A simplified explanation on how the AWE produces water

AWE Technology Provides
New Sources of Water

- **AWE Technology extracts water vapor from the ambient air to produce New Sources of Water.**
- **AWE devices use condensation to extract water vapor and collect liquid water.**
- **AWE devices use air compression to extract water vapor and collect liquid water.**
- **AWE devices filter and treat the water collected to produce potable water. Untreated water can be used for irrigation or industrial processing.**
- **AWE devices store the water after processing for deliver to a water company pipeline or a nearby user.**

The AWE – Water Production Analysis

- The data used in calculating AWE Device performance and results and climate conditions is based on the actual wind data from N.O.A.A. for the Class 1, 3 & 6 AWE study areas.

- The data includes dates, time of day, wind speeds, direction, pressures, temperatures and relative humidity as the conditions change on an hourly and minute-by-minute basis.

- The data downloaded is for multiple years and specific weather station locations that allow for analysis of seasonal, year to year and locality variations.

- The three study areas used are in Southern California and where compared use data from the same year.

The AWE – Water production

1. What is the range of water that can be pulled from the air? Are there differences based on humidity? Location? Time of year?

AWE Devices process billions of cubic feet of air in the compression operation. Water vapor is extracted in two processes. The first operation is condensation prior to compression to dewater the air. The second is the compression process. The greater the volume of air the greater the amount of available water vapor can be extracted.

The methods used in the component modules of the AWE Devices to extract water from the air show that the processes are based on physical properties of the air.

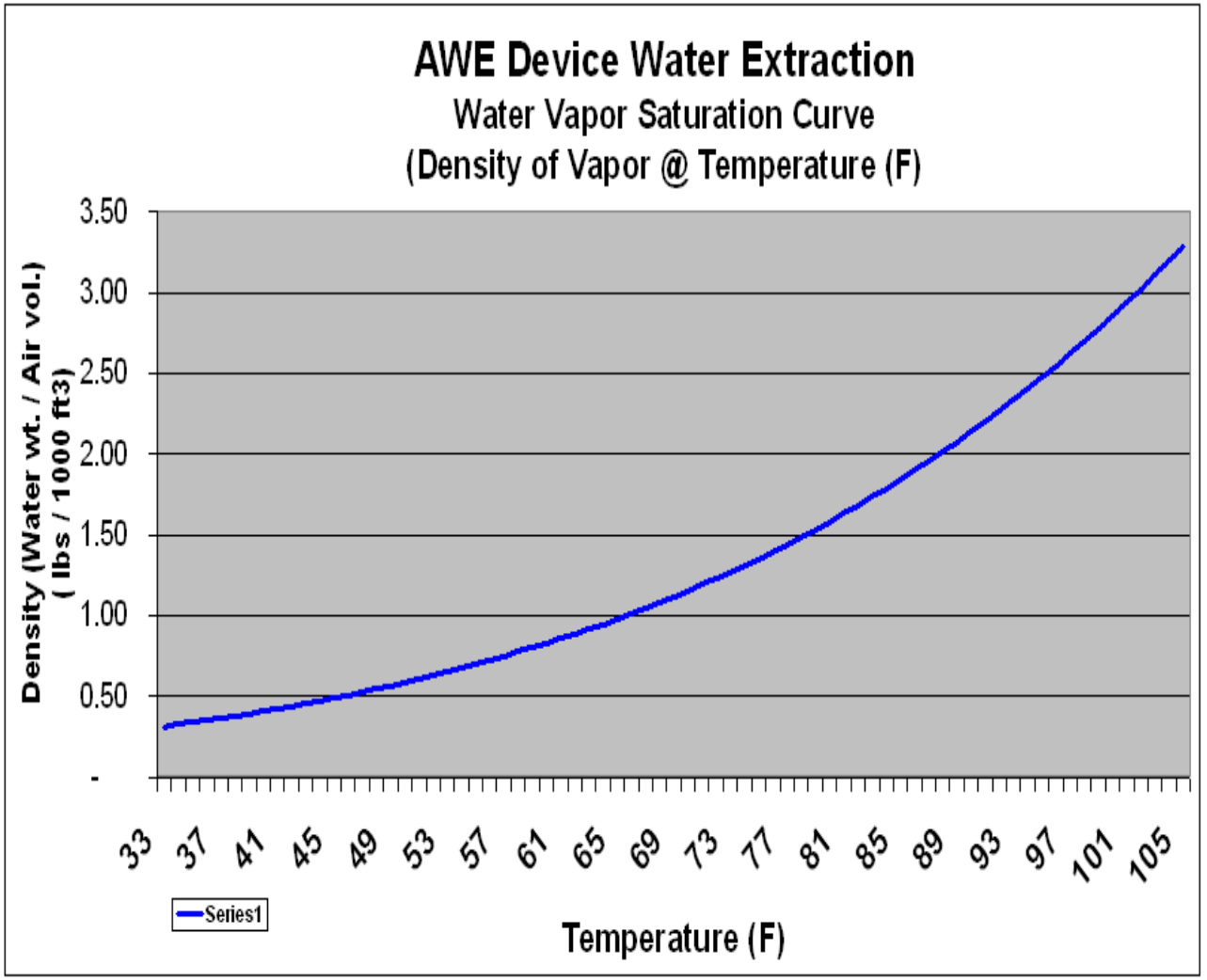
To better understand the ability of an AWE Device to extract water from the ambient air we must first better understand the capacity of air to hold water vapor and the relationships of that to Relative Humidity and Air Temperature.

The AWE – Water production
Capacity of Air to Hold Water Vapor

The Water Vapor Saturation Curve to the right shows the Density weight (lbs) of Water (vapor) in 1,000 cubic feet of air. It is not a straight line relationship due to pressure and other factors.

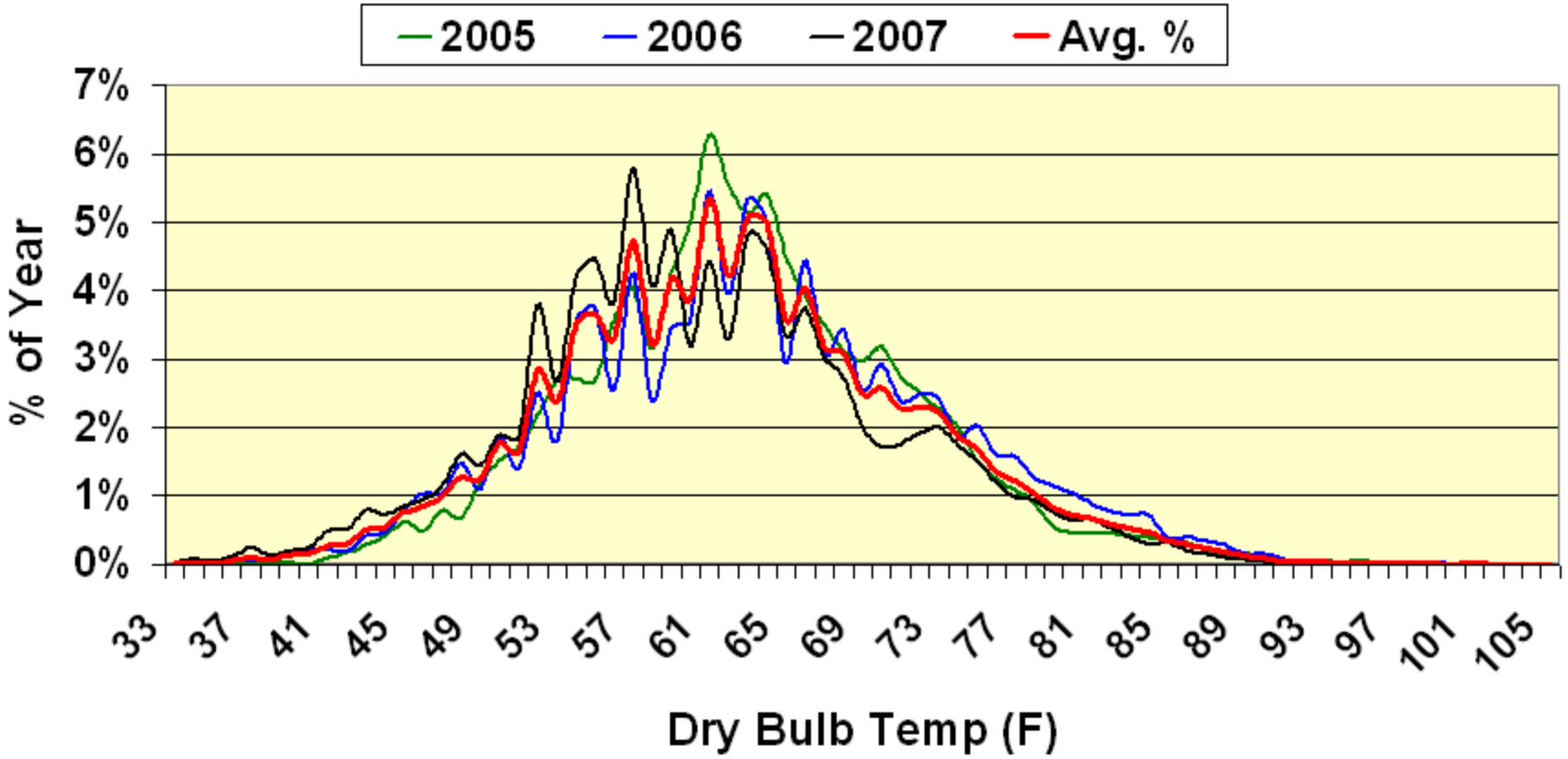
The capacity of air to hold water vapor increases with higher temperature.

It is fair to say that the Saturation level is equivalent to 100% Relative Humidity at the same pressure.



AWE Water Extraction - Class 1 Study Area
Annual Temperature - Saturation Variations

Predicting the amount of available water vapor is difficult due the number of variables. Dry Bulb Temp (F) is the gage of Saturation. This can be averaged for the same location using historical data.



The AWE – Water production
Water Vapor Saturation & Relative Humidity

2. **Is there a percentage rate of humidity that equals an amount of water that can be extracted?**

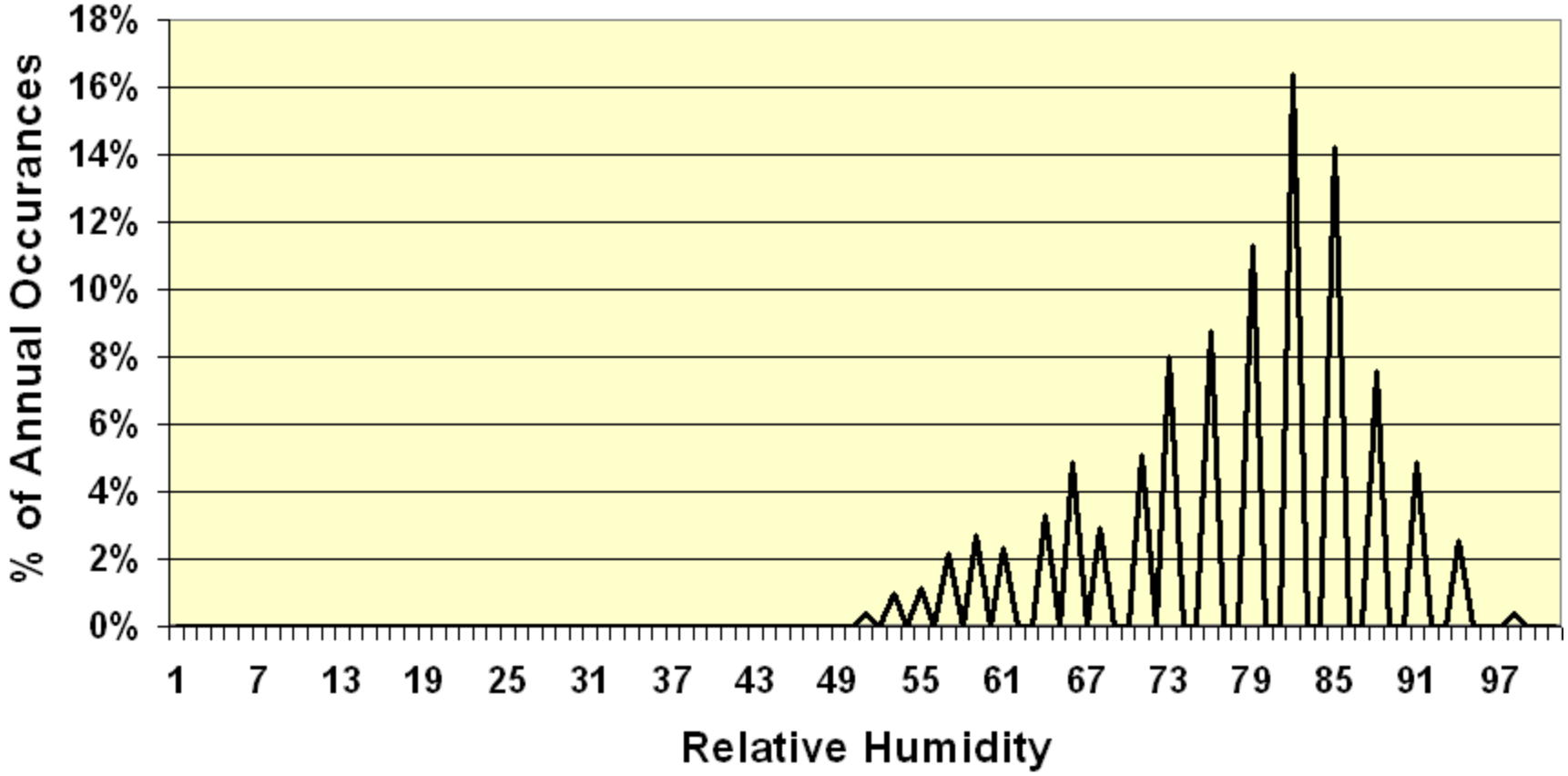
Water Vapor Saturation levels can be looked at as the amount of water under conditions of temperature and pressure equivalent to that of 100% Relative Humidity. The Relative Humidity we hear on the local weather reports is in fact the percentage of the calculated Water Vapor Saturation level of the air under current conditions.

Like the glass above to the right. When its volume is full (saturated) it can hold a certain amount of water. In terms of Relative Humidity the same glass is 70% full or has a Relative Humidity of 70.

Similar to the glass being filled, as Relative Humidity increases it means that more water vapor is filling the same volume of air at the current temperature and pressure. The water vapor in the volume of air is getting closer to it saturation level.

AWE Water Extraction - Class 1 Study Area
Variations of Relative Humidity
@ 61º F Dry Bulb Temp

Relative Humidity varies even at the same Saturation Dry Bulb Temperature (F) at the same location during the year.

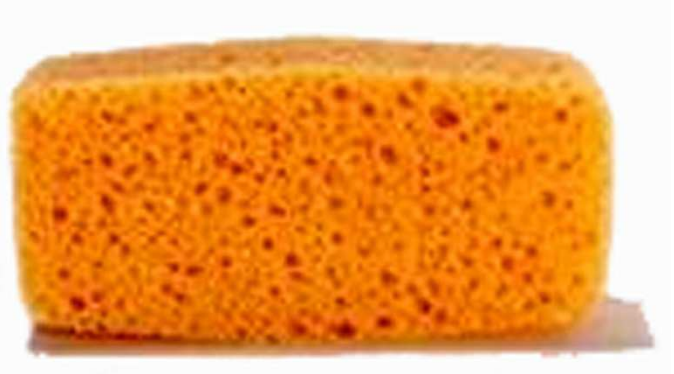


AWE Devices use condensation to extract water vapor and collect liquid water

- Humidity in the air comes in contact with the chilled surface of the glass and the water vapor “condenses” or reaches a temperature below the dew point at which water changes physical phase from vapor to liquid.
- This is the same process that produces rain.
- AWE devices have Condensation Modules that effectively perform this same process.
- One could say that AWE devices create “artificial rain”.

AWE devices use air compression to extract water vapor and collect liquid water

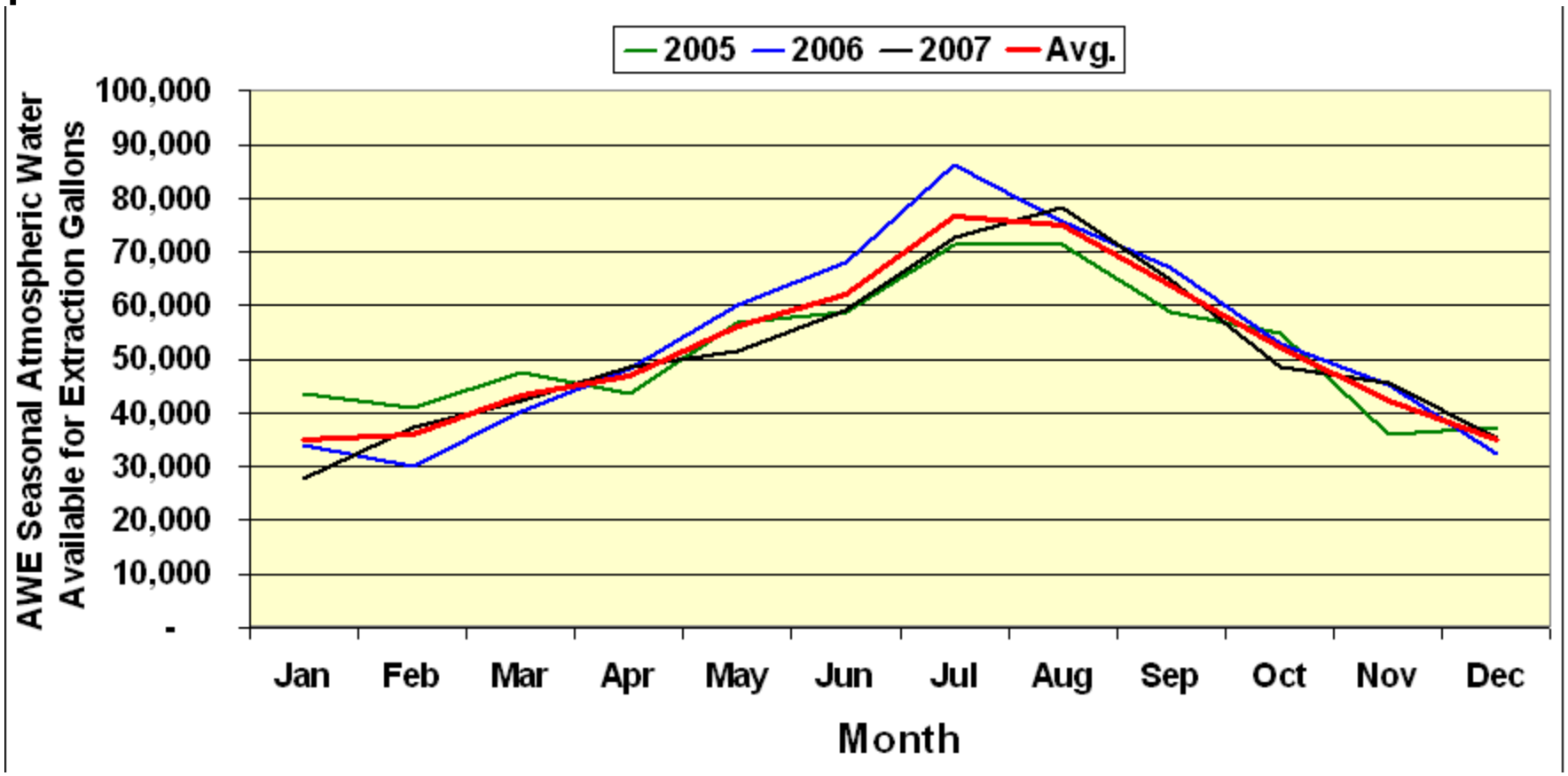
- When we squeeze water from a sponge we are compressing the volume of the sponge leaving insufficient area for the water to occupy.



- Compressing air is similar, air pressure (psi) describes the density of air (pounds per cubic foot).
- Increasing pressure forces the same number of air molecules into a smaller volume leaving insufficient area for the water to occupy . The lighter water molecules are forced from a vapor to a more dense liquid phase.

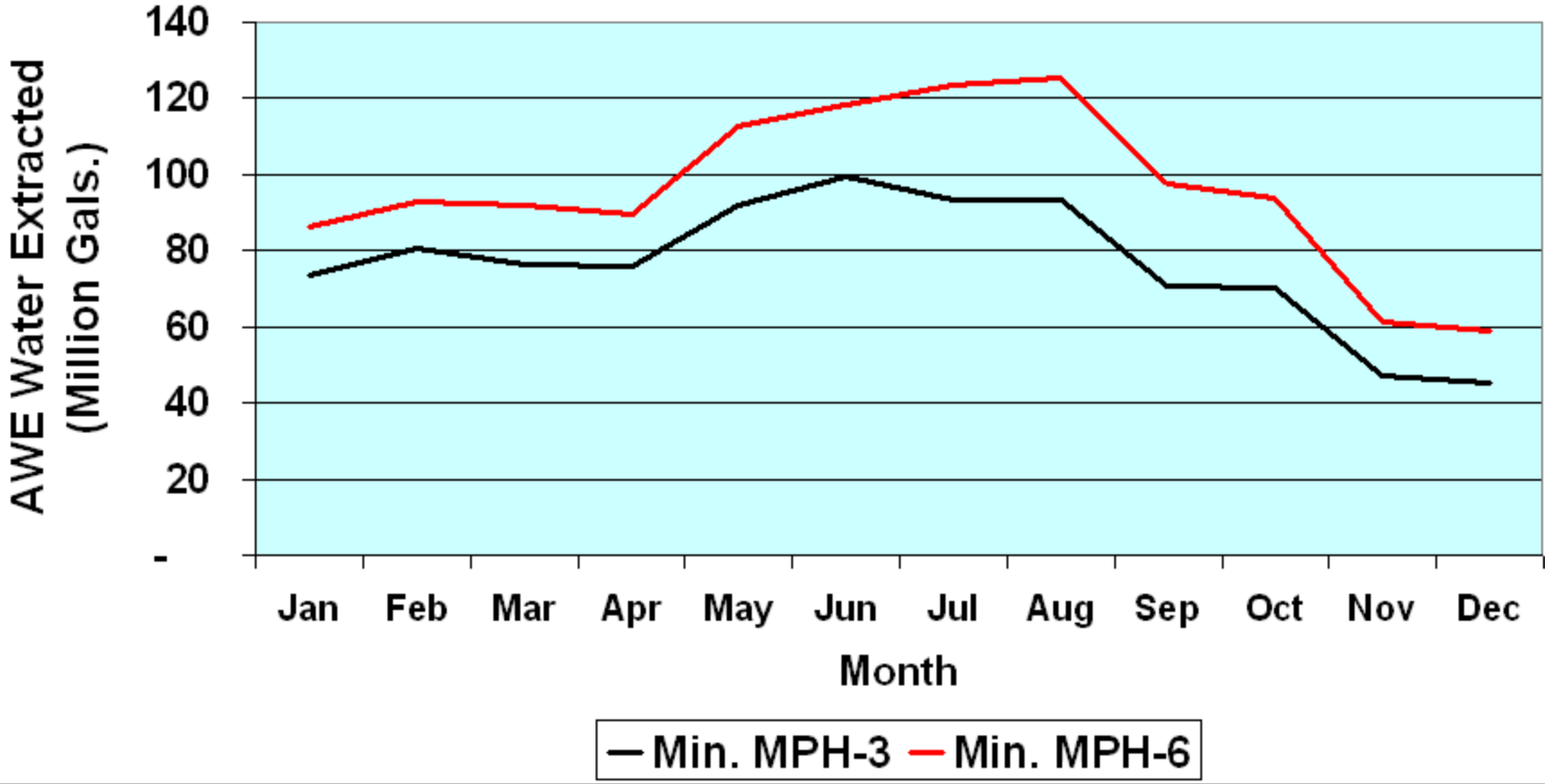
The AWE – Atmospheric Water Available for Extraction – Seasonal Variation

The calculation of Relative Humidity applied to the Saturation amount of water vapor made for each of the 3 years in the Class 1 Coastal Study Area shows the number of gallons that could be extracted per 1 million cubic feet per hour of processed air.



The AWE – Water Production Adaptability

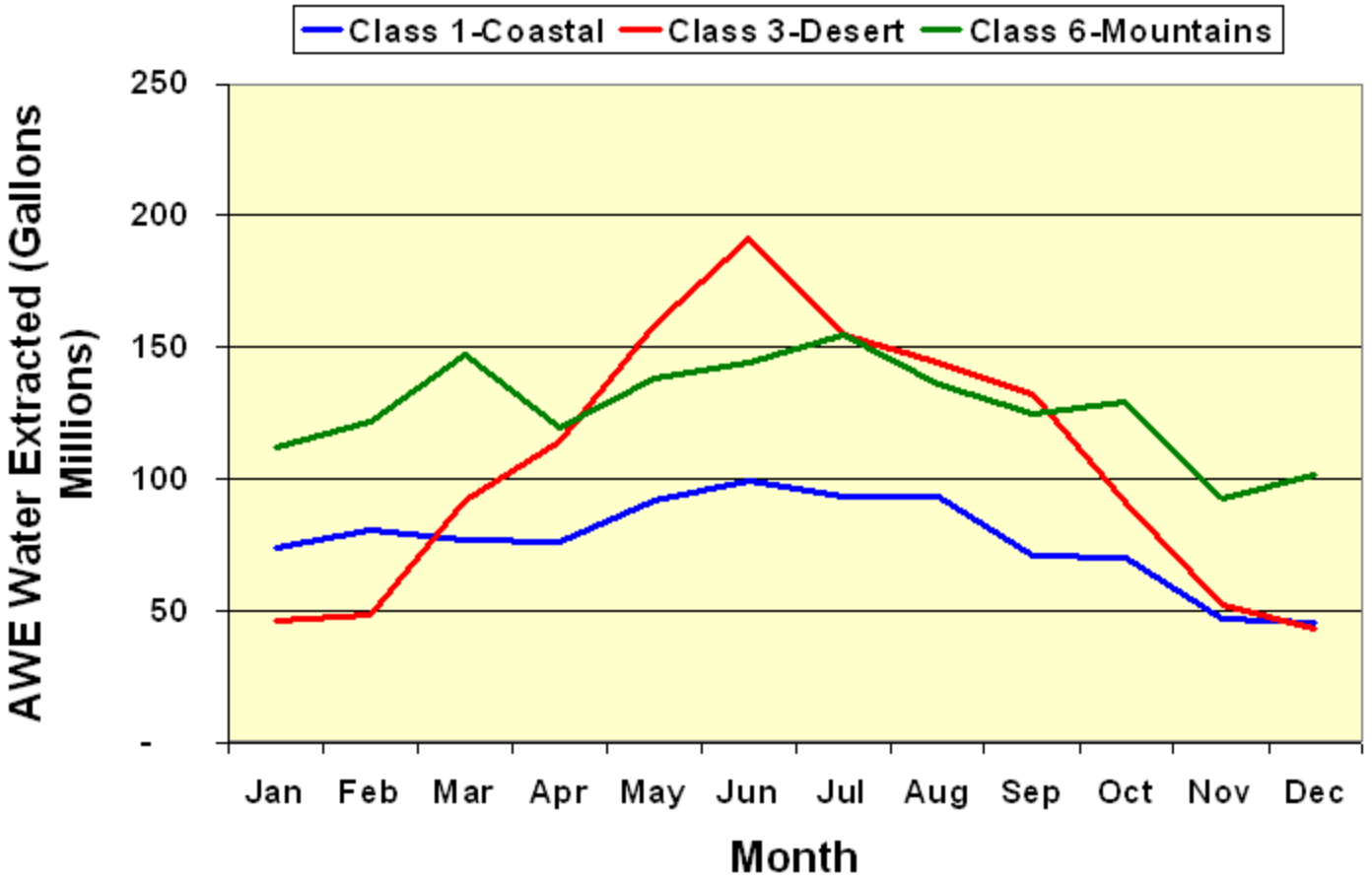
AWE Technologies Forced Rotation Modules provides the ability to adjust the performance of any AWE Device without additional equipment. Shown below are the quantities of water extracted using a mid-sized low capacity equipped AWE Device making only an adjustment in the Forced Rotation minimum MPH setting. This shows the range of water output for the same AWE Device.



The AWE – Water Production
Local Atmospheric Conditions

Shown below are the quantities of water extracted using a mid-sized low capacity equipped AWE Device at the same Forced Rotation settings for three typical location conditions: Coastal, Desert and Mountains.

The actual wind data in the same year for the three study areas are in Southern California and represent different Wind Power Classes and geographic land forms.



The AWE
Local Water Production

AWE Water Extraction Study: 12 Months – Weather Station Daily Reported Data
AWE Model 37.64 – Mid Size AWE unit build with limited capacity.

Region	Location	Elev. ft.	Avg. Temp Fº	Relative Humidity Avg. %	Water Extracted (Gals./Yr)	People served year round @ 88 gpd/person	Water Extracted (Acre Feet/Yr)
Atacama Desert - Driest Place on Earth	Calama, Chile	7,496	58	23	10,925,511	340	34
North Africa-Sahara	Tamanrasset, Algeria	4,475	75	23	19,408,194	604	60
Andes Mountains	La Paz, Bolivia	13,169	47	62	19,522,005	608	60
East European Plain	Moscow, Russia	587	43	74	23,941,493	745	73
Sahara Desert	Agadez, Niger	1,644	86	21	24,711,783	769	76
East Africa	Khartoum, Sudan	1,247	85	27	27,031,447	842	83
Pacific Coast	San Diego, CA	13	63	68	37,527,441	1,168	115
Pacific Ocean - Wettest Place on Earth	Kauai, Hawaii	151	76	72	59,474,901	1,852	183

How Much Water Is In Atmosphere?

Worldwide 3,010,981,437 acre feet of fresh water is withdrawn from fresh groundwater, freshwater lakes and rivers.

This is equivalent to 28.8% of the total 10,467,286,895 acre feet of total freshwater in the atmosphere on average.

So the answer to the question:
"Is there enough water vapor in the atmosphere available for the AWE to supply the volumes of water projected?"

Yes, over 3 times more water is in the atmosphere than the entire world population uses for all purposes.

The Earth will never "run out" of freshwater. Water is a renewable resource with natural recycling. But the isolated local water resources are being consumed at rates far faster than groundwater aquifers can recharge. Add to that local water resources such as groundwater, lakes and rivers are being heavily contaminated.

The AWE adds a new dimension to the supply of water.

The water in the atmosphere is every where, so the ability of the AWE to tap into this ample supply means a supply of fresh water can now be everywhere. No dams, reservoirs, cross country pipe lines and expense pump stations. Droughts will persist but the devastation caused will be minimized if not eliminated.

Atmospheric Water Vapor Extraction

The volume of water in the atmosphere increases with temperature. The percentage of the water vapor in the atmosphere varies by conditions that include temperature, location, altitude and other factors. Generally the highest percentages +/- 4% of water vapor content is along the equator and reduces in relationship to colder latitudes closer to the poles < 1%.

Earth		**square miles**		**gallons of water vapor in atmosphere**
Total Surface Area:		197,000,000		3,407,582,821,242,730
Area of land:	29%	57,268,900		988,199,018,160,392
Area of water:	71%	139,668,500		2,419,383,803,082,340
Global Water Surfaces:		salt water	97%	
		fresh water	3%	

Example of estimated water vapor by geographic area:

Example of estimated water vapor by geographic area:				
United States of America		% of Global Water Vapor	Square Miles	Gallons Of Water Vapor in Atmosphere
Total Surface Area:		1.8872%	3,717,813	64,308,401,512,832
Population (2011)	313,847,465			
Water Consumption:		% of Global Water Vapor	gallons/day per capita	gallons/day
Water Utilities- (Treated Potable)		0.0010%	108	34,000,000,000
Irrigation Of Crops		0.0041%	449	141,000,000,000
Industrial Use		0.0046%	510	160,000,000,000
Total USA Water Use		0.0098%	1,067	335,000,000,000
% of USA Water Vapor		0.5209%		
Average Daily Human Consumption Of Water [1]			87	
Per Acre Irrigated			2,232	

AWE Model 37.64-Persons Served with Water

AWE devices condense water vapor in the atmosphere into a liquid. The liquid water is both treated for potable use and untreated for irrigation and industrial use. Water use varies substantially from one country to another so the numbers of persons able to be served by an AWE device vary correspondingly. AWE devices can be configured to produce greater amounts of water to fit the demands for the location and primary use.

AWE Model 37.64		Typical Configuration Production	Increased Water Production	Maximum Water Production
Gallons/Day		159,308	477,923	1,115,154
% of Global Water Vapor		0.0000000046%	0.0000000138%	0.0000000322%
Country	Average Daily Human] Consumption Of Water [3	AWE Model 37.64-persons served		
USA [2]	87	1,831	5,493	12,818
Italy	72	2,198	6,593	15,384
Mexico	55	2,899	8,697	20,292
Austria	42	3,784	11,353	26,491
Brazil	29	5,589	16,766	39,121
China	13	12,654	37,961	88,575
Nigeria	5	29,369	88,107	205,583

[3] source: United Nations Development Program-Human Development Report 2006, adjusted to EPA water uses.

<u>Impact on global atmosphere:</u> To extract only 1.0% of the total water vapor in the global atmosphere more than 576,677 AWE devices configured to maximum water production would have to be installed.

United States of America	
Average Daily Human Consumption Of Water	Gallons Per Capita Per Day
Bathing	20.0
Toilet Flushing	24.0
Drinking And Cooking	2.0
Garbage Disposal	1.0
Dishwasher	4.0
Car Wash	2.5
Laundry	8.5
Lawn Watering And Swimming Pools	25.0
Average Water Use-Total	87.0

[2] source: EPA.gov

The AWE – Water production

These **AWE Technology** produced
New Sources of Water will:

- reduce the ground water withdrawals,
- provide water to small towns and large metropolitan areas that may need to start rationing,
- allow farmers to grow crops rather than turn them under due to irrigation curtailment of supplies and
- sustain life in small underdeveloped villages.