Evaluation of the Environmental Impact Of Wired Telecommunication Networks in Japan

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Life cycle assessment (LCA) can be applied not only to products but also to services such as information and communication technology (ICT) services. The ICT infrastructure is huge and many services share the same networks. This makes the LCA of ICT difficult, because a complete analysis of all facilities and equipment is impossible and the portion of the environmental burden imposed by each service is unclear. Process LCA is considered to be efficient at evaluating individual products, but rather inefficient at assessing huge systems that include unknown processes. Input-output (I-O) LCA is considered efficient for evaluating general services, because direct and indirect effects can be evaluated at a national level. For these reasons we used both process LCA and I-O LCA to evaluate ICT services. We employed process LCA according to our telecommunication network model, which includes end-user terminals, access facilities, transmission facilities, end office and repeater-station facilities in Japan. We also evaluated I-O LCA using the Japanese input-output table for 1995. We found that throughout the entire lifecycle, the CO_2 emissions emanating from wired telecommunication networks during the use stage accounted for 50-80% of the total. The emissions from customers' equipment were particularly heavy. The total environmental burdens imposed by 10,000 subscribers were about 700t-CO_2 and 1,700t-CO_2 as determined by process and I-O LCA, respectively. The tendency was almost the same. The differences between these results can be explained by the evaluation limits of the two methods.