Master Course Syllabus for EEL 4990

1. **Title:** INTRODUCTION TO RENEWABLE ENERGY

2. **Credits:** 3 (2 lectures of 75 minutes per week)

3. **Course Coordinator:** Dr. Muhammad H Rashid

4. **Textbook(s) and/or Other Required Materials:**
   **Reference:**

5. **Catalog Description:** The main objective of this course is to study the different types of energy sources and storages, renewable energy systems, energy distribution, energy policy and management. Computer-aided analysis of renewable energy resource information and data for evaluating energy potential and energy costs

6. **Prerequisite(s):** ENC1102, PHYS 2049 and CHM 2045 with a grade of C or better.

7. **Course Designation as Elective or Required:** Elective

8. **Course Objectives:**
   - Study the different types of renewable energy sources
   - Study the different types of energy storages
   - Study the elements of energy systems and their functions of different elements with wind, solar, wind and ocean energy systems.
   - Study the energy policy and management.
   - Computer-aided analysis of renewable energy resource information and data

9. **Student Learning Outcomes:** After successfully completing the course with a grade of C (2.0/4.0) or better, the student should be able to do the following:
   - List and describe the renewable energy sources
   - List and describe the types of energy storages
   - Describe the elements of solar energy systems
   - Describe the elements of wind energy systems
   - Describe the elements of wind energy systems
   - Describe the elements of ocean energy systems
   - Calculate the energy costs
   - Describe the elements of the Power Distribution
   - Calculate the energy potential of a region using the renewable energy resource information and data.
   - Describe the Energy Management Requirements and Energy Independence & Security Act
• Analyze renewable Energy Consumption and Electricity Preliminary Statistics

10. Student Outcomes Addressed:

<table>
<thead>
<tr>
<th>#</th>
<th>Student Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Recognize, interpret, and apply concepts of mathematics, science, and engineering.</td>
</tr>
<tr>
<td>5</td>
<td>Identify, formulate, and solve engineering problems.</td>
</tr>
<tr>
<td>7</td>
<td>Identify and apply the skills necessary to communicate effectively.</td>
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<tr>
<td>9</td>
<td>Recognize the need for, and able to engage in, life-long learning.</td>
</tr>
<tr>
<td>10</td>
<td>Recognize the need for, and able to engage in, life-long learning.</td>
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<tr>
<td>11</td>
<td>Identify and apply the techniques, skills, and modern engineering tools necessary for engineering practice.</td>
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</table>

11. Topics Covered:

<table>
<thead>
<tr>
<th>Items</th>
<th>Topics</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Energy and Power, Growth Rate</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>AC versus DC Supply</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Components of Power Systems and Into to Smart Grid</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Energy Resources</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>Power Plants</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>Environmental Impact of Power Plants</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>Power Electronics</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Renewable Energy - Geothermal, Tidal and Biomass</td>
<td>2</td>
</tr>
<tr>
<td>12.</td>
<td>Renewable Energy Storage Technology and Research and Development</td>
<td>2</td>
</tr>
<tr>
<td>13.</td>
<td>Renewable Energy Consumption and Electricity Statistics</td>
<td>1</td>
</tr>
<tr>
<td>14.</td>
<td>DOE Data Center Energy Efficiency Program and Tool Strategy</td>
<td>2</td>
</tr>
<tr>
<td>15.</td>
<td>Exams/Quizzes</td>
<td>2</td>
</tr>
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<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Computer Resources: Each student must use software tools to calculate the energy costs and evaluate the energy optimization of a region to help facilitate renewable energy policy and investment.

12. Prepared by: Dr. Muhammad H. Rashid Date: December 30, 2009
   Revised by: Dr. Muhammad H Rashid Date: March 21, 2011
   Revised by: Dr. Muhammad H Rashid Date: November 4, 2012
ELECTRICAL AND COMPUTER ENGINEERING  
UNIVERSITY OF WEST FLORIDA  
EEL 4990 – Introduction to Renewable Energy  
Spring 2013

Course Background: This course is designed to study different types of energy sources and storages, renewable energy systems, energy distribution, energy policy and management. Computer-aided analysis of renewable energy resource information and data for evaluating energy potential and energy costs.

Expected course outcomes:
- List and describe the renewable energy sources and the types of energy storages.
- Describe the elements of solar energy systems, wind energy systems, and ocean energy systems.
- Calculate the energy efficiency and costs.
- Describe the elements of the Power Distribution.
- The contemporary reports on renewable energy and related issues.

Expectations from Students:
- Read the complete syllabus and the deadlines (see the schedule in page 5).
- Active participation in the weekly discussion (see schedule in page 5).
- Submit assignments in the e-learning by the due dates (normally the following Sunday) to avoid any grade penalty.
- Complete all quizzes by the due dates (normally the following Sunday) to avoid any grade penalty.
- Submit the contemporary final report (5-6 pages) in the IEEE format (see the IEEE template and the sample report) and the PowerPoint presentation slides (12-15 slides) in the e-learning. It is required to pass this course.
- Submit the energy efficiency final report in the e-learning. It is required to pass this course.
- Submit the contemporary final report in http://www.turnitin.com. It is required to pass this course.
- Last not the least, when you e-mail to the instructor, you must mention the course number EEL 4990 in your note.

Expectations from the Faculty:
- Return the feedback comments for assignments by the following Wednesday.
- Response to any questions by e-mail or phone within 48 hours (expect Weekends, breaks, and holidays).
- Send a reminder for the due date of the contemporary final report and final PowerPoint slides.
- Send a reminder for the submission of the contemporary final report in the e-learning and http://www.turnitin.com

Lecture Hours: On-line, no fixed time

Semester: Spring 2013
Instructor: Dr. M. H. Rashid
Office: SSE Building # 4, Room #133 (PNS)
Phone: 850 474 – 2976 (Office) (863) 660-6400 (Cell, leave a message with a contact number)
Office Hours: Thursday: 1-3 pm. or communications through e-mails and telephone calls.
e-mail: mrashid@uwf.edu
Prerequisites: ENC1102, PHYS 2049 and CHM 2045 with a grade of C or better.

Textbook(s) and/or Other Required Materials:


Course website site: All course handouts (e.g., syllabus, lecture handouts, reference material, etc.) will be posted in http://elearning.uwf.edu. You will also use the e-learning for quizzes and discussions, and for dropping your case-study reports.

The contemporary report template is posted in the e-learning site in http://elearning.uwf.edu. You will also submit your contemporary report and PowerPoint in the e-learning site in: http://elearning.uwf.edu.

E-learning Tips: Visit the UWF site for new online students and working with other students online: http://onlinecampus.uwf.edu/gearup/

E-learning Problems: Call UWF Help Desk: (850) 474 2075

Make up: No make up tests or quizzes, except in case of emergency, e.g. illness and accident. For make up tests, medical certificate is required and the instructor must be notified in advance of the test.

Grading Scheme:

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<table>
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<tbody>
<tr>
<td>Quizzes</td>
<td>61</td>
</tr>
<tr>
<td>Energy Efficiency Report*</td>
<td>10</td>
</tr>
<tr>
<td>Contemporary paper** (individual)</td>
<td>10</td>
</tr>
<tr>
<td>Contemporary paper PowerPoint** (individual)</td>
<td>5</td>
</tr>
<tr>
<td>Participation in on-line discussion***</td>
<td>12</td>
</tr>
<tr>
<td>Pre-Quiz &amp; Post-Quiz**** (1+1)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes on Late Assignments:

- No late assignments will be accepted beyond the due date and time.
- If you receive an incomplete final grade due to any missing assignment, you will receive no more than 80% of the assigned points for the missing assignment.

* A score of 7 out of 10 in the Energy Efficiency Report (one from each of the four areas – Buildings, Homes, Industry, and Vehicles - see Ref # 18) is required to pass this course
** A contemporary paper on Energy and a related issue (see the MIT OpenCourseWare for the list of topics). The report must conform to the IEEE paper format with 5 to 6 pages (excluding the cover page) and PowerPoint presentation of 12-15 slides. A score of 7 out of 10 in the research paper is required to pass this course.
*** Must Author 3 times (minimum) and Read 4 times (minimum) for each discussion item to receive full points (1.0 points for Authoring and 1.0 point for Reading). Please keep your discussion focused as if you are a professional engineer. It is not uncommon to have different views on the same issue.
**** Must complete Pre-Quiz & Post-Quiz to pass this course. Responding to all the items will score 2%.
Question on Final Grades: Question on Grading Scheme: When determining a student’s final grade, do you assign only A’s, B’s, etc. Or do you assign plus and minus as well. If so, what are the cut off grades for the plus and minus?
Answer: Yes, there will be plus and minus letter grades as in the UWF catalog. The grade cut-offs are not fixed. It will depend on the class performances which will be curved to determine the final grades. Publishing the grade cut-offs limits the instructor’s ability to take into account the class performances. The grade cut-offs will not be higher than that which are published in the UWF catalog.

Question on 70% requirements (7/10): Why do we need to meet the 70% requirements (7/10) in the final exam and contemporary report?
Answer: By doing this, I as the instructor can ensure and certify that you not only passed the course, but you have also met the program outcomes (# 1, 5, 7, 9, 10 & 11 see the ABET Master Syllabus), which are required for you to meet as the graduation requirement. I can use your graded work as the evidence in support of my certification. The instructor will use your graded work as the evidence in support of certification.

Questions on Pre and Post-Quizzes: Can you clarify the pre- and post-quizzes? It said I would receive a full score for answering all the questions. I answered all the questions to the best of my ability, but I did not receive 100%.
Answer: Yes, you will receive full points for answering all. Do not worry about the points you scored, we do not expect you to score high rather low in the pre-quiz and the score reflects your current knowledge at the beginning of the course, not your grade points. We, however, expect higher score in the post-quiz at the end of the course. You DO NOT need any preparation for the pre-and post-quizzes. We want you to assess your abilities and skills at the beginning and end of the course. This should give us some indications of the level of your learning in the course.

Question on Discussion: Can you clarify authoring 3 times and Reading 4 times? Does replying to others post count as authoring?
Answer: Yes, Replying to others counts as “Authoring” and reading other comments counts as Reading.

Warning on Discussion: It is wrong to copy and paste someone’s comments and claimed as your own statement. Please note that your comment is stamped with Authored by: Authored on: date and time. We can easily check who is copying from whom. It is unethical do so and cannot be allowed. Please focus on the discussion and write your own comments.

Assistance for Special Needs Students: The Student Disability Resource Center SDRC at the University of West Florida supports an inclusive learning environment for all students. If there are aspects of the instruction or design of this course that hinder your full participation, such as time limited exams, inaccessible web content, or the use of non-captioned videos and podcasts, please notify the instructor or the SDRC as soon as possible. You may contact the SDRC office by e-mail at sdrc@uwf.edu or by phone at (850) 474-2387 (Pensacola) or 850-833-3283 (Emerald Coast). Appropriate academic accommodations will be determined based on the documented needs of the individual.

Academic Integrity: There are special expectations of students for any academic work done at UWF. Please refer to the following for questions on academic conduct, plagiarism, etc.
Academic Conduct Policy:

Plagiarism Policy:  http://uwf.edu/cas/aasr/Plagiarism.pdf


Academic dishonesty is a serious offense and will be taken seriously.
   Honesty in our academic work is vital, and we will not knowingly act in ways which erode that integrity. Accordingly, we pledge not to cheat, nor to tolerate cheating, nor to plagiarize the work of others (UWF Student Life Handbook).

Turnitin Software Use:  UWF maintains a university license agreement for an online text matching service called Turnitin (see http://uwf.edu/cutla/turnitin.cfm). At instructor’s discretion the instructor will use the Turnitin service to determine the originality of your papers and reports. Your paper or report to Turnitin will be stored in a Turnitin database for as long as the service remains in existence. For this course, you must also submit a copy of your contemporary report in the http://www.turnitin.com/ to generate Originality Report. For quick start see at, http://www.turnitin.com/static/pdf/tii_student_qs.pdf

   Class ID: 5764257 Password: eel4990

Warning: The SILILARITY report generated by turnitin.com must be less than 25% for the report to be acceptable and to pass this course. You must not submit the same report which was used previously for credit(s) in another course.

Question #1 on Turnitin Log in:  By typing the class ID and the password, I cannot log in to the turnitin.com. What should I do?
Answer: Your instructor will register you by the time, the report or the paper is due. If you have used before Turnitin, log in with your e-mail and password. If you forgot your password, you can retrieve the password. If this is first time, select “Create Account”, from the main login menu.
Select “Student”
The “Create a New Student Account”
Type the class ID and password.

Question #2 on Turnitin and Energy Efficiency report:  Do we submit the energy efficiency report in the turnitin?
Answer: NO, you submit only the contemporary report in the turnitin.com

General Information:  Important deadlines for withdrawal from courses are listed in the academic calendar found at http://uwf.edu/registrar/. Also, this syllabus is based on the ABET master syllabus, which is a separate document and can be fund in the e-learning. Finally, the course instructor reserves the right to make changes to the course syllabus and the schedule with adequate notice to students.

WITHTHDRWAL DATE: MARCH 22, 2012
WITHTHDRWAL DEAD LINE: APRIL 19, 2013 with Instructor’s Permission
<table>
<thead>
<tr>
<th>#</th>
<th>Date</th>
<th>Reading</th>
<th>Topics</th>
<th>Class</th>
<th>Discussion</th>
<th>Quiz</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jan 7 – 13</td>
<td></td>
<td>Read course syllabus and familiarize with e-learning site</td>
<td>1</td>
<td></td>
<td>Pre-Quiz</td>
<td>Take the Pre-Quiz and read the instructions</td>
</tr>
<tr>
<td>2.</td>
<td>Jan 14 –20</td>
<td>Notes</td>
<td>Energy and Power, Growth Rate (Sec, 1.1 and 1.2 by Nasar)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1. View the PowerPoint presentation</td>
</tr>
<tr>
<td>3.</td>
<td>Jan 21 –27</td>
<td>1.3</td>
<td>AC versus DC Supply</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2. Read the assigned sections</td>
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<tr>
<td>4.</td>
<td>Jan 28 –Feb 3</td>
<td>2.1 -2.6</td>
<td>Basic Components of Power Systems and Into to Smart Grid</td>
<td>1</td>
<td>3</td>
<td></td>
<td>3. Take Quiz by 11.59 pm on the last day of the week, Sunday</td>
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<tr>
<td>5.</td>
<td>Feb 4 –10</td>
<td>3.1- 3.2 and Notes</td>
<td>Energy Resources</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4. Participate in the discussion by both Authoring and Reading by 11.59 pm on the last day of the week, Sunday</td>
</tr>
<tr>
<td>6.</td>
<td>Feb 11 – 17</td>
<td>4.1 – 4.3</td>
<td>Power Plants</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>7.</td>
<td>Feb 18 – 24</td>
<td>5.1 to 5.3</td>
<td>Environmental Impact of Power Plants</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td></td>
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<tr>
<td>8.</td>
<td>Feb 25–Mar 3</td>
<td>10.2.2 –10.2.3</td>
<td>Power Electronics</td>
<td>1</td>
<td>7</td>
<td></td>
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<tr>
<td>9.</td>
<td>March 4- 10</td>
<td>6.1 and Notes</td>
<td>Renewable Energy – Solar</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td></td>
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<tr>
<td>10.</td>
<td>March 11 –17</td>
<td></td>
<td>SPRING BREAK</td>
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<td>11.</td>
<td>March 18 –24</td>
<td>6.2 and Notes</td>
<td>Renewable Energy – Wind</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
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<tr>
<td>13.</td>
<td>April 1 -7</td>
<td>6.4 – 6.7 and notes</td>
<td>Renewable Energy – Small Hydroelectric Systems, Geothermal, Tidal and Biomass</td>
<td></td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>April 8 – 14</td>
<td>Notes</td>
<td>Energy Storage Technology and Research and Development</td>
<td></td>
<td>1</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>15.</td>
<td>April 15 – 28</td>
<td>Assignments</td>
<td>Post-Quiz</td>
<td></td>
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<tr>
<td>16.</td>
<td></td>
<td></td>
<td>Energy Efficiency Report (see Ref # 18 in page # 10)</td>
<td>1</td>
<td></td>
<td></td>
<td>1. Submit the report (5 to 6 pages) in the IEEE paper format (see Guidelines) by 11:59 pm on April 28</td>
</tr>
</tbody>
</table>

Total: 16
Instructions:

- Take all quizzes (multiple-choice type) through the e-learning at http://elearning.uwf.edu. You will be able to view the Quiz answers on the following Wednesday to Sunday.
- All quizzes are open book.
- The contemporary report must be submitted in MS Word to the http://elearning.uwf.edu. (see the notes for naming files and coversheet). PDF or other files will NOT be acceptable.
- The PowerPoint slides for the contemporary report must be submitted in MS Word PowerPoint to http://elearning.uwf.edu. (see the notes for naming files and coversheet). PDF or other files will NOT be acceptable.
- All reports must be submitted along with a cover sheet with your statement and signature. The cover sheet must be at the beginning of your report, not as a separate document. Without the cover sheet, your report will not be graded.
Instructions for Naming the Files

- Name your file: Assignment # _ your Name_Date of submission, i.e., Design Report # 1_M H Rashid_2_12_2013.
- Each assignment must have the cover sheet with your signature and other information. Otherwise, your work will not be graded for credits.
- Your uwf e-mail serves as your signature. DO NOT USE other commercial e-mails.
- Also submit your assignments in **MS Word only** in the appropriate submit folder for the specific assignment in the [http://elearning.uwf.edu](http://elearning.uwf.edu).
- DO NOT send no e-mails or any paper copy.

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**Cover Page**

Name:
Course Number: EEL 4990
Semester: Spring 2013
Assignment:

(Your signature after the statement)
I certify that this assignment is the result of my own efforts.

- Signature
  
e-mail: uwf e-mail
  
e-mail: non-uwf commercial e-mail

Date:
Guidelines for Energy issue presentation and report

1. Select an energy related topic.
2. Make a power point presentation of 12-15 slides.
3. Write a formal report in **MS Word only** in the IEEE paper submission format (see the sample attached), **NOT** a pdf file.
4. Make sure to include a cover sheet at the beginning of the report.
5. Follow the IEEE paper format including your name and affiliations, single line spacing, double column, font Roman Times, size 10, all margins 1” and two-columns, etc.
6. Page limit: 5 to 6 pages without the cover page.
7. You report should look like the paper IEEE sample in pdf format (see attached)
8. Use the IEEE MS Word template (see in the [http://elearning.uwf.edu](http://elearning.uwf.edu)).

**Question #1:** Where do I get more information about the energy efficiency calculations for the report?
Answer: See the assignment on energy efficiency.

**Question #2:** What would be a good topic for contemporary report?
Answer: See the list for possible topics for contemporary energy topics.

**Question #3:** Do we have to include a biography portion in the report?
Answer: YES, a short bio (see the MS Word template for the location of the bio). Is an author’s photo required? Not required. But you may want to include one for yourself only, but **NOT** with your a friend(s) or a family member(s).

**Question #4:** When you say 'page limit 5-6 pages'. Is that a maximum, minimum, or both?
Answer: Not more than 6 pages and not less than 5 pages excluding the cover page.

**Question #5:** Does 5-6 pages include the cover page?
Answer: NO. With the cover sheet, it must be 6-7 pages.

**Question #6:** Are there any requirements as to what kind of references they need to be? How many references are we required to have in our contemporary report?
Answer: NO, but they should be related to the topic. As many as you feel necessary, but should in general be more than 5.

**Question #7:** What are the common mistakes in preparing the contemporary report?
Answer. The common mistakes in preparing the contemporary report are:
- **NO** cover or signature page
- **NO** paper Title
- **NO** author’s affiliation
- **NOT** in two columns
- **NOT** following the IEEE format: font size, page margins, single-space, etc
- **NOT** following the page limits: 5 to 6 pages excluding the cover sheet.

**Question #8:** Can we see a sample contemporary report?
Answer: YES, see one sample contemporary report in the e-learning.
Question # 9: Can we see a sample energy efficiency report?
Answer: YES, see one sample energy efficiency report in the e-learning.

Question # 10: If the content of the sample report is different from what the syllabus says what should we do? Should we pick one of them as a guideline for the content of the report?
Answer: Yes, The section headings of the sample report may be different from the syllabus heading, but it should give an idea of how it should look like. You should follow the section heading and guidelines as outlined in the syllabus and the IEEE paper Template.

Question # 11: Contemporary Report Submission: Where we are supposed to submit the report: e-learning drop box, or turnitin.com
Answer: Submit both in the learning drop box and turnitin.com. Submit the PowerPoint presentation in the e-learning only.

Question # 12: Are we allowed to copy pictures from the internet?
Answer: Yes, if you cite the source reference in the text.

Dr. Rashid - Mentor for your Reports

If your instructor, Dr. Rashid, thinks that your contemporary and/or energy efficiency report(s) are of excellent quality and worthy of sharing with professional community, he may decide to submit your report(s) for presentation in a conference or a journal. He will add his name as the 2nd author being your mentor for the report and make any changes needed for making it acceptable as a conference or a journal paper - before and after the peer review process. Dr. Rashid will sign the IEEE copyright form (see in the e-learning under content). He will try to contact you if the report is accepted for publication in a conference or a journal and if he can locate your contact information. If you do not wish your report to be considered for a possible publication in a conference or a journal, please let Dr. Rashid know with a note in the cover sheet.
Web-site sources for Renewable Energy:

2. Do-It-Yourself Home Energy Audits
http://www.energysavers.gov/your_home/energy_audits/index.cfm/mytopic=11170
3. Appliances and Home Electronics
http://www.energysavers.gov/your_home/appliances/index.cfm/mytopic=10020
6. Distributed Energy Resources and Combined Heat and Power
http://www1.eere.energy.gov/femp/technologies/derchp.html
7. Distributed Energy Resource Basics
http://www1.eere.energy.gov/femp/technologies/derchp_derbasics.html
8. Renewable Energy
http://my.epri.com/portal/server.pt?open=512&objID=216&mode=2&in_hi_userid=2&cached=true
9. Ocean Tidal and Wave Energy:
15. Renewable Energy Consumption and Electricity Preliminary Statistics 2008:
http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/rea_prereport.html
20. Energy Efficiency Calculations: Vehicle
http://www.fueleconomy.gov/feg/savemoney.shtml

NOTE: It is possible that the web-links may have changed; search the web with the key words.