OGWC *Membership Additions*

- Commission discussion from November meeting:
  - Add OHCS to the list of nonvoting agency members
  - Add a youth representative
  - Add an Environmental Justice Council representative or some type of regular reporting requirement – but also conscious of resource constraints
- Staff recommendation follow-up:
  - Add OHCS to the list of nonvoting agency members along with others identified
  - Add two new voting members for a total of 13 voting members:
    - Youth representative
    - Member with experience in environmental justice
      - This could be an Environmental Justice Council representative

# 2020 Biennial Report Recommendations

- 36 Recommendations
- Many acted upon – e.g., passage of 100% clean legislation (see Recommendation 25)
- **Others partially or not achieved**
  - Some relevant to the draft Roadmap recommendations and were noted in the draft recommendations framework where applicable
  - Others not currently addressed in specific draft Roadmap recommendations – some of which might be able to be included in the draft Roadmap recommendations or need new recommendations
    - e.g., Create a state-sponsored “Green Bank” (see Recommendation 11)
    - e.g., Require use of social cost of carbon to inform investments and regulations (see Recommendation 7)