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Event Schedule:

Check-In · 3:30

Gallery: Interactive Session on Climate
Change with WUSTL Students · · · · · · · · · · 3:30–6:00

Prospects for Citizen Watershed
Modeling and Green Infrastructure
Siting in the St. Louis Region · · · · · · · · · · · · 4:00–4:45

Climate Change in the Midwest:
Challenges and Responses · · · · · · · · · · · · · 5:00–5:45

Talanoa Dialogue on Climate Change · · · · · 6:00–7:00

Social Ecological Systems for Spatial Design

What is the class about?

Climate change and the rapid destruction of biodiversity pose existential threats to the functioning of human society in the 21st century.

The goal of this course is to empower spatial designers to implement sustainable relationships with the earth's biosphere and the social systems it supports.

Through readings, designs, and dialogue, we aim to:

- Name the major causes of climate change including primarily contributing sectors and industries.

- Communicate about major climate change impacts.

- Define climate change adaptation and mitigation and the relationship between them.

- Articulate the fundamental strategies for climate change adaptation and mitigation focusing on urban systems and cities.

- Understand, apply, critique, and contribute to theories and methods of Social Ecological Systems and Ecological Economics.

- Critically utilize systems dynamics modeling and ecological economics to propose interventions and programs which target leveraged systemic change.

- Read a variety of literatures on the implications of climate change on social ecological systems.

- Develop and communicate climate change action using a variety of methods and literatures (drawings) focused on climate action

Model created by students in Washington University in St. Louis' summer 2017 "Global Urbanism(s)" Johannesburg studio.

Climate Change

What is climate change?

Carbon dioxide levels today are higher than at any point in at least the past 800,000 years.[1] Five major countries contributed two-thirds of the world's CO2 emissions: the United States, European Union, China, Russian Federation and Japan.

Talanoa Dialogue:

Launched at the 2017 UN COP23 to help communities implement the Paris Agreement by asking these questions:
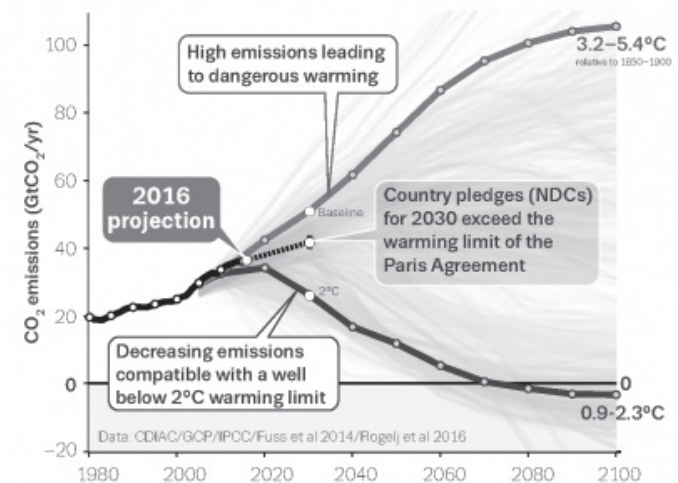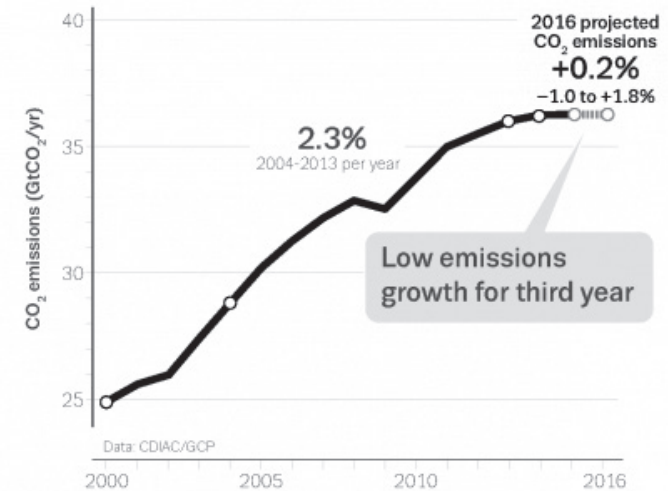
Where are we?
Where do we want go?
How do we get there?

Talanoa is a traditional word used in Fiji and across the Pacific to reflect a process of inclusive, participatory and transparent dialogue. The purpose is to share stories, build empathy and to make wise decisions for the collective good by sharing of ideas, skills, and experience through storytelling.
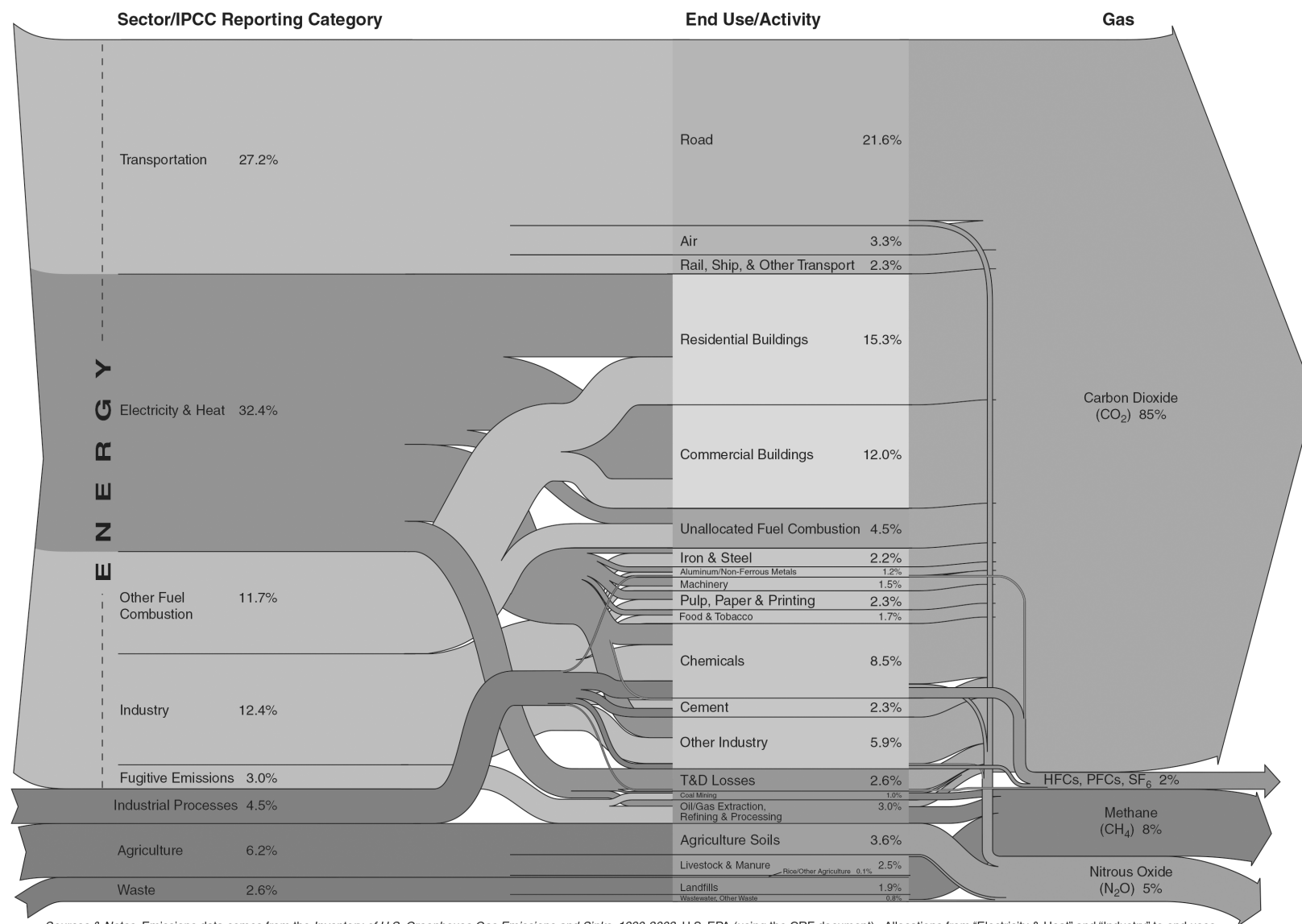
[1] Lüthi, D., Le Floch, M., Bereiter, B., Blunier, T., Barnola, J.-M., Siegenthaler, U., ... Stocker, T. F. (2008). High-resolution carbon dioxide concentration record 650,000–800,000 years before present. Nature, 453(7193), 379–382.

Graphs of Global CO2 Emissions
(Before and After Paris Agreement)

U.S. GHG Emission Flow Chart
Model created by the World Resources Institute

Sector/IPCC Reporting Category	End Use/Activity	Gas

ENERGY

- Transportation 27.2%
- Electricity & Heat 32.4%
- Other Fuel Combustion 11.7%
- Industry 12.4%
- Fugitive Emissions 3.0%
- Industrial Processes 4.5%
- Agriculture 6.2%
- Waste 2.6%

End Use/Activity:
- Road 21.6%
- Air 3.3%
- Rail, Ship, & Other Transport 2.3%
- Residential Buildings 15.3%
- Commercial Buildings 12.0%
- Unallocated Fuel Combustion 4.5%
- Iron & Steel 2.2%
- Aluminum/Non-Ferrous Metals 1.2%
- Machinery 1.5%
- Pulp, Paper & Printing 2.3%
- Food & Tobacco 1.7%
- Chemicals 8.5%
- Cement 2.3%
- Other Industry 5.9%
- T&D Losses 2.6%
- Coal Mining 1.0%
- Oil/Gas Extraction, Refining & Processing 3.0%
- Agriculture Soils 3.6%
- Livestock & Manure 2.5%
- Rice/Other Agriculture 0.1%
- Landfills 1.9%
- Wastewater, Other Waste 0.8%

Gas:
- Carbon Dioxide (CO_2) 85%
- HFCs, PFCs, SF_6 2%
- Methane (CH_4) 8%
- Nitrous Oxide (N_2O) 5%

Sources & Notes: Emissions data comes from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003,* U.S. EPA (using the CRF document). Allocations from "Electricity & Heat" and "Industry" to end uses are WRI estimates based on energy use data from the International Energy Agency (IEA, 2005). All data is for 2003. All calculations are based on CO_2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on total U.S. emissions of 6,978 $MtCO_2$ equivalent. Emissions from fuels in international bunkers are included under Transportation. Emissions from solvents are included under Industrial Processes. Emissions and sinks from land use change and forestry (LUCF), which account for a sink of 821.6 $MtCO_2$ equivalent, and flows less than 0.1 percent of total emissions are not shown.

Green New Deal

What is the Green New Deal (GND)?

A congressional resolution that lays out a national plan for tackling climate change and promoting social justice.

What are the GND's goals?[2]

- Achieve net-zero greenhouse gas emissions through a fair and just transition for all communities

- Ensure prosperity and economic security in the US by creating millions of good, high-wage jobs

- Invest in the infrastructure and industry of the US to sustainably meet future challenges

- Secure clean air, water, food, sustainable environments, and community resiliency for future US generations

- Promote justice and equity for historically oppressed communities

Image from "A Message from the Future with Alexandria Ocasio-Cortez"

Above: Klein, N., & Crabapple, M. (2019, April 17). A Message From the Future With Alexandria Ocasio-Cortez. Retrieved April 26, 2019, from The Intercept website: https://theintercept.com/2019/04/17/green-new-deal-short-film-alexandria-ocasio-cortez/

[2] Ocasio-Cortez, A. (2019, February 12). H.Res.109 - 116th Congress (2019-2020): Recognizing the duty of the Federal Government to create a Green New Deal. [Webpage]. Retrieved May 2, 2019.

Ecological Economics

What is ecological economics?

Ecological Economics is an emergent school of economic thinking distinguished from the neoclassical model on two key points:

1. The laws of thermodynamics apply to economic processes.
2. Humans receive direct economic benefit from ecosystem services that are not counted in any market.

This model seeks to ground economic thinking in the dual realities and constraints of our biophysical and moral environments.

Genuine Progress Indicator (GPI)

The GPI is an attempt to measure whether the environmental impact and social costs of economic production and consumption in a country are negative or positive factors in overall health and well-being.

It is a metric that has been suggested to replace, or supplement, gross domestic product (GDP).

The Genuine Progress Indicator (GPI):
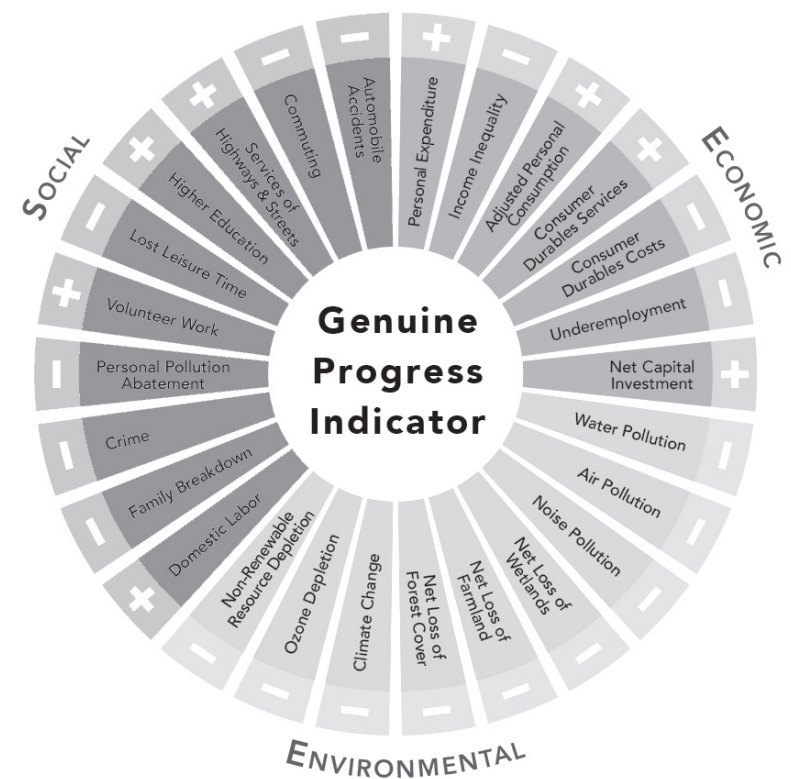
Source:
Gross National Happiness USA. https://gnhusa.org/genuine-progress-indicator/

System Dynamics

What is system dynamics (SD)?

A system is a set of things—people, cells, molecules, or whatever—interconnected in such a way that they produce their own pattern of behavior over time.

"System dynamics is a method for understanding, designing, and managing change. It models the relationships between elements in a system and how these relationships influence the behavior of the system over time." — Donella Meadows[3]
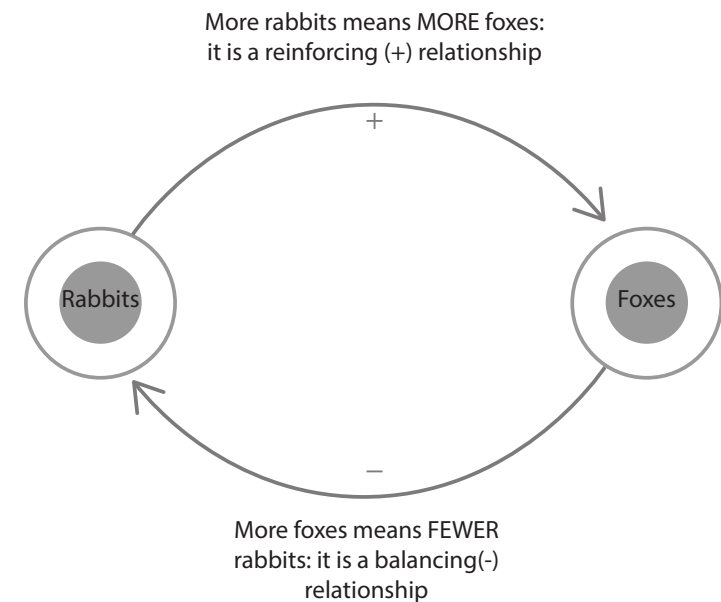
What is community-based system dynamics (CBSD)?

"CBSD is a participatory method for involving communities in the process of understanding and changing systems from the endogenous or feedback perspective of system dynamics." — Peter Hovmand[4]

Example of a Dynamic System Model:

More rabbits means MORE foxes: it is a reinforcing (+) relationship

Rabbits + Foxes

More foxes means FEWER rabbits: it is a balancing(-) relationship

Loopy Software and Model developed by Nicky Case https://ncase.me/

[3] Meadows, D. (2008). Thinking in systems: a primer. White River Junction, Vt.: Chelsea Green Publishing.
[4] Hovmand, P. S. (2014). Community Based System Dynamics. New York, NY, Springer. https://doi.org/10.1007/978-1-4614-8763-0

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Thank you for coming!