1. **New Facilities and Equipment**
   Work has started on a supplemental lighting testing facility (e.g., light intensity, distribution, spectral quality, electricity consumption) as part of the multi-institutional Specialty Crop Research Initiative LED project.

2. **Unique Plant Responses**
   None

3. **Accomplishment Summary**
   We continue to work through operating and maintenance challenges associated with our landfill gas fired microturbine installation at the 1-acre NJ EcoComplex Research and Demonstration Greenhouse. A doctoral student (Ariel Martin) is developing an operational decision support system to manage the electricity generated: use onsite (supplemental lighting for greenhouse tomatoes), export to the utility grid (additional income), or a combination of the two. Our work on energy monitoring & auditing and the use of alternative energy sources for agricultural operations is continuing through outreach activities and publications. Resulting from continued collaborations with colleagues in Japan, additional work was done on using heat pumps for greenhouse heating.

4. **Impact Statement**
   Nationwide, Extension personnel and commercial greenhouse growers have been exposed to research and outreach efforts through presentations, publications and evaluation tools. It is estimated that this information has led to proper greenhouse designs and updated operational strategies that saved an average sized (1-acre) greenhouse business a total of $20,000 in operating and maintenance costs annually. Greenhouse energy conservation presentations and written materials have been prepared and delivered to local, regional, and national audiences. Growers who implemented the information resulting from our research and outreach materials have been able to realize energy savings between 5 and 30%.

5. **Published Written Works**
6. Scientific and Outreach Oral Presentations

7. Other Relevant Accomplishments and Activities
   Both, A.J. Sabbatical leave: August 2011-July 2012, Wageningen University, the Netherlands.
   Both, A.J. (since 2003) Associate Editor Transactions of the ASABE/Applied Engineering in Agriculture.