

2016 Agriculture Irrigation Market Research

Bonneville
POWER ADMINISTRATION



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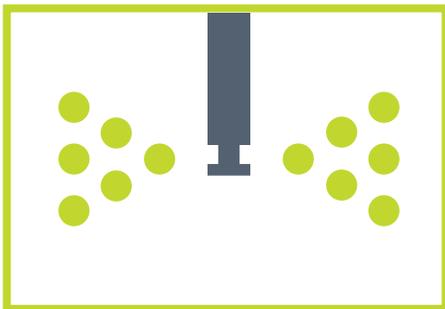
EXECUTIVE SUMMARY

This report details the research team's findings from Bonneville Power Administration's (BPA) agricultural irrigation market characterization study conducted from 2014 to 2016. It includes findings from the research team's review and characterization of the agricultural market and BPA's current agricultural program. Based on these findings, the research team identified key areas of opportunity for irrigation efficiency in the Pacific Northwest.



APPROACH

This study sought to address the following research objectives:



1. Identify the top opportunities for improving irrigation efficiency.

The primary goal of this study was for the research team to identify the top opportunities to improve irrigation energy efficiency in the Pacific Northwest.



2. Characterize the current state of the irrigation market.

This study sought to identify the current irrigation technologies and practices in the Pacific Northwest, and document the market barriers to the adoption of efficient irrigation technologies and practices.



3. Review the current state of BPA's agricultural program.

This study sought to document BPA's current agricultural program logic and desired program outcomes, and assess how the program aligns with the energy savings opportunities identified in the market research.

MARKET CHARACTERIZATION

The research team identified six key findings from the Pacific Northwest agricultural market:

The majority of irrigators in the Pacific Northwest changed from inefficient impact sprinklers to efficient rotating-type or wobbling-type sprinklers in a mid elevation sprinkler application (MESA) configuration on center pivots many years ago.

There are a variety of factors that irrigators consider when deciding what type of controls to install on a center pivot.

Dealers play a critical and influential role in the agricultural irrigation supply chain.

Current perceived barriers to efficient irrigation include water policies, terrain, and cost.

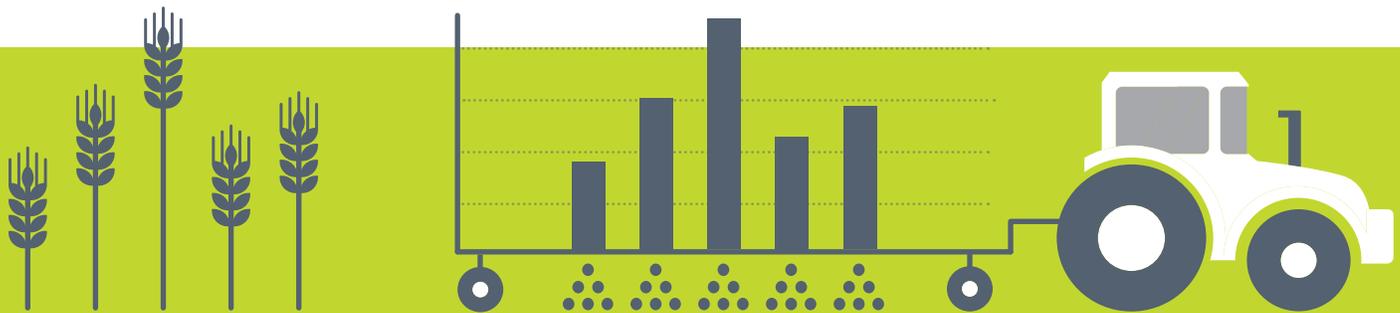
The most efficient irrigation system today is one that takes into account crop, soil type, and terrain.

Many experts believe that the future of irrigation will be data-driven.

The research team reviewed BPA's current agricultural program and identified how it aligns with the Pacific Northwest irrigation market

Desired Program Outcomes:

- Achieve the regional targets for energy savings within the agricultural sector.
Assist BPA's customer utilities in helping their agricultural customers save energy and increase efficiency.



DATA-DRIVEN IRRIGATION

Current Program Initiatives:

Agricultural Program Specialists

Employment of agricultural program specialists (APSS) who conduct direct outreach to irrigators and supplement utilities' energy efficiency staff

Outreach

Informal outreach to trade allies (e.g., manufacturers, distributors, dealers) and regional organizations involved in energy and water efficiency

Promote Efficiency

Providing marketing collateral and information resources to help promote irrigation efficiency, including an online tool that allows utilities to customize marketing materials

Collaboration

Collaboration with universities and research organizations to conduct research and demonstration projects for developing new irrigation efficiency measures like LESA and LEPA

Current Program Activity:

17.9

BPA's agriculture program saved 17.9 aMW from 2010 to 2015

SIS

Of all agriculture program end-uses, irrigation accounts for the greatest amount of savings; within the irrigation end use, scientific irrigation scheduling (SIS) contributed the majority of savings on annual basis



Washington and Oregon achieved the most SIS savings, while Idaho did not have any SIS savings in BPA's territory between 2010 and 2015

21%

BPA's program is maintaining the existing market efficiency. Seventy-nine percent of efficient sprinklers incented by BPA replace already efficient sprinklers in the market. Only 21% of the sprinkler measure savings are from efficient sprinklers replacing inefficient sprinklers.

WAYS TO INFLUENCE A MARKET



Based on the research team's characterization of the market and BPA's agriculture program, the research team identified a number of opportunities to "push" the irrigation market toward more efficient technologies and practices. This concept is in contrast to "maintaining" the market by—for example—offering to replace sprinklers in a market that has already adopted high efficiency sprinklers.

1. Focus on the Irrigation System as a Whole, Rather than Individual Components

Each farm has different irrigation needs and requires different solutions to achieve the right efficiency for the farm. This requires a focus on the entire irrigation system, incorporating low-pressure sprinklers, variable frequency drives (VFDs), controls, and other efficient irrigation hardware. The research team thinks there is an opportunity to push the market by focusing on the irrigation system as a whole when considering incentive offerings.

2. Develop a Dealer and Food Processor Trade Ally Network

Interviews with manufacturers, dealers, irrigation consultants, and other market actors revealed that irrigation dealers and food processors (who buy crops from irrigators) have a strong influence on irrigator efficiency within the market. The research team sees opportunities to formalize a trade ally network throughout the Northwest and use the influence of dealers and food processors to push the market toward increased efficiency.

3. Highlight Secondary Benefits within Marketing Materials

Interviews with dealers and irrigation consultants suggests that marketing energy efficiency as the primary benefit to upgrading equipment is good, but adding the secondary benefits to marketing collateral may increase the chances that an irrigator will upgrade their equipment. Based on this research, highlighting secondary benefits within marketing materials could push the market to take advantage of more BPA incentive offerings. BPA does include messages about the non-energy benefits of irrigation efficiency in its marketing materials, but there may be additional opportunities to focus on secondary benefits.

4. Promote Data-Based Irrigation Practices

"Farming was once intuitive. Today it is analytical and data driven." This quote comes from the October 2015 issue of Popular Science that included an article titled "The iPhone-Driven Farm." The article talked about one farmer who has automated his farm

with dozens of sensors and drone technology to track soil moisture, wind speed, and rainfall. He receives all this data on his iPhone. Based on this and other study research, the research team sees opportunities to push the market by promoting data-based irrigation practices; this could mean incentivizing controls and other tracking technologies, or providing education about data-based agriculture to the region.

5. Continue to Incentivize Motors, Pumps, and VFDs

Dealers and irrigation consultants said that while they have observed irrigators adopting VFDs on their own without program incentives, there is still a lot of room for improvement and continued incentives from BPA would help push the market. The research team found that motors, pumps, and VFDs are popular measures that are worth promoting. Continuing to incentivize these measures could help push the market to installing more measures in some instances and maintaining the market savings in other instances.

6. Consider a LESA/LEPA Program Based on Study Results

Dealers and manufacturers said that only 1%-2% of center pivot sprinkler packages sold in the Pacific Northwest are designed for low elevation spray application (LESA) or low energy precision application (LEPA), yet the Council's Seventh Plan calculated that 15% of the region's agricultural cumulative technically achievable savings in 2035 are available from LESA/LEPA systems. To push the market, the research team recommends that BPA review the results of the current LESA demonstration project and determine the extent to which the technology could achieve savings in BPA's territory.



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