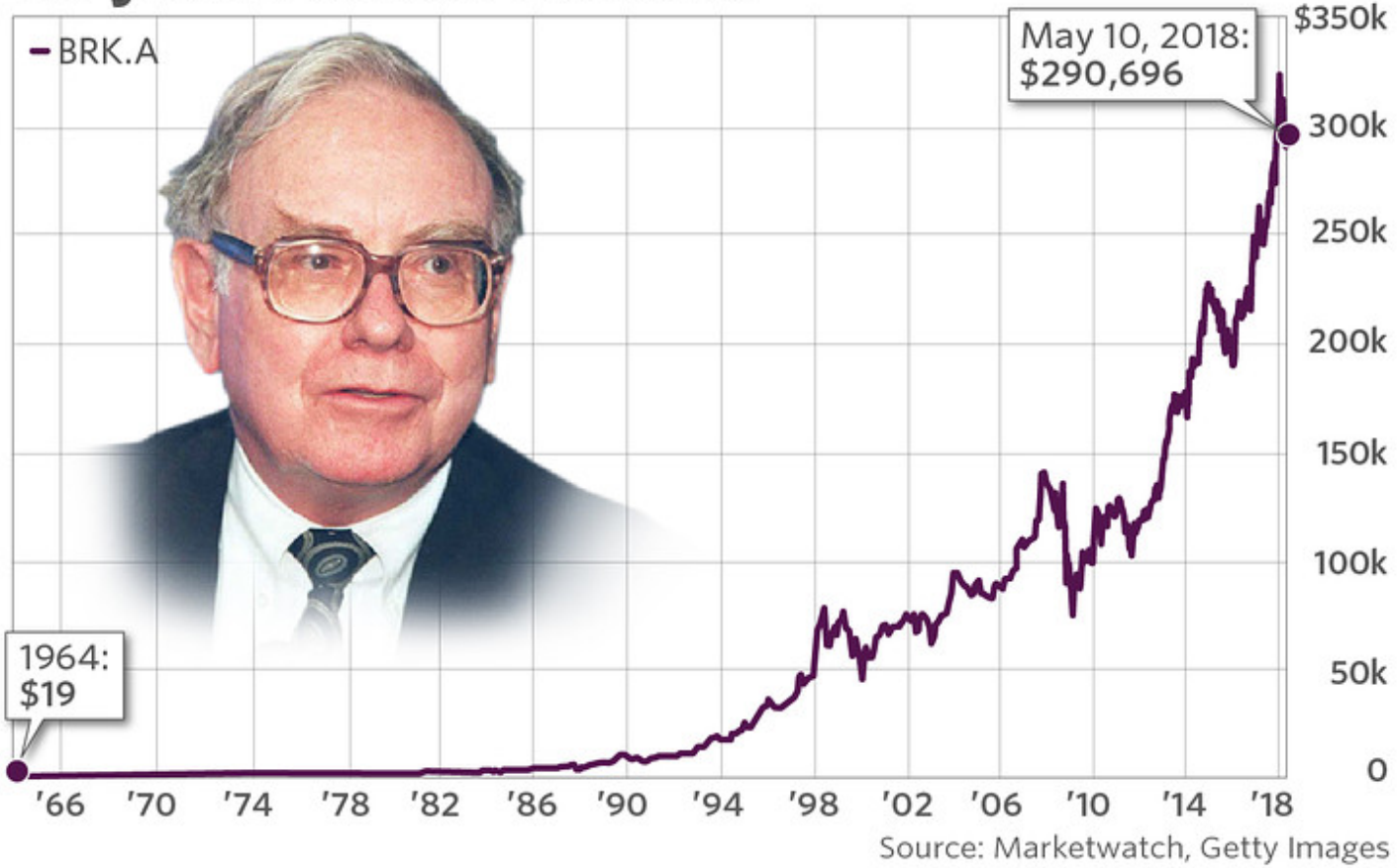
Energy Efficiency - The 5th Fuel - At Home And In The Work Place



- Net Worth $83,000,000,000
- 3rd wealthiest person in the world
- Since 1964 Berkshire Hathaway has averaged 20% return

- 20%
- 30%
- 40%
- 50%
- $16,000

- Motors
- Pumps
- Power Factor Correction
- 20% to 80% or more
- $4,500,000

Green Ideas To Save You Green

1. Coal
2. Oil / Natural Gas
3. Nuclear
4. Renewable Energy
5. Efficiency = Fifth Fuel

Green Ideas To Save You Green

Efficiency = Fifth Fuel

Forbes – 1975 – 2005 - 46%

The Economist IEA 2011 $753 B

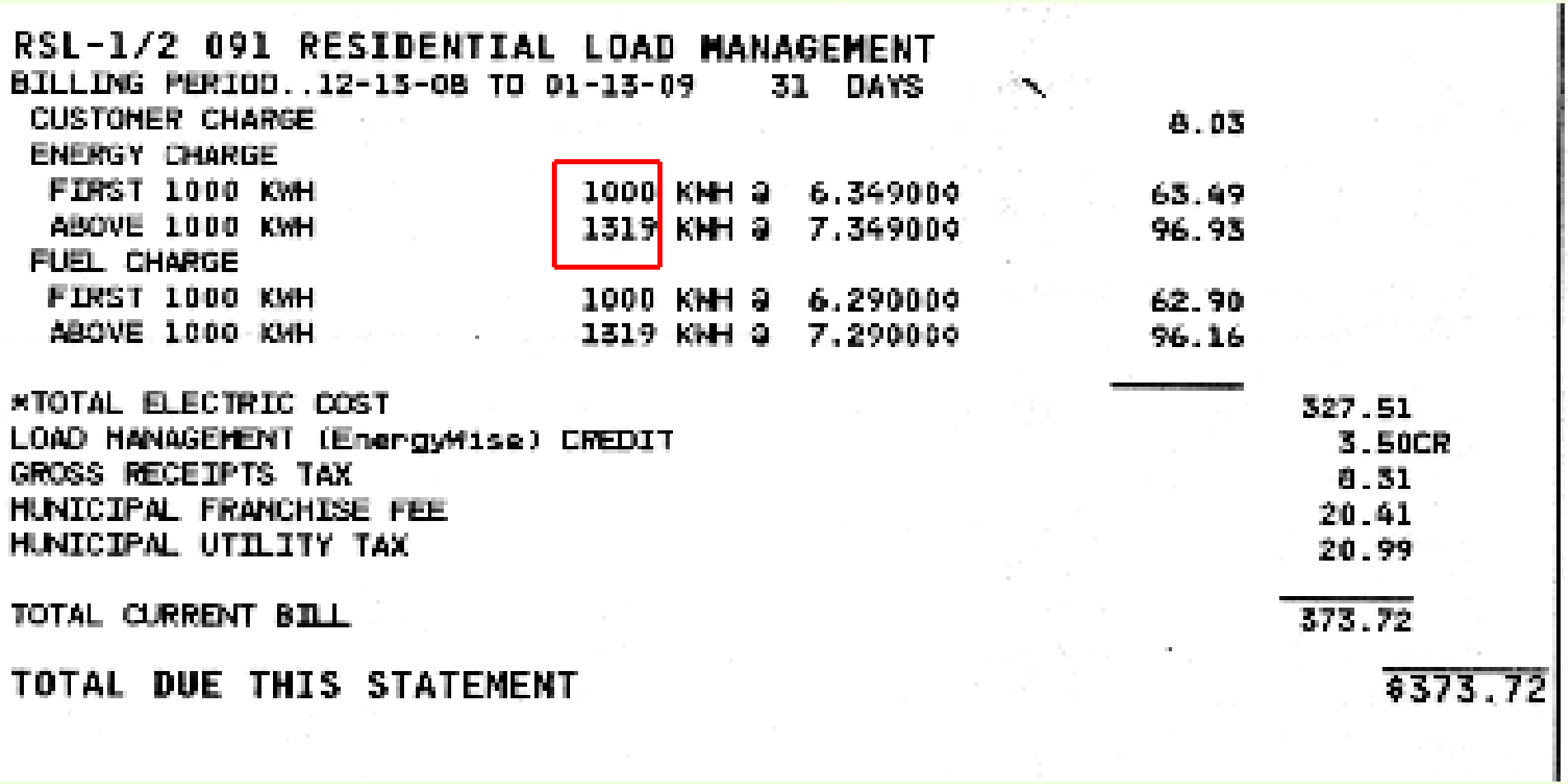
McKinsey 40%

A/C and Motors

Green Ideas To Save You Green

1) Collect your electric bills
2) Plot your electric bills
3) Read you air conditioner name plate
4) Input the data
5) Analyze the results
6) Conduct sensitivity studies
7) Review incremental investment
8) Consider appliance rebates, tax credits, tax deductions

Green Ideas To Save You Green

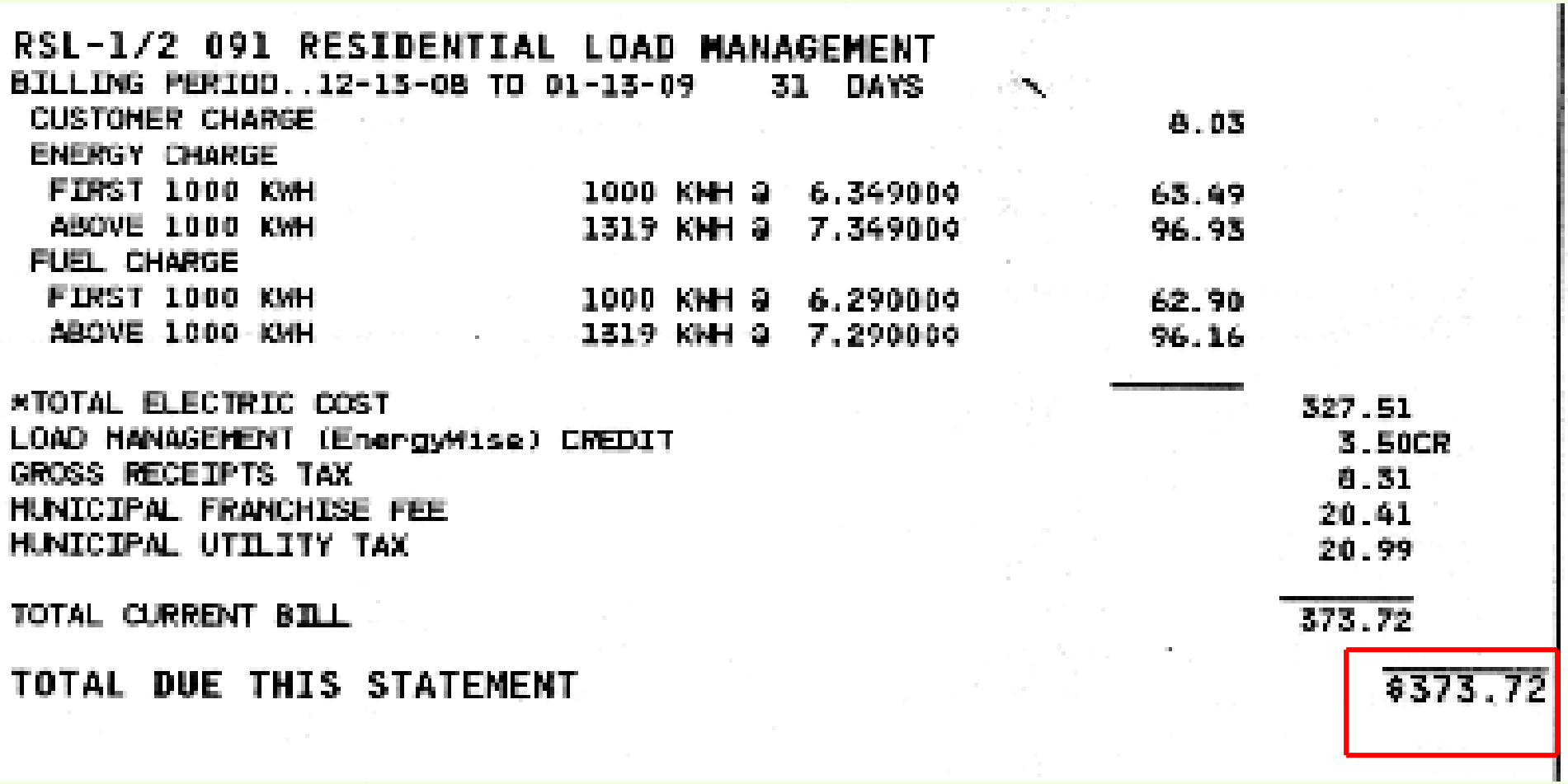


RSL-1/2 091 RESIDENTIAL LOAD MANAGEMENT
BILLING PERIOD..12-15-08 TO 01-13-09 31 DAYS

CUSTOMER CHARGE				8.03
ENERGY CHARGE				
FIRST 1000 KWH	1000	KWH @	6.349000	63.49
ABOVE 1000 KWH	1319	KWH @	7.349000	96.93
FUEL CHARGE				
FIRST 1000 KWH	1000	KWH @	6.290000	62.90
ABOVE 1000 KWH	1319	KWH @	7.290000	96.16

*TOTAL ELECTRIC COST	327.51
LOAD MANAGEMENT (EnergyWise) CREDIT	3.50CR
GROSS RECEIPTS TAX	8.31
MUNICIPAL FRANCHISE FEE	20.41
MUNICIPAL UTILITY TAX	20.99
TOTAL CURRENT BILL	373.72
TOTAL DUE THIS STATEMENT	$373.72

Green Ideas To Save You Green



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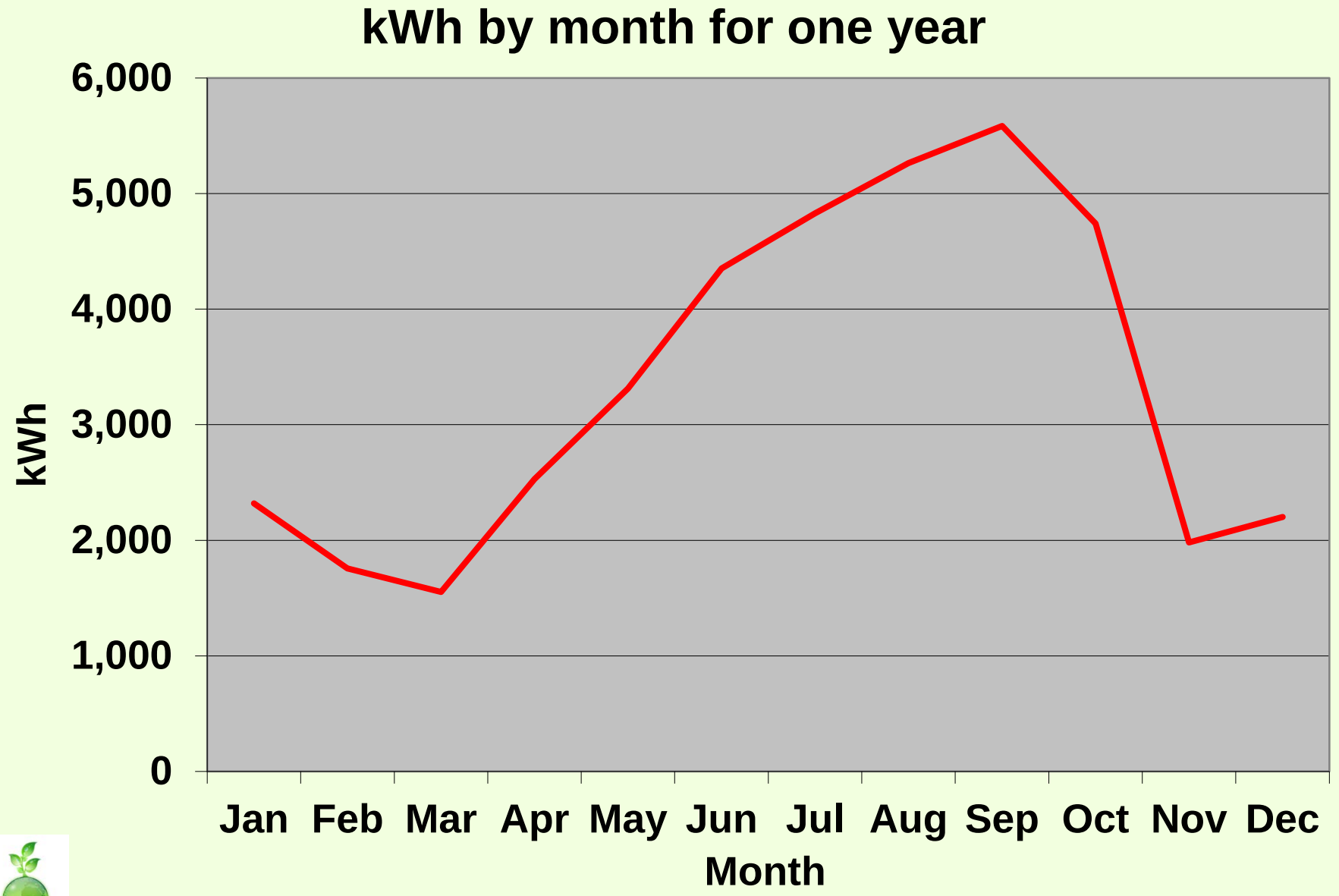
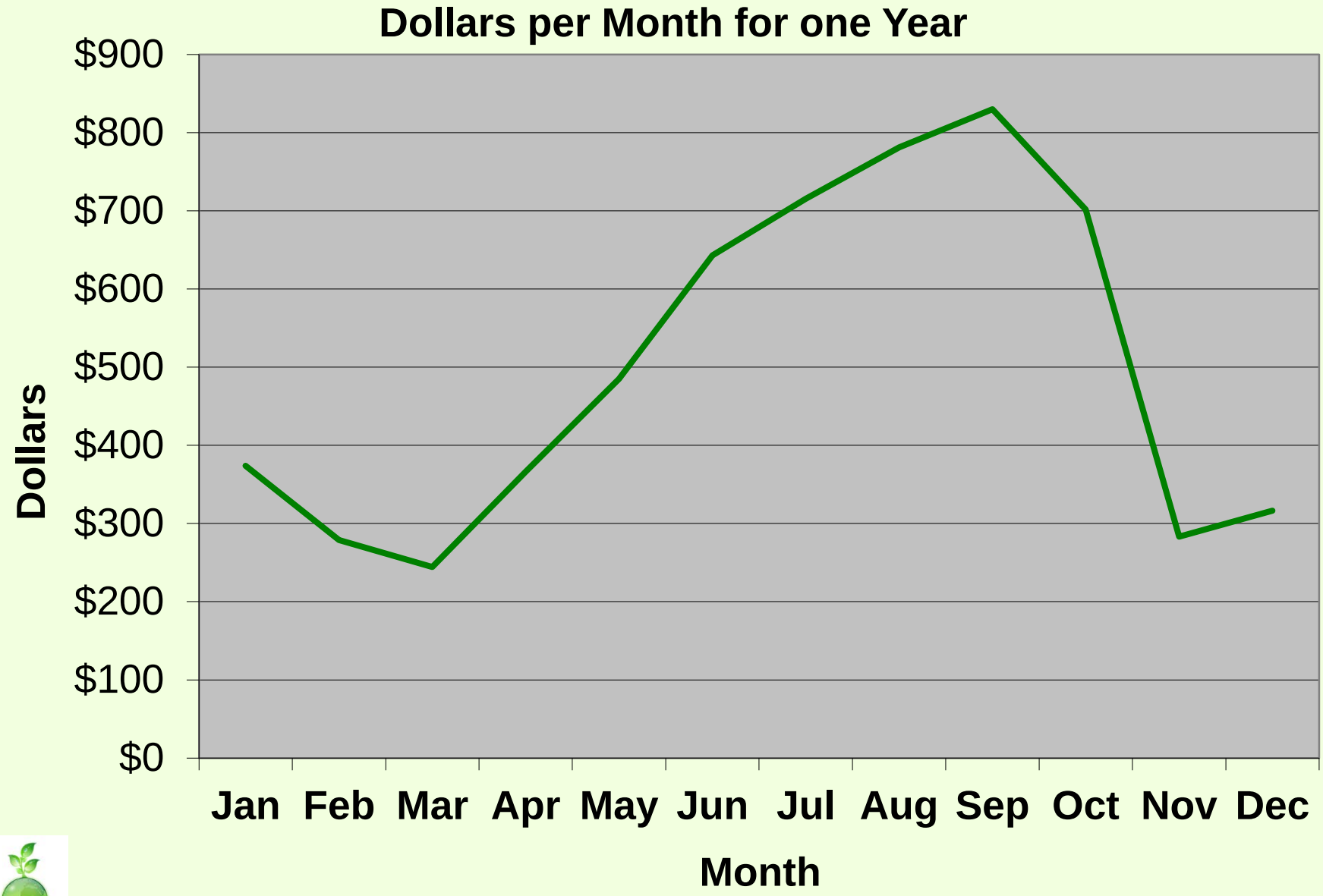
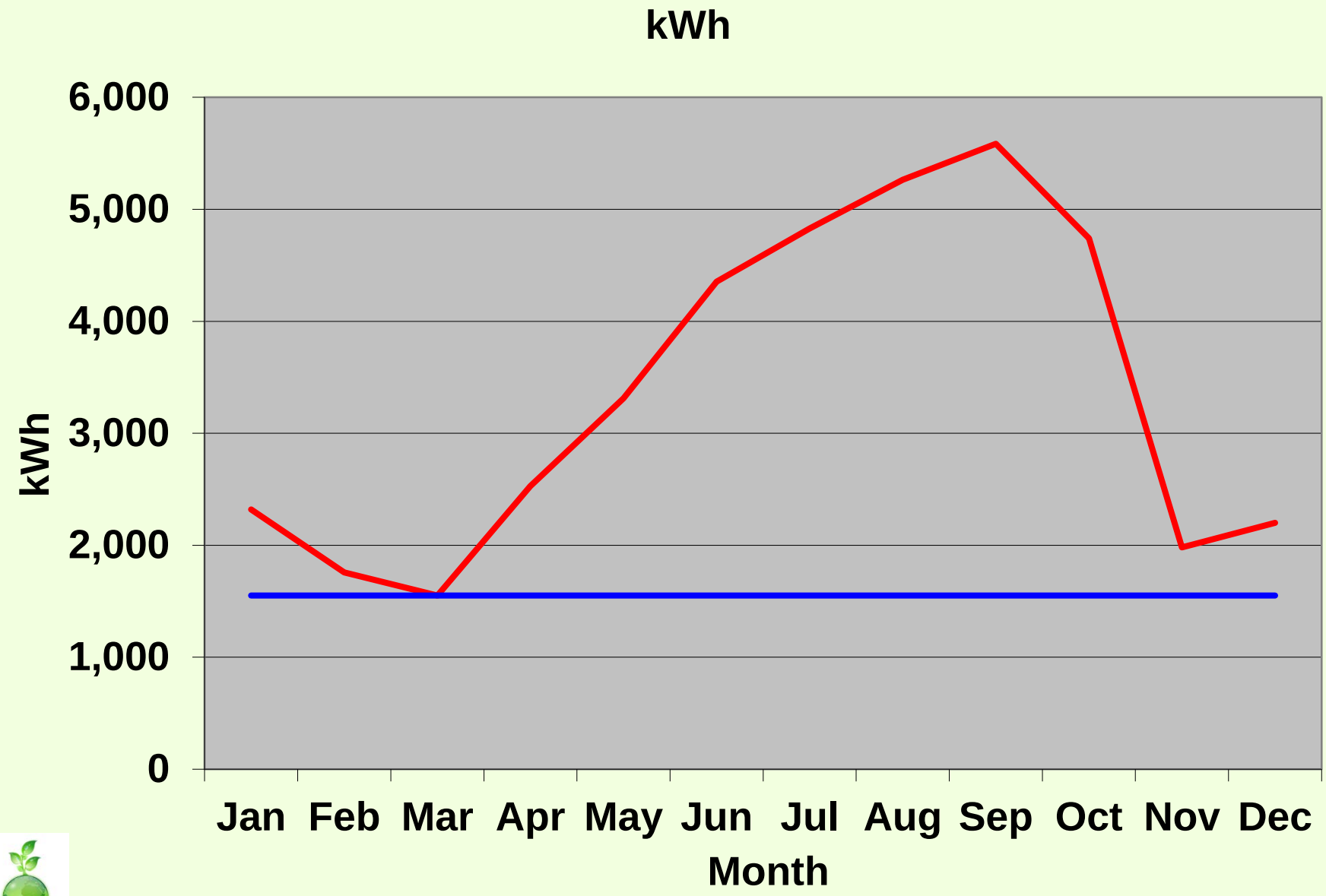
Green Ideas To Save You Green

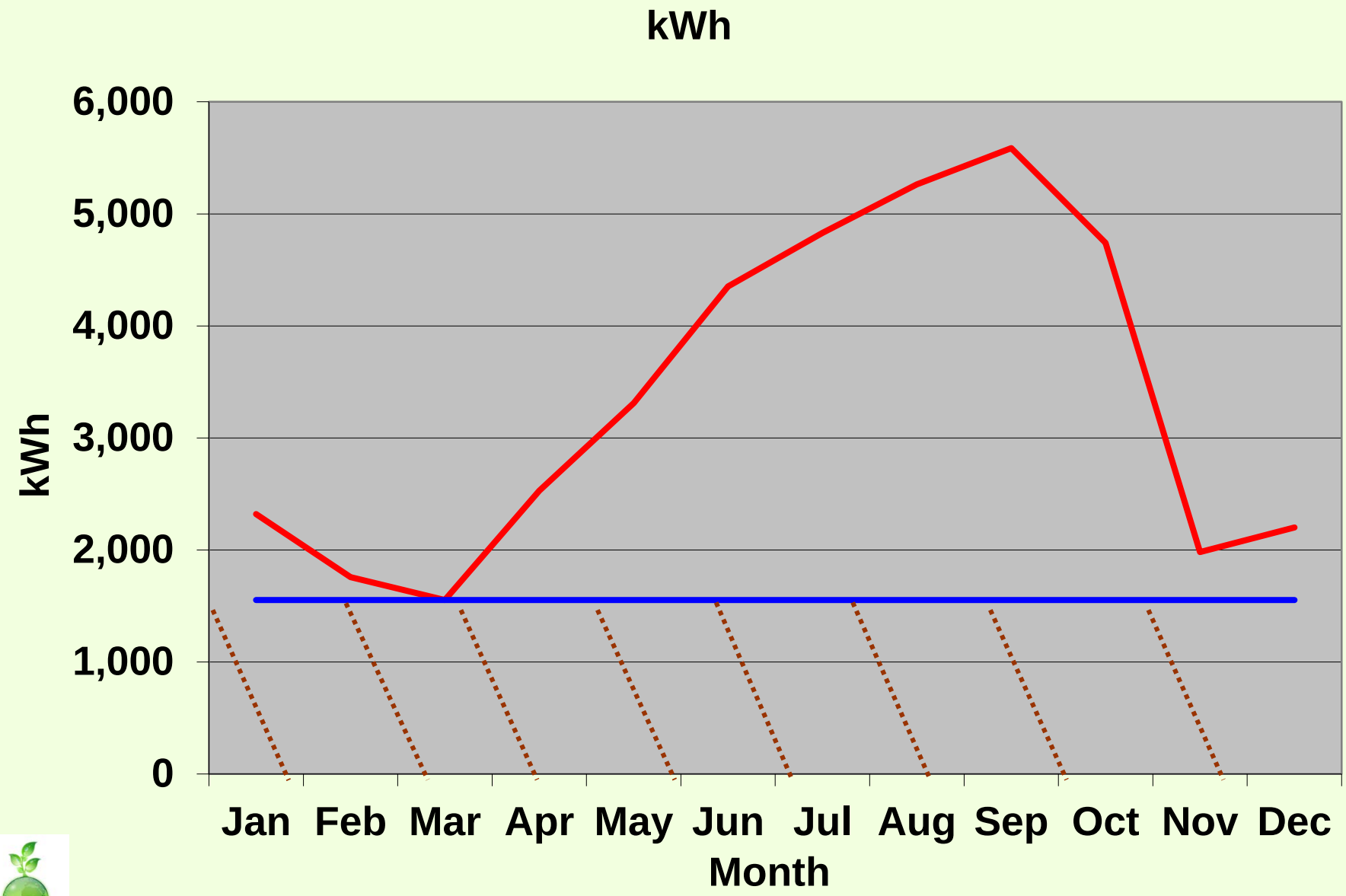
Month	kWh	$
Jan	2,319	$373.72
Feb	1,757	$278.96
Mar	1,552	$244.40
Apr	2,529	$366.31
May	3,312	$485.07
Jun	4,353	$642.97
Jul	4,830	$715.32
Aug	5,264	$781.15
Sep	5,586	$829.99
Oct	4,741	$701.82
Nov	1,981	$283.19
Dec	2,201	$316.56
TOTALS	40,425	$6,019.46
Tabulate your annual electric bills		

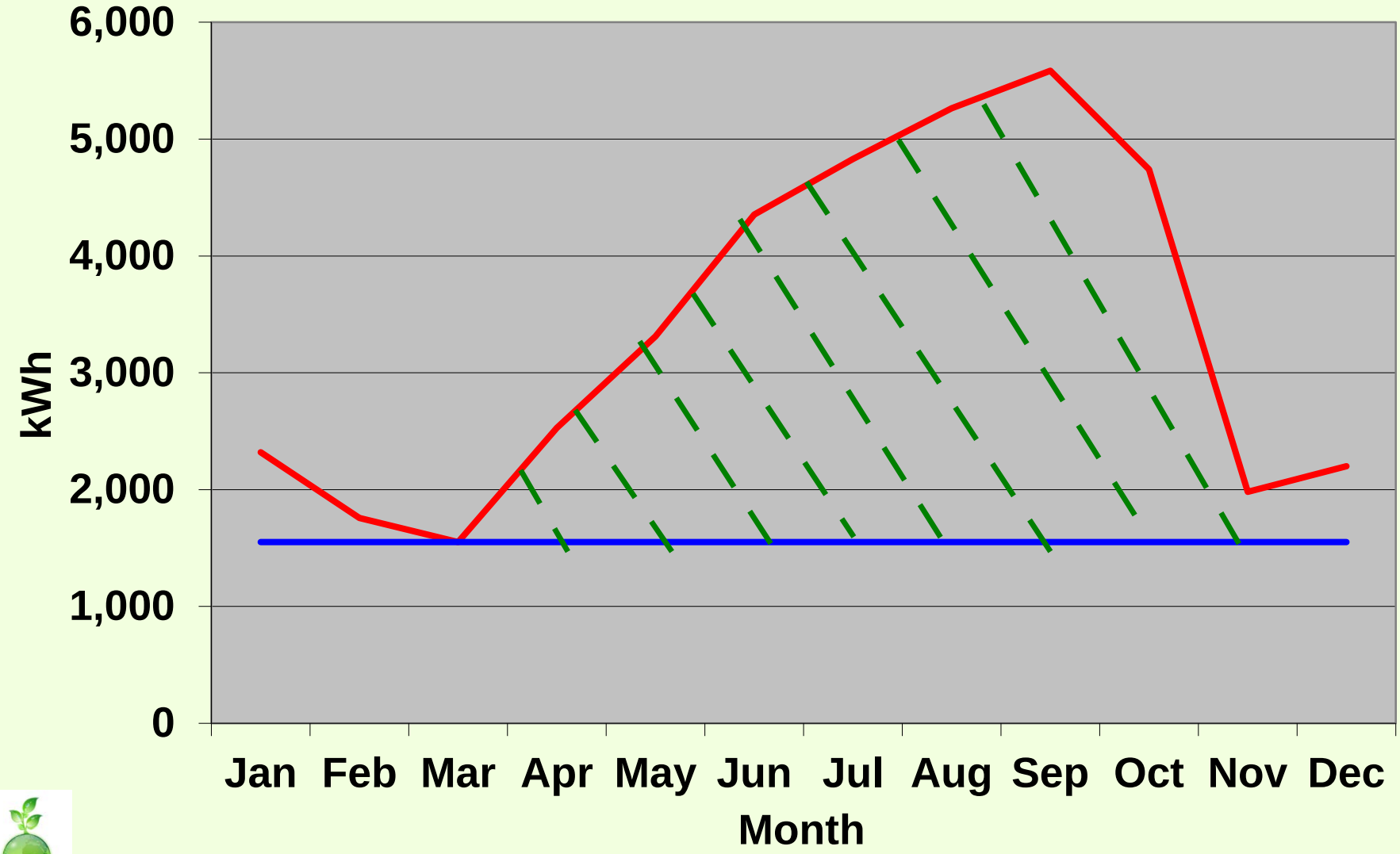




	Existing Condition
Total annual kWh used	40,425
Annual $ dollars	$6,019
EER	8
Watts used in a/c	4,500
kWh used in a/c	19,751
Annual $ of a/c	$3,183
A/C as percentage of bill	53%
Hours of a/c operation	4,389
kWh/Sq Ft/Yr	9.0
$/Sq Ft/Yr	$1.34
# CO2/Yr	54,574

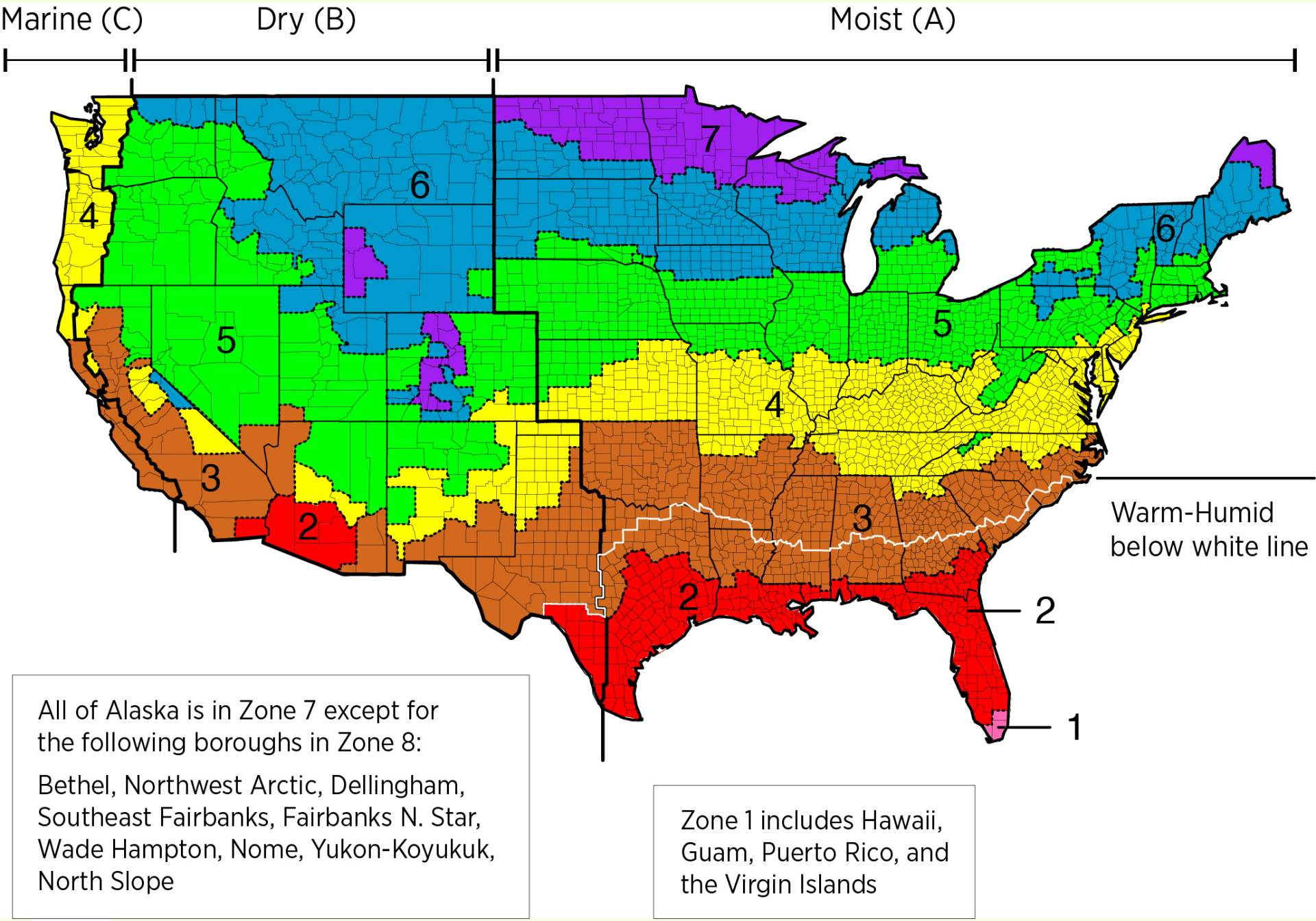


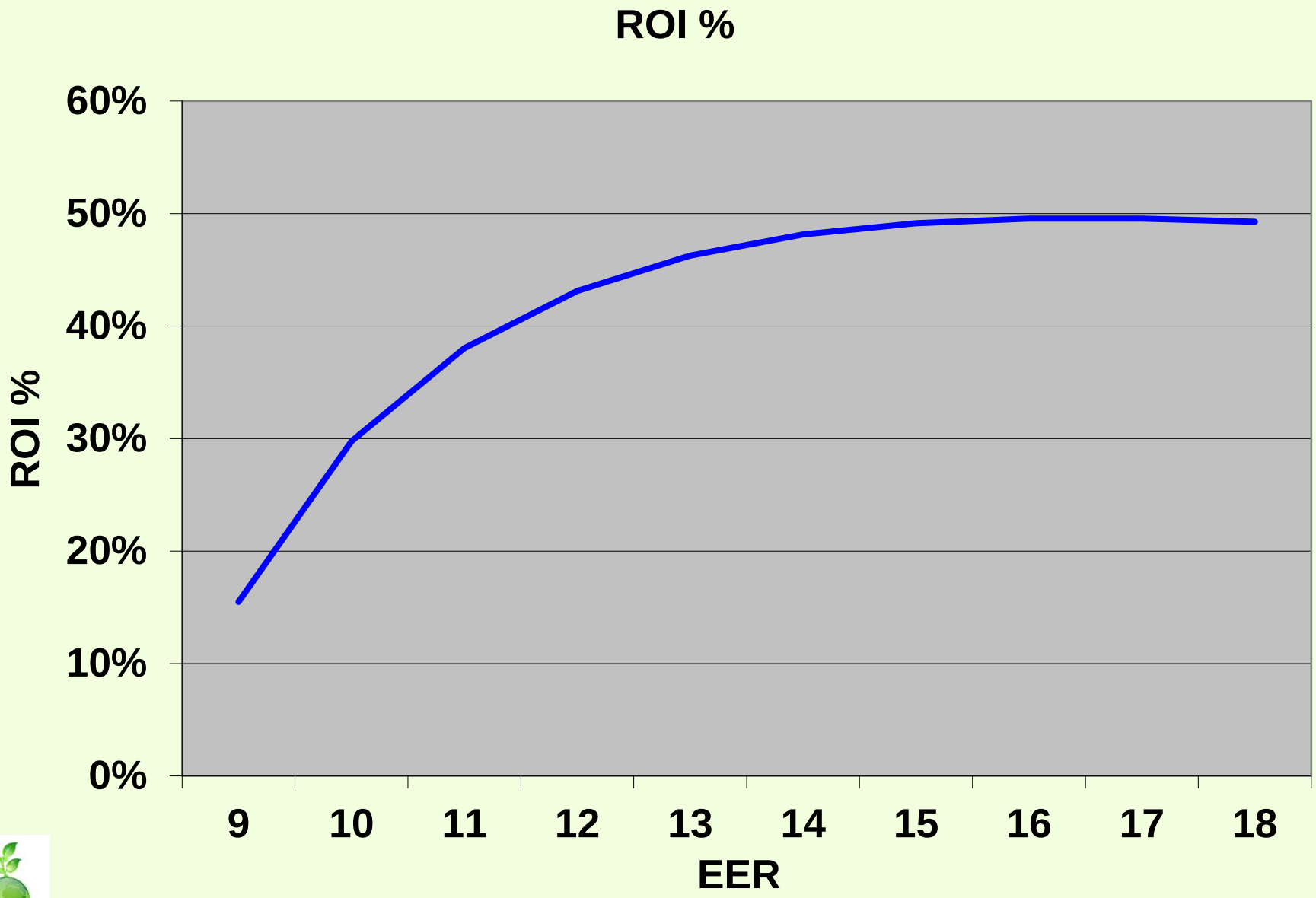


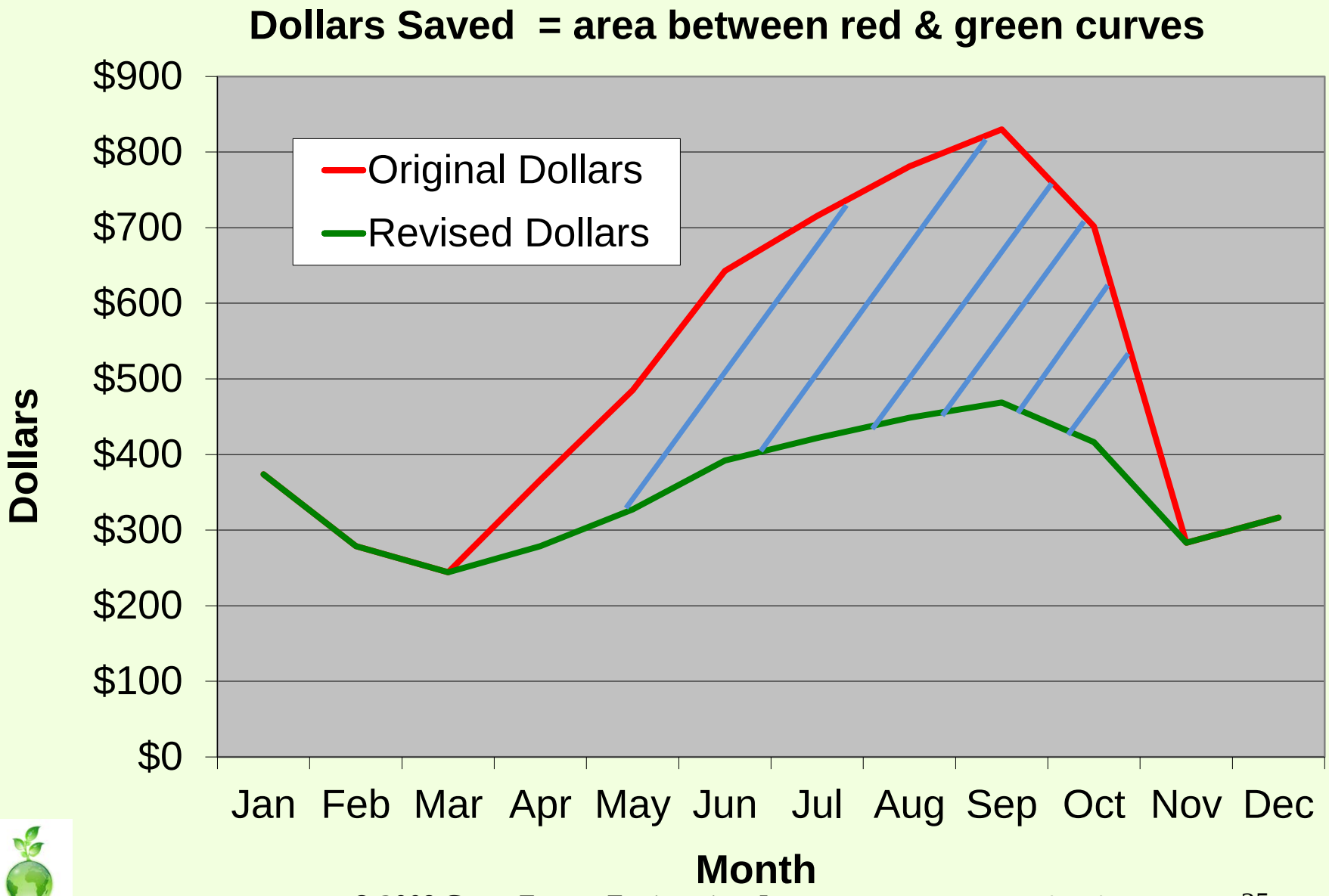


Green Ideas To Save You Green

- EER or SEER
- 6, 8, 10, 11, 12
- 13, 14, 16, 18, 20
- Rough rule of thumb
- EER = SEER * 0.875


Marine (C)
Dry (B)
Moist (A)
Warm-Humid
below white line
All of Alaska is in Zone 7 except for the following boroughs in Zone 8:
Bethel, Northwest Arctic, Dellingham, Southeast Fairbanks, Fairbanks N. Star, Wade Hampton, Nome, Yukon-Koyukuk, North Slope
Zone 1 includes Hawaii, Guam, Puerto Rico, and the Virgin Islands

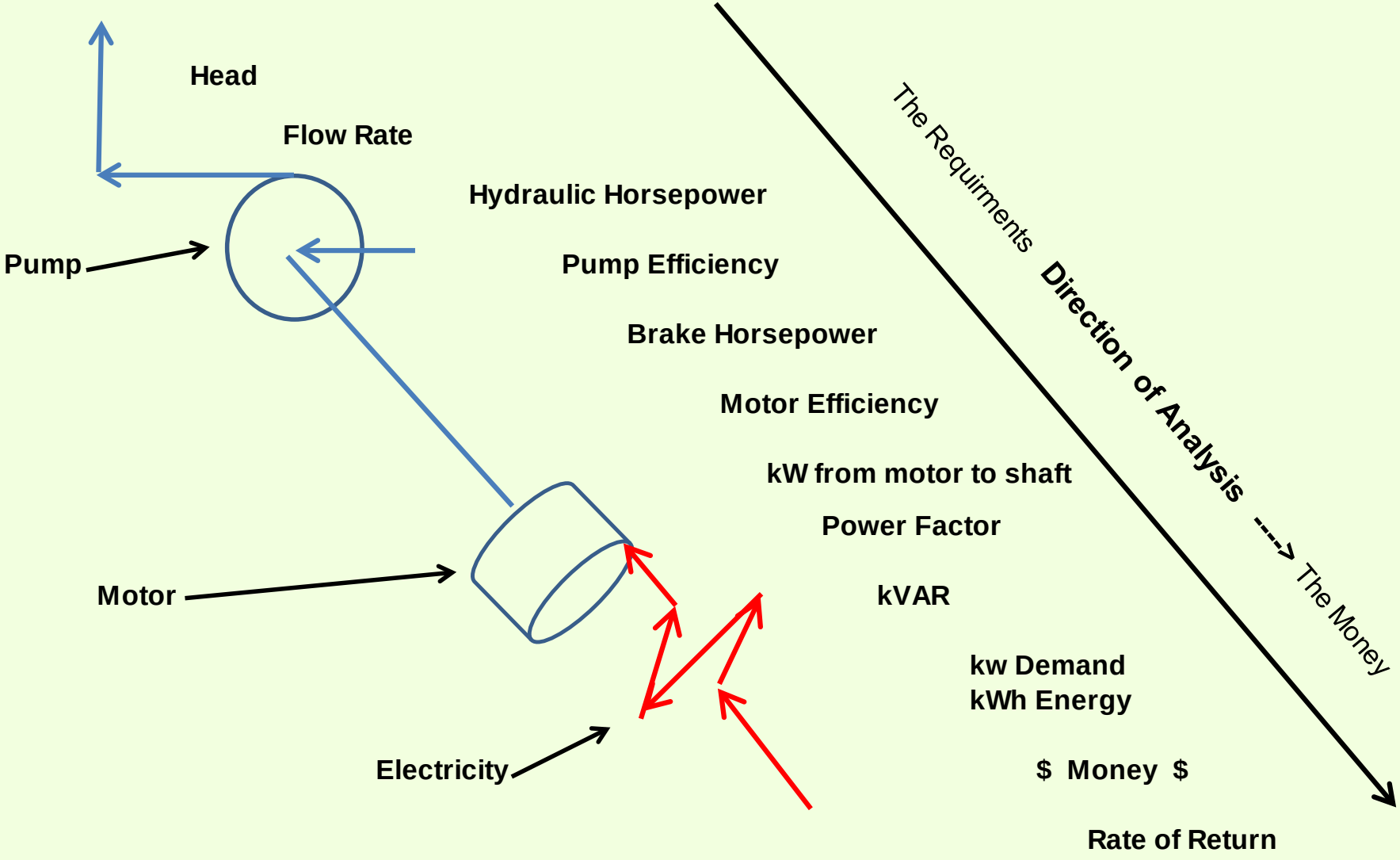




Green Ideas To Save You Green

Variable under consideration	Existing Condition	New a/c Installed	Total Savings	Percent Savings
Total annual kWh used	40,425	30,550	9,875	24%
Annual $ dollars	$6,019	$4,428	1,591	26%
EER	8	16		
Watts used in a/c	4,500	2,250	2,250	50%
kWh used in a/c	19,751	9,876	9,875	50%
Annual $ of a/c	$3,183	$1,591	1,592	50%
A/C as percentage of bill	53%	32%	21%	39%
$/SqFt/Yr	$1.34	$0.98	$0.36	27%
# CO2/Yr	54,574	41,242	13,332	24%
Return on Investment (ROI)		60%		

Figure 4 Pump System Analysis



- 1,500 gpm at 100 feet
- Hydraulic Horsepower =
- $= \frac{8{,}329 \text{ \#/min} \times 100 \text{ feet}}{33{,}000 \text{ ft lb per min}}$
- = 38 hp

- Brake horsepower =

- = $\frac{\text{Hydraulic horsepower}}{\text{Pump efficiency}}$

= $\frac{38 \text{ hp}}{75\%}$

= 50 hp

- Motor horsepower =

- = $\frac{\text{Brake horsepower}}{\text{Motor efficiency}}$

- = $\frac{50}{90\%}$

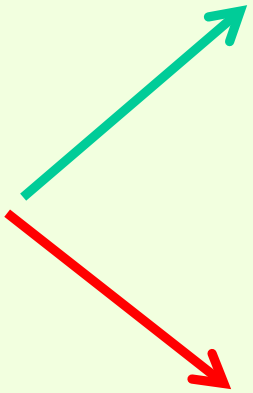
- = 56 hp

- 56 hp = 42 kW

- kVA input = $\frac{42\ kW}{90\%\ pf}$

kVA = 49 = 66 hp

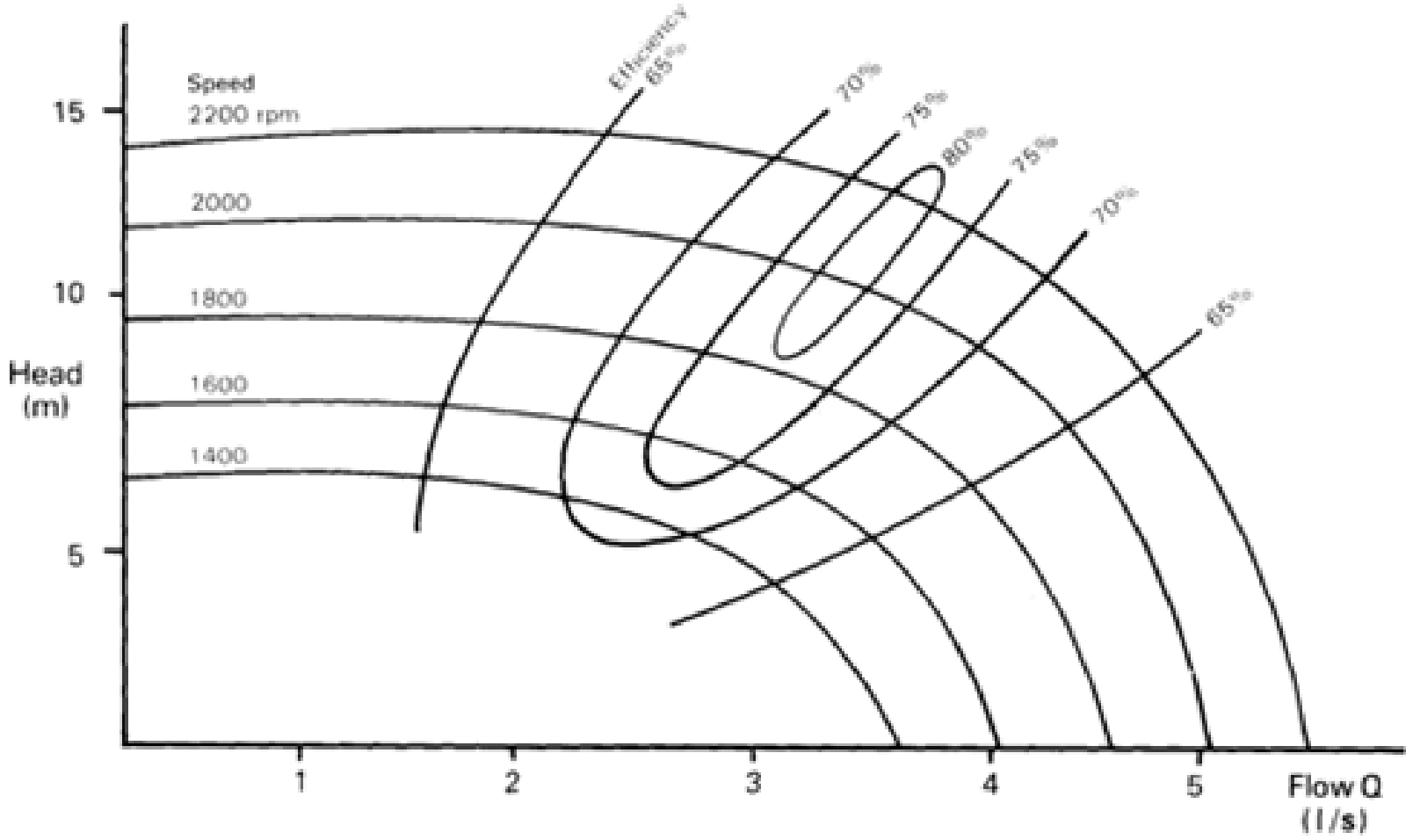
- Use 38 hp
- Purchase 66 hp
- Lose 28 hp



- 43% lost due to inefficiencies

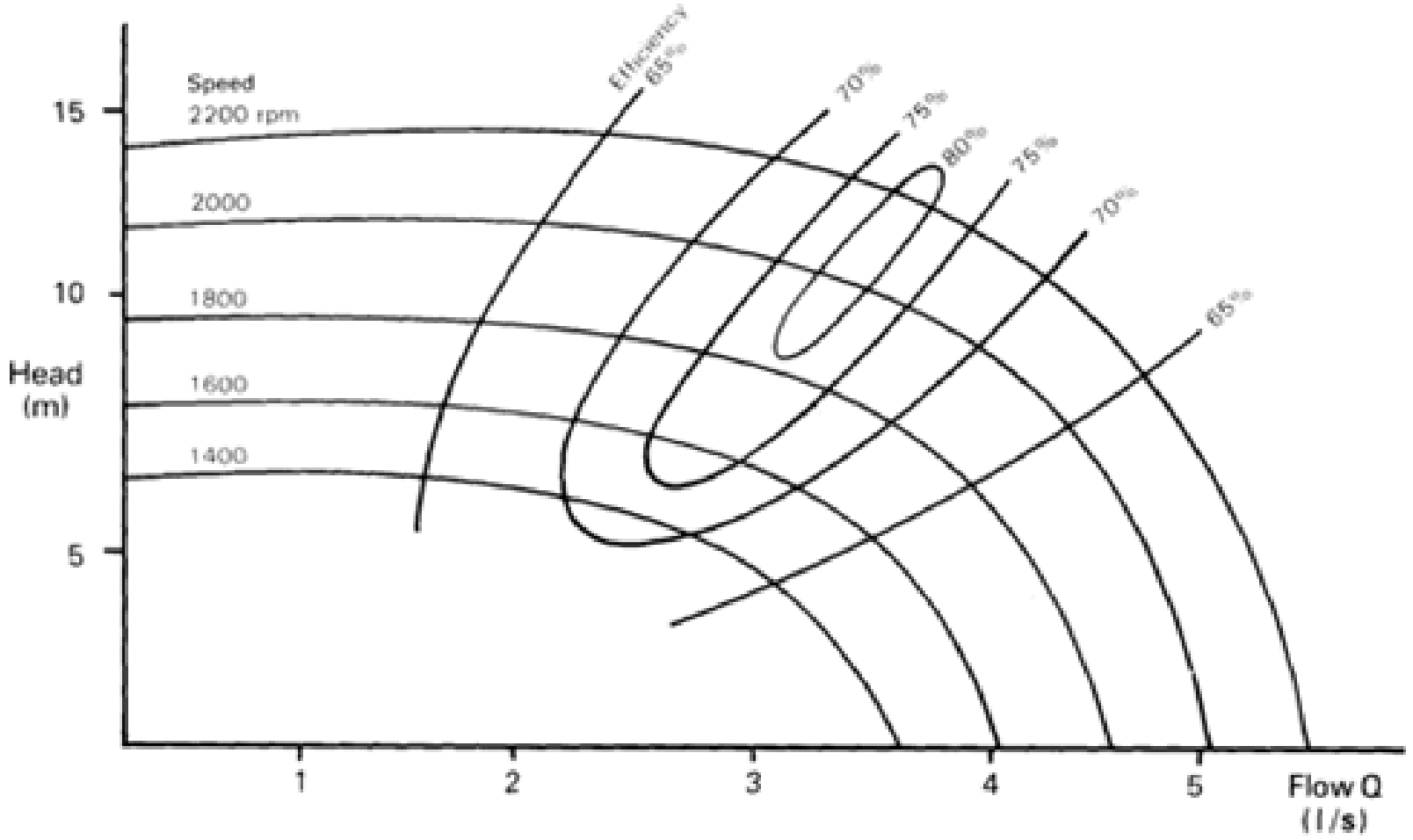
- Replace 100 hp 90% efficiency motor with a 95% efficiency motor

Yields a 38% return



- Replace 75% efficiency pump
  with a 80% efficiency pump

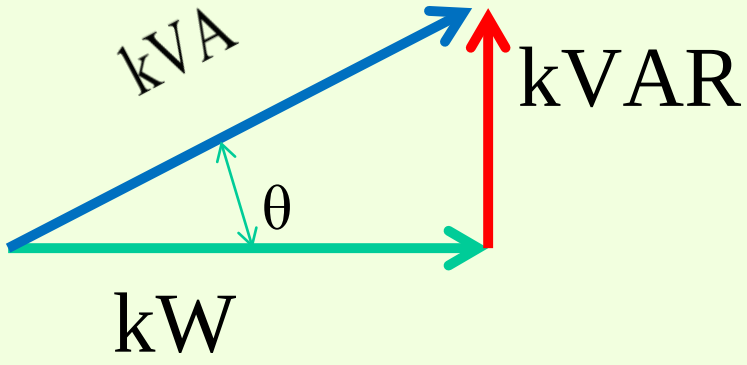
Yields a 41% return



- Replace VFD pump operating at 70% point with a pump sized for 80% point

Yields a 117% return

- Power Factor Correction

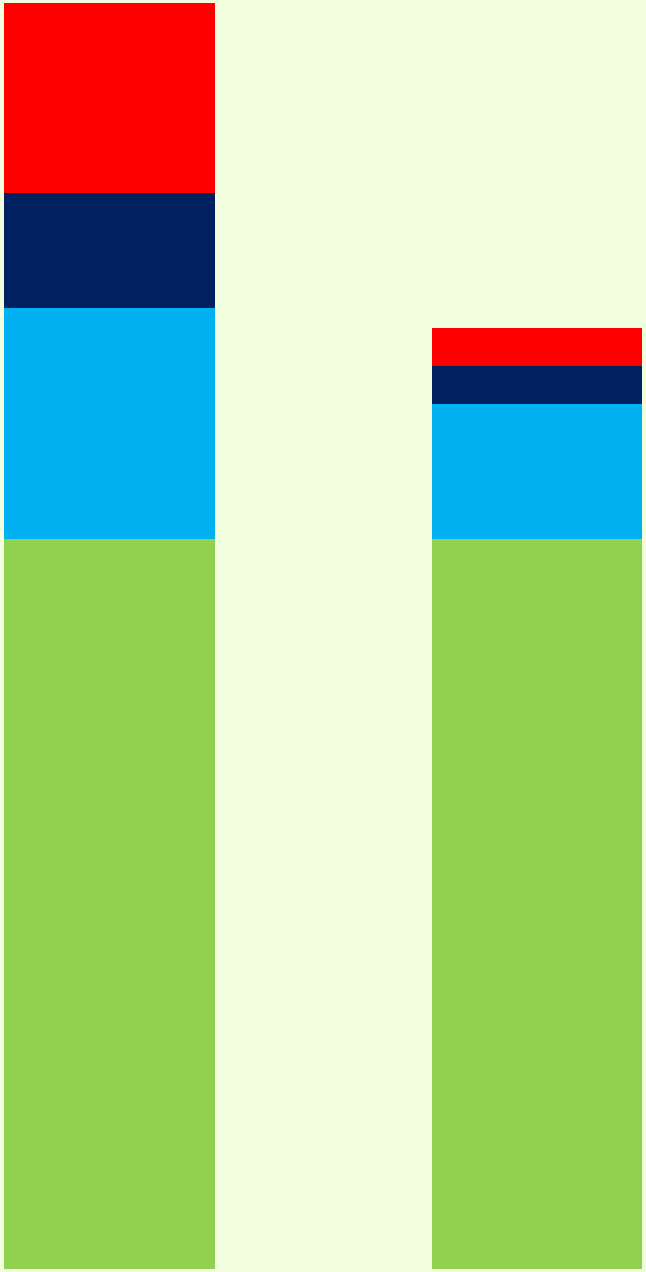


- kW is the actual working power
- kVA is what is being purchased
- kVAR is the reactive power
- Power Factor is kW/kVA = cosine θ

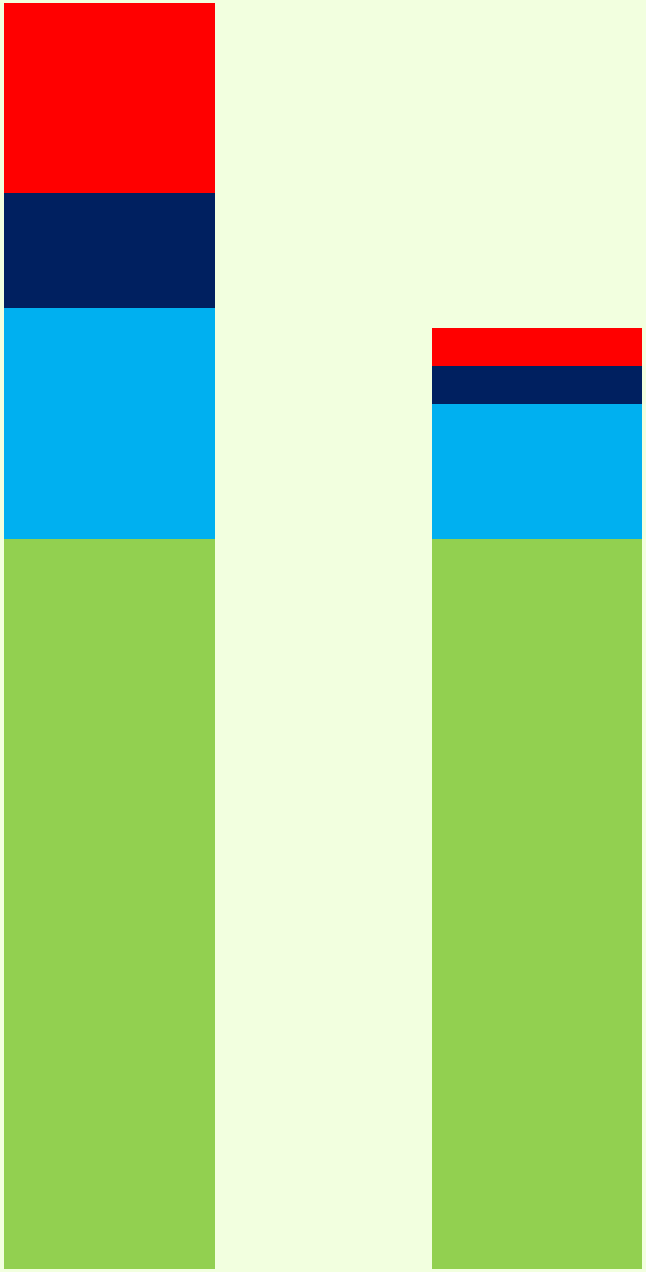
- Improve a 90% power factor
  to a 91% power factor

  Yields a 247% return

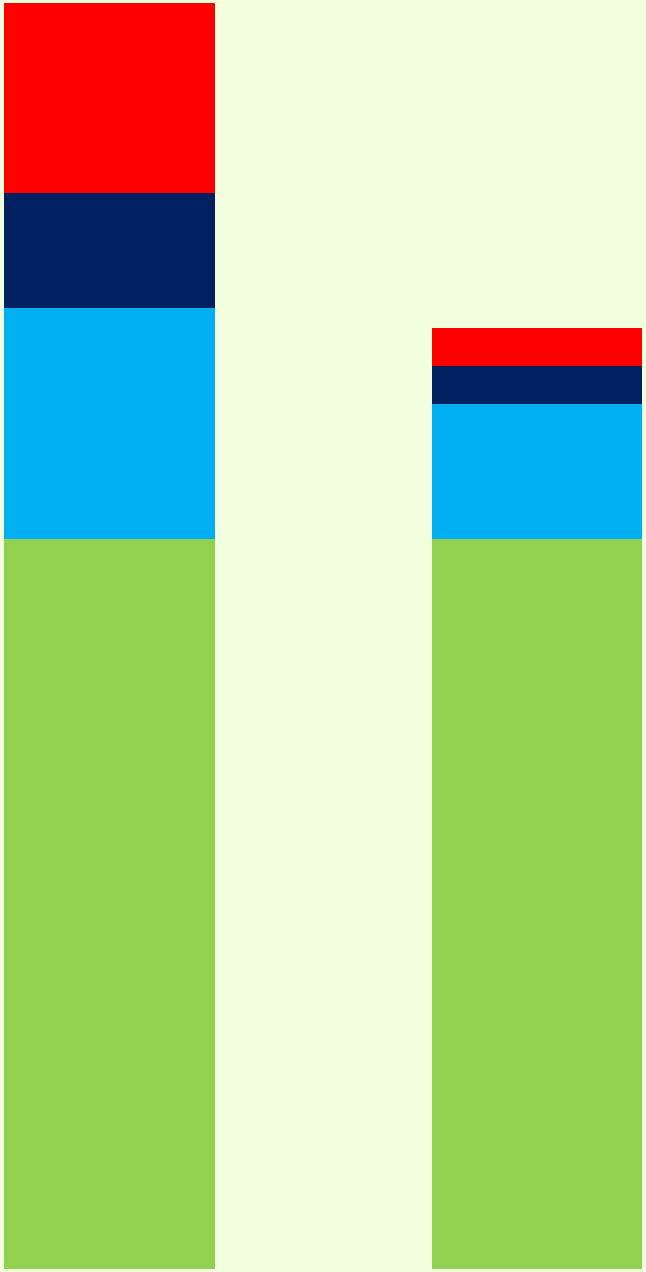
- Power Factor
- Performance Contracting
- Wall Street
- Investors



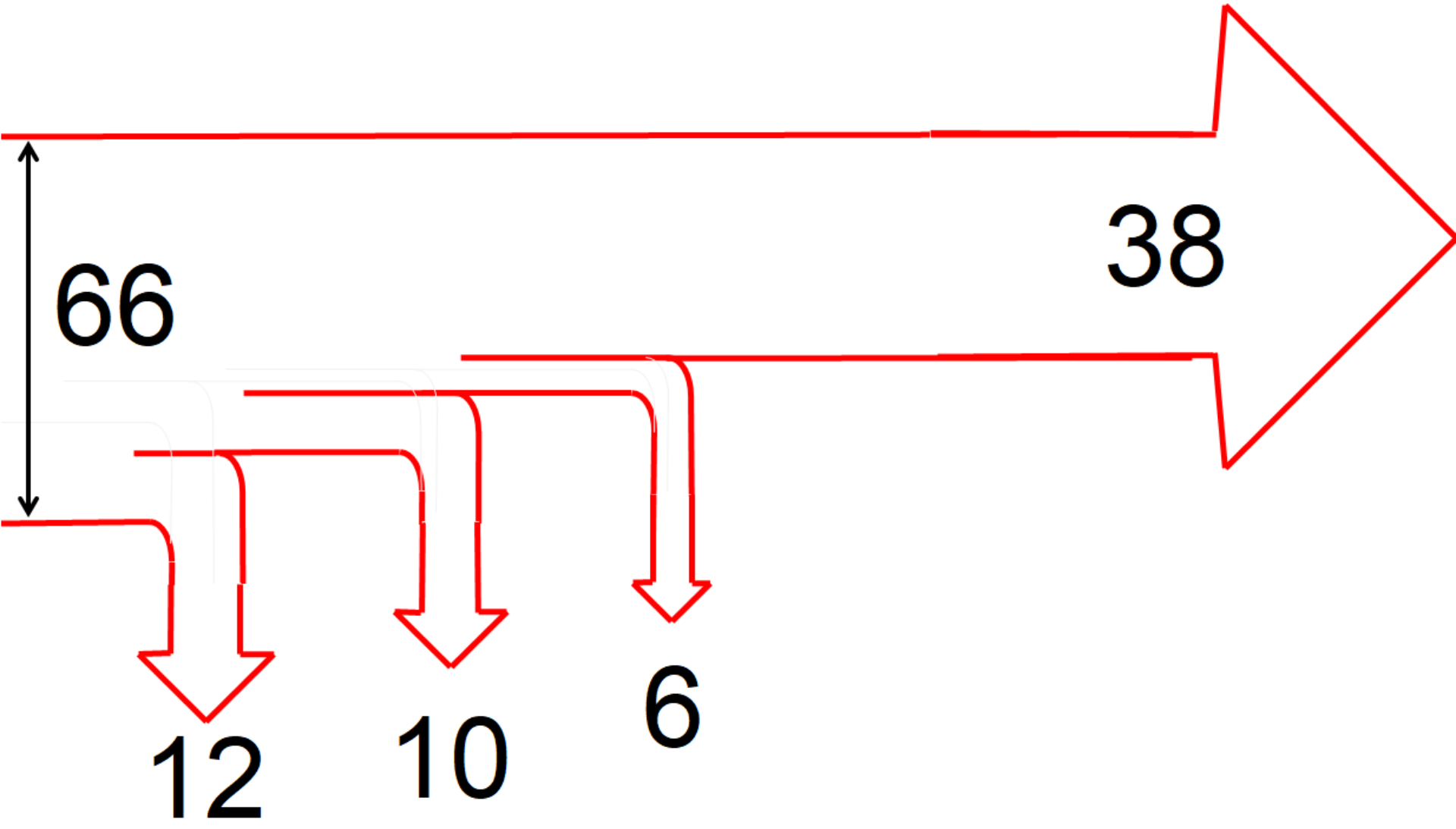
Existing		New
10	Power Factor Correction	2
6	Motor Eff	2
12	Pump Eff	7
38	Hydraulic HP	38

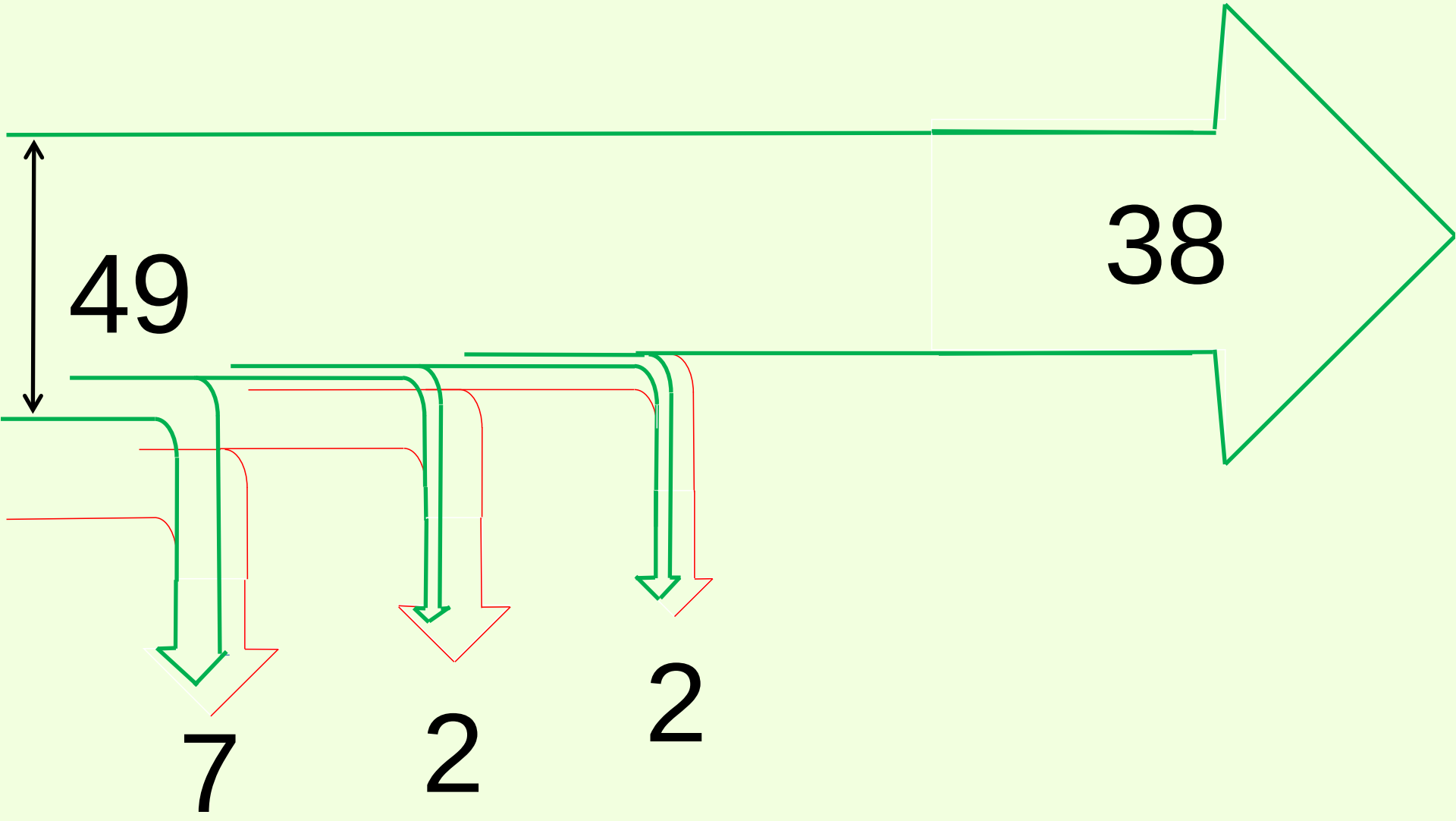


Existing		New
66	Purchased	49

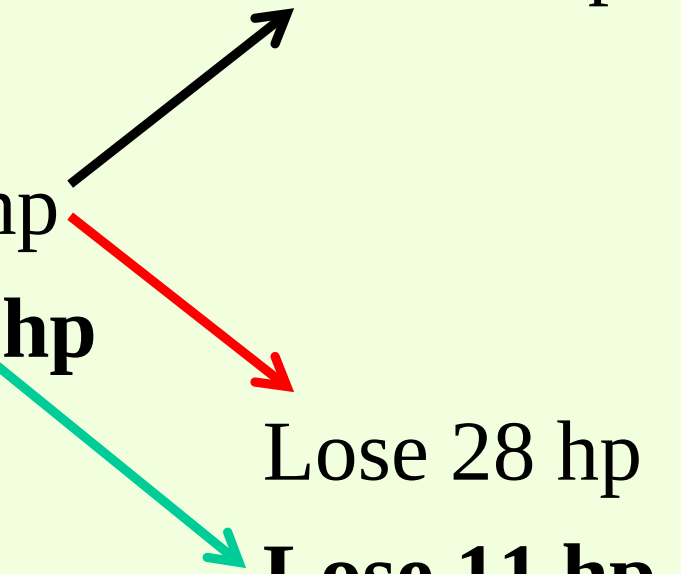


Existing		New
66	Purchased	49
57%	Overall Efficiency	78%





- Use 38 hp
- Purchase 66 hp
- **Purchase 49 hp**
- Lose 28 hp
- **Lose 11 hp**



- 43% lost due to inefficiencies
- **22 % lost due to inefficiencies**

- Existing
- $35,428

- Existing New
- $35,428 $26,497

- Existing New Savings
- $35,428 - $26,497 = $8,391

- Existing New Savings
- $35,428 - $26,497 = $8,391

Five Years $44,655

- Existing New Savings
- $35,428 - $26,497 = $8,391

  Five Years = $44,655
- 100 Motors = $4,465,500

- Questions