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## Agricultural Energy Information Needs of Cooperative Extension Agricultural Agents and Their Clientele

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**Abstract:** *A nationwide survey of Extension agricultural agents was conducted to determine interests and educational needs related to energy and agriculture. Their highest ranked interests were renewable energy (wind, solar), farm system conservation and efficiency, and biodiesel. They perceived their clientele's greatest interests in biodiesel, wind energy, farm system conservation and efficiency, and solar energy. Regional differences were found, but similar interests included renewables, conservation and efficiency, and inputs (feedstocks) rather than outputs (end products) and processes. The results identify and prioritize informational needs and are useful for planning future educational training and developing educational materials on farm energy topics.*

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### Introduction

Over the past decade petroleum costs have increased, affecting agricultural and horticultural production costs for fuel, fertilizer, electricity, and other essential inputs. By 2008, a historic peak in petroleum prices once again raised significant concerns related to agricultural energy (Muhammad & Kebede, 2009). As a result, "exponential" interest in and need for information by farmers and ranchers occurred. What information was needed by Extension personnel to increase their own

knowledge on farm energy related topics? What were the informational needs and interests of their clientele? What topics were most relevant to each audience, and what mechanisms for sharing this information were preferred?

Extension has the reputation of being able to develop educational programs and research-based information for emerging and rapidly changing issues. Clearly, as energy prices soared, there was an increasing need for a coordinated effort to develop and organize information, and experts to assist Extension personnel and their clientele (Fortson, 2006). The eXtension initiative ([www.eXtension.org](http://www.eXtension.org)) is one example of such efforts: an interactive, Web-based learning environment to share research-based knowledge from land-grant universities and cooperating organizations with the public. Communities of Practice (CoPs) develop informational resources and knowledge sharing tools on specific topics (Sobrero & Craycraft, 2008). To meet such needs in the area of sustainable farm energy, the Farm Energy CoP was formed in 2008 by a team of Extension professionals. The mission of the CoP was to collect, organize, and generate information for agricultural producers, Extension personnel, and information service providers to make decisions about sustainable agricultural energy that enhances farm profitability, conserves natural resources, and promote vibrant local communities.

It is imperative that needs assessment research for content and program development be conducted when developing collaborative learning environments, to make sure learners are integrally involved in determining content rather than the decision being made by others absent their input (Locke, 2006; Sobrero, 2008). Educators have used a variety of methods to collect information for a needs assessment (Etling, 1995), including survey questionnaires. The Farm Energy CoP determined a needs assessment survey of Extension professionals should be conducted with the following objectives: 1) determine personal interest and need for information in broad subject matter categories and on specific topics related to farm energy; 2) seek their perception of clientele interest in specific informational topics; and 3) determine preferred methodologies and modes for personal knowledge gain and for assisting clientele.

## **Materials and Methods**

A nationwide survey of Extension personnel holding membership in the National Association of County Agricultural Agents (NACAA) was conducted in 2008 to determine their interests and educational needs related to agricultural energy. The survey was comprised of the following three questions:

1. Choose priority subjects of personal interest or need from 30 informational topics under five broad agricultural energy categories.
2. Indicate our perception of clientele's priority interests or needs in these same 30 informational topics.
3. Choose preferred modes of information sharing to assist with Farm Energy CoP eXtension site development.

The survey was conducted between August 5 and September 23, 2008, and was distributed electronically via Zoomerang™ to 3230 NACAA members. After the initial distribution, reminder e-mails were sent 1, 3, and 5 weeks later to non-respondents using a modified survey method (Dillman, 2007). The number of respondents was 1,355, and the response rate was 41.95%. The responses came from 47 states (none from CT, MA, and RI). Using USDA and NACAA region designations, 11% of the respondents were from the North East, 33% from the North Central, 44% from the South, and 12% from the West. As for survey response rate within each region, 51% of the North East region's membership, 64% of the North Central's, 33% of the South's, and 42% of the West's membership completed the survey.

## **Results and Discussion**

### **Farm Energy Informational Topic Interests**

Survey respondents were asked to select three of 30 farm energy related informational topics that are of most interest to them and to their clientele. The 30 informational topics were identified under five broad informational categories developed by the Farm Energy CoP to provide structure and content focus for the eXtension website. Specifically the categories included farm conservation and efficiency, biofuel feedstocks, biofuel processes, biofuel end products, and renewable energy. The 30 informational topics under these categories are listed below (Table 1).

**Table 1.**  
Farm Energy Informational Categories and Topics

<b>Informational Categories</b>	<b>Informational Topics</b>
	Farm Building

Conservation and Efficiency	Farm Equipment
	Farm System (reduced tillage, nutrient recycling, etc.)
	Food System (local food, food miles, etc.)
	Greenhouse
	Irrigation
Biofuel Feedstocks	Algae
	Animal Wastes
	Crop Residues
	Grasses
	Grains
	Oil Seed Crops
	Starch
	Sugar Crops
	Wood and Woody Biomass
Biofuel Processes	Anaerobic Digestion
	Combined Heat and Power
	Combustion
	Enzymatic Processes
	Fermentation
	Thermochemical
Biofuels End Products	Biodiesel
	Biogas
	Electricity
	Ethanol and Other Alcohols
	Solid Biomass
	Geothermal

Renewable Energy	Hydropower
	Solar Energy
	Wind Energy

A list of the top 10 topics of most interest to Extension personnel and their perception of clientele interest and need is provided in Table 2. The highest ranked topics of most interest to Extension agricultural agents (based on the percentage of respondents selecting each topic) were: 1) wind energy, 2) solar energy, and 3) farm system efficiency and conservation and 4) biodiesel. The highest ranked topics perceived as of greatest interest and need of their clientele were: 1) biodiesel, 2) wind energy, and 3) farm system efficiency and conservation and 4) solar energy. Noted is that for nine of the 10 topics, survey respondents indicated their interest and need were similar to their perceptions of clientele interest and need. The only differences were the topics of food system conservation and efficiency for Extension personnel and irrigation for their clientele. The study did not pursue why this congruency occurred; however, it might signal that the two audiences share similar interests or that the educator's perception of what information their clientele need is influenced or represented by their own needs and interests.

**Table 2.**

Top 10 Informational Topics of Most Interest to Extension Agricultural Agents and Their clientele. Ranked by Percentage of Total Survey Respondents Selecting the Topic

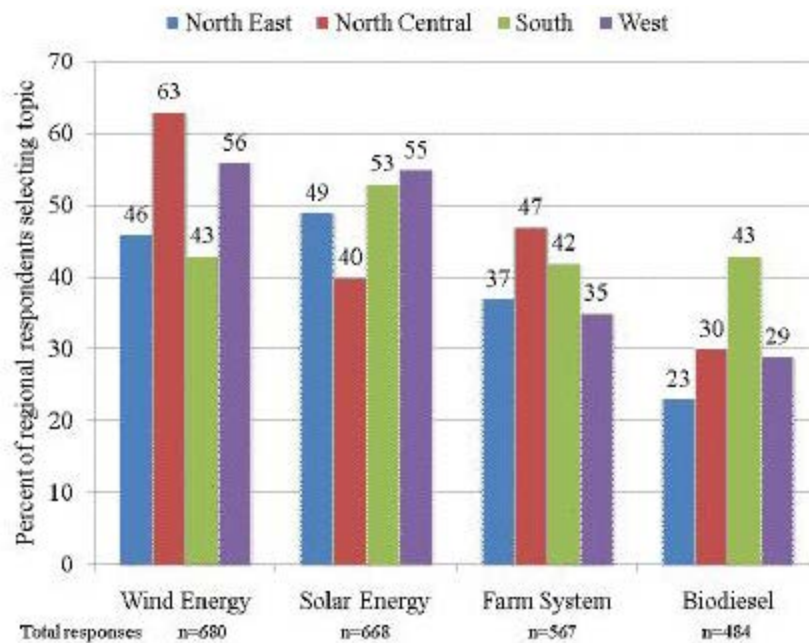
Rank by response rate	Extension		Clientele	
	Topic	% of respondents selecting topic	Topic	% of respondents selecting topic
1	Wind Energy	50	Biodiesel	48
2	Solar Energy	49	Wind Energy	45
3	Farm System Conservation and Efficiency	42	Farm System Conservation and Efficiency	44

4	Biodiesel	36	Solar Energy	40
5	Grasses	31	Ethanol and Other Alcohols	36
6	Ethanol and Other Alcohols	30	Farm Equipment Conservation and Efficiency	33
7	Food System Conservation and Efficiency	29	Crop Residues	30
8	Crop Residues	28	Grasses	29
9	Farm Equipment Conservation and Efficiency	27	Animal Wastes	25
10	Animal Wastes	26	Irrigation	24

Data for the top four ranked topics selected by Extension agricultural agents is graphically by region is presented in Figure 1. For agents in the North Central and West regions, wind energy was of greatest interest. Solar energy was of lesser interest in the South, while farm system conservation and efficiency were of greater interest in the North Central and South regions than in the other two regions. Biodiesel was of greatest interest to survey respondents from the South.

**Figure 1.**

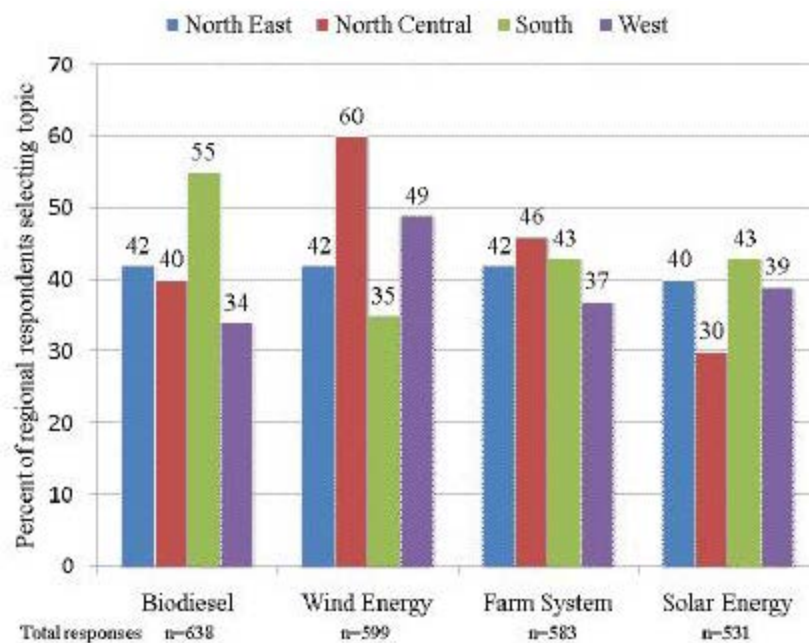
Response Rate by U.S. region for the Four Top-Ranked Informational Topics of Interest or Need of Extension Agricultural Agents



Data for the top four ranked topics for clientele as perceived by agricultural agents is graphically presented by region in Figure 2. Biodiesel was of greatest perceived interest or need by clientele in the South region, and wind energy of greater interest in the North Central and South regions. Farm conservation and efficiency were of nearly equal interest in all four regions, while solar energy was of lesser interest or need to clientele in the North Central region.

**Figure 2.**

Response Rate by U.S. region for the Four Top-Ranked Informational Topics of Perceived Clientele Interest or Need by Extension Agricultural Agents





### Farm Energy Informational Topic Interests Within Regions

Survey data were sorted in order to determine information interests specific to each of the four geographical regions. As previously noted, the interests of Extension agricultural agents were similar to those they perceived as of interest and need of their clientele. In the North East (Table 3), the emphasis was renewable energy sources (solar, wind) and conservation and efficiency (farm systems and food systems). Biofuels were the highest priority for the clientele but not for Extension personnel, perhaps because they already have adequate resources to meet this clientele interest.

**Table 3.**

Rank of Topics of Most Interest to Extension Personnel and Their Clientele, North East Region

Rank	Extension	% of respondents selecting topic	Clientele	% of respondents selecting topic
1	Solar Energy	49	Biofuels	42
2	Wind Energy	46	Wind Energy	42
3	Farm System Conservation and Efficiency	37	Farm System Conservation and Efficiency	42
4	Food System Conservation and Efficiency	35	Solar Energy	40

In the North Central region (Table 4), topics of greatest interest were renewable energy (wind), farm system conservation and efficiency, production of inputs (crop residues and grasses), and end-products (ethanol and biodiesel). These findings are similar to those in a bioenergy study by the National Integrated Water Quality Program (Lezberg et al., 2009). Agricultural and Natural Resource Extension personnel within this region indicated their greatest level of need for information/training on best management practices and farm system conservation and efficiency, on-farm energy generation, and production and marketing. These

respondents indicated their greatest level of inquiry by clientele were on-farm energy generation, farm system practices (including energy crop suitability, feeding byproducts to livestock), and conservation.

**Table 4.**

Rank of Topics of Most Interest to Extension Personnel and Their Clientele, North Central Region

Rank	Extension	% of respondents selecting topic	Clientele	% of respondents selecting topic
1	Wind Energy	63	Wind Energy	60
2	Farm System Conservation and Efficiency	47	Farm System Conservation and Efficiency	46
3	Crop Residues	37	Grasses	43
4	Ethanol	35	Biodiesel	40

In the South region (Table 5), topics of greatest interest were renewable (solar, wind), farm system conservation and efficiency, end-products (biodiesel), and input production (grasses); similar interests were indicated for the West region (Table 6).

**Table 5.**

Rank of Topics of Most Interest to Extension Personnel and Their Clientele, South Region

Rank	Extension	% of respondents selecting topic	Clientele	% of respondents selecting topic
1	Solar Energy	53	Wind Energy	55
2	Wind Energy	43	Farm System Conservation and Efficiency	43

3	Biodiesel	43	Biodiesel	43
4	Farm System Conservation and Efficiency	42	Grasses	38

**Table 6.**

Rank of Topics of Most Interest to Extension Personnel and Their Clientele, West Region

Rank	Extension	% of respondents selecting topic	Clientele	% of respondents selecting topic
1	Wind Energy	56	Wind Energy	49
2	Solar Energy	55	Biodiesel	43
3	Farm System Conservation and Efficiency	35	Farm System Conservation and Efficiency	37
4	Biodiesel	29	Grasses	35

These results are useful to identify priority subject matter informational needs in each region. There may also be a need for sub-regional information based on differences in farming sectors, natural resources, markets and existing infrastructure, climate, etc.; this was not included as part of the study reported here.

### Preferred Information Modes

Survey recipients were asked to select their preferred information modes for receiving information. Specifically, they were asked what specific items should be added to the Farm Energy CoP eXtension website in order to increase their knowledge and to assist their clientele. The highest ranked modes were Frequently Asked Questions; worksheets, workbooks, and decision-making tools; and research study summaries (Table 7).

**Table 7.**

Preferred Information Sharing Modes of Extension Agricultural Agents for the Farm Energy eXtension Community of Practice

Rank	Information Mode	% of respondents selecting topic
1	FAQs (Frequently Asked Questions)	76%
2	Worksheets, workbooks and decision-making tools	66%
3	Research study summaries	54%
4	Scripted Power Point presentations	49%
5	Case studies	43%
6	Instructional videos	40%
7	Vendor/Commercial information	27%
8 (tie) <sup>a</sup>	Informational podcasts	20%
8 (tie)	Blogs for discussion	20%
9	Other, please specify	4%
<p><sup>a</sup> Dense ranking. In dense ranking, items that compare equal receive the same ranking number, and the next item(s) receive the immediately following ranking number.</p>		

## Conclusions

Results of the survey demonstrate that Extension agricultural agents have the greatest need for information about renewables, conservation and efficiency, and inputs (feedstocks) rather than outputs (end products) and processes. There was little difference between interests of Extension clientele and their perception of clients' interests, perhaps based on the fact that they are in tune with their clientele needs or biased in their view of client needs versus their own interests and needs. However, there were some regional differences in topics of need and interest, and the level of interest in specific topics. The preferred modes for receiving information were FAQs, decision-making tools, and research summaries and other pre-packaged

learning/training modules.

The Farm Energy CoP used these data as a basis for conceptualizing and structuring the information on eXtension. The findings may be of value to others such as Extension specialists to develop local resources or programming for their colleagues, and agricultural agents to meet the needs of their local constituents.

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