

# Value Proposition for Reducing the Carbon Footprint



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# What We'll Cover ...

- Introduction
- What can be done
- Network Planning
- Demonstration
- Wrap-up



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# Changes are the pressing Green issue

## **Geophysicists: Theory of Global Warming 'Well Established'**

The world's largest society of Earth and space scientists has released a new statement on climate change that unequivocally names human activity as the cause of global warming.

Foxnews.com, New York City, 25 Jan 2008

**We have consumed 1 trillion barrels of Oil over the last 125 years. We will consume the next trillion in the next 30 years**

*Cambridge Energy Research Associates, 2005*

**183 countries ratified the Kyoto Protocol to date**

*Nov 08, United Nations Framework Convention on Climate Change*

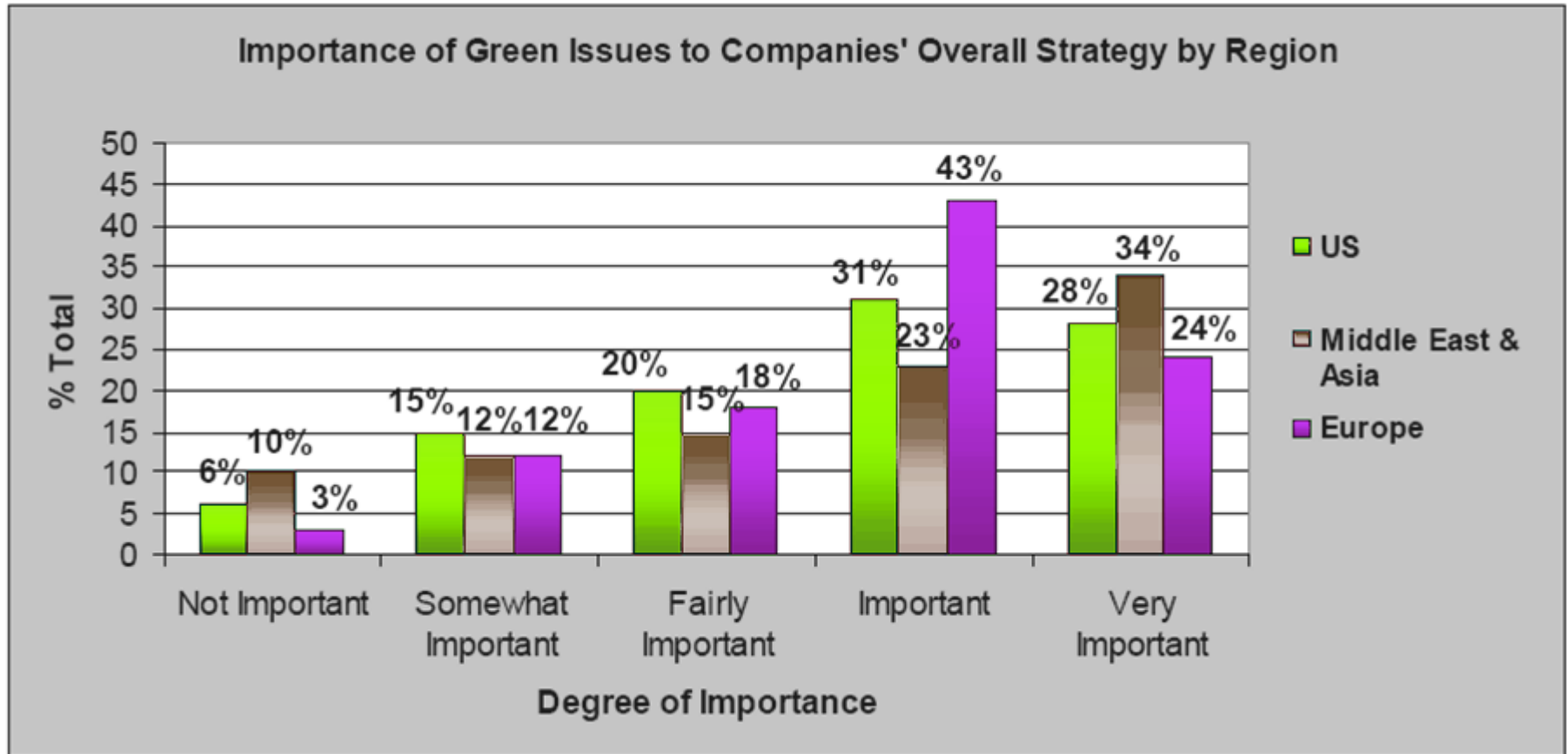
**Barack Obama supports the implementation of a market-based cap-and-trade system to reduce carbon emissions by the amount scientists say is necessary: 80 percent below 1990 levels by 2050.**

*Obama-Biden Environment Plan 2008*



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# Green SC: Executives are Concerned



Eye for Transport Survey, Nov. 2007



# Pressure Comes

- From Consumers
  - Products we buy should have less carbon footprints
- From Employees
  - Is my company doing the right thing ?
- From B2B
  - From business processes (New rules)



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# Product Labels



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# The Carbon Reduction Label

(Source Carbon Trust)

## Core Modules

## Optional Modules

Carbon  
Trust

working with  
the Carbon Trust

Logo



Number,  
Per XXX

CO2  
per 250g serving

Reduction

We have committed  
to reduce this  
Carbon Footprint

The Carbon Footprint of this product is XXX per [functional unit]. This is the total carbon dioxide (CO2) and other greenhouse gasses emitted during its life, including production, use and disposal

Carbon  
Footprint  
Explanation

This compares to the Carbon Footprint of Non-Concentrated Biological Powder, which is 98g per wash

Product  
Comparisons

You can reduce this Carbon Footprint by washing at 30°C

Customer  
Action



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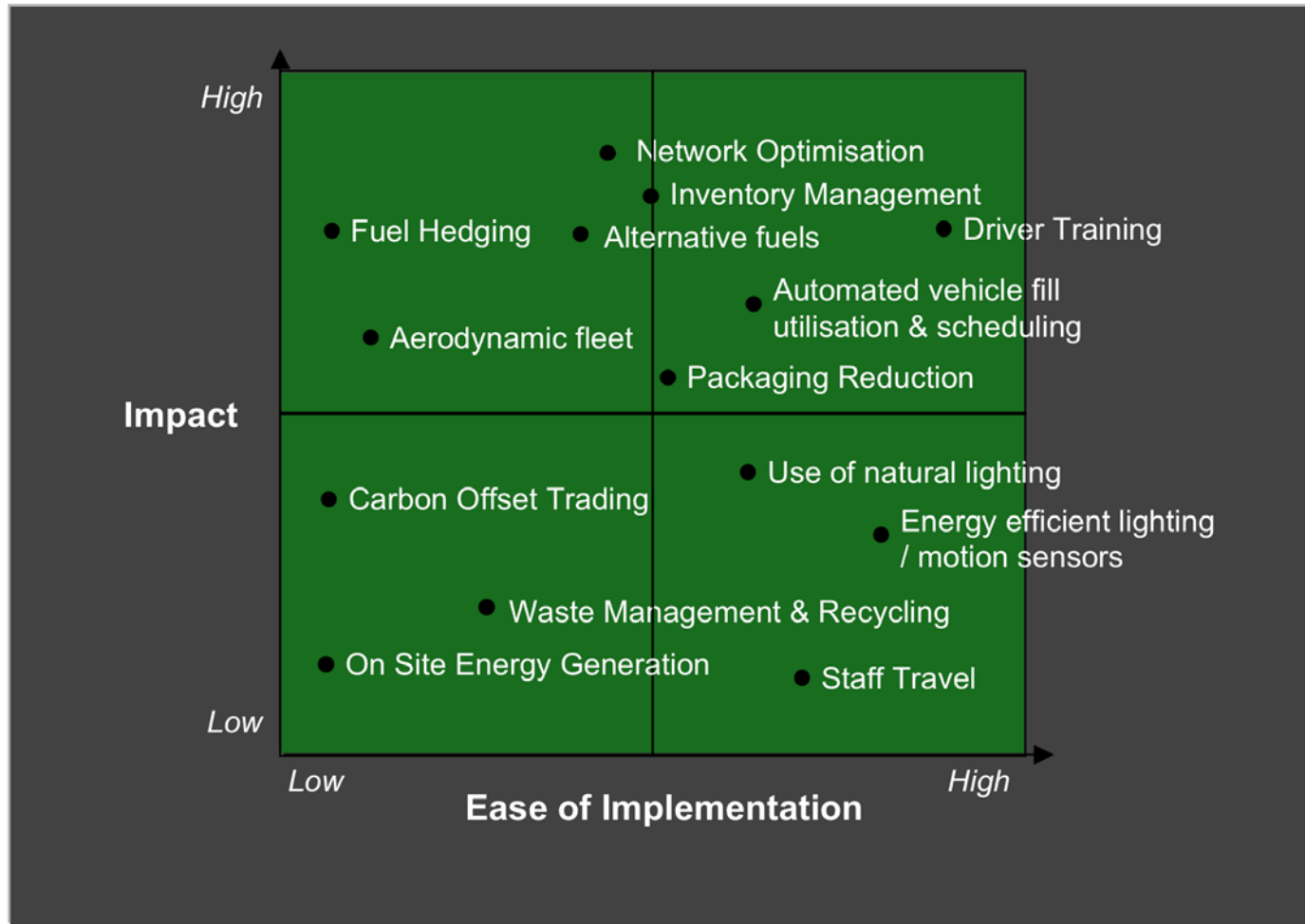
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# What can be done !



# logistics opportunities



- Network Optimisation
- Improved Inventory Management
- Improved Vehicle Fuel Consumption
- Reduced Warehouse Energy Consumption
- Packaging Reduction



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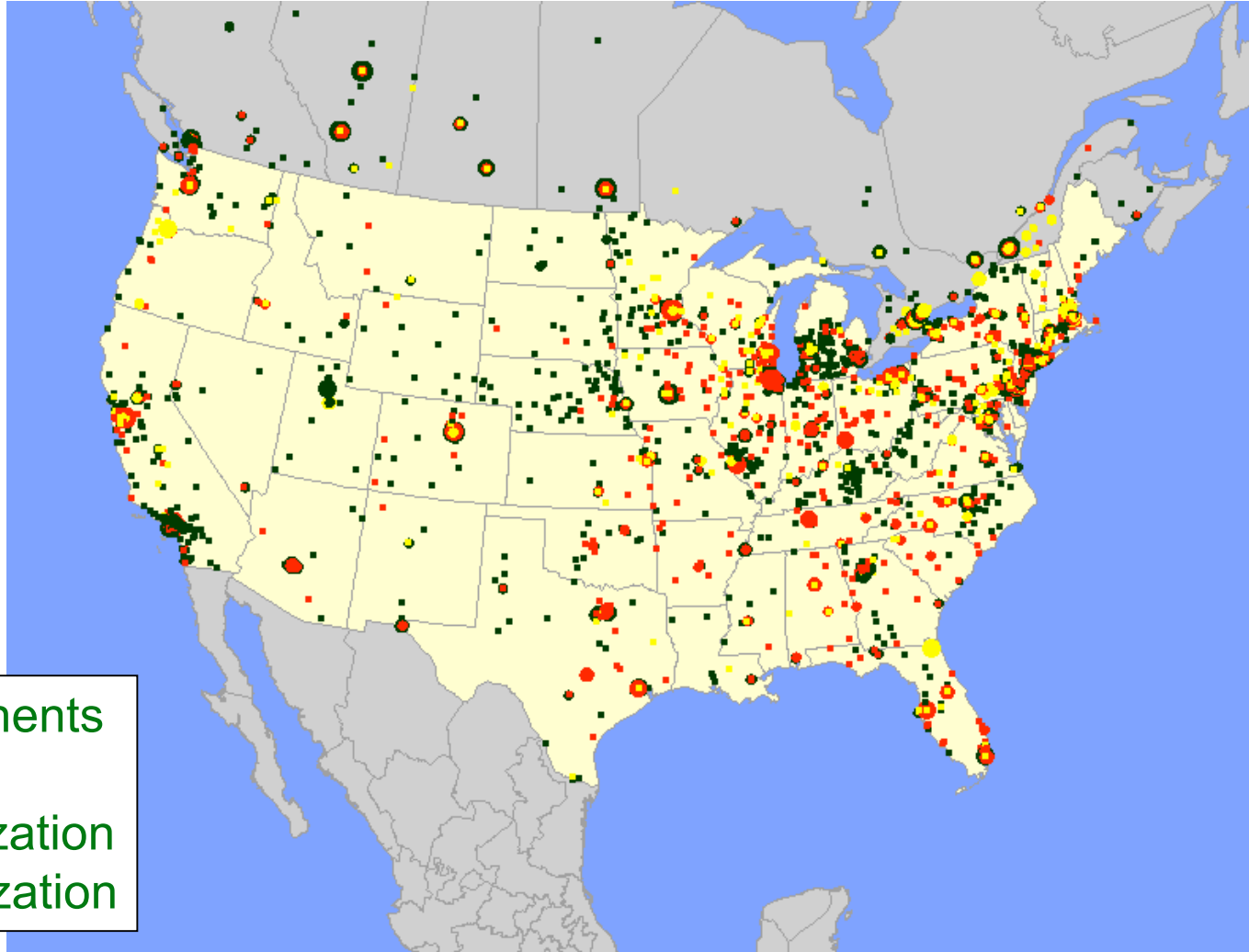
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# Network Design Introduction



Components

- Data
- Optimization
- Visualization



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# More and More companies are using Network Design

- Mergers and Acquisitions
- Consolidations, cost reduction and plant rationalization
- Transportation costs
- Production sourcing
- Risk Management
- Carbon emission footprint



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# Strategic Network Design

- Allows companies to design & optimize their supply chain network
- Key questions answered:
  - What is the right number, location, size, and handling capacities of depots, hubs, DCs, etc.? Which ones should be closed / opened ?
  - What is the optimal number, location and capacities of suppliers, plants and production lines?
  - What modes of transportations should be used where ?
  - How to best handle different products types?
  - How to best assign customers and products to DC's ?
- Considers at the trade-offs between:
  - Total logistics costs
    - Fixed and variable facility costs
    - Transportation costs (Inbound and outbound, duties, tariffs, etc.)
    - Production costs (in-house, outsourced, suppliers)
    - Inventory costs
    - Carbon emission costs
  - Service level / distance to customer



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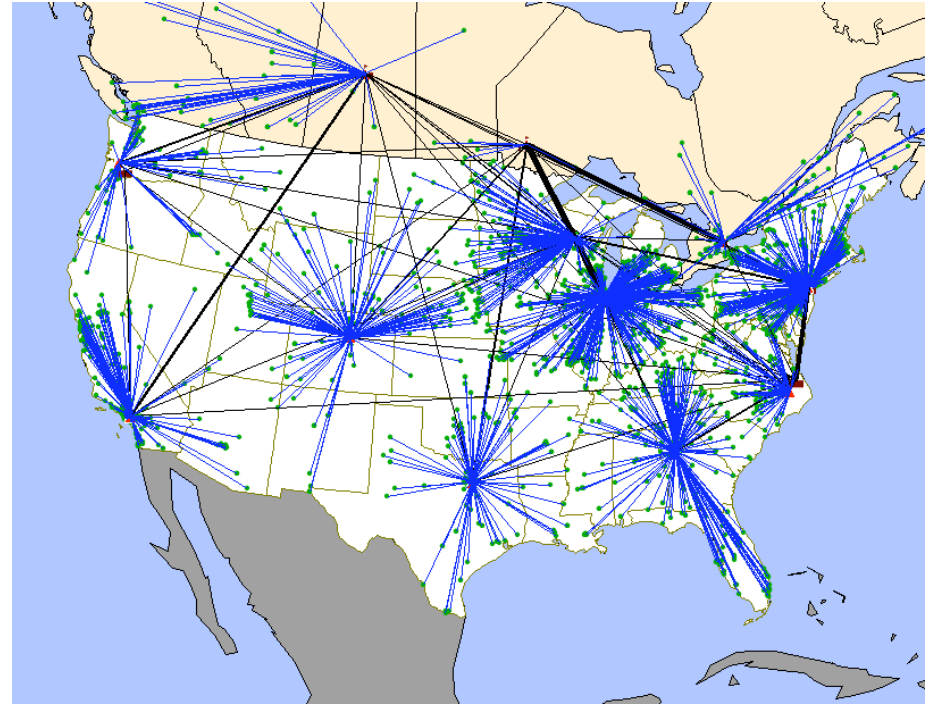
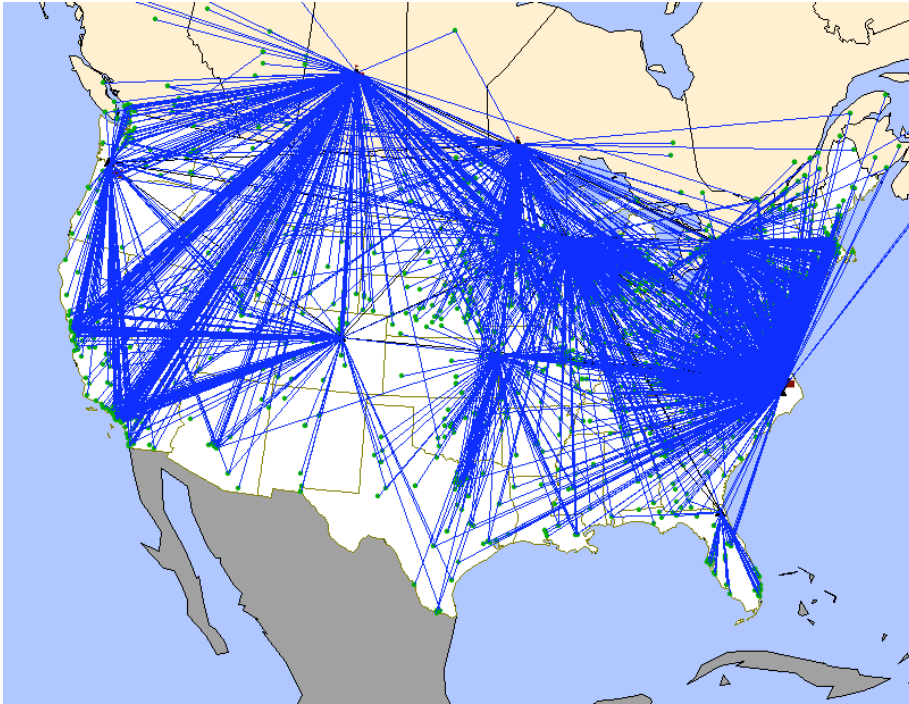
# Supply & Sourcing Decisions

- Are products being made in the right location?
- How to most efficiently use my factories?
- When and how much should I outsource?
- Should plants produce a lot of products to serve the local market or should a plant produce a few products to minimize production costs?
- Should we close the high-cost plant(s)?
- How to address seasonal demand or large spikes (e.g., at product launches): Should we build ahead? Use overtime? Outsource?



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# Solution Comparison

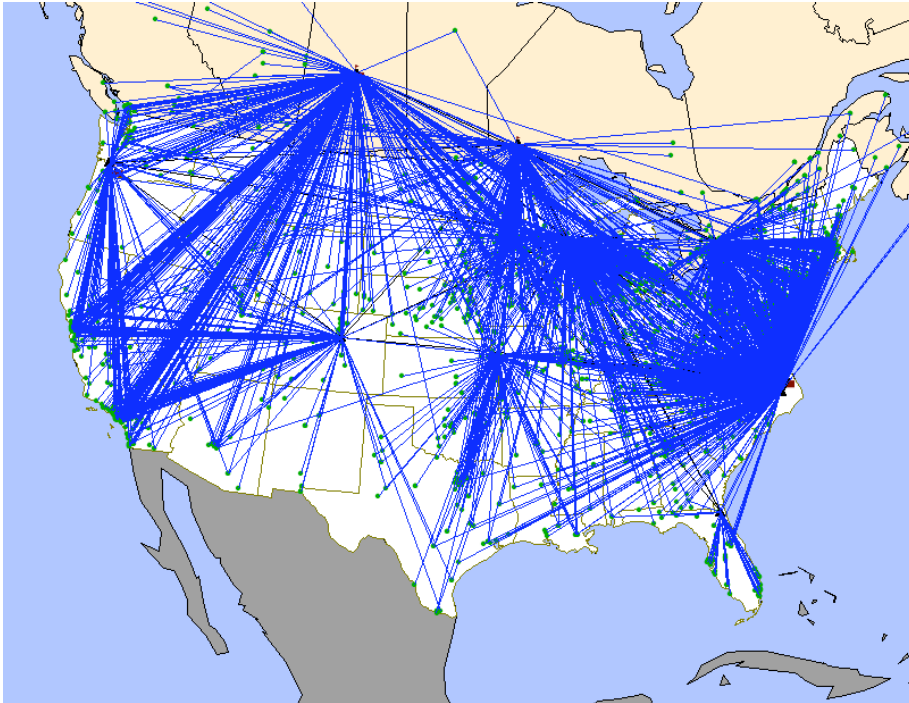


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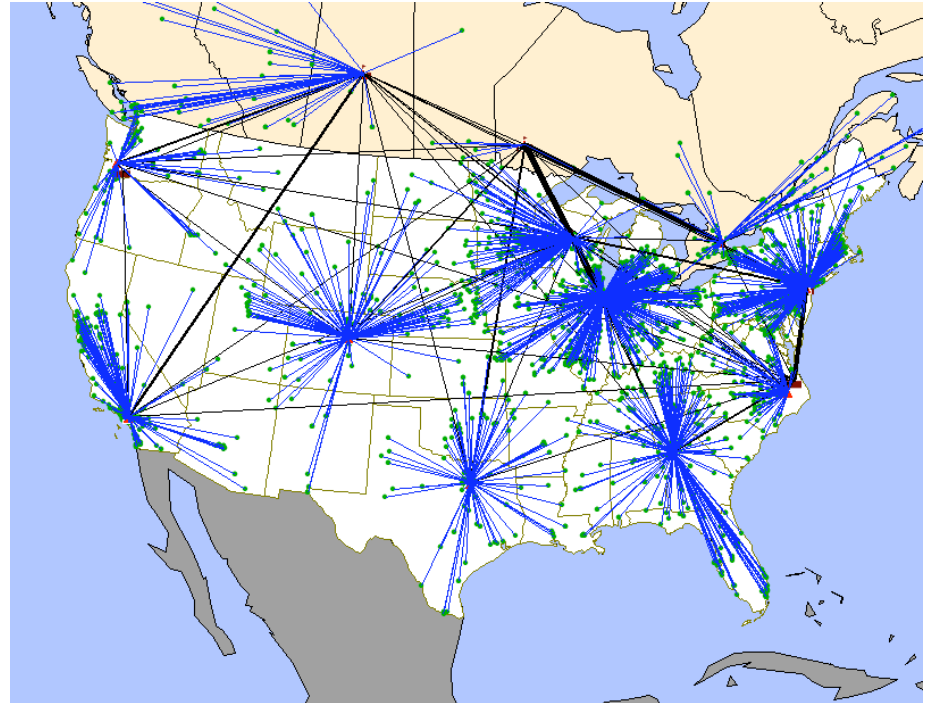
# Making the Trade-Off Between Service and Cost

## Optimal Network For Cost



Savings: \$6 million  
Service: 40% next day

## Optimal Network For Service



Savings: \$3 million  
Service: 80% next day

**Which is Better?**

# LogicNet Plus Carbon Footprint Extension

## *Used in two ways*

### Reporting

- User enters various factors used to calculate CO<sub>2</sub> emissions associated with various supply chain activities.
- LogicNet Plus optimizes the supply chain for lowest total cost, or maximum total profit.
- LogicNet Plus reports total Carbon Footprint to be used as an additional factor in decision making.

### As a Constraint

- User enters various factors used to calculate CO<sub>2</sub> emissions associated with various supply chain activities.
- User enters a maximum total Carbon Footprint (in metric tons) the supply chain is not to exceed.
- LogicNet Plus optimizes the supply chain for lowest total cost, or maximum total profit while adhering to the constraint on Carbon Footprint.



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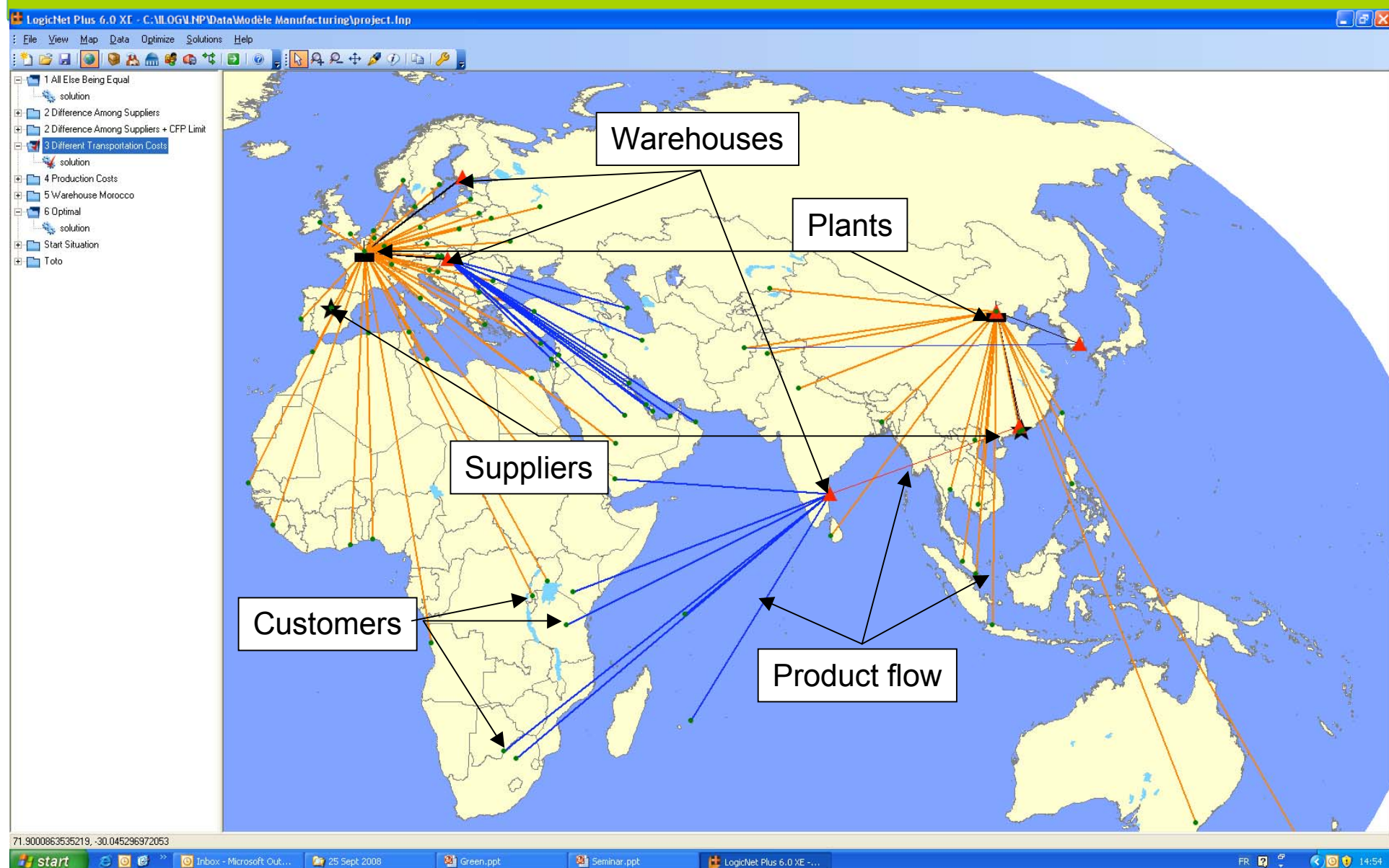
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# Strategic Network Design





# ILOG Carbon Footprint



# ILOG Carbon Footprint

LogicNet Plus 6.0 XE - C:\ILOG\NP\Data\Modele Manufacturing\project.inp

File View Map Data Optimize Solutions Help

1 All Else Being Equal solution  
2 Difference Among Suppliers  
2 Difference Among Suppliers + CFP Limit  
3 Different Transportation Costs solution  
4 Production Costs  
5 Warehouse Morocco  
6 Optimal solution

Microsoft Excel - rad2259B.tmp

File Edit View Insert Format Tools Data Window Help

Type a question for help

A2 Next CBECs will be conducted in 2007

Released: Dec 2006  
Next CBECs will be conducted in 2007

Table C14. Electricity Consumption and Expenditure Intensities for Non-Mall Buildings,

	Electricity Consumption						Electricity Expenditures		
	per Building (thousand kWh)	per Square Foot (kWh)	per Worker (thousand kWh)	Distribution of Building-Level Intensities (kWh/square foot)			per Building (thousand dollars)	per Square Foot (dollars)	per kWh (dollars)
25th Percentile				Median	75th Percentile				
All Buildings*	202	14.1	12.2	3.6	8.2	17.1	15.7	1.09	0.078
Building Floorspace (Square Feet)									
1,001 to 5,000	47	17.8	11.4	3.8	8.9	20.3	4.3	1.63	0.092
5,001 to 10,000	92	12.4	10.3	3.8	7.4	14.5	8.7	1.18	0.095
10,001 to 25,000	164	10.5	11.1	2.9	6.3	13.4	13.8	0.88	0.084
25,001 to 50,000	439	12.2	11.6	3.8	8.8	16.2	33.6	0.94	0.077
50,001 to 100,000	927	13.1	14.1	4.5	9.9	17	68	0.97	0.073
100,001 to 200,000	2,181	15.7	12.2	5.3	13	23.4	146.4	1.05	0.067
200,001 to 500,000	4,347	15	15.4	5.8	12.1	20.7	301	1.04	0.069
Over 500,000	17,034	19	12.8	10	16.6	25.2	1209.8	1.35	0.071
Principal Building Activity									
Education	283	11	8.7	4.9	8.9	13.6	21.1	0.82	0.075
Food Sales	276	49.4	43	33.4	48	77	20.9	3.74	0.076
Food Service	213	38.4	20.3	18.8	37.4	70.3	17.4	3.13	0.082
Health Care	564	22.9	11.5	6.1	12	18.4	37.9	1.54	0.067

LogicNet Plus Carbon Footprint Extension

Trans. By Distance | Trans. By Freight | Warehouses | Plants | Production | Preferences

Plant ID	Plant Name	Energy Consumption per Space (kWh/Pal)	Carbon Conv Factor - Space (kgCO2/kWh)	Energy Consumption per Pdcn Cpcty (kWh/hours)	Carbon Conv F. Cpcty (kgCO2/kWh)
105	Plant China	6.00	1.00	3.00	
104	Plant France	4.00	1.00	3.00	
102	Supplier China	3.00	1.00	4.00	
106	Supplier Spain	1.00	1.00	3.00	

Record: 1 of 4

Example Data

8.0287583786159, 65.9432015601862

start

Inbox - Microsoft Out... 25 Sept 2008

Green.ppt

Seminar.ppt

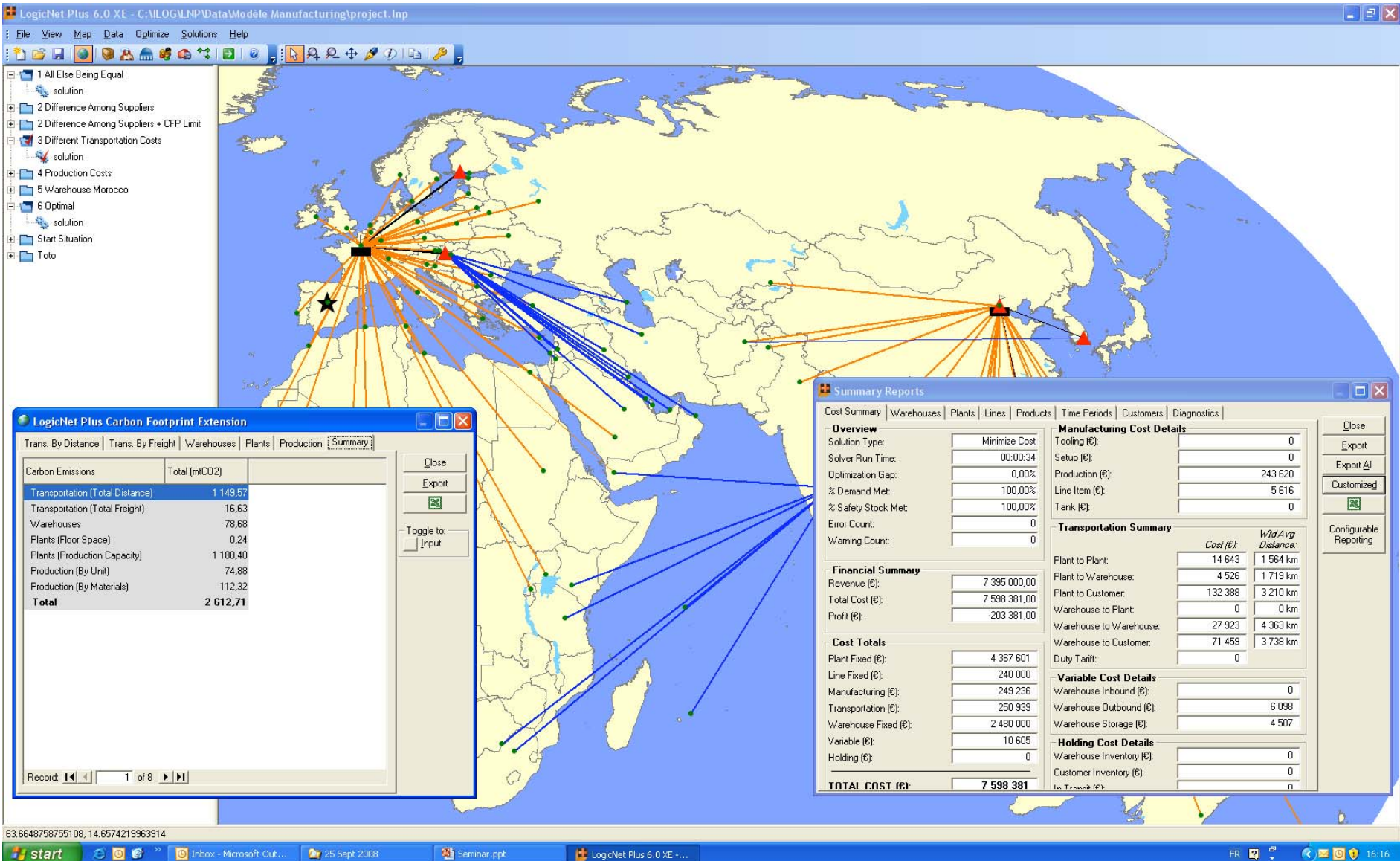
LogicNet Plus 6.0 XE -...

Microsoft Excel - rad2...

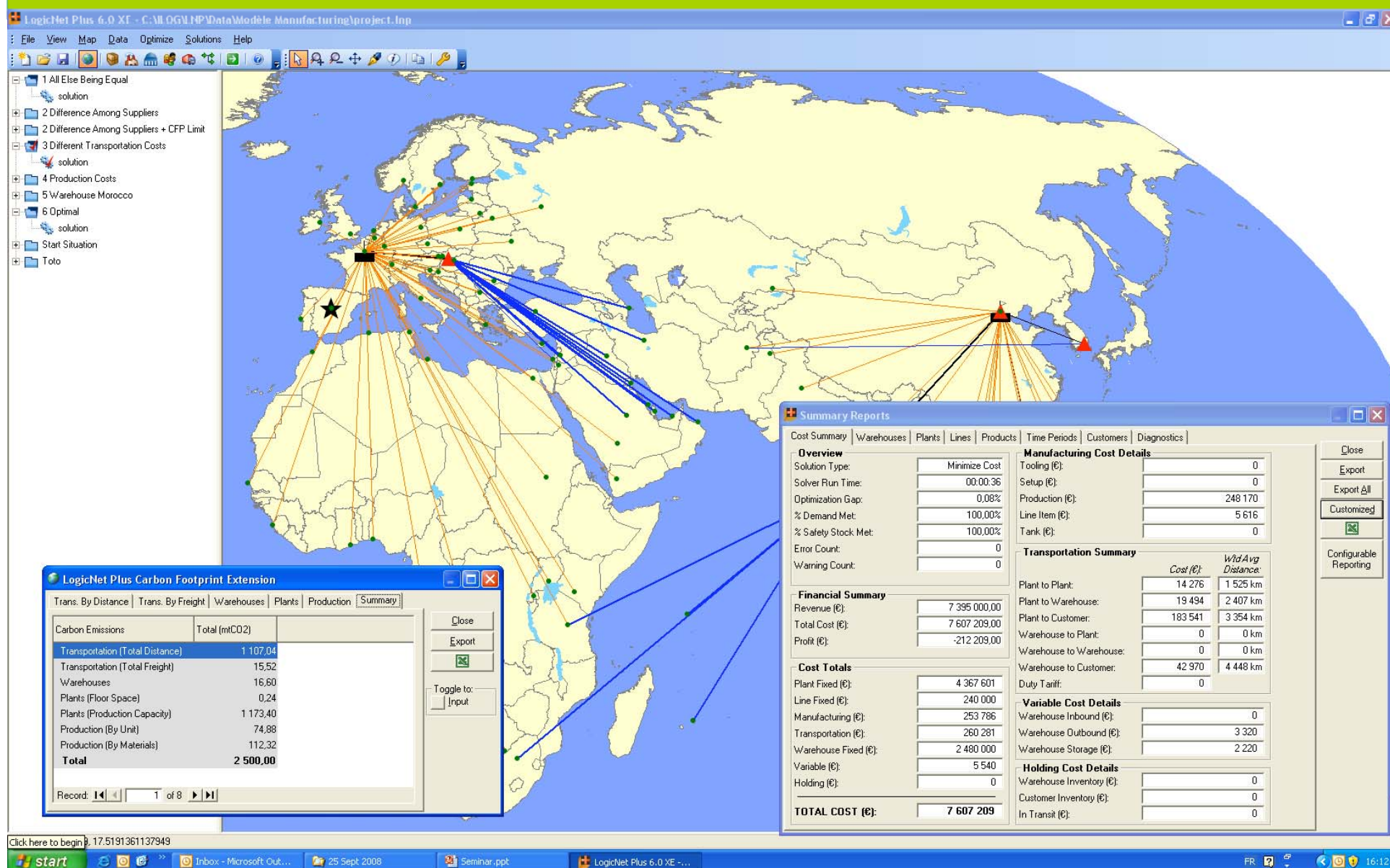
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# ILOG Carbon Footprint Reporting

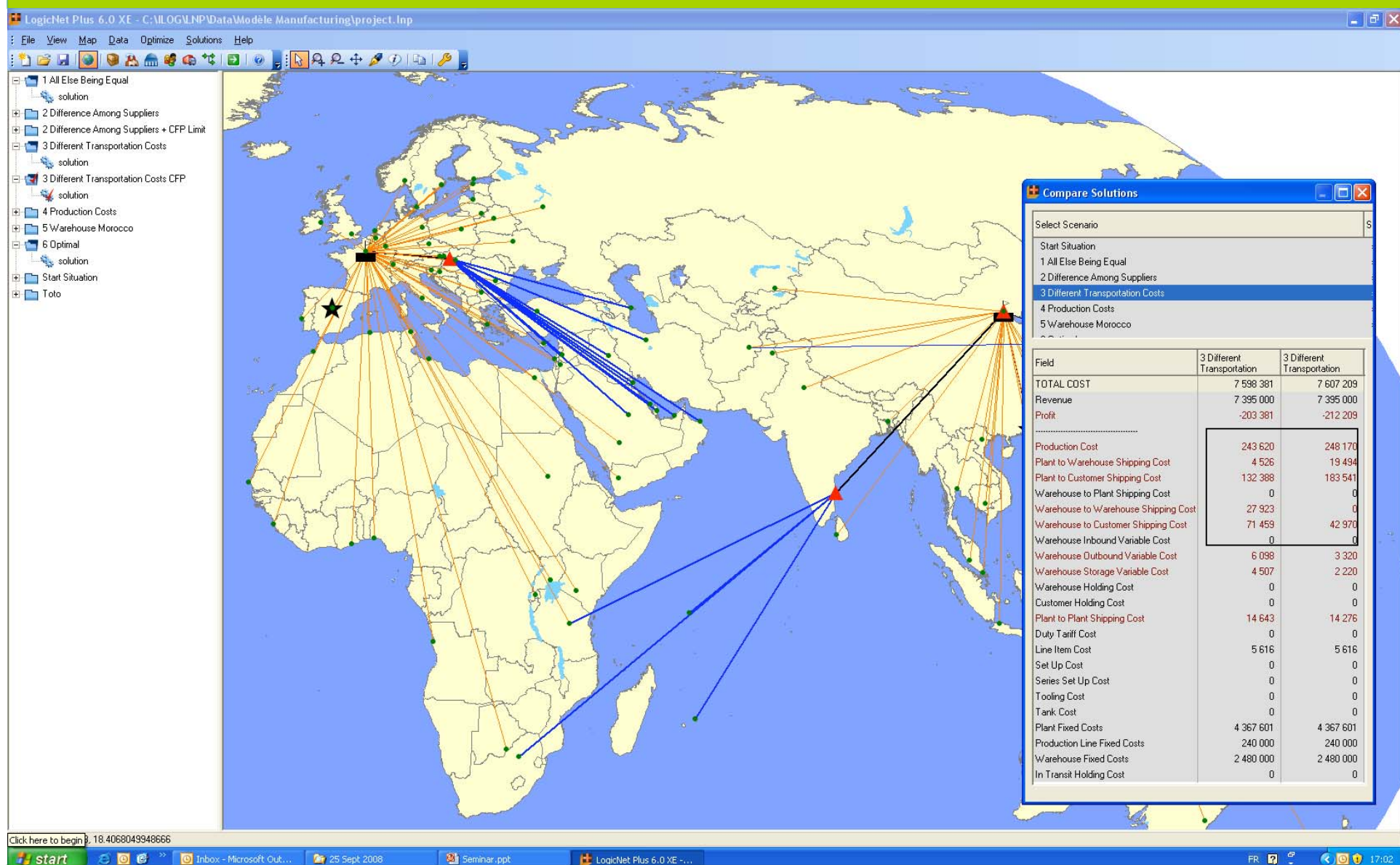


# Carbon Footprint as a constraint





# Solution Comparison



# Case Study 1: Supply Chain Design

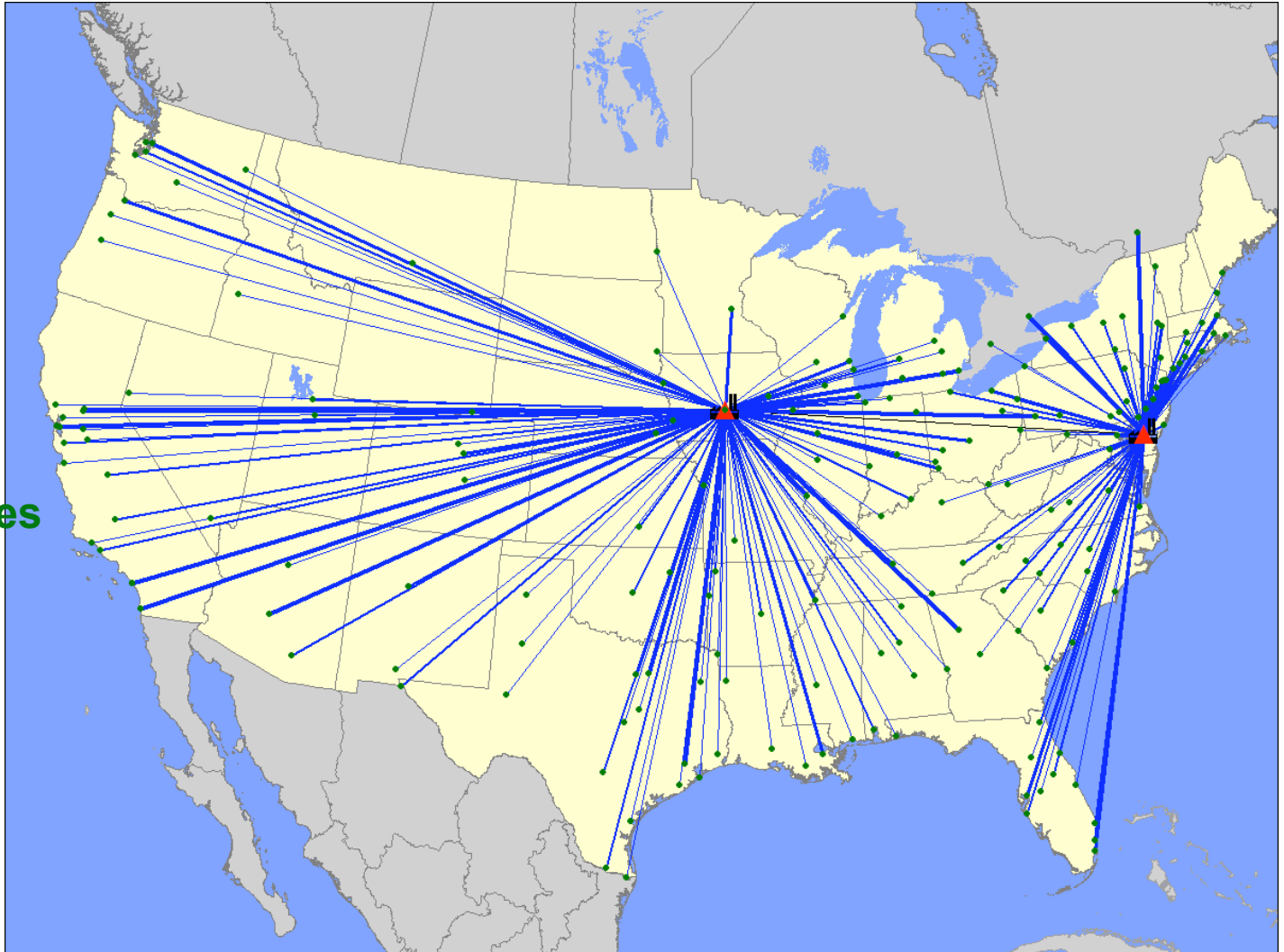
- Manufacturer of Office Furniture
  - Steel Cabinets
- US based manufacturing & distribution network
  - Manufacturing and distributions from 2 sites- Des Moines, IA and Dover, DE
- Two objectives:
  - Redesign distribution network to reduce costs and improve customer service
  - Reduce Carbon Footprint to align with corporate environmental objectives
- The challenge: Find the appropriate trade-off between reducing cost and reducing Carbon Footprint



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# Office Furniture Manufacturer Distribution Study

**2 Plants**  
**2 Existing DC's**  
**58 Potential DC's**  
**200 Customers**  
**11 Product Families**



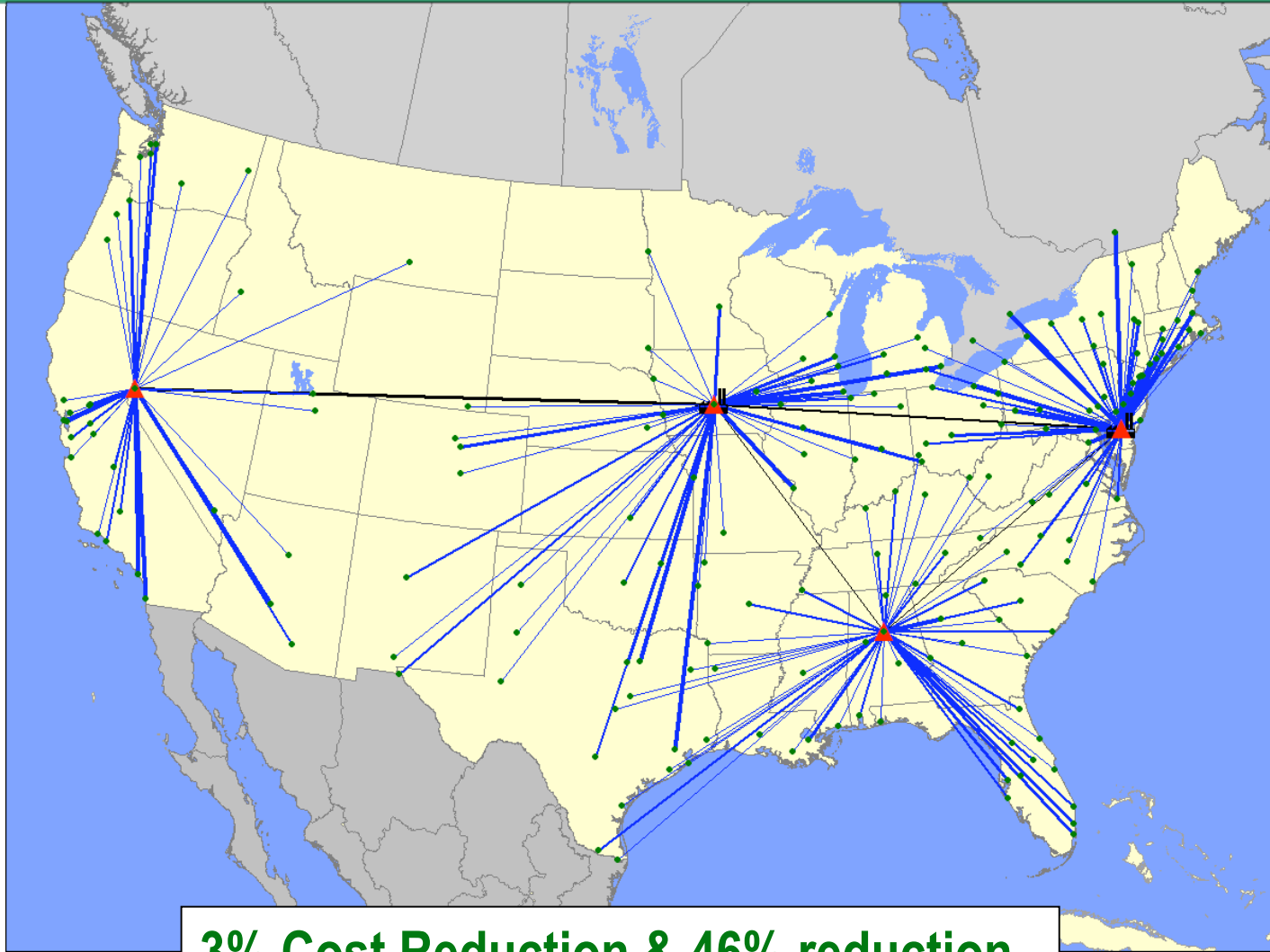
# Office Furniture Manufacturer Distribution Study

- Apply network modeling to design a distribution network that satisfies customer demand at the lowest possible cost, while considering the Carbon Footprint of the new network
- Consider all logistics costs as well as carbon emission from plants, DCs, and the various modes of transportation.
  - Carbon emission per kWh is different from state to state due to different power generation technology
    - Grid Electricity, Natural Gas, Diesel, Petrol, Coal, etc.



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# Optimized Network



**3% Cost Reduction & 46% reduction  
in average distance to customer**



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# Tradeoffs in network

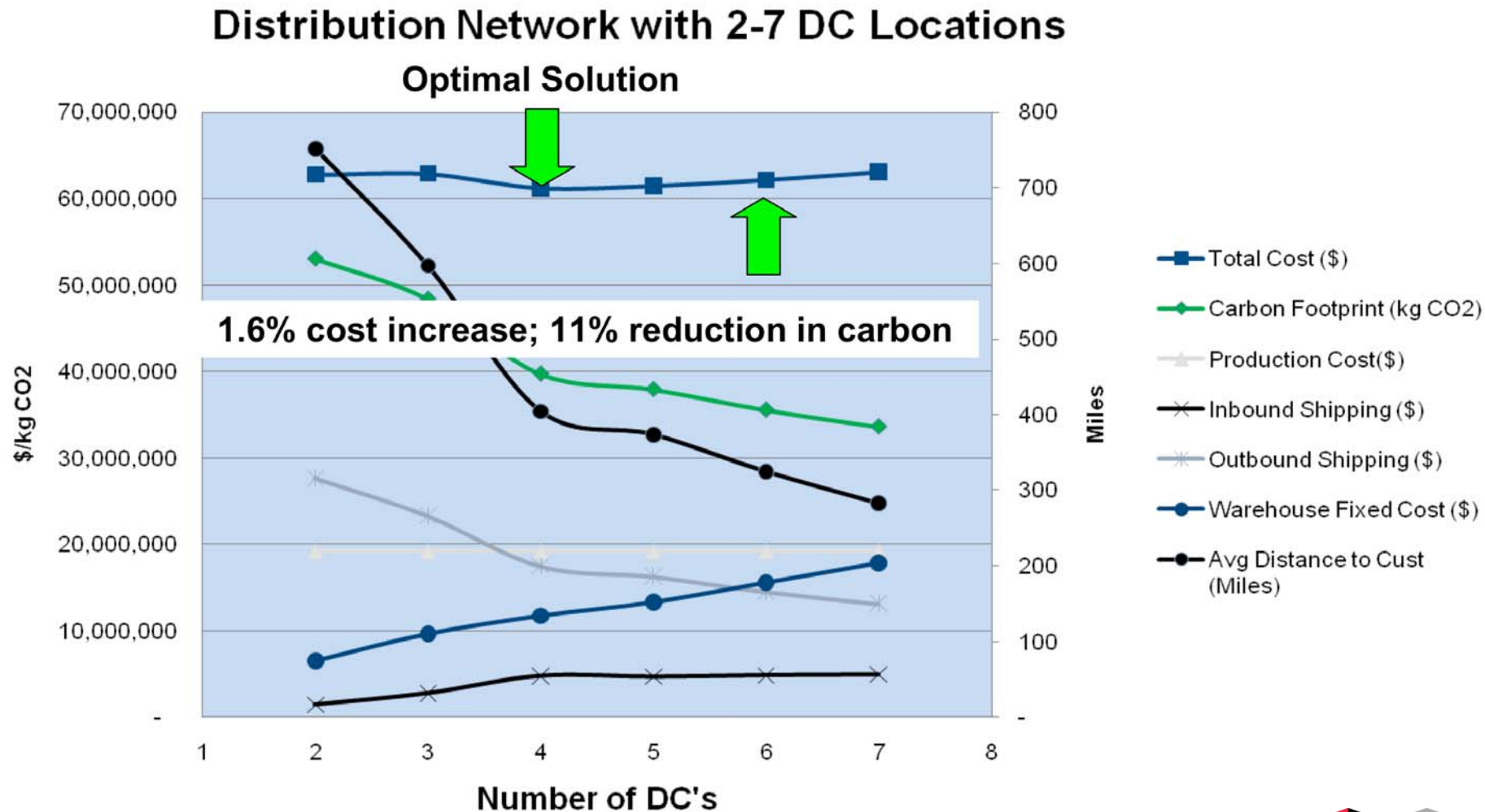
- As additional DCs enter the network, the following occur:
  - DC Fixed Costs increase
  - Outbound Transportation Costs decrease
  - Average distances to customer decrease
  - Carbon Footprint tends to decrease
    - Why?
      - Inbound transportation is mostly rail which has less environmental impact than truck
      - As DC's increase, a greater proportion of total freight is plant-warehouse transportation (rail)
      - Increased CO2 from more facilities does not outweigh reduction in transportation CO2 emissions



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# Trade-Off Curve Between Number of DC's, Costs, Service and Carbon Footprint



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# Key Points to Take Home

- Growing pressure to become more green
  - Regulation
  - Consumer and customer pressure
  - Waste reduction
- LogicNet Plus provides real value
  - Accurate supply chain assessment
    - Network modeling for cost, service *and carbon emissions*
  - Optimization for better investment decisions
    - ILOG, a leader in optimization for 20 years

<http://www.ilog.com/products/supplychain/>



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# Join us at DIALOG09

February 3-5, 2009  
Renaissance Resort at SeaWorld  
Orlando, FL

*For event information*  
[www.ilog.com/dialog](http://www.ilog.com/dialog)



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THANK YOU