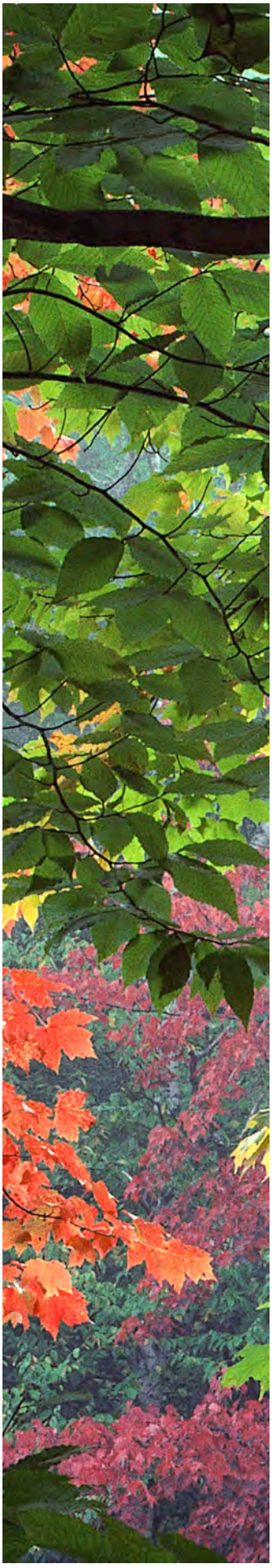

WORKSHOP SUMMARY

Ensuring Forest Sustainability in the Development of Wood-based Bioenergy in the Pacific Coast Region

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Meeting Summary
Ensuring Forest Sustainability in the Development of Wood-based Bioenergy in the Pacific Coast Region

February 24-25, 2010, University of California, Davis

Introduction

This workshop convened stakeholders engaged in the development of wood-based bioenergy in the Pacific Coast region[1] as part of a national policy dialogue on the sustainability of wood-based bioenergy. As one in a series of four regional workshops, this meeting addressed the same core issues explored in previous regional workshops,[2] including: characterizing methodologies to assess the availability of adequate feedstocks, outlining policy mechanisms that may be used to pair appropriate biomass utilization technologies with these feedstocks, and identifying flexible policy options to help ensure that any expansion of bioenergy in the region is consistent with sustaining environmental, economic, and social values. Sixty-seven participants came from across the region and included representatives from the energy and forest products industries, land management agencies at all levels of government, state policy and planning agencies, tribal organizations, conservation NGOs, and academia.

Context for Forest Bioenergy in the Pacific Coast Region

The Pacific Coast region is characterized by significant diversity in forest management and restoration objectives, energy and climate policy goals, and the region has a long history with bioenergy development. California already has the largest concentration of bioenergy facilities of any state in the U.S. [32 facilities generating approximately 700 MW of electricity] and while this capacity is down from a historical high of 60 facilities generating 1,000 MW in the late 1990s, new projects are being planned. Oregon, Washington, and British Columbia have supported bioenergy facilities through the existing forest products sector and Southeast Alaska is presently assessing opportunities to facilitate biomass markets. The development of renewable portfolio standards (RPS) by the west coast states (for example, California has an aggressive

[1] This workshop focused on the Pacific Coast region that is comprised of Northern California, Oregon, Washington, British Columbia and Southeast Alaska.

[2] http://www.pinchot.org/gp/RegionalMeetings http://www.heinzctr.org/forestbioenergy/index.shtml

RPS of 33% by 2020) is a major driver for expanded interest in bioenergy. Motives for participation in the bioenergy sector vary; some see biomass as a mechanism to restore forest ecosystem health and resiliency, while others see opportunities for community economic development and rural energy security. In terms of sustainability, there is a perception by some that policy incentives have the potential to: 1) favor projects that may be "out of scale" with biomass supplies over the long-term, and 2) lead to an uncoordinated build-out of the region's bioenergy capacity in a fashion that may not be consistent with broadly supported goals for forest ecosystem health restoration, climate/energy policies intended to reduce greenhouse gas (GHG), and sustainable economic development.

Biomass Supply and Demand in the Pacific Coast Region

In the 1980s, California energy companies moved quickly to take advantage of a number of well intentioned incentives. Participants commented that during this period California's biomass energy capacity was overbuilt based on faulty feedstock assumptions and the assumption that price supports that supported biopower production would continue. Many of the facilities built during this period are no longer in operation or have modified their feedstock procurement strategies significantly as the number of sawmills (and the corresponding supply of mill residues) decreased due to a confluence of factors including a significant reduction in the availability of timber from federal lands that began in the late 1980s. History has shown that the most successful bioenergy facilities in California rely on a range of feedstock options. Participants noted that the combination of an aggressive RPS and encouraging financing incentive packages are leading some of these previously shuttered biomass plants to be retrofitted with updated conversion technology for renewed power production. Participants also noted that in some cases coal facilities are undergoing full and partial fuel switches to biomass. This historical example illustrates the need to ensure that estimates of available biomass can support decision makers at multiple scales.

Policy makers need accurate information to determine regional capacity for biomass production at multiple price points, and project developers need information to evaluate feasibility and acquire equity partners to finance project development. Forest stewardship collaboratives seeking agreement on the management of public lands also need accurate and timely information on which to base their decisions. Supply analysis is not "one-and-done," as one analysis is usually not sufficient because there are multiple variables to consider and multiple analytical approaches that may be applied. "Investor grade" feasibility analyses are a prerequisite for financing individual projects and regional-scale supply studies are also needed to help frame policy debates. Project level due diligence requires ensuring that biomass supply is larger than planned sourcing capacity in order to account for future competition during the 30 – 40 year service life of a given facility. Moreover, project level due diligence should consider future competition, potential for increases in price, both the effect and reliability of subsidies, the effect of changes in landowner objectives, as well as, changes in land ownership patterns, the effect of

altered disturbance regimes and growth cycles associated with climate change, and the legacy of past management decisions and fire exclusion policies.

Dialogue participants recommended that sub-regional biomass availability estimates should apply a series of "sustainability filters." The filters may vary by location but generally analyze:

- Coarse biophysical capability of forests to supply a range of potential forest biomass quantities over a given length of time using best available Forest Inventory and Analysis (FIA) data and realistic assumptions.
- The public policy overlay of lands not included for legislative, judicial administrative reasons (e.g. inventoried roadless areas, wilderness areas, administratively withdrawn areas) and other areas of high conservation value determined off-limits through collaborative multi-stakeholder processes).
- How much of the remaining supply is economically available considering various factors (e.g. road network analysis for both subsidized and unsubsidized transportation, institutional costs such as permits and associated analysis, as well as, utilization capacity and technology).
- Supply competition between the existing forest industry and the emerging forest bioenergy industries.
- Demand relative to existing energy infrastructure and fossil fuel prices.

Previous estimates of California's forest biomass supply are as large as 14.2 million dry tons annually. Whereas a recent supply analysis of forest biomass availability in the region suggests that the range of forest biomass that is economically available[3] in WA, OR and CA together varies from 5.7 - 7.9 million dry tons annually[4] depending on whether or not hazardous fuel treatments from federal lands are included. Both studies recognized that the estimated amount could increase by: expanding forest health thinnings on federal lands, removing a greater percentage of logging residues that are currently piled and burned to comply with slash disposal regulations, diverting mill residues from current uses, and/or establishing energy crop plantations. These estimates are also based on the assumption that industrial roundwood currently the basis of other markets are not used directly as feedstock for bioenergy.

Participants expressed that the integration of biomass supply analyses with policy analysis is an important aspect of ensuring long-term forest sustainability in advance of instituting policies that will shape regional biomass/bioenergy market development. There are currently multiple methodologies used to estimate and communicate how much forest biomass is available. There is a need to develop uniform standards and common assumptions for performing supply

[3] USFS estimate of available biomass at roadside priced at or below $44/oven dry ton (ODT) after applying various filters. A detailed description of the assumptions of this analysis is available in Skog *et al*., (2009) *Forest-based biomass supply curves for the U.S.* available at http://www.pinchot.org/uploads/download?fileId=550

[4] This volume would be enough to produce 438/628 million gallons of cellulosic ethanol/year or 593/850 MW of biopower annually. For key assumptions made in this analysis see the presentation by Skog available at this link: http://www.pinchot.org/uploads/download?fileId=613

assessments. Reaching this common understanding is necessary to avoid competing assumptions[5] that yield very different volumes. Communicating this need to policy makers is of utmost importance since different volumes of biomass will be capable of supporting different policy goals. Resolving discrepancies among biomass supply estimates may be an appropriate area for public-private partnerships at the federal, state and local levels.

Reducing Uncertainty and Ensuring the Sustainability of Biomass Supplies

Participants recognized that energy policy could have a profound impact on forest policy and agreed it is important to ensure that forest ecological needs—not the need to supply bioenergy facilities—drive silvicultural prescriptions. A number of broad strategies were proposed to address concerns of adequate supply and related sustainability safeguards.

Site level sustainability - forest management classifications. Participants generally agreed that there should be minimum safeguards to ensure that ecosystem services (water quality, soil productivity, biodiversity, etc.) are maintained at the site level commensurate with biomass harvests. However, they expressed that there are, several ways to achieve this. It was recognized that all of the Pacific Coast states have different approaches to forest management and support various voluntary and regulatory programs. Some expressed that state forest practices acts in Pacific Coast states are sufficient to address concerns over the potential impacts associated with biomass removals, yet there was recognition that nationwide not all state programs are as rigorous and there are real or perceived deficiencies in these programs, which contributes to the interest in creating other mechanisms to compensate. It was recommended that there should be a "policy cross walk" of existing state forest practices acts and other relevant natural resource policies in the Pacific Coast to determine if these policies need to be augmented to safeguard ecosystem service values under more intensive biomass removals. It was suggested that this would also be a potential area for effective public-private partnerships.

Others suggested that performance-based incentive programs may be ideal instruments to encourage sustainable management. Third-party forest certification programs were one such approach discussed extensively. Participants expressed that there is value in forest certification, because most certification programs are built around adaptive management frameworks, which may be an ideal approach for managing the potential risks associated with biomass removals. Certification programs may also provide adequate assurance that removals are done in a sustainable manner. Others expressed that the cost of certification remains a barrier for an economic sector (the forest sector) that operates within small margins. Given that the emergence of the bioeconomy is integrating the energy sector with the forest sector in new ways, the economics of certification may change overtime if the energy sector is willing to pay more for

[5] For example one estimate of available forest biomass in California is 14 million ODTs annually, whereas the methodology applied by Skog et al., suggests that significantly less biomass is economically available.

certified biomass. However, it was not extensively discussed whether the energy sector would be able to pay more for certified biomass and still remain competitive within energy markets.

While the applicability of forest certification programs to the federal land base was discussed, there was no apparent consensus on whether certification programs should apply to the management of federal forests. Some felt that certification could actually improve land management in some federal forests and increase the supply of certified material, while providing a mechanism for third parties to evaluate the performance of federal land managers. Despite the fact that all relevant statutes (the National Forest Management Act, the National Environmental Policy Act, the Endangered Species Act, etc.) would still apply, some felt that certification systems were not designed for federal forests, or that the various certification programs would need to go through a public vetting process before they could be applied to federal forest lands.

Regional level sustainability - land classifications. Federal forest management involves complex and sometimes lengthy environmental reviews and contracting processes, which are often mismatched to the timetable requirements of the bioenergy industry that requires certainty of long-term ($\geq$ 20 years) supply agreements. The difference between biomass supply (what is biophysically present on the landscape) and what is socially allowable, ecologically sustainable, and economically recoverable, is largely a function of social, political, and legal processes that influence management activities. It was noted that while some forests are easily identified as in need of restoration (i.e. fuel thinnings) to reduce wildfire risk, such treatments are not necessarily ecologically appropriate in all forests, such as high altitude or mesic forests that historically experienced low frequency fire return intervals and would not have been adversely affected by fire suppression. Moreover, some participants worry that as the scale of bioenergy development increases, safeguards already in place through the federal statutes that govern federal public lands may be insufficient to prevent overharvesting of federal forests. Disagreement persists over the definition of "renewable biomass" in federal policy and participants expressed that a more open dialogue may help clarify what sort of biomass definition may satisfy the concerns of all stakeholders.

It is generally acknowledged that ensuring the sustainability of wood energy involves more than just the definition of renewable biomass, but there remains some disagreement about the specific environmentally sound opportunities on federal lands. Some participants pointed to programs like the Collaborative Forest Restoration Program (CFRP) of the Forest Restoration Title of the Omnibus Public Land Management Act of 2009 (P.L. 111-11) and a number of long-term collaboratives efforts in the Pacific Northwest, such as the work in Lakeview, Oregon, as positive examples of where agreement around biomass projects may be reached. For many of these collaborative efforts, stewardship contracts offer an opportunity to align the priorities of long-term collaborative efforts with the need for a multi-year supply agreement.

Various federal tax, subsidy, and mandate programs define renewable biomass in different ways. Many expressed that national policy should not automatically exclude all federal public lands as biomass sources and even more expressed that biomass availability is best defined through science-based collaborative processes at the local level. Some Eastern states have developed voluntary biomass harvesting guidelines, whereas the Western states have focused more on defining "forest restoration principles" rather than site-specific biomass harvesting guidelines. Past drafts of the federal definition of renewable biomass do not recognize restoration principles in the same way that state BMPs and harvesting guidelines are recognized. One concept discussed was the notion of using spatial analysis and decision support tools to identify areas where extra precautions may need to be taken to mitigate potential risks. This is a precautionary approach that is being adopted by some states, Canadian provinces and European nations.

Collaborative planning and stewardship. The predominance of federal lands in this region and the high stakeholder interest in forest management decisions create a context in which the "social license" for forest management is crucial. There are pockets of activity across the region's public forest landscapes where multi-stakeholder collaboration forms the basis for determining areas where silvicultural treatments will be applied to address concerns over forest health, restoration, and wildfire risk. Such decisions can strongly influence where, when and how much supply is available, and reduce the potential for appeals and delays. In the absence of clear (or presence of several conflicting) national-level goals with regard to restoring forest ecosystem health and resiliency place-based and regional collaborative groups are coming up with their own goals, objectives, and strategies, often independent of national-level goals and policies. Participants commented that one consequence of this process is that these collaborative efforts are often not adequately supported by the federal budget process. Participants generally felt that these collaboratives should be supported.

In some instances deliberative collaborative processes have resulted in agreement on harvesting standards and the acceptable volumes of biomass that can be removed from the federal forests through long-term stewardship contracts. In Lakeview, Oregon a long-term local and regional collaboration has resulted in three 10-year stewardship contracts that represent a significant portion of the biomass supply for a CHP facility, which is expected to operate in conjunction with a solid wood products mill and facilitate broadly supported silvicultural treatments across thousands of acres. Each of these indefinite-delivery indefinite-quantity (IDIQ) stewardship contracts largely depends upon annual appropriations, yet representatives from Lakeview suggest that the biomass facility will allow their stewardship contract to be revenue-neutral or revenue-positive. Long-term stewardship contracts are also starting to be used in other areas of the Pacific Coast region. Ten year contracts are being developed in Oregon's Blue Mountains, Washington's Colville National Forest, and in the Shasta-Trinity National Forest in California.

While an important tool, participants recognized that stewardship contracting is hampered by some issues that may require legislative changes. Foremost, cancellation ceiling reserves reduce the feasibility to establish new biomass utilization infrastructure through stewardship projects

unless appropriate federal funds can be set aside to compensate contractors for infrastructure investments in the event a contract is canceled. Participants felt that addressing this legal/institutional hurdle would likely expand opportunities for stewardship contracts.

Defining Sustainable Biomass Utilization Options

There are many demonstrated technology options for utilizing forest biomass to produce energy. In the absence of energy markets that force firms to internalize the cost of carbon emissions, many of the options for which biomass substitution would likely make sense in a carbon constrained economy (e.g. CHP units in industrial facilities) are currently overshadowed by financial incentives for the production of liquid transportation fuels and renewable electricity. In the absence of a price on GHG emissions, U.S. energy policy is thus focused on supporting technologies that promise to deliver some mixture of energy security and GHG reduction. Participants emphasized the importance of communicating energy value in common units (i.e. converting to BTUs), so that decision makers can accurately evaluate the merits of the various biomass utilization options in light of biomass supply information.

Removal of forest biomass (logging residues and small diameter trees) as part of hazardous fuel treatments and ecosystem restoration activities is a costly endeavor, especially on federal public lands. This leads to relatively high roadside costs for forest biomass, which poses a further challenge to investments in biomass utilization infrastructure. While revenue from merchantable material from such treatments is significantly larger than revenue collected for biomass, there was disagreement as to whether or not integrating removal of some larger diameter saw timber during biomass harvests would be acceptable. In unsubsidized markets, forest biomass utilization options are thus constrained to those options that can pay higher prices for biomass. Experience suggests that these are usually smaller scale thermal and combined-heat-and-power (CHP) facilities, many of which operate in direct partnership with existing wood products facilities or some other industrial application capable of using significant quantities of process heat. Participants suggested that well-crafted CHP projects may yield three revenue streams: (1) the sale of steam or hot water, (2) renewable electricity, and (3) marketable carbon offsets through the displacement of fossil fuels. While CHP has lower fuel procurement costs than stand alone biopower options, these projects typically face comparatively higher up front capital costs and higher O&M costs. Conversely, while large stand alone biopower facilities may achieve economies of scale that drive down up front capital and O&M costs, they often face higher feedstock procurement costs. Another emerging option well matched to certain parts of the West, biomass densification (pellets, briquettes, or pyrolysis oils) may be a good option as densification typically offers higher energy content than non-densified biomass and thus lower transportation costs per unit energy.

A biomass consultant with extensive experience in the region suggested that small (5-10 MW) to very small ($\leq$ 5 MW) CHP will generally be the most viable. It was noted that some of the facilities planned in the region are larger than this. Likewise, at least two recent biomass supply

studies across the Pacific Coast region suggest that the best size for new CHP facilities may be in the 10-15 MW[6] range. Some communities may be able to support larger facilities, whereas others may be better matched to smaller-scale options. Larger facilities are frequently favored by the energy industry because they achieve economies of scale and a replicable design, which promises to make bioenergy more competitive in renewable electricity markets that are dominated by a wind industry that has clearly achieved both replicability and economies of scale. Like other regions of the country, biomass co-firing and the repowering of existing coal fired power plants with some combination of natural gas and biomass are a likely future direction. However, some participants wonder whether many small projects implemented across the landscape would ever be capable of providing an aggregate level of energy that would be sufficient to meet the expectations for renewable energy in national policy. Others question whether large-scale bioenergy facilities and their effects on local communities and natural resources would be socially and environmentally sustainable.

As in other regions of the country there may be opportunities for synergies between the existing forest products industry and the emerging bioeconomy that would provide opportunities for cost-effective biomass utilization and rural economic development. The existing forest products industry is already a large component of the region's bioenergy industry and the basis of the forest biomass supply chain. Locating new energy facilities in conjunction with existing mills may also offer greater feedstock certainty. A large proportion of the required fuel may be procured on site (as mill residues-although there are some concerns about the potential impacts associated with displacing existing residue markets) with the remaining supply coming from other sources that may be less secure (short-term IDIQ service contracts from federal lands). It was also recognized that, based on the nature of the mixed-ownership landscape and the economics of feedstock procurement, forest biomass is not likely to be procured exclusively from federal forests in most instances. Those projects that are sourcing biomass exclusively from the federal land base are likely to be smaller facilities holding a long-term stewardship contract, a model that has proven successful in the case of the White Mountain Stewardship Contract in Arizona.

Broader Policy Considerations

Participants addressed several overarching policy considerations, including the following:

Energy policy and the role of government intervention: There are many instances in which policy tools (such as loan guarantees and tax credits) may constructively intervene in markets for biomass and energy. There was a sense that great care should be taken in designing market interventions in order to avoid unintended consequences. The economics of biomass projects are challenging and federal and state policy incentives need to be carefully aligned if projects are to be successful. Participants noted that state level incentives such as Oregon's Business Energy

[6] Facilities of this size use approximately 100,000 – 150,000 green tons of wood annually.

Tax Credit (BETC) must be carefully timed and aligned with federal incentives to improve the economics of biomass projects. Although the current option to qualify for federal DOE grants in lieu of the federal production tax credit (PTC) or the investment tax credit (ITC) was regarded by participants as a very positive development, support remains for the PTC for open-loop biomass. Some participants viewed the support of the 30% federal tax credit to developers of renewable energy projects as important, while others mentioned that federal tax credits and investment dollars are actually favoring wind and solar over biomass, and believed that a more level playing field should be established.

Other significant policy incentives are targeted towards improving the economics of transporting biomass. Haul costs are one of the most important factors in dictating how biomass is ultimately utilized. However, there is significant ambivalence towards transportation subsidies such as the Biomass Crop Assistance Program (BCAP). Some noted that an unintended consequence of BCAP is that it distorts local markets and diverts mill residues away from existing wood products industries such as medium-density fiber board manufacturers.

Other points of discussion related to energy policy:

- While biomass tax credits are viewed as important for renewable electricity production, many participants felt that more could be done to incentivize highly efficient biomass utilization options (CHP, district heating and cooling, and institutional facility scale heating). The thermal energy these options produce is currently not valued in existing incentive programs or recognized in the current policy framework.
- Several participants suggested that either additional federal funding was needed to expand the scale of ecosystem restoration activities, or that existing incentives (grants, loans, tax credits, loan guarantees, etc.) can be better targeted to support appropriately-scaled utilization infrastructure (small log mills and CHP facilities) that are designed to match local circumstances. Others mentioned their optimism for increased R&D funding focused on biomass technologies and demonstration projects which show the use of waste streams via safe, environmentally sustainable approaches.
- It was suggested that there should be an inventory of all CHP/thermal opportunities in the region that should be mapped and easily accessible to project developers. This would include all CHP and district heating/cooling opportunities (e.g. university campuses, industrial facilities, fossil fuel-fired boilers that could easily be converted, etc.) A few existing tools and information sources may help with this. Most states maintain a database of any boiler that is operating in the state. The national biorefinery siting model is also being expanded to evaluate opportunities for biomass electricity and CHP. The 2007 Energy Independence and Security Act (EISA) requires the USEPA to develop a public database of all heat plumes to identify CHP options.

- Participants recognized the need to support the development of mobile and omnivorous bioenergy technologies as these may improve the economics of removing forest biomass through hazardous fuel treatments and restoration activities.
- Participants expressed that there are opportunities for market interventions (e.g. incentive programs and subsidies) to be performance based to encourage biomass to be produced in sustainable ways and to encourage bioenergy systems that utilize biomass in a way that optimizes the amount of energy produced and/or GHG reduced per unit wood.

Bioenergy and Carbon: Participants emphasized that federal legislation that supports approaches to "put a price on carbon" could change the context for bioenergy development. This might occur through approaches that value avoided GHG emissions, but may also result in competition between carbon-for-storage and carbon-for-bioenergy. Current public policy does not adequately address this issue. Policy was also regarded to be out ahead of the science on GHG accounting and opinions varied on how GHG emissions should be accounted for in bioenergy projects. Full GHG life-cycle analyses are complex and while there was some ambivalence about their relevance in current policy debates, participants generally agreed that bioenergy options should strive to reduce GHG emissions. It was suggested that some forms of bioenergy will likely have a better life-cycle GHG profile than others. Some forms are likely to be very good and other utilization options perform quite poorly. Participants suggested that if life-cycle analysis is to have a role in policy, then it is of utmost importance that common practices and standard measures be used to perform such analyses.

Summary of Key Findings

- Supply analyses can be performed using a multitude of analytical techniques operating on a number of scales. They are not just "academic exercises" and are extremely important for ensuring the long-term sustainability and determining the relative climate benefits of various bioenergy options. Participants suggested that it would be valuable to approach the issue of supply in a transparent manner to collectively define a set of standard scenarios that could cover a range of possible futures. While the group did not identify any specific suggestions as to what would constitute and appropriate venue or process, previous meetings in this dialogue suggested that USFS Renewable Resource Planning Act (RPA) assessments may be an appropriate venue.
- Collaborative processes, planning and long-term stewardship contracts are extremely important for both determining what supply may be available from federal lands given ecological and socio-economic objectives and for actually accessing this supply through long-term (up to ten year) agreements.
- Ensuring the long-term sustainability of the region's public and private forests is recognized by many as requiring a holistic approach that uses transparent, open and inclusive multi-stakeholder collaborative processes to identify opportunities to restore forest ecosystem health.

- A cross-walk of existing voluntary and regulatory programs that are currently operational in Pacific Coast states is needed to determine if programs intended to protect key ecosystem service values are sufficient to address concerns about forest biomass removal.
- A majority of participants expressed that if incentive programs exclude biomass harvested from federal public lands, many potential biomass projects in the Pacific Coast region will not be feasible. While there remains disagreement about the definition of renewable biomass in federal policy, many expressed that there may be more creative alternatives to addressing concerns over sustainability than an outright prohibition of all federal lands.
- Performance-based mechanisms were identified as a constructive way to incentivize sustainable biomass harvests and bioenergy utilization options that yield net ecosystem service benefits.
- Based on the information presented at this workshop, the optimal scale of new stand-alone grid energy biomass facilities in this region are most likely to be between 5 – 15 MW. However, some areas may be able to support more or less than this level of energy production. Scaling projects depends on a complex set of uncertain variables, including fossil energy prices, emerging technologies for liquid fuels, heat and power needs, carbon credit values, energy policy, and local forest conditions. Other technological and business model options were not discussed in detail, such as transitioning existing pulp facilities to biorefineries, or co-siting larger grid energy projects with existing mills.
- To the extent possible, energy policy and natural resource policy should be complementary and not competitive. Federal and state energy and natural resource policy incentives need to be carefully aligned if projects are to be successful and if a regional build out of an expanded bioenergy industry is to be sustainable.
- Certain bioenergy options are likely to make better use of policy incentives than others based on the economics of biomass supply chains and utilization options.
- The economics of bioenergy projects and biomass harvesting are important determinants of what sort of policy interventions are necessary.

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