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# BIRD ELECTROCUTION MITIGATION WEBSITE AND PRODUCT ENCYCLOPEDIA

*Prepared For:*  
**California Energy Commission**  
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and



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**PIER FINAL PROJECT REPORT**

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We also wish to acknowledge the Santa Cruz Predatory Bird Research Group, Santa Cruz, California, and the PIER group, for their ongoing support and guidance.

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## Preface

The Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

The PIER Program, managed by the California Energy Commission (Energy Commission), conducts public interest research, development, and demonstration (RD&D) projects to benefit electricity and natural gas customers.

The PIER program strives to conduct the most promising public interest energy research by partnering with RD&D entities, including individuals, businesses, utilities, and public or private research institutions.

PIER funding efforts are focused on the following RD&D program areas:

- Buildings End-Use Energy Efficiency
- Energy-Related Environmental Research
- Energy Systems Integration
- Environmentally Preferred Advanced Generation
- Industrial/Agricultural/Water End-Use Energy Efficiency
- Renewable Energy Technologies
- Transportation

*Bird Electrocutation Mitigation Website and Product Encyclopedia* is the final report for the Bird Electrocutation Mitigation Web Site and Product Encyclopedia project (contract number 500-01-032) conducted by EDM International, Inc. The information from this project contributes to PIER's Energy-Related Environmental Research Program.

For more information about the PIER Program, please visit the Energy Commission's website at [www.energy.ca.gov/pier/](http://www.energy.ca.gov/pier/) or contact the Energy Commission at 916-654-5164.

## **Abstract**

The Bird Electrocution Mitigation and Product Encyclopedia Website provides a single source of information on retrofitting power lines to mitigate raptor electrocutions. This unique interactive site provides common problems and solutions based upon the results of a survey submitted to all California electric utility companies. The information is supplemented with a searchable product encyclopedia which includes all commercially available items used to mitigate electrocutions. The encyclopedia provides vendor information on retrofitting products along with information on the advantages and disadvantages of each. Material properties and installation methods are also provided.

Keywords: electrocution, raptor, avian, retrofit, mitigation, power line, perch management, insulation, isolation, website, outage

# Executive Summary

## Introduction

Although there are several sources available on retrofitting power lines, there has not been a single comprehensive product that specifically addressed California construction, which adheres to General Order No. 95 (Rules for Overhead Electric Line Construction [GO 95]). There are also numerous products available to retrofit lines, but there was not a common location to view and obtain information on these products as well as an explanation of the advantages and disadvantages of each.

## Purpose

Under a contract with the Santa Cruz Predatory Bird Research Group, through the California Energy Commission's Public Interest Energy Research Environmental Area program, EDM International, Inc. set out to fill this void by creating a product encyclopedia that links typical California distribution overhead power line configurations associated with historic avian mortalities to recognized effective retrofitting solutions. These solutions include various options such as perch management, isolation, and insulation.

## Project Objectives

The objective of this project was to develop a single website with the ability to find common raptor electrocution problems and solutions. Additionally, it was important to provide a site where all commercially available mitigating products could be reviewed, coupled with important information about the effectiveness and durability of each product. Finally, developers sought to provide utility feedback on common misapplication of various products.

## Project Outcomes

The website was developed and posted at <http://bems.edmlink.com/>.

## Conclusions

The Bird Electrocution Mitigation and Product Encyclopedia website was launched in September 2005. Feedback has been positive and although developed for California utilities, the site is used by numerous utilities throughout the United States and internationally. Additionally, product vendors have supported the site by regularly providing information on new products.

## **Recommendations**

The website should be maintained and expanded as more information becomes available. For example, the Institute of Electrical and Electronics Engineers (IEEE) is presently developing standards on how raptor mitigating products should be electrically and mechanically tested. When finalized, these standards should be published on the site with all the IEEE testing results.

## **Benefits to California**

The website enables biologists and engineers to quickly determine which products effectively mitigate bird electrocutions. This increases the reliability of the electric utility system by reducing costly power outages and protects birds of prey and other animals.

## **1.0 Introduction**

### **1.1. Background and Overview**

EDM International, Incorporated (EDM) was contracted by the Santa Cruz Predatory Bird Research Group, with support from the California Energy Commission's Public Interest Energy Research (PIER) Environmental Area to create an interactive bird electrocution product encyclopedia and mitigation website to improve the environmental cost/risk of California's electricity.

### **1.2. Project Objective**

The objective was to create a website that would allow utility engineers and linemen who are unfamiliar with this subject to quickly come up to speed on ways to effectively retrofit California power line configurations. This technology transfer objective was to provide standardized retrofitting recommendations and detailed information on retrofitting products, their properties and proper installation. These data were to be presented in a manner which will allow someone that is new to dealing with avian interactions to quickly see what types of solutions work and what types of products are available. Additionally, common misapplications that will lead to future operational problems were to be provided in a user-friendly format.

## 2.0 Project Approach

The EDM project team created an interactive menu-driven website that contains a list of retrofitting products, along with images and interactive links to manufacturers, and a brief narrative for each retrofit outlining the benefits and disadvantages of each. The website also has a secure section for utility testimonials on the effectiveness of a particular product.

EDM's Project Team accomplished these objectives in the following ways:

- Compiled and created an interactive database with all present products used to mitigate bird electrocutions. Included in the database is information on:
  1. Product specifications
  2. Vendor claims
  3. Installation techniques (including common misapplications)
  4. Product Images
  5. Vendor contact information
- These products have been classified into the types of equipment applications they are designed to protect, such as arresters, cutouts, insulators, switches, and other devices.
- The products have also been classified into the product mechanism by which they function. For example one device might function as a barrier; another as insulation.

A website containing this menu-driven database was created by EDM to allow sorting for a particular type of mitigating product, based upon specific criteria and providing installation tips (see Figure 1).



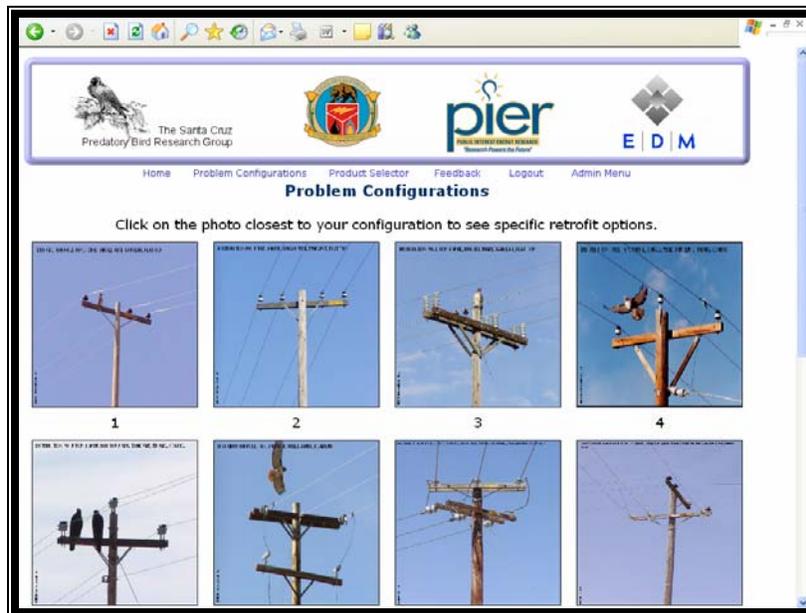
Figure 1. Interactive Bird Electrocutation Mitigation Website

The website is posted at <http://bems.edmlink.com/>. The website is secured using a password. When the user signs on for the first time, a password is required. This information is retained by EDM in order to insure that any users providing feedback on a particular product are legitimate.

In addition to the above-referenced tasks performed, the following have been accomplished:

- EDM compiled and summarized typical California historic problem structure configurations including transformer units, riser poles, narrow profile structures, and others.
- EDM created images showing historic problem structures without and with state-of-the-art retrofitting. Retrofitting also includes various options such as using insulation versus perch guards, and reframing.
- EDM provided a material list for each retrofitting option.

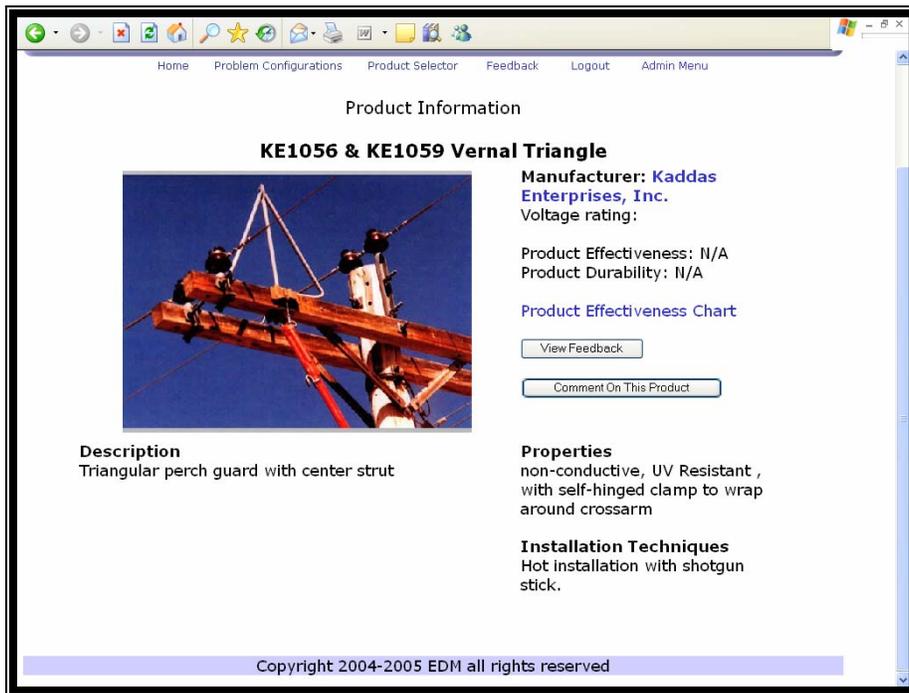
A series of images were created from a survey sent out to California utility companies showing historic problem structures without and with state-of-the-art retrofitting. These structures form the basis of a California retrofitting guide (see Figure 2). Information was also sought on existing retrofitting measures and their success or lack thereof. Retrofitting includes various options such as using insulation versus perch guards and reframing.



**Figure 2. Configuration examples linked to retrofitting options**

The final retrofitting guidelines provide a detailed material list for each retrofitting option. The final documents have been placed on the website and linked to the

interactive database. This feature allows users to view various retrofitting measures while simultaneously reviewing various material options. The information provided on a particular product includes a photo and detailed engineering information on the product's properties and installation techniques (see Figure 3). Although numerous products have been available to the utility industry, there has been very little information available on how satisfied utilities are with them. EDM solved this problem by including a user's forum on the website for electric utility product comments. This is available to members only. That is, although vendors can log on and review posted information, only utility members can post product comments.



**Figure 3. Interactive database provides various details helpful to product selection**

The EDM Project Team linked the material list to the interactive product database to provide basic product information, including product description, e-mail address, equipment application, and other pertinent details. Particular product details include a photo and in-depth engineering information on the product's properties and installation techniques.

### 3.0 Project Results

Between October 2005 and September 2006 there were 516 page loads (See Figure 4). Additionally, EDM promoted the website during a tech transfer meeting at PIER's joint Avian Power Line Interaction Committee (APLIC)/Edison Electric Institute (EEI) meeting in Pleasanton, California.

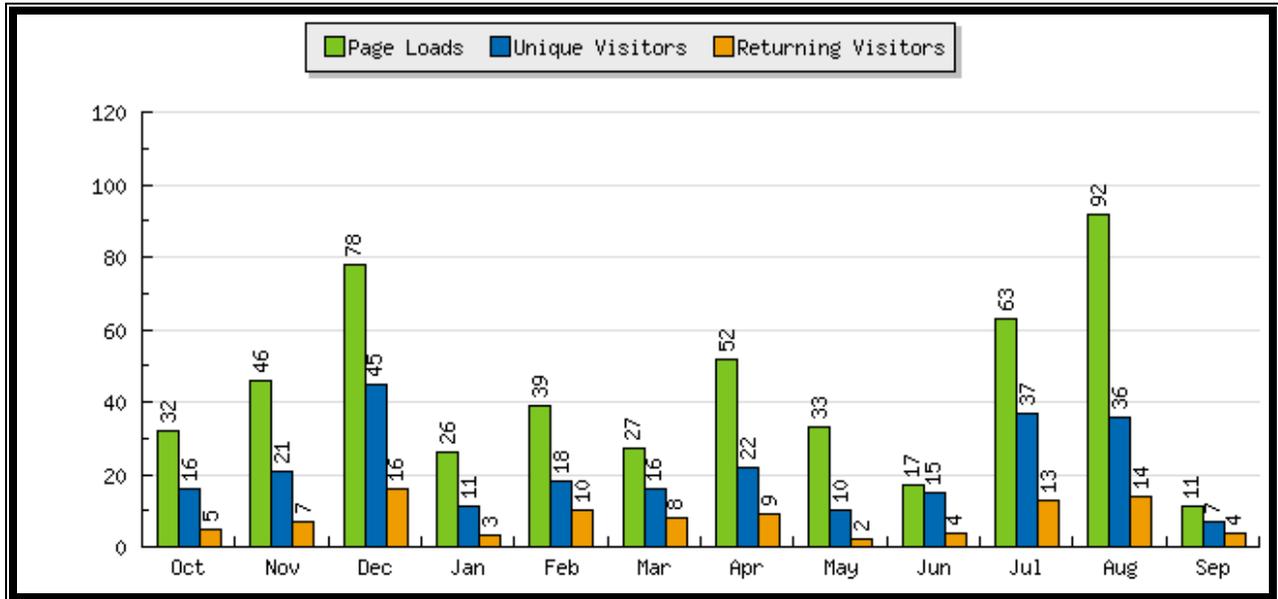
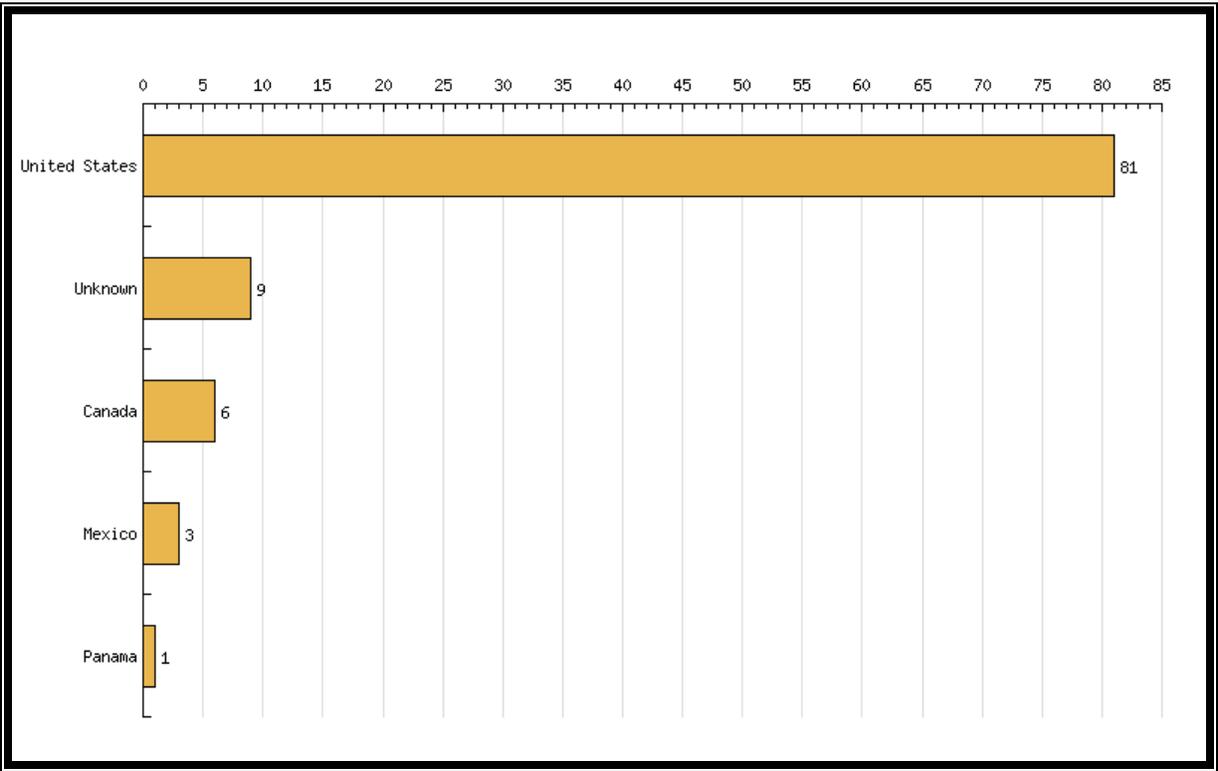


Figure 4. Number of page loads, unique visitors, and returning visitors

The site is up and operating as designed, and 19% of its users are from outside the United States (See Figure 5).



**Figure 5. Breakdown of the last 100 website users, by country**

The site has not experienced any significant problems and was supported by the California Energy Commission’s PIER program through September 1, 2006. Support is being solicited from other sources and may possibly be supplemented with PIER funds.

## **4.0 Conclusions and Recommendations**

### **4.1. Conclusions**

There are presently over 200 different available products to mitigate animal interactions with power lines. EDM has compiled and created an interactive database which serves as a central location where a utility can go to view all these products used to mitigate bird electrocutions, including information on:

- Product specifications
- Vendor claims
- Installation techniques (including common misapplications)
- Product Images
- Vendor contact information

The database also classifies products into the types of equipment applications they are designed to protect and the product mechanism by which they function. The database is menu driven, so products can be sorted instantly. This allows a user to quickly find out what products are available to protect a specific piece of equipment. Additionally, it provides a reliable avenue for a utility to view and compare various products promptly, in order to make informed decisions about their properties, ease of installation, and cost.

### **4.2. Commercialization Potential**

The commercialization potential is limited. EDM has looked into supporting the website through commercial fees. This would work by charging each vendor listed on the site a maintenance fee. In theory, the vendors should support this because the website increases their exposure and thus new markets. However, the advantage of this site is that it is independent and contains information on every product available. If a fee system was initiated, the value of the website would be diminished if certain products were eliminated because vendors did not want to pay a fee.

It is possible however that the site could be partially supported through the placement of vendor advertising. However this too would need to be cautiously explored in order to avoid the perception of the site endorsing particular products.

### **4.3. Recommendations**

The site should continue to be maintained and expanded as more information becomes available. For example, the IEEE is presently developing standards on how raptor mitigating products should be electrically and mechanically tested. When these standards are finalized they should be published on the site along with all the IEEE testing results. Future support of this site should also be explored by contacting other organizations dealing with animal-caused outages such as APLIC, EEI, and others.

#### **4.4. Benefits to California**

The website enables biologists and engineers to quickly determine which products to use to effectively mitigate bird electrocutions. This increases the reliability of the electric utility system by reducing costly power outages, while also protecting birds of prey and other animals.