



## RURAL BIOMASSES IN URBAN CYCLES

TAMPIO ELINA, RASI SAIJA, LUOSTARINEN SARI, SAASTAMOINEN MARKKU, MARTTINEN SANNA, WINQUIST ERIKA, TIMONEN KARETTA (Luke), MANNINEN KAISA, GRÖNROOS JUHA (SYKE)

### Biogas potential

The theoretical biogas potential in Finland is 24 TWh and techno-economical potential 10 TWh (Fig. 1). Rural biomasses (manures, energy crops and residues) contribute to around 86% of the techno-economical biogas potential in Finland. In addition to energy production, a biogas plant has also other benefits. Biogas process is an easy way to handle e.g. excess silage, which would otherwise need to be composted and then spread separately on the field. Use of grass silage as a co-substrate also increases biogas production and the nutrient content of the digestate. Furthermore, digestate can be used as a fertilizer or soil amendment.

Published in: Rural biogas: feasibility and role in Finnish energy system. <http://bestfinalreport.fi>

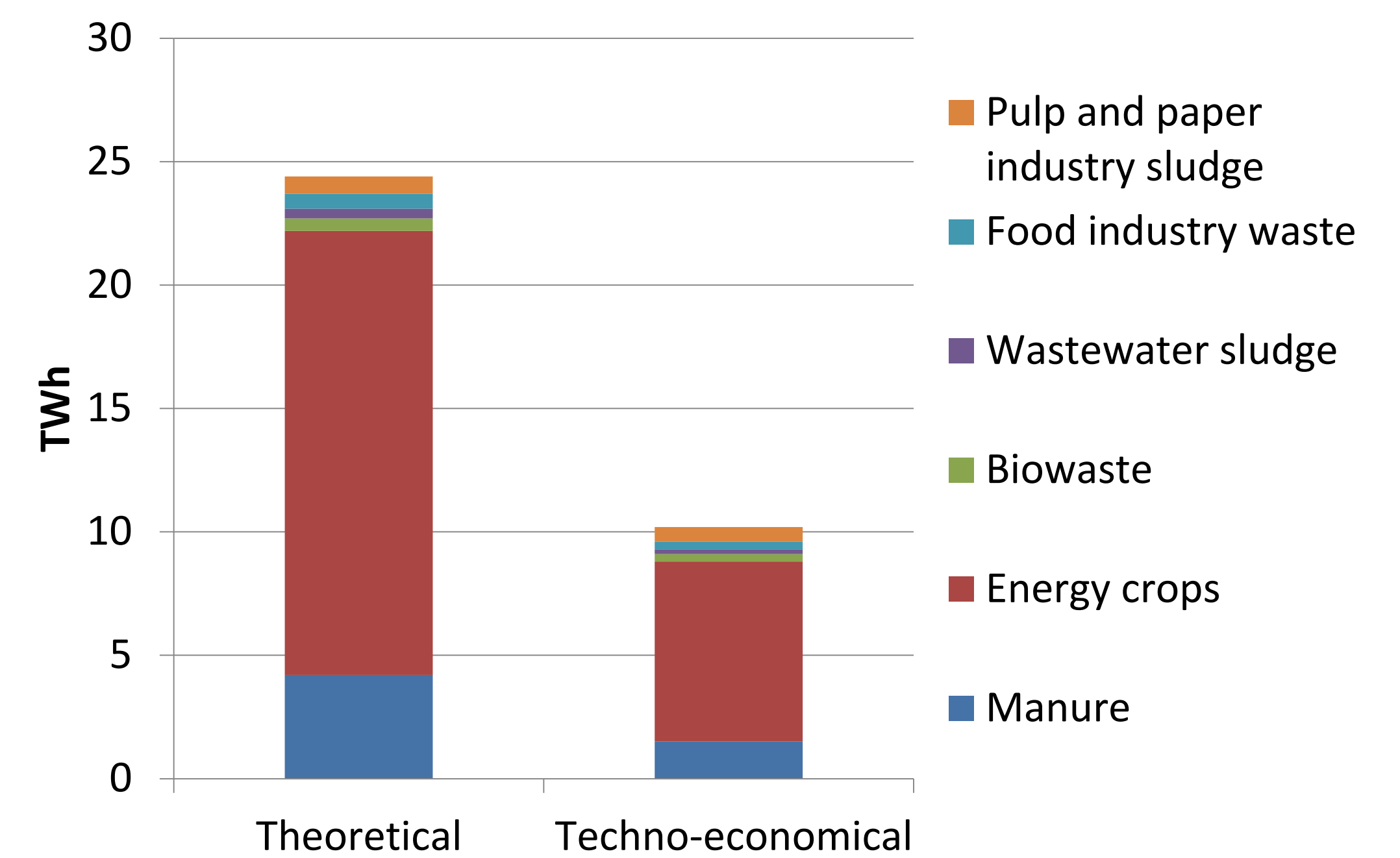


Fig. 1. Theoretical and techno-economical biogas potential of biomasses in Finland.

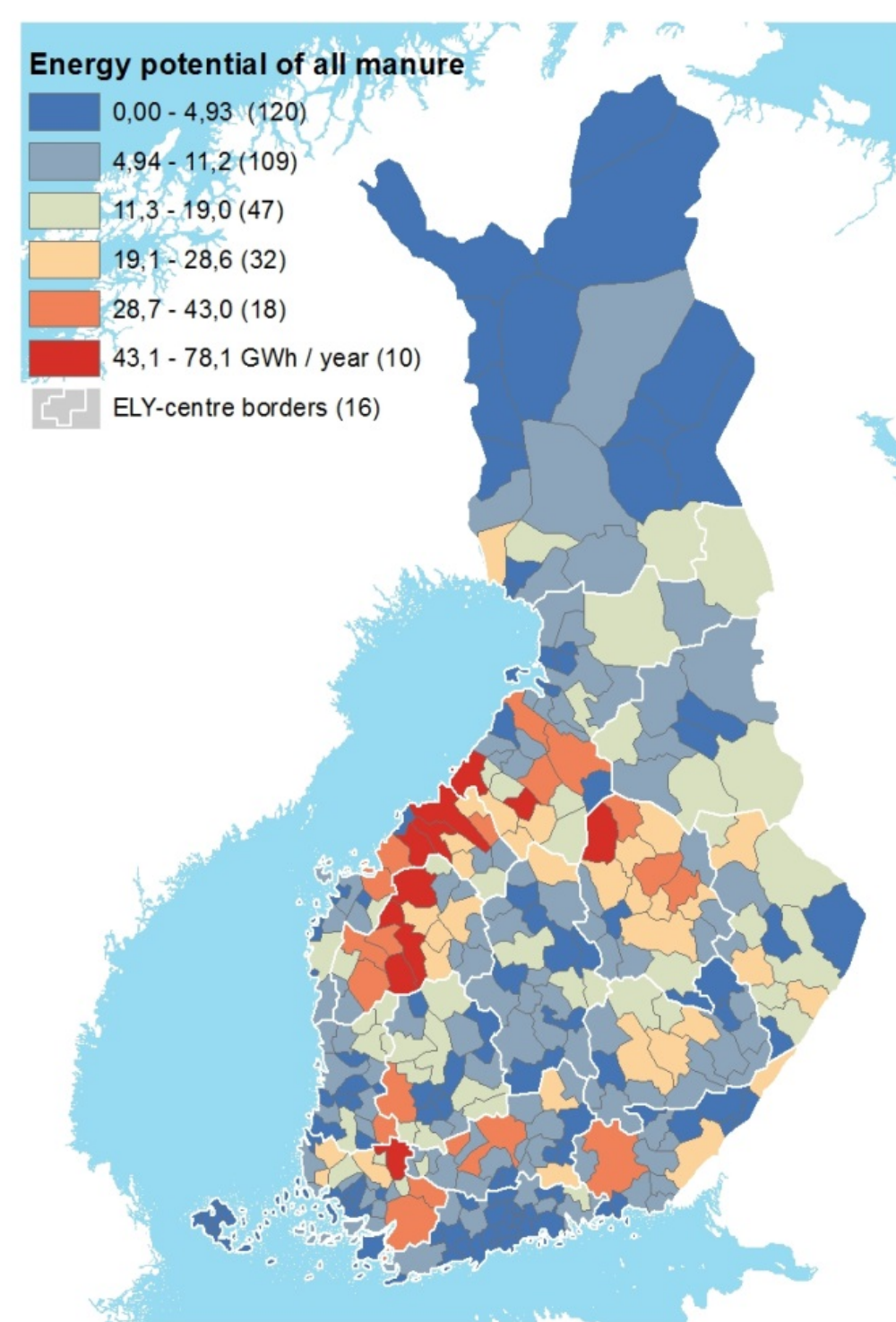


Fig. 2. Manure production in Finland (cattle, pigs, poultry, horses).

### Heat and electricity from horse manure

In Finland, 10 t/a of horse manure and its beddings are produced per animal, while the total animal quantity is close to 75 000. To tackle the difficulties with the horse manure utilization in urban areas, the co-incineration of manure with wood chips has been studied. Horse manure with saw dust as bedding material corresponded to 30% of the energy produced in the power plant. The results showed that the use of saw dust bedding and the co-incineration concept produced 80% less greenhouse gas emissions compared to manure composting and use of peat as a bedding material.

Published in: Hevosennan energiakäytön ympäristövaikutukset. <http://urn.fi/URN:ISBN:978-952-326-246-1>

### Urban farming

The changing eating habits in the future will favor local food. This has already increased the amount of home farming but also commercial greenhouse farming in urban city areas. The local production of vegetables in greenhouses reduces transportation costs and improves the product quality as they are fresh. To produce a sustainable and resource efficient greenhouse concept, vegetable waste, as well as other biowaste from the area, can be treated in a biogas plant (Fig.3). Subsequently, the produced energy and nutrients can be utilized in local food production.

Published in: Resource efficient use of biomass in future cities. <http://bestfinalreport.fi>

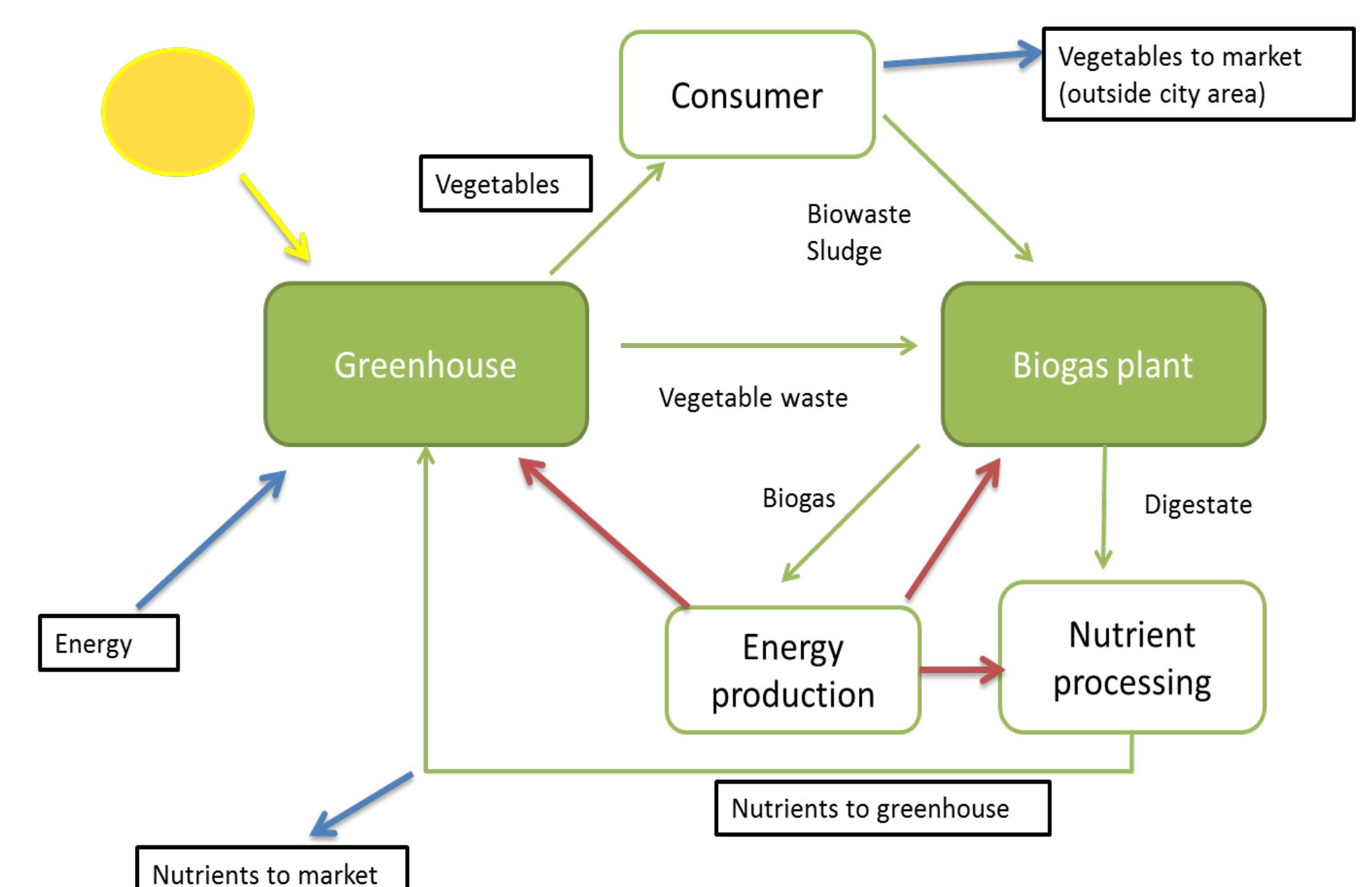


Fig. 3. An urban greenhouse concept.