

DOCKETED	
Docket Number:	18-IEPR-09
Project Title:	Decarbonizing Buildings
TN #:	223801
Document Title:	Zero Carbon Building Research
Description:	Presentation by Dana Papke Waters at June 14, 2018 IEPR Workshop on Achieving Zero Emission Buildings
Filer:	Stephanie Bailey
Organization:	California Air Resources Board
Submitter Role:	Public Agency
Submission Date:	6/13/2018 11:38:54 AM
Docketed Date:	6/13/2018



ZERO CARBON BUILDING RESEARCH

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Building Context within State Climate Strategy

Estimated Change in GHG Emissions by Sector (MMTCO₂e)

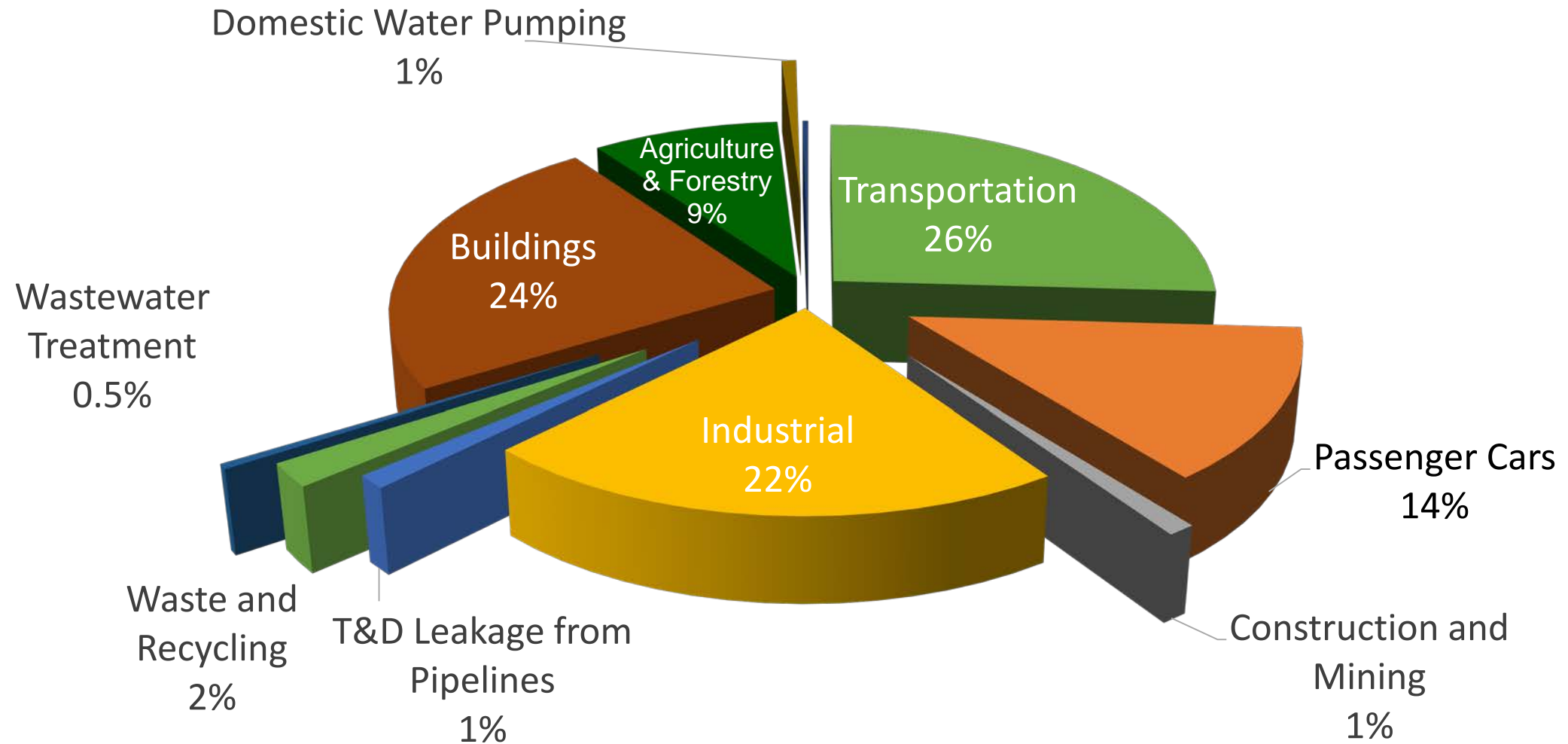
	1990	2030 Scoping Plan Ranges	% change from 1990
Agriculture	26	24–25	-8 to -4
Residential and Commercial	44	38–40	-14 to -9
Electric Power	108	30–53	-72 to -51
High GWP	3	8–11	267 to 367
Industrial	98	83–90	-15 to -8
Recycling and Waste	7	8–9	14 to 29
Transportation (Including TCU)	152	103–111	-32 to -27
Natural Working Lands Net Sink	-7	TBD	TBD
Sub Total	431	294–339	-32 to -21
Cap-and-Trade Program	n/a	34–79	n/a
Total	431	260	-40

- Energy efficiency measures provide significant cumulative GHG reductions
- Evaluate building electrification where demonstrated to reduce GHGs
- Establish target dates and pathways for a zero carbon building State policy

Demand-Side View: Consumption Based GHG Inventory

2016 Total Emissions 427 MMT CO₂e

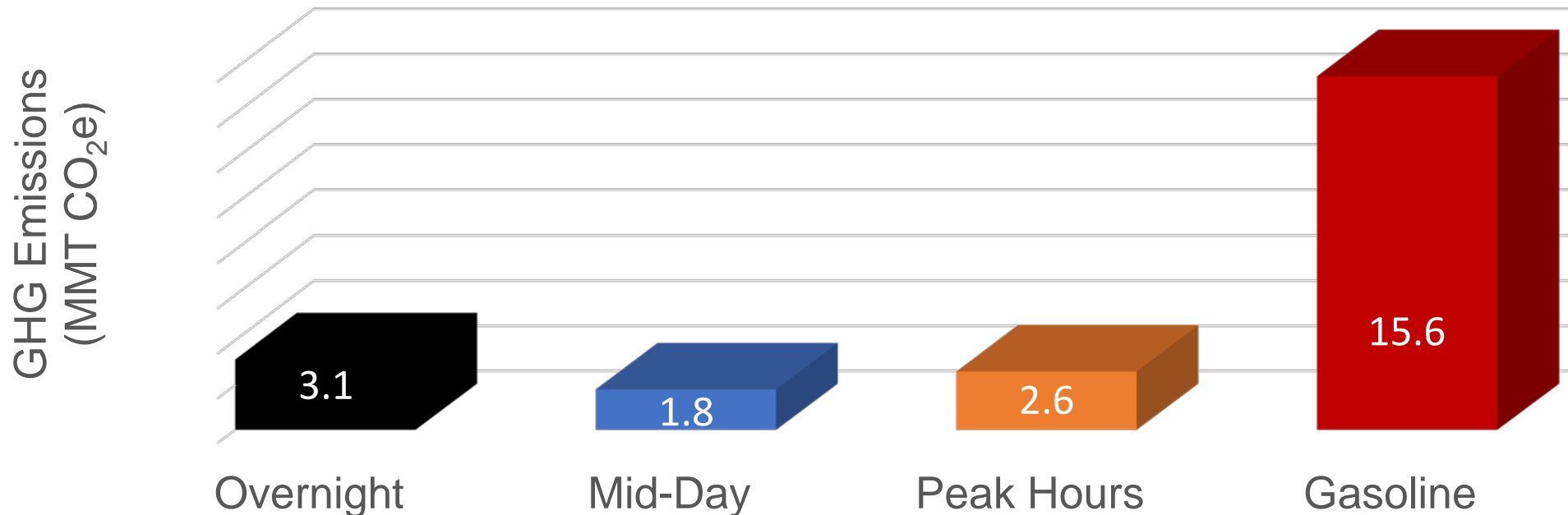
Additional GHG Sources Affected by Building Operations



Transportation: EV Charging

Time of use and renewable energy is critical to maximize GHG reductions for EV charging

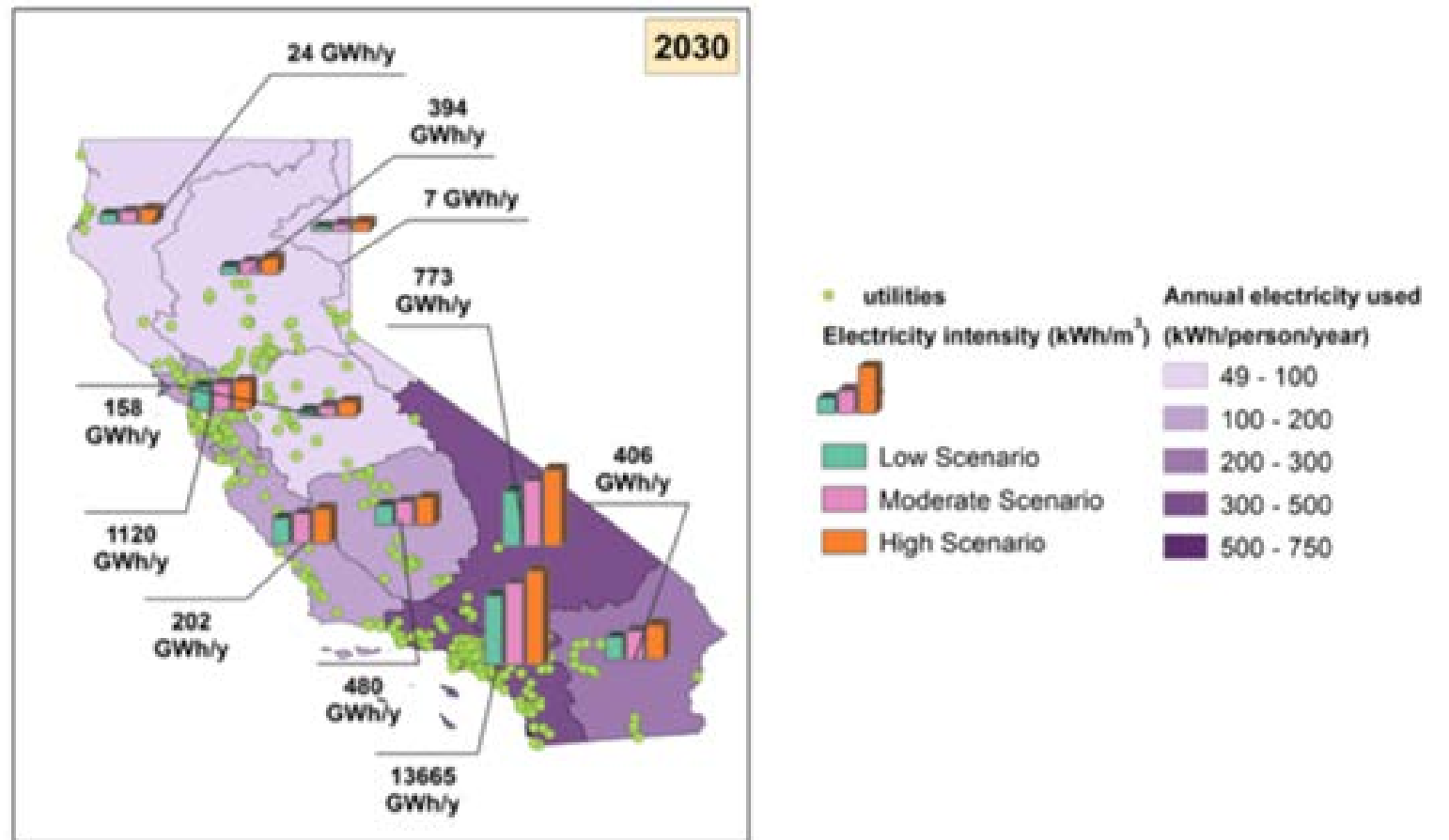
2030 Projections for Statewide GHG Emissions



4 Scenarios to Refuel 4.2 Million Passenger Vehicles

Water

- Water efficiency in buildings can reduce GHG emissions
- Carbon intensity of water pumping varies by region



Source: Stokes-Draut, 2017

Ongoing: Zero Carbon Building Research

Explore technical feasibility and cost effectiveness



Transportation, water, and waste strategies



Time of use and energy storage*



Richmond ZNE project → zero carbon community

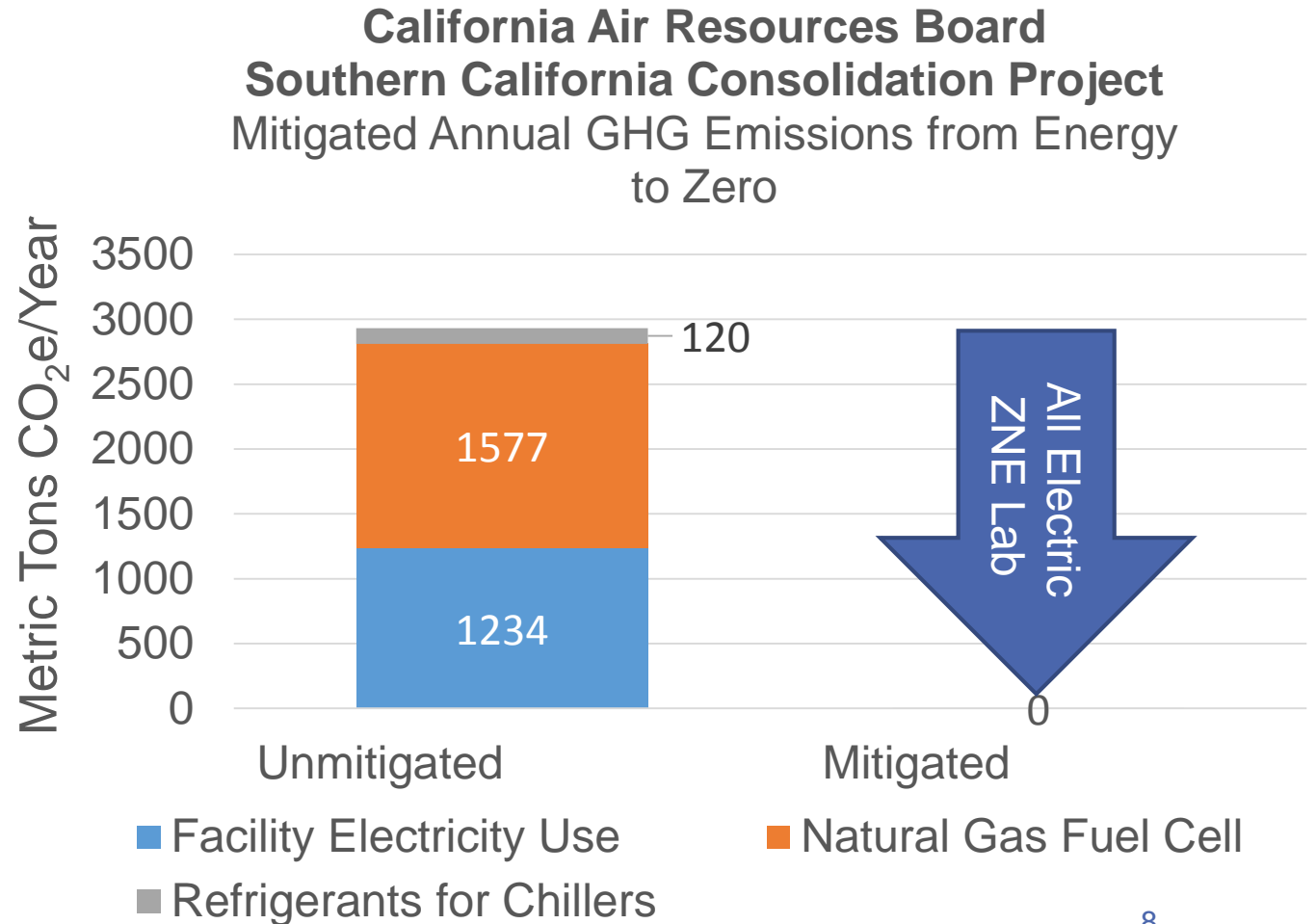


Assess realistic target dates for state policy

***Note:** Research will not address refrigerant reduction measures

Key Recommendations for Zero Emission Building Framework

- Zero emission building =
 - All-electric, energy efficient
 - 100% renewable energy
 - Zero/low-GWP refrigerants
 - Mitigate construction emissions
- Support consumption-based GHG accounting
- Consider transportation and water end uses
- Research will inform additional cost-effective strategies



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