



*Engineering Air for a Cleaner World™*

# NEEDLEPOINT BIPOLAR IONIZATION - COLD PLASMA

## ***What is NPBI?***

Needlepoint Bipolar Ionization is an artificial generation of both positive and negative ions without the production of ozone or byproducts.

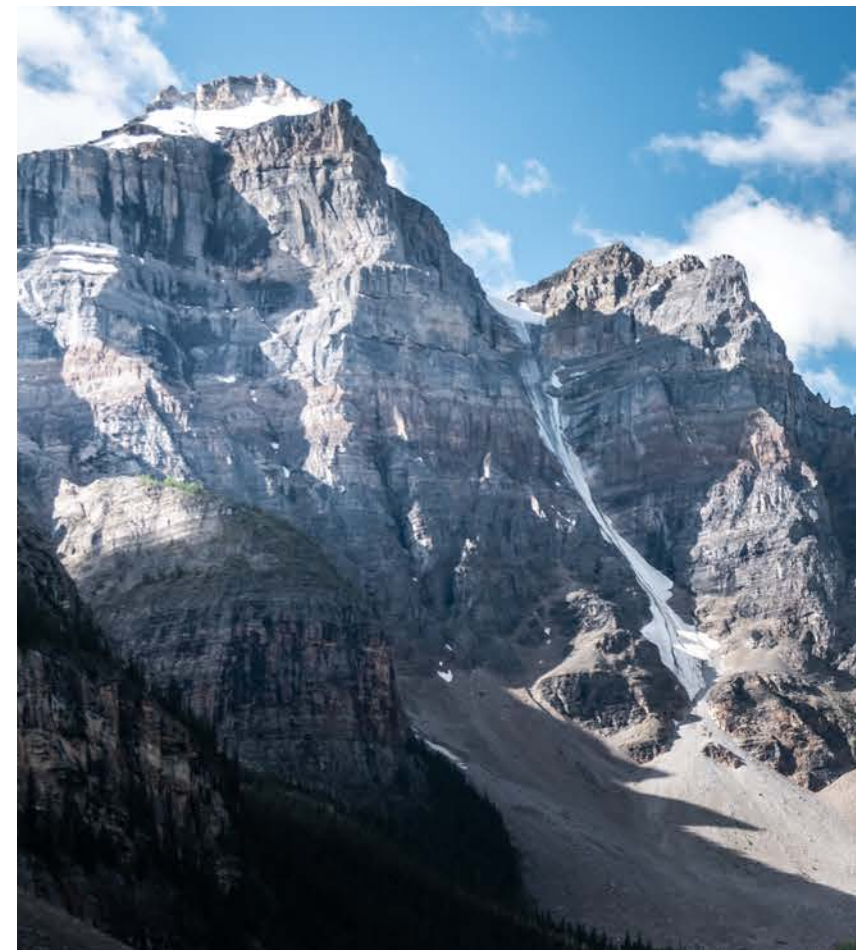
## ***Cleans Air Naturally***

Ions are present naturally in the air and are found in the highest concentrations where the ocean meets the shore and high elevation in the mountains.

The plasma made in the NPBI process artificially creates the ions found in these desirable locations and delivers them into the space, enhancing the indoor air quality.

## ***What NPBI does...***

1. Reduces Particulate
2. Reduces Pathogens, mold spores and viruses
3. Converts VOCs (odors)
4. Replaces UV Lights to clean coils
5. Allows for reduced ventilation air



## ***Typical Ions***

Waterfalls/High Elevation	5,000 i/cc
City	200 ions/cc
Inside Buildings	<100 ions/cc

*Units of Measure = ions/cc (cubic centimeter)*

## ***GPS NPBI ADVANTAGES***

- ✓ ***Produces No Harmful Byproducts***
- ✓ ***Reduces Airborne Particles***
- ✓ ***Reduces Odors***
- ✓ ***Kills Pathogens***
- ✓ ***Reduces Energy Cost***
- ✓ ***UL 2998 No-Ozone Certified***
- ✓ ***Treats In-Room Air***
- ✓ ***No Replacement Parts***
- ✓ ***Improved Indoor Air Quality (IAQ)***
- ✓ ***Auto Self-Cleaning***
- ✓ ***Static Electricity Control***
- ✓ ***Reduce Allergens***
- ✓ ***Simple to Install - Compact and Fits Every Application***
- ✓ ***Low Total Cost - Saves on build & renovation construction costs***
- ✓ ***Reduces Maintenance***
- ✓ ***Keeps new cooling coils clean & Cleans up old coils***

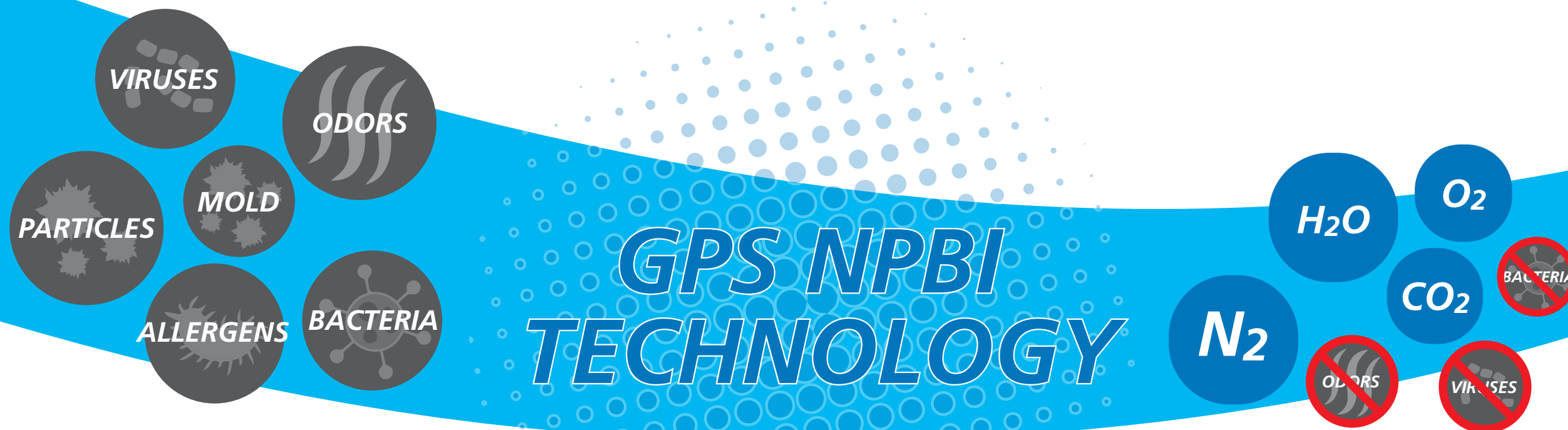
*Did you know...*

Many sites are able to  
**REDUCE ENERGY COSTS  
UP TO 30%**  
after installing a  
GPS Indoor Air Quality solution.

✓ ***Delivers P.O.P.E.***

## HOW NPBI TECHNOLOGY WORKS

GPS' NPBI technology works to safely clean the air inside industrial, commercial and residential buildings. The patented technology uses an electronic charge to create a plasma field filled with a high concentration of + and - ions. As these ions travel with the air stream they attach to particles, pathogens and gas molecules. The ions help to agglomerate fine sub-micron particles, making them filterable. The ions kill pathogens by robbing them of life-sustaining hydrogen. The ions breakdown harmful VOCs with an Electron Volt Potential under twelve ( $\text{eV} < 12$ ) into harmless compounds like  $\text{O}_2$ ,  $\text{CO}_2$ ,  $\text{N}_2$ , and  $\text{H}_2\text{O}$ . The ions produced travel within the air stream into the occupied spaces, cleaning the air everywhere the ions travel, even in spaces unseen.



*Passing through an ionization field causes harmful compounds to break into one or more of four basic elements: oxygen, nitrogen, carbon dioxide or water vapor.*

*Upon entering the ionization field, positive and negative ions surround harmful ammonia particles, breaking them down into hydrogen and nitrogen naturally occurring in the atmosphere.*

## WHAT IS P.O.P.E.?



### *Particle Reduction*

The GPS NPBI technology reduces airborne particles (i.e., dust, pet dander, pollen) through agglomeration. The ions attach to the airborne particles. The air filtration system easily captures the larger particles, increasing the capture efficiency of your HVAC system.



### *Odor Reduction*

During the GPS cleaning process chemical, pet, cooking, and other odors are broken down into basic harmless compounds, leaving the indoor air fresh smelling and free of odor causing VOCs.



### *Pathogen Reduction*

During the GPS cleaning process the NPBI technology attacks and kills viruses, mold spores and bacteria. The ions steal away hydrogen from the pathogens, leaving them to die, and leaving you with clean and healthy indoor air.



### *Energy Saving*

GPS' environmentally friendly cleaning process allows commercial buildings to significantly reduce the amount of outdoor air required to operate. This equates to a safer, more comfortable environment that requires up to 30% less energy to condition.



*Using GPS cleaning products  
allows for reduction in Outdoor Air (OA)*

**REDUCE ENERGY COSTS  
UP TO 30%**

### ***Outdoor Air***

- Ventilation rate procedure (VRP)
- Requires additional HVAC equipment
- Requires additional HP

### ***ASHRAE 62.1***

- Indoor Air Quality Procedure (IAQP)
- Contaminants of concern
- Up to 75% OA reduction
- Less capital upfront
- Less energy consumption



## % of VIRUS CONTROLLED BASED ON TECHNOLOGY

MERV Rating	Filter Only	Filter + UVX***	Filter + Ionization *, **
6	6.2%	10%	34%
7	7%	12%	61%
8	11%	19%	84%
10	12%	35%	89%
13	46%	84%	97%
15	71%	97%	99%
16	76%	98.80%	99.90%
17 (HEPA)	99.9%	99.99%	99.99%

\* Ionization increases the filter efficiency 4-5 MERV levels

\*\* Does not take into account ionization kills in the space and on surfaces

\*\*\* UVC does not effectively kill airborne pathogens in high RH conditions<sup>2</sup>

**ASHRAE Technical Paper on Airborne Infectious Diseases**

<https://www.ashrae.org/File%20Library/About/Position%20Documents/Airborne-Infectious-Diseases.pdf>

**Swine H1N1 Influenza A: Transmission of Viruses in Indoor Air: HVAC System Protection Options**

<https://elib.tips/edoc/swine-h1ni-influenza-a.html>

GPS added the third column to demonstrate estimated efficacy due to particle agglomeration as tested by Blue Heaven Labs and the National Research Council of Canada on GPS' NPBI technology.



# ***FREQUENTLY ASKED QUESTIONS***





## **FAQ'S - GPS TECHNOLOGY**

### ***What is Needlepoint Bipolar Ionization?***

Needlepoint Bipolar Ionization, also known as "NPBI", is an artificial generation of both positive and negative ions without the production of ozone or byproducts.

### ***What happens to the particles as air passes by an NPBI system?***

As air passes by the product, our Needlepoint Bipolar Ionization (NPBI) technology uses an electronic charge to create a plasma field filled with a high concentration of + and - ions. As these ions travel with the air stream they attach to particles, pathogens and gases. The ions help to agglomerate fine sub-micron particles, like dust or pollen, making them unable to pass through a filter.

### ***What does NPBI do?***

Simply put, NPBI technology 1. Reduces Particulate 2. Reduces Pathogens, mold spores and viruses 3. Converts VOCs (odors) 4. Replaces UV Lights to clean coils and 5. Allows for reduced ventilation air.

### ***How does this product kill pathogens?***

The ions kill pathogens by robbing them of life-sustaining hydrogen. The ions breakdown harmful VOCs with an Electron Volt Potential under twelve (eV  $V < 12$ ) into harmless compounds like O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, and H<sub>2</sub>O. The ions produced travel within the air stream into the occupied spaces, cleaning the air everywhere the ions travel, even in spaces unseen.

## **FAQ'S - GENERAL**

### ***What is an ion?***

An ion is a molecule or atom that is positively or negatively charged, meaning that it has electrons to give or needs electrons to become uncharged, thus becoming stable.

### ***How long do the ions last in the air?***

Typically small ions have a life expectancy of about 60 seconds before they touch a surface or particle to discharge.

### ***What does universal voltage input mean?***

GPS products with universal voltage input means the unit will operate with any voltage in the range of 24 – 240 VAC or DC. The auto-cleaning line of products senses the input voltage automatically and the internal circuitry adapts to the voltage. The GPS-iMOD power supply comes with a built-in selector switch. The GPS-iRIB operates on voltages between 110-240VAC.

### ***Does the technology generate line noise or EMF?***

GPS' technology does not generate line noise and does not generate electromagnetic forces. GPS' technology is the only ionization technology approved by the FAA for installation on aircraft since it passes the stringent DO-160 certification, proving no line noise and no EMF, which could be detrimental to aircraft avionics, if produced.

### ***Will humidity effect the NBPI ion output?***

Humidity does not affect the ionization output; however, if water condenses on the needle tips, ions cannot emit and the ion output will be greatly reduced or cease.