ICT for Sustainable Cities: How ICT can support an environmentally sustainable development in cities.

Authors

Anna Kramers[1], Mattias Höjer[1], Nina Lövehagen[2], Josefin Wangel[1]

[1] KTH Royal Institute of Technology,
Environmental Strategies Research and Centre for Sustainable Communications,
Lindstedsvägen 3, SE-100 44 Stockholm
+4687906000
kramers@kth.se, hojer@kth.se, wangel@kth.se

[2] Ericsson AB,
Torshamnsgaten 23 SE-164 83 Stockholm
+46107190000

nina.lovehagen@ericsson.com

ABSTRACT

In this article we focus on the opportunities to use ICT to help cities reach their environmental targets and specifically how ICT can support reduction of energy use. We have developed an analytical framework to be able to identify ICT solutions opportunities that can support cities to decrease the energy use that origin from the inhabitants' consumption in order to reach climate targets. We use a consumption perspective on energy and allocate all energy to the final consumers that are the individuals living in the city. The analytical framework can be used by city administrations and ICT solution companies for identification and mapping of ICT applications and solutions with opportunities for sustainable development in cities.

Keywords

Smart cities, energy use, ICT

1. INTRODUCTION

Several initiatives have highlighted how ICT can be used to reach cities climate targets by lowering energy use and greenhouse gas (GHG) emissions from other sectors. There are proposals such as dematerialization and demobilization, as well as whole concepts for smart logistics and smart cities [1, 2].

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It has been argued that decoupling of material resources into dematerialized immaterial resources such as services is a condition for sustainable development [3]. Within the field of ICT it is the software that represents the immaterial resources and the services provided represents the value that could become the paradigm for the decoupled economy of the future [4].

ICT can, according to Hilty et al. [4], be viewed as an enabling technology to improve or be substituted for processes in other sectors. ICT can optimize the design, production, use and end-of life treatment of other products as well as optimization and/or modification of demand for other products by substitution or induction by enabling distributed forms of production.

Cities with strong environmental profiles as well as telecommunication industries seek to understand how to best utilize ICT as an enabler to reach climate targets. Cities need to better understand how to direct investments in ICT to provide greater benefits for environment and society. ICT solution providers are interested in emphasizing how they can provide enabling technologies, which is demanded by their customers – the cities.

The concept "smart city" has been used during the last 20 years and has been seen as a strategic concept to gather modern urban production factors in a common framework [5]. The adjective "smart" and the concept "smart city" are used to highlight the importance and potential of ICT supporting the city to get a competitive profile and implies a positive urban-based technological innovation and change via ICT [5, 6].

Mitchell has defined five main principles for how ICT can contribute to reduce environmental impacts [1]. The first opportunity is *dematerialization*, where physical things have been replaced by virtual. The second is *demobilization*, where travel is totally or partially replaced with telecommunications. The third opportunity is *mass customization*, with less consumption of scarce resources through intelligent adaptation or personalization. The fourth opportunity, *intelligent operation*, involves more intelligence in operations of for instance water, fuel and electric power. The fifth opportunity is *soft transformation*, where existing physical infrastructure are transformed to meet requirements from the information paradigm. The principles can be applied to product design, architecture, urban design and planning and regional, national and global strategy [1].

In 2008, the IT and telecom sector published a report together with the Climate Group [7] that focused emissions reductions from four different sectors; buildings, transport, power and industry [2]. Five major opportunities for reduction of GHG emissions and calculated potential emissions savings from each of these sectors were identified. The opportunities were smart -grids, -logistics, -buildings, -motors and dematerialization. The reduction potential of these opportunities was estimated to be 15% of total GHG emissions in a business as usual scenario 2020, which represents five times the sector's own emissions [2].

This paper focuses on the opportunities to use ICT to help cities reach their environmental targets and specifically the climate targets. Climate targets are here understood as comprising targets on energy use and GHG emissions [8], and we focus on how ICT can support the reduction of energy use in this article.

The purpose of this paper is to explore to what extent ICT can support an environmentally sustainable development in cities using a consumption perspective on energy. This is done through the development of a framework for identification and mapping of ICT applications and solutions with opportunities to decrease energy use.

2. DEFINITIONS OF A SMART CITY

The concept "smart city" can be understood as highlighting the importance and potential of ICT supporting the city to get a competitive profile [5]. Could it also be seen as a concept for an environmentally sustainable city? We are investigating different definitions of the smart city as well as ICT solutions for environmentally sustainable cities. Forrester [9] focus on the main infrastructures that cities provide to its citizens meaning that it is the combination of the "smart computing" (use of software systems, server infrastructure, network infrastructure and client devices) within seven critical infrastructure components and services (city administration, education, healthcare, public safety, real estate, transportation and utilities) that makes a city smart.

The Climate Group et al. have focused on ICT for the cities own administration and have defined the smart city to be a city that uses data, information and communication technologies strategically to provide efficient services to citizens, monitor policy outcomes, manage and optimize existing infrastructure, employ cross-sector collaboration and enable new business models [10].

Nam and Pardo [11] frame the smart city by different clusters that can be divided into three dimensions: technology (infrastructures of hardware and software), people (creativity, diversity and education) and institutions (governance and policy). According to Nam and Pardo [11] the technology dimension can be clustered in six different definitions, the digital city, the intelligent city, the ubiquitous city, the wired city, the hybrid city and the information city. The human dimension "people" are described in four clusters, which are the creative city, the learning city, the humane city and the knowledge city. The institution dimension has two different definitions the smart community and the smart growth. Visions about the future smart city includes solutions for smart transportation, smart environment, smart health care, smart energy, smart education, smart safety etc.[11].

Maeng and Nedovic-Budic [12] have gathered metaphors of the ICT based city from literature that affects the urban form and economics of cities. They found twelve useful metaphors which are Electronic cottage; Technoburb, Wired City, Informational city, Intelligent city, Invisible city, Telecity, City of bits, E-topia, Digital places, Network cities and Ubiquitous city.

The Intelligent Community Forum (ICF) has listed five successful factors for an intelligent community, which they use to rank the level of smartness of different cities each year [13]. The success factors according to ICF are broadband connectivity, knowledge workforce, digital inclusion, innovation and marketing and advocacy.

3. METHOD

To be able to understand to what extent a city (or another object of study) is environmentally sustainable, there is a need to define what is meant by a "city", i.e. to define the system. In order to do so, we here use four so called methodological considerations, identified as crucial when setting climate targets for cities [14]. The considerations can be seen as a way to identify the most important choices that needs to be dealt with when defining the system boundaries. The considerations concern the temporal scope, the object i.e. the spatial boundaries and activities included, the unit typically energy or GHG-emissions and the range of the target. The range is divided into two different perspectives, if a consumer or producer perspective is used and to what extent a lifecycle perspective is taken [14].

In this paper we use a consumer perspective elaborated by Höjer et al. [15] where the city residents' activities have been divided into six household functions. The energy use by city residents in Stockholm in the year 2000 was distributed over the different household functions [15]. The system for distributing energy between the functions was comprehensive in the way that all energy used for Stockholmers' consumption was allocated to the functions. The six household functions were personal, housing, food, care, common and support.

We used the four methodological considerations defined by Kramers et al. [14] as a basis for setting the system boundaries of the environmental impacts of the city. For this paper's specific purpose, we defined the system boundaries by stating in what way we handle each methodological consideration.

To get an overview of ideas on how different ICT applications and solutions can support an environmentally sustainable development in cities we investigated the main proposals from businesses and previous research, including definitions of the term smart city, in literature and through seminars. Participants included major ICT companies, city officials and a neighborhood community as well as from researchers from academia.

The five main ICT opportunities to support cities to become environmentally sustainable developed by Mitchell [1] and the household functions elaborated by Höjer [15] were then used to develop a matrix to be used as an analytical framework for identifying new ICT application and solution opportunities.

For each household function we went through the five ICT opportunities by Mitchell to identify already implemented and existing solutions, ideas or pilots that are underway, new opportunities and lastly areas where we did not find any use of ICT to reduce energy.

Lastly we discuss the potential reduction of energy use in cities by the ICT opportunities we have identified, based on the findings and complemented with own speculations regarding what could be done in a situation that is seen as pressing for energy reductions.

4. DEFINING SYSTEM BOUNDARIES FOR THE SUSTAINABLE CITY

By setting clear and transparent system boundaries it is possible to understand which of the environmental impacts generated by the city that is included. System boundaries can be set differently dependent of the purpose of the measurement of environmental impact of the city.

As previously mentioned we here try out to use the methodological considerations in Kramers et al. [14] to define system boundaries for an environmentally sustainable city, exemplified by suggested targets for Stockholm.

There are four major considerations to make.

The first consideration is *the temporal scope* of the target, i.e. what future point in time it aims at, and from which year, if there is a reference year. For the temporal scope we use 2050, with reference year 2000, the same years as in Höjer et al, 2011 [15]. Long-term targets are often discussed for 2050, even though not even the 2050-targets are always final targets, as mentioned by e.g. Åkerman and Höjer [16].

The second consideration is about *the object of target*, i.e. the spatial boundaries and activities included. In this paper, we propose to follow the same geographical limits as in Höjer [15]. Therefore, we here chose the 26 municipalities, comprising the Greater Stockholm labour market as the geographical scope. We include all activities in society in the target.

The third consideration is about *the unit of target*, typically energy use or GHG-emissions. The unit of the target in this first attempt to use the methodological considerations is energy and it is set to te same as in Höjer et al, 2011 [15], i.e. a reduction by 60% per capita living in the city. Thus an increased population in the city means that more energy can be used within the geographical borders in question.

The fourth consideration is about *the range of the target*. The range is divided into two different perspectives, if a consumer or producer perspective is used and to what extent a lifecycle perspective is taken [14]. For the range of the environmental impacts we are using a consumption perspective and only include the emissions from city residents living in the city and not from visitors. The consumption perspective we are using in this article is further highlighted by using the household functions suggested in Höjer et al, 2011 [15], where all energy use is allocated to one of the six categories personal, housing, food, care, common and support (see also Section 5 for more details regarding these functions). These are developed so as to comprise all energy use related to the consumption of residents living in a specific area.

Altogether, this means that if the same considerations were set up for all geographical areas in the world, the targets would cover the total global energy use. Table 1 illustrates the baseline situation for Stockholm 2000 with our methodological considerations.

Table 1. Energy use per household function, Stockholm 2000 [15]

Function:	Personal	Housing	Food	Care	Common	Support
Energy use	35%	32%	13%	11%	5%	4%

The choices we make in this paper can be compared to how the current policy of the City of Stockholm looks like in the area. According to the Stockholm Environment Program 2012-2015 [17], the City uses in principle two target years: 2015 and 2050. Both of those are absolute, thus, they have no reference year. However, the City indirectly relates the 2020-targets to EU-targets and national targets both stated with 1990 as reference year. The object of target is the Municipality of Stockholm and only heating, electricity and transport within the municipality are included. The City does not use any target on energy in their environmental program. Instead, they stick to CO2e/per capita. The aim is set to 3 tons CO2/capita by 2015 aiming at a fossil free Stockholm by 2050. The range of the City's target is the whole life cycle for fuels and electricity production. However, they do not include energy use for the citizens' consumption of goods, nor their travel beyond the city borders, but they bring in transport within the city limits by others than the citizens.

The main differences between the City's considerations, and ours, can be summarized as follows:

- The city uses CO2e instead of energy. This means that change of fuels in power plants or for cars, can be a way of reaching their target, but does not help with our methodological considerations.
- The city only includes some activities, whereas we put forward a comprehensive system of activities.
- The city limits most of the activities to things happening within the city border, whereas we include all activities by the city's citizens.

Looking at Table 1 can make a very rough quantitative measurement of the difference in scope between the two sets of considerations. Energy use for "Personal" consists of mainly long-distance travel, and to some extent of consumption of personal products, and heating of holiday houses. Thus, most of this energy use is not covered by the City's delimitation. The same goes for most of the energy use for food. For the other parts, the City's target covers most, but not all, energy use – such things as heating of houses (Housing) and public buildings (Care and Common) and commuting (Support). Thus, altogether it seems like the City's target covers about 50-60% of the energy use caused by all Stockholmers. Therefore, such a target does not only imply that a large portion of the energy use remains unattended but also risks resulting in that a whole range of measures are overlooked.

5. ICT FOR ENVIRONMENTALLY SUSTAINABLE CITIES

To support the identification of ICT applications that can support the reduction of energy use in cities we developed an analytical framework, presented in Table 2. The analytical framework was developed by combining the household functions elaborated by Höjer et al [15], with the ICT opportunities for reducing energy use in cities identified by Mitchell [1]. To also address solutions aimed at persuasion or "user awareness and decision support" [18] these were included in "intelligent operation".

The analytical framework was used to categorize ICT solutions that emerged from the literature studies and seminars into: already implemented solutions (i), pilot solutions (p), and new opportunities for ICT application (o). Furthermore also areas where ICT solutions were deemed to have little or no potential to make use of to decrease energy use were identified (n.a.)

Table 2. Analytical framework to explore the potential of ICT solutions to decrease energy use. The matrix shows energy use per household function in Stockholm 2000 [15] combined with the identified ICT opportunities. The latter divided into new opportunities (o), pilots (p) and existing ICT solutions (i) as well as where ICT solutions not is applicable for energy decrease (n.a).

Energy use %	ICT Opportunity / Household functions	Demateralization	Demobilization	Mass customization	Intelligent operation	Soft transformation
35	**Personal**	i	n.a.	o/p	p	o
32	**Housing**	o	n.a.	o	o	o
13	**Food**	n.a	n.a	o/p	o	o
11	**Care**	n.a	i	i	o	o
5	**Common**	n.a.	n.a.	n.a.	n.a.	n.a.
4	**Support**	n.a.	i/o	o/p	p	o

In the following sections ICT application solutions are identified, presented and discussed for each household function.

5.1 Personal

The category *Personal* comprises the largest part of householders' energy use. This household function category includes activities such as sleep, clothing, hygiene, recreation, entertainment, certain types of trips and holiday homes. It also includes durable and semi-durable goods such as televisions, computers, sound systems and discs, videotapes, books and clothes; consumables such as tobacco, wine, soap and makeup; and services such as restaurant visits and pedicure [15]. Many of the activities, goods and services included in the category Personal serve as lifestyle markers. Within this category the activity leisure travel with car stands for the largest part of the energy use followed by holiday air travel. Goods such as cars, mobile phones, lap tops etc. use a lot of the energy from Personal.

To *demobilize* leisure travel would not be easy, since the whole idea with the activity is to physically go somewhere else, to meet with friends and family and take part of different activities or to spend a weekend in Paris. It is difficult to *demobilize* a soccer game competition or a visit to a countryside house. Therefore the opportunity within Personal lies more in *dematerialization*, *mass customization* and *intelligent operation*.

Many of the durable goods included in Personal are already becoming *dematerialized* by the use of different ICTs. Videotapes, records and books are now broadly available as media files. Moreover, other goods such as phones, cameras, keys, money, CD-players and navigation devices have been dematerialized by way of being integrated in one and the same device.

There are also other durable or semi durable goods in the household that might be transferred to services performed by an operator that have resources to dematerialize and/or mass customize services based on demand. One example of where both *dematerialization* and *mass customization* are used is cloud computing. Cloud computing is a model for enabling on-demand network access to a shared pool of resources such as servers, storage, applications etc. [19]. Cloud computing allows for computer-processing resources to reside in the cloud and thus enables only having the displaying devices in the household. The energy used for the cloud computing services would still be allocated to the household but could, depending on the energy performance of the cloud computing service, be lower than if all households have their own computing devices. Another example of a good could be both *dematerialized* and *mass customized* through ICT is to shift the owning a private car to a subscription to a mobility service, such as a car pool in which a range of different cars are available to be booked and used for different purposes. Similar solutions are public transportation access cards, car renting services and City Bike systems. There is however a great potential to use ICT to further integrate these systems, e.g. by way of providing a common booking system, interface and payment system. One example of such a system is the Dutch system 'Green Wheels', but public transportation is not integrated in that service [20].

Intelligent operation of personal household functions could for example be used to make use of ICT to help travellers to find the most environmentally friendly travel mode. Kramers [21] has explored these opportunities by identifying new functionality for advanced traveller information systems. Intelligent operation could also be used to help reduce the energy use in households by different technologies aiming at user awareness and decision support, intelligent control of the households energy use through e.g. standby management, energy management and trading, or by integration technologies for both process and system integration [18].

The presented ICTs could also contribute to a *soft transformation* of the urban fabric through an optimized use of transportation infrastructure, roads and parking places. The need for space in the household can be reduced because of the need for storage of durable and semi durable goods will decrease.

5.2 Housing

The energy use allocated to the household function *Housing* consists of the residence and parts of its equipment such as residential service, heating and lighting; furnishings such as furniture, carpets and textiles; and domestic services such as cleaning, maintenance and repair. The energy use for operation and management of the housing as well as electricity for common areas in multifamily houses is also included [15]. The by far largest part of the energy use within the housing category comes from heating. The energy use for heating is even greater than the energy use for leisure travel.

Today the main focus on intelligent operation solutions in relation to Housing is focusing on the electricity grid. As electricity is used for more than one household function, saving effects from ICT investments in the grid need to be allocated to all of these functions. However, the same technologies that are used for the smart grid and smart meter solutions could also be used to lower or cut peaks in the use of district heating [22]. When looking at the activities in Housing it becomes evident that ICT is not used to any wider extent for the purpose of saving energy. Thus, the potential for identifying further opportunities should be good.

Indoor-space can be *dematerialized* to some extent by sharing of spaces but also by using a virtual world for certain activities. The energy use for transportation in Housing is very low, meaning that there is little potential for *demobilization*.

Mass customization is currently mainly used for demand management of indoor lighting by sensors in buildings used for business purposes. It could however also be used for management of households lighting and for steering of heating and/or cooling of indoor space.

Likewise as the durable and semi durable goods in the household function Personal some goods connected to Housing such as laundry machines, vacuum cleaners, drilling machines or trailers can also be shared between households or subscribed to from an operator that supplies the service. The role of ICT in this would be to facilitate booking of the service, and potentially to keep track of the goods. The *soft transformation* that can take place because of the different ICT solutions for the housing household function is a more optimized use of heated and/or cooled space and reduced number of heated spaces as well as reduced need for space to store goods. Energy trading between buildings will put requirements on how to arrange the buildings for more optimized use of the energy system. If office buildings were located close to residential buildings excess waste heat can be used to heat the residential buildings [23]. *Intelligent operation* to optimize management and operation of the whole building or apartment is already used in parts of the building stock but could be much more widely used.

5.3 Food

Food includes energy use related to food items and the equipment required for storage, purchasing and preparation of food, as well as parts of the restaurant and café visits. Production of food is the largest contributor to energy use in this category – what we eat is important for the energy use [15]. The second largest portion comes from the storage and cooking of food. The travel to buy food is included in this category but is much smaller than the other two activities.

*Dematerializatio*n and *demobilization* is not possible for this category since food cannot be digitalized. Instead ICT can be used to inform and build up knowledge of what we eat and how it affects the environment. *Mass customization and intelligent operation*, in combination enables ICT to tell us about the best possible choices from environmental and availability point of view. There are existing examples of these types of applications. Two examples are Good Guide [24] in the US and Shopgun [25] in Sweden. *Intelligent operation* could also be used to optimize logistics of food transportation and to find the best possible place for the trading point between delivery of goods and the consumer.

A lean production way of thinking of the food supply chain would make it possible to both optimize the production as well as the transportation of food. Maybe it would also in the long run provide means for *soft transformation* of both to decrease the need for heated and/or cooled spaces in groceries and less demand for transport infrastructure.

5.4 Care

The category *Care* stands for an eighth of the households' energy use. The category is divided into three major parts: education, social security and healthcare. Only 10 % of the energy use in the care category is related to the private households according to Höjer et al [15]. The rest is mainly energy use in public buildings.

Being a service it may be hard to see how Care could be *dematerialized*. However, Care includes numerous types of material equipment that might be substituted by the help of ICT, for instance the shift from analogous x-ray to digital. It is possible to *demobilize* certain care services. Examples on these are remote healthcare via sensors and mobile phones, education on distance and security systems via surveillance equipment. An opportunity for *mass customization* is to make use of ICT for more personalized service to care takers according to their needs.

Intelligent operation can be used to manage and operate energy use in buildings used by the care function. A *soft transformation* can take place by making use of ICT to understand where to locate care functions to best serve the households in the effort to minimize the distance travelled.

5.5 Common

The category Common meets the basic needs of safety and security. The energy use comes from buildings and public goods used in the political system, military, police, judiciary, central and local government administration and the county administration and local government [15]. Most of the energy use in this category is outside the individuals responsibility and therefore difficult for the individual to reduce. Instead, the ICT-applications of relevance here are such that can improve efficiency in use and heating of buildings. Examples of the first are steering systems for heating and cooling, and examples of the latter are various forms of reforms for reduced use of space, such as distance work, e-governance and mediated meetings.

5.6 Support

The category *support* includes paid work and commuting. The energy use in the category support consists solely of energy use from commuting to work [15], since energy use at work, is allocated to other categories.

Travelling by car and/or motorcycle is responsible for 65 % of total energy use for commuting. The rest of the energy use for the category support is shared between commuting via public transportation/cycling and maintenance of the road infrastructure, which have the same share, 17 % of the total energy use.

Dematerialization of commuting through ICT is not possible and therefore not applicable in the category support. Commuting is different from leisure travel and can more easily be *demobilized* and replaced by virtual means such as collaboration tools, telephone or video-meetings. Commuting could be *mass customized* and enabled by ICT in the same way as described for leisure travel. *Intelligent operation* of commuting could likewise as for leisure travel be used to make use of ICT to help travellers to find the most environmentally friendly travel mode.

Since commuting is more easily demobilized, there are possibilities for soft transformation of buildings and infrastructure. There are possibilities to locate work hubs close to where people are living and provide professional business environments with all necessary equipment that can be shared between different companies. The idea is not new but has very rarely been implemented, but the opportunities can increase with a population more used to communicating without being at the same physical spot, and with a more pressing situation, caused by e.g. demands on reduced energy use.

To make use of ICT for transport of both leisure travel as well as commuting and business travel could lead to more optimized infrastructure with less demand for energy. A demand-based mobility where city residents subscribe to mobility can lead to less demand for both fuel and also for spaces used for private cars. A more intelligent operation of public transportation and information about it by the use of advanced traveler information systems would be feasible. There are gains for unexploited efficiency potentials in public transportation, seamless integration of various systems for different travel modes, demand/supply co-ordination and electronic payment for both dematerialization and demobilization of ticket handling [21, 26].

6. CONCLUDING DISCUSSION

In this paper we have put together thoughts on smart cities, methodological considerations for setting climate targets and household functions and collected ideas on how ICT-solutions can be used to reduce energy use in cities.

We conclude that the concept "Smart city" is in many cases used as a place-marketing concept to attract investments, businesses, residents and tourists. It promotes the city's image and attractiveness, but it often has little to do with environmental concerns or solutions. Therefore, caution is called for when using the smart city concept, so that it does not lead to the promotion of environmentally negative effects, but instead focus on the environmentally positive solutions.

The framework we developed can be used to find opportunities, pilots and existing solutions for the use of ICT for energy reductions. We suggest that areas with the greatest potential for energy reductions can be identified by looking for combinations of household functions with large energy use and many new opportunities for ICT solutions. These areas are mass customization, intelligent operation and soft transformation of transport and heating of buildings. This correlates well with the findings from a study made by Hilty et al. [26], where it was found that ICT could increase energy use by 37% in the worst-case scenario but it could also decrease energy use in the best-case scenario by 17% [26].

When searching for figures on how much energy that can be saved there is not much information. We have used energy use as an indicator on ICTs contribution to environmental sustainability, however there are other proposals such as, tons of kilometers of freight transport = tkm, passenger transport measured in persons times kilometer = pkm, energy use, GHG emissions and waste not recycled [26]. Other indicators that could be useful are for example heated space, kg of decreased material resources, number of parking spaces and road kilometers.

Hilty et al. [26] found that the main decreasing effects of ICT on energy consumption are to make use of ICT to shift from material goods to services, to install intelligent heating systems, to use ICT for production process control and for supply chain management.

Personalization and demand management characterize the ICT potential mass customization. In this field there are opportunities to use the concept persuasive computing to enable ICT to automate, persuade or inform individuals of different alternatives [27].

Cities need to thoroughly go through the opportunities and investigate how they best can support the implementation of different ICT solutions. Meanwhile, businesses need to learn how to best design and implement ICT-solutions that decrease energy use.

A special problem that is displayed in this paper is the risk for mismatch between city's climate targets and the opportunities given by ICT-solutions. As was shown in Section 4, Stockholm City's climate targets only covers 50-60 percent of total energy use. Therefore, they may miss important ICT-solutions. Those are solutions related mainly to personal consumption of goods and services. They can be either focused on direct energy savings, e.g. by more efficient use of leisure houses. Or they can be focused on collecting information on energy use of various activities.

It is highly debated if and how such information can have any effect on actual energy use. There are also sensitive ethical issues involved in which ways public authorities may affect its citizens. This still needs to be investigated. In any case, the lack of knowledge regarding activities' energy use is a democratic problem, since it blocks informed discussions regarding what can, should and needs to be done and whose responsibility that is. ICT has a great potential to highlight those issues. Therefore, it can make energy use that until now has been seen as beyond the jurisdiction of city administrations, to being something they should and need to deal with.

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