Conference Report

Biofuels (2012) 3(2), 115–118

Towards 2020: Growing Our Sustainable Future

12th Annual Bioenergy Australia conference, International Energy Agency Bioenergy Executive Committee meeting (ExCo68), and Task 42 and 43 meetings on the Sunshine Coast, Queensland, Australia
22–25 November 2011

Brendan H George
Rural Climate Solutions, University of New England & NSW Department of Primary Industries, Tamworth, NSW, Australia
Tel.: +61 2 6763 1238;
E-mail: brendan.george@dpi.nsw.gov.au

The opportunities for the bioenergy industry in Australia, and globally, continue to grow. However, with scale-up comes opportunity, together with tension and a need for careful consideration of the governance of bioenergy systems. What are the expectations on producers from society? How do we ensure that employed governance systems are well targeted? Who designs and develops the governance systems? And who benefits from development and implementation? Managing the sustainability risks associated with bioenergy is critical to ensure that low-carbon energy systems are developed within the expectations of society. While steady industry progress is being achieved, clearer statement of goals and expectations from governments is required. Being confident that bioenergy systems, premised on delivering low-carbon energy solutions, can meet the challenges of increasing scale while not competing directly with other needs such as food production, is an ongoing and significant challenge.

Conference objectives & key outcomes

The conference, hosted by Bioenergy Australia in Queensland, Australia, offered the opportunity for domestic and international participants to discuss significant issues facing industry and policy-makers [101]. 'Towards 2020: Growing Our Sustainable Future', was attended by 300 delegates. The program contained over 100 presentations, covering many bioenergy-related topics, including policies and programs, bioenergy projects, project development case studies, biomass feedstocks and supply issues, biomass heat and power, pyrolysis, gasification, liquid biofuels, algae for biofuels, carbon sequestration via biochar, anaerobic digestion and energy production from various wastes. Overarching issues, including GHG emissions of bioenergy systems and sustainability, were central to discussions.

Plenary

The conference was opened by Tim Mulherin, Queensland Minister for Agriculture, Food and Regional Economies. The plenary session addressed current national issues, developing policies and new and existing programs. The upcoming White Paper for Energy [102] and the limited progress made by the bioenergy industry in contributing to the Renewable Energy Target scheme [103] were also discussed [1]. The plenary session continued with updates from the IEA Bioenergy [104] tasks 'Biorefineries: Co-production of Fuels, Chemicals, Power and Materials from Biomass (Task 42 [105]) and 'Developing Tomorrow's Biofuels' (Task 39 [106]).

IEA Bioenergy: sustainability workshop

As industry, in its many forms, realizes the significant opportunities for bioenergy and scale-up of production increase sustainability of production systems, the ability to meet stated goals, such as GHG reduction [2], becomes more pressing. The IEA Bioenergy Executive Committee, following their business meeting prior to the conference, coordinated a technical workshop, 'Environmental Sustainability of Biomass', within the conference, beginning in the plenary session. Overarching papers focused on the biophysical global potentials (Göran Berndes, Chalmers University, Sweden) and international trade (Andre Faaij, Utrecht University, The Netherlands).

During the workshop multiple themes arose, particularly in relation to the management of 'risk'. While industry operates with different levels and components of risk that it can understand or manage relatively well (i.e., technical or production, market and trade, and financial), it is the sovereign risk, reflecting societal demands, that is proving critical. This issue, which underpinned many of the discussions in the

10.4155/BFS.12.10 © 2012 Future Science Ltd ISSN 1759-7269

Environmental Sustainability of Biomass workshop, was encapsulated by Paul Martin (University of New England, NSW, Australia) the following morning in a challenging paper that highlighted some of the significant governance issues facing society and the bioenergy industry [3]. According to Martin, "in the international context it is clear that the legal governance of biofuels is often beyond the capacity of national and international institutions of government, because of factors such as the trans-jurisdictional nature of the impacts, the diversity and complexity of the rapidly evolving technology and production/distribution systems, and also because there is no consensus about whether the policy goals are to drive further development or to restrict development. The result is incoherence." These significant challenges, if not addressed, will lead to a lack of confidence in bioenergy systems and an increase in sovereign risk as countries continually adapt their laws without having clear goals with defined outcomes. Understanding the impacts of change on industry and society is also deficient.

Various initiatives to address the economic, social and environmental aspects of sustainability were discussed in an international and Australian context with an expectation that bioenergy producers will 'wear the burden of proof' in proving the sustainability of their production systems and supply chains [4]. The on-ground interpretation and application of different schemes (e.g., Global Bioenergy Partnership [5] and the Roundtable for Sustainable Biofuels [6]) will be challenging but critical to achieve desired outcomes. The development of principles, criteria and indicators, which are the foundation of many sustainability systems, proceed within the different processes at different scales and to differing target audiences. It is important that these basic components of the respective systems are robust, adaptable and enacted as soon as reasonable. Ensuring that bioenergy production can be sustained by careful management of nutrients [7] and water [8] is critical in ensuring the sustainability credentials of large-scale production systems.

IEA Bioenergy Task 43: Bioenergy & Water

As part of the ongoing collaboration between IEA Bioenergy Task 43 [107], the UN Environment Programme and the Oeko-Institute regarding the water and bioenergy nexus, a workshop within the Bioenergy Australia conference was organized. Göran Berndes (Chalmers University, Sweden and IEA Bioenergy Task 43 leader) outlined the inextricable links between bioenergy production and water scarcity/quality, particularly in countries with existing water stresses [9]. Berndes considered that bioenergy development provides opportunities to improve water productivity. This could be achieved via increased access to water by leveraging the introduction of efficient water management techniques, providing energy for water pumping and cleaning, and by providing a wider range of land use options to optimize land and water utility. He further suggested that proper integration of bioenergy systems into forestry and agriculture can even reduce some of the impacts of present land use, such as eutrophication and soil erosion [9]. These suggestions were reinforced through the findings and discussion of Dan Neary (USDA Forestry Services), who demonstrated the effectiveness of forestry-based best management practice guidelines that could be applied to bioenergy systems [10].

To ensure that bioenergy systems meet obligations (e.g., GHG balance) and continue to develop through best management, a robust understanding of life cycle assessment (LCA) procedures and application to water is required. Brendan George (University of New England & NSW Department of Primary Industries, Australia) introduced the application of LCA to account for water and surrounding issues, especially in relation to determination of the 'water footprint' and the need to account for the whole hydrological cycle, including 'green' water (i.e., evapotranspiration of plants) [11]. Kevin Fingerman (University of California, CA, USA) developed this theme and highlighted a spatially explicit agroclimatic model to estimate the water intensity of biofuel feedstock cultivation across California regions [12]. Developing an argument from earlier work [13,14], Fingerman concluded with the importance of accounting for the 'stress-weighted' water footprint in determining the impact of potential and actual bioenergy crops. LCA is one tool that offers quantification of identified impacts, for example water. However, there are several significant parameters that are required to give context to the data generated, including spatial and temporal availability of water and how it is utilized in bioenergy production.

In Australia, a water-scarce country where water is often the critical limiting factor that dictates production rates, the capacity to produce biomass for energy and not compete strongly with existing agricultural systems (e.g., annual crops) will remain a topical and important consideration. John McGrath (Future Farm Industries Cooperative Research Centre, Australia) identified strategies to mitigate the risks posed by episodic and long-term water stress and optimize productivity, including

species and site selection; management of leaf area via planting densities, nutrient status and harvesting regimens; and the spacing of plantings within agricultural systems with the capacity to capture excess water [8].

Managing the demands for water in production of biomass for energy is challenging. It is critical that an understanding of the hydrological cycles and application of techniques for best management be developed to optimize production while minimizing impacts and competition for resources.

Other themes

The IEA Bioenergy Task 42 (Biorefineries) held their annual meeting at the conference and a series of papers were presented. The significant global work in biorefineries continues with multiple opportunities and streams of products arising. Some systems are becoming economical in their own right and there is the potential that energy, as a product, will be marginalized as other higher value, bio-based products develop [15].

Specific streams focused on the advances in algae, biochar and energy from waste.

Conclusion

Many issues and opportunities including sustainability, sovereign risk, multiple product pathways and scale were again outlined and discussed during the conference. Many individuals, companies and governments are improving our understanding of sustainable bioenergy systems. Substantial technical development continues yet remains incomplete (e.g., some excellent reports regarding biochar development and trials). A feeling of slow, steady progress pervades, when significant 'game-changing' breakthroughs are required to capture the imagination of larger society to the 'real', as opposed to 'potential', benefits of bioenergy. Perhaps the Clean Energy legislation in Australia and the implementation phase of C&I in sustainability systems will increase the momentum.

A central theme from the conference workshops was the management of risk, especially sovereign risk, associated with bioenergy systems and production. In managing risk it is essential that the governance planned, enacted and shown by industry proponents in presenting the sustainability capacity and credentials of respective bioenergy systems, is clearly defined and demonstrated. Governments need to focus on establishing clear goals and mechanisms to allow industry to achieve targets and meet opportunities for low-carbon energy systems.

For the industry to develop it must strive to become more cost competitive with existing markets. Communication remains critical. This encompasses the quality, style and volume of information communicated by industry proponents, particularly in relation to the general public and ensuring that the 'social license to operate' is achieved [16].

The conference Abstracts, speaker bios, presentations, program and photos of the posters are available from the Bioenergy Australia website [101].

Financial & competing interests disclosure

BH George is a member of the Bioenergy Australia Management Team that guided the conference outline and direction. This is an honorary role receiving no financial assistance. BH George is currently the National Team Leader for Australia on the IEA Bioenergy Task 43 and the Alternate Member for the International Energy Agency Bioenergy Executive Committee. No recompense was received for this article. The author has no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript apart from those disclosed. No writing assistance was utilized in the production of this manuscript.

References

1 Livingston A. Update on LRET and bioenergy projects. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

2 Cowie AL, Bird N. Quantifying climate change impacts of biomass and bioenergy systems. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

3 Martin P. Biofuels: addressing major policy risks. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

4 O'Connell D, Cowie AL, Brodie H, Raison J, George BH. Sustainable bioenergy in Australia: an overview. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

5 Reeves J. Governing bioenergy: an international perspective on attempts to define and promote sustainable bioenergy development. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

6 Junquera V. Biofuel sustainability certification – the RSB standard. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

7 Raison RJ. Maintaining soil fertility in biomass for bioenergy production systems. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

8 McGrath J, Dumbrell I, Harper RJ, Crombie S, White D. Optimising water use and minimising drought risks in biomass production: an Australian perspective. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

9 Berndes G. Bioenergy and water – challenges and opportunities. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

10 Neary D. Best management practices: A tool for responsible water management. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

11 George BH. Conceptual and analytical frameworks for evaluation and reporting of the bioenergy impacts: some challenges for life cycle assessment and water. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

12 Fingerman KR, Kammen D, O'Hare M, Torn M. Accounting for the water impacts of biofuel production: the case of California. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference.* Sunshine Coast, QLD, Australia, 22–25 November 2011.

13 Fingerman KR, Berndes G, Orr S, Richter BD, Vugteveen P. Impact assessment at the bioenergy-water nexus. *Biofuels Bioprod. Bioref.* 5(4), 375–386 (2011).

14 Fingerman KR, Torn MS, O'Hare MH, Kammen DM. Accounting for the water impacts of ethanol production. *Environ. Res. Lett.* 5(1), 8 (2010).

15 De Jong E. IEA Bioenergy Task 42: value added products from biorefineries – bio-based chemicals. Presented at: *Towards 2020: Growing Our Sustainable Future. The 12th Annual Bioenergy Australia Conference* Sunshine Coast, QLD, Australia, 22–25 November 2011.

16 O'Connell D, Braid A, Raison J *et al. Sustainable Production of Bioenergy: a Review of Global Bioenergy Sustainability Frameworks and Assessment System.* Rural Research and Development Corporation, Barton, ACT, Australia, 164 (2009).

▪ Websites

101 Bioenergy Australia. www.bioenergyaustralia.org

102 Australian Government. Department of Energy, Resources and Tourism. www.energywhitepaper.ret.gov.au

103 Australian Government. Department of Energy Efficiency and Climate Change. www.climatechange.gov.au/en/government/initiatives/renewable-target/legislation.aspx

104 International Energy Agency. Bioenergy. www.ieabioenergy.com

105 International Energy Agency. Bioenergy Task 42. www.iea-bioenergy.task42-biorefineries.com

106 International Energy Agency. Bioenergy Task 39. www.task39.org

107 International Energy Agency. Bioenergy Task 43. www.ieabioenergytask43.org