

Inputs to the Transition Scenarios Analysis

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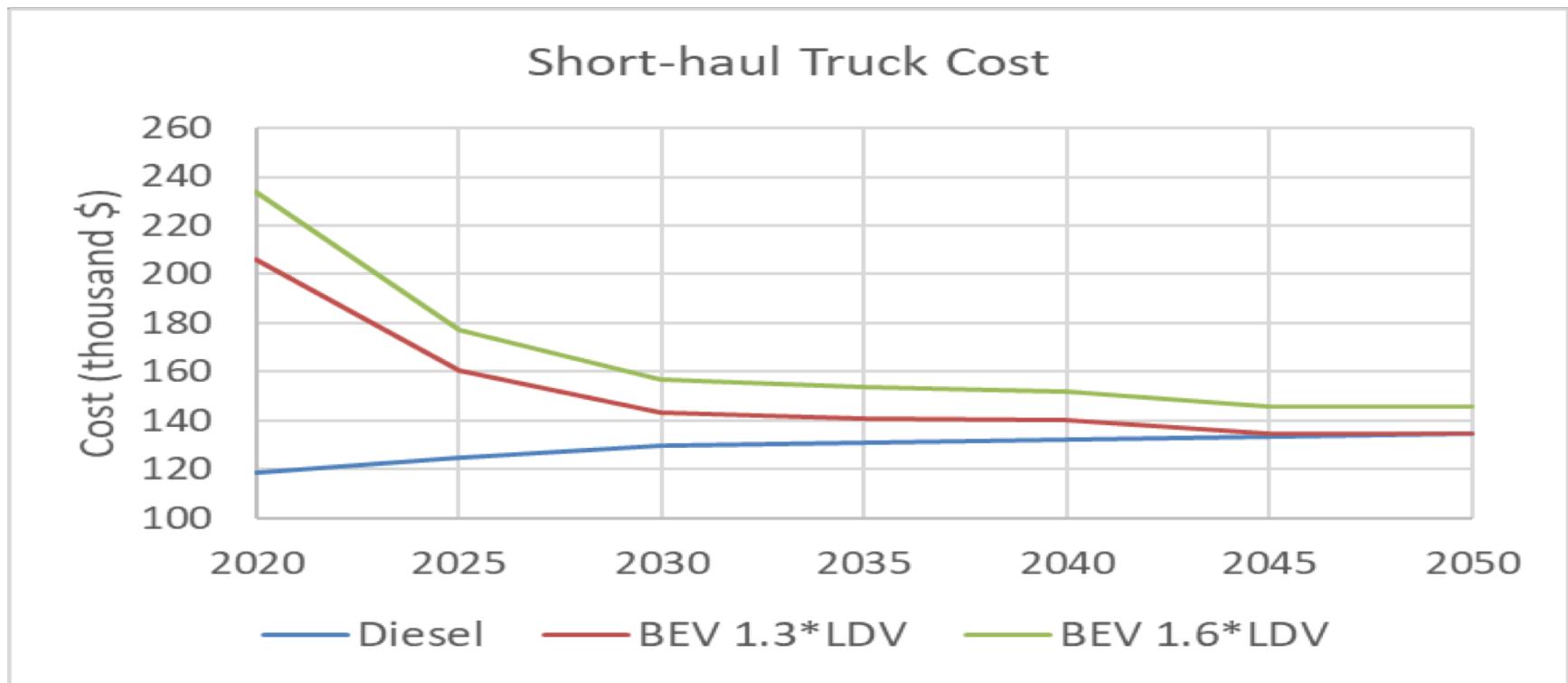
- Vehicle simulations (fuel economy)
- Vehicle Cost
- Truck Choice Model
- Comments on truck types
- Future work

Fuel Economy – Advisor model (mpgge)

Vehicle Type	2030	2050
Long-haul		
Diesel	7.9	9.4
Fuel Cell	9.5	11.3
BEV	16.8	18.6
Short-haul		
Diesel	6.5	7.6
Fuel Cell	13.7	16.0
BEV	20.9	24.3
Transit Bus		
Diesel	5.1	5.9
Fuel Cell	11.3	13.0
BEV	16.4	18.8

Vehicle Cost

- Methodology: add component cost to glider cost
- Baseline: LDV = \$90/kWh (2050)



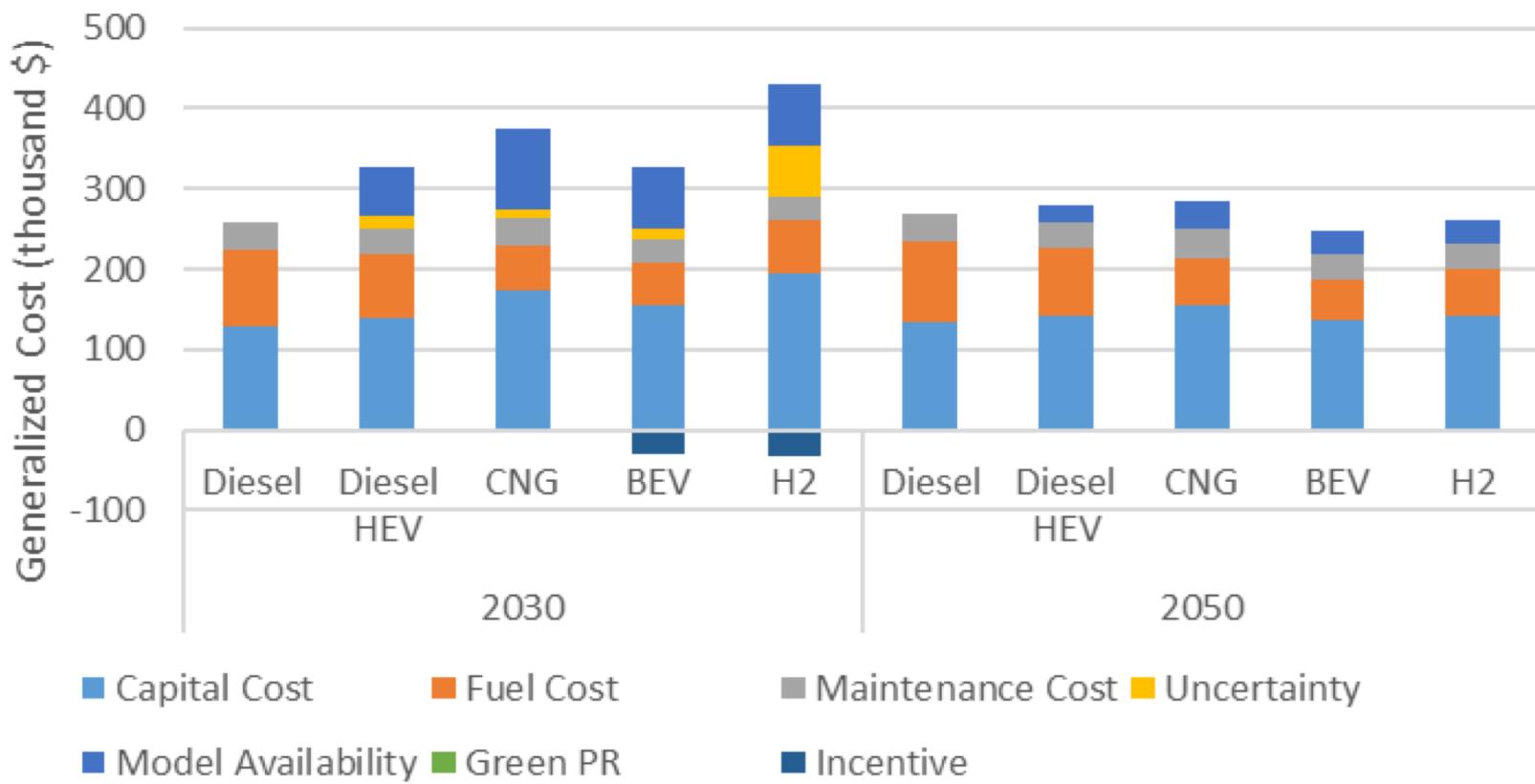
Truck Choice Model



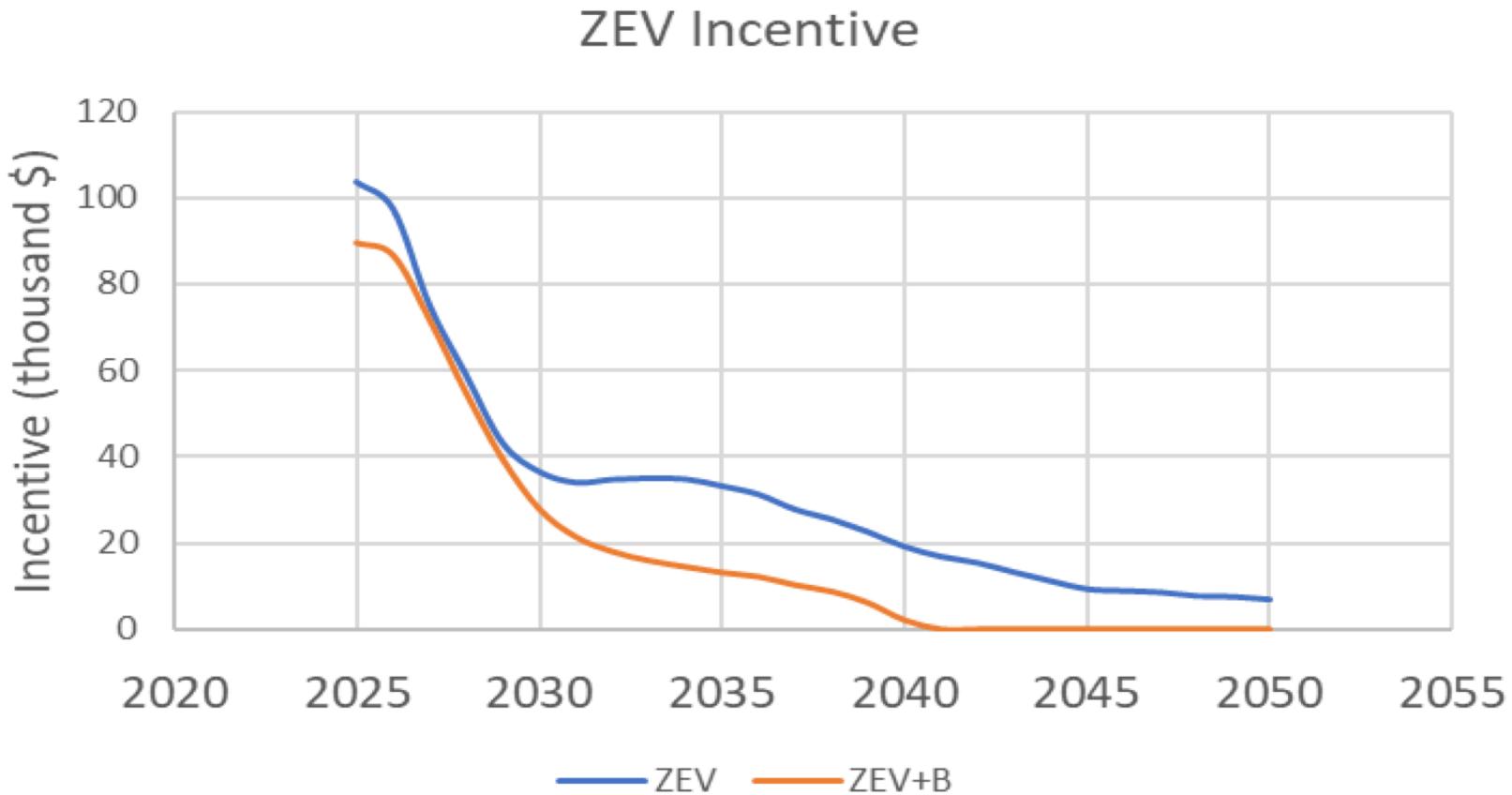
- Understand real world truck purchase of new technologies
- Model from fleet manager perspective
- TCO inputs (capital, fuel, maintenance)
- Non-monetary (uncertainty, model availability, refueling inconvenience)

Short-haul Generalized Cost (In between)

Short-haul Truck generalized Cost - ZEV+Biofuels



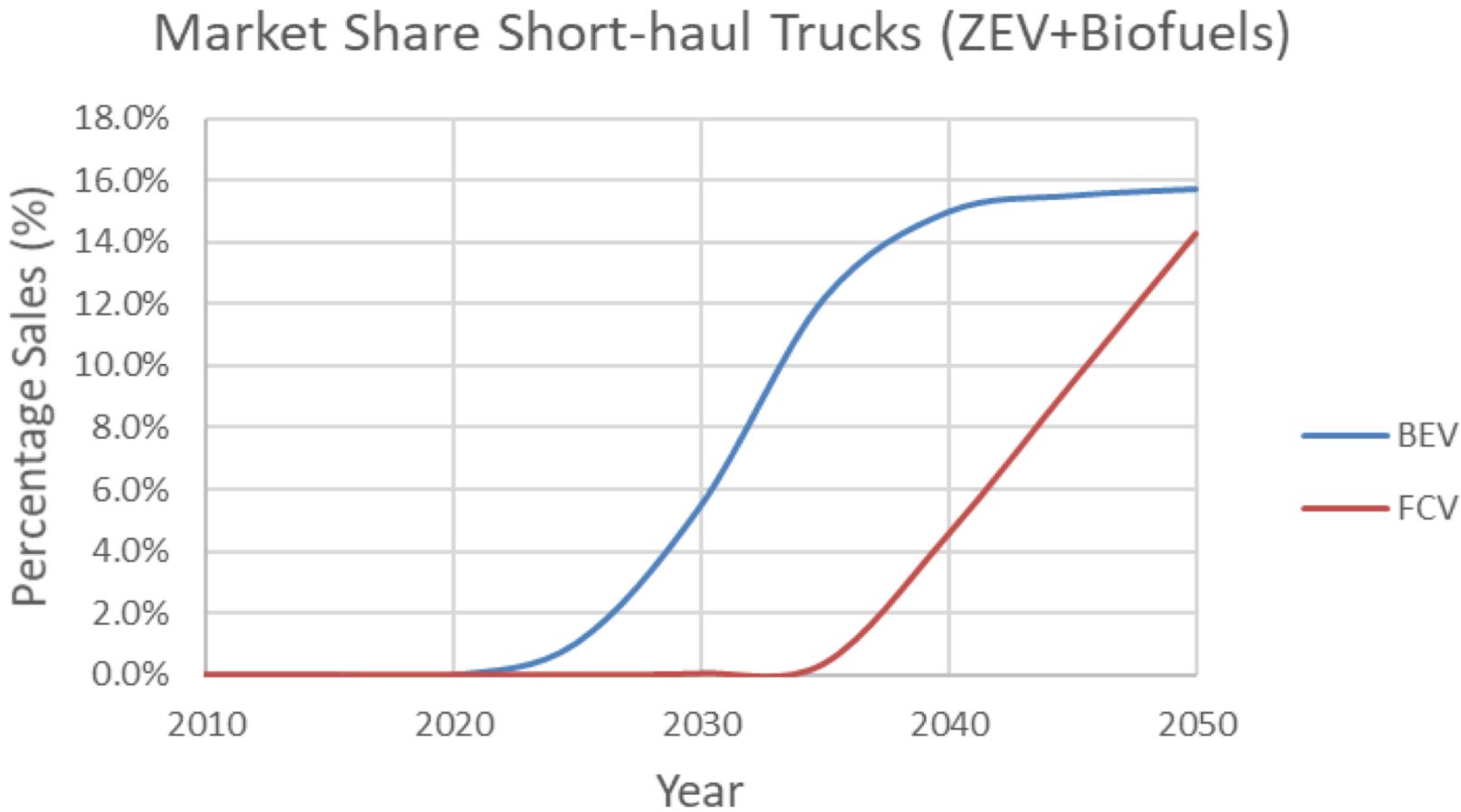
Incentive Cost Estimates – Short-haul Trucks



ZEV Scenario – 60% sales in 2050

ZEV + Biofuels Scenario – half ZEV scenario (i.e. 30% sales in 2030)

FCVs vs BEVs



ZEV Scenario (60% sales in 2050) Incentives

Incentive Spending (\$ Millions)							
	FCV	BEV	Total Incentive	FCV + BEV Costs	% ZEV Costs	Total Vehicle Cost	% Total vehicle Cost
2025	80	70	150	450	33%	9,740	2%
2030	260	280	550	1,50	36%	10,650	5%
2035	450	430	880	3,330	26%	10,820	8%
2040	530	440	970	4,990	19%	11,450	8%
2045	660	600	1,250	6,160	20%	11,750	11%
2050	910	860	1,770	7,330	24%	12,050	15%

Comments on Truck Types

- Long-haul
 - FC fuel economy requires H2 cost ~\$5/kg (renewable?)
 - BEV has heavy battery (~6,000 kg), constrains payload
 - Need biofuels?
- Transit Bus
 - Large maintenance savings (~\$0.20/mi), Fed government pays significant % capital cost, BEV look very promising
- ZEV technology choice (Truck Choice Model)

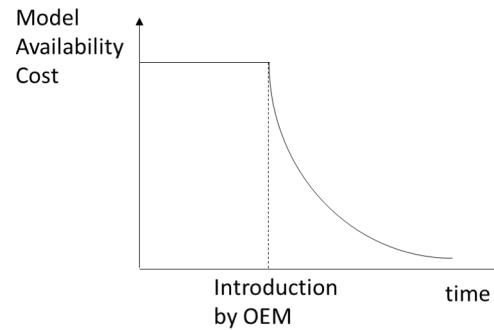
FCV	Long-haul (by default)
BEV	Transit Bus, Other Bus, HD voc
Both	Short-haul, MD urban, MD voc, HD pickup

Future Work 1

- Additional Vehicle Types
 - Add plug-in hybrids
 - Add more BEV ranges (e.g. 120, 200, 300 miles)
- Additional Fuels
 - Expand biofuels (e.g. DME, ammonia)
- Update Truck Choice Parameters
 - Maintenance costs
 - Significant potential uncertainty in non-monetary factors (uncertainty/risk, model availability, refueling inconvenience)
 - Survey planned next year
 - Possible second workshop

Future Work 2 (Sensitivity Studies)

- Sensitivity Studies: varied some inputs in Transition Study but not in Truck Choice Model. Understand effect of each parameter (which are most important)
- Model inputs
 - Battery and fuel cell cost, fuel cost, ZEV scenario (include PHEV)
 - Payback period, discount rate
- Non-monetary factors
 - Vary initial magnitude
 - Vary time “decay”





Thank You