Biofuels Policies: Why a Clean Fuels Standard and Other Polices are Critical for the Advanced Biofuels Industry

Ross Macfarlane, Senior Advisor
Climate Solutions

Advanced **Hardwood Biofuels** Northwest

Climate Solutions Mission

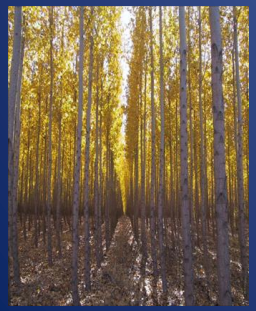
Accelerate *practical, profitable* solutions to global warming by:

- ✓ **Galvanizing leadership**
- ✓ **Growing investment**
- ✓ **Bridging divides**

Make the Northwest a national and world leader in the clean energy economy

Climate Solutions' Sustainable Advanced Fuels Program

- Helping to bring **sustainable advanced fuels** to scale in the NW:
  - Cement the Northwest as a global and national leader in creating the sustainable, low-carbon alternatives for transportation
  - Develop an informed and active community of sustainable advanced fuels stakeholders
  - **Pass critical policies** required to bring sustainable advanced fuels to scale in region



Sustainable Aviation Fuels Northwest

- Mission: Explore opportunities and challenges in production of sustainable aviation fuel using Pacific Northwest feedstocks
- Regional stakeholder process: +40 participants
- Geographical scope (WA, OR, ID, MT)
- Limited Duration: July 2010-July 2011
- First in the U.S.; Australia, Mexico, Brazil
- Climate Solutions: facilitator and lead for research and writing
- www.safnw.com

SAFN Stakeholders


Alaska Air

Spokane


Boeing


Port of SEA


Port of PDX


WSU

General Atomics


OSU


PNNL

Great Plains


Imperium


Targeted Growth


Alt Air


Catchlight


Stoel Rives


Verno


Harris Group

CAAFI


NREL


Sun Grant


USAF

USDA


US Navy


DLA


DOE


FAA


Amyris


ATA


Weyerhaeuser


Sustainable Oils


Danforth


ADAGE


Bioalgene


Biopure Fuels


Conservation NW


Green Diamond


Houghton Cascade


NRDC


Nature Conservancy


NW Biodiesel Network


OR Dept of Agriculture

OR Env. Council


OR Wheat Growers


Parametrix

Roundtable on Sustainable Biofuels


Simpson Investment


Spokane Industries


USDA - RD


USDA - ARS


Honeywell

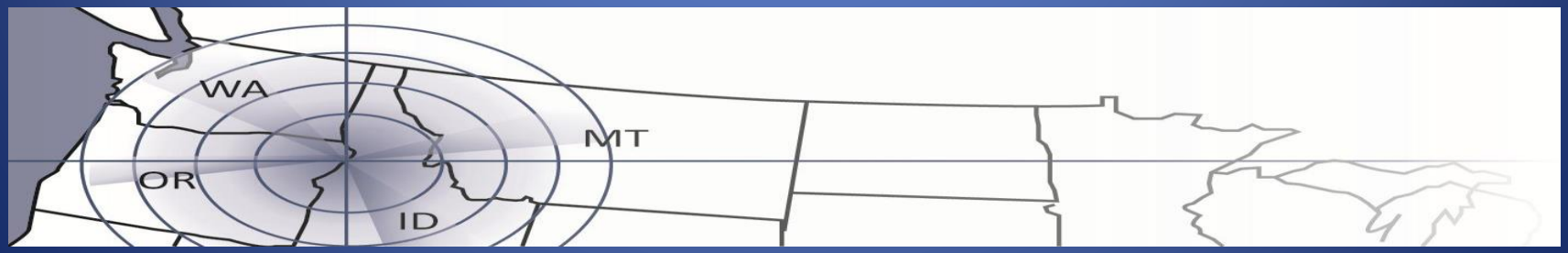

WA Dept of Comm


WA - DNR


Sap

Pacific Northwest: Prime Location

- **Rich and diversified biomass resources – farm, forest, municipal**
- **Policy and business leadership**
  - RFS in MT, OR, WA
  - Climate framework in OR, WA
  - Major bioenergy focus at universities, federal labs
  - Interest by established players plus numerous business start-ups



Sustainable Aviation Biofuel Projects

SAFUG-Europe
Member Projects

Working Together MOUs
with CAAC, Air China,
PetroChina

Sustainable
Aviation Fuels
Northwest

Life
Cycle
Analysis

Singapore SAF
Roadmap

Project
Flight Path

Masdar
Research
Project

Aviation Biofuel
Road Map

Sustainable
Aviation Biofuels
Brazil

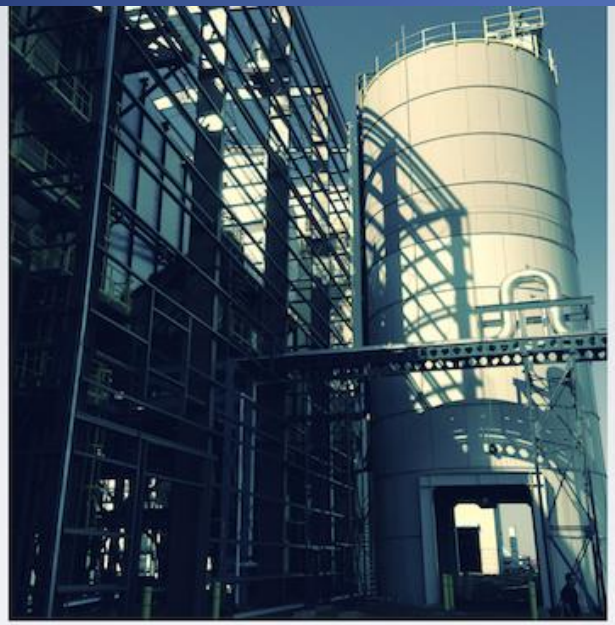
Top Six SAFN Recommendations

1. Create a strategic focus on sustainable fuels for aviation
2. **Promote stable, long-term policy to attract investment**
3. Ensure support for aviation fuels & promising feedstocks under RFS2 Program
4. Provide strong backing for the industry
5. Target R&D on regional efforts critical to commercializing aviation fuel projects
6. Incorporate sustainability considerations to create an advanced biofuels industry

The Core Challenge: Getting to Scale

- Scale/Cost – Chicken and Egg
- Starting to see scale level refineries in cellulosics and other advanced fuels

2014 – "The Year of Steel"



POET-DSM

Emmetsburg, Iowa - 20 million gallons

ABENGOA

Hugoton, Kansas - 25 million gallons

DUPONT

Nevada, Iowa - 30 million gallons

- Courtesy, Biofuels Digest.

Policy Priorities

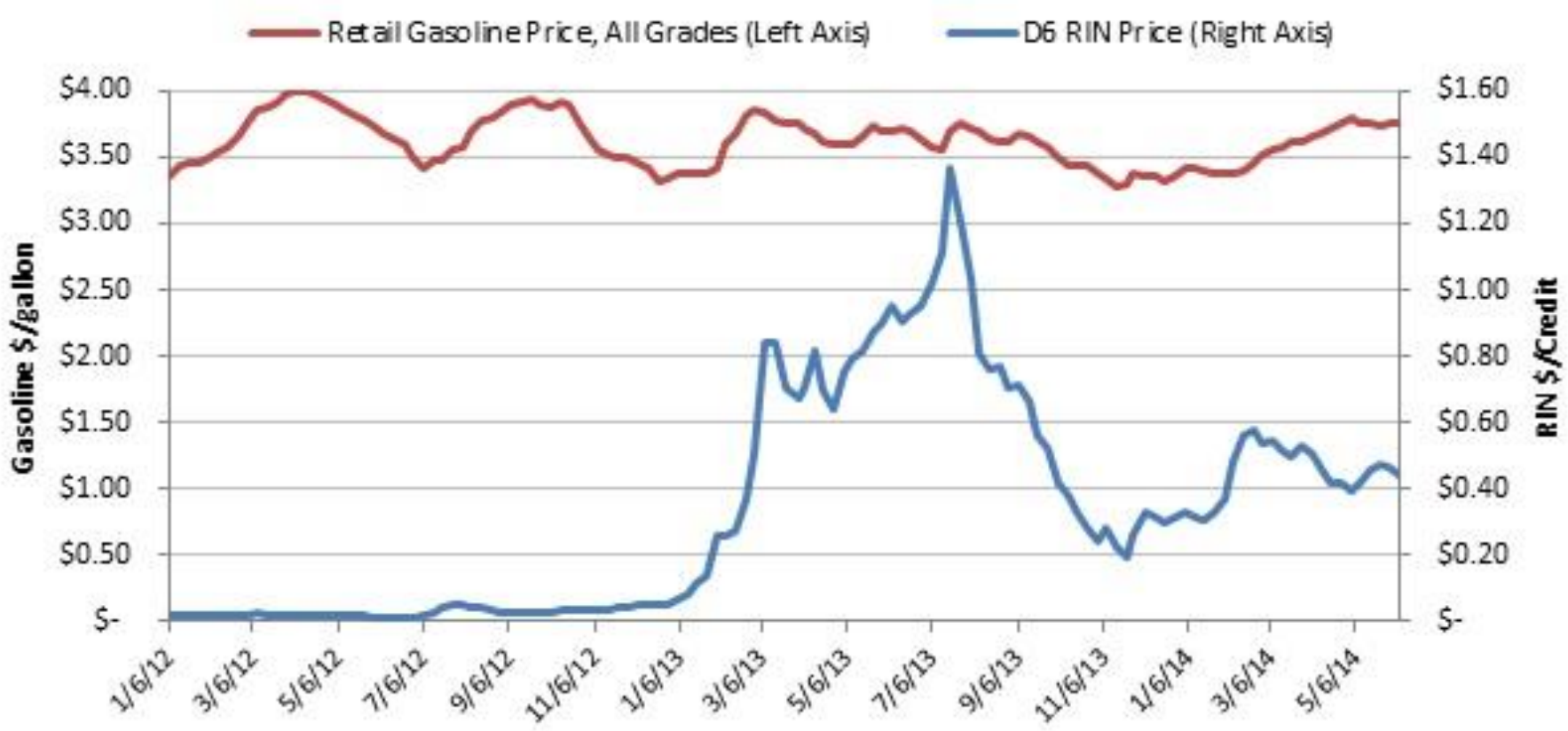
- Build Strong Markets for Renewable Fuel Producers
  - Promote durable policy to drive demand
  - Support federal RFS
  - Join California and BC in driving demand for sustainable fuels with low life-cycle carbon emissions (Clean Fuels Standard)

U.S. Renewable Fuels Standard

- 36 billion gallons/year by 2022 (21 bgy advanced and cellulosic)
- Includes standards for ghg reduction, indirect land use change
- RINS credits create powerful industry incentive for investments in advanced fuels

U.S. Renewable Fuels Standard

- Under fierce attack by petroleum industry
- Evidence shows no impact on fuel prices



Clean Fuels Standard

What Is It?

- A clean fuels standard (AKA Low Carbon Fuel Standard or LCFS) establishes pollution limits for transportation fuels sold in Washington. The program requires oil companies to gradually reduce carbon intensity of transportation fuels by 10 percent over 10 years.

Status

- California, BC and Oregon all have CFS in place
- California standard withstood court challenge in 2013 – Supreme Court refused appeal

Clean Fuels Standard

- Washington Status:
  - Department of Ecology has the ability to adopt a Clean Fuel Standard by Rule
  - Governor Inslee directed the Office of Financial Management (OFM) to evaluate technical feasibility, costs, benefits and jobs implications of Clean Fuel Standard.
  - Draft report for OFM, conducted by Life Cycle Associates, was completed earlier this month. Final report likely in late October.

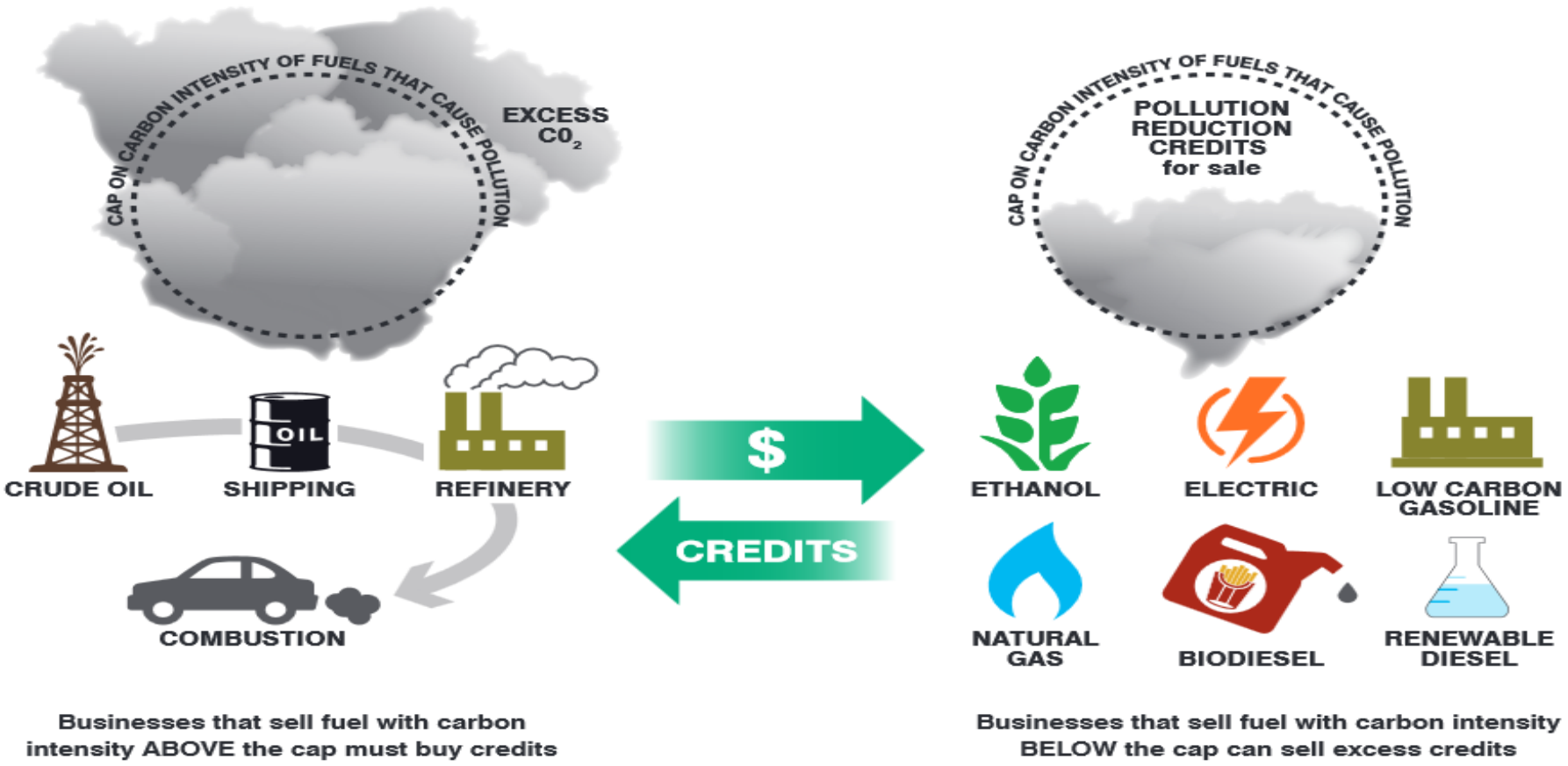
Clean Fuels Standard

- Oregon Status:
  - Oregon legislature will consider bill to lift “sunset” in 2015 session.
  - Phase 2 rulemaking is underway.
    - Public hearing on November 6, 2014
    - Public Comments accepted through November 7, 2014
  - To learn more: http://www.deq.state.or.us/aq/cleanFuel/

Clean Fuels Standard

FIGURE 2-1

Operation of California's Low Carbon Fuel Standard



An LCFS limits the amount of carbon emissions from fuels and allows clean fuel producers to sell their carbon credits to businesses that have trouble meeting the carbon intensity requirement.

Courtesy, EDF, American Lung Assoc, TetraTech: "Driving California Forward"

Clean Fuels Standard

What Is It?

The Nuts and Bolts of LCFS

Carbon intensity is measured on a lifecycle or well-to-wheels basis in units of grams of carbon dioxide equivalent per unit energy of fuel (gCO2e/MJ).

The LCFS is implemented using a system of **credits and deficits**, with each credit representing one metric ton of reduction. Credits are generated by transportation fuels that have a carbon intensity lower than the compliance schedule (ranging from about 98 gCO2e/MJ in 2013 to 89 gCO2e/MJ in 2020) and deficits are generated by gasoline and diesel.

At the end of each year, compliance is achieved by offsetting deficits with credits. Credits can be banked and traded, and they do not lose value over time.

Courtesy, CalETC LCFS Compliance Outlook, June 2013

Clean Fuels Standard

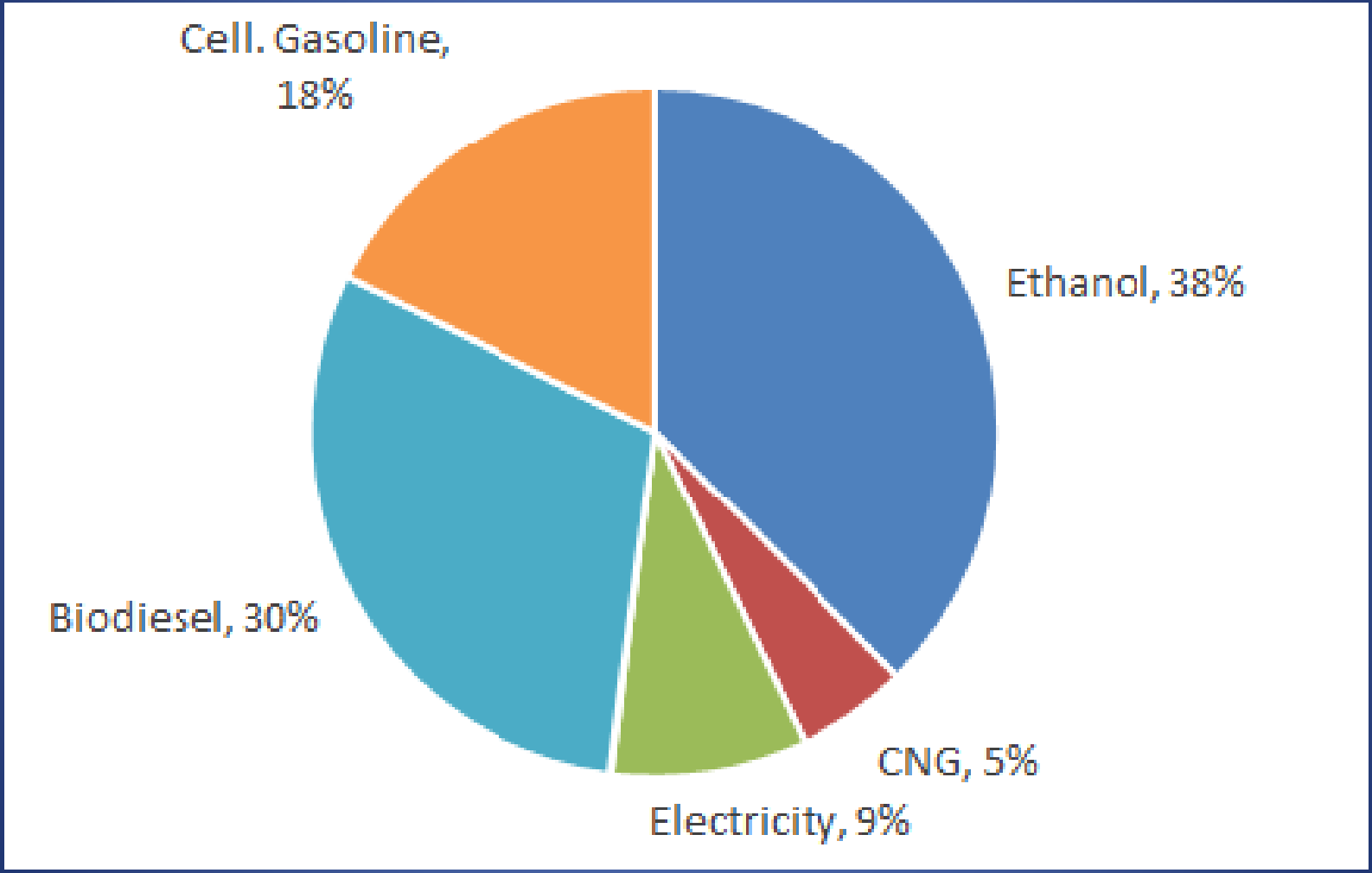
- If implemented, the standard would allow NW to stop spending billions a year to import oil from other states and countries
- Will significantly lower global warming emissions and health impacts resulting from other air pollution from transportation fuels
- Drive investments in renewable fuels and other low carbon solutions.
- **Create Scale!**

Clean Fuels Compliance Scenarios

	Scenario A Advanced Vehicles	Scenario B Max Cellulosic	Scenario C Min Cellulosic	Scenario D Min Cellulosic with E15
Max Gasoline Ethanol %	10%	10%	10%	15%
FFV E85 Consumption	Up to 85%	0%	Up to 85%	Up to 85%
Max Biodiesel Blend %	Up to 15%	Up to 15%	Up to 15%	Up to 15%
Ethanol Volumes				
MW Corn	Balance	Balance	Balance	Balance
Corn+	Up to 40 MGY	Up to 40 MGY	Up to 40 MGY	Up to 40 MGY
Sugarcane	Up to 146 MGY	Up to 146 MGY	Up to 200 MGY	Up to 200 MGY
Molasses	Up to 20 MGY	Up to 20 MGY	Up to 20 MGY	Up to 20 MGY
Cellulosic	63 to 300 MGY	63 to 300 MGY	63 to 300 MGY	63 to 300 MGY
Cell Gasoline and Diesel	55 to 200 MGY (gasoline equiv)	55 to 200 MGY (gasoline equiv)	55 to 200 MGY (gasoline equiv)	55 to 200 MGY (gasoline equiv)
Biodiesel				
Soybean	As needed	As needed	As needed	As needed
Canola	Up to 42 MGY	Up to 42 MGY	Up to 42 MGY	Up to 42 MGY
UCO	Up to 10 MGY	Up to 10 MGY	Up to 10 MGY	Up to 10 MGY
Tallow	Up to 12 MGY	Up to 12 MGY	Up to 12 MGY	Up to 12 MGY
Corn Oil	Up to 40 MGY	Up to 40 MGY	Up to 40 MGY	Up to 40 MGY
RNG	Up to 16 MGY (diesel equiv)	Up to 12 MGY (diesel equiv)	Up to 12 MGY (diesel equiv)	Up to 12 MGY (diesel equiv)
Vehicle Populations				
CNG	1.5 X BAU	BAU	BAU	BAU
EV/PHEV	CA ZEV	BAU	BAU	BAU
H2 FCV	CA ZEV	BAU	BAU	BAU

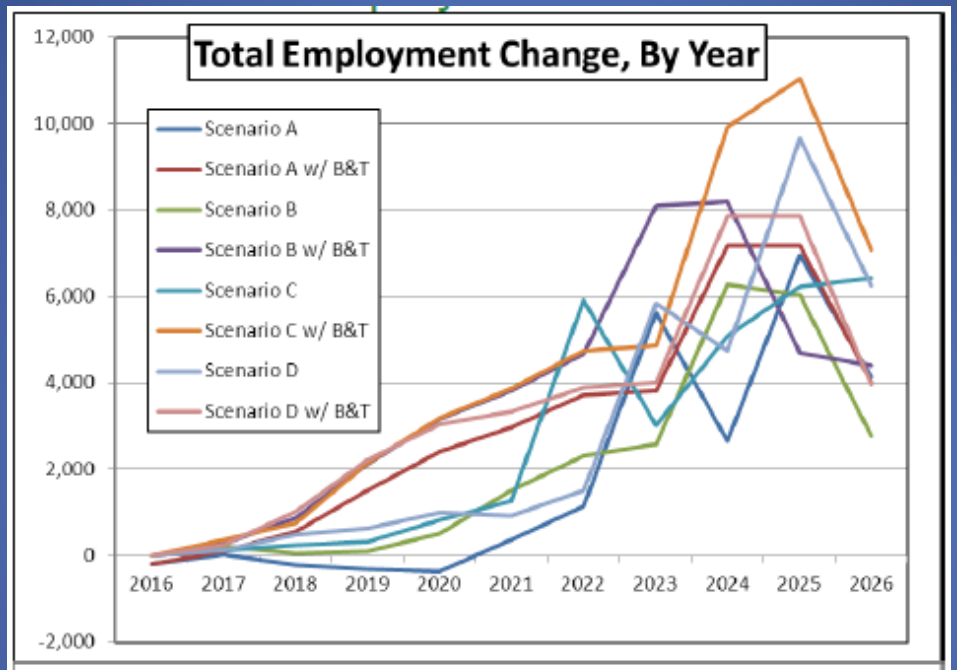
Courtesy, Life Cycle Associates Progress Report, October 2014

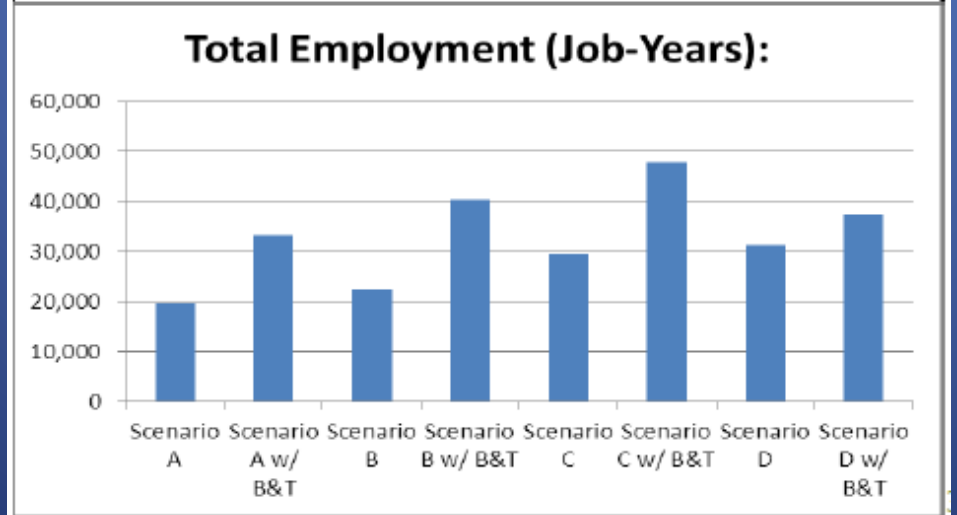
Maximum Cellulosic Scenario



Courtesy, Life Cycle Associates Progress Report, October 2014

A Clean Fuel Standard Creates Jobs





Courtesy, Life Cycle Associates Progress Report, October 2014

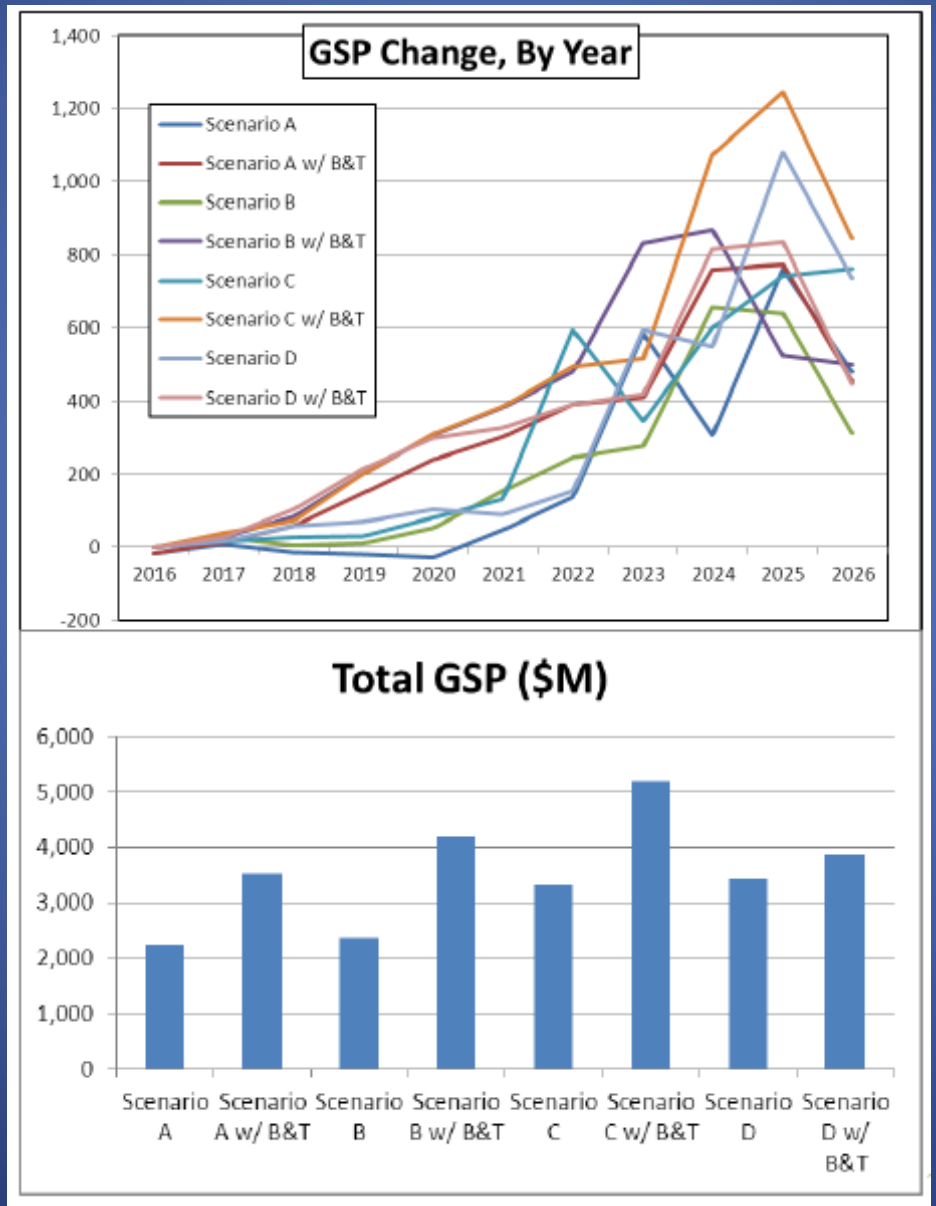
A Clean Fuel Standard Creates Jobs

Life Cycle Associates

Employment Impacts of Eight Scenarios, Jobs, Job Years

	Scenario A	Scenario A w/ B&T	Scenario B	Scenario B w/ B&T	Scenario C	Scenario C w/ B&T	Scenario D	Scenario D w/ B&T
2016	-190	-190	-1	-1	-1	-1	-1	-1
2017	26	108	229	271	122	364	122	259
2018	-211	568	63	872	256	771	497	1,021
2019	-318	1,517	93	2,127	312	2,140	636	2,213
2020	-365	2,422	514	3,164	827	3,194	1,000	3,040
2021	375	2,969	1,511	3,831	1,265	3,883	933	3,344
2022	1,145	3,717	2,310	4,663	5,913	4,751	1,515	3,886
2023	5,625	3,833	2,585	8,110	3,024	4,860	5,832	4,009
2024	2,655	7,179	6,275	8,201	5,095	9,917	4,750	7,847
2025	6,967	7,178	6,037	4,709	6,224	11,044	9,649	7,868
2026	4,139	4,023	2,784	4,416	6,417	7,077	6,262	3,972
2016-2026	19,846	33,323	22,400	40,363	29,454	48,000	31,194	37,458

CFS = Economic Growth



Courtesy, Life Cycle Associates Progress Report, October 2014

- Clean Fuels Standard drives supply chain growth and agricultural prosperity
- Pacific Coast Canola – illustrates triple benefits
  - Farmers
  - Crushing facility
  - Biofuel processing

Capital Press
The West's Ag Website

Homegrown energy independence means more money for Washington farmers

7

By Matt Upmeyer
For the Capital Press

Published:
October 14, 2014 2:11PM

Matt Upmeyer

Most of the money spent on energy in Washington leaves the state. By having a clean energy standard, Washington can keep more of that money in-state.

Nearly all of the $14 billion we spend annually on petroleum in Washington leaves the state. We have a golden opportunity to move a lot of those dollars to Washington farmers. By putting a new clean fuels standard in place, we can continue to build a thriving homegrown renewable fuels industry that encourages our farmers to grow more renewable fuels crops.

Pacific Coast Canola (PCC) owns and operates the first commercial-scale canola crushing facility west of the Rocky Mountains. Located in Warden, Wash., the plant provides competitive-wage jobs with comprehensive benefits to our 46 employees. Our oil is bought by food and biodiesel customers, while our

Study on CFS Shows successful growth at every step of the value chain

How should we measure success?

It should drive positive outcomes:

1. Reduction of carbon intensity for fuel mix.
2. Foster solid growth of alternative fuel supplies to petroleum.
3. Over compliance in carbon trading program in early years.

It should avoid negative outcomes:

1. Lower economic growth measured by GDP.
2. Slower growth in jobs as measured by unemployment rate.
3. Clear evidence that a CFS doesn't spike fuel prices.

Courtesy – John MacLean, Dec. 2013

What historical data suggests

It should drive positive outcomes:

✓ 1. Reduction of carbon intensity for fuel mix.

✓ 2. Foster solid growth of alternative fuel supplies to petroleum.

✓ 3. Over compliance in carbon trading program in early years.

It should avoid negative outcomes:

✗ 1. Lower economic growth measured by GDP.

✗ 2. Slower growth in jobs as measured by unemployment rate.

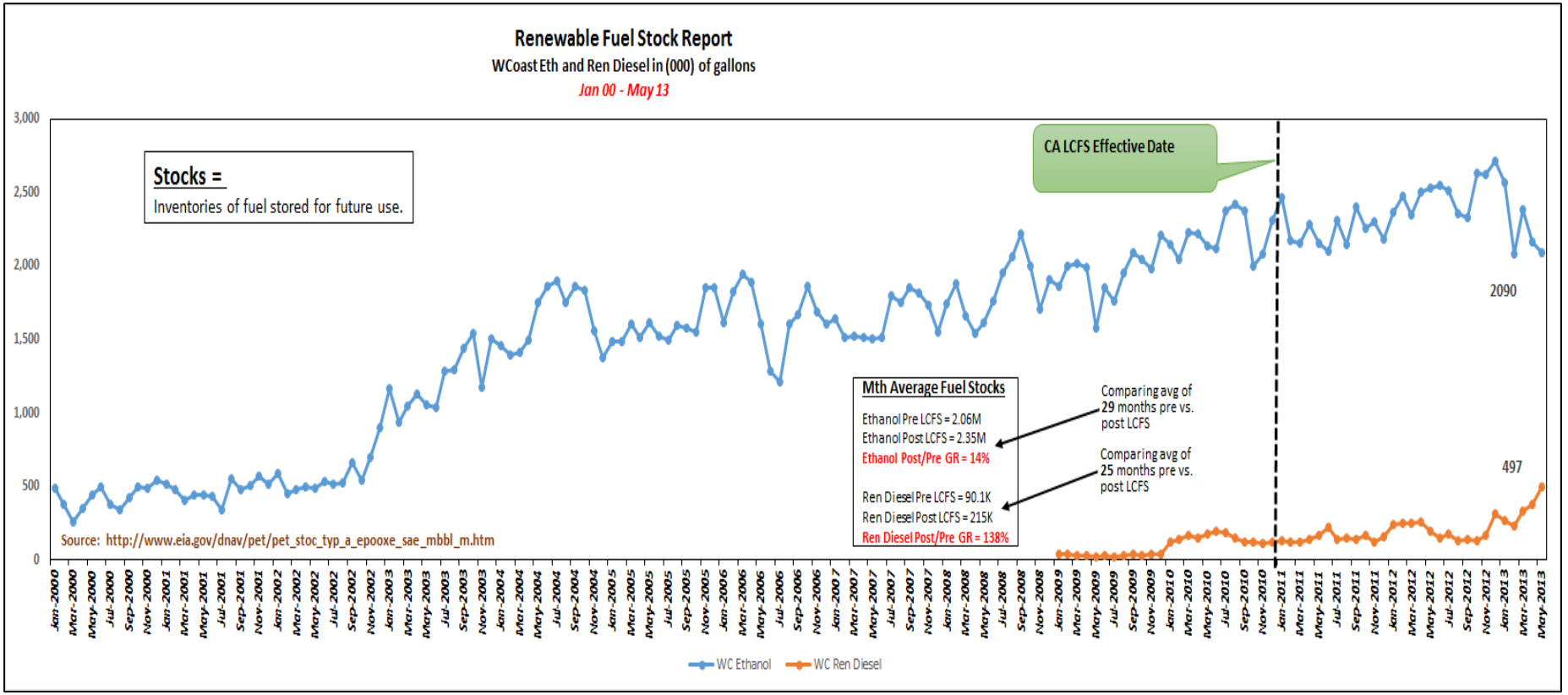
✗ 3. Clear evidence that CFS doesn't spike fuel prices.

Courtesy, John MacLean, December 2013

Growth in Alternative Fuel Supply

Conclusions

- California Ethanol stocks experienced a 14% growth rate in the 29 months after CA LCFS versus the prior 29 months.
- **Renewable Diesel** stocks experienced a **138% growth rate in the 25 months** after CA LCFS versus the prior 25 months.

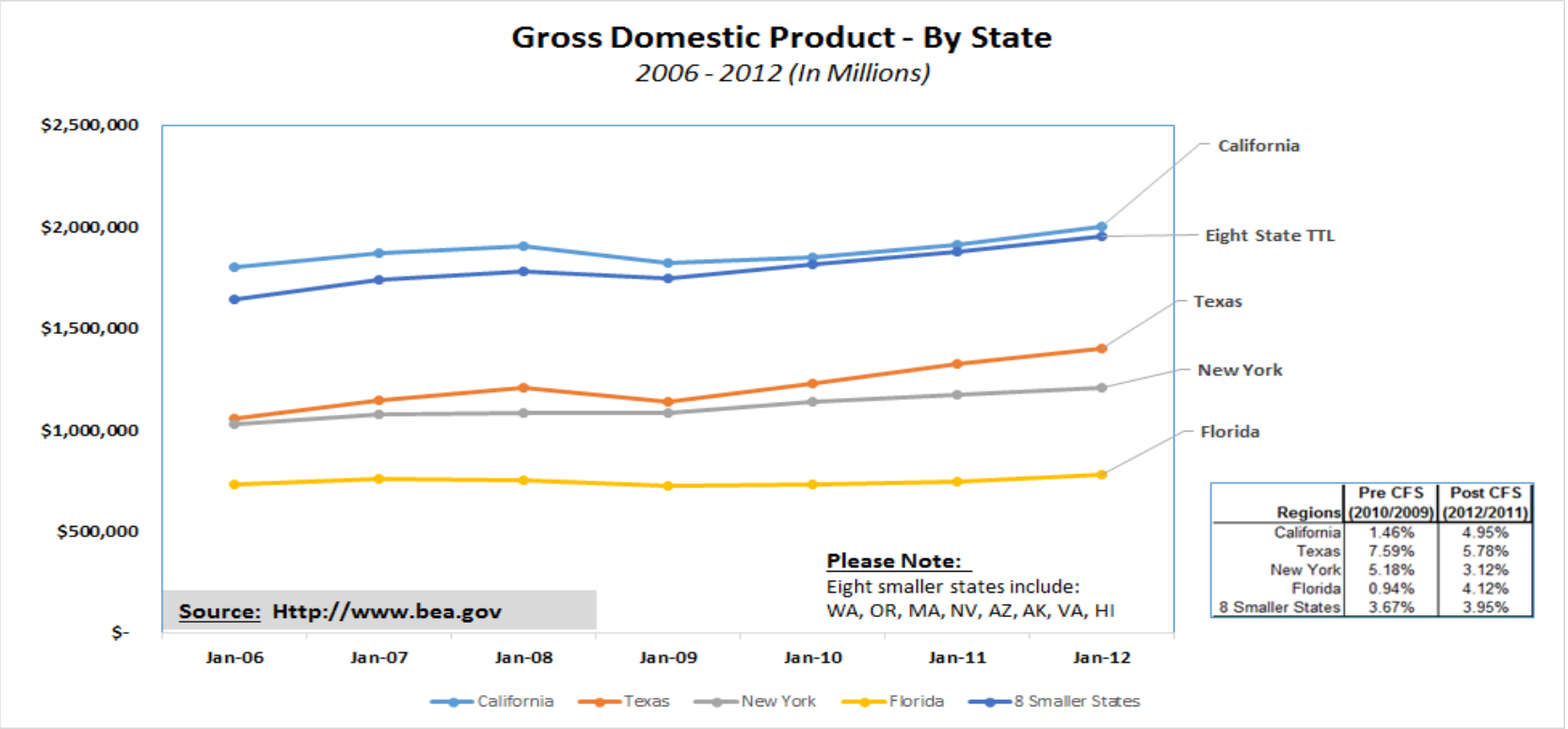


Courtesy, John MacLean, December 2013

Lower Economic Growth?

Summary:

- Gross Domestic Product or "GDP" measures economic output for a region or a country.
- We looked at GDP growth across 4 major states & 8 smaller ones to compare performance.



Regions	Pre CFS (2010/2009)	Post CFS (2012/2011)
California	1.46%	4.95%
Texas	7.59%	5.78%
New York	5.18%	3.12%
Florida	0.94%	4.12%
8 Smaller States	3.67%	3.95%

Observations/Conclusions

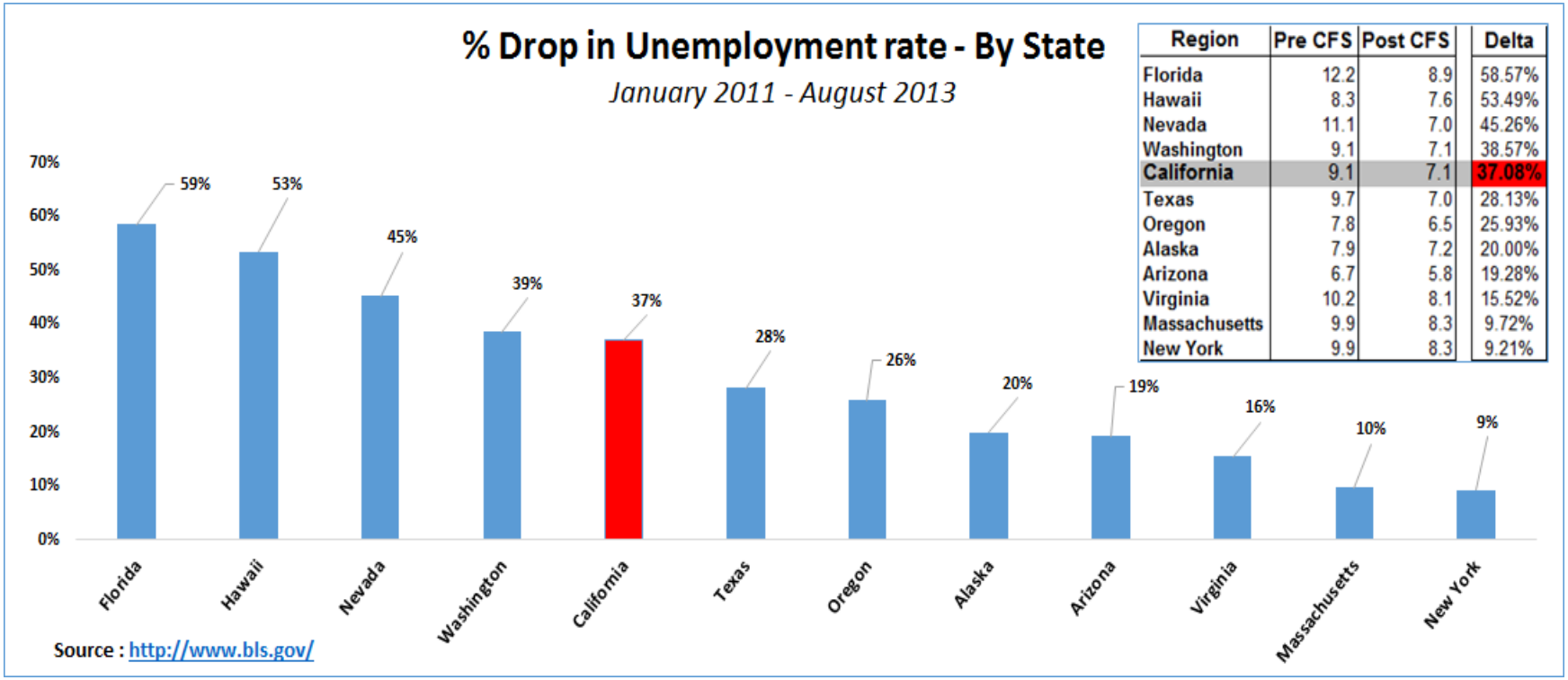
- California is a massive state with a huge economy but still grew GDP by 4.95% in 2012.
- This 4.95% GDP growth is **one of the highest surveyed** only bested by Texas.

Courtesy, John MacLean, December 2013

No clear impact on jobs

Summary:

- Unemployment rates are closely watched to determine the health of a regional economy.
- We looked at Unemployment rates across **12 states** to compare performance post LCFS.



Region	Pre CFS	Post CFS	Delta
Florida	12.2	8.9	58.57%
Hawaii	8.3	7.6	53.49%
Nevada	11.1	7.0	45.26%
Washington	9.1	7.1	38.57%
California	9.1	7.1	37.08%
Texas	9.7	7.0	28.13%
Oregon	7.8	6.5	25.93%
Alaska	7.9	7.2	20.00%
Arizona	6.7	5.8	19.28%
Virginia	10.2	8.1	15.52%
Massachusetts	9.9	8.3	9.72%
New York	9.9	8.3	9.21%

Observations/Conclusions

- All states surveyed enjoyed drops in unemployment as we moved away from recession.
- California held it's own with a 37% drop **which is better then 7 of the other 12 states**.

Courtesy, John MacLean, December 2013

The Lynchpin

Summary

- Another way to see if California's CFS has had a material impact on prices is to look at it from the perspective of credits and deficits.
- California Reformulated Gasoline Blend stock for Oxygenate Blending (CARBOB) generated about 373,000 deficits in 2011 and 724,000 in 2012.
- For fuel sales we had 13.9 and 13.75 billion gallons of gas sold in 2011/2012 respectively.

	Price/G impact based on Avg. RIN Prices	
	2011	2012
Deficits	373,000	724,000
Real RIN Price	$ 16	$ 16
	$ 5,968,000	$ 11,584,000
Gas volume	13,900,000,000	13,750,000,000
Price/Gallon	$ 0.0004	$ 0.0008

- As this table indicates, with an average RIN price of $16 or less in 2011/12, the Price/G impact is < 1/15th of 1 cent!

- For regulated parties to experience a $.01/G impact for LCFS RIN prices would've had to be between $190 & $386 in 2011 and 2012. Not even close!

	Price/G impact based on Hypothetical RIN Prices	
	2011	2012
Deficits	373,000	724,000
Hypth. RIN Price	$ 386	$ 190
	$ 143,978,000	$ 137,560,000
Gas volume	13,900,000,000	13,750,000,000
Price/Gallon	$ 0.010	$ 0.010

Courtesy, John MacLean, December 2013

Conclusions

1. We are almost 3 years in for California's LCFS and evidence clearly show it's generating the kinds of demand for alternative fuels needed to drive scale in this industry.
   i. This directly drives the scale needed for advanced fuels for aviation and other sectors.
2. So far there are **zero indications** that California's LCFS has created fuel price spikes and negatively impacted economic growth or jobs in the state.

3. California's economy has been through turmoil over the last several years like other states but not due to the rollout of the LCFS in 2011.

Courtesy, John MacLean, December 2013

Study: California's AB 32 transportation policies will ***save money***

Implementation of LCFS and C&T will result in avoided costs of $23.1 billion by 2025 due to:

- Avoided public health costs ($8.3 billion)
- Avoided fossil fuel dependence costs ($7.9 billion)
- Avoided climate change-related costs ($6.9 billion)

- Courtesy, EDF, ALA,TetraTech

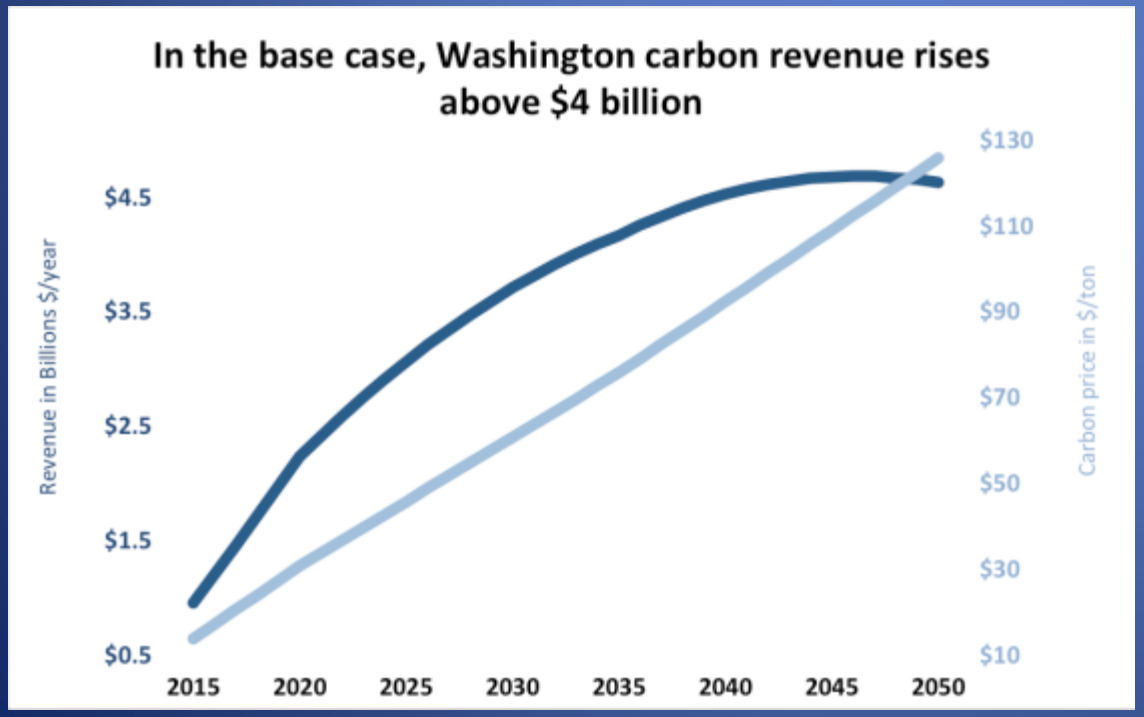
Other Policy Priorities

- **Continued R&D Leadership**
- **Incentives supporting scale level construction**
  - **Revolving loan funds; loan guarantees**
  - **Direct support for infrastructure investments**
  - **Support for feedstock production and processing**
  - **Use Gov't purchasing authority to build markets**
- **Key Question with incentives: $$$$?**

Other Policy Priorities

Price and Limit Carbon Pollution

- **Create level playing field**
- **Create significant funding for solutions**



Courtesy, Sightline Institute, October 2014

Join Us!

http://www.cleanfuelsjobs.org/

66 Government leaders voiced support for clean fuels standard, Sept. 2014

http://www.cleanfuelsjobs.org/

Advocates Law Group PLLC
Ascent Law Partners
B2B4ME
Bricklin & Newman
Cascadia Law Group
Cedar Grove Composting
Cestjon Macfarland LLC
CineCity Pictures, Inc.
Clean Energy
Clean Energy Renewable Fuels Corp.
Clean Technology Partners
CLEAResult
Compendium, Inc
Cyan Strategies
Demand Energy Management
Don Baker Design
Ecological Solutions
Element 8
Emerald Services, Inc.
Energethic, LLC
Energy Friendly Holdings
Environmental Entrepreneurs
General Biodiesel
Good Company
Green Canopy Homes
GreenBalance Energy Marketing
Hire Electric
Hudson Bay Insulation
Impact Bioenergy
Imperium Renewables
John Engber & Associates
MacDonald-Miller Facility Solutions
Mercurius Biofuels
MicroEnergy Credits
MicroGREEN Polymers, Inc
National Biodiesel Board
Network for Business Innovation and Sustainability
North Star Chemical
Pacific Ag
Pacific Ethanol
Powering Imagination
Precision Pipe Fabricators, Inc.
Promus Energy
Propel Fuels
Rainrock
Re-Vision Lab
Scoville PR
Seattle Steam
SeQuential Pacific Biodiesel
Site Story
Summit Power
TransMessis Columbia Plateau
Tutoring Wonders, LLC
Whole Energy

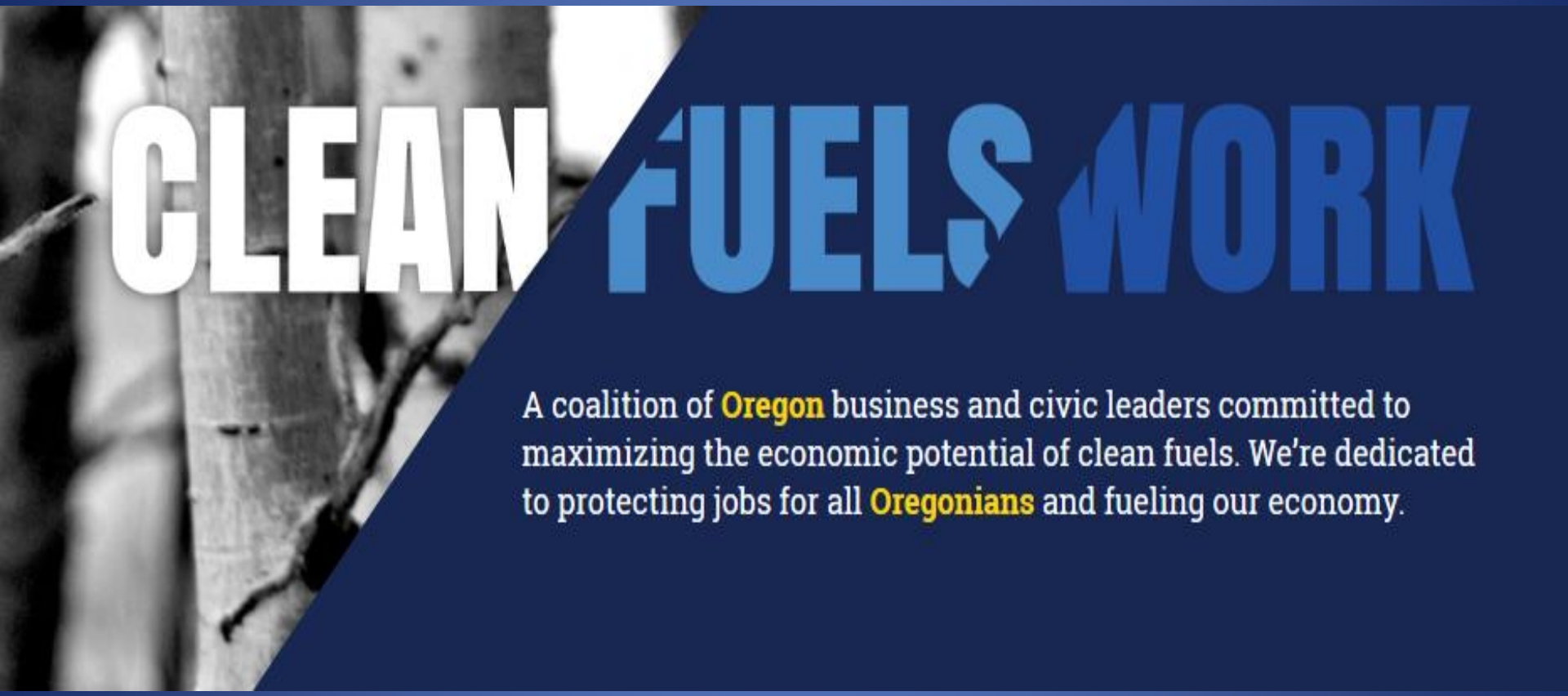
WASHINGTON BUSINESSES SUPPORT A CLEAN FUELS STANDARD

Protect our employees, customers, and families from air pollution.

Spur innovation in Washington's clean energy economy and create jobs.

Promote fuel choice to reduce reliance on oil.

Join Us!



http://CleanFuelsWork.com/

Biofuels Policies: Why a Clean Fuels Standard and Other Polices are Critical for the Advanced Biofuels Industry

Ross Macfarlane, Senior Advisor
Climate Solutions

Advanced **Hardwood Biofuels** Northwest