Market Progress Evaluation Report

Drive Power Initiative, No. 2

prepared by

Pacific Energy Associates, Inc.

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DRIVE POWER INITIATIVE

MARKET PROGRESS EVALUATION REPORT #2

Final Report

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NORTHWEST ENERGY EFFICIENCY ALLIANCE

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Executive Summary

A. Introduction

The Northwest Energy Efficiency Alliance (the Alliance) is a non-profit group of electric utilities, state governments, public interest groups, and industry representatives committed to bringing affordable, energy-efficient products and services to the marketplace. The *Drive Power Initiative* is a market transformation venture funded by the Northwest Energy Efficiency Alliance (the Alliance) and administered by the Electric League of the Pacific Northwest (the League). The League began work on the Initiative in January 1999, and their contract is to continue through December 2000. Pacific Energy Associates, Inc. (PEA) was hired to evaluate the *Drive Power Initiative*.

This report comprises the second of three *Market Progress Evaluation Reports* (MPER) on the Northwest Energy Efficiency Alliance's *Drive Power Initiative* (the Initiative). This report covers the ten-month period of October 2000 through July 2000. The first MPER covered the nine-month period between January 1999 and September 2000. The purpose of the *Market Progress Evaluation Reports* is to track changes in the regional motor services market that may demonstrate market transformation over the course of the Initiative. The evaluation also provides "adaptive management" feedback to help the initiative in making mid-course modifications.

The *Drive Power Initiative* replaced the Alliance's *Premium Efficiency Motors* (PEM) program. The PEM program focused on dealer motor stocking practices, but was discontinued because market research showed that stocking practices were not a primary barrier to sales of premium efficient motors.

The Initiative's primary objective is to influence customers' decisions regarding what to do when an existing motor fails. The Initiative also seeks to influence the practices of motor service shops to support customer requests for improved repairs. The Initiative offers two main services: a broad customer education program, and tailored one-on-one customer support to address specific motor management issues and improve practices. To leverage their work with individual customers (as well as repair shops), the Initiative will publicize "success stories" resulting from the one-on-one assistance to influence the practices of other customers within and across industries. The goals and

approaches of the Initiative are shown in the Alliance's *Logic Model* for the project, a copy of which is provided in *Appendix A*.

The Initiative's objectives as described in the League's statement of work are as follows:

- Increase the operating efficiency of in-situ motors by assisting customers with comprehensive motor management;[1]
- Increase the number of motors that are replaced with new efficient motors instead of being reconditioned by helping customers with repair/replace decision making;
- Increase quality reconditioning by educating customers, providing repair guidelines, and working to assure an adequate supply of qualified repair shops; and
- Support the national use of the Consortium for Energy Efficiency (CEE) standard for premium motors.

The purpose of this second MPER is to:

- Provide an overview of the Initiative's progress to date in relation to the *"early"* and *"progressive"* indicators described by PEA in its workplan. The focus for this report is on two *early* indicators defined as follows: 1) progress compared to goals in delivery of Initiative services to customers and motor services businesses; and 2) the opinion of participating customers and vendors about the services.
- Describe findings and recommendations regarding "adaptive management" issues. One area concerns Initiative strategy and focus, the other relates to content and message.

[1] Motor management practices include, but are not limited to: inventory of fleet motor age, efficiency, and rewind history; implementation of repair/replace policies; active use of a high-quality repair specification; predictive/preventive maintenance practices; and stocking guidelines for on-site replacement.

To complete MPER #2, PEA conducted the following activities:

- Detailed review of field consultants' end-user trip reports.
- Three site visits to observe the field consultants working with end - users.
- Attendance at two motor seminars and compilation of participant exit survey results.
- Second-round interviews with the four field consultants, the League project manager, and the Alliance project manager.
- Detailed review of the tool kit materials.
- Review of progress reports and other League correspondence to the Alliance and field consultants.
- Surveys of 21 end-users contacted by the field consultants.
- In-person interviews with six motor manufacturer representatives.

B. Initiative Progress to Date

The focus for this report is on two *early* progress indicators: 1) progress compared to goals in delivery of Initiative services; and 2) the opinion of participating customers and vendors. A third early indicator – increased awareness among nonparticipants and motor service businesses regarding the Initiative and improved motor management practices – will be addressed in a later MPER. Given that the Initiative is in a relatively early stage, it would be premature to assess broader market awareness. This report also describes findings from interviews with motor manufacturer representatives.

Before describing the Initiative's progress, it is important to provide some context. Change in motor management practices, both for individual customers and for the market as a whole, is inherently incremental and slow. Substantial and sustainable change in practices at medium and large industrial plants may take two years or more. The "gestation period" depends on a number of factors such as: 1) the kind of change the customer is willing or able to make; 2) the customer's decision-making process; 3) staffing; and 4) other situational

and organizational constraints. Change at the broader market level is likely to take much longer.

While the League's contract officially started in January 1999, fieldwork did not begin in earnest until late spring, given the need to hire skilled field consultants. Thus, the Initiative's core work has been going on for just over a year. Furthermore, a key component (the Department of Energy's motor rewind practice specification) was unavailable until April 2000, due to events beyond the control of the *Drive Power Initiative.* Given this context, the Initiative is at too early a stage to reliably assess the depth and sustainability of the changes it is fomenting in customers' and repair shops' motor management practices. However, early indicators can be assessed.

Both progress and recommendations are summarized in *Table ES-1*. Following *Table ES-1* is a description of highlights of the Initiative's progress to date, a discussion of results of manufacturers' interviews, and a discussion of findings and recommendations.

Table ES - 1: Early Indicators of Motor Services Market Change

EARLY INDICATOR	EARLY INDICATOR GOAL	PROGRESS TO DATE (8/1/00)	SUMMARY OF KEY RECOMMENDATIONS
UTILITY CONTACTS	Inform utilities, work to identify customer leads, plan motor seminars.	Field consultants (FCs) have met in-person with 60 utilities throughout the region. Nine utilities have sponsored seminars. Several plan to sponsor future seminars.	• For future Alliance efforts, focus on those utilities with the most potential to provide definite customer leads that meet size and other criteria.
TOOL KIT	Create *Motor Management Tool Kit* for use by end-users and field consultants.	First cut of *Tool Kit* complete. Completion in April of repair spec and repair/replace nomographs were critical additions. Per Alliance's *Logic Model* further refinement planned. New simplified motor management software underway.	• Reduce the amount of information. • Flag key tools/materials and provide more instruction on how to use. • Create sample repair/replace and premium purchase policies. • Consider degradation from repair in repair/replace nomographs.
ONE-ON-ONE END USER SERVICES	Original goal: FCs deliver motor management services focusing on repair/replace decisions to 100 end-users. Current goal: 60	FCs have met in-person with 61 end-users in multiple industries throughout the region. Depth of services provided varies depending on customer needs and interest. Among the 43 customers with motor data, 26 have over 250 motors, but 17 have fewer than 250. Of those seventeen, 12 have fewer than 100.	• Any future customer contacts should have 250 motors or more, or at least 20 motors over 50 HP. • Focus on one-on-one customer work: take stock of end-users contacted to date and plan remaining activity. • Begin considering how to lay groundwork for self-sustaining market for motor management services.
"SUCCESS STORIES"	Original goal: 25 by end of contract period. Goal reduced to 15, and more recently to 10.	One final and one draft success story prepared. Sixteen customers and two repair shops are potential candidates. Among the 11 customer candidates with motor data, 10 have over 400 motors.	• First success story is excellent; use it to guide the other stories. • We believe the current goal of 10 success stories is more reasonable.

Continued

EARLY INDICATOR	EARLY INDICATOR GOAL	PROGRESS TO DATE (8/1/00)	SUMMARY OF KEY RECOMMENDATIONS
Motor Management Seminars	No specific goals set.	Seven seminars and forums with 183 attendees representing 30 manufacturing companies, 5 wastewater facilities, and 32 other types (e.g., offices, hospitals).	• Clarify seminar objectives. • Increase attendance of manufacturing companies. • Explicitly state desired outcomes; simplify and repeat central themes.
Service Shop Contacts	No specific goals set.	Eighteen shops contacted. Depth of services provided varies.	• Work in a coordinated way with a certain number of end-users and their repair shops. • Encourage dealers to promote the repair spec, but discourage them from altering it.
Participating Customer and Vendor Opinion of Services	Goal is for participating customers and vendors to have positive opinion of initiative services.	Participant surveys indicate high opinion of field consultants. Less positive about tool kit. Seminar participants are positive. Service shops have not yet been surveyed.	• Strengthen tool kit per recommendations above. • Be selective in what materials are left with customers. • Inform manufacturer reps of initiative activity.
Plans to Change Motor Management Practices	Goal is high rate of planned changes among participants.	In surveys, 6 of 21 participating customers say they plan to make changes and attribute their plans to the initiative. Depth and sustainability of change as yet unclear.	• Evaluation team will conduct second round surveys including surveys of seminar participants to determine follow-through. • Additional documentation by FCs of customer potential for change and planned work through end of contract period would be very helpful.
Customer and Motor Service Awareness	Goal is for increase in awareness from "baseline" due to initiative.	More data will be gathered in the second round of participant surveys and in nonparticipant surveys to be conducted towards end of evaluation period.	

One-on-One Customer Motor Management Services

- As shown in *Table ES-1* above, field consultants have made in-person visits with 61 industrial motor end-users in the region. This meets the Initiative's revised goal of 60 visits (100 were originally planned). As the Initiative is in a relatively early stage and end-users' circumstances and interest levels vary, the types and depth of motor management services provided vary and customers' commitment to follow through is often unclear.

- Industrial end-users visited by the field consultants are representative of the cross section of regional industrial motor users.

    - Industries include: pulp and paper (7), wood products (18), water and wastewater (2), primary metals and metals manufacturing (4), food processing (10), chemical and petroleum (3), and other (17).
    - Customers vary in size ranging from 30 to 5,000 installed motors.
    - Customers contacted so far are in all of the states: Washington (52%), Oregon (26%), Idaho (15%), and Montana (2%).[2]

- Based on analysis of trip reports and interviews with Initiative staff, among the customers receiving site visits thirteen (21%) appear to have strong potential to make concrete changes to their motor management practices as a result of the Initiative services. This was echoed by participant survey results indicating that about 28% of respondents said they had made or plan to make practice changes, and attributed their decisions to the Initiative.

- Both findings above are early indicators that the Initiative is making tangible progress, but at this point only a handful of these customers can be described as "certain to follow through" on substantial motor

[2] The total does not sum to 100% as two were in Utah and one was in Nevada.

management practice enhancements. One "success story" is in draft form, and one has been finalized for publication. The latter was reviewed for this report. It is compelling, well written, and describes concrete and substantial benefits. For the remaining eleven, the timelines to completion, as well as the anticipated outcomes, are less well defined.

- Key customer barriers to changing motor management practices are: 1) obtaining management buy-in; 2) staff time; and 3) cost.

- The field consultants are knowledgeable and very capable based on observations made during site visits and on the review of trip reports. Their credibility and knowledge were rated very positively in the customer surveys as well.

- Respondents to the customer surveys gave lower ratings for how well motor management services matched their needs. Given that changes to motor management practice require a long-term commitment, and so may not directly address current immediate needs, this lower rating is to be expected. Respondents were also ambivalent about the tool kit materials. This may be attributable in part to the fact that key tools, specifically the repair spec and the repair/replace nomographs, were not yet available at the time of many site visits.

Motor Management Seminars

- The Initiative held seven seminars and forums with 183 attendees representing 30 manufacturing companies, 5 wastewater facilities, and 32 other types (e.g., offices, hospitals).

- Most of the exit surveys completed by participants in four motor management seminars gave the events high ratings. Attendees often commented that they found the handouts, the repair specification, and *MotorMaster* most useful. They also were generally very positive in rating their likelihood to implement the motor management practices advocated in the seminars.

- Follow up surveys will be conducted as part of the evaluation as it is not yet clear whether the seminars are actually leading to concrete actions.

It is also not clear at this point how the seminars fit into the program's process and schedule for recruitment for more intensive assistance.

Other Outreach Activities

- Approximately 1,500 end-users are regularly receiving the Initiative's newsletter.
- Over 60 utilities were visited by the field consultants and informed of the Initiative's services.
- Eighteen motor service centers have been visited by field consultants and informed of the Initiative's services.

Motor Manufacturer Interviews

Below are highlights of the findings from interviews conducted with regional representatives of six major motor manufacturers. The interviews were primarily conducted: 1) to explore whether manufacturers are offering additional motor-related services beyond sales; and 2) to assess whether manufacturer contacts could provide a low-cost means of tracking premium motor market share.

- Most manufacturers are not heavily invested in the motor services market beyond selling new motors, drives, and related equipment. Only one major manufacturer is significantly invested in providing "comprehensive" in-house motor management services including repair, installation, inventory, maintenance, warehousing of spares, motor sizing, and motor testing (including for efficiency). Four others offer testing (usually for OEMs), and two offer limited warehousing (again either for OEMs[3] or on behalf of distributors). We will be exploring the extent to which motor repair/sales shops provide such services in surveys conducted for the third MPER.

[3] Original Equipment Manufacturers.

- A few manufacturers sell ancillary equipment such as drives and pumps, but in most cases the dominant income is from new motor sales. Annual regional sales for those interviewed were over 30,000 integral horsepower for three-phase motors. There does not appear to be a discernable trend among manufacturers towards integrated equipment sales, equipment services, or other "synergies" in sales. We expect that any movement in this direction will come from large repair/sales shops, and from the one manufacturer noted above.

- Motor manufacturers focus on niches in the market, based on customer groupings, historical relationships, and real and perceived differences between motors. It will be important to pay attention to the specific patterns of these relationships when marketing motor service programs and premium efficiency motors.

- Obtaining data on premium motor market share proved problematic for a number of reasons: 1) manufacturers' definitions of "premium" vary; 2) manufacturers track sales in dollars rather than units, therefore data on unit sales were approximations; and 3) not all manufacturers will respond and it is difficult to extrapolate to nonrespondents because reports of premium market share varied drastically. Nevertheless, the following data were gleaned from the interviews.

    - On average, respondents reported that 41% of sales were premium motors (as defined by manufacturers). This is much higher than the market-wide estimates of 33% developed by PEA three years ago,[4] but it is difficult to know if the difference is due to survey methods and non-response. This value varied between 20% and 73%.

    - The remaining motor sales were reported as 37% standard efficiency motors and 22% specialty motors. On average, sales of premium motors increased 3.5% percent in the last year. All

[4] Fred Gordon, John Jennings, Les Tumidaj, and Will Miller, *Premium Efficiency Motors Program Evaluation Report*, Pacific Energy Associates, Inc. Portland, OR, December 10, 1998.

the representatives but one said premiums are a good value for end-users of their motors.

- Manufacturers said that they use only EASA shops to do repair warranty work.[5] Arrangements with shops varied from verbal agreements to written contracts.

- Only one manufacturer said they had heard about the *Drive Power Initiative,* but all were very interested in knowing more.

C. Findings and Associated Recommendations

The following findings and recommendations are further detailed in the body of the report.

Targeting and Planning

Finding: The field consultants have made in-person visits with 61 customers so far. Of these, 45 have data on their number of motors. Nineteen have 250 or fewer motors. Of those, thirteen have 100 or fewer motors.

> ***Recommendation:*** While hard and fast rules are not advisable, the Initiative needs to better target those end-users that have significant motor loads.

Finding: Based on our interviews with staff, it has been a challenge to meet the multiple, and sometimes broadly defined objectives of the Initiative within budget. Some field consultants cited budget issues and work stoppages as factors that have intermittently slowed down one-on-one customer work.

> ***Recommendation:*** Alliance staff should determine whether problems of workload or direction are still impeding high-priority work, and plan specific changes as needed.

[5] Members of the Electrical Appliance Service Association.

Finding: Given multiple objectives, a limited budget, and growing awareness of the Initiative it is important for the Initiative to carefully plan its activities and services for the next six months.

> ***Recommendation A:*** Before proceeding with new customer contacts or other work, determine with more certainty which current contacts can be developed into compelling success stories.
>
> ***Recommendation B:*** Reinforce the message with field personnel that it is important to convert existing "good prospect" contacts into successes, and fit new contacts and other services around this priority.

Momentum and Exit Strategy

Finding: The Initiative is at a critical point in its momentum and the Alliance and League need to consider how this momentum is to be sustained beyond the end of 2000.

> ***Recommendation A:*** We believe that it will be necessary for the Alliance to extend funding if it wishes to determine whether *Drive Power* can be successful as a market transformation initiative.
>
> ***Recommendation B:*** The League and Alliance need to explicitly plan an exit strategy, and in particular decide the degree to which the Initiative wants to actively work towards forming a self sustaining market for motor services.

Finding: Key customer barriers to changing motor management practices are obtaining management buy-in, staff time, and cost.

> ***Recommendation:*** The League may want to consider recruiting college students[6] or utilizing utility subsidies for temporary staffing. The

[6] This concept is already being pursued by one field consultant

field consultants may want to advise plant staff on pitching their motor management plans and staffing needs to management.

Repair Shop Strategy

Finding: Some of the field consultants are working in tandem with customers and their shops to introduce and discuss the repair spec so both parties know about it. This will make it more likely to be adopted.

Recommendation: The Initiative should consider more formally adopting this strategy and setting goals for it.

Motor Management Seminars

Finding: There appear to be differing views on the purpose of the seminars. Some Initiative staff consider them a vehicle for generating customers' interest in one-on-one field consultant work. The consultants described the seminars more as enabling customers to take action on their own.

Recommendation: Clarify the seminars' objectives and tailor them accordingly. If, for example, a primary objective is for participants to take action, the seminars probably need to be longer and have more hands-on exercises.

Finding: Attendance by manufacturing companies is significant, but relatively modest compared to similar efforts in other areas of the country.

Recommendation: Field consultants and seminar sponsors need to personally recruit more manufacturing companies with many motors and/or a significant number of large ones.

Tool Kit

Finding: Customer recollection of the tool kit is not high. Furthermore, some pieces could be more effective and some different material may help close sales.

Recommendation: 1) Flag key tools and materials; 2) consider only giving customers selected and relevant items rather than the entire toolkit; and 3) Remove overly complex or conflicting materials.

Finding: The importance of developing repair/replace and premium motor purchase policies is often discussed in the seminars, the tool kit materials, and by consultants, but there are no written examples.

Recommendation: Create or collect sample policies. The League's motors expert could provide valuable assistance here.

Finding: The repair/replace nomographs (in *Your Motors and Money*) do not explicitly include any assumption about motor efficiency degradation from repair. This may bias decisions toward rewinding motors.

Recommendation: This issue should be discussed further with motors experts. One option would be to publish two sets of nomographs showing a range of possible economics: one with 0% degradation and the other with 1%.

Finding: The *Electric Motor Manager* (EMM) software is a positive addition, and far simpler than *MotorMaster*. However, issues regarding the software's ownership, funding, marketing, and maintenance (documentation, new programming, debugging, etc.) need to be addressed.

Recommendation: The Alliance should consider making EMM the League's primary inventory tool, but needs to resolve the issues listed above.

I. Introduction

The Northwest Energy Efficiency Alliance (the Alliance) is a non-profit group of electric utilities, state governments, public interest groups, and industry representatives committed to bringing affordable, energy-efficient products and services to the marketplace. The *Drive Power Initiative* is a market transformation venture funded by the Alliance and administered by the Electric League of the Pacific Northwest (the League). The League began work on the Initiative in January 1999, and their contract is to continue through December 2000. Pacific Energy Associates, Inc. (PEA) was hired to evaluate the *Drive Power Initiative.*

This report comprises the second of three *Market Progress Evaluation Reports* (MPER) on the Northwest Energy Efficiency Alliance's *Drive Power Initiative* (the Initiative). This report covers the ten-month period of October 2000 through July 2000. The first MPER covered the nine-month period between January 1999 and September 2000. The purpose of the *Market Progress Evaluation Reports* is to track changes in the regional motor services market that may demonstrate market transformation over the course of the Initiative. The evaluation also provides "adaptive management" feedback to help the initiative in making mid-course modifications. The following is a brief recap of the introductory information provided in the first MPER.

The *Drive Power Initiative* replaced the Alliance's *Premium Efficiency Motors* (PEM) program. The PEM program focused on dealer motor stocking practices, but was discontinued because market research showed that stocking practices were not a primary barrier to sales of premium efficient motors.

The Initiative's primary objective is to influence customers' decisions regarding what to do when an existing motor fails. The Initiative also seeks to influence the practices of motor service shops to support customer requests for improved repairs. The Initiative offers two main services: a broad customer education program, and tailored one-on-one customer support to address specific motor management issues and improve practices. To leverage their work with individual customers (as well as repair shops), the Initiative will publicize "success stories" resulting from the one-on-one assistance to influence the practices of other customers within and across industries. The goals and approaches of the Initiative are shown in the Alliance's *Logic Model* for the project, a copy of which is provided in *Appendix A*.

I. Introduction

The Initiative's objectives as described in the League's statement of work are as follows:

- Increase the operating efficiency of in-situ motors by assisting customers with comprehensive motor management;[7]

- Increase the number of motors that are replaced with new efficient motors instead of being reconditioned by helping customers with repair/replace decision making;

- Increase quality reconditioning by educating customers, providing repair guidelines, and working to assure an adequate supply of qualified repair shops; and

- Support the national use of the Consortium for Energy Efficiency (CEE) standard for premium motors.

The purpose of the first MPER was to provide market context as well as feedback on early initiative activities. The market discussion covered a number of topics, including providing an overview of national motor efficiency standards, guidelines and initiatives, and describing the effects of those on motor pricing and availability. The report also described and characterized the customer segments of strategic importance to the Initiative and their "baseline practices," as well as barriers to market change. It estimated the size of the motor services market and distribution by customer segment and size. MPER #1 also described the motor repair and rewind market.

The purpose of this second MPER is to:

- Provide an overview of the Initiative's progress to date in relation to the *"early"* and *"progressive"* indicators described by PEA in its workplan. The focus for this report is on two *early* indicators defined

[7] Motor management practices include, but are not limited to: inventory of fleet motor age, efficiency, and rewind history; implementation of repair/replace policies; active use of a high-quality repair specification; predictive/preventive maintenance practices; and stocking guidelines for on-site replacement.

as follows: 1) progress compared to goals in delivery of Initiative services to customers and motor services businesses; and 2) the opinion of participating customers and vendors about the services.

- Describe findings and recommendations regarding "adaptive management" issues. One area concerns Initiative strategy and focus, the other relates to content and message.

- A review of the Alliance's cost-effectiveness assumptions was postponed until MPER #3. The analysis was undergoing a major revision and was not final at the time of this MPER.

To complete MPER #2, PEA conducted the following activities:

- Detailed review of field consultants' end-user trip reports.

- Three site visits to observe the field consultants working with end - users.

- Attendance at two motor seminars and compilation of participant exit survey results.

- Second-round interviews with the four field consultants, the League project manager, and the Alliance project manager.

- Detailed review of the tool kit materials.

- Review of progress reports and other League correspondence to the Alliance and field consultants.

- Surveys of 21 end-users contacted by the field consultants.

- In-person interviews with six motor manufacturer representatives.

I. Introduction

II. Initiative Progress

A. Framework for Expectations

Before describing the Initiative's progress, it is important to provide some context. Change in motor management practices, both for individual customers and for the market as a whole, is inherently incremental and slow. Substantial and sustainable change in practices at medium and large industrial plants may take two years or more. The "gestation period" depends on a number of factors such as: 1) the kind of change the customer is willing or able to make; 2) the customer's decision-making process; 3) staffing; and 4) other situational and organizational constraints. Change at the broader market level is likely to take much longer.

While the League's contract officially started in January 1999, fieldwork did not begin in earnest until late spring, given the need to hire skilled field consultants. Thus, the Initiative's core work has been going on for just over a year. Given this context, the Initiative is at too early a stage to reliably assess the depth and sustainability of the changes it is fomenting in customers' and repair shops' motor management practices. However, early indicators can be assessed.

It is also important to note that some of the key elements of the customer tool kit were not available until several months into the program's active period. Most notably, because of delays in the U.S. Department of Energy issuing their repair specifications, on which the Initiative's is based, the Initiative's spec was not available until April 2000. In turn, site visits to repair shops were largely postponed.

B. One-on-One Customer Motor Management Services

A primary approach of the Initiative is to have field consultants work one-on-one with customers. To leverage this work, the Initiative will then publicize these "success stories" through formal channels, as well as word of mouth, so as to influence the practices of other customers within and across industries. We believe this one-on-one customer approach is appropriate and valuable, and that the success stories are a critical fulcrum for the Initiative to influence the broader market.

Number, Types, and Geographic Distribution of Customers Contacted

The field consultants have made in-person visits with 61 industrial motor end-users in the region. This meets the Initiative's revised goal of 60 visits (100 were originally planned). Industrial end-users visited by the field consultants are representative of the cross section of regional industrial motor users:

- Industries include: pulp and paper (7), wood products (18), water and wastewater (2), primary metals and metals manufacturing (4), food processing (10), chemical and petroleum (3), and other (17).
- Customers vary in size, ranging from 30 to 5,000 installed motors.
- Customers contacted so far are in all of the states: Washington (52%), Oregon (26%), Idaho (15%), and Montana (2%).[8]

Services Provided and Potential "Success Stories"

As the Initiative is in a relatively early stage and end-users' circumstances and interest levels vary, the types and depth of motor management services provided vary and customers' commitment to follow through is often unclear.

Table 1 below provides an overview of all the customers contacted to date by sector, and divides them into categories according to the evaluation team's assessment of the likelihood of their becoming "success stories."

[8] The total does not sum to 100% as two were in Utah and one was in Nevada.

Table 1: Potential Of Customers To Be Success Stories

INDUSTRY	STRONG CANDIDATE	MEDIUM[9] CANDIDATE	WEAK CANDIDATE	NOT A CANDIDATE	STATUS UNKNOWN
WOOD PRODUCTS (18 TOTAL)	4	2	1	3	8
FOOD PROCESSING (10 TOTAL)	1	3	3	3	
PULP & PAPER (7 TOTAL)	2	3		2	
CHEMICAL MANUFACTURING (2 TOTAL)		1		1	
PETROLEUM (1 TOTAL)					1
METALS MANUFACTURING (4 TOTAL)	3	1			
WASTEWATER (2 TOTAL)				2	
OTHER (17 TOTAL)	3	3	4	6	1
TOTAL = 61	**13**	**13**	**8**	**17**	**10**

This assessment is based on analysis of trip reports and interviews with Initiative staff. As shown, thirteen customers (21%) appear to have strong potential to make concrete changes as a result of the Initiative services. This was echoed by participant survey results indicating that about 28% of respondents said they had made, or plan to make, practice changes and attributed their decisions to the Initiative.

Both findings are early indicators that the Initiative is making tangible progress, but at this point only a handful of these customers can be described as "certain to follow through" on substantial motor management practice enhancements. *Table 2* provides information on the expected content of each success story. One success story is in draft form, and one has been finalized for publication. The latter story on Woodgrain Millwork is provided in *Appendix B*. For the remaining eleven, the timelines to completion, as well as the anticipated outcomes, are less well defined.

[9] "Medium" candidates are usually those that have shown definite interest and potential but are facing staffing or other barriers that are greatly slowing work.

Table 2: Description of Strong Success Story Candidates

TYPE OF END USER	SUCCESS STORY DESCRIPTION
WOOD PRODUCTS	Created motor inventory including rewind history; used it to compare existing to new efficient motors and for repair/replace decisions; potentially will replace large inefficient motors.
WOOD PRODUCTS	Set up and maintained a motor inventory.
WOOD PRODUCTS	Will develop and use a repair spec on their own, but the spec is based on the Initiative's.
WOOD PRODUCTS	Achieved compressor system savings through operational changes.
FOOD PROCESSING	Entered motor inventory data into *MotorMaster* to enable customer to make a repair/replace decisions for each motor.
PULP AND PAPER	Created motors inventory and replaced inefficient motors.
PULP AND PAPER	Developed a "tech tip" for moving data back and forth from *Maximo* (plant inventory database software) to *MotorMaster*. Helped train students to complete inventory.
METALS MANUFACTURING	Replaced older motors with energy efficient motors.
METALS MANUFACTURING	Assisted customer with preparation of RFP to contract out motor management.
METALS MANUFACTURING	Tested League's new motor management software with Palm Pilot and did batch analysis to identify savings opportunities.
CEMENT PLANT	Purchasing Palm Pilots and installing League's new motor management software.
OTHER	Assisting customer with reworking their repair spec and introducing it to their repair shop.
OTHER	Developed repair/replace policy that might eventually be used throughout state facilities.

The field consultants indicated that changing circumstances and limited staff time at some facilities have slowed progress towards project completion. Also, for a number of the projects, the field consultants are working with customers to gather information on existing motors and set up a motors inventory as a first step in helping them make better repair/replace decisions. This is a time-consuming undertaking. The amount of information in *Table 2* also reflects the challenge of obtaining detailed and consistent field documentation given the number of projects and consultants.

It is expected that by the time the third *Market Progress Evaluation Report* is prepared, the content of a number of these success stories will be much more

fleshed-out in terms of concrete results of the type described in the Woodgrain Millwork piece. Nevertheless, given the pace of work, the Initiative's decision to reduce its success story goal from fifteen to ten is a good one.

What is not clear at this point is whether the field consultants have been able to work in depth with the most promising customers to map out a motor repair/replace plan or policy that will result in consistent, sustainable, facility-wide improvements in motor efficiency. This may be because projects are at an early stage, or perhaps because the field consultants do not have the time or budget. It is also possible that customers' particular circumstances have made it difficult to take the work to this next stage (i.e., staff time, prioritization, lack of management interest).

Customer Targeting and Planning

In gathering data for the report, customer size in terms of motors was analyzed for 45 of the 61 customers that had data. As shown in *Table 3* below, it was found that nineteen of the 45 have 250 or fewer motors total. Of those, sixteen have fewer than 100 motors, although data on four of those indicate that they have more than 20 motors over 50 horsepower.

Table 3: Size of Customer in Terms of Numbers of Motors

NUMBER OF MOTORS	NUMBER OF CUSTOMERS
OVER 500	17
251 TO 500	5
101 TO 250	6
100 OR FEWER	13
TOTAL	41

Based on the market analysis performed in the first MPER, the evaluation team recommended that the Initiative target medium (2 to 10 MW) and large customers (over 10 MW) that have fewer advanced motor management practices in place and are generally receptive to improving their motor

management practices. Customers in these size categories would probably have at least 250 motors, or at least 20 motors over 50 horsepower.

The information on number of motors per customer suggests that for any new customer contacts made, the Initiative has not always targeted end-users who have significant motor loads, so as to use Initiative resources most effectively and optimize market transformation. The emphasis on larger customers is borne out by the fact that ten of the most promising success story candidates have over 400 motors. While it is sometimes difficult to know how many motors a customer has before visiting, and utilities have requested some visits to political "squeaky wheels," some of the customers initially selected for intensive activity were marginal program candidates. In the last several months, Electric League staff has directed the field consultants to focus more narrowly on the most promising sizes and types of customers.

The field consultants are knowledgeable and very capable, based on observations made during site visits and on the review of trip reports. Their entrepreneurial spirit and willingness to be "self-starters" are great assets to the Initiative. Their credibility and knowledge were rated very positively in the customer surveys, as described in the section on participant survey results.

A potential concern is that in the early months of the Initiative, the field consultants may have been spread too thin in trying to achieve multiple, and sometimes broadly defined initiative objectives. These have included in-person utility visits (60 total); in-person visits with 61 end-users to date; development of fifteen success stories (recently revised to ten); participation in planning and teaching seminars; and work with motor service centers. Several field consultants have also become very involved in developing new motor management tools for the Initiative, including designing and developing new software.

While it is difficult to say how much the field consultants can stretch their time and resources, their direct comments indicate that work with key customers may have been slowed down in some instances by the large number of other obligations and activities. Again, Electric League staff have provided stronger recent direction to the field consultants to focus on one-on-one customer work.

Field consultants also cited broader project budget issues as intermittently slowing down one-on-one customer work. For example, in the month of May,

marketing work was put on hold because expenditures from the field were running at a faster pace than budget. One potential success story was apparently not pursued because of resource limitations.

With 61 customer contacts, limited field consultant time and budgets, and the need to complete and publicize success stories, it is important for the Initiative to carefully plan its activities and the services it will offer over the next six months. Some field consultants may need additional assistance with strategies to provide customers with clear options for moving forward, while still showing their recognition that plant personnel, and their need to deal with more pressing problems, will control the pace of the project. Some may also benefit from a more structured approach to sorting customers. They need to figure out if there is real potential for practice change and, if not, doing what they can and then moving on. This is crucial as it is likely that awareness of the Initiative's services is growing through word-of-mouth, *Windings* (the Initiative's newsletter), and the seminars conducted in the spring and summer of 2000.

The Alliance and League also need to start planning for how to sustain or perhaps transition the relationships that the field consultants have developed so far with large industrial customers to maintain and leverage the momentum the Initiative has achieved. Even if Alliance funding is extended, and we believe it should be, there needs to be an explicit transition strategy to be implemented before the project is over. A clearer concept of what that strategy looks like may help focus services over the next year.

C. Work with Motor Service Centers

The field consultants have visited with eighteen motor service centers (repair shops) to let them know about the Initiative services. The strategy for approaching repair shops has been evolving. At first it was somewhat undefined because the Department of Energy's repair specification was not yet available. As a result, the League decided to temporarily hold off doing further work with shops.

In April, the specification was completed. Since then, based on the review of the trip reports, it appears that at least two of the field consultants are working in tandem with customers and their repair shops to introduce and discuss the repair spec so both parties know about it and will be more likely to adopt it.

The League project manager confirmed that this approach is being pursued, although it is not clear if it has been formalized as a strategy.

Two of the repair shops are potential "success story" candidates because they are planning to purchase testing equipment, making it possible to comply with the specification and provide customers with better quality repairs. Both repair shops serve a number of large industrial customers.

One issue of potential concern is that the repair spec is available electronically to customers and repair shops. This is a good idea for putting a shop's logo or letterhead on the spec, but the League should make sure the content is not altered or diluted such that the spec can no longer serve as a recognized standard.

D. General Education and Outreach Activities

The following general education and outreach activities have been conducted to date:

- The Initiative held seven seminars and forums with 173 attendees representing 27 manufacturing companies, 5 wastewater facilities, and 32 other types of facilities (e.g., offices and hospitals).
- Approximately 1,500 end-users are regularly receiving the Initiative's newsletter, *Windings.*
- Over 60 utilities were visited by the Field consultants and informed of the Initiative's services.

Motor Management Seminars

Table 4 below provides a list of seminars and forums conducted to date. These results show significant attendance for manufacturing companies, but attendance is still modest for these types of customers compared to similar efforts in other areas of the county.

Most of the exit surveys completed by participants in four motor management seminars gave the events high ratings. Attendees often commented that they found the handouts, the repair specifications, and *MotorMaster* most useful.

They also were generally very positive in rating their likelihood to implement the motor management practices advocated in the seminars. Some attendees thought some of the presentations were overly technical and theoretical and would have liked more hands-on exercises. Whether seminar participants actually take action on their own will be assessed in the next round of customer surveys.

In addition to reviewing the seminar exit surveys, members of the evaluation team attended two separate seminars. The formats for the two seminars were different. One involved a repair shop visit, while the other did not. The presenters were also different. In both seminars, the presenters were articulate, very knowledgeable, humorous, and good at keeping the pace moving. The presentation materials were generally very clear and well done. The topics were generally well suited to the audiences, which consisted predominantly of maintenance staff and electricians.

While the seminars were well regarded by attendees, there are indications that they might be more effective if they are further refined to produce specific outcomes. The evaluators' observations are that the purpose, message, and desired outcomes of the seminars could be more clearly and explicitly stated to the audience and repeated throughout the seminar. In addition, materials, exercises, and tools could be more streamlined to relate more directly to the seminars' central objectives.

If the intent is to spur specific actions, the seminars could also benefit from hands-on exercises to more actively involve the audience. More information on how to sell these new practices to management would also be helpful since the practices are comprehensive in nature, involve policy decisions, and can impact areas of the company such as purchasing.

Table 4: Motor Management Events Held to Date

EVENT TYPE/FORMAT	DATE AND LOCATION	NUMBER OF ATTENDEES	NUMBER OF END USERS AND MOTOR SERVICE COMPANIES REPRESENTED	SPONSOR(S)
NEEC LUNCH FORUM	10/27/99 Seattle, WA	19 various	No information available	Northwest Energy Efficiency Council and Avista
HANDS-ON MOTOR ASSEMBLY AND REASSEMBLY	11/16/99 Boise, ID	7 Idaho Power Ag Reps	Not applicable	Idaho Power
MOTOR EFFICIENCY PLANNING	12/99 Eureka, MT	4 attendees	1 manufacturing co. *** (3 misc.)	Lincoln Electric Coop
MOTOR EFFICIENCY PLANNING	12/99 Pasco, WA	6 attendees	3 manufacturing co. (3 misc.)	Franklin PUD
PUD FORUM – HALF DAY PRESENTATION	2/15/00 Pasco, WA	36 attendees	5 manufacturing co. 7 other end-user types* 2 motor service co. (6 misc.**)	Franklin PUD
MOTOR EFFICIENCY PLANNING – HALF-DAY PLUS SHOP TOUR	4/12/00 Seattle, WA	26 attendees	5 manufacturing co. 6 other end-user types* 2 motor service co. (2 misc.**)	Seattle City Light
MOTOR EFFICIENCY PLANNING – HALF-DAY	4/26/00 Everett, WA	16 attendees	5 manufacturing co. 4 other end-user types* 3 motor service co. (1 misc.**)	SnoPUD
MOTOR EFFICIENCY PLANNING – HALF-DAY	5/2/00 Portland, OR	43 attendees	9 manufacturing co. 6 other end-user types* 6 motor service co. (4 misc.***)	PacifiCorp
MOTOR EFFICIENCY PLANNING – HALF-DAY	5/4/00 Tacoma, WA	26 attendees	2 manufacturing co. 9 other end-users types* 1 motor service co. (1 misc.**)	Tacoma Power
TOTAL		183 attendees	30 manufacturing cos. 32 other end user types* (20 misc.**)	

* Hospitals, office buildings, etc.

** Design engineers, consultants, utility representatives, etc.

*** Note: event was snowed out so attendance was very low.

Another more general observation was that the League and Alliance may need to further clarify the purpose of the seminars. Some Initiative staff view the seminars primarily as a vehicle for publicizing the Initiative and generating customer interest in doing in-depth, one-on-one work with the consultants. The field consultants described the seminars more in terms of a vehicle to leverage their efforts by enabling customers to take action on their own with minimal help. These objectives have different implications for seminar content and length.

Utility Visits

Regarding the 60 in-person site visits to utilities, Initiative staff have spent a significant amount of time and resources trying to build these alliances. While some of the activity was important, contacting 60 utilities was perhaps more than necessary, as only a few provided assistance in identifying promising customer leads and supporting other efforts such as the seminars.

E. Motor Management Tool Kit

The *Motor Management Tool Kit* is an important element of the Initiative's educational efforts. It is used in both the seminars and as an aid in one-on-one customer work. For this evaluation, the tool kit materials were reviewed in detail. Overall, the tool kit contains an impressive array of motor-related information. The pieces created by the Electric League are particularly useful. The motor repair purchasing specification is extremely well done.

Another useful element is the *Electric Motor Manager* (EMM) software created by one of the field consultants. It is far simpler than *MotorMaster*, but is technically compatible. It will also use the Palm Pilot for field data collection, which is an exciting idea. As with any software, issues of ownership, funding, marketing, and maintenance (documentation, new programming, debugging, etc.) will need to be addressed.

Another key piece in the tool kit is *Your Motors and Money,* which contains nomographs concisely representing financial tradeoffs between repair and replace decisions. This is an easy tool to use. A concern is that it does not explicitly include any assumptions about motor efficiency degradation. While general assumptions about percent degradation are difficult to make, an

assumption of zero-percent degradation may bias decisions toward rewinding motors which it would be economically beneficial to replace. One option would be to publish two sets of nomographs showing a range of possible economics: one with zero-percent degradation and the other with 1%. The League also should strongly consider adding sample repair/replace and premium purchase policies since they are often discussed in seminars and with customers; they are also referred to in other tool kit materials.

Besides the key tool kit elements such as the repair spec and nomograph, the kit also contains numerous other materials from EASA and *Motor Challenge*, some of which is overlapping. While much of the information is useful, and different pieces will resonate with different users, a concern is that the amount of information may be overwhelming and/or confusing. Indeed, the participant survey results indicated that many of the customers did not remember any of the specific information or tools given out by the field consultants. This could be due in part to the fact that a few key tools (specifically the repair spec and the repair/replace nomographs) were not yet available at the time some early customer visits were made. However, it could also be because many of the customers were given an entire folder full of motor management materials and key pieces are not flagged.

Below is *Table 5* which shows the Initiative's progress to date and summarizes the key recommendations. These key results are further detailed in the final section of the report.

Table 5: Early Indicators of Motor Services Market Change

EARLY INDICATOR	EARLY INDICATOR GOAL	PROGRESS TO DATE (8/1/00)	SUMMARY OF KEY RECOMMENDATIONS
UTILITY CONTACTS	Inform utilities, work to identify customer leads, plan motor seminars.	Field consultants (FCs) have met in-person with 60 utilities throughout the region. Nine utilities have sponsored seminars. Several plan to sponsor future seminars.	• For future Alliance efforts, focus on those utilities with the most potential to provide definite customer leads that meet size and other criteria.
TOOL KIT	Create *Motor Management Tool Kit* for use by end-users and field consultants.	First cut of *Tool Kit* complete. Completion in April of repair spec and repair/replace nomographs were critical additions. Per Alliance's *Logic Model* further refinement planned. New simplified motor management software underway.	• Reduce the amount of information. • Flag key tools/materials and provide more instruction on how to use. • Create sample repair/replace and premium purchase policies. • Consider degradation from repair in repair/replace nomographs.
ONE-ON-ONE END USER SERVICES	Original goal: FCs deliver motor management services focusing on repair/replace decisions to 100 end-users. Current goal: 60	FCs have met in-person with 61 end-users in multiple industries throughout the region. Depth of services provided varies depending on customer needs and interest. Among the 43 customers with motor data, 26 have over 250 motors, but 17 have fewer than 250. Of those seventeen, 12 have fewer than 100.	• Any future customer contacts should have 250 motors or more, or at least 20 motors over 50 HP. • Focus on one-on-one customer work: take stock of end-users contacted to date and plan remaining activity. • Begin considering how to lay groundwork for self-sustaining market for motor management services.
"SUCCESS STORIES"	Original goal: 25 by end of contract period. Goal reduced to 15, and more recently to 10.	One final and one draft success story prepared. Sixteen customers and two repair shops are potential candidates. Among the 11 customer candidates with motor data, 10 have over 400 motors.	• First success story is excellent; use it to guide the other stories. • We believe the current goal of 10 success stories is more reasonable.

Continued

EARLY INDICATOR	EARLY INDICATOR GOAL	PROGRESS TO DATE (8/1/00)	SUMMARY OF KEY RECOMMENDATIONS
MOTOR MANAGEMENT SEMINARS	No specific goals set.	Seven seminars and forums with 183 attendees representing 30 manufacturing companies, 5 wastewater facilities, and 32 other types (e.g., offices, hospitals).	• Clarify seminar objectives. • Increase attendance of manufacturing companies. • Explicitly state desired outcomes; simplify and repeat central themes.
SERVICE SHOP CONTACTS	No specific goals set.	Eighteen shops contacted. Depth of services provided varies.	• Work in a coordinated way with a certain number of end-users and their repair shops. • Encourage dealers to promote the repair spec, but discourage them from altering it.
PARTICIPATING CUSTOMER AND VENDOR OPINION OF SERVICES	Goal is for participating customers and vendors to have positive opinion of initiative services.	Participant surveys indicate high opinion of field consultants. Less positive about tool kit. Seminar participants are positive. Service shops have not yet been surveyed.	• Strengthen tool kit per recommendations above. • Be selective in what materials are left with customers. • Inform manufacturer reps of initiative activity.
PLANS TO CHANGE MOTOR MANAGEMENT PRACTICES	Goal is high rate of planned changes among participants.	In surveys, 6 of 21 participating customers say they plan to make changes and attribute their plans to the initiative. Depth and sustainability of change as yet unclear.	• Evaluation team will conduct second round surveys including surveys of seminar participants to determine follow-through. • Additional documentation by FCs of customer potential for change and planned work through end of contract period would be very helpful.
CUSTOMER AND MOTOR SERVICE AWARENESS	Goal is for increase in awareness from "baseline" due to initiative.	More data will be gathered in the second round of participant surveys and in nonparticipant surveys to be conducted towards end of evaluation period.	

III. Participant Survey Results

A. Introduction

During the second half of March 2000, Pacific Energy Associates, Inc. surveyed 21 participants in the Alliance's *Drive Power Initiative.* These participants were drawn from a total pool of 39 customers contacted through early March by the program's circuit riders. At the time the survey was conducted, all but one of the respondents had met once with their circuit rider, mostly in late 1999 or early 2000; one had been contacted twice. The surveys assessed the following:

- Customers' baseline motor management practices including repair/replace decisions, use of a repair specification, purchase of premium motors, inventory use, and motor testing.
- Any changes customers made to their motor management practices over the past year, any planned changes for the next year, and reasons for those changes (i.e., whether customers attribute their decision to the Initiative.
- Customers' recollection of the motor management recommendations made and tools provided by the circuit riders.
- Customers' perceptions of barriers to implementing the circuit riders' recommendations.
- Customers' opinions of the Initiative (circuit rider knowledge, tools and materials, etc.) and any other further assistance they would like.
- Other training customers may have received on motor management practices.

B. Summary of Key Findings

Current Motor Management Practices

Survey responses indicate ample room for improvement in "baseline" motor management practices. This appears to be fairly consistent across industries.

Recent and Planned Changes to Motor Management Practices

About 28% of respondents had made or plan to make changes and attributed their decisions to the Initiative. This finding is echoed by our review of trip reports for the entire group of 52 customers, where about fourteen indicate change or definite potential to change. Key customer barriers are obtaining management buy-in, staff time, and cost. More data on type, depth, and sustainability of changes will be gathered in the second round of surveys.

Feedback on Program Tools/Materials and Consultants

Consultants' credibility and knowledge were rated very positively. Ratings weren't as high for how good a match the services are to customers' needs. The data indicate that the tools are not standing out in most respondents' minds.

C. Detailed Findings

Current Motor Management Practices

Survey responses indicate there is room for improvement in the "baseline" motor management practices of customers being approached through the Initiative. Some key findings are:

- ***Energy efficiency lags other factors as a consideration in purchase and repair.*** For both motor purchase and motor repair, energy efficiency was rated lowest by respondents as a factor considered important.

- ***Respondents' existing repair/replace decision-making processes and policies appear weak.*** Respondents do not appear to be doing sophisticated analysis and advanced planning for what to do at time of failure for each of their critical motors. The most common factor used in making repair/replace decisions is motor size. However, the generally low size thresholds for replacement (20 horsepower or less) and a wide variation in thresholds suggest that these are not based on systematic analysis. Further, none of the respondents mentioned life-cycle cost, run-time hours, or motor load as factors in their repair/replace decisions. Although eight describe their repair/replace

decision process as a "formal policy," all eight also said the policy is "generally known" rather than written, and five of the eight said it was "sometimes" rather than always followed.

- ***Respondents sometimes buy premium motors, but a number expressed concerns about them.*** Most respondents said they sometimes buy premium motors (as defined by motor manufacturers). Eight said they had a formal purchase policy. However, it was notable that seven respondents also expressed serious concerns about premium motors regarding reliability, availability, how the motor is classified, and whether they would fit an existing application.

- ***Few respondents have a repair specification.*** Only four of 21 respondents said they have a repair specification or checklist they ask their shops to follow.

- ***About half say their repair shop uses a specification, but a substantial number do not know.*** Ten of 21 said they know their repair shop uses a specification. Eight do not know. Three said their shop does not.

- ***Most respondents say they have a motors inventory, but it is ambiguous whether they use it systematically in their repair/replace decisions.*** None of the respondents explicitly described using their inventory to make repair/replace decisions, although five of the fifteen said it did track the number of rewinds. Most said they use it primarily to track their motors in stock. That respondents do not say they use their inventories to make repair/replace decisions may be because the inventories do not have the right data to perform the analysis. Many inventory systems are vague on motor specs, rewind history, etc, and some customers do not enter the requisite data, even when the system allows this.

- ***Some respondents do motor testing, although none of the types of testing directly relates to efficiency.*** Eight of 21 do testing related to reliability and safety rather than efficiency. However, the fact that they do any testing at all may make them more receptive to efficiency testing.

Recent and Planned Changes to Motor Management Practices

Findings are summarized in *Tables 6* and *7* and discussed below. Some of the findings of note are:

- ***Responses indicate the Initiative is influencing some respondents' practices; there is also independent market activity.*** Over half of survey respondents (eleven of 21) reported either past or planned practices changes. Six of 21 respondents (28%) indicated that the Initiative had impacted their decisions.

    - Two of the respondents who had made recent changes to their motor management practices in the past year mentioned their work with the consultant as a main factor in those changes (*see Table 6*). One respondent mentioned the consultant as the main factor in planned changes for the future (*see Table 7*).
    - One respondent specifically said they had established a "motor management policy" (*Table 6*) and two said they planned to establish a "repair/replace policy" (*Table 7*). These responses are likely indicative of the Initiative's influence.
    - Most of the other factors mentioned relate to either reducing downtime and increasing reliability, or reducing overall operations costs and/or per unit production costs.

Table 6: Recent Changes to Motor Management Practices

RECENT CHANGES	NUMBER WHO RECENTLY MADE CHANGE	FACTORS IN MAKING CHANGE
STARTED AN INVENTORY	3	• Need to track spares and equipment maintenance history • Savings • Consultant's help
INITIATED OR IMPROVED PREVENTATIVE MAINTENANCE PRACTICES	2	• Need to understand equipment maintenance history • Want to know why motors fail
STARTED PURCHASING MORE PREMIUM MOTORS	2	• Savings • Reduce down time and costs plus a need to know what they have and establish a regular PM program

CONVERTED TO COMPUTERIZED INVENTORY	2	• Want to know why motors fail • Reduce down time and costs plus a need to know what they have and establish a regular PM program
INCREASED MOTOR TESTING	1	• Cost avoidance
ESTABLISHED MOTOR MANAGEMENT POLICY	1	• Reduce down time and costs plus a need to know what they have and establish a regular PM program
WORKING ON MOTOR PROBLEMS WITH THE INITIATIVE CONSULTANT	1	• Work with consultant
CHANGED GREASE TYPE	1	• Motors burning up because of wrong grease
TOTAL*	**13**	

* Eight customers reported recent practice changes. Total sums to greater than 8 since some respondents described more than one practice change.

Table 7: Planned Changes to Motor Management Practices

RECENT CHANGES	NUMBER WHO RECENTLY MADE CHANGE	FACTORS IN MAKING CHANGE
CONTINUE TO INSTALL INVENTORY	2	• Consultant • Savings
CONTINUE TO COMPUTERIZE INVENTORY	2	• Reduce downtime to 2% • Reduce downtime and costs plus a need to know what they have and establish a regular PM program
ESTABLISH A REPAIR/REPLACE POLICY	2	• Keep things running, reduce downtime improve quality of rewinds • Need to find ways to make more paper at a lower cost • Need to have a consistency plant-wide
CONTINUE TO INITIATE/ IMPROVE PM PROGRAM	2	• Reduce downtime to 2% • N/A
CONTINUE TO PURCHASE PREMIUM MOTORS	1	• Savings • Reduce downtime and costs plus a need to know what they have and establish a regular PM program
CONTINUE TO ESTABLISH MOTOR MANAGEMENT POLICY	1	• Reduce down time and costs plus a need to know what they have and establish a regular PM program

EXPAND MOTOR TESTING	1	• Cost avoidance
GET MOTOR SIGNATURES ON DC MOTORS WHEN FIRST INSTALLED	1	• N/A
REDUCE BURNOUTS AND MAKE MOTORS LAST LONGER	1	• High rate of motor burnouts
TRAINING STAFF	1	• Respondent is retiring
TOTAL*	12	

* Nine customers described planned practice changes. Total sums to greater than 9 since some respondents described more than one practice change.

- ***The correlation between field consultants' recommendations and customers' changes is an additional indication that the Initiative is influencing what customers' say they are planning to do.*** The consultant's recommendations described by six of these fifteen respondents echoed one or more of the changes they said they were planning to make in the near term. *Table 8* provides detail on recommendations respondents said the field consultants made.

- ***Customers face key barriers in implementing the consultants' recommendations***. Respondents say the primary barriers are obtaining management buy-in, staff time, and cost of changes.

Table 8: Practice Changes Recommended by Consultant

PRACTICE CHANGE	SURVEY RESPONDENTS
ESTABLISH A REPAIR/REPLACE POLICY	6
PURCHASE MORE PREMIUM MOTORS	6
START AN INVENTORY	4
COMPUTERIZE OR UPGRADE INVENTORY	4
START USING A REPAIR SPEC	5
CONDUCT (MORE) MOTOR TESTING	4
WORK WITH REWIND SHOP ON SPEC	1

USE *MOTORMASTER*	1
ESTABLISH PREMIUM PURCHASE POLICY	1
(RESPONDENT CAN'T REMEMBER)	2
TOTAL*	34

* Sums to greater than 17 since some respondents described more than one recommendation

Feedback on Consultants and Program Tools/Materials

The following points were made regarding the program consultant's and tools/materials:

- **Respondents rated consultants' credibility and knowledge of the services very positively.** Respondents also generally felt the services are a good match to their needs, but ratings weren't as consistently high for this question.

- **The data indicate that the key tools are not standing out in most respondents' minds.** Only six of the eighteen respondents who remembered receiving any materials at all could name specific tools. Those six specifically mentioned the repair/replace chart, repair spec, inventory worksheet and *MotorMaster*. The other twelve said they had received "pamphlets," "a packet or folder," or "information." Several respondents remarked they had not had time to read the materials. Several said the information would not be useful, although these comments seemed to stem from specific circumstances (e.g., company too small or for sale).

IV. Motor Manufacturer Interview Results

A. Introduction

Representatives of six major motor manufacturing companies were interviewed to:

- Understand the sales of efficient motors and variable speed drives, as well as the manufacturers' positions on motor efficiency.
- Explore whether manufacturers are offering additional motor-related services beyond sales.
- Assess whether manufacturer contacts could provide a low-cost means of tracking premium motor market share.

These manufacturer representatives have a great deal of knowledge in the motors market, with a minimum of ten years experience and an average of over sixteen years of selling motors.

For the most part, the service or sales territory for these motor reps was similar to that of the Alliance. In terms of a region, this summary covers Washington, Oregon, Idaho, and Montana. A number of reps also included Alaska in their territory, but sales there were relatively small. Several of them mentioned that the vast majority of sales occurs in the "triangle" formed by Portland, Seattle, and Spokane, and interestingly, the majority are located in the Portland metropolitan area.

B. Summary of Key Findings

Below are highlights of the findings from the interviews:

- Most manufacturers are not heavily invested in the motor services market beyond selling new motors, drives, and related equipment. Only one major manufacturer is significantly invested in providing "comprehensive" in-house motor management services, including repair, installation, inventory, maintenance, warehousing of spares,

motor sizing, and motor testing (including for efficiency). Four others offer testing (usually for OEMs), and two offer limited warehousing (again, either for OEMs[10] or on behalf of distributors).

- A few manufacturers sell ancillary equipment such as drives and pumps, but in most cases the dominant income is from new motor sales. Annual regional sales for those interviewed were over 30,000 integral horsepower three phase motors.[11] This represents almost 90% of the 34,000 annual regional sales estimated in Pacific Energy Associates' 1998 study.[12] Even if some sales growth is assumed, the vast majority of sales were covered.

- There does not appear to be a discernable trend among manufacturers towards integrated equipment sales, equipment services, or other "synergies" in sales. We expect any movement in this direction will come from large repair/sales shops, and from the one manufacturer noted above.

- Motor manufacturers focus on niches in the market, based on customer groupings, historical relationships, and real and perceived differences between motors. It will be important to pay attention to the specific patterns of these relationships when marketing motor service programs and premium efficiency motors.

- Obtaining data on premium motor market share proved problematic for a number of reasons: 1) manufacturers' definitions of "premium" vary; 2) manufacturers track sales in dollars rather than units, therefore data on unit sales were approximations; and 3) not all manufacturers will

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[10] Original Equipment Manufacturers.

[11] Even though respondents were specifically asked for premium sales in terms of units, the tendency to think in terms of dollar sales and the fact that larger motors are more expensive might have biased these results somewhat upwards.

[12] Fred Gordon, et al. *Program Evaluation Report for the Premium Efficiency Motors Program*. December 10, 1998.

respond and it is difficult to extrapolate to nonrespondents because reports of premium market share varied drastically.

- Nevertheless, the following data were gleaned from the interviews: on average, respondents reported that 41% of sales were premium motors (as defined by manufacturers); this value varied between 20% and 73%.

- Regarding manufacturers' arrangements with shops to do repair warranty work or motor modification, respondents said they only use EASA shops.[13] Arrangements with shops varied from verbal agreements to written contracts.

- Only one manufacturer said they had heard about the *Drive Power Initiative*, but all were very interested in knowing more.

C. Detailed Findings

Motor Sales Summary

New motor sales are the vast majority of respondents' revenues, comprising 80% on average of reported sales volume. Variable speed drives are number two in sales volume, followed by motor system equipment and other motor-related services.

In terms of the sizes of motors sold, 66% of motor sales were less than 50 horsepower, 19% are between 50 and 200 horsepower, and the remaining 15% were larger than 200 horsepower.

There was substantial variation in sales by size. In the up to 50 horsepower range, one company sold as few as 15%, while another was 90% of sales. One sold no motors larger than 200 horsepower and therefore sold more "commodity" motors in standard efficiency of smaller sizes. Another rep said that 60% of sales were in motors larger than 200 horsepower.

[13] Members of the Electrical Appliance Service Association.

Sales of Premium Motors

Obtaining data on premium motor market share proved problematic. Manufacturers' definitions of "premium" vary. They also track sales in dollars rather than units; therefore, data on unit sales were approximations. Finally, not all manufacturers responded to the request for an interview.

On average, respondents reported that 41% of sales were premium motors (as defined by manufacturers). This value varied between 20% and 73%. The remaining motor sales were reported as 37% standard efficiency motors and 22% specialty motors. While these were estimates made by respondents during interviews, rather than drawn from sales data, it is nevertheless extremely significant that more than half of non-specialty motor sales are reported to be premiums.

In terms of annual change in the sales of premium motors, the overall response was a 3.5% average increase. Two of the representatives said that there was no change in premium sales; two said there had been a 5% increase; and the remaining two said 2%.

All the representatives but one said premiums are a good value for end-users of their motors. In general, it appears that manufacturers may be more positive than end-users about the use of premium motors:

- *"Premium efficiency motors are recommended for inverter duty, for hostile environments, and for constant use applications. Also for high torque, cyclical, or reversing applications, and for pumping."*
- *"[Premium motors are recommended] except for low run time applications. [Also recommended] for severe duty, high start torque and special applications."*
- *"Recommends premium efficiency motors in applications that run continuously – not appropriate for applications with low motor run time. Also, premium efficiency motors must be sized properly."*
- *"[Recommended] anytime for a VSD or severe duty application. Recommended not just for energy cost savings, but for higher quality."*

Target Markets

Who they sell to varies substantially. One acts as a distributor and representative both – resulting in 60% of sales to end-users. Two of the representatives don't sell to end-users at all, two others have about 10% of sales to end-users, and another is at 5% to end-users. These sales to end-users are usually one or two special contracts with major companies in the region.

Each representative and motor brand appeared to have a market niche. These motor manufacturers don't seem to necessarily share the same sales ground, but each might focus a bit more on the OEM market, large industrial sales, or commodity motors. For example, OEM sales varied substantially across manufacturers, from a low of 15% up to 60% of sales. Motors are not uniform commodities. Some product lines may be similar between several brands, but apparently may be perceived by customers as different.

Company Sales Structure

The organizational structure of the manufacturer representative varies substantially. Several are contractors or contract firms, some are employees but actually work out of their homes. One of them worked with up to seven outside sales people, while one each had five and six sales staff. Two of the representatives worked with one other person, and one of them worked alone. There was not a clear relationship between number of representatives and sales volume in the region – it appears to be an artifact of their sales organization.

Other Motor-Related Services

Respondents were asked if they offered "other motor-related services." These are services beyond sales of new and used motors, variable speed drives, and motor system parts and equipment such as pumps, drives, and couplings. These other motor-related services and the associated number of manufacturers offering them are listed in *Table 9* below.

Most manufacturers are not heavily invested in the motor services market beyond selling new motors, drives, and related equipment. Only one major manufacturer is significantly invested in providing "comprehensive" in-house motor management services, including repair, installation, inventory,

maintenance, warehousing of spares, motor sizing, and motor testing (including for efficiency). Four others offered less comprehensive testing and two limited warehousing (again either for OEMs or on behalf of distributors). One manufacturer also said he offers engineering services for motors on controls for ends-users, and does some trouble shooting and "surveys."

Table 9: Other Motor Related Services

MOTOR-RELATED SERVICE	NUMBER OF RESPONDENTS OFFERING
Motor Repair	1
Motor Installation	1
Motor Inventory Services	1
Motor Maintenance	1
Warehousing of Spares	3
Motor Testing	5
Motor Sizing	1
Comprehensive Motor Management *(Inventory, Maintenance, Warehousing Of Spares, Etc.)*	1
Other	1

The company offering comprehensive services did testing for efficiency, load, vibration, speed, balance, shorts, resistance, current, and noise (on ASDs). Two did more standard testing involving insulation, bearings, windings, vibration, and harmonics. The other two did limited and occasional testing on OEM applications.

Regarding arrangements with shops to do repair warranty work or motor modification, respondents said they only use EASA shops. Arrangements with shops varied from verbal agreements to written contracts. In some cases the repair work was an extension of the distributorship arrangement.

Interestingly, the manufacturer offering comprehensive services said that major distributors are considering and offering services to improve margins, but we did not hear that from the other reps, even though they sell to the same distributors.

Variable Speed Drives

An estimated 4,100 variable speed drives are sold annually among all these manufacturers. This represents about 38% of estimated annual VSDs in the Pacific Northwest.[14] On average, respondents estimated that 73% of variable speed drives are used in new applications, and the balance for existing systems.

Although three manufacturers said that variable speed drives sales are the same as last year, two said that sales were up markedly, 20% to 25%. The fourth representative does not sell variable speed drives, but plans to start soon.

There were a variety of positive comments on recent market changes for variable speed drives:

- *"There has been a surge in the availability of inexpensive small drives."*
- *"There has been more creative application of variable speed drives and people are using them in more places. Perhaps people are getting used to inverters as a safe application."*
- *"Biggest growth is in HVAC. Clean rooms have been big lately also."*

[14] The estimate of annual regional VSD sales is extrapolated from the Easton VSD report. (*Market Research Report: Variable Frequency Drives.* Easton Consultants, June, 2000.) This report estimated national integrated motor sales of about 2,000,000 in 1997. PEA estimated 34,000 for the region, which represents about 1.7%. If VSD sales in the region follow the same pattern, and the Easton report estimated about 640,000 were sold nationally in 1998, about 10,900 were sold in the region. Thus 4,100 represents about 38% of regional sales.

- *"Most everyone is thinking about putting soft start or variable speed drives on motors. A variable speed drives also gives good information on motor operation and protects motor from damage. There is a trend toward one supplier for drives and motor together and manufacturers are assembling compatible packages."*

- *"Trend is growing somewhat. Municipalities, usually conservative, are going for variable speed drives. Also OEM manufacturers are using them more. Variable speed drives are similar in price to high-end motor starter equipment and also provide process control information."*

- *"Trends in drives are increased sales in the 50-200 HP market because VSD in medium voltage are difficult/expensive."*

Awareness of CEE Motor Efficiency Guidelines and Opinion of Labeling

Only one rep had heard about the Consortium for Energy Efficiency (CEE) motor efficiency guidelines. Not surprisingly, this was the same company as offers comprehensive services. He also said that it is the first item mentioned about motor specifications in their company catalog.

The representatives had a wide range of opinions about labeling – from strong support to disparaging comments. Their opinions may be a function of their type of motor and market niche. Those with strong premium motor lines were more supportive, and those focused on commodity motors less so:

- *"I think it would be great. Super. We typically build this type of motor."*

- *"Nice toy for engineers to write into their specs. But in real world it wouldn't mean much.*

- *"I think it's pure marketing."*

- *"For end-users it would be OK. Motor sales won't care for it. It may create a level playing field."*

- *"I would like that. We have better premium efficiency motors that others. But we need more uniform testing. The 10/20 percent window for efficiency [measurement] creates confusion. Everyone needs to come on board with a standard approach."*

- *"Don't really see any problem with it but would need to see if it would fly with my company's policy and engineering."*

Awareness of Drive Power

All the manufacturers are interested in knowing what's going on with motor management initiatives, including those of the Alliance and Electric Motor Management. Only one had heard anything about this initiative, there was no attribution to the Alliance. All of them have seen a lot of programs come and go, and although not cynical to these efforts, they would like to have information on any motor related activity.

IV. Motor Manufacturer Interview Results

V. Findings and Recommendations

A. Targeting and Planning

Finding: The field consultants have made in-person visits with 61 customers so far. Of these, 45 have data on their number of motors. Nineteen have 250 or fewer motors. Of those, thirteen have 100 or fewer motors.

> ***Recommendation:*** While hard and fast rules are not advisable, if the Initiative is going to pursue new customer contacts in the future, it needs to better target those end-users that have significant motor loads and who have not yet aggressively pursued motor management services. The emphasis on larger customers is borne out by the fact that ten of the most promising success story candidates have over 400 motors.[15] In the last several months, Electric League staff have directed the field consultants to focus more narrowly on the most promising types and sizes of customers.

Finding: Based on our interviews with staff, it has been a challenge to meet the multiple, and sometimes broadly defined objectives of the Initiative within budget. Some field consultants cited budget issues and work stoppages as factors that have intermittently slowed down one-on-one customer work. For the month of May, marketing work was put on hold because expenditures from the field were running at a faster pace than budget. One potential success story was apparently not pursued because of resource limitations. It is unclear to the evaluators whether this was a one-time, start-up issue related to introducing the program to many entities and getting the workshops started, etc., or whether there may be ongoing issues concerning setting priorities for budget expenditures.

> ***Recommendation:*** Alliance staff should work with the implementation staff to determine whether problems of workload or direction are still impeding high-priority work. If problems remain, it needs to be

[15] One other candidate had 60 motors. Motor data was not available for the remaining two.

determined whether the key issues are funding, priorities, organization, or oversight. Then the Alliance should plan specific changes as needed.

Finding: With 61 customer contacts, limited field consultant time and budgets, and the need to complete and publicize success stories, it is important for the Initiative to carefully plan its activities and the services it will offer over the next six months. This is crucial as it is likely that awareness of the Initiative's services is growing through word of mouth, *Windings* (the Initiative's newsletter), and the seminars conducted in the spring and summer of 2000.

Recommendation A: Before proceeding with new customer contacts or other work such as additional seminars, take stock of the status of end-users contacted to date and determine with more certainty which ones can be developed into compelling success stories. Based on the most recent *Logic Model (see Appendix A)*, the Initiative has revised its goal of 15[16] success stories to 10 over the next six months. We believe this is a more reasonable goal.

Recommendation B: Reinforce the message with field personnel that it is more important to convert existing "good prospect" contacts into successes than to make additional contacts. Efforts to expand the customer base or provide more training or other services should be fit around this priority. With this in mind, determine what further services should be offered to new customers and if further customer contacts should be actively pursued.

B. Momentum and Exit Strategy

Finding: The Initiative is at a critical point in its momentum and the Alliance and League need to consider how this momentum is to be sustained beyond the end of 2000. The field consultants have developed important relationships with large industrial customers. They are making good progress, but a number of

[16] The original goal was 25.

success stories may not be wrapped up by the end of the year. Further, publicizing the success stories to generate customer interest and activity is important to leveraging Initiative efforts and will take time.

> ***Recommendation A:*** We believe that it will be necessary for the Alliance to extend funding if it wishes to determine whether *Drive Power* can be successful as a market transformation initiative. There are clear signs that success is possible, but until a significant number of early adopters implement practices successfully, there is no way to know.
>
> ***Recommendation B:*** *The* League and Alliance need to explicitly plan an exit strategy to be implemented during the next phase of Initiative activity. An important part of this planning will be deciding the degree to which the Initiative wants to actively work towards forming a self sustaining market for motor services. The Alliance needs to decide on specific objectives in this regard and plan their activities accordingly.

Finding: Key customer barriers to changing motor management practices are obtaining management buy-in, staff time, and cost.

> ***Recommendation:*** The League may want to consider a more formalized effort to overcome the staffing/time barrier. Possibilities include localized efforts to recruit technical and community college students[17] and utility subsidies for temporary staffing or contracting. The field consultants may also want to provide more structured advice to plant staff on how to pitch their motor management plans and associated staffing needs to management.

C. Repair Shop Strategy

Finding: Some of the field consultants are working in tandem with customers and their shops to introduce and discuss the repair spec so both parties know

[17] This concept is already being pursued by one field consultant

about it. This will make it more likely to be adopted. The League project manager confirmed that this approach is being pursued as a strategy.

> ***Recommendation:*** The Initiative should consider more formally adopting this strategy and setting goals for it. Specifically, they could consider setting a goal of working in a coordinated way with those 13 or so customers that have shown the most potential for practice change, along with their repair shops.

D. Motor Management Seminars

Finding: There appear to be differing views on the purpose of the seminars. Some Initiative staff view the seminars primarily as a vehicle for publicizing the Initiative and generating customers' interest in doing in-depth, one-on-one work with the consultants. The field consultants described the seminars more in terms of a vehicle to leverage their efforts by enabling customers to take action on their own with minimal help.

> ***Recommendation:*** Continue the seminars as a program, but clarify the seminars' objectives and then more deliberately plan the seminars to meet those objectives. If, for example, a primary objective is for participants to take action, the seminars probably need to be lengthened and more hands-on exercises included, along with advice on how to garner management support. In addition, based on the evaluators' observations, it would be helpful if the seminar's purpose, message, and desired outcomes were more explicitly stated and repeated throughout the seminar.

Finding: Attendance by manufacturing companies is significant, but relatively modest compared to similar efforts in other areas of the country.

> ***Recommendation:*** The marketing approach should be refined to recruit more manufacturing companies with many motors and/or a significant number of large ones.

E. Tool Kit

Finding: Customer recollection of the tool kit is not high. This may be because the kit in its entirety contains numerous and diverse pieces of information, and key pieces are not flagged. Furthermore, some pieces could be more effective and some different material may help close sales.

> ***Recommendation:*** 1) Flag key tools and materials; 2) consider only giving customers selected and relevant items rather than the entire toolkit; and 3) Remove overly complex or conflicting materials.

Finding: The importance of developing repair/replace and premium motor purchase policies is often discussed in the seminars, the tool kit materials, and by consultants, but there are no written examples.

> ***Recommendation:*** Create or collect sample policies. The League's motors expert could provide valuable insight and assistance here.

Finding: The repair/replace nomographs (in *Your Motors and Money*) do not explicitly include any assumption about motor efficiency degradation from repair. While it is difficult to make any general assumptions about the percent of degradation, this may bias decisions toward rewinding motors that it would be economically beneficial to replace.

> ***Recommendation:*** This issue should be revisited and discussed further with motors experts. One option would be to publish two sets of nomographs showing a range of possible economics: one with 0% degradation and the other with 1%.

Finding: The *Electric Motor Manager* (EMM) software created by one of the field consultants is a positive addition. It is far simpler than *MotorMaster*, but is technically compatible. The proposed use of the Palm Pilot® for field data collection is an exciting idea and should be pursued. However, there are a number of issues that need to be addressed regarding the software's ownership, funding, marketing, and maintenance (documentation, new programming, debugging, etc.).

Recommendation: The Alliance should consider making EMM the League's primary inventory tool, but needs to resolve the issues listed above.

Appendices

Appendix A: Northwest Energy Efficiency Alliance Logic Model

Appendix B: Woodgrain Millwork Success Story

Appendix C: Toolkit Review

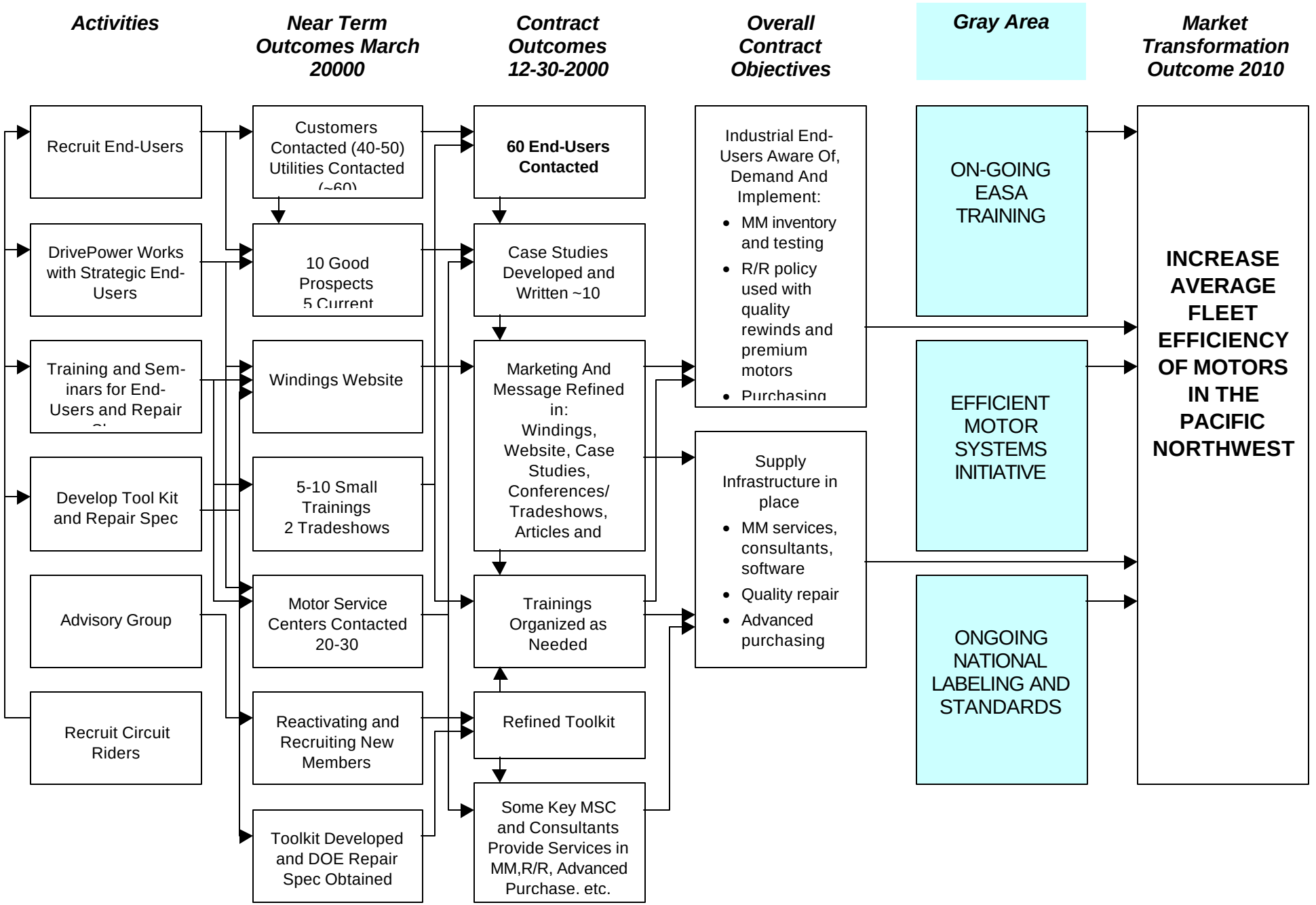
Appendices

Appendix A

Drive Power Motor Management Logic Model

Appendix A

Drive Power Motor Management Logic Model



Appendix B

NEWS RELEASE July 21, 2000

Contact: Cynthia Putnam, Electric League of the Pacific Northwest
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Woodgrain Millwork Installs Efficient Motor and Begins Plant-Wide Motor Inventory

Benefits

- $850 savings from an energy efficient 250 hp motor
- Streamlined process for motor inventory collects data on 55 motors in one month's time
- New motor inventory will track spare motors on hand, provide rewind history, be used for repair/replace decision making and choosing efficient motors

Overview

Mark Rawlings, Plant Maintenance Manager, thought he had the numbers wrong when a recent calculation showed that his company, Woodgrain Millwork, Inc., was paying almost as much in utility costs as his annual salary – just to run a single 250 hp motor. The motor had failed and Rawlings had to decide whether to repair it or replace it with a new one. Company policy for this type of decision was simple – compare the cost of repair to the cost of buying a new motor, then pick the less expensive of the two. For this particular decision, however, Rawlings factored another cost into the equation – the cost of running the motor. This made all the difference in his final decision: replace the old motor with a new, energy efficient one.

The expense to operate the motor was so surprising that "I called our representative at Idaho Power to confirm the rate information I was using," said Rawlings. Idaho Power confirmed the rate schedule and encouraged Rawlings to explore efficient motor options. With the help of Dennis Bowns, the Electric

League's motor management field consultant, Rawlings used MotorMaster+ software to compare the existing motor to comparable new energy efficient motors. The software identified two new motors, one of which was priced in the same range as the rewind cost while offering 1.3 percent greater efficiency. Rawlings concluded it was the best choice and bought it to replace the failed motor. This decision is estimated to save Woodgrain as much as $850 per year.

Lessons Learned

Rawlings learned much from this simple analysis. First, is that the company's current repair/replace policy ignores the costs of operating a motor and is costing them money in the long run. Second, there are good software tools available to make life cycle costing and comparison shopping easy, and help make the pitch to management. "The fact that I could generate a written report for management comparing our options helped convince management to buy the new efficient motor," said Rawlings. Third, the analysis tools are only as good as the information at hand on the motors in the plant. Without an inventory that provides good data such as rewind and repair history, hours of operation, nameplate data, and more, the tools won't be of much help. Finally, since it takes time to do this analysis, doing it in advance of a motor failure can prevent a hasty decision that costs more in the long run.

Next Steps

Using these lessons, Rawlings committed his department to develop a motor inventory for their 500 motors in the coming year. Once established, the inventory will track spares on hand, rewind history, and be used for repair/replace decision making with energy efficient motors. He worked with Bowns to streamline the process by collecting only the most important motor data (see sidebar), and focusing on one set of motors in the plant at a time. He's now nearing completion of some 55 of the major motors that keep the plant running. He estimates the cost of operating these motors exceeds $600,000 annually. The next phase of the inventory will focus on specialty motors that run equipment such as

molders and are hard to replace. Bowns and Rawlings are exploring ways to speed up the collection process further by using a PalmPilot® loaded with the inventory spreadsheet to enter data directly from the plant floor.

Even with streamlining, Rawlings expects the project to take six months to complete. In the meantime, he plans to use the inventory data collected so far to generate reports that demonstrate savings opportunities. He expects these to be convincing enough to change the way the company makes repair/replace decisions. He knows after all, when utility costs rival labor costs, his management takes notice.

Partners
Woodgrain Millwork, Inc.
Idaho Power
Electric League of the Pacific Northwest
Northwest Energy Efficiency Alliance

The Electric Motor Management Program offers training and on-site technical assistance for motors and motor driven systems. Services are free of charge and can help you make cost effective decisions about the repair and replacement of electric motors. More information is available by calling 888-720-6823, or by visiting the web site at www.electricleague.net/motors.htm

SIDEBAR 1

Motor Data Shortlist Used by Woodgrain Millwork, Inc.

Woodgrain saved time inventorying its motors by collecting only the most important data as featured in this shortlist jointly developed with the League's Electric Motor Management field consultant, Dennis Bowns. To further save time, data is entered directly from the plant floor into a PalmPilot® then transferred to a computer for analysis later.

DATA: Motor ID number, amps and volts with four different time entries for preventive maintenance, nameplate data, original cost, vendor, comment lines, number of rewinds and repairs, date put in service, date put in inventory, location, machine number, bearing numbers and type, lubrication date, annual operating hours, and annual cost of operation.

SIDEBAR 2

Profile Information

Woodgrain Millwork operates seven plants in locations throughout the Northwest and Southeast (Fruitland and Nampa, Idaho; White City and Lakeview,Oregon; Albany, Georgia; Marion, VA; and Montevallo, AL). The company manufactures wood molding for door and window parts for manufactured housing.

The Fruitland, Idaho plant has 500 motors ranging in size from 1 to 250 hp; the average size is 15-20 hp. Fruitland also serves as the repair hub for the company's specialty molding motors operating in the Nampa, Idaho and two Oregon plants.

Appendix C

TOOL KIT REVIEW

Introduction

The following is a brief review of the *Motor Management Toolkit* provided by Electric Motor Management. This includes materials from the Electric Motor Management (Electric League), from the Electric Apparatus Service Association (EASA), and from the U.S. DOE *Motor Challenge*. In general, all these materials are useful, complete, and detailed, and provide an excellent education on industrial motors. However, there are probably too many materials for most maintenance personnel to effectively use. The Toolkit may also not contain enough straightforward instruction for maintenance staff to clearly understand how to use the materials to improve basic motor management. Further, the level of complexity of analysis described in some of the materials may be beyond the available abilities of staff.

Electric League Materials

Motor Repair Purchasing Specification

Altogether excellent. Might also be distributed with a one-page preface of instructions.

Typical Savings from Premium Efficiency Motors

This is an attractive and easy to use graph on card stock to calculate energy savings of a new premium efficiency versus a new EPACT standard efficiency motor. The back of the graph has information on efficient motors, with the third paragraph suggesting that companies should "purchase the most efficient motors available because of their greater bottom-line value." This could be clearer, and it would be helpful if the front stated a rationale for making the choice. For example: "If the savings are the same as the cost difference, it will pay for itself in a year." Or "Savings of $104 per year are about the same as the extra cost for premium in most brands!"

The assumption of 5¢ per kWh is more than most large industrial customers would pay in the region. The "wavy" lines of the graph are attractive, but are inexplicable in terms of what the data behind them would be. The suggestions on getting the most from the Motor System are good. The rationale beyond energy savings, like longer motor life, improved system reliability should be mentioned also.

Guidelines to a Good Motor Repair (or, Motor Repair is a Two-way Street)

Something like this should always be distributed with the *Motor Repair Purchasing Specification*. However, it is probably more detailed than necessary and redundant with other materials.

Your Motors and Money

This is a clear and easy to use guide to motor repair/replace decisions. The graphs for six motor types/speeds are different enough to justify the extra pages. It does raise the question of why *Typical Savings from…* has only one graph. The graphs might also clearly state that the results are based on a two-year payback.

In the narrative section on motor replacement, it would be helpful to explicitly emphasize the connections between this document and the *Typical Savings from…*

We are concerned that the piece does not explicitly include any assumption about motor efficiency degradation from repair in the nomographs, nor does it discuss this issue in the text. One option might be to have two sets of nomographs for more sophisticated users; one with 0% degradation and the other with 1%.

EASA Materials

Note that some of the EASA materials are prepared in cooperation with the U.S. DOE *Motor Challenge Program*.

Failure in Three Phase Motors

Very clear, great pictures, with a short but succinct explanation. The usefulness to facility maintenance staff is unclear, except to diagnosis of problems that they have created or unless they have reason not to trust their motor repair shop.

How to Get the Most from Your Electric Motors

This is a concise summary of the use and care of electric motors. It is probably most useful as a reference, as in places the information is somewhat technical but yet doesn't provide complete instruction or examples to complete a task. The information on maintenance is good, although it doesn't seem that most industrial facilities could reasonably undertake the predictive maintenance described in this document, except perhaps on a few critical systems.

The discussion of Repair vs. Replacement leans in the direction of motor repair instead of replacement with efficient motors. This apparent bias shows elsewhere in EASA's materials. There is no suggestion that a rewound motor might have degraded efficiency.

A Guide to AC Motor Repair and Replacement

Overall, a useful and well-written piece. This document suggests a proactive approach to motor failures, a good approach to emphasize. It also at the start recommends that customers keep a motor inventory.

Of concern is that it states that: "While no studies to date directly address [reliability of repaired/rewound motors], the quality of the materials and workmanship that go into properly repaired/rewound motors often surpass manufacturers' design specifications." This conflicts with a statement found elsewhere in the Toolkit materials that rewound motors typically have about half the life of new motors, 3.5 years instead of 7 years.

There is a tutorial (without examples) of calculating energy cost savings of repair vs. replacement. There is no suggestion that improper motor repair could degrade motor efficiency, even historical repairs.

The brief summary discussion of obtaining high quality rewinds is good. It doesn't provide a specification, but mentions the ability of EASA shops and their standards. It suggests that customers develop a motor repair/replace policy without describing what might go into one.

The booklet also contains a good general discussion of the steps involved in a motor repair.

Understanding Energy Efficient Motors

This booklet presents a particularly complex technical subject in a particularly complex manner. It's not clear who the intended audience was for this publication, but it's unlikely to be useful to any staff involved in facility maintenance.

The evaluation team had a major difference with their *"Misconception 1"* regarding oversized motors being less efficient. The problem is that the *motor drive system* is less efficient, and this is what the customer is paying for in both capital for larger motors and in energy use.

The discussion of field efficiency testing methods tends toward emphasizing the unsuitability and inaccuracy of these methods, rather than how the methods might be useful to understand motor problems and improve overall motor management.

Recommended Practice for the Repair of Rotating Electrical Apparatus

This is something that only the most sophisticated customers should ever see. It is a complicated and more detailed version of the *Motor Repair Purchasing Specification* and it is redundant to that document. These two publications should probably not be distributed together as it would be confusing of which one to use.

Motor Challenge Materials

Optimizing Your Motor Drive System

This has some useful information. Two of their figures are especially clear – those on voltage variation and motor performance and the other on insulation service life vs. temperature.

Replacing an Oversized and Underloaded Electric Motor

Assessment of proper motor sizing can be a complex problem. This document maintains that complexity. Conflicts with some information provided by EASA.

Reducing Power Factor Costs

Very clear description of a very difficult concept. The description of power factor correction doesn't suggest modification to other inductive loads besides motors that can contribute to poor power factor.