

In Remembrance of
Dr. Subrato Chandra

September 28, 1950 – January 12, 2012





FLORIDA SOLAR ENERGY CENTER®

Creating Energy Independence

FSEC 2011 Update

Policy Advisory Board Meeting

February 10, 2012



US DOE – Building America Research

- Flexible Residential Test Facility configured to control infiltration and duct leakage
 - 16.8% heating energy savings achieved by aggressively air sealing a leaky building
- Hot Water Systems Lab
 - Evaluating performance of high performance “hybrid” water heating systems including solar + HPWH
- Turning research into practice on display at 2012 International Builders Show
 - Palm Harbor modular Show Homes demonstrate path to “zero energy”

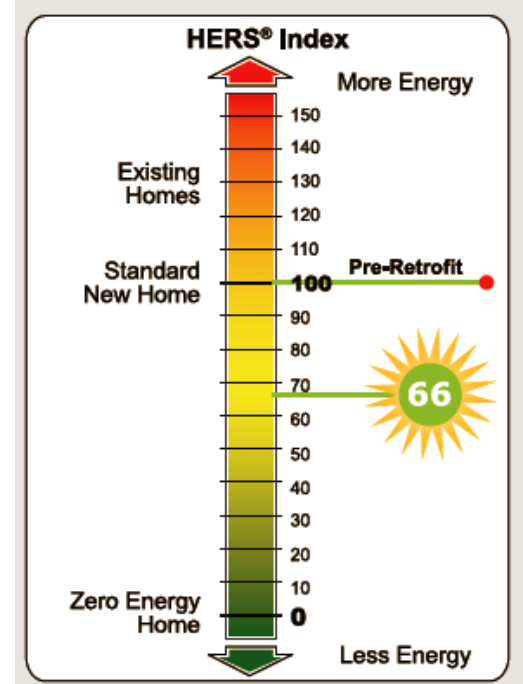


High Performance Existing Homes

- FSEC’s Building America Partnership for Improved Residential Construction
- Florida Local Gov’t and Non-profits
 - HUD Neighborhood Stabilization Funding
- 30%+ lower HERS Index, Cost Effective
- 43 (of 70) Renovations Achieved Goal
- Improvements: “Tune up” tasks; low cost, low hanging fruit; upgrade at replacement
- Home Energy Rater - QA & Safety Net
- Next Step: Standardized Packages

Completed Renovations by Vintage

50's	60's	70's	80's	90's	00's
2	15	14	22	9	8



1960's ~150



1970's ~135



1980's ~125



Building Training

- 38 building science courses offered
- More than 500 course attendees
 - Nearly 100 students received ENERGY STAR 3.0 training
 - 90+ students received weatherization training
 - 21 students received Florida green home certification training
 - Over 70 students received residential EnergyGauge® rater training



U.S. Photovoltaic Manufacturing Consortium (PVMC)

- DOE wanted a similar SEMATECH model for the PV Industry
- Led by SEMATECH in partnership with CNSE (College of Nanoscale Science and Engineering) and UCF (University of Central Florida)
- Overall investment of ~\$300M over 5 years from DOE and matching funds



Initial PVMC cSi Program Areas

\$14.3M of DOE and industry/partner matching funding

In-line/Off-line Metrology

- Primary Goals
 - Identify critical industry needs in metrology and rank
 - Develop projects to demonstrate new cSi metrology technologies
 - Transition new metrology technologies into pilot and manufacturing lines

New Feedstock/Wafering Methodologies

- Primary Goals
 - Identify necessary feedstock/wafering targets for \$/W
 - Establish cSi feedstock/wafering programs to accelerate transition of new technologies into mainstream manufacturing
 - Provide and foster process, test, and demonstration activities to validate new technologies and identify technical barriers



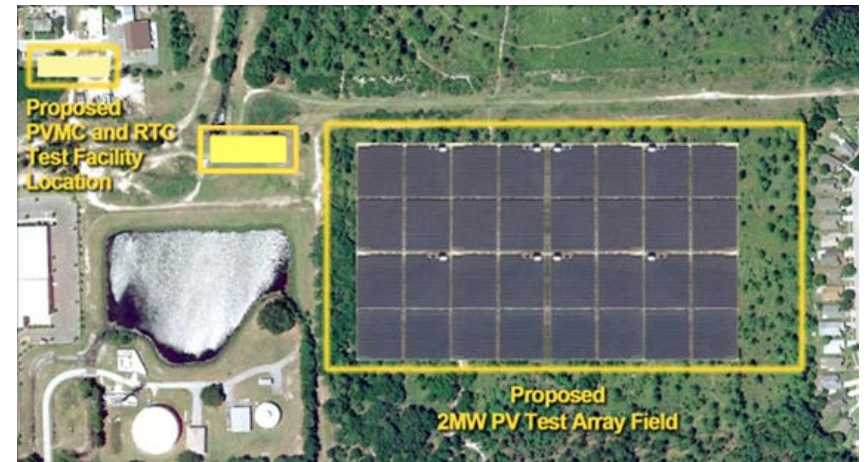
Regional Test Center (RTC)



RTC Site Concept

- DOE created 3 Regional Test Centers
- UCF site selected as the Hot-Humid RTC
- UCF is the only University site (others: NREL and Sandia)
- 20-acre site at the southeast corner of campus
- Capacity of 2MW+ of PV
- Bankability and Validation Studies
- DOE's go-to locations for independent testing
- Accelerate new technology pathway development

- Major presence on the UCF main campus
- Expansion of existing FSEC test facilities
- Large-scale system performance studies
- Equipment and Materials reliability studies
- Close interaction with counterparts and the National Labs

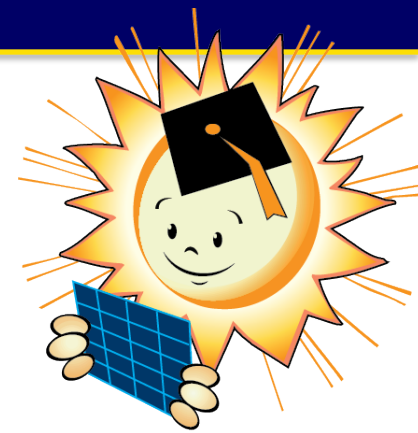


RTC Site Concept





SunSmart Schools



- 90 emergency shelter schools throughout Florida selected to receive 10-kW solar electric system with battery back-up
- 63 of 90 schools permitted
- 37 schools completed or near completion
- 10 additional PlusUp Schools (9 Progress Energy, 1 TECO)
- 73 interior critical load panels installed
- Teacher and facilities manager workshops
- Hurdles: Permitting and misconceptions of solar



FSEC Solar Training Programs

- **FSEC Continuing Education Workshops**
 - PV Systems
(2,340 students since 2003)
 - Solar Water Heating Systems
(355 students since 2008)
- **Train-the-Trainer Workshops**
 - Southeast Solar Training Program
 - 5 year, \$2 million DOE funded program
 - Trained 176 faculty from 67 SE institutions
 - Employ Florida Banner Center
 - Funded by Workforce Florida, Inc.
 - Trained faculty at 25 Florida educational institutions



Training for faculty from Alabama, Arkansas, Florida, Georgia, Kentucky, Tennessee, Puerto Rico and the US Virgin Islands.



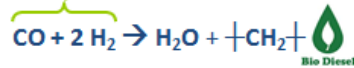
Biomass to Liquid Fuels Research

Chemistry of Gasification Process & Fischer-Tropsch (FT) Synthesis

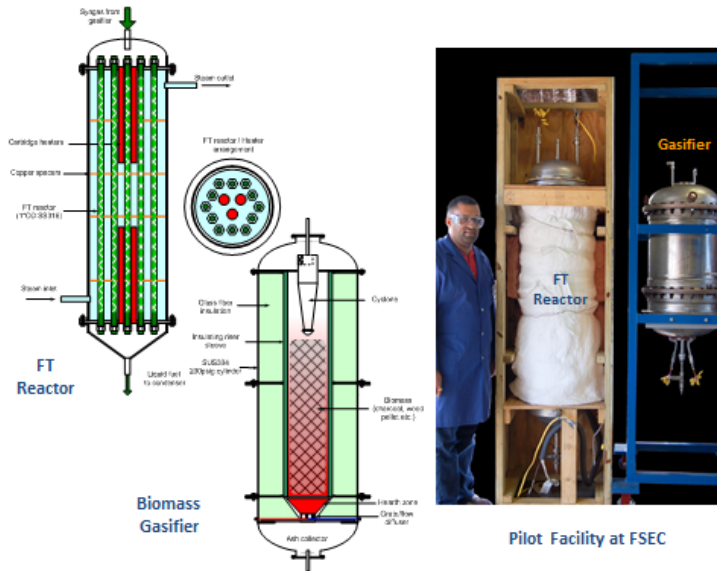
Ideal biomass gasification reaction:



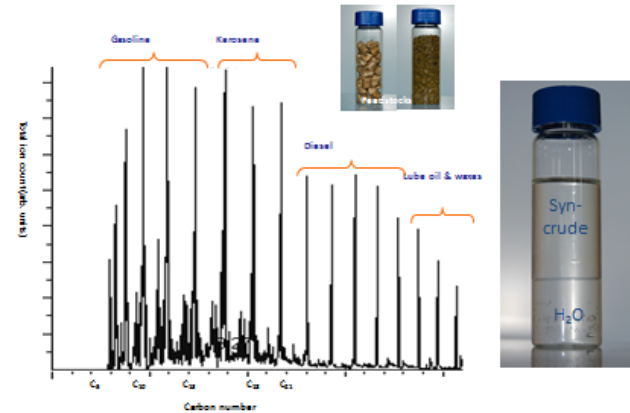
Ideal Fischer-Tropsch (FT) synthesis reaction:



Gasifier & FT Reactor Design



Biomass Feedstock & Products



Estimated Fuel Cost

- More than 50% of the FT fuel cost is the cost of biomass feedstock
- Biomass feedstock cost ranges from \$50 to \$170/ton
- Estimated fuel cost is in the range of \$3.00 to about \$7.00 per gallon



Human Energy™

Fuel Cell Related Projects

- Lead for DOE's Hi Temp, Low RH Membrane Program
 - Program extended (with funding) at request of DOE
- DOE's FHI: Membrane Durability
 - Determination of Pt-band formation
- DOE's FHI: Hi Efficiency, Low cost Electrocatalyst for H₂ Production and Fuel Cells

