

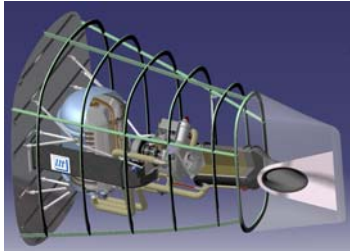


**Kirk Thomson**

**Director**

**Boeing Environmental Affairs**

# Opportunities go beyond products



**Fuel cells offer a technology with positive climate change implications.**



**Commute reduction programs mean less greenhouse gas emissions.**



**Green building methods can provide great energy savings.**

**Energy reductions are still out there in our existing facilities.**



**Green energy and carbon banking.**





Shared Services Group

COMPANY ENVIRONMENTAL AFFAIRS

Environment

# People / Processes / Products

# People

- **Environmental Commitment**
- **Commute Trip Reductions**
- **Virtual Office Opportunities**

# Company-wide, Boeing Commuters avoid . . .

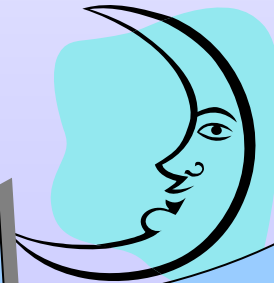
757,736 - miles/day

22,732,085 - miles/month

**272,785,020 - miles/year**



**434 round trips to the  
moon so far this year !**



# Boeing Puget Sound Commuters avoid . . .

408,132 - miles/day

12,243,957 – miles last month

**104,798,682 – miles last year**



A trip to the moon every day

49 trips to the moon last month

**439 trips to the moon last year**



# Boeing Everett Commuters save . . .

8,729 - gallons of gas/day

261,860 - gallons of gas/month

**3,142,323 - gallons of gas/year**



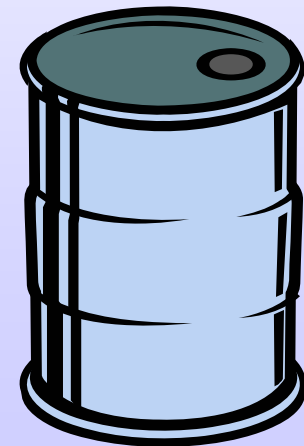
208

barrels of oil



6,235

barrels of oil



74,817

barrels of oil

# Everett Commute Reductions Save:

- **63 million miles per year**
- **2,329 tons of CO<sub>2</sub> per month**
- **CO<sub>2</sub> uptake of 10,760 acres of forest  
(17 square miles)**
- **CO<sub>2</sub> equivalent of the electricity used by  
23,318 Snohomish County Households**

# Puget Sound Commute Incentives Include:

- \$30 Public Transportation Incentive
- \$100 Carpool Start-up Incentive
- Emergency Ride Home Program
- Vanpool and Carpool priority parking
- Alternate Work Schedules
- Telecommuting Options
- Transit Information Fairs
- Special Regional Rideshare Promotions
- Commuter Information Boards and Kiosks
- Internal Ride-matching Database (Commuter Connection)
- Commute Web Site
- Frequent articles in Boeing News Now

# Processes

- **Energy efficient lighting**
- **Higher Efficiency Compressors**
- **Routine energy audits to Identify & Implement Energy-saving Opportunities**

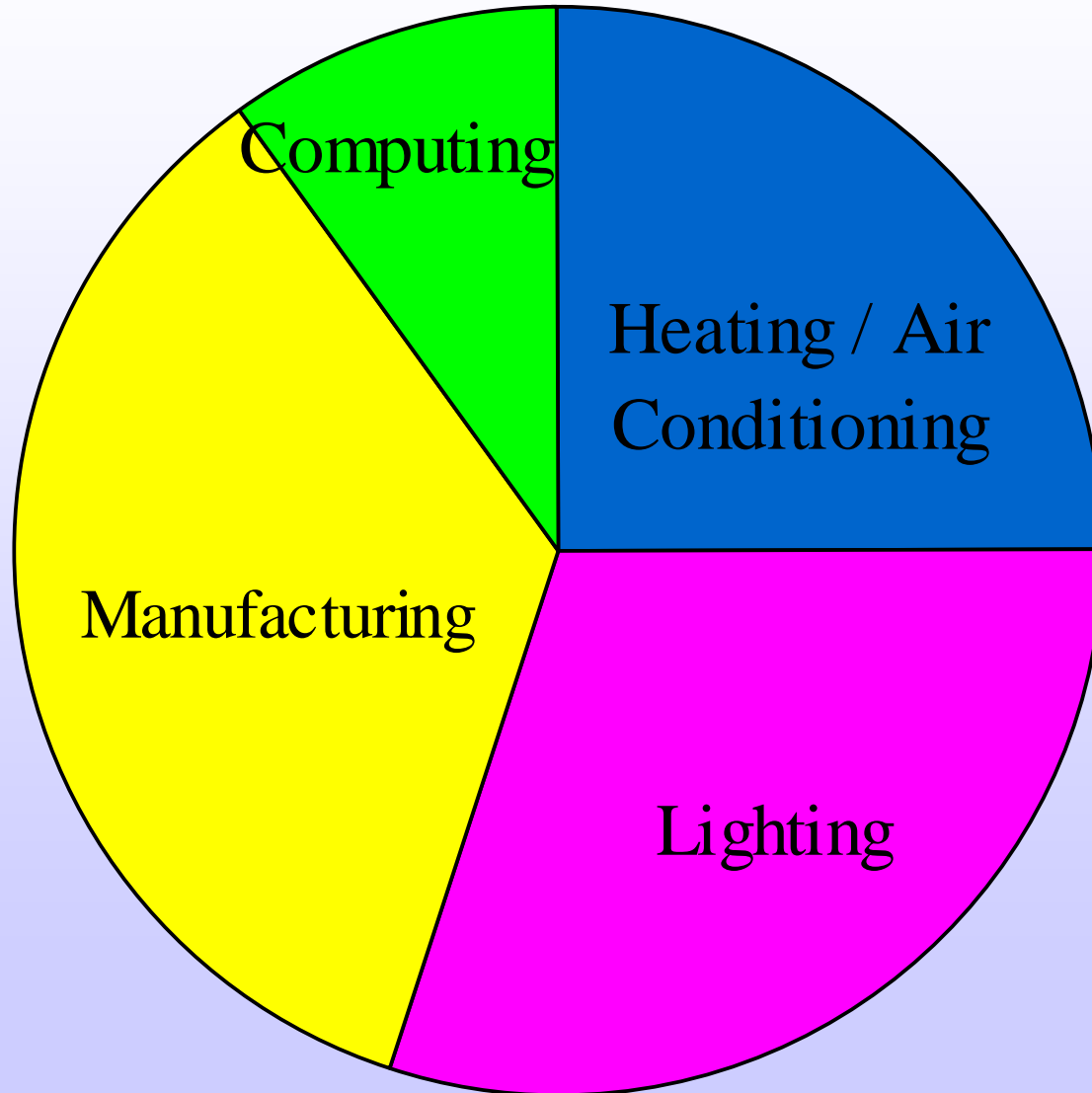
*Manufacturing*

*HVAC*

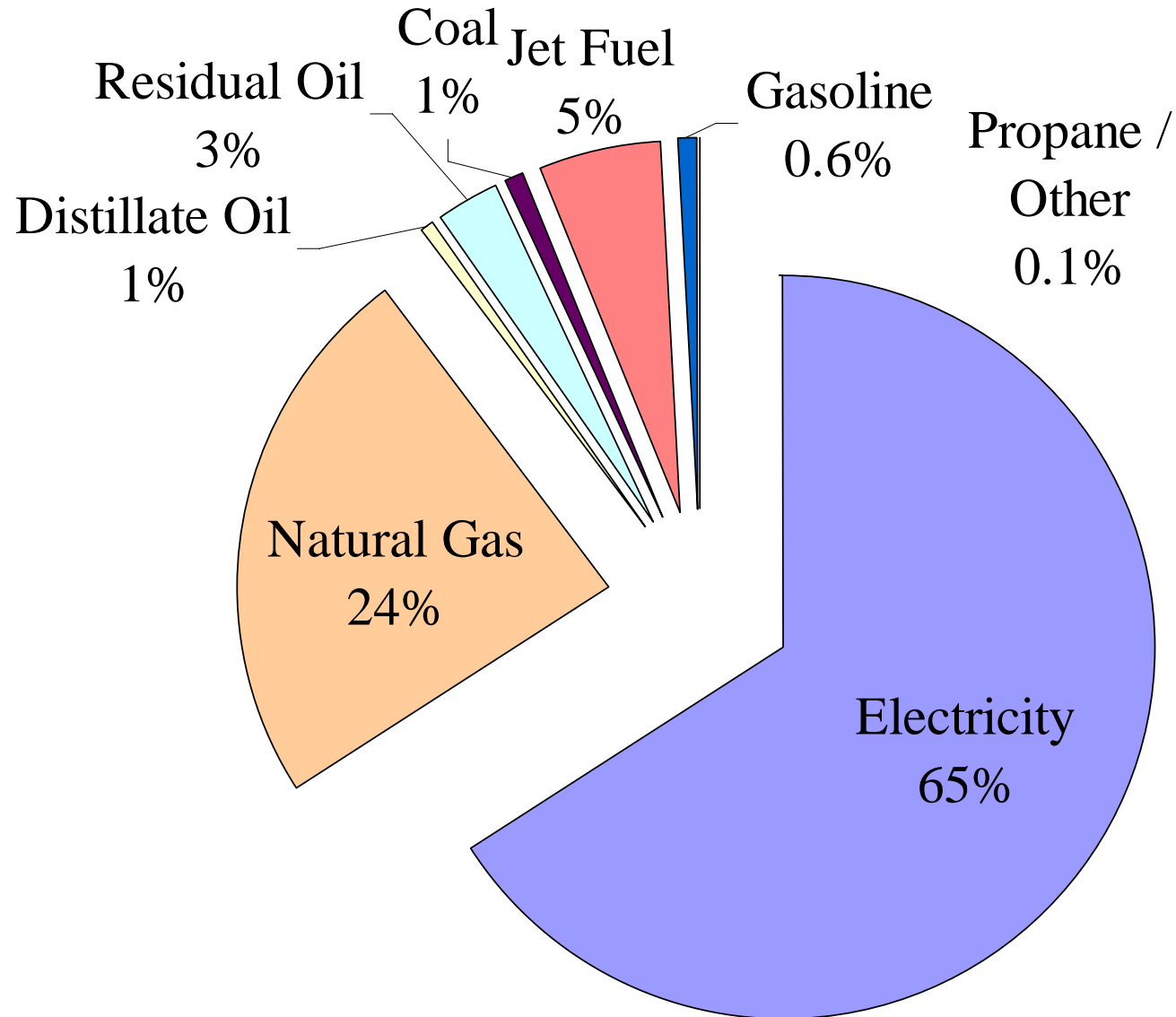
*Lighting*

*Computing*

# Boeing Electricity Use



# Boeing Factory CO<sub>2</sub> Emission Sources



# Energy Accelerated Improvement Workshops



- 32 Energy AIWs conducted since 2002
- 5 scheduled 1<sup>st</sup> 6 months of 2006
- 108,000 MW/Yr ( 400K MMBTU) Energy Savings – Enough to Electrify 10,000 homes

## 2006 Energy Management

March 2006

YTD YE PGM  
G G G

Leader: Keith Warner

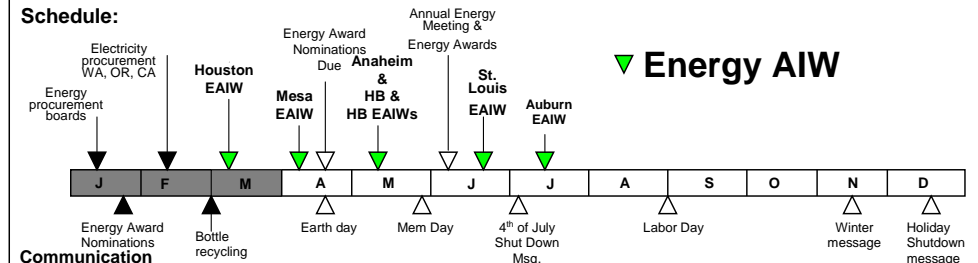
### Program Description:

Execute a strategic utilities management plan, including electricity, natural gas, water, recycling, and solid waste disposal.

### Technical / Functional Objectives:

- 1) Promote conservation activities through effective employee communication and Energy AIWs
- 2) Pursue utility rate contracts and cost mitigation measures providing affordable, reliable energy supplies
- 3) Improve energy efficiency through infrastructure improvements
- 4) Deploy streamlined utility bill paying process throughout the enterprise
- 5) Monitor and evaluate legislative and regulatory issues

### Schedule:



### Communication

YTD	YE	PGM	
<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	Technical (Functional Objectives)
<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	Schedule
<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	Cost (actual versus plan)
<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	<span style="border: 1px solid black; padding: 2px;">G</span>	Benefit (savings)

### - Accomplishments

- Natural gas storage for Northwest sites locked in for 30 years.
- Houston EAIW Compete - \$414.0K in savings
- Houston electricity supply contract complete. \$475K per year savings

Issues/Risks: None

B G Y R GY



# Recent Energy Reduction Projects

Energy AIWs	kWHrs Saved
<b>Everett</b>	<b>6,675,000</b>
St. Louis	2,561,000
El Paso	2,239,000
San Antonio	2,605,000
Philadelphia	2,150,000
Macon	2,617,000
Huntsville	2,348,000
Oak Ridge	2,314,000

## HVAC PROJECTS

El Segundo Retrofit with new units	9,009,009
St. Louis Paint Booth recirculation	13,293,478
<b>Everett HVAC Terminal Unit Fan Motor change-out</b>	<b>8,793,103</b>
Frederickson Chilled Water Load Optimization	3,760,331
St. Louis Assembly Bldg airlock installation	3,097,826

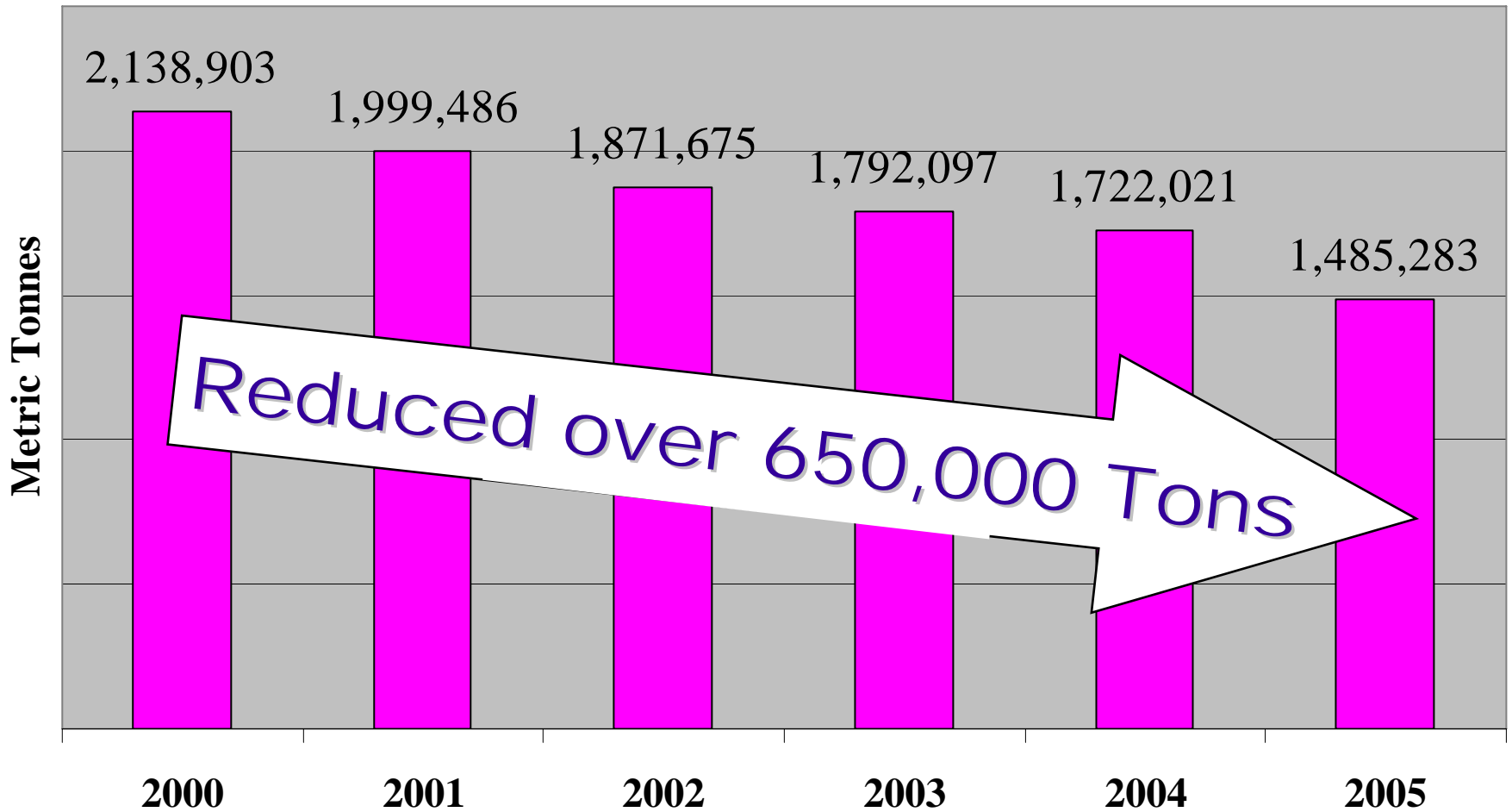
## LIGHTING PROJECTS

<b>Everett lighting circuit rewiring</b>	<b>5,172,414</b>
Spares Distribution	2,592,593

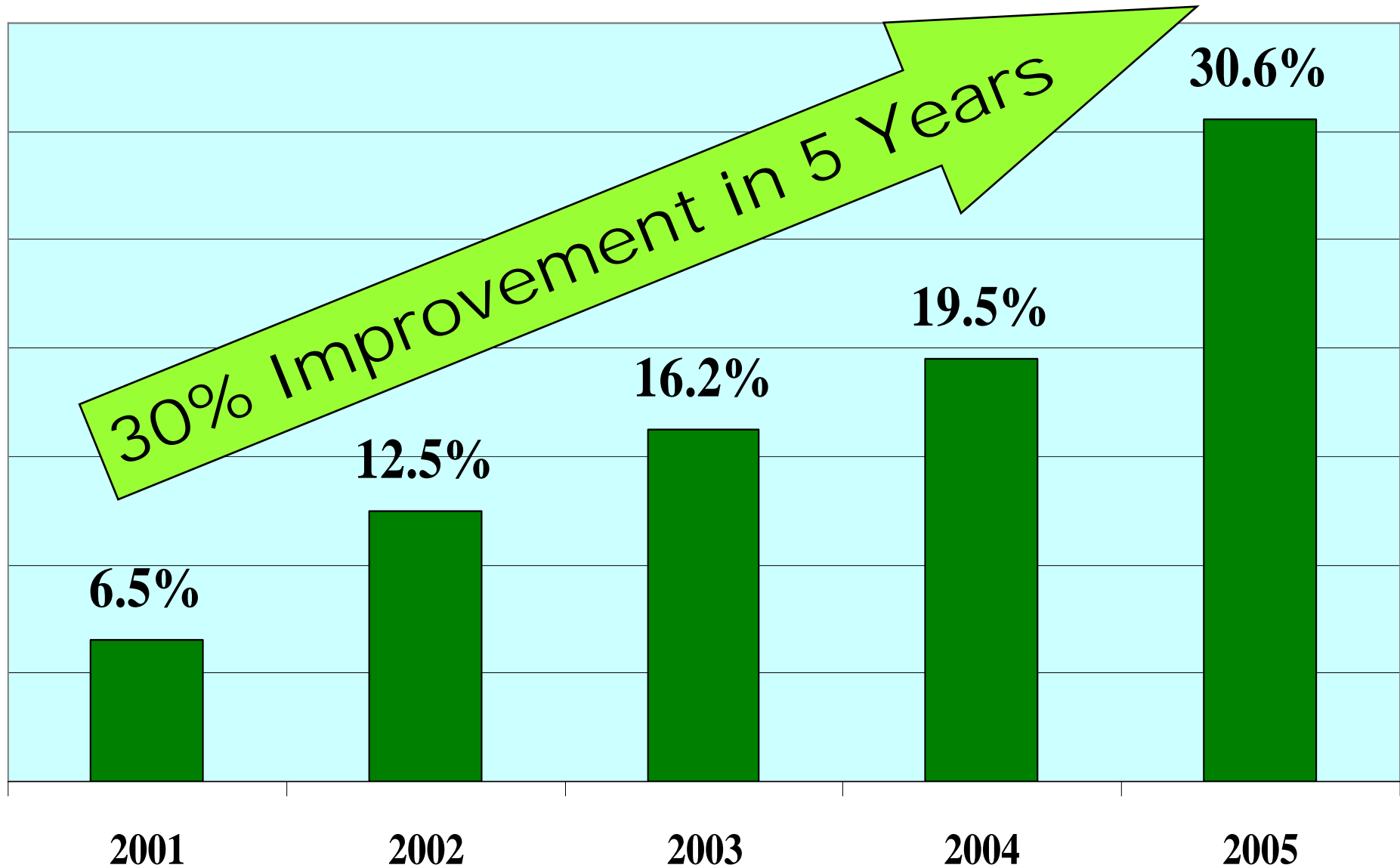
## OTHER BUILDING UTILITY SYSTEM PROJECTS

El Paso Compressed Air System Leak Repairs	5,278,947
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# Total CO<sub>2</sub> Emissions



# Boeing CO<sub>2</sub> Reduction





Shared Services Group

COMPANY ENVIRONMENTAL AFFAIRS

Environment

# Products

# Lifecycle Approach Helps Save Fuel and Avoid Emissions

RESEARCH & DEVELOPMENT

DESIGN

MANUFACTURE

AIRLINE OPERATIONS/MAINTENANCE

Retirement

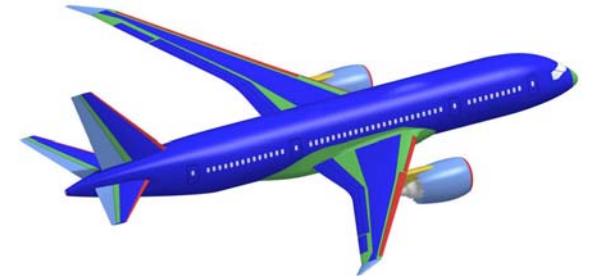
## Engine



## Aerodynamics



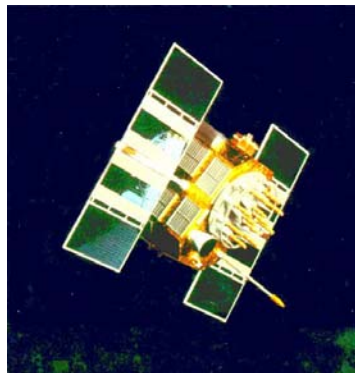
## Structures and materials



## Systems



## Air traffic management

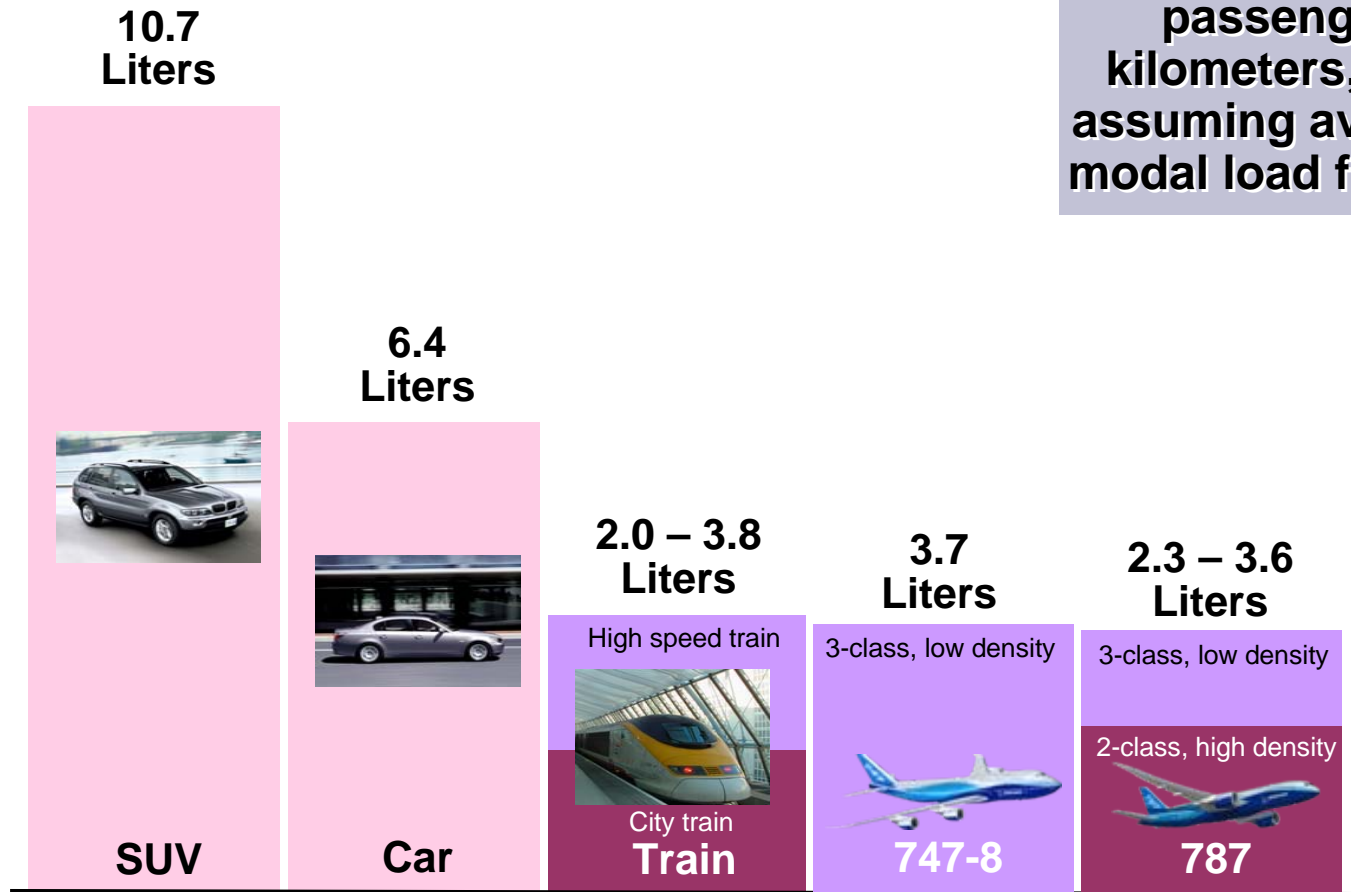


## Engine/airframe integration



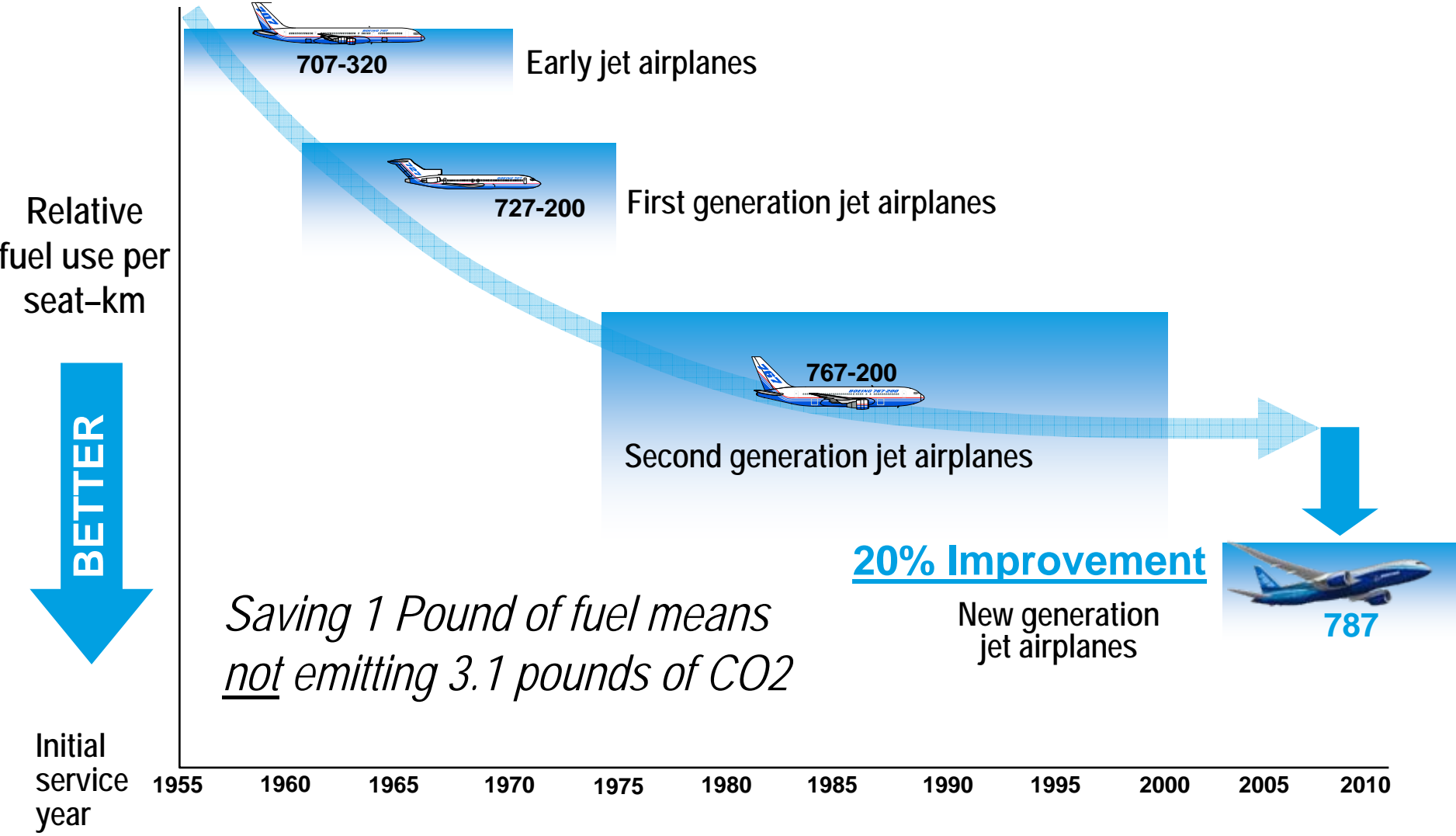
# One of the Most Fuel Efficient Modes of Transportation

Measured per 100 passenger kilometers, and assuming average modal load factors



low density @ 70% full  
high density @ 90% full

# Modern Airplanes Are More Fuel Efficient



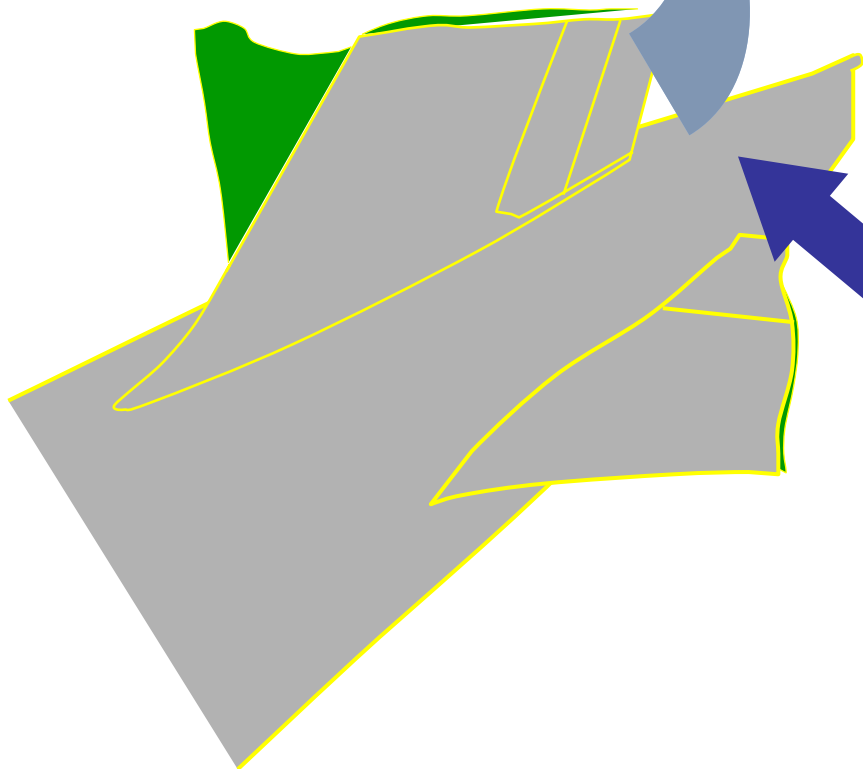
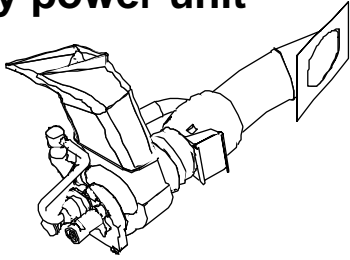
# Fuel Cells Offer Ultra Clean Power



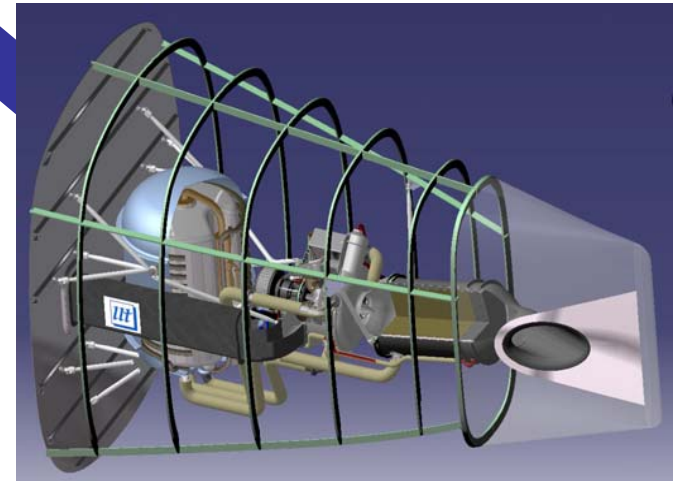
- *Chemical Reaction Provides Electric Power*
- *Primary Emission is Water*

# Boeing is Developing Ultra Clean Auxiliary Power

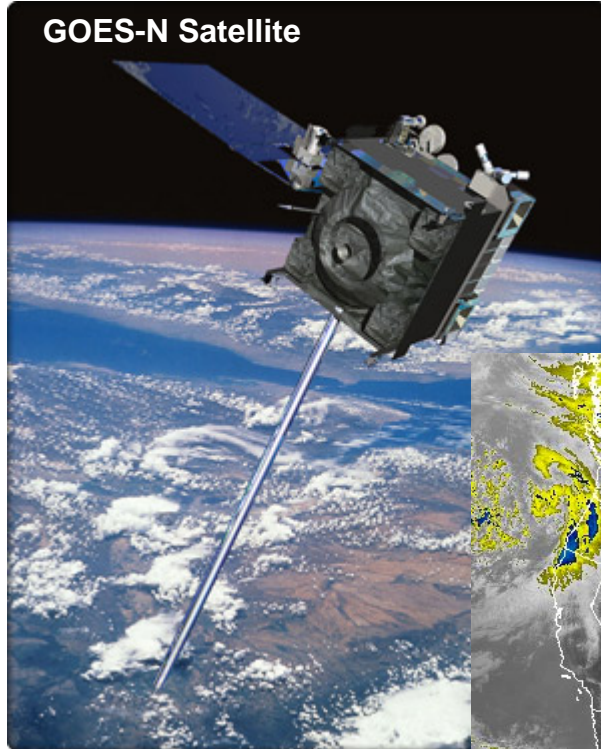
Auxiliary power unit



Solid oxide fuel cell power unit



# Boeing leads in producing climate research technology

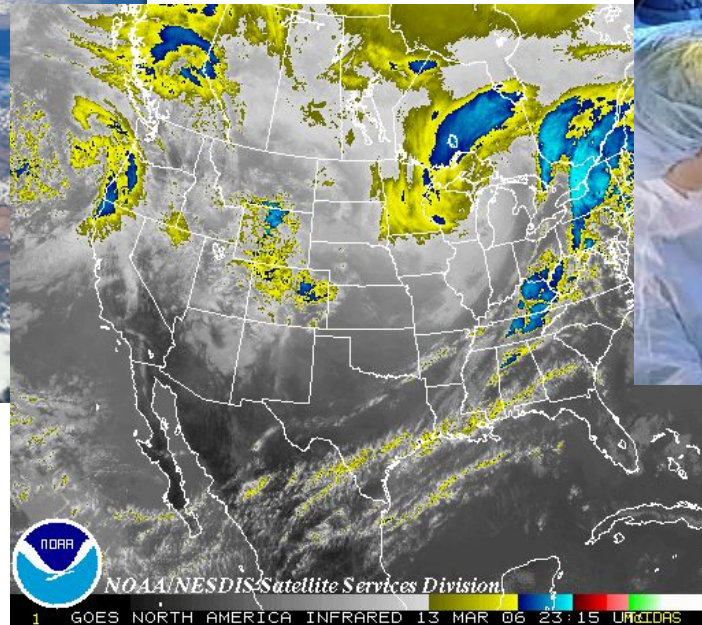


GOES-N Satellite

May 24, 2006 –

**Boeing  
launches  
GOES-N  
Satellite**

**Understanding our Earth:**  
Weather, climate and  
atmospheric monitoring  
satellites and communication  
technology



**Connecting the World:**  
SynCom – the first  
geo-stationary  
communications  
satellite



**Alternative Energy Sources:**  
Boeing has developed the  
world's most efficient solar cells

**Inventing the tools of future progress**

- **We're all in this together**
- **More Opportunities than you Expect**
- **Look for Partnerships**
- **Take the Next Right Step**