Report to the GTAP Advisory Board 2016

The Agricultural Economic Research Institute (LEI), part of Wageningen University (WUR), has been a member of the GTAP consortium since November 1996. We use the GTAP database and model for a variety of research activities related to the agri-food sector and beyond.

In particular, the standard GTAP model constitutes the basis of the MAGNET model, a modular CGE model approach developed at LEI. Hence the name MAGNET, short for "Modular Applied GeNeral Equilibrium Tool". MAGNET has the standard GTAP model at its core with all extensions added in a modular fashion. It allows the user to select which additional modules he/she wishes to include by adjusting the model settings and by including the relevant data. See annex 2 for an overview of the current structure of the MAGNET model.

Apart from LEI, MAGNET is used and developed by researchers from IPTS and TI, with cooperation organized in a MAGNET consortium. A website has been launched (http://www.magnet-model.org/) providing access to project information, module descriptions and publications. To consolidate and develop MAGNET, we continue to hold regular update meetings and research seminars at LEI to present research and address specific issues in depth.

The following presents a summary of the activities of the MAGNET group at LEI in 2015/2016.

People

Annex 1 gives an overview of current team members and main research interests in relation to CGE modelling with GTAP/MAGNET.

In 2015 Jeff Powell unfortunately left the MAGNET team. Marijke Kuiper, Lindsay Shutes and Andrzej Tabeau have been managing the MAGNET team at LEI. They have been given the task of coordination and programming activities in the GTAP/MAGNET work on a day to day basis. Hans van Meijl remains the scientific leader and contact person for GTAP/MAGNET work.

Furthermore, Heleen Bartelings and Zuzana Smeets Kristkova attended the dynamic GTAP short course in October 2015. They aim to apply some of the concepts learnt during the course in a new MAGNET module that will incorporate dynamic modelling of fisheries, as explained in the following section (page 2).

Looking ahead – focus areas for the coming year

The sizeable group of researchers involved with MAGNET work makes it worthwhile to exploit potential economies of scale, overcoming limits posed by project-driven research as done at LEI. For the coming year work on the following cross-cutting themes is planned, funded by a range of projects (more details can be found under CGE-related research).

- *Bio-based economy*: MAGNET has been extended with a large number (about 20) new sectors related to the supply of biomass (residues, plantations, pellets) and conversion of biomass (electricity, chemicals). Focus in 2016 is on various assessments of the socio-economic and environmental impacts of bioenergy use and especially on synergy and trade-off effects of strategies to avoid undesirable land use change and food security effects.
- *Food and nutrition*: following up on the FoodSecure project, the SUSFANS project shapes the work by the MAGNET team on incorporation of food waste as influenced by underlying economic incentives, imperfect competition in the food supply chain, incorporation of micronutrients, and improved consumption and nutrition at household level detail in 4 EU countries (France, Italy, Denmark, Czech republic) better capturing the variability in nutritional content of especially processed food (across income levels and over time in long term projections). Future interest lies in the computation of health effects of changing diets and feedback effects onto the economy (labor time, productivity; wellbeing; health care costs).
- *Food security and environment nexus:* exploiting the modular character of MAGNET we will analyze the food security implications of the bio-based economy and climate change; i.e. combining several main strands of MAGNET developments to asses potential food security/environment trade-offs.
- *Energy and Climate Change:* detailed energy sectors (including renewable electricity sectors wind, solar and biomass) will be added and in combination with the new bioeconomy and

emission modules IPCC scenario's will be quantified to 2050. Mitigation and adaptation scenario's will be assessed.

- *Water:* An explicit accounting of water use in agriculture will be included in the MAGNET model within the framework of examining the global confluence of water, energy, climate and food. Initially this will be implemented as an ex-post analysis to assess the change in water demand. Further, supply and market mechanisms will be added as the relationships between water and the other three elements (climate, energy and food) crystalize.
- *Fisheries:* The database used by MAGNET will be extended to include both wild catch fisheries, aquaculture and fish processing sectors. Interactions between aquaculture and fisheries, for example fisheries providing fishmeal and fish seed to aquaculture will be taken into account. Feed will also be explicitly modelled and attention is given to the competition between aquaculture and cattle sectors for available feed. Since the size of the fish stock is one of the primary drivers for the fisheries sector, attention will be given to dynamic modelling of the fish stocks. The size of the fish stock is determined by a yearly growth rate, natural mortality and fishing mortality of the previous year. Fish stocks will be modelled completely mobile for countries fishing in a common sea or ocean. Fish stocks however are not expected to move between seas. To capture this dynamic of the fish stocks the world is divided into several seas and oceans. Countries adjacent to these sea areas get assigned fish stocks based on historic catches but are able to freely trade fish stocks. The mobility of natural resources will be modelled similarly to the capital mobility as used by dynamic GTAP model leading to endogenous fish stocks.
- *International transfers:* An international transfers module will be added to MAGNET based on the theory, data and code of the MyGTAP model. The module will capture international flows in foreign aid, remittances and foreign income. It is expected that the module will be used to evaluate the impact of changes in foreign aid on food security.
- *Afforestation:* Potential impacts of afforestation on resilience of food and forest systems under economic and climate stress at multiple scales will be further investigated. For example carbon sinks support the stabilization of the climate, however the additional land needed for afforestation reduces the stock of crop land and the land reserve, which may affect local and global food availability and may contribute to upward pressure on food prices. Depending on the structure of the system for paying for afforestation, this activity could either support of hinder communities whose livelihoods depend on forests and agriculture, as well as the urban poor who may be faced with higher food prices with no compensation. The above will have consequences for food and nutrition access and socio-economic stability. The political economy aspect of financing the REDD initiative which until now has not been considered within a general equilibrium framework will be explored here.
- *Imperfect competition:* In response to the relatively recent advances in the modelling literature on the role of market power, an imperfectly competitive market module will be incorporated into MAGNET. The module will permit the user to switch between perfect competition, Spence-Dixit-Stiglitz-Krugman type monopolistic competition and the more recent Melitz model.

CGE-related research in 2015/2016

Land supply
- Recalibration and revision of land supply elasticities. Survey of land supply elasticities was prepared. Calibration procedure of land supply function was developed and programed.
- Improvement of agricultural land availability estimates – using newly developed data provided by the Dutch Environmental Agency (PBL). New land availability estimates have been added to MAGNET data base and used in several projects.

Afforestation
- Afforestation is considered an important and possibly rather cheap climate mitigation option. The possibility of converting an agricultural land was implemented in MAGNET. Economic effects of afforestation, especially for food security, have been investigated by running several scenario experiments.

Fertilizer modeling
- Emissions of fertilizers consumption and production are now calculated.

Data and model management software
- Electricity split
    - Electricity has been split into 5 electricity sectors: electricity from (1) coal, (2) gas, (3) nuclear, (4) solar and wind (5) hydro and thermal
    - The old electricity sector is now a transport sector of electricity
    - Emissions attributed to the different electricity sectors have been calculated
- R Code that facilitates the post-processing of MAGNET output by automatically converting har files to gdx and upload them into R has been developed.

Emission module
- Magnet has been extended with an emission module.
- Both CO_2 and Non-CO_2 emissions published by GTAP have been included.
- Emissions for the newly introduced biofuel sectors, fertilizer sectors and energy sectors are also calculated.
- The emission module makes it possible to solve MAGNET either with a CO_2 tax or with an emission reduction target.
- A system of emissions permit trading is to be incorporated into the model which follows the work of the GTAP-E model.

Linking of models and long term scenario development
- AgMIP: Comparison of alternative approaches for long-term scenarios for agricultural markets and trade
    - The LEI/MAGNET and PBL/IMAGE teams are busy with quantification of RAPs (Representative agricultural pathways) and climate scenarios. The SSP1, 2, 3, 4 and 5 story lines and macro-economic assumptions are used. Teams involved are GCAM, AIM, IIASA (GLOBIOM for land use part), PIK (Remind-MagPie). For IPTS, mitigation and adaptation scenario's are analysed by LEI\PBL (MAGNET-IMAGE), IIASA (Globiom), PIK (Magpie) and UniBonn (CAPRI).
    - Five global economic models (ENVISAGE, FARM, MAGNET, IMPACT and MAgPIE) with a focus on agriculture were used to analyze climate impacts on agri-food-sectors in combination with the three SSPs and their associated changes in crop- and region-specific changes in agricultural productivity. Also, it was investigated whether the impacts of climate change would differ if restrictive trade policies would be in place or if trade would be liberalized.
    - Impact of different shocks on scenario results will be investigated. The decomposition method will be used.

Examining the impact of high and low prices
- We examine the impact of high and low prices using a SSP2 baseline and a high and low price variant for a joint FAO-UNCTAD publication. We consider the impact on economic growth, production, food prices and poverty in key regions.

Impacts of trade policies: tariffs and non-tariff measures
- Application of MAGNET for assessing trade policies (focus agri-food trade), in particular tariff and NTM liberalisation (state of the art methods). For modelling the NTM liberalisation, the size of the shock is crucial. Thus NTM data work has started in several smaller projects that can be considered as pilots and could be applied in a standard CGE application.
- Investigation of NTMs in the context of trade agreements continues. In particular EEU and DCFTAs agreements.

Impacts of bioenergy production and use
- Land use effects of biofuel use in Brazil (BE Basic project): Biofuel production and use scenarios have been developed and implemented in MAGNET to analyze the impacts of biofuel policies on land use changes in Brazil. MAGNET is soft-linked to a spatial allocation model PLUC of Utrecht University which is applied in this exercise for Brazil and uses land demand changes derived from MAGNET (Verstegen et al., 2015). MAGNET is integrated with BLUM partial equilibrium model of the Brazilian agricultural sector and biofuel sectors. This project is carried out together with Agricultura, Energia e Sustentabilidade (ICONE) in Sao Paulo (Brazil) and Utrecht University.

- Biofuel production and use scenarios will be developed and implemented in MAGNET to analyze the impacts of biofuel policies on food security at the global level and in specific regions and countries, including Ghana. Specific attention will be given to strategies aimed at reducing negative impacts on food security. The analyses will be done at household level, possibly results will be given for nutritional values. This project is carried out in collaboration with Utrecht University.
- MAGNET is used to evaluate the land use change and food security effects of the use of residues and waste, using the sustainable potential of wheat straw for energy production in the EU in 2030 as a case study. This is done based on a shock of output subsidies. This project is carried out in collaboration with the Netherlands Environmental Assessment Agency. A similar analysis is done for the world.
- MAGNET is used to evaluate the economic impacts of biobased technologies in the EU. These technologies are considered in MAGNET by means of shift in technology as also applied in earlier assessments with a.o. the Netherlands Environmental Assessment Agency and the Institute for Prospective Technological Studies of the EC. An update of this study is currently ongoing.

Household modeling
- The modular set-up in MAGNET now allows the household module to be activated by model region (choosing either a regional household as in GTAP, a split between a single private household and government with no overarching regional household, or multiple households and a government) and combined with the other modules in MAGNET (like endogenous land supply, biofuels etc.).
- The household module has been applied in several studies this year including analysis of four future worlds that vary in terms of equality and sustainability (the FoodSecure scenarios) and an analysis of the impact of high and low prices on growth and poverty.

Global household database
- Multiple household groups have been introduced for 6 countries in MAGNET: Ghana, Kenya, Uganda, China, India and Indonesia. In the SUSFANS project four European countries will be added (Italy, France, Denmark, Czech Republic) and Netherlands might be included as well.
- The household data procedures also allow a split of standard GTAP factors using national SAM data, providing a more detailed assessment of the distributional consequences of macroeconomic changes. These factor splits are modular and can be switched on independently from the household split. Testing revealed that the additional detail requires more refined scenario specification or the introduction of additional factor supply modules.

Food security
- The stakeholder defined FoodSecure scenarios have been implemented in MAGNET to 2050. The four scenarios are defined as combinations of two axes: equal/unequal and sustainable /unsustainable. The development of global/regional and household level food and nutrition security in each future world is analysed using a newly developed suite of 10 indicators covering the four dimensions of food and nutrition security: availability, access, utilisation and stability.

Consumption and nutrition
- Nutrition indicators developed earlier have been integrated with household module making nutrition indicators available by household type and are part of the indicators used in the scenarios developed as part of FoodSecure.
- An agenda for improvements of consumption and nutrition has been set out in the SUSFANS project work plan (see also looking ahead; food and nutrition), and focuses on incorporating micronutrient indicators, adding multiple households for 4 EU countries, improving household consumption and nutrition, and accounting for food waste and underlying economic incentives.
- Vertigolab won a tender by ADEME and is contracting LEI to run various food loss and waste reduction scenarios to show broader societal impacts.

- In the longer term the CGIAR flagship programme, coordinated by Wageningen UR and administered by LEI on Food systems for Healthier Diets will shape much of future work on diets and nutrition.

Modeling agricultural R&D investments
- The R&D module built last year was further improved and extended. Improvements include translation from annual to period productivity growth, alternative options for governmental decision on R&D spending (following real agricultural GDP, governmental budget or a mixed approach) and the possibility of swapping R&D investments with land productivity to determine the nominal value of R&D expenditures needed for a desired growth of productivity.
- Next steps will include incorporating business R&D in MAGNET within SUCCESS project on fisheries.

Imperfect competition
- Under the auspices of the Jobs and Growth project financed by the European Commission (IPTS), a study is currently underway to examine the export competitiveness of the EU dairy sector. To this end, a Melitz model variant is employed, following the work of Akgul et al. (2016). This model is particularly pertinent for this topic, since as well as including the traditional 'scale' and 'variety' effects associated with market power and endogenous product differentiation, the Melitz model also explicitly contemplates the self selection of firms by sales markets, which allows the user to contemplate changes in exports at the extensive margin (i.e., penetration into previously untapped export markets).

CAP module
- The current CAP module employs detailed auditing data supplied by the European Commission (DG Agri). The data covers the split of pillar 1 payments (market support) between coupled (including article 68/69) and decoupled payments, whilst the coverage of pillar 2 (rural development) covers Axis 1 to 6. From this data, a CAP baseline has been developed, although the coverage of years is limited. An update to this work will be carried out this year with, potentially, more years of time series data. In addition, the modelling of the CAP budget module has been modified to permit more detailed policy shocks by specific CAP measures as well as the creation of an 'own-resources' component where CAP expenditure is explicitly co-financed by Member States. The rebate component of this module will also be updated with the change of benchmark years from 2007 to 2011.

MAGNET related 2015/2016 publications

Journal articles & book chapters:

- Rutten, M. and A. Kavallari, (2016), "Reducing food losses to protect domestic food security in the Middle East and North Africa", forthcoming in African Journal of Agricultural and Resource Economics, 11(2).

- Koopman, J.F.L., Kuik, O.J., Tol, R.S.J. and R. Brouwer (2015). The potential of water markets to allocate water between industry, agriculture and public water utilities as an adaptation mechanism to climate change. Submitted.

- Smeets Kristkova, Z., van Dijk, M., van Meijl, H. (2016). Projections of long-term food security with R&D driven technical change – a CGE analysis. Wageningen Journal of Life Sciences, 77, pp 39–51. doi:10.1016/j.njas.2016.03.001

- Smeets Kristkova, Z., Gardebroek, K., van Dijk. M., van Meijl, H. (2016). Impact of R&D on factor-augmenting Technical change. Economic Systems Research (currently under revision).

- Smeets Kristkova, Z., Van Dijk, M., Van Meijl, H.(2016). Assessing the impact of agricultural R&D investments on long-term projections of food security. Chapter in Frontiers in Economics and Globalization, Vol. 17. Emerald Group Publishing Limited (currently under revision).

- Philippidis, G., Boulanger, P., Ferrari, E., Michelak, J., Resano, H., Sanjuán, A.I., Vinyes, C. (2015) The Costs of EU Club Membership: Agri-Food and Economy-Wide Impacts in Croatia, Post-Communist Economies, 27(1), pp60-75.

- Boulanger, P. and Philippidis, G. (2015) The EU Budget Battle: Assessing the Trade and Welfare Impacts of CAP Budgetary Reform, Food Policy, 51, pp119-130.

- Boulanger, P. and Philippidis, G. (2015) The End of A Romance? A Note on the Quantitative impacts of Brexit, Journal of Agricultural Economics, 66 (3), pp832-842

- Boulanger, P., Dudu, H., Ferrari, E. and Philippidis, G. (2016) Russian Roulette at the Trade Table: A specific factors CGE analysis of an agri-food import ban, Journal of Agricultural Economics, 67(2): 272-291

- Boulanger, P., Philippidis, G. and Jensen, H.G. (2015) Domestic Support in the European Union, Chapter 10.B, *Global Trade, Assistance, and Production: The GTAP 9 Data Base*, Narayanan, B., Aguiar, A. and McDougall, R. (Eds.). Center for Global Trade Analysis, Purdue University https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=5109

- Helal Ahammad, Edwina Heyhoe, Gerald Nelson, Ronald Sands, Shinichiro Fujimori, Tomoko Hasegawa, Dominique van der Mensbrugghe, Elodie Blanc, Petr Havlik, Hugo Valin, Page Kyle, Daniel Mason-D'Croz, Hans van Meijl, Christoph Schmitz, Herman Lotze-Campen, Martin von Lampe, Andrzej Tabeau, "Climate change and food systems: global assessments and implications for food security and trade", Edited by Aziz Elbehri, 01/2015: chapter 10: pages 292-312; Food Agriculture Organization of the United Nations (FAO). http://www.researchgate.net/publication/279771018_The_role_of_international_trade_under_a_changing_climate_Insights_from_global_economic_modelling

- Banse, M., Franziska Junker, Anne Gerdien Prins, Elke Stehfest, Andrzej Tabeau, Geert Woltjer, Hans van Meijl, "Global impact of multinational biofuel mandates on land use, feedstock prices, international trade and land-use greenhouse gas emissions", Landbauforschung Volkenrode 06/2014; 64(2):59-71. DOI:10.3220/LBF_2014_59-72 http://literatur.ti.bund.de/digbib_extern/dn054352.pdf

- Wiebe, Keith; Lotze-Campen, Hermann; Sands, Ronald; Tabeau, Andrzej; van der Mensbrugghe, Dominique; Biewald, Anne; Bodirsky, Benjamin; Islam, Shahnila; Kavallari, Aikaterini; Mason-D'Croz, Daniel; Mueller, Christoph; Popp, Alexander; Robertson, Richard; Robinson, Sherman; van Meijl, Hans; Willenbockel, Dirk, "Climate change impacts on agriculture in 2050 under a range of plausible socioeconomic and emissions scenarios", Environmental Research Letters, 2015, Volume 10, Number 8. http://iopscience.iop.org/article/10.1088/1748-9326/10/8/085010 (IF 4.1)

- Dixon, P., Hans van Meijl, Maureen Rimmer, Lindsay Shutes, Andrzej Tabeau, "RED versus REDD: Biofuel policy versus forest conservation", Economic Modelling, 2015. (IF 0.83) http://www.sciencedirect.com/science/article/pii/S0264999315002618

- Stürck J., Levers C., van der Zanden E, Schulp C., Verkerk P., Kuemmerle T., Helming J., Lotze-Campen H., Tabeau A., Popp A., Schrammeijer E., Verburg P., "Simulating and delineating future land change trajectories across Europe", Regional Environmental Change, 2015, pp. 1-17. http://link.springer.com/article/10.1007%2Fs10113-015-0876-0

- Verstegen, Van Hilst, Woltjer, Karssenberg, Jong, Faaij (2015) What can and can't we say about indirect land use change in Brazil using an integrated economic-land use change model? GCB Bioenergy.

- Helming, J. & A. Tabeau (2016), The economic, environmental and agricultural land use effects in the European Union of agricultural labour subsidies under the Common Agricultural Policy. Regional Environmental Change. *Under review*.

Conference papers

- Michiel van Dijk (LEI – WUR) , Maryia Mandryk (PBL), Marc Gramberger (Prospex), David Laborde (IFPRI), Lindsay Shutes (LEI-WUR), Elke Stehfest (PBL), Hugo Valin (IIASA), Katharina Zellmer (Prospex), (2016) Scenarios to explore global food security up to 2050: Development process, storylines and quantification of drivers, FOODSECURE working paper.

- Michiel van Dijk, George Philippidis, Geert Woltjer (2016) Catching up with history: A methodology to validate global CGE models, FOODSECURE working paper.

- Rau, M.-L. and M. Verma (2015). NTMs in CGE models – Is reducing iceberg trade costs enough? An experiment of modelling EU DCFTAs in GTAP. ETSG 2015 PARIS 17th Annual Conference, 10-12 September 2015

- Smeets Kristkova, Z., (2015) Impact of public agricultural R&D investments on agricultural productivity and food security. Paper presented at the 19th ICABR Conference, Ravello (June 16 – 19, 2015).

- Smeets Kristkova, Z. (2015) Long Term Projections of Global Food Security with R&D Driven Technological Progress. Paper presented at the International Conference on Economic Modelling EcoMod 2015, Boston (July 15- 17, 2015).

- Smeets Kristkova, Z., Gardebroek, K., Van Meijl, H. and M. van Dijk (2015). The Impact of R&D on factor-augmenting technical change - an empirical assessment at the sector level. Paper presented at International IAAE Conference ICAE, Milan, August 8 – 14, 2015.

- Boulanger, P., and Philippidis, G. (2015) 2020 Common Agricultural Policy in Spain: General Equilibrium Effects of an EU28 Budget deal, X Congress of the Spanish Association of Agricultural Economists, Cordoba, Spain, September 9th - 11th, 2015.

- Boulanger, P., Dudu, H., Ferrari, E. and Philippidis, G. (2015) The Cost of import prohibition for political reasons: A CGE Analysis of the Russian ban on agri-food products, 18th Annual Conference on Global Economic Analysis, Melbourne, Australia, June 17th – 19th, 2015.

- Boulanger, P., Philippidis, G. and Jensen, H.G. (2015) EU Agricultural domestic support in GTAP: A proposal for an alternative approach, 18th Annual Conference on Global Economic Analysis, Melbourne, Australia, June 17th – 19th, 2015.

- Waschik, R., Philippidis, G. (2015) Removal of EU Milk Quotas Using a CGE Model with Imperfect Competition and Heterogeneous Firms, Workshop on Imperfect Competition organised by DG Agri and JRC IPTS, Brussels, 27th January.

- Smeets, E., A. Tabeau, H. van Meijl (2015) An evaluation of the macro-economic impacts of biobased technologies in the EU. 19th ICABR Conference (Ravello, Italy, June 16 - 19, 2015) "Impacts of the Bioeconomy on Agricultural Sustainability, the Environment and Human Health"

- Smeets, E., A. Tabeau, H. van Meijl (2015) An assessment of the global land use change and food security effects of the use of agricultural residues for bioenergy production. 19th ICABR Conference (Ravello, Italy, June 16 - 19, 2015) "Impacts of the Bioeconomy on Agricultural Sustainability, the Environment and Human Health"

- Tabeau, A., H. van Meijl, K. P. Overmars and E. Stehfest (2015) REDD policy impacts on the agri-food sector and food security. Contributed Paper at the 29th Triennial Conference of the International Conference of Agricultural Economists (ICAE) in Milan, Italy from 9 to 14 August, 2015.

- Smeets, Tabeau, Van Berkum, Moorad, Van Meijl, Woltjer (2015) The impact of the rebound effect of first generation biofuels use in the EU 27 on greenhouse gas emissions. Poster presentation. Global Bioeconomy Summit 2015 Berlin Congress Center, 25-26 November Berlin, Germany.

- Sustainable bioenergy supply strategies: uncertainties, synergies and trade-offs. Oral presentation given at the 2015 CRC Life Cycle Analysis of Transportation Fuels Workshop, 26-28 October 2015, Argonne, IL, USA.

- Smeets, Levin-Koopman, Tabeau, Van Meijl et al (2015) Sustainable bioenergy supply strategies: uncertainties, synergies and trade-offs. Oral presentation given at the 2015 CRC Life Cycle Analysis of Transportation Fuels Workshop, 26-28 October 2015, Argonne, IL, USA.

- Smeets, Tabeau, Kuiper, Brink, Prins, Woltjer, Van Meijl (2015) Evaluating the indirect land use change (ILUC) and food security effects of residues and waste for bioenergy production. Oral presentation and conference paper. International Conference - Food in the Bio-based Economy; Sustainable Provision and Access; Wed 27 May 2015 until Fri 29 May 2015; Wageningen University, The Netherlands

- Smeets, Vinyes, Tabeau, Van Meijl, Brink, Prins (2015) An evaluation of the macro-economic impacts of biobased technologies in the EU. Oral presentation and conference paper.

International Conference - Food in the Bio-based Economy; Sustainable Provision and Access; Wed 27 May 2015 until Fri 29 May 2015; Wageningen University, The Netherlands.

- Smeets, Vinyes, Tabeau, Van Meijl, Brink, Prins (2015) An evaluation of the macro-economic impacts of biobased technologies in the EU. Oral presentation by Tabeau and conference paper. 19th ICABR Conference 'Impacts of the bioeconomy on agricultural sustainability', Ravello (Italy): June 16 - 19, 2015.

- Smeets, Tabeau, Brink, Prins, Kuiper, Wolter, Van Meijl (2015) Evaluating the land use change and food security effects of the use of residues and waste for bioenergy production. Poster presentation. Global Bioeconomy Summit 2015 Berlin Congress Center, 25-26 November Berlin, Germany.

Reports & working papers
- Rutten, M., A. Zimmermann, P. Havlík, A. Leip, T. Heckelei and T. Achterbosch (2016), Modelling Sustainability and Nutrition in Long Run Analyses of the EU Agri-Food System: Work Plan for the SUSFANS Toolbox, D9.1 of the SUSFANS project, H2020 / SFS-19-2014: Sustainable food and nutrition security through evidence based EU agro-food policy, GA no. 633692.

- Rutten, M., M. Verma, N. Mhlanga and C. Bucatariu (2015), Potential Impacts on sub-Saharan Africa of Reducing Food Loss and Waste in the EU: A Focus on Food Prices and Price Transmission Effects, Joint FAO and LEI Wageningen UR Report, FAO, Rome.

- Rutten, M., T. Achterbosch, et al. (2016), Metrics, models and foresight for European sustainable food and nutrition security: the vision of the SUSFANS project. SUSFANS project position paper, under journal review.

- Rutten, M., A. Tabeau and F. Godeschalk (2016), "An Economic Tool for Tracing the Origins of Nutrients with Entry Points for Action", under journal revision (2nd round).

- Philippidis, G., M'barek, R. and Ferrari, E. (2016) Drivers of the European Bioeconomy in Transition (BioEconomy2030): An Exploratory Model Based Assessment, Joint Research Centre Policy Report, European Commission, EUR 27563 EN; doi:10.2791/529794 https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/documents/drivers-of-the-eu-bioeconomy-in-transition.pdf
- Philippidis, G., M'barek, R. and Ferrari, E. (2015) Drivers of the Bioeconomy in Europe towards 2030: Short Overview of an Exploratory, model-based assessment, European Commission, Joint Research Centre, Institute for Prospective Technological Studies. https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/documents/drivers%20of%20the%20bioeconomy%20in%20europe%20towards%202030.pdf

- Van Dijk, M. M. Kuiper, and L. Shutes, (2015) From Global to Local: The impact of climate change on Economic Development in Ghana, Reported prepared for USAID.

- Shutes (Ed.) et al. (2015) Toolbox 2050: Description of Linked Economic-Biophysical Modelling (FoodSecure D7.2)

- Bouet et al. (2015) Toolbox 2050: Description of FNS models for various household typologies (FoodSecure D7.3)

- Shutes, L. Kuiper, M. & Verma, M. (2015) Changing diets in a changing world: assessing the impact of urbanisation on agriculture.

- KIS project team (2015) Knowledge Infra Structure project Deliverable 14 Final document on new methodology and modeling framework for assessing biomass supply and its impacts. KIS project team: LEI, PBL, Utrecht University.

- KIS project team (2015) Knowledge Infra Structure project Deliverable 13 Managing LUC-induced GHG emissions and price impacts from bioenergy under different scenarios. KIS project team: LEI, PBL, Utrecht University.

- Helming et al (2015) Deliverable 3: The biomass processing, second generation biofuels and bio-electricity sectors in MAGNET. ENGAGE project 154208.X4 "The enhancement of the MAGENT model: fertilisers and bio-based sectors.

- Helming et al (2015) Deliverable 4: The biochemical module in MAGNET. ENGAGE project 154208.X4 "The enhancement of the MAGNET model: fertilisers and bio-based sectors.

- Smeets et al. (2015) Operational enhanced global economic modeling framework to assess the economic impact of advanced biomass options. BE Basic Deliverable 4.6.

- Van Meijl, H., I. Tsiropoulos, H. Bartelings, R. Hoefnagels, M. Van Leeuwen, A. Tabeau and E. Smeets (2016). Macro-economic outlook of sustainable energy and biorenewables innovations (MEV II). The Hague, The Netherlands, LEI Wageningen UR

- Andrzej Tabeau, John Helming, 2016. D3: Land Supply Elasticities. Overview of Available Estimates and Recommended Elasticities Values for MAGNET. Specific Contract 154208.X20 Scenar 2030: Parameters and Model Chain Preparation.

Other

- Smeets Kristkova, Z., van Dijk, M. (2015) Impact of agricultural R&D investments on long-term food security, an ex ante impact assessment. Paper presented at INRA seminar: Impacts of agricultural research –towards an approach of societal values, INRA Paris (Nov 2 – 3, 2015):

- Smeets Kristkova, Z. (2015) Macroeconomic Modelling Workshop "Innovation and R&D modelling in a general equilibrium framework", IPTS Seville (December 10- 11, 2015): Endogenising R&D investments in a global CGE model MAGNET.

- Smeets Kristkova, Z. (2015) Agricultural R&D investments and food security. Guest Lecture for Course of Economics and Policy of Agricultural Development, Wageningen (November 19, 2015)

- Smeets Kristkova, Z. (2016) Agricultural R&D investments, biofuel policy and food security – a CGE analysis. Lunch Lecture at the Wagenigen School of Social Sciences (April 30, 2016)

- Smeets Kristkova, Z. (2015) Modelling R&D-driven technical change in Magnet: modelling approach and baseline projections. Magnet Seminar Presentation.

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Awards

George Philippidis GTAP Research Fellow 2015-2017

Annex 1 – MAGNET team at LEI

Hans van Meijl

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- Team leader
- CAP
- Bio-based economy
- Food security
- Climate Change

Marijke Kuiper

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- MAGNET management team
- Developer
- Food security
- Poverty
- Bio-based economy
-

Lindsay Shutes

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- MAGNET management team
- Food security
- Poverty

Andrzej Tabeau

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- MAGNET management team
- Baseline
- Scenarios
- Land use
- Nutrition
- Bio-based economy

Martine Rutten

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- Consumption modelling
- Food security, food waste
- Resource scarcity
- Diets, nutrition and health

Michiel van Dijk

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- Technical change
- Land use change
- Developing countries

Edward Smeets

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- Biofuels and biobased materials
- Land use change
- GHG emissions

Myrna van Leeuwen

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- Single country CGE (ORANGE)
- Agricultural policy

Heleen Bartelings

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- Developer
- Sector splits
- Biobased economy
- Fertilizers
- Climate change modelling
- Fisheries and aquaculture

Zuzana Smeets Kristkova

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- General equilibrium modelling
- R&D and technical change
- Food security and economic development

John Helming

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– Common Agricultural Policy
– Agriculture

Marie-Luise Rau

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- Trade (trade policy)
- Trade agreements
- Non-tariff measures
- Developing countries

Diti Oudendag

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- HH modelling
- GHG emissions
- Magnet Database(s)

Monika Verma

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- Consumption
- Food loss and Waste
- Households
- Non-tariff measures
- Climate change

Jason Levin-Koopman

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- Water scarcity
- Biofuels
- Climate change

George Philippidis

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- Bioeconomy
- Climate change modelling
- EU Common Agricultural Policy (CAP) modelling
- International trade, EU trade and enlargement

John Doornbos
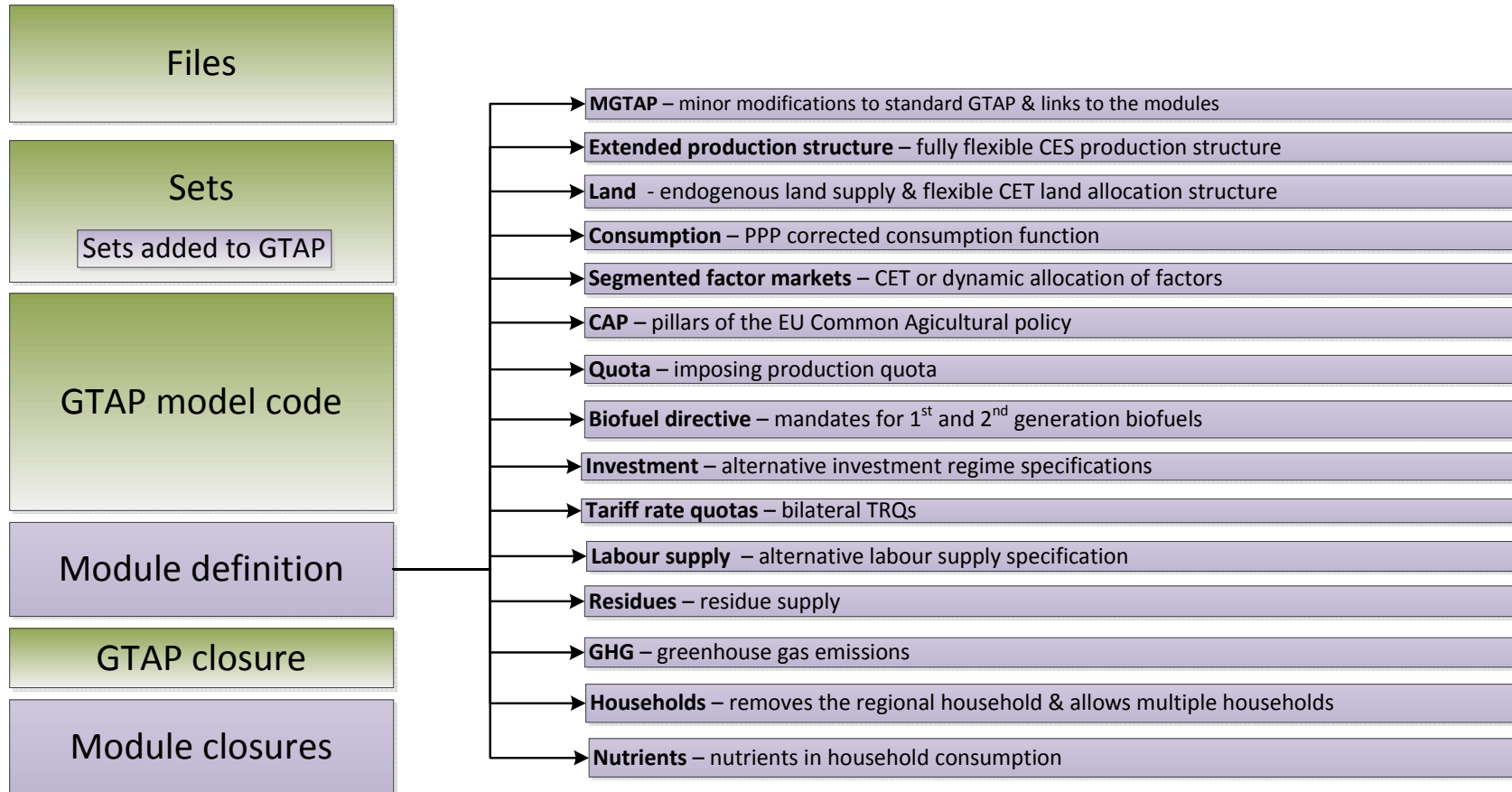
John.Doornbos@wur.nl

- Software development

Barbara van der Hout

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- Software development

Annex 2: Overview of the structure of the MAGNET model

Files

Sets
Sets added to GTAP

GTAP model code

Module definition

GTAP closure

Module closures

MGTAP – minor modifications to standard GTAP & links to the modules

Extended production structure – fully flexible CES production structure

Land - endogenous land supply & flexible CET land allocation structure

Consumption – PPP corrected consumption function

Segmented factor markets – CET or dynamic allocation of factors

CAP – pillars of the EU Common Agicultural policy

Quota – imposing production quota

Biofuel directive – mandates for 1st and 2nd generation biofuels

Investment – alternative investment regime specifications

Tariff rate quotas – bilateral TRQs

Labour supply – alternative labour supply specification

Residues – residue supply

GHG – greenhouse gas emissions

Households – removes the regional household & allows multiple households

Nutrients – nutrients in household consumption

Key:-

GTAP	MAGNET