

## **SUMA K4150 Energy and Sustainable Development**

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### **Course Overview**

This course explores the tension and ambiguity that characterizes energy and development issues in the world's most marginal markets; the inadequacies of "business-as-usual" energy planning and implementation in these markets; and, the potential of non-traditional energy businesses, projects and programs to reach beyond "business as usual" approaches.

It mixes the topics of cleaner energy production & use, energy efficiency & waste reduction and energy access & energy poverty in a way that points participants to a different framework for analyzing options to combat climate change, reduce waste and reach un-served and under-served populations. Its entry point and theme is "energy through enterprise". It uses individual enterprise examples to examine resources & technologies, business & program models, policies & institutional approaches and the analysis of macro (country), meso (sector) and micro (transactions). Participants learn and use a set of "frameworks" to achieve a more balanced view of activities at all three of the levels.

Tensions & Ambiguities Explored and Linkage to Sustainability Management include the following:

- Smaller developing countries have contributed least to climate change and likely will suffer the most... what are their options?
- Smaller developing countries paradoxically have high energy costs and tremendous fossil fuel dependence ... can this be turned into an opportunity?
- "Energy poor" without modern energy often pay significant amounts for dirty, dangerous fuels ... what factors and myths keep this condition in place?
- OECD, OPEC and BRIICS dominate the geopolitics of energy and climate change... are the ROW (Rest of World) countries that are the focus of this course destined to be more and marginalized, potentially constituting a new 4th World class of countries?
- Traditional energy infrastructure (large projects connected by pipes and wires) have failed to reach > 1 billion people with electricity and >2 billion people with modern fuels ... why has this limit been reached?
- Business-as-usual forecasts indicate that this level of un-served population will remain at essentially this level twenty years from now (after tens of trillions of dollars have been expended on the traditional energy system) ... what are the economically sound options to be considered to avoid this outcome?

Students work individually on country analysis and propose a relevant enterprise for the assigned country. Students work in groups to compare similarities and differences among the assigned countries and to collaborate on enterprise development ideas and issues.

### **Learning Objectives**

The primary learning objective of this course is for students to be able to clearly show an ability to apply their understanding of the basic principles and theories of sustainability management as a frame for strategic planning, and the management of people, finances and operations toward sustainability goals. In Energy and Sustainable Development participants will explore a cycle of four stages that leads to an understanding of flexible and practical frameworks. The cycle is RESOURCE (waste, water, wood, sun et cetera) to TECHNOLOGY (biogas / anaerobic digestion; kinetic conversion / hydropower; charcoal /

improved stoves solar / photovoltaic conversion); EXAMPLE (Nepal BSP, Pura; LaEsperanza; Toyola; Selco ); and ENABLING CONDITIONS (policies, institutions, programs).

The frameworks include:

- High Level: Policy-Technology-Enterprise
- Ground Level: eight part enterprise-customer spider
- Capacity Building: Policy, Technology, Finance and Project Management
- Finance: Policy, Business Environment, Capacity

The secondary learning objective is for students to develop an ability to work collaboratively to develop strategies promoting wide ranging sustainable solutions and to effectively communicate these plans in a professional environment. In Energy and Sustainable Development participants will be organized into peer groups to share their individual country and enterprise research and proposals and to collectively seek out and describe the similarities and differences among their (randomly assigned and unfamiliar) countries and enterprises.

### **Method of Evaluation**

1. PAPER and WIKISPACE (40% and 20%) Participants will create a research and analysis Wikispace devoted to their (randomly) assigned country and their chosen enterprise. They will synthesize this effort into a 10 page summary paper and unlimited appendices (the synthesis and summary being an important outcome of the course). A complete and balanced presentation in the paper will include:

- Country Data and SWOT analysis (which will be posted on the Wikispace and used as a progress indicator);
- Linkage of Country Data and SWOT to the identification of "most likely" enterprise choices;
- Description of Enterprise, including a rudimentary financial analysis using one of two techniques (covered during the course for those unfamiliar with such techniques);
- Recommendations and conclusions regarding the conditions under which the proposed enterprise will be deemed feasible.

A complete and balanced WIKISPACE will reflect not only a broad range of data but very importantly, the organization of that research into a coherent approach that relates to the enterprise chosen. Each Wikispace will be reviewed throughout the semester; papers will be outlined on the Wikispace (three sample papers will be offered to guide "best practice" and the final paper will receive detailed written comments from the instructor. The final quality of the paper and Wikispace will receive a letter grade that will represent 60% of the final course grade. The criteria for a successful Wikispace and country-enterprise paper will be discussed in class throughout the semester.

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2. Participants will prepare two short assignments (20%) aimed at reinforcing their country or enterprise or financial analysis skills and experience. One assignment will involve a comparison of two documents on a common subject, such as "how to reduce energy poverty". Students will be asked to identify similarities and differences and comment on the approach best suited to their work-in-progress on country and enterprise analysis. A second assignment will ask that they describe the type of financial analysis technique to be employed in their selected enterprise and ask that they present the key basic assumptions. Both assignments are meant to focus thinking on essential inputs and approaches (top-down, bottom-up; project or enterprise) to the individual country and enterprise analysis, which serves as the centerpiece of the course. Each assignment will be worth 10% of the final grade and will each be graded between 0 and 10.

3. Class and Peer Group Collaboration (with a short group presentation) will count for 20%. Peer Groups are expected to meet and organize a group presentation that reflects similarities and differences among assigned countries and individually selected enterprises. The individual contributions to the group presentation are worth 10% of the course grade (active participation = 7.5 of 10; excellence of summarized content in 1-2 slides adds up to 2.5). Individual participation in class discussion (7.5 of 10) and quality of interventions (2.5) will determine this second component of the 20% course grade. Absences, lateness and tardy assignments will reduce student scores.

### Course Content

Session	Topic	Readings	Assignments
<b>Week 1</b>	Cross-section of Examples I ; Intro to Energy Poverty; Basic Energy Measurement and Research	no advance readings ... information packet will be posted for review post-class	
<b>Week 2</b>	Waste / Biogas ; PET Framework	Pura Village & BSP Nepal ; Class #1 Info Packet	
<b>Week 3</b>	Water / Small Hydro	La Esperanza & Practical Action	Wikispace Page Established
<b>Week 4</b>	Wood / Charcoal / Stoves; E-C Spider Framework	Toyola & Cook Stove Alliance; UN Secy General /IEA and PPEO	
<b>Week 5</b>	Sun / PV	Selco, Zara, Tecnosol	Short Assignment 1 <sup>1</sup>
<b>Week 6</b>	End-user Finance / Gender	Selco-SEWA, Energia, Multi- function Platform	Country SWOT Posted on Wikispace
<b>Week 7</b>	Monitoring & Evaluation / Cross- section of Examples II	Hystra & Red Ceramics; (3) Prior Papers	
<b>Week 8</b>	Fossil Fuel / LPG / Cooking / Climate Change	Anasset & LPG Alliance; CC Summary	Choice of Paper Example Explained on

<sup>1</sup> 250-500 word comparison of UN Sec Gen / IEA to Poor People Energy Outlook

			Wikispace
<b>Week 9</b>	Finance	Money Management for Energy Entrepreneurs (Consolidated)→	Post Selected Enterprise on Wikispace
<b>Week 10</b>	Other Resources & Technologies <sup>2</sup>	To be assigned and posted	Short Assignment 2 <sup>3</sup>
<b>Week 11</b>	Other Resources & Technologies	To be assigned and posted	
<b>Week 12</b>	Group Presentations I		
<b>Week 13</b>	Group Presentations II		
<b>Week 14</b>	Review and Critique		Papers due at class (printed copy) and posted on Wikispace

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<sup>2</sup> Examples: Water: drip irrigation, purification ...Biofuel in MFP ... Agro-industrial waste to energy

<sup>3</sup> Explain type of financial analysis appropriate to selected enterprise... identify “Basic Assumptions”