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# Assessing Opportunities for ICT to Contribute to Sustainable Development

December 2005



This report draws on the valuable input received from major stakeholders during a workshop organized on 20<sup>th</sup> September 2005 by the Evaluation and Monitoring unit (INFSO C3), in collaboration with unit D1 of the Secretariat General on “Assessing Opportunities for ICT to Contribute to Sustainable Development”.

It also refers to relevant literature on the subject to assess possible contributions from and by ICTs to Social inclusion and Environmental aspects of sustainability.

Exchange of views with major stakeholders from the ICT business community and civil society highlighted consensus on the positive role that ICT can have in all dimensions of sustainable development: in terms of efficient energy and resource use in relation to transport and climate change; and in relation to social equity, notably social inclusion, but recognising the continuing need to address “digital divides”.

A wealth of existing business initiatives in the domain stressed opportunities for the ICT industry and the civil society to work closely for the achievement of common goals of sustainable development. An inventory of business-led initiatives is attached in the annex.

The report has been prepared for DG Information Society of the European Commission by Ms. Joanna Knast under the supervision of Mr. Loris di Pietrantonio and Mr. Peter Johnston.<sup>1</sup> It also draws on a preliminary report by Mr Gilles Berhault on the workshop organized on the 20<sup>th</sup> September 2005.

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<sup>1</sup> The views expressed in this report are the authors own and do not reflect the official view of the European Commission.

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## 1. SUSTAINABLE DEVELOPMENT STRATEGY

In 1987 the World Commission on Environment and Development (WCED) (known as the “Brundtland Commission”) defined Sustainable Development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Since then meeting the goals of sustainable development has become one of the greatest challenges of our times.

Sustainable Development is a fundamental objective under the European Union Treaty, and is an overarching concept that underpins all Union policies, strategies and actions. The EU Sustainable Development Strategy (SDS) was adopted by the European Council in Göteborg in June 2001. It sets out ‘a positive long-term vision for a society that is more prosperous and more just, and which promises a cleaner, safer, healthier environment’<sup>2</sup>. Therefore, the three dimensions of sustainability – the economic, social, and environmental – are mutually reinforcing and must be progressed at the same time. The SDS identifies six specific unsustainable trends. These are climate change, public health, poverty and social exclusion, ageing society, management of natural resources, and mobility and transport.

It was agreed that it would be reviewed every five years when a new Commission takes office. After a substantial public consultation in 2004 the Commission proposed general orientations for the Review of the Sustainable Development Strategy in February 2005<sup>3</sup> including a stronger focus on Research and Innovation to enable continued growth, creation of jobs and more efficient use of resources – notably energy. In May 2005, the Commission proposed a Draft Declaration on Guiding Principles for Sustainable Development (COM(2005) 218), including a wider partnership with the business community and civil society, and these were adopted in June 2005.<sup>4</sup>

In this context, the role of ICT is of particular importance to a new paradigm of growth to meet the goals of the Lisbon and Sustainable Development Strategies.

There is now good evidence that ICTs make a major contribution to economic growth. They account for 40% of Europe’s productivity growth and for 25% of EU GDP growth.<sup>5</sup> They make both a direct and indirect contribution to growth and competitiveness, but also facilitate improvements in public services, provide energy-efficient solutions, and help address social challenges. ICTs therefore offer a potential and possibly important route to global sustainable development through accelerated technology development, business innovation and structural change.<sup>6</sup>

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<sup>2</sup> European Commission, *A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development*, COM (2001) 264 final.

<sup>3</sup> European Commission, *The 2005 Review of the EU Sustainable Development Strategy: Initial Stocktaking and Future Orientations* - COM(2005) 37 final.

<sup>4</sup> Presidency Conclusions Brussels European Council 16-17<sup>th</sup> June 2005, Doc 10255/05.

<sup>5</sup> European Commission, *i2010 – A European Information Society for growth and employment*, SEC(2005) 717.

<sup>6</sup> Hughes, B.B. and Johnston, P.D. (2005) *Sustainable Futures: Policies for Global Development*, *Futures*, Vol. 37, No. 8, p. 813-831; Luukkanen, J., *The Information Society and Dematerialization*, Visions of the Information Society Conference: EMPA, St. Gallen, Switzerland, 3-4 November 2005.

## 2. ICT AND SUSTAINABILITY

ICTs have a great potential to support sustainable development. Not only do they constitute an industry in their own right, but they act as a technological base for other sectors of the economy. By increasingly pervading all layers of the economic and social fabric, ICT present a unique opportunity to deliver competitiveness while enhancing sustainability. ICTs are a key contributor to productivity growth especially in the service industry (and particularly in retailing and financial services).

The “digital” information and communication technologies constitute a fast growing proportion of GDP. In the OECD countries, the sector has grown from 4% of GDP in 1990 to about 7% in 2002<sup>7</sup>, and is likely to grow to 10% in 2012. In the European Union, it constitutes 5.9% of GDP.<sup>8</sup> The ICT acts also as a contributor to GDP and productivity growth across the rest of the economy.<sup>9</sup>

The link between the ICT and sustainable development is being addressed by extensive debates and research which recognize the existence of both significant opportunities and threats. In this polarized view, the ICT can be viewed as a tool contributing to ‘a shift towards a sustainable development’ or as “catalyst that can speed up current negative trends”.<sup>10</sup> On the one hand, there is optimism that ‘new economy’ will bring dematerialisation, a reduction in movement of goods, and a general decoupling of economic growth and resource use. On the other hand, there is fear that current unsustainable trends, such as digital divide, accelerated consumption and toxic waste, will be worsened.

There is little evidence of greater resource-use efficiency in the ‘new economy’. However, evidence is emerging in that a holistic approach based on the interaction of complimentary policies is needed.<sup>11</sup> The sustainable use of ICT alone will not deliver the goals of social and environmental sustainability if systemic approaches are not introduced at all levels of policy-making.<sup>12</sup> Systemic approaches and common efforts from governments, civil society and businesses alike are needed.

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<sup>7</sup> *OECD Science, technology and industry scoreboard 2003* : In Finland, the ICT sector’s added value is now over 16% of the business sector total – [www.oecd.org/dataoecd/41/0/17130709.pdf](http://www.oecd.org/dataoecd/41/0/17130709.pdf)

<sup>8</sup> Van Ark, B., Frankema, E. and Dutew, H. (2004) *Productivity and Employment Growth: An Empirical Review of Long and Medium Run Evidence*, University of Groningen: Research Memorandum GD-71 <http://www.ub.rug.nl/eldoc/ggdc/200471/200471.pdf>

<sup>9</sup> Jorgenson (2003) *Information technologies and the G7 economies* – <http://post.economics.harvard.edu/faculty/jorgenson/papers/papers.html>

<sup>10</sup> WWF (2002) *Sustainability at the Speed of Light – Opportunities and Challenges for Tomorrow’s Society*.

<sup>11</sup> Johnston, P.D (2001) *Sustainability and Jobs in the Knowledge Economy*, Journal of Universal Computer Science, Vol. 7 No. 6.

<sup>12</sup> Pamlin, D. (2005) *Eco-friendly actions*, <http://www.i4donline.net/aug05/strategicarea.pdf>

The business community has the opportunity to contribute to sustainability, by making its supply-chains more energy and resource efficient through positively leveraging the best use of ICT. Civil society and people will be vital players in changing work practices in more sustainable ways through the necessary enabling technologies and regulatory frameworks. Governments can grasp the opportunity to modernise public service delivery while improving their processes and resource management.

If applied within this broad framework, the ICT may reduce environmental impact (mainly by improving transport and energy efficiency) while contributing to social inclusion.

ICT facilitates the participation of European citizens at all levels of social and economic activities. By providing the necessary tools for the elderly and unemployed to be included actively in the fabric of the European economy, ICT can foster social and territorial inclusion, help eradicate poverty, empower women, and help building sustainable communities, provided the current “digital divides are addressed.”<sup>13</sup> Social inclusion in an “information society for all” is therefore already a major goal of the i2010 initiative proposed by the European Commission in May 2005<sup>14</sup>.

Existing business initiatives in the field of ICT and sustainability already result in major economic gains for companies implementing energy efficiency strategies. The market incentive in improving efficiency -while minimising waste of resources and de-materialising processes- is the major stimulus for businesses to initiate actions in this field. With increasing energy prices, the reduction of energy and transport intensity is becoming necessary to maintain and improve profitability in the near future.

Appropriate use of ICT can therefore contribute in addressing the challenge of climate change. These technologies have the potential to contribute to higher energy efficiency by making offices, homes and transportation systems more ‘intelligent’. Moreover, the ICT-based services and working methods, such as teleworking and videoconferences, can result in lowering carbon emissions from business activities. These opportunities are beginning to be addressed in a variety of business-led collaborations – as highlighted in this report.

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<sup>13</sup> Despite the growing use of ICT in all sections of the European Society, the “digital divide” is not being bridged. The reasons for the existence of this gap are numerous and include: the lack of infrastructure, lack of incentives to use ICTs, and insufficient IT literacy and skills. Age and education are important factors in describing the divide: 75% of the young population (aged 16 to 24) access Internet, three times more than the elderly population (aged 55 to 74). Similarly, 77% of highly educated individuals use Internet, as opposed to 25% of lower educated persons. Another important factor is the degree of urbanisation, where rural and thinly populated areas have lower availability of infrastructure. Source: Eurostat (2005) *The digital divide in Europe*.

<sup>14</sup> European Commission, *i2010 – A European Information Society for growth and employment*, SEC(2005) 717.

### 3. ICT AND SOCIAL INCLUSION: CURRENT UNDERSTANDING AND RESEARCH RESULTS.

The new strategic framework, “i2010 – European Information Society for Growth and Employment”<sup>15</sup>, emphasises the role of ICT as a driver of inclusion and quality of life.

In line with i2010 proposal, key stakeholders of the workshop on 20<sup>th</sup> September 2005 highlighted the potentials of ICT to contribute to both social sustainability as well as the goals of competitiveness, by enhancing the inclusion of European citizens at all levels of social and economic activities.

Continued economic growth is the key for equitable and flourishing societies. However, ICT development has to address development opportunities for the poor and disadvantaged. Social capital is endangered by high crime rates, tensions deriving from gender, religious, ethnic and racial differences and family disintegration. On the contrary, economic growth associated with equitable wealth creation is the most commonly considered contributor to social capital. Both democratisation and value change are largely determined by income levels. No society with GDP per capita exceeding \$7,000 has supported the transition from democracy to autocracy.<sup>16</sup>

ICT can widely contribute to more equitable distribution of human capital. Digital technologies have the potential to empower billions of people and enhance human dignity. It is also recognized that ICT assures equal reception and distribution of information, thus fighting against the global digital divide and contributing to the inclusion of various social and geographically remote groups.

Accessibility to new technology, on-line applications and network infrastructure is the prerequisite to benefit from opportunities that arise from ICT. The most revealing indicator in this respect is the broadband penetration. As represented on the graph (see Figure 1), Netherlands and Denmark are the leading countries of the EU, with penetration rates higher than 20 subscribers per 100 inhabitants. Finland, Belgium and Sweden follow in the European broadband league table. Among the new member states, Estonia and Malta achieve the highest penetration rates of 11 and 10 subscribers per 100 inhabitants respectively.

Once the appropriate framework is in place, ICTs can contribute to social sustainability in the areas of:

- more efficient public administration

e-Government refers to any transaction which requires the government’s involvement and that is executed, even partially,

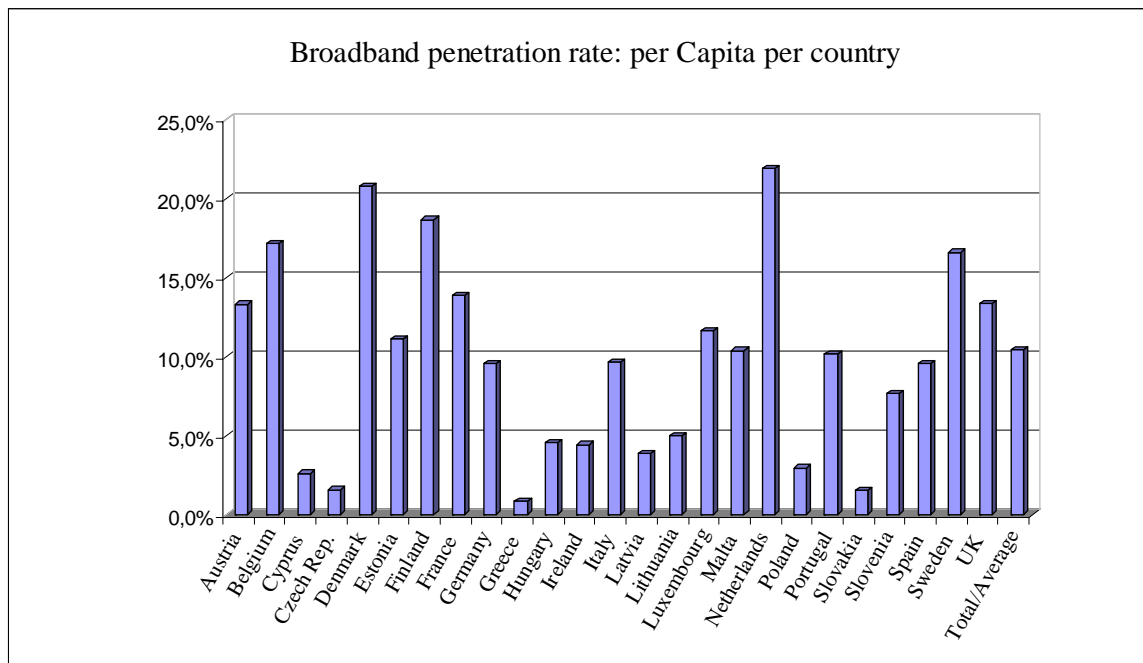
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<sup>15</sup> SEC(2005) 717.

<sup>16</sup> Hughes, B.B. and Johnston, P.D. (2005) *Sustainable Futures: Policies for Global Development*, Futures, Vol. 37, No. 8, p. 813-831.

using electronic means. Its impact goes beyond mere use of electronic devices since it actually requires re-thinking the way that the government works. The SIBIS study<sup>17</sup> indicates that both citizens and businesses are interested in online services. Familiarity with online service and greater online usage is linked to a positive attitude toward e-Government among citizens. Similarly, convenience is named as the key attractiveness of online services for businesses.

**Figure 1 Broadband penetration rate in the European Union (July 2005)**



Source: ECTA Scorecard end of July, 2005; [www.ectaportal.com](http://www.ectaportal.com).

- improved governance, wider participation in democracy and public life, increased transparency in public administration

The European Commission in its action plan<sup>18</sup> acknowledges the importance of public procurement, pointing out that it accounts for about 16% of the EU GDP. Moving to electronic procurement can result in savings for up to 5% on expenditure for public budgets. Moreover, it would decrease transaction costs for both buyers and suppliers by between 50 – 80% and hence make it more accessible to SMEs.

- better access to health services (e.g. health care through remote assistance and assistive living)

<sup>17</sup> [http://www.empirica.biz/sibis/files/WP5\\_No8\\_e-Government\\_2.pdf](http://www.empirica.biz/sibis/files/WP5_No8_e-Government_2.pdf)

<sup>18</sup> European Commission, *Communication from the Commission on the Action plan for the implementation of the legal framework for electronic public procurement*, Brussels, 13.12.2004.

ICT can help improve the affordability and availability of the European national healthcare systems.<sup>19</sup> IT solutions have the potential to streamline administrative procedures and offer improved and more cost-efficient treatment for patients,<sup>20</sup> resulting in better services accompanied by major savings in national healthcare budgets<sup>21</sup>.

On-line search for information relating to health is of growing importance, especially among the internet users (data for EU-15). The forefront runner in this regard is Ireland (41.8% of internet users seek e-Health information).<sup>22</sup>

ICT offers, for example, tools for e-Prescription, with services for patients becoming safer, better and more time and cost efficient. Although there are several regional initiatives in this field, there is a need for increased coordination at the EU level.<sup>23</sup>

- better access to education for and by the people even in the most remote regions

ICT can enable self-expression, new knowledge creation and cultural diversity.<sup>24</sup>

It facilitates, through e-Learning technologies, lifelong training. About 15% of the European labour force (EU-15) benefit from work-related e-Learning (such as programmes on CD-ROMs), with about two thirds of which using online applications. The key to successful uptake of e-Learning is user experience with ICT. The most successful in this regard is Finland, where 91% of employees have free access to internet in their workplace.<sup>25</sup>

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<sup>19</sup> European Commission, *e-Health - making healthcare better for European citizens: An action plan for a European e-Health Area*, COM (2004) 356 final.

<sup>20</sup> Nairn, G. (2005) Medical information in the digital age, *Financial Times*, 25.11.2005.

<sup>21</sup> Danzon, P.M. and Furukawa, M. (2001) e-Health: Effects of the Internet on Competition and Productivity in Health Care, [http://e-economy.berkeley.edu/conferences/9-2000/EC-conference2000\\_papers/danzon.pdf](http://e-economy.berkeley.edu/conferences/9-2000/EC-conference2000_papers/danzon.pdf)

<sup>22</sup> [http://www.empirica.biz/sibis/files/WP5\\_No9\\_Health\\_2.pdf](http://www.empirica.biz/sibis/files/WP5_No9_Health_2.pdf)

<sup>23</sup> European Commission, Proposal for a Decision of the European Parliament and of the Council establishing a Competitiveness and Innovation Framework Programme (2007-2013), COM(2005) 121 final; European Commission, Annex to the Proposal for a Decision of the European Parliament and of the Council establishing a Competitiveness and Innovation Framework Programme (2007-2013) {COM(2005) 121 final}, SEC(2005) 433.

<sup>24</sup> Half of students admit to use e-Learning at least once a month, which indicates wide-spread use of this form of education and its future potential. [http://www.empirica.biz/sibis/files/WP5\\_No4\\_Education\\_2.pdf](http://www.empirica.biz/sibis/files/WP5_No4_Education_2.pdf)

<sup>25</sup> [http://www.empirica.biz/sibis/files/WP5\\_No5\\_Work\\_employment\\_skills\\_2.pdf](http://www.empirica.biz/sibis/files/WP5_No5_Work_employment_skills_2.pdf)

The DIGITAL EUROPE project indicates that the focus should be placed on developing and enabling knowledge networks as a way of promoting more dispersed economic hubs.<sup>26</sup>

- better combination of work, education and family dimension (e.g. through “home-office” e-working).

There is evidence that teleworking increases the participation in work, and hence contributes to the European Employment Policy’s goals of higher employment rate. The SIBIS study shows that in the 2002, 7% of European workforce benefit from home-based tele-work. At the same time, there is a disproportionate interest in tele-work, with an average of 66% of surveyed respondents interested in this form of work. The strongest interest is among the unemployed. Since the unemployment rates are higher in remote and peripheral areas of the EU, telework could contribute to higher social inclusion.<sup>27</sup>

The FAMILIES project<sup>28</sup> supports finding that teleworking is socially sustainable. More flexibility in working organization is of particular importance in the context of ageing societies and the need to work longer. Between 2010 and 2030, the number of elderly workers will increase by 15.5%, while that of adults and young adults will decrease by the same amount.<sup>29</sup>

Services in the area of public interest constitute 45% of the EU GDP.<sup>30</sup> There is a great scope for improving their quality, making them more efficient, and effective through innovative use of ICT. This can lead to decreasing budgetary pressures, since better outcomes can be delivered with a smaller application of resources. Moreover, it offers great opportunities for SMEs to participate in the process of improving and reengineering public services.<sup>31</sup>

In sum, there is huge potential for improving social cohesion throughout Europe as well as economic growth from having an inclusive and more productive workforce.

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<sup>26</sup> [www.digital-eu.org](http://www.digital-eu.org)

<sup>27</sup> [http://www.empirica.biz/sibis/files/WP5\\_No5\\_Work\\_employment\\_skills\\_2.pdf](http://www.empirica.biz/sibis/files/WP5_No5_Work_employment_skills_2.pdf)

<sup>28</sup> [www.families-project.com](http://www.families-project.com)

<sup>29</sup> European Commission, Green Paper: *Confronting demographic change: a new solidarity between the generations*, COM(2005) 94 final, p. 8; *Access to Assistive Technology in the EU*, a DG EMPL report, CE-V/5-03-003-EN-C

<sup>30</sup> Eurostat.

<sup>31</sup> [http://europa.eu.int/information\\_society/activities/egovernment\\_research/presentations/index\\_en.htm](http://europa.eu.int/information_society/activities/egovernment_research/presentations/index_en.htm)

#### 4. ICT AND ENVIRONMENTAL SUSTAINABILITY: CURRENT UNDERSTANDING AND RESEARCH RESULTS.

The effects of climate change are a major preoccupation and as such have been reflected in the UK Presidency priorities for the EU and addressed during the 2005 G8 summit meeting.<sup>32</sup>

The new Lisbon objectives increase the focus on environmental technologies and innovations that facilitate long term sustainability, such as in the areas of resource use, energy and transport efficiency.<sup>33</sup>

On the 22 June 2005, the Commission published the Green Paper on Energy Efficiency<sup>34</sup> to explore possibilities for energy efficiency savings. The paper identifies the importance of increased energy efficiency while boosting competitiveness and jobs. It estimates that the deployment of successful energy efficiency schemes by 2020 could bring savings of up to 20% of European current energy consumption, which translates itself into €60 billion savings for the EU economy.

In line with the renewed Lisbon Strategy, the key stakeholders<sup>35</sup> recognised that the ICT can contribute to *win-win* outcomes delivering better environmental performance, while enhancing European competitiveness.

This can be achieved only if both the inputs to human systems from the environment and the outputs of human activities back to the environment are sustainable in the long run. The achievement of this long-run equilibrium still proves difficult. While the “end products” of economic activity are being de-materialised in the emerging knowledge economy, the overall use of resources continues to grow.

In order to reverse this unsustainable trend, actions have to be taken that break the link between economic growth and environmental degradation.<sup>36</sup> In fact, decoupling is the major environmental challenge and the key to sustainable development. Such decoupling can occur in absolute or relative terms. In case of the former, growth rate is increasing, while the relative environmental pressure is stable or decreasing.

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<sup>32</sup> www.g8.gov.uk

<sup>33</sup> European Commission, Working together for growth and jobs. A new start for the Lisbon Strategy, COM (2005) 24

<sup>34</sup> European Commission, *Green Paper on Energy Efficiency or Doing More With Less*, COM(2005) 265 final.

<sup>35</sup> Workshop on ‘Assessing Opportunities for ICT to contribute to Sustainable Development’, 20th Sept. 2005, Brussels.

<sup>36</sup> European Commission, *Draft Declaration on Guiding Principles for Sustainable Development*, COM(2005) 218 final.

Relative decoupling is more common and refers to cases where growth rate of environmental degradation is positive, though less than the growth of GDP.<sup>37</sup>

The Advanced Sustainability Analysis (ASA) is an example of scientific framework developed to identify the direction of environmental changes.<sup>38</sup> It is an analytic tool that deals with social, economic and environmental dimensions of sustainability with an objective to formulate policy recommendations in relation to environmental sustainability. In the context of decoupling, eco-innovations allow to sustain high levels of output growth from given inputs through increased productivity. This leads to a type of economic growth that is more sustainable environmentally.<sup>39</sup>

The ASA analysis of the relative contributions to carbon emissions from our daily activities show major opportunities for greater efficiency from the structural changes that can be facilitated by ICT use:

“Teleservices, logistics, recycling, nano technology as well as biomaterials will all be key factors if we are to create an ecologically, socially, economically and culturally sustainable information society.”<sup>40</sup>

In its explorative study on the relationship between the ICT and the environmental sustainability, the IPTS concludes that the impact of ICT on the environmental performance ‘should be taken into account by environmental policies’. By far the largest potential for ICT to contribute to greater energy efficiency emerges from use of ICT for<sup>41</sup>:

- dematerialisation – product-to-service shift.
- energy management in facilities (‘intelligent offices’ and ‘intelligent homes’)
- passenger and freight transport

All those areas have a dramatic importance for the environmental sustainability (see Figure 2).

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<sup>37</sup> <http://www.oecd.org/dataoecd/0/52/1933638.pdf>. The successful example of absolute decoupling are the reductions in emissions of ozone-depleting CFCs and lead emissions from petrol. Relative changes occur in many areas of energy, water and resource use.

<sup>38</sup> The method, developed by the Finland Futures Research Center, decomposes micro- and macro-level data into different effect components. Further information: <http://www.tukkk.fi/tutu/terra2000>

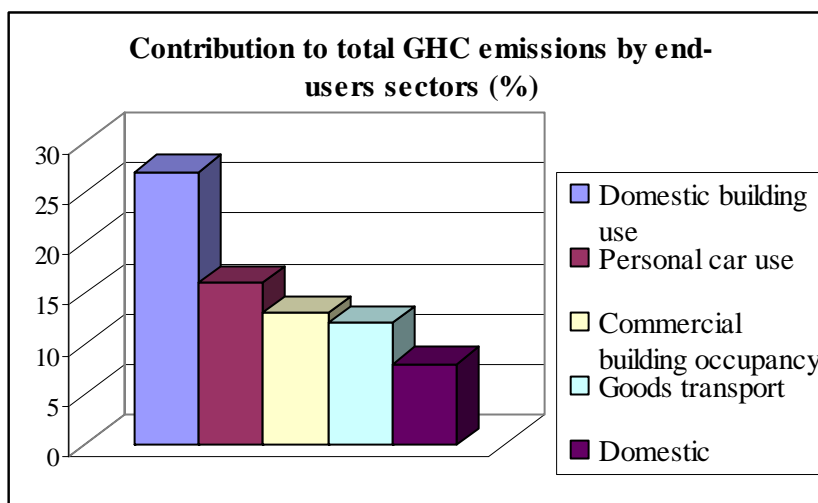
<sup>39</sup> European Commission, *Working together for growth and jobs. A new start for the Lisbon Strategy*, COM (2005) 24

<sup>40</sup> Luukkanen J., Vehmas J., Kinnunen V., Kuntsi-Reunanen E. & Kaivo-oja J. (2005). *Converging CO2 Emission to Equal per Capita Levels. Mission Possible?* FFRC-publications 2/2005. Finland Futures Research Centre, p. 125.

<sup>41</sup> The Future Impact of ICT on Environmental Sustainability, 2004, [http://www.forumforthefuture.org.uk/publications/futureict\\_page2116.aspx](http://www.forumforthefuture.org.uk/publications/futureict_page2116.aspx)

Structural changes in the global economy, notably dematerialisation, are essential for advancing sustainability.<sup>42</sup> Dematerialisation resulting from the shift to knowledge economy, in which more "value" is associated with "immaterial features and knowledge" creates opportunities for decoupling the economic growth from the use of limited resources.<sup>43</sup> Also in more traditional industries, notably in manufacturing<sup>44</sup>, substantial reductions in the "material intensity" have already taken place.

**Figure 2 Contribution to total GHC emissions by end-users sectors (%)**



Source: European Commission (2003) Study on external environmental effects related to the life cycle of products and services, p. 86,  
[http://europa.eu.int/comm/environment/ipp/pdf/ext\\_effects\\_finalreport.pdf](http://europa.eu.int/comm/environment/ipp/pdf/ext_effects_finalreport.pdf)

When measuring the effects of dematerialisation, it is important to include rebound effects, since increased efficiency and lower consumer costs can result in increased consumption.<sup>45</sup> In this regard, the role of ICT is very important. Preliminary ASA results indicate that there is a strong correlation between the rate of dematerialisation and the investment in ICT. It has led to the formulation of "a 5% rule" hypothesis – evidence shows that if the ICT investment ratio exceeds 5% of GDP, the effects of dematerialisation are strong.<sup>46</sup>

<sup>42</sup> Luukkanen, J., The Information Society and Dematerialization, Visions of the Information Society Conference: EMPA, St. Gallen, Switzerland, 3-4 November 2005.

<sup>43</sup> Hughes, B.B. and Johnston, P.D. (2005) *Sustainable Futures: Policies for Global Development*, Futures, Vol. 37, No. 8, p. 813-831

<sup>44</sup> eCommerce report (2000) [www.cool-companies.org](http://www.cool-companies.org)

<sup>45</sup> Luukkanen, J., The Information Society and Dematerialization, Visions of the Information Society Conference: EMPA, St. Gallen, Switzerland, 3-4 November 2005.

<sup>46</sup> Vehmas, J., Malaska, P., Luukkanen, J., Kaivo-oja, J., Hietanen, O., Vinnari, M. & Ilvonen, J. (2003) Europe in the Global Battle of Sustainability: Rebound Strikes Back? Advanced Sustainability Analysis. Turku School of Economics and Business Administration. KR-7:2003, Turku.

#### 4.1. ICT PAVING THE WAY TO ENERGY EFFICIENCY: PROCESSES AND ECO-EFFICIENT TECHNOLOGY

In terms of energy-use per unit of economic added-value, the ICT sector is one of the most efficient: it generates about 6-8% of GDP and uses only about a few percent of electrical power. The network operators are nevertheless significant users of electrical power and operate substantial vehicle fleets. They are at the leading-edge of business efforts to improve energy efficiency.

Most individual ICT equipments represent a small burden on electrical power use. However, there are so many in use, and most are left on in “standby mode”, especially with “always on” broadband access to the Internet, that total energy use is substantial.<sup>47</sup> The International Energy Agency estimated (in 1999) that 5-10% of total electrical power use in homes is “standby power”.<sup>48</sup> The IEA proposed that all countries adopt policies to reduce standby power to less than 1 watt per device by 2010. This is strongly supported by the US Department of Energy through the Federal Energy Management Program<sup>49</sup>, and by major ICT companies participating in the Energy Star Initiative.<sup>50</sup> There is a great scope to reduce the “standby” energy consumption by up to 75% through cost-effective technologies. In the EU, the Commission has proposed to increase energy savings in domestic appliances in the ECO-Design Directive, currently with the Council and Parliament.<sup>51</sup>

Taken into consideration the widespread use of ICT applications, it is important to design IT products paying attention to their environmental impact and energy consumption. Otherwise their environmental impact can be significant.<sup>52</sup>

There is also much to be done for gains from dematerialisation to be more significant, since the “office-based” activities of research, design, administration and customer-service have often more impact than manufacturing and product use themselves. This is aggravated by the inefficient use and inefficient organisation of work.<sup>53</sup> In Europe, the active use of offices is less than 10% of the total time.<sup>54</sup>

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<sup>47</sup> A good overview of benefits and threats of ICT was done in the IST-Digital Europe Project: [www.digital-eu.org](http://www.digital-eu.org).

<sup>48</sup> IEA / OECD (2001) *Things that go blip in the night: standby power and how to limit it*.

<sup>49</sup> [www.eere.energy.go/femp/](http://www.eere.energy.go/femp/)

<sup>50</sup> Introduced in 1992 by the US Environmental Protection Agency, Energy Star is a voluntary labelling program designed to help businesses and individuals protect the environment through superior energy efficiency.

<sup>51</sup> More information: [http://energyefficiency.jrc.cec.eu.int/html/standby\\_initiative.htm](http://energyefficiency.jrc.cec.eu.int/html/standby_initiative.htm)

<sup>52</sup> [www.digital-eu.org](http://www.digital-eu.org)

<sup>53</sup> The Ericsson Report (2000) shows that twice as much energy and nearly twice as much of CO<sub>2</sub> were associated with office work as with product production. Source: Johnston, P. D (2001) *Sustainability and Jobs in the Knowledge Economy*, Journal of Universal Computer Science, Vol. 7 No. 6

<sup>54</sup> Harrison, A., Wheeler, P., Whitehead, C. (eds) (2004) *The distributed workplace*, London: Spon Press.

Rising cost of energy is a powerful commercial drive for more energy-efficient solutions in building techniques and transport systems. In a recent study, IPTS estimates<sup>55</sup> a positive impact of ICT in terms of reduction in energy consumption (-17%) and greenhouse emissions (-18%) in best case scenarios, including best and wide use of ICT and a systemic approach to sustainability.

There is a great potential for better management of energy in heating and lighting buildings. Currently, energy use of buildings is growing as fast as GDP. Since 1980, new building and construction activities have more than doubled.<sup>56</sup> The pressure it creates for the environment is substantial. Heating and lighting of buildings now accounts for 40-50% of the industrialised world's energy consumption<sup>57</sup>. The use of domestic and commercial buildings (offices and shops) represents around 35 - 40% of the total contributions to greenhouse emissions.<sup>58</sup>

ICTs offer tools for reducing the overall greenhouse emissions by making offices, shops and homes "more intelligent" in terms of energy consumption based on capacity utilisation. Designers aim at reducing energy consumption and carbon emissions in new constructions and improve the efficiency of water and energy management systems in the existing structures.<sup>59</sup> Lightening consumes a third of the energy used by buildings, and hence more modern and intelligent lightening (such as light-emitting diodes (LED) technology) creates a huge potential for savings.<sup>60</sup>

A good example of an initiative focused on power efficiency is the collaborative OLLA project,<sup>61</sup> which is funded by the IST program of the European Commission's 6th Framework. Its aim is to develop high-efficiency light sources (OLED) and demonstrate its use in general lighting applications. OLLA is an urgently necessary investment in the future of European lightening industry, leading to better energy efficiency of the European society.

The advantage of all those measures is that they can be applicable in all buildings, which strengthens the final effect.<sup>62</sup> Unfortunately, not all new constructions make

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<sup>55</sup> IPTS (2004) The Future Impact of ICTs on Environmental Sustainability.

<sup>56</sup> This growth in construction is almost entirely associated with the growth in employment in services and with changes in lifestyles, notably the growth of office work, commuting and one-person households.

<sup>57</sup> Green Futures May/June 2000. Achieving SDS objectives clearly points to the need to focus on urban management and planning issues.

<sup>58</sup> European Commission (2001) Towards a thematic strategy on the urban environment, *An agenda for sustainable construction in Europe* (2001), COM(2004)60 final <http://www.europa.eu.int/comm/enterprise/construction/suscon/sustcon.htm>.

<sup>59</sup> Financial Times, *Even small investment can produce big results*, 10 October 2005.

<sup>60</sup> Potential savings can run up to 50% of the current energy consumption. Source: *Green Paper on Energy Efficiency or Doing More With Less*, COM(2005) 265 final.

<sup>61</sup> <http://www.hitech-projects.com/euprojects/olla/>

<sup>62</sup> The Future Impact of ICT on Environmental Sustainability, 2004, [http://www.forumforthefuture.org.uk/publications/futureict\\_page2116.aspx](http://www.forumforthefuture.org.uk/publications/futureict_page2116.aspx)

use of the existing technology.<sup>63</sup> An important point to be made is that the ICT sector enables the design of more sustainable workplace, but the key catalyst are the actual changes in the working practices.<sup>64</sup>

Improved office design has been the objective of the ISTN-SANE Project.<sup>65</sup> The objective of the project was to design a sustainable workplace with a location independent approach.<sup>66</sup> The initiative identified opportunities both for the well-being and creativity of staff, as well as for energy efficiency. The ideas (from the DEGW architectural practice<sup>67</sup>) have been taken up in the Telenor headquarters and in the redesign of the UK Treasury.

## 4.2. WASTE ELECTRIC AND ELECTRICAL EQUIPMENT

Waste of electric and electronic equipment (WEEE) currently represents 8% of municipal waste and is fast growing. Approximately 500 million computers are estimated to become obsolete in the period between 1994 and 2003. Similarly, around 130 million mobile sets will end their service in 2005.<sup>68</sup>

Wuppertal Institute<sup>69</sup> estimates that the EU generates 6 million tons of e-Waste per year. It is expected to grow at a rate of 3 – 5% annually.<sup>70</sup>

Recycling is the key component of the sustainable development.<sup>71</sup> In order to manage the growing amount of waste, the European Union's WEEE Directive<sup>72</sup>

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<sup>63</sup> European Commission, Communication from the Commission: Towards a thematic strategy on the urban environment, COM(2004)60 final.

<sup>64</sup> DEGW (1998) Design for Change, Watermark, Haslemere.

<sup>65</sup> SANE stands for: Sustainable Accommodation for the New Economy.

<sup>66</sup> Harrison, A., Wheeler, P., Whitehead, C. (eds) (2004) *The distributed workplace*, London: Spon Press.

<sup>67</sup> [www.degw.com](http://www.degw.com)

<sup>68</sup> Widmer, R., Oswald-Krapf, H., Sinha-Khetriwal, D., Schnellmann, M., Böni, H. (2005), *Global perspectives on e-waste*, Environmental Impact Assessment Review 25(5), pp. 436-458.

<sup>69</sup> <http://www.wupperinst.org/>

<sup>70</sup> Hischier, R., Wäger, P., Gauglhofer, J. (2005) *Does WEEE Recycling Make Sense from an Environmental Perspective? The Environmental Impacts of the Swiss Take-Back and Recycling Systems for Waste Electrical and Electronic Equipment (WEEE)*, Environmental Impact Assessment Review 25(5), pp. 436-458

<sup>71</sup> Luukkanen J., Vehmas J., Kinnunen V., Kuntsi-Reunanen E. & Kaivo-oja J. (2005). *Converging CO2 Emission to Equal per Capita Levels. Mission Possible?* FFRC-publications 2/2005. Finland Futures Research Centre.

<sup>72</sup> Directive 2002/96/EC of the European parliament and of the council of 27 January 2003 on waste electrical and electronic equipment (WEEE). *Environmental Impact Assessment Review* 25(5), pp. 436-458

obliges manufacturers and importers of electronic devices to collect their products from consumers and recycle them. The European ICT industry has established processes to successfully complying with the requirements of the WEEE Directive (on recycling of electronic equipment waste) and the RoHS Directive<sup>73</sup> (on hazardous substances used in ICT components). Existing business initiatives are trying to extend these practices to the rest of the world and developing countries with a significant knock-on effect on non-European markets.

The results of the E-Living<sup>74</sup> project indicated that the ‘problem of electronic waste growth could be much worse than predicted’, and urged the prompt application of the EU directives on this issue.

### 4.3. ICT FOR EFFICIENT TRANSPORT

A company’s impact does not stop at the factory gate or office door. Transport poses a considerable burden on the environmental sustainability, representing about 25-30% of the total contribution to carbon emissions (see Figure 2).

Energy consumed by transport constitutes 31% total energy consumption in the EU, 82% of which is used by road transport; further 13% by aviation and the remaining by rail (3%) and inland navigation (2%).<sup>75</sup> With 10% of road traffic suffering from chronic traffic jams, rapid increase in the number of cars, congestion costs amount currently to 0.5% of the EU’s GDP, but without an appropriate action they can double by 2010.<sup>76</sup> Similar unsustainable patterns are observable in the air transport, which could increase by 80% in this decade.<sup>77</sup> The Commission has therefore proposed that a priority must be to decouple transport growth from growth in GDP in order to reduce congestion and pollution.<sup>78</sup>

Intelligent applications for transport can enhance capacity utilisation, and enable integrated logistics. ICT also allows to best calibrate product life-cycles and supply chains. Warehousing and inventories can be minimised, and total transport “truck-kms” can be cut, cutting costs, improving efficiencies and reducing environmental impact and congestion.

ICT systems have the potential to increase efficiency and capacity utilisation of the rail network; the European Railway Traffic Management System could increase

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<sup>73</sup> Directive 2002/95/EC of the European parliament and the council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

<sup>74</sup> [www.euroscm.de/e-living](http://www.euroscm.de/e-living)

<sup>75</sup> Eurostat (2005) Measuring progress towards a more sustainable Europe.

<sup>76</sup> European Commission, *White Paper - European transport policy for 2010: time to decide*, COM(2001) 370 final.

<sup>77</sup> Johnston, P.D (2001) *Sustainability and Jobs in the Knowledge Economy*, Journal of Universal Computer Science, Vol. 7 No. 6

<sup>78</sup> European Commission, *White Paper - European transport policy for 2010: time to decide*, COM(2001) 370 final.

capacity by 30% and enable a shift of freight transport. The IST COMBINE 2 Project<sup>79</sup> developed real-time train positioning to enhance the performance of the whole network and the results have already been used in the Milan metro and in the Netherlands.

The Galileo satellite positioning system and an advanced air traffic control system could both substantially improve capacity and efficiency. The implementation of the Commission's eSafety proposals<sup>80</sup> can result in more efficient use of road transport.

#### 4.4. ICT FOR TRANSPORT SUBSTITUTION - TELEWORKING

Mobile work - e-working methods and new ways of delivering public services (based on *de-materialisation* of processes) represent possible contribution of ICT to transport substitution, reducing passenger transport growth. Telework arrangements, which cut business travel by car and air, could decrease total energy use, greenhouse emissions and congestions.<sup>81</sup>

Teleworking allows also for optimal office space utilisation, and enables innovative business services. "Virtual Mobility" through telework and video-conferencing can substitute for some travel and as such decrease commuting, as demonstrated and quantified in the IST-Sustainable Teleworking Project<sup>82</sup>.

Currently, the studies on benefits of teleworking to the residential and commercial building energy use do not yet indicate major net savings.<sup>83</sup> DIGITAL EUROPE project states that teleworking will not deliver major environmental savings unless there is substitution of movement, not only decoupling of space and time.<sup>84</sup> Therefore, in order to assess the future impact of teleworking, there is the need to distinguish how it is adopted. Similarly, IST-SANE project findings indicate the need to measure energy consumption in a more holistic way.<sup>85</sup> This translates into

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<sup>79</sup> [http://icadc.cordis.lu/fep-cgi/srchidadb?ACTION=D&CALLER=PROJ\\_IST&QM\\_EP\\_RCN\\_A=61530](http://icadc.cordis.lu/fep-cgi/srchidadb?ACTION=D&CALLER=PROJ_IST&QM_EP_RCN_A=61530)

<sup>80</sup> European Commission, Communication: Information and Communications Technologies for Safe and Intelligent Vehicles, COM(2003)542 Final

<sup>81</sup> Aviation's greenhouse gas emission are rapidly growing on average by 4.3% p.a. (measured from 1990 to 2003) and currently account for about 3% of overall greenhouse gas emission. Such a rapid growth undermines progress made in greenhouse emissions from other sectors. Source: European Commission, *Reducing the Climate Change Impact of Aviation*, COM(2005) 459.

<sup>82</sup> [www.sustel.org](http://www.sustel.org)

<sup>83</sup> Matthews, H.S., Williams, E., T (2005) *Telework Adoption and Energy Use in Building and Transport Sectors in the United States and Japan*, Journal of Infrastructure Systems, Vol. 11, No. 1 March, ASCE

<sup>84</sup> [www.digital-eu.org](http://www.digital-eu.org)

<sup>85</sup> Harrison, A., Wheeler, P., Whitehead, C. (eds) (2004) *The distributed workplace*, London: Spon Press.

taking into account “the factor of energy consumed through travel to and from buildings, as well as the effectiveness of a building in terms of the number of people supported per unit of space.”<sup>86</sup> Consequently, future research into the elimination of office space due to the introduction of virtual offices and the subsequent reduction in energy use is required.<sup>87</sup> New “e-work” models, flexible in time and place, with greater use of shared workplaces, and more work in local communities can reverse negative trends of transport growth, but only when wide adoption is accompanied by structural change in work organisation by most companies.

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<sup>86</sup> Ibidem, p. 121.

<sup>87</sup> Matthews, H.S., Williams, E., T (2005) *Telework Adoption and Energy Use in Building and Transport Sectors in the United States and Japan*, Journal of Infrastructure Systems, Vol. 11, No. 1 March, ASCE.

## 5. SEMINAR DISCUSSION AND OBSERVATIONS: SEPTEMBER 2005

### 5.1. GOVERNANCE AND POLICY OWNERSHIP

The workshop has recognized that the ICT solutions and advances in environmental technologies can successfully assist global and systemic efforts of a wide group of actors towards a more sustainable development. A holistic approach is required to involve a transformation of governance and social action.

It is important that both the users of the ICT are familiar with solutions created by the sector, and that the IT industry is aware of needs of its consumers. In many cases, technological solutions for more sustainable devices and services already exist. What is therefore important is to transpose eco-innovation practices into the business models of various sectors.<sup>88</sup>

Major stakeholders have identified opportunities for DG INFSO to play a catalytic role by supporting demonstrative initiatives of ICT use in the area of resource-efficiency and social inclusion.

In line with the “Draft Declaration on Guiding Principles for Sustainable Development”<sup>89</sup>, the actions of DG Information Society will need to stimulate the widest involvement of key players. In this regard, the representations from business community and civil society<sup>90</sup> considered that leverage is particularly needed at the European and international level through high-level alliances between institutional actors, the business community and the civil society.

All Governments have recognised that a new partnership with business and civil society will be necessary and that the success in sustainable development ultimately depends on widespread “ownership” of change by individual and businesses. Moreover, the opportunity for a world-wide coherence and impetus lies in the global range of the IT and telecoms companies.

There are three major drivers for the ICT sector to lead and benefit from pro-growth, technology-based sustainable development. These are: acting in conformity with regulation, catering for companies’ good reputation, and realising the efficiency benefits of their own technologies.<sup>91</sup>

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<sup>88</sup> Moniz, E. (2005), Energy Technology, Climate Change, and Security – The Role of Innovation, Workshop: Achieving Growth Through Strategic Innovation, Brussels, 14-15 November 2005.

<sup>89</sup> European Commission, *Draft Declaration on Guiding Principles for Sustainable Development*, COM(2005) 218 final.

<sup>90</sup> Workshop on ‘Assessing Opportunities for ICT to contribute to Sustainable Development’, 20th Sept. 2005, Brussels.

<sup>91</sup> Financial Times, 28-10-05.

Existing business initiatives (Annex 1) show the merits of Corporate Social Responsibility (CSR)<sup>92</sup> and triple-bottom-line reporting by European ICT industries.

#### 5.1.1. MEASUREMENT AND REPORTING

The first step in strategies for sustainable development is to measure progress and impacts. To do so, it is necessary to develop and promote appropriate sustainability indicators, which, in turn, may enhance our understanding of sustainability. Moreover, there is a need for uniform indexes to measure business performance and to benchmark between companies.

Improved measurement techniques are also necessary to develop the evidence base for the contribution of ICT to social cohesion and environmental sustainability<sup>93</sup> A good example of sustainability indicators is the SIBIS<sup>94</sup> project, which aims at coherent and comprehensive approach in measuring the Information Society.

There is now a growing trend of companies that measure and report not only on economic, but also on social and environmental aspects of business activity. The examples include amongst others: guidelines published in 2003 by the Global Reporting Initiative<sup>95</sup>; “sustainability” indexes introduced by major stock markets<sup>96</sup>; a European business campaign on corporate social responsibility.<sup>97</sup>

The ICT sector can take broader leadership in an integrated approach to Corporate Social Responsibility, since its competitiveness depends on high-skills, continuous learning and motivated people with high creativity and innovativeness.

CSR is currently well established and mainly focused on delivering social benefits, better inclusion in the labour market and improvement of working conditions by assessing supply-chain management in ICT companies and in their upstream and downstream suppliers. This has also led to substantial improvements in social sustainability beyond the borders of the European Union.

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<sup>92</sup> Corporate Social Responsibility is defined by the Commission as: “companies integrat[ing] social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” COM (2001) 366 final.

<sup>93</sup> ECOTEC (December 2004) *Delivering Lisbon through the Information Society: The contribution of DG Information Society and the European Commission*.

<sup>94</sup> Statistical Indicators Benchmarking the Information Society, IST-26276. [www.sibis-eu.org](http://www.sibis-eu.org).

<sup>95</sup> [www.globalreporting.org](http://www.globalreporting.org).

<sup>96</sup> Dow Jones Sustainable Group Index (1999); FTSE4 Good (7/2001).

<sup>97</sup> [www.csreurope.org](http://www.csreurope.org)

A case in point is the Global eSustainability Initiative (GeSI). As described in the Annex, participating companies recognize the importance of cooperation in the field of sustainability performance. As highlighted by the GeSI initiative on collaborative supply-chain management, industry-wide CSR approaches have more significant impact and leverage on guaranteeing high working and environmental standards across the industry's global supply chain.

## 5.2. LEVERAGING AND CATALYSING

With regard to leveraging and catalysing initiatives, stakeholders concluded that<sup>98</sup>:

- Framework conditions need to be established so as to obtain systemic engagement and consistent results;
- Opportunities arise for Governments and the EU to catalyse demand for sustainability-led initiatives, while using in certain cases public procurement to encourage uptake of technologies delivering sustainable outcomes;
- Procurement guidelines across the EU would be needed to encourage green procurement (in terms of emission requirements)
- Business stakeholders in the field of ICT and the civil society need to be widely included in the processes of delivering sustainability;
- Creating a European core of “business leaders” in the field of ICT and sustainability was also seen as a necessity.

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<sup>98</sup> Workshop on ‘Assessing Opportunities for ICT to contribute to Sustainable Development’, 20th Sept. 2005, Brussels.

## ANNEX 1: EXISTING BUSINESS-LED INITIATIVES ON ICT AND SUSTAINABILITY

### Global eSustainability Initiative (GeSI)

The *eSustainability initiative* (<http://www.gesi.org>) is a global and open initiative including major stakeholders in the ICT industry<sup>99</sup> which has an objective of disseminating awareness of the relationship between the ICT and social, industrial and ecological systems, and promoting cooperation in the field of sustainability performance. The initiative partners with UNEP and ITU.

The ongoing activities evolve around the following four areas:

- Supply Chain:

The GeSI Supply Chain Working Group is working on a number of initiatives such as reporting on supply-chain management processes in terms of social and environmental implications (e.g. coltan mining case).

#### GeSI - Electronic Industry Code of Conduct (EICC)

The EICC ([www.eicc.info](http://www.eicc.info)) was launched in 2004 and the partnership with GeSI followed up in early 2005 with an objective to collaboratively develop and implement a common supplier code of conduct for the technology industry.

Member companies share a common goal of creating enhanced social, economic and environmental conditions for the technology industry's supply chain.

In October 2005, the joint initiative reported on progress in its efforts to develop industry-wide approaches and tools designed to guarantee high working standards in the industry's global supply chain. Transparency is at the core of the initiative.

The Working Group developed a standardised Self Assessment Questionnaire in a common industry format which expects to raise supplier's awareness of the CSR issues, help suppliers assess to what extent they are meeting key standards, and assist GeSI members in determining whether action or investigation is needed.

This initiative aligns companies' Codes and Practices and streamlines the process for suppliers which serve a number of GeSI members.

The initiative is based on premise that industry collaboration is the most effective way to raise standards and ensure commercial viability by avoiding the 'first-mover disadvantage'. In order to guarantee wide ownership of the supply chain industry's standards, the code is annually updated based on input from a wide variety of stakeholder organizations.

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<sup>99</sup> Members include: Alcatel, Bell Canada, British Telecommunications plc, Deutsche Telekom AG, Ericsson, European Telecommunication Network Operators Association (ETNO), Hewlett Packard, Orange, Panasonic Mobile Communications, MMO2, Motorola, Telefonica SA, USTelecom Association, Vodafone plc. Associate members: Carbon Disclosure Project, E-Square.

Future initiatives of the EICC Implementation Group in partnership with GeSI include a risk assessment tool, and a web-based platform to facilitate efficient information flow between participants. Their completion is scheduled by early 2006.

- Accountability

In light of the rising importance of the ‘sustainability reporting’, the GeSI convened in partnership with the Global Reporting Initiative (GRI) and with financial support from the European Commission, a multi-stakeholder task force to develop a Telecommunications Sector Supplement to the GRI 2002 Sustainability Reporting Guidelines.

GeSI builds on the WSIS strategy and encourages companies to strengthen their triple-bottom line reporting (on economic, social and environmental accounts).

GeSI in partnership with EICC is working on a common audit methodology. It is believed that use of standardized tools will help reduce audit inefficiencies and clarify performance expectations for suppliers.

- Measurement and Research

GeSI is also aimed at enhancing measurement capabilities to quantify the impact of ICT on reduction of environmental damage or in increasing benefits from social inclusion. In the FP6 project “Digital Europe” first research attempts have been made in this direction.

GeSI's participation included a case study highlighting the replacement of travel by telecommunication services (telework) and its implications on traffic and climate change.

- Outreach

The last stream of the GeSI activities is aimed at sharing their experience nationally and internationally. It can enable other sectors and countries to learn lessons learnt by GeSI members. Those activities include product life-cycles, and opportunities for recycling ICT equipment in developing countries.

Evidence of the positive benefits of ICT on Sustainability is provided by the GeSI members stating that ICT applied to production processes and service provision contributed to reduce CO2 emissions from their companies more markedly than in sectors not having clear strategies for use of ICT in sustainable terms.

## **The Resource Efficiency Alliance**

The Resource-Efficiency Alliance is a multi-stakeholder coalition of Investors, the Financial Industry, Suppliers and “Buyers” (public and private) and other interested parties, supporting political authorities and companies efforts at European, national and local levels towards a renewable-clean-energy and resource efficiency economy. The Alliance is focusing on investment, purchasing and trade decisions that can cost-effectively save energy, material and operational resources – and thereby sustain the environment and increase our productivity and competitiveness.

The Resource Efficiency Alliance applies the concept of knowledge cluster and aims to foster innovation and pool the intellectual capital of different players around a specific sector and geographic space.

The initiative focuses on interventions that can cost-effectively save energy, material and operational resources – and thereby sustain environment. It aims at creating a critical mass to accelerate the transition to a renewable/clean/low carbon energy and resource efficiency economy through co-ordinated innovation.

It is a “Multi-stakeholder Accelerator of Progress”, engaging synergies between Investors, Companies, Public Authorities, Civil Society Organisations and Media.

A better use of resources is needed to be more competitive. As an example, the EU stated in its Green Paper on energy efficiency from June 2005, that Europe can save up to 60 billion Euro every year through efficiency measures which represents 20% of the European energy consumption. However, eco-technologies and eco-innovation necessary to face global ecological and security threats - such as climate change - are now addressed more prominently in China, India, Japan, the USA, Brazil, than in Europe. Europe’s eco-strength potential is only partially being realized.

The Resource Efficiency Alliance identifies and makes use of the purchasing and investment levers for change. The overriding premise is to create a competitive advantage, explore new synergies, and improve linkages between for instance information technology, banking services, supply-chain guidelines, technical assistance, advertising, EU, Member states and regional funding schemes, rural and urban management and development schemes.

The initiative sees in three key areas of transport, intelligent buildings and energy efficiency for businesses, the main opportunities for ICT to contribute to sustainable development. It is also important to expand sustainability actions from “niche markets” to “mainstream markets”.

## **ETNO-WWF initiative**

WWF (World Wildlife Fund) initiated the concept of “Sustainability at the speed of light” in 2004. ETNO (European Telecommunications Network Operators’ Association)<sup>100</sup> joined the WWF initiative by adding sectoral experience, business knowledge and a network of key players.

The project “Saving the Climate @ the Speed of Light” is a joint ETNO - WWF initiative. It began in Budapest after the First European Conference on Telecommunication and Sustainability on 25-26 November 2004. During the conference it became obvious that there existed many overlaps and interesting synergies between ETNO’s and WWF’s agendas for the sustainable use of ICT.

WWF published “Sustainability at the speed of light” in 2002, when in the same year ETNO started a project to identify information communication technologies’ greenhouse gas effect. The project rests on four assumptions, that there is a need to act now, a strategy is necessary to ensure that ICT will help to reduce CO<sub>2</sub>, we must have a clear focus and we need to scale up those existing applications which are already delivering good results.

Already today a large number of ICT solutions exist which have been successfully tested and implemented. However, so far no coherent strategy or supporting framework exists, so these solutions are neither well known nor are they multiplied and integrated as mainstream solutions in our society.

Three goals were chosen for the strategy in order to ensure the development of policy in Europe that supported sustainable utilisation of ICT:

- ICT is recognised as an important part of the solution for combating climate change in Europe
- Key actors have a climate change strategy for ICT
- Concrete “ICT-Climate change” programmes are initiated in Europe by 2007

The goals are meant to provide guidance for the work and provide a framework for the discussions with relevant decision makers in EU.

The most obvious way is perhaps that ICT can reduce the need to travel and transportation of goods. The use of video- and teleconferencing can dramatically decrease the use of travel. E-commerce can reduce the need for transportation, if it is used combined with a sustainable logistic system, especially if combined with a system that allows instructions/information to be sent to local high-technology decentralised facilities where the goods are produced locally instead of transporting them all over the world, etc.

The next group of savings are more general and can be applied in a number of areas related to production and consumption patterns, as different ways to dematerialise the

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<sup>100</sup> ETNO: European Telecommunications Network Operators’ Association. It consists of 41 member companies from 34 European countries which account for an aggregate annual turnover of more than 210 billion Euros and employ over one million people across Europe.

economy and focus on the service instead of the product. Sustainable consumption where we get increased welfare but with reduced material consumption is still a concept that is neither integrated into business strategies or policymaking.

ICT can also allow us to build our societies in more sustainable ways. Flexible work, decentralised production of goods and videoconferencing are just three applications that could help us build sustainable cities. Sustainable cities that not just are marginally better is something that is a high global priority now when we will see approximately two billion people move into cities until 2030 and for the first time in history more people will live in urban than rural areas.

On an even larger and more complicated scale ICT will interact with other technologies and enable new solutions. The shrinking world is also challenging us to think about the "digital divide" that is not about providing the same hardware to everyone, but truly make the development of the new digital infrastructure and context something that do not exclude those who already are excluded in many ways, both in rich and poor countries.

This is clear that ICT and sustainable development is a very complex matter. Therefore the joint initiative decided to focus on a global, but one problem to start with. Climate change is one of the most serious environmental challenges, which needs action right now, but approached until now in a very traditional way, where ICT has never been mentioned. As environmental protection is still always connected to costs, we decided to focus on ICT – climate change as with this approach we can provide such a part for the solution which in addition to combat climate change, is essential for economic growth, competitive advantage, and also includes potentials for increasing social development (welfare) and justice.

### **Some examples for ICT combating climate change**

**Flexi-work:** If 10% of EU-25 countries' employees became flexi-workers, then 22.17 million tonnes CO<sub>2</sub> can be saved per year.

**Audio-conference:** If 50% of EU-25 countries' employees replaced one meeting with one audio-conference call per year, then 2.128 million tonnes CO<sub>2</sub> can be saved per annum.

**Business travel replacement (video-conference):** If 20% of business travel in EU-25 countries is replaced by a non-travel solution (e.g. video-conference), around 22.35 million tonnes CO<sub>2</sub> can be saved per year.

**Online phone-bills:** If all households, that have Internet access, in EU-15 countries, and all mobile customers in EU-25 countries get an online phone-bill, then 491.6 thousand tonnes CO<sub>2</sub> can be saved per year.

**Virtual answering machine:** If 20% of households in EU-15 countries use virtual answering machines instead of physical answering machines, then 1.03 million tonnes CO<sub>2</sub> can be saved per year.

**Web-based tax return:** If all employees in EU-25 countries (193 million) deliver their tax return via Internet, then 195.78 thousand tonnes CO<sub>2</sub> can be saved per year.

**All together this would mean saving around 50 million tones CO<sub>2</sub> emissions annually.**

## **The Carbon Disclosure Project (CDP)**

The Carbon Disclosure Project (CDP) provides a secretariat for the world's largest institutional investor collaboration on the business implications of climate change.

CDP represents an efficient process whereby many institutional investors collectively sign a single global request for disclosure of information on Greenhouse Gas Emissions. CDP then send this request to the FT500 largest companies in the world measured by market capitalisation. More than 350 of the 500 largest corporations in the world currently report their emissions through CDP website. The latest report was published in New York on 14th September 2005 at JP MorganChase.

Wide response from the business community to the CDP initiative confirms that there is rising awareness of the climate change risks and opportunities among the largest corporations.

Key findings of the report reveal an increase in the number of companies which responded to the CDP information request. Moreover, 90% of respondents flagged climate change as an important risk and opportunity to their business, and 80% allocate management responsibility for the issue. ([http://www.cdproject.net/press\\_release.asp](http://www.cdproject.net/press_release.asp)) According to the CDP, global investors are ready to invest in green technologies, as a major source of revenues for the next decades.

The CDP report confirms also the value that the information on climate change has for shareholders. The request to fill the report was signed by 155 parties who represent more than \$21 trillion in assets under management, which means a significant increase in relation to previous projects ([http://www.cdproject.net/press\\_release.asp](http://www.cdproject.net/press_release.asp)).

In this regard, ICT-related technologies for resource management have a considerable role to play especially in the area of applications for intelligent transport or transport substitution<sup>101</sup>. Setting and encouraging positive examples with the necessary critical mass is recognised as a key role for the European Commission.

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<sup>101</sup> It is believed that transport generate 30 per cent of total emissions

## **ICT Sustainability Forum**

The ICT Sustainability Forum gathers a group of companies<sup>102</sup> jointly discussing sustainability issues; how they affect the ICT sector; and how the ICT sector can contribute to sustainability.

The Forum states that high tech innovation can deliver solutions to all three pillars of Sustainable Development and, at the same time, contribute to growth and competitiveness.

The initiative aims to:

- Diffuse information among key stakeholders about the ICT industry
- Provide a one-stop-shop resource on practical issues around sustainable development
- Raise level of awareness of the sector's contribution to the objectives of sustainable development and Lisbon
- Provide a vehicle for multi-stakeholder discussion focusing on challenges, solutions and best practices regarding the input from ICT to sustainable development.

The Forum recognises the important role of ICT as a key tool for sustainability in terms of dematerialisation, e-materialisation, eco-efficiency and e-mobility (tele-commuting).

The activities proposed for 2006 are in 5 concrete areas of:

- environmental design,
- digital divides,
- transport and mobility,
- climate change,
- environmental technologies.

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<sup>102</sup> Including, among others, HP, Intel, and Sun Microsystems.

## **The Clean, Clever, Competitive (CCC) Initiative**

The initiative Clean Clever and Competitive Europe (CCC) started under the auspices of the Dutch Presidency in 2004 to enhance the role of the European ICT industry facing the challenge of sustainability.<sup>103</sup> The CCC is currently supported by the WBCSD, EPE, UNICE and Euro-chambers.

At the end of the Netherlands EU-Presidency, the Dutch Minister for the Environment, Pieter van Geel, initiated a dialogue with business to improve the market perspective of eco-efficient innovations. A think tank of business oriented people (Eminent People Group) is installed and asked to come up with an advice on the key instruments which in their view are necessary to enhance the market introduction of eco-efficient innovations and environmental technology.

The Group had its first meeting at 3-4 November in Brussels. Environment Minister Van Geel joined them and encouraged them to come forward with a both bold and realistic advice on concrete instruments and measures to promote the demand for eco-efficient innovations.

At its first meeting, the Group agreed to focus the advice on the market opportunities that eco-efficient innovations offer. It was underlined that, while maintaining the balance between economic and environmental aspects of the concept, the link with the Strategy for Growth and Employment and thus enhanced competitiveness will be the major driver for this project. The Group also agreed to focus on the demand side of the market, on market players and market introduction. In addition, the advice should be complementary to ongoing activities, such as EU's Environmental Technology Action Plan (ETAP).

The Group recognized that, despite their promising potential, eco-efficient innovations only capture a small part of today's market. Bearing this in mind, the Group discussed conditions for change in the field of information, market conditions and policy and politics.

Finally the Group had a first exchange of ideas on concrete instruments and measures that can influence market conditions or in general can provide a stimulating climate for investments in eco-efficient innovations.

The Group will work on a concrete set of recommendations, endorsing the targets already set in the Employment and Growth (revised Lisbon) Strategy and the Sustainable Development Strategy. The advice on CCC will be published at the beginning of next year so that it can tap into the decision making process in the preparation of the Spring Council.

The group will therefore meet at least two more times before February 2006. The first meeting will take place on the 1<sup>st</sup> of December in Brussels.

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<sup>103</sup> For more detailed information: [www.cleanclevercompetitive.com](http://www.cleanclevercompetitive.com)

## **IFIP initiative (International Federation for Information Processing)**

IFIP is a non-governmental, non-profit umbrella organization for national societies which work in the field of information processing. It was established in 1960 under the auspices of UNESCO and today its membership represents 55 countries from all regions of the world. The initiative maintains connections to specialized agencies of the UN system and non-governmental organizations.

IFIP's mission is to “be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of Information Technology for the benefit of all people.”<sup>104</sup>

The initiative’s technological leadership is centred around numerous Working Groups, and Technical Committees, membership in which is based on individual excellence of more than 3500 scientists from Academia and Industry. The effects of their work are disseminated during over 100 international events and some 30 new publications annually.

In recognition of the importance of systematic approaches to develop ICTs and their application in view of the goal of sustainable development, IFIP established a Working Group on ICT and Sustainable Development (Working Group 9.9). The Group’s aims are the following:

- To be actively involved in the development of ICT applications which involve the goal of sustainable development.
- To investigate the interaction among social, environmental and economic issues in the development of ICTs and their applications.
- To promote worldwide research and practice for further advancement of ICT towards a safe and sustainable self developing World
- To strengthen interdisciplinary research efforts in technology assessment for ICTs with a focus on ICT-induced opportunities and risks for the individual, for social systems and for the global ecosystem.
- To provide a platform for presenting and discussing emerging ideas and trends in the intersection of the topics ‘information society’ and ‘sustainable development’.
- To promote or support the organization of meetings as well as easy access to high-quality data, information and knowledge in this area and related areas.

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<sup>104</sup> <http://www.ifip.org>

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