Evaluation of the environmental impact of wired telecommunication networks in Japan

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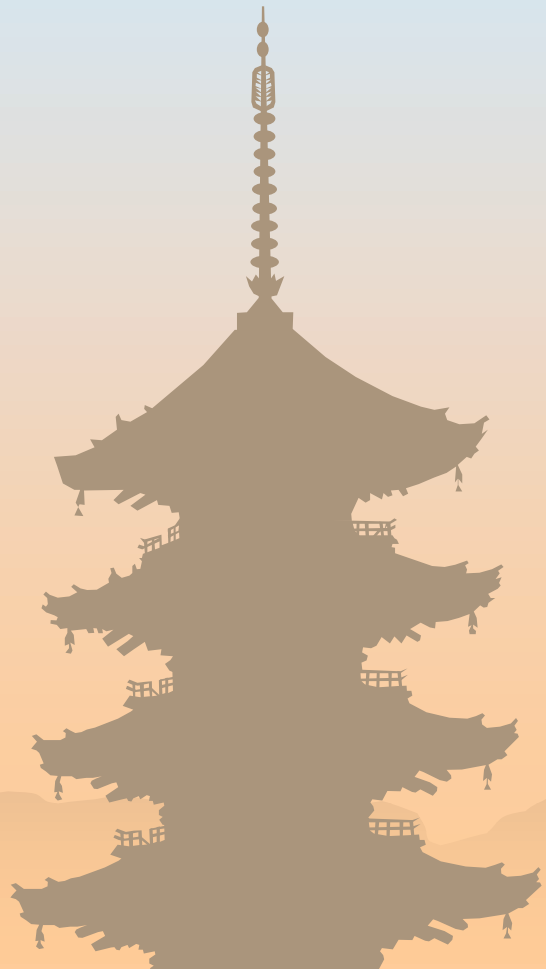


Introduction

Process LCA (P-LCA)

Specific products
Local level
Model analysis

In-depth analysis
Time-consuming

Bottom-up approach

VS.

Input-Output LCA (I/O-LCA)

General products
National level
Statistic analysis

Rough approximation
Convenient

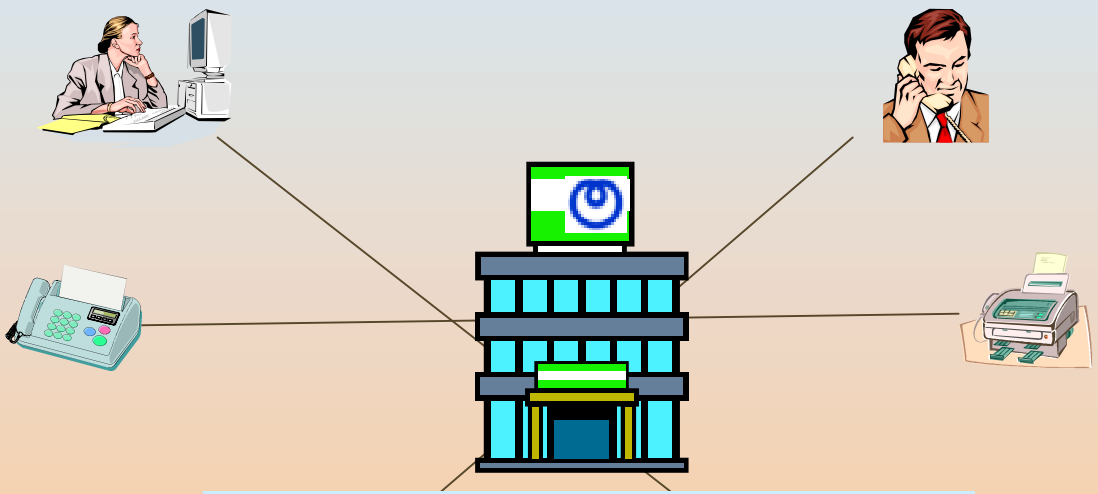
Top-down approach

Mutual correspondence ?

Objective

Question:

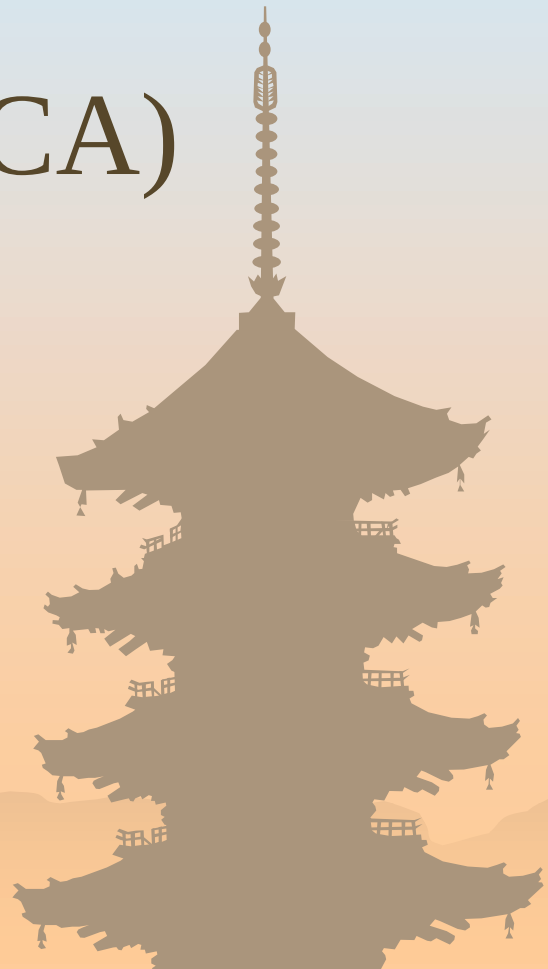
If 10,000 subscribers communicated through wired telecommunication networks for 1 year, how much CO_2 would be discharged in Japan?



Wired telecommunication networks

P-LCA and I/O-LCA

Process LCA (P-LCA)



Procedure for P-LCA

- Modeling

  List main utilities and facilities

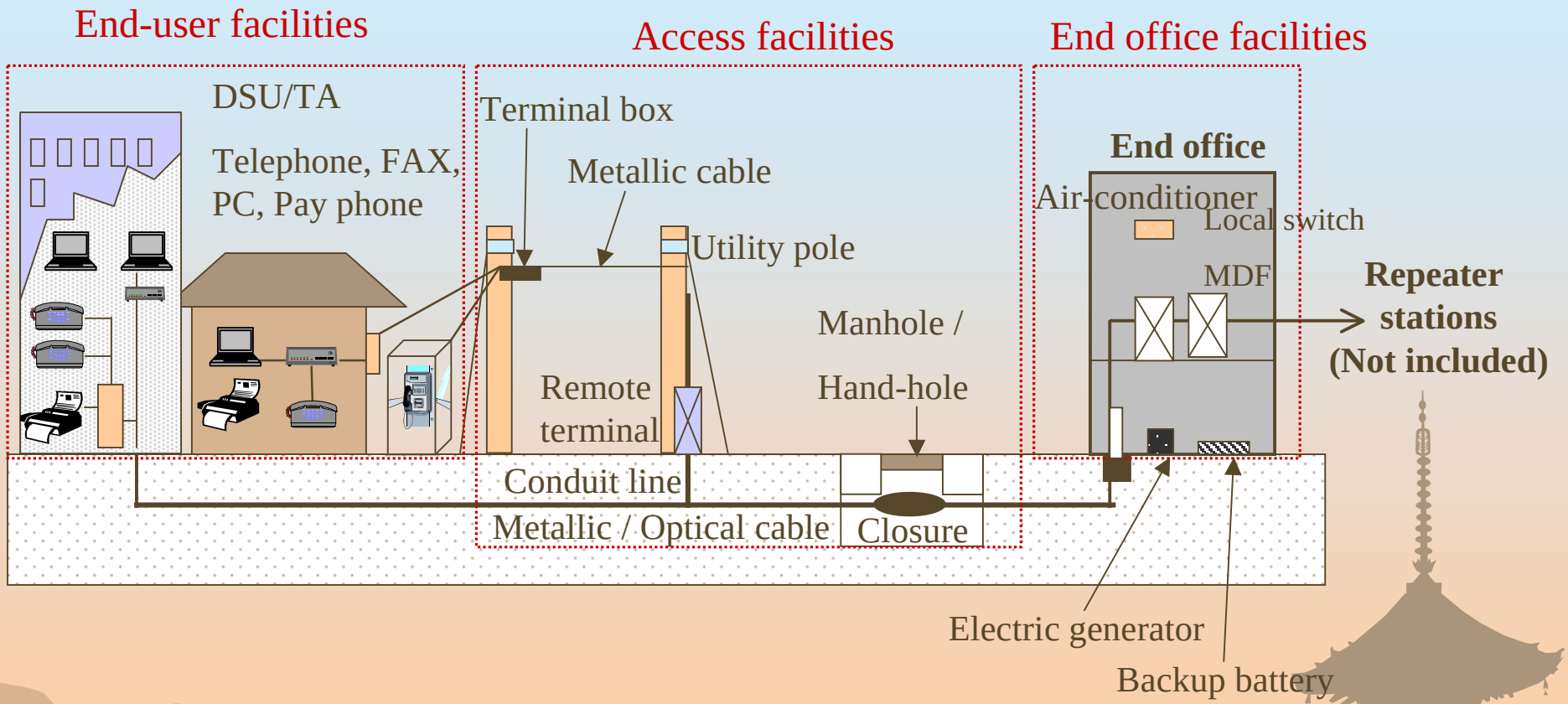
- Correction of inventory data

  Based on on-site information

- Inventory analysis

  CO_2 emission

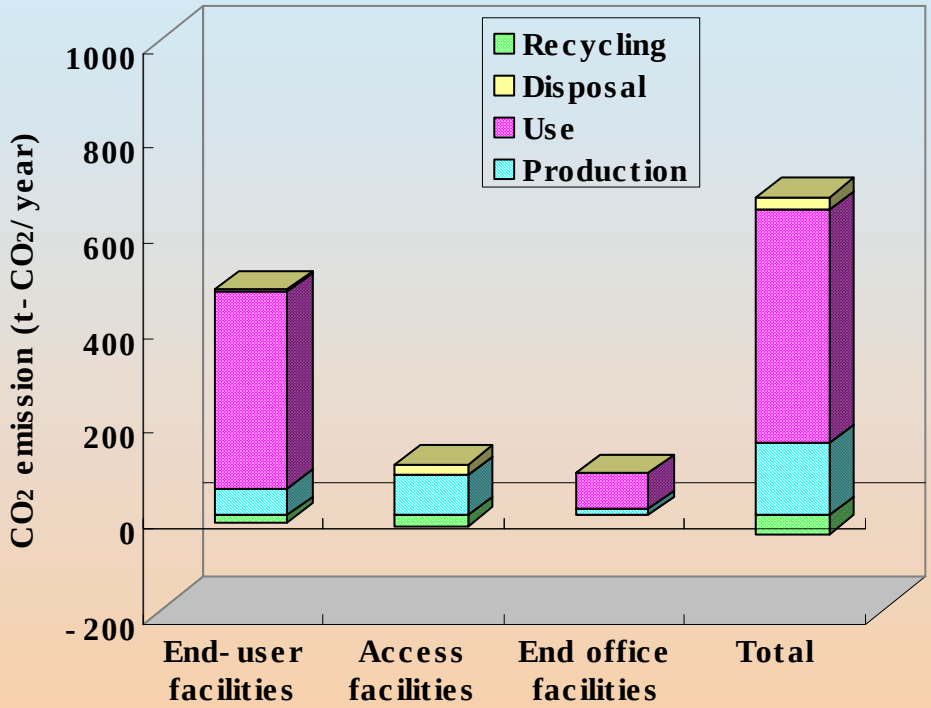
Model of local telecommunication network



Based on the Tokyo metropolitan area around 1998

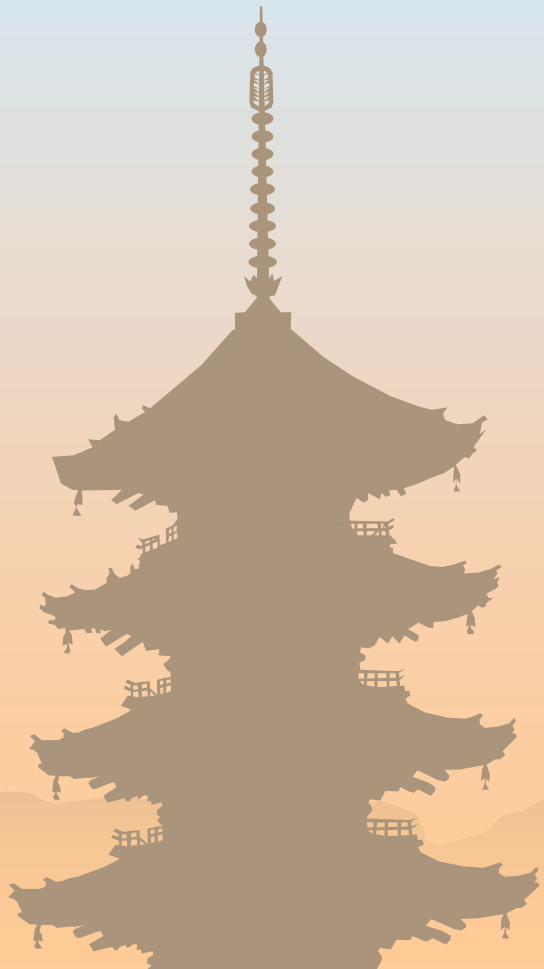
K. I. Takahashi, J. Nakamura, Tatsuya Kunioka, H. Harada, S. Miyamoto, an d J. Fujimoto, Proceedings of The Fifth International Conference on EcoBalance , S1-88, pp275-276, 2002

Inventory analysis (P-LCA)

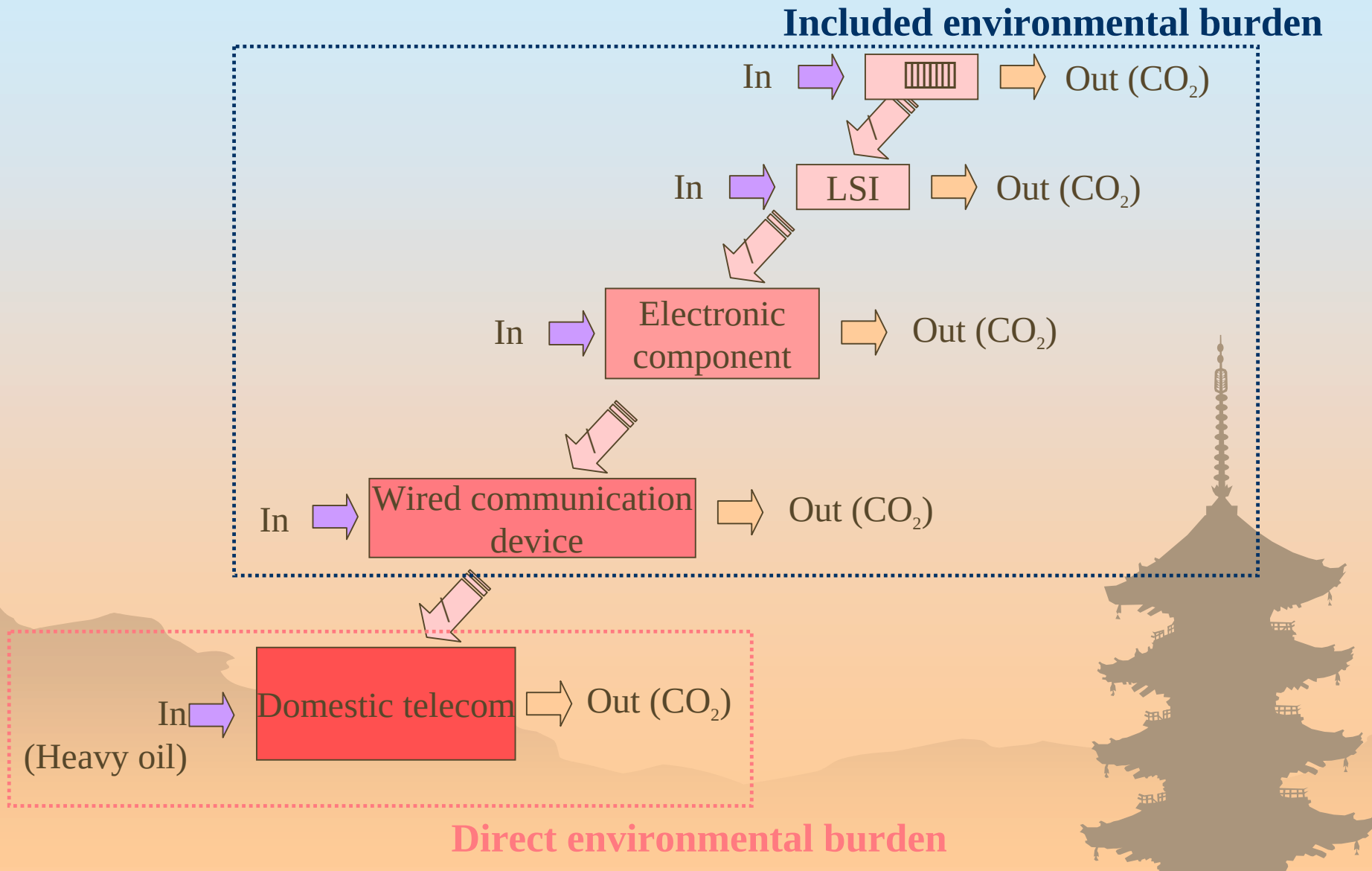


*Total CO_2 emission was about 700 t-CO_2/year/10000 subscribers.
*End-user facilities were dominant sources.
*Use stage was dominant factor in P-LCA.

I/O-LCA



I/O-LCA evaluation

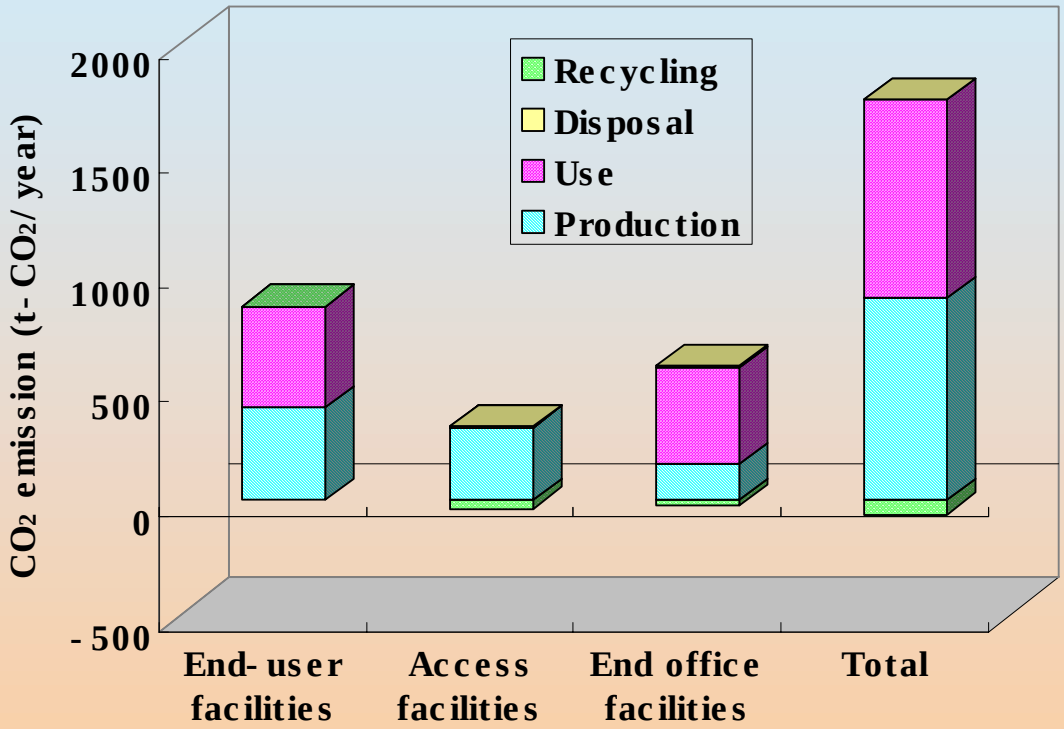


Data for I/O-LCA

	Production	Use	Disposal	Recycling
End-user Facilities	I-O * (Production of communication equipment)	Public data**	None	None
Access Facilities	I-O* (Cables, Construction of ICT infrastructure)	I-O* (Domestic ICT)	None	Company data***
End Office Facilities	I-O* (Construction of ICT base)		None	Company data***

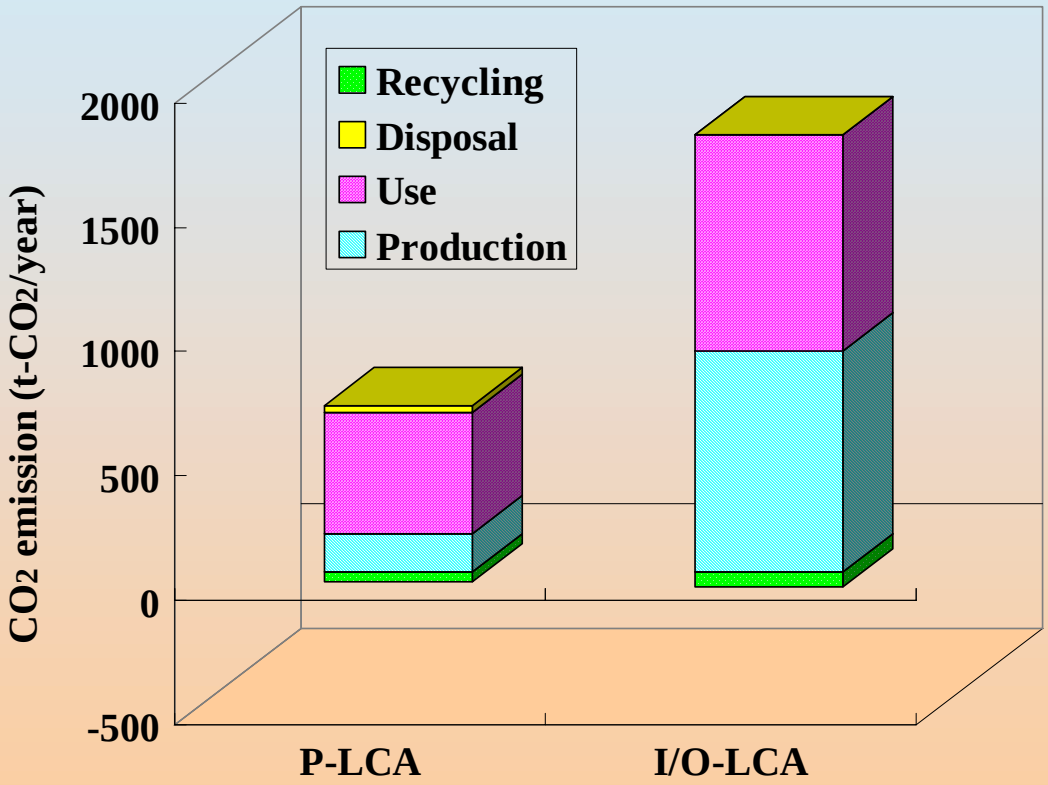
*I-O: 1995 Input-Output tables for Japan and various public data.
** Public data: Office automation report (1998), Catalogs for electric appliances etc.
***Company data: NTT Environmental Report (2000)

Inventory analysis (I/O-LCA)



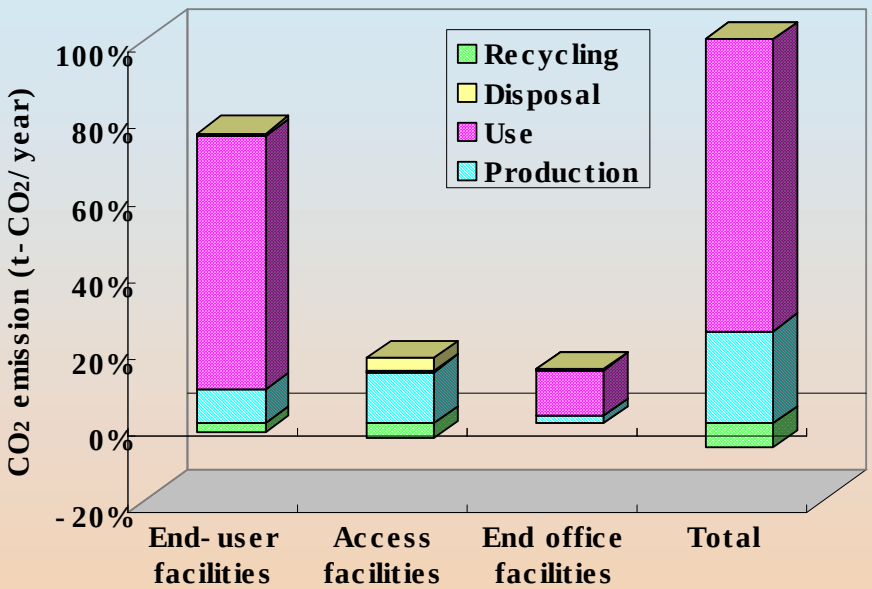
*Total CO_2 emission about 1700 t-CO_2/year/10000 subscribers.
*End-user facilities dominant sources.
*Production and use stages almost identical in I/O-LCA.

P-LCA vs. I/O-LCA

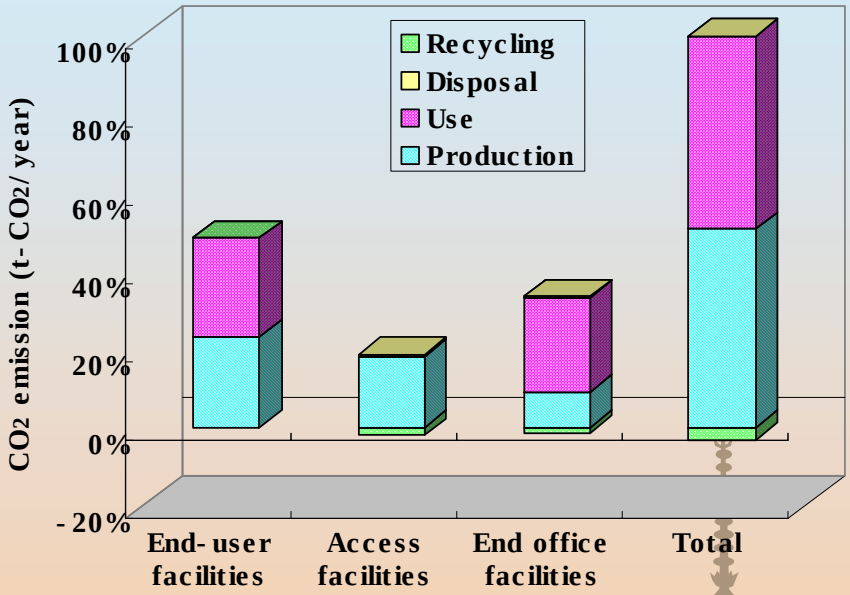


*Total CO_2 emission for P-LCA about half that for I/O-LCA.
*Different ratios for each process.

P-LCA vs. I/O-LCA



P-LCA



I/O-LCA

P-LCA: End-use > Access > End office Use > Produce >> Recycle

I/O-LCA: End-user > End office > Access Produce = Use >> Recycle

Discussion

What are the differences between P-LCA and I/O-LCA?

- Different boundaries

  e.g. I/O-LCA for end office facilities includes sales, marketing, and maintenance...

  e.g. P-LCA remove the burdens from core networks.

- Limitations of P-LCA and I/O-LCA

  e.g. City model ≠ General model

  Producer's price ≠ Retail price

- Cost oriented data vs. Material oriented data

  □□□Cost□□Environmental burdens ?

Conclusion

Question:

If 10,000 subscribers communicated through wired telecommunication networks for 1 year, how much CO_2 would be discharged in Japan?

Answer:

Total environmental burdens about…..

700 t-CO_2 by P-LCA

1,700 t-CO_2 by I/O-LCA

***End-user facilities dominant sources.**

***Use stage dominant factor in P-LCA.**

Production and use stages almost identical in I/O-LCA.

Further study

- **Evaluation for other telecommunication networks (Wireless telecommunication, ADSL, IP).**
- **Evaluation for ICT services.**
- **Developing low-energy consumption ICT facilities.**

- **Offer new environmental friendly lifestyles with ICT.**

*ICT: Information and communication technology