IECOMAT summary

Sustainable material management and circular economy are high on the agenda of policy makers in many industrialized countries. The peak in resource prices of 2008, looming exhaustion of some critically important resources in the long term and short and medium term supply risk as result of changing political and strategic operating environments (for instance rare earths) have spurred interest in alternative concepts of material use in our economy. Against this background the IECOMAT project main objective was to investigate the potential for the Belgian economy of the transition towards a more circular economy model. First, a workable definition of the concept of circular economy was delineated. Secondly, the research teams developed and applied a set of complementary numerical and analytical tools that are each designed to study a particular aspect of sustainable material management. These models range from Input-Output models over partial, computable and general equilibrium models and analytical industrial organization models of economic incentives. Thirdly, the project has investigated in depth the micro economic incentives of economic actors (consumers, businesses, …) to adopt alternative material management business models. The main conclusions can be summarized as follows.

- The many definitions and conceptualizations of circular economy hamper perhaps the mainstreaming of it towards actual policy making, but at the same time, they are an indication of the depth and breadth of the concept. The IECOMAT research illustrates that circular economy is about a whole lot more than closing circles. Complex interactions between, at least, connected markets, rebound effects, environmental impacts, strategic business incentives and consumer attitudes are to be taken into account for a proper understanding of the desirability and incentivisation of a transition towards a more circular economy. The notion of “preserving the value of materials and products” and the notion of “functionality” should be central in circular economy research according to the IECOMAT research team.
- There exists a multitude of modelling approaches for circular economy, but none of them currently captures endogenously and comprehensively the shift from a linear to a more circular economy. For the moment, a complementary set of modelling tools best serves the purpose, each of them tailored to specific research and policy questions. The IECOMAT project has contributed substantially to the methodological development and empirical application of different modelling tools for Belgium, but additional investments in methodological and empirical research are definitely needed.
- The Input-Output and Computable General Equilibrium models demonstrates that the circular economy will have an economy-wide impact. The input-output model results show the importance of taking the very high level of openness of the Belgium economy into account, when designing policies. The application of the computable general equilibrium model to the sector of repair of household appliances shows how some sectors will be impacted through direct intersectoral linkages with the circular activities while other sectors will be impacted indirectly. Some sectors may be positively impacted, while other sectors may be negatively impacted. The bottom line remains that these intersectoral linkages are considerable and should be taken into account properly while designing policies in support of the circular economy in order to limit or prevent unintended consequences. In addition to their impact at the sectoral activity levels, different policy types will also differently impact other macroeconomic parameters (e.g. import

dependency, overall welfare & GDP, labour requirements, capital-intensity of production etcetera).

- Modelling the full global value chain, both domestically and abroad, is crucial for a comprehensive modelling of circular economy transitions in a small open economy like Belgium. The partial equilibrium framework developed under the IECOMAT project shows that environmental externalities in the life cycle of a good should be tackled by policy instruments that target decisions very close to where environmental effects originate. Also, given the interconnection of markets, a combination of policy instruments (like for example deposit-refund systems) will be necessary to align all stakeholders' incentives with maximum social welfare including environmental effects while avoiding negative rebound effects and illegal behaviour.
- Regarding the producers' perspective, the IECOMAT project investigated theoretical models of the strategic incentives of companies to engage in more circular business models like sorting and recycling, Peer-to-Peer and Pay-per-Use. The analysis shows that the possible adoption of more circular business models is driven by the interplay of different incentives like "market-expansion" (attracting new customers), "surplus-extraction" (charging more to existing customers) and "value" (the owner earning money by sharing his goods) effects. There are win-win situations possible in which firms switch to more circular business models because they are more profitable and at the same time beneficial for the environment. However, this is not always the case so that additional incentives remain necessary to achieve the desired transition.
- Through a series of interviews with businesses the IECOMAT team also investigated the business drivers for circular economy transition. This research revealed that many circular economy start-ups in Belgium are driven by personal conviction and their desire to have a positive impact on society through environmental, social and economic changes. In spite of this positive driver, the interviewees mentioned a strong need for smarter regulation and price signals that internalize the social costs of materials in order to achieve a more level playing field for circular business models.
- Regarding the consumer perspective on circular economy business models, the IECOMAT research demonstrates that there is a large heterogeneity among consumers in their willingness to switch away from conventional linear and ownership-based consumption models. Legal uncertainty, loss of status effects of ownership, the high perceived total cost of ownership etcetera seem to hold back even young consumer segments from switching towards more circular business models for clothing and smartphones. Only improved repair options (prolonging the life time of products) seem a more established and acceptable circular economy strategy to consumers for these product types. Overall, more elaborate use of smart monetary incentives will be required to incentivize the transition towards a more circular economy. A better understanding of the perceived consumer barriers can also help innovative companies to develop new, fashionable business models that can seduce consumers into more circular modes of consumption.

Keywords: circular economy; resource management; recycling of materials; input-output, partial and general equilibrium economic modelling; business models