Sustainability: What is it and how can we achieve it?

Frank DiSalvo, Director

The David R. Atkinson Center for a Sustainable Future

and

John A. Newman Professor of Physical Science

Dept of Chemistry and Chemical Biology

Cornell University

Boomer Lectures

University of Alberta

October 1, 2012

Boomer lectures #2 and #3

Tuesday at 11:00 am in E3-25
Materials for Energy Systems: the Case of Fuel Cells

Wednesday at 11:00 am in E3-25
Materials for Energy Systems: the Case of Thermoelectrics

Humanity's Top Challenges for this Century

- Climate
- Disease
- Education
- Energy
- Environment
- Food
- Poverty and Inequality
- Water

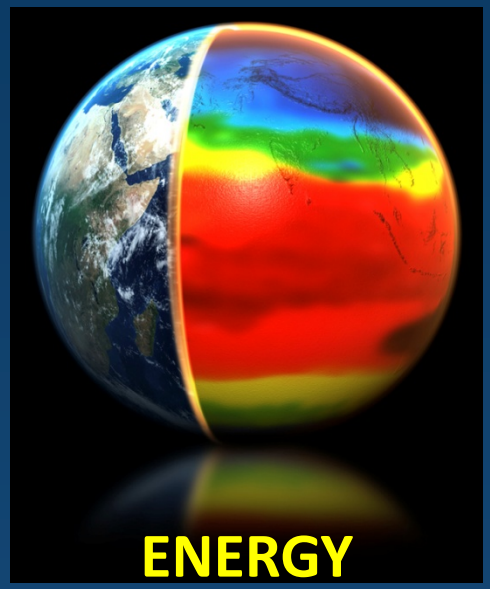
1000:	0.26 Billion People
1750:	0.72 Billion People
1900:	1.6 Billion People
2011:	7.0 Billion People
2050:	9 to 11 Billion People

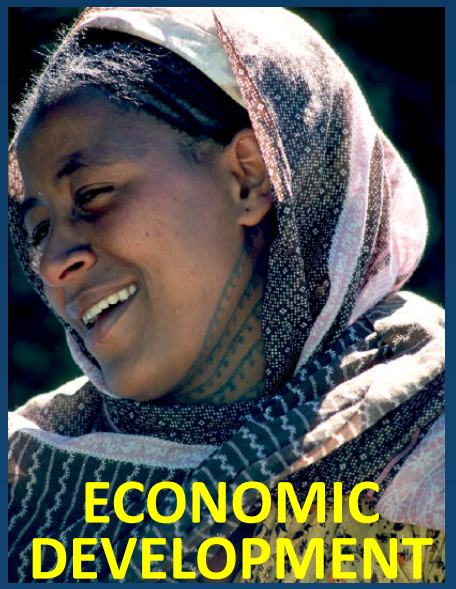
Social and Political Instability

Sustainability Defined

Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.

– United Nations Brundtland Commission, 1983





Example: Fossil Fuels

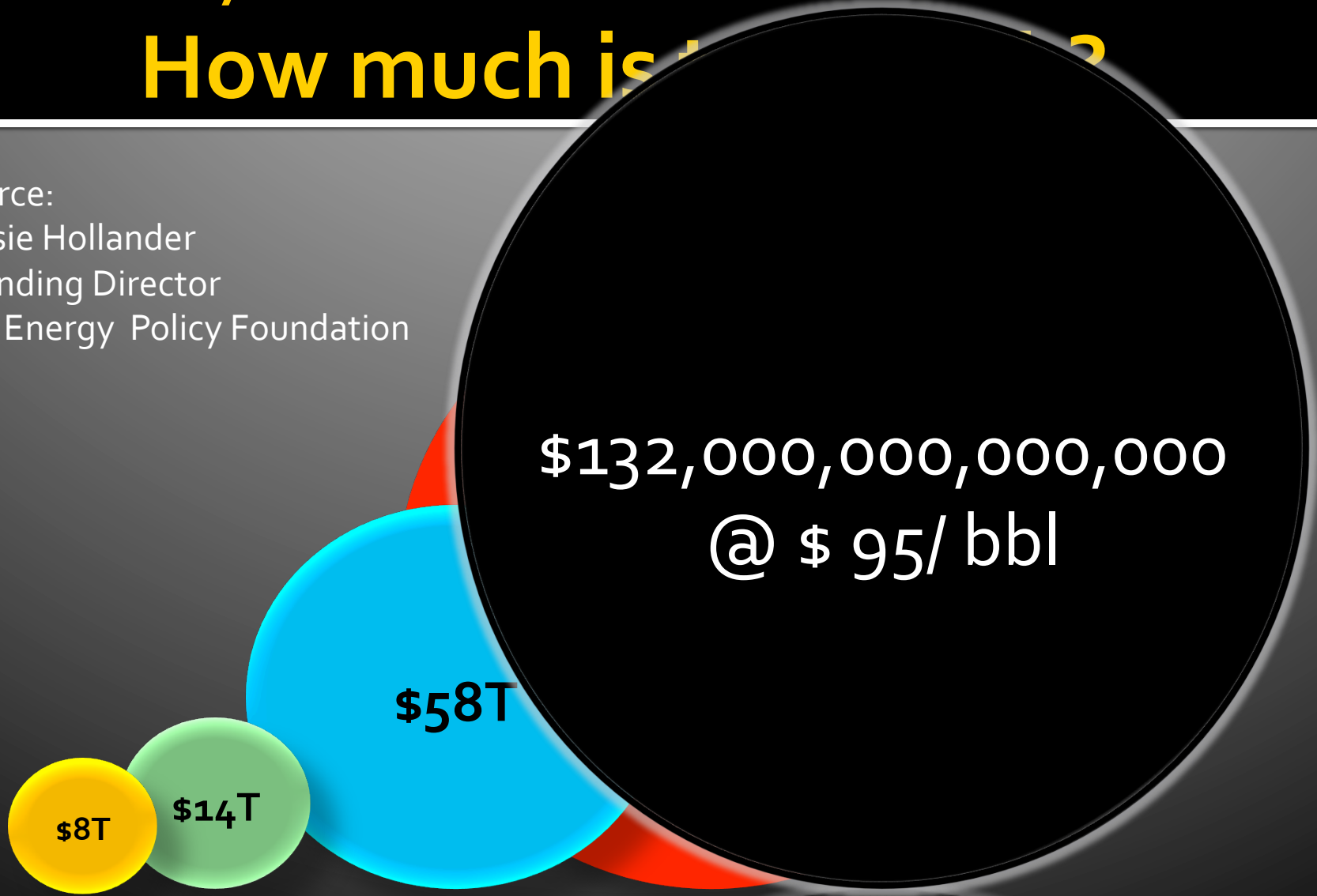
The energy system that has been developed over the last century is THE wonder of the world.
It's success and enormous growth has had mostly positive, but growing negative, impacts.

Three major arguments for reducing and eventually eliminating most of the world's fossil fuel dependence

1. Environmental Impacts & Climate Change
2. Strategic/Military
3. Financial/Economic

Money and Power:
How much is [illegible]?

Source:
Yossie Hollander
Founding Director
Our Energy Policy Foundation



Cornell: Four Arenas of Sustainability

Research and Scholarship

Education

Campus Sustainability

Public Engagement

ACSF

Play to Strengths

- Sustainable agricultural and food systems
- The science and engineering of materials
- Biodiversity and Ecosystem Sustainability
- Broad programs to address poverty, inequality, malnutrition and food insecurity
- Renewable and efficient energy systems, including: biofuels, geothermal, shale/gas, and sustainable building design

Emerging Areas

- Energy and environmental economics and sustainable enterprise,
- Climate change science, including: modeling, local forecasting, impacts on ecosystem and human health, mitigation and adaptation strategies
- Other renewable energy sources: wind, algae, and solar.
- Fresh water and marine resources management
- Citizen science

Atkinson Center Mission

Advance multidisciplinary research
and cultivate innovative collaborations
within and beyond Cornell
to foster a sustainable future for all

Our Approach

- Develop programs to bring faculty together across campus to address sustainability problems, advance solutions
- Promote "random collisions" that result in new connections across disciplines, colleges
- Convene and connect; incubate and innovate
- Communication: inform and inspire
  - Develop the trust and common language needed to work together

ACSF Builds Dynamic Engagement across Cornell

Faculty and External Advisory Boards

Atkinson Center for a Sustainable Future (ACSF)

Faculty Fellows from all Colleges

ACSF Facts: After 5 years

315 Faculty Fellows

75 topical lunches

Strategic Partnerships: e.g. CARE-Cornell

ROI: $9M → $92 M

45 AVF Seed Grants

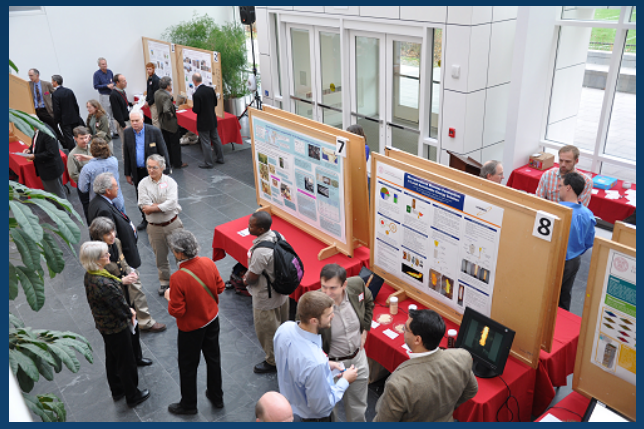
60+Rapid Response Grants

66 centers and institutes

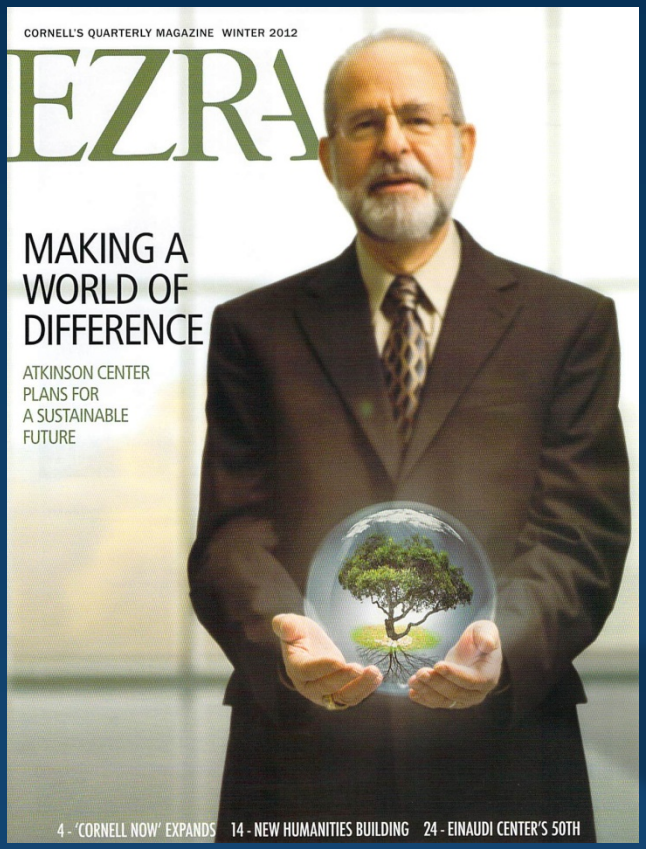
65 departments/ 11 colleges

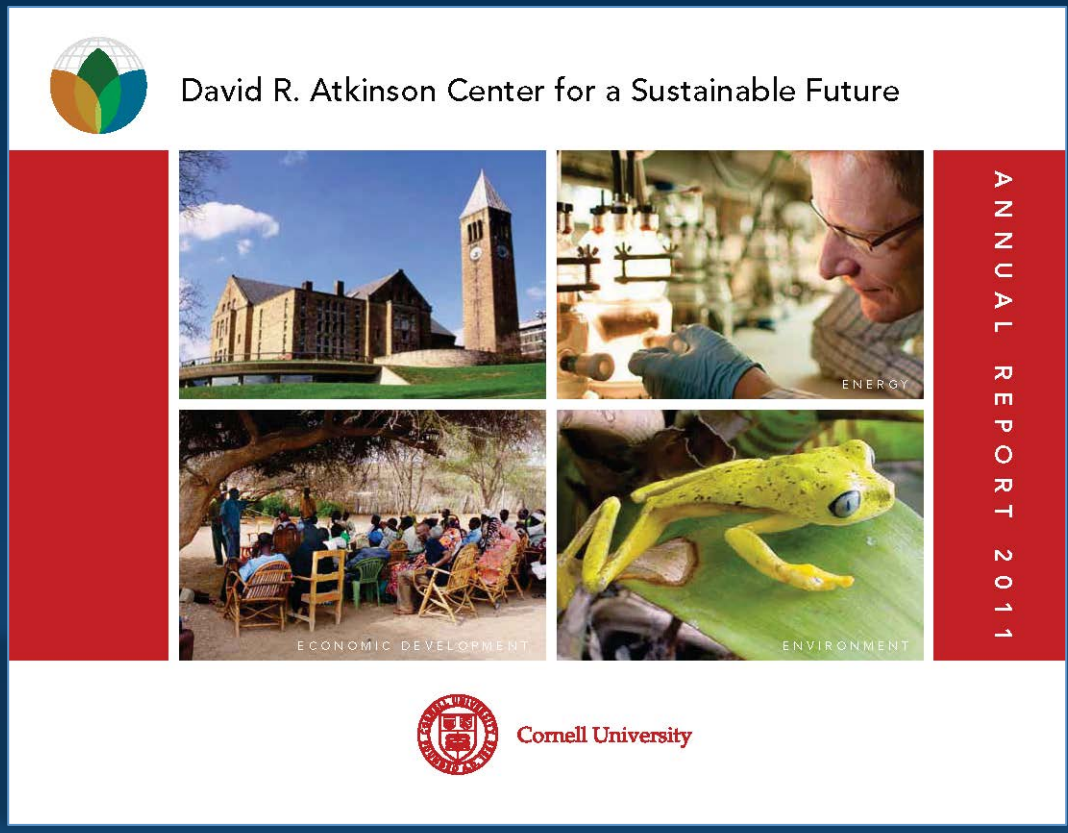
Our Job: Adding Value

- Connecting colleges : concentrating resources
  - Introducing and teaming star faculty on projects
  - Creating critical mass
  - Providing seed funding “glue”
  - Generating visibility and impact
  - Responding quickly and flexibly to opportunities
  - Scaling up research
- College partnerships
- External collaborations/partnerships



Our Stories


CORNELL'S QUARTERLY MAGAZINE WINTER 2012
EZRA
MAKING A WORLD OF DIFFERENCE
ATKINSON CENTER PLANS FOR A SUSTAINABLE FUTURE
4 - 'CORNELL NOW' EXPANDS
14 - NEW HUMANITIES BUILDING
24 - EINAUDI CENTER'S 50TH

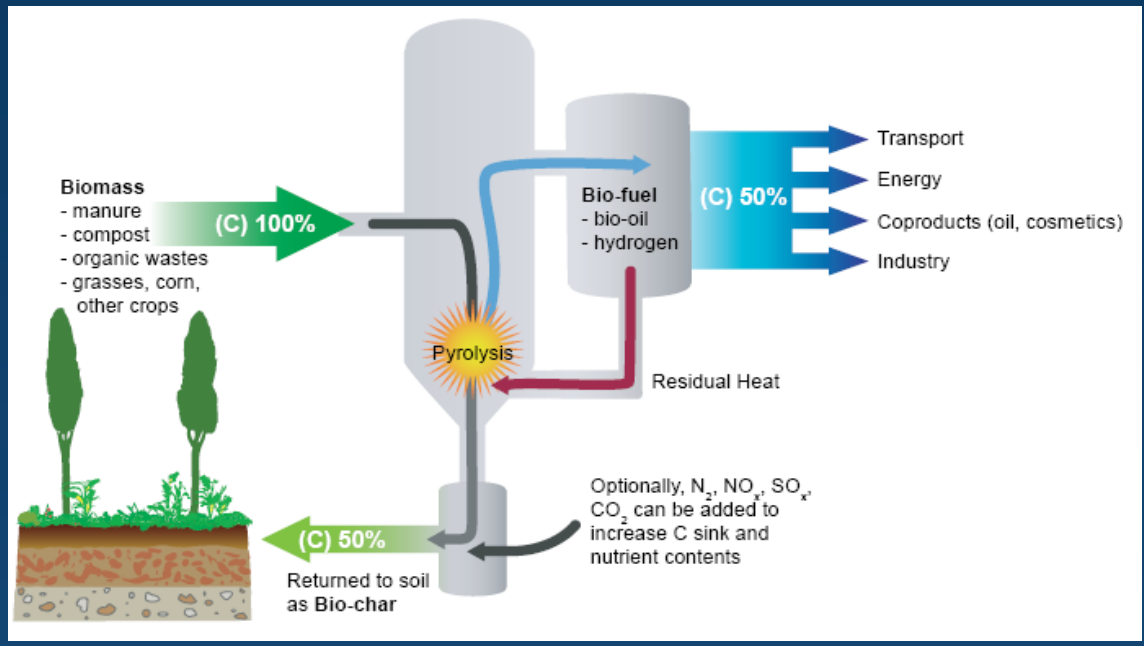

David R. Atkinson Center for a Sustainable Future
ENERGY
ECONOMIC DEVELOPMENT
ENVIRONMENT
ANNUAL REPORT 2011
Cornell University

A Seed Project Grows

Biochar is the stable, carbon-rich product produced by thermal decomposition when biomass is heated in an anoxic environment (pyrolysis).

Johannes Lehmann
Lars Angenent
Betta Fisher
Fred Gouldin
David Lee

$5 M from Yossie Hollander



More stories

- CARE-Cornell Strategic Partnership
- Sustainability of Food Systems
- Challenges with Large Scale Wind
- Environmental Sustainability in an Aging Society
- Biofuels from Algae
- Digital Design Environment for Sustainable Architecture

ACSF Leadership Team

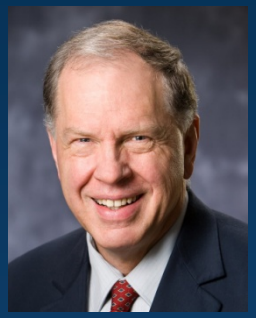
Director

Frank DiSalvo

Associate Director
Economic Development

Chris Barrett

Associate Director
Energy



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Lauren Chambliss

Executive in Residence

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Power, Inc., Serial Entrepreneur

William Schlesinger
President, Cary Institute of
Ecosystem Studies

Sheryl WuDunn
Pulitzer Prize winning Author, Senior
Managing Director of Mid-Market
Securities, Cornell BOT

Spreading Sustainability Programs to all Universities

- Conservative University Culture: Silos
  - Strong Disciplines necessary, but not sufficient
  - Need problem focus, rather than subject focus
  - Outcomes as important as output
- Federal Funding
  - Also siloed: NSF very academic, DOE, EPA, USAID, …..
  - Need for University and Philanthropic Support
- Universities tend to be inward looking
  - External Partnerships: ground truthing and bringing to scale

Depth and breadth of challenges demand broad participation from all sectors and university engagement.

Selected Readings:

"Earth: A Tenant's Manual" by Frank H. T. Rhodes. Frank is president emeritus of Cornell and a geologist. ISBN 978-0-8014-7823-9

"Thinking: Fast and Slow" by Daniel Kahneman. Daniel won Nobel prize in economics for his insights into human decision making.
ISBN 978-0-374-27563-1

"Sustainable Energy – without the hot air" by David J. C. MacKay. Puts numbers in perspective so the average person can grasp scale of the energy challenges.
This book is available in pdf format online for free.

"Capitalism at the Crossroads: Aligning Business, Earth, and Humanity" (2nd Ed) Stuart L. Hart ISBN-10: 0-13-613439-4

"Collapse" Jared Diamond ISBN 0-14-30.365-6

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