Journal of Socialomics
ISSN: 2167-0358

Padovan et al., J Socialomics 2015, 4:2
DOI: 10.4172/2167-0358.1000119

Research Article Open Access

Social Practices of Ordinary Consumption: An Introduction to Household Metabolism

Dario Padovan[1]*, Fiorenzo Martini[2] and Alessandro K. Cerutti[2]

[1]*Department of Cultures, Politics, Society, University of Turin, LungoDora Siena 100, 10153 Torino, Italy*
[2]*IRIS (Interdisciplinary Research Institute on Sustainability), University of Turin, via Academia Albertina 13, 10100 Torino, Italy*

Abstract

In recent years, the evaluation of environmental sustainability of consumption practices has gained a central role in European research. Several analytical tools and methodologies are proposed in order to quantify the environmental burden of production and consumption. Such models can be very precise and efficient in the evaluation of energy consumption, emissions and land use, but most of the time; they are unsuitable to catch the social dimension of the investigation. Thus, many of them are unsuitable for investigating at the level of consumption practices. In this article we focus on Household Metabolism, a model that links social and environmental performances in order to perform a systemic investigation of the impact of consumption. Yet, housing metabolism implies not only quantitative aspects of consumption and the merging of different methods of analysis. It engenders some redefinitions of the sociology of consumption such as the discovery of the environmental aspects of consumption itself, the implication of household models in order to identify specific environmental impacts, and the significance of social practices as the principal activator of societal metabolism, and as the key driver for future changes in consumption behaviour.

Keywords: Social practices; Household metabolism; Impact of consumption

Introduction

This paper, quite oriented toward the perspective of the science of consumption, presents the Household Metabolism (Moll et al.) [1] model and a coupled hybrid assessing tool with some sociological aspects related to its application. As suggested by Shove and Warde [2] sociology of consumption has made real progress in identifying and dissecting a series of mechanisms, which maintain and expand demand for goods and services. This is the reason why sociology of consumption needs tools for the evaluation of the environmental sustainability of the way people consumes. Several consumption patterns are claimed to be sustainable but evaluation of different social scenarios from an environmental point of view is quite difficult to achieve and suitable tools are required. The self-evident fact that the massive use of machinery—in transport, communication, digital systems, entertainment, home design, and nearly all technologies—which provide societies with their dynamic character are almost invisibly dependent on energy use (Horta et al.) [3] suggests that the decoupling between economic growth and energy consumption is very arduous. Changing the current energy predatory model that is spreading globally with dramatic consequences for climate change, is in fact very challenging.

In this article we highlight a theoretical and empirical model - Household Metabolism - which aims at studying the relationship between consumption dynamics and their environmental effects, as a basic method for the application of a hybrid environmental assessment method in order to obtain a systemic evaluation of the environmental burden of consumption practices. Yet, housing metabolism implies not only quantitative tools of investigation, but it engenders also some redefinitions of the sociology of consumption. It enables us to discover the environmental aspects of consumption itself, the implication of household models working in order to identify specific environmental impacts, and the significance of social practices as the principal activators of household metabolism and as the key drivers for future changes in consumption behaviour.

In this paper we present both the sociological implications of Household Metabolism and its methodological foundation. In the first section, socio-metabolic approaches as the key model for assessing consumption at different levels of social system, and as a way to think the society-nature dialectic in an integrated way, are investigated. In the second one, we show how a metabolic approach can reassemble production and consumption for a more useful socio-environmental perspective. In the third section we discuss the importance of household perspective for studying consumption and its consequences on social stratification and inequalities. In the fourth section we open the chapter of social practices viewed as household metabolism activators. In fifth and sixth parts we present the formal model that grounds Household Metabolism merging the LCA and IOA assessing environmental methods.

Metabolic Consumption

Societies draw from nature matter, energy, services, knowledge, ideas for their reproduction and maintenance. Only the most obstinate cannot recognize that the problems posed by environmental crises are deeply affecting global social systems reproduction and thus becoming an object of research of sociology. Environmental sociology itself, not to mention other branches such as sociology of consumption, rarely engaged with relations between natural processes and social practices. It is rather concerned to understand environmental problems as socially constructed "dilemmas", diverting attention from the connections between social practices and ecological changes.

***Corresponding author:** Dario Padovan, Department of Cultures, Politics, Society, University of Turin, and Lungo Dora Siena 100, 10153 Torino, Italy, Tel: 011/4371425; E-mail: dario.padovan@unito.it

Received July 30, 2015; **Accepted** August 25, 2015; **Published** September 02, 2015

Citation: Padovan D, Martini F, Cerutti AK (2015) Social Practices of Ordinary Consumption: An Introduction to Household Metabolism. J Socialomics 4: 119. doi:10.4172/2167-0358.1000119

The complex society/nature was, in essence, studied in the light of a one-way causality, from social to natural [4]. If the early social sciences considered human systems embedded in natural ecosystems, for contemporary social sciences is normal consider the latter part of the overall social system. A more realistic view should not only claim that the "natural" is deeply involved in all social forms (Williams) [5], but that social systems are mainly ecological regimes aimed to appropriate natural resources as these were free gifts [6]. As proposed by Michel Goldman, not only society should be investigated as constitutive of nature and vice versa, but also nature must be grasped as an actor with a materiality sometimes joined to sometimes autonomous from society [7].

To perform a more accurate and systemic view of society/nature relationships we suggest adopting a metabolic perspective. In the same direction we need a tool to perform empirical research at the level of consumption, able to manage data at different scales. Within biological and ecological analysis, the concept of metabolism has been used as a central category in systems-theory to explain the relation of organisms to their environments. It refers to a complex process of metabolic exchange, whereby an organism (or a cell) draws upon materials and energy from its environment and converts these by way of various metabolic reactions into the building blocks of proteins and other compounds necessary for growth. In short, a metabolic system could be considered an input-output system, even if it is not only this.

A metabolic perspective allows us to understand where the input-output interfaces of nature and society have problems, strengths or limits; furthermore it allows us to evaluate where there is a decrease in resources because at some point a given social system starts to show disturbances and crises altering the process of material exchange jeopardizing its survival. The metabolic analogy can work not only for the proto-capitalist societies, which had a relatively simple metabolic profile, but especially for the advanced societies because the metabolism is historically determined, depending on the variety of systems that organize and regulate exchanges between society and nature [8].

Defining society as a metabolic system might be considered an undeserved simplification because it risks hiding the singularities in the cauldron of the statistics relative to the appropriation, transformation, consumption, ejection of natural resources. However, the fact of using such an analogy to give an account also of the functioning of the social system is theoretically plausible [9-15]. In social sciences, as in biological and ecological ones, society has long been held "analogously" to be a metabolic organism of a superior order, but it is also "concretely" a metabolic system, as its subsystems (cities, enterprises, organisations, community, families, and individuals) are. The exchanges of matter, energy and information of such subsystems with their environments, or the environmental consumption in terms of bio-capacity, are by now taken by sophisticated and formalized methodologies of accountability based on interdisciplinary approaches derived from metabolic models [16-18].

To study the society/nature complex from the metabolic point of view inserts into the old abstract knowledge of nature formalized by natural sciences a materiality and a realism that reside in the space/time sphere of human practices. Nor are people or scientists the producers of the abstract knowledge of nature, but their mutual actions are on the frame of a temporal sphere that comprehends nature itself. The materialism of this approach derives from the Marxian assumption that human history belongs to natural history and is completely dominated in the last instance by material necessities. When these necessities take a social or socialized form mediated by the human labour, nature extends in the form of the human history [19].

There is, however, a crucial difference between the individual living organism (e.g. a cell) metabolism and the social system. In the case of individual living organisms, the exchange of matter and energy with their environment is oriented to the simple non-teleological reproduction of the organism itself. In this case, modalities of recovery and transformation of the necessary elements for the reproduction of the organism's life change very slowly in time and above all, when they reach a balance, they are maintained over time. The social or socio-economic metabolism instead is not oriented to an equilibrium condition, but to continuous growth. For social sciences there aren't any limits to the physical growth of the objects to consume and reject in the environment, in a word in the growth of whole social system. The consequence is that societies organise this resource throughput purposively, by even changing parameters of natural processes to gain better access to nature's resource supply [20].

In this perspective the metabolic relation between social and environmental systems acquires the form of appropriation, colonization, predation or domination [21]. It is not a secret that the elaborated scientific knowledge and practice in the capitalist society are oriented to the control, manipulation, and dominion of the broadly speaking "other" (nature). Appropriation of nature means that man manipulates it for his own goals, makes it similar to himself, and assimilates it. The material appropriation of nature happens through labour and consumption: nature is marked by human form and it is integrated by the social body [22].

The process of appropriation of nature and the transformation of nature in "appropriated nature" implies the following phenomena that should be the object of reflection by social sciences because they represent crucial socio-technical-material interfaces between society and nature:

1. The technological multiplication of the society-nature metabolism that carries to increasing consumption of natural resources in order to extract and consume other indispensable resources like food and energy.

2. The endless growth of the rate of consumption of raw materials and primary sources of energy, reaching unthinkable peak of consumption and forcefully posing the issue of resource renewability.

3. The increase without end of the conversion of matter and energy, to the point of reaching dimensions comparable to the geophysical and biological global processes (as for example the consumption of CO_2 stocked in the ground and its remittance in the atmosphere).

4. The development of knowledge about the natural mechanisms of reproduction that implies a consequent debugging of technological devices able to regulate, transform, and alter such mechanisms of eco-system services reproduction.

In few words, a hypertrophied metabolism can damage the societal reproduction process itself, bringing the system towards inefficiency, dissipation, waste, and inequality, towards a metabolic rift.

Household metabolism is one of the methods that use a "metabolic perspective" to investigate the interactions between society and nature and the exploitation and consumption of energy, raw materials, water. Among metabolic approaches we can find Industrial Metabolism, Urban Metabolism, and Metabolic Rift, MuSIASEM approach (Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism). Any of them have their specific quantitative methods of analysis of metabolic exchange between social and natural systems.

Industrial metabolism studies the throughput of raw materials and energy sources in productive systems, arguing that societies must actively regulate this process and develop efficient machinery to diminish the rate of material consumption [23]. The analysis of the metabolism of a socio-economic system, be it a national economy, an industrial sector, a company, a community or a household, is a truly interdisciplinary enterprise that utilises concepts and methodology from several social and natural sciences [24-26]. The tool used by industrial or socio-economic metabolism's scholars is the Material and Energy Flow Accounting (MEFA). The MEFA framework analyses important aspects of society–nature interaction by tracing socio-economic materials and energy flows and by assessing changes in relevant patterns and processes in ecosystems related to these flows - in other words, the "colonization" of terrestrial ecosystems [18].

Urban Metabolism is a multi-disciplinary and integrated platform that examines material and energy flows in cities as complex systems shaped by various social, economic and environmental forces. The biophysical approach to studying and quantifying urban material and energy flows and stocks is the predominant interpretation of urban metabolism today [27]. It generally focuses on quantifying the flow of particular materials or energy in an urban system in order to identify environmental problems and designing more efficient urban planning policies [28-30]. Yet, cities are not only physical entities. They are also symbolic, social, cultural machines. A growing cohort of scholars are developing new, expanded conceptions of urban metabolism as consisting of not just material and energy cycles but also of highly politicized physical and social processes. These scholars move away from a society-nature dualism to seeing the city as a process of metabolically transformed nature, a dynamic intersection between social and bio-physical dimensions to urban space, even a socio-natural hybrid or a cyborg of machine and organism [31,32].

The concept of metabolic rift has recently been used to understand Marx's developed analysis of the antagonism of town and country, his critique of capitalist agriculture, or his calls for the "restoration" of the necessary metabolic relation between humanity and the earth, that is, his basic notion of sustainability [11,33-35]. Moreover, Marx conceived this metabolic rift not simply in abstract terms but in terms of the concrete crisis represented by the degradation of the soil and by the problem of human and animal "wastes" that engulfed the cities. Both were equal indications, in his analysis, of the metabolic rift between humanity and the soil, reflected in the antagonism of town and country.

The multi-scale integrated analysis of societal and ecosystem metabolism (MuSIASEM) [36] approach makes it possible to perform a check on the feasibility and desirability of patterns of metabolism of socio-economic systems by providing a characterization at different levels and scales of: (a) the performance of socio-economic activities (for households, enterprises, economic sectors, national economies, world economy) and (b) ecological constraints (micro, meso, macro) by looking at the interference that the metabolism of matter and energy flows controlled by human activity induces on the expected pattern of metabolism of matter and energy flows associated with the self-organization of natural ecosystems [36].

Reassembling Production and Consumption

Even though we think we clearly know where consumption starts and ends, from the point of view of "nature" each activity (production, distribution, exchange, reproduction) consumes environment. It means that any agent of bio-socio-economic activity consumes, thus everybody is actually a consumer. A metabolic approach gives consumption its original materialistic meaning, bringing back together production-based and consumption-based approaches. Consuming energy, resources, and materials means transforming these resources in consumable commodities, working to buy them and acting to consume them.

All views discussing production and consumption links pay a clear tribute to Marx. He expressed a clear preference for production, stating that production produces consumption (1) by creating the material for it; (2) by determining the manner of consumption and thus creating the consumer; and (3) by creating the products, initially posited by it as objects, in the form of a need felt by the consumer [37]. However he was very aware of the fact that a society is an integrated autopoietic machine of production and consumption. In Grundrisse Karl Marx was very clear on this topic: "Production is also immediately consumption. Twofold consumption, subjective and objective: the individual not only develops his abilities in production, but also expends them, uses them up in the act of production, just as natural procreation is a consumption of life forces. Secondly: consumption of the means of production, which become worn out through use, and are partly (e.g. in combustion) dissolved into their elements again. Likewise, consumption of the raw material, which loses its natural form and composition by being used up. The act of production is therefore in all its moments also an act of consumption… Consumption is also immediately production, just as in nature the consumption of the elements and chemical substances is the production of the plant. It is clear that in taking in food, for example, which is a form of consumption, the human being produces his own body. But this is also true of every kind of consumption which in one way or another produces human beings in some particular aspect [37].

The Marx's propositions are instructive for our purpose, suggesting that: 1. it is only consumption that consummates the process of production; 2. consumption completes the product as a product by destroying it, by consuming its independent concrete form; 3. consumption of raw materials during production dissolves them into their basic elements; 4. consumption produces living beings. Indeed, Marx distinguished between productive consumption and individual consumption. The product of individual consumption is the consumer himself; the result of productive consumption is a product distinct from the consumer. The two processes are dialectically linked. Both consume material resources and both generate use-values but for different scopes: labour transforms matter in order to provide generic use-values; consumer consumes to reproduce his own material and living individuality. These products when suitably consumed, become elements in the formation of new use-values, new products, which are capable of entering into individual consumption as means of subsistence or into a new labour process as means of production. It implies automatically the recomposition of production and consumption, whereas workers and consumers are recomposed in the same body, whereas consumption of labour-force and consumption of natural resources are inevitably merged becoming the two sides of the same (dialectical) coin.

Moreover by its need for repetition consumption leads to the perfection of abilities evolved during the first process of production and converts them into skills, into repeated social practices. This scheme still shapes contemporary theories such as that of [38] that discerns between three models of consumption: directly biotic consumption, productive consumption and consumerist consumption [38]. It is a truism to note that sociologists of consumption have dealt exclusively the so-called consumptive consumption, which represents

only a small part of the enormous matter, energy and information consumption behind the daily consumption. Assessing biotic and productive consumption means taking into account the constellation of practices of consumption that tacitly consume energy, matter, bio-capacity, and eco-system services, composing and decomposing them at the analytical level to remove the veil of opacity that makes them appear neutral.

From a metabolic perspective, the labour process is a purposeful activity aimed at the appropriation of what exists in nature for the requirements of man. It is the universal condition for the metabolic interaction between man and nature, the everlasting nature-imposed condition of human existence, and it is therefore independent of every form of that existence, or rather it is common to all forms of society in which human beings live. But the fact that labour is at the end consumptive production, means that industrial and institutional activities are the major source of nature's consumption.

Societal metabolism presupposes practices producing objects that are already framed by funds of consumed raw materials and past labour. It means that a physiological reduction in resources' consumption is conceivable. But, as suggested by Schor [39], to face ecological crisis resource-efficient technological change and changes in the product mix are not enough. Restoring a sustainable metabolism entails a stabilization of consumption through reductions in hours of work [39]. Working less will slow both consumptive production and household consumption. It seems likely that on average, as noted by Schor [39] the economy shifts to a situation of "time surplus," there will be a decline in the demand for speed and convenience, both of which are highly consuming [39]. The out-of-market household work of reproduction carried on mainly by women is clearly a process where labour presupposes and supports consumption, but it is likely that housework has less environmental impact than industrial production of the same products and services. Capitalist accumulation brings about the growth of metabolic activities engaging rising amount of abstract labour, with its indifference for the use and quality of its products, with its destructive indifference regarding the material content of the agents set in motion. This is the reason why metabolism deserves to be carefully regulated. Work might be interesting because it tried to turn upside-down the point of view of the classical and neoclassic political economy, essentially directed to the analysis of productive processes, means employed for the production of wealth, such as the division of labour, the industrial organization, the employment of machinery, the accumulation of capital, the dynamics of value and prices. To this perspective Kropotkin opposed that of the consumption or rather the analysis of needs that are at the base of the development and government of the production needs that must be satisfied from the production. But, as he argued, "as soon as we look at Political Economy from this point of view, it entirely changes its aspect. It ceases to be a simple description of facts, and becomes a science, and we may define this science as: The study of the needs of mankind, and the means of satisfying them with the least possible waste of human energy. Its true name should be, Physiology of Society [40]. It had to constitute a parallel science to the physiology of plants and animals, which is the study of the needs of plants and animals, and of the most advantageous ways of satisfying them. In the series of sociological sciences, the economy of human societies takes the place, occupied in the series of biological sciences by the physiology of organic bodies. Kropotkin insisted on a peculiar universal phenomenon of the system of production that he called "waste of human energy", from which the inadequate consumption of the workers depended [40]. In the perspective of Kropotkin, consumption, production and exchange of resources with the nature they constituted a unique and integrated system from which the satisfaction of the social needs depends on. It was an innovative perspective that challenged the anthropocentric point of view of classical economics, introducing a complex notion of consumption, which leads to a metabolic model.

Production provides the tools for the consumption of natural resources; it is a medium of the metabolic action that demands natural, working and social energy for his own cycle. Production allows associated individuals to turn the natural resources into use values to consume, but while it is transforming them for a future consumption it consumes other resources. This perspective, that the sociology of the metabolic processes should assume and that some sociologists of consumption are pursuing (Hertwich) [41], is not so strange, since it was very well explained, as we have seen before, by Marx and Kropotkin.

The Material Dimension of Household Consumption

There is an increasing awareness of the fact that the households devour an important part of the energetic/environmental budgets and that the industrial enterprises consume while they are producing commodities. Moreover, whoever uses a product is objectively part of the life-cycle of that product: recent studies highlight that about 25% of the environmental impacts of food products is related to the consumer phase [42]. The study of consumptions, estranging itself from the classical differentia list, identity-making or rationalist paradigms, is able to suggest important research questions, to close the gap, at least, in the field of the environmental studies, between production and consumption, to delineate a scientific picture of studies on the material limits of the planet.

In addressing the question 'why do people consume as they do and what are the environmental consequences of escalating demand? Warde [43] note that that the sociology of consumption is not especially well equipped to deal with environmentally critical forms of "inconspicuous" consumption in some key areas such as demand for energy, water and other natural resources as well as with rough objects. The reason of this inadequacy probably lies in the fact that consumption is mainly considered a means of communication or an apparatus of identity-building, omitting many environmentally sensitive practices or conditions of consumption such as the planned obsolescence of goods. The household metabolism poses a new order of problems regarding the nature of consumption itself, e.g. its prosaic materiality or its recursion and repetitiveness or again the fact that being the final ring of the entire consumption chain, it indirectly incorporates the environmental consumption of many other agents such as firms, organizations, and institutions that contributed to the production of household goods and objects.

Underlining the materiality of consumption means indirectly suggests that the influence of consumer culture over individuals' self-identity is both over generalised and significantly overstated. As such culture-based explanations of consumption are of limited value. Most of what is consumed by most individuals can best be explained in terms of practical responses to contemporary living conditions rather than cultural factors. Consumer choices cannot be equated with individual freedom. The portrayal of consumption as an outcome of free choices ignores the fact that most personal and domestic consumption is an adaptive response to present day living conditions, and is best seen as *obligatory* [44]. In short, consumption is not the realm of freedom; rather it is a realm of necessity even though it is masked by free choice [45].

Household metabolism focuses on ordinary, inconspicuous,

daily and obligatory consumption, which doesn't mean that this consumption is without qualities but that often it is pushed by rooted habits and inertial social mechanisms. Here luxury consumption is by now considered only a residue of the global amount of ordinary consumption.

In fact, a great deal of consumption takes place inconspicuously as a part of the ordinary, everyday decision-making of millions of individual consumers. Ordinary consumption …is not oriented particularly towards individual display. Rather it is about convenience, habit, practice, and individual responses to social norms and institutional contexts [46].

Therefore the analysis of household consumption is of special interest, because there exists no ultimate reason for people to behave in one way or in another. This also means that there is not necessarily a strong relationship between income and expenditures. As exposed by Mary Douglas, consumption in society does not reflect the effects of pure division of income only but has to be viewed in the social Embeddedness of consumption [47,48].

As well as interlocked biochemical processes (enzymes) are the activators of individual organism metabolism, household practices are the activators of household metabolism. Shopping, cooking, cleaning, heating and cooling, wasting are arrays of activities or streaming of actions that trigger the exchange of matter, energy and information between the household and its so-called environment. At a macro level, an unlimited number of practices' arrays activate the social system metabolism sparking off the exchange of matter and energy between nature and society. These practices are socially determined and influenced by habitus. The concept of habitus is a concept of practice, the practical enactment of a set of objective conditions of existence. As suggested by Pierre Bourdieu [49], inside the household habitus takes form. He defines habitus as: "... the structures characteristic of a determinate type of conditions of existence, through the economic and social necessity which they bring to bear on the relatively autonomous universe of family relationships, or more precisely, through the mediation of the specifically familial manifestations of this external necessity (sexual division of labour, domestic morality, cares, strife, tastes, etc.), produce the structures of the habitus which become in turn the basis of perception and appreciation of all subsequent experience [49].

Families function as sites in which the competences deemed necessary at a given time are constituted by usage itself, and, simultaneously, as sites in which the price of those competences is determined, i.e., as markets which, by their positive or negative sanctions, evaluate performance, reinforcing what is acceptable, discouraging what is not, condemning valueless dispositions to extinction. In other words, family is the place where practices are acquired as cultural competences inseparable from insensible acquisition of "sense" for cultural investment [50].

This barbarous reintegration of conspicuous consumption into the world of ordinary consumption has the virtue to reminding us that consumption of goods always presupposes a labour of appropriation, at different degrees depending on the goods and the consumers or, more precisely, that the consumer helps to produce the product he consumes, by a labour of identification and decoding which, as in the case of daily consumption, requires time, practical sense and dispositions acquired over time.

Scholars or policy makers can ignore what happens to products in the relationship with the consumers, that is, with the dispositions which define their useful properties and real uses. To hypothesize, for instance, that consumers perceive the same decisive attributes, which amounts to assuming that products possess objective or technical characteristics which can impress themselves as such on all perceiving subjects, is to proceed as if perception only seized on the characteristics designated by the manufacturer's brochure and as if social uses could be derived from the operating instructions. Objects, even industrial products, are not objective in the ordinary sense of the word, i.e. independent of the interest and taste of those who perceive them, and they do not impose the self-evidence of a universal, unanimously approved meaning [50].

Consumption is made by a labour of appropriation of goods consisting of streams of actions deployed inside household. This is the reason why consumption is a social and not an individual practice, a commitment, an obligation often shared and negotiated at the household level, engaging all household members, a process of de-objectification of consumed objects. Food consumption can be appreciated as a form of *social* action at different levels avoiding the idea that consumption is a series of abstract and individualistic decisions. As a purchase decision it is clear that it is taken by all household members, as well as what to buy is not a choice of the singular household member occasionally the buyer.

But food provisioning does not end at the shop door. Practices are also embedded in broader social structures. The supply chain of final goods is marked by the so-called institutional consumption or productive consumption, namely the consumption of producer, manufacturer, big or small dealer, retailer, and so on. In this case household metabolism is able to identify the single practices that engender a final good and its energetic burden and carbon emissions. As noted by Kjærnes [51], to sustain end-market exchanges between consumers and retailers, a whole range of social organization of consumer practices is assumed, that cannot be derived directly from supply-side characteristics. The household as an institution for food consumption is not simply an effect of the products bought and consumed within it. Coordinated acts of purchase, food preparation, and eating within households is an outcome of considerations about nutrition, health, quality, economy, and ethics beard by household components and daily negotiated. A ready-to-eat meal heated in a microwave entails quite different quantity of energy than food bought as raw/fresh ingredients to be conserved and prepared in the household. The models of food buying, preparing and consuming depend on, at the end, labour market structure, mobility structure, working and free-time structure, in a word on the social fabric in which householders are engaged and ways they tackle it.

Consequently, the practices approach doesn't assert that the consumer plays a true key role in significantly shaping the market toward more environmental friendly outputs. We don't think that his or her preferences, no matter how he or she modified them, can automatically bring an adjustment in the action of the manufacturer. The present society is too reliant on consumerism ideology to give consumers the power for shaping big producers (Bauman) [52], even though it is now clear that from an environmental perspective the classic distinction between production and consumption loses its legitimacy and theoretical credibility. The changing of actual consumption patterns should depend on different agents and structural conditions such as the role of governance in the design of policy instruments for sustainable consumption, or the improving of social interactions and engagement in these practices of everyday household consumption [14,53,54].

Situated Practices of Ordinary Metabolism

Societal metabolism brings into focus the largest processes of societal reproduction at the global level. These processes of nature appropriation, implying work, technology, consumption, expertise and various facilities supporting them, must be regulated by laws, money (wages and profits) and organizational regimes. But, as we have seen above, there is another and more situated side of metabolism, the one focusing on the routinized reproduction of the material basis of social life. It is social or/and household metabolism. It entails everyday life, ordinary, repeating and unpaid practices, activities and actions performed by people in the context of stable activity systems. Here, the social metabolism is the result of a particular way to use goods, energy and things as dictated by the way social actors are pushed to act. It responses to real situations, commitments, needs, roles, projects, abilities with the help of specific sociotechnical regimes, within given (actual or perceived) constraints. In other words, social metabolism is the outcome of arrays of bundles of activities needed for its continuity.

In this perspective, we might also differentiate between 'work' and 'labour' as suggested by Agnes Heller [55]. While work might be seen as a generic and species-essential activity, essential for the metabolic exchange of society with nature, labour is an everyday activity aimed to reproduce living agents in their singular bodies and social relationships. All the rational large-scale organized social activity, all the objectivities necessary for the reproduction of a given society, and the manner in which it is performed, corresponding to the norms and timescales of that society, can be regarded as 'work'. All social practices life-activities, such as cooking, cleaning, washing, caring, aimed at the daily reproduction of agents, can be regarded as 'labour'. The latter often consists of out-of-market consumption practices, even if they combine different incomes and both market and non-market activities. To be performed, they imply labour as words socially necessary unpaid labour. Paid and unpaid activities are strictly interdependent, in the sense that paid work is conditioned in its efficiency by the already done unpaid labour of reproduction. The existence of unpaid labour – coupled with the appropriation of free nature services – is not an anomaly: it is a basic condition of accumulation [56,57].

In my view, social practices are both the activators and the outcomes of societal metabolism. Social metabolism is activated, maintained and regulated by infinite constellations of practices bundled with material arrangements. The reproduction of social life process (social metabolism) is 'housed in' and at the same time 'stems from' social practices. Such bundles of practices and material arrangements make possible social metabolism, which makes social reproduction possible. It follows that the sum of such bundles provides the basic ingredients from which all social life processes leak out [58]. Bundling practices and material arrangements, consequently, is a fundamental social mechanism, marked by the emergence, persistence, and dissolution of bundles. For Schatzki, 'practices' are spatially-temporally dispersed open sets of doings and sayings organized by common understandings, teleology (ends and tasks), and rules [59]. Material arrangements are people, organisms, artefacts and natural things. Practices and arrangements bundle in that (i) practices affect, alter, use, and are inseparable from arrangements and (ii) arrangements channel, prefigure, and facilitate practice [58]. This definition of the 'social' as stemming from and housing in these bundles of nature, artefacts and human activity opens up new perspectives on sustainable transition where new constellations and bundles of activities might prepare a more sustainable higher stage of social metabolism.

To be studied, practices have to be organized in enduring and recognizable – across time and space – sets of activities [59,60]. Practices can be divided into a huge number of different and interconnected activities, made up not only of current activities but of blocks of past labour, and raw materials embedded in devices. In short, I consider some practices as form-giving activities – activities that produce objects and events using stocks and flows of past and present combinations of labour, knowledge, instruments and matter. These processes are performed by large groups of people and are fixed as structural forms or entities in which materials, instruments and labour are consumed by being employed and converted from their original form into the form of the event, goal, and telos to be performed. The combination of these three different moments of the process – the material, the instrument, and labour – depending on agents acting for it, gives rise to different objects and events.

Sustainable consumption is studied by many scholars using the 'practices approach'. They started to look at daily practices that are deemed basic components of social reproduction. In the light of the social practices approach, energy (Gram-Hans) [61,62], cooling, heating, time (Shove) [63,64], food, technology (Røpke et al.) [65,66], mobility and housing (Bartiaux et al., Bartiaux and Reátegui Salmón) [67,68] have been explored. But these studies do not throw enough light on the natural conditions of everyday life reproduction.

Together with natural resources and artefacts, practices emerge as heterogeneous and disordered fields in which creating, consuming, adapting, transforming, handling, manipulating processes amalgamate in ever changing ways and outcomes. All these everyday reproduction practices are heterogeneous [55]. They accumulate and gather, without a clear order, entailing skills and capabilities of different kinds. Agents coping with everyday life and performing heterogeneous practices give rise to a social order that is often unstable and subjected to sudden changes. It casually arises from practices entailing relations such as coordination and cooperation among humans and nonhuman agents that are frequently also conflicting. The fact that social practices entail conflicts and inequalities is a self-evident truth, as in the case of driving practices, which entail conflicts, tensions, quarrels, bad encounters and accidents. These social relations constitute certain specific and irreducible conditions of reproduction in which human agency must operate, but these conditions and relations of power are not chosen by the agent itself.

Goffman's notion of 'situated activity systems' seems very useful here both at an empirical and a theoretical level. A situated activity system is an individual's regular participation in a regular sequence of daily activities. Some of these activities will bring him into face-to-face interaction with others for the performance of a single joint activity, a somewhat closed, self-compensating, self-terminating circuit of interdependent actions [69]. Such situated systems of activity are composed of interacting people, physical objects, mechanical devices, rules, accomplishments, administrative purposes and emerging roles and they are to be distinguished from a task performed wholly by a single person, whether alone or in the presence of others. Meal taking in domestic establishments provides a situated activity system. When the actions of a situated system are repeated, situated roles seem to emerge, and action comes to be divided into manageable bundles, each a set of acts that are sufficiently compatible with each other that they can be performed by a single participant. There is also a tendency for role differentiation to occur, so that the package of activity that the members of one class of participants perform is different from, though dependent on, the set performed by members of another category. In short, situated activity systems are bundles of practices and material

arrangements from which roles and positions emerge. They connect not named individuals but any persons who come to occupy the positions specified by the activity to be performed. Systems of activities or structures of practices are sets of empty places. In entering the position, the practitioner finds that he/she must take on the whole array of practices encompassed by the corresponding role, so the role implies a social determinism and a doctrine about socialization. It is through roles that tasks in society are allocated, and arrangements are made to enforce their performance. Recruitment for positions is restrictively regulated, assuming that role players will possess certain minimal qualifications and capabilities. This recruitment occurs for structures typically to bind together not named individuals but whosoever happens to perform the role in question. The way in which they recruit agents help to explain why societies and their metabolism persist in time.

Situated activity systems not only recruit people to perform certain tasks but, when needed, they also provide a means for acquiring competences. But in doing that they are also power-conferring systems, which give different people different powers for performing activities. Practices are clearly performed with diverse tools, habits, qualifications, and capabilities. Meal preparing is clearly a practice but it might be performed in a variety of modes and with a variety of foods and skills to make meals very different from each other. Here practice performances and outcomes might follow paths of social disparity and asymmetry, different roles and positions. This problem is linked to the different roles that mark any situated activity system, the access of agents to different kinds of practices and devices. Knowledge, habits, capability, devices and objects employed by agents in the practice of cooking vary greatly, producing very different results in quality and taste of cooked food. There is, here, a problem of failing practices, or of those practices that never succeed in reaching noteworthy goals or are have never been performed in the right ways by practitioners.

Consumption studies have traditionally considered stratification processes to be central to understanding the use, distribution and meanings of goods in society. Class and status inequalities have been central in consumption studies, although during recent years they may have lost significance [44,50,70]. Stratification and inequalities continue to raise important questions about the relationship between consumption and social position and they pose the same problems for practices: why are some people recruited to certain practices and some not? What is the role of the different agents inside the same practices? Why some agents are good practitioners and some not? Might we speak of positional practices, as well as of positional goods or positional consumption? What is the role of status or class in positional practices? How are people trained to accomplish certain practices? These aspects seem to be missing the literature on practices and this is a gap that should be filled.

Household Metabolism in Practice: Energy Consumption and GHG Emissions

The Household Metabolism model estimates the energetic burden of at least all items of consumption, which are composed mainly by ordinary items such as food and drink, transports, leisure, direct energy, household appliances, electronic stuff. We can say that it focuses on social and domestic practices of consumption. Speaking of social practices and not only of lifestyles means that the model provides good insight for the analysis of practices of consumption, which implies the whole lifecycle of the stuff consumed, the way in which it is consumed, and not only their symbolic meaning and value. In this model the location of consumption is the household, not the rational individual. In this perspective households are social entities with internal and external interactions (metabolism), which in some way represent an opposed approach to the atomic consumer one [71].

Several international surveys (Tukker) [72], emphasize that commonly prescribed measures to reduce family energy consumption, such as running dishwashers and washing machines only when they are fully loaded, taking showers instead of baths, lowering indoor temperatures at night, turning off lights when leaving a room and others, are almost inefficient in significantly lowering energy consumption. Some authors (Kok) [73], refer to this problem that the limitation of such advices is that they focus on just one part of the household's total energy use and not the total energy consumption of a household. The other part of the total energy is the indirect energy, which comprehends the energy needed to produce the goods and services used in industries, in the transport sector, and in retail as a result of consumer demand [74]. This part of energy consumption can be relevant (Vringer and Blok) [75] found that 54% of the total average energy demand for a Dutch household was indirect.

As a result, to quantify properly the energy consumption of a household and its full energy-saving potential, indirect energy has to be considered. It has already been investigated whether some consumption behaviour may lead to a reduction in the total energy consumption, such as a dietary change toward less meat and more seasonal vegetables (Carlsson-Kanyama) [76], reuse of products and a change in leisure activities away from holidays abroad [77]. Although these examples of changes in specific consumption behaviour, major assessment of a full consumption pattern are difficult to achieve. Thus many studies refer the level of the environmental assessment to the household consumption [71].

As showed in the Figure 1, the socio-economic metabolism, measured by the household final consumption, includes all energy that is consumed directly and indirectly in the processes of production of final goods, which allows to account biotic consumption, productive consumption, consumptive consumption and consumption of the whole system. From the energetic point of view, this model thus includes both the demand for resources (flows of direct input of family resources) and indirect demand for resources, which are the resource flows that occur elsewhere to produce household consumption (e.g. in mining, in production of materials, in housing construction and in waste treatment).

At the same time, the household metabolism allows to identify different types of aggregation and categorization of consumption (Benders) [74], providing a model for understanding the stratification of consumption. This stratification model is based both on family size and some qualitative characteristics (income, title study, professions) that in sociological research are considered to be the main structural variables. In addition, the metabolic model for the household also allows identifying the structures of everyday practices of consumption, by which to reconstruct the physiology of the same socio-economic system.

The Environmental Assessment of Household Consumption

Many studies address the environmental impacts of household consumption because of the overall importance of this final demand category (Hertwich). In these studies various methods of modelling imports, transport and trade margins, expenditures abroad (e.g. vacations) are presented and several ways to aggregate the results in categories are proposed. These studies consider both an aggregate

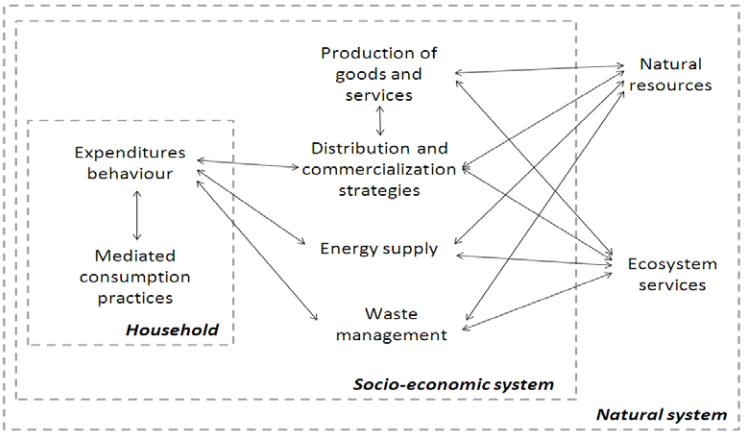

Figure 1: Schematic representation of the household metabolism model. Consumption of a family is strongly connected with the production of goods and services, the energy supply and the waste management. These processes are themselves related with the consumption of natural capital in term of resource used and pollutant emitted.

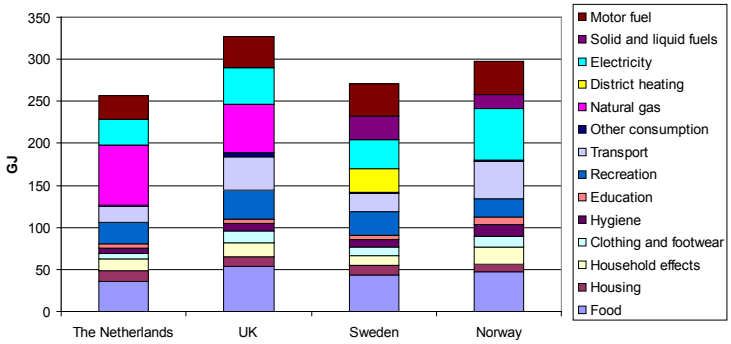

Figure 2: Total energy consumption (direct and indirect) in the selected family consumption categories considered in the Tool Sust project [73].

index, such as life cycle assessment methods (Nijdam and Huppes) [78,79] or ecological footprint methods (Wiedmann) [80], and a single parameter as an indicator. In the latter case energy consumption and greenhouse gasses (GHG) are the most used parameters.

According to a recent literature review (Hertwich) [81] on the environmental impacts of consumption, shelter accounts for 35-53% of the total energy use; mobility, including fuel use, vehicle purchase and public transportation, accounts for 15-31%; food accounts for 11-19%; recreation accounts for 4-10%, clothing 3-5%, and health 1-5%. In has to be noticed that in this review the energy use in some foods, consumed in restaurants, hotels, as part of package tours, or in educational and health care institutions, is not allocated to the food category but listed under other, recreation, transportation, or government consumption.

Taking into account the GHG emission form household consumption, a comprehensive research across Europe 25 has been conducted in 2006 [14]. In this study the GHG emission accounts for 31% for food, beverage, tobacco and narcotics; 2% for clothing and footwear; 24% for housing, furniture, equipment and utility use; 2% for health; 19% for transport; 2% for communication; 6% for education; 9% for restaurants and hotels; 5% other goods and services.

Although different types of resources are relevant to the analysis in household metabolism model, energy was chosen as the key parameter for the detection of environmental load consumption. This assumption was made also because energy is linked to important environmental issues and energy consumption is also reported with attention within the firm for its economic importance. While the use of other resources such as land and water is essentially assessed in a few specific areas, the energy use occurs in every sector of the economy and society. The result is that energy is a useful indicator of the economy at the macro level as well as at the micro level of specific goods and services to be consumed by households [73].

Energy is therefore the key parameter of the adopted model. Evaluating energy (direct and indirect), the use of household goods and services is linked to specific environmental impacts in terms of pollutant emissions and resource consumption.

For the purposes of quantification of household consumption, the model predicts a schematization in activities of household consumption (e.g. food, holidays, and private transport) and quantification of energy consumption per unit associated with each category of activities. For example, in Figure 2 are reported the results of applying this model applied to some Northern European countries within the project Toolsust [73].

The Need of a Hybrid Method

As for household consumption the greatest environmental impacts take place within complex supply chains of goods and services rather than directly from fuel and/or energy consumption, an assessment derived from fuel and electricity consumption alone is inadequate. In order to assess GHG emissions and energy consumption, most companies use 'bottom-up' approaches, summing estimates of emissions associated with specific goods and resources used during the productive process, thorough a process-based LCA to estimate the impacts across an inventory of activities and purchases. Nevertheless, a number of authors (Wilting) [82] highlight that this approach suffers from 'truncation error', and when applied in household consumption, it leads to serious underestimation of the total impacts. The truncation arises from the inevitable omission of steps and processes in order to make the task manageable. An LCA defines the system it is describing as a finite number of steps and in most cases these provide an adequate estimation (Baumann and Tillman) [83] however, with this method it will never be possible to consider a "total economy scenario.

On the other hand, there are top down analyses, which use Input–Output Analysis (IOA) and are able to locate emissions to different sectors considering the total economy of the Country. Thus this approach has the benefit of not underestimating global figures, but the calculations are only made for economic sectors and not for certain products. This means that the IOA gives cruder estimates than an LCA does, but on the other hand the accounting is more comprehensive. Furthermore, IOA indicates an emission factor per Euro consumed in a certain sector. This is considered a very useful task, even if it could lead to the 'aggregation error' as the input–output coefficients for each industry are averages derived from the comprehensive natural summation of all the related, but not identical production processes. However, as the individual processes are not individually discernible, it lacks the potential for specificity of the bottom-up approach [84].

Therefore, a number of hybrid models that combine the LCA and IOA have been developed to describe the consumption systems from an energetic point of view, in an attempt to benefit both from the completeness of EIOA and from LCA's potential for specificity [85]. As highlighted in previous chapters, several hybrid environmental impact assessment methods are already developed and illustrated in the international literature [73,81,84]. Here a novel hybrid LCA-IOA tool is developed on the basis of the works of Wiltings [82] and further researches conducted at the Centre for Energy and Environmental Sciences, IVEM (University of Groningen), to calculate the energy requirement of households, following the household metabolism approach. This tool quantifies the total energy demand of households as a proxy for environmental pressure related to household consumption for a given population (that can be a city, a region or a country in according to the survey). Main advantages of this tool are:

Contribution of capital goods

As well known, the Leontief model, mainly used in environmental applications, considers only intersect oral transaction of the actual productive activities in a given year. Transactions relating to the safeguarding and enhancement of the equipment fixed (or stocks of raw materials and semi-finished) are being combined into a single item of final demand called investment. In this way, these are not endogenous to the production, but are elements to be determined independently.

This effect is a problem as the investments needed in part to create new production capacity but also to replace worn out the share of fixed capital in the process of annual production. Thus the question is: how to consider the role of investments in an analytical framework, such as the evaluation of the carbon footprint of consumption of the population. A number of methods have been proposed: there are studies which simply ignore the issue and other which propose a complete inclusion of investments.

Nevertheless the most appropriate method should involve the segregation from the vector of final demand an amount equal to depreciation and its internalization in the matrix of cross-sectoral exchanges. This kind of solution is thus adopted by the hybrid model which introduces a fictitious sector called depreciation. This sector is accounted for the redistribution of externalities embedded in the use of annual capital equipment based on the share of depreciation specific to each sector of the economy.

Foreign Trade

In the issue of foreign trade, the hybrid model has the advantage of distinguishing clearly between competitive and non-competitive imports, depending on whether they are goods and services produced or not at the Country level. Imports of the first type are included in the matrix of intermediate exchanges, under the assumption that the production structure of the country from which matter is similar to that of the country examined. These assumptions are not unreasonable also in the Italian context, which imports mainly from other Western countries.

Conclusions

The Household Metabolism model entails relevant aspects at environmental accounting methodological level. It has some innovative aspects presenting a useful hybrid LCA-IOA model including not only the indirect energy embodied in goods at the final consumption stage, but also the energetic contribution of capital goods and of foreigner trade. Yet, it poses new problems to sociology and sciences of consumption. It provides for a metabolic approach that seems very useful to study the interchange between environment and society. Compared with other methods based on the same metabolic pattern, Household Metabolism model shows some vantages for who is engaged on the study of consumption.

- It doesn't base its vision on a top-down metric of evaluation (for example from the national level down to the regional or communal one), but it gives preference to the bottom-up approach moving from micro (household) to macro (different scales of social aggregation) (even though it uses a IOA that is by definition a top-down assessing method).

- Household Metabolism blends better than other approaches the production and consumption realms, looking at consumption as the key to understand the social system metabolic profile.

- Household metabolism is focused on household behaviour and thus it can help to change old and unsustainable practices.

- Household Metabolism is focused mainly on ordinary consumption, that part of consumption often relegated to the fringe of consumption study.

- Household Metabolism deals with social practices, the principal activators of societal metabolism.

- Household Metabolism allows us to set-up scenarios of transition toward sustainability, starting from the daily practices of families to go back to the overall size of the system by verifying the

plausibility and effectiveness of transition practices.

References

1. Moll HC, Noorman KJ, Kok R, Engstrom H. Throne-Holst, Clark C, et al. (2005) Pursuing More Sustainable Consumption by Analysing Household Metabolism in European Countries and Cities. Journal of Industrial Ecology 9: 259-275.
2. Shove E, Warde A Dunlap R, Buttel F, Dickens P, Gijswijt A, et al. (2002) Inconspicuous Consumption: the sociology of consumption, lifestyles and the environment Sociological Theory and the Environment: Classical Foundations, Contemporary Insights (1stedn), Lanham, MA: Rowman and Littlefield.
3. Horta A, Wilhite H, Schmidt L, Bartiaux F (2014) Socio-Technical and Cultural Approaches to Energy Consumption. An Introduction. Nature and Culture 9: 115-121.
4. Murphy R (1995) Sociology as if nature did not matter: an ecological critique. British Journal of Sociology 46: 688-707.
5. Williams R (1980) Problems in Materialism and Culture: Selected Essays, Verso, London.
6. Moore JW (2011) Transcending the metabolic rift: a theory of crises in the capitalist world-ecology. The Journal of Peasant Studies 3: 81-46.
7. Goldman M, Schurman R (2000) Closing the great divide: new social theory on society and nature. Annual Review of Sociology 25: 563-584.
8. Clark B, York R (2005) Carbon metabolism: global capitalism, climate change, and the biospheric rift. Theory and Society 34: 391-428.
9. Burkett P (1999) Marx and Nature,St. John's Press New York.
10. Dickens P (2004) Society and Nature, Polity Press, Cambridge.
11. Foster JB (1999) Marx's theory of metabolic rift: Classical Foundations for Environmental Sociology. American Journal of Sociology 105: 366-405.
12. Hayward T (1994) Ecological Thought, Polity Press, Cambridge.
13. Moore JW (2000) Environmental crises and the metabolic rift in world-historical perspective. Organization and Environment 13: 123-157.
14. Padovan D, Tukker A, Charter M, Vezzoli C, Sto E, et al. (2008) Social capital, lifestyles and consumption patterns System Innovation for Sustainability. Perspectives on Radical Changes to Sustainable Consumption and Production. (1stedn) Greenleaf Publishing, Sheffield 271-287.
15. Padovan D (2015) metabolic exchanges and practices of regulation. The assemblage of environment and society in early social sciences. Ecological Informatics 26: 1
16. Fischer-Kowalski M, Haberl H (1998) Sustainable development: socio-economic metabolism and colonization of nature. International Social Science Journal 158: 573-587.
17. York R, Rosa E, Dietz T (2003) Footprints on the Earth: the environmental consequences of modernity. American Sociological Review 68: 279-300.
18. Haberl H, Fischer-Kowalski M, Krausmann E, Weisz H Winiwarter V, et al. (2004)Progress towards sustainability? What the conceptual framework of material and energy flow accounting (MEFA) can offer. Land Use Policy 21: 199-213.
19. Sohn-Rethel A (1976) Intellectual and Manual Labour A Critique of Epistemology Macmillan, London.
20. Schandl H, Grünbühel CM, Haberl H,Weisz H (2002) Handbook of Physical Accounting Measuring bio-physical dimensions of socio-economic activities, Federal Ministry of Agriculture and Forestry, Environment and Water Management, Wien.
21. Alier MJ (2002) The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation, Edward Elgar, Cheltenham, UK
22. Böhme G. und Grebe J (1985) Soziale Naturwissenschaft – Über die wissenschaftliche Bearbeitung des Stoffwechsels Mensch – Natur in: G. Böhme und Schramm , Soziale Naturwissenschaft, Frankfurt/M 19-41
23. Ayres RU, Simonis UE (1994) Industrial Metabolism: Restructuring for Sustainable Development. Tokyo/New York/Paris.
24. Fischer-Kowalski M (1998) Society's Metabolism. The Intellectual History of Material Flow Analysis, Part I, 1860-1970. In: Journal of Industrial Ecology 2: 61-78.
25. Fischer-Kowalski M, Bourg D, Erkman S (2003) On the History of Industrial Metabolism in Perspectives on Industrial Ecology, Greenleaf Publishing.
26. Fischer-Kowalski M, Hüttler W (1999) Society's Metabolism: The State of the Art. The Intellectual History of Material Flow Analysis, Part II: 1970-1998. In:Journal of Industrial Ecology 21: 07-137.
27. Gandy M (2004) Rethinking urban metabolism: Water, space and the modern city, City 8: 363-379.
28. Barles S (2010) Society, energy and materials: the contribution of urban metabolism studies to sustainable urban development issues. Journal of Environmental Planning and Management 53: 439-455.
29. Brunner PH (2008) Reshaping Urban Metabolism. Journal of Industrial Ecology 11: 11-13.
30. Rapoport E (2011) Interdisciplinary Perspectives on Urban Metabolism. A review of the literature, Development Planning Unit.
31. Heynen NC, Kaika M, Swyngedouw E (2006) In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism. Questioning cities series. Abingdon: Routledge.
32. Swyngedouw, Erik (2006) Circulations and metabolisms (Hybrid) Natures and (Cyborg) cities. Science as Culture 15: 105-121.
33. Foster JB (2000) Marx's ecology. New York: Monthly Review Press.
34. Clark B, Foster JB (2009) Ecological imperialism and the global metabolic rift. International Journal of Comparative Sociology 50: 311-34.
35. Clausen R, Clark B (2005) The metabolic rift and marine ecology. Organization and Environment 18: 422-44.
36. Giampietro M, Mayumi K, Ramos-Martin J (2009) Multi-scale integrated analysis of societal and ecosystem metabolism (MuSIASEM).Theoretical concepts and basic rationale Energy 34: 13-322.
37. Marx K, Grundrisse (1973) Foundations of the critique of political economy, Penguin Books in association with New Left Review. London orig. writings 1857-58
38. Immler H (1985) Natur in der ökonomischen Theorie. Opladen; Economia della natura, Donzelli, Roma.
39. Schor JB (2005) Sustainable Consumption and Worktime Reduction. Journal of Industrial Ecology 9: 37-50
40. Kropotkin P (1913) The Conquest of Bread, Chapman and Hall, London.
41. Hertwich EG (2005) Consumption and industrial ecology. Journal of Industrial Ecology 9: 1-6.
42. Milà i Canals L, Sim S, García-Suárez T, Neuer G, Herstein K, et al. (2011) Estimating the greenhouse gas footprint of Knorr. The International Journal of Life Cycle Assessment 16: 50-58.
43. Warde A, Martens L (2000) Eating out: Social Differentiation, Consumption and Pleasure, Cambridge University Press, Cambridge.
44. Lodziak C (2000) On Explaining Consumption Capital & Class 72: 111-133.
45. Binkley S (2006) The Perilous Freedoms of Consumption: Toward a Theory of the Conduct of Consumer Conduct. Journal for Cultural Research 10: 343-362.
46. Jackson T, Michaelis L (2003) Policies for Sustainable Consumption. A report to the Sustainable Development Commission.
47. Douglas M, Isherwood B (1979) The World of Goods, Routledge, London and New York.
48. Bögenhold D, Fachinger U (2000) The Social Embeddedness of Consumption - Towards the Relationship of Income and Expenditures over Time in Germany ZES Arbeitspapier Nr. 6/00, Universität Bremen, Zentrum für Sozialpolitik.
49. Bourdieu P (1977) Outline of a Theory of Practice, Cambridge University Press, Cambridge.
50. Bourdieu P (1984) Distinction. A social critique of the judgement of taste, Harvard University Press, Cambridge, Mass.
51. Kjærnes U, Warde A, Lavik R, Harvey M (2005) Trust and the institutionalisation of food consumption, Paper presented at the biannual meeting of the European Sociological Association, working group of the Sociology of Consumption, Torun, Poland 1: 9-12

52. Bauman Z (2007) Consuming Life. Politiy Press, Cambridge.

53. Shove E (2010) Beyond the ABC: climate change policy and theories of social change. Environment and Planning 42: 1273-1285.

54. Pape J, Rau H, Fahy F, Davies (2011) A Developing Policies and Instruments for Sustainable Household Consumption: Irish Experiences and Futures Journal of Consumer Policy 34: 25-42.

55. Heller A (1984) Everyday Life, Routledge and Kegan Paul, London.

56. Colatrella S (2013) Collective Housekeeping and the Revenge of the Oikos: Against Hannah Arendt on Democracy, Work and the Welfare State. International Critical Thought 3: 444-467.

57. Moore JW, Suter C, Chase-Dunn C (2014) The End of Cheap Nature, or: How I learned to Stop Worrying about the Environment and Love the Crisis of Capitalism Structures of the World Political Economy and the Future of Global Conflict and Cooperation. (1stedn) Berlin: LIT 285-314.

58. Schatzki TR (2011) Where the Action Is (On Large Social Phenomena Such as Sociotechnical Regimes). Sustainable Practices Research Group, Working Paper Lancaster.

59. Schatzki TR (2002) The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change, Pennsylvania State University Press, University Park, PA.

60. Røpke I (2009) Theories of practice. New inspiration for ecological economic studies on consumption. Ecological Economics 68: 2490-2497.

61. Gram-Hanssen K (2010) Standby consumption in households analysed with a practice theory approach. Journal of Industrial Ecology 14: 150-165.

62. Gram-Hanssen K (2011) Understanding change and continuity in residential energy consumption. Journal of Consumer Culture 11: 61-78.

63. Shove E (2003) Comfort, Cleanliness and Convenience. The Social Organization of Normality, Berg, Oxford.

64. Shove E, Shove F, Trentmann R, Wilk (2009) Everyday practice and the production and consumption of time, in Time, Consumption and Everyday Life (1stedn), Berg Oxford.

65. Røpke I (2012) The unsustainable directionality of innovation – the example of the broadband transition. Research Policy 41: 1631-1642.

66. Røpke I, Christensen TH, Jensen JO (2010) Information and communication technologies. A new round of household electrification. Energy Policy 38: 1764-1773.

67. Bartiaux F (2011) A practice-theory based analysis of energy renovations in four European countries. In:ECEEE 2011 Summer Study Proceedings. Energy efficiency first: The foundation of a low-carbon society 1: 67-78.

68. Bartiaux F, Reátegui Salmón L (2012) Are there domino effects between consumers' ordinary and 'green' practices An analysis of quantitative data from a sensitisation campaign on personal carbon footprint, International Review of Sociology: Revue Internationale de Sociologie 22: 471-491.

69. Goffman E (1961) Encounters. Two Studies in the Sociology of Interaction, Penguin University Books, Harmondsworth.

70. Spilerman S (2000) Wealth and Stratification Processes. Annual Review of Sociology 26: 497-524.

71. Spangenberg JH, Lorek S (2002) Environmentally sustainable household consumption: from aggregate environmental pressures to priority fields of action. Ecological Economics 43: 127-140.

72. Tukker A, Huppes G, Guniee J, Heijungs R, de Koning A, et al. (2006) Environmental Impact of Products (EIPRO). EUR22284EN. Seville, EC Joint Research Centre – IPTS.

73. Kok R, Falkena HJ, Benders RMJ, Moll HC, Noorman KJ, et al. (2003) Household metabolism in European countries and cities. IVEM Report

74. Benders RM, Kok R, Moll HC, Wiersma G, Noorman JK, et al. (2006) New approaches for household energy conservation—In search of personal household energy budgets and energy reduction options. Energy Policy 34: 3612-3622.

75. Vringer K, Blok K (1995) The direct and indirect energy requirements of households in the Netherlands. Energy Policy 23: 893-910.

76. Carlsson-Kanyama A, Pipping Ekstrom M, Shanahan H (2003) Food and life cycle energy inputs: Consequences of diet and ways to increase efficiency. Ecological Economics 44: 293-307.

77. Lenzen M, Dey CJ (2002) Economic, energy and greenhouse emissions impacts of some consumer choice, technology and government outlay options. Energy Economics 24: 377-403.

78. Nijdam DS, Wilting HC, Goedkoop MJ, Madsen J, (2005) Environmental Load from Dutch Private Consumption: How Much Damage Takes Place Abroad. Journal of Industrial Ecology 9: 147-168.

79. Huppes G, De Koning A, Suh S, Heijungs R, Van Oers L, et al. (2006) Environmental Impacts of Consumption in the European Union: High-resolution Input–Output Tables with Detailed Environmental Extensions. Journal of Industrial Ecology10: 129-146.

80. Wiedmann T, Lenzen M, Turner K, Barrett J (2007) Examining the Global Environmental Impact of Regional Consumption Activities – Part 2: Review of Input–Output Models for the Assessment of Environmental Impacts Embodied in Trade. Ecological Economics 61: 15-26.

81. Hertwich EG (2011) The life cycle environmental impacts of consumption. Economic Systems Research 23: 27-47.

82. Wilting HC (1996) An energy perspective on economic activities. PhD. Thesis, Centre for Energy and Environmental Studies. University of Groningen.

83. Baumann H, Tillman AM (2004) The Hitch Hikers Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Application, Studentlitteratur, Goteborg, Sweden.

84. Wiedmann T (2009) Carbon Footprint and Input–Output Analysis an Introduction. Economic Systems Research 21: 175-186.

85. Hertwich EG (2005) Consumption and industrial ecology. Journal of Industrial Ecology 9: 1-6.