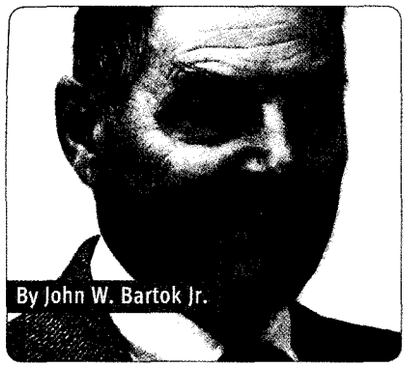
From Forest Nursery Notes, Summer 2008

60. Be prepared with standby power equipment. Bartok, J. W., Jr. Greenhouse Management and Production 28(7):90-91. 2008.

A BACKUP POWER SUPPLY CAN BE NECESSARY.



Be prepared with standby power equipment

WHEN WAS THE LAST TIME you tested your standby power alternator? Do you have standby power? It's surprising the number of growers who don't have a backup unit.

A backup power supply is necessary for a greenhouse operation to keep essential equipment operating when the utility power is interrupted. Interruptions of more than a few minutes during a cold winter night or hot summer day will allow the temperature to exceed acceptable limits.

Alternator types

A good selection of standby power generating equipment is available. Alternators can be classified as engine driven or tractor driven. Engine-driven units are self-contained with the engine integral with the generator. These can be portable in sizes up to about 15 kilowatts or pad mounted above that size. Smaller portable units are usually hand-carried and larger ones mounted on wheels.

Engines are available that are powered by gasoline, LP gas or diesel fuel. LP gas units tend to burn cleaner and require less maintenance. Diesel units cost more but have a longer life. When selecting a unit consider the type of fuel that is normally available at the greenhouse. Water-cooled engines are usually supplied with generators over 15 kilowatts.

Tractor powered alternators have a lower initial cost because they don't require an integral power source. A tractor, large enough to power the unit should be available at all times. Generally it requires 2½ horsepower of engine capacity for each 1,000 watts of generator capacity. The unit is connected to the tractor through the power take-off or by V-belts. Accurate control of tractor speed with a tachometer is essential to maintain the 1,800 or 3,600 revolutions per minute needed.

Proper voltage is essential for safe operation of electrical equipment. Most large alternators are available with multiple voltages. Common voltages are 120/240. Some units will provide both single and 3-phase power.

Alternators are usually rated for continuous duty and load. Heavy-duty units will take considerable intermittent overload that helps in starting larger motors. Most alternators manufactured today utilize solid state diodes to eliminate brushes on the commutator.

Generation location

Locate a generator near the electric distribution panel. Portable units can be stored indoors and then moved outside when backup power is needed. Quick connect wiring of adequate size should be provided.

Permanently mounted units are generally located in a building for weather protection. Adequate ventilation is needed for engine heat removal. The exhaust must be vented outside and the pipe kept at least 6 inches from combustible material. A muffler will keep exhaust noise at an acceptable level.

Sizing the system

A standby generator can be sized to power all the equipment at a nursery or just the essential equip-

Starting and running requirements for 60-cycle, single-phase motors

Motor horsepower rating	Watts required to start*		Watts required to run (full load)
	Split phase	Capacitor start**	
⅙	860		215
¼	1,500	1,200	300
⅓	2,000	1,600	400
½		2,300	575
¾		3,345	835
1		4,000	1,000
1½		6,000	1,500
2		8,000	2,000
3		12,000	3,000
5		18,000	4,500
7½	15,100*** to 28,000	28,000	7,000
10	81,900 to 36,000	36,000	9,000

* Adapted from Cornell Extension Bulleting 879.

** Reduce 25 percent for repulsion induction motors.

*** Soft start motors.

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ment that needs to be operated when a power interruption occurs. Full load systems are expensive.

Two lists of the essential electrical equipment should be made; one for equipment operated during summer and one for winter. Summer equipment includes all fans and vent motors. Winter equipment includes furnaces and boilers. The list should contain the size, type, horsepower and phase of all motors.

It usually takes four to six times as much power to start a motor as it does to run it. Check motors that must be operated during a power interruption. Also list the nameplate wattage of all equipment and the wattage of all lights.

Discuss your needs with the electric supplier's agricultural operations representative as well as a couple of standby generator suppliers. Most companies have a computer program to determine the size of unit needed. Before purchasing a unit, have your electrician work up a wiring plan to connect the unit to your present electric service and distribution system.

Generator installation

Except for a small standby generator that you can plug in a few lights or small motor, all units should be connected to the electrical distribution box by a transfer switch. This transfers or changes the source of electricity being used from the power company wires to the standby unit. It protects power company employees from feedback that could endanger their safety.

A system transfer switch has the same ampere rating as the distribution box switch and allows the operation of any circuit up to the output capacity of the generator. There are also transfer switches that limit the operation to a few important circuits. These are less expensive but require more wiring. Installation must be in accordance with the National Electrical Code.

Although a standby electrical system can be made completely automatic, these are not very common in most greenhouse operations. They are considerably more expensive and require an engine starting control and automatic load transfer control. Unless the equipment controlled has to be operated continuously, a manual system and telephone dialer alarm usually work well. An automatic system has to be sized to start all the motors that may be in operation at one time or have time delay relays installed.

Generator operation

An operating procedure should be developed for use during an emergency. Before starting the generator, shut off all electrical equipment. Place the transfer switch in the position to operate the generator. After the unit is started check the voltage. Then place the essential equipment into operation starting with the largest motor first.

If you already have a system in place, have you started it recently? A strict maintenance schedule should be followed so that the generator will always be ready to operate. Exercise the equipment at least once a month under load and keep a record of the testing dates. Store extra fuel in a safe place. Train someone else to operate the unit in the event of a power interruption in your absence. Be sure that power interruption and high-low temperature alarms are in good operating condition.

Although power companies try to restore electrical service as rapidly as possible after an interruption, there are times when the outage can last for several hours or longer. A small investment in emergency generating equipment is good insurance to cover these times.

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