

Production of Biofuels for transport in Colombia:

AN ASSESSMENT THROUGH
SUSTAINABILITY TOOLS

CARLOS ARIEL RAMÍREZ TRIANA

INSTITUCIÓN UNIVERSITARIA
POLITÉCNICO GRANCOLOMBIANO

Production of Biofuels for transport in Colombia:
An assessment through sustainability tools

E–ISBN: 978–958–8721–54–5

Octubre de 2017

Bogotá Colombia

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Editorial Politécnico Grancolombiano

Av. Caracas No. 63–55

PBx: 7455555 ext. 1171

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Production of Biofuels for transport in Colombia: An assessment through sustainability tools / Carlos Ariel Ramírez Triana; Coordinador editorial, Eduardo Norman ; Analista de producción editorial, Paulo Mora Noguera – Bogotá D.C.: Editorial Politécnico Grancolombiano, 2017.

431 p.: il.; 17 × 24 cm.

Incluye Referencias Bibliográficas.

E–ISBN: 978–958–8721–54–5

1. Biocombustibles 2. Biocombustibles – Investigaciones – Colombia
3. Recursos energéticos 4. Conversión de energía 5. Combustibles vegetales I. Norman Acevedo, Eduardo II. Mora Noguera, Paulo III. Institución Universitaria Politécnico Grancolombiano. Facultad de Ciencias Administrativas, Económicas y Contables IV. Tit.

SCDD 662.88

Co–BoIUP

Sistema Nacional de Bibliotecas–SISNAB
Institución Universitaria
Politécnico Grancolombiano.

¿Cómo citar este Libro?

Ramírez Triana, C. A. (2017), Production of Biofuels for transport in Colombia: An assessment through sustainability tools, Bogotá: Editorial Politécnico Grancolombiano.

La *Editorial Politécnico Grancolombiano* pertenece a la Asociación de Editoriales Universitarias de Colombia, ASEUC.

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REFERENCES

- “Plantas de etanol...”. (2010). Ethanol plants started to sink [Original in Spanish: Plantas de etanol ‘hacen agua’.] Retrieved from: <http://www.dinero.com/edicion-impresa/investigacion/articulo/plantas-etanol-hacen-agua/104313> Accessed 28/03/11. Dinero.
- ACCEFYN. (2003). Emission factors of Colombian Fuels (Original in Spanish: Factores de emisión de los combustibles colombianos) Bogota, Colombia: UPME.
- ACR. (2011). Biodiesel in Guatemala. [Original in Spanish: Biodiesel en Guatemala] Retrieved from: www.acrguatemala.com/biodiesel.shtml#biodieseG Accessed 11/12/12.
- Acuña, N. (2010). Colbiocel presented a project of a cellulosic ethanol plant. [Original in Spanish: Colbiocel presentó proyecto de planta de etanol celulósico]. Retrieved from: <http://www.vanguardia.com/historico/63193-colbiocel-presento-proyecto-de-planta-de-etanol-celulosico#sthash.D4GxvJzV.dpuf>, Vanguardia Liberal.
- Achten, W. M., Mathijs, E., Verchot, L., Singh, V. P., Aerts, R., & Muys, B. (2007). Jatropha biodiesel fueling sustainability? Biofuels, Bioproducts and Biorefining, 1(4), 283-291.
- Agrammon. (2009). Technical process description AGRAMMON - Draft.
- Ajila, V. H., & Chiliquinga, B. (2007). Biofuel legislation analysis in Latin America. [Original in Spanish: Análisis de legislación sobre biocombustibles en América Latina.] Retrieved from: <http://revistavirtual.redesma.org/vol4/pdf/legislacion/Analisis%20de%20la%20legislacion%20de%20Biocombustibles.pdf> Accessed 25/06/11. Revista Olade.
- Álvarez, M. (2001). Could peace be worse than war for Colombia’s forests? The Environmentalist, 21, 305-315.
- Anderson–Teixeira, K. J., Davis, S. C., Masters, M. D., & Delucia, E. H. (2009). Changes in soil organic carbon under biofuel crops. Gcb Bioenergy, 1(1), 75-96.
- Anderson, J., Fergusson, M., & Valsecchi, C. (2008). An overview Of Global Greenhouse Gas Emissions and emissions reduction scenarios for the future Retrieved from: www.ieep.eu/assets/428/overview_gge.pdf Accessed at: 13/12/12. Brussels: IEEP.
- Andrade, G. (2004). Forest without law. Conflict, drugs and globalization of deforestation in colombia. [Original in spanish: Selvas sin ley. Conflicto, drogas y globalización de la deforestación de Colombia]. Retrieved from: <http://library.fes.de/pdf-files/bueros/kolumbien/01993/05.pdf>. Bogotá. Foro Nacional Ambiental-CIFOR.
- Aquino, M. (2006). State of Biofuels in Paraguay. [Original in spanish: Situación de los biocombustibles en Paraguay] Retrieved from: <http://www.mag.gov.py/dgp/SITUACION%20DE%20BIOCOMBUSTIBLES%20EN%20PARAGUAY%202006.pdf> Accessed: 02/06/10. Asunción.

- Argentinian Congress. (2006). Regulation and promotion scheme for production and sustainable use of biofuels. [Original in Spanish: Régimen de Regulación y Promoción para la Producción y Uso Sustentables de Biocombustibles.] Retrieved from: www.bccba.com.ar/bcc/images/00001197_BIOCOMBUSTIBLES.pdf. Buenos Aires.
- Arriaza, J. M. (2011). Biofuels: Analysis on their contribution to the Chilean energy matrix. [Original in Spanish: Biocombustibles: Análisis sobre su aporte a la matriz energética de Chile.] Retrieved from: http://www.tesis.uchile.cl/tesis/uchile/2011/cf-arriaza_jh/pdfAmont/cf-arriaza_jh.pdf accessed 15/06/12. Universidad de Chile, Santiago de Chile.
- Asamblea constituyente de Ecuador. (2007). Organic Law for National oil resources recovery and distribution of the debt processes. [Original in Spanish Ley orgánica para la recuperación del uso de los recursos petroleros del estado y racionalización administrativa de los procesos de endeudamiento] Retrieved: http://constituyente.asambleanacional.gob.ec/documentos/ley_petroeros_2_2_0informe_final.pdf Accessed 15/03/10. Quito.
- Asamblea nacional. (2011). Guidelines for National policy on biofuels and electricity generation from biomass within national territory. [Original in Spanish: Lineamientos para la política nacional sobre biocombustibles y energía eléctrica a partir de biomasa en el territorio nacional.] Retrieved from: http://www.energiarenovablepanama.com/wp-content/uploads/2011/09/Ley-42_Biocombustibles.pdf Accessed: 18/03/12. Panama.
- Asman, W. (1992). Ammonia emission in Europe: updated emission and emission variations. Roskilde, Denmark: National Institute of Public Health and Environmental Protection.
- Asocaña. (2009). History of the sugar sector [Historia del sector azucarero (in Spanish)] Retrieved 30/07/10, 2010, from <http://www.asocana.org/publico/info.aspx?Cid=8>
- Asocaña. (2010). Annual report 2009-2010 (Original in Spanish: Informe anual 2009-2010). Cali: Asocaña.
- Asocaña. (2011). Annual report 2010-2011 (Original in Spanish: Informe anual 2010-2011). Cali: Asocaña.
- Asocaña. (2012). Balance del sector Azucarero Colombiano 2000-2012 (In Spanish) Balance of the sugar industry in Colombia 2000-2002. <http://www.asocana.org/modules/documentos/5528.aspx> Accessed 05/11/12. Cali, Colombia: Asocaña.
- Asocaña. (2013). Balance azucarero colombiano Asocaña 2000 - 2013 (en tmvc). [In Spanish: Sugar sector balance Asocaña 2000-2013] Retrieved from: www.asocana.org/modules/documentos/3/194.aspx Accessed at: 13/12/13.

- Asocaña. (2014). Sugar sector balance Asocaña 2000-2014 [In Spanish: Balance azucarero colombiano Asocaña 2000–2014 (en toneladas).] Retrieved from: www.asocana.org/modules/documentos/5528.aspx Accessed at: 25/08/14.
- Assessment, M. E. (2005). Ecosystems and human well-being (Vol. 5): Island Press Washington, DC.
- Ausubel, J. H. (2000). The great reversal: nature's chance to restore land and sea. *Technology in Society*, 22(3), 289-301.
- Azizi, B., Zulkifli, H., & Kasim, M. (1995). Indoor air pollution and asthma in hospitalized children in a tropical environment. *Journal of Asthma*, 32(6), 413-418.
- Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M. J., Aviles-Vazquez, K., Perfecto, I. (2007). Organic agriculture and the global food supply. *Renewable agriculture and food systems*, 22(2), 86-108.
- Balasundram, S. K., Robert, P. C., Mulla, D. J., & Allan, D. L. (2006). Relationship between Oil Palm Yield and Soil Fertility as Affected by Topography in an Indonesian Plantation. *Communications in Soil Science and Plant Analysis*, 37(9-10), 1321-1337. doi: 10.1080/00103620600626817
- Barros, S. (2012). Brazil biofuel anual report http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_Sao%20Paulo%20ATO_Brazil_8-21-2012.pdf In USDA (Ed.).
- Basiron, Y. (2007). Palm oil production through sustainable plantations. *European Journal of Lipid Science and Technology*, 109(4), 289-295.
- Batidzirai, B., Smeets, E., & Faaij, A. (2012). Harmonising bioenergy resource potentials – Methodological lessons from review of state of the art bioenergy potential assessments. *Renewable and Sustainable Energy Reviews*, 16(9), 6598-6630.
- Batjes, N. (2010). IPCC default soil classes derived from the Harmonized World Soil Data Base. Retrieved 12/06/11, 2011
- Bergkamp, G., Orlando, B., & Burton, I. (2003). Adaptation of water management to climate change.: Gland & Cambridge: International Union for Conservation of Nature (IUNC).
- Berndes, G. (2008a). Future biomass energy supply: The consumptive water use perspective. *Water Resources Development*, 24(2), 235-245.
- Berndes, G. (2008b). Water demand for global bioenergy production: trends, risks and opportunities. *Journal of Cleaner Production*, 15(18), 1778-1786.
- Besosa, R. (2005). Organic Matter in the Soils of Cauva Valley region [Original in Spanish:Materia Orgánica de los suelos del Valle del Cauca]. Presentation: Ingenio Providencia. Procaña Seminar .

- BioPact. (2007). A quick look at 'fourth generation' biofuels. Website: www.google.com.co/search?sourceid=navclient&ie=UTF-8&rlz=IT4WZPA_enCO207CO208&q=Heverlee Accessed: 05/04/2010.
- Bittencourt, G., & Reig, N. (2009). Biofuel industry in Uruguay: Current situation and perspectives [Original in Spanish: La industria de biocombustibles en Uruguay: situación actual y perspectivas] Retrieved from: <http://www.fcs.edu.uy/archivos/I109.pdf> Accessed: 12/05/11 Departamento de economía, : Universidad de la República,.
- BMI. (2008). Colombia Power Report Q4 2008: Business Monitor International.
- Bolivian National Congress. (2005). Law 3152. [Original in Spanish: Law 3152] Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20\(Ley%203152\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20(Ley%203152).pdf) Accessed 02/12/12. La Paz. Bolivia.
- Bongiovanni, R., & Lowenberg-DeBoer, J. (2004). Precision agriculture and sustainability. *Precision Agriculture*, 5(4), 359-387.
- Briceño, C. (2006). Disposition of vinasses produced in sugar processing distilleries in Colombia. (Original in spanish: Disposición de las vinazas producidas en las destilerías del sector azucarero colombiano.). Paper presented at the Taller combustibles, energía y el medio ambiente a partir de la caña de azúcar y otras biomásas., Santa Lucía, Guatemala.
- Brooks, T., De silva, N., Foster, N., Hoffmann, M., & Knox, D. (2008). Biodiversity hotspots. Retrieved from: www.biodiversityhotspots.org Accessed 10/02/09: Conservation international.
- Brugman, A. (2004). Design of an economic instruments Porogram for managing and Controlling Urban atmospheric pollution in Colombia. Consultant report. Bogota, Colombia: MAVDT.
- Buchanan, E. (1975). The introduction of a relative cane payment system in the South African Sugar Industry. *South African Sugar Year Book*, 45, 11-14.
- Buitrago, A. C., Correa Roldán, D., & Palacios Botero, F. A. (2007). Agri-industrial potential in Antioquia, colombia (Original in Spanish: Potencial Agroindustrial Antioqueño). Medellín, Colombia.
- Calixto, D., & Díaz, A. (1995). Economic Valuation of the enviromental impact of air quality on population undet 5 years old. [Original in Spanish: Valoración económica del impacto ambiental del aire sobre la salud de los habitantes menores de 5 años en Bogotá.]. Unievridad Javeriana, Bogota. Colombia.
- Cámara de Diputados. (2008). Law of Promotion of Bioenergy products. [Original in Spanish: Ley de promoción y desarrollo de los bioenergéticos] Retrieved from:

- http://www.diputados.gob.mx/LeyesBiblio/pdf/LPDB.pdf Accessed from: 18/03/11. Ciudad de México.
- Cámara de Senadores. (2005). [Original in Spanish: Ley n° 2.748.- de fomento de los biocombustibles.] Retrieved from: www.bvsde.paho.org/bvsacd/cd38/Paraguay/L2748-05.pdf Accessed: 15/06/11. Asunción.
- Camastra, N. D. (2008). National Security and Development: How Blocking the U.S.-Colombia Free Trade Agreement will Protect Colombians and the U.S. Retrieved 03/08/2009, from <http://www.foodfirst.org/en/node/2110>
- Campuzano, L. F. (2011). Platform Jatropha Colombia: Myth or True [Original in Spanish: Plataforma Jatropha Colombia: Mito o Realidad] Retrieved from: www.minagricultura.gov.co/archivos/plataforma_jatropha_colombia.pdf Accessed 12/05/12. Bogotá, Colombia: Corpoica.
- CARB. (2009). Californian Low Carbon Fuel Standard. Resolution 09-31. Sacramento, California.
- Cardona Alzate, C. A. (2009). Perspectives of Biofuels Production in Colombia: Latinamerican and World Contexts [Original in Spanish: Perspectivas de la producción de biocombustibles en Colombia: contextos latinoamericano y mundial] Retrieved from: <https://revistaing.uniandes.edu.co/pdf/A12%2029.pdf>. Revista de Ingeniería(29), 109-120.
- Cardona, C. A., C.E., O., Sanchez, C. A., & Rincón, L. E. (2007). Rapeseed biodiesel: an Alternative of rural development. [Original in spanish: Biodiesel de higuerrilla: una alternativa de desarrollo rural] Retrieved from: <http://corpomail.corpoica.org.co/BACFILES/BACDIGITAL/55173/19.pdf> Accessed at: 25/04/14. Manizales: Universidad Nacional de Colombia.
- Carnoval, M. (2009). Free Markets? - A Look Into the US Colombia FTA
- Carpenter, S. R., Mooney, H. A., Agard, J., Capistrano, D., DeFries, R. S., Diaz, S., Pereira, H. M. (2009). Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. Proceedings of the National Academy of Sciences, 106(5), 1305-1312.
- Cassalett, C., Torres, J. S., & Isaacs, C. (1995). Sugarcane cultivation in the sugar production zone of colombia. (Original in Spanish: El cultivo de la caña en la zona azucarera de Colombia) Retrieved from: http://www.cenicana.org/publicaciones/libro_cana/libro_cana.php Accessed 15/07/11. Cali.
- Cassman, K. G., Dobermann, A., Walters, D. T., & Yang, H. (2003). Meeting cereal demand while protecting natural resources and improving environmental quality. Annual Review of Environment and Resources, 28(1), 315-358.

- Castiblanco, C., & Hortúa, S. (2012). Colombiano Biofuels' energetic paradigm and its implications [Original in Spanish: El paradigma energético de los biocombustibles y sus implicaciones: panorama mundial y el caso] *Gestion y Ambiente*, 15(3), 5-26.
- Castillo, E. F. (2009). Cogeneration in the Colombian sugar sector. (Original in spanish: Cogeneración en el sector azucarero colombiano) Retrieved from <http://www.acolgen.org.co/jornadas2gen/CenicanaCogeneracion.pdf> 12/05/10. Bogota: Alcogen.
- Cazal, g., & Cáceres, O. (2006). Biofuels in Paraguay. [Original in Spanish: Biocombustibles en Paraguay] Retrieved from: <http://www.olade.org/biocombustibles/Documents/PDF-22-8%20Paraguay.pdf> Accessed: 02/06/12. Paper presented at the Seminario Internacional "BIOCOMBUSTIBLES", Brasilia, Brazil.
- CEET. (2009, 31/03/2009). 'Upaquizaron el precio del etanol' advierte ex codirector del Emisor, Salomón Kalmanovitz (Manipulation on ethanol prices warns Central Bank ex-bydirector, Salomon Kamanovitz) http://www.portafolio.com.co/economia/economiahoy/2009-04-01/ARTICULO-WEB-NOTA_INTERIOR_PORTA-4929267.html, Portafolio.
- CEN. (2009). CEN/TC 383 Sustainably produced biomass for energy applications Retrieved from <http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/Fuels/Pages/Sustainability.aspx> Accessed at 15/06/10.
- Cenicaña. (2010). Water savings and applied volumes with the use of irrigation technologies (Original in Spanish: Ahorros de agua y volúmenes aplicados con el uso de tecnologías de riego). Florida, Colombia: Cenicaña.
- CENICANA. (2011). Historic dates of the sugar agroindustry in Colombia http://www.cenicana.org/quienes_somos/agroindustria/historia_eng.php.
- Cenicaña. (2012). Anual report 2012. [Original in Spanish: Informe anual 2012] Retrieved from http://www.cenicana.org/pdf/informe_anual/ia_2012/ia_2012.pdf. Accessed at 25/08/14. Cali, Colombia: Cenicaña.
- Cenipalma. (2000). Palm oil plagues in Colombia [Original in Spanish: Plagas de la palma de aceite en Colombia]: Fedepalma-Cenipalma Santafe de Bogota.
- Cepeda, V. (2007). Incentives laws to Renewable energies and their special schemes of application: law 57-07. Components and potentials. [Original in Spanish: Ley de Incentivos a las Energías Renovables y sus Regímenes Especiales. Ley 57- 07: Componentes y Potencialidades] Retrieved from: www.olade.org/biocombustibles2008/Documents/ponencias/d%C3%ADa3/Sesi%C3%B3n12-Dia%203/VirgilioCepeda.pdf Accessed: 05/06/11. El Salvador.

- Cerrato, M. (2011). Biofuels in El Salvador. [Original in Spanish: Biocombustibles en El Salvador] Retrieved from: www.cepal.org/drni/noticias/noticias/8/45098/ManuelCerrato.pdf Accessed 15/06/12. San Salvador.
- CNE. (2007). Curcular Number 30. [Original in Spanish: Circular N°30 Del 16 De Mayo Del 2007] Retrieved from: <http://www.sii.cl/documentos/circulares/2007/circu30.htm> accessed 12/12/11. Santiago.
- Coelho, S. (2005). Brazilian sugarcane ethanol: lesson learned. Paper presented at the Workshop & Business Forum on Sustainable Biomass Production for the World Market, São Paulo.
- Comisión nacional asesora (2007). Decree 109/2007 Biofuels. [Original in spanish: Decreto 109/2007] retrieved from http://www.ambiente.gov.ar/archivos/web/DNorAmb/File/Decreto_109%202007.pdf Accessed 15/09/12. Buenos Aires.
- Law 2 About forest economy of the Nation and preservation of renewable natural resources. (Original in Spanish: Ley 2 Sobre economía forestal de la Nación y conservación de recursos naturales renovables.) http://www.minambiente.gov.co/documentos/ley_0002_161259.pdf, (1959).
- Congreso de Ecuador. (2006). Law 2006-57. Organic Law of creation of the ecuadorian investment fund in Energy and hydrocarbon sectors. [Original in Spanish: Ley No. 2006-57. Ley orgánica de creación del fondo ecuatoriano de inversión en los sectores Energético e hidro-carburífero -FEISEH] Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Ecuador-Biocombustibles%20\(Ley%202006-57\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Ecuador-Biocombustibles%20(Ley%202006-57).pdf) Accessed 31/01/11. Quito.
- Congreso de la República. (2003). [Original in Spanish: Ley De Promoción Del Mercado De Biocombustibles] Retrieved from: <http://intranet2.minem.gob.pe/web/archivos/dgh/legislacion/128054.pdf> Accessed: 06/03/12. Lima, Peru.
- Congreso Nacional de Bolivia. (2005). Law N. 3279 of December 9th of 2005. Ley N° 3279 del 9 de Diciembre de 2005. Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20\(Ley%203279\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20(Ley%203279).pdf) Accessed 12/02/11. La paz.
- Congreso Nacional de la República Dominicana. (2007). Law 57-07: Incentives law to Renewable energies and their special schemes of application [Original in Spanish: Ley No. 5707 sobre Incentivo al Desarrollo de Fuentes Renovables de Energía y de sus Regímenes Especiales.] Retrieved from: http://www.phlaw.com/pubs/rejec/sp/Ley_Energia_Renovable.pdf Accessed: 22/05/11. Santo Domingo.

- Consejo de Ministros. (2007). [Original in Spanish: Reglamento para la comercialización de biocombustibles] Retrieved from: <http://www2.osinerg.gob.pe/MarcoLegal/docrev/DS-02I-2007-EM-CONCORDADO.pdf> Accessed: 03/010. Lima, Peru.
- Contexto Ganadero. (2014). Colombia, it is stuck in the Biofuels National program [Original in Spanish: Colombia, estancada en Programa Nacional de Biocombustibles] Retrieved from: <http://www.contextoganadero.com/agricultura/colombia-estancada-en-programa-nacional-de-biocombustibles> accessed 12/05/2014 Contexto Ganadero.
- Contreras, C., & Rodríguez, M. (2006). Foundations and current use of ethanol anhydro as oxygenant of regular fuels in Costa Rica. [Original in Spanish: Fundamentos y situación actual del uso de etanol anhidro como oxigenante de gasolinas en Costa Rica] Retrieved from: http://www.mopt.go.cr/planificacion/centrotransferencia/RTM_06/Etanol.pdf Accessed 23/02/11. San José.
- Corley, R. H. V., & Tinker, P. (2007). Care and Maintenance of Oil Palms The Oil Palm (pp. 287-325): Blackwell Science Ltd.
- Corley, R. H. V., & Tinker, P. (2007). The Origin and Development of the Oil Palm Industry The Oil Palm (pp. 1-26): Blackwell Science Ltd.
- Corley, R. H. V., & Tinker, P. (2008). The oil palm: Wiley-Blackwell.
- Corpoica. (2011). Castor oil: productive enrgy and agroindustria alternative for Colombia. [Original in Spanish: Higuerrilla, Aternativa productiva, Energetica, y agroindustrial para Colombia] Retrieved from: http://www.minagricultura.gov.co/archivos/presentacion_higuerrilla_navas.pdf Accessed: 12/05/12. Bogota, Colombia: Corpoica, MADR.
- Corzo, G., Londoño-Murcia, M. C., Fonseca, C., Ramírez, W., Salamanca, B., Alcázar, C., Lasso, C. A. (2008). Identification of priority areas for preservation in situ of biodiversity. (Original in Spanish: Identificación de áreas prioritarias para la conservación in situ de la biodiversidad.). In Corzo German et al. (Ed.), Environmental planning for the preservations of biodiversity in the operative areas of Ecopetrol located in Magdalena Medio and the Llanos orientales of Colombia (Original in spanish: Planeación ambiental para la conservación de la biodiversidaden las áreas operativas de Ecopetrol localizadas en el Magdalena Medio y los Llanos Orientales de Colombia). Bogotá, Colombia: Instituto Alexander von Humboldt and Ecopetrol S.A.
- Čuček, L., Klemeš, J. J., & Kravanja, Z. (2012). A Review of Footprint analysis tools for monitoring impacts on sustainability. *Journal of Cleaner Production*, 34(0), 9-20. doi: <http://dx.doi.org/10.1016/j.jclepro.2012.02.036>

- Chacón , J., & Gutiérrez , R. (2008, 20/12/2008). Controversia por precio de etanol (Controversy for ethanol price) <http://www.elspectador.com/impreso/negocios/articuloimpresoI00690-controversia-precio-de-etanol>, El espectador.
- Chartres, C. (1981). Land resources assessment for sugar-cane cultivation in Papua New Guinea. *Applied Geography*, 1(4), 259-271.
- Cherubini, F., Bird, N. D., Cowie, A., Jungmeier, G., Schlamadinger, B., & Woess-Gallasch, S. (2009). Energy-and greenhouse gas-based LCA of biofuel and bioenergy systems: Key issues, ranges and recommendations. *Resources, Conservation and Recycling*, 53(8), 434-447.
- Cherubini, F., & Strømman, A. H. (2011). Life cycle assessment of bioenergy systems: State of the art and future challenges. *Bioresource Technology*, 102(2), 437-451. doi: <http://dx.doi.org/10.1016/j.biortech.2010.08.010>
- Christodoulidis, N. (2011). International Governance Options for the Sustainable Production of Biofuels. THE UNIVERSITY OF NEW SOUTH WALES - INSTITUTE OF ENVIRONMENTAL STUDIES, Sydney.
- Chum, H., Faaij, A., Moreira, J., Berndes, G., Dhamija, P., Dong, H., & Others. (2011). Bioenergy IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation ed O Edenhofer et al: Cambridge: Cambridge University Press.
- Dale, B. E., Allen, M. S., Laser, M., & Lynd, L. R. (2009). Protein feeds coproduction in biomass conversion to fuels and chemicals. *Biofuels, Bioproducts and Biorefining*, 3(2), 219-230.
- DAMA. (2004). Atmospheric emissions of Bogotá Savannah. [Original in Spanish: Emisiones atmosféricas de la sabana de Bogotá]. . Bogota, Colombia: Departamento Administrativo del Medio Ambiente (DAMA).
- DANE. (2005). National census 2005 [Original in Spanish: Censo nacional 2005]. Bogota, Colombia: Departamento Nacional de Estadística (DANE).
- DANE. (2009). Principales indicadores del mercado laboral: Febrero 2009 (Main Indicators of Labor Market: February 2009). Bogota: DANE, Departamento Administrativo Nacional de Estadística. (National Administrative Department of Statistics).
- Dangond, I. (2013). Biofuels, without rules of the game . [Original in Spanish: Biocombustibles sin reglas de juego] Retrieved from: <http://contextoganadero.com/columna/biocombustibles-sin-reglas-de-juego> accessed at 13/12/13, Contexto Ganadero.
- de Fraiture, C., & Berndes, G. (2009). Biofuels and water Biofuels: Environmental consequences and interactions with changing land use.

- De Klein, C., Novoa, R. S., Ogle, S., Smith, K., Rochette, P., Wirth, T., Walsh, M. (2006). N₂O emissions from managed soils, and CO₂ emissions from lime and urea application. IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, 4.
- Demirbas, A. (2007). Importance of biodiesel as transportation fuel. *Energy Policy*, 35(9), 4661-4670.
- Demirbas, M. F. (2011). Biofuels from algae for sustainable development. *Applied Energy*, 88(10), 3473-3480.
- DENC-SEIC. (2009). Biofuel in dominican Republic [Original in Spanish: Los biocombustibles en República Dominicana] Retrieved from: <http://www.seic.gov.do/media/135701/marco%20legal%20de%20los%20biocombustibles.pdf> Accessed: 12/06/12.
- Department of Conservation. (2010). Annual Reports of the State Oil & Gas Supervisor, 2009-2000. . California, USA: Department of conservation.
- Dickey, E. C., Shelton, D. P., Jasa, P. J., & Peterson, T. R. (1985). Soil erosion from tillage systems used in soybean and corn residues. *TRANS. AM. SOC. AGRIC. ENG.*, 28(4), 1124-1129.
- Dilek, F. B., Yetis, U., & Gökçay, C. F. (2003). Water savings and sludge minimization in a beet-sugar factory through re-design of the wastewater treatment facility. *Journal of Cleaner Production*, 11(3), 327-331. doi: 10.1016/S0959-6526(02)00029-X
- Dincer, I., & Rosen, M. A. (1999). Energy, environment and sustainable development. *Applied Energy*, 64(1), 427-440.
- Division of Oil & Gas. (2012). Lessee's Acreage Summary. Retrieved from http://dog.dnr.alaska.gov/Leasing/Documents/LeaseReports/Acreage_by_Owner_Summary.pdf. Alaska, USA: Department of Natural Resources.
- DLD. (1992). Land Evaluation for Economic Crops Manual. Bangkok, Thailand: Department of Land Development.
- DNP. (2005). CONPES 3343 Lineamientos y estrategias de desarrollo sostenible para los sectores de agua, ambiente y desarrollo territorial (in Spanish) [Policy guidelines and sustainable development strategies for water, environment and territorial development]. (Conpes Document 3510). Bogotá: MAVDT, DNP, MHCP.
- DNP. (2007). Vision Colombia 2019: Creating an enviromental management framework to promote sustainable development. Proposal for discussion [Original in Spanish: Vision Colombia 2019: Consolidar una gestion ambiental que promueva el desarrollo sostenible - Propuesta para discusion]. Bogota: Departamento Nacional de Planeacion.

- DNP Departamento Nacional de Planeación [National Economic Planning Bureau]. (2008). Lineamientos de política para promover la producción sostenible de Biocombustibles en Colombia (in Spanish) [Policy guidelines to Promote Sustainable Biofuels Production in Colombia]. (Conpes Document 3510). Bogotá.
- DNV. (2010). Biofuels 2020. A policy driven logistics and business challenge Retrieved from: http://www.dnv.com/binaries/biofuels%202020%20position%20paper_tcm4-434417.pdf Accessed at 19/12/13. Høvik, Norway.
- Doherty, S., & Rydberg, T. (2002). Ecosystem properties and principles of living systems as foundation for sustainable agriculture – Critical reviews of environmental assessment tools, key findings and questions from a course process. *Ekologist lantbruk*, 32.
- Dufey, A. (2006). Biofuels production, trade and sustainable development: emerging issues: Iied.
- EC. (2003a). CAP reform. [Original in Spanish: Reforma de la PAC] Retrieved from: <http://www.viaganadera.com/aseava/reformaPAC/articulos/29.pdf> accessed 18/06/10. Madrid, Spain.
- EC. (2003b). Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity. Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:283:0051:0070:EN:PDF> accessed 12/05/11. Luxembourg.
- EC. (2003c). Directive 2003/17/EC of the European Parliament and of the Council of 3 March 2003 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0017:en:NOT> Accessed 15/03/10. Brussels.
- EC. (2003d). Directive 2003/30/ec of the European Parliament and of the Council of 8 may 2003 on the promotion of the use of biofuels or other renewable fuels for transport. Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:123:0042:0042:EN:PDF> accessed 13/05/11. Brussels.
- EC. (2008). Directive of the European parliament and of the council on the promotion of the use of energy from renewable sources Brussels, Belgium: Official Journal of the European Union.
- EC. (2009). Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Strasbourg.: European Comission.

- Ecopetrol. (2009). Refining and Petrochemistry Annual Report 2009 Retrieved from <http://ecopetrol.com.co/english/especiales/Corporate%20Management%20and%20Finances%202009/finan-down.htm> (05/08/10). Bogot  : Ecopetrol.
- Ecopetrol. (2011). Evaluation of a Life cycle assessment of the Ecopetrol's fossil fuels (Original in Spanish: Evaluaci  n del An  lisis del Ciclo de Vida de los combustibles f  siles de Ecopetrol). Bogota: Ecopetrol.
- EIA. (2009a). Colombia Energy Data, Statistics and Analysis - Oil, Gas, Electricity, Coal: EIA (Energy Information Administration).
- EIA. (2009b). Petroleum statistics - Colombia. Retrieved from <http://www.eia.gov/countries/country-data.cfm?fips=CO>. Accessed (05/10/10).
- EIA. (2012). Annual Energy Review 2011 Retrieved from: <http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf> Accessed 10/12/13. . Washington DC: EIA.
- El Pais Newspaper. (2009). El valle producir   bioetanol con yuca (The valley will produce cassava-based ethanol), El Pais.
- Ellis, R., & Merry, R. (2007). Chapter five: Sugarcane agriculture Sugarcane, Second Edition (pp. 101-142).
- Eneas, G. (2006). Cassava, A biofuel, Tha Bahama Journal.
- EPA. (1996). Bagasse combustion in sugar mills. Retrieved from <http://www.epa.gov/ttn/chief/ap42/ch01/bgdocs/b01s08.pdf> Accessed at: 15/06/11. In EPA (Ed.), Clearinghouse for Inventories & Emissions Factors: EPA.
- EPA. (2010). Renewable Fuel Standard (RFS) Retrieved from: <http://www.epa.gov/otaq/fuels/renewablefuels/index.htm> Accessed 10/01/2010.
- EPFL. (2008). Roundtable on Sustainable Biofuels Global: Principles and criteria for sustainable biofuels production. Version Zero. Lausanne, Switzerland: EPFL - Energy center.
- Etter, A. (1993). General ecological characterization and human action in the amazon jungle. [Original in Spanish: Caracterizaci  n ecol  gica general y de la intervencion humana en la amazon  a colombiana] Amazonia colombiana, diversidad y conflicto [Original in spanish: Colombian amazon, diversidad y conflicto]. Bogota: Colciencias.
- EU-Comission. (2010). Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels. Retrieved from <http://www.efoa.eu/en/document/2010-I6002-communication-from-the-commission-on-the-practical-implementation-of-the-eu-biofuels-and-bioliquids-sustainability-scheme-and-on-counting-rules-for-biofuels.aspx> Accessed at 23/10/11. Official Journal of the European Union.

- Evans, G. (2007). Liquid Transport Biofuels - Technology Status Report. York: The National Non-Food Crops Centre, NNFCC.
- Faaij, A. (2007). Biomass and Biofuels. Background Report for the Energy Council of the Netherlands. See also: <http://www.energieraad.nl/Include/ElectosFileStreaming.asp>.
- Faaij, A. P. C., & Domac, J. (2006). Emerging international bio-energy markets and opportunities for socio-economic development. *Energy for Sustainable Development*, 10(1), 7-19.
- Fadul, M. (N.D.). Report: Alliances for peace: The case of Indupalma. (Original in Spanish: Informe alianzas por la paz: el modelo Indupalma) Retrieved from: www.indupalma.com/sites/default/files/gallery/Informe_Alianzas_por_la_Paz_fadul-esp.pdf Indupalma (Ed.) Retrieved from http://www.indupalma.com/sites/default/files/gallery/Informe_Alianzas_por_la_Paz_fadul-esp.pdf
- Fahrig, L. (2003). Effects of habitats fragmentation on Biodiversity. *Annual Review of Ecology, evolution and systematics*. ProQuest Ecology Journals, 487.
- Faist Emmenegger, M., Reinhard, J., & Zah, R. (2009). SQCB - Sustainability Quick Check for Biofuels: Background Report. Retrieved from http://rsb.epfl.ch/files/content/sites/rsb2/files/Biofuels/Working%20Groups/GHG%20EG/SQCB_Background_report_en.pdf Accessed at 21/11/11. Dübendorf, Switzerland: EMPA.
- FAO. (1981). A framework for land evaluation (Retrieved 12/05/09) (Vol. 32). <http://www.fao.org/docrep/X5310E/x5310e00.htm>: FAO.
- FAO. (2008). The State of Food and Agriculture. Biofuels: Prospects, risk and opportunities. Rome, Italy: FAO.
- FAO and IIASA. (2007). Mapping biophysical factors that influence agricultural production and rural vulnerability. Rome: FAO.
- FAOSTAT. (2009). Land availability and use. Retrieved from: <http://faostat.fao.org/site/377/default.aspx#ancor> Accessed: 05/07/09.
- FAOSTAT. (2010). FAO Online Database: Crops production by country <http://faostat.fao.org>. Retrieved 12/01/2010, from FAO Statistic Division
- FAOSTAT. (2011). Food and Agricultural commodities production (Sugarcane, Palm and other commodities) Retrieved from: <http://faostat.fao.org/site/339/default.aspx> Accessed at 02/09/11.
- FAOSTAT. (2014). Fertilizers and pesticides Retrieved form <http://faostat.fao.org/site/575/default.aspx#ancor> Accessed 05/01/14.
- Fargione, J., Hill, J., Tilman, D., Polasky, S., & Hawthorne, P. (2008). Land clearing and the biofuel carbon debt. *Science*, 319(5867), 1235-1238.

- Fedebiocombustibles. (2010a). Biofuels today Bulletin of the Biofuel Colombian Federation [Original in Spanish: Biocombustibles hoy] Retrieved from <http://www.fedebiocombustibles.com/files/boletinI9.pdf> Accessed: 12/11/11. In Fedebiocombustibles (Ed.), (Vol. 19). Bogota, Colombia.
- FEDEBIOCOMBUSTIBLES. (2010b). Ongoing ethanol processing plants [Plantas productoras de Etanol en funcionamiento (in Spanish)]. Retrieved 30/06/10, 2010, from www.fedebiocombustibles.com
- Fedepalma. (2000). Vision and strategy of the palm business in Colombia. [Original in Spanish: Visión y estrategias de la palmicultura colombiana: 2000-2020.]. Bogota, Colombia.
- Fedepalma. (2004). Le apostamos al ALCA pero con reglas de juego claras (We bet on FTAA but with clear game rules). Palmas, 24(1), Editorial.
- Fedepalma. (2006a). Fedepalma sectoral CDM Umbrella Project For methane capture, fossil fuel displacement and cogeneration of renewable energy—Project design document form (CDM PDD). Retrieved from [www.dnv.com/focus/climate_change/Upload/FEDEPALMA%20CDM%20PDD%20V2_13_03%2007%20\(2\).pdf](http://www.dnv.com/focus/climate_change/Upload/FEDEPALMA%20CDM%20PDD%20V2_13_03%2007%20(2).pdf) Accessed at 12/04/10: CDM Executive Board.
- Fedepalma. (2006b). The Oil Palm Agroindustry in Colombia. Bogota: FEDEPALMA.
- Fedepalma. (2009). Statistical Annual report 2009 - The palm oil agri-business in Colombia and the world (Original in Spanish: - Anuario estadístico 2009 - la agroindustria de la palma de aceite en Colombia y el mundo). Bogota: Fedepalma.
- Fedepalma, & MAVDT. (2011). Environmental guide for the Palm agribusiness industry in Colombia [Original in Spanish: Guía ambiental de la agroindustria de la palma de aceite en Colombia] Retrieved from http://portal.fedepalma.org/documen/2011/Guia_Ambiental.pdf Accessed 14/03/12.
- Fehér, A., & Lúdia, K. (2005). An Analysis of Indicator for Sustainable Land use based on Research in Agricultural Landscape. In W. Leal Filho (Ed.), Handbook of Sustainability Research (Vol. 20, pp. 49-67): Peter Lang. Europäischer Verlag der Wissenschaften.
- Fernández Acosta, A. D. (Producer). (2009, 12/05/12). Biofuels National Policy (Original in Spanish: Política Nacional de Biocombustibles). Retrieved from www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCwQFjAA&url=http%3A%2F%2Fwww.minagricultura.gov.co%2Farchivos%2Fbiocombustibles_asamblea_bid_30_de_marzo_2009.ppt&ei=GmnHUOnLHoms9ASF14H4DA&usq=AFQjCNF_jlZ2Pm-zeO6TS45utp2tWhVccw Accessed: 12-05-12.
- Finkbeiner, M. (2014). Indirect land use change—Help beyond the hype? Biomass and Bioenergy, 62, 218-221.

- Fischer, G., Shah, M., van Velthuis, H., & Nachtergaele, F. O. (2001). Global agro-ecological assessment for agriculture in the 21st century.
- Forero, O. (2009). Sugarcane bagasse: Green oil of this century. [Original in Spanish: El bagazo de caña de azúcar, petróleo verde del siglo] Retrieved from: <http://www.dinero.com/Imprimir/82610> Accessed 15/05/14, Dinero.
- FPP. (2007). Promised land: Palm oil and land acquisition in Indonesia: Implications for local communities and indigenous peoples: Forest Peoples Programme (FPP).
- Franklin, M., Zeka, A., & Schwartz, J. (2006). Association between PM_{2.5} and all-cause and specific-cause mortality in 27 US communities. *Journal of Exposure Science and Environmental Epidemiology*, 17(3), 279-287.
- Freitas Vian, C. E. (2005-2007). Sugarcane Pre-production. Features, Climate. (Original in portuguese: Cana-de-açúcar, Pré-produção, Características, Clima.) Retrieved from: http://www.agencia.cnptia.embrapa.br/gestor/cana-de-acucar/arvore/CONTAG01_11_711200516716.html accessed at 15/01/12. Brasília DF, Brasil: Embrapa.
- Frischknecht, R., Jungbluth, N., H, A., Doka, G., Heck, T., Hellweg, S., Wernet, G. (2007). Overview and Methodology - Data v2.0 Retrieved from: www.ecoinvent.org/fileadmin/documents/en/01_OverviewAndMethodology.pdf Accessed at 12/04/10 ecoinvent report No. 1. Dübendorf, Switzerland: Swiss Centre for Life Cycle Inventories.
- Garcez, C. A. G., & Vianna, J. N. d. S. (2009). Brazilian Biodiesel Policy: Social and environmental considerations of sustainability. *Energy*, In Press, Corrected Proof.
- García, M. L. (2008). Fondos de Estabilización de Precios, desde las normas de la competencia [Original in Spanish: Prices Stabilization Funds, from competition regulation perspective] Retrieved from: <http://www.portafolio.co/archivo/documento/CMS-4103218> Accessed 04/04/12, Portafolio.
- Garrido, A. (2007). Biofuel production in Peru. [Original in Spanish: La producción de Biodiesel en el Perú] Retrieved from: www.olade.org/biocombustibles2008/Documents/ponencias/d%C3%ADa3/Sesion%2010%20-%20Dia%203/AngieGarrido.pdf Accessed: 12/03/11. Paper presented at the II Seminario Latinoamericano y del Caribe de Biocombustibles, Lima, Peru.
- GBEP. (2009). The Global Bioenergy Partnership Common Methodological Framework for GHG Lifecycle Analysis of Bioenergy. Retrieved from www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/2009_events/7th_SC_NY/GBEP_GHG_report_2306.pdf Accessed at 29/05/12. Rome, Italy: FAO.

- Gerbens-Leenes, P., & Nonhebel, S. (2002). Consumption patterns and their effects on land required for food. *Ecological Economics*, 42(1), 185-199.
- Germer, J., & Sauerborn, J. (2008). Estimation of the impact of oil palm plantation establishment on greenhouse gas balance. *Environment, Development and Sustainability*, 10(6), 697-716. doi: 10.1007/s10668-006-9080-1
- Gibson, L. (2010). RFS2 reduces 2010 cellulosic ethanol requirement Retrieved from: <http://www.biomassmagazine.com/articles/3474/rfs2-reduces-2010-cellulosic-ethanol-requirement/>. Biomass Magazine.
- Gilbert, C. L. (2008). Value chain analysis and market power in commodity processing with application to the cocoa and coffee sectors. *Commodity market review*, 5-34.
- Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., . . . Toulmin, C. (2010). Food security: the challenge of feeding 9 billion people. *Science*, 327(5967), 812-818.
- Goedkoop, M., & Spriensma, R. (2007). The Eco-indicator 99: a damage oriented method for life cycle impact assessment. Methodology Report. Amersfoort, Netherlands, 2000.
- Goh, K. J. (2000). Proceedings of the Seminar on Managing Oil Palm for High Yields : Agronomic Principles. Paper presented at the Seminar on Managing Oil Palm for High Yields, Malaysia.
- Goldemberg, J. (2007). Ethanol for a Sustainable Energy Future. *Science*, 315(5813), 808-810. doi: 10.1126/science.1137013
- Goldemberg, J., Coelho, S. T., & Guardabassi, P. (2008). The sustainability of ethanol production from sugarcane. *Energy Policy*, 36(6), 2086-2097.
- Goldemberg, J., Coelho, S. T., Nastari, P. M., & Lucon, O. (2004). Ethanol learning curve—the Brazilian experience. *Biomass and Bioenergy*, 26(3), 301-304. doi: 10.1016/s0961-9534(03)00125-9
- Gómez, E. A., Ríos, L. A., & Peña, J. D. (2012). Wood, Potencial Lignocelulosic Material for the Production of Biofuels in Colombia [Original in Spanish: Madera, un Potencial Material Lignocelulósico para la Producción de Biocombustibles en Colombia] retrieved from: <http://www.scielo.cl/pdf/infotec/v23n6/art09.pdf> Accessed 23/05/14. *Información tecnológica*, 23(6), 73-86.
- Gomez, F. (2010). Current state and perspectives of biofuels in Dominican Republic [Original in Spanish: Estado actual y perspectivas de los biocombustibles en Republica Dominicana] Retrieved from: www.olade.org/biocombustibles/Documents/Ponencias%20Chile/Sesion%207_F%20Gomez_CNE_%20Rep%20Dominicana.pdf Accessed: 12/05/11. Santo Domingo.

- Gonsalves, J. B. (2006). An assessment of the biofuels industry in India: UN.
- González, A. F., Jiménez, I. C., Susa, M. R., Restrepo, S., & Gómez, J. M. (2008). Second generation biofuels and biodiesel: A brief review of the Universidad de los Andes contribution [Original in Spanish: Biocombustibles de segunda generación y Biodiesel: Una mirada a la contribución de la Universidad de los Andes]. Retrieved from: <https://revistaing.uniandes.edu.co/pdf/a8%2028.pdf> Accessed 25/04/2014. Revista de Ingeniería Universidad de los Andes(28), 70-82.
- González, M. (2006). Biofuel formulation program. [Original in Spanish: Programa de formulación de biocombustibles.] Retrieved from: <http://www.olade.org/eficiencia/Documents/PDF-22.pdf> Accessed 15/03/12. Quito: Ministerio de Energía y minas,.
- Gressel, J. (2008). Transgenics are imperative for biofuel crops. *Plant Science*, 174, 246–263.
- Guinée, J. (2001). Handbook on life cycle assessment—operational guide to the ISO standards. *The international journal of life cycle assessment*, 6(5), 255-255.
- Guinee, J. B., Heijungs, R., Huppes, G., Zamagni, A., Masoni, P., Buonamici, R., . . . Rydberg, T. (2010). Life Cycle Assessment: Past, Present, and Future†. *Environmental Science & Technology*, 45(1), 90-96.
- Gunkel, G., Kosmol, J., Sobral, M., Rohn, H., Montenegro, S., & Aureliano, J. (2007). Sugar cane industry as a source of water pollution—Case study on the situation in Ipojuca River, Pernambuco, Brazil. *Water, Air, & Soil Pollution*, 180(1), 261-269.
- Gurjar, B., Butler, T., Lawrence, M., & Lelieveld, J. (2008). Evaluation of emissions and air quality in megacities. *Atmospheric Environment*, 42(7), 1593-1606.
- Guzman, J. L. (2009). En Colombia no modificarán el precio del etanol. "Ethanol price won't be modified in Colombia" <http://www.biodiesel.com.ar/?p=1300>. Retrieved 17/07/2009, from <http://www.biodiesel.com.ar/?p=1300>
- Haas, M. J., McAloon, A. J., Yee, W. C., & Foglia, T. A. (2006). A process model to estimate biodiesel production costs. *Bioresource Technology*, 97(4), 671-678.
- Habitat, U. (2008). State of the world's cities 2008/2009: Harmonious cities. Earthscan, London. 264pp.
- Hamelinck, C. N., & Faaij, A. P. C. (2006). Outlook for advanced biofuels. *Energy Policy*, 34(17), 3268-3283.
- Hampannavar, U., & Shivayogimath, C. (2010). Anaerobic treatment of sugar industry wastewater by Upflow anaerobic sludge blanket reactor at ambient temperature. *International Journal of Environmental Sciences*, 1(4), 631-639.
- Hartley, C. W. S. (1988). Oil palm (*Elaeis guineensis* Jacq.) (Third edition ed.). New York: Wiley.

- Hauschild, M., Jeswiet, J., & Alting, L. (2005). From Life Cycle Assessment to Sustainable Production: Status and Perspectives. *CIRP Annals - Manufacturing Technology*, 54(2), 1-21. doi: [http://dx.doi.org/10.1016/S0007-8506\(07\)60017-1](http://dx.doi.org/10.1016/S0007-8506(07)60017-1)
- Hebebrand, C., & Laney, K. (2007). An Examination of US and EU Government Support to Biofuels: Early Lessons. International Food & Agriculture Trade Policy Council.
- Heriansyah. (2008). Optimizing the use of oil palm by-product (EFB) as fertilizer Supplement for oil palm. PT. BW Plantation tbk. Jakarta, Indonesia.
- Hernandez, E. (2008). Comparative study of Biofuel legislation in Latin America. [Original in Spanish: Estudio Comparativo de La Legislación Latinoamericana sobre Biocombustibles] Retrieved from: http://www.snvla.org/mm/file/Estudio_Comparativo.pdf Accessed: 15/03/11. Tegucigalpa: SNV.
- Hill, J. (2007). Environmental costs and benefits of transportation biofuel production from food-and lignocellulose-based energy crops. A review. *Agronomy for Sustainable Development*, 27(1), 1-12.
- Hischier, R., Weidema, B., Althaus, H., Bauer, C., Doka, G., Dones, R., . . . Nemecek, T. (2010). Implementation of Life Cycle Impact Assessment Methods Retrieved from http://www.ecoinvent.org/fileadmin/documents/en/03_LCIA-Implementation-v2.2.pdf Accessed at 12/04/12 Ecoinvent report No. 3.
- Hoffmann, M. (2006). Advances of Panama in the use of Biofuels. [Original in Spanish: Avances de Panamá en el uso de biocombustibles] Retrieved from: <http://www.olade.org/eficiencia/Documents/PDF-22-7%20Panama.pdf> Accessed: 02/06/11. Panamá: Ministerio de Comercio e Industrias.
- Honty, G., & Gudynas, E. (2007). Agrocombustibles y Desarrollo Sostenible en América Latina y el Caribe (Agrofuels and sustainable Development in Latin America and Caribbean) (pp. 34). Montevideo: Observatorio de Desarrollo.
- Hopkins, S. (2008). Colombian FTA misses Biofuels., from <http://www.greenchipstocks.com/articles/colombia-biofuels-investing/227>
- House of Representatives. (2002). Public Law 107-171. Farm Security And Rural Investment Act Of 2002 Retrieved from <http://www.gpo.gov/fdsys/pkg/PLAW-107publ171/pdf/PLAW-107publ171.pdf> Accessed 04/11/11.
- Huertas Greco, K., & Sánchez Medina, I. A. (2012). Obtención y caracterización de biodiesel a partir de aceite de semillas de *Ricinus communis*.(Higuerilla) modificadas genéticamente y cultivadas en el Eje Cafetero [Original in Spanish: Production and Characterization of biodiesel from oil from *Ricinnus Communis* (repeseed) seeds, genetically modified and grown within the Coffee region] Retrieved from:

<http://repositorio.utp.edu.co/dspace/bitstream/11059/3048/1/6626S211.pdf>
 Accessed at: 23/05/14. UNIVERSIDAD TECNOLÓGICA DE PEREIRA, Pereira.

- Hurtado, M., & Hernández-Salazar, G. A. (2010). Local Profile and Palm Tree Agro-Industry: Exploring the case of San Alberto and San Martín (Cesar). *Cuad. Desarro. Rural*, 125-145.
- IDB, MME, MADR, MAVDT, & DNP. (2012). Strategies for Sustainable energy and biofuels in Colombia. [Original in Spanish: Estrategias de energía sostenible y biocombustibles para Colombia]. Medellín, Colombia.
- IDEAM. (2001a). Colombia: First communication before United Nations Framework Convention on Climate Change. [Original in Spanish: Colombia: Primera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático] Retrieved from <http://unfccc.int/resource/docs/natc/colnc1.pdf> accessed 12/05/10. Bogotá, Colombia: IDEAM.
- IDEAM. (2001b). The natural environment in Colombia [Original in Spanish: El medio ambiente en Colombia]. Bogotá, Colombia: IDEAM.
- IDEAM. (2004). Annual report on the environment and renewable resources in Colombia. [Original in Spanish: Informe anual sobre el estado del medio ambiente y los recursos naturales renovables en Colombia.]: IDEAM.
- IDEAM (Cartographer). (2005a). Climate Atlas of Colombia . (Original in spanish: Atlas climatológico de Colombia).
- IDEAM. (2005b). Solar Radiation Atlas of Colombia. Atlas de Radiación Solar de Colombia.
- IDEAM (Cartographer). (2006). Wind and wind power Atlas of Colombia. (Original in spanish: Atlas de Vientos y Energía Eólica de Colombia).
- IDEAM. (2007). Forest Ecosystem in zone of forest reserves, based on database of IGAC. (Original in Spanish: Ecosistemas de bosque en las Zonas reserva Forestal de Ley 2 de 1959 con base de datos de IGAC) Bogotá: Ideam.
- IDEAM. (2009a). Final document of the ecologic component within the framework of construction of the suitability map of recommended areas for Palm oil cultivation. (Original in Spanish: Documento final del Componente ecologico en el marco de la construcción del mapa de aptitud de áreas aptas para cultivo de palma de aceite en Colombia.) Bogotá: Ideam.
- IDEAM. (2009b). Introduction of environmental criteria in the identification and characterization of suitable zones for palm oil cultivation. (Original in spanish: Incorporación de criterios ambientales en la identificación y caracterización de zonas aptas para el cultivo de palma de aceite programa de apoyo al SINA II). Bogotá: Ideam.

- IDEAM. (2009c). Socioeconomic and cultural component within the framework of the construction of a suitability map of the areas for palm oil cultivation. (Original in spanish: Componente Socioeconomico y Cultural en el marco de la construccion del mapa de aptitud de areas para el cultivo de palma de aceite en Colombia). Bogota: Ideam.
- IDEAM. (2010). Water National Study (Original in Spanish: Estudio Nacional de l Agua) www.siac.gov.co/documentos/DOC_Portal/DOC_Agua/3_Estado/20120928_Estado_agua_ENA2010PrCap1y2.pdf Retrieved 12/03/11 Ideam (Ed.)
- IDEAM, & MAVDT. (2007). Annual report on the environment and renewable resources in Colombia: air quality. [Original in Spanish: Informe anual sobre el estado del medio ambiente y los recursos naturales renovables en Colombia: Calidad del aire.]. Bogota: IDEAM
- IDEAM, & MAVDT. (2011). Analysis of the impact of "La Niña" 2010-2011 within the hydroclimatology of Colombia. [Original in Spanish: Análisis del Impacto del Fenómeno "La Niña" 2010-2011 en la Hidroclimatología del País] Retrieved from: <file:///C:/Users/Carlos/Downloads/Analisis%20impacto%20La%20Ni%C3%BIa.pdf> Accessed at 24/08/2014. Bogota, Colombia.
- IEA. (2010). World Energy Outlook (pp. 736pp). Paris, France: OECD/IEA.
- IEA. (2011). Oil in Colombia in 2009 (Retrieved from: http://iea.org/stats/oildata.asp?COUNTRY_CODE=CO. accessed 21/11/12).
- IGAC. (2003). General study of soils 1:500.000 (Original in Spanish: Estudio General de suelos 1:500.000). Bogota: IGAC.
- IGAC (Cartographer). (2005). Road Infrastructure Map (Original in Spanish: Vías terrestres).
- IGAC (Cartographer). (2010). Indigenous reserves and collective titles for black communities. (Original in Spanish: Resguardos indígenas y títulos colectivos de comunidades negras).
- IGAC and CORPOICA. (2002). Cover and current use of land in Colombia (Original in spanish: Cobertura y uso actual de las tierras de Colombia).
- Infante, A. (2008). National biofuels program. An answer to the energy challenge. [Original in Spanish: El Programa Nacional De Biocombustibles. Una Respuesta al desafío Energético] retrieved from <http://www.colombiaprende.edu.co/html/directivos/1598/article-157195.html> Accessed at 6/05/14. Paper presented at the Seminario Internacional Sobre Políticas De Ciencia, Tecnología E Innovación, Bogotá.
- Infante, A., & Tobón, S. (2010). BIOENERGÍA PARA EL DESARROLLO SOSTENIBLE: Políticas Públicas sobre Biocombustibles y su relación con la seguridad alimentaria en Colombia [Original in Spanish: Bioenergy for Sustainable Development: Public policies on biofuels and their impact on food security in Colombia]: FAO.

- IPCC. (2006). Guidelines for National Greenhouse Gas Inventories - Volume 4 Agriculture, Forestry and Other Land Use. Retrieved from: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>. 21/04/11 IPCC.
- ISO. (2006). ISO 14040:2006 Environmental management –Life cycle assessment– Principles and framework. Geneva, Switzerland.
- ISRIC-WSI. (2005). Development of a soil and terrain database for Latin America and the Caribbean (SOTERLAC) Retrieved from <http://www.isric.org/projects/soter-latin-america-and-caribbean-soterlac> Accessed at 15/05/10.
- James, G. L. (2007). An Introduction to Sugarcane Sugarcane (pp. 1-19): Blackwell Publishing Ltd.
- Jatzke, H. (1994). Possibilities and limits of tax concessions for bio-fuels. *Zeitschrift für Zölle und Verbrauchsteuern*, 70(4), 104-108.
- Johnson, F. X. (2011). Regional-global Linkages in the Energy-Climate-Development Policy Nexus: The Case of Biofuels in the EU Renewable Energy Directive. *Renewable Energy L. & Pol'y Rev.*, 91.
- Johnson, F. X., & Roman, M. (2008). Biofuels sustainability criteria: relevant issues to the proposed Directive on the promotion of the use of energy from renewable sources (COM (2008) 30 final).
- Johnson, F. X., & Rosillo-Calle, F. (2007). Biomass, livelihoods and international trade. Stockholm Environment Institute Climate and Energy Report, 1.
- Jonker, J., & Faaij, A. (2013). Techno-economic assessment of micro-algae as feedstock for renewable bio-energy production. *Applied Energy*, 102, 461-475.
- Jungbluth, N., Chudacoff, M., Dauriat, A., Dinkel, F., Doka, G., Faist Emmenegger, M., Sutter, J. (2007). Life Cycle Inventories of Bioenergy. Final report. Uster, Switzerland: Swiss Centre for Life Cycle Inventories.
- Kaplinsky, R., & Morris, M. (2001). A handbook for value chain research (Vol. 113): IDRC.
- Keerthipala, A., & Thomson, K. (1999). A cane payment formula for sugarcane small-holders in Sri Lanka. *Sugar Tech*, 1(1), 1-9.
- Khan, S. R., Khan, S. A., & Yusuf, M. (2007). Biofuels trade and sustainable development: The case of Pakistan. The Sustainable Development Policy Institute (SDPI), Working document.
- Khatiawada, D., Pacini, H., & Lönnqvist, T. (2010). Tailor-made solutions: Small-scale biofuels and trade. *Bridges Trade BioRes Review*, 4(4), 10-11.
- Khatiawada, D., Seabra, J., Silveira, S., & Walter, A. (2012). Accounting greenhouse gas emissions in the lifecycle of Brazilian sugarcane bioethanol: Methodological references in European and American regulations. *Energy Policy*, 47, 384-397.

- Kuppatawuttinan, P. (1998). A model of Land Suitability Evaluation for Economic Crops in Song Kram Watershed: An Application using Satellite Data and Geographic Information System. Master of Science Thesis in Soil Science, Graduate School, Khon Kaen University.[ISBN 974-676-039-4].
- La Rotta, S. (2009, 22 julio 2009). La bacteria verde (The green bacteria), El espectador.
- Lamers, P., Hamelinck, C., Junginger, M., & Faaij, A. (2011). International bioenergy trade—A review of past developments in the liquid biofuel market. *Renewable and Sustainable Energy Reviews*, 15(6), 2655-2676.
- Lamers, P., Junginger, M., Hamelinck, C., & Faaij, A. (2012). Developments in international solid biofuel trade—An analysis of volumes, policies, and market factors. *Renewable and Sustainable Energy Reviews*, 16(5), 3176-3199.
- Larsen, B. (2004). Cost of Environmental Damage: A Socio- Economic and Environmental Health Risk Assessment (Prepared for MAVDT). Bogota, Colombia: MAVDT.
- León, T., Valbuena, S., & Borrero, M. (2006). Palm oil, biodiversity and policy trends: the Colombian Orinoco case. [Original in Spanish: Palma de aceite, biodiversidad y tendencias de política: el caso de la Orinoquia colombiana]. In W. W. Fund (Ed.). Bogotá: Instituto de Investigaciones de Recursos Biológicos Alexander Von Humboldt.
- Londoño, L. (2012). General facts of the Colombian Sugar Business Industry 2011-2012. [Original in Spanish: Aspectos Generales del Sector Azucarero Colombiano 2011 □ 2012] Retrieved from: <http://www.asocana.org/documentos/3152012-3e90e415-00ff00,000a000,878787,c3c3c3,0f0f0f,b4b4b4,ff00ff,2d2d2d,b9b9b9.pdf>. Accessed 15/09/12. Cali, Colombia.
- López, N. A. (2000). La palma de aceite: un caso exitoso de desarrollo empresarial en Colombia (In Spanish) [Palm oil: a successful case of entrepreneurship in Colombia] Retrieved from: http://portal.fedepalma.org/responsabilidad_social/palma_aceite_caso_exitoso.pdf Accessed at 17/10/11. Palmas, 21(2), 132-141.
- Lorenzo de Juárez, A. (2011). Current situation of Biofuels in Guatemala. [Original in Spanish: Situación Actual de los Biocombustibles en Guatemala] Retrieved from: www.corpoica.org.co/sitioweb/Documento/JatrophaContrataciones/GUATEMALA.pdf accessed 15/03/12. Guatemala.
- Lovera, L. (2010). Biofuel in Paraguay: Current State and perspectives. [Orinigal in Spanish: Biocombustibles en el Paraguay Situación actual y perspectivas] Retrieved from: www.olade.org/biocombustibles/Documents/Ponencias%20Chile/Sesion%207_L%20Lovera_VMME_Paraguay.pdf Paper presented at the V Seminario Latinoamericano y del Caribe de Biocombustibles, Santiago, Chile.
- Lozano, N. (2003). Air pollution in Bogotá (Colombia): A concentration Response approach. Master Thesis., University of Maryland, Maryland.

- Lozano, N. (2004). Air Pollution in Bogotá, Colombia: A Concentration-Response Approach. *Desarrollo y Sociedad*. (Development and Society) Universidad de los Andes CEDE, 133-177.
- Lu, J., Sheahan, C., & Fu, P. (2011). Metabolic engineering of algae for fourth generation biofuels production. *Energy & Environmental Science*, 4(7), 2451-2466. doi: 10.1039/C0EE00593B
- Lubis, A., & Adiwiganda, R. (1996). Agronomic management practices of oil palm plantation in Indonesia based on land conditions. Paper presented at the Seminar on Agronomic Update in Oil Palm Management, Pekanbaru, Indonesia.
- Lytse, S. (2011). Out with the old, in with the new; bidding farewell to the corn ethanol tax credit.
- Macedo, I. C. (2010). Sustainable Biofuels: recent studies on land use and climate change. Sugarcane expansion and sustainability: land use, GHG emissions and technology. Tokyo, Nov 19 2010: NIPE/UNICAMP.
- Macedo, I. C., Seabra, J. E. A., & Silva, J. E. A. R. (2008). Green house gases emissions in the production and use of ethanol from sugarcane in Brazil: The 2005/2006 averages and a prediction for 2020. *Biomass and Bioenergy*, 32(7), 582-595.
- MADR. (2005). Vegetable oil chain in Colombia. Overview of its structure and dynamics 1991-2005. [Original in Spanish: La cadena de las oleaginosas en Colombia. Una mirada global de su estructura y dinámica 1991-2005] Retrieved from: www.agronet.gov.co/www/docs_agronet/2005112162648_caracterizacion_oleaginosas.pdf Accessed 20/02/10. Bogota: Ministerio de Agricultura y Desarrollo Rural,.
- MAG-MINAE. (2008). Biofuels National Program. [Original in Spanish: Programa Nacional de Biocombustibles.] Retrieved from www.dse.go.cr/es/03Publicaciones/01PoliticaEnerg/Programa%20Nacional%20de%20Biocombustibles.pdf Accessed: 09/03/11. San José de Costa Rica.
- Mannan, R. (2009). Intellectual property landscape and patenting opportunity in biofuels. *Journal of Commercial Biotechnology*, 16(1), 33-46.
- Manson, A. (2003). Colombia's Democratic Security Agenda: Public Order in the Security Tripod. *Security Dialogue*, 34, 391-409.
- MANUELITA WEBSITE. (2010). www.manuelita.com. Retrieved 18/01/2010, 2010
- Martines-Filho, J., Burnquist, H. L., & Vian, C. E. F. (2006). Bioenergy and the rise of sugarcane-based ethanol in Brazil. *Choices*, 21(2), 91-96.

- Martinez, H. (2009). Biofuels program in Colombia (public speech). [Original in Spanish: El programa de Biocombustibles en Colombia] Retrieved from: www.olade.org/biocombustibles2009/Documents/ponencias/ponencias%20pdf/2009-04-28-Discurso%20Ministro%20Colombia.pdf. Paper presented at the IV Seminario Latinoamericano Del Caribe De Biocombustibles, Cali.
- Martinez, H., Espinal, G., & Ortiz, L. (2005). The agribusiness Chain of Panela in Colombia, an overview on its structure and dynamics. [Original in Spanish: La cadena agroindustrial de la panela en Colombia, una mirada global de su estructura y dinámica, 1991 – 2005]. Retrieved from: <http://ebookbrowse.com/2005112163343-caracterizacion-panela-pdf-d55602836> Accessed 16/10/10 (Vol. 57). Bogota, Colombia: Ministerio de Ambiente y Desarrollo Rural.
- Masera, O., Rodríguez, N., Lazcano, I., & Horta, L. (2006). Potential and feasibility of Ethanol and Biodiesel use for transportation in Mexico. [Original in Spanish: Potenciales y Viabilidad del Uso de Bioetanol y Biodiesel para el Transporte en México] Retrieved from: http://www.sener.gob.mx/res/169/Biocombustibles_en_Mexico_Resumen_Ejecutivo.pdf Accessed: 15/03/12. Mexico D.F.: GTZ.
- Mathews, J. (2007a). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35, 3550-3570.
- Mathews, J. (2007b). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35(7), 3550-3570.
- Mathews, J. (2007c). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35, 3550-3570.
- Mathews, J. (2008a). Carbon-Negative Biofuels. *Energy Policy*, 36, 940-945.
- Mathews, J. (2008b). How carbon credits could drive the emergence of renewable energies. *Energy Policy*.
- Mathews, J. (2009). From the petroeconomy to bioeconomy: integrating bioenergy production with agricultural demands. *Biofuels, bioprod. bioref*, 3, 613-632.
- Mathews, J., & Goldsztein, H. (2008). Capturing latecomer advantages in the adoption of Biofuels: The case of Argentina. *Energy Policy*. doi: 10.1016/j.enpol.2008.07.022
- Mathews, J., & Tan, H. (2009a). Biofuels and indirect land change effects: the debate continues. Society of Chemical Industry John Wiley & Sons Ltd. *Biofuels, Bioprod, Bioref*. doi: 10.1002/bbb.147
- Mathews, J., & Tan, H. (2009b). Biofuels and indirect land use change effects: the debate continues. *Biofuels, Bioproducts and Biorefining*, 3(3), 305-317.
- Mathews, J. A. (2008). Biofuels, climate change and industrial development: can the tropical South build 2000 refineries in the next decade? *Biofuels, Bioproducts and Biorefining*, 2, 103-125. doi: 10.1002/bbb.63

- McBratney, A., Whelan, B., Ancev, T., & Bouma, J. (2005). Future directions of precision agriculture. *Precision Agriculture*, 6(1), 7-23.
- ME-BID. (2008). Pre-feasability studies of Ethanol production by use of sugar cane. [Original in spanish: Estudios de pre-factibilidad de la producción de etanol utilizando caña de azúcar.] Retrieved from : <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35237968>. accessed 04/09/12. San Salvador.
- Mejía, D., & Posada, C. E. (2008). Cocaine Production and Trafficking: What Do We Know? World Bank Policy Research Working Paper 4618.
- MEN. (2008). Support to research in Biofuels [Original in Spanish: Apoyo a la investigación en biocombustibles] Retrieved from: <http://www.mineducacion.gov.co/cvn/1665/article-152017.html> Accessed at: 05/01/14. Boletín digital.
- Meneses, K., & Valenciano, J. (2007). Fuel alternative sources in Costa Rica: General overview of the molasses-based ethanol and palm oil-based biosieles chains. [Original in Spanish: Fuentes alternativas de combustibles en Costa Rica: Una visión general de las cadenas de etanol a base de melaza, y de biodiésel a base de aceite de palma.] Retrieved from: http://biblioteca.icap.ac.cr/rcap/52_53/karla_meneses.pdf. Accessed 13/07/12. Revista Centroamericana de Administración Pública, 52-53, 97-140.
- Mesa-Dishington, J. (2007). Palm oil biodiesel, a fact in Colombia [Original in Spanish: Biodiésel de Palma, una Realidad en Colombia] Retrieved from: http://portal.fedepalma.org//documen/2007/Presentacion_Fedepalma.pdf. Paper presented at the Biofuels Americas Conference & Expo III, Cartagena, Colombia.
- Mesa Dishington, J. (2010). Reality and perspectives of the palm oil agroindustry. [Original in Spanish: Realidad y perspectivas de la agroindustria de la palma de aceite.] Retrieved from: http://www.indepaz.org.co/blogs/palma/wp-content/uploads/2012/09/municipios_palmeros.pdf. Accessed at 04/05/14. Paper presented at the PRIMER ENCUENTRO DE MUNICIPIOS PALMEROS, Bogotá.
- Metzger, M., Rounsevell, M., Acosta-Michlik, L., Leemans, R., & Schröter, D. (2006). The vulnerability of ecosystem services to land use change. *Agriculture, ecosystems & environment*, 114(1), 69-85.
- MIDAS. (2010). De Las Alianzas Productivas a los Negocios Inclusivos: Guía de Mejores Prácticas para la implementación de Negocios Inclusivos en palma de aceite [Original in Spanish: From productive alliances to inclusive business: Guide for Better practices for Inclusive Business implmentation in the palm oil sector] Retrieved from: http://www.mapeo-rse.info/sites/default/files/De_las_alianzas_productivas_a_los.pdf Accessed at 05/07/10 Fedepalma (Ed.)
- Mielke, I. (2008). Oil World Annual 2008. Hamburg: ISTA Mielke GmbH.

- Miller, A. S., Mintzer, I. M., & Hoagland, S. H. (1986). *Growing power: Bioenergy for Development and Industry*: World Resources Institute.
- Ministerio de Agricultura. (2007). Oportunidades para la Equidad Rural: Alianzas productivas. [Original in Spanish: Opportunities to reach rural equity: Productive Alliances] Retrieved from: http://www.minagricultura.gov.co/02componentes/08rur_04alianzas.aspx Accessed at 05/07/10.
- Ministerio de Agricultura. (2011). Proyecto Apoyo alianzas productivas: Firma protocolaria de Alianzas Productivas en zonas emblemáticas del país [Original in Spanish: Support to Productive Alliances: Protocolary signature of Productive Alliances in emblematic regions across the nation] Retrieved from: http://www.minagricultura.gov.co/archivos/presentacion_alianzas_productivas.pdf Accessed at 05/02/12. Bogota.
- Ministerio de Energía de Chile. (2012). Biofuel National Directory [Original in Spanish: Directorio Nacional de Biocombustibles] Retrieved from: <http://biocombustible.minenergia.cl/dhtml/cne/paginas/index.php>. Retrieved 12/01/13, 2013
- Ministerio de Energía y Minas. (2007). Current situation and perspectives of biofuels industry in Peru. [Original in Spanish: Situación Actual y Perspectivas de los Biocombustibles en el Perú] Retrieved from: http://www.comunidadandina.org/desarrollo/biocombustibles_peru.pdf Accessed: 02/11/11.
- Ministerio de Minas. (2005). Regulation on the law of promotion of biofuels market. [Original in Spanish: Reglamento de la ley de promoción del mercado de biocombustibles] Retrieved from: www.minem.gob.pe/minem/archivos/file/Hidrocarburos/normas_legales/ds013-2005.pdf Accessed: 02/03/10. Lima. Peru.
- Resolution I81232 of 2008 [Original in Spanish: RESOLUCION I81232 DE 2008] Retrieved from: faolex.fao.org/docs/texts/col83372.doc Accessed at 15/12/13 (2008).
- Ministry of Housing, & environment, S. p. a. t. (2000). Eco-indicator 99 - Manual for designers. A damage oriented method for Life Cycle Impact Assessment. Retrieved from http://www.pre-sustainability.com/download/manuals/EI99_Manual.pdf accessed at 14/03/11. The Netherlands.
- Mirón, d. (2010). Ethanol biofuel in Guatemala. [Original in Spanish: El biocombustible etanol en Guatemala] Retrieved from: www.oas.org/dsd/Energy/Documents/SimposioG/1%20Panel%20I%20Etanol.pdf Accessed 15/03/12.

- Mondragón, H. (2007). The sugarcane industry in Colombia. Retrieved from <http://base.dph-h.info/en/fiches/dph/fiche-dph-7797.html> Accessed at 09/07/10.
- Monsalve Gil, J. F., Medina de Pérez, V. I., & Ruiz Colorado, Á. A. (2006). Ethano production of Banana shell and cassava starch. [Original in spanish: Producción de etanol a partir de la cáscara de banano y de almidón de yuca] Retrieved from: <http://www.bdigital.unal.edu.co/10960/1/johnfredymonsalvegil.2006.pdf> accessed 23/05%14. Dyna, 73(150), 21-27.
- Moor, G., & Wynne, A. (2001). Economic maximisation of grower and miller sugar cane profits: optimising the length of milling season at South African sugar factories. Paper presented at the International Society of Sugar Cane Technologists. Proceedings of the XXIV Congress, Brisbane, Australia, 17-21 September 2001. Volume I.
- Morton, O. (2008). Eating the sun. How plants power the planet: Harper.
- Mosquera Montoya, M., Bernal Hernández, P., & Silva Carreño, Á. (2009). Agenda Prospectiva de Investigación y desarrollo Tecnológico de la Oleína Roja [Original in Spanish: "Research and Technological Foresight Agenda for red palm oil"] Retrieved from: http://www.agronet.gov.co/www/docs_agronet/2009424I03533_OLEINA.pdf accessed at 20/06/2011. Bogotá, D.C.: MADR, Universidad Nacional de Colombia, Cenipalma, Fedepalma.
- Mutert, E. (1999). Suitability of Soils for Oil Palm in Southeast Asia. Better Crops International, 13(1), 30-38.
- Netafim. (2011a). Crop Growth Phases http://www.sugarcane crops.com/crop_growth_phases/.
- Netafim. (2011b). Favourable climate conditions for sugarcane production (Original in portuguese: Clima favorável à produção de cana-de-açúcar) Retrieved from <http://www.sugarcane crops.com/p/climate/> Accesseed 12/04/12. Retrieved 05/06/10, 2011
- Neumann, K., Verburg, P. H., Stehfest, E., & Müller, C. (2010). The yield gap of global grain production: A spatial analysis. Agricultural Systems, 103(5), 316-326.
- Nicolella, A. C., & Belluzzo, W. (2011). Impact of reducing the pre harvest burning of sugarcane area on respiratory health in Brazil. Paper presented at the Anais do XXXVIII Encontro Nacional de Economia [Proceedings of the 38th Brazilian Economics Meeting].
- Norman, R., Cairncross, E., Witi, J., Bradshaw, D., & Collaboration, S. A. C. R. A. (2007). Estimating the burden of disease attributable to urban outdoor air pollution in South Africa in 2000. South African Medical Journal, 97(8), 782-790.
- Northoff, E. (2005). Cattle ranching is encroaching on forests in Latin America. Retrieved from: <http://www.fao.org/newsroom/en/news/2005/102924/index.html> Accessed at: 19/12/13. FAONewsroom.

- O'Brien, P.J. (1997). Global Processes and the Politics of Sustainable Development in Colombia and Costa Rica. In R. Auty & K. Brown (Eds.), *Approaches to Sustainable Development*: Pinter.
- Ogunkunle, A. O. (1993). Soil in land suitability evaluation: an example with oil palm in Nigeria. *Soil Use and Management*, 9(1), 35-39. doi: 10.1111/j.1475-2743.1993.tb00925.x
- Ojima, D., Galvin, K., & Turner, B. (1994). The global impact of land-use change. *BioScience*, 300-304.
- Omer, A. M. (2008). Energy, environment and sustainable development. *Renewable and Sustainable Energy Reviews*, 12(9), 2265-2300.
- Ortega, G., Cárdenas, C., Recalde, P., & Cazco, P. (2007). Biofuels. [Original in Spanish: Biocombustibles] Retrieved from: www.comunidadandina.org/desarrollo/biocombustibles_ecuador.pdf Accessed 12/03/11. Quito.
- Ospina, M. (Producer). (2008). Fluvial transport in colombia (Original in Spanish: La navegacion fluvial en Colombia) Retrieved from: www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=9&ved=0CFMQFjAI&url=http%3A%2F%2Fwww.oas.org%2Fcip%2Fdocs%2Fareas_tecnicas%2FI1_des_puert_fluv_y_lacustres%2FI0_la_nav_fluv_colombia.ppt&ei=0QLBUImyFoHO9QTctYGoAQ&usq=AFQjCNFmLJD0tvovQNXWPP9NIvMxI7HfIg&cad=rja Accessed 02/06/2011.
- Oxford Analytica. (2007, 02/02/2007). Bush Outlines '20 In 10' Energy Plan. *Forbes.com*.
- Paiboonsak, S., Chanket, U., Yommaraka, B., & Mongkolsawat, C. (2004). Land Suitability Evaluation For Sugarcane: GIS Application Centre of Geo-informatics, Northeast Thailand. Khon Kaen Province.
- Parques Nacionales Naturales de Colombia. (2011). What is the national system of protected areas? (Original in Spanish: ¿Qué es el Sistema Nacional de Áreas Protegidas?) Retrieved from: www.parquesnacionales.gov.co/PNN/portel/libreria/php/decide.php?patron=01.11 Accessed at 24/09/11. Bogota: MinAmbiente.
- Patiño, C. (2010). Microalgae, another option to produce biofuels [Original in Spanish: Microalgas, otra opción para producir biocombustible] Retrieved from: www.unperiodico.unal.edu.co/dper/article/microalgas-otra-opcion-para-producir-biocombustible.html Accessed: 23/02/11, UN Periodico.
- Perez, M. (2007). International trade and environment in Colombia: review from Ecology economics [Original in Spanish: Comercio internacional y medio ambiente en Colombia: mirada desde la economía ecológica]. Cali, Colombia: Universidad del Valle.

- Perez, M., Rojas, J., & Ordoñez, C. (2010). Sustainable development, principles, applications and policy guidelines for Colombia. [Original in Spanish: Desarrollo Sostenible, principios, aplicaciones y lineamientos de política para Colombia]. Cali, Colombia.: Universidad del Valle.
- Pérez, M., Rojas, J., & Ordoñez, C. (2010). Sustainable development: Principles, applications and policy guidelines for Colombia [In Spanish: Desarrollo sostenible: principios, aplicaciones y lineamientos de política para Colombia] (1st ed.). Cali, Colombia: Universidad del Valle.
- Pfister, S., Koehler, A., & Hellweg, S. (2009). Assessing the environmental impacts of freshwater consumption in LCA. *Environmental Science & Technology*, 43(11), 4098-4104.
- Pimentel, D. (2003). Ethanol Fuels: Energy Balance, Economics, and Environmental Impacts Are Negative. *Natural Resources Research*, 12(2), 127-134. doi: 10.1023/a:1024214812527
- Pinzon, L. (2009). Colombian Sugar Market Outlook. Retrieved from www.thebioenergysite.com/articles/contents/colombia.pdf Accessed at 23/10/11 GAIN Report Number: CO9012: USDA.
- Piñeros, Y., Rincón, L., Bourdon, A., & Velásquez, M. (2009). Assessing ethanol production from palm wastes pretreated with NaOCl, using hydrolysis and fermentation simultaneously. [Original in Spanish: Evaluación de la producción de etanol a partir de residuos de palma pretratados con NaOCl, mediante hidrólisis y fermentación simultáneas] Retrieved from: www.smbb.com.mx/congresos%20smbb/acapulco09/TRABAJOS/AREA_IX/CIX-14.pdf Accessed: 25/04/2014. Paper presented at the XIII Congreso Nacional de Biotecnología y Bioingeniería. VII Simposio Internacional de Producción de Alcoholes y Levaduras.
- Prada Owen, T. (2004). Welfare Analysis of the implementation of the Sugar Price Stabilization Fund in Colombia. [Original in Spanish: Análisis del efecto en el bienestar de la incorporación del fondo de estabilización de precios del azúcar en Colombia.] Retrieved from: <http://fen.uahurtado.cl/wp-content/uploads/2010/07/inv158.pdf> Accessed : 16/12/13. Santiago, Chile.
- Prada, T. (2004). Analysis in the welfare effect through the incorporation of the Sugar Price Stabilization Fund in Colombia [Original in Spanish: Análisis del efecto en el bienestar de la incorporación del fondo de estabilización de precios del azúcar en Colombia] Retrieved from: <http://fen.uahurtado.cl/wp-content/uploads/2010/07/inv158.pdf> Accessed 13/08/09. Georgetown University, Georgetown.
- PRé Consultant. (2010). SimaPro 7.2.3 LCA software. Amersfoort, Netherlands.

- PROEXPORT. (2012). Biofuels sector in colombia. [Original in Spanish: Sector de biocombustibles en Colombia] Retrieved from: http://www.inviertaencolombia.com.co/images/Perfil_Biocombustibles_2012.pdf. accessed at 15/12/13. Bogota.
- PROEXPORT. (2013). Investment in the Biofuel sector in Colombia [Original in Spanish: Inversión en el sector de Biocombustibles en Colombia] Retrieved from: <http://www.inviertaencolombia.com.co/sectores/agroindustria/biocombustibles.html> Accessed at 03/01/14.
- Publicaciones Semana. (2010). Ethanol plants sink [Original in Spanish: Plantas de etanol 'hacen agua'] Retrieved from: <http://www.dinero.com/edicion-impresa/investigacion/articulo/plantas-etanol-hacen-agua/104313> Accessed at: 15/05/14, Dinero.
- Ramírez-Villegas, J., Salazar, M., Jarvis, A., & Navarro-Racines, C. E. (2012). A way forward on adaptation to climate change in Colombian agriculture: perspectives towards 2050. *Climatic Change*, 115(3-4), 611-628.
- Ramírez Triana, C. A. (2010). Biocombustibles: seguridad energética y sostenibilidad. Conceptualización académica e implementación en Colombia [Biofuels: energy security and sustainability: Academic discussion and its implementation in Colombia]. *Punto de Vista*, 2, 43-79.
- Ramírez Triana, C. A. (2011). Energetics of Brazilian ethanol: Comparison between assessment approaches. *Energy Policy*, 39(8), 4605-4613.
- Ravindranath, N., Balachandra, P., Dasappa, S., & Usha Rao, K. (2006). Bioenergy technologies for carbon abatement. *Biomass and Bioenergy*, 30(10), 826-837.
- REDAIRE. (2003). Atmospheric emissions for Bucaramanga [Original in Spanish: Emisiones atmosféricas para Bucaramanga]. Retrieved from www.cdmb.gov.co/monitoreo.redaire.php.
- Rojas R, J. C. (2008). Colombian Plan for Research, development and innovation of Biofuel sector. [Original in Spanish: Plan Colombiano de Investigación, Desarrollo e Innovación en Biocombustibles] Retrieved from [www.corpoica.org.co/sitioweb/Documento/Jatropha Contrataciones/JCARLOSROJAS.pdf](http://www.corpoica.org.co/sitioweb/Documento/Jatropha_Contrataciones/JCARLOSROJAS.pdf) Accessed at 05/01/14. Paper presented at the Biocombustibles Colombia 2008, Bogota.
- Romero, M., Cabrera, E., & Ortiz, N. (2008). Report on the Biodiversity status in Colombia 2006-2007. [Original in Spanish: Informe sobre el estado de la Biodiversidad en Colombia 2006-2007.] Retrieved from www.humboldt.org.co/download/Informe_Nacional_biodiversidad_I.pdf. Bogota.: IIAvH.

- Romijn, H. A. (2011). Land clearing and greenhouse gas emissions from Jatropha biofuels on African Miombo Woodlands. *Energy Policy*, 39(10), 5751-5762.
- Rost, S., Gerten, D., Hoff, H., Lucht, W., Falkenmark, M., & Rockström, J. (2009). Global potential to increase crop production through water management in rainfed agriculture. *Environmental Research Letters*, 4(4), 044002.
- Rothkopf, G. (2007). A Blueprint for Green Energy in the Americas. Strategic Analysis of Opportunities for Brazil and the Hemisphere: IDB.
- Rutz, D., Janssen, R., Anton, H., Helm, P., Rogat, J., Hodes, K., & et al. (2008). Biofuels assesment on technical opportunities and research needs for Latin America: BioTop. Biofuels RTD-cooperation Latin America-Europe.
- Rutz, D., Thebaud, A., Janssen, R., Segura, S., Riegelhaupt, E., Ballesteros, M., Coelho, S. (2009). Biofuel Policies and Legislation in Latin America, BioTop Project. Seventh Framework Programme, European Commission.
- Ryan, D. (2006). Cuban Oil And Ethanol Could Prosper In Havana's Hunt For Energy Supplies. Retrieved from <http://www.coha.org/cuban-oil-and-ethanol-could-prosper-in-havana%E2%80%99s-hunt-for-energy-supplies/> Accessed 2010/12/15.
- SAGARPA. (2008). Law of Promotion and development of Bioenergy products. [Originao in Spanish: Ley de Promoción y Desarrollo de los Bioenergéticos.] Retrieved from <http://www.bioenergeticos.gob.mx/index.php/programas/marco-legal.html> accessed: 15/06/2011. Ciudad de México.
- Saikkonen, L., Lankoski, J., & Ollikainen, M. (2012). Biofuels from alternative feedstocks under fiscal fuel taxation and actual EU biofuel policy or optimal emission taxes: The case of palm and rapeseed based renewable diesels from Finland's perspective when global greenhouse gas emissions are accounted for.
- Sánchez, L., & Cochrane, T. (1985). General description of the ecosystem, landscape soils and climate of the Eastern flatlands in Colombia [Original in Spanish: Descripción general del ecosistema, paisajes, suelos y clima de los Llanos Orientales de Colombia]. Bogota: CIAT (International Center for Tropical Agriculture).
- Schuck, S. (2006). Biomass as an energy source. *International journal of environmental studies*, 63(6), 823-835.
- Schuck, S. (2007). What Now and What Next for Global Biofuel Technologies? *BIOFUELS, ENERGY AND AGRICULTURE*, 14.
- Searchinger, T., Heimlich, R., Houghton, R. A., Dong, F., Elobeid, A., Fabiosa, J., Yu, T.-H. (2008). Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change. *Science*, 319(5867), 1238-1240. doi: 10.1126/science.1151861

- Secretaría de Energía. (2009). Guidelines for the Law of promotion and development of Bioenergy products. [Original in Spanish: Reglamento de la ley de promoción y desarrollo de los bioenergéticos] Retrieved from: <http://www.bioenergeticos.gob.mx/descargas/Reglamento-de-la-Ley-de-Bioenergeticos.pdf> Accessed 13/06/12. Ciudad de México.
- Secretaría de Nacional de Energía. (2012). Law of Biofuels. [Original in Spanish: Ley de biocombustibles] Retrieved from: <http://www.energia.gob.pa/Biocombustibles.html> Accessed: 15/06/12. Panama.
- Senado de Chile. (2007). Bulletin 4873. [Original in Spanish: Boletín N° 4.873-08] Retrieved from: http://www.bcn.cl/actualidad_legislativa/temas_portada.2007-01-29.7882319251/boletin_4873_actualidad.pdf. Accessed 23/06/11. Santiago.
- Senado de Uruguay. (2002). Law 17.567 alternative, renewable and substitute fuels of oil origin made out of national feedstock of animal or vegetal origin. [Original in Spanish: Ley 17.567 Combustibles alternativos, renovables y sustitutivos de los derivados del petróleo elaborados con materia prima nacional de origen animal o vegetal] Retrieved from: [www.ursea.gub.uy/web/mnnormativo2.nsf/98FFB2517A61DBA0832579090068A320/\\$file/Ley%20N%C2%BA%2017567.pdf?OpenElement](http://www.ursea.gub.uy/web/mnnormativo2.nsf/98FFB2517A61DBA0832579090068A320/$file/Ley%20N%C2%BA%2017567.pdf?OpenElement) Accessed: 15/16/12. Asunción.
- Senado de Uruguay. (2007). Law 18.195 Agrofuels. Promotion and standarization of production, comercialization and use. [Original in Spanish: Agrocombustibles:Fomento y regularizacion de su producción, comercilización y utilización] Retrieved from: <http://www0.parlamento.gub.uy/leyes/AccesoTextoLey.asp?Ley=18195&Anchor=> Accessed: 15/16/12. Asunción.
- Sheridan, M. (2006). California crude oil production and imports. California, USA: Fossil Fuels Office - Fuels and Transportation Division - California Energy Commission.
- SHL. (2010). Technical Parameter Model Agrammon (Original in german: Technische Parameter Modell Agrammon) Retrieved from: agrammon.ch/assets/Downloads/Technische_Parameter_Modell_Agrammon_20100309.pdf Accessed 12/04/11. Bern, Switzerland: Swiss College of Agriculture (SHL).
- Singh, M. (2006). Economics of biofuels for the transport sector in South Africa. *Energy for Sustainable Development*, 10(2), 40-47.
doi: [http://dx.doi.org/10.1016/S0973-0826\(08\)60530-X](http://dx.doi.org/10.1016/S0973-0826(08)60530-X)
- Slaughter, J. C., Kim, E., Sheppard, L., Sullivan, J. H., Larson, T. V., & Claiborn, C. (2004). Association between particulate matter and emergency room visits, hospital admissions and mortality in Spokane, Washington. *Journal of Exposure Science and Environmental Epidemiology*, 15(2), 153-159.

- Smeets, E. (2008). Possibilities and limitations for sustainable bioenergy production systems. (PhD Thesis), Utrecht University.
- Smeets, E., Junginger, M., Faaij, A., Walter, A., & Dolzan, P. (2006). Sustainability of Brazilian bio-ethanol (Vol. NWS-E-2006-110). Utrecht, The Netherlands: Copernicus Institute—Department of Science, Technology and Society.
- Smil, V. (2002). Worldwide transformation of diets, burdens of meat production and opportunities for novel food proteins. *Enzyme and Microbial Technology*, 30(3), 305-311.
- Smith, J. P., Lawn, R. J., & Nable, R. O. (1999). Investigations into the root:shoot relationship of sugarcane, and some implications for crop productivity in the presence of sub-optimal soil conditions. Paper presented at the Australian Society of Sugar Cane Technologists.
- Smith, K. R., Uma, R., Kishore, V., Zhang, J., Joshi, V., & Khalil, M. (2000). Greenhouse implications of household stoves: an analysis for India. *Annual Review of Energy and the Environment*, 25(1), 741-763.
- Solomon, S., Qin, M., Manning, Z., Chen, M., Marquis, K. B., & Averyt, M. (2007). *Climate Change 2007: The Physical Science Basis*. Retrieved from: www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wgI_report_the_physical_science_basis.htm Accessed 30/06/11. United Kingdom and New York, NY, USA: IPCC.
- Stehfest, E., Bouwman, L., van Vuuren, D. P., den Elzen, M. G., Eickhout, B., & Kabat, P. (2009). Climate benefits of changing diet. *Climatic Change*, 95(1-2), 83-102.
- Stern, N. H., Peters, S., Bakhshi, V., Bowen, A., Cameron, C., Catovsky, S., Dietz, S. (2007). *Stern Review: The economics of climate change*. Retrieved from: http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/sternreview_index.htm Accessed: 03/07/11 (Vol. 30): HM treasury London.
- Subía Loayza , E. C., & Cueva Moya, J. J. (2005). Carbon fixation in two agricultural systems of the humid tropical region of Costa Rica (original in Spanish: Fijación de carbono en dos sistemas agrícolas del trópico húmedo de Costa Rica). (Agronomical Engineering), Universidad Earth, Guacimo, Costa Rica.
- sugarcane.org. (2014). Brazilian experience <http://sugarcane.org/sugarcane-products/ethanol>.
- Sumathi, S., Chai, S., & Mohamed, A. (2008). Utilization of oil palm as a source of renewable energy in Malaysia. *Renewable and Sustainable Energy Reviews*, 12(9), 2404-2421.
- Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. *Nature*, 418(6898), 671-677.
- Toasa, J. (2009). Colombia: A New Ethanol Producer on the Rise? In WRS-0901 (Ed.): Economic Research Service USDA.

- Tokgoz, S., & Elobeid, A. (2006). Policy and competitiveness of US and Brazilian ethanol. *Iowa Ag Review*, 12(2), 6-7.
- Trenberth, K. E. (2012). Framing the way to relate climate extremes to climate change. *Climatic Change*, 115(2), 283-290.
- Trindade, S. (2005). Global Biofuels Trade. Paper presented at the XV International Symposium on Alcohol Fuels - ISAF "Alcohol Fuels' role in sustainable transportation", San Diego, California, USA.
- Trindade, S. C. (2010). Nanotech Biofuels and Fuel Additives <http://cdn.intechweb.org/pdfs/17478.pdf> Accessed 27/08/2013.
- Trindade, S. C., Cocchi, M., Onibon, A., & Grassi, G. (2012). BIOFUELS TECHNOLOGY CHANGE MANAGEMENT AND IMPLEMENTATION STRATEGIES. Bioenergy for Sustainable Development and International Competitiveness: The Role of Sugar Cane in Africa, 369.
- Tyner, W. E. (2008). The global impacts of US and EU biofuels policies. Sugarcane ethanol, 181.
- U.S. Congress. (2006). Biomass research and Development Act of 2000. Retrieved from http://www.usbiomassboard.gov/pdfs/biomass_rd_act_2000.pdf Accessed 25/05/10: U.S. Congress.
- U.S. Congress. (2005). Public Law 109-58. Energy policy act. Retrieved from <http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf> Accessed 26/02/12. Whashington. D.C.
- UN-Energy. (2007). Sustainable Bioenergy: A Framework for Decision Makers: UN.
- UN. (2012). Millennium Development Goals indicators: Carbon dioxide emissions (CO₂), thousand metric tons of CO₂ (CDIAC). Retrieved from <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749> Accessed 19/03/11
- UNEP. Biofuels Working Group, & Management, U. N. E. P. I. P. f. S. R. (2009). Towards sustainable production and use of resources: assessing biofuels: UNEP.
- UNFCCC. (2013). Greenhouse Gas Inventory Data. Retrieved from: http://unfccc.int/ghg_data/items/3800.php Accessed at: 13/12/13.
- UNODC. (2007). Illicit crops report Colombia. [Original in Spanish: Informe de cultivos ilícitos Colombia]. Bogota DC: Programa SIMCI de la UNODC.
- UNPD. (2014). Sustainable Energy (Retrieved from www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/sustainable-energy/) Accessed 01/04/2014.
- UPME. (2008). Energy demand forecast for the transportation sector. [Original in Spanish: Proyección de demanda de energía para el sector transporte]. Bogota, Colombia.

- UPME. (2009). Reference expansion plan Generation-Transmission 2010-2024. (Original in spanish: Plan de Expansión de Referencia Generación – Transmisión 2010-2024) Retrieved from http://www.upme.gov.co/Docs/Plan_Expansion/2010/Plan_Expansion_2010-2024_Preliminar_DEF3.pdf Accessed at 23/05/10. Bogotá, Colombia.
- USCO. (2012). Biofuel production does not pose a threat to food security, according to Fedebiocombustibles [Original in Spanish: La producción de biocombustibles aún no afecta la seguridad alimentaria en Colombia, según Fedebiocombustibles] Retrieved from <http://ingenieria.usco.edu.co/formacion/component/content/article/286-la-produccion-de-biocombustibles-an-no-afecta-la-seguridad-alimentaria-en-colombia-segn-fedebiocombustibles-wadfrfj> Accessed at: 05/01/14. Faculty of engineering, Universidad Surcolombiana.
- USGS. (2012). GTOPO30 30 Arc Second elevation data (1976 Version). Retrieved from http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info Accessed 12/02/12.
- van Dam, J., Junginger, M., & Faaij, A. P. (2010). From the global efforts on certification of bioenergy towards an integrated approach based on sustainable land use planning. *Renewable and Sustainable Energy Reviews*, 14(9), 2445-2472.
- Van Den Wall Bake, J., Junginger, M., Faaij, A., Poot, T., & Walter, A. (2009). Explaining the experience curve: Cost reductions of Brazilian ethanol from sugarcane. *Biomass and Bioenergy*, 33(4), 644-658.
- Vargas, R. (2010). Alternative development in Colombia and Social engagement: Proposals towards a change of strategy. [Original in Spanish: Desarrollo Alternativo en Colombia y Participación Social: propuestas hacia un cambio de estrategia.]. Bogotá, Colombia: Diálogo Inter-Agencial en Colombia.
- Verdonk, M., Dieperink, C., & Faaij, A. (2007). Governance of the emerging bio-energy markets. *Energy Policy*, 35(7), 3909-3924.
- Vergara, W. (2010). Extensive ranching and the agricultural problem. Challenge for a sustainable rural development for Colombia. [Original in spanish: La ganadería extensiva y el problema agrario. El reto de un modelo de desarrollo rural sustentable para Colombia] Retrieved from: <http://revistas.lasalle.edu.co/index.php/ca/article/view/350> Accessed 19/12/13. *Ciencia Animal*, 3, 45-53.
- Vlek, P. L. G., Denich, M., Martius, C., Rodgers, C., & Giesen, N. v. d. (2005). The potential of oil palm and forest plantations for carbon sequestration on degraded land in Indonesia. *Ecology and Development Series*, 28.
- Von Braun, J., & Pachauri, R. (2006). The promises and challenges of biofuels for the poor in developing countries: Intl Food Policy Res Inst.

- WB. (2007). *Environmental Priorities and Poverty Reduction: A Country Environmental Analysis for Colombia* (Directions in Development). Washington: World Bank.
- WCED. (1987). *Our Common Future: A report to the World Commission on Environmental and Development of the United Nations* Oxford University Press.
- Wicke, B., Sikkema, R., Dornburg, V., & Faaij, A. (2011). Exploring land use changes and the role of palm oil production in Indonesia and Malaysia. *Land Use Policy*, 28(1), 193-206.
- Wicke, B., Verweij, P., van Meijl, H., van Vuuren, D. P., & Faaij, A. P. (2012). Indirect land use change: review of existing models and strategies for mitigation. *Biofuels*, 3(1), 87-100.
- Wilhelm, W. W., Johnson, J. M., Karlen, D. L., & Lightle, D. T. (2007). Corn stover to sustain soil organic carbon further constrains biomass supply. *Agronomy journal*, 99(6), 1665-1667.
- Wirsenius, S. (2003). Efficiencies and biomass appropriation of food commodities on global and regional levels. *Agricultural Systems*, 77(3), 219-255.
- Wood, B. J., & Corley, R. H. V. (1991). The energy Balances of oil palm cultivation. . Paper presented at the PORIN International palm oil Conference, Kuala Lumpur, Malaysia.
- Worldwatch Institute. (2006). *Biofuels for transportation: Global potential and implications for sustainable agriculture and energy in the 21st century* (Extended summary) Washington D.C.: Worldwatch Institute.
- XM expertos (Ed.). (2010). *Neon Database. Colombia*. Retrieved from: <http://sv04.xm.com.co/neonweb/> accessed 12/12/11.
- Yáñez Angarita, E. E., Silva Lora, E. E., da Costa, R. E., & Torres, E. A. (2009). The energy balance in the palm oil-derived methyl ester (PME) life cycle for the cases in Brazil and Colombia. *Renewable Energy*, 34(12), 2905-2913.
- Yáñez, E. Y., Castillo, E. F., & Silva, E. (2011). Cogeneration in palm processing plants: An alternative for increasing competitiveness and reducing environmental impact. (Original in Spanish: Cogeneración en plantas de beneficio: Una alternativa para el incremento en la competitividad y reducción del impacto ambiental) Retrieved from: <http://galeon.com/separacionfrutos/cogeneracion.pdf> accessed 15/09/12: Cenipalma. UIS UIS-CEIAM. UNIFEI-NEST.
- Zah, R., Böni, H., Gauch, M., Hischier, R., Lehmann, M., & Wäger, P. (2007). *Life Cycle Assessment of Energy Products: Environmental Assessment of Biofuels*. Bern, Switzerland: Federal Office for Energy (BFE), the Federal Office for the Environment (BFE) and the Federal Office for Agriculture (BLW).
- Zúñiga, O., Osorio, J., & Cuero, R. (2009). Alternatives in the sustainable managing of soils: a analytical and synthetic approach. [Original in Spanish: Alternativas en el manejo sostenible de los suelos un enfoque analítico y sintético]. Cali, Colombia: Universidad del Valle.

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Production of biofuels for transport in Colombia: An assessment through sustainability tools

Ramírez Triana, Carlos Ariel

TÓPICOS		EVALUACIÓN	
		Par 1	Par 2
Aporte al conocimiento: Contribución al desarrollo de la teoría/al conocimiento de la realidad, originalidad en las ideas/ desarrollo de una nueva metodología.		9	9
Interés y/o actualidad del artículo		9	10
Calidad Marco Teórico:	Revisión de literatura fundamental, actualizada y articulada para el logro de los objetivos	9	9
	El marco desarrollado permite su operacionalización en la metodología		
Rigor metodológico:	Claridad sobre cómo se llega a los resultados(fuentes, obtención, procesamiento de la información) obtenidos	8	9
	Si es cuantitativo el artículo: representatividad, confiabilidad y validez de los datos		
	Si es cualitativo: claridad del marco interpretativo, sustentación de planteamientos y conclusiones		
Nivel analítico: Profundidad en la reflexión, argumentación/sustentación de los planteamientos hechos en la reflexión sobre los resultados que dialoga con la teoría, el marco analítico y los objetivos		9	9
Coherencia: Correspondencia y articulación entre el título, problema, objetivo, marco teórico, metodológico y conclusiones		8	9
Estilo: Claridad y sencillez, fluidez y agilidad en el desarrollo del texto; adecuado uso de apoyos didácticos (ejemplos, gráficas, cuadros, etc.)		8	8
Resultado parcial		8,6	9,0
RESULTADO TOTAL		8,8	

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