Handout: *Economic and Environmental Costs of Electric and Flex-Fuel Vehicle*

Table 1: Mass Energy Ratios for EV Batteries

Battery	Volts	**Amp hours**	Wh (V X Ah)	**Battery mass (lbs)**	kWh (Wh ÷ 1000)	Lbs / kWh (Lbs ÷ kWh)
Lithium	12					
Lead	12					

Table 2: EV Charging

EV model	**kWh / 100 miles**
2014 Honda Fit	

100 Miles

A	B	C	D
Energy	kWh / 100 miles (Table 2)	Lbs / kWh (Table 1)	Lbs / 100 miles (B X C)
Lithium			
Lead			

Table 3: Mass Needed per

Table 4: Battery Cost for 100 Mile Range

A	**B**	C	D	E	F
Battery type	**Cost ($)**	kWh (from Table 1)	Cost / kWh (Cost ÷ C)	kWh / 100 mi. (from Table 2)	Cost / 100 mi. (D X E)
Lithium					
Lead					

Table 5: Land Needed for Ethanol Production [1,2,3]

Gasoline use/day in US bbls	÷ 0.67 = gas to ethanol ratio	X 42 gal./bbl = ttl gal. needed	X 365 day/yr. = gal./ yr.	÷ 80 gal./ton = switchgr./ year	÷9.4 = ton/acre total acre/year	÷640 acres/mile = total square mi.

Table 6: Combustion of Switchgrass [4,5,6,7]

Switchgr. kWh/ton	÷2000 lb/ton =kWh/lb	X 0.95 = transmis. efficiency	X 0.81 = charg. efficiency	X 100 = kWh /100 lbs	X 3.45 mi./kWh = miles /100 lbs for electric Honda Fit

Table 7: Fermentation of Switchgrass [7,2]

Gas-powered Honda Fit mpg	÷ 0.67 = Gas to ethanol ratio	Switchgr. mi./100 lbs for ethanol Honda Fit X 0.040 gal./lb

Table 8: Kilowatt Hours per Unit Fuel [8,9]

Fuel used	**Total kWh**	**Total fuel consumed**	Original fuel unit	Unit conversion	kWh per converted unit	Converted unit
coal			per ton	2K lbs/ton		per lb
oil			per barrel	42 gal/bbl		per gal.
gas			per ft^3	N/A		per ft^3

Table 9: Miles per Unit Fuel [5,6,7]

Fuel used	kWh per converted unit	Transmission efficiency	Charging efficiency	Miles per kWh	Miles per unit fuel	Converted unit
coal		0.95	0.81	3.44		per lb
oil		0.95	0.81	3.44		per gal.
gas		0.95	0.81	3.44		per ft^3

Table 10: Effect of Supply on Oil Price [10]

Mill. bbl. oil consumed by US per day	% increase in US consumption	Millions of barrels consumed by US per day	**Price per bbl. ($)**	New price per bbl.
	10.00			

Table 11: Effect of Oil Price on Economic Growth [11,12]

Tax per barrel	% reduction in US GDP

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