



Biomass in
north coast
Community
Choice
Aggregation

Peter
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UCB/UCANR
Wood
Products
Program

Renewables on
CAISO grid

Differentiating
Biomass

Carbon
dynamics in
forestry

Biomass
energy

Biomass in
North Coast
CCAs

Biomass in north coast Community Choice Aggregation

Peter Tittmann

UC Berkeley Center for Forestry
Wood Resources Group
<http://ucanr.edu/sites/WoodyBiomass/>

May 17, 2016



Outline

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- 4 Carbon dynamics in forestry
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UC Wood Resources Group

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- Public Outreach and Education
 - Workshops
 - Extension publications
- Technical assistance
 - Project development
 - Grant proposal development
- Staff/Faculty
 - John Shelly (*Emeritus*)
 - Peter Tittmann
 - Rick Satomi
 - Sahar Mohammadi

<http://ucanr.edu/sites/WoodyBiomass/>

The screenshot shows the website for the Woody Biomass Utilization group at UC Berkeley. The page includes a navigation bar, a main heading, and a large video player showing a workshop. Below the video, there is a list of activities and news items, including a webinar announcement and a grant program update.

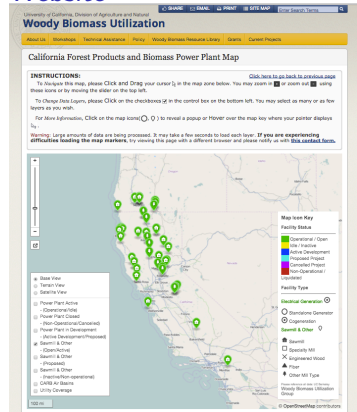


Industry infrastructure data

UC Wood Resources Group maintains a web map and publicly accessible database of:

- Biomass power plants
 - Status: Inactive, Idle, Operational, Planned (projects)
 - Size
- Primary wood processing facilities 1970 – 2013
 - Production/shift
 - Closed/open

Website



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Yesterday on the CAISO grid...

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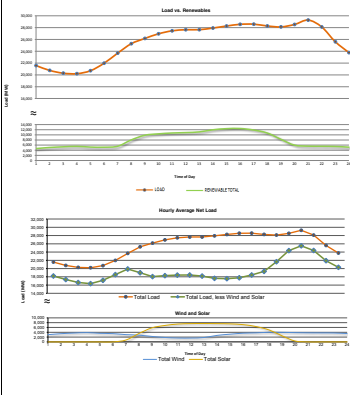


For Operating Day:

The fast graph provided on this page shows how much energy renewable resources are contributing to the grid, and when those resources are producing that daily maximum and how that production correlates to the maximum energy demand.



Comparison to Load



The information contained in this report is preliminary and subject to change without notice. No reliance should be made based on the information in this report or any series of these reports. All values are hourly average unless otherwise stated. Comments about this report should be directed to Jessica Gardner at gardner@caiso.com.



CA Energy consumption over time

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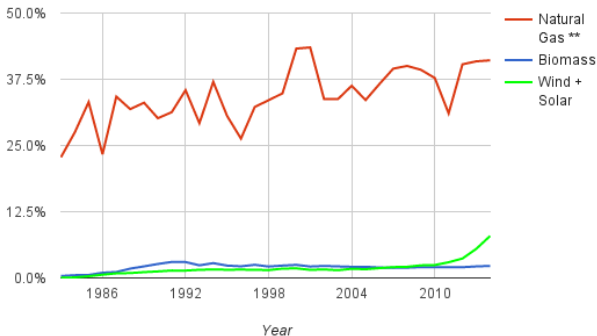
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Correlation between natural gas and select renewables on CA grid. ($p=0.56$ @99.5% ci)





Biomass decline with solar increase.

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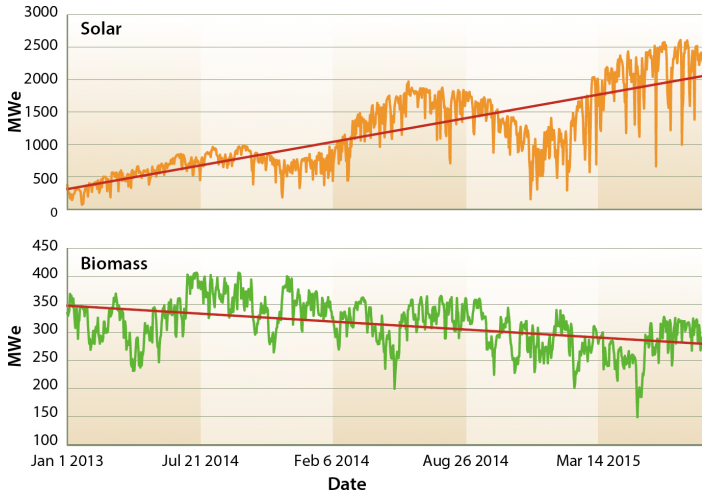
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Aggregate energy consumption in CA

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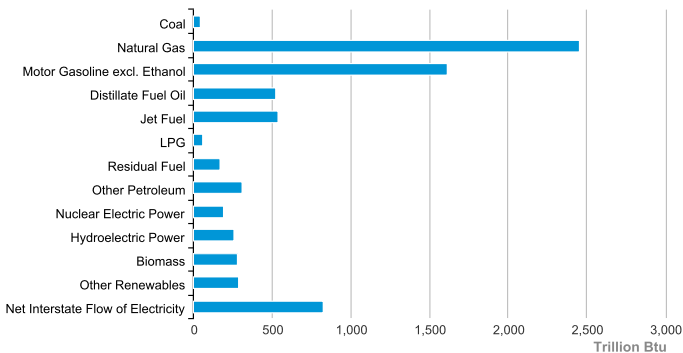
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California Energy Consumption Estimates, 2012



Source: Energy Information Administration, State Energy Data System



Biomass is dispatchable

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For Operating Day: **Monday, May 16, 2016**

The Renewables Watch provides important information about actual renewable production within the ISO grid as California moves toward a 33 percent renewable generation portfolio. The information provided is as accurate as can be delivered in a daily format. It is unverified raw data and is not intended to be used as the basis for operational or financial decisions.

Renewables Production

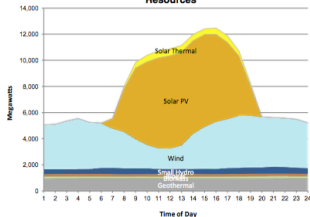
24-Hour Renewables Production

Renewable Resources	Peak Production Time	Peak Production (MW)	Daily Production (MWh)
Solar Thermal	10:40	537	5,255
Solar	12:54	7,149	70,632
Wind	17:46	4,115	75,517
Small Hydro	21:03	542	10,463
Biogas	17:22	197	4,535
Biomass	20:06	186	3,947
Geothermal	0:00	953	22,515
Total Renewables			192,864

Total 24-Hour System Demand (MWh): 615,441

This table gives numeric values related to the production from the various types of renewable resources for the reporting day. All values are hourly average unless otherwise stated. Peak Production is an average over one minute. The total renewable production in megawatt-hours is compared to the total energy demand for the ISO system for the day.

Hourly Average Breakdown of Renewable Resources



This graph shows the production of various types of renewable generation across the day.

System Peak Demand (MW)
*one minute average: **29,440**
Time: **20:31**



Provides beneficial means of disposal for low value biomass

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- Agriculture
- Waste management
- In-woods slash
- Wood processing
- Urban green and C&D





Biomass Supply in CA

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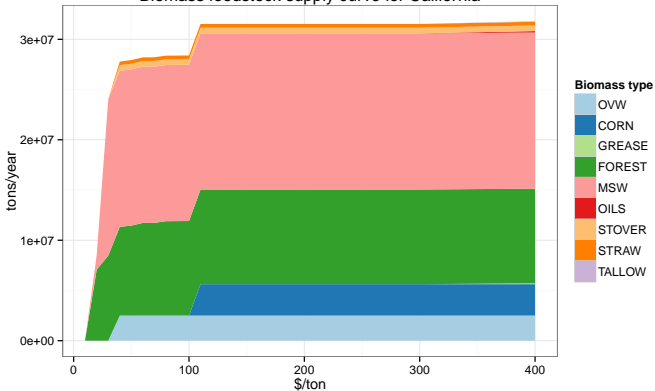
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Biomass feedstock supply curve for California





Responsible use of a residual material

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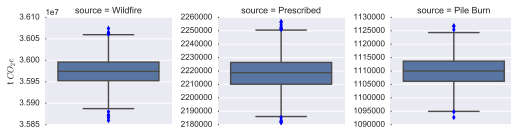
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Alternate fate
would have
substantially
worse public
health and
climate impacts
produces
renewable
electricity.

Black Carbon

Black carbon emissions in CO2 equivalent units from burning in CA, 2015



Sources: CARB Criteria Pollutant Emissions Inventory(2015), Ward and Hardy (1989)



Review carbon dynamics in forest systems.

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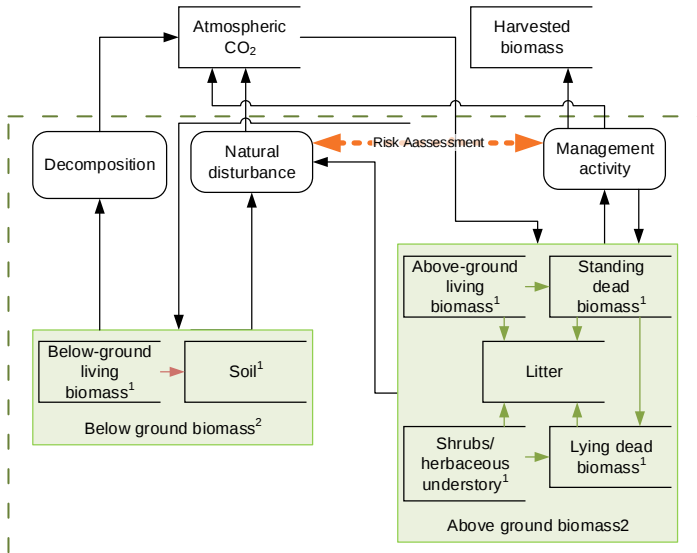
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Review carbon dynamics in energy and forest product markets.

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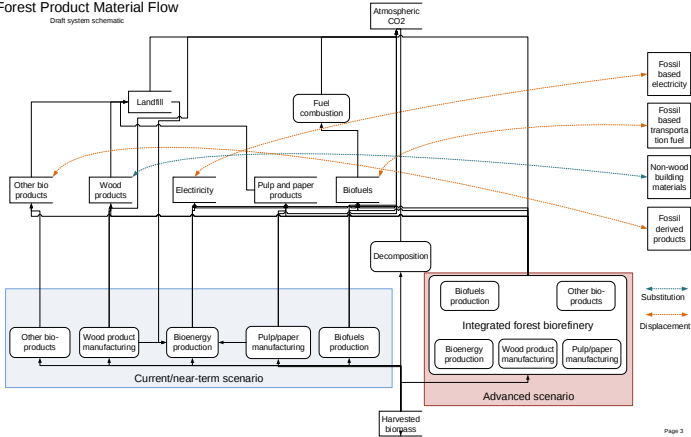
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Forest Product Material Flow

Draft system schematic





Carbon intensity of wood products

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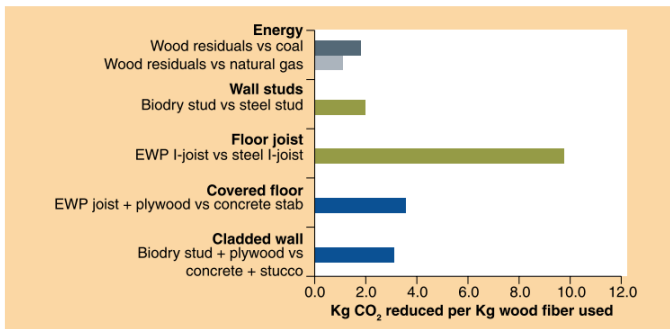


Figure 5. Carbon emission reduction by displacing non-wood products.

EWP: Engineered wood product.

Reproduced with permission to publish from CORRIM [107].



Fates of forest biomass

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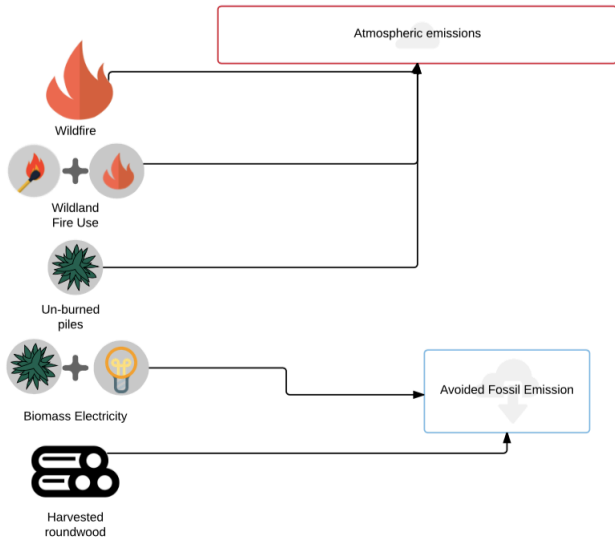
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GHG emissions impact from biomass energy over time

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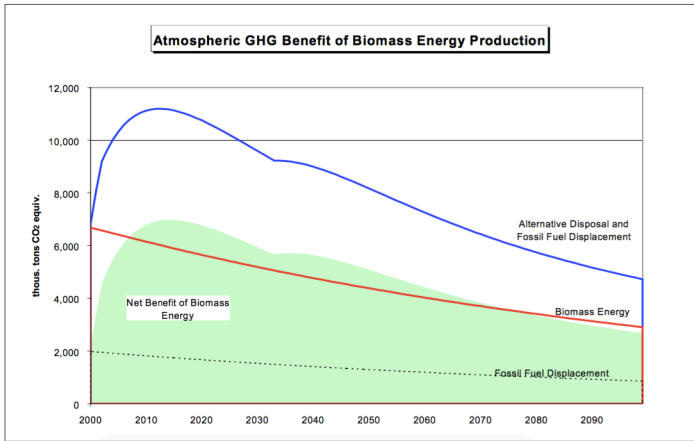
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Biomass is a local resource

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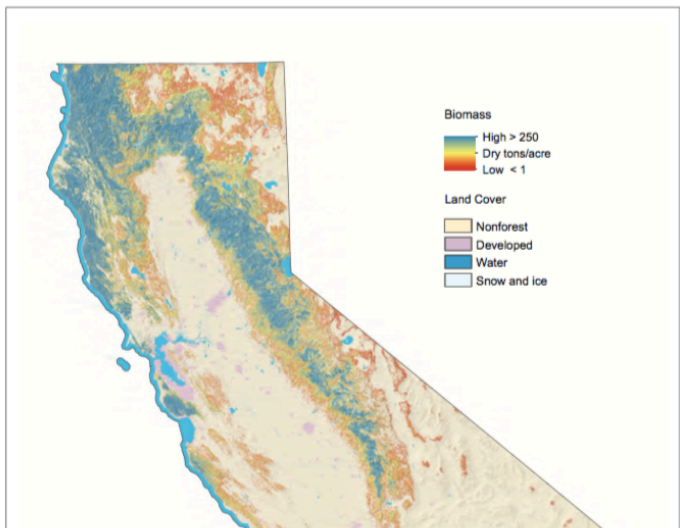
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Supports regions forests

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- Offset costs for non-commercial forest management:
 - SOD containment
 - Oak habitat retention
 - Fire hazard reduction



Supports the regional economy

- Critical to regions forest product economy
 - Mills **will close** without a buyer for residuals.
- Forest products and carbon economy will become more important following legalization of cannabis.



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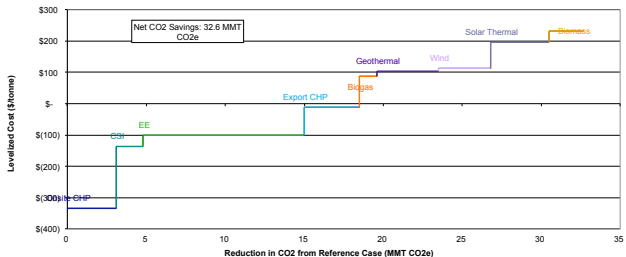
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CCA's and biomass

- Must price biomass right to reflect the value to the region **in addition** to 'renewable' (hint: \$60-70/MWh won't do it..)
- Biomass is **costly** compared to other low-carbon renewables, but also much more valuable to the regions economy and forest lands





Take-home messages

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- **Markets** for forest products (including residuals) ensure that **working forests persist** on the landscape and are managed **sustainably**
- Biomass energy on the North Coast as a part of a CCAs **diverse portfolio**, will **support the regions forests**, as well as provide **carbon neutral electricity**
- A sustained **price signal** from a CCA, combined with explicit environmental performance standards reflecting the **communities values** will drive investment in innovation in the regions bioeconomy.