Report to the GTAP Advisory Board 2019

Wageningen Economic Research (WEcR) (previously LEI), part of Wageningen University and Research (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 Wageningen Economic Research. 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.

In addition to Wageningen Economic Research, MAGNET is used and developed by researchers from the Joint Research Centre of the European Commission (JRC)and the Thünen Institute (TI), with the cooperation being organized in a MAGNET consortium. A website has been launched (http://www.magnet-model.org/) in order to provide access to project information, module descriptions and publications. Consolidating and developing MAGNET, we continue to hold regular update meetings and research seminars at Wageningen Economic Research to present research and address specific issues in depth.

In the following a summary of the activities of the MAGNET group at Wageningen Economic Research in 2018/2019 is presented.

People

In Annex 1 a list of the team members and their main area of CGE related research with contribution to GTAP/MAGNET is presented. Within this reporting period two new colleagues have joined the team. Eugene Westerhof is involved in data management and analysis tools; and Ewa Tabeau, who will assist in managing the MAGNET team. In addition several colleagues have left the MAGNET team at WEcR: Lindsay Shutes, Marie-Luise Rau, George Philipides, John Helming and Edward Smeets, although Lindsay Shutes remain involved with the MAGENT model as private consultant. John Helming will focus on micro modelling at WecR.

Marijke Kuiper, Ewa Tabeau, Andrzej Tabeau and Heleen Bartelings have been managing the MAGNET team within Wageningen Economic Research. Their main task is coordinating the 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.

Awards

Looking ahead – focus areas for the coming year

The 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 Wageningen Economic Research. 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). In 2017, MAGNET was applied to quantify the impact of a Bioeconomy in the European Union (JRC project, Philippidis et al. 2018). Several policies related to the current and new Renewable Energy Directive were quantified. The impacts were quantified on several SDGs. The focus in 2018/2019 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. The H2020 Biomonitor project will be a key project to enhance data and add new biobased sectors. In 2018 first steps were taken to include circularity in the model. To this effect waste generation by households was included in the model as well as waste treatment sectors, i.e. incineration, landfillling composting and recycling. The work on circularity will be continued in 2019. *In 2019 the bio-*economy sectors will be further extended with a bio heat sector and a fossil heat counterpart.

- *Food and nutrition*: work on a sustainable, healthy and accessible diet in the SUSFANS project continues this year by exploiting the model developments of the past years (waste, imperfect competition, macro and micro nutrient availability) in scenario-based assessments jointly with GLOBIOM and CAPRI while connecting to detailed food intake data for 4 EU countries (France, Italy, Denmark, Czech republic) to better capture the variability in nutritional content of especially processed food (across demographic groups in long term projections). Scenario results will be presented in a consistent SUSFANS framework of nutrition, profitability, environment and equity metrics.

- *Microsimulation tool for modelling diets:* In order to reflect better the ongoing processes of food systems transformation connected to diet quality changes and corresponding nutrition-health linkages, an effort will be made to build a microsimulation tool that will enable to link macro drivers with household/individuals' consumption choices. Tracing aggregate consumption to the household and/or individual level will enable to estimate precisely the nutritional outcomes (both macro and micronutrients) and will be useful for capturing the health effects linked to consumption of particular foods (relevant for food-borne disease burden in developing countries and obesity-related diseases in developed countries).

- *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 assess potential food security/environment trade-offs.

- *Water:* An explicit accounting of water use in agriculture has been included in the MAGNET model as an ex-post analysis to assess the change in water demand. In the coming year this will be linked to an explicit agricultural water endowment. In addition, in the coming year a framework to trace virtual water flows and assess a water (and land) footprint will be included.

- *Sustainable Development Goals:* Expand the coverage of SDG indicators produced by the model for evaluating progress towards the SDGs in an ex-ante modelling framework.[1]

- *Imperfect competition:* In response to the relatively recent advances in the modelling literature on the role of market power, an imperfectly competitive market module has been incorporated into MAGNET. The module permits the user to switch between perfect competition, Spence-Dixit-Stiglitz-Krugman type monopolistic competition and the more recent Melitz model.

- Post processing: Magnet results will be incorporated in an access data model and PowerBI templates will be made available for result analysis and reporting.

- Scenarios development: new version of MAGNET baseline and an RCP 2.6 scenario, update of SSP scenarios, the long-term global climate change mitigation scenarios

- Extreme climate events modelling: Assessing the impact of climate change related extreme events on crop yields through biophysical modelling, statistical analysis and using agro-economic models. Implementing extreme events in MAGNET, assessing their economic impact investigating possible mitigation options.

- Implementation of endogenous allocation of forestry land in MAGNET.

- Updating MAGNET to new GTAP database and core model version. MAGNET database will be updated to the latest benchmark year (2014) consistent with version 10 of the GTAP database. Accompanying modules which rely on secondary data estimates from external sources will be updated as well. The core of the MAGNET model will be updated to the new developments of the standard GTAP model version 7.

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[1] http://www.magnet-model.org/MAGNET%20SDG%20Insights%20Module%20Flyer.pdf

- Adjusting of the labor markets in MAGNET towards providing a good basis for capturing the changing skill structure of economies, especially those undergoing rapid development, when examining medium- to long-term time frames.

CGE-related research in 2018/2019

Data and model management software
- The GENUS database with global data on macro and micro nutrient availability for 225 (primary) commodities has been added to the MAGNET database

Emission module
- The developed emission module makes it now possible to solve MAGNET either with a CO_2 tax or with an emission reduction target.
- Carbon tax driven adoption of new technology by producers is implemented as means to reduce emissions. This is done by means of abatement curves. Costs of adopting a new technology enter the production function. The approach enables use of alternatives (tax or subsidy) to incentivize emission cuts.
- A system of emissions permit trading is incorporated into the model.

Linking of models and long term scenario development
- AgMIP: Comparison of alternative approaches for long-term scenarios for agricultural markets and trade
  - Wageningen Economic Research/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 JRC, mitigation and adaptation scenarios are analyzed by Wageningen Economic Research\PBL (MAGNET-IMAGE), IIASA (Globiom), PIK (Magpie) and UniBonn (CAPRI). In a follow up JRC project (Agclim50II) various mitigation (CO_2 taxes) and diet change scenarios have been quantified (Frank et al. 2019).
  - Impact of different shocks on scenario results will be investigated. The decomposition method will be used.
- In SUSFANS a link with a micro-level diet data is developed. This provides a new set of challenges with the need to simultaneously account for diversity in the population (age, sex and education) while the micro detail lack socio-economic detail needed for detailed demand modelling
- Combining forces with similar needs in the CGIAR sponsored A4NH and CCFAS projects a approach is being developed where a micro-simulation diet model bridges the macro and micro level approaches. This will be tested for Nigeria (A4NH) and Bangladesh (CCFAS).
- In the ongoing SIM4NEXUS project, MAGNET is working together with the models IMAGE-GLOBIO (PBL), E3ME (Cambridge Econometrics), MAgPIE (PIK), CAPRI (UPM), and OSeMOSYS (KTH), to explore variations of the SSP2 scenario, particularly focusing on the consequences of aggressive global mitigation policy, from the perspective of the Nexus of Water, Food, Land, Energy and Climate.

Examining the interactions between climate and trade, and implications for global food security
- Climate change is expected to have an overall negative impact on food security and alter trade flows in multiple dimensions: exports and imports in different regions and different sectors may respond to climate change differently. On the other hand, changes in trade environment via removing border tariffs are expected to mitigate to some extent the overall negative impacts of climate change to global economy and food security.

Impacts of bioenergy production and use
- In a project, financed by JRC, the impact of a bioeconomy in the European Union has been quantified (Philippidis et al. 2018). Several policies related to the current and new Renewable Energy Directive were quantified. Impacts were quantified for various SDGs.
- Biofuel production and use scenarios will be developed and implemented in MAGNET to analyze the impacts of biofuel policies on food security in Ghana. 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.

Food loss and waste
- An analyses of the socio-economic and environmental effects of reducing food loss and waste in agricultural supply, food processing, food retail and in the household consumption phase in France in 2030 is carried out using MAGNET. This project is commissioned by the French Environment and Energy Management Agency (ADEME) and is coordinated by Vertigo Lab.
- Supported by knowledge funding program of ministry of economic affairs work in the field has culminated in a) a framework to determine consumer food waste as driven by income b) a systematic framework to look at Food losses justified by some micro-case study results. Further going in the direction towards implementing a circular system of food waste and loss in MAGNET.

Household modeling
- The household module has been applied this year in a study for the World bank to assess the economic costs and benefits of an improved food safety system in India, accounting for differential impact across household types. Results will be presented in Cartagena.

Global household database
- In the context of SUSFANS multiple household groups are being introduced Czech Republic.

Consumption and nutrition
- A GENUS nutrition module has been added to MAGNET, allowing targeting of food-based guidelines or macro/micro nutrient availability.
- In the longer term the CGIAR flagship programme, coordinated by Wageningen UR and administered by Wageningen Economic Research on Food systems for Healthier Diets will shape much of future work on diets and nutrition.

Imperfect competition
- Under the auspices of the Jobs and Growth project financed by the European Commission (JRC), a study was undertaken to examine the export competitiveness of the EU dairy sector. To this end, a Melitz model variant was 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. 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.

Fisheries
- The database used by MAGNET was 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 were taken into account. Feed is also 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 was given to modelling of the fish stocks. Fish stocks are treated independently of other natural resources, removing thus the unwanted competition of mining sector and fisheries over the same natural resource. Given that the parameters of fish stocks vary significantly across fish types, three broad fish types were included in MAGNET: Pelagic Marine fish, Demersal Marine Fish and Crustaceans. The fish module has

been used in the horizon 2020 project SUCCESS to calculate the impact Brexit will have on fish related sectors. This research has been published in the Guardian[2].

Sustainable Development Goals
- A range of official and supporting indicators for measuring progress towards the Sustainable Development Goals have been introduced in the MAGNET SDG Insights module[1] and applied to the case of the bioeconomy in Europe.

Climate module
- The climate module of MAGNET was introduced in MAGNET. It implements the climate variables and related equations - CO_2 concentration, radiative forcing, potential temperature and actual temperature – to the model and introduces a function linking change in the temperature to impact on agricultural yields productivity.

Land use emissions
- GHG-emissions calculation due to land use and land use change is implemented in the model.

Climate and agriculture
- Examining relation between climate, adaptation and mitigation policies and climate change by mean of analysing a set of alternative scenarios by five several global climate and agro-economic models including, among others, integrated assessment (IMAGE) model, partial equilibrium (CAPRI, GLOBIOM, MAgPIE) model and computable general equilibrium (MAGNET) model

Migration
- Inclusion of international migration in MAGNET based on the GMig2 model (Walmsley, Winters, & Ahmed, 2007) which extends the GTAP framework to include bilateral labour migration data and explicitly models the movement of workers and estimates the level of remittances.

Natural Resource Stocks
- In order to capture the effects of a global carbon tax and the subsequent reduction in the production of fossil energy, MAGNET has been extended with dynamic natural resource stocks developments for gas, coal and crude oil. Available stock of resources are be endogenous in the model instead of exogenous.

MAGNET related 2018/2019 publications

Journal articles & book chapters:

2019
- Frank, S., Havlík, P., Stehfest, E., van Meijl, H., Witzke, P., Perez-Dominguez, I., Doelman, J. C., Fellmann, T., Levin-Koopman, J., Tabeau, A., Valin, H., 2019 Agriculture mitigation wedges for a 1.5 degree world: a multi-model assessment. Nature Climate Change. 9, p.: 66–72.

- Philippidis, G., Bartelings, H., Helming, J., M'Barek, R., Smeets, E., van Meijl, H. (2019). Levelling the playing field for EU biomass usage. Economic Systems Research, p.: 1-20, doi: 10.1080/09535314.2018.1564020.

- Stehfest, Elke, Willem-Jan van Zeist, Hugo Valin, Petr Havlik, Alexander Popp, Page Kyle, Andrzej Tabeau, Daniel Mason-D'Croz,Tomoko Hasegawa, Benjamin L. Bodirsky, Kate Calvin, Jonathan Doelman, Shinichiro Fujimorb, Florian Humpenöder, Hermann Lotze-Campei, Hans van Meijl, Keith Wiebe, Key determinants of global land-use projections, Nature Communication, (forthcoming), (IF 12.1).

- Smeets-Kristkova, Z., Achterbosch, T., & Kuiper, M. (2019). Healthy diets and reduced land pressure: Towards a double gain for future food systems in Nigeria. *Sustainability* (Switzerland), 11(3). https://doi.org/10.3390/su11030835

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[2] Guardian 24 April - Hard Brexit would mean more and cheaper British fish – but there's a catch

- Jonathan C. Doelman, Elke Stehfest, Andrzej Tabeau, Hans van Meijl, Making the Paris agreement climate targets consistent with food security objectives. Global Food Security 23 (2019) 93–103. https://authors.elsevier.com/a/1Yz5t7sxZzzvLF

- Koopman J.F.L., Kuik O., Tol R.S.J., van der Vat M.P., Hunink J.C., Brouwer R. (2019) Distributing Water Between Competing Users in the Netherlands. In: Wittwer G. (eds) Economy-Wide Modeling of Water at Regional and Global Scales. Advances in Applied General Equilibrium Modeling. Springer, Singapore

- Verma M., Plaisier C., Wagenberg C., Achterbosch T. (2019). A Systems Approach to Food Loss and Solutions: Understanding Practices, Causes, and Indicators. Sustainability 2019, 11(3), 579.

2018
- van Meijl, H., Havlik, P., Lotze-Campen, H., Stehfest, E., Witzke, P., Pérez-Domínguez, I., Bodirsky, B., van Dijk, M., Doelman, J. C., Fellmann, T., Humpenoeder, F., Levin-Koopman, J., Mueller, C., Popp, A., Tabeau, A., Valin, H., van Zeist, W.-J. (2018). Comparing impacts of climate change and mitigation on global agriculture by 2050. *Environ. Res. Lett*. 13 064021. doi: 10.1088/1748-9326/aabdc4.

- Doelman, J. C., Stehfest, E., Tabeau, A., van Meijl, H., Lassaletta, L., Neumann-Hermans, K., Gernaat, D. E.H.J., Harmsen, M., Daioglou, V., Biemans, H., van Vuuren, D. P. (2018). Exploring SSP land-use dynamics using the IMAGE model: regional and gridded scenarios of land-use change and land-based climate change mitigation. *Global environmental change*: human and policy dimensions, 48 . p.: 119 - 135.

- Hasegawa, T., Fujimori, S., Havlik, P., Valin, H., Bodirsky, B., Doelman, J.C., Fellmann, F., Kyle, P. Levin-Koopman, J., Lotze-Campen, H., Mason-D'Croz, D., Ochi, Y., Perez-Dominguez, I., Stehfest, E., Sulser, T.B., Tabeau, A., Takahashi, K., Takakura, J., van Meijl, H., van Zeist, W.-J., Wiebe, K. D., Witzke, P. (2018). Risk of increased food insecurity under stringent global climate change mitigation policy. *Nature Climate Change*, volume 8, p.: 699–703.

- Helming, J., Tabeau, A. (2018). The economic, environmental and agricultural land use effects in the European Union of agricultural labour subsidies under the Common Agricultural Policy. *Regional Environmental Change*, March 2018, Volume 18, Issue 3, p.: 817–830.

- Lotze-Campen, H., Verburg, P., Popp, A., Lindner, M., Verkerk, H., Moiseyev, A., Schrammeijer, E., Helming, J., Tabeau, A., Schulp, N., van der Zanden, E., Lavalle, C., Batista de Silva, F., Eitelberg, D., Walz, A., Bodirsky, B. (2018). A cross-scale impact assessment of European nature protection policies under contrasting future socio-economic pathways. *Regional Environmental Change*, March 2018, Volume 18, Issue 3, p.: 751–762.

- Mellios, N., Koopman, J.F.L, Laspidou, C. (2018). Virtual Crop Water Export Analysis: The Case of Greece at River Basin District Level. *Geosciences* (Switzerland). 9.10.3390/geosciences8050161.

- Philippidis, G. Bartelings, H., Helming, J., M'Barek, R., Smeets, E., van Meijl, H. (2018). The Good, the Bad and the Uncertain: Bioenergy use in the European Union. *Energies* 2018, 11(10).

- Philippidis, G., Bartelings, H., Smeets, E. (2018). Sailing into Unchartered Waters: Plotting a Course for EU Bio-Based Sectors. *Ecological Economics*, 147, p.: 410-421.

- Philippidis, G., van Berkum, S., Sanjuán, A., Tabeau, A., Verma, M. (2018). A Foresight Study of European East-West Agrifood Trade Options. *German Journal of Agricultural Economics*, 67(3), p.: 160 – 175.

- Stürck, J., Levers, C., van der Zanden, H., Schulp, C.J.E., Verkerk, P.J. , Kuemmerle, T., Helming,J., Lotze-Campen, H., Tabeau, A., Popp, A., Schrammeijer, E., Verburg, P. (2018). Simulating and delineating future land change trajectories across Europe. *Regional Environmental Change*, March 2018, Volume 18, Issue 3, p.: 733–749.

- Rutten, M., Achterbosch, T., de Boer, I., Crespo Cuaresma, J., Geleijnse, M., Havlík, P., Heckelei, T., Ingram, J., Marette, S., van Meijl, H., Soler, L.-G., Swinnen, J., van 't Veer, P., Vervoort, J., Zimmermann, A., Zimmermann, K. L., Zurek, M. (2018). Metrics, models and

foresight for European sustainable food and nutrition security: the vision of the SUSFANS project. *Agricultural Systems*, 163, p. 45 – 57.

- Verkerk, P. J., Lindner, M., Pérez-Soba, M., Paterson, J. S., Helming, J., Verburg, P. H., Kuemmerle, T., Lotze-Campen, H., Moiseyev, A., Müller, D., Popp, A., Schulp, C. J. E., Stürck, J., Tabeau, A., Wolfslehner, B., van der Zanden, E. H. (2018). Identifying pathways to visions of future land use in Europe. *Regional Environmental Change*, March 2018, Volume 18, Issue 3, p.: 763–773.

- van Meijl, H., Tsiropoulos, Y., Barteling, H., Hoefnagels, R., Smeets, E., Tabeau, A., Faaij, A. (2018). On the macro-economic impact of bioenergy and biochemicals – Introducing advanced bioeconomy sectors into an economic modelling framework with a case study for the Netherlands. *Biomass and Bioenergy*, 108, p.: 381 – 397.

Conference papers

- An ex-ante modelling approach of assessing the impact of R&D investments on global food security. Presentation prepared for the 30th IAAE Conference in Vancouver, Special Session on Global innovation and R&D, July 28- August 2, 2018.

- *A GLOBAL ECONOMIC EVALUATION OF GHG MITIGATION POLICIES FOR AGRICULTURE*
  - *International Conference on Agricultural GHG Emissions and Food Security, Berlin (2018).*
  - *European Association of Agricultural Economists (EAAE) Seminar, Brussels (2019).*

Reports & working papers

- Achterbosch T, Verma M, Leip A, Zurek M, Hebinck A, Oudendag D, Geleijnse M, Latka C, Havlik P, Kuijsten A, Kuiper M.(2019). A systematic analysis of social, economic and environmental sustainability metrics for the range of activities and world views encompassed in the EU food systems. SUSFANS Report

- Cui, D., Achterbosch, T.J., Kuiper, M.H., Shutes, L.J., Tabeau, A.A., Latka, C., Havlík, P., Frank, S. and Leip, A., 2019. Resumé on performance of EU food systems towards European FNS and SDGs. Deliverable 2.3: WP 2 Mapping of trends in food systems and related R&I policy frameworks. SUSFANS.

- Cui, D. , Kuiper, M., van Meijl, H., and Tabeau, A., 2018. Climate change and global market integration: implications for global economic activities, agricultural commodities, and food security. FAO SOCO 2018 background paper. Wageningen Economic Research 2018.

- Frank, S., van Dijk, M., Havlik, P., Cui, D., Heckelei, T., Kuiper, M.H., Latka, C., Witzke, H.P. and Achterbosch, T.J., 2018. Quantified future challenges to sustainable food and nutrition security in the EU: Deliverable No. 10.2. SUSFANS.

- Frank, S., Latka, C., Havlik, P., Kuiper, M.H., van Dijk, M., Achterbosch, T.J., Cui, D., Geleijnse, J.M., Hebinck, A., Heckelei, T. and Kuijsten, A., 2019. Foresight of EU sustainable food and nutrition security: the interplay between major challenges and policy responses at different spatiotemporal scales: Deliverable No. 10.4. SUSFANS.

- Henderson, B. et al. (2018), A global economic evaluation of GHG mitigation policies for agriculture, OECD, COM/TAD/CA/ENV/EPOC(2018)7.
- Kuiper, M.H. and Cui, D. 2019. Reducing food loss and waste to reach food security and environmental objectives: Identifying leverage points through a CGE analysis. State of Food and Agriculture 2019 background paper, Food and Agricultural Organization of the United Nations, Rome.
- Kuiper, M., Shutes, L., Verma, M., Tabeau, A., van Meijl, H., 2018. Exploring the impact of alternative population projections on prices, growth and poverty developments. Background paper to the UNCTAD-FAO Commodities and Development, Report 2017 Commodity markets,

economic growth and development. Food and Agriculture Organization of the United Nations. Rome.

- Latka, C., Heckelei, T., Batka, M., Boere, E., Chang, C.Y., Cui, D., Geleijnse, M., Havlík, P., Kuijsten, A., Kuiper, M. and Leip, A., 2018. The potential role of producer and consumer food policies in the EU to sustainable food and nutrition security. SUSFANS.
- Philippidis, G., Bartelings, H., Helming, J., M'barek, R., Ronzon, T., Smeets, E., van Meijl, H., Shutes, L., 2018. The MAGNET model framework for assessing policy coherence and SDGs - Application to the bioeconomy. EUR 29188 EN, Publications Office of the European Union, 2018, Luxembourg, 2018, ISBN 978-92-79-81792-2, doi:10.2760/560977, JRC111508.

- Bartelings, H., Smeets Kristkova, Z., Leuwen, M.: The impact of Brexit on the competitiveness of EU fisheries. This report is deliverable 5.2 of the European SUCCESS project.

- Smeets Kristkova, Z., Helming, J., Verma, M., Oudendag, D., Philippidis, G., Ferrari, E., Boulanger, P.: External Dimensions of EU policies – focus on CAP. Final Report.
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Annex 1 – MAGNET team at WEcR

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- Team leader
- CAP
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- Food security
- Climate Change

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- Land use
- Nutrition
- Bio-based economy

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- Land use change
    Developing countries

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- Agricultural policy

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- Fertilizers
- Climate change modelling
- Fisheries and aquaculture

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

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Diti Oudendag

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

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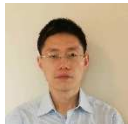- Consumption
- Food loss and Waste
- Households
- Non-tariff measures
- Climate change

Jason Levin-Koopman

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- Water scarcity
- Biofuels
- Climate change

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- Energy and climate change
- International trade
- Land use change
- Food security

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- Climate change
- Food Security
- Sustainable Food System

John Doornbos

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- Software development

Ewa Tabeau
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- Project/Programme management
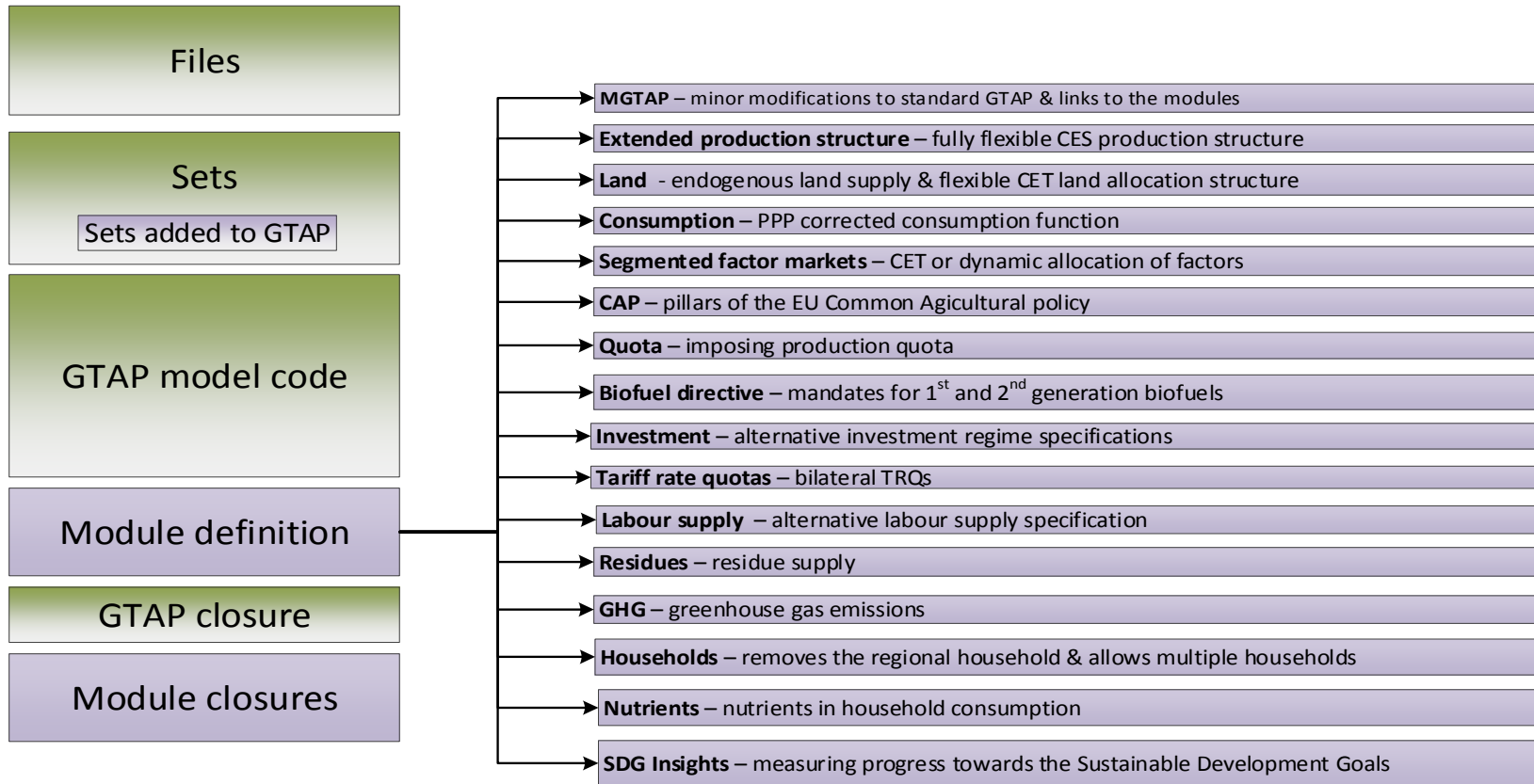- Food and nutrition security
- Population, migration, labour

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Eugene Westerhof

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- Data Management

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

SDG Insights – measuring progress towards the Sustainable Development Goals

Key:-

GTAP   MAGNET