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Zdeněk Linhart[1] and Vladimir Hönig[2]

[1]Department of Management, Faculty of Economics and Management, Czech University of Life Sciences, Kamycka 129, 165 21 Prague 5, Czech Republic
linhart@pef.czu.cz

[2]Department of Chemistry, Faculty of Agrobiology, Food and Natoral Resources, Czech University of Life Sciences, Kamycka 129, 165 21 Prague 5, Czech Republic
honig@af.czu.cz

Annotation: Research question is if excess of energy in C:N balance relevant source for CAP restructuring. The objective is to reduce value of agricultural and regional subsidies by increased price of products made out of waste. It was concluded that 30% decrease of agricultural subsidies is possible due to synergy of production of lacking proteins with fuel standardisation. Abandonment of investment subsidies for biogas, which is lacking any synergy due to subsidised price of green energy will also save many hectares for food and feed production. Balancing C:N doesn't solve problem of obesity. Therefore, saved subsidies should be partly used for schools opening better horizons to people with low social status. Subsidies for healthcare of people with high social status who rarely fall in obesity are not used in reality. Further development of technology converting waste into products would save subsidies for waste processing.

Key words: Economy, circular, energy, protein, biofuel, oilseed rape

JEL classification: Q42, Q57

1 Introduction

Waste is often useful raw material, exceeding balance. Price of excessive energy over proteins (C:N) in European food and feed is seen at obesity, investments to processing of renewable fuels and climate warming. Negative excess of energy over proteins can be compensated by trade, by processing of commodities in circular economy and in mixed or organic farms. Mixed and organic farming is marinalised because of high labour intensity and low income of employees oppose to modern market oriented farming. Although fatty acids (C) may principally act in the hypothalamus and function to increase food intake in response to a fast, triglycerids sensing may depend on local hydrolysis by Lipoprotein Lipase (LpL) in the mesolimbic pathway where they decrease the rewarding or motivational properties of food (Cansell and Luquet, 2015). Therefore, obesity of people with limited physical activity can be regulated.

World trade has compensated excess of palatable fatty food and feed in Europe by import of 70-80% of proteins from overseas (Table 2). Later, Europe has decreased dependence on global commodity trade by start of circular economy decreasing imports of lacking protein to 50% by production of proteins for feed from byproduct of biofuels of first generation.

Surprisingly, while biofuels are taxed the other alternative energies are supported. Farmers receive subsidies to produce excess of energy. Traders benefit from import of proteins. Municipalities are supporting investments into waste processing. These contradictory policies benefit stakeholders but, from system point of view are more expensive than above shown example of conversion of waste into resource in circular economy.

Are subsidies of waste processing and agricultural subsidies really cheaper than revenues from sold products compensating C:N unbalance? This research question is answered if objective of this article succeeds to reduce value of agricultural and regional subsidies by increased price of products made out of waste. Objective will be reached by comparison

of filling gaps by worldwide commodity trading with investments into technologies for products processed from waste and low yields of organic or high costs of mixed farms.

2 Materials and Methods

Not all parts and data used fits together precisely. This study is not comparative neither compile only, but construct conclusions for main objective from relationships. Therefore, methodology proves objectives if following arguments will be true:

Benefits of excessive energy in circles = f(- healing costs of inhabitants with overweight and obesity; + energy of biomass and biofuels; + income of inhabitants due to compensated imports of lacking proteins; + decreased damage due to climate warming; + biodiversity; - climate warming)

Enthalpy (Scheme 1), climate warming (Scheme 2) and health costs (Table 1) were found as secondary issues besides C:N balance making products out of wastes (Table 2 and 3). Filling gaps by worldwide commodity trading with investments into technologies for products processed from waste and low yields of organic or high costs of mixed farms has no common denominator value. Therefore, argument of comfort and investment attractiveness of public and private investments are discussed. Expectations for testing of findings by taxpayers and investors as relevant groups of stakeholders are follows:

1. People are lazy. Therefore, labour intensive technologies will be abandoned and employee status in industry of circular economy preferred.
2. Investors are rich. Therefore, the most expensive stable investments will be preferred over accidental commodity trading opportunities.

Unstructured interview was used for verification of relationship between different supports, for example private, public, investment, product and operations subsidies reducing its value due to increased price of products made out of waste.

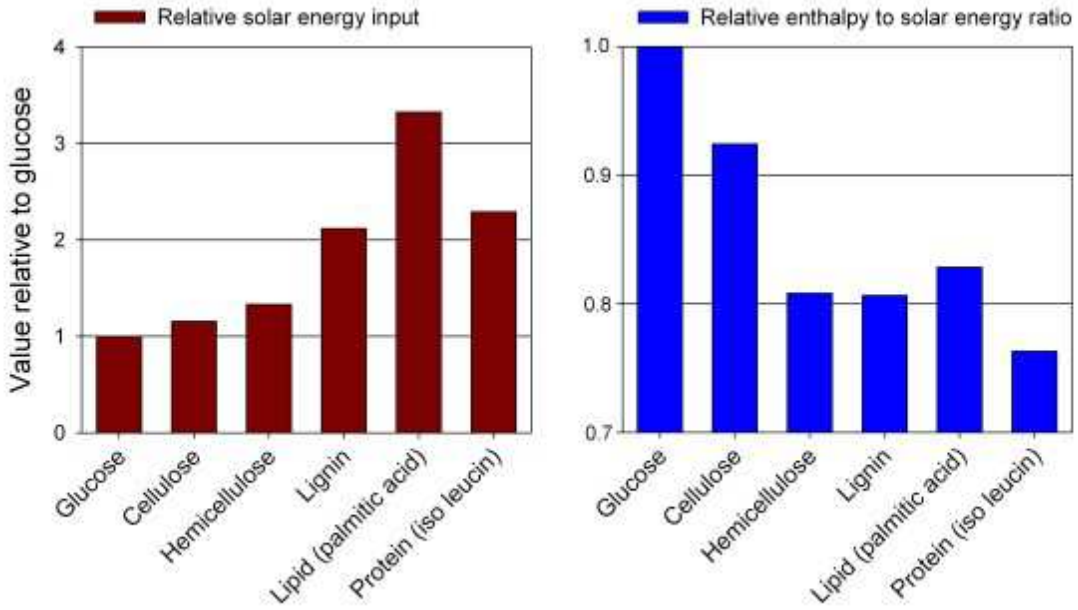
Data from technical analysis were converted into currency as common denominator allowing comparison of fuel, health and trade in both Nature and Society if possible. Normative values of saved GHG, costs of biomass waste processing and price of biofuels were used to calculate impact for both Nature and Society. An excise duty was not taken into consideration because this criteria applies only for society. Costs of dependence on palatable food was calculated from costs of medical care diseases caused by obesity.

Value of imported proteins from overseas was compared with investment costs for decision to protect or remove trade barriers. Standard practice evaluating technologies, which use the global warming potential (GWP) compare the integrated radiative forcing of emitted gases over a fixed time horizon (Solomon, 2007). Edwards, M.R. and Trancik, J.E. (2014) demonstrate that the GWP misvalues the impact of CH_4-emitting technologies as mid-century approaches, and we propose a new class of metrics to evaluate technologies based on their time of use. The instantaneous climate impact (ICI) compares gases in an expected radiative forcing stabilization year, and the cumulative climate impact (CCI) compares their time-integrated radiative forcing up to a stabilization year. The impact of natural gas for transportation, with CH4 leakage, exceeds that of gasoline within 1–2 decades for a commonly cited 3 W.m-2 stabilization target. The impact of algae biodiesel overtakes that of corn ethanol within 2–3 decades (Frank, E.D., Han, J., Palou-Rivera, I., Elgowainy, A. and Wang, M. Q. (2012), where algae co-products are used to produce biogas and corn co-products are used for animal feed.

3 Results

Firstly, increased price of products made out of waste for reduction of subsidies is searched in process of saving solar and use of chemical energy in Nature to its select best performing source. Values of glucose, cellulose, hemicellulose, lignin, lipid and proteins are shown in relation to energy input (left pane) and to enthalpy to solar energy input ratio for glucose (right pane) (Scheme 1). Lipids having sixth position and needing twice more solar energy oppose to glucose when constructed at left pane have third position at right pane of solar energy leaving hemicellulose, lignin and proteins behind. Highly concentrated energy of lipids favours both industrial processing and worldwide trade oppose to organic and mixed farming with local applicability only. Therefore, trade and industrial processing of condensed energy of oils will be compared with less concentrated energy of glucose in following text (Scheme 1).

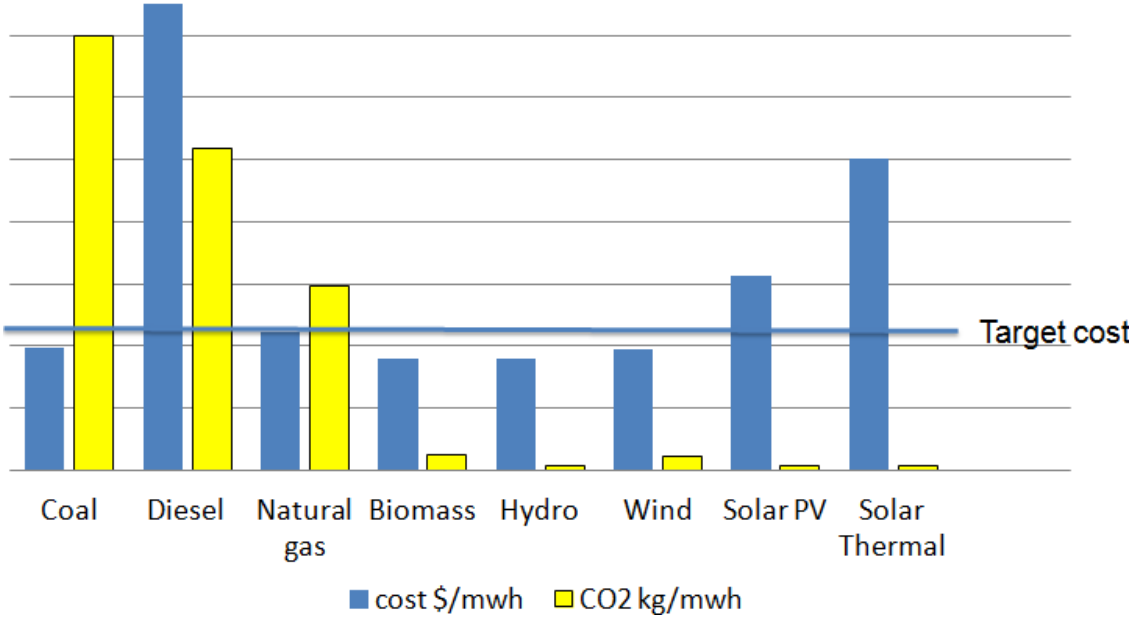
Scheme 1. Efficacy of Nature



Source: Bentsen and Felby, 2012

Secondly, costs and pollution of generated and used renewable energy were observed to select the cheapest and the least polluting solution. For example, renewable electricity generation reached 64.4 TWh in the U.K. last year, up 20 percent from the 53.7 TWh reported for 2013. Bioenergy increased 24 percent reaching 22.9 TWh. The increase in bioenergy generation is primarily attributed to the second biomass conversion at Drax Power Station. Renewables accounted for a record 19.2 percent of electricity generation, up 4.3 percent from 14.9 percent in 2013. Renewable capacity was 24.2 GW at the close of 2014, up 23 percent from the 4.5 GW reported in 2013. Best combination of both low cost electricity and low carbon emissions have biomass, hydro and wind energy production facilities (Scheme 2). All other sources of energy cause higher both costs and climate warming (Burnham, A., Han, J., Clark, C. E., Wang, M., Dunn, J. B. and Palou-Rivera, I., 2012).

Scheme 2. Electricity Cost and Carbon Dioxide Emissions per kilowatt hour



Source: http://www.viaspace.com/biomass_versus_alternatives.php from 24.4.2015

Thirdly, only biomass was further processed because its cultivation and harvest pushes people to move, what they are accustomed to. Otherwise, their increased body weight increases health costs. To confirm this expectation the health costs were compared according to body weight. The predicted average adjusted total direct medical costs per year and per user were estimated to be EUR 1029 for healthy weight people, EUR 1093 for overweight people and EUR 1040 for obese people. The predicted indirect costs increase significantly from a healthy weight participant (EUR 2271) to an overweight participant (EUR 2826, $p < 0.01$) as well as to an obese participant (EUR 2830, $p < 0.05$) (Wolfenstetter, 2012). Health costs per one participant of each category of different categories are listed in headlines of columns (Table 1). Age and social status have opposite impact on obesity. Overweight and obesity are significantly different in age categories. Social status of people with normal weight and overweight significantly correlates. But, social status of people with overweight and obesity has oppose polarity, don't correlate significantly and is significantly different. We may conclude that human body has large capacity to use excess of energy for improvement of social status. People with high social status should bare their health costs of overweight. Obesity more damage people with low social status. They should be better treated not by hospitals but schools. Increased costs for medical care for patients with overweight directly EUR 11 and indirectly EUR 59 per year indicate that not everyone is harmed by unbalanced C:N. Therefore, consequences of C:N imbalance on health costs may finish with this justification of school role improving competitiveness of individuals, which brings higher benefits than waste conversion to products, but out of topic of this article.

Healthy weight: $18.5 \leq BMI < 25$; overweight: $25 \leq BMI < 30$; obesity: $BMI \geq 30$.

a - Column percentages per gender, age and social inequality score are shown.

b – Row percentages per each characteristic (sex, age group, socioeconomic strata) and weight category are shown.

t – t-test value; r – correlation; p – reliability

Table 1. Health impact of excessive energy

< 75 years		**Overall**	**Healthy weight (EUR 2271)**		**Overweight (EUR 2826)**		**Obesity (EUR 2830)**	
		***n* = 2581 [*n* %]** [a]	**n=988 [*n* %]** [b]		**n=1135 [*n* %]** [b]		**n=458 [*n* %]** [b]	
Age (years)	35–45	22.1%	330	57.9%	185	32.5%	55	9.6%
	45–55	26.3%	325	47.8%	253	37.2%	102	15.0%
	55–65	27.4%	203	28.7%	369	52.1%	136	19.2%
	65–75	24.1%	130	20.9%	328	52.6%	165	26.5%
			t=-0.430; p=0.696;		t=7.584; p=0,005;			
Social class	Lower	14.8%	94	24.7%	175	45.9%	112	29.4%
	Lower middle	20.3%	176	33.7%	215	41.1%	132	25.2%
	Middle middle	22.0%	231	40.6%	257	45.2%	81	14.2%
	Upper middle	25.0%	291	45.1%	264	40.9%	90	14.0%
	Upper	17.9%	196	42.3%	224	48.4%	43	9.3%
			r=0.973; p=0.005		r=-0,369; p=0.541;			

Source: Wolfenstetter, 2012, adapted

Fourthly, self-sufficiencies below 100% between production and consumption of biomass for food and fuel are showing need for imports (Table 2) to compensate lack of protein. 68% of lacking proteins in EU C:N food and feed balance is showing needed volume with price of N up to level of imported soybeans. Skins of oilseed rape are considered as waste even with protein content due to glucosinulates. But this protein feed from waste becomes a product if its volume is sufficient to run research, standardisation and genetic or industrial improvements. There is not much place for manoeuvres as land is limited resource. 75% of self-sufficiency in N from oilseed rape shows the volume if biofuel is processed.

Table 2. EU - 27 balance sheet for protein rich feed materials in 1000 t for 2011/12

	EU production (*)		EU consumption (**)		Self-sufficiency (%)
	Products	Proteins	Products	Proteins	
Soybeans / meal	1275	485	32672	15220	3
Rapeseed and sunflower/meals	27492	5164	21779	6917	75
Pulses	2180	480	1780	392	122
Dried forage	4483	852	4250	808	105
Miscellaneous	3205	738	6056	1291	57
Sub-total	38635	7719	66537	24628	31
Fish meal	324	224	576	397	56
Total	38959	7943	67113	25024	32

Source: PROLEA in FEFAC: http://www.fefac.eu/files/55172.pdf, 2015

(*) EU production from EU seeds
(**) Including consumption by the pet food industry and on-farm uses
Miscellaneous: includes groundnuts, linseed, copra, palm kernel and cotton seed meals and corn gluten feed (Table 1).

Fifthly, the needed volume of lacking proteins was compared with potential of lacking land and performance of crops across countries of Europe (Table 3). The best alternatives are oilseed rape covering lacking protein with 0% increase and alfa-alfa with 8% increase of yield or area to decrease imports of soy by 50%. Pulses and alfalfa may compensate lack of proteins in circle of organic farming. Oilseed rape may decrease imports of protein to 50% in conventional agriculture circle. Table 3 shows consequences of assumption that 50% of the imported soya bean protein would be replaced by EU production of each of the mentioned crops when they have reached a yield level competitive to that of soft wheat.

Table 3. Yield increases required for the potential value of the protein crops to match that of wheat

Crop	Yield			Oil		Starch		EU
	current (t/ha)	required (t/ha)	increase (%)	produced (M ton)	World oil (%)	produced (M ton)	Area needed (km^2)	arable land (%)
Soya	2.7	3.4	30	3.9	9.5	0	57.264	5.4
Rape	3.1	3.1	0	13.8	61.9	0	111.846	10.5
Sunflower	2.2	2.9	31	20.3	133.3	0	163.277	15.4
Lupin	1.0	4.2	334	1.9	nd	0	51.934	4.9
Pea	2.7	4.8	76	0	0	15.5	72.683	6.8
Faba bean	2.7	4.5	69	0	0	11.1	63.553	6.0
Alfalfa	40.2	43.6	8	0	0	0	40.294	3.8

Source: de Visser, Schreuder. and Stoddard, 2014

Sixthly, stemming from previous work(s) biobutanol and hydrogenated vegetable oils (HVO) may increase benefits of saturation of lacking proteins while fully replacing ether based additives in modern fuels.

4 Discussion

Volume of waste biomass from industrial processing of decreased number of high yielding crops in crop rotation is increasing opportunity to convert this waste to product for sale. Southern sorts for production of vegetable oils and northern model of wood processing into biofuels offer complementary ingredients for standardisation of products for example feed and fuels. Therefore, negative impact of waste from globally specialised crop rotation needn't only to increase turnover and make products competitive by low price and standard quality, but also improve biodiversity in wild Nature. We have proved in our other articles that properties of biobutanol standardise fuels better than bioethanol. Trends reflect strong growth and investments across all market sectors (REN21 Renewable Energy Policy Network for the 21st Century, REN21, 2011). Also reuse of investments of first generation of biofuels while a break event point for investments into second generation biofuels is decreasing is positive. Private investments into first generation of biofuels can be repaid and European public subsidies for waste biomass processing, especially investment subsidies and subsidised price of green energy from biogas facilities, can be decreased if high quality renewable fuel – biobutanol is produced.

High yields and advanced technology of agriculture commodities favours local waste processing, while reducing 80% dependence on World trade with feed proteins to 50%. Private investments into processing of byproducts are two and half times exceeding capacity of production of commodities like oilseed rape and cereals. These commodities have advantage of natural monopoly for France, Germany, Czech Republic and Poland. Further,

not only oilseeds and cereals, but all lignocellulosic materials, starch and simple sugars can be processed by microorganism Clostridium acetobutylicum producing biobutanol, ethanol and acetone. Quality of raw biofuels is bad, except of methylesters of oilseed rape. Besides fuel quality improving biobutanol, properties of fuel from biomass can be improved by hydrogenation of animal fats and other waste biomass in fuel blends.

Biogas technology is transporting waste to fields while damaging diversity of wild Nature oppose to all technologies of biofuels. Privately invested biofuel technologies, which are also improving C:N balance in feeds are much better option than public investment support and subsidised green energy of biogas. This difference of private and public support of investments and operations justifies ban of public support for developing market of biogas.

Subsidies for bioeconomy of fuels are recently replaced by regulations, what makes this technology cheaper for taxpayer. The joint selling (including fixing prices together) supporting promotion of increased volume of proteins in food and feed against standard competition rules) under conditions of Article 101(3) of Treaty on Functioning EU regulate market access. Further, the EU Commission has launched a public consultation on new draft guidelines on the application of EU antitrust rules in the agricultural sector in January 2015. The joint promotion on some specific criteria such as protein content in the oilseed sector including technical information for feeding ration, would help to promote EU production in comparison with standard use of soybean for the feed sector (Copa-Cogeca, 2015).

5 Conclusion

The objective to reduce value of agricultural and regional subsidies by increased price of products made out of waste succeeded to decrease this value about 30%. Also long list of observed issues was reduced with following arguments:

1. Synergy of two factors, lacking protein and fuel as new product from waste in circle of global economy is developing faster than local mixed and organic farming (Table 2, 3). Decrease of emissions in carbon equivalent by synergy of lacking N balancing by biofuels was discussed.
2. Privately financed investments to biomass processing technologies may develop even faster if competing biogas technology would lose high public investments (see discussion). Subsidies developing biogas are removing number of hectares from availability for feed and food production at all farms without synergy effect of proteins and competitive price for new product as green energy is subsidised.
3. Ban of subsidies of Common Agriculture Policy for commodities is justified as World price for products with natural monopoly is stable and profitable (see discussion).
4. Circle of mixed and organic farming with enthalpy and entropy compensating each other still deserves some subsidies (Scheme 1).
5. Some public subsidies should be given to schools to teach people with low social status whose vulnerability by obesity was found (Table 1).
6. It was shown that high performing upper class of inhabitants (Table 1) is not harmed by overweight and can cover higher health costs itself without subsidies.

Limitations: These six arguments are still complex from methodological point of view. Methodological simplification of generalised factors of employees' laziness and investors' stability for prognoses of development of circular economy would help. Low fit of data of secondary origin is known, but was compensated by references to publicised data. Especially, data about volumes of subsidies and default climate warming data were not shown

in this article as they are known. But, still further research is needed to prove validity of default values of both subsidies and carbon equivalent emissions.

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