



GN3 Study of Environmental Impact Inventory of Greenhouse Gas Emissions and Removals – NIF/Hungarnet

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Author:	Tamás Máray

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1. Introduction

1.1 The reporting Organisation

NIIF/Hungarnet is the Hungarian national research and educational network (NREN), run by the NIIF Institute. NIIF/Hungarnet provides high level network and eInfrastructure services to more than 400 Hungarian organisations, including all the universities and higher level educational institutes, public research organisations and large public collections (libraries, museums, archives). The NIIF Institute is based in Budapest (1132 Victor Hugo u. 18-22.) and employs some 45 people.

1.2 Persons responsible

This GHG report has been prepared by:

Tamás Máray
Technical Director of NIIF
Email: maray@niif.hu
Phone: +36 14503064

with the contribution of the following NIIF staff members: László Kun, István Farkas, Péter Stefán, Ágoston Erős

1.3 Reporting period covered

The GHG audit report covers the period from 1st of January to 31st of December 2009.

2. GHG Inventory

2.1 Organisational Boundaries

The GHG emissions of NIIF Institute comprise the direct and indirect emissions of the NIIF owned and operated infrastructure components (including all the network devices and servers in the central data centers and in the PoPs), the offices, as well as the emissions produced by the commuting and business travels of the employees. The emission caused by the operation of the leased communication lines provided by telecom operators is not considered in this report, as they are not part of the NIIF owned and operated infrastructure.

2.2 Direct GHG Emissions

The NIIF Institute does not own and operate any source of direct emission of GHG, other than 5 passenger cars. The emission of these vehicles is included in the calculation of emissions caused by the travelling of NIIF staff members.

List of GHGs:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF₆)

2.3 Treatment of Biomass CO₂ Emissions in the GHG Inventory

The NIIF Institute does not cause any CO₂ emissions from the combustion of biomass.

2.4 GHG Removals

The NIIF Institute does not perform any GHG removals.

2.5 GHG Sources or Sinks Exclusion

No known GHG sources or sinks have been excluded from this quantification.

2.6 Indirect GHG Emissions

Indirect GHG emissions are associated with the generation of consumed electricity and heat or other type of energy.

The table below summarizes the energy consumption of NIIF Institute classified as:

- Office
- Data centres
- PoPs (backbone)
- Transportation

The corresponding GHG emissions, totalling 957 tons CO₂e, are calculated from published emission factors for each of the three contributing GHGs:

- CO₂
- CH₄
- N₂O

NIIF Institute Climate Accounting							
Accounting item	Units	Supplementary information	CO ₂ factor	CH ₄ factor	N ₂ O factor	Emission	Subtotal
						(kg CO ₂)	(tons CO ₂ e)
Office	kWh/year	Office space (m ²)	(g/kWh)	(g/kWh)	(g/kWh)		
Heating+cooling+electricity	121800	609	430			52374	
							52
Data centres power consumption	kWh/year		(g/kWh)	(g/kWh)	(g/kWh)		
Network equipments, servers, supercomputers, cooling	1727082		400	0.78	0.018	728932	
							729
PoPs (backbone)	kWh/year		(g/kWh)	(g/kWh)	(g/kWh)		
	291595		400	0.78	0.018	123070	
							123
Transportation	km/year	of this commuting (km/year)	(g/km)	(g/km)	(g/km)		
Car	98184	28854	175	0.025	0.002	17294	
Train	87264	84744	60	N/A	N/A	5236	
Bus	33653	33653	90	0.012	0.001	3047	
Tram/metro	89909	89409	18	N/A	N/A	1618	
Flight <800 per trip	21568		160	N/A	N/A	3450	
Flight >800 per trip	216090		100	N/A	N/A	21609	
							52
Grand Total (kg CO ₂ e/year)						956630	957

Table 2.1: NIIF Institute energy consumption and GHG emission, Y2009

2.7 Base Years

This is the first GHG report of the NIF Institute, covering the full year of 2009, which will serve as historical base year of the GHG inventory.

2.7.1 Base Year Changes and Recalculations

This is the base year report. No changes or recalculations are applicable.

3. Quantification Methodologies

Only recurrent emissions are covered in the GHG report. No effort has been made to calculate the embedded carbon emission from building the facilities and manufacturing the infrastructure components. Apart from 5 passenger cars, no other type of direct emission sources are owned and operated by the NIIF Institute. The emissions of these cars are calculated in the transportation emission section.

The indirect emissions are collected and calculated from four areas:

1. Office emissions from heating, cooling and electricity
2. Central data centres emissions from electricity consumptions, including cooling
3. Emissions from the PoP equipment
4. Employee business and commuting transportation emissions

1. Office emissions from heating, cooling (air condition) and electricity

The offices of the NIIF Institute are located in a big office building that accommodates many other organizations and companies, and they are rented from the facility owner. The flat rate rental fee includes the cost of heating, air conditioning, lighting and electricity for office equipment. The energy consumption of lessees is not being measured separately. For this reason the calculation of GHG emission of NIIF offices is based upon the estimation of 200 kWh/m²/year as an average energy consumption volume of offices operating in Hungary.

2. Central data centres emissions from electricity consumptions, including cooling

The electricity consumption of the 3 data centres operated by NIIF is directly measured. The measurement includes the cooling of one of the data centres (the largest), while cooling of the 2 others are not directly measured. However, since the cooling conditions, equipment and technology are very similar in all cases, by having precise information about the energy needs of cooling of one of the centres we can calculate the energy needs of the two others.

The total calculated energy consumption includes that of the supercomputers (HPC infrastructure) as well.

3. Emissions from the PoP equipments

Several PoPs scattered across the country are operated by NIIF. The infrastructure elements of these PoPs can be different from location to location, but a PoP typically contains a number of network devices and servers (for management, monitoring and local services). The energy consumption of these PoPs are calculated based on measurements (wherever available) and/or device specifications.

4. Employee business and commuting transportation emissions

Emissions from the transportation of employees are calculated based on information gathered from each employee, detailing his or her transportation in Y2009. For each of the transportation means the distance travelled is multiplied by the matching GHG emission coefficients published from the public EU, international and national information sources specified in section 3.2.

3.1 Change to Quantification Methodologies

No previously defined quantification methodologies were changed.

3.2 GHG Emission and Removal Factors

Electricity and heating emission factors:

Ministry of Environment and Water:

<http://www.kvvm.hu/>

<http://klima.kvvm.hu/>

http://klima.kvvm.hu/documents/32/VEZETOI_OSSZEFOGLALO.pdf

MVM Group (Hungarian Power Companies Ltd.):

<http://www.mvm.hu>

<http://english.mvm.hu/engine.aspx?page=kornyezeti>

Hungarian Mining and Metallurgical Society:

http://www.ombkenet.hu/bkl/koolaj/2003/bklkoolaj2003_0910_02.pdf

EU overview:

<http://www.eea.europa.eu/themes/energy/indicators>

Transportation emission coefficients:

General Information:

<http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009>

Siemens AG:

http://w1.siemens.com/Daten/siecom/HQ/TS/Internet/Transportation_Systems/WORKAREA/reinhold/templatedata/English/file/binary/20661combino_tests_20661.pdf

3.3 Accuracy of GHG Emission and Removals Data

The GHG information management procedures at NIIF Institute are still in their infancy.

Although the energy consumption of the largest consumers are precisely measured, some of the other data (mainly transport and office operation related) are based on estimations and theoretical calculations. Yet, we are confident that the GHG values being reported here give a reasonable value of the current CO2 footprint of NIF/Hungarnet.

3.4 ISO Compliance

This GHG inventory report has been prepared in accordance with part 1 of the ISO 14064 standard.

3.5 Verification Statement

This GHG report will be submitted to external verification. As this is the first GHG report of the NIF Institute and the internal GHG measuring procedures are still under development, it will be submitted for a limited assurance engagement only.