



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

# Review of Washington Climate Policy

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# Climate Policy Overview

- This review is to provide context for the LCFS work
- It briefly summarizes background actions:
  - Sources of GHG emissions & reduction goals
  - Overall carbon reduction strategies
  - Major transportation related actions
  - Work with other western states and Canada, i.e. the Western Climate Initiative (WCI)
- The 2009 Governor's Executive Order on Climate

# 2005 GHG Emissions



**Electricity Consumption 20%**



**Residential, Commercial and Industrial Fuel Use 20%**



**Transportation 47%**

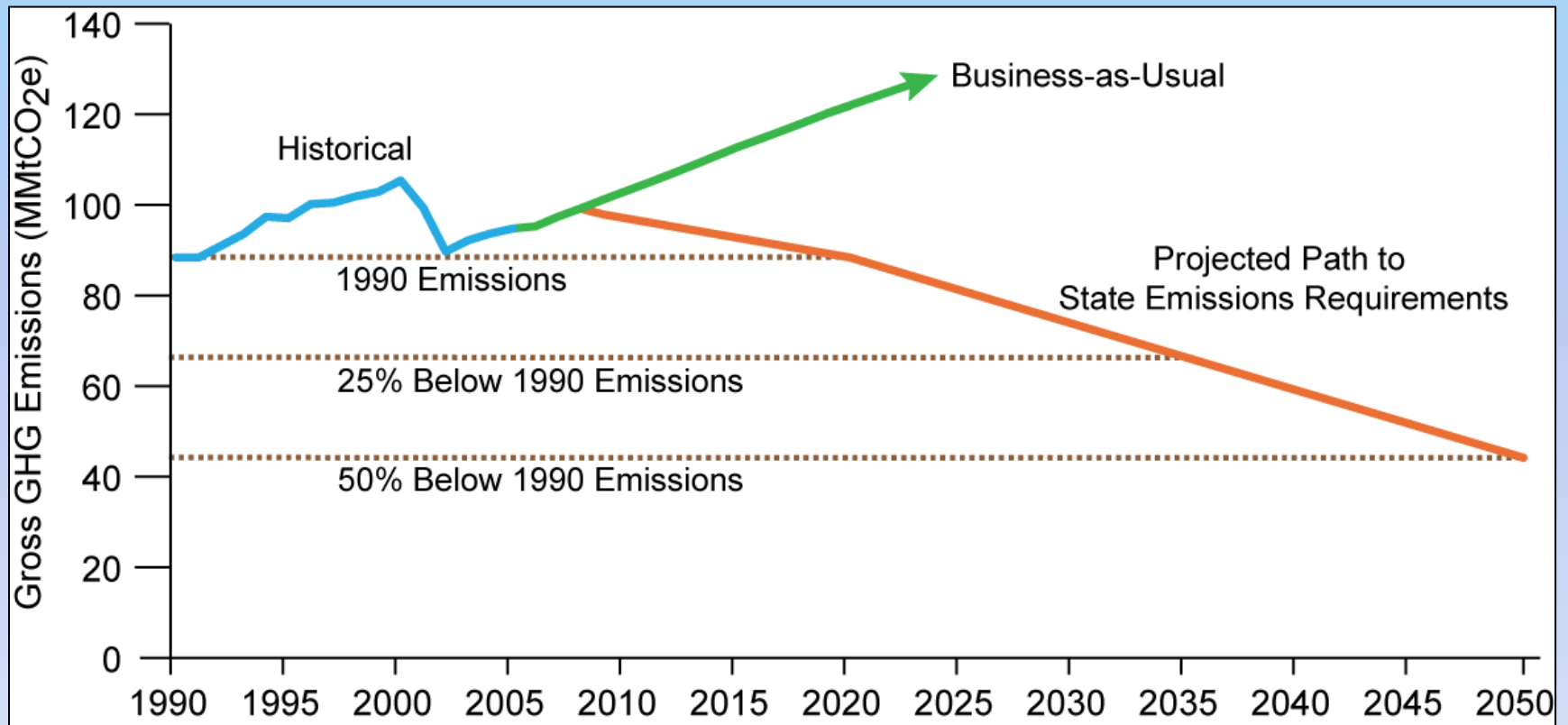
**Agriculture 6%**

**Industrial processing 4%**

**Waste 3%**

Source: Washington State Greenhouse Gas Inventory, December 2007  
Percentages are rounded numbers

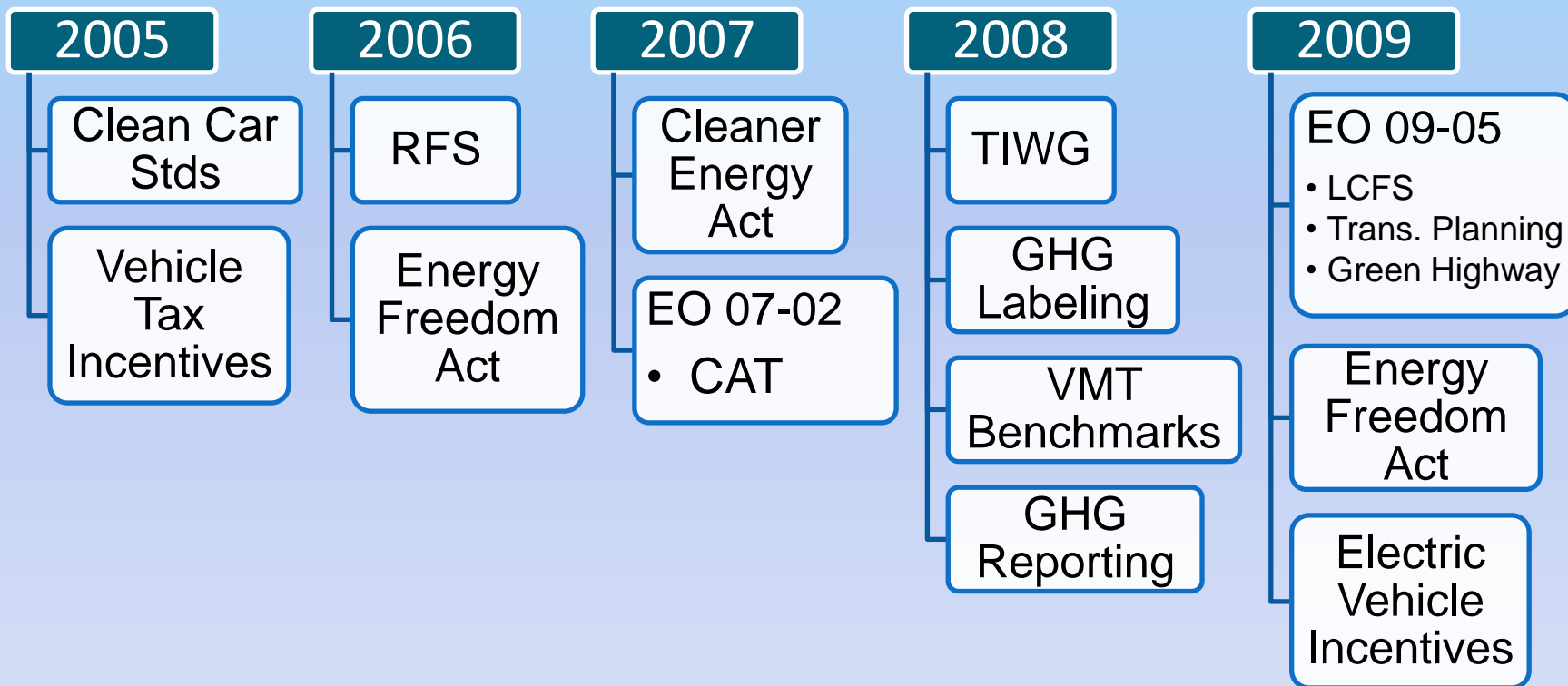
# Statutory Emissions Reductions



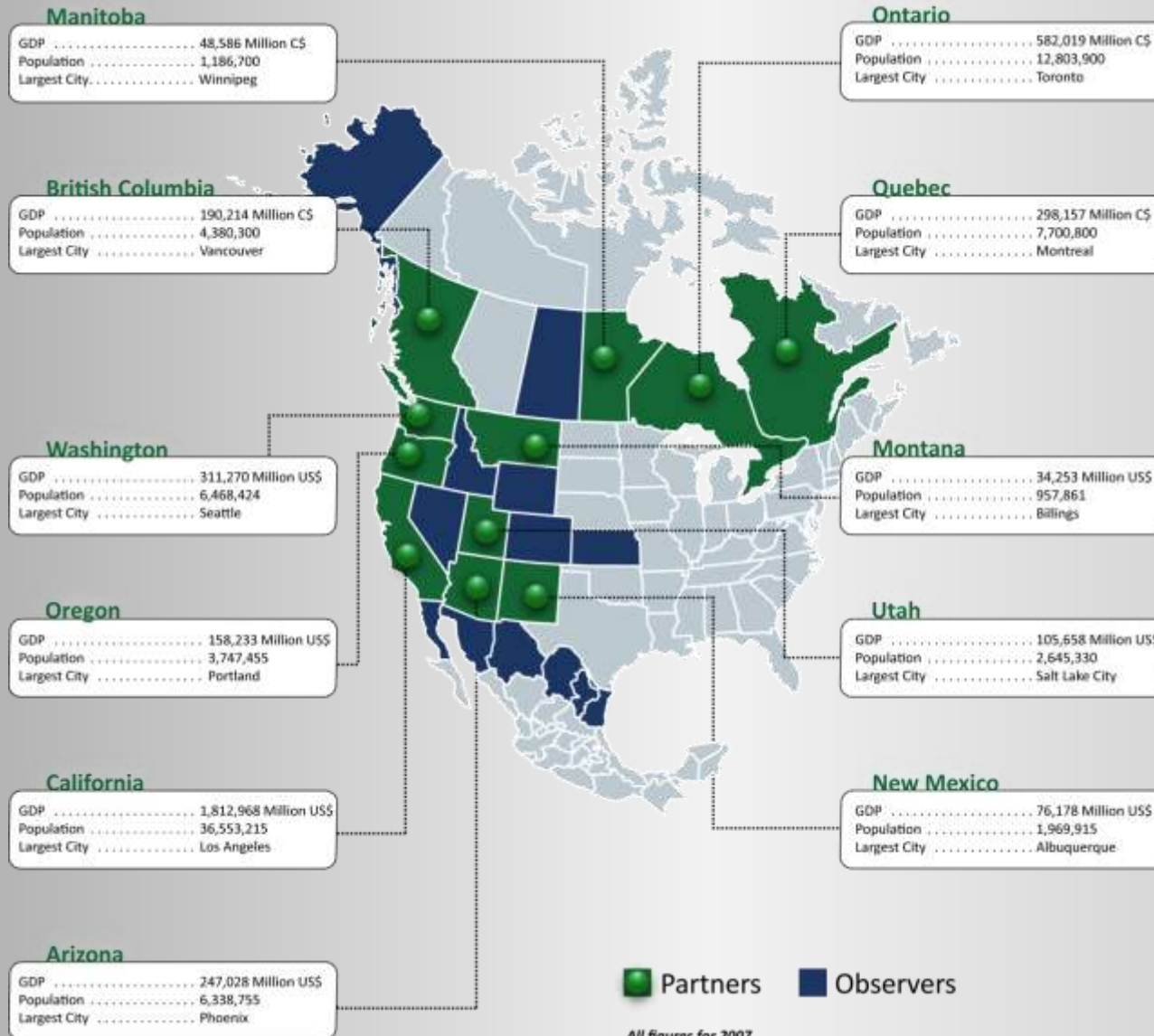
# Washington Low Carbon Policies

- Climate Action Plan
- Waste management
  - ✓ Methane capture, anaerobic digesters, recycling and reuse
- Clean cars and fuel use reduction
  - ✓ CA clean car stds, low-carbon fuel standard, electric cars, fuel economy, vehicle miles traveled
- Transportation and land-use planning
  - ✓ Lower carbon transportation choices
  - ✓ Building compact communities
- Clean Energy
  - ✓ Renewable Portfolio stds
  - ✓ GHG Emissions performance stds for power plants
- Energy efficiency
  - ✓ Building codes, green building, appliance stds

# Major Transportation GHG Actions



# Western Climate Initiative



## WCI OBSERVERS

### CANADA

Saskatchewan

### UNITED STATES

Alaska  
Colorado  
Idaho  
Kansas  
Nevada  
Wyoming

### MEXICO

Baja California  
Chihuahua  
Coahuila  
Nuevo Leon  
Sonora  
Tamaulipas

Partners Observers

All figures for 2007

Source for US data: US Census Bureau and US Bureau of Economic Analysis  
Source for Canadian data: Statistics Canada

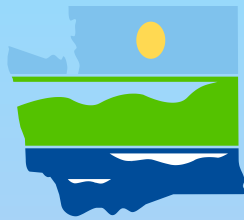
# Ongoing WCI Design Work

WCI 2009-2010 Work Plan highlights:

- Influencing the design of a federal program
- Establishing an overall regional emission cap and each Partner's allowance budget
  - Also, emissions reporting and allowance tracking systems
- Offset programs
- Evaluating complementary and transition policies
- Expanding the economic analysis

# 2009 Climate Change Executive Order

- Continue with WCI
- Work with Obama Administration on national policy
- Develop industry reduction strategies and benchmarks
- Develop TransAlta GHG performance standards
- Develop forestry offset protocols and incentives
- Evaluate a low carbon fuel standard for WA
- Develop VMT reduction plans and transportation alternatives
- Develop ways to address sea level rise and water supply risks
- Develop a West Coast green highway



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# LCFS Workplan and Evaluation Process

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# LCFS Outline

- Fuel emissions performance standard
- Reduces the average carbon intensity of fuels
- Technology neutral
- Market-based system
- Complementary to other climate policies including cap-and-trade
- Implemented in California
- Under consideration in Northeast states, midwest states, Florida, British Columbia, Oregon, EU

# Analysis Overview:

- ❖ Ecology will have consultant assistance
- ❖ ECY will adapt work from California, Northeast states, Midwest states, and EPA to Washington
- ❖ Workshops: to improve the analysis through dialogue & information exchange
- ❖ Draft recommendations: will be the subject of a workshop before being finalized.

# Report Recommendations:

- ❖ Ecology will make recommendations on:
  - ❖ Whether to pursue a state LCFS
  - ❖ The best structure and policies for a Washington LCFS
  - ❖ The next steps for implementing an LCFS if recommended.
- ❖ Ecology may also consider other ways to reduce GHGs from transportation fuel if a LCFS is not recommended

# Major Issues to be Addressed:

- ❖ Carbon reduction targets and schedule
- ❖ Baseline fuels, i.e. what fuels are included
- ❖ Approach to life-cycle analysis and indirect land-use
- ❖ Washington carbon intensity values for baseline and major alternative fuels
- ❖ Potential compliance scenarios
- ❖ Economic effects
- ❖ Significant administrative issues.
- ❖ NOT every program detail in this evaluation

# Process:

- ❖ Ecology has a steering committee -- DOT and Commerce
- ❖ Ecology will consider partner and stakeholder input on analysis and recommendations.
- ❖ Ecology may seek other assistance, e.g. Agriculture, Licensing, WSU, and U.W.
- ❖ Ecology is actively coordinating with Oregon
- ❖ Ecology will consider analysis from other states

# Workshop Schedule, Topics

**Sep 25, 2009: Approach and scope of LCFS evaluation**

**Oct 23, 2009: Baseline fuels & economic impact scoping**

- ❖ Fuels included: on-road, non-road, rail, marine, air
- ❖ Gas & diesel baseline pathways, CI values, tar sand questions
- ❖ Identify promising NW alternative fuel pathways
- ❖ Scoping of WA economic impacts analysis

**Nov 24, 2009: Ethanol pathways and CI values**

- ❖ Near term, large volume ethanol
- ❖ Mid-term ethanol, lower CI pathways e.g. cellulosic
- ❖ Long-term ethanol e.g. biobutanol, algae

# Workshop Schedule, Topics

## **Jan 19, 2010: Biodiesel pathways and CI values**

- ❖ Near term biodiesel: soy, grease, others
- ❖ NW biodiesel: canola, camelina, others
- ❖ Mid and long-term biodiesel: algae, waste streams, others

## **Mar 25, 2010: Electricity, CNG, other pathways & CI**

- ❖ Electricity
- ❖ CNG
- ❖ Hydrogen or other pathways

# Workshop Schedule, Topics

## **May 18, 2010: Initial results, remaining issues**

- ❖ Review analysis results to date
- ❖ Identify remaining issues on pathways, CI
- ❖ Goal and timetable: 10% in 10 years, or ?
- ❖ Compliance scenarios and economic analysis to date

## **Jun 17, 2010: Draft report & recommendations**

- ❖ Draft report recommendations and key issues

## **Jul 1, 2010: Recommendations to Governor**

## **Aug 1, 2010: Analysis write-up complete**



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# WA LCFS Evaluation Methodologies

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# Overview:

- ❖ GREET AND LIFE CYCLE ANALYSIS
- ❖ GREET AND A WASHINGTON LCFS
- ❖ INDIRECT LAND USE CHANGE
- ❖ DEVELOPMENT OF COMPLIANCE SCENARIOS
- ❖ ECONOMIC IMPACTS

# What is GREET?

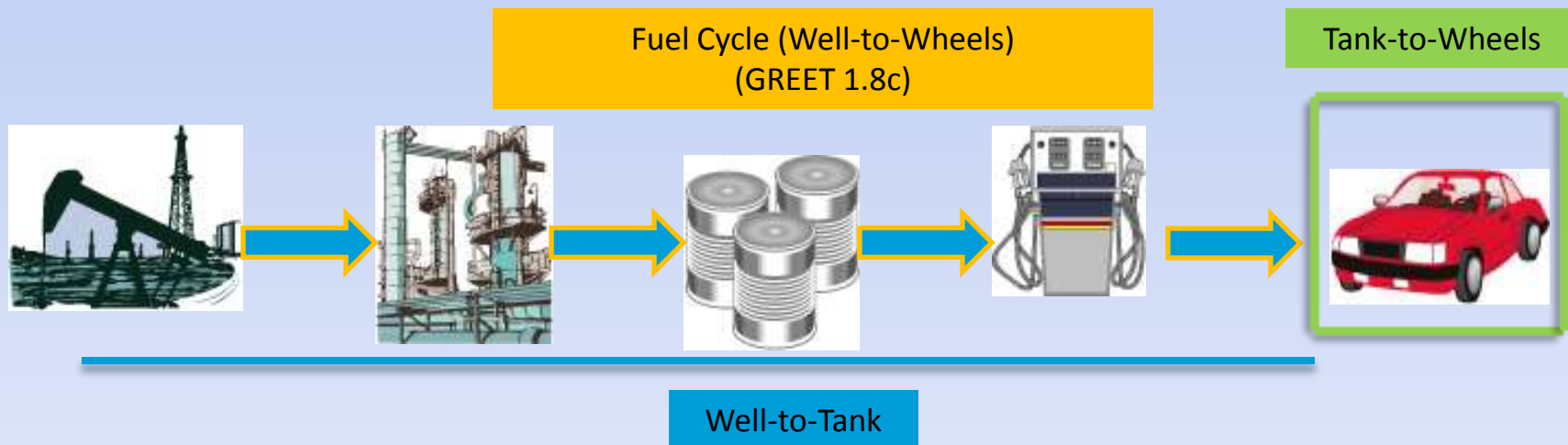
(Greenhouse Gases, Regulated Emissions and Energy Use in Transportation)

- ❖ Life Cycle Analysis (LCA) model for WTW analysis of fuels/vehicle systems.
  - ❖ > 100 fuel production pathways, > 75 Vehicle/Fuel Systems.
- ❖ GREET has become a standard tool for LCAs of vehicle/fuel systems
  - ❖ More than 10,000 registered GREET users worldwide from car manufacturers, to government agencies and universities
- ❖ Most recent update (GREET 1.8c) released in March 2009.

**The GREET model and its documents are available at:**  
<http://www.transportation.anl.gov/modelingsimulation/GREET/index.html>

# How Does GREET Work?

- ❖ Based on defaults and user inputs, GREET:
  - ❖ Calculates energy use/emissions of transportation fuels from production to finished fuel – Well-to-Tank (WTT).
  - ❖ Calculates the energy use/emissions of vehicle technologies - Tank-to-Wheels (TTW).
  - ❖ WTT and TTW activities are combined to provide full life-cycle Well-to-Wheels (WTW) analysis of carbon emissions.



# HOW DOES GREET WORK?

- ❖ Via GREET LCA each fuel (petro and alternatives) is assigned a “carbon intensity” (CI) value
- ❖ Examples of CI values (from CA rule):
  - ❖ Gasoline = 96 Diesel = 95
  - ❖ MW ethanol, dry mill, dry DGS, NG = 98
  - ❖ CA ethanol, dry mill, wet DGS, 80% NG, 20% biomass = 77
  - ❖ MW soy biodiesel = 69 (not final)
  - ❖ CA grid electricity = 41

# REET for Washington

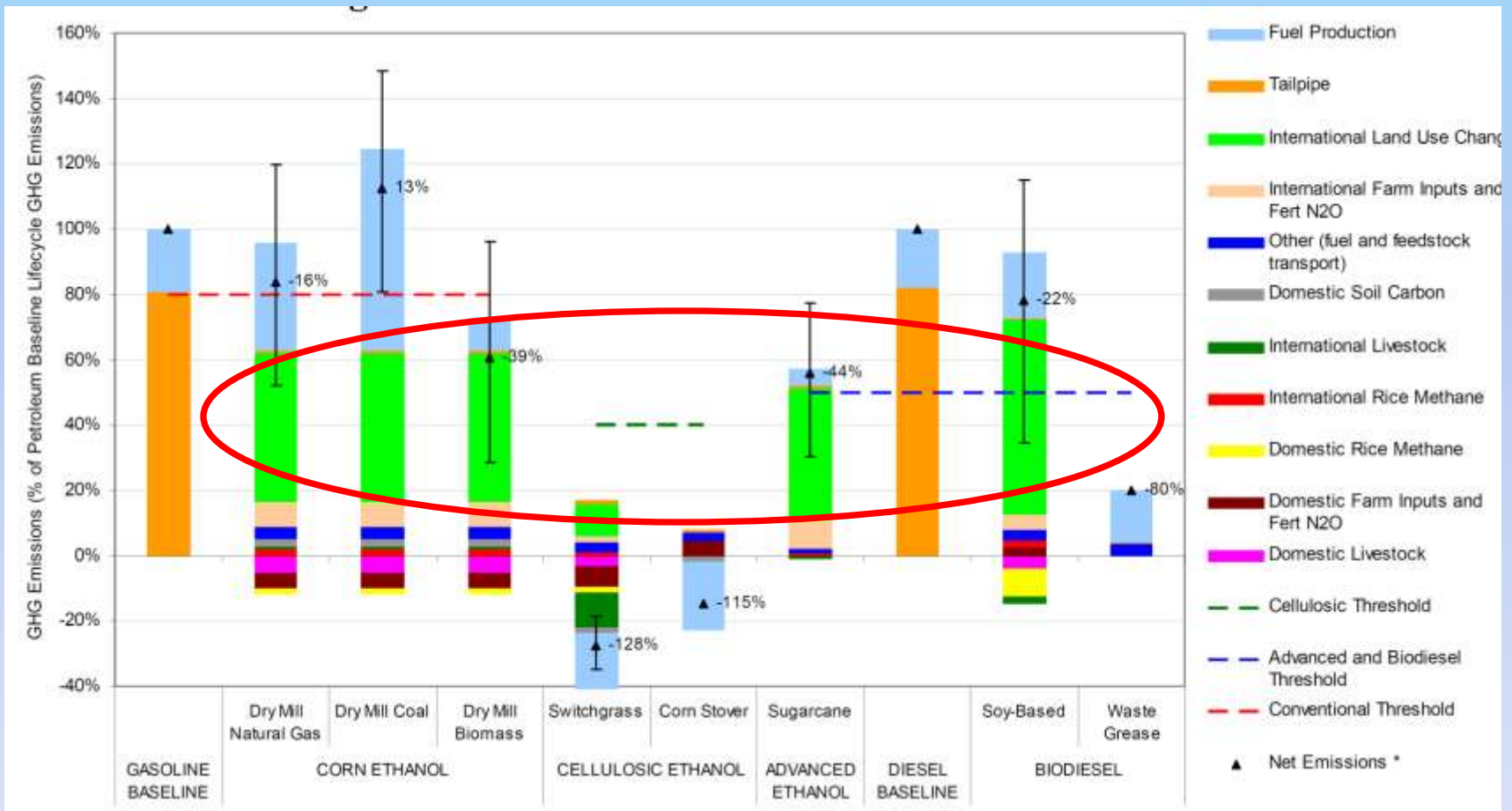
- ❖ Work with consultant to identify best approach/data
- ❖ REET defaults vs. Washington specific inputs
- ❖ Use WA specific or regional data when available
  - ❖ Examples
    - ❖ Fuel processing inputs, efficiencies and emissions
    - ❖ Transport distances and modes for fuel pathways
    - ❖ Resource mixes (including electricity)
    - ❖ Many others

# Land-Use Change Emissions

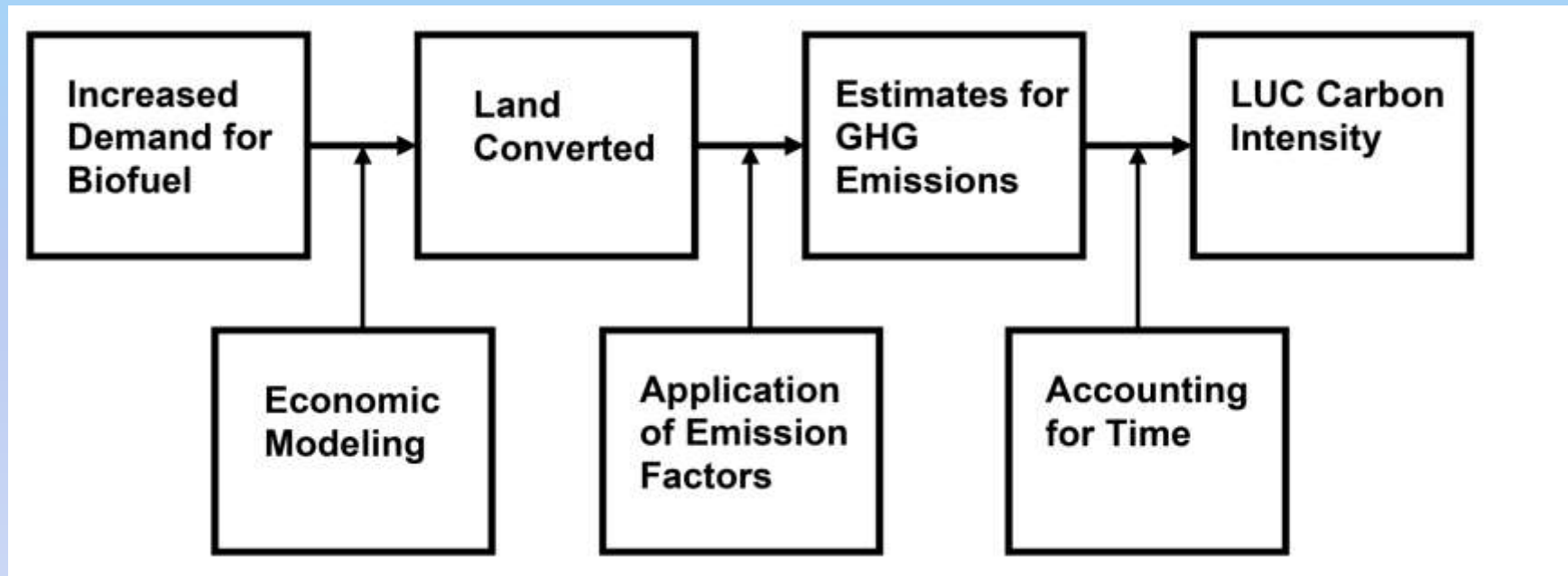
- ❖ Emissions from changing land from one use to another
- ❖ Can occur both domestically and internationally
- ❖ Direct land-use emissions
  - ❖ Shift from rain forest to palm plantation
  - ❖ Shift from CRP to cropland
- ❖ Indirect land-use emissions
  - ❖ Increasing demand for biofuel crops will increase price
  - ❖ Increased price will stimulate:
    - ❖ More intensive agriculture
    - ❖ Converting land from something else to crop in high demand from biofuels



# Indirect Land-Use Change



# CA Calculation Method

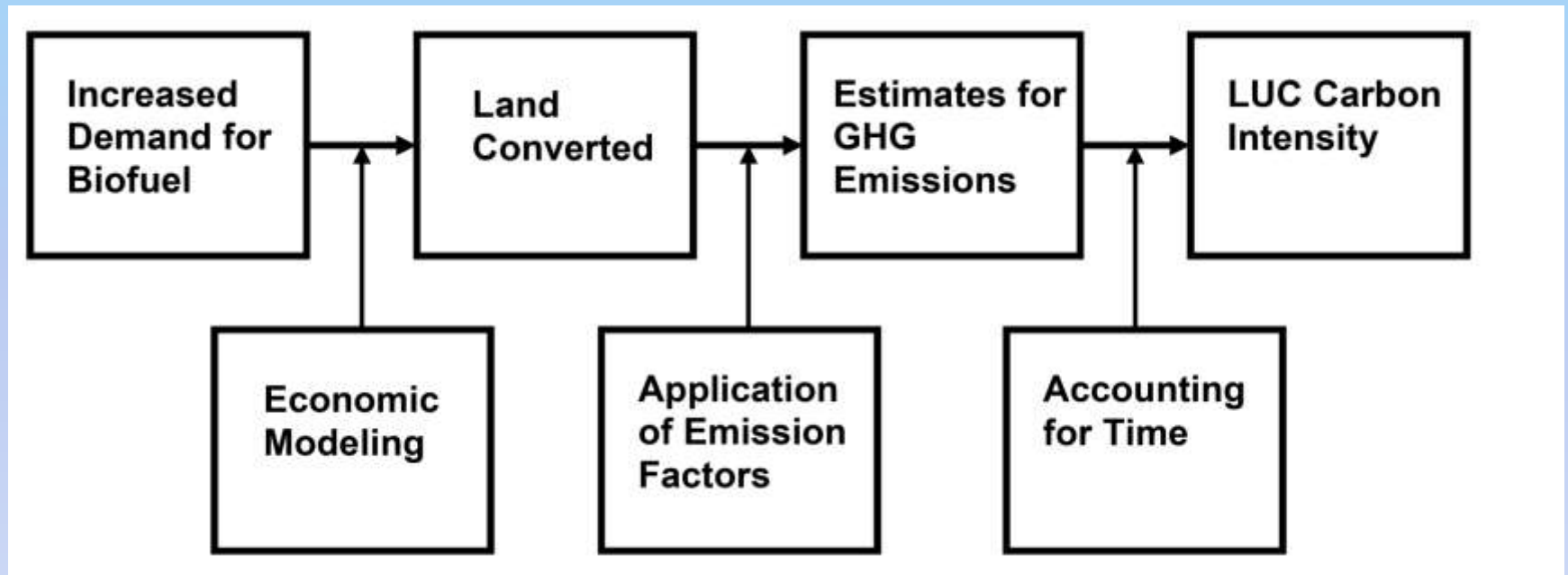


**GTAP**

**Searchinger et al.  
2008**

**30 Year annualized**

# EPA Calculation Method



**FASOM: U.S.A**  
**FAPRI: International**  
**MODIS: Type of Int.**  
**change**

**FASOM: U.S.A**  
**IPCC AFOLU**

**100 year, 2% discount**  
**30 Year annualized**

# Indirect Land-Use Questions

## ❖ Policy Questions

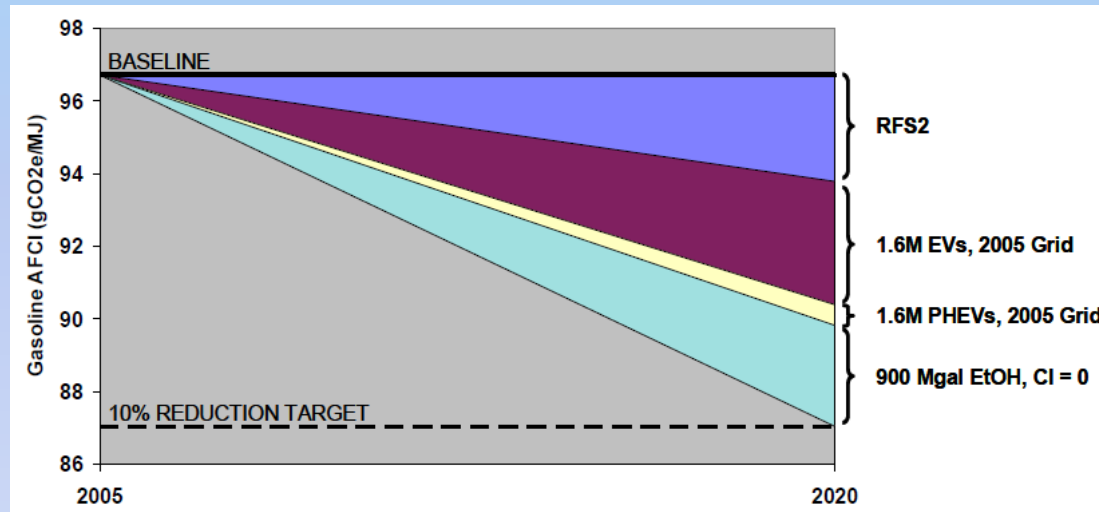
- ❖ Are these calculations too uncertain to direct policy?
- ❖ Is the policy ahead of the science?
- ❖ Are there large indirect emissions for petroleum use not being counted (i.e. military emissions)?

## ❖ Technical Questions

- ❖ What is the proper discount rate and time frame for land-use emissions?
- ❖ How much land is converted?
- ❖ Where does land-use change occur?
- ❖ What types of land are converted?
- ❖ What are the emissions from land conversion?

# Developing Compliance Scenarios

- ❖ Goal – assess feasibility of compliance
  - ❖ Northeast States Center for a Clean Air Future (NESCCAF):
    - ❖ Five compliance scenarios (3 gasoline/2 diesel)



Example: Aggressive penetration of PHEVs/EVs (CI = 2005 ave. generation mix), plus 900 mgal very advanced ethanol (CI equals 0 g/MJ) displacing 600 mgal of gasoline.

# Developing Compliance Scenarios

## ❖ California:

- ❖ Seven compliance scenarios (4 gasoline/3 for diesel)
  - ❖ 3 supplemental scenarios,
    - ❖ Light duty diesel as a gasoline compliance path
    - ❖ Changes in compliance scenarios w/o iLUC
    - ❖ CI reductions with RFS only - no LCFS mandate

# Economic Analysis Overview

- ❖ Estimate baseline fuel costs – no LCFS regulation
- ❖ From compliance scenarios identify the alternative fuels mix
- ❖ Estimate costs of alternative fuels in the scenarios
- ❖ Estimate difference between total cost of scenarios and baseline costs
- ❖ 5 main results from economic analysis
  - ❖ Change in costs of transportation fuel
  - ❖ Change in overall state economic output
  - ❖ Change in personal incomes and employment
  - ❖ Change in investment (e.g. CARB estimated 25 new biofuel facilities)
  - ❖ Changes in tax revenues

# Economic Analysis Methods

- ❖ From compliance scenarios, estimate volumes of baseline and alternative fuels needed
- ❖ Based on volumes and engineering analysis, estimate investment and production costs for these fuels
- Feed capital, operating and distribution costs for the fuels and vehicles into the REMI model.
- ❖ Derive changes in output, employment, and incomes from REMI
  - ❖ Tax revenue change will be derived from output changes
- ❖ Impact of any new fuel production and distribution facilities will be estimated separately from REMI

# Economic Analysis Methods

- ❖ Analysis will document assumptions and show basis for deriving inputs such as costs of alternative fuels
- ❖ Analysis will document baseline conditions, e.g.
  - ❖ RFS 2
  - ❖ Pavley/CAFÉ requirements
  - ❖ Gasoline and diesel fuel feedstocks, production, distribution

# Conclusion

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# Contact Information

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- ❖ <http://www.ecy.wa.gov/climatechange/fuelstandards.htm>