Massachusetts Farm Emergency Plan Template

Note: The information requested in this document is not intended for collection by anyone, it is for your personal use only. The items discussed are intended to aid you in developing your own specific plan relevant to your unique situation. There is an extensive amount of information included in this template, not all of it may be relevant to your specific situation or the type of animal species on your farm. This is a living document your comments and suggestions are welcome.

An emergency can strike your farm at any time. It's important to be prepared with information to assist emergency responders and others if called upon when a disaster like a fire, flood or disease outbreak happens. If you need assistance from your community contact your Public Safety Officials, i.e, emergency management director, police and fire.

Current operational procedures exist for local police, fire and emergency response teams, but many of the individuals involved in these units may have little experience or knowledge of the workings of a farm. Farms may have equipment, building structures, livestock bio-security measures, farm chemicals and fuels, power usage and generation, and other aspects of raising livestock and growing crops that require special attention by emergency responders.

This farm emergency plan will provide rapid information on the description and location of production facilities, animals and equipment to minimize the devastating effects of a disaster on your farm and provide additional safety information to emergency responders. Review and update this emergency list annually with your family and employees. **Make sure family members and employees are aware of the location of this emergency information, including being able to describe directions to the farm.**

Make copies of this emergency contact information and give to family members, employees and neighbors, and place a copy near all telephones.

Keep in mind that you may not be present when an event occurs on your premise. This fact alone highlights the need to include all pertinent information about your animals in an easily accessible location. Familiarize yourself with your local emergency planners.

Items to include in your farm emergency plan: **remember to update your plan as needed.** Not all of these items will apply to each individual situation.

- List of family members, employees or neighbors, who are familiar with your farm business. Keep communications open with your neighbors. (see appendix A)
- Telephone list to contact family members or employees. (see appendix A)
- List of emergency contacts. (see appendix A)
- Contact information of medical care provider. (see appendix A)
- Telephone contact list of farmers to help provide livestock care, emergency feed and water, power, etc. (see appendix A)

- Description of medical conditions or medical information of family members and employees. Consider providing this information to your local emergency services personnel.
- Description of location of the farm and directions from nearest major intersection. Why? An employee unfamiliar with the area may be the one that needs to direct emergency personnel to the farm.
- A general diagram of the farm that includes the possible location of chemical, fuels, livestock, equipment, overhead and buried utilities, etc. (see appendix B)
- Location of spare keys for vehicles or buildings.
- Contact information of businesses providing services such as veterinarian, heavy equipment, electricity, livestock and milk hauling, insurance, financial, etc. (see appendix A)
- List of suppliers of chemicals, fertilizer, drugs, etc.
- List of equipment essential to provide power to operate farm in the event of a power outage or natural disaster. Include equipment needed in the event of an extended power outage, such as well pumps, feed mill, egg processors, office systems (phones, computers, etc,), and generators. Educate all family members/employees regarding the operation of the emergency equipment. (see appendix A)
- If requesting assistance in obtaining help through your local emergency management agency i.e, generators, sandbags, etc, you will need specifics on the type and size you need. In regards to generators you need to know the size of the generator based on kilowatts.
- Description of location of important farm and personal documents. (see appendix A)
- Safe storage of farm and personal financial information in fire-proof boxes or off-site safe deposit boxes.
- Fire-proof backup files of computer records.
- Off-site meeting location and contacts for family and employees to gather following a disaster to assess the situation and coordinate response. (see appendix A)
- Leased Buildings. Contact information as to the owner of animals in leased building should be posted inside each leased building. A contact should be identified for each leased location, in the event of a natural disaster and you are unable to reach the premise.
- Census of animals on the farm by buildings. (see appendix C)
- Feed (type, quantity, etc.;) and water (restricted, medicated, etc.;) instructions for each building. (see appendix C)
- List of special circumstances regarding certain animals. List of medications, what, when, etc. (see appendix C)
- If animal or animal products are entering the food chain, please identify method for marking animals or products that need to be withheld. Predetermine a disposal method for your product in the event of a disaster preventing it leaving your premise, such as shipping milk, etc.
- Barn Fires, what will you do in the event of a fire? What precautions are you taking to prevent one?
- **Risk Assessment in the event of a disease outbreak. Your risk assessment activities will produce a list of relevant disease outbreak issues. Your discussion of these issues will lead to greater awareness and heightened skills for diagnosis and response when a disease**

emergency is apparent. The first step is often to understand just what kind of biosecurity/disease emergency is underway. (see appendix E)

- Request an energy audit for your farm, these are usually done at no charge to you. This can be accomplished by contacting your local electrical company, or the Department of Agricultural Resources Alternative Energy Specialist Gerry Palano at 617-626-1706.
- Do you have a disposal plan for mortalities?
- In the event of a natural disaster, could you implement your carcass disposal plan with limited resources, help, etc, or would you need an alternative site for disposal.

- Source of water, is it supplied by your local town or do you have a private well? Do you have a generator on the premise that can power your well pump? Inquire with your local Emergency Management Director (EMD) as to the likelihood of obtaining water from the fire/highway department in the event of a disaster.
- Compile and regularly update a complete list of all identification numbers and veterinary records for all animal species on premise. Don't forget Fido and Fluffy.
- To help with identifying problem areas in your plan, re-examine a recent disaster you were involved with and make a list of the obvious problems you encountered. (see appendix D)
- In the event of companion animals, backyard horses etc, do you have a plan in place to care for them in the event you are unable to.

Barn Owner/Lessee Information.

Barn owner/lessee information is also very important. This information ideally should be posted in the same location in everyone's barn. Inside the barn door on the left side, attached to the wall. This enables the fireman/first responder to quickly locate the owner/lessee. This packet of information shall include several sheets. The first sheet should be contact information (see attached sheet), listing the owner/lessee name, contact number (preferably cell number), and an alternate contact name and number. Grain suppliers should also be listed here. A census of all the animals in the barn should also be included on the first sheet. This packet of information will enable someone to care for the animal/s if the owner/lessee is sick, critically injured or cannot be located. You should have on hand at least a weeks worth of feed and water.
Grain barrels/bins need to be labeled, with a label or feed bag tag. It is very difficult to feed someone else's animals if you do not know what barrel/bin has what feed. Or perhaps you are told to use the green barrels and there are 4 green barrels in the barn all with a different looking (color, pellet or mash) type of feed.

In the event of a natural disaster, is there someone familiar with the animals located on that premise that could feed and care for them, if you or your personnel were unable to reach that location. Do you also have a power source available for that location, preferably located on site.

What you can do to help prevent Barn Fires

- Do not block roadways to your barn with tractors and other vehicles. Fire apparatus need a clear path to your barn.
- Dirt access roads need to be graded and maintained to allow for the passage of large and heavy fire trucks.
- Do not lock or obstruct farm gates.
- Farm roadway gates should be at least 12-16 feet wide.
- Do not store combustible materials in a barn that is used to house animals. If you do store combustibles in your barn, make sure the local fire department is aware of this.
- Is there an apartment or living quarters in your barn?
- Contact information packet should be posted in a location known to the local fire department, preferably in the same location in each barn in town.
- Install heat and smoke detectors in your barn.
- Fire extinguishers need to be inspected once a year.
- Pressurized water extinguishers are the correct type for extinguishing hay fires.
- Be aware of the location of fire hydrants in your area.
- If possible put in an electrical shut off on the outside of your barn. When you leave the barn turn off the power.
- If feasible post a weatherproof sign in a prominent location on your barn to emergency responders, to identify to them the number of animals in the building during the day and night. This applies mainly to equine and large animal operations. Thus preventing unnecessary entry into the barn in the event of a fire.

Appendix A

Farm Emergency Contact Information

Farm name:
Owner:
Medical History, if any:
Hospital/Family Physician:
Farm Address:
Farm Phone Number:
Home Phone Number:
Mobile Number:
Pager:
Location of Farm and directions from nearest major intersection:
Spouse's Name:
Contact Number:
Work:
Mobile:
Medical History, if any:
Hospital/Family Physician:
Children, Name:
Contact Number:
Work:
Mobile:
Medical History, if any:
Hospital/Family Physician:
Children, Name:
Contact Number:
Work:
Mobile:
Medical History, if any:
Hospital/Family Physician:

Children, Name:
Contact Number:
Work:
Mobile:
Medical History, if any:
Hospital/Family Physician:
If leased, Property owners Name:
Address:
Contact Number:
Mobile Number:

Emergency Services

Fire Department:
Police Department:
Poison Control:
Hospital:
Local Emergency Management Director: (EMD)

Meeting site in event of disaster

Off-site meeting location:
Off-site phone number:

Off-site aid

City or Town Animal Control Officer
Work contact number:
Mobile contact number:
Assistance/ equipment available:
Name of neighbor able to provide assistance:

Home contact number:
Mobile contact number:
Assistance/ equipment available:
Name of neighbor able to provide assistance:
Home contact number:
Mobile contact number:
Assistance/ equipment available:
Name of farmer able to provide assistance:
Home contact number:
Mobile contact number:
Assistance/ equipment available:

Contact Information for Farm Circumstances

Insurance Agent:
Office:
Mobile:
Home:

Veterinarian:
Office:
Mobile:
Home:

Livestock Shipper:
Office:
Mobile:
Home:

Grain Hauler:
Office:
Mobile:
Home:

Electrician:
Office:

Mobile:
Home:

Chemical Supplier:
Office:
Mobile:
Home:

Plumber:
Office:
Mobile:
Home:

Fuel Supplier:
Office:
Mobile:
Home:

Milk Hauler:
Office:
Mobile:
Home:

Equipment Dealer:
Office:
Mobile:
Home:

Location of Important Farm Documents

Storage Location of Farm information:
Storage Location of personal financial information:
Storage location of backup computer files:
Location of Spare Keys to Buildings and Equipment:

Amperage of Farm equipment (in the event of power failure, and rental generator is needed) Record as much information as possible

Type of equipment:	
Starting Watts:	Running Watts:
Kilowatts:	
Amperage:	
Volts:	
Single Phase:	Three Phase:

Type of equipment:	
Starting Watts:	Running Watts:
Kilowatts:	
Amperage:	
Volts:	
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Starting Watts:	Running Watts:
Kilowatts:	
Amperage:	
Volts:	
Single Phase:	Three Phase:

Appendix B MAP OF FARM

Use Top of Page as NORTH

(Use more than one page if necessary) or (use carcass disposal map) Instead of drawing a computer generated map may be added.

1. Draw the road(s) that run(s) directly in front of your property. Include the name(s) of road.
2. Draw access to property including roads, lanes, and driveways.
3. Draw buildings as they exist on the property. Use simple shapes such as rectangles or squares to depict structures.
4. Indicate where chemicals, fertilizer, fuel and utilities are located.
5. Indicate where livestock are housed.
6. Indicate where machinery is located.
7. Indicate other important features of your farm.
8. Draw all geographic water holding features that exist on the property. Include streams, creeks, rivers, irrigation ditches, wells and other collection areas.

APPENDIX C **CENSUS OF ANIMALS ON PREMISE**

Barn #	**Type and # of animal**	**Feed & amount**
Special needs animals, medications, animals or animal products that cannot enter food chain:		

Appendix D

Sample worksheet for your plan

1. Create an emergency (no electricity, disease, etc.)
2. List your farms critical operations on a worksheet
3. Have a brief discussion about how the farm would respond.
4. List your actions for that response.

Remember it is important to document your plan; consider what would happen in an event where the farm operators are unavailable to respond and others (Police, Fire, MSPCA, etc)would be responsible for making critical decisions.

Type of Emergency:_____

CRITICAL OPERATIONS	RESPONSE	WHERE DO YOU GO FOR HELP

Repeat the exercise with another type of emergency.

Appendix E

Biosecurity Emergency Risk Assessment

A biosecurity emergency is any event that potentially could involve animal or human exposure to infectious and/or contagious diseases.
In the event of a biosecurity emergency, the following actions should be implemented.
1. Take immediate action to protect people and animals on the premises.
2. If a biosecurity incident is underway (suspected or confirmed), do not leave your premises until instructed or authorized to do so. You may risk spreading the biological agent and expanding the incident beyond the perimeter of your farm/facilities and property.
3. Work with your veterinarian, medical provider, the MA Division of Animal Health and local Emergency Management Director to properly diagnose the nature of the biosecurity emergency, and the implementation or deployment of any neutralizing agents.
4. Conditions permitting, assess the scale, nature and origin of the biosecurity emergency.

- Is this an acute biosecurity emergency or something that is an emergency threat?
- Are people, animals or plants dead or dying? . . . at an alarming rate?
- Is this biosecurity emergency local and limited to your farm, or is this emergency impacting neighbors and others beyond the perimeter of your property?
- Is the nature of this emergency publicly known, i.e., public radio announcements, or, newly discovered by you or someone on your premises and unknown to others?
- Is the nature of the risk and emergency known, i.e., avian/bird flu; brucellosis; equine encephalitis; Johne's Disease; BSE (Mad Cow); pollen contamination; soybean rust; West Nile virus; etc.?
- Is the nature of the emergency unknown, but observations confirm people and animals are at risk?
- Is the origin of the emergency known and what are the vectors of transmissibility, i.e., airborne; waterborne; insect borne; visitor's boots, hands and clothing; contaminated feed, water or equipment; etc.?

5. Use your judgment and call appropriate people for assistance.

- Call 911 for first response to current and imminent threats.
- Call MA Department of Agricultural Resources for animal and plant health related issues at 617-626-1795.

6. Where appropriate, and safe to do so, take immediate action to mitigate harm to people, plants and animals.

- Wear appropriate protective gear (gloves, respirators, etc.). Work carefully with affected victims, being careful to not expose yourself to a biological agent, or to cross-infect or contaminate people, plants or animals that appear not to be impacted.
- Exercise awareness, assessment and judgment – remember carbon monoxide is odorless and colorless, but could be the cause of a biosecurity breach that is causing injury and death.

Appendix F

WHY EVERY FARMER SHOULD BE UTILIZING PROVEN BIOSECURITY MEASURES:

Biosecurity is the application of protections and practices against infectious biologic agents that endanger the food supply. These protections and practices exist at many points in the animal handling process and limit the danger spread of disease causing organisms. When teamed with disinfection and sanitation procedures, biosecurity practices can eradicate or reduce pathogens to non-infectious levels. Serologic monitoring and vaccinations also insure flock/herd health.

Inadequate biosecurity can contribute to industry wide epidemics of highly pathogenic or exotic disease, resulting in quarantine and possible condemnation of flocks/herds. An infection by a non-virulent organism within a facility can be just as devastating economically, reducing production over the life of the facility without overt signs of disease. Once contaminated with pathogens, livestock facilities are extremely difficult and expensive to clean, sanitize and disinfect.

A further consideration related to biosecuity at all levels is the potential for terrorists to introduce pathogens into livestock and the food chain. This could cause significant direct and indirect economic loss. According to the Gilmore Commission "A concerted biological attack against an agricultural product offers terrorists a virtually risk-free form of assault, which has a high probability of success."

SOURCES OF DISEASE

Source contamination: Animals (wild and new introductions to flock/herd, semen), feed or water that carry a biological agent and transmit it. People, clothing or vehicles can harbor a biological agent that when moved around can spread the agent.
Vector contamination: Efforts to minimize vectors can significantly reduce disease transmission. Rodents, wild birds, insects, fomites (such as fecal material, feathers and dust) can be wind or water transmitted etc.
Facility Contamination: A major source of disease transmission is people (employees, service personnel, truck drivers, vaccination crews). Facilities may also be contaminated by new flocks/ herds and additions to flocks/herds.
Intentional contamination: A bioterrorist event that is intended to inflict harm in multiple ways. Motives could include market destabilization, economic loss, disruption of trade and imposition of embargoes and social in-stability through loss of confidence in the food supply.

LIVESTOCK MANAGEMENT

The most important first step is to obtain animals from a reliable source. Managing livestock/poultry facilities for maximum health and productivity requires a qualified facility manager trained to keep the livestock as healthy as possible and able to respond quickly and forcefully to any disease condition. Many factors must be considered to achieve maximum health and productivity, including optimum disease and infection controls, along with environmental provisions and safeguards.
Animal Selection and Maintenance: Livestock should be purchased from disease free certified herds. Poultry must be purchased from S. pullorum clean sources from National Poultry Improvement Plan (NPIP) participants. Hatching eggs and chicks must originate from S. pullorum clean stock. Sick birds

should be evaluated at a lab or by a vet. The state Department of Agricultural Resources (DAR) can assist in this process.

Stress Control: Provision of suitable housing, good quality feed and adequate, clean water minimize stress and generally increase flock/herd health.

Ventilation: Proper ventilation is necessary for control of various respiratory diseases.

Temperature: Control measures should be taken to avoid temperature extremes thereby avoiding stressors.

Stocking Density: Floor, feed and water space should be allotted according to age, breed, and type of animal.

Brooder House: Always clean the brooder house thoroughly and disinfect it before a new shipment of animals arrives.

Feed and Water: Feed should be of high quality. It should be balanced, free from toxins and palatable. Toxins in feed at a very low level can affect productivity and general health. Water should be clean, cold in summer, warm in winter. Water and feed are important as far as disease prevention is concerned because many vaccines and medicines are administered by adding them in feed and water. Contaminated feed, lumped feed or oxidized feed or feed, which has a bad odor, should be discarded.

Sick And Dead Animals: Sick animals should be evaluated at a lab or by a vet. The MA Department of Agricultural Resources may be able to assist in this process. Dead animals should be immediately removed from the building and buried, incinerated or disposed of properly.

Vaccination and Medication: Vaccination before infection occurs in a flock/herd is the best means of protecting the flock/herd. Vaccines may be live or killed. Live vaccines consist of live micro agents and can be given at a younger age than killed vaccine. They can be administered by injection, drinking water, eye drop application or inhalation.

With live vaccine there is always a possibility of secondary infection so they should only be used to prevent diseases that have already been present at your facility and have been unable to be eradicated by other means. The use of live vaccines must be approved by the state through the MA Department of Agricultural Resources. Killed vaccines must be injected and can cause reactions. The age of the animal and proper timing are very important. The most important consideration is to avoid over or under utilization of vaccines. A proper vaccination schedule for specific important diseases should be followed. In case of a disease out break, notifications should be made according to a set procedure. All diagnosis should be confirmed and recorded. Expiration dates of vaccines and medicines should be recorded; expired medications should be disposed. All medications and vaccines should be stored in a secure area.

Infection Control: The spread of disease between facilities is a major concern. Animals must be purchased only from sources, which are certified disease free and have records of appropriate vaccinations. Farms should maintain records of animals sold and their final destination.

Protection From Pests And Predators: Rats, mice, wild birds, flies and beetles can all cause contamination and spread disease such as salmonella. They should be kept away from buildings to the greatest extent possible and the buildings should have any access points boarded up. Livestock, especially poultry flocks with outside access need protection from owls, hawks, coyotes, foxes, etc. Outside enclosures should be covered.

Cleaning Animal Containment Houses:

After a flock/herd has been depopulated, manure from around the houses should be removed. Sunlight adds to the break down the pathogens. A complete cleanout of houses between each flock/herd is most desirable. If cleaning that often is not possible, broiler houses should have all organic materials removed, most be cleaned out completely then disinfected, at least once a year.

Equipment:

Farm equipment can be a source of disease transmission and should be cleaned and disinfected regularly. Dedicated equipment, for use on your farm only, is preferable.

ENVIRONMENTAL MANAGEMENT

Location: Facilities should be located at least 1 - 2 miles from other commercial facilities and in the case of poultry away from waterways used by migratory waterfowl. Location must be an appropriate distance from other livestock sheds, road facilities and other farm operations.
Construction: Housing should be of sound quality and suitable to environmental conditions of the geographic area. It should, to the extent possible, be without access points for rodents or stray animals, crevices, free of leaks and damp floors, etc. Roads should be built of all weather materials to reduce the transport of organic material on tires.
Access Restrictions: Records should be kept of all visitors to the farm, including vendors and inspectors. It should include names and addresses, dates of visits, and nature of business. Since different diseases have different incubation periods, once a disease has been identified, the farm may check the incubation period and identify potential carriers by reviewing records. All doors to livestock buildings should be locked and the keys stored in a secure location. When deliveries of livestock is accomplished, the entire crew should observe strict sanitary conditions since (1) The building they are entering has been disinfected, and (2) They may have made another delivery previously and different protective clothing should be worn at each stop.
Vehicles, Personnel And Visitors: Vehicles and people are major sources of flock/herd contamination. Parking should be away from the livestock buildings. Vehicles entering and departing the area where livestock are housed should be washed then sprayed with a disinfectant (including wheel wells and tires). Personnel movement should be restricted. Verify the identity of any unknown contractors or vendors. Protective outer clothing, including boots and headgear should be worn at all times when in and around the sheds.
Outside Security: Perimeters around facilities should be reasonably secure to prevent unauthorized entry. "No Trespassing" signs should be conspicuously posted. Lighting should be sufficient to allow surveillance of exterior of buildings and parking areas. Any outside storage bins or sheds should be securely locked and/or sealed to prevent tampering. Requiring positive identification, such as a driver's license, with sign in and sign out procedures in place should control entry into facilities.
Inside Security: Restricted areas should be clearly marked as such. Visitors, guests and non-farm employees should not be allowed to move about the offices, product areas or sheds without an authorized escort and, if necessary, being subject to all biosecurity conditions required.
Sanitary Traffic Control: Control of human traffic is essential. Lock doors, ban all visitors and allow building access only to authorized and necessary personnel who are wearing properly sanitized footwear, coveralls and headgear. Human hands may also spread infection and should be sanitized before entering a poultry building and before leaving the farm. The use of disinfecting foot dips or footpads at entrances and exits is desirable. A footpad can be fabricated using rubber pans with carpet pads cut to fit the pan and saturated with disinfectant.
Traffic control is not limited to humans. Any damage to a facility or open access should be screened or sealed to prevent animal, rodent and wild bird access. A possible exception would be cats, which can provide effective rodent control. Also, dogs can be trained and used to keep out intruders of all types.
Traffic Pattern: Routes through the facility should be "one way" and route personnel and vehicles from youngest livestock to oldest livestock and from clean areas to dirty areas and from individual livestock houses to common use employee areas. This minimizes movement of contaminants through the facility.
Farm Stores: Farm stores should be located away from your livestock housing areas. Do not allow customers access to your animal areas. If there is ever a disease break on your farm, requiring quarantining the premise, it is important to have a plan in place to route farm store customers away from animal areas.

Trucks and Service Personnel: No responsible livestock farm should allow livestock trucks or equipment, which is unclean or soiled with manure near the farm. In order to ensure prevention of disease the following procedures for cleaning trucks should be followed:

- Operator must wear disinfected clothing.
- Remove modules and scrape and brush litter from the transporter deck.
- Scrape and brush the sidewalls, floor and tail lift of enclosed vehicles.
- Remove deposits of mud, straw, etc., from wheels and exposed chassis.
- Using a disinfectant detergent, wash down the truck from top to bottom, paying particular attention to wheels, wheel wells and tail lift.
- Wash all tools and equipment.
- If applicable, due to contamination, remove all removable items from the cab and wash both these items and wash the inside of the cab.
- When washing is complete, use a high-pressure rinse with clean water.

The most effective method of operation for service personnel with vehicles is to treat their vehicles passenger compartment as clean and the cargo area as contaminated. Before calls a package of sanitized clothing for each stop (boots, cap and coverall) are sealed and placed in the clean area. After use they are removed and placed in the contaminated area. Each vehicle should be equipped with a bucket, brush, disinfectant, and a supply of clean water.

For more information or to discuss the biosecurity situation on your farm, call the Massachusetts Department of Agricultural Resources, Division of Animal Health at 617-626-1795.

Appendix G

Generator Information*

Sizing a Generator - How to Determine What Size You Need

Getting a generator that can handle all your power generation needs is one of the most critical aspects of the purchasing decision. Whether you are interested in prime or standby power, if your new generator can't meet your specific requirements then it simply won't be doing anyone any good because it can put undue stress on the unit and even damage some of the devices connected to it. Unfortunately, determining exactly what size of generator to get is often very difficult and involves a number of factors and considerations.

Making a choice amongst single phase, three phase, kW, KVA, welder, standby or motor starting generators can be mind-boggling. To prevent such confusion, this article was developed to help you get a better idea of how the sizing process works and some key things to keep in mind. This is not a substitute for a certified electrician, which we always suggest talking to before buying, but it should provide you with enough information to get a solid understanding of some of the key things that are involved.

Generator Size Variations: With the latest advancements in the field of electrical engineering, generators are now available in a wide range of sizes. Generators with power supply capacities of 5kW to 50kW are readily available in the personal and home use markets, while industrial generators are anywhere from 50kW to over 3 Megawatts. Handy and portable gensets are available for homes, RV's and small offices, but larger businesses, data centers, buildings, plants, and industrial applications need to use the much larger sized industrial generators to meet their higher power requirements.

Generator Sizing - How Much Power? Many people believe smaller generators can be used for standby electric power because they are not running all the time. This is not only a myth but can actually be very detrimental. Unfortunately, generator under sizing is one of the most common mistakes committed by buyers. Not only does it involve the risks of damaging your new asset (the generator), but also it can damage other assets connected to it, create hazardous situations, and even limit overall productivity of the unit and/or the business relying on it. If nothing else, the key thing to remember here is that more is always better than less.

How to Determine the Right Size Engine or Generator: While there is no substitute for having a certified electrician perform an inspection and calculate everything for you, the guidelines below do offer some great starting points and should at least get you started in the right direction:

Know Your Requirements: Going to a dealer and buying the best or cheapest generator available without any other consideration is clearly not the best approach. It is always better to delve deep into your power generation requirements before making a choice. You can do this in the following ways:

- Make a list of the items that need to be powered by the generator
- Make a note of the starting and running wattage of the respective items

- Calculate the total power requirements in KVA or KW

How to Find the Starting and Running Wattage: Getting the right starting and running wattage of the devices you intend to power is crucial for calculating the accurate power requirements. Normally, you will find these in the identification plate or the owner's manual in the buyer's kit of each respective device, tool, appliance, or other electrical equipment.

Ampere - Watt Conversion: You may often find power requirements of tools stated in amperes. In order to convert the power requirement of a tool from ampere to watts, follow these calculations.

For resistive load: Wattage = amperes x volts

For reactive load: Wattage = (amperes x volts) x load factor

Power Requirement Charting: It often happens that you lose the owner's manual or for some reason can't find the power requirement specification of the tools and/or other electrical devices you're running. Attached is a sample power consumption chart that demonstrates some of the typical wattages used for common appliances and tools. The chart is simply provided as an example to demonstrate how starting and running wattages differ, and how each device has specific consumption needs. If you have questions over any particular items you can contact the manufacturer, consult an electrician, or contact us for a free consultation.

Different ways of Calculating: Depending upon the type and number of devices, and the way the generator is scheduled to be used, there are a few different ways of calculating power requirements:

- Single motor running
- Multiple motors running simultaneously
- No electric motors.

Advantages of choosing the right size generator: Now that you have an idea on how to choose the appropriate size of generator to suit your needs, here's just a few of the benefits obtained by going through that process:

- No unexpected system failures
- No shutdowns due to capacity overload
- Increased longevity of the generator
- Guaranteed performance
- Smoother hassle-free maintenance
- Increased system life span
- Assured personal safety
- Much smaller chance of asset damage

Maintenance- Generators need to be started and run a minimum of 4 times a year or according to manufacturer recommendations.

Standard Electrical Formulas Used for Power Consumption Calculations

TO DETERMINE:	SINGLE-PHASE	THREE-PHASE	DIRECT CURRENT
KVA	$\frac{I \times E}{1000}$	$\frac{I \times E \times 1.73}{1000}$	--------
Kilowatts	$\frac{I \times E \times PF}{1000}$	$\frac{I \times E \times 1.73 \times PF}{1000}$	$\frac{I \times E}{1000}$
Horsepower	$\frac{I \times E \times \%EFF \times PF}{746}$	$\frac{I \times E \times 1.732 \times \%EFF \times PF}{746}$	$\frac{I \times E \times \%EFF}{746}$
Amperes (when HP is known)	$\frac{HP \times 746}{E \times \%EFF \times PF}$	$\frac{HP \times 746}{1.73 \times E \times \%EFF \times PF}$	$\frac{HP \times 746}{E \times \%EFF}$
Amperes (when kW is known)	$\frac{KW \times 1000}{E \times PF}$	$\frac{KW \times 1000}{1.73 \times E \times PF}$	$\frac{KW \times 1000}{E}$
Amperes (when KVA is known)	$\frac{KVA \times 1000}{E}$	$\frac{KVA \times 1000}{1.73 \times E}$	--------

Guide to Standard Uints	
Kilo Volt Amperes	kVA
KiloWatts (1000 watts = 1 kW)	kW
Ampere (Volt-Amperes or Current)	I
Volts	E
Power Factor	PE
Percent Efficiency	%EFF
Horse Power	HP

A very useful power conversion calculator is located on the following website:
www.dieselserviceandsupply.com/Power_Calculator.aspx

Power Consumption Chart

This chart is provided as an example as to how wattage varies between various electrical devices. It is not meant to be a strict guide to calculate your requirements. For the most accurate calculations refer to the owners manual of each device, tool, appliance, etc., or most preferably, consult a professional electrician:

Item	Starting Wattage (W)	Running Wattage (W)
Circular Saw	2400	1200
Drill	1800	720
Edger	2400	960
Electric Chainsaw	2400	1200
Electric Lawn Mower	4320	1440
Electric Pressure Washer	3600	1200
Electric String Trimmer	1500	600
Jig Saw	1800	720
Miter Saw	2100	840
Orbital Sander	1800	600
Paint Sprayer	1080	360
Planer	2400	960
Router	1500	600
Water Pump	3000	1000
Wet/Dry Vacuum	2500	888
Winch	5400	1800
Furnace Fan, gas/fuel oil furnace		
1/8 horsepower (hp)	500	300
1/6 horsepower (hp)	750	500
1/4 horsepower (hp)	1000	600
2/5 horsepower (hp)	1400	700
3/5 horsepower (hp)	2350	875
Central Air Conditioner		
10,000 BTU	2200	1500
20,000 BTU	3300	2500
24,000 BTU	4950	3800
32,000 BTU	6500	5000
40,000 BTU	6700	6000
1/4' Drill	300	300
Jigsaw	300	300
Electric Weed Trimmer	500	500
Belt Sander	1000	1000
Disc Sander	1200	1200
Chain Saw	1200	1200
Worm Drive Saw	3100	1560
12' Concrete Cutter	3600	1800
7 1/4' Circular Saw	3000	1500
Disc Grinder	4000	2000
Air Compressor (Average)	4000	2000

kVa/kW Amperage Chart

This chart estimates the output amperage of a generator based on the operating power and voltage. Please note that this table is intended to be used as an estimate of how many amps a generator outputs during operation and is not an exact representation due to various factors that can increase or decrease this value.

80 % Power Factor

kVa	kW	208V	220V	240V	380V	400V	440V	450V	480V	600V	2400V	3300V	4160V
8	6.3	**17.5**	16.5	15.2	9.6	9.1	8.3	8.1	**7.6**	6.1			
9.4	7.5	**26.1**	24.7	22.6	14.3	13.6	12.3	12	**11.3**	9.1			
12.5	10	**34.7**	33	30.1	19.2	18.2	16.6	16.2	**15.1**	12			
18.7	15	**52**	49.5	45	28.8	27.3	24.9	24.4	**22.5**	18			
25	20	**69.5**	66	60.2	38.4	36.4	33.2	30.1	**24**	6	4.4	3.5	
31.3	25	**87**	82.5	75.5	48	45.5	41.5	40.5	**37.8**	30	7.5	5.5	4.4
37.5	30	**104**	99	90.3	57.6	54.6	49.8	48.7	**45.2**	36	9.1	6.6	5.2
50	40	**139**	132	120	77	73	66.5	65	**60**	48	12.1	8.8	7
62.5	50	**173**	165	152	96	91	83	81	**76**	61	15.1	10.9	8.7
75	60	**208**	198	181	115	109	99.6	97.5	**91**	72	18.1	13.1	10.5
93.8	75	**261**	247	226	143	136	123	120	**113**	90	22.6	16.4	13
100	80	**278**	264	240	154	146	133	130	**120**	96	21.1	17.6	13.9
125	100	**347**	330	301	192	182	166	162	**150**	120	30	21.8	17.5
156	125	**433**	413	375	240	228	208	204	**188**	150	38	27.3	22
187	150	**520**	495	450	288	273	249	244	**225**	180	45	33	26
219	175	**608**	577	527	335	318	289	283	**264**	211	53	38	31
250	200	**694**	660	601	384	364	332	324	**301**	241	60	44	35
312	250	**866**	825	751	480	455	415	405	**376**	300	75	55	43
375	300	**1040**	990	903	576	546	498	487	**451**	361	90	66	52
438	350	**1220**	1155	1053	672	637	581	568	**527**	422	105	77	61
500	400	**1390**	1320	1203	770	730	665	650	**602**	481	120	88	69
625	500	**1735**	1650	1504	960	910	830	810	**752**	602	150	109	87
750	600	**2080**	1980	1803	1150	1090	996	975	**902**	721	180	131	104
875	700	**2430**	2310	2104	1344	1274	1162	1136	**1052**	842	210	153	121
1000	800	**2780**	2640	2405	1540	1460	1330	1300	**1203**	962	241	176	139
1125	900	**3120**	2970	2709	1730	1640	1495	1460	**1354**	1082	271	197	156
1250	1000	**3470**	3300	3009	1920	1820	1660	1620	**1504**	1202	301	218	174
1563	1250	**4350**	4130	3765	2400	2280	2080	2040	**1885**	1503	376	273	218
1875	1500	**5205**	4950	4520	2880	2730	2490	2440	**2260**	1805	452	327	261
2188	1750			5280	3350	3180	2890	2830	**2640**	2106	528	380	304
2500	2000			6020	3840	3640	3320	3240	**3015**	2405	602	436	348
2812	2250			6780	4320	4095	3735	3645	**3400**	2710	678	491	392
3130	2500			7520	4800	4560	4160	4080	**3765**	3005	752	546	435
3750	3000			9040	5760	5460	4980	4880	**4525**	3610	904	654	522
4375	3500			10550	6700	6360	5780	5660	**5285**	4220	1055	760	610
5000	4000			12040	7680	7280	6640	6480	**6035**	4810	1204	872	695

Approximate Fuel Consumption Chart

This chart approximates the fuel consumption of a diesel generator based on the size of the generator and the load at which the generator is operating at. Please note that this table is intended to be used as an estimate of how much fuel a generator uses during operation and is not an exact representation due to various factors that can increase or decrease the amount of fuel consumed.

Generator Size (kW)	1/4 Load (gal/hr)	1/2 Load (gal/hr)	3/4 Load (gal/hr)	Full Load (gal/hr)
20	0.6	0.9	1.3	1.6
30	1.3	1.8	2.4	2.9
40	1.6	2.3	3.2	4.0
60	1.8	2.9	3.8	4.8
75	2.4	3.4	4.6	6.1
100	2.6	4.1	5.8	7.4
125	3.1	5.0	7.1	9.1
135	3.3	5.4	7.6	9.8
150	3.6	5.9	8.4	10.9
175	4.1	6.8	9.7	12.7
200	4.7	7.7	11.0	14.4
230	5.3	8.8	12.5	16.6
250	5.7	9.5	13.6	18.0
300	6.8	11.3	16.1	21.5
350	7.9	13.1	18.7	25.1
400	8.9	14.9	21.3	28.6
500	11.0	18.5	26.4	35.7
600	13.2	22.0	31.5	42.8
750	16.3	27.4	39.3	53.4
1000	21.6	36.4	52.1	71.1
1250	26.9	45.3	65.0	88.8
1500	32.2	54.3	77.8	106.5
1750	37.5	63.2	90.7	124.2
2000	42.8	72.2	103.5	141.9
2250	48.1	81.1	116.4	159.6

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