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USDA's 2022 Agricultural Outlook Forum

"New Paths to Sustainability and Productivity Growth"

Climate-Related Supply Chain Disruptions; Social Impacts, Tools and the Benefits of Reduced Risks

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SUPPLY CHAIN MANAGEMENT

Overview

- Background
- Case for Climate Action
- Supply Chain Climate Research
- Climate Resilience Tools

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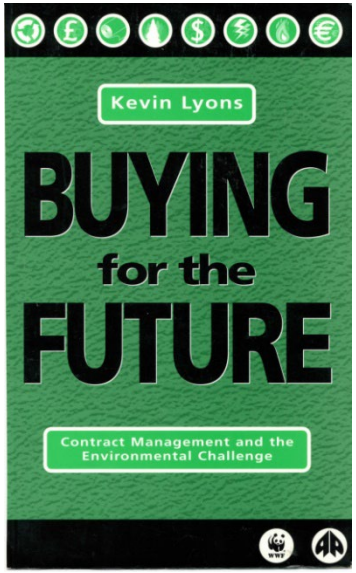
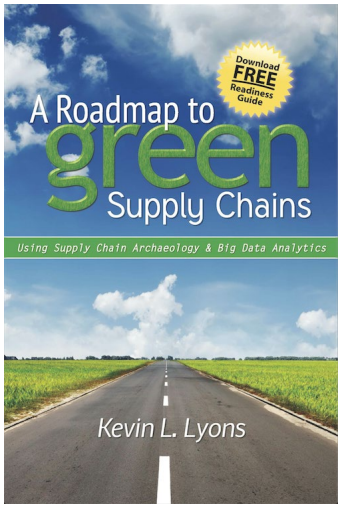
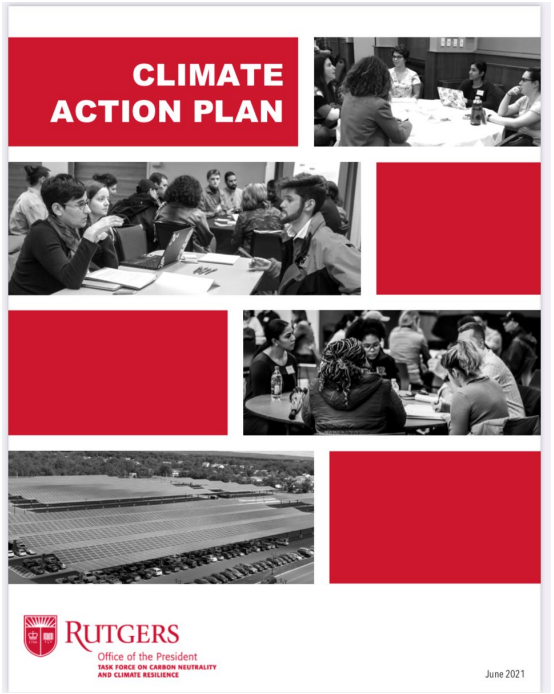
Bloomberg



CNBC





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Kevin Lyons, Ph.D.
Rutgers – 33 Years (Faculty-CPO)
St. Peter's Medical Center – 2 Years
U.S. Air Force – 6 years

Ph.D. Supply Chain Management and Environmental Management

Areas of Research/Work:

- Procurement – Supply Chain Management
- Supplier Diversity
- Economic Development – Social Impact – Social Determinants of Health (Newark 2020)
- Complex Decision Analysis
- Manufacturing
- Supply Chain Workforce Development
- Environmental Sustainability
- Mandela Washington Fellowship
- Sub-Saharan Africa Agriculture and Entrepreneurship

Current Board Membership:

- Rutgers Climate Action Office; Co-Director
- NJ Council on the Green Economy
- NJ Recycling Market Development Council
- Newark Equitable Growth Advisory Commission
- Rutgers Institute for Corporate Social Innovation
- Rutgers Global Health Institute (Core Faculty Member)
- Rutgers Center for African Studies
- Rutgers Office for the Promotion of Women in Science, Engineering & Mathematics (WiSEM)
- Rutgers Earth, Ocean and Atmospheric Science Institute
- Rutgers EOHSI Division of Global Environmental Health

Member:
Institute for Supply Management (ISM)
Chartered Institute of Procurement and Supply (CIPS)

Current Significant Research Project:

- Newark 2020-Buy Local (Researcher, Board Member)
- Newark Anchor Collaborative (Member, Researcher)
- NJEDA (NJMEP Grant) NJ Manufacturing Research (NJMEP Board of Trustees)
- Center of Accelerated Real Time Analytics an NSF Industry/University Cooperative Research Center (Researcher)
- Rutgers Energy Institute (Associate Director)
- Rutgers EcoComplex (Researcher)
- Rutgers Edison Papers (Board Member and Researcher)
- DOE Supply Chain Risk Roundtable (Researcher)

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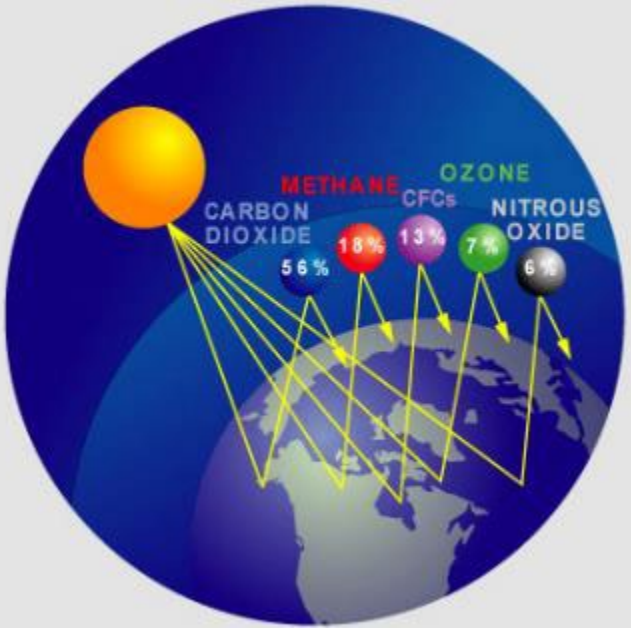
The Greenhouse Effect

Some sunlight that hits the earth is reflected. Some becomes heat.

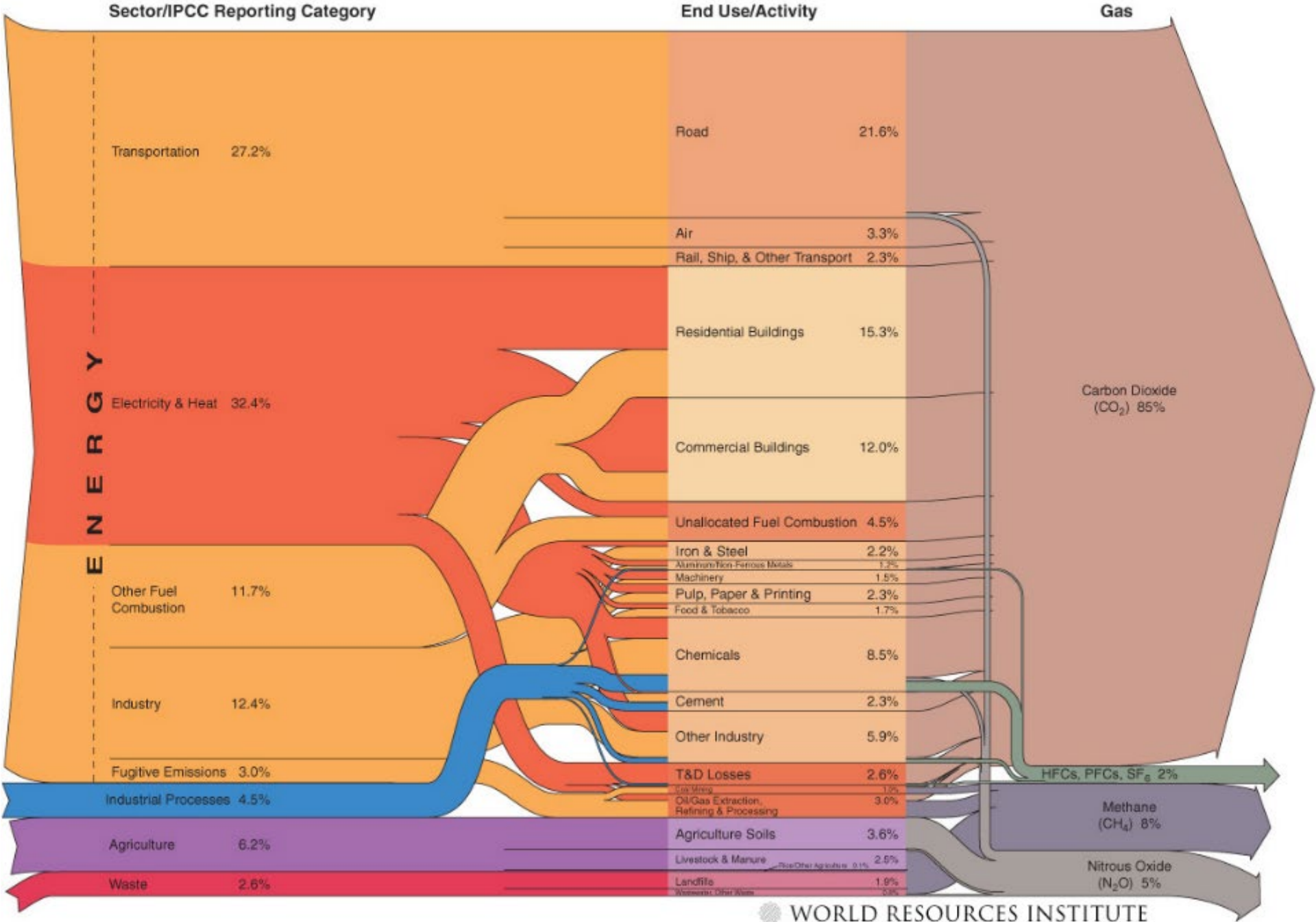
CO_2 and other gases in the atmosphere trap heat, keeping the earth warm.

ATMOSPHERE

For many companies, at least 75% of carbon emissions are from the supply chain.



U.S. GHG Emissions Flow Chart



WORLD RESOURCES INSTITUTE

Why consider the environment?

Supply Chain Management with a 'DfE' mindset can:

- Reduce energy and water consumption (which can reduce costs)
- Improve resource use efficiency
- Reduce waste (which can reduce waste disposal costs); archaeology
- Reduce environmental health impacts of goods and services.
- Potential post-consumer feedstock

Potential Benefits:

- Improves Agility
- Increases Adaptability
- Promotes Alignment
- Bring Value

DfE-Design-for-the-Environment

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Rutgers University
Product Carbon/Climate Impact Research

Measuring carbon emissions at every step of the supply chain could lead to valuable energy and cost saving opportunities (for the General Public, Rutgers, and our Manufacturers). "Carbon Footprinting" is a way to measure the impact human activities have on the environment, in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide.

Rutgers Carbon Reduction Label Concept:
The Rutgers Carbon Reduction Label would show the total Greenhouse gas emissions from every stage of the product's lifecycle, including production, transportation, preparation, use and disposal.

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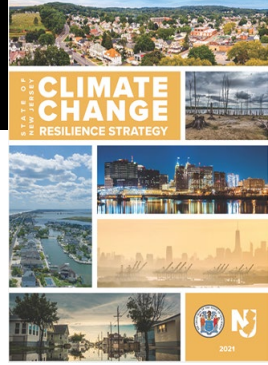


A climate resilience process

Identify future threats and opportunities

Possible threats and opportunities from future climate change can be categorised by business function or by sector:

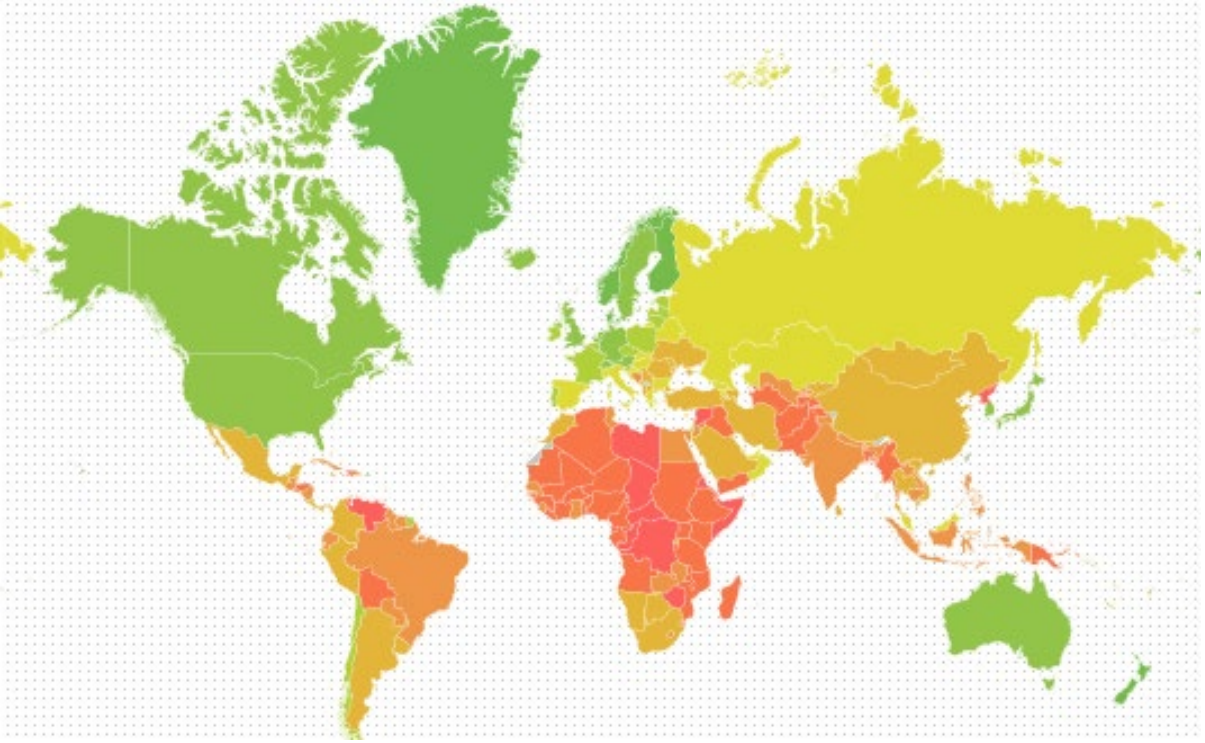
- Typical business functions might include: markets, processes, logistics, people, premises and finance.
- Sectoral examples could include agriculture, finance, health, retail or oil & gas.

	Threats (negative impacts)	Opportunities (positive impacts)
Finance	*Increased insurance premiums*	*New market opportunities*
Supply Chain	*Increased disruptions and delays*	*Local Sourcing Market Development*
Premises	*Repeat flooding, Droughts, Pests*	*Opportunity to relocate*

A climate resilience process: Tool #1

Datasets and tools

- **ND GAIN Country Readiness Scores**

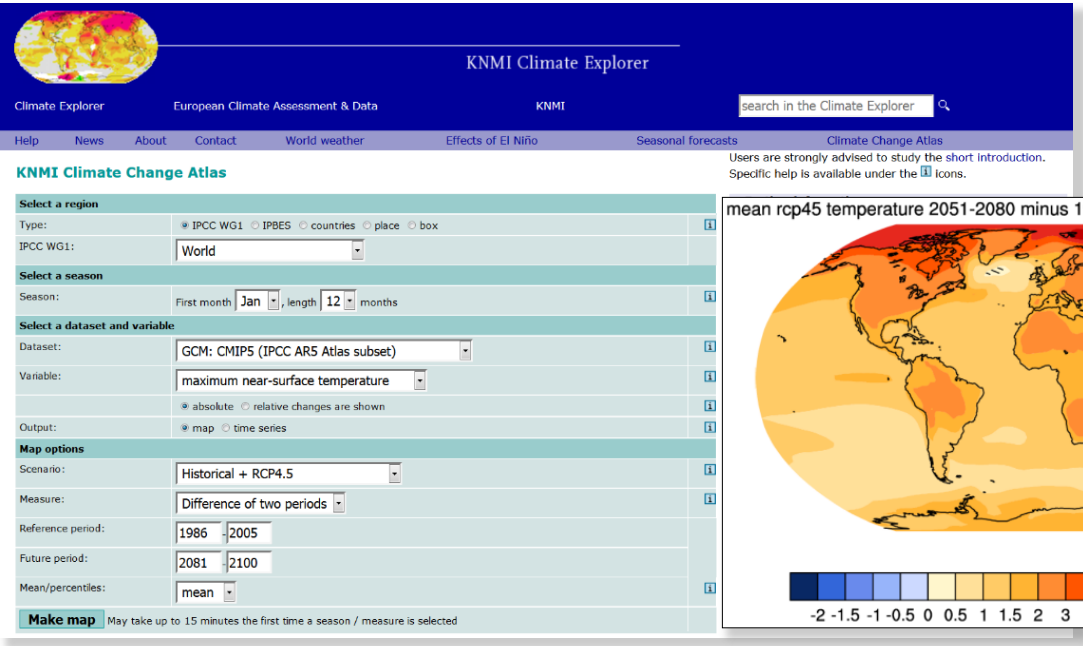


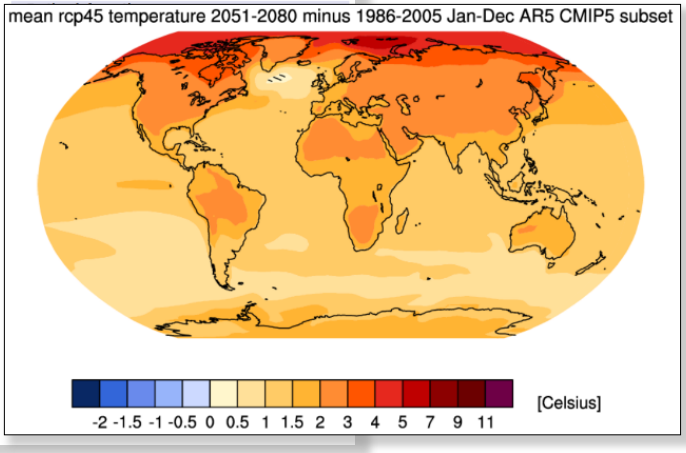
Since 1998, the University of Notre Dame has published an annual Index based on countries' vulnerability to climate and other risks, and their readiness to build resilience.

A climate resilience Tool #2

Datasets and tools

- **KNMI Climate Change Atlas**
- The latest observed, reanalysis and climate projection data accessible through an easy-to-use user interface.





Includes the following core IPCC projection variables, as well as multiple extreme parameters:

- Near-surface min/max temperature
- Precipitation
- Evaporation, transpiration, sublimation
- P-E, net water flux
- Moisture content of soil layer
- Humidity (specific and relative)
- Downward solar radiation
- Air pressure at sea level

RUTGERS Newark Anchor Collaborative

Business School
SUPPLY CHAIN MANAGEMENT

Newark 2020 Program

- New Jersey's most populous city
- America's 3rd oldest city (est. 1666)
- One of many U.S. "legacy cities"

Local Sourcing for:

- Economic Development
- Social Impact
- Climate Impact Reduction
  - Tool #3-5

*City of Newark's effort to **strengthen and grow its local and regional manufacturing and business base.***

*Anchor:
30% supply

70% demand

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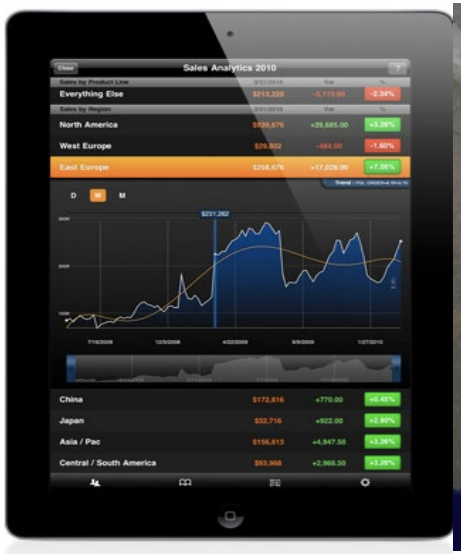
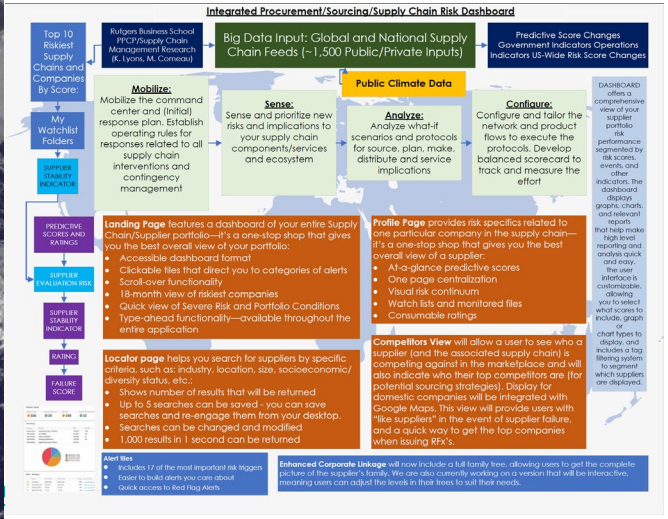
Rutgers Tool #3

Rutgers Business - Big Data Analytics Climate Impact and Supply Chain/Procurement Impacts

Climate Impact…Analyzing Supply Chain Risks and Responses Utilizing Big Data Analytics

Impact of "Super Storms" on the Supply Chain





Integrated Procurement/Sourcing/Supply Chain Risk Dashboard

Rutgers Tool #4

Top 10 Riskiest Supply Chains and Companies By Score:

Rutgers Business School PPCP/Supply Chain Management Research (K. Lyons, M. Comeau)

Big Data Input: Global and National Supply Chain Feeds (~1,500 Public/Private Inputs)

Predictive Score Changes
Government Indicators Operations Indicators US-Wide Risk Score Changes

Public Climate Data

My Watchlist Folders

SUPPLIER STABILITY INDICATOR

PREDICTIVE SCORES AND RATINGS

SUPPLIER EVALUATION RISK

SUPPLIER STABILITY INDICATOR

RATING

FAILURE SCORE

Mobilize:
Mobilize the command center and (Initial) response plan. Establish operating rules for responses related to all supply chain interventions and contingency management

Sense:
Sense and prioritize new risks and implications to your supply chain components/services and ecosystem

Analyze:
Analyze what-if scenarios and protocols for source, plan, make, distribute and service implications

Configure:
Configure and tailor the network and product flows to execute the protocols. Develop balanced scorecard to track and measure the effort

DASHBOARD offers a comprehensive view of your supplier portfolio risk performance segmented by risk scores, events, and other indicators. The dashboard displays graphs, charts, and relevant reports that help make high level reporting and analysis quick and easy. The user interface is customizable, allowing you to select what scores to include, graph or chart types to display, and includes a tag filtering system to segment which suppliers are displayed.

Landing Page features a dashboard of your entire Supply Chain/Supplier portfolio—it's a one-stop shop that gives you the best overall view of your portfolio:

- Accessible dashboard format
- Clickable tiles that direct you to categories of alerts
- Scroll-over functionality
- 18-month view of riskiest companies
- Quick view of Severe Risk and Portfolio Conditions
- Type-ahead functionality—available throughout the entire application

Profile Page provides risk specifics related to one particular company in the supply chain—it's a one-stop shop that gives you the best overall view of a supplier:

- At-a-glance predictive scores
- One page centralization
- Visual risk continuum
- Watch lists and monitored files
- Consumable ratings

Locator page helps you search for suppliers by specific criteria, such as: industry, location, size, socioeconomic/ diversity status, etc.:

- Shows number of results that will be returned
- Up to 5 searches can be saved - you can save searches and re-engage them from your desktop.
- Searches can be changed and modified
- 1,000 results in 1 second can be returned

Competitors View will allow a user to see who a supplier (and the associated supply chain) is competing against in the marketplace and will also indicate who their top competitors are (for potential sourcing strategies). Display for domestic companies will be integrated with Google Maps. This view will provide users with "like suppliers" in the event of supplier failure, and a quick way to get the top companies when issuing RFx's.

Alert tiles

- Includes 17 of the most important risk triggers
- Easier to build alerts you care about
- Quick access to Red Flag Alerts

Enhanced Corporate Linkage will now include a full family tree, allowing users to get the complete picture of the supplier's family. We are also currently working on a version that will be interactive, meaning users can adjust the levels in their trees to suit their needs.

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Rutgers Tool #5

RUTGERS UNIVERSITY | NEWARK

Integrated Procurement/Sourcing/Supply Chain Risk/Social Impact Dashboard

Annual Procurement Budget (Government, Corporate, Organization, etc.); FY/CY Current, Previous Year, Real-Time Spend Data (Budget/Spend)

Division, Agency, Department Spend (by category) last year, YTD

80/20 Mix by spend, category and supplier: FY/CY Current, Previous Year

Public Climate Data (e.g.NASA)

Savings Analysis (Rutgers/ Princeton Study); 10 criteria

Organization Expansion – Contraction Plans

Past 6 years of purchasing data (updated annually)

Supplier Performance Data

- Number of Suppliers (by category, usage, not used, inactivity data)
- Supplier Portal Performance (updates and input)
- Payment Performance
- Procurement KPIs

Supply Chain EcoSystem and Range

- Spend by Region and Community economic input/ output impact
- Commodity Price Index (NASDAQ, DJIA, FTSE, NIKKEI, Africa, etc.); Linked
- Commodity and Services Discoveries, Patents, Research, Concepts,
- Risk and Resiliency Index (multiple input from dashboard, including climate-NASA data)

Sourcing Market Trends

- Local Sourcing Market and Trends
- Regional Sourcing Market and Trends
- U.S. Sourcing Market and Trends
- Global Sourcing Market and Trends

Social and Community Impact

- Organizational Environmental Scan Data
- Supplier Diversity Data: industry standard criteria plus community buy/hire local data
- Purchasing Disparity Index (by year, current trend); data from IPSSCD dashboard
- Local Anchor/Business Resident Employment Data

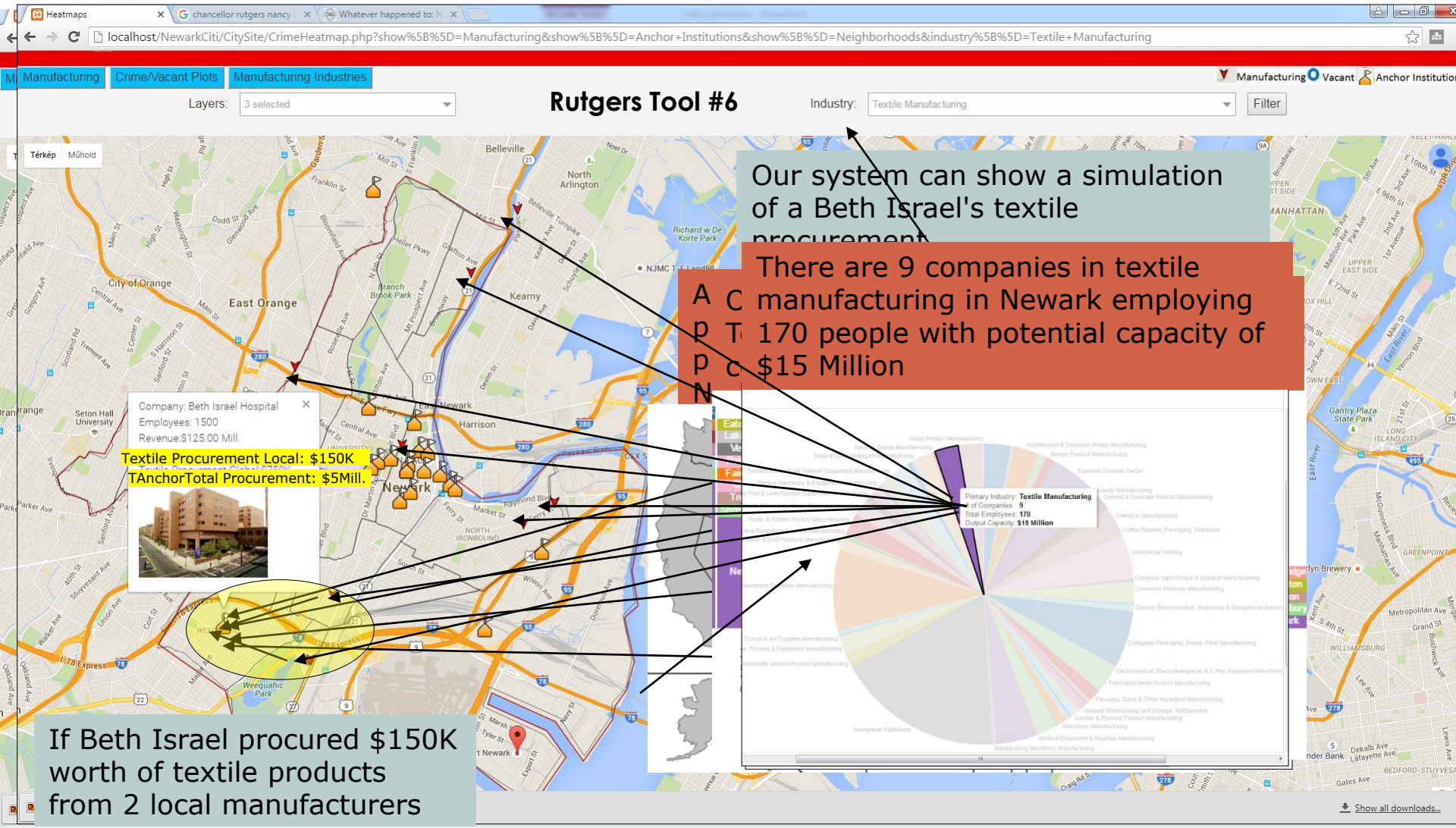
Social Determinants of Health Performance Reports:

- Economics
- Employment
- Health
- Tranportation

Dashboard design for the integration of souring, supply chain and procurement data with social determinants of health criteria for public and private stakeholder decision-making. November 2021

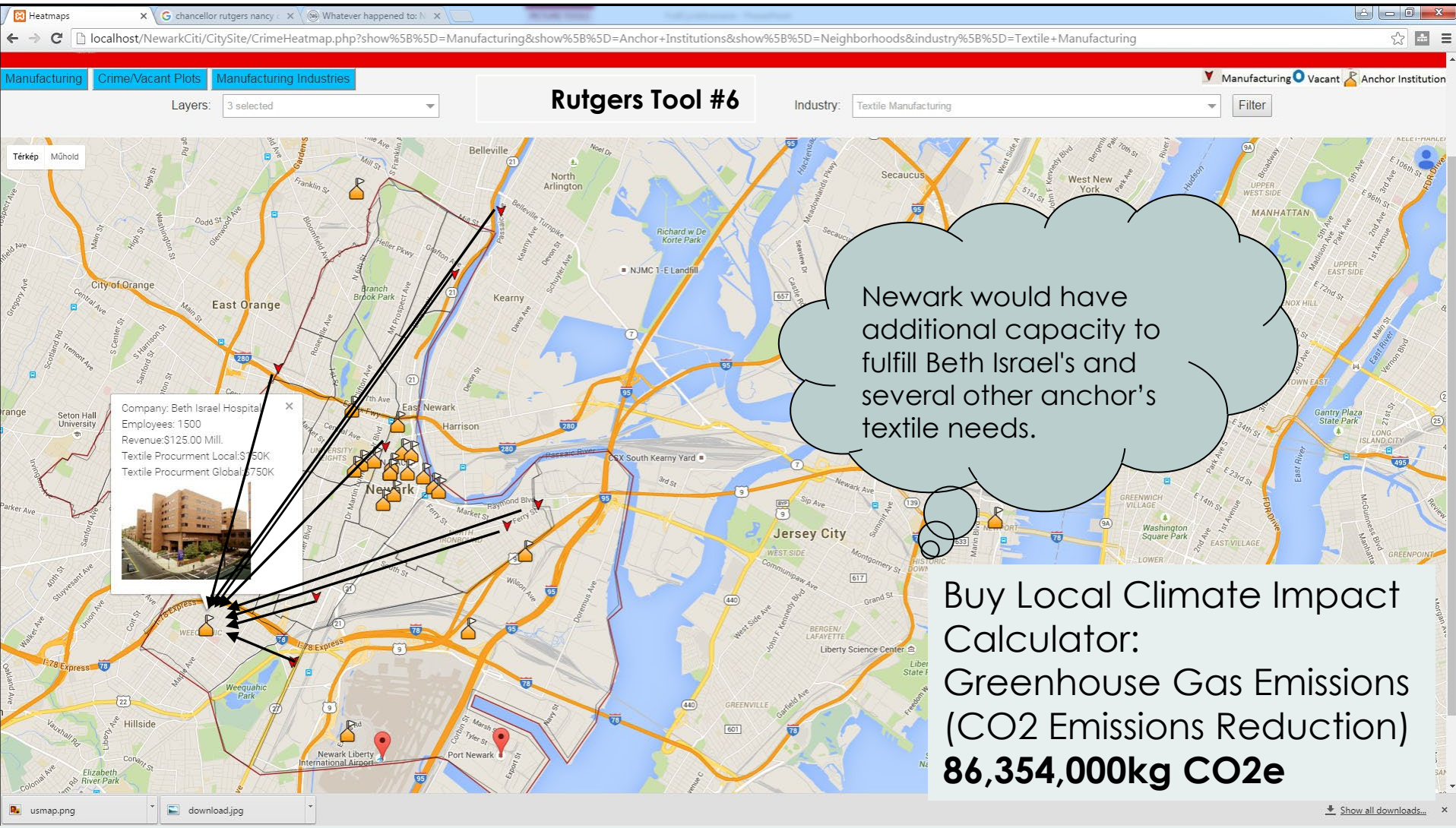
Magda Comeau, RBS-PPCP
Kevin Lyons, Ph.D., RBS-SCM-PPCP

RUTGERS Newark Anchor Buy Local – Climate Impact Program



Rutgers Business - Big Data Analytics Climate Impact and Supply Chain/Procurement Impacts

RUTGERS Newark Anchor Buy Local – Climate Impact Program



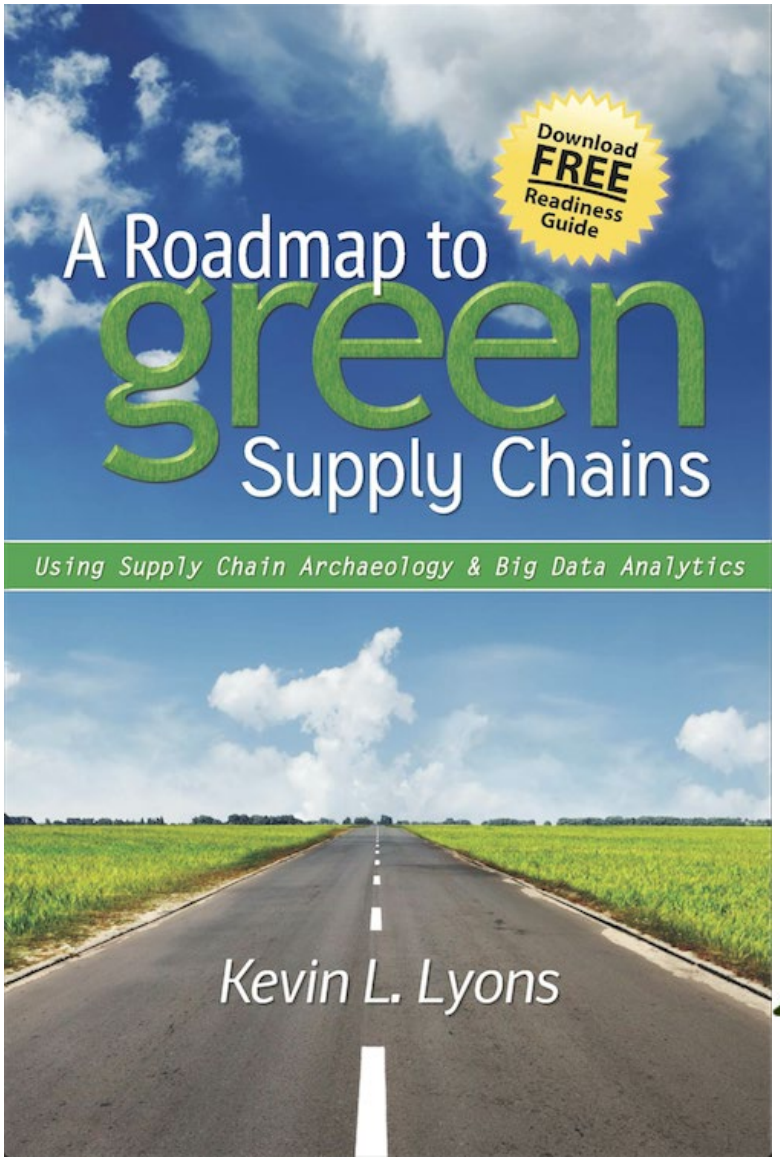
Rutgers Business - Big Data Analytics Climate Impact and Supply Chain/Procurement Impacts

In summary

- Climate risks - exposure, vulnerability, and hazard;
- Assessing and managing climate risk is an increasingly routine component of risk management schemes and investment due diligence processes;
- There is no universal method to assess climate risk; tools are available!
- Obtaining the right data and information is an important early step in any climate risk process;

Adaptation involves:

1. Recognizing that the risk landscape is changing
2. Make decisions that allow likely impacts to be reduced or managed, and deploy adaptation actions that are flexible
3. Adaptation actions need to be physical, financial, informational, governance and collaborative



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