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Evaluation of Key ACE Model Assumptions for Motor Rewinds

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Executive Summary

The Northwest Energy Efficiency Alliance (NEEA) engaged Cadmus to conduct research to update the key Alliance Cost Effectiveness (ACE) model assumptions for motor rewinds performed in 2015 in Idaho, Montana, Oregon, and Washington.

The Drive Power Initiative (DPI), via the Green Motor Initiative (GMI) and the Green Motors Practices Group (GMPG), encourages those in the Northwest's motor service center market to adopt green motor rewind practices. These practices reduce energy use for motors utilized in the agricultural and industrial sectors. Green motor rewinds require rigorous testing and offer greater energy savings compared to standard motor rewinds.

NEEA required a third-party evaluation of its ACE model assumptions for the motor rewind market as part of its long-term monitoring and tracking efforts to determine progress within the market. This evaluation required collection of a range of data to meet three major research objectives necessary to update ACE model assumptions for motor rewinds: (1) determine the size of the motor rewind market in the Northwest; (2) establish the market share of green motor rewind practices; and (3) calculate the regional savings for green motor rewinds. Cadmus also gathered data to address a fourth, supplementary objective to gather market intelligence.

Key Findings to Update ACE Model Assumptions

This section presents Cadmus' key findings, organized by major study objectives to update ACE model assumptions: market size, market share, and regional savings.

Market Size. In 2015, Cadmus determined the Northwest market comprises 81 motor service centers—34 members and 47 nonmembers. Below, Cadmus lists the breakdown of performance by member and nonmember centers.

- **Number of rewinds.** Motor service centers performed an estimated 3,059 motor rewinds in the Northwest in 2015: GMPG members performed 2,032 (66%); and nonmembers performed 1,026 (34%). The estimated number of rewinds performed by Northwest motor service centers decreased by 1,572 motor rewinds between 2013 and 2015—from 4,631 in 2013 to 3,505 in 2014 to 3,059 in 2015. This decrease in motor rewinds most likely resulted from a decline in the motor rewind industry along with improvements Cadmus made in data collection and subsequent changes in Cadmus' study sample between 2013 and 2015. Cadmus increased data collection response rates from 29% in 2013 to 47% in 2015, resulting in a more accurate profile of the motor service center market (including representation from less active motor service centers), and therefore more accurate extrapolations to the population of motor service centers.
- **Total horsepower rewound.** In 2015, motor service centers rewound motors with a total value of 430,677 horsepower in the Northwest. GMPG members rewound 355,602 horsepower (83%) and nonmembers rewound 75,075 horsepower (17%).

- **Undocumented rewinds.** GMPG member service centers reported an estimated 8% of all eligible green motor rewinds—constituting 12% of total horsepower rewind—that did not receive a utility incentive as they were not documented.
- **Application.** Overall, industrial motors accounted for 54% of the total horsepower rewind at GMPG member and nonmember motor service centers in 2015. Agricultural motors accounted for the remaining 46% of total horsepower rewind.

Market Share. Cadmus found GMPG member service centers performed an estimated 479 green motor rewinds, representing 118,273 horsepower in 2015. Nonmembers performed 45 green motor rewinds, representing 4,100 horsepower in 2015. Green motor rewinds accounted for over 24% of all rewinds performed by GMPG member service centers. Thirty-three percent of all horsepower rewind by GMPG member service centers resulted from green motor rewinds.

Regional Savings. Green motor rewinds performed in 2015 resulted in an estimated annual total of 1,775,858 kilowatt hours (kWh) energy savings for member service centers and 76,543 kWh for nonmember service centers.

Table 1 provides annual kWh and average megawatt (aMW) energy savings from green motor rewinds by state for GMPG member and nonmember centers.

Table 1. 2015 Annual kWh and aMW Savings from Green Motor Rewinds

| State | Green Motor Rewind Savings | | | | | |
|------------|----------------------------|----------------|-----------|-------------|----------------|-------|
| | kWh | | | aMW | | |
| | GMPG Member | GMPG Nonmember | Total | GMPG Member | GMPG Nonmember | Total |
| Washington | 813,045 | 0 | 813,045 | 0.09 | 0.00 | 0.09 |
| Oregon | 577,224 | 0 | 577,224 | 0.07 | 0.00 | 0.07 |
| Idaho | 340,056 | 0 | 340,056 | 0.04 | 0.00 | 0.04 |
| Montana | 45,533 | 76,543 | 122,076 | 0.01 | 0.01 | 0.01 |
| Total | 1,775,858 | 76,543 | 1,852,401 | 0.20 | 0.01 | 0.21 |

Conclusions Regarding Market Intelligence

Market Transformation. Based on the study's findings, green motor rewinds have not yet become standard practice in the Northwest; therefore, the region's efforts have not transformed the market for green motor rewinds. GMPG members reported that green motor rewinds comprised only 33% of all horsepower rewind, and 24 % (5 out of 21) of member respondents indicated performing no green motor rewinds in 2015. Only one nonmember, previously a member of the GMPG, reported performing green motor rewinds, which comprised 5% of all nonmember horsepower rewind in 2015.

GMPG members perform more motor rewinds in compliance with green motor rewind standards than nonmembers. While a majority of nonmembers knew of the GMPG (68%), surveyed nonmembers expressed reluctance to join: one said they were unsure whether they would pursue

GMPG membership and none of the remaining nonmembers surveyed in 2015 planned to join the group.

In addition, seven members (though none of the nonmembers), were Electrical Apparatus Service Association (EASA) accredited. While one-third of members who knew of EASA but had not yet become accredited (3 of 9) said they planned to seek EASA accreditation, no nonmembers reported planning to do so.

NEEA, the GMPG, and EASA have made significant progress in encouraging motor service centers to perform green motor rewinds. Without additional intervention, however, the market penetration of green motor rewinds likely will not increase. The current study did not explore motor service centers' reasons for not planning to join the GMPG or seek EASA accreditation. In the 2013 study, however, nonmembers identified the following reasons for not joining the GMPG:

- Lack of proper equipment (specifically, core loss test machines);
- Lack of customer interest;
- Paperwork hassles
- A perception that green motor rewinds did not last as long; and
- Lack of time to sign up.

Additionally, in the 2013 study, stakeholder interviewees suggested that developing a customer awareness campaign and reducing paperwork burdens could help encourage motor service centers to offer green motor rewinds. While a deeper exploration of motor service center barriers and motivations fell outside of this study's scope, these findings suggest opportunities remain for NEEA to support interventions to transform the motor rewind market.

Future Data Collection Improvements. Given inherent issues faced when working with this hard-to-reach market segment, the 2015 data collection efforts particularly focused on service center outreach and solicitation. The study found such efforts proved successful in reducing previous study participants' attrition and in encouraging 2014 nonparticipants to provide motor rewind data in 2015. Cadmus achieved a 46% overall data collection form response rate (59% of members and 36% of nonmembers). While two fewer nonmembers completed the data collection forms in 2015 than in 2014 (a 4% decrease in participation), five additional members completed the form (a 14% increase in participation).

Maintaining a high level of outreach and engagement with motor service centers and exploring additional outreach and engagement strategies may be necessary to encourage continued participation in future data collection efforts. Cadmus believes, however, that the likelihood of achieving participation remains low for the 26 nonmember motor service centers and 10 member motor service centers that declined to provide motor rewind data during all three study years (2013, 2014, and 2015).

Recommendations

NEEA and Cadmus should consider adopting the following methods to maintain and increase participation in future data collection efforts:

- Provide early notification to motor service centers as soon as possible. Motor service centers would prefer to receive the notification at the beginning of the year, but this may not be feasible, given NEEA's decision-making timeline. During the March 2016 presentation of research findings, Cadmus and NEEA should discuss an achievable timeline.
- For 2016 data collection, continue employing the outreach and solicitation tactics used to increase response rates in 2015.
- To solicit the participation of less-engaged GMPG nonmembers, explore opportunities to partner with EASA in reaching out to EASA member motor service centers and encouraging their participation in 2016 data collection.

1 Introduction

The Northwest Energy Efficiency Alliance (NEEA) engaged Cadmus to conduct research in 2015 to update the key Alliance Cost Effectiveness (ACE) model assumptions for motor rewinds, with the study performed in Idaho, Montana, Oregon, and Washington.

NEEA funded the Drive Power Initiative (DPI) between 1999 and 2004 to increase motor efficiency and to transform the electric motor market. The Electric League of the Pacific Northwest provided the effort's initial funding.

Through the DPI, NEEA sought to achieve the following objectives:

- Increase the region's overall motor fleet efficiency.
- Influence end users' decision-making processes to repair or replace motors and encourage the consideration of life-cycle costing in investment decisions.
- Help motor service centers improve their repair practices and expand their motor management services.

In 2007, NEEA began tracking activities and trends in the drive power and motor rewinds markets through its long-term monitoring and tracking (LTMT) efforts. Subsequent LTMT reports in 2009 and 2011 updated the ACE model assumptions for motor rewinds, as did NEEA's 2013 and 2014 Evaluation Reviews of Key ACE Model Assumptions for Motor Rewinds.

Also in 2007, the Green Motors Practices Group (GMPG) submitted a request to the Regional Technical Forum (RTF) for approval of deemed savings for motors rewound by participating member centers. GMPG further requested that the RTF recognize and include green motor rewinds on its list of eligible energy efficiency measures. The RTF approved the green motor rewinds as an eligible energy efficiency measure later that year.

Shortly thereafter, a group of Northwest utilities convened to discuss an approach to support certified green motor rewinds at GMPG member service centers. The utilities decided to pursue a regional approach, focusing on helping the GMPG, motor service centers, and utilities achieve increased numbers of certified green motor rewinds. Though the group recognized that success depended on agreeing to a simple, market-based approach (such as providing incentives for green motor rewinds), it also understood complete uniformity in executing the approach might not be possible due to utility-specific preferences.

With assistance from NEEA and the region's utilities, the Bonneville Power Administration (BPA) formed the Green Motor Initiative (GMI) in 2008. GMI sought to educate, train, and certify service centers on following effective shop procedures and to offer incentives to service centers and end users for efficient motor rewinds.

Specific GMI objectives included the following:

- By 2010, grow the GMPG to self-sustain through membership and utility programs.
- By 2010, ensure Northwest motor service centers train personnel and adopt GMPG rewinding practices.
- Continue to promote customer motor management practices that lead to all industrial customers demanding GMPG-certified rewinds.

Via the GMI and the GMPG, the DPI encourages the Northwest's motor service center market to adopt green motor rewind practices. These practices reduce energy use for motors utilized in the agricultural and industrial sectors. Green motor rewinds require rigorous testing and offer greater energy savings compared to standard motor rewinds.

Service centers offering these services must, at a minimum, meet the following GMPG specifications for green motor rewinds:

- There must be no visible damage to the motor's core.
- The burn-off temperature must not exceed 385 degrees Celsius (720 degrees Fahrenheit) using verified water mist controls.
- The motor must undergo two (or more) core loss tests before and after stripping. The final core's test watts loss per pound must be no more than 20% greater than during the first test.
- No hot spots occur at greater than 10 degrees Celsius.
- Final core tests must be less than or equal to 4-watts loss per pound.
- The new winding must achieve an equivalent to the manufacturer's original length and (may exceed) circular mils (voltage changes must be calculated to circular mil equivalents).

BPA, Energy Trust, and other regional investor-owned utilities provide incentives of \$2 per horsepower, per GMPG member service center, for green motor rewinds. Each member service center retains \$1 per horsepower rewind and passes the other \$1 per horsepower rewind directly to the customer as part of its GMPG member agreement. Nonmember service centers remain ineligible to receive utility incentives.

GMPG serves as the program administrator for each of the region's utilities and provides the documentation necessary for each utility to claim savings and pay incentives. Monthly, GMPG collects this documentation from each of its member service center.

Although NEEA no longer provides funding, GMI's formation would not have been possible without NEEA's initial funding of the DPI and its subsequent funding to support the development of the GMPG and GMI. Due to its crucial role as regional collaborator, NEEA seeks to understand the current Northwest motor rewinds marketplace and to identify underlying data and assumptions that will allow NEEA to claim savings from this market transformation initiative.

1.1 Research Objectives

Cadmus designed this study to meet three key research objectives to update NEEA's ACE model assumptions for motor rewinds: (1) determine the size of the motor rewind market in the Northwest; (2) establish the market share of green motor rewind practices; and (3) calculate the regional savings for green motor rewinds. Cadmus also collected data to address a fourth supplementary objective—gather market intelligence.

1.1.1 Market Size

To determine the motor rewind market size, Cadmus conducted the following secondary and primary research:

- **Secondary Research:** This research determined the number of Northwest motor service centers, and, among these, identified the number of GMPG members and nonmembers.
- **Data Collection Forms:** This research collected the number of motor rewinds conducted at service centers to determine the total performed annually in the Northwest and the distribution among GMPG members and nonmember groups by horsepower. This research also collected the number of green motor rewinds documented by GMPG motor service centers that received utility incentives as well as the number of green motor rewinds that went undocumented and did not receive utility incentive.

1.1.2 Market Share

Using feedback from the data collection forms described in section 1.1.1 Market Size, Cadmus measured the market share of green motor rewind practices among Northwest motor service centers. Specifically, Cadmus determined the following:

- The granularity of data on rewinds, designed to estimate regional energy savings from motor rewinds;
- The number of rewinds in compliance with green motor rewind specifications; and
- The penetration of green motors practices among GMPG member and nonmember centers.

1.1.3 Savings Rate

For 2015, Cadmus used several sources to estimate regional savings from green motor rewinds:

- The data collection form described in section 1.1.1. Market Size.
- The RTF workbooks, which recorded details and assumptions pertaining to green motor rewinds.

The RTF maintains one workbook each for industrial and agricultural green motor rewinds. Motors in industrial applications typically operate for more hours within a year than do motors in agricultural settings, meaning they adopt different assumptions per application in terms of hours of operation, savings values, and measure lifetimes.

The RTF workbooks also contain annual energy-savings estimates for agricultural and industrial motors for a range of discrete horsepower values, from 15 horsepower to 5,000 horsepower. Cadmus multiplied these savings estimates by the number of green rewinds for each horsepower level within each market sector; this determined total annual energy savings for green motor rewinds.

1.1.4 Market Intelligence

Cadmus surveyed staff at 45 motor service centers (26 members and 19 nonmember centers) to collect market intelligence for tracking motor service center awareness of and intentions to seek Electrical Apparatus Service Association (EASA) accreditation and GMPG membership. Through the surveys, Cadmus explored motor service center perspectives on the motor rewind industry's trends.

1.2 Organization of This Report

Cadmus organized this report into the following sections:

- Methodology
- Findings
- Conclusions and Recommendations
- Appendices

The appendices include copies of the data collection form and survey questionnaires.

2 Methodology

Cadmus conducted secondary and primary research to meet the study's major objectives. Table 2 lists these objectives, their associated research activities, and respondents to the primary research activities: data collection forms and surveys

Table 2. Key Study Objectives and Activities

| Study Objectives | Study Activities | Respondents (to primary research) |
|---------------------|---|-----------------------------------|
| Market Size | Review GMPG membership list, survey, and data collection form | GMPG members and nonmembers |
| Market Share | Data collection form | GMPG members and nonmembers |
| Savings Rate | Data collection form and analysis | GMPG members and nonmembers |
| Market Intelligence | Survey | GMPG members and nonmembers |

2.1 Secondary Research

For 2015, Cadmus identified 81 motor service centers in the Northwest, compared to 83 motor service centers identified in 2014.

To determine the number and membership status of the Northwest motor service centers in 2015, Cadmus asked the GMPG administrator to review the 2015 list of motor service centers (33 GMPG members, 50 nonmembers). Following the review, the GMPG administrator informed Cadmus that one former nonmember had joined the organization.

Through direct mailings and phone surveys (detailed in the next section), Cadmus determined that two nonmember motor service centers no longer remained in business. This reduced the population from 83 service centers to 81 (34 member service centers, 47 nonmember service centers).

2.2 Primary Research

2.2.1 Preliminary Solicitation Outreach

Given the issues inherent in working with this hard-to-reach market segment, the 2015 data collection efforts especially focused on service center outreach and solicitation. Based on lessons learned from previously collecting motor rewind sales data from motor service centers in the Northwest, Cadmus employed several tactics to increase response rates. Prior to data collection, Cadmus contacted motor service centers three times to inform them about the 2015 study and to encourage their participation.

Contact 1: For both the 2013 and 2014 research studies, motor service centers requested advance notification of the study. In July 2015, Cadmus and the GMPG administrator provided advance notification to motor service centers. This notification consisted of two components:

- The GMPG administrator e-mailed all member motor service centers, providing notification of the study and a copy of the data collection form, and offering service centers an option to start the data collection process, recording motor rewinds throughout the year.
- Cadmus contacted all motor service centers (members and nonmembers) via mail, sending a study notification letter, a data collection form, and a professionally designed brochure that highlighted the 2014 study findings.

For the 35 motor service centers supplying data for the 2014 evaluation, Cadmus provided a customized brochure, comparing their shops' metrics against the 2014 study population. These metrics included the following:

- The number of GMPG member and EASA-accredited motor service centers in the Northwest.
- The distribution of horsepower rewind in 2014.
- The total number of motor rewinds their shops reported in 2014, compared to the average Northwest firm.
- Market penetration of green motor rewinds practices, by the number of rewinds and the total horsepower rewind.
- The total number of green motor rewinds performed in 2014, the proportion of green motor rewinds out of total motor rewinds, and the associated energy savings resulting from those green motor rewinds.

For motor service centers not supplying data for the 2014 evaluation, Cadmus provided a similar brochure, describing the same findings from the 2014 evaluation. As these service centers did not, however, provide data, this brochure did not contain the customized, service center-specific, motor rewind data.

Contact 2: In October 2015, Cadmus developed and delivered a postcard to all motor service centers, reminding them of the study and informing them of Cadmus' calling efforts, scheduled to begin in December.

Contact 3: During the first week of December 2015, the GMPG administrator again e-mailed the data collection form to member motor service centers and asked them to complete it. Cadmus then sent e-mails to the 28 nonmember motor service centers having available e-mail contact information and notified them of the research project before the survey effort began. The e-mails included a Microsoft Excel attachment of the data collection form and solicited the firms' participation.

2.2.2 Motor Service Center Survey

Cadmus surveyed GMPG member and nonmember service centers performing motor rewinds. The brief phone survey addressed the following research objectives:

- Assess motor service centers' awareness of EASA's accreditation program for motor service centers and respondents' intentions to seek EASA accreditation.
- Assess service centers' awareness of the GMPG and respondents' intentions to become GMPG members (nonmembers only).
- Explore trends in the motor rewind industry.

Forty-five motor service centers (26 members and 19 nonmembers) completed the phone surveys in 2015, a slight decrease from 50 surveys motor service centers completed for the prior year's survey.

Table 3 shows populations and completed surveys for member and nonmember motor service centers in 2013, 2014, and 2015. Based on the population size of 81 motor service centers, 2015's number of completed surveys achieved 90% confidence at $\pm 8\%$ precision overall. Cadmus achieved greater survey participation from members than nonmembers, therefore achieving a more statistically robust sample from members:

- Based on a member population size of 34, the number of completed surveys (n=26) achieved 90% confidence at $\pm 8\%$ precision for member service centers.
- Based on a nonmember population size of 47, the number of completed surveys (n=19) achieved 90% confidence at $\pm 15\%$ precision for nonmember service centers.

By design, not all respondents were asked every question. Additionally, as is typical with surveys, respondents may not have answered every question asked. Consequently, these survey findings should only be considered as directional.

Table 3. Number of Motor Service Centers that Completed the NEEA Survey in 2013, 2014, and 2015

| State | Member | | | | Nonmember | | | |
|-------------------|------------|----------------|----------------|----------------|------------|----------------|----------------|----------------|
| | Population | 2013 Survey | 2014 Survey | 2015 Survey | Population | 2013 Survey | 2014 Survey | 2015 Survey |
| Idaho | 10 | 7 | 7 | 8 | 13 | 7 | 8 | 7 |
| Montana | 4 | 3 | 3 | 4 | 8 | 1 | 5 | 2 |
| Oregon | 10 | 9 | 8 | 7 | 18 | 2 | 5 | 5 |
| Washington | 10 | 5 | 8 | 7 | 8 | 2 | 6 | 5 |
| NEEA Region Total | 34 | 24 | 26 | 26 | 47 | 12 | 24 | 19 |

2.2.3 Data Collection Forms

NEEA annually updates the key ACE model assumptions for estimating energy savings from motor rewinds. Cadmus used a data collection form to acquire data needed for these calculations (e.g., the number of motor rewinds performed annually in the Northwest; the distribution of rewinds between GMPG members and nonmembers by horsepower).

To ensure uniform data collection across study years, Cadmus used the same data collection form implemented in NEEA’s 2013 and 2014 evaluations of ACE model assumptions for motor rewinds. This form asked service centers to provide the following sales data for their businesses:

- The number of motor rewinds conducted in the Northwest during 2015, by horsepower and by state; and
- The number of green motor rewinds conducted in the Northwest during 2015, by horsepower and by state.

To accommodate the preferences and needs of motor service centers and to encourage high response rates, Cadmus provided service centers with three options for completing the forms:

- **Electronic:** The GMPG administrator and/or Cadmus e-mailed the data collection form (in Excel format) to the motor service centers.
- **Manual:** Cadmus faxed the data collection form to motor service centers. Motor service center staff completed the form by hand and returned it to Cadmus by fax, mail, or e-mail.
- **Verbal:** For motor service center staff finding it more convenient to complete the data collection form verbally, Cadmus conducted form completion by phone.

To increase response rates, Cadmus and NEEA offered nonmember service centers a \$150 incentive to complete the form. Cadmus also conducted all service center outreach and solicitation in-house (for both surveys and data collection forms), using staff familiar with the technical aspects of green motor rewinds. Cadmus contacted the 81 motor service centers five times by phone. For those indicating willingness to provide data collection forms, Cadmus conducted up to five follow-up phone calls to encourage them to provide sales data.

Thirty-eight motor service centers (21 members and 17 nonmembers) completed the data collection forms—an increase from the 35 motor service centers completing the form in 2014 and the 27 motor service centers completing the form in 2013. Table 4 shows the number of completed member and nonmember data collection forms by state and study year.

Table 4. Completed Member and Nonmember Data Collection Forms by State and Study Year

| State | Member | | | | Nonmember | | | |
|-------------------|-------------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------|-----------------------|-----------------------|
| | Population (N) | 2013 Sample (n) | 2014 Sample (n) | 2015 Sample (n) | Population (N) | 2013 Sample (n) | 2014 Sample (n) | 2015 Sample (n) |
| Idaho | 10 | 5 | 7 | 8 | 13 | 2 | 6 | 7 |
| Montana | 4 | 2 | 2 | 3 | 8 | 0 | 3 | 2 |
| Oregon | 10 | 4 | 4 | 6 | 18 | 6 | 5 | 4 |
| Washington | 10 | 7 | 3 | 4 | 8 | 1 | 5 | 4 |
| NEEA Region Total | 34 | 18 | 16 | 21 | 47 | 9 | 19 | 17 |

Cadmus has tracked motor service center participation in the study since 2013 and found that:

- All **members** who provided data in 2014 again provided data in 2015. Six members who declined to provide data in 2014 chose to provide data in 2015. Ten members did not complete the form during all three study years.
- Four **nonmembers** who completed the data collection form in 2014 declined to do so in 2015. However, two nonmembers who declined to provide data in 2014 provided data in 2015. Twenty-six nonmembers declined to complete the data collection form during all three study years.

2.3 Savings Rate Analysis

Cadmus used the following savings calculation methodology:

$$Energy\ Savings = \sum_{ij} Savings\ Rate_{ij} \times Reported\ Units_{ij}$$

Where:

| | | |
|--|---|---|
| i | = | sector (agricultural or industrial) |
| j | = | motor rewind horsepower |
| Savings rate _{i} | = | incremental per-unit savings (kWh per year) over baseline unit energy consumption |
| Reported units _{i} | = | green motor compliant rewinds |

On the data collection forms, the motor service centers recorded the number of rewinds (green or standard) by horsepower within the agricultural or the industrial sector. Cadmus built a table using these quantities and descriptions.

The RTF unit energy-savings Excel workbooks provide the savings rate for each horsepower value indicated on the data collection forms. Cadmus calculated total regional savings for green motor rewinds by building a simple lookup function that multiplied the number of rewinds times the respective annual kWh savings for a given horsepower for agricultural and industrial sector motors.

2.3.1 Savings Extrapolations

To estimate total energy savings attributable to green motor compliant rewinds, Cadmus extrapolated the savings from the reported sample to the population. Cadmus explored multiple methods for doing so. This section provides the statistical basis for the savings extrapolations.

For each motor service center, Cadmus calculated the energy savings resulting from the green motor rewinds shown in section 2.3. The primary objective for determining regional savings included calculating the savings attributable to agricultural and industrial applications for members and nonmembers. The 2013, 2014, and 2015 evaluation studies used the same methods for determining regional savings.

Cadmus calculated the total savings estimate and its precision level using a standard, stratified mean estimation.

$$Total\ Savings_{i,h} = Savings_{i,h} \times N_h / n_h$$

Where:

| | | |
|---|---|----------------------|
| i | = | motor service center |
| h | = | stratum |
| N | = | population |
| n | = | sample |

Cadmus also used the same method for calculating total energy savings for industrial and agricultural applications. Section 3.3 provides the results of these extrapolations.

Cadmus calculated the total number of rewinds, the total horsepower rewind, and their precision estimates using standard, stratified ratio estimation.

2.3.2 Savings Confidence Interval

Extrapolating from a sample to a population introduces uncertainty into the population estimate. Therefore, it is necessary to build a confidence interval around an estimate to describe its uncertainty level. The confidence interval contains two parts: the confidence level and precision level.

This report presents the extrapolation results of motor rewinds, horsepower rewind, and savings at a confidence level of 90%. Precision is the radius of the confidence interval, as a percentage of the estimate itself, and can be called the relative precision or relative error.

3 Findings

This section describes findings for each key study objective for updating market size, market share, savings rate calculations, and supplementary market intelligence findings. Specifically, the report organizes findings as follows:

- Section 3.1 presents findings from primary and secondary research to determine market size.
- Section 3.2 presents findings from the data collection forms, distinguishing the market share objective results between members and nonmembers.
- Section 3.3 presents estimates of regional savings from motor rewinds in 2015, using results from the electronic data collection efforts in combination with savings values per horsepower rewind, as developed by the RTF.
- Section 3.4 presents market intelligence findings, drawn from surveys with GMPG member and nonmember motor service centers. Where appropriate, Cadmus compares the current study findings to findings from NEEA's 2013 and 2014 evaluations of key ACE model assumptions for motor rewinds.

3.1 Market Size

Cadmus assessed the size of the motor rewinds market using secondary research, phone surveys, and data collection forms. This section describes market size findings for the following elements:

- Number of motor rewind service centers;
- Number of motor rewinds performed in 2015;
- Distribution of motor rewinds by horsepower;
- Number of green motor rewinds documented and incented; and
- Number of agricultural versus industrial rewinds by horsepower.

3.1.1 Number of Motor Rewind Service Centers

As shown in Table 5, Cadmus determined the Northwest market consisted of 81 motor service centers in 2015—a decrease from the 83 Cadmus estimated in 2014 and the 94 estimated in 2013. Through direct mailings and 2015 phone surveys, Cadmus determined that two nonmember motor service centers no longer remained in business. Of 81 motor service centers in 2015, 42% (34) were GMPG members. The market concentrates in Washington, Oregon, and Idaho.

Table 5. Number of Motor Service Centers in the Northwest by Study Year

| State | 2013 | | | 2014 | | | 2015 | | |
|-------------------|--------|-----------|-------|--------|-----------|-------|--------|-----------|-------|
| | Member | Nonmember | Total | Member | Nonmember | Total | Member | Nonmember | Total |
| Idaho | 9 | 16 | 25 | 10 | 14 | 24 | 10 | 13 | 23 |
| Montana | 4 | 8 | 12 | 3 | 9 | 12 | 4 | 8 | 12 |
| Oregon | 10 | 18 | 28 | 10 | 17 | 27 | 10 | 18 | 28 |
| Washington | 12 | 17 | 29 | 10 | 10 | 20 | 10 | 8 | 18 |
| NEEA Region Total | 35 | 59 | 94 | 33 | 50 | 83 | 34 | 47 | 81 |

3.1.2 Number of Motor Rewinds Performed in 2015

Cadmus received 38 valid data collection forms from member and nonmember service centers; these provided the number of motor rewinds their shops performed in 2015 by state and by application (i.e., agricultural or industrial).

As shown in Table 6, the sample—comprising the data collection forms—shows that 21 GMPG member service centers performed 1,320 motor rewinds in 2015, and 17 nonmember service centers reported 390 motor rewinds in 2015. The table also shows population extrapolations within each state for members and nonmembers.

However, due to the low numbers of member and nonmember service centers in some states (per Table 5), these within-state estimates remain highly uncertain. The precision values for several within-state estimates remain uncertain as they present values greater than 100%. In other words, the relative error of the rewinds-per-state estimates would mean the confidence intervals would include zero.

Table 6. Number of GMPG Member and Nonmember Motor Rewinds in 2015 by State

| State | Member | | Nonmember | | Total | |
|-------------------|------------|--------|------------|--------|------------|--------|
| | Population | Sample | Population | Sample | Population | Sample |
| Washington | 443 | 177 | 186 | 93 | 629 | 270 |
| Oregon | 592 | 355 | 266 | 59 | 857 | 414 |
| Idaho | 789 | 631 | 327 | 176 | 1,116 | 807 |
| Montana | 209 | 157 | 248 | 62 | 457 | 219 |
| NEEA Region Total | 2,033 | 1,320 | 1,026 | 390 | 3,059 | 1,710 |
| Number of Rewinds | | | | | | |

Cadmus also extrapolated the sample number of rewinds within the member and nonmember populations to the regional level, as shown in Table 7. This method provides a more reliable estimate of the total number of rewinds, while remaining indifferent to differences between service centers due to locations.

Table 7. Number of GMPG Member and Nonmember Motor Rewinds in 2015 at the Regional Level

| | Member | | Nonmember | | Total | |
|---|------------------------|--------------------|------------------------|--------------------|------------------------|--------------------|
| | Population (N = 34) | Sample (n = 21) | Population (N = 47) | Sample (n = 17) | Population (N = 81) | Sample (n = 38) |
| Extrapolated Number of Rewinds to the Region | 2,137 | 1,320 | 1,078 | 390 | 3,215 | 1,710 |

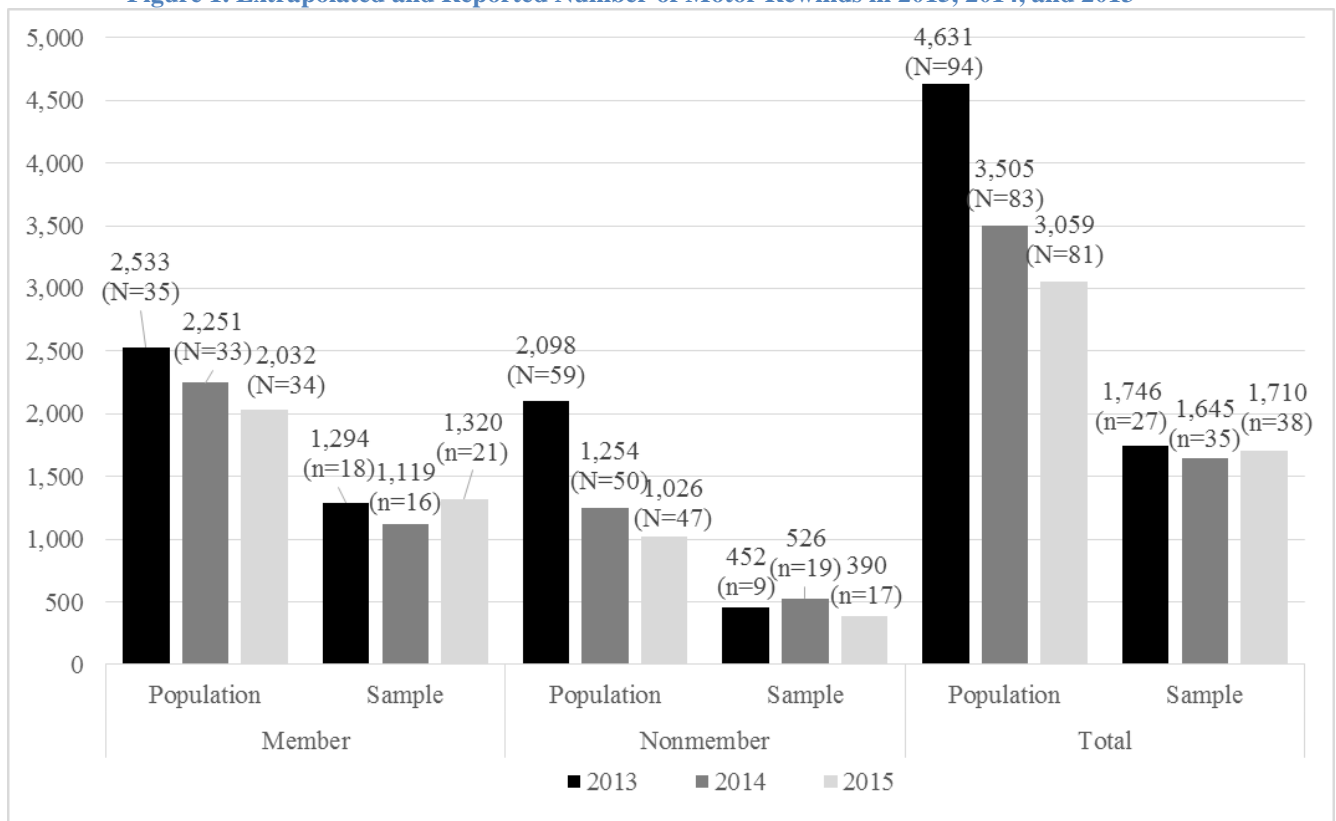
In 2015, member service centers conducted 2,137 estimated total rewinds, with a 90% confidence level and a relative precision of $\pm 16\%$. For nonmembers, the extrapolation results

indicated 1,078 motor rewinds in 2015 with a 90% confidence level and a relative precision of $\pm 41\%$.

Figure 1 shows the extrapolated (population) and reported (sample) number of member and nonmember motor rewinds by study year.

- The extrapolated number of total member and nonmember motor rewinds decreased by 1,572 between 2013 (4,631) and 2015 (3,059).
- The largest annual decrease in extrapolated motor rewinds for all members and nonmembers (1,126) was reported between 2013 and 2014. Motor rewinds decreased from 4,631 in 2013 to 3,505 in 2014.
- The extrapolated number of total member and nonmember rewinds decreased by an additional 446 in 2015, from 3,505 in 2014 to 3,059 in 2015.

Figure 1. Extrapolated and Reported Number of Motor Rewinds in 2015, 2014, and 2013



Notes: Cadmus used the total of within-state extrapolations for motor rewinds.

Cadmus compared the number of reported motor rewinds from the sample of motor service centers completing data collection forms in 2013, 2014, and 2015. As shown in Table 8, of 15 motor service centers completing data collection forms in all three study years, service centers reported 229 fewer motor rewinds in 2014 than in 2013, and 39 fewer motor rewinds in 2015 than in 2014.

Table 8. Number of Motor Rewinds Reported by Motor Service Centers Providing Data in 2015, 2014, and 2013

| Number of Reported Motor Rewinds | 2013 Sample | | | 2014 Sample | | | 2015 Sample | | |
|----------------------------------|---------------|------------------|--------------|---------------|------------------|--------------|---------------|------------------|--------------|
| | Members (n=8) | Nonmembers (n=7) | Total (n=15) | Members (n=9) | Nonmembers (n=6) | Total (n=15) | Members (n=9) | Nonmembers (n=6) | Total (n=15) |
| Rewinds | 797 | 375 | 1172 | 722 | 221 | 943 | 674 | 230 | 904 |

Several factors could have contributed to the declining trend in the number of member and nonmember motor rewinds since 2013. Cadmus and NEEA's prior market intelligence research suggests the Northwest motor rewind market is contracting. In NEEA's 2013 evaluation of ACE model assumptions for motor rewinds, Cadmus asked two stakeholder interviewees if they thought the market for motor rewinds would expand, shrink, or remain the same over the next five years. These stakeholders indicated the motor rewind industry had been slowly declining for the past several years and would probably continue to do so. They described the following reasons for their observations:

- Less expensive motors.
- Decline in the number of United States-based industrial plants due to the migration of manufacturing to foreign countries.
- More durable motors resulting from better design and protection than motors made in the 1980s and 1990s.
- Longer-lasting motors resulting from better customer education and, therefore, better care and maintenance of motors.

Although the decrease in estimated motor rewinds probably results, in part, from an actual decrease in the Northwest motor rewind market, changes in the characteristics of the sample, resulting in a more accurate profile of the motor service center market, may have contributed to the large estimated decrease between 2013 and 2014.

Given the small nonmember sample size in the 2013 study, Cadmus may have overestimated the number of motor rewinds performed by nonmembers in 2013. Cadmus reached 10 more nonmember motor service centers in 2014 than in 2013. Nonmember centers providing data in both 2013 and 2014 reported an average of 42 motor rewinds. However, the average number of reported motor rewinds for the 10 nonmember motor service centers providing data only in 2014 was lower by half: an average of 21 motor rewinds.¹

In 2014 and 2015, Cadmus may have been more successful in encouraging participation from motor service centers that were less active in the motor rewind market, who were underrepresented in the 2013 study sample. For example, respondents from three nonmember motor service centers (two in 2014 and one in 2015) that did not provide data in 2013 initially declined to provide motor rewind data, believing, as their shops conducted so few motor

¹ All nonmembers that completed the data collection form in 2013 did so in 2014.

rewinds, their data would not prove relevant for the study. After an explanation and encouragement from Cadmus, these service centers provided data (one conducted only one motor rewind in 2014; one conducted five motor rewinds in 2014; and one conducted two motor rewinds in 2015).

Additionally, Cadmus has estimated a smaller motor service center population size each year since 2013, from an estimated 94 motor service centers in 2013, to 83 in 2014, and 81 in 2015. Through the 2014 and 2015 research efforts, Cadmus determined that 13 nonmember motor service centers either ceased to conduct business, did not conduct motor rewinds, or discontinued motor rewind services. As a result, Cadmus has extrapolated the number of motor rewinds to a smaller population each year, contributing to the decrease in estimated motor rewinds.

3.1.3 Distribution of Motor Rewinds by Horsepower

Cadmus estimated the total horsepower rewind by member and nonmember service centers in 2015. Table 9 shows 34 GMPG member service centers rewind over an estimated 355,000 total horsepower in 2015 and 47 nonmembers rewind over 75,000 horsepower. The table also shows sample totals within each state for members and nonmembers.

Table 9. Horsepower Rewound by GMPG Members and Nonmembers by State in 2015

| State | Member | | Nonmember | | Total | |
|---------------------------------|------------|---------|------------|--------|------------|---------|
| | Population | Sample | Population | Sample | Population | Sample |
| Washington | 166,140 | 55,380 | 9,630 | 4,815 | 175,770 | 60,195 |
| Oregon | 62,200 | 37,320 | 11,250 | 2,500 | 73,450 | 37,320 |
| Idaho | 107,055 | 95,160 | 33,735 | 18,165 | 140,790 | 113,325 |
| Montana | 20,207 | 15,155 | 20,460 | 5,115 | 40,667 | 20,270 |
| NEEA Region Total HP Rewound | 355,602 | 203,015 | 75,075 | 30,595 | 430,677 | 231,110 |

Cadmus extrapolated the horsepower within the member and nonmember sample populations to the regional level. This method provided a more reliable estimate of the total number of rewinds while remaining indifferent to variations between service centers due to locations. Table 10 shows the extrapolation's results.

Table 10. Total Member and Nonmember Horsepower Rewound at the Regional Level for 2015

| State | Member | | Nonmember | | Total | |
|----------------------------------|------------------------|--------------------|------------------------|--------------------|------------------------|--------------------|
| | Population (N = 34) | Sample (n = 21) | Population (N = 47) | Sample (n = 17) | Population (N = 81) | Sample (n = 38) |
| Extrapolated HP to the Region | 328,691 | 203,015 | 84,586 | 30,595 | 413,277 | 233,610 |

In 2015, member service centers rewind an estimated total horsepower of 328,691, with a confidence level of 90% and relative precision of $\pm 22\%$. For nonmembers, extrapolation indicated 84,586 horsepower rewind in 2015 with a confidence level of 90% and relative precision of $\pm 70\%$.

Cadmus created distributions of motor rewinds by horsepower performed by GMPG members and nonmembers. Table 11 shows the percentage of rewinds in six horsepower ranges by motor

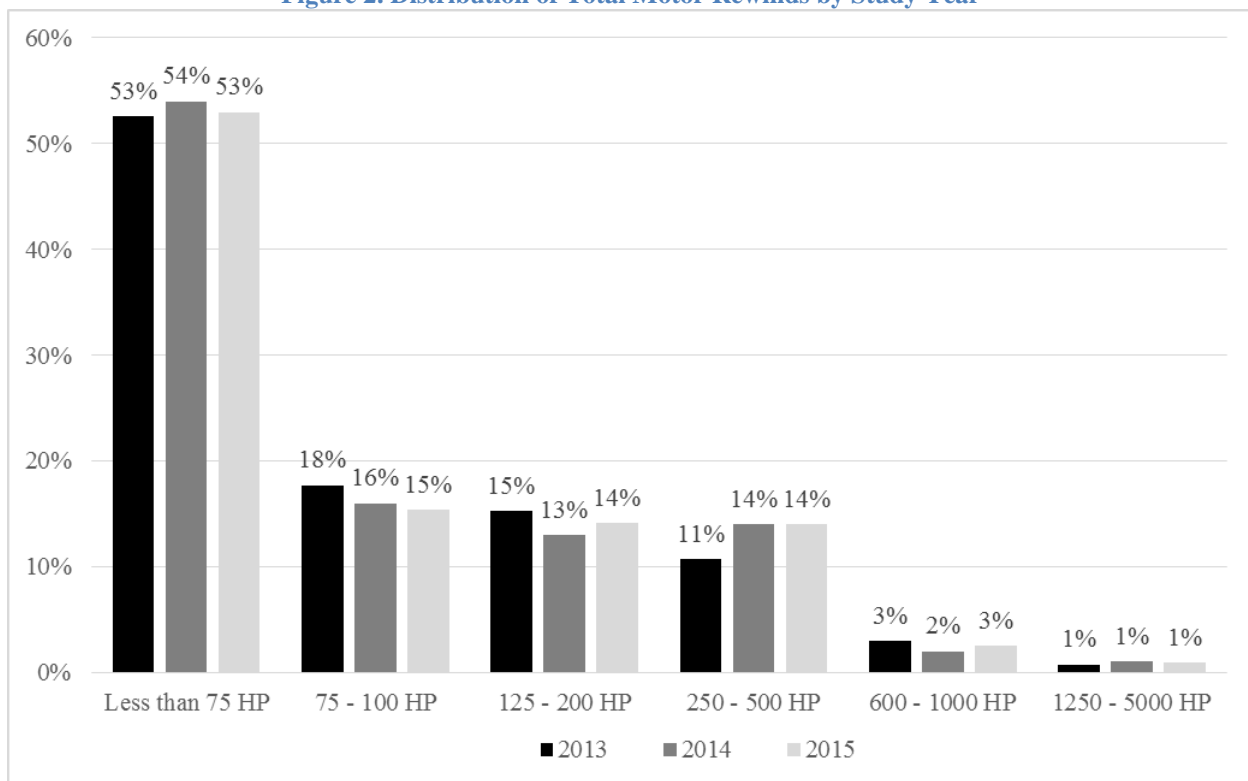
application. More than one-half of all motor rewinds were less than 75 horsepower; 82% of all rewinds were less than 250 horsepower.

Table 11. 2015 Distribution of Motor Rewinds by Application

| HP Range | Percentage of Rewinds | | |
|-----------------|-----------------------|------------|-------|
| | Agricultural | Industrial | Total |
| Less than 75 HP | 46% | 58% | 53% |
| 75 - 100 HP | 15% | 16% | 15% |
| 125 - 200 HP | 18% | 12% | 14% |
| 250 - 500 HP | 17% | 12% | 14% |
| 600 - 1000 HP | 4% | 2% | 3% |
| 1250 - 5000 HP | 1% | 1% | 1% |
| Total | 100% | 100% | 100% |

Figure 2 compares the distribution of total motor rewinds by study year. The distribution of motor rewinds across the six horsepower ranges was similar in 2013, 2014, and 2015, with over one-half of total motor rewinds, performed during all three years, for motors below 75 horsepower.

Figure 2. Distribution of Total Motor Rewinds by Study Year



3.1.4 Documented and Incented Motor Rewinds

For GMPG members, Cadmus estimated the percentage of green motor rewinds unreported to GMPG and which member service centers did not receive incentives in 2015. To receive utility incentives for green motor rewinds, member service centers had to provide documentation to GMPG, which verified and submitted the paperwork to the service center's utility. The utility then provided the incentive to the member service center. A motor service center had to be a registered GMPG member to receive a utility incentive for a green motor rewind.

Estimating the number of unreported green motor rewinds serves to account for all savings resulting from green motor rewinds—not just those reported by member service centers. The GMPG administrator provided Cadmus with the number of agricultural and industrial rewinds from 15 motor service centers from which Cadmus had already gathered data (15 centers provided this information on their data collection forms by the beginning of February 2016).²

Table 12 lists the number of rewinds that motor services centers reported to GMPG for incentive payments, as reported to Cadmus, and the percentage that went undocumented by GMPG. Overall, motor service centers failed to report 10% of green motor rewinds eligible for incentives.

Table 12. GMPG Green Motor Rewinds Documented and Undocumented for 2015

| Sector | Number of Rewinds | | |
|--------------|-----------------------------|--------------------------------|--------------------------------------|
| | GMPG Documented (n = 15) | Reported to Cadmus (n = 15) | Percentage not Documented by GMPG |
| Agricultural | 77 | 106 | 27% |
| Industrial | 157 | 153 | -3% |
| Total | 234 | 259 | 10% |

Cadmus expected the number of GMPG-documented green motor rewinds would be less than or equal to the number reported on the data collection forms. Although this was true overall, the numbers of GMPG-documented industrial rewinds exceeded the number provided to Cadmus by four motor rewinds.

² To comply with contractual obligations to keep trade data anonymous, the GMPG administrator could not provide Cadmus with a definitive count of motors rewound by horsepower for each member service center supplying GMPG with data. Therefore, GMPG agreed to provide Cadmus with these data at a level that maintained anonymity for GMPG members but allowed for a summary comparison of results to data received by Cadmus.

The following possibilities could explain this slight discrepancy in industrial rewinds:

- **Timing of reporting.** Cadmus began receiving data collection forms on December 1, 2015. GMPG provided the documented list of rewinds in late January 2016. Motor service centers might have performed additional rewinds in 2015 after submitting the data collection forms to Cadmus.
- **Timing of services provided.** Cadmus requested data for all motor rewinds performed in 2015. This discrepancy may be explained by timing differences among motor service centers regarding dates that rewinds were completed, the customer paid the invoice, the utility paid the incentive, and GMPG received the documentation.
- **General errors in reporting.** Discrepancies between the two data sources could result from general reporting errors.

Cadmus also calculated undocumented horsepower for the member motor service centers who reported green motor rewinds to both Cadmus and the GMPG. Table 13 provides the green motor rewind total horsepower documented by GMPG, reported to Cadmus, and the percentage not documented.

Table 13. Green Motor Rewind Horsepower GMPG Documented for 2015

| Sector | Horsepower Rewound | | |
|--------------|-----------------------------|--------------------------------|--------------------------------------|
| | GMPG Documented (n = 15) | Reported to Cadmus (n = 15) | Percentage Not Documented By GMPG |
| Agricultural | 23,620 | 28,210 | 16% |
| Industrial | 25,295 | 27,785 | 9% |
| Total | 48,915 | 55,995 | 13% |

3.1.5 Agricultural Versus Industrial Rewinds by Horsepower

In the data collection form, Cadmus requested information about which application—agricultural or industrial—customers used the rewind motors for. GMPG and the region’s utilities also required this information to calculate savings as the RTF assumed different savings values for similar horsepower motors in different applications.

For every data collection form, motor service centers differentiated between industrial and agricultural applications. Table 14 shows the horsepower percentage for the agricultural and industrial sectors, for GMPG member and nonmember centers.

Table 14. Percentage of GMPG Rewinds by Horsepower by Sector

| | GMPG Members | | GMPG Nonmembers | |
|-------------------|--------------|------------|-----------------|------------|
| | Agricultural | Industrial | Agricultural | Industrial |
| NEEA Region Total | 46% | 54% | 46% | 54% |

Overall, in 2015, industrial motors accounted for 54% of the total rewind horsepower at both the GMPG member and nonmember motor service centers.

3.2 Market Share

Cadmus assessed the market share of the green motor rewinds market using secondary research and data collection forms. This section describes the market share findings for the following aspects:

- Granularity of data
- Number of green motor compliant rewinds
- Penetration of green motor rewinds practices

3.2.1 Granularity of Data

Since beginning to collect data from its members in 2009, GMPG has provided a template for categorizing the number of motor rewinds by state, horsepower, and application (agricultural or industrial). Cadmus made one modification to that template to account for the total rewinds needed to estimate the market share of green motor rewinds.

The GMPG members and nonmembers who responded provided data with the granular detail needed for Cadmus to estimate savings according to the RTF workbooks.

3.2.2 Number of Green Motor-Compliant Rewinds

Cadmus requested the number of green motor-compliant rewinds for both GMPG members and nonmembers, as indicated in the data collection forms.

3.2.2.1 GMPG Members

Table 15 shows the sample number of green motor rewinds performed by the 21 member service centers who provided data in 2015, as reported to Cadmus for each state and agricultural or industrial motor application combination.

| Table 15. Number of GMPG Green Motor Rewinds | | | |
|---|-------------------------------|------------|-------|
| State | Number of Green Motor Rewinds | | |
| | Agricultural | Industrial | Total |
| Washington | 32 | 26 | 58 |
| Oregon | 24 | 105 | 129 |
| Idaho | 57 | 36 | 93 |
| Montana | 0 | 2 | 2 |
| NEEA Region Total | 113 | 169 | 282 |

Table 16 shows the within-state extrapolation of sample green motor rewinds for the agricultural and industrial sectors for GMPG members.

Table 16. Number of Extrapolated GMPG Member Motor Rewinds

| State | Number of Green Motor Rewinds | | |
|-------------------|-------------------------------|------------|-------|
| | Agricultural | Industrial | Total |
| Washington | 80 | 65 | 145 |
| Oregon | 40 | 175 | 215 |
| Idaho | 71 | 45 | 116 |
| Montana | 0 | 3 | 3 |
| NEEA Region Total | 191 | 288 | 479 |

Cadmus also extrapolated the sample green motor rewinds within the agricultural and industrial populations to the regional level for members. This method provides a more reliable estimate of the total number of rewinds while remaining indifferent to location differences among service centers. Table 17 shows the extrapolated green motor rewind results for members.

Table 17. Extrapolated Member Green Motor Rewinds by Sector

| Region | Number of Green Motor Rewinds | | |
|-------------------|-------------------------------|------------|-------|
| | Agricultural | Industrial | Total |
| NEEA Region Total | 183 | 274 | 457 |

For member service centers, Cadmus estimated 183 agricultural green motor rewinds, with a confidence level of 90% and relative precision of $\pm 37\%$, and 274 industrial green motor rewinds, with a confidence level of 90% and relative precision of $\pm 40\%$.

3.2.2.2 Nonmembers

Table 18 shows the number of green motor rewinds performed by the nine nonmember service centers, as reported to Cadmus for each state and by agricultural or industrial motor application.

Table 18. Number of Nonmember Green Motor Rewinds

| State | Number of Green Motor Rewinds | | |
|-------------------|-------------------------------|------------|-------|
| | Agricultural | Industrial | Total |
| Washington | 0 | 0 | 0 |
| Oregon | 0 | 0 | 0 |
| Idaho | 0 | 0 | 0 |
| Montana | 24 | 21 | 45 |
| NEEA Region Total | 24 | 21 | 45 |

One nonmember service center, which previously had been a GMPG member, accounted for all 45 of the reported green motor compliant rewinds. Given one former GMPG member motor service center performed all of these green motor rewinds and most likely did not represent the population of nonmembers, Cadmus did not extrapolate the sample of green motor rewinds to the population of nonmember service centers.

3.2.3 Penetration of Green Motor Practices

Table 19 shows the penetration of green motor rewind practices among GMPG members. Overall, GMPG members perform green motor rewinds on 24% of all motors rewound in 2015. GMPG member service centers rewound 33% of total horsepower to green motor practice specifications.

Table 19. Penetration of Green Motor Rewinds Practices in 2015

| | Number of Rewinds | Horsepower |
|-----------------|-------------------|------------|
| GMPG Members | 24% | 33% |
| GMPG Nonmembers | 4% | 5% |

Table 19 shows a higher penetration rate of green motor practices for GMPG members than for nonmembers, regarding both the number of rewinds and overall horsepower rewound in 2015. As with total green motor rewinds performed, since one former GMPG member motor service center performed all of the nonmember green motor rewinds Cadmus used sample green motor rewind values to calculate penetration and did not extrapolate the sample of green motor rewinds to the population of nonmember service centers. Due to the outlier of green motor rewinds performed by a single nonmember service center, however, Cadmus determined that extrapolating the penetration rate of green motor rewind practices to the population of nonmember service centers would lack the necessary and reasonable precision required.

3.3 Savings Calculations

Using results from data collection efforts and per-unit energy savings from the RTF, Cadmus estimated the regional savings for GMPG member and nonmember motor service centers from green motor rewinds conducted in 2015.

3.3.1 Members

Cadmus calculated the annual kWh savings resulting from green motor rewinds for GMPG members by sector (industrial or agricultural) and state for 2015. Table 20 shows savings for the 21 member service centers that provided data collection forms.

Table 20. 2015 Green Motor Rewind Savings for GMPG Member Sample

| State | Green Motor Rewind Savings (Annual kWh) | | |
|-------------------|---|------------|---------|
| | Agricultural | Industrial | Total |
| Washington | 124,677 | 200,541 | 325,218 |
| Oregon | 46,537 | 299,798 | 346,335 |
| Idaho | 131,598 | 140,447 | 272,044 |
| Montana | 0 | 34,150 | 34,150 |
| NEEA Region Total | 302,812 | 674,935 | 977,747 |

Table 21 shows the within-state extrapolation of sample green motor rewinds for the agricultural and industrial applications for the GMPG members.

Table 21. 2015 Extrapolated Green Motor Rewind Savings for GMPG Members

| State | Green Motor Rewind Savings (Annual kWh) | | |
|-------------------|---|------------|-----------|
| | Agricultural | Industrial | Total |
| Washington | 311,693 | 501,351 | 813,045 |
| Oregon | 77,562 | 499,663 | 577,224 |
| Idaho | 164,497 | 175,559 | 340,056 |
| Montana | 0 | 45,533 | 45,533 |
| NEEA Region Total | 553,752 | 1,222,106 | 1,775,858 |

Cadmus extrapolated sample green motor rewind savings within the agricultural and industrial populations at the regional level for members. This method provided a more rigorous estimate of savings while remaining indifferent to variations among service centers for location. Table 22 shows extrapolated green motor rewind savings for member service centers.

Table 22. 2015 GMPG Members Green Motor Rewind Savings Extrapolated to the Regional Level

| State | Green Motor Rewind Savings (Annual kWh) | | |
|-------------------|---|------------|-----------|
| | Agricultural | Industrial | Total |
| NEEA Region Total | 490,267 | 1,092,752 | 1,583,019 |

For member service centers, estimated savings for agricultural green motor rewinds were 490,267 annual kWh, with a confidence level of 90% and a relative precision of $\pm 44\%$. For industrial green motor rewinds, estimated savings were 1,092,752 annual kWh, with a confidence level of 90% and a relative precision of $\pm 31\%$.

3.3.2 Nonmembers

Cadmus calculated annual kWh savings resulting from green motor rewinds for nonmembers by application (industrial or agricultural) and state for 2015. Table 23 shows savings for the 17 nonmember service centers providing data collection forms.

Table 23. 2015 Green Motor Rewind Savings for Nonmember Sample

| State | Green Motor Rewind Savings (Annual kWh) | | |
|-------------------|---|------------|--------|
| | Agricultural | Industrial | Total |
| Washington | 0 | 0 | 0 |
| Oregon | 0 | 0 | 0 |
| Idaho | 0 | 0 | 0 |
| Montana | 20,915 | 55,628 | 76,543 |
| NEEA Region Total | 20,915 | 55,628 | 76,543 |

Cadmus determined that extrapolations of nonmember green motor rewind savings were not meaningful as 16 of the 17 nonmember service centers in the sample reported no green motor rewinds and, therefore, all savings came from one service center.

3.4 Key Market Intelligence Findings

This section presents key market intelligence findings from the telephone surveys with motor service centers. Where appropriate, Cadmus compares the current study findings to 2013 and 2014 survey findings.

3.4.1 Awareness of and Intentions to Seek EASA Accreditation and GMPG Membership

Two organizations promote motor rewind best practices in the Northwest: The GMPG and EASA. The GMPG educates, trains, and certifies service centers on effective shop procedures and conducts annual inspections of each member motor service center to verify their shop uses best practices for motor rewinds. The GMPG also offers incentives to Northwest GMPG member motor service centers and end users to supply and/or demand efficient motor rewinds.

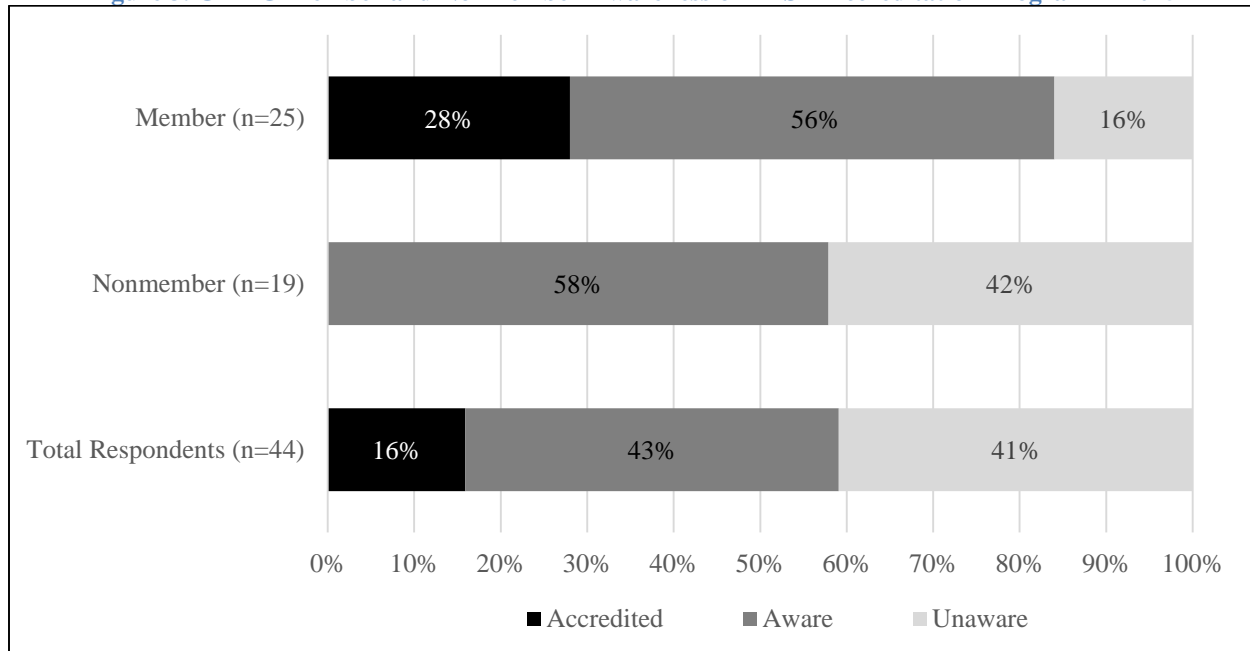
EASA also promotes motor rewind best practices, and rolled out a nationwide accreditation program for motor service centers in 2014. Through this program, EASA evaluates motor service centers using a third-party auditor to ensure service centers use best practices for maintaining motor efficiency and reliability during motor repairs. These auditors then inspect and verify shop procedures every three years, with service centers conducting annual self-verification between audits. In addition to receiving third-party verification, accredited service centers also receive recognition on EASA's website.

To understand the motor service centers' awareness of and intentions to participate in these offerings, Cadmus asked questions addressing the following topics:

- Members' and nonmembers' awareness of and intentions in 2015 to seek accreditation through EASA.
- Nonmembers' awareness of the GMPG and utility incentives available for GMPG members, and their intentions to join the group (asked in 2013, 2014, and 2015).

As shown in Figure 3, GMPG members indicated greater awareness of EASA's accreditation program than nonmembers. The majority of surveyed members knew of EASA's accreditation program (56%; 14 of 25) or were already accredited (28%; 7 out of 25). Slightly more than one-half (58%; 11 of 19) of nonmembers surveyed knew of EASA's accreditation program for motor service centers.

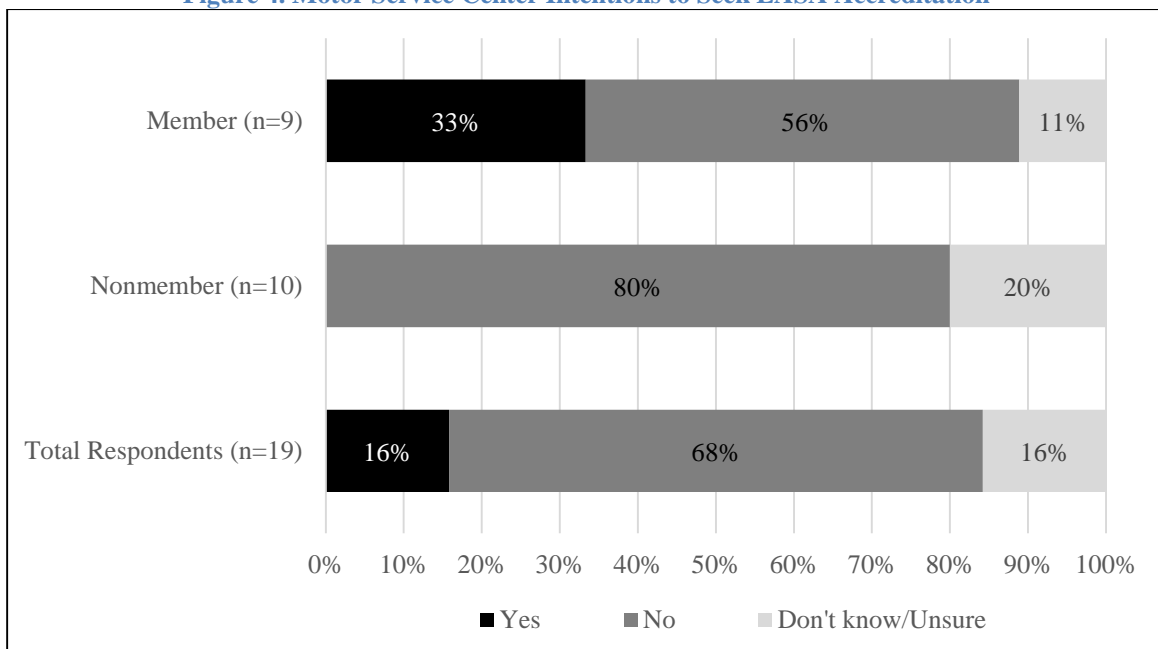
Figure 3. GMPG Member and Nonmember Awareness of EASA Accreditation Program in 2015



Notes: Results show responses to question B1: Are you aware of Electrical Apparatus Service Association's accreditation program for motor service centers?

Cadmus asked those aware of EASA's accreditation program (but not yet accredited through the program) if they planned to seek EASA accreditation. Members' and nonmembers' responses differed. As shown in Figure 4, while one-third of members providing a response (3 of 9) said they planned to seek EASA accreditation, no nonmembers reported planning to do so. A minority of both members (11%, 1 of 9) and nonmembers (20%, 2 of 10) said they were unsure whether they would seek EASA accreditation.

Figure 4. Motor Service Center Intentions to Seek EASA Accreditation



Notes: Results show responses to question B2: *Is your shop planning to seek EASA accreditation?* Cadmus only asked this question of motor service centers reporting they knew of EASA's accreditation program.

Cadmus asked nonmembers in the 2013, 2014, and 2015 evaluations about their awareness of the GMPG and of utility incentives available for green motor rewinds.

As shown in Table 24, the majority of nonmember motor service centers surveyed in 2014 (71%, 17 of 24) and 2015 (68%, 13 out of 16) knew of the GMPG, while over one-half of nonmember respondents surveyed in 2013 (54%, 7 of 13) knew of the GMPG.

Table 24. Nonmember Awareness of GMPG by Study Year

| Are you aware of the Green Motors Practices Group? | 2013 Survey (n=13) | | 2014 Survey (n=24) | | 2015 Survey (n=19) | |
|--|--------------------|------------|--------------------|------------|--------------------|------------|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| Yes | 7 | 54% | 17 | 71% | 13 | 68% |
| No | 6 | 46% | 7 | 29% | 6 | 32% |

Results show responses from question B3 in the 2014 and 2015 surveys and question D1 in the 2013 survey: *Are you aware of the Green Motors Practices Group?* Cadmus only asked this question of nonmember motor service centers.

As shown in Table 25, of nonmembers who knew of the GMPG in 2015, 92% (12 of 13) knew of opportunities to receive utility incentives by joining the GMPG and performing green motor rewinds for their customers. This represents an increase from the 65% of respondents (11 of 17) in 2014 and the 86% (6 of 7) in 2013 who knew of these incentive opportunities.

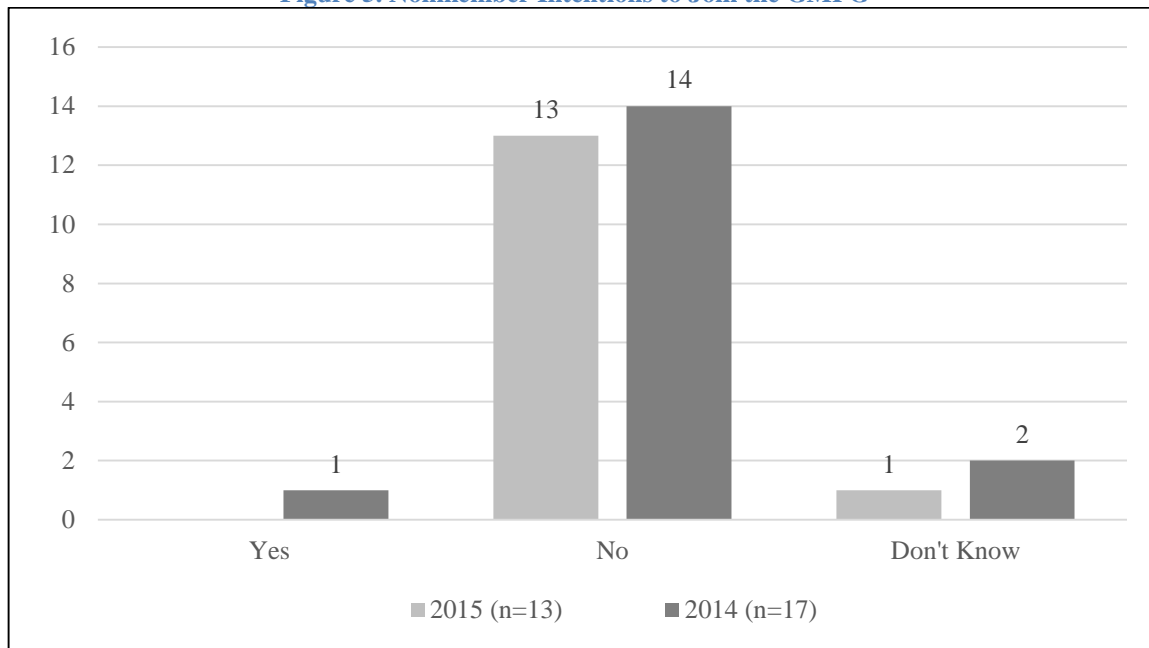
Table 25. Nonmember Awareness of Utility Incentives for Green Motor Rewinds by Study Year

| Before this survey, were you aware of the opportunity to receive utility incentives via joining the Green Motors Practices Group? | 2013 (n=7) | | 2014 (n=17) | | 2015 (n=13) | |
|---|------------|------------|-------------|------------|-------------|------------|
| | Frequency | Percentage | Frequency | Percentage | Frequency | Percentage |
| Yes | 6 | 86% | 11 | 65% | 12 | 92% |
| No | 1 | 14% | 6 | 35% | 1 | 8% |

Notes: Results show responses from question B4 in the 2014 and 2015 surveys and question D3 in the 2013 survey: *Before this survey, were you aware of the opportunity to receive utility incentives via joining the Green Motors Practices Group?* Cadmus only asked this question of nonmember motor service centers

In 2014 and 2015, Cadmus asked nonmembers who knew of the GMPG if their shops planned to become members of the organization. The majority of nonmembers in 2014 and 2015 did not plan to join the GMPG—only one out of 17 nonmembers in 2014 (who knew of the GMPG) planned to join the group. None of the nonmembers surveyed in 2015 planned to join the group, as shown in Figure 5. Two nonmembers in 2014 and one in 2015 said they were unsure whether they would pursue GMPG membership.

Figure 5. Nonmember Intentions to Join the GMPG



Notes: Results show responses from question B5: *Is your shop planning to become a member of the Green Motors Practices Group?* Cadmus only asked this question of nonmember motor service centers.

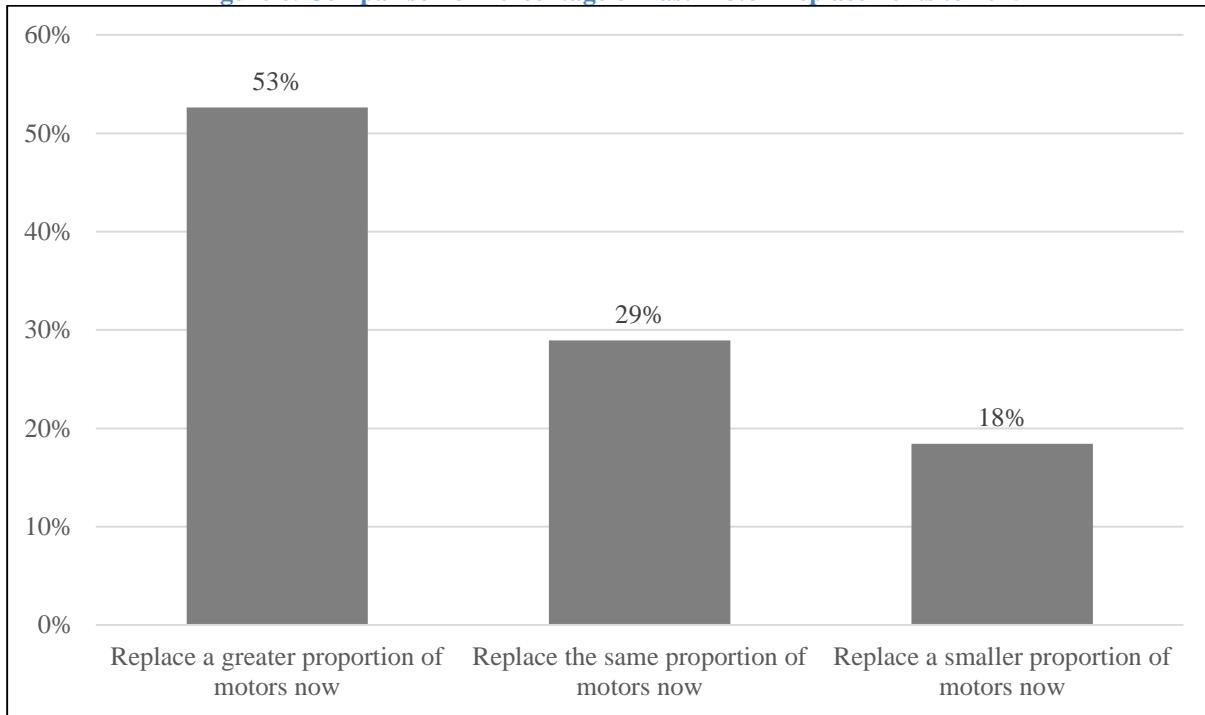
3.4.2 Motor Replacements and the Future of the Motor Rewind Industry

To explore how green motor rewind market activity changed over time and how motor service centers anticipated future changes in the market, Cadmus asked motor service center respondents questions regarding the following topics.

- The percentage of motors replaced rather than rewound five years ago compared to 2015.
- Where respondents saw the motor rewinds industry heading in the next five years.

As Figure 6 shows, more than one-half of the respondents (20 of 38) said they replaced more motors now than they did five years ago.

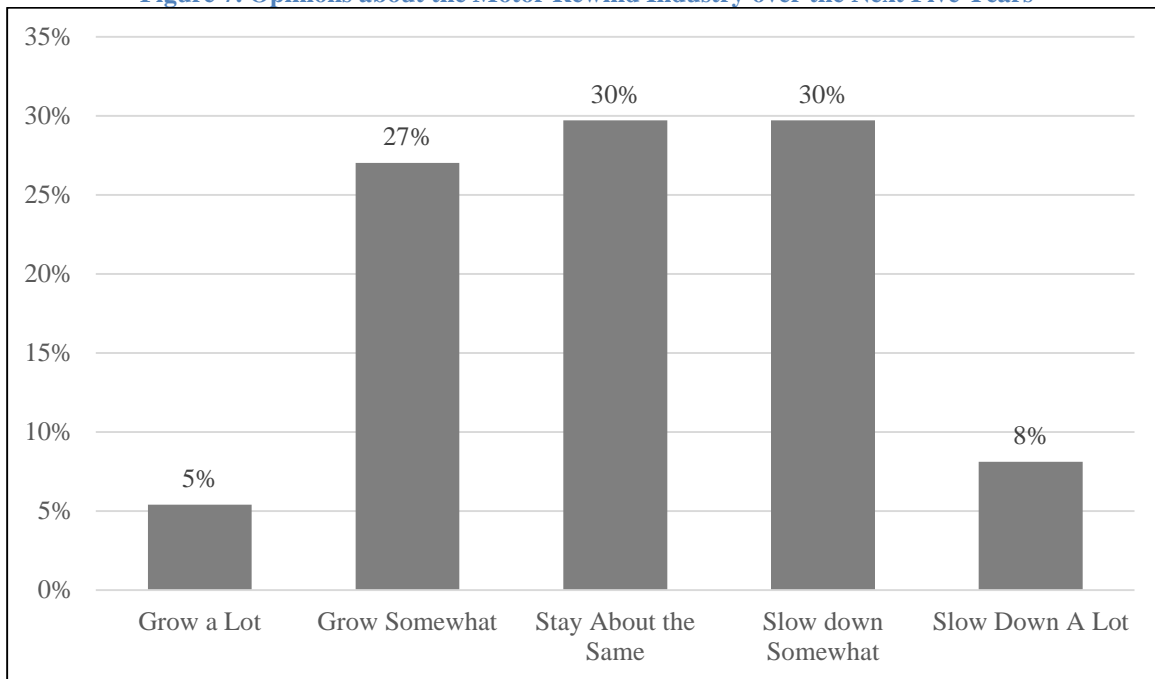
Figure 6. Comparison of Percentage of Past Motor Replacements to 2015



Notes: Results show responses from question C2: Is the percentage of motors you replaced rather than rewound in 2015 more, less, or the same as five years ago? (n=38)

Motors service centers expressed differing views about the motor rewind industry's future over the next five years, producing no consensus about whether the industry would grow, shrink, or stay the same. As shown in Figure 7, responses were distributed relatively evenly between the industry growing (32% said "grow a lot" or "grow somewhat"), staying the same (30%), and slowing down (38% said "slow down somewhat" or "slow down a lot").

Figure 7. Opinions about the Motor Rewind Industry over the Next Five Years



Notes: Results show responses from question C3: Thinking specifically about motor rewinds, where do you see the industry heading in the next five years? Would you say that you expect the motor rewind business to....
(n=37)

Respondents reflected diverse perspectives regarding the rewind industry's future and the causes of industry trends. Those thinking the motor rewind industry would "grow somewhat" or "grow a lot" in the next five years had seen their businesses grow over the past several years and expected that trend to continue. One motor service center representative estimated a 70% increase in his shop's business in the past few years. Another anticipated an increase in motor rewinds, given an influx of new industries to his service territory as well as demand from local agricultural customers. A third motor service center representative acknowledged EASA's and the GMPG's effort in promoting motor rewind best practices to customers, which he believed would increase customer demand for motor rewinds.

Of motor service center representatives expressing the motor rewind industry would "slow down somewhat" or "slow down a lot," six cited an expected decrease due to the prevalence of cheaper, imported new motors in the market; these less expensive motors typically made motor rewinds less cost-effective and harder to sell to customers. Others cited the decline in industry and manufacturing—including the closing of paper mills, timber mills, and factories—within their service areas, which reduced their customer bases.

4 Conclusions and Recommendations

Based on the study findings, Cadmus developed the following conclusions and recommendations.

4.1 Key ACE Model Assumptions

4.1.1 Conclusions About Key ACE Model Assumptions

This study's major research objectives pertain directly to key ACE Model assumptions, as outlined below:

- **Market Size.** In 2015, 81 Northwest motor service centers performed 3,059 motor rewinds, amounting to over 430,677 horsepower. Industrial application motors accounted for 54% of the total rewind horsepower in 2015. The estimated number of rewinds performed by Northwest motor service centers decreased by 1,572 motor rewinds between 2013 and 2015—from 4,631 in 2013 to 3,505 in 2014 to 3,059 in 2015. This decrease in motor rewinds most likely resulted from a decline in the motor rewind industry, along with improvements Cadmus made in data collection and subsequent changes in Cadmus' study sample between 2013 and 2015.
- **Market Share.** In 2015, GMPG member service centers performed an estimated 479 green motor rewinds, representing 118,273 horsepower. Nonmembers performed 45 green motor rewinds, representing 4,100 horsepower. Green motor rewinds accounted for 24% of all motor rewinds performed by GMPG members. Nearly 33% of all horsepower rewind by GMPG members resulted from green motor rewinds.
- **Savings Calculations.** Cadmus estimated total, regional savings from green motor rewinds in 2015 of 1,852,401 annual kWh (0.21 aMW).

Table 26. Total Regional Green Motor Rewinds Savings in 2015

| State | Green Motor Rewind Savings | | | | | |
|------------|----------------------------|----------------|-----------|-------------|----------------|-------|
| | kWh | | | aMW | | |
| | GMPG Member | GMPG Nonmember | Total | GMPG Member | GMPG Nonmember | Total |
| Washington | 813,045 | 0 | 813,045 | 0.09 | 0.00 | 0.09 |
| Oregon | 577,224 | 0 | 577,224 | 0.07 | 0.00 | 0.07 |
| Idaho | 340,056 | 0 | 340,056 | 0.04 | 0.00 | 0.04 |
| Montana | 45,533 | 76,543 | 122,076 | 0.01 | 0.01 | 0.01 |
| Total | 1,775,858 | 76,543 | 1,852,401 | 0.20 | 0.01 | 0.21 |

4.2 Data Collection Improvements

4.2.1 Conclusions About Data Collection Improvements

Conclusion: Cadmus' focused efforts on service center outreach and solicitation successfully reduced attrition from previous study participants and encouraged nonparticipants from 2014 to provide motor rewind data in 2015. Cadmus achieved an overall data collection form response rate of 46% (59% of members and 36% of nonmembers). While two fewer nonmembers completed the data collection forms in 2015 than in 2014, four additional members completed the forms.

Given issues inherent in working with this hard-to-reach market segment, the 2015 data collection efforts especially focused on service center outreach and solicitation. Based on lessons learned from previously collecting motor rewind sales data from Northwest motor service centers, Cadmus employed the following tactics to increase response rates:

- Provided early notification of study efforts in July 2015, compared to November in 2014 and 2013.
- Delivered three personalized pre-notice mail and/or e-mail contacts, compared to one pre-notice e-mail delivered for each study in 2014 and 2013.
- Provided a customized market snapshot of 2014 study findings.
- Conducted all service center outreach and solicitations in-house, using staff familiar with the technical aspects of green motor rewinds
- Contacted each of 81 motor service centers five times by phone and conducting up to five follow-up phone calls with those expressing interest in completing the form, to encourage them to provide sales data

Maintaining this level of outreach and engagement, and exploring additional outreach and engagement strategies, may be necessary to encourage continued participation in future data collection efforts. Cadmus believes, however, that the likelihood remains low of achieving participation from the 26 nonmember motor service centers and 10 member motor service centers that have declined to provide motor rewind data during all three study years.

4.2.2 Recommendations

NEEA and Cadmus should consider the following methods for maintaining and increasing participation in future data collection efforts:

- Provide early notification to motor service centers as soon as possible. Motor service centers prefer to receive notification at the beginning of the year, but this may not be feasible, given NEEA's decision-making timeline. During the presentation of research findings in March 2016, Cadmus and NEEA should discuss an achievable timeline for early notification.

- For 2016 data collection, continue to employ the outreach and solicitation tactics used to increase response rates in 2015.
- To solicit participation from less-engaged GMPG nonmembers, explore opportunities to partner with EASA in reaching out to EASA-member motor service centers and to encourage their participation in 2016 data collection.

4.3 Market Transformation

4.3.1 Conclusions About Market Transformation

Based on study findings, green motor rewinds have not yet become standard practice in the Northwest. Therefore, the region's efforts have not transformed the market for green motor rewinds.

GMPG members reported that green motor rewinds comprised only 30% of all horsepower rewind, and 24% (5 out of 21) of member respondents indicated performing no green motor rewinds in 2015. Only one nonmember, previously a member of the GMPG, reported performing green motor rewinds, which comprised 13% of all nonmember horsepower rewind in 2015.

GMPG members performed more motor rewinds in compliance with green motor rewind standards than nonmembers. While a majority of nonmembers knew of the GMPG (68%), surveyed nonmembers proved reluctant to join the GMPG—none of the nonmembers surveyed in 2015 planned to join the group, and one expressed uncertainty whether they would pursue GMPG membership. Similarly, seven members (though no nonmembers) were EASA accredited. While one-third of members who knew of EASA but had not yet been accredited (3 of 9) said they planned to seek EASA accreditation, no nonmembers reported planning to do so.

NEEA, the GMPG, and EASA have made significant progress in encouraging motor service centers to perform green motor rewinds. Without additional intervention, however, the market penetration of green motor rewinds will not likely increase. The current study did not explore motor service center reasons for not planning to join the GMPG or seek EASA accreditation, but, in the 2013 study, nonmembers identified the following reasons for not joining the GMPG:

- Lack of proper equipment (specifically, core loss test machines);
- Lack of customer interest;
- Paperwork hassles;
- A perception that green motor rewinds do not last as long; and lack of time to sign up.

Additionally, in the 2013 study, stakeholder interviewees suggested that developing a customer awareness campaign and reducing paperwork burdens could help encourage motor service centers to offer green motor rewinds. While a deeper exploration of motor service center barriers and motivations fell outside the scope of this study, these findings suggest opportunities remain for NEEA to support interventions to transform the motor rewind market.

5 Appendices

Appendix A. Data Collection Form



CADMUS

| Motor Rewind Data Sheet Directions |
|---|
| On the next tab, labeled "Motor Rewind Data Sheet", you will find the motor rewind form. Please use the directions below to complete the form. |
| Section A |
| Record a count of <u>all</u> 15 to 5,000 HP motor rewinds (green motor rewinds and standard motor rewinds) in 2015. In the data sheet, record the number of motor rewinds for each sector (agriculture or industrial), state, and HP. |
| Section B |
| Record a count of <u>Green Motor</u> rewinds for 15 to 5,000 HP motors in 2015. (NOTE: If your company is a member of the Green Motors Practices Group, this includes both green motor rewinds you have reported and received an incentive for, as well as those you have <u>not</u> reported or received an incentive for.) |

| Important Definitions |
|--|
| Green Motor Rewinds , in contrast to standard motor rewinds, refer to motors that are rewound to their original nominal efficiency. The Green Motors Initiative rewind specifications require several criteria for a motor rewind to be considered a green rewind. The minimum criteria are as follows: |
| a. There must be no visible damage to the core |
| b. The burn-off temperature should not exceed 725 degrees F using verified water mist control |
| c. Service center must conduct two (or more) core-loss tests before and after stripping with the final core test watts loss per pound no more than 20% greater than the first test |
| d. There must be no hot spots greater than 10 degree C |
| e. The final core test must be less than or equal to 4 watts loss per pound |
| f. The new winding must be equivalent to the manufacturer's original length and (may exceed) circular mils (voltage changes must be calculated circular mil equivalent) |

| Contact Information and Form Submittal |
|--|
| For questions about this form or project, please contact Hanna Lee at the Cadmus Group, at hanna.lee@cadmusgroup.com or (503) 467-7110. Please also email completed forms to Hanna Lee at the email address above, or fax to: (503) 575-4710 by December 16, 2015 . |
| Name: |
| Company: |
| Address: |
| |
| |
| |

| Rewind Type | Section A: Count of <u>all</u> Motor Rewinds | | | | | | | | Section B: Count of <u>Green Motor</u> Rewinds | | | | | | | |
|-------------|--|----|----|----|------------|----|----|----|--|----|----|----|------------|----|----|----|
| End Use | Agriculture | | | | Industrial | | | | Agriculture | | | | Industrial | | | |
| State | ID | MT | OR | WA | ID | MT | OR | WA | ID | MT | OR | WA | ID | MT | OR | WA |
| 15 HP | | | | | | | | | | | | | | | | |
| 20 HP | | | | | | | | | | | | | | | | |
| 25 HP | | | | | | | | | | | | | | | | |
| 30 HP | | | | | | | | | | | | | | | | |
| 40 HP | | | | | | | | | | | | | | | | |
| 50 HP | | | | | | | | | | | | | | | | |
| 60 HP | | | | | | | | | | | | | | | | |
| 75 HP | | | | | | | | | | | | | | | | |
| 100 HP | | | | | | | | | | | | | | | | |
| 125 HP | | | | | | | | | | | | | | | | |
| 150 HP | | | | | | | | | | | | | | | | |
| 200 HP | | | | | | | | | | | | | | | | |
| 250 HP | | | | | | | | | | | | | | | | |
| 300 HP | | | | | | | | | | | | | | | | |
| 350 HP | | | | | | | | | | | | | | | | |
| 400 HP | | | | | | | | | | | | | | | | |
| 450 HP | | | | | | | | | | | | | | | | |
| 500 HP | | | | | | | | | | | | | | | | |
| 600 HP | | | | | | | | | | | | | | | | |
| 700 HP | | | | | | | | | | | | | | | | |
| 800 HP | | | | | | | | | | | | | | | | |
| 900 HP | | | | | | | | | | | | | | | | |
| 1000 HP | | | | | | | | | | | | | | | | |
| 1250 HP | | | | | | | | | | | | | | | | |
| 1500 HP | | | | | | | | | | | | | | | | |
| 2000 HP | | | | | | | | | | | | | | | | |
| 2250 HP | | | | | | | | | | | | | | | | |
| 2500 HP | | | | | | | | | | | | | | | | |
| 3000 HP | | | | | | | | | | | | | | | | |
| 3500 HP | | | | | | | | | | | | | | | | |
| 4000 HP | | | | | | | | | | | | | | | | |
| 4500 HP | | | | | | | | | | | | | | | | |
| 5000 HP | | | | | | | | | | | | | | | | |

Appendix B. 2015 Motor Service Center Survey

Hi, my name is _____ and I'm calling from Cadmus on behalf of the Northwest Energy Efficiency Alliance, or, NEEA. May I please speak with [NAME]? [IF NO NAME AVAILABLE SAY]: with the owner or manager of your business? [IF NOT AVAILABLE, SCHEDULE CALL BACK]

[IF NEEDED, REPEAT WHEN OWNER/MANAGER IS ON THE PHONE]: Hi, my name is _____ and I'm calling from Cadmus on behalf of the Northwest Energy Efficiency Alliance, or, NEEA.

A. Introduction

[NOTE TO REVIEWERS]: Since we are conducting these interviews in-house, we'd like these interactions to have a more conversational flow. Therefore, we intend for the introductory text below to serve as a guide for the interviewer rather than a script to be read verbatim.]

[IF MEMBER]

NEEA has contracted with my company to continue the Pacific Northwest Green Motor Rewind study that began in 2013.

[IF THEY PROVIDED DATA IN 2014: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to request your participation in this year's research. You may have already received an e-mail from Dennis Bowns, Executive Director of the Green Motors Practices Group, about this important study. Does this sound familiar?

[IF NEEDED: The study involves answering a few brief questions over the phone, and afterwards, sending us some information about the motor rewinds your company performed in 2015. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. It will take you about a half hour to complete that spreadsheet and you can complete it via email, fax, or phone. All of the data that you provide will remain confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]

In return for your participation, we will share a summary of research findings with you each year that this research continues.

I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than 5 minutes of your time.]

[IF NEEDED: Answering these few questions over the phone should take no more than five minutes of your time.]

[IF A NONMEMBER WHO RECEIVED A PRIOR E-MAIL FROM GMPG]

NEEA has contracted with my company to continue the Pacific Northwest motor rewind study that began in 2013, and we are offering a \$150 visa gift card to motor service centers that participate this year.

[IF THEY PROVIDED DATA IN 2014: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to request your participation in this year's research. You may have already received an e-mail from me/my colleague at Cadmus, Hanna Lee, about this important study. Does this sound familiar?

[IF NEEDED: The study involves answering a few brief questions over the phone, and afterwards, sending us some information about the motor rewinds your company performed in 2015. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. It will take you about a half hour to complete that spreadsheet and you can complete it via email, fax, or phone. All the data will remain confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]

When we receive your data, we will mail you a \$150 gift card. In return for your participation, we will also share a summary of research findings with you each year that this research continues.

I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than 5 minutes of your time.]

[IF NON-MEMBER AND NO PRIOR EMAIL FROM CADMUS]

NEEA is conducting a study about motor rewinds, and we are offering a \$150 visa gift card to motor service centers who participate. NEAA has contracted with my company to continue this Pacific Northwest motor rewind study that began in 2013.

[IF THEY PROVIDED DATA IN 2014: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to see if you would like to participate in this year's research and receive the incentive.

[IF NEEDED: First, let me tell you a little about the study. It involves answering a few brief questions over the phone, and afterwards, sending us some information over email, fax, or phone about the motor rewinds your company performed in 2015.] The purpose of the research is to help NEAA understand more about the motor rewinds industry in the Pacific Northwest. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an

agricultural or industrial application. All the data will remain completely confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]

Once we send you the form to collect the information we need, we expect it to take about a half hour of your time. After we receive your data about motor rewinds, we'll put a \$150 gift card in the mail. In return for your participation, we will also share a summary of research findings with you each year that this research continues.

I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than 5 minutes of your time.]

- A1. To start with, how many employees does your company have in the Northwest? [IF NEEDED: We are only interested in the number of employees your company has in Idaho, Montana, Washington, and Oregon.]
1. [RECORD NUMBER; SPECIFY IF THESE EMPLOYEES ARE AT A SINGLE LOCATION OR MULTIPLE LOCATIONS]
 98. Don't know
 99. Refused

B. EASA and GMPG Awareness and Interest

[ASK IF NOT EASA ACCREDITED]

- B1. Are you aware of the accreditation program for motor service centers offered through the Electrical Apparatus Service Association, or EASA This program evaluates motor service centers using a third-party auditor to ensure services centers are using best practices for maintaining motor efficiency and reliability. [IF NEEDED: In return for participation, accredited service centers receive third-party verification and recognition on EASA's website.]
1. (Yes)
 2. (No)
 98. (Don't know)
 99. (Refused)

[ASK IF G1=1]

- B2. Is your shop planning to seek EASA accreditation?
1. (Yes)
 2. (No)
 98. (Don't know)
 99. (Refused)

[ASK IF GMPG NONMEMBER]

- B3. Are you aware of the Green Motors Practices Group?
1. (Yes)

- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF G3=1]

- B4. Before this conversation, were you aware of the opportunity to receive utility incentives via joining the Green Motors Practices Group?
- 1. (Yes)
 - 2. (No)
 - 98. (Don't know)
 - 99. (Refused)

[ASK IF G3=1]

- B5. Is your shop planning to become a member of the Green Motors Practices Group?
- 1. (Yes)
 - 2. (No)
 - 98. (Don't know)
 - 99. (Refused)

C. Motor Rewind Industry Trends

Next I have a few questions about the motor repair industry.

- C1. About what percentage of motors that came into your shop in 2015 were replaced rather than rewound?
- 1. [RECORD NUMBER]_____
 - 98. (Don't know)
 - 99. (Refused)
- C2. Is that percentage of motors you replaced in 2015 more, less, or the same as five years ago?
- 1. Percentage of motors replaced is more now
 - 2. Percentage of motors replaced is less now
 - 3. Percentage of motors replaced is the same
 - 98. (Don't know)
 - 99. (Refused)
- C3. Thinking specifically about motor rewinds, where do you see the industry heading in the next five years? Would you say that you expect the motor rewind business to...[READ LIST]
- 1. Grow a lot,
 - 2. Grow somewhat,
 - 3. Stay about the same,
 - 4. Slow down somewhat, or
 - 5. Slow down a lot?
 - 98. (Don't know)
 - 99. (Refused)

- C4. What are your reasons for saying that?
1. [RECORD RESPONSE]_____
 98. (Don't know)
 99. (Refused)

D. Data Collection Forms

- D1. In the future, what could we do to make it easier for you to complete the data collection form?

1. [RECORD RESPONSE]_____
98. (Don't know)
99. (Refused)

- D2. How would you prefer to receive the data collection form I mentioned earlier?

1. E-mail
D2a. [COLLECT E-MAIL]_____
2. Fax
D2b. [COLLECT FAX NUMBER]_____
3. Phone
D2c. [COLLECT PHONE NUMBER]_____
4. Other [SPECIFY]_____
98. Don't know
99. Refused

[SAY IF GMPG NONMEMBER AND H1=99]

- D3. Unfortunately, I am unable to provide you with an incentive for participating in the study if you do not complete the data collection form.

- D4. We need to collect this motor rewind information from service centers each year for the next three years. Starting in 2015, we will provide advance notice of these efforts. Would you like to receive advance notice and a copy of the data collection form in early 2015?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[If H3=1]

- D5. How would you like to receive the data collection form in 2015?

1. E-mail
D5a. [COLLECT E-MAIL IF DIFFERENT FROM H1]_____
2. Fax
D5b. [COLLECT FAX IF DIFFERENT FROM H1]_____
3. Other [SPECIFY]_____
98. Don't know
99. Refused

E. Closing

Great. Thanks again. You should expect to receive the form shortly. There will be more detailed directions on how to complete it on the form itself. It will also have contact information for someone to call if you have any questions, and it will have instructions on how to submit it.

[SAY IF GMPG NONMEMBER]: Once we receive the form, we will mail you your \$150 gift card.

Thank for your time, have a great day!

Appendix C. 2014 Motor Service Center Survey

Hi, my name is _____ and I'm calling from Cadmus on behalf of the Northwest Energy Efficiency Alliance, or, NEEA. May I please speak with [NAME]? [IF NO NAME AVAILABLE SAY]: with the owner or manager of your business? [IF NOT AVAILABLE, SCHEDULE CALL BACK]

[IF NEEDED, REPEAT WHEN OWNER/MANAGER IS ON THE PHONE]: Hi, my name is _____ and I'm calling from Cadmus on behalf of the Northwest Energy Efficiency Alliance, or, NEEA.

F. Introduction

[NOTE TO REVIEWERS]: Since we are conducting these interviews in-house, we'd like these interactions to have a more conversational flow. Therefore, we intend for the introductory text below to serve as a guide for the interviewer rather than a script to be read verbatim.]

[IF MEMBER]

NEEA has contracted with my company to continue the Northwest Green Motor Rewind study that began in 2013.

[IF THEY PROVIDED DATA IN 2013: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to request your participation in this year's research. You may have already received an e-mail from Dennis Bowns, Executive Director of the Green Motors Practices Group, about this important study. Does this sound familiar?

The study involves answering a few brief questions over the phone, and afterwards, sending us some information about the motor rewinds your company performed in 2014. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. It will take you about a half hour to complete that spreadsheet and you can complete it via e-mail, fax, or phone. All of the data that you provide will remain confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.

[IF THEY MENTION THEY REQUESTED ADVANCE NOTIFICATION IN 2013: Several motor service centers requested advance notification of data collection efforts last year. I want to assure you that your voice was heard. Starting in 2015, if requested, we will provide advance notice and a copy of the data collection form to track motor rewinds throughout 2015 and each year research continues.]

In return for your participation, we will share a summary of research findings with you each year that this research continues.

So to begin, I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than five minutes of your time.]

[IF A NONMEMBER WHO RECEIVED A PRIOR E-MAIL FROM GMPG]

NEEA has contracted with my company to continue the Northwest motor rewind study that began in 2013, and we are offering a \$150 visa gift card to mechanical contractors who participate this year.

[IF THEY PROVIDED DATA IN 2013: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to request your participation in this year's research. You may have already received an e-mail from Dennis Bowns, who is the former President of the Northwest Chapter of EASA and Executive Director of the Green Motors Practices Group, about this important study. Does this sound familiar?

The study involves answering a few brief questions over the phone, and afterwards, sending us some information about the motor rewinds your company performed in 2014. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. It will take you about a half hour to complete that spreadsheet and you can complete it via e-mail, fax, or phone. When we receive your data, we will mail you a \$150 gift card. All the data will remain confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]

[IF THEY MENTION THEY REQUESTED ADVANCE NOTIFICATION IN 2013: Several motor service centers requested advance notification of data collection efforts last year. I want to assure you that your voice was heard. Starting in 2015, if requested, we will provide advance notice and a copy of the data collection form to track motor rewinds throughout 2015 and each year research continues.]

In return for your participation, we will also share a summary of research findings with you each year that this research continues.

So to begin, I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than 5 minutes of your time.]

[IF A NONMEMBER WHO DID NOT RECEIVE A PRIOR E-MAIL FROM GMPG]

NEEA is conducting a study about motor rewinds, and we are offering a \$150 visa gift card to mechanical contractors who participate. NEEA has contracted with my company to continue this Northwest motor rewind study that began in 2013.

[IF THEY PROVIDED DATA IN 2013: Thank you again for taking the time last year to participate in the study and contribute to this project's success.]

We're contacting you to see if you would like to participate in this year's research and receive the incentive. First, let me tell you a little about the study. It involves answering a few brief questions over the phone, and afterwards, sending us some information over e-mail, fax, or phone about the motor rewinds your company performed in 2014.

The purpose of the research is to help NEEA understand more about the motor rewinds industry in the Pacific Northwest. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. All the data will remain completely confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.

[IF THEY MENTION THEY REQUESTED ADVANCE NOTIFICATION IN 2013: Several motor service centers requested advance notification of data collection efforts last year. I want to assure you that your voice was heard. Starting in 2015, if requested, we will provide advance notice and a copy of the data collection form to track motor rewinds throughout 2015 and each year research continues.]

Once we send you the form to collect the information we need, we expect it to take about a half hour of your time. After we receive your data about motor rewinds, we'll put a gift card in the mail. In return for your participation, we will also share a summary of research findings with you each year that this research continues.

So to begin, I just have a few short questions for you.

[IF NEEDED: Answering these few questions over the phone should take no more than five minutes of your time.]

- F1. To start with, how many employees does your company have in the Northwest? [IF NEEDED: We are only interested in the number of employees your company has in Idaho, Montana, Washington, and Oregon.]
1. [RECORD NUMBER; SPECIFY IF THESE EMPLOYEES ARE AT A SINGLE LOCATION OR MULTIPLE LOCATIONS]
 98. Don't know
 99. Refused

G. EASA and GMPG Awareness and Interest

[ASK IF NOT EASA ACCREDITED]

- G1. Are you aware of Electrical Apparatus Service Association, or EASA, accreditation program for motor service centers? [IF NEEDED: The EASA accreditation program evaluates motor service centers using a third-party auditor to ensure service centers are using best practices for maintaining

motor efficiency and reliability during motor repairs. In return, accredited service centers receive third-party verification and recognition on EASA's website.]

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF G1=1]

G2. Is your shop planning to seek EASA accreditation?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF GMPG NONMEMBER]

G3. Are you aware of the Green Motors Practices Group?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF G3=1]

G4. Before this conversation, were you aware of the opportunity to receive utility incentives via joining the Green Motors Practices Group?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF G3=1]

G5. Is your shop planning to become a member of the Green Motors Practices Group?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

H. Data Collection Forms

H1. How would you prefer to receive the data collection form I mentioned earlier?

- 1. E-mail
 - H1c. [COLLECT E-MAIL]_____
- 2. Fax
 - H1d. [COLLECT FAX NUMBER]_____
- 3. Phone
 - H1e. [COLLECT PHONE NUMBER]_____
- 4. Other [SPECIFY]_____
- 98. Don't know
- 99. Refused

[SAY IF GMPG NONMEMBER AND H1=99]

- H2. Unfortunately, I am unable to provide you with an incentive for participating in the study if you do not complete the data collection form.
- H3. We need to collect this motor rewind information from service centers each year for the next three years. Starting in 2015, we will provide advance notice of these efforts. Would you like to receive advance notice and a copy of the data collection form in early 2015?
1. (Yes)
 2. (No)
 98. (Don't know)
 99. (Refused)

[If H3=1]

- H4. How would you like to receive the data collection form in 2015?
1. E-mail
H4f. [COLLECT E-MAIL IF DIFFERENT FROM H1] _____
 2. Fax
H4g. [COLLECT FAX IF DIFFERENT FROM H1] _____
 3. Other [SPECIFY] _____
 98. Don't know
 99. Refused

I. Closing

Great. Thanks again. You should expect to receive the form shortly. There will be more detailed directions on how to complete it on the form itself. It will also have contact information for someone to call if you have any questions, and it will have instructions on how to submit it.

[SAY IF GMPG NONMEMBER]: Once we receive the form, we will mail you your \$150 gift card.

Thank for your time, have a great day!

Appendix D. 2013 Nonmember Motor Service Center Survey

| Research Objectives | Item |
|--|----------------------|
| Determine number of motor rewinds performed annually by non-GMPG service centers | Data Collection Form |
| Determine the distribution of motor rewinds by horsepower | Data Collection Form |
| Determine the percentage of rewinds completed by horse power for the agricultural market vs. the rest of market (ROM) | Data Collection Form |
| Evaluate the number of motor rewinds compliant with Green Motor Rewinds specification | Data Collection Form |
| Gauge the natural adoption of Green Motor Rewinds practices without NEEA or utilities' influence | D1-D5; F1-F2 |
| Determine the number of motors that are replaced with new motors instead of rewind | C1-C4 |
| Identify new and salient market barriers and possible intervention strategies | E1-E7 |
| Explore potential ways to engage with the market more effectively | E8-E12 |
| Assess how green motor rewind market penetration has changed over time and how it is anticipated to change in the future | G1-G8 |
| Understand motor service shop characteristics (# of employees, primary customer types) | A1-A2, B1-B7 |

NOTE: Answer options in parentheses or instructions in brackets are never read by the interviewer.

Hi, my name is _____ and I'm calling from RDD Services on behalf of the Northwest Energy Efficiency Alliance, or, NEEA. May I please speak [NAME]? [IF NO NAME AVAILABLE SAY]: with the owner or manager of your business? [IF NOT AVAILABLE, SCHEDULE CALL BACK]

[IF NEEDED, REPEAT WHEN OWNER/MANAGER IS ON THE PHONE]: Hi, my name is _____ calling from RDD Services on behalf of the Northwest Energy Efficiency Alliance, or, NEEA.

A. Introduction

[IF RECEIVED PRIOR E-MAIL FROM CADMUS/NEEA]

NEEA is conducting a study about motor rewinds, and we are offering mechanical contractors who participate in our study a \$100 visa gift card. We're contacting you to see if you would like to participate in the research. You may have already received an e-mail from Dennis Bowns, who is the President of the Northwest Chapter of EASA [PRONOUNCED EEESA] and Executive Director of the Green Motors Practices Group, about this important study. Does this sound familiar?

[IF NEEDED: The purpose of the research is to help NEEA understand more about the motor rewinds industry and about companies like yours that provide these services.]

The study involves answering a few questions over the phone, and afterwards, sending us some information over e-mail about the motor rewinds your company performed in 2013. We'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. Once we send you the form to collect the information we need, we expect it to take about a half hour of your time. When we receive your data, we will mail you a \$100 gift card. All the data will remain confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]

So to begin, I have a few questions for you. [SKIP TO A1]

[IF CALLER DID NOT RECEIVE PRIOR E-MAIL FROM CADMUS/NEEA]

NEEA is conducting a study about motor rewinds, and we are offering mechanical contractors who participate in our study a \$100 visa gift card. We're contacting you to see if you would like to participate in the research and receive the incentive. First, let me tell you a little about the study.

It involves answering a few questions over the phone, and afterwards, sending us some information over e-mail about the motor rewinds your company performed in 2013.

The purpose of the research is to help NEEA understand more about the motor rewinds industry and your company's practices. So, we'll ask you for the number of rewinds by horsepower and if the motor was used in either an agricultural or industrial application. All the data will remain completely confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.

Once we send you the form to collect the information we need, we expect it to take about a half hour of your time. After we receive your data about motor rewinds, we'll put a gift card in the mail.

So to begin, I have a few questions for you.

[CONTINUE UNLESS THEY DO NOT WANT TO PARTICIPATE].

[IF NEEDED: The study is about motor rewind practices.]

- A1. First, can you please tell me the primary service or services your business provides?
[OPEN END]
- A2. And for my records, can you please tell me your title at the company?
[OPEN END]

B. Business Information

B1. Does your company have service locations in more than one state?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[[IF B1=1]

B2. In which states are your company's service centers located? [MARK ALL THAT APPLY]

1. (Idaho)
2. (Montana)
3. (Oregon)
4. (Washington)
5. (Other) [SPECIFY: _____]
98. (Don't know)
99. (Refused)

[IF B2=5]

Even though your company has motor service centers in more than one state, NEEA is only gathering information about motor rewinds conducted in Idaho, Montana, Oregon, and Washington. For the purposes of this survey, please provide answers only for your company's motor service centers in Idaho, Montana, Oregon, and Washington.

B3. What types of customers does your business rewind motors for?

[MARK ALL THAT APPLY]

1. (Agricultural)
2. (Commercial)
3. (Industrial: Pulp and Paper)
4. (Industrial: Wood products manufacturing)
5. (Industrial: Food processing)
6. (Industrial: Fabricated metal manufacturing)
7. (Industrial: Waste-water treatment)
8. (Industrial: Chemical)
9. (Other) [SPECIFY _____]
98. (Don't know)
99. (Refused)

- B4. In addition to motor rewinds, what other types of services does your company provide for customers? **[MARK ALL THAT APPLY. DO NOT READ]**
1. Pump rebuilds
 2. Compressor rebuilds
 3. Vibration testing
 4. Shaft alignment
 5. Controls and instrumentation
 6. Piping
 7. General maintenance
 8. General preventative monitoring of equipment
 9. (Other) **[SPECIFY:_____]**
 98. (Don't know)
 99. (Refused)
- B5. Does your shop provide regular preventative maintenance to identify problems, or do most of your customers call you when a motor needs repair?
1. (Preventative maintenance)
 2. (Customer calls us when needed)
 3. (A combination of both)
 98. (Don't know)
 99. (Refused)
- B6. Who at your shop is responsible for interacting with customers? Would you say... **[READ LIST. MARK ALL THAT APPLY]**
1. Sales staff,
 2. Dedicated account representatives,
 3. The first person who answers a customer's call,
 4. Any available technician on staff, or
 5. Business owner
 6. (Other) **[SPECIFY:_____]**
 98. Don't know
 99. Refused
- B7. How many employees does your company have in the Northwest? **[IF NEEDED: We are only interested in the number of employees your company has in Idaho, Montana, Washington, and Oregon]**
[NUMERIC OPEN-END]

C. Motor Replacements

- C1. About what percentage of motors were replaced rather than rewound in 2013?
[RECORD NUMBER]
[IF RESPONDENT SAYS 0% SKIP TO C4]
98. (Don't know)
 99. (Refused)

- C2. In most cases, what are the reasons that a customer would replace a motor as opposed to rewinding the motor?
1. (Damage to core)
 2. (Motor size: if the motor is too small)
 3. (Too expensive to rewind; better value to buy a new one)
 4. (Customer preference)
 5. (Motor age or motor vintage)
 6. (Other) [SPECIFY:_____]
 98. (Don't know)
 99. (Refused)
- C3. Of the motors you replaced, what was the approximate horsepower range for these motors?
[DO NOT READ; CHECK ALL THAT APPLY]
1. (<15 HP)
 2. (15 to 500)
 3. (501-1000)
 4. (1001 to 2000)
 5. (2001 to 3000)
 6. (3001 to 4000)
 7. (4001 to 5000)
 8. (>5000)
 9. (Other)
 98. (Don't know)
 99. (Refused)
- C4. If utility incentives became available to replace core damaged motors with new motors, how likely would your company be to participate? Would you say...[READ LIST]
10. Very likely
 11. Somewhat likely
 12. Not too likely
 13. Not at all likely
 98. (Don't know)
 99. (Refused)

D. Green Motor Rewinds Practices and Program Influence

- D1. Are you aware of the specifications for Green Motor rewinds? [NOTE: IF RESPONDENT SAYS "Sort of..." or, "I think so..." THIS SHALL BE MARKED AS YES.]
1. (Yes)
 2. (No)
 98. (Don't know)
 99. (Refused)

[IF D1=1]

- D2. What have you heard about Green Motor rewinds?
[OPEN END]

[EVERYONE]

Green Motor Rewinds, in contrast to standard motor rewinds, refer to motors that are rewound to their original nominal efficiency. The Green Motors Initiative rewind specifications require several criteria for a motor rewind to be considered a green rewind, such as no damage to the motor core, water mist controlled burn-off temperatures of less than 720⁰ F, core-loss test before and after stripping, limited hot spot allowance, and other criteria.

[SKIP IF D1=1]

D3. Before this survey, had you heard of Green Motor Rewinds?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[SKIP IF D1=2, 98, or 99 AND D3=2, 98, or 99]

D4. Does your company make a distinction between a standard rewind and a Green Motor rewind?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK EVERYONE]

D5. Would you say your company performed any green motor rewinds in 2013, according to the green motors specifications or the criteria I just mentioned?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[IF D5=1]

D6. About what percent of your total rewinds would you say were performed in 2013 according to green motor rewind specs?

[OPEN END NUMERIC]

E. Market Barriers and Interventions

E1. Are you aware of the Green Motors Practices Group? [NOTE: IF RESPONDENT SAYS "Sort of..." or, "I think so..." THIS SHALL BE MARKED AS YES.]

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[SKIP IF E1=2, 98, or 99]

E2. According to my understanding, to be eligible for an incentive from your utility for performing green motor rewinds, service centers must be members of the Green Motors Practices Group. My records show that your business is not a member, do I have that right?

1. (Yes, correct, we are not a member)
2. (No, incorrect. We are a member)
98. (Don't know)
99. (Refused)

[SKIP IF E1=2, 98, or 99]

E3. Before this survey, were you aware of the opportunity to receive utility incentives via joining the Green Motors Practices Group?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[SKIP IF E1=2, 98, or 99, OR E2=2, 98, or 99]

E4. What are the main reasons that your business isn't a member of the Green Motors Practices Group?

[DO NOT READ, MARK ALL THAT APPLY]

1. (I don't know how to become a member)
2. (I just haven't had time to sign up yet)
3. (I do not have the proper equipment to conduct green motor rewinds)
4. (Paperwork hassle)
5. (Incentive is too low, it does not cover the costs of a green motor rewind)
6. (I do not like the Green Motors Practices Group) [RECORD VERBATIM
WHY_____]
7. (It's my boss's decision)
8. (Customers don't care about green motor rewinds)
9. (Other) [SPECIFY:_____]
98. (Don't know)
99. (Refused)

[ASK If D5=2]

E5. What are the main reasons your business does not conduct green motor rewinds? [OPEN END]

[SKIP IF D1=2, 98, or 99]

E6. Are there any challenges with conducting rewinds in accordance with green motor rewind specifications? [OPEN END; 2=No, 98=DON'T KNOW, 99=REFUSED]

[SKIP IF D1=2, 98, or 99 OR E6=2, 98, or 99]

E7. What could be done to help you overcome those challenges? [OPEN END]

E8. How helpful would it be for you or your employees to receive more information or training about conducting green motor rewinds? Would you say more information or training would be... [READ LIST]

1. Very helpful
2. Somewhat helpful

- 3. Not very helpful
- 4. Not at all helpful
- 98. (Don't know)
- 99. (Refused)

[IF E8=1 OR 2]

E9. What types of information or training would you like to receive about conducting green motor rewinds? [OPEN END]

[SKIP IF D1=2, 98, or 99, D3=2, , 98, or 99 or D4=2, 98, or 99]

E10. About what percent of your customers request or require green motor rewinds?
[OPEN END NUMERIC; 96 = N/A (no customers), 98=Don't know, 99=Refused)

[SKIP IF D1=2, 98, or 99, D3=2, 98, or 99, or D4=2, 98, or 99]

E11. How often do you recommend green motor rewinds to your customers? Would you say...[READ LIST]

- 1. Very often,
- 2. Sometimes,
- 3. Not too often, or
- 4. Never
- 98. (Don't know)
- 99. (Refused)

[ASK IF E11=3 OR 4]

E12. What makes you say that?
[OPEN END]

[ASK SECTION F IF D5=1]

F. Program Influence

F1. You mentioned that you performed some green motor rewinds in 2013, but did not receive any incentive for them. Do I have that right?

- 1. (Yes)
- 2. (No)
- 98. (Don't know)
- 99. (Refused)

[ASK IF F1=1]

F2. What are the main reasons why your company performed green motor rewinds?
[OPEN END]

G. Historical and Future Trends

[ASK IF D5=1]

- G1. Earlier, you mentioned that about [INSERT ANSWER FROM D6] of your rewinds in 2013 were green motor rewinds in 2013. Thinking about the rewinds your company performed 5 years ago, would you say the percentage of green motor rewinds you performed in 2013 is ... [READ LIST]
1. About the same as it was five years ago,
 2. Lower than five years ago, or
 3. Higher than five years ago?
98. (Don't know)
99. (Refused)

[ASK IF G1=1,2, or 3]

- G2. Using your best estimate, about what percentage of your motor rewinds were green motor rewinds five years ago?
[OPEN END NUMERIC]

[ASK IF G1=2]

- G3. What are the reasons that your company performs fewer green motor rewinds now?
[OPEN END]

[ASK IF G1=3]

- G4. What are the reasons that your company performs more green motor rewinds now?
[OPEN END]

[SKIP IF D3=2 OR D5=2]

- G5. In the next five years, would you say that the percentage of green motor rewinds that you will conduct will be ... [READ LIST]
1. About the same as it is now,
 2. Lower than it is now, or
 3. Higher than it is now?
98. (Don't know)
99. (Refused)

[SKIP IS G5=98 or 99]

- G6. What are the reasons you think the percentage of green motor rewinds you conduct in five years will be [INSERT ANSWER FROM G5]?
[OPEN END]

[ASK ALL]

- G7. Thinking about motor rewinds in general, not just green motor rewinds, where do you see the industry heading in the next five years? Would you say that you expect business to...[READ LIST]
1. Grow a lot,
 2. Grow somewhat,
 3. Stay about the same,
 4. Slow down somewhat, or
 5. Slow down a lot?

- 98. (Don't know)
- 99. (Refused)

G8. What makes you say that?
[OPEN END]

H. Closing

Thank you, those are all the questions I have for you today. If you'd like to provide me with your e-mail address now, I will send you a form that we need for the second stage of this study.

- H1. 1. [COLLECT E-MAIL_____]
2. (Do not have an e-mail)
99. (Refused) [Thank you for your time. Unfortunately I am unable to provide you with an incentive for participating in the study if you do not complete the 2nd stage, but I appreciate your feedback today.]

[ASK IF H1=2]

- H2. Do you have a fax number so that I could fax it to you instead?
1. [COLLECT FAX NUMBER_____]
99. (Refused)

Great. Thanks again. You should expect to receive the form shortly. There will be more detailed directions on how to complete it on the form itself. It will also have contact information for someone to call if you have any questions, and it will have instructions on how to submit it. Once NEEA receives the form, they will mail you a gift card.

Thank for your time, have a great day!

[IF NEEDED: The form will ask you for the number of rewinds your company performed by horsepower in 2013 and if the motor was used in either an agricultural or industrial application.]

[IF NEEDED: All the data will remain completely confidential; we are only using it to combine with other data in the Northwest region so we can get an accurate and comprehensive picture of the motor rewinds market.]