# Web-based approaches to community building and policy development in two regional sustainability cases: Sonoma County (US) and Project Zero (Denmark)

System Dynamic Models of Coupled Natural-Social Systems
Bekkjarvik, 22-26 June 2009

Diana Mangalagiu
Reims Management School, France & University of Southern Denmark

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Peter Rathje, Director, ProjectZero

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# Initiative for Science, Society, and Policy
# ISSP (http://www.sdu.dk/issp)

**Goals:**

- Help make science and technology integral components of societal planning and public discourse
- Bridge the gap between state of the art science and policy issues.
  - Promote responsible and informed discussion of ethical and social issues
  - **Work with stakeholders and decision makers** to achieve specific policy recommendations
  - Promote **scientific social responsibility**
  - Promote socially responsible and sustainable business opportunities

- Initiative sponsored by the University of Southern Denmark
- Support from SFI, Brookings Institution, Louisiana Museum of Modern Art
- Discussions with Copenhagen Business School, University of Aarhus and University of Copenhagen

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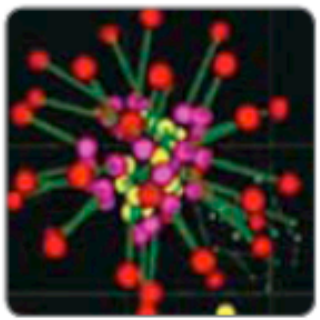
# ISSP
## THE INITIATIVE FOR SCIENCE, SOCIETY AND POLICY

## INVITATION

YOU ARE INVITED TO A PUBLIC DISCUSSION ABOUT HOW SCIENCE, SOCIETY AND POLICY CAN BEST SUPPORT EACH OTHER.

AT LOUISIANA MUSEUM OF MODERN ART
**JUNE 11, 2009**



UNIVERSITY OF SOUTHERN DENMARK

# CHEVRON PRESENTS: ENERGYVILLE
An Energy Game Developed by The Economist Group

http://www.willyoujoinus.com/Energyville/

## About Energyville – The Game

The Economist Group developed the Energyville game with sponsorship from Chevron Corporation. The Economist Intelligence Unit, an Economist Group company, provided the data and content driving the game.

Energyville represents the average industrialised city with growing energy demands from homes and apartments, office buildings, factories, cars, mass transit, trucks and aeroplanes. The game is divided into two "levels" or rounds of game play. In the first level the player has to choose energy sources to meet Energyville's demands in 2015, and in the second level must make additional decisions to prepare for the energy demands of 2030.

## Game limitations

Energyville is a game that represents reality, but it does not serve as a perfect model of the real world. Many elements have been simplified to facilitate game play. For example, projected energy demands from the various components of Energyville are based on forecasts for the OECD (as described above), but projections are also available for the types of energy used by each component; e.g. in 2015, 15.2% of energy consumed by the residential sector is projected to be from liquid and other petroleum sources. Although the player has to meet minimum uses of petroleum and certain other energy sources for homes and apartments, he or she is given substantial freedom to provide power as he or she chooses. Afterwards, he or she can see the economic, environmental and security implications of these decisions.

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# Sonoma County Sustainability Initiative: Community Climate Action Plan


670.000 citizens in an urban/rural area

wine-farmers play an important role

## County goals:

- Reduce GHG emissions by 25% below 1990 levels by 2015 (more aggressive than CA AB32)
- Move to Carbon-free water system by 2015:
  - Hydroelectricity – 2.5 MW
  - Solar PV – 2 MW
  - Landfill Biogas – 6 MW
  - Wastewater geo-exchange
  - Wind
- County (and municipality) level funding capability
- County level energy aggregation
- Develop systems-level understanding of technology insertion, economics, behavior…

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# Resource Dynamics

http://www.resourcedynamics.org

- Collaboration and communication tool to bring together ideas and showcase integrated carbon reduction projects of public agencies and private partners from various regions.
- Public partners: Cities and Counties in New Mexico, Arizona, Montana, North Carolina, Louisiana, California, Iowa and Colorado, Los Alamos National Laboratory.
- Create partnerships and collaborative relationships that help **local** governments substantially lower GHG, reduce energy consumption, implement alternative energy programs, stimulate innovation, adopt new technologies, and create green jobs.
- Phase I: demo version
- Phase II: innovative library search capabilities, community building tools (allow participants to identify others with similar interests, examine current research, add appropriate projects and documents), use semantic social networking capabilities to form discussion groups and forums which can contribute to cooperation and sharing of ideas and resources.
- Partnership with policy-forming initiatives: America's Fund for Integrated Solutions: a national network of local governments formed to secure federal matching funds of up to 50 percent for projects that address broadly integrated systems solutions and create new jobs while reducing environmental impacts: www.appliedsolutions2009.com

- Renewable Energy Secure Community Project (RESCO)Project supported by Institute for Geophysics & Planetary Physics and Sonoma County Water Agency
- $1M pilot project over 3 years from the California Energy Commission

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# Content Management System (CMS)


Based on Drupal

- Information
- Interactivity
- News feeds
- Presence & Social networking
- Content awareness
- Surveys
- Interactive models
- Data animation
- Consensus building


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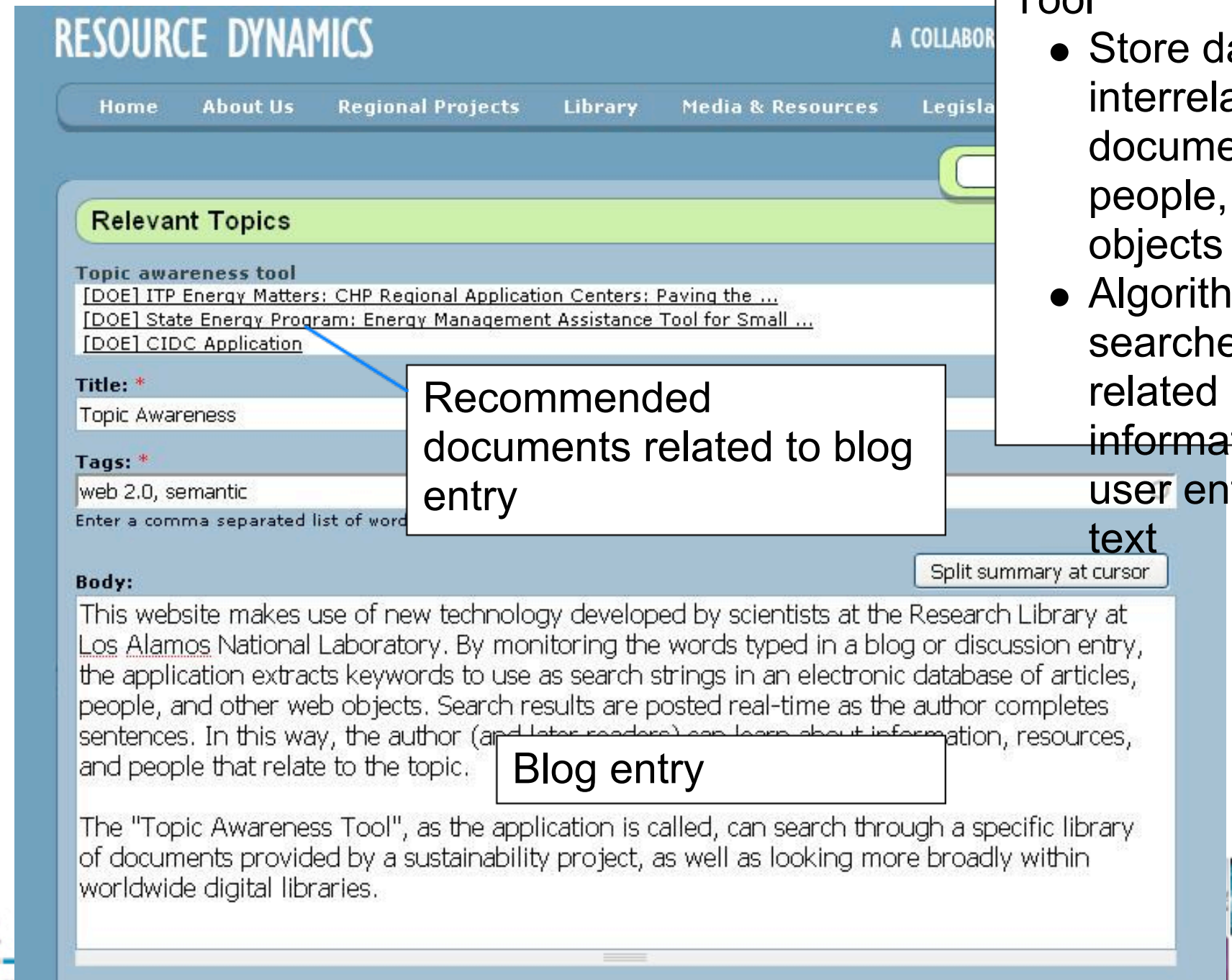
# Semantic Tools

"Topic Awareness Tool"

- Store database of interrelated documents, people, web objects
- Algorithm searches for related information as user enters blog text




Recommended documents related to blog entry

Blog entry

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ISSP

# Project Space

- Web pages for regional sustainability projects
- Description of scope, cost, legislative barriers
- Facilitate interaction among project teams

RESOURCE DYNAMICS

A COLLABORATIVE APPROACH TO SUSTAINABLE

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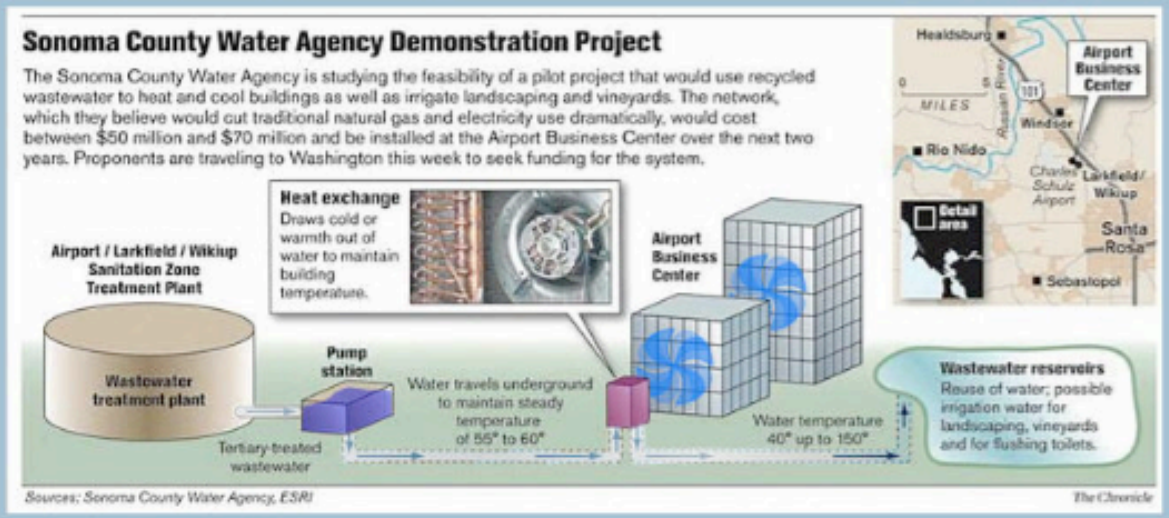
This project is intended to reduce the carbon footprint of an entire business park to zero. Through the use of the latest energy efficiency technologies, all of the building will be retrofitted to reduce their energy needs as much as possible. Using geothermal heat pumps coupled to a recycled water source, HVAC energy needs will be greatly reduced. The remainder of the energy needs of the business park will be made up with renewable supplies such as solar PV and fuel cells using bio-gas.

**SCWA Demonstration Project** — View Project Group

Posted by SCWA on Friday September 12, @12:27 PM




**Project Details:**

**Project title:** SCWA Demonstration Project

**Project goal:** To transform an existing business park into an energy neutral development

**Project location:** 4 miles north west of the City of Santa Rosa

**Congressional district:** 6th

**Project state:** CA

**County:** Sonoma

**City:** Santa Rosa

**Project Timeline:** Complete in

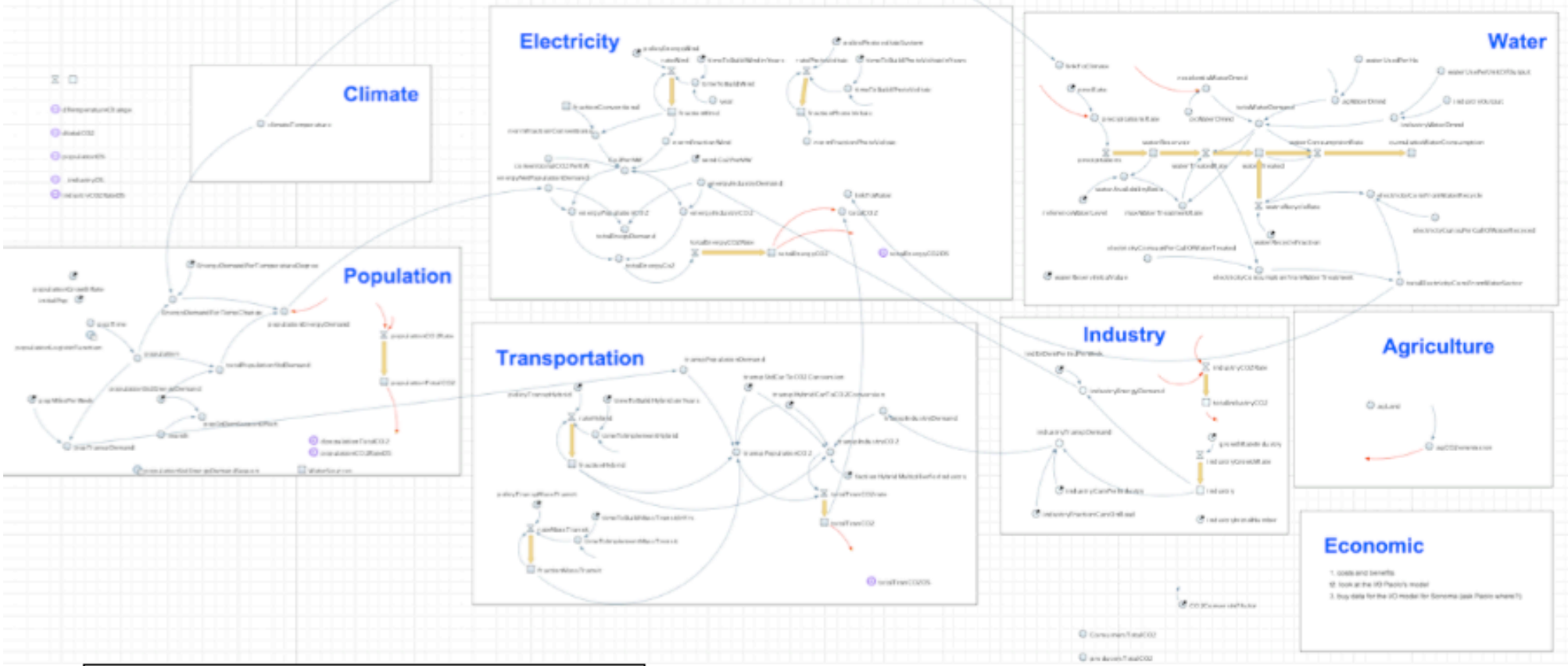
**What phase is the project currently in:** The project is in the feasibility stucy

Groups
Forums
Logout

create
Add Blog
Create Group

# System Dynamics Model

*Investigate non-intuitive interrelationships among important systems that affect energy-water sustainability and resilience*




Models energy flows and tracks CO2 emissions

- Policy selection
- Scenario comparison
- Nonlinear feedbacks

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# CLEAR System Dynamics Model

- Developed by Donatella Pasqualini (Los Alamos National Laboratory) using AnyLogic
- Interactive application (demo version now)
- Goal: track the interdependence of $CO_2$ emissions across sectors and ways to reduce emissions.
- Two $CO_2$ sources: transportation and electricity generation.
- Emissions driven by demand from the population, industry (commerce), and agriculture.
- Economic and population growth drives changes in demand.
- Policies for increases in use of renewable energy (wind, solar) and low-emissions transportation (hybrid cars, mass transportation) provide mitigation choices.
- Climate change (in the form of increase in average daily temperature) drives electricity and water demand.

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# CLEAR model: Sonoma County

## Energy Policies

Photovoltaic System (p1)

0% 25%

Wind (p2)

0% 20%

% of the total energy supply

## Transportation Policies

Mass transportation (p3)

0% 30%

Hybrid Cars (p4)

0% 30%

% of the total transportation

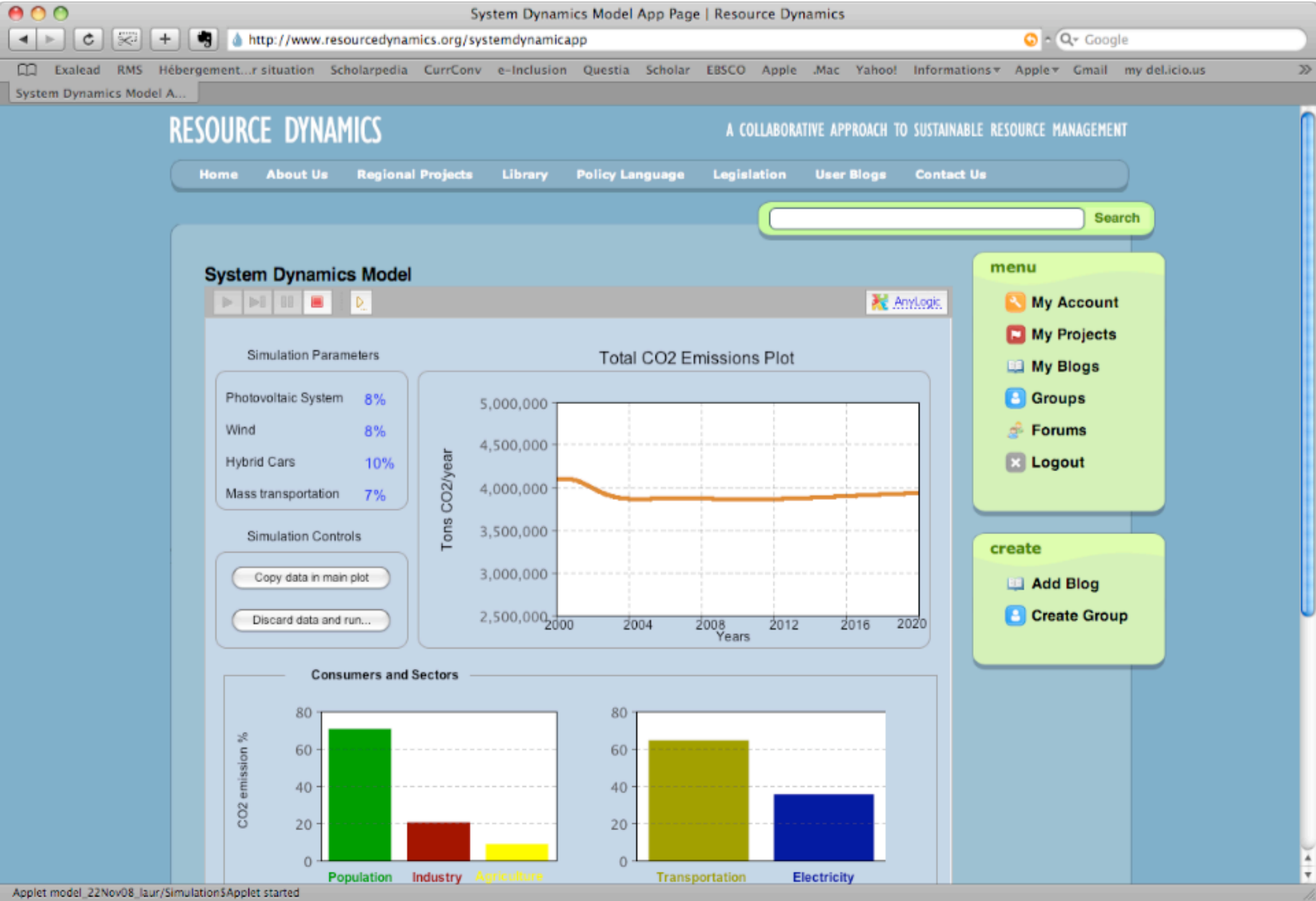
Run Simulation

## Tons CO2/years Vs Years


Clear main Plot

ver. 0.8 Oct. 2008 by D. Pasqualini (dondy@lanl.gov) Los Alamos National Laboratory

# CLEAR Model - Sonoma County



# Project Zero, Sonderborg, Denmark


- 500 km2 region
- 77,000 inhabitants

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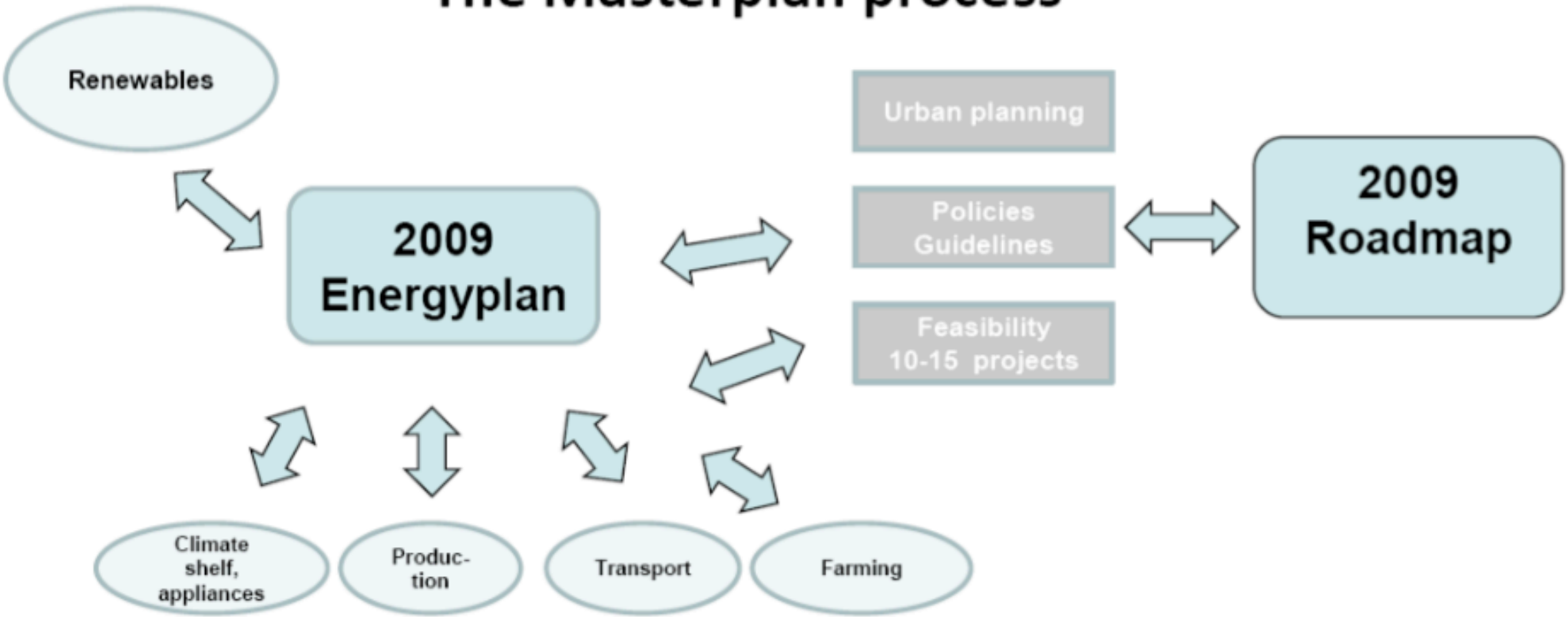
# ProjectZero

## The Masterplan process

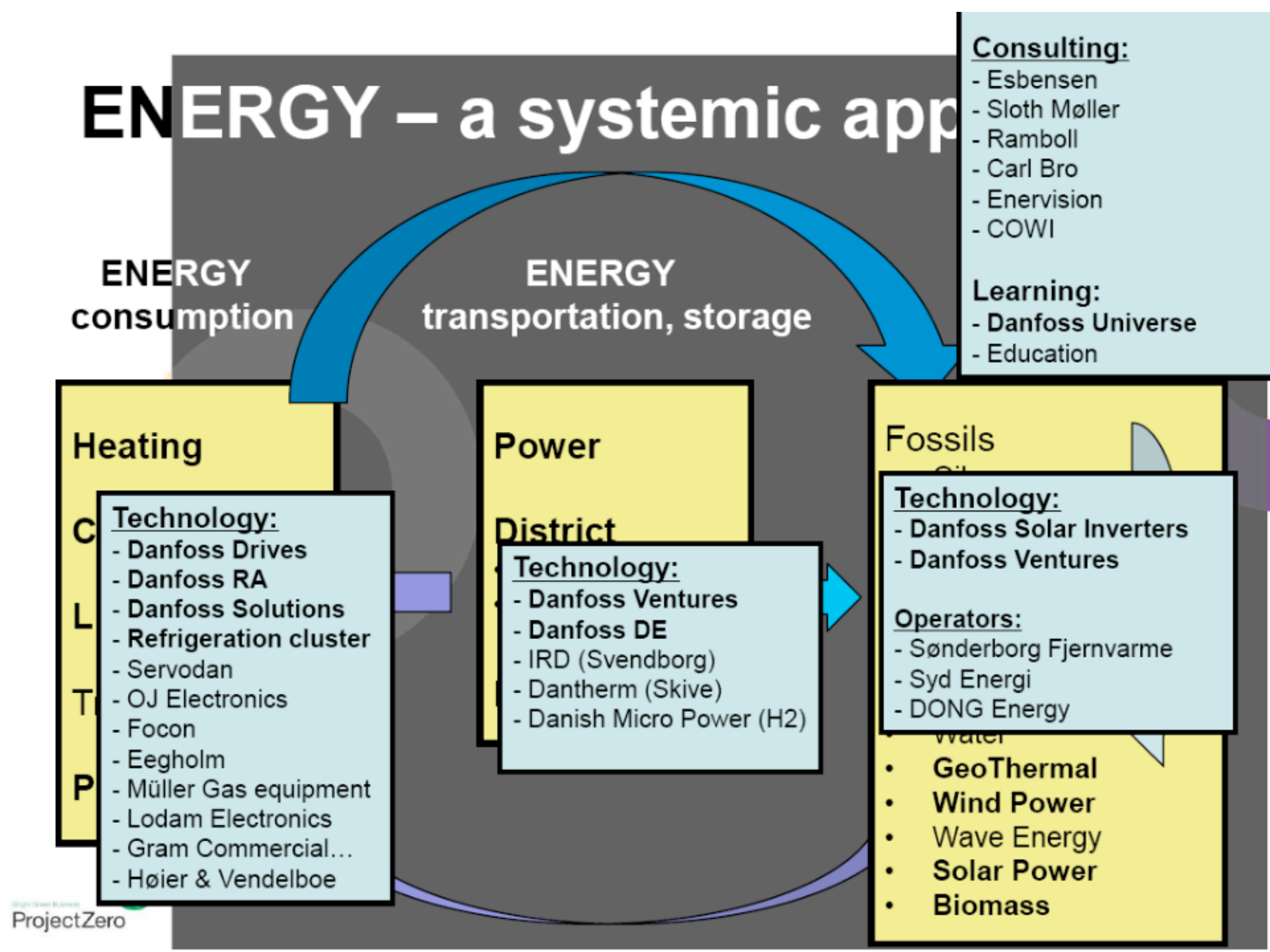



| Segments |
|---|
| Citizens |
| Public |
| Industry |
| Trade & Service |
| (Farming |

CO2 Baseline Demografy

**Participation across segments and themes**

Review of ZEROpotentials per 2012, 2015, 2018, 2021, 2025 og 2030


ENERGY – a systemic app
ENERGY consumption
ENERGY transportation, storage
Consulting:
- Esbensen
- Sloth Møller
- Ramboll
- Carl Bro
- Enervision
- COWI
Learning:
- Danfoss Universe
- Education
Heating
Technology:
- Danfoss Drives
- Danfoss RA
- Danfoss Solutions
- Refrigeration cluster
- Servodan
- OJ Electronics
- Focon
- Eegholm
- Müller Gas equipment
- Lodam Electronics
- Gram Commercial…
- Høier & Vendelboe
Power
District
Technology:
- Danfoss Ventures
- Danfoss DE
- IRD (Svendborg)
- Dantherm (Skive)
- Danish Micro Power (H2)
Fossils
Technology:
- Danfoss Solar Inverters
- Danfoss Ventures
Operators:
- Sønderborg Fjernvarme
- Syd Energi
- DONG Energy
• GeoThermal
• Wind Power
• Wave Energy
• Solar Power
• Biomass
ProjectZero

# ProjectZero – theme initiatives

- **ZERO+ house constructions (House construction)**
  - SIB ZERO+ house as role model (construction completed February 2009) – sibzero.dk
  - LE1 (DK building code for 2015) as new standard for Sonderborg from May 2008
  - Gehry Masterplan for the harbor (presented in October 2008)
- **ZEROfamily (Citizens)**
  - 100 private families individual Roadmaps to ZERO Carbon (started january 2009)
- **ZEROmunicipality (Government)**
  - The city´s actionplan for cutting energy consumption by 20% within 3 years
- **ZEROcompanies - Bright Green Business (the Business community)**
  - Climate management plans and CLEANTECH
  - LINAK Company as **ZERO+ Company** role model
  - **CDP** "Carbon Disclosure Project" – Climate reporting – trial spring 2009
- **ZEROshops**
  - Action plan for energy savings – lightning, heating, cooling …
- **ZEROenergy – (Renewables)**
  - 4 windmill projects with private investors – ready to go
  - 2 biogasprojects with farmers (feasibility study in process)
  - Geothermal, solar & bioheat with District energy companies (2008+)

# LCCI Low Carbon City Index

## LCCI Low carbon City Index

- City focused - Global benchmarking
- Steering committee by ProjectZero og WWF
- Development group:Dalberg, WWF, CASS/Kina, SDU/Sønderborg, KTH/Stockholm, University of Reims
- Under construction – ready to go by May 2009

## Cooperation cities

- Baoding/China
- Sonoma County
- Flensburg/SH

# Conclusions

## Not really exploited opportunities for collaboration

- Parallel goals of MANY sustainability projects
- Overlapping efforts in modeling and stakeholder involvement
- Opportunities for ICT collaboration via project web portals: community building and policy development
- Tangible connections via web site connections, site visits
- How this workshop can help moving forward?

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