

Energy Systems Engineering Technician (ESET)

and Technologist Program

St. Lawrence College

Kingston, Ontario

EnergyHouse
St. Lawrence College



Steve Lapp – Coordinator / Professor – ESET Program

ESET Program – Why?



- Growing market for:
 - Efficiency and energy building services
 - Renewable energy systems design and installation
- Market served by very few efficiency and renewable energy training programs



Target Employment?

- Sustainable energy system and building design, specification and installation (res. & commercial)
- Commercial, institutional & residential energy audits (building energy modeling)
- Municipal sustainability programs
- ESCO's (Energy Service Companies)
- Energy and GHG accounting
- Green energy NGO's
- Overseas projects



ESET Program Design

- 2 year technician, 3 year technologist – flow through
- Theory, modeling and installation-based training
- Entrepreneurial skill development
- **ENERGY HOUSE** – a hands-on training and outreach facility built by students
- Field trips, promotional activities, and community “green” events involving all 3 years of program



Energy House Equipment

- 4 kW PV, various manufacturers
- 3 heat pumps (1 to 2.5 ton units)
- 4 bore holes (2.5 ton)
- 3 ground loops
- Two stage solar wall (air heating)
- 4 SDHW systems, various manufacturers
- 2 inverter-based electricity supplies
- 1 – 450 Ah, 48 VDC battery bank
- 1 – 1700 Ah, 48 VDC battery bank
- 3 – 400 watt demonstration wind turbines
- 2 – 1 kW wind turbines with 50 foot towers



ESET Program Status

- 34 students started September 2005
- 70+ in program W08
- 25 hours per week class/ lab time
- Excellent employment status for first graduates
- New renewable energy and building systems control lab under development (student installed)



Lessons Learned

- **ESET students are agents of change**
They have vision – this is a positive and a negative!
- **Local teaching expertise is limited**
Allow extra time to find suitable instructors
(Local university graduate students, beg and borrow from local design / installation companies)
- **Textbooks & lab manuals not generally available**
Curriculum design and lab development is time consuming – plan months ahead!
- **Equipment is evolving rapidly**
Lab equipment is quickly outdated - purchase the latest
- **The program is part of a culture change**
Community expectations can be overwhelming!



Thanks for your attention

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Additional Material



ESET Program Streams

- Instrumentation and Building Automation Systems
- DC, AC and Electronics
- HVAC theory, and equipment orientation
- Building energy modelling
- Solar and electric renewable energy design and installation
- ACAD, Writing, Problem solving and Entrepreneurship



- Education (ESET/primary/secondary/public)
 - Laboratory for ESET students
 - Outreach activities for public and high school students
- Applied Research (ESET program)
 - Monitor and compare RE system performance
 - System Integration (solar/heat pump)
- Demonstration (public/consumer)
 - Working renewable energy and building systems for public display





Energy House

Functional Requirements

- Utilize commercial RE equipment
- Zero Emissions Goal
- Secure, safe and accessible to public
- Provide training facility to ESET students and the public according to objectives
- Requires reusable racking, solar panels, heat pumps, etc.



ESET Outcomes - 2005

1. Assess the total energy loss in existing residential, smaller-scale commercial or industrial structures.
2. Assess the energy efficiency of facilities by identifying major energy-consuming systems and equipment within such a facility.
3. Install, repair, maintain, modify, and calibrate existing energy systems and alternative energy systems for residential, smaller-scale commercial or industrial structures.
4. Articulate the degree of energy loss in each major area within the structure.
5. Describe mechanisms for improved energy efficiency through changes in structure, energy systems, or control strategies.
6. Calculate cost savings related to the implementation of any particular energy strategies.
7. Ensure a high level of energy efficiency in new structures by assisting design and construction companies in the structural and systems design.
8. Contribute to the design and selection of alternative energy technologies in the areas of heating and cooling, and electrical generation in new designs.
9. Contribute to the improvement of the energy efficiency of new structures by working with property owners and managers in the design and selection of alternative energy technologies.

