MICAT

Multiple Impacts Calculation Tool

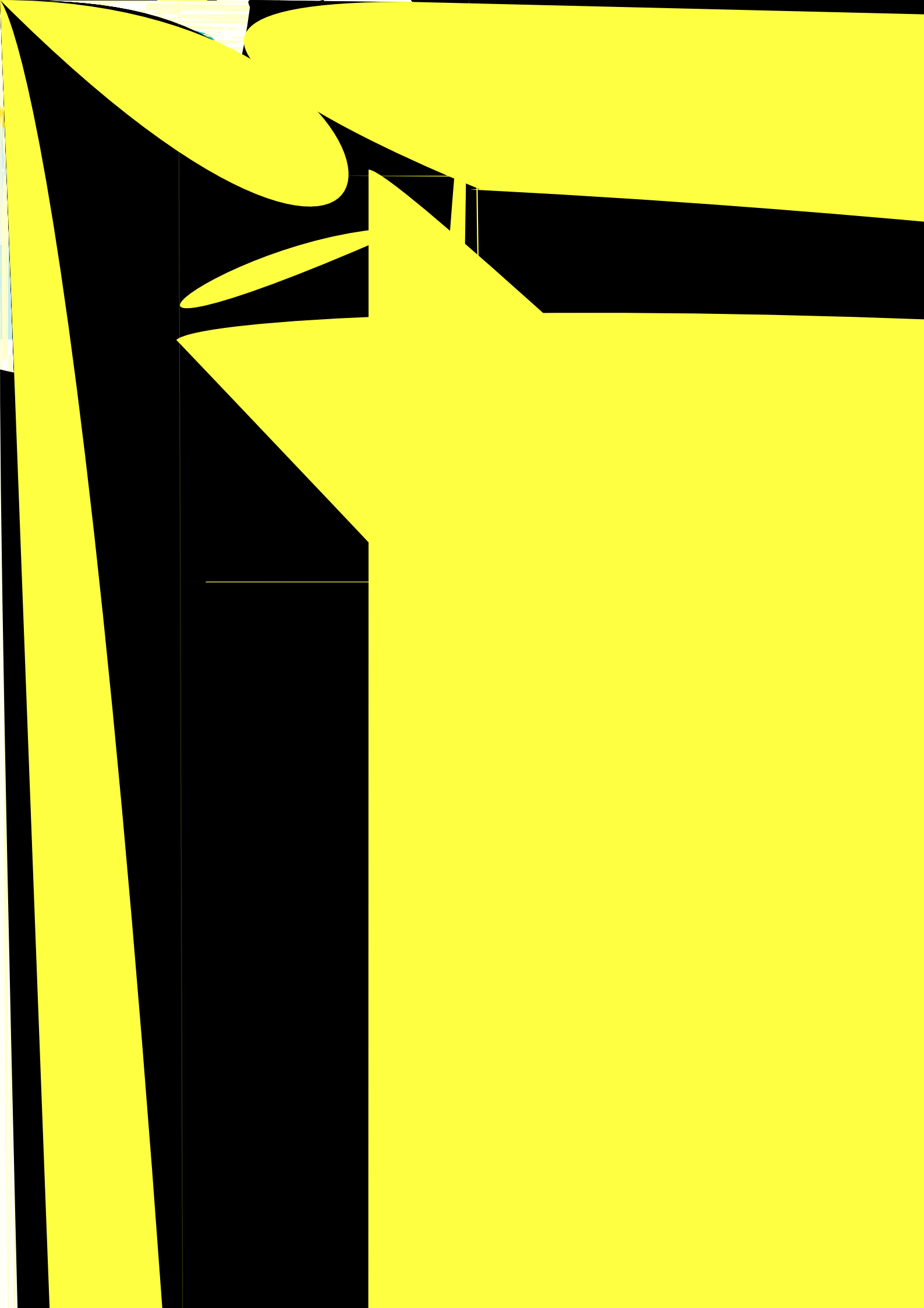
Empirical basis of Economic Impacts Import Dependency

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101000132.

Frederic Berger - Fraunhofer ISI

MICAT

Multiple Impacts Calculation Tool



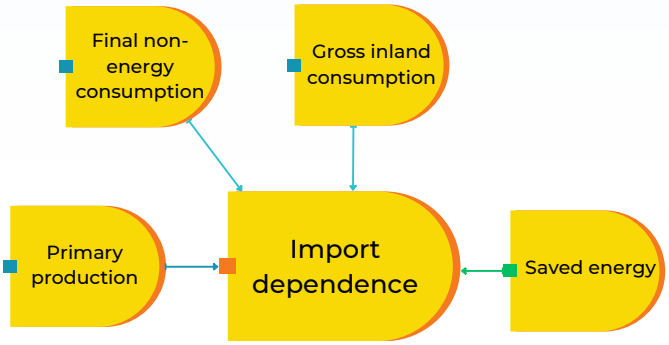
Potential savings ... regated to sector (s) or end-use (u) level) t... ecific energy carrier (with a relevant fuel mix) would reduce gross inland consumption without ...ring any other variable:

This figure can the ...levant energy carrie... by weighting with the cor... is possible, it would c... dependencies for certain ener... particularly important in men... different level of dependence for ... given the different predominan... countries of the resources.

... differentiation between sectors or ena... would not be expedient, since all savings impa... the overall wholesale market for the relate... energy ca... the same way and no sectoral targets regar... dependency exist.

...e quantification ... using a top-...vn approach, with ... eq... ...lable on a nationa... cos... ...ee-Mure.

...e linked to this formul... ery ...ependent resources sign... ... energy efficiency entail ... the indicator. Thereby, ...n import volumes canno... a... within this indicator. Therefore, ad... ...nd approach is proposed, base... on ... energy efficiency as 'first fuel'. Inste... ...ing the value of the energy consu... ...e related savings, the savings are acc... ...rimary production, as if they replaced ... used fuel in a scenario with a cons... ...iness-as-usual energy consumptio...



Two approaches with a different level of sophistication present themselves. If the envisaged measure aims at the reduction of the consumption of a single energy carrier, a standalone calculation for this specific product can be performed. The assessment of the measure's impact on import dependency is therefore significantly more accurate, since strong variations between import ratios for different energy carriers within a single country are common. This method can and should also be used if the mix of saved energy carriers is known. It would require the primary production, gross inland consumption, and non-energy uses for the examined fuel(s). If electricity or heat is saved, the respective local generation energy carrier mix is to be used. If unknown, the mean national mix can be used as a substitute. Another option can be to determine the saved energy carriers for electricity and heat generation on a merit-order basis.

Alternatively, in case the mix of saved energy carriers is unknown, the general unspecific equation can be employed using the same data but with total values. The underlying assumption is then that the ratio of saved fuels corresponds to the national energy carrier mix.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101000132.

Impact factor/functional relationship

Total aggregation:

$$\Delta ID_{c,e} = PP_{c,e}\left[\frac{1}{GIC_{c,e} - NE_{c,e}} - \frac{1}{(GIC_{c,e} - \Delta E_c \cdot k_{c,e}) - NE_{c,e}}\right]$$

Sectoral disaggregation:

$$\Delta ID_{c,e} = PP_{c,e}\left[\frac{1}{GIC_{c,e} - NE_{c,e}} - \frac{1}{(GIC_{c,e} - \sum_s \Delta E_{c,s} \cdot k_{c,e,s}) - NE_{c,e}}\right]$$

End-use disaggregation:

$$\Delta ID_{c,e} = PP_{c,e}\left[\frac{1}{GIC_{c,e} - NE_{c,e}} - \frac{1}{(GIC_{c,e} - \sum_u \Delta E_{c,u} \cdot k_{c,e,u}) - NE_{c,e}}\right]$$

First fuel approach:

$$\Delta ID_{c,e} = \frac{-\Delta E_c \cdot k_{c,e}}{GIC_{c,e} - NE_{c,e}} = \frac{-\sum_s \Delta E_{c,s} \cdot k_{c,e,s}}{GIC_{c,e} - NE_{c,e}} = \frac{-\sum_u \Delta E_{c,u} \cdot k_{c,e,u}}{GIC_{c,e} - NE_{c,e}}$$

Monetisation

Because the scale of the unquantifiable benefits significantly exceeds the quantifiable benefits (which would also come alongside significant methodological challenges), a monetisation of the import dependency is not recommended. Issuing a figure for the monetary value of the quantifiable share of the indicator would sell the benefits at less than fair value and undermine the central point of this indicator.

Aggregation

An aggregation of results with the indicator supplier diversity would be very expedient. A high import dependency can be cushioned by a variety of reliable supplying countries, while a low supplier diversity is generally not particularly problematic in case of a low import dependency. Thus, merely the combination of both MI is really meaningful and useful.

Conclusion:

The indicator import dependency is very relevant and has been pushed even further into the political spotlight by Russia's war in Ukraine. Nearly exclusively relevant on the European and national level, the data needs are generally covered by Eurostat and PRIMES. It might be worth discussing which quantification approach is most fruitful, the classical or one basing itself on the Energy Efficiency First principle. Moreover, an aggregation with the MI supplier diversity would enhance the meaningfulness of this indicator. However, a monetisation of the MI is not recommended, since the correct inclusion of monetary benefits of the indicator would significantly exceed the scope of this project.