# FUNDAMENTALS OF PHOTOVOLTAICS FOR THE FIRE SERVICE

**TOPIC:** I: Introduction

**TIME FRAME:** 0:30

**LEVEL OF INSTRUCTION:** Level 1

**BEHAVIORAL OBJECTIVE:**

**Condition:** Given a written test

**Behavior:** The student will confirm their knowledge of photovoltaic safety by completing the written test.

**Standard:** With a minimum 80% accuracy according to the information contained in:

- Fundamentals of Photovoltaics for the Fire Service, Rodney Slaughter, September 2006

**MATERIALS NEEDED:**

- Writing board or pad with markers/erasers
- Appropriate audiovisual equipment
- Appropriate audiovisual materials

**REFERENCES:**

- Fundamentals of Photovoltaics for the Fire Service, Rodney Slaughter, September 2006

**PREPARATION:** Increased cost in hydrocarbon fuels and the electrical energy associated with it, have forced many Americans to look for alternative energy options. Solar electric is becoming the most prevalent alternative electric source. Fire fighters can be sure that they, at some point in the future, will have at least one emergency involving a building with a solar electric system. This training program is designed to prepare you for that eventuality.

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| PRESENTATION | APPLICATION |
|---|---|
| | Slide 1 – Title |
| **I. INTRODUCTION** | |
| A. Welcome to the Fundamentals of Photovoltaics! | |
| B. This program is funded by:<br>1. California Solar Energy Industries Association<br>2. Sacramento Municipal Utilities District<br>3. Developed by Rodney Slaughter | |
| | Slide 2– Acknowledgements |
| C. Acknowledgements<br>1. Sue Kateley, CEC<br>2. Jon Bertolino, SMUD<br>3. Les Nelson, CAL SEIA<br>4. Lee Parker, Modesto Fire Department<br>5. Bob Gill, Central Calaveras Fire and Rescue<br>6. Russ Tingley, Hermosa Beach Fire Department<br>7. Dirk Drossel, Burbank Fire Department<br>8. Scott Corrin, U.C. Riverside Fire Department<br>9. Howard Cooke, Sacramento Fire Department | |
| | Slide 4 – Program Goal |

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| D. Program Goal<br><br>1. To provide the fire service with an awareness of photovoltaic systems, so that you can make informed decisions and operate safely during an emergency | |
| | Slide 5 – Course Materials |
| E. Course Materials on Compact Disk<br><br>1. Student Manual<br>2. Student Handout<br>3. Instructor Guide<br>4. Presentation | |
| | Slide 6 – Student Introductions<br><br>Instructors Note:<br>Use whiteboard or flip chart to record student expectations |
| F. Student Introductions by:<br><br>1. Name<br>2. Rank<br>3. Department<br>4. What do you know about PV?<br>5. What do you hope to learn? | |
| | Slide 7 - Agenda |
| G. The Agenda for what we are going to discuss is:<br><br>1. Introduction<br>2. Cells And Components<br>3. PV Performance | |

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| 4. PV Applications<br>5. Codes And Standards<br>6. Emergency Response | |
| | Slide 8 – Worldwide Production |
| **II. WHAT ARE THE CHANCES?** | |
| A. 2005 worldwide PV production was 1,565 megawatts | |
| B. 705 of worldwide production in 2005 came from: | |
| 1. Germany at 53% or 837 MW<br>2. Japan at 14% or 292 MW<br>3. U.S.A. at 3% or 104 MW<br>4. The remaining 30% is the PV production of all other countries | |
| | Slide 9 – California Production |
| C. A 10% increase is expected for 2006 | |
| D. By 2010 2.5 gigawatts are projected worldwide | |
| E. California leads the nation with over 17,300 grid-connected systems | |
| F. California goal is to have 1 million solar roofs by 2017 generating 3,000 mw, double 2005 worldwide output | |
| | Slide 10 – Livermore multi-housing |

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| G. We can expect to see more and more housing developments like this one- as the cost of energy goes up and we learn to become more reliant on renewable resources | |
| | Slide 11 – PV System Safety |
| **III. ARE SOLAR ELECTRIC SYSTEMS SAFE?** | |
| A. Yes, under normal operating conditions | |
| B. The PV industry has a good safety record | |
| C. No technology is risk free! | |
| D. Only one recorded electrical injury to a fire fighter was reported worldwide | |
| | Slide 12 – Fire Fighter Safety |
| E. In emergency conditions note the following hazards to fire fighting personnel:<br>1. Electric shock<br>2. Inhalation exposure<br>3. Falls from Roofs<br>4. Roof collapse | |
| | Slide 13 – Scripps Ranch wildfire |
| F. With a concentration of PV in San Diego—there were no reported injuries during the 2003 wild fires | |

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| **IV. Summary:**<br><br>A. As Chief Ronny J. Coleman pointed out in the Foreword of the text<br><br>B. The fire service has been known to be resistant to technological changes in our society<br><br>C. Alternative energy production is the next big technological change that the fire service will have to come to terms with<br><br>D. SMUD and CAL SEIA saw the need to educate and inform emergency responders of how to work around photovoltaic technology safely | Slide 14 - Summary |