

The TE has made an indicative estimate of obtained direct GHG emission by the Project. Specific technical parameters for the realized investments were not collected by the Project partners and thus not available for the Evaluation. The following buildings are considered:

1. Birmann 21 Building, Pinheiros, São Paulo. This commercial building hosting a variety of private business offices was retrofitted with support from Somar Engenharia under a contract with the “chiller project” (BRA/12/G77). The main objective was to increase comfort and eliminate the old HCFC chiller system. Some basic information was provided concerning the energy consumption.¹

BIRMANN 21 BUILDING – ELECTRIC AND THERMAL CAPACITY CHILLER SYSTEM				
	BEFORE	AFTER	DIFFERENCE	
	(kW)	(kW)	(kW)	(%)
Cooling capacity	3,773 (th)	4,063 (th)	290	7.7%
Electric power	921 (el)	849 (el)	-72	-7.8%
Performance coefficient (COP)	4.1	4.8		17%

Changes were also introduced to building management and costing, limiting operation of utility systems to standard office hours. Companies who wish to be present outside this time window will be charged for the extra costs. Therefore, indicative operation is assumed of 300 days, 8 hours per day, which translates into a load factor of 27%. Total energy savings are:

$290 \text{ kW} * 8,760 \text{ hours/year} * 27\% = 696,000 \text{ kWh/yr} = 696 \text{ MWh/yr}$. A lifetime of 10 years is assumed (total: 6,960 MWh).

2. EEGM Portfolio. This involved 6 implemented projects covering EE and chiller equipment, and one PV system (distributed generation). The projected electricity savings, which form the basis for issuance of the Partial Credit Guarantee (PCG) are known and were provided by IDB Invest. Annual electricity savings are: 38,719 MWh. The lifetimes vary per project; savings for the whole portfolio are estimated at: 371,033 MWh.

3. Public buildings. A set of 20 public was audited under the benchmark process implemented by the Project. In three buildings, energy improvements were implemented, involving and investment of R\$ 3.9M. No information has been made available to the TE about the type of EE technologies hence a simple estimate has been made based on an assumed simple payback time of the investment of 4 years and a tariff of 0.3 R\$/kWh.² With an exchange rate of 3.25 R\$/USD, the following is obtained:

- Investment: R\$ 3,901,500 = USD 1,200,462.
- Electricity volume (4 years): (1,200,462 USD) / (0.032 USD/kWh) = 13,005,000 kWh = 13,005 MWh.
- Yearly electricity savings: 13,005 MWh/4 = 3,251 MWh/yr.

Experience in EE projects indicates that EE measures can bring along additional savings through the introduction of some energy management systems (ideally a formal system aligned with ISO 50001).

¹ Email correspondence with Somar Engenharia, 29 June 2018.

² ANEEL webpage.

Therefore, an “EE management” bonus is assumed due to improved building management and end-user behavior. With an assumed bonus of 30%, total annual savings would be 4,227 MWh/yr.

4. ANEEL building, Brasilia. The ANEEL building involves an investment of R\$ 1.3M in retrofitting measures (lighting and chiller)³ plus a R\$ 8.3M investment in 540 kWp solar energy. Technical assistance was provided under a partnership with GIZ Germany, and investment and operation is done by local electricity company CEB under a performance contract – a modality made possible by the GEF project.

Applying the same logic as under 3 (public buildings), the R\$ 1.3 M would translate into annual electricity savings of the order of 1,408 MWh. The PV system produces about 710 MWh/yr. Since PV capacity is well below overall building demand, the electricity saved is proportional to the reduction in grid electricity consumed.

MMA Building, Bloco B, Esplanada dos Ministerios, Brasilia. Investments in retrofitting and PV systems were implemented in the MMA building. Since no figures about investment were provided, the environmental benefits delivered by this building are not included.

Post-project GHG reductions.

The market prospects for building retrofits and EE measures in public buildings look more encouraging than at project start. The GEF Project managed to reduce some of the barriers; there is stronger awareness on saving of resources in the public sector including enforcement by the Federal Tribunal de Contas; investment capital is available through the ANEEL PEE program and is linked to building energy labelling (PBE Edifica). In the private sector, more ESCO are offering integrated retrofit solutions than before, but the market is still incipient.

It is assumed that at least the full portfolio of 20 audited buildings will implement EE retrofit measures in the following years (post-project). This would involve an investment of the order of R\$ 22.1 M (USD 6.8), which will deliver annual energy savings of the order of 23.9 MWh (assuming 4-year payback period).

GHG reductions

GHG reductions are achieved by reducing grid electricity consumption (EE) and substitution of grid electricity by PV-based generation⁴. The grid GHG intensity factor used is 0.5882 tCO₂/MWh (IGES database 2017). It is acknowledged that authorities may use other (official) factors but for the purpose of assessing GHG benefits of the Project, the IGES value provides a more useful comparison with the targets presented to the GEF in 2010.

³ Source: “Sede da ANEEL será exemplo de eficiência energética em suas instalações”, ANEEL Assessoria de Imprensa, 29 March 2016.

⁴ Source: “Usina de energia solar da ANEEL será inaugurada na próxima terça-feira (26/6)”, ANEEL Assessoria de Imprensa, 22 June 2018.

The following table summarizes the figures and key results.

PROJECT MARKET TRANSFORMATION FOR ENERGY EFFICIENCY IN BUILDINGS (GEF ID 2941) – ESTIMATED CONTRIBUTION TO GEF-5 CCM INDICATORS						
Building	Energy savings		GHG reductions ⁵		Investment	
	(MWh/yr)	(MWh)	(t CO2/yr)	(t CO2)	(USD)	(RS)
DIRECT						
Chiller Birmann 21	696	6,960	409	4,904	(undisclosed)	
EEGM (6 buildings)	38,719	371,033	22,775	218,242	17,486,451	56,831,000
3 approved public buildings	4,227	42,266	2,486	24,861	1,200,462	3,901,500
ANEEL building	2,118	21,183	1,246	12,460	2,950,000	9,600,000
Total	45,760	441,443	26,916	259,657	21,641,000	70,332,000
INDIRECT (POST-PROJECT REPLICATION) ⁶						
Public Building portfolio (17)	23,951	239,509	14,088	140,879	6,800,000	22,100,000

⁵ The given GHG estimates have the sole purpose to enable a comparison with the targets defined in the GEF CEO Endorsement Request (2010). The reductions are based on estimates of electricity savings and production from installed RE/EE technologies in buildings. A GHG intensity factor of 0.5882 tCO2/MWh is used (IGES 2017), which is slightly higher than value used in the CEO ER (0.502 tCO2/MWh). For more information on the assumptions made, please refer to Annex J.

⁶ The estimated replication is based on the assumption that investment will occur in all 20 audited buildings.