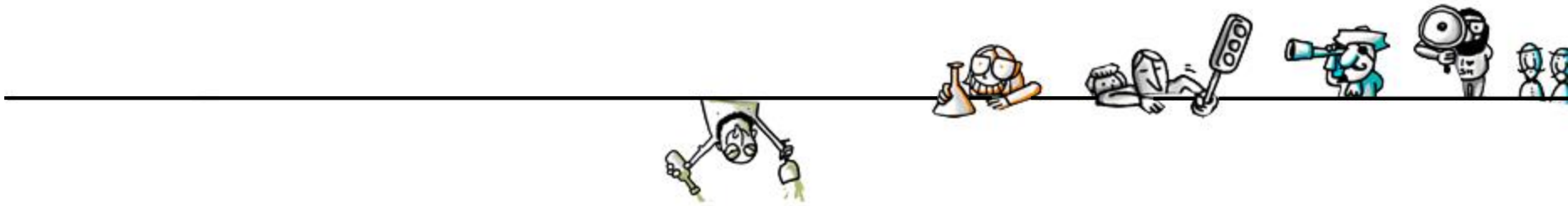
15.366 ENERGY VENTURES



Class 5: The Economic Equation of Energy Startups
COCA/LTV & IRR > WACC

October 6, 2016

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Calculate the COCA

More Precisely…

- Example: Our new venture will sell a widget, and to successfully acquire a new customer it takes one of our sales people 1/20 of their time for 6 months.
- Let's assume we pay the sales person $150K per year if they make 100% of their assigned quota. We will assume they make their quota.
- Then the sales person's expense to close this deal might be seen as:

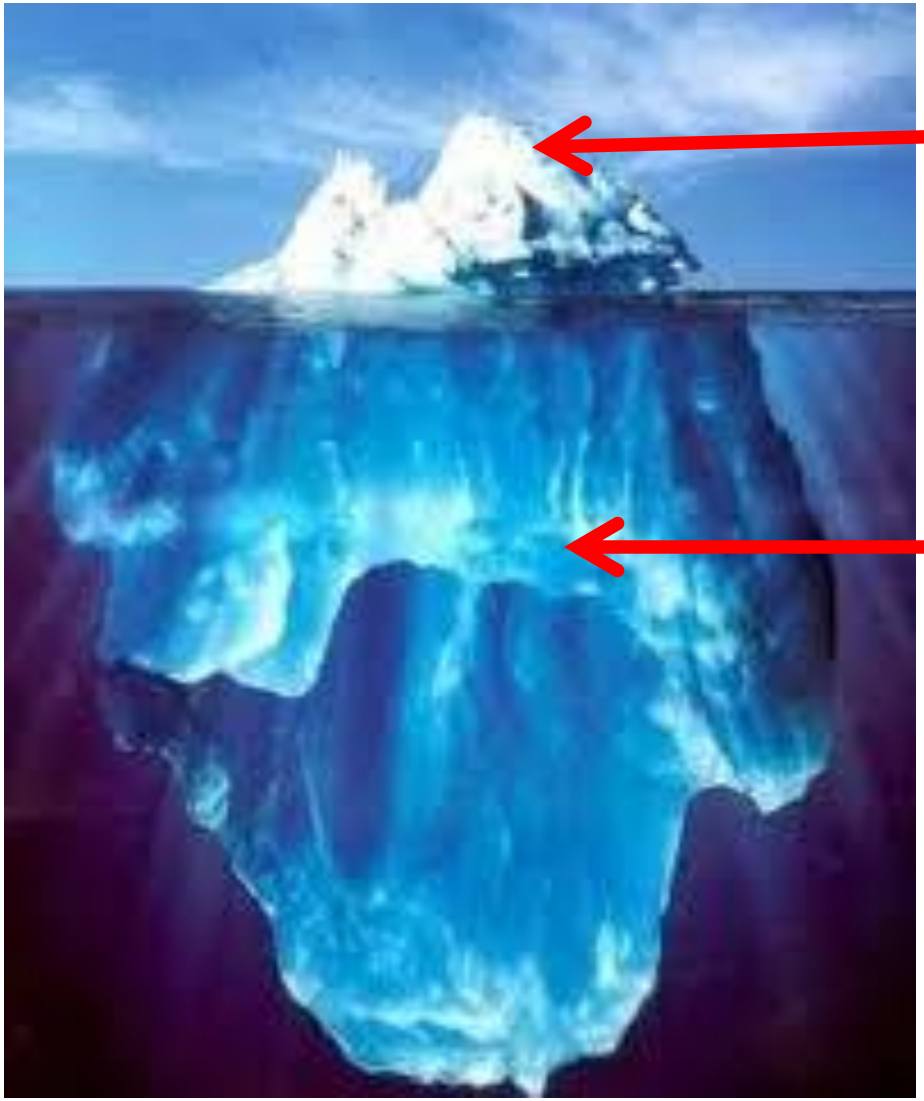
  $150K* (6 months/12 months)*(1/20) = $3,750

- But there is more …

Additional Sales Costs…

- The sales rep has to be assigned their full costs beyond salary
- This could include: auto, real estate, administration, benefits, administration allocation, phone, internet, computer, etc.
- After we do a lot of digging and calculating, we estimate this to be $1,000.
- Then incidental costs associated with this account of travel, lodging, entertainment, demo units, tech support, etc. need to be included.
- After doing a lot of receipt checking and the like we estimate this to be $1,500
- Then the COCA = $3,500 + $1,000 + $1,500 = **$6,250**, right?

WRONG!



How is that?

- Initial calculation did not include the conversion rate of 5% for the sales rep
- So the rep has to track 20 prospects for every sale and incurs the costs of these non-performers as well
- The sales cycle of 6 months is probably well below average
- There were many other resources that went into making the sales rep successful – e.g., website, sales support, advertising, tradeshows, help of executives, etc.
- Logically the bottoms up methodology should work if you took a long time and got to understand all of the costs but that is very difficult and costs are generally missed or even double counted
- The good news is that there is a much easier way that is more accurate …

Calculating the COCA Correctly

- Determine all your marketing and sales cost for your company for a set time period.
- That time period is related to the length of your sales cycle.
- It should be at least 2 times your sales cycle.
- Include not just the expenses for your marketing and sales group but also, if it is significant, an allocation of the executives and/or any other resources involved in sales & marketing.
- We will call this number **TMSE(t)** for Total Marketing and Sales Expense for a time period t.

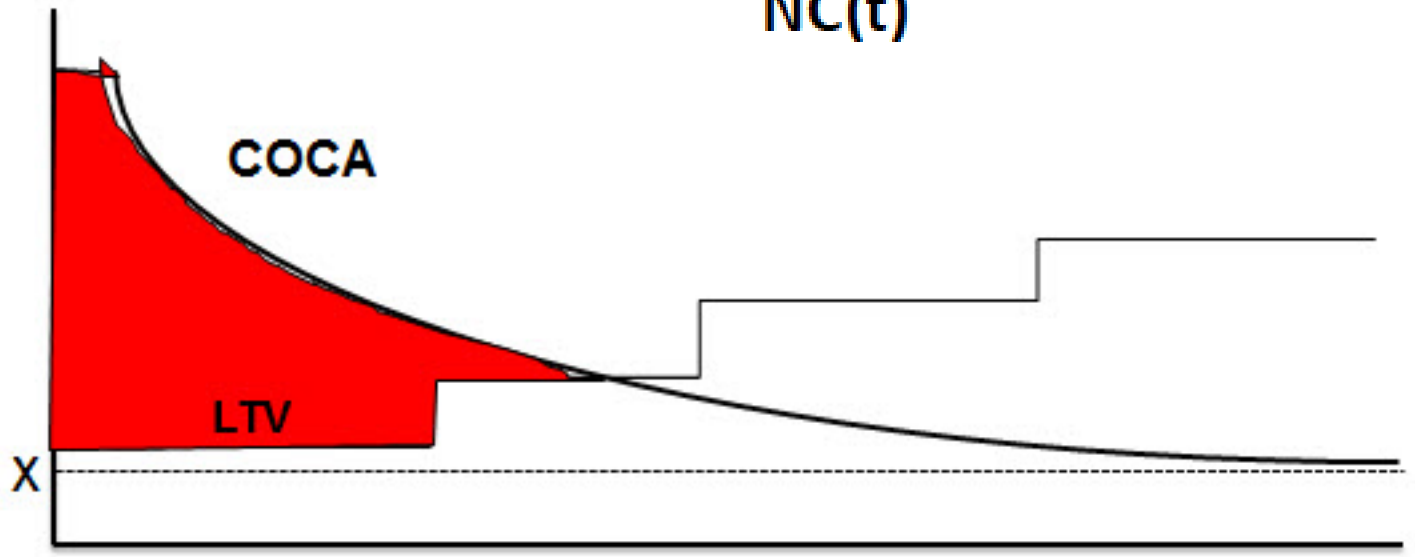
Calculating COCA Correctly (cont.)

- Next, you determine if there is a substantial amount of the TMSE(t) that is dedicated for customer retention, e.g., customer support on going customers and we will call this **IBSE(t)** for Install Base Support Expense for time period t.
- We will then determine the number of new customers we close in the same time period and we will call this **NC(t)** for New Customer in the time period t.

Calculating COCA Correctly (cont.)

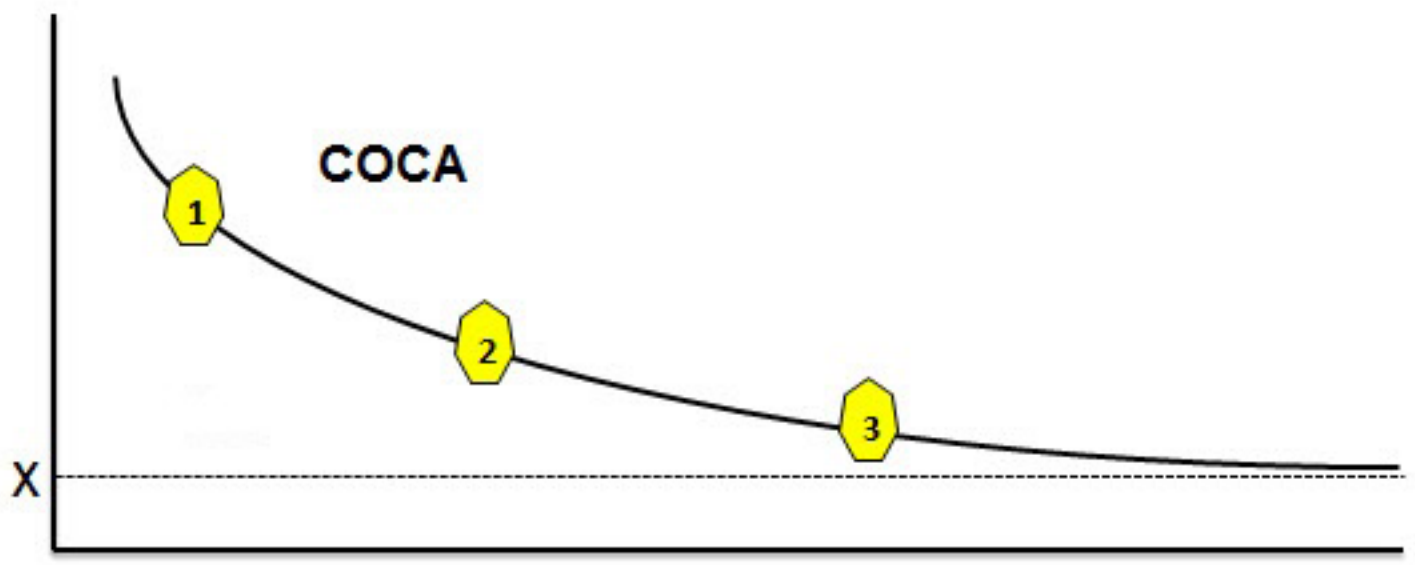
- Then the equation to calculate the COCA for any given period is:

$$COCA(t) = \frac{TMSE(t) - IBSE(t)}{NC(t)}$$



It is Very Important to View COCA Over Time

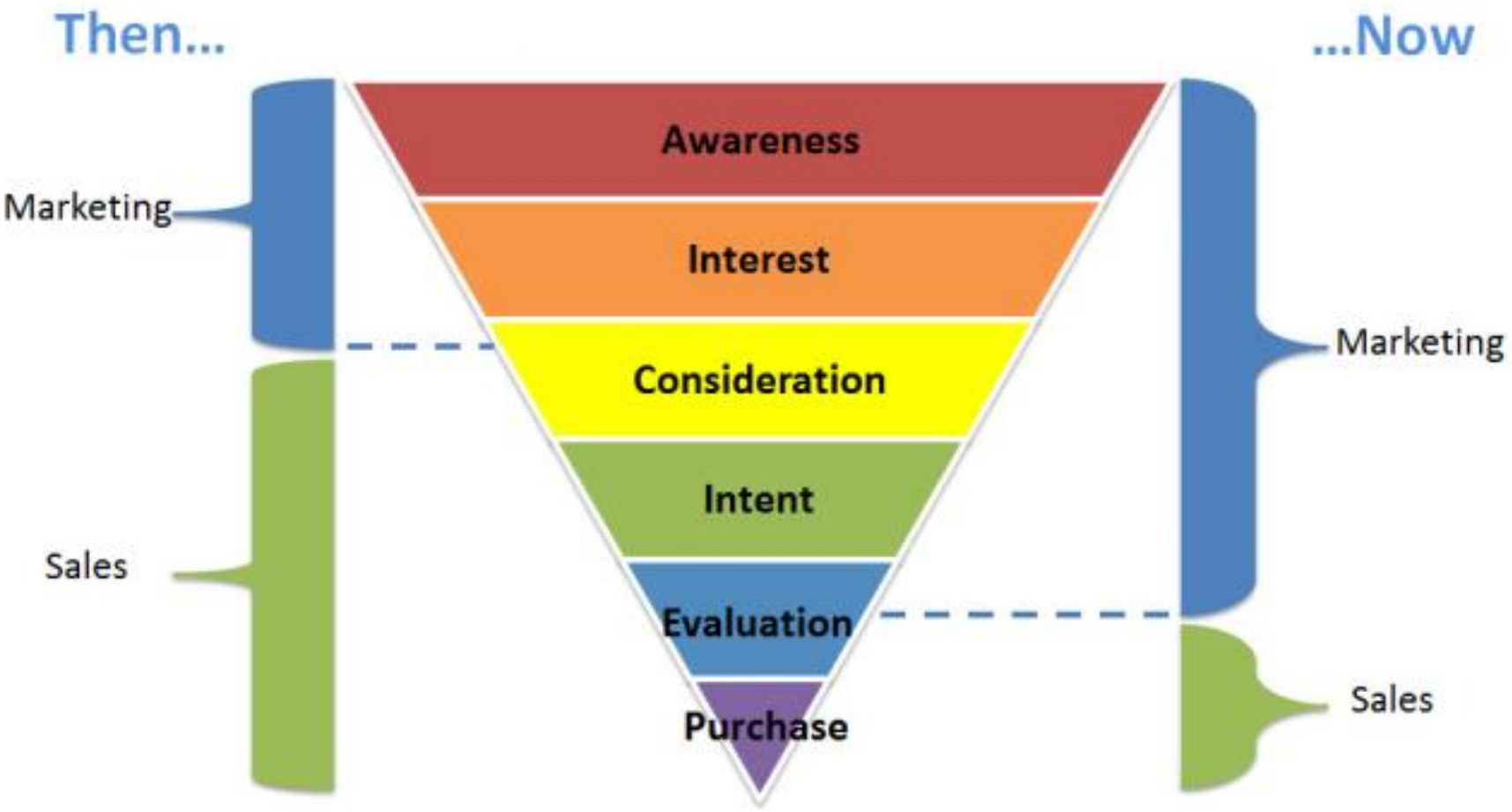
- It will start out very high and then it should go down over time



COCA Key Factors

- Direct Sales vs. Telemarketers
- High Touch vs. Automated
- Conversion Rate
- Cost of Leads
- Quality of Leads
- Moving them Down through the Sales Funnel
- Design of Your Business Model
- WOM
- Focus => Decrease Sales Cycle

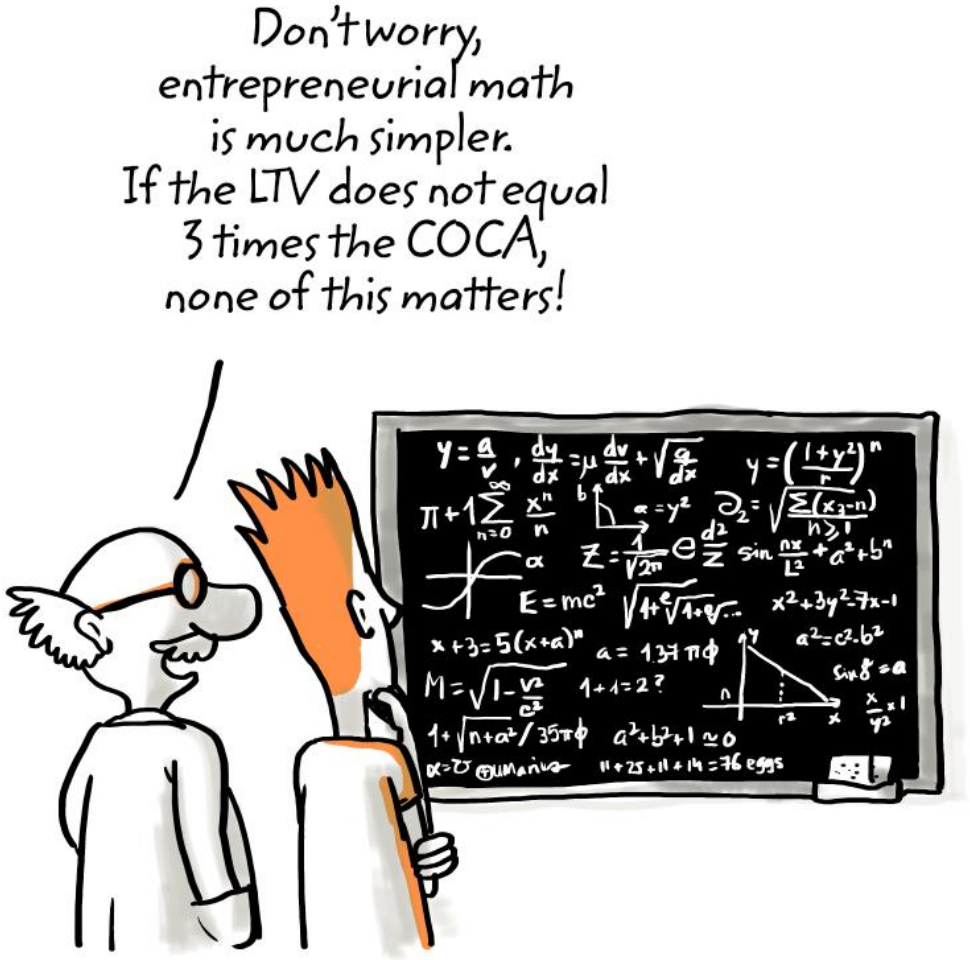
The New Marketing & Sales Funnel



Direct Sales COCA Example

COCA Calculation: Direct Sales Example			
	Year		
Items from Marketing & Sales Budget	1	2	3
Number of Sales People = Tech Support	1	2	3
Salary ($175k/year fully burdened)	$ 175,000	$ 350,000	$ 525,000
Tech Support ($125K/year fully burdened)	$ 125,000	$ 250,000	$ 375,000
Travel	$ 24,000	$ 40,000	$ 52,500
Entertainment	$ 15,000	$ 24,000	$ 30,000
Events	$ 30,000	$ 35,000	$ 40,000
Website Cost	$ 10,000	$ 10,000	$ 10,000
Consultant	$ 15,000	$ -	$ -
Total	$ 394,000	$ 709,000	$ 1,032,500
Number of Customers	1	3	7
COCA for Year	**$ 394,000**	**$ 236,333**	**$ 147,500**

Calculate the LTV



Conceptually

- How much a new customer is worth to your venture over the life time with you

$$\text{LTV} = \sum \text{NPV (Profits for 5 years)}$$

- Key considerations
  - Gross Margins (Pricing & Costs)
  - Cost of Capital
  - Retention Rate
  - Ability to Upsell or Capture Value in other Dimensions
  - *Note that Profit is what matters and not Revenue*
  - *Skok's Law: LTV must be at least 3X COCA*

LTV Example: Helios

HELIOS

remote-activated, crystal-clear windshields

Life Time Value of Acquired Customer

The long-term value of an acquired customer is estimated to be about $100-125K per municipal fleet. This is driven by the fact that once a fleet adopts the Helios technology, there is a continuing revenue stream to update the new fleet vehicles. As the technology has already been proven successful, follow-up sales take minimal effort. We estimate that the initial sales will generate about 5 years of follow-on sales to the municipal fleet before a new technology displaces it (that we plan on producing).

Average Yearly Revenue per Fleet	$100K
Gross Margin	97%
Price Increase Per Year	5%
Life of Product	5 years
Retention Rate	90%
Cost of Capital for Company (est)	40%
Resultant Average LTV Per Fleet	$121K

Example: Helios LTV

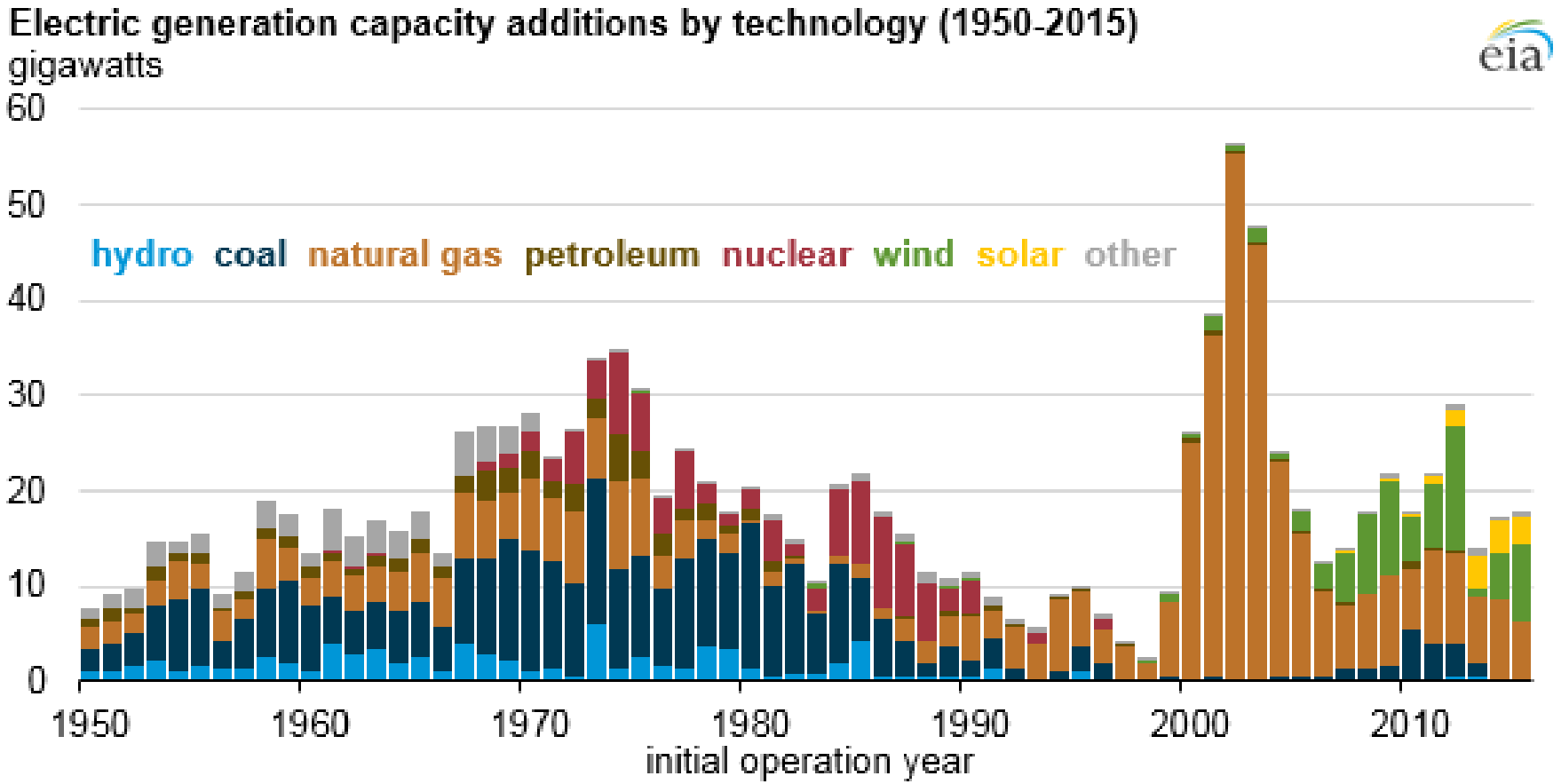
Example: Helios LTV						
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue Per Year (Assumes 5% Yearly Price Increase) =	$ 100,000	$ 18,900	$ 17,861	$ 16,878	$ 15,950	$ 15,073
Gross Margin Profits from Revenues =	**$ 97,000**	**$ 18,333**	**$ 17,325**	**$ 16,372**	**$ 15,471**	**$ 14,620**
Net Present Value at Above Cost of Capital =	$ 97,000	$ 11,000	$ 6,237	$ 3,536	$ 2,005	$ 1,137
NPV of Profit Stream or LTV per Fleet =	**$ 120,915**					
Pricing (Unit Price)	$100	Business Model is a one time charge with no recurring revenue				
Average Yearly Revenue per Fleet in Yr 1	$100K					
Gross Margin	97%					
Price Increase Per Year	5%					
Life of Product	5 years					
Retention Rate	90%					
Cost of Capital for Company (est)	40%					

Another Example

Year		1	2	3	4	5
Units		100	250	500	500	500
Revenue		$1,000,000	$2,500,000	$4,500,000	$4,500,000	$4,000,000
Gross Margin		$0	$250,000	$900,000	$1,350,000	$1,600,000
NPV @ 30%	$1,461,178					
NPV @ 40%	$1,104,451					

- Discount factor is a larger issue, as gross margin is further out
- Account changes in product price over time (in this case down)
- Also changes in margin (in this case up)

Adding the Energy Perspective



IRR > WACC

IRR: Internal Rate of Return

- “Unlevered”
- Impacted by lots of variables
- Variables that can change significantly over time

WACC: Weighted Average Cost of Capital

- For the project/product
- Include debt and equity costs
- Can be highly impacted by tax policy

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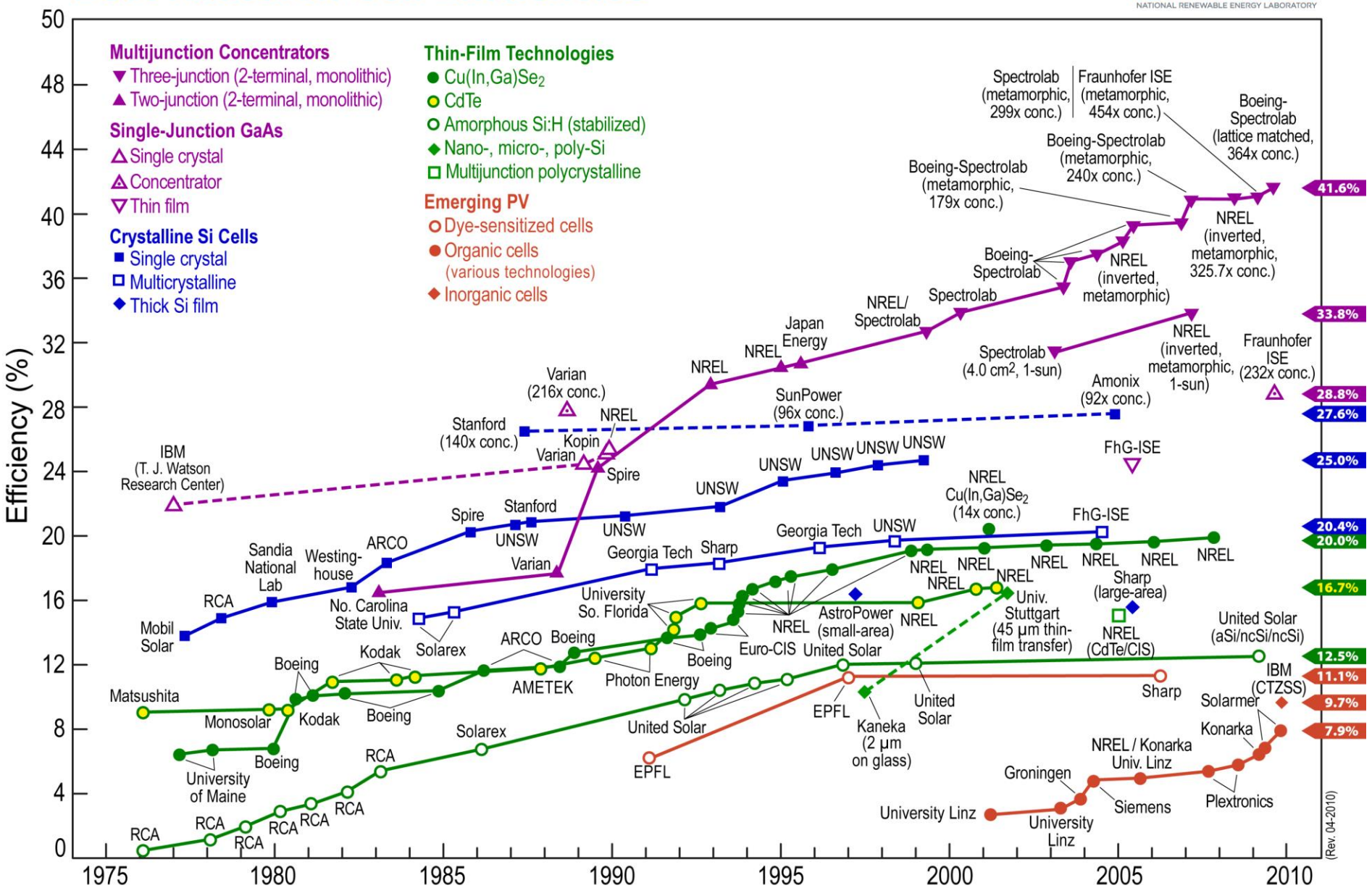
You make $ of the spread

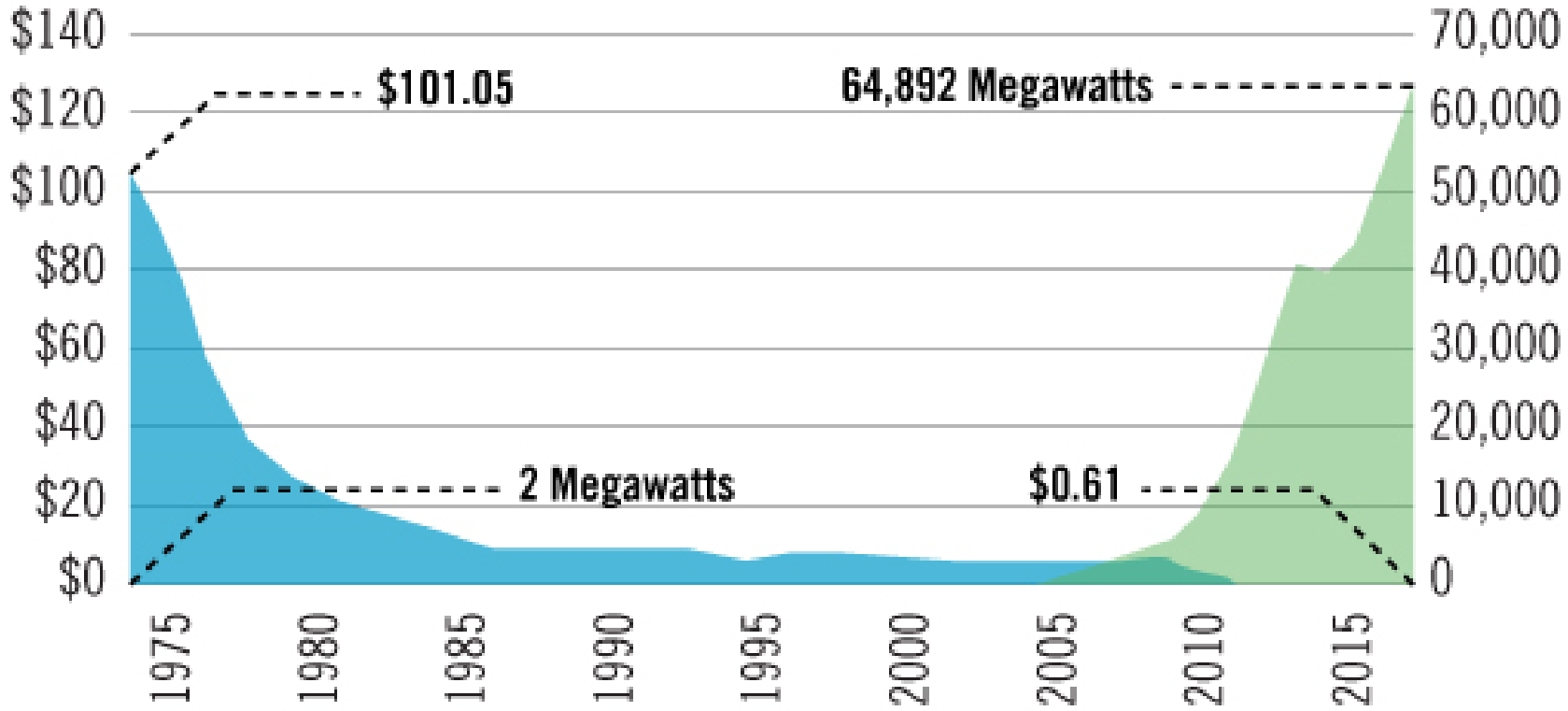
So ideally

IRR >> WACC

Best Research-Cell Efficiencies

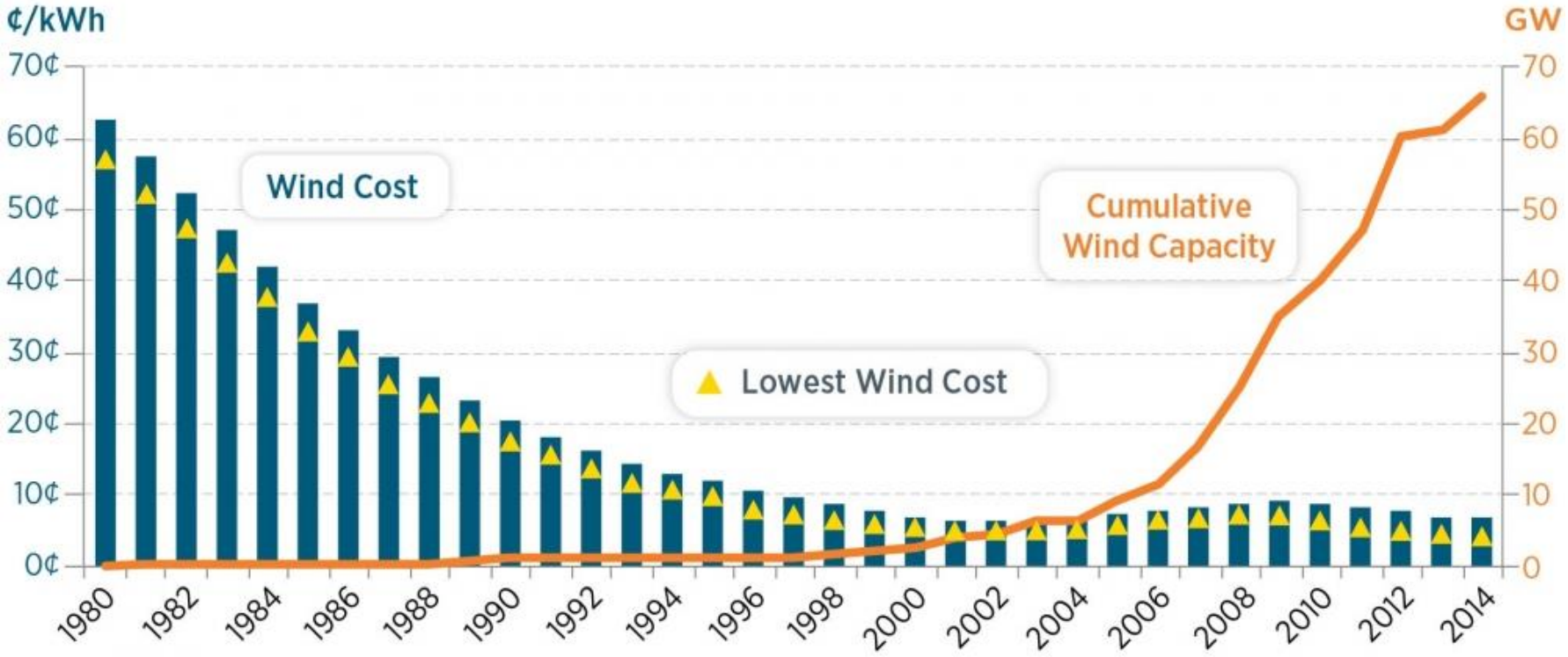


Price of a Solar Panel per Watt vs. Global Installations



Source: Earth Policy Institute/Bloomberg

Wind Power Cost and Growth in US



http://breakingenergy.com/2015/11/17/6-charts-that-will-make-you-optimistic-about-americas-clean-energy-future/

Focus on IRR

- But that's hard (lots of variables)…
  - Efficiency
  - Cost per kW of panels
  - Cost per kW of balance of plant and installation
  - Cost of operation
  - Resource quality
  - Longevity of project
  - Tax incentives
  - Energy sales
  - REC sales
  - Cost of sales (now higher than cost of panels for residential market!)
  - Others…
  - …and they change over time

Easy to track

Site specific

Harder to predict and track

XLhybrids™

XL Hybrids Powertrain Savings Calculator

Fleet name: [redacted]

Vehicle type: GM Van

Vehicle / fleet

Vehicles purchased	282	
Sales price per unit	$8,500	
Expected years on road	10.0 yrs	1 yrs ◄► 20 yrs
Annual miles driven	25K	5K ◄► 100K
Total lifetime miles driven	250K	
Baseline mpg	11.3 mpg	1 mpg ◄► 20 mpg
Hybrid mpg improvement %	25.0%	
Cost of fuel ($/gal)	$2.63	per gallon at a 4.0% inflation rate

Engine

Engine option	● Downsize engine	○ Keep existing engine
Downsize savings	$900	

Brake maintenance

Normal brake replacement interval (miles)	35K
Total replacement cost (equipment + labor)	$750

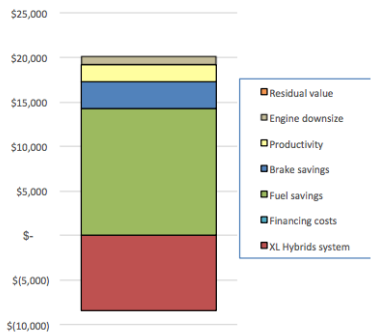
Driver productivity

Include driver productivity savings? ☑ Yes, include savings

Finance inputs

Type of financing	Purchase
Down payment (%)	0%
Interest rate (% APR)	2.0%
Term of loan/lease (yrs)	3 yrs
Residual value (%)	0%

Chart type: ○ Annual ● Lifetime



Lifetime Savings

	Per vehicle	Fleet total
Gross	$ 20,108	$ 5,670,508
	x 282 vehicles in fleet	
Net	$ 11,608	$ 3,273,508

	Per vehicle	Fleet total
Operating metrics		
Vehicles equipped	282	
Years on road	10.0 yrs	
Initial mpg	11.3 mpg	
Resulting mpg	14.1 mpg	
Fuel saved per year:	442 gal	124,779 gal
Fuel saved over lifetime:	4,425 gal	1,247,788 gal
Productivity gains (hrs/yr):	3.9 hrs	1,088 hrs
Productivity gains (hrs/life):	38.6 hrs	10,876 hrs
Average lifetime fuel price:	$3.23/gal	
Average effective fuel price (due to HEV savings):	$2.57/gal	
CO2 reduction (%):	-20.0%	
CO2 reduction per year:	3.9 MT	1,113 MT
CO2 reduction over lifetime:	39.5 MT	11,130 MT
Cost per MT CO2 reduction:	-$215.36	

	Per vehicle	Fleet total
Financing (lease/loan) metrics		
Avg. gross monthly benefit (10 years):	n/a	n/a
Monthly finance payment (3 years):	n/a	n/a
Term difference monthly amort:	n/a	n/a
Avg. net monthly benefit (10 years):	n/a	n/a
Savings per mile:	n/a	

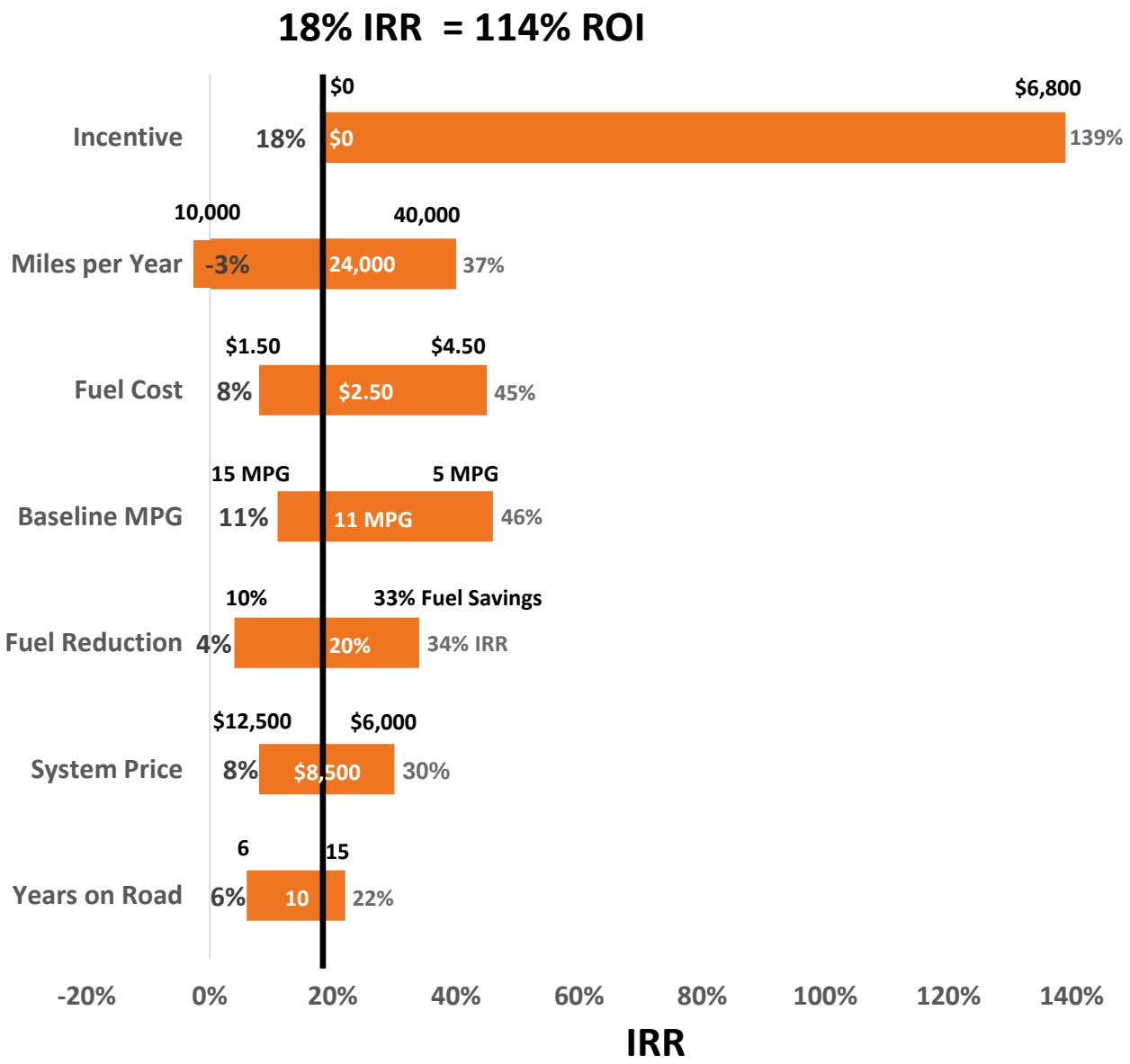
	Per vehicle	Fleet total
Financial metrics		
Total savings (gross) per year:	$ 2,011	$ 567,051
Total savings (gross) lifetime:	$ 20,108	$ 5,670,508
Total savings (net) per year:	$ 1,161	$ 327,351
Total savings (net) lifetime:	$ 11,608	$ 3,273,508
NPV (of lifetime savings):	$ 5,247	$ 1,479,751
Payback in years:	4.3 year(s)	
Payback in miles:	107,500 miles	
Internal Rate of Return:	22.7%	
Return on Investment:	152.7%	

	Per vehicle	Fleet total
Savings detail annual		
Fuel savings:	$ 1,428	$ 402,689
Brake maintenance savings:	$ 300	$ 84,600
Driver productivity savings:	$ 193	$ 54,382
Engine downsize savings:	$ 90	$ 25,380
Residual value savings:	$ -	$ -
Carbon savings:	$ -	$ -
	$ 2,011	$ 567,051
Savings detail lifetime		
Fuel savings:	$ 14,280	$ 4,026,891
Brake maintenance savings:	$ 3,000	$ 846,000
Driver productivity savings:	$ 1,928	$ 543,817
Engine downsize savings:	$ 900	$ 253,800
Residual value savings:	$ -	$ -
Carbon savings:	$ -	$ -
	$ 20,108	$ 5,670,508

Hybrid IRR – Sensitivity Analysis

Assumes:

- Base case numbers in white along line
- 5% fuel price escalation
- 50% brake savings
- Driver productivity improvements
- Does not include engine downsizing which saves $800-$2,500 on price



In Some Cases IRR Not Required

TOYOTA

TESLA

- Green Premium Market
  - ~3% of US vehicle market
- ~6 million sold ~63% market share

- Performance/luxury market
- ~163,000 sold
- Model 3 ➔ mass market

Questions?