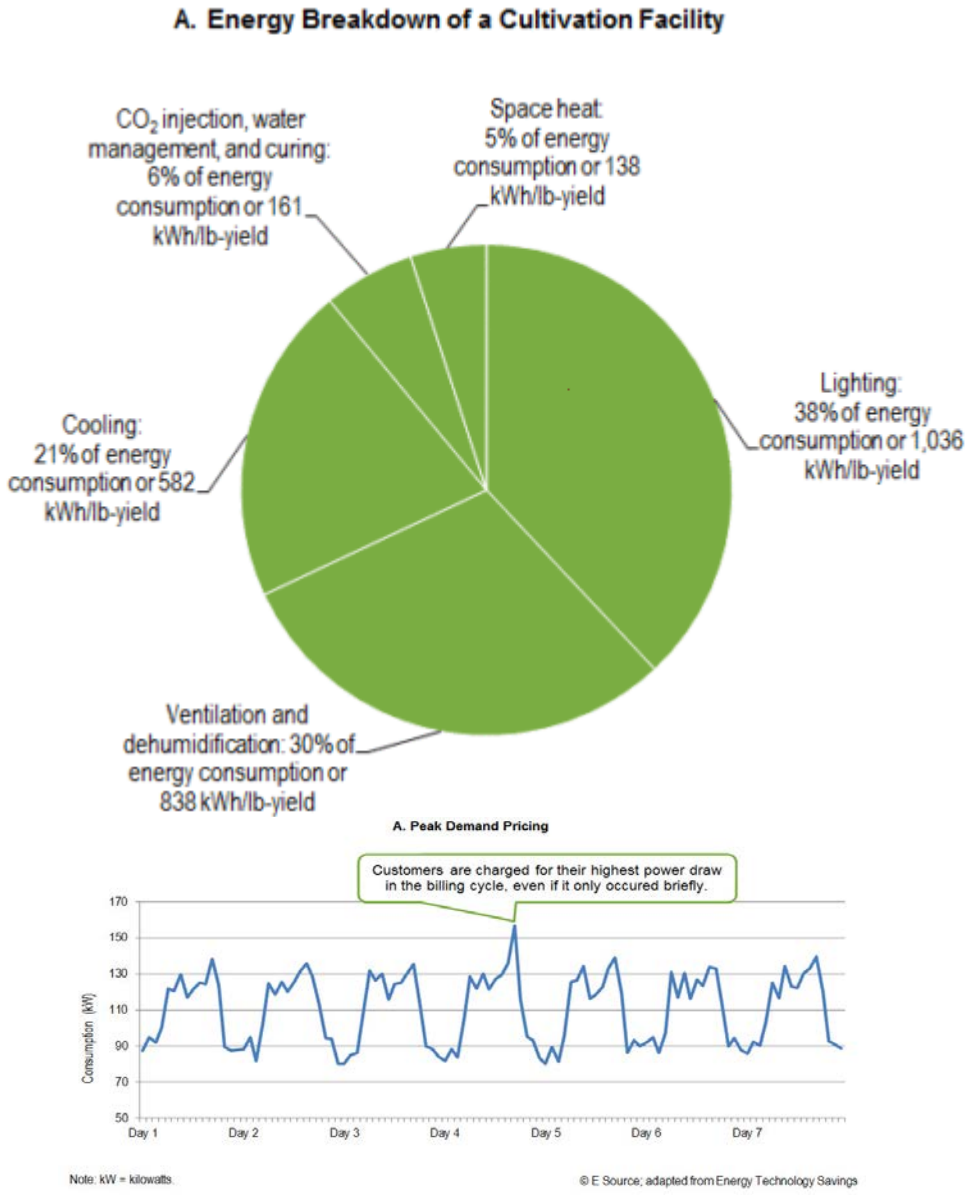
NEEDS OF THE CANNABIS INDUSTRY

FACTS:

- Growing cannabis for medical use takes large, controlled facilities.
- Major drug manufacturers such as Pfizer are heavily investing in research to standardize production and consumption methods to stabilize dosing. This is where the major money is being spent.
- Outside air, untreated water, uncontrolled soil, are not permitted in medical marijuana production. Unknown factors and contaminants will cause instability and variables in the dosing that could result in lawsuits. Therefore, a very tight control must be maintained during the entire grow cycle and subsequent processing.

NEEDS OF THE CANNABIS INDUSTRY

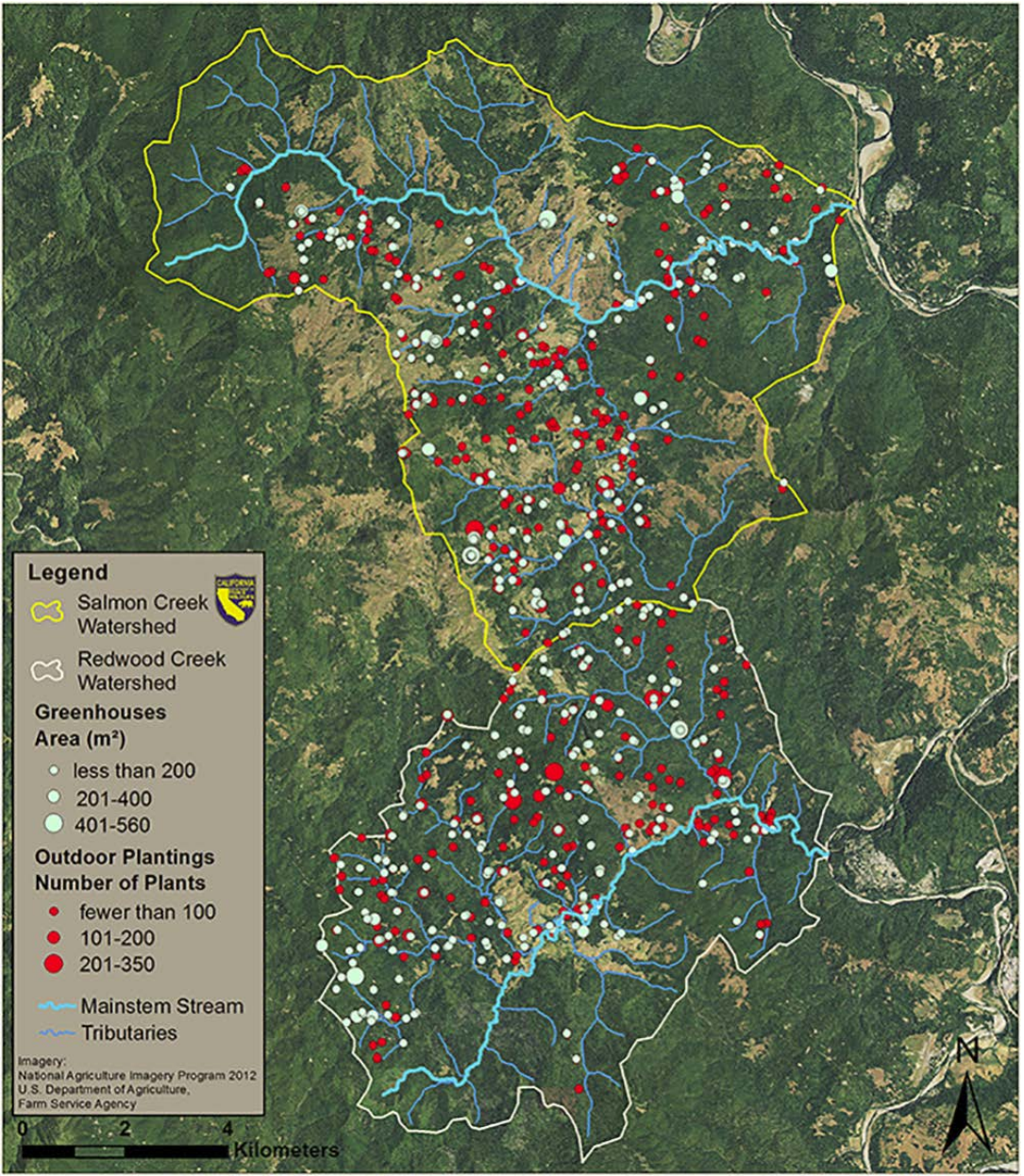


FACTS:

- While water is a big concern for the grow facilities, the primary concern is electrical power.
- Special grow lights must be used and light intensity must be similar to actual sunlight.
- Electricity demand is about $0.67 per square foot per month for medical marijuana grow facilities. That means a $67,000 USD electric bill per month for a 100,000 square foot grow area.
  - 100,000 square feet is considered “small” grow facility.

- The high load and of time-of-use billing in most cannabis markets leads to a very favorable situation for CHP utilization.

POWER FOR THE CANNABIS INDUSTRY

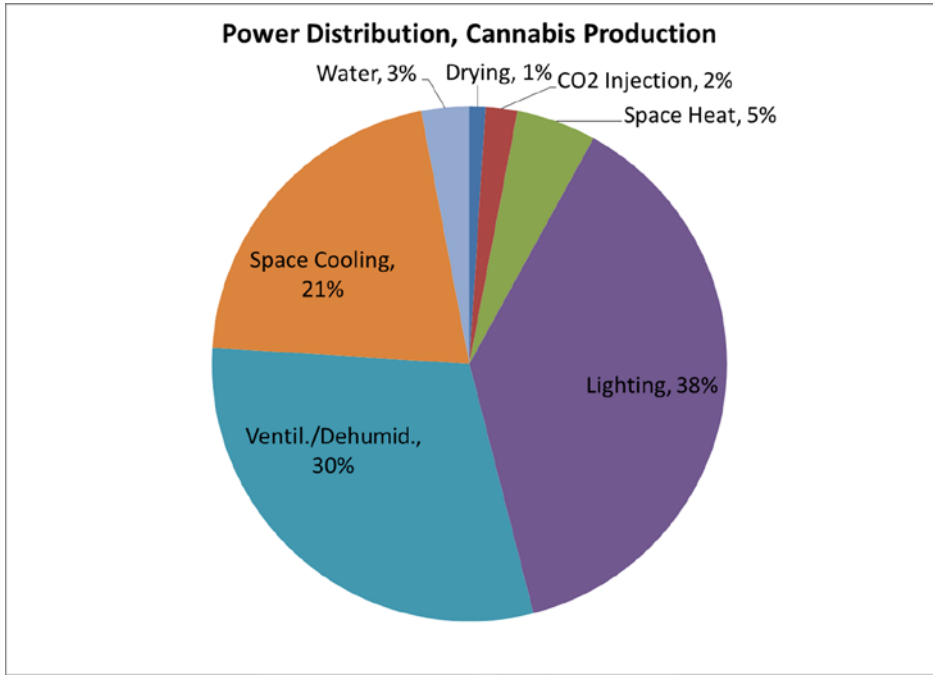


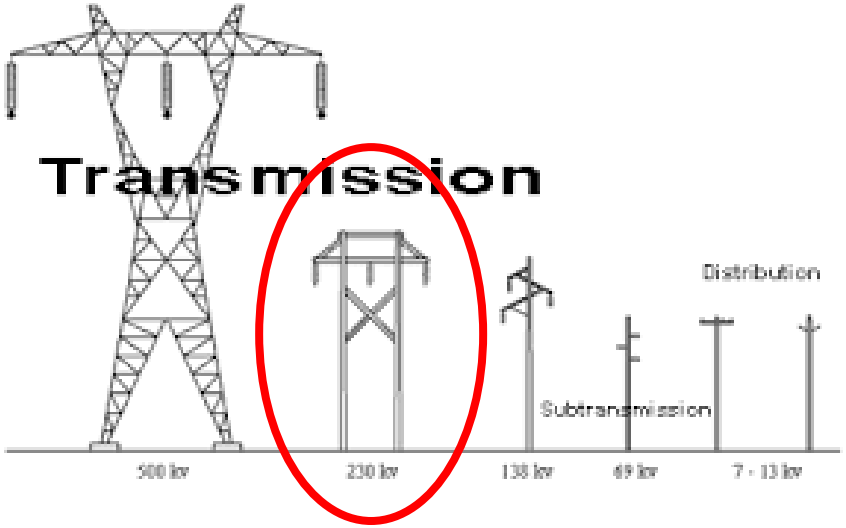
FACTS:

- The sudden increase in numbers of grow facilities is not something the current electrical grids can support.
- A single facility can require several MW of power.
- Many facilities are being located in very remote areas due to the cheap land prices as well as a lack of neighbors to complain.
- This scenario lends itself very well to use of CHP and other off-grid solutions.

- In the photo, white dots are greenhouse grow facilities. Red dots are outdoor grow facilities. There is no city within 10 km. No utilities, poor roads. Off grid is the best solution for them.

POWER FOR THE CANNABIS INDUSTRY



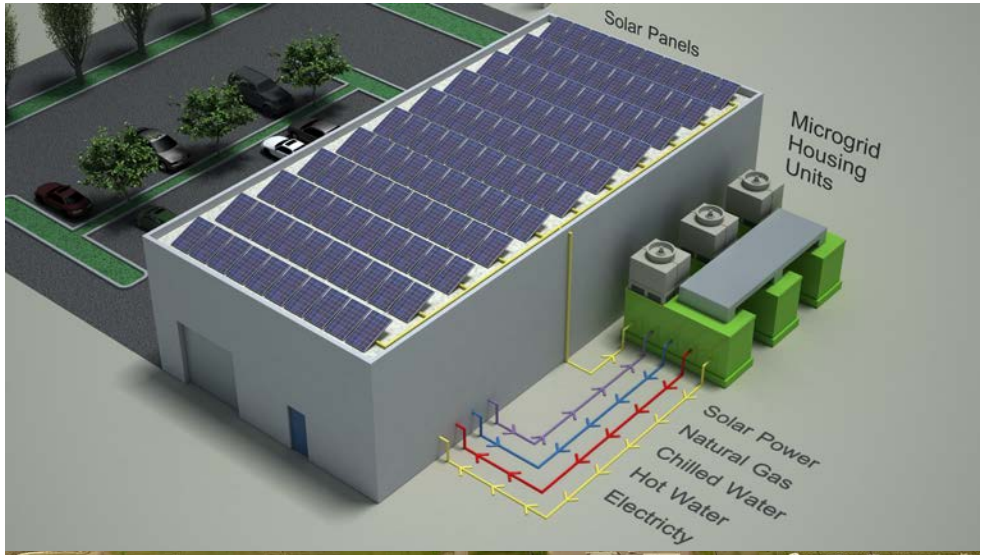


FACTS:

Consider a "small" 100,000 square foot medical marijuana grow facility in this example.

- At 0.67 kw/sqft, the grow area alone requires 67 kW of power availability. Since the grow area is only about 1/3 of the total power requirement for the grow facility, the facility easily could require over 200 kW of power.
- **Cost to bring grid power to this facility is roughly $1.5 million USD per mile of transmission line**, assuming the grid capacity exists for use by the facility. That does not include the cost of easements for rights to set transmission line towers on private property to get to the facility.

CHP FOR THE CANNABIS INDUSTRY



FACTS:

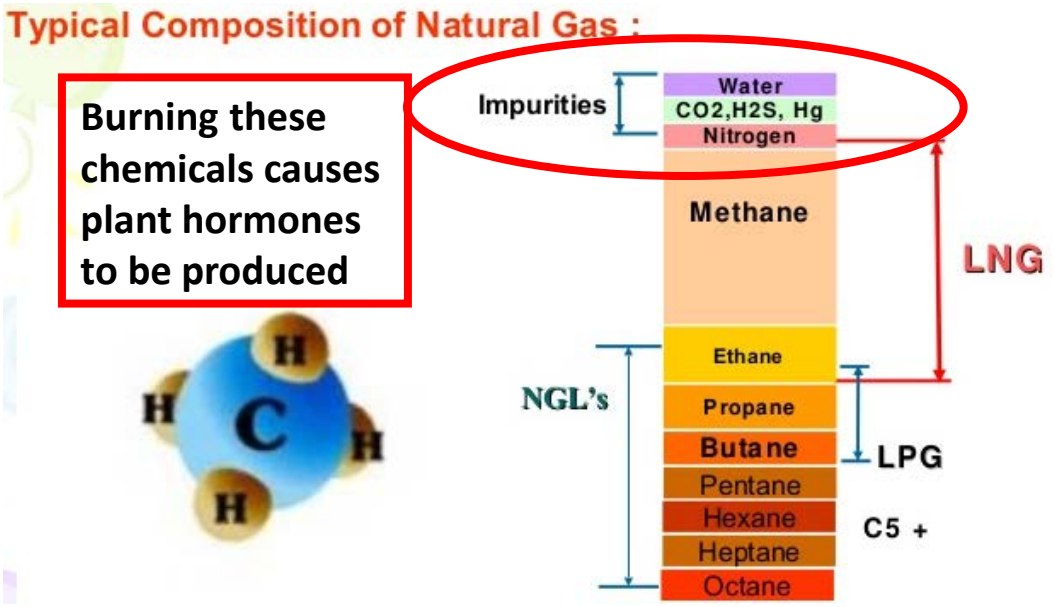
- Due to the enormous cost to bring grid power to grow sites, CHP is being vigorously embraced by the cannabis industry.
- The CHP gen-sets generate waste heat that can be used to fire a Yazaki WFC absorption chiller to provide part of their cooling and chilled water needs.
- Any need for cooling or chilled water can be supplemented by using natural gas direct-fired absorption chiller/heaters.

CCHP FOR THE CANNABIS INDUSTRY

FACTS:

- Medical marijuana grow facilities are perfect sites for CCHP.
- They have a constant need for dehumidification and tight temperature control. The WFC-M100 unit fits the application perfectly.
- The condensate from dehumidification can be reused as irrigation water.
- In recreational grow sites, humidity and temperature control can be achieved through fresh air ventilation. However, medical marijuana cannot stand for contaminants that come from this air exchange. Therefore, humidity and temperature control must be achieved through boilers, chillers, and other dehumidification systems.

CO2 INJECTION



FACTS:

- All cannabis grow facilities benefit greatly from CO2 injection. The source of this CO2 can be as simple as tanks supplied by a gas supplier or as complicated as scrubbing the exhaust gas of a gen set.
- Scrubbing the exhaust gas of engines is tricky business. The byproducts of chemicals other than methane in natural gas act as hormones to the cannabis plants causing them to grow improperly and can destroy an entire crop if introduced into the grow facility.

OTHER OPPORTUNITIES

Does it HAVE to be Cannabis? NO!

ANY greenhouse grown product has many of the same needs. Cannabis is just one of the many crops that can benefit from this same process.

Table 2. Greenhouse Vegetable Production, 2015

Location	Tomatoes	Cucumbers		Lettuce	Peppers
	Kg	Kg	Dozen	Heads	Kg
Ontario	178,968,106	144,436,581	42,457,087	---	92,153,552
Quebec	---	1,648,970	484,714	26,250,668	782,752
B.C.	55,690,027	23,706,063	6,968,390	---	40,392,648
Alberta	10,272,452	9,351,061	2,748,741	523,332	1,242,695
Canada	266,844,897	180,194,102.	52,879,693	36,505,919	134,638,065
Source: Statistics Canada CANSIM 001-0006					

Table 4. Greenhouse vegetable production operating revenues and expenses

	Cucumber production $ per square metre	Tomato production $ per square metre	Pepper production $ per square metre
Average gross revenues	115.33	116.06	111.43
Average operating costs	109.06	101.01	114.67
Capital costs	9.17	9.02	10.19
Cash costs [1]	109.03	100.81	113.86
Average total production costs	118.22	110.03	124.86

[1]Cash costs is equal to total operating cost less unpaid labour.

Even wineries are found “under glass” these days

Table 5. Crop scheduling for commercial greenhouse vegetables

	No. of cycles/year	Months typically produced			Seed to harvest	Crop Density	Yield
Crop		*Seeded*	*Planted*	*First Harvest*	*(days)*	*(plants/sq. m)*	*Kg/m²*
Cucumbers, long English	2	Nov	January	February	45 (summer) 60 (winter)	1.25-1.50	110-130[2]
		June	July	August			
	3	Nov	January	February			
		April	May	June			
		July	August	September			
Cucumbers, mini	Similar to above but potential for 4 crop cycles in a year						70-90
Tomatoes	1	November	January	February	110	2.5-3.2[3]	50-70
Peppers	1	October	December	March	130	3.3-3.5[4]	22-26
Eggplant	1	November	January	March	120	1.67-1.75	40-45
Lettuce	12-50[5]	Seeded and harvested weekly			42-70	38-97	5.7