



NARA

Northwest Advanced Renewables Alliance

A new vista for Green Fuels, Chemicals, & Environmentally Preferred Products

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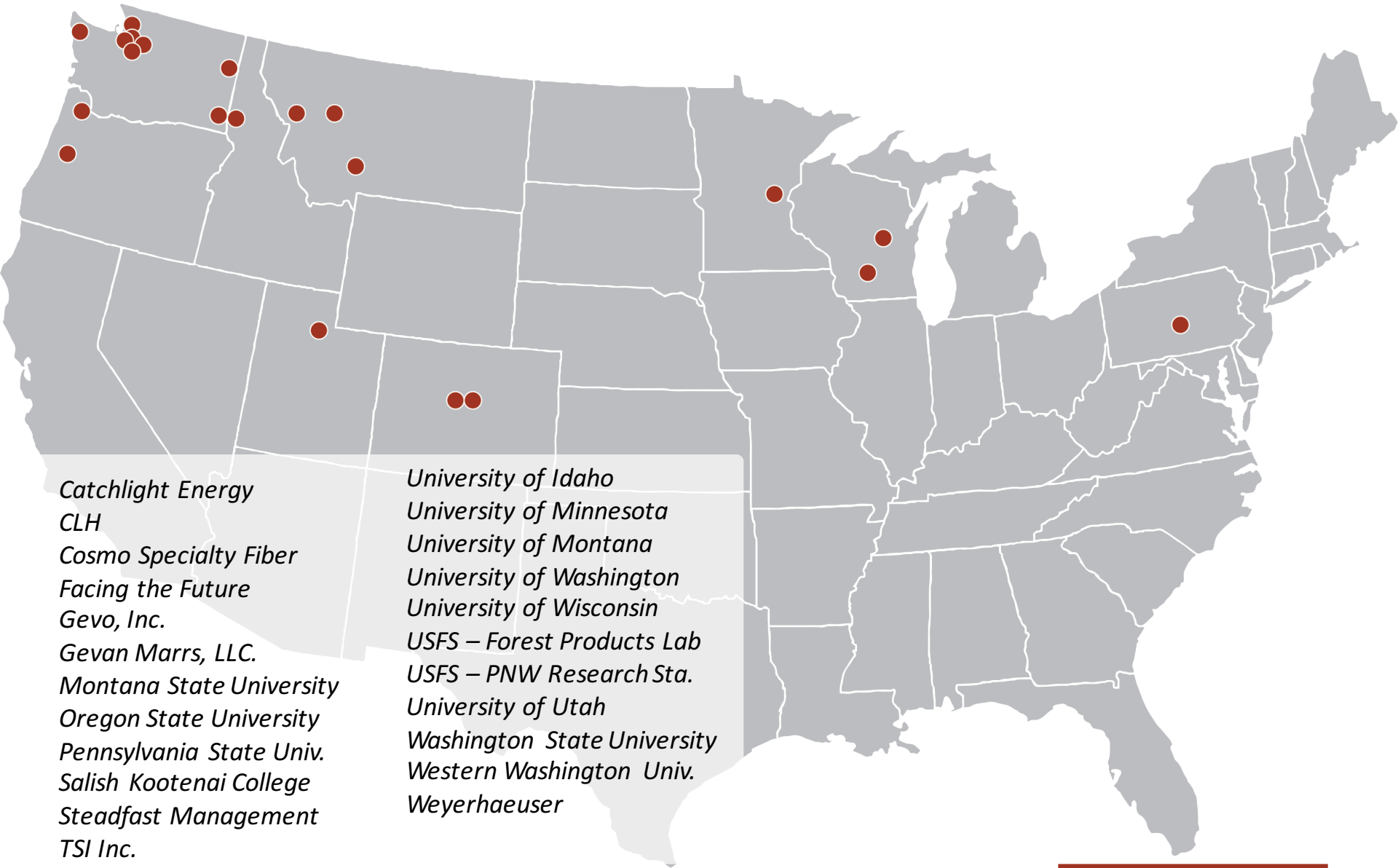
Northwest Advanced Renewables Alliance



The NARA Team

Oregon Stakeholder Meeting
April 10, 2016 in Portland, OR

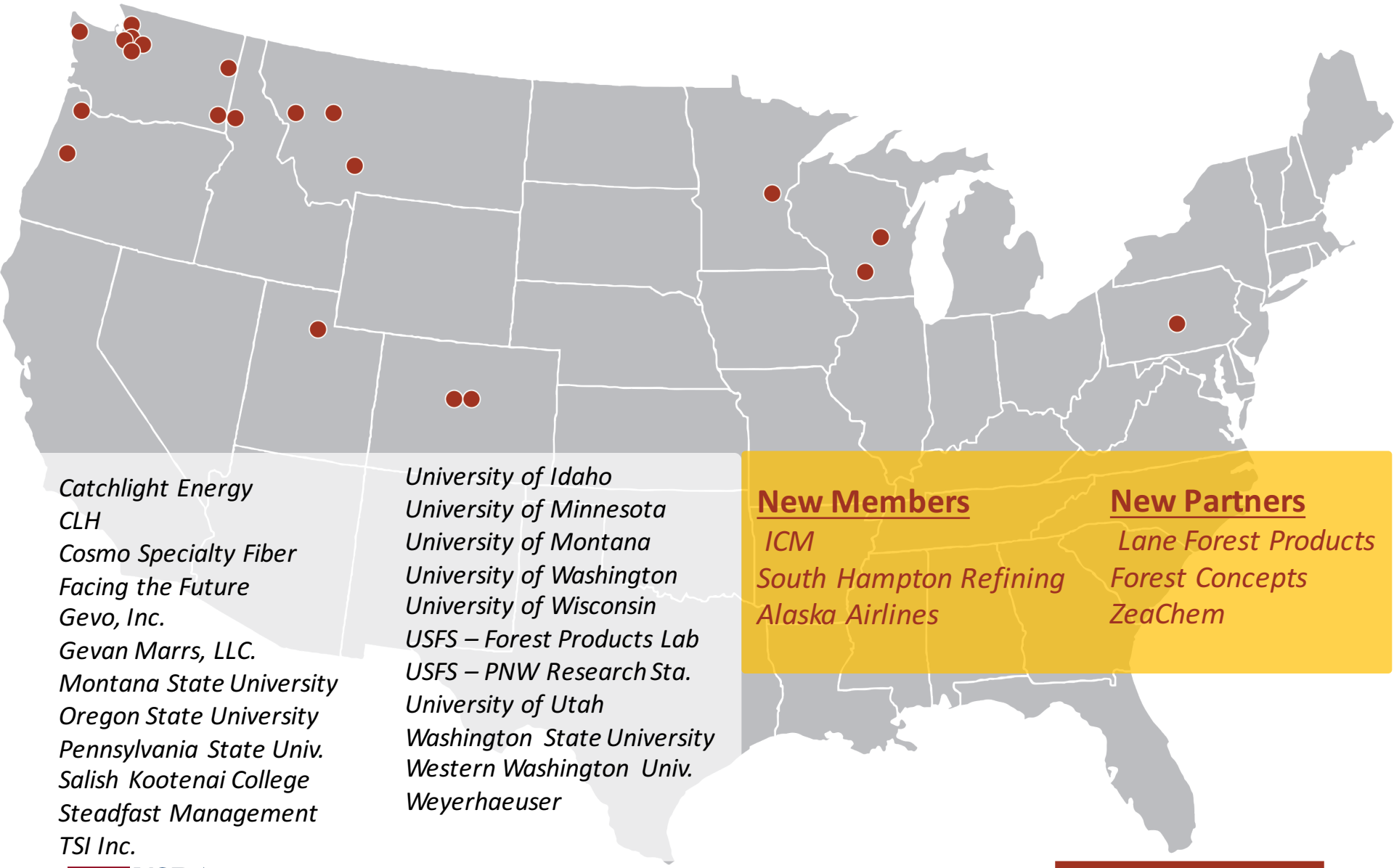




Catchlight Energy
CLH
Cosmo Specialty Fiber
Facing the Future
Gevo, Inc.
Gevan Marrs, LLC.
Montana State University
Oregon State University
Pennsylvania State Univ.
Salish Kootenai College
Steadfast Management
TSI Inc.

University of Idaho
University of Minnesota
University of Montana
University of Washington
University of Wisconsin
USFS – Forest Products Lab
USFS – PNW Research Sta.
University of Utah
Washington State University
Western Washington Univ.
Weyerhaeuser





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New Members

ICM
South Hampton Refining
Alaska Airlines

New Partners

Lane Forest Products
Forest Concepts
ZeaChem

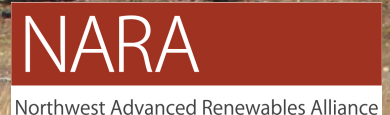




Completed Year 4 of 5

Our Biomass Source

Oregon Stakeholder Meeting
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Industrial Feedstock

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Biorefinery Approach

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Isobutanol to Jet Fuel Demonstration

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Demonstration unit at South Hampton Resources, Silsbee, TX is fully functional



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Environmental

Economic

Social



Sustainable
Feedstock

Weyerhaeuser, OSU,
UW, WSU

Life Cycle
Assessment

UW

Economic
Analysis

TSI, Weyerhaeuser,
UW

Social & Market
Assessment

Penn State, WSU,
UIdaho



Final Form for Deployment

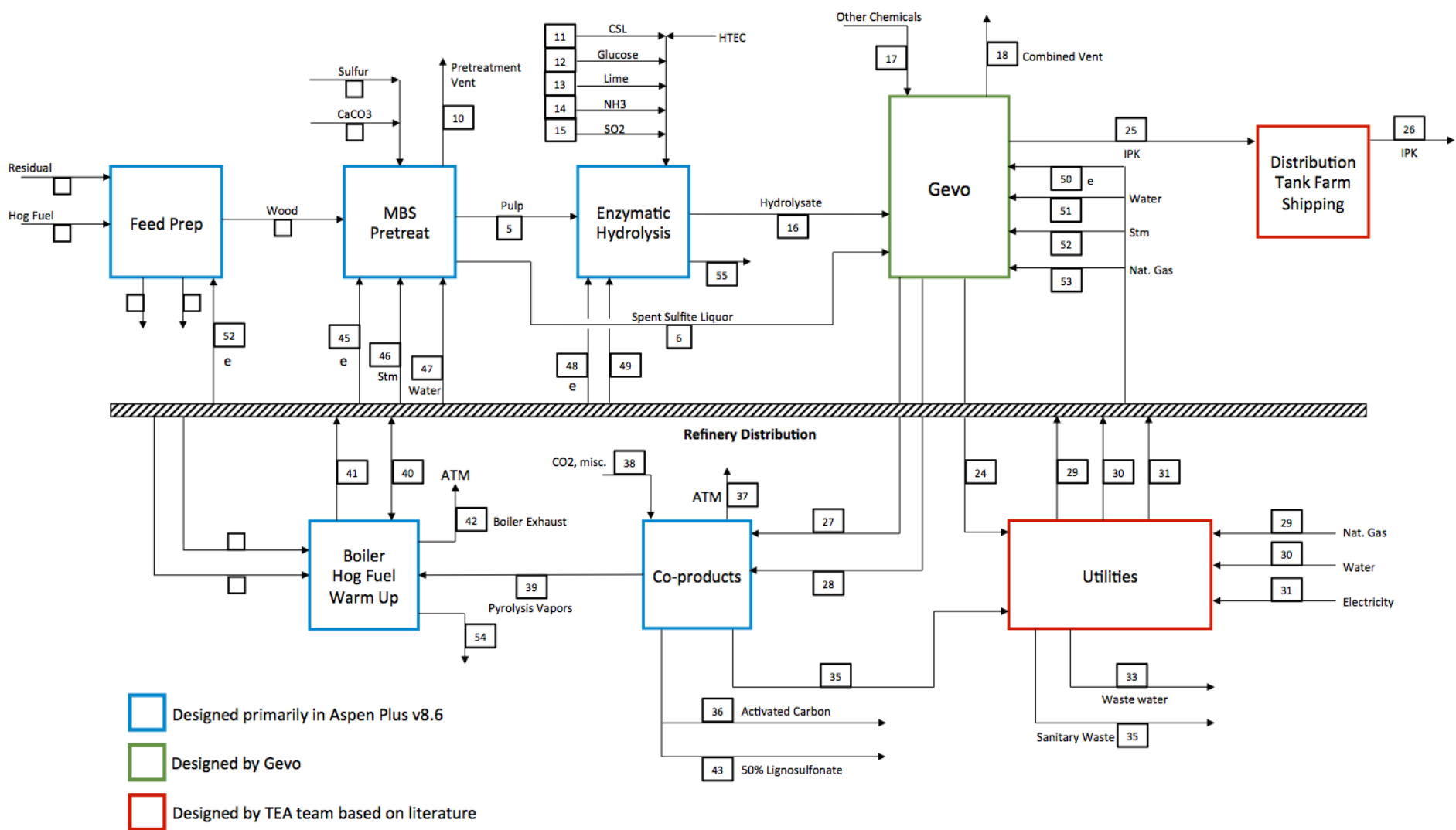
- Biomass Sourcing Model
- Biorefinery Siting Methodology
- ASPEN Process Model for Integrated Bio-refinery (IBR)
- Life Cycle Assessment Model (LCA)
- Community Impact Assessment (CIA)
- Techno Economic Analysis (TEA)
- Environmental Assessment Systems

SUSTAINABILITY ANALYSIS STATUS

READY TO SHARPEN THE PENCIL

NARA ASPEN Process Model

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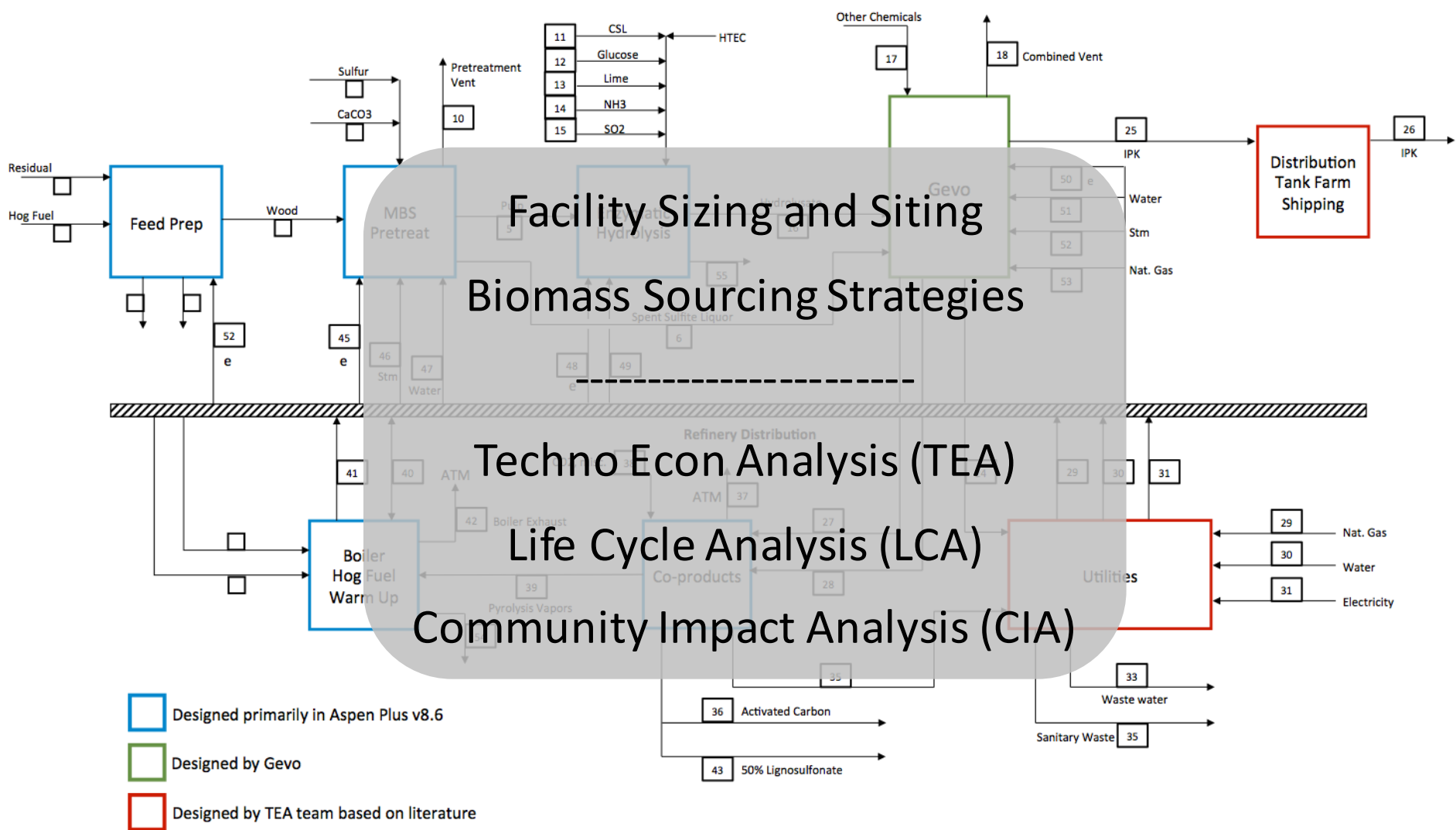


Source: TSI Chemicals & Biomass Products and Processes



... underpins our Sustainability Analyses

Oregon Stakeholder Meeting
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Source: TSI Chemicals & Biomass Products and Processes



MID-CASCADE TO PACIFIC CORRIDOR

Volume II | ANALYSIS



Northwest Advanced Renewables Alliance





WHY

Demonstrate Integrated
Technologies

Supply Chain to Deliver
Technologies

Needs of Aviation Partners

Learn, Educate, Connect

11 WOOD TO WING K



Feedstock Suppliers

Weyerhaeuser Corp (OR)
Confederated Salish and
Kootenai Tribes (MT)
Muckleshoot Tribe (WA)

Processing Partners

Lane Forest Products (OR)
Forest Concepts (WA)
Kevin Jump (MT)
Bill Bass (WA)

Production Partnerships

Pretreatment

Andritz Corp
ZeaChem

Fermentation

ICM

Alcohol to Jet

South Hampton Refining



Conf. Salish and Kootenai
Kevin Jump



Weyerhaeuser Corp
Lane Forest Products



Weyerhaeuser Corp
Lane Forest Products

Fuel Certification

Alter Jet - ASTM D7566

Blending

Conv Jet – ASTM D1655

Distribution to Wing

Commercial Demonstration
Flight

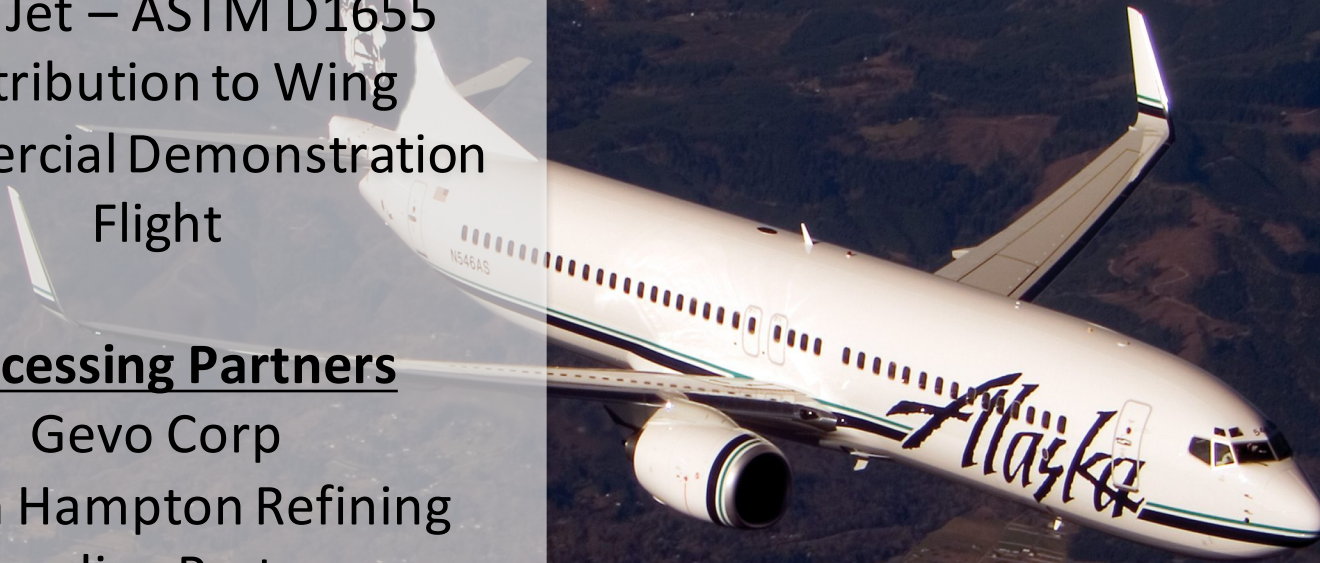
Processing Partners

Gevo Corp

South Hampton Refining

Blending Partner

Alaska Airlines



Moving from Invention to Commercial Reality

- Forest Residue Collection and Preparation
- Envisioning Integrated Facilities and Siting
- SPORL / MBS Pretreatment
- Alcohol to Jet
- Demonstrating Feasibility with Supply Chain Implementation Partners
- Educating Citizens, Industry, Policy Makers

Advancing Supply Chain Development

THE ROLE OF NARA

Invention is important.

Improvement is crucial....

A crisis doesn't go away by ignoring it.

It is solved by working on it.

A REVOLUTION COMES IN LAYERS

JOHN YEMMA | CSMONITOR.COM | AUGUST 30, 2015

THANK YOU

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