Adding further biomass case studies to the web-based dashboard

IEA Bioenergy

IEA Bioenergy: Task 43

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Abstract

Biomass supply chains and bio-hubs are systems and intermediate facilities to enable landowners and managers to deliver biomass resulting from land management to markets. To support the effective communication of knowledge and best practice from around the world on biomass supply chains and bio-hubs, a unique web-based dashboard was developed in 2021 to present the key aspects, strengths, weaknesses, opportunities, and threats of different documented case studies on biomass supply chains and bio-hubs from different regions and countries. The web-based dashboard is available at https://sunshinecoast.maps.arcgis.com/apps/dashboards/6ff054437d6b4cee90962fad2be8a505. This tool can provide a single access point that can facilitate comparison and investigation of supply chain and bio-hub options to further global development of sustainable biomass supply. To populate the web-based dashboard, 20 case studies (majority published after 2017) were selected from the data base created by Blair et al. 2021 and were uploaded to the web-based tool. Their detailed information on each case study are available on the web-baed tool via https://sunshinecoast.maps.arcgis.com/apps/dashboards/6ff054437d6b4cee90962fad2be8a505

Introduction

Biomass supply chains and bio-hubs are systems and intermediate facilities to enable landowners and managers to deliver biomass resulting from land management to markets. These supply chains and hubs can support sorting, merchandising, and pre-processing that can yield higher quality and values along the supply chain. IEA Bioenergy Task 43 aims to support the development and deployment of effective and sustainable biomass supply chains and bio-hubs. Although industrial waste streams can also be integrated into the bio-hub services however this project mainly focus on primary biomass sources.

To support the effective communication of knowledge and best practice from around the world on biomass supply chains and bio-hubs, a unique web-based dashboard was developed in 2021 to present the key aspects, strengths, weaknesses, opportunities, and threats of different documented case studies on biomass supply chains and bio-hubs from different regions and countries. The web-based dashboard is available at https://sunshinecoast.maps.arcgis.com/apps/dashboards/6ff054437d6b4cee90962fad2be8a505. This tool can provide a single access point that can facilitate comparison and investigation of supply chain and bio-hub options to further global development of sustainable biomass supply.

This project aimed to populate the current online portal and identify global knowledge gaps in the literature, case studies and best practices for biomass supply chains to inform targeted case study work for the balance of the triennium.

Method

The SWOT analysis (strengths, weaknesses, opportunities, and threats) and detailed case study results from available biomass supply chain case studies and bio-hub were collected (priority was given to the cases after 2017- five years-) through previous IEA Task 43 project published by Blair et al. 2021. All case studies were summrised in an excel file and uploaded into the web-based dashboard that was developed in 2021 (Ghaffariyan et al. 2021).

Result

1- Biohubs review for inclusion in web-based dashboard

Nicolls et al. (2022) described forest biohubs as networks that can facilitate the biomass supply chain management to deliver biomass from plantations/forests to the central processing yards. Their study area included three regions consisting of the Pacific Northwest, the southwest region, and the southeast USA. Different biomass types such as forest residues, mill residues, agricultural residues and municipal solid waste can be processed within a biohub. Like the previous IEA Task43 report on biohubs (Ghaffariyan et al. 2021) Nicolls et al. (2022) also used a SWOT analysis (strengths, weaknesses, opportunities, and threats) to compare three biohubs in the USA. The study results confirmed that biohubs need to be innovative and adaptable to be successful. Following parameters should be considered for designing biohubs; forest type, land ownership, scale of operation, forest products infrastructure, current markets

(Nicolls et al. 2022), transportation costs, characteristics of transportation technologies and optimal location of terminals/biohubs (Berg and Athanassiadis, 2020(a); Berg and Athanassiadis, 2020(b)).

. Forest biohubs, if planned carefully, can provide several services such as local economic growth, enhanced forest health and reduced fire risk (Nicolls et al. 2022). These three biohub case studies were add to the web-based dashboard. Table 1 provides background information of these case studies.

Table 1. Background information of three biohub case studies (Nicolls et al. 2022)

Region/State	Country	Biomass type	Biomass production	Supplied as	Annual supply (GMt)	Bioenergy product
Pacific Northwest	USA	Woody	Harvest residues	Chips	n/a	Pellet, Biofuel (potential)
Southwest region	USA	Woody	Small diameter trees from forest restoration thinning	Chips	n/a	Pellets and firewood
Southeast	USA	Woody	Harvest residues	Chips	n/a	Pellets

2- Uploading case studies documented in IEA Bioenergy/Task 43 project (Contribution of biomass supply chains to the sustainable development goals when implemented for bioenergy production) into the web-based dashboard

In previous version of the web-based dashboard published in 2021 there were 7 case studies taken from the data base created within the project published by Blair et al. 2021. To populate the web-based dashboard, 20 case studies (majority published after 2017) were selected from the data base created by Blair et al. 2021 and were uploaded to the web-based tool are summrised in Table 2. Their detailed information on each case study are available on the web-baed dashboard via
https://sunshinecoast.maps.arcgis.com/apps/dashboards/6ff054437d6b4cee90962fad2be8a505

Table 2. Background information and number of new case studies added to the web-based tool

Country of the study	**Biomass type**	**Biomass supplied as**	**Biofuel**	**Bioenergy product**
Austria (1)	Straw (1)	Not-standardised (e.g. bagasse, husks, pits, kernels…) (1)	-	Pellets (1)
Brazil (1)	Straw (1)	Not-standardised (e.g. bagasse, husks, pits, kernels…) (1)	Liquid Biofuel (1)	-
Canada (5)	Woody (5)	Chips (1) Logging residues (2) Logs (1) Shavings (1)	Liquid biofuel (1)	Pellets (3) District heating (1)
China (1)	Woody (1)	Chips (1)	-	CHP (1)
France (3)	Woody (2) Straw (1)	Not-standardised (e.g. bagasse, husks, pits, kernels…) (2) Sawdust (1)	-	Pellets (3)
Germany (1)	Sludge (1)	Biomass used within a company (1)	-	Biogas or RNG (1)
Italy (1)	Woody (1)	Chips (1)	-	CHP (1)
Netherlands (1)	Woody (1)	Chips (1)	-	District heating (1)
Sweden (3)	Woody (3)	Chips (3)	-	CHP (3)
Switzerland (1)	Woody (1)	Chips (1)	-	District heating (1)
USA (5)	Woody (5)	Chips (3) N/A(2)	Liquid biofuel (1)	Pellets (3), N/A (1)

Figure 1 presents the overall picture of the web-based dashboard. At the left side of the window (Figure 1) the project names are illustrated. In the middle of the window a global map is shown where the case studies are marked in various regions. The right side of the window presents the distribution of regions, observations (case studies) and source of information.

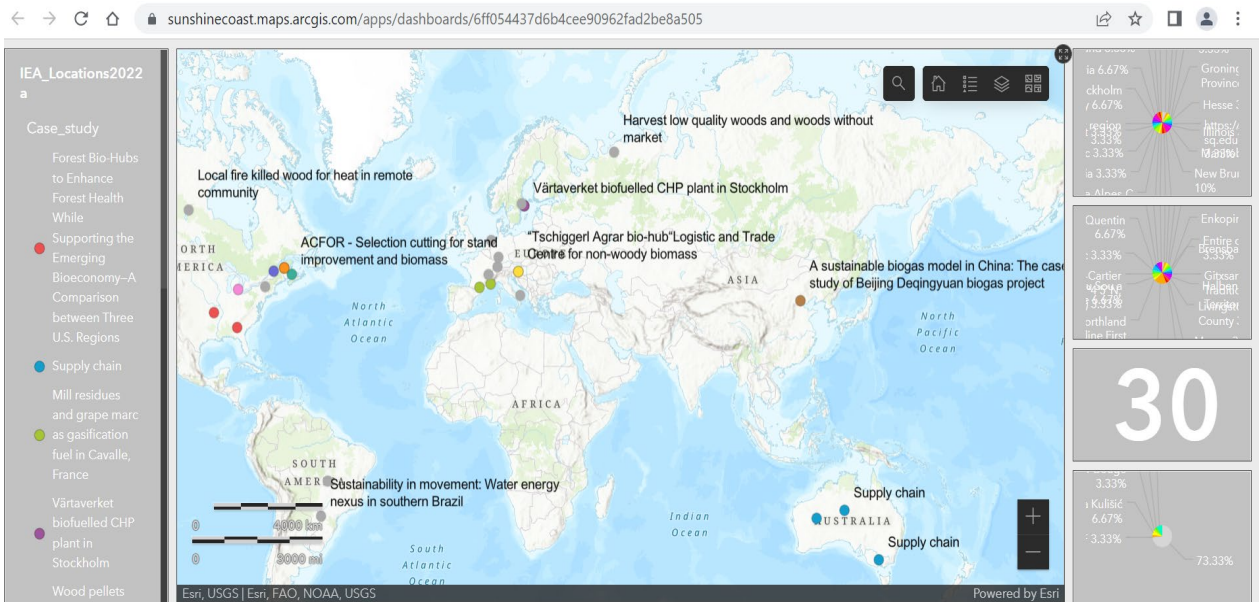

Figure 1. Main page of the web-based dashboard

To view the details of each case study the users can zoom in near the location of any case study. When clicking on the location point a box will open which contains information on location, biomass characteristics and SWOT results of the case study (Figure 2).

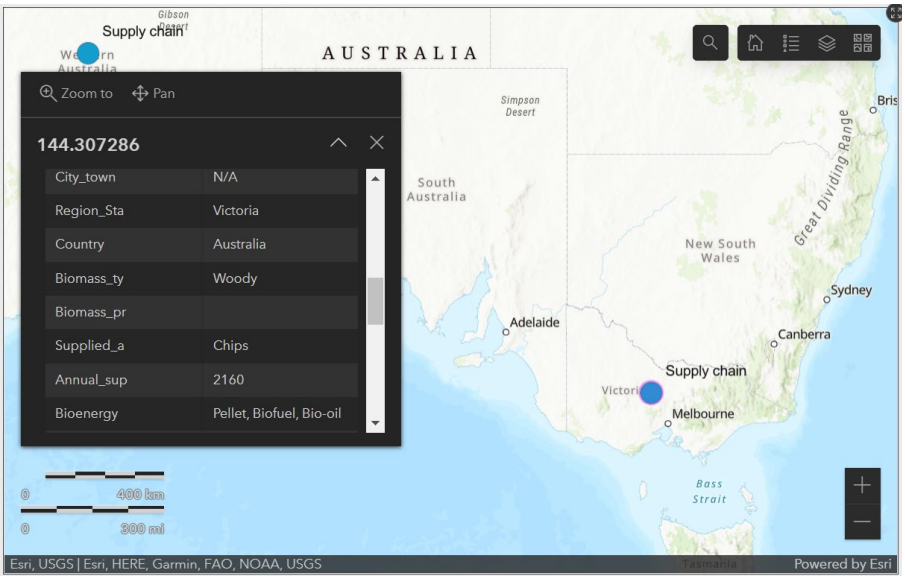

Figure 2. A biomass case study uploaded into the web-based dashborad in Victoria, Australia

Recommendations

Nicholls et al. (2022) suggested that bio-hubs could be used to enhance the quality of the biomass materials such as reducing moisture content and increasing bulk density to help improve the transportation efficiency over long distances for the markets in USA (e.g. Pacific Northwest) or Asia (Note that if readers are interested to find out further technical detailes on other uploaded biomass case studies in this report they are referred to the IEA Bioenergy: Task 43: 04 2021 published by Blair et al. (2021))

Current data that were added to the web-based dashboard provides a good diversity in terms of case study locations around the globle. However there is still need to upload more case studies in each region to make the tool much more informative to the users. There are different types of published biomass supply chain studies and some do not have any SWOT analysis thus it is suggested that future projects could develop a diffent data collection form to suit those studies and add them into the web-based dashboard to pupoulate it further. Future project can develop the analytical capacities of the tool based on the bioenergy users' preferences.

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