

**I PRO 352**  
**Solar Decathlon 2011**  
**FINAL REPORT**  
**May/Spring 2008**

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# Business Plan

## INTRODUCTION:

The Solar Decathlon is a competition in which 20 teams of college and university students compete to design, build, and operate the most attractive, effective, and energy-efficient solar-powered house. The Solar Decathlon is also an event to which the public is invited to observe the powerful combination of solar energy, energy efficiency, and the best in home design.

The event takes place on the National Mall in Washington, D.C., October 12 - 20. The team houses are open for touring everyday, except Wednesday, October 17, when they will close for competition purposes. An overall winner is announced on Friday, October 19 at 2 p.m. See the schedule for more information.

Teams of college students design a solar house, knowing from the outset that it must be powered entirely by the sun. In a quest to stretch every last watt of electricity that's generated by the solar panels on their roofs, the students absorb the lesson that energy is a precious commodity. They strive to innovate, using high-tech materials and design elements in ingenious ways. Along the way, the students learn how to raise funds and communicate about team activities. They collect supplies and talk to contractors. They build their solar houses, learning as they go.

The 20 teams transport their solar houses to the competition site on the National Mall and virtually rebuild them in the solar village. Teams assemble their houses, and then the active phase of the Solar Decathlon begins with an opening ceremony for students, media, and invited guests. The teams compete in contests, and even though this part of the Solar Decathlon gets the most attention, the students really win the competition through the many months of fund raising, planning, designing, analyzing, redesigning, and finally building and improving their homes. The public is invited to tour the solar homes and event exhibits during much of the competition.

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## II.

## Executive Summary

We the students at Illinois Institute of Technology are keen on participating in the Solar Decathlon event to be held in 2011 at Washington DC. The competition will be against 19 other universities competing in 10 different aspects of Zero Energy Housing. An entrepreneurial project IPRO 352 was started in spring of 2008 with students majoring in different subjects were involved in this project. Our initial goal was to conduct surveys and research on different universities and the technologies that were used by them. Also a specific research was conducted on the various sponsors that have had major involvement with the Solar Decathlon. A separate database was created for this information and a website was launched which focused on the technology, the needs, the sponsorships and the team of this project. The PR team was responsible in coming up with various brochures and marketing strategies to promote this project. Two brochures were made during the course of this semester: One was primarily for IIT campus and to raise awareness among the students, Faculty and staff members, the second brochure had more in depth detail about the project and was made for the purpose of raising some sort of sponsorship.

The business plan was divided into two segments:

The focus of the plan was of course the Solar Decathlon. The plan is to construct a Zero energy house with the best possible ways of merging Technology and Art together. We plan to use the house for research and demonstration purposes on IIT campus to raise awareness among the people and students about the Green technology which is growing at a fairly rapid pace given the current economic conditions. The house will be built in Chicago close to IIT campus for the purposes of cost savings and accessibility reasons. The same house will be shipped to the decathlon for the competition. After the competition the house will be used as a guest house and will be placed on IIT campus for generating revenues and paid visitations for non IIT's that will be encouraged and promoted. Our ever so dependency on oil and global warming makes this project worthwhile each of our efforts that will be put in and each dime of the dollars invested by the sponsors. Vigorous promotions and involvement will be endured to our investors and on site visitations will be encouraged to make suggestions and also note the slow and steady progress of this project. We made a very precise time line for the future of this project and how we plan to proceed with it. Formation of various teams consisting of specialized masters or PhD students in different aspect of the project was one of the

key discussion points during this ENPRO. An estimated budget has also been provided in the latter part of this paper and prices are subjected to change. We as students of Illinois Institute Of technology have one of the most elite architecture, engineering and business schools. We plan to merge the ever growing technology and art work in a house which will be enabled by the energy provided by nature, the sun, which would be totally green, pollution free and will hopefully relieve some stress on our ever growing and exhausting need for oil.

### **III. General Description Company and Products/Services**

Just like the well-known Olympic decathlon, the Solar Decathlon consists of ten contests. But the Solar Decathlon centers on all of the ways in which we use energy in our daily lives—at work, at home, and at play.

To compete, our teams must design and build energy-efficient homes that are powered exclusively by the sun. The homes must be attractive and easy to live in. To maintain a comfortable temperature, provide attractive and adequate lighting, power household appliances for cooking and cleaning, power home electronics, and provide hot water. These houses must also power an electric vehicle to meet household transportation needs.

Some contests are scored by measuring performance, such as meeting certain temperature requirements. Others require the successful completion of tasks. Some contests are scored by jurors who are experts in architecture, engineering, and other appropriate fields. The jurors evaluate things that measurements cannot, such as aesthetics and comfort. Some contests are scored by a combination of these methods.

The following will be the areas of concentration of our team:

#### **Architecture:**

- Firmness — the house's strength, suitability, and appropriateness of materials for the building
- Commodity — ease of entry into the house and circulation among the public and private zones; architectural strategy used to accommodate the technologies required to run the house; and generosity and sufficiency of space in the house
- Delight — surprises, unusual use of ordinary materials, or use of extraordinary materials in the house.

## **Engineering:**

### **INTRODUCTION:**

I PRO 352: Solar Decathlon 2011 lays the starting foundation for a multiple stage project which culminates in IIT's participation in the 2011 Solar Decathlon. Our goal was to lay the groundwork in the areas of research, design, and public relations for creating an IIT team for the 2011 Solar Decathlon.

### **OBJECTIVES**

Our objectives for the semester were:

- Form a network of potential donors and sponsors
- Create a PR campaign including a webpage that provides information to the public and potential sponsors
- Create a conference for fall 2008 at IIT, that will deal with solar building and technology. This will serve to raise campus and city wise awareness and support of this important undertaking.
- Create a database of information related to the building of a solar house – including different technologies, systems, and design concepts
- Come up with a detailed cost estimate based on research of previous participants
- Based on the database of information prepare and deliver a proposal to President John Anderson for IIT's involvement in the 2011 Solar Decathlon

### **BACKGROUND**

This EnPRO project is the first of several designed to position IIT for a competitive proposal entry in 2009 for the Solar Decathlon 2011 competition. The Solar Decathlon is

a competition in which 20 teams of college and university students compete to design, build, and operate the most attractive, effective, and energy-efficient solar-powered house. The Solar Decathlon is also an event to which the public is invited to observe the powerful combination of solar energy, energy efficiency, and the best in home design.

This year the event will take place on the National Mall in Washington, D.C. October 12 - 20. The team houses are open for touring everyday except Wednesday, October 17, when they will close for competition purposes. An overall winner is announced on Friday, October 19 at 2 p.m.

Teams of college students design a solar house, knowing from the outset that it must be powered entirely by the sun. In a quest to stretch every last watt of electricity that's generated by the solar panels on their roofs, the students absorb the lesson that energy is a precious commodity. They strive to innovate, using high-tech materials and design elements in ingenious ways. Along the way, the students learn how to raise funds and communicate about team activities. They collect supplies and talk to contractors. They build their solar houses, learning as they go.

The 20 teams transport their solar houses to the competition site on the National Mall and virtually rebuild them in the solar village. Teams assemble their houses, and then the active phase of the Solar Decathlon begins with an opening ceremony for students, media, and invited guests. The teams compete in contests, and even though this part of the Solar Decathlon gets the most attention, the students really win the competition through the many months of fundraising, planning, designing, analyzing, redesigning, and finally building and improving their homes. The public is invited to tour the solar homes and event exhibits during much of the competition.

The Solar Decathletes, i.e., tomorrow's engineers, architects, researchers, and homeowners, are sharing with us a new vision for living under the sun. These solar homes are powerful, comfortable, and stylish. They are relaxed and elegant, wasting neither space nor energy.

Today's solar houses connect with nature to take advantage of heat and light from the sun and cooling breezes and shading. But they crank this natural advantage way up by using the newest products and technologies on the market. The Solar Decathlon solar homes combine the best from the past and the present... and deliver the promise of a brighter future.

Being a large undertaking, participation in a solar decathlon must be preceded by much preparation. This IPRO team will begin laying the foundation for IIT's involvement in the 2011 Solar Decathlon in Washington, DC. This involves getting support not only from the Administration but the larger community as well.



Wider issues are also encountered in this project. This touches on aspects of energy and resource management and stewardship. A solar house is still a progressive design and some aspects of society have not yet orientated themselves to changing climate of resource conservation and sustainable building. To move ahead in the project the team will need to be informed and prepared to address these issues as they come up.

Designing and building a solar house incorporates the entire range of academic disciplines. Architecture and civil engineering knowledge and skills for the design and construction of the house along with chemical, electrical and mechanical engineering to design and set up the technological aspects of a solar powered house. That only accounts for the main features of the house. Students with majors from business to psychology will be needed in different aspects of the project. The time required is immense! Because of this, full cooperation of the administration is needed. This includes help with technical issues from the respective departments as well as academic credit for students who devote their time to this undertaking.

## METHODOLOGY/BRAINSTORM/WORK BREAKDOWN STRUCTURE

### Team Divisions

Webpage: John Ruffolo, Juan DeMarco, Marcin Mejsak

Public Relations and Business: Nikhil Madan, Mohammad Ishaq, Daniel Johnson

Engineering: Jamie Amber, Milagros Calizo, John Carroll, Anthony Doellman, Trent Steffen

Design: Marcin Mejsak, Juan DeMarco, Nathaniel Hollsiter, Laura Mast, Matthew Pollina, Kaitlin Streyle

The semester's task are divided into these major sections

- Researched Past Solar Decathlon teams – All team members participated
  - Interview past team members to gain a broad understanding of what this project will take
  - Gleaned the past team websites to see what worked and what didn't
- Built a database to house research and information gained during the semester
- Use the information gained from interview and research to determine what will be needed financially as well as cooperation from the School

- Determine the required resources
  - Workspace
  - Students
  - Materials
  - Technical Consultation
- Determine the how interface will be needed with the academic departments
- Come up with a financial estimate
- Build a backbone for future Sponsors and Allies and Raise Awareness
  - Designed and Published a Website
  - Began a PR campaign
  - Approached Architectural Organizations in Chicago to introduce IIT's plans for participation in the Solar Decathlon
  - Created individual brochures for IIT students/faculty, and a separate brochure for possible sponsors

## **Obstacles**

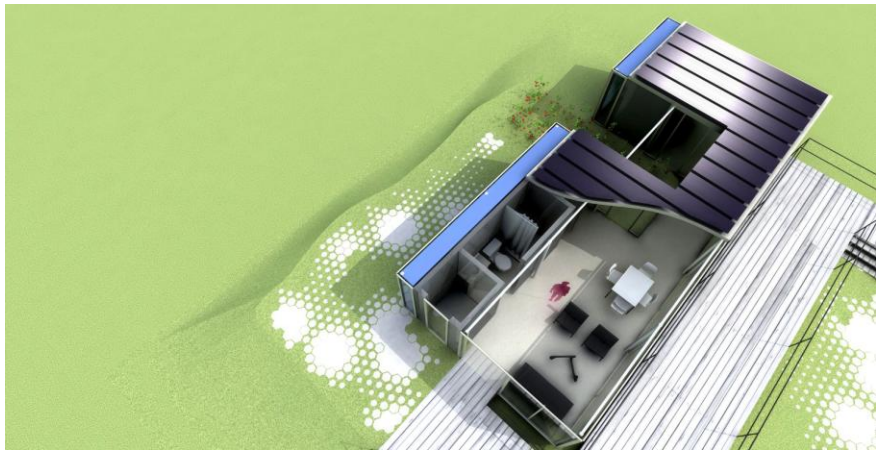
### Assessment of Team

We came to the table with very different skills and strengths. It was important to tap into the talents while also allowing each person to grow in the areas they were enthusiastic.

Each person was given the opportunity to join whichever group fit their individual interests within the project. It was crucial for all team members to work together, because any individual could not complete this project on their own. Our team had members involved in many other activities, volunteer, school-related projects, and professional jobs, which always made it a challenge to set up meetings and create a common day and time from which individuals could collaborate. The advantages of having a multidisciplinary team was innovative ideas and concepts, as well as multiple perspectives and expertise.

## **Results**

Design Team:





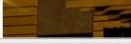
Engineering:

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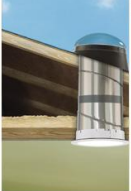
24	<a href="http://www.nudura.com/Content/C-2119&amp;CID=1&amp;CID1=910114&amp;CID2=448">http://www.nudura.com/Content/C-2119&amp;CID=1&amp;CID1=910114&amp;CID2=448</a>	Nudura - Insulated Concrete Forms	Insulated concrete forms		energy efficiency - high insulation creates lower heating and cooling load	not listed	The Standard is on form unit. It measures and provides an R value per sq. ft. of wall area. Standards easily used, are fully reviewed, are available with 4/8/10/12" core
25	<a href="http://www.rociromero.com/">http://www.rociromero.com/</a>	Rocio Romero - modern design and prefab architecture	customizable prefab homes		affordable, easily built, and highly customizable	<a href="http://www.rociromero.com/">http://www.rociromero.com/</a> \$ 19,992 - \$ 45,225	standard LV series designed to meet stringent earthquake regulations and maximum LV 158 complies with the stringent hurricane energy efficient by deeper wall and r which allow us to insulate and achieve remarkable R-value home has (2) 6" v. If ball insulation is can achieve R-38
	<a href="http://www.msd-arc.com/">http://www.msd-arc.com/</a>	Michelle Kaufmann	pre-fab houses		eco-friendly, beautiful and cost effective. The homes materials systems and design can achieve LEED gold or platinum	MK predesigned homes: \$250 to \$275 per square foot MK custom designed homes: \$400 and up per square foot	Renewable materials because it grows easily, is a wood-renewable material

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<http://creator.zoho.com/paradigm/technology/view/3/>

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15	<a href="http://www.renewedmaterials.com/">http://www.renewedmaterials.com/</a>	alkemi - recycled surface material	recycled aluminum milling scrap		SCS certified, LEED credits receiving, recycled surface material composed of post-industrial scrap waste (35% by weight—as certified—or 66% by volume).	not listed	
16	<a href="http://www.veluxusa.com/prod/">http://www.veluxusa.com/prod/</a>	Velux America	energy efficient skylight		daylighting, reduce use of electricity	not listed	
17	<a href="http://www.discoverylighting.com/">http://www.discoverylighting.com/</a>	Discovery Lighting	12 watt retrofit downlight recessed light LED bulb		50% more efficient than fluorescent and 80% more efficient than incandescent lighting, 50,000 hour life span	\$120.00	

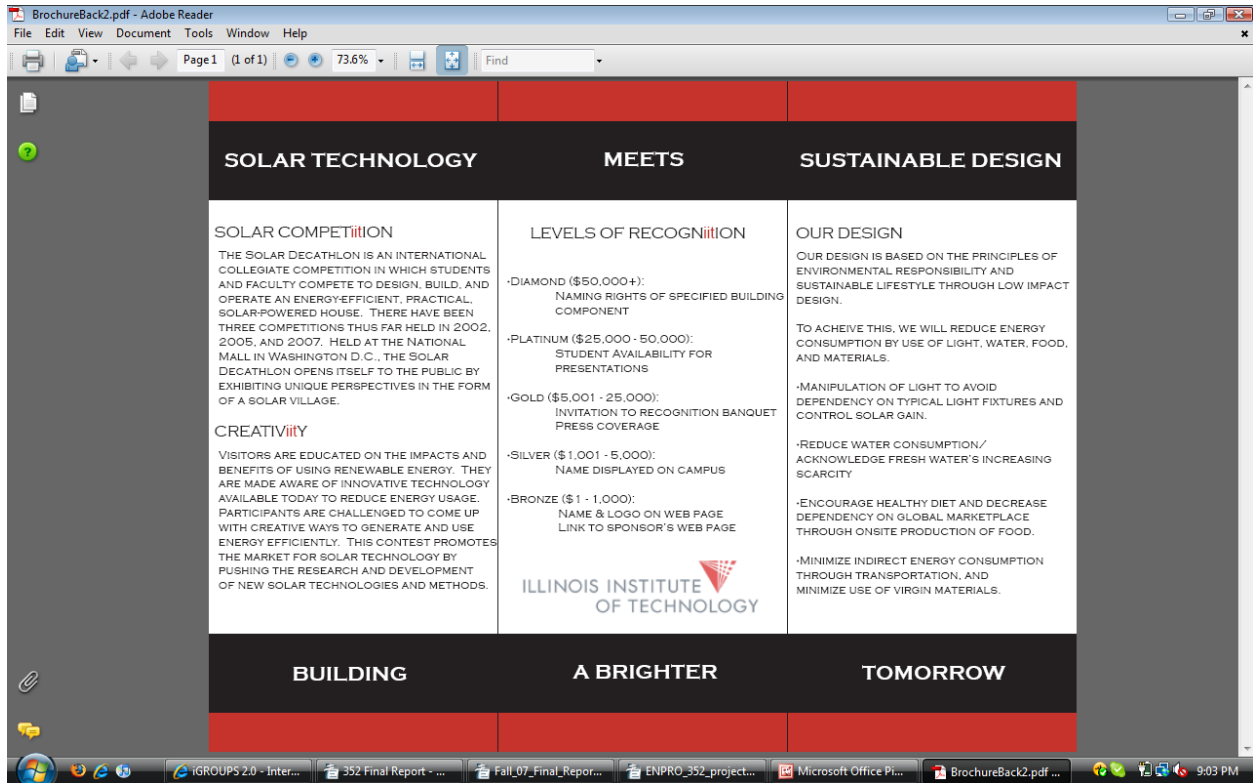
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Website:

[www.iitsolardecathlon.com](http://www.iitsolardecathlon.com)



## Public Relations:



The above are screen shots of different areas covered within our individual teams. The design team produced a digital model of our initial conceptual design for IIT's entry for the 2011 Solar Decathlon, incorporating some of the technologies researched and collected in the database shown under the Engineering team. The final image is the brochure designed for IIT faculty and students, as well as potential sponsors.

## SUMMARY

Over the semester we learned about team cohesiveness and accountability through our participation in both group and individual projects. We achieved all of our objectives, except for creating a conference for Fall '08. Individuals learned that the problems they encountered were more easily solved with the help of others. The multidisciplinary aspect of our IPRO helped



expose individuals to multiple unique majors, as well as mimicked the types of interactions team members will encounter in real world situations. Individuals came away with many experiences that better prepare them as they embark on their professional careers in various professions.

## **RECOMMENDATIONS**

The Spring 2008 IPRO 352 is the first in a series of three more IPROs to continue the IIT 2011 solar decathlon program. During the following IPROs our main goals are to plan and host a symposium showcasing several solar technologies and to submit a final proposal for consideration in the 2011 Solar Decathlon.

Fall 2008:

- IPRO (not EnPRO) with 2 faculty (1 architecture, 1 engineering)
- Selective admittance into IPRO so only students truly interested sign up; faculty recommendation required
- TO DO in IPRO:
  - Continue very specific research of technologies
  - Develop internal contacts based on specific technologies
  - Plan and host a symposium
- BY END of IPRO:
  - Must have IIT devotion (both student, faculty, and administrative) to Solar Decathlon with a deliberate proposal

Spring 2009:

- Independent study involving small groups of architecture , engineering , and business/psychology students headed by team leaders of either Masters degree students, PhD candidates, or professors and overseen by head faculty member for Solar Decathlon proposal
- Faculty should already be involved, but continue/develop ties
- Develop schematic design for official proposal
- Continue building student interest
- Solidify sponsorship

Fall 2009:

1. Compile final official proposal for Solar Decathlon
2. RFP due in December of 2009
  1. School support / devoted faculty and admin named
  2. Proof of financial backing
  3. Business and financing plan
  4. Schematic design
  5. Strong student interest

**Market Viability:**

1. Market Appeal
2. Suited for everyday living
3. Accommodate variety of potential home owners
4. Livability
5. Build ability
6. Flexibility

## 7. Affordability

### **Communications:**

The Communications contest will challenge our team to communicate about the technical aspects of our home as well as our experiences to a wide audience through Web sites and public tours. Our focus will be based on success in delivering clear and consistent messages and images that represent the vision, process, and results of each team's project.

### **Comfort Zone:**

Our team will design the houses to remain a steady, uniform, comfortable temperature and humidity throughout. A narrow temperature (72°F/22.2°C - 76°F/24.4°C) and relative humidity (40% - 55%) will range inside the house

### **Appliance:**

1. Refrigerator
2. Freezers
3. Washers
4. Dryers
5. Televisions
6. Computers

### **Hot Water:**

The house will be built that solar hot water systems can supply all the hot water that households use daily for bathing, laundry, and dishwashing. . They aim is to deliver 15 gallons of hot water (110°F/43.3°C) in 10 minutes or less.

### **Lighting:**

The team will focus on key aspects on the issues of lighting:

1. Energy Efficient
2. Ambience
3. Aesthetically pleasing
4. Task lighting

#### IV. Market research

*The Coming Saudi Oil Shock and the World Economy* that the Saudis are lying about the size of their reserves and that they are really running on empty; last September he announced that “we could be looking at \$10-a-gallon gas this winter.” Colin Campbell, a former petroleum geologist who is now a trustee of the U.K.-based Oil Depletion Analysis Centre, warned way back in 2002 that we were headed for peak oil production, and that this would lead to “war, starvation, economic recession, possibly even the extinction of homo sapiens.” In his 2004 book *Out of Gas: The End of the Age of Oil*, the Caltech physicist David Goodstein wrote that the peak of world production is imminent and that “we can, all too easily, envision a dying civilization, the landscape littered with the rusting hulks of SUVs.” Jim Motavalli, editor of the environmentalist magazine *E*, writes in the January/February 2006 issue, “It is impossible to escape the conclusion that we’re steaming full speed ahead into a train wreck of monumental proportions.”

And James Schlesinger, the country’s first secretary of energy, declared in the Winter 2005–06 issue of the neoconservative foreign policy journal *The National Interest* that “a growing consensus accepts that the peak is not that far off.” He added, “The inability readily to expand the supply of oil, given rising demand, will in the future impose a severe economic shock.”

Even some traditionally calm voices are starting to sound panicky. In March 2005, the New York investment bank Goldman Sachs issued a report suggesting that oil prices would experience a “super spike” in 2006, reaching up to \$105 per barrel. ChevronTexaco’s [willyoujoinus.com](http://willyoujoinus.com) campaign, featuring a series of full-page newspaper ads that urge Americans to conserve energy, flatly declares, “**The era of easy oil is over.**”

With the oil price ever on the increase and no point will we expect it to come down, it becomes of the up most importance to have a renewable source of energy to power the houses and eliminate the total dependency on oil.

#### V. Marketing Plan:

As a team we will have our markets focused first to raise awareness at IIT campus and make sure all the students would know what we are doing. Also since we tend to generate money through funding from the University first and then seek outside

investors or companies that are willing to sponsor our project. Some of the ways in which we intend to market the project would be:

1. BROCHURES: The brochure would contain a clear background of solar decathlon itself, time lines, our needs for sponsorship. Two types of brochures were developed during the course of our progress. One of the brochures was for campus purposes for the Professors, students etc and the other form of brochure were for the sponsors.

2. FACEBOOK

3. YOUTUBE

4. ADVERTISEMENTS

5. SYMPOSIUM

6. GETTING ORGANIZATIONS INVOLVED

7. SURVEYS

### **Product**

The products in the house will include the following:

1. Refrigerator

2. Freezer

3. Television

4. Computer

5. Washer

6. Dryer

7. Water Storage

8. Heating/cooling system

9. Landscaping

## **Features and Benefits**

List all of your major products or services.

For each product or service:

- Describe the most important features. What is special about it?
- Describe the benefits. That is, what will the product do for the customer?

Note the difference between features and benefits, and think about them. For example, a house that gives shelter and lasts a long time is made with certain materials and to a certain design; those are its features. Its benefits include pride of ownership, financial security, providing for the family, and inclusion in a neighborhood. You build features into your product so that you can sell the benefits.

What after-sale services will you give? Some examples are delivery, warranty, service contracts, support, follow-up, and refund policy.

## **Customers**

The customers for the extended goal of this business plan, which is mentioned later on in this paper, we tend to focus on customers that are in the high level of income group and certain demographics of the customers are give below:

- Age – 30-60 yrs
- Gender – M / F
- Location – Continental US
- Income level – Mid - high
- Social class – Upper middle +
- Education – College graduate
- Other (specific to your industry)- Environmentally conscious
- Other (specific to your industry)

## **VI. Competition**

In the solar decathlon, 20 universities compete in 10 different events. Our competition will be the 20 other different universities that will be taking part at the decathlon. Even though the list is not confirmed for the 2011 event, the list of universities taking part in 2009 are:

### **Boston Architectural College**

Attn: [Jeff Stein](#)  
320 Newbury Street  
Boston, MA 02115  
Phone: 617-585-0226

### **Universidad de Puerto Rico**

Attn: [Sania Miranda Palacios](#)  
P.O. Box 21909  
San Juan, PR 00931-1909  
Phone: 787-250-8581

### **Cornell University**

Attn: [Zellman Warhaft](#)  
120 Day Hall  
Ithaca, NY 14853-2801  
Phone: 607-255-3898

### **Universidad Politécnica de Madrid**

Attn: [Jose Manuel Paez Borrallo](#)  
AVDA. Ramiro de Maeztu No. 7  
Madrid, Spain 28040  
Phone: +34 91 336 36 59

### **Iowa State University**

Attn: [Urlike Passe](#)  
1138 Pearson  
Ames, IA 50011-2207

Phone: 515-294-7142

## **University of Calgary**

Attn: [Warren Veale](#)  
CCIT Bldg. Room 218  
2500 University Dr. NW  
Calgary, Alberta, Canada T2N 1N4  
Phone: 403-220-6958

## **Penn State**

Attn: [Jeffrey R.S. Brownson](#)  
110 Technology Center Building  
University Park, PA 16802-3377  
Phone: 814-865-8473

## **University of Illinois at Urbana-Champaign**

Attn: [Patrick Chapman](#)  
1901 S. First Street, Suite A  
Champaign, IL 61820-7406  
Phone: 217-333-4694

## **Rice University**

Attn: [John Casbarian](#)  
6100 Main Street  
Houston, TX 77251-1892  
Phone: 713-348-5152

## **University of Kentucky**

Attn: [Donald Colliver](#)  
109 Kinkead Hall; 172 Funkhouser Drive  
Lexington, KY 40506-0057  
Phone: 859-257-3000 x211

## **Santa Clara University**



Attn: [Timothy Hight](#)  
500 El Camino Real  
Santa Clara, CA 95053  
Phone: 408-554-6870

### **University of Louisiana at Lafayette**

Attn: [W. Geoff Giertson](#)  
104 University Circle  
Lafayette, LA 70503  
Phone: 337-482-5175

### **Team Missouri**

Attn: [Katie Grantham Lough](#)  
202 University Center, 300 W. 12th Street  
Rolla, MO 65409-1330  
Phone: 573-341-4598

### **University of Minnesota**

Attn: [Ann Johnson](#)  
450 McNamara Alumni Center, 200 Oak Street, S E  
Minneapolis, MN 55455-2070  
Phone: 612-625-7669

### **Technische Universität Darmstadt**

Attn: [Manfred Hegger](#)  
Karolinenplatz 5  
Darmstadt, Hesse, Germany 64289  
Phone: +49-6151-16-2046

### **University of Waterloo**

Attn: [Geoffrey Thun](#)  
7 Melville Street South  
Cambridge, Ontario, Canada N1S 2H4  
Phone: 519-888-4567

## **The Ohio State University**

Attn: [Mark E. Walter](#)  
1960 Kenny Road  
Columbus, OH 43210-1063  
Phone: 614-292-6081

## **University of Wisconsin-Milwaukee**

Attn: [Gregory Thomson/Chris Cornelius](#)  
P.O. Box 340  
Milwaukee, WI 53201-0340  
Phone: 414-229-4014

## **The University of Arizona**

Attn: [Larry Medlin](#)  
PO Box 3520  
Tucson, AZ 85722-3520  
Phone: 520-621-6751

## **Virginia Tech**

Attn: [Joseph Wheeler](#)  
1880 Pratt Drive, Suite 2006  
Blacksburg, VA 24073  
Phone: 540-818-5012

## **Competitive Advantages of IIT:**

Why should IIT participate in the Solar Decathlon?

3. Publicity
  - Get IIT's name out
  
  - Attract potential new students
4. Show technological resources of IIT
5. Provide new hands-on experience for students
6. Provide new research opportunities
7. Help students network with industry professionals and other disciplines

8. Create potential entrepreneurship opportunities
9. Help IIT reach out to the community through volunteer programs
10. Build a brighter tomorrow
11. Promote everyday technologies to be used in the design ( I.e. Toilets, grey water systems)
12. Solve environmental problems through technology without limiting our lifestyles.
13. IIT is already involved in the conceptual design of Smart Homes that automatically conserve energy through building integrated energy systems.
14. Coordinate research efforts among departments
15. Show solar and other green technologies are viable now.
16. Develop new technologies
17. Chicago wants to become a green city, the Solar Decathlon is a great opportunity to show green initiatives.

## **VII. Pricing/Budget**

Since the technology is fairly new and not a lot of people are aware that their daily chores can be carried out by using the most powerful source energy provided to us by nature ( "THE SUN"). Here is the breakdown of the estimated cost of the construction of the house.

Purpose	Cost incurred in usd(\$)
GENERAL CONDITION	50,000
FOUNDATIONS	40,000
ENCLOSURES	55,000
WINDOWS/DOORS	35,000
MOISTURE PROTECTION	10,000
REINSCREEN ENCLOSURES	17,500

ROOF SYSTEMS	15,000
INTERIORS	45,000
DECKING	30,000
ELECTRICAL	65,000
PLUMBING	15,000
APPLIANCES	15,000
TRAILER(BATTERY WATER)	12,5000
HOUSING FURNISHING	1,000
EQUIPMENT EXPENSES	35,000
TEAM SUPPLIES	2,000
TEAM TRAINING/EXPENSES/EVENTS	2,000
HOUSE TRANSPORTATION	65,000
TEAM TRAVEL EXPENSES	2,000
LABOR/CONSULTATION FEES	150,000
<b>GRAND TOTAL</b>	<b>700,000</b>

\*\* All expenses are subject to change

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## **VII. Plan**

## **Operational**

### **SPRING 2008**

- Enpro Of Solar Decathlon is formed
- Extensive research is done on the solar decathlon
- Research on technologies used by other universities
- Meetings with various Organizations
- Website of the Solar Decathlon is formed
- Separated database of all research is created
- Overall Expenses and a flexible budget is created
- Brochures for the Solar Decathlon is created
- Student Brochure/ Sponsor Brochure is created
- Marketing Strategies Analyzed

GOAL TO BE ACHIEVED BY THE END OF IPRO: Set up the goals and guidelines for the future IPRO's.

### **Fall 2008**

- IPRO, not ENPRO with two faculty members
- Selective admittance into IPRO so students only interested join
- Continue very specific and detailed research on Technology and the design of the house
- Develop Internal contact

- Plan and host Symposium

GOAL TO BE ACHIEVED BY THE END OF IPRO: Must have IIT devotion (students, faculty and administrative bodies) to Solar Decathlon with a specific purpose.

### **SPRING 2009:**

- Independent study involving small groups of Architecture, Engineering, Business, Psychology headed by masters and PHD Students
- The group will be overseen by head faculty members for Solar Decathlon
- Develop systematic design for official proposal
- Continue building student interest
- Solidify sponsorship

GOAL TO BE ACHIEVED BY THE END OF IPRO: To solidify some sort of sponsorship

### **FALL 2009**

- Compile final proposal for the Solar Decathlon
- RFP due in December 2009
- School support /Devoted faculty members and administration named
- Proof of financial backing
- Business and Financial backing
- Systematic Design
- Strong Student Interest

- Construction Of the House begins by the end of IPRO

## **Location**

The location of the construction of the house will be Chicago. A separate warehouse will be rented out where the construction and the research will take place. The location of the warehouse will also support as a storage place for all the raw materials. The warehouse will be rented out close to IIT campus for accessibility and convenience purposes of the students and faculty members.

Physical requirements:

- Amount of space
- Type of building
- Zoning
- Power and other utilities

Access:

It is of utmost importance that the location is accessible to the suppliers, students, and the staff members. Choosing Chicago was one of the reasons for that. Also the location of the warehouse and the construction site will be close to IIT campus. Going any further north will incur more expenses for rent. We felt that IIT location was a good decision based both on cost savings and accessibility issues.

## **Inventory**

- What kind of inventory will you keep: raw materials, supplies, finished goods?  
Raw materials: dimensional lumber, SIPs, drywall, plywood, doors, windows, pv panels, kalwall, cisterns, plants, HVAC equipment (fans, ducts), plumbing fixtures, electrical equipment, lighting, insulation, wood and steel structural members, finishes (floor, wall, ceiling)
- Average value in stock (i.e., what is your inventory investment)? \$500,000
- Rate of turnover and how this compares to the industry averages? 3-6 mo
- Seasonal buildups? n/a
- Lead-time for ordering? 1-2 weeks average

## Key suppliers:

- Lumber Yard, Steel Mill, Insulation manufacturer, PV distributor, Window/Door, plumbing fixtures
  - Steel Mill
    - Industrial Steel Construction, Inc. (ISC) two locations in the Chicago land area: Gary, IN and Hodgkins, IL
  - Lumber Yard
    - Lee Lumber South 633 West Pershing Chicago, IL 60609-2617
- Type and amount of inventory furnished
  - Steel Mill
    - Capable on supplying any typical steel necessary for construction
    - Ability to custom make orders on request
  - Lumber Yard
    - Capable on supplying any typical steel necessary for construction
    - Hardwood planks as wells as custom molding patterns available
- Credit and delivery policies
  - Steel Mill
    - Will produce on credit
    - Will deliver, cost based on distance and amount ordered
  - Lumber Yard
    - Will produce on credit.
    - Will deliver, cost based on distance and amount ordered
- History and reliability
  - Steel Mill



- ISC is a privately owned steel processing, manufacturing and bridge fabrication business that was established in 1968.
  - ISC has over 200 employees in two facilities. The historic plant in Gary Indiana is 1.6 million square feet and the newly constructed facility in Hodgkins Illinois is 160,000 square feet.
  - ISO 9002 compliant
  - All measuring devices certified and calibrated
- Lumber Yard
    - Founded in 1952 – largest lumberyard headquartered in Chicago
    - Clientele has expanded to include virtually all of the Crain's Chicago Business top 25 contractors, custom homebuilders, noted architects, and sophisticated re modelers and homeowners.

Should you have more than one supplier for critical items (as a backup)? Yes

Do you expect shortages or short-term delivery problems? No

The following will be the areas of concentration of our EMRPO

- Brochures and advertising materials
- Industry studies
- Blueprints and plans
- Maps and photos of location
- Magazine or other articles
- Detailed lists of equipment owned or to be purchased
- Letters of support from future competitors
- Any other materials needed to support the assumptions in this plan
- Market research studies
- List of assets available as collateral for a loan

## **IV. Refining the Plan**

### **“THE EXTENDED BUSINESS PLAN”**

There is no way that we can emphasize the importance to find a renewable source of energy to have a back up for our houses. One it helps the absolute reliability on oil, for which the prices are sky high and the forecasts suggests that it will increase even more. If we do well in the Solar Decathlon on 2011 we plan/ propose a formation of a Limited Liability Company under IIT. This will be a commercial company that would undertake profit projects for generating revenues and also non profit projects for disaster hit areas.