

# Summary of Updates in GREET1\_2012 (Revision 2)

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This release of GREET1\_2012 model includes the following updates:

- Added Hydrothermal Liquefaction (HTL) of algae to the Algae Process Description (APD) and the GREET model (Reference: Frank E. D., Elgowainy A., Han J., Wang Z. “Life cycle comparison of hydrothermal liquefaction and lipid extraction pathways to renewable diesel from algae.” Mitigation and Adaptation Strategies for Global Change, 2012. doi: 10.1007/s11027-012-9395-1)
- Added wastewater sludge-based renewable natural gas pathways in the GREET model. (Reference: TBA)
- Updated sugarcane ethanol pathways on the basis of recent studies (Reference: Jeongwoo Han, Jennifer B. Dunn, Hao Cai, Amgad Elgowainy and Michael Q. Wang, 2012, Updated Sugarcane Parameters in GREET1\_2012, Second Revision. Available at: <http://greet.es.anl.gov/publication-greet-updated-sugarcane>; Wang, M.Q., Han, J., Dunn, J.B., Cai, H., Elgowainy, A., 2012. Well-to-Wheels Energy Use and Greenhouse Gas Emissions of Ethanol from Corn, Sugarcane, and Cellulosic Biomass for U.S. Use. Environmental Research Letters 7 (4), 0459050. doi:10.1088/1748-9326/7/4/045905)
- Replaced farmed trees farming with willow and poplar farming (Reference: Wang, Z., Dunn, J.B., Wang, M.Q., 2012. “GREET Model Short Rotation Woody Crops (SRWC) Parameter Development”, Argonne National Laboratory. Available at <http://greet.es.anl.gov/publication-greet-SRWC-Development>)
- Updated electricity generation mixes, shale gas shares and oil sand shares on the basis of AEO 2013 Early Release (Reference: EIA “Annual Energy Outlook 2013 Early Release.” U.S. Department of Energy. Report Number: DOE/EIA-0383ER, 2013)
- Added navigation menus to enhance the user experience.
- Added energy functional units to the “Results” worksheet.
- Adjusted lipid and moisture contents of oil seeds (e.g. palm, rapeseed, jatropha and camelina) and their impact on the oil and co-product yields. (References: Wicke, B. Dornburg, V., Faaij, A.P.C., Junginger, H.M., 2007. A greenhouse gas balance of electricity production from co-firing palm oil products from Malaysia. Available at: <http://igitur-archive.library.uu.nl/chem/2008-0424-200551/UUindex.html>; Wong, H.M., 2008. Life-cycle Assessment of Greenhouse Gas Emissions from Alternative Jet Fuels, Master of Science Thesis, Massachusetts Institute of Technology, Cambridge, Massachusetts.; Reinhardt, G., Becker, K., Chaudhary, D.R., Chikara, J., Falkenstein, E., Francis, G., Gartner, S., Gandhi, M.R., Ghosh, A., Ghosh, P.K., Makkar, H., Munch, J., Patolia, J.S., Reddy, M.P., Rettenmaier, N., Upadhyay, S.C., 2008. Basic Data for Jatropha Production and Use, Institute for Energy and Environmental Research, Central Salt and Marine Chemicals Research Institute, University of Hohenheim: Heidelberg, Bhavnagar and Hohenheim.; Yusoff, S., 2006. Renewable energy from palm oil – innovation on effective utilization of waste. Journal of Cleaner Production, 14(1), pp.87–93.