



2014 Rhode Island Farm Energy Survey

Commissioner Marion S. Gold, Ph.D.



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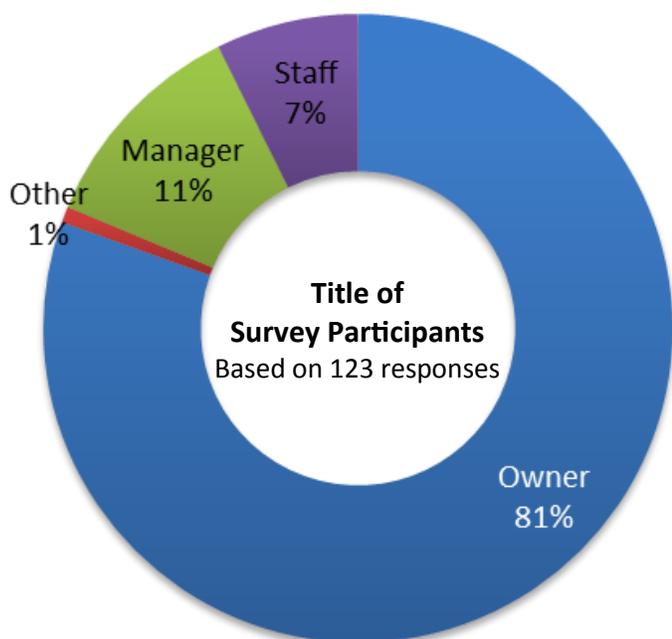
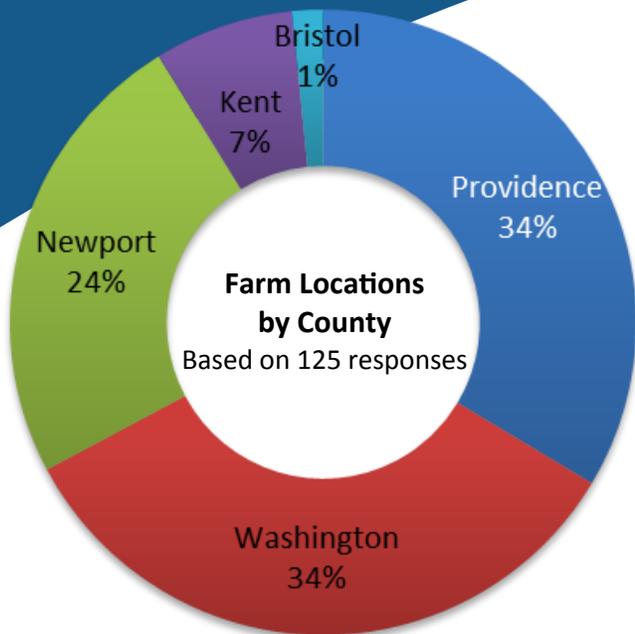


RHODE ISLAND FARM ENERGY SURVEY EXECUTIVE SUMMARY

The goal of this survey was to assess the interest in and need for a farm-specific energy efficiency program in Rhode Island. A total of 125 surveys (approximately 10% of Rhode Island farms) were completed either online or via phone interviews. Each interview took approximately 10 to 15 minutes to complete and most were conducted with farm owners and managers.

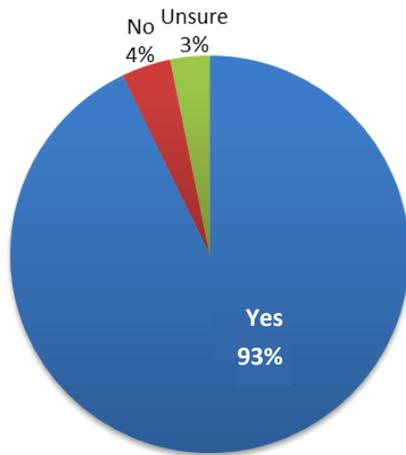
The survey indicates high farmer interest in energy efficiency and renewable energy. In addition, it pinpoints the following as the most widely acknowledged energy consuming systems on Rhode Island farms: refrigeration, ventilation, irrigation, and heating. Moreover, it shows that more than half of those surveyed rely on delivered fuels, such as oil and propane, to operate their business. This suggests that both thermal and electrical savings are likely to benefit Rhode Island farms through operating cost reductions. However, the survey also identifies initial program costs and long payback periods as major obstacles to farmer participation.

- ◆ Surveys were collected from each county in Rhode Island.
- ◆ The majority of surveys were completed by individuals that make both financial and operational decisions, with 'owners' accounting for 80% of responses.
- ◆ It is clear from the sample that vegetables, along with greenhouse plants and flowers, dominate the Rhode Island farming sector. However, the survey also showed a large diversity of operations and products.



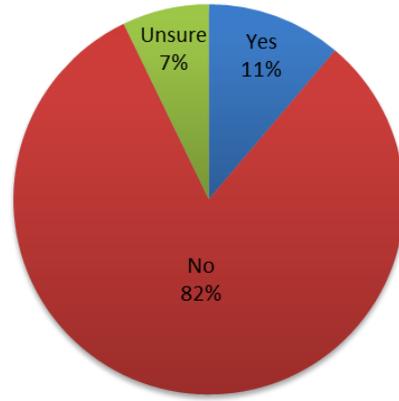
Farm Products	% Farms
Vegetables	32.8%
Nursery Plants & Flowers	24.8%
Beef Cattle	20%
Sheep, Goats, Pigs, Alpacas	12%
Poultry	8.8%
Fruit	8%
Hay/Corn for Silage	8%
Dairy	7.2%
Christmas Trees	6.4%
Eggs	5.6%
Herbs	5.6%
Shellfish	5.6%
Other	4.8%
Horses	4%
Educational/Non-profit Farm	3.2%
Honey Bee Products	2.4%
Jams, Jellies	2.4%
Wood/Timber	1.6%
Wine Grapes	1.6%
Turf	1.6%
Mushrooms	1.6%
Dogs	1.6%
Maple Syrup	0.8%
Hops	0.8%

*Does not sum to 100% because Rhode Island farms often produce multiple products



Do you get your electricity from National Grid?

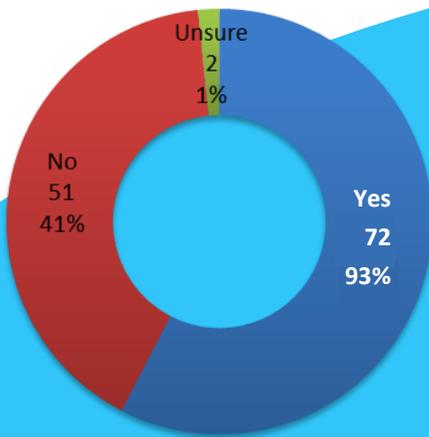
Based on 125 responses



Are you connected to the natural gas line?

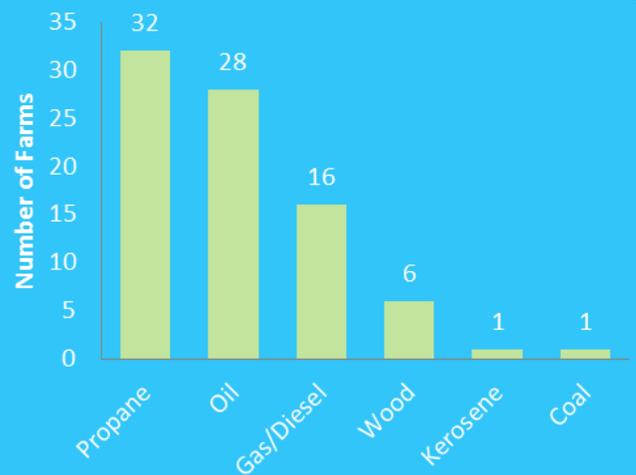
Based on 125 responses

- ◆ Most Rhode Island farmers get electricity from National Grid, but don't have access to the natural gas line.



Do you use other fuels on your farm?

Based on 125 responses



If yes, what fuels do you use?

Based on 72 responses

- ◆ 58% of the farmers surveyed rely on fuels other than natural gas for their operations, and 48% of those farmers rely on oil and propane. Most of the fuels are primarily used for space heating and water heating.

What are the fuels used for?

Based on 72 responses

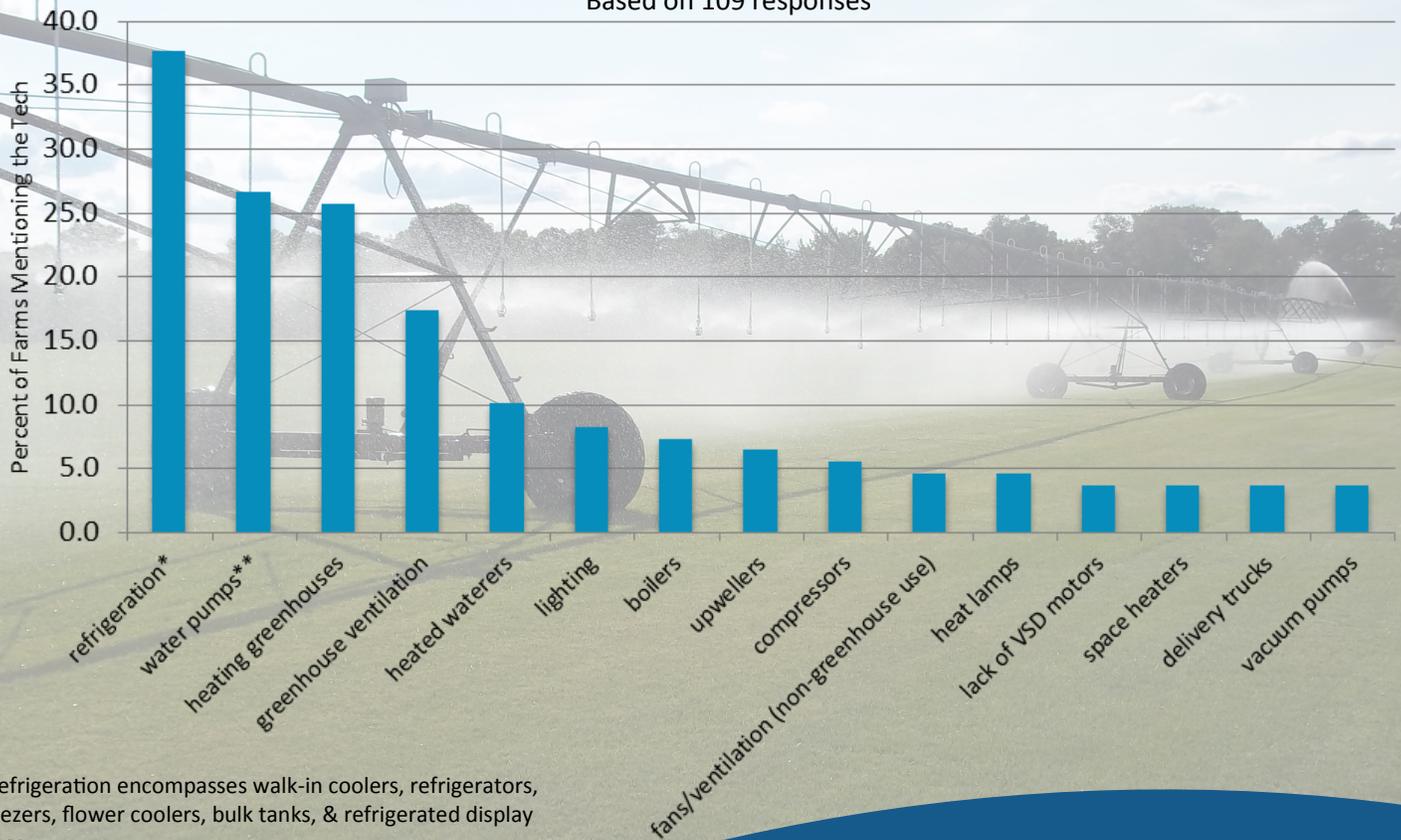
(Chart shows percent of farms using a particular fuel for each category)

	Propane	Oil	Gas/Diesel	Wood	Kerosene	Coal
Space Heat	62.5%	82.1%	-	83.3%	100.0%	100.0%
Hot Water	12.5%	14.3%	-	16.7%	-	-
Transportation & Tractors	3.1%	-	87.5%	-	-	-
Motors/Pumps/Generators	9.4%	-	50.0%	-	-	-
Cooking	9.4%	-	-	-	-	-
Sap Evaporator	-	3.6%	-	-	-	-
Not Specified	3.1%	-	-	-	-	-

ENERGY CONSUMPTION BY FARM TECHNOLOGIES

What *technologies* do you think are consuming the most energy on your farm?

Based on 109 responses



*Refrigeration encompasses walk-in coolers, refrigerators, freezers, flower coolers, bulk tanks, & refrigerated display cases

**Water pumps encompass irrigation, hydroponic, and animal watering uses

Other technologies mentioned less than 3% of the time:

Technologies	% of Surveys
HVAC system	2.8%
grow lights	2.8%
generators on boats	2.8%
stoves/ovens	2.8%
electric fencing	1.8%
electric heating tank for honey	1.8%
chick brooder	1.8%
humidifiers	1.8%
tractors	1.8%
oil burner for evaporator	0.9%
computers	0.9%
ice machines	0.9%
commercial corn drier	0.9%
electric egg washer	0.9%
deicer pumps	0.9%
grinders for apples	0.9%
wax melters	0.9%
heat guns	0.9%
pumps to move sap	0.9%
pumps to move honey	0.9%

- ◆ The survey data identify refrigeration, water movement, and greenhouse climate control technology as the largest energy consumers on Rhode Island farms.
- ◆ Other technologies were brought to our attention through the survey. However, their demand appeared to be too low to support their conversion to prescriptive energy efficiency farm measures. Nevertheless, some of these other measures ought to be considered during custom energy audits.

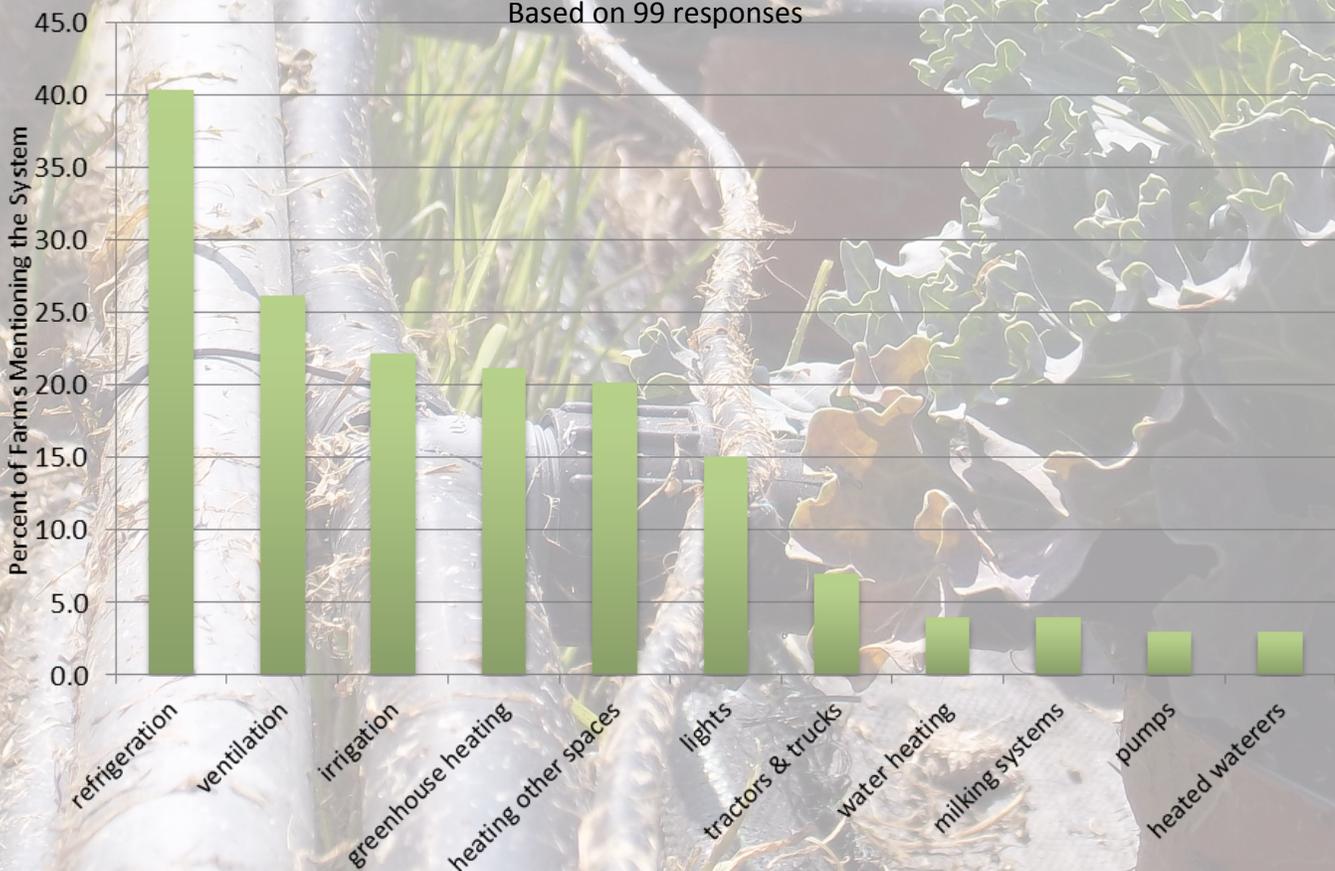
ENERGY CONSUMPTION BY FARM PRODUCTION SYSTEMS

- ◆ Once again, most of the less frequently mentioned energy-consuming systems should be considered during custom energy audits. However, they are not common enough to support the creation of prescriptive measures within an energy program.
- ◆ The top energy consumers appear to be refrigeration, ventilation, irrigation, and space heating (for both greenhouses and other farm buildings).

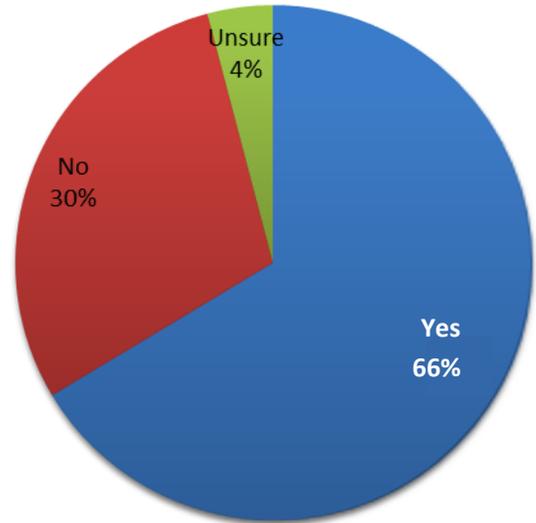
Other systems mentioned less than 3% of the time (based on 99 responses):

Systems	% of Time Mentioned
lack of 3 phase power	2.0%
insulation	2.0%
maple syrup production	2.0%
electric fencing	1.0%
ice production	1.0%
heat mats	1.0%
humidity control	1.0%
melting wax	1.0%

What systems do you think are consuming the most energy on your farm?
Based on 99 responses

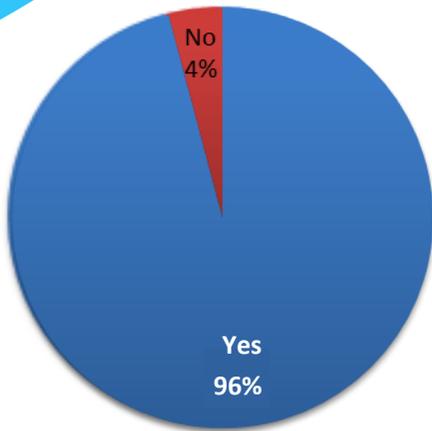


66% of Rhode Island farmers are interested in participating in an energy efficiency program. However, most of them will only participate if the audit/assessment is free.



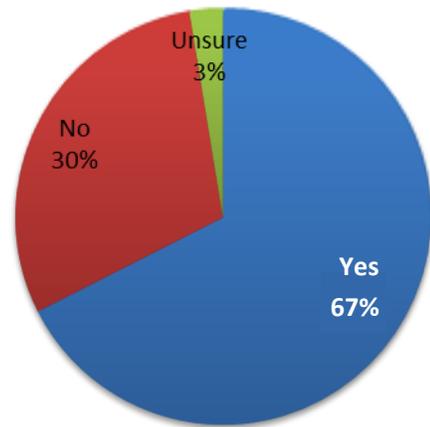
Would you be interested in participating in a farm-specific energy efficiency program?

Based on 122 responses



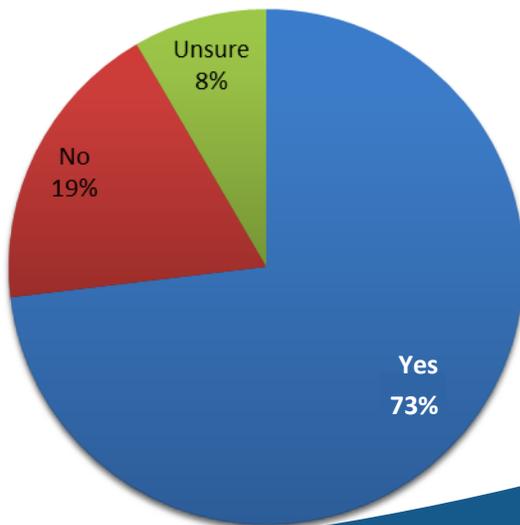
Would your participation be dependent on upfront program cost?

Based on 121 responses



Would you only participate if the program was free?

Based on 117 responses



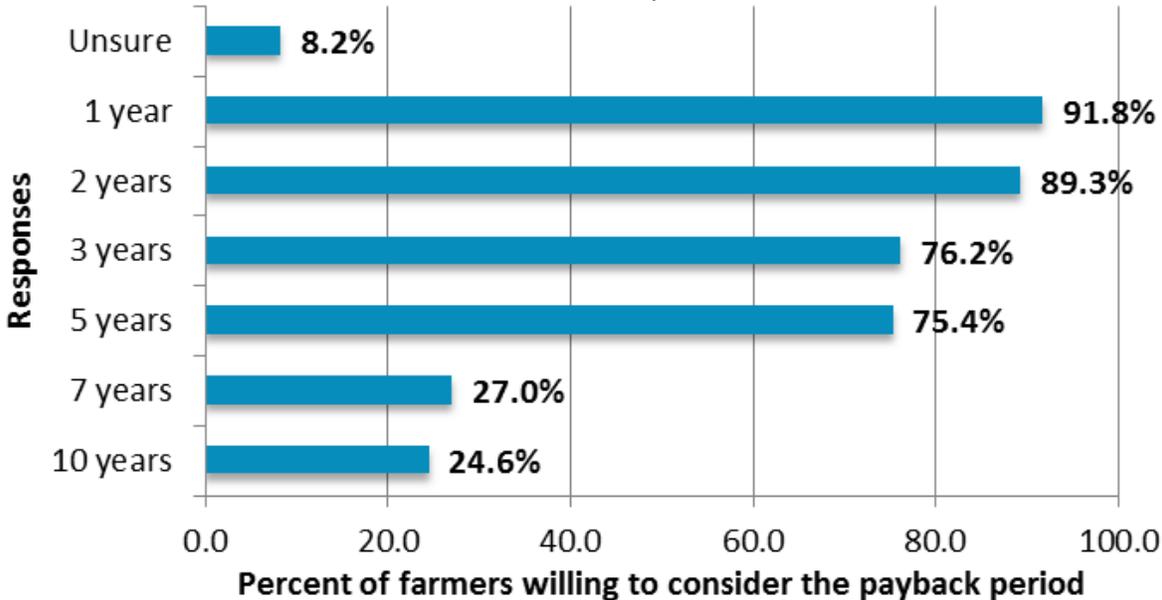
Would you be more likely to participate if the program improved your chances of receiving federal or state funding for renewable energy projects?

Based on 119 responses

73% of Rhode Island farmers would value increased access to renewable energy project funds.

When considering implementing an energy efficient measure, what would be an acceptable payback period for you and your business?

Based on 122 responses

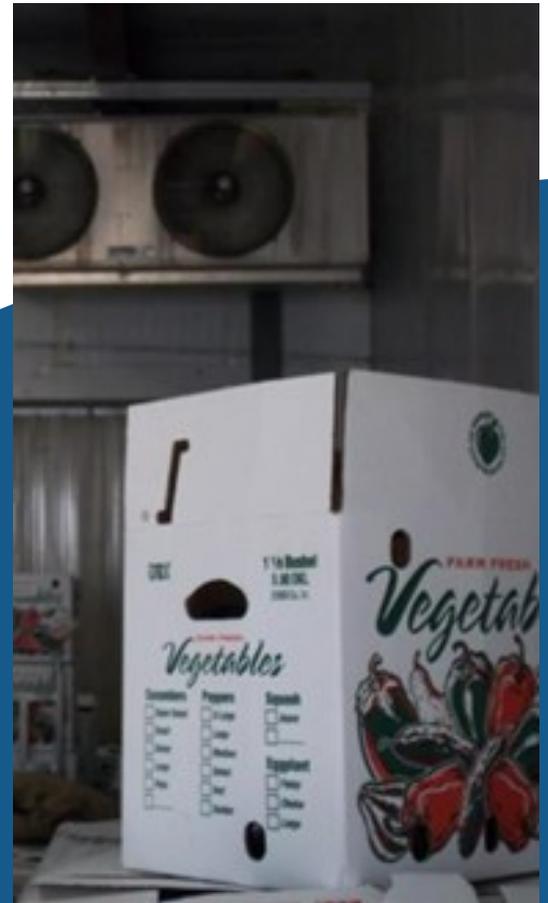


The majority of Rhode Island farmers are only comfortable with investments in energy efficiency measures that have a five year payback period or less.

Are there any particular technologies that you think we should incentivize?

Based on 63 responses

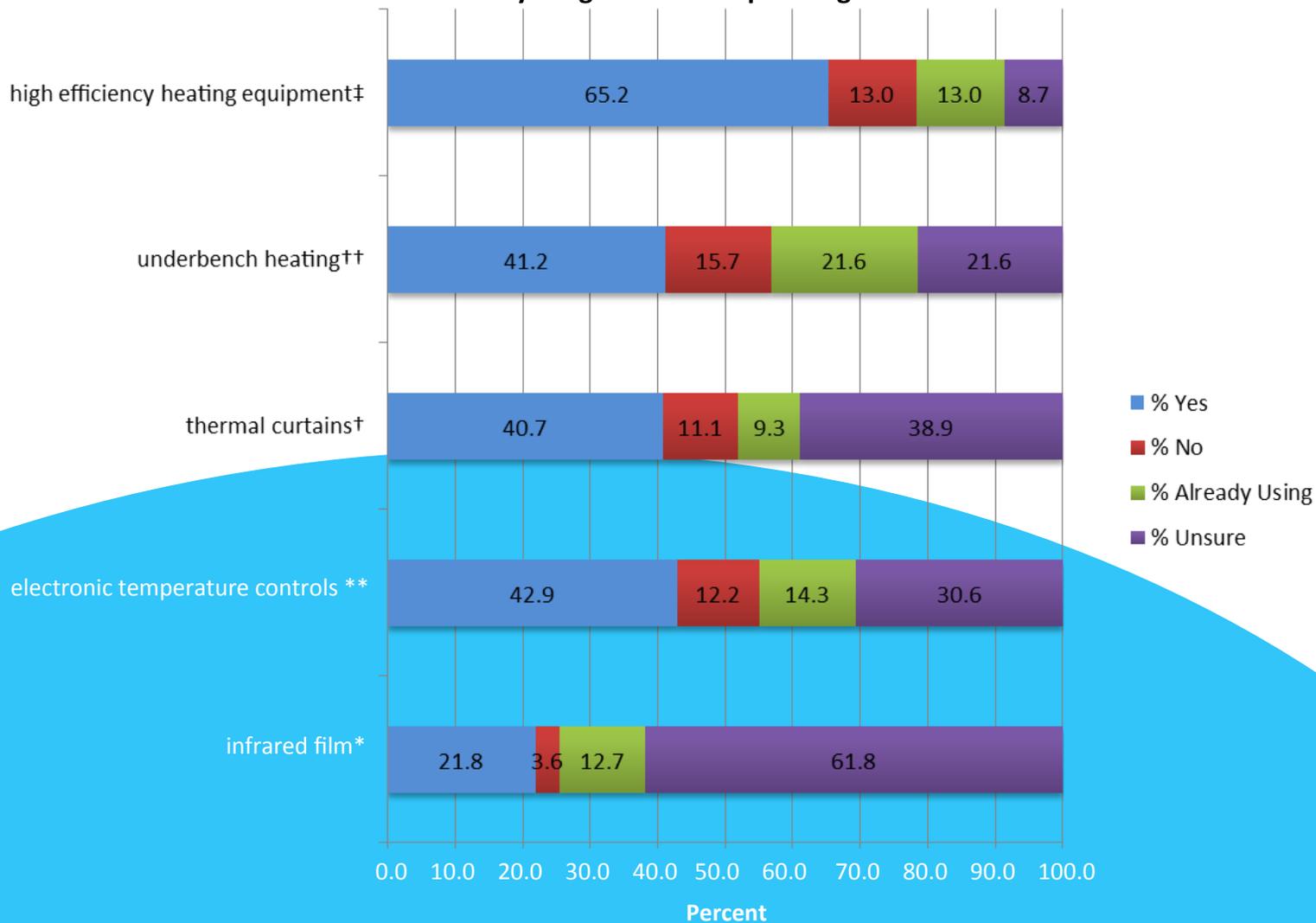
Technologies	% of Time Mentioned
solar panels	39.7%
wind turbines	25.4%
solar thermal	6.3%
lighting	6.3%
geothermal	4.8%
irrigation systems	4.8%
rainwater collection	4.8%
electric tractors	3.2%
automatic roll-up sides for greenhouses	3.2%
3 phase power	3.2%
wood burning stove	3.2%
computer controls with sensors for climate control	3.2%
anaerobic digesters	3.2%
heat pumps	3.2%



Renewable energy technologies appear to be popular among Rhode Island farmers. **Solar panels** are shown to be strongly favored over wind power. However, efficiency measures including **lighting and water management** systems are also of interest to farmers.

At the start of this survey, several greenhouse measures were being considered for inclusion in the farm energy efficiency program. Therefore, interest, knowledge, and current usage of these technologies were gauged through the following question:

If you have a greenhouse, do you think the following technologies would help to reduce your greenhouse operating costs?



‡Based on 46 responses
 **Based on 49 responses

††Based on 51 responses
 *Based on 55 responses

† Based on 54 responses

High efficiency heating equipment is the most widely accepted energy efficient technology for greenhouses. However, none of the technologies were met with strong negative reactions. Most Rhode Island farmers are willing to consider all of the suggested measures.





CONCLUSION

This survey engaged a wide variety of Rhode Island farms – from small-scale dairies to medium-scale horticulture to poultry farms and more. While there was diversity in production, there was agreement around two key points: farmers are interested in programs to improve their electric and thermal energy efficiency, but potentially high upfront costs and long-term financing are the biggest barriers preventing participation.

As a state with a thriving and growing agriculture industry, and one of the top energy efficiency programs in the country, Rhode Island is well-positioned to tackle these obstacles. The Office of Energy Resources (OER) plans to partner with National Grid, Commerce RI, the Farm Energy Program, and other stakeholders to design an energy efficiency program that more fully meets the needs of local farmers. The program will focus on widely applicable prescriptive measures with low initial cost and quick payback periods. In launching the program, OER will support the development of a strategic communications plan to better inform Ocean State farmers about current energy-related opportunities, such as the USDA Rural Energy for America Program, the NRCS Agriculture Energy Management Plan program, and Rhode Island’s Renewable Energy Fund.



STATE OF RHODE ISLAND

OFFICE OF ENERGY RESOURCES

The Office of Energy Resources works closely with private and public stakeholders to increase the reliability and security of our energy supply, reduce energy costs and mitigate price volatility, and improve environmental quality.

Rhode Islanders spend over \$3 billion per year on energy to light their homes, keep the heat on, and fuel their vehicles. Fossil fuels, such as natural gas, fuel oil, and gasoline, supply the vast majority of these energy needs. By recommending and implementing smart energy policies – including those that promote energy efficiency and renewable energy – the OER helps reduce Rhode Island's dependence on these out-of-state fuels and advances our state as a national leader in the new clean energy economy.

The OER operates at the nexus of the many ongoing efforts to transform the Ocean State energy system. Some core functions of the office include:

- Developing, administering, and monitoring a variety of programs designed to promote energy efficiency, renewable energy, alternative fuels, and energy assurance.
- Offering technical assistance and funding opportunities for end-users including residents, businesses, and municipalities.
- Providing policy expertise and support related to strategic energy planning, energy assurance, and clean energy workforce development.
- Leveraging, coordinating, and aligning inter-agency, public-private, regional, and federal efforts to reach and exceed energy goals.

Supplemental Information from the 2012 Agricultural Census:

Rhode Island Farms by North American Industry Classification System (NAICS)	% of Farms
Greenhouse, nursery, and floriculture production (1114)	20.6
Animal aquaculture and other animal production (1125, 1129)	19.6
Sugarcane farming, hay farming, and all other crop farming (11193, 11194, 11199)	15.8
Beef cattle ranching and farming (112111)	12.4
Vegetable and melon farming (1112)	11.2
Poultry and egg production (1123)	7.1
Fruit and tree nut farming (1113)	5.2
Sheep and goat farming (1124)	4.3
Hog and pig farming (1122)	1.6
Dairy cattle and milk production (11212)	1.0
Oilseed and grain farming (1111)	0.6
Cattle feedlots (112112)	0.6

Rhode Island Office of Energy Resources | Becca Trietch, Energy Fellow | Formatting by Lafleche Giasson

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