

Pursuing research and development on advanced technologies contributing to reduce the environmental load.

Promoting R&D on Advanced Environmental Technologies

Web search 19-1

The NTT Group has been making solid progress toward reducing the environmental impact of its own corporate activities and reducing the environmental load of society through IT services based on "NTT Group Ecology Program 21." The company carries out extensive R&D on advanced environmental technologies. Here

we will highlight some of the R&D achievements from 2003 including a solar-powered mobile power source, a compact power-efficient optical modulator, and a method for analyzing the ripple effects of IT services.

Development of a Clean Energy Solar-Powered Mobile Power Source

Web search 19-2

NTT Energy and Environment Systems Laboratories developed Solar Card Power, a compact yet powerful solar-cell-based mobile power source that can supply power to a range of mobile devices. This device for the first time overcomes the inherent drawbacks of solar cells—relatively low output power and poor stability—by incorporating a low-voltage input booster circuit. Solar Card Power stores the power it generates, and is capable of stably supplying about double the power of the batteries in a cell phone. To realize the potential of this technology, consider that if all 80 million cell phone AC adapters were converted to Solar Card Power, CO₂ emissions could be reduced by 85 thousand tons a year. This would be equivalent to the CO₂ absorption of an immense forested area twice the size of the land enclosed by Yamanote Loop Line in central Tokyo.



Solar-powered mobile power source (prototype)

Development of an Environmentally Friendly Optical Cable Deployment Method

Web search 19-3

Determined to develop an environmentally friendly method of deploying underground optical cable, NTT Access Network Service Systems Laboratories came up with the "pipe insertion method" the permits cable to be deployed without opening up a trench.

This method can be used when new cable is installed in existing conduits that have enough room to accommodate the new cable. Essentially the way it works is that a deflated flattened length of pipe is inserted all the way into the conduit, then expanded using air pressure to create a nice smooth cylindrical space into which the new optical cable can be easily inserted. This new method gives us access to space in conduits that was practically impossible to use before, and thus avoids costly and disruptive open-trench conduit extension construction. The environmental impact of this new approach has been dramatic. Using the method to deploy optical

cable in 500 conduit section, it is estimated that the environmental impact of the construction was reduced by 98% compared to if conventional open trench pipe extension construction was used.

CO₂ emissions for open trench construction versus the pipe insertion method

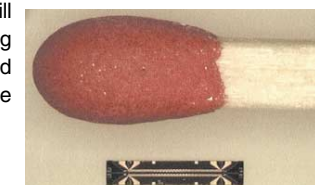
Construction method	Amount CO ₂	Number assumed construction sites
Cable deployed by open trench construction	318.0 tons	500 sites
Cable deployed by pipe insertion method	7.6 tons	500 sites

Development of a Compact Power-Efficient Optical Modulator

Web search 20-1

Optical modulators modulate intensity of the light emitted from semiconductor lasers and generate high speed digital optical signals. They are a key component for optical fiber transmission systems. Now NTT Photonics Laboratories has developed an optical modulator that is only 1/20 the size of conventional devices and only consumes 1/3 the power of conventional devices. The performance of the device is equally remarkable: it is capable of sending signals twice the distance at 40 gigabits per second, approximately four times the speed of

conventional devices. This part will likely play a key role in supporting environmentally friendly broadband communications that enhance the quality of peoples' lives.



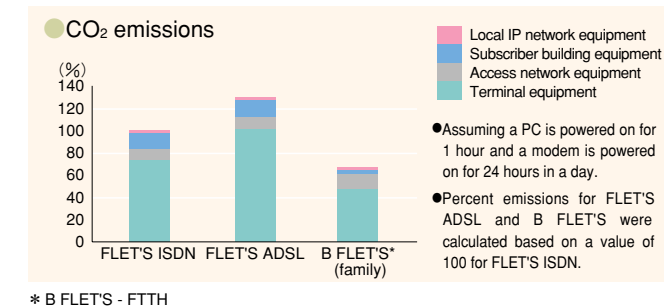
Optical modulator that consumes 1/3 the power and is 1/20 the size of conventional devices

LCA of IP Connection Services

Web search 20-2

In order to assess the environmental burden of information and communication services, NTT Information Sharing Laboratory Group is pursuing research and development on Life Cycle Assessment (LCA). Going beyond the LCA studies that have been done on local and domestic long-distance telephone services, LCA comparisons are now being conducted to evaluate their environmental impact of IP connection services in cooperation with NTT EAST. Based on this comparison, we determined that the order of diminished impact on the environment is FTTH, ISDN, ADSL. We also found that the environmental burden of power consumed by individual subscribers to run personal computers, modems, and other terminal equipment is substantially greater than the burden imposed by network-side equipment. This underscores the

importance of turning personal computers and modems and other equipment off when the equipment is not being used.



Analysis of the Environmental Ripple Effects of IT Services

Web search 20-3

TV conferences is expected to save the time and energy that would be consumed for traveling to a venue conventionally. Meanwhile there are ripple effects, such as the additional energy consumption for substitute activities during the additional free time due to a lack of business trip. The ripple effects should be taken into consideration for more realistic analysis. NTT Energy and Environment Systems Laboratories has analyzed the factors contributing to such IT service ripple effects and proposed a method to quantify environmental impacts that includes the ripple effects. Based on questionnaire results (goo Research, 1,100 valid responses), the researchers analyzed CO₂ emissions for a TV conferences and a face-to-face meeting, and reached a number of interesting findings:

- More CO₂ were emitted due to videoconferencing itself than a face-to-face meeting.
- The amount of CO₂ emissions from incidental activities for a face-to-face meeting was greater than the CO₂ emissions from the substitute activities for business trip in the videoconference case.
- The CO₂ emission from transportation for a face-to-face meeting was about 20 times that of a videoconference.

Totaling these various factors, it was found that the CO₂ emission from a face-to-face meeting was about 100 times that from a TV conferences.

