CARBON FOOTPRINT REPORT 2017

IROTA ECOLODGE

About Irota EcoLodge

Irota EcoLodge is a small-scale sustainable holiday resort in Northern Hungary, consisting of three holiday homes and a biological swimming pool. The resort opened on the 7th of July 2016 and has operated now for more than 1.5 years.

It is our vision that luxury and a sustainable way of life go well together and with Irota EcoLodge we set a leading sustainable example in the hospitality industry[1].

Picture 1: Terrace of the Upper House

Why this report?

A sustainable way of living means organizing human life such a way that the planet can sustain all human activities indefinitely. To achieve sustainability, 17 Sustainable Development Goals (SDG) have been defined[2]. In this report, we focus on one SDG: Combat climate change.

Scientists agree that the global temperature rise should no rise with more than 2 degrees. This 2-degree scenario is the maximum possible increase in temperature to

1 For an overview of all our sustainable features see http://www.irotaecolodge.com/en/econess.html
2 http://www.un.org/sustainabledevelopment/sustainable-development-goals/

avoid the most catastrophic effects of climate change. The Paris Climate Agreement, which was based on this scenario, requires a 50-80% global emissions reduction by 2050 from 2010 levels.

The hospitality industry already accounts for around 1% of global emissions and this is set to increase as the hospitality industry continues to grow. The International Tourism Partnership, a platform for hotel industry leaders to work collaboratively to make this one of the world's most responsible industries, has set a carbon reduction goal for its members. The goal is to reduce their absolute carbon emissions by 66% by 2030 and by 90% by 2050, against a 2010 baseline, to fully play their part in mitigating global warming[3].

Picture 2: Natural pool with water cleaning reed on the right.

The World Green Building Council, a network of professionals in the building industry who are committed to the environment, has set a similar target in the Net Zero Project: by 2030 all new buildings should operate at net zero carbon emissions and by 2050 all buildings should be net zero[4].

3 https://www.tourismpartnership.org/blog/itp-carbon-report-provides-hotel-sectors-goal-mitigate-climate-change/
4 http://www.worldgbc.org/news-media/thousands-billions-coordinated-action-towards-100-net-zero-carbon-buildings-2050

At Irota EcoLodge we took it a step further: We did not want to wait until 2030, but instead aimed at being net zero carbon *already in 2016*. To support this climate-neutrality claim, Irota EcoLodge will publish a carbon footprint report for each calendar year. The first report covered 2016 and this report contains the second calculation covering 2017 being the first full year of operation.

Irota EcoLodge can claim to be the first and so far only climate-neutral holiday accommodation in Hungary[5], and probably in the wider region as well.

Picture 3: 6.56 kWp photovoltaic solar system (right) and solar collectors (left) at Irota EcoLodge Middle House.

Carbon emissions sources

Carbon neutrality, or having a net zero carbon footprint, refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset, or buying enough carbon credits to make up the difference[6].

Irota EcoLodge consists of three physical locations: First Irota EcoLodge itself with the three holiday homes (Lower, Middle and Upper House) and a swimming pool. The second location is the utility building in Irota where bed linen is washed and

5According to the Hungarian Hotel & Restaurant Association.
6 https://en.wikipedia.org/wiki/Carbon_neutrality, accessed on 23 May 2017.

stored. On the same plot a cottage is located with a kitchen, living room and bathroom. The third location is the Budapest City Apartment: this apartment is offered in a package deal to guests of Irota EcoLodge, but also rented out separately through platforms like AirBNB. A fourth 'location' are fuels for the company car and garden maintenance equipment.

Picture 4: One of the bedrooms in the Lower House

The following 12 sources of carbon emissions where identified at these four locations:

Irota EcoLodge:

1. Emissions as a result of electricity being consumed in the houses.
2. Offset emissions as a result of electricity being generated by the solar panels on the roof of the Middle House. As solar panels generate emission-free electricity, feeding this electricity into the holiday homes or into the grid results in less emission by power plants connected to the electricity grid.
3. Each house has a cooking stove using propane/butane gas supplied in gas cylinders. These on-site emissions occur by burning of this gas in the stove.

Utility building and Cottage:

4. Emissions as a result of electricity being consumed, mainly by the washing machine.
5. Offset emissions as a result of electricity being generated by the solar panels on the roof of the utility building. As solar panels generate emission-free electricity, feeding this electricity to the utility building and into the grid result in less emission by power plants connected to the electricity grid.
6. The cottage has a cooking stove using propane/butane gas supplied in gas cylinders. These on-site emissions occur by burning of this gas in the stove.

Budapest City Apartment:

7. Emissions as a result of electricity being consumed. These emissions occur not on-site, but off-site at power plants feeding into the electricity grid.
8. The building, in which the apartment is located, has a central heating system fuelled by natural gas. Individual meters are installed in each apartment, so that the total gas consumption for heat generation can be attributed to each individual unit.
9. The building in which the apartment is located, has a central cooling system powered by electricity. Individual meters are installed in each apartment so that the total electricity consumption for cooling can be attributed to each individual unit.
10. Hot water is also centrally generated using natural gas. Individual meters are installed in each apartment, so that the total gas consumption for hot water product can be attributed to each individual unit.

Fuels:

11. The company car uses diesel fuel. It is used both for business and private use and often trips are combined. Therefore it is not possible to determine precisely which part of the emissions should be assigned to business use. 50% would be an estimated guess, but to be on the conservative side, 75% of the emissions have been assigned to business purpose.
12. Gasoline is used to fuel garden tools to maintain the premises at Irota EcoLodge and around the utility building. Also, chain saws are used to cut firewood. The garden tools are used both for business and private use. Approximately 25% are company related, but to be on the conservative side, 100% of the emissions have been assigned to business purpose.

The following emission sources have not been taken into account:

13. Heating of the houses occurs with firewood. The firewood is sourced locally from the surrounding forests. As these forests are replanted, the occurring carbon dioxide emission will be absorbed when new tree grow (short-cycle carbon emissions). In accordance with carbon accounting practise, these emission can be set at zero.

14. Another source of carbon emission is the usage of charcoal or firewood in the outdoor kitchens. Similarly, these are short-cycle carbon emissions and can be set zero.

Picture 4: Kitchen, Middle House.

Calculations

To calculate carbon emissions, the following Carbon Emission Factors (CEF) have been used:

Electricity[7]	0.566	$kgCO_2/kWh$
Butane/propane	2.95	$kgCO_2/kg$
Natural gas	56.1	$kgCO_2/GJ$
Diesel	2.7	$kgCO_2/litre$
Gasoline	3.2	$kgCO_2/litre$

Table 1: Carbon Emission Factors

7 http://www.eumayors.eu/IMG/pdf/technical_annex_en.pdf. Convenant of Mayors, technical annex containing emission factors.

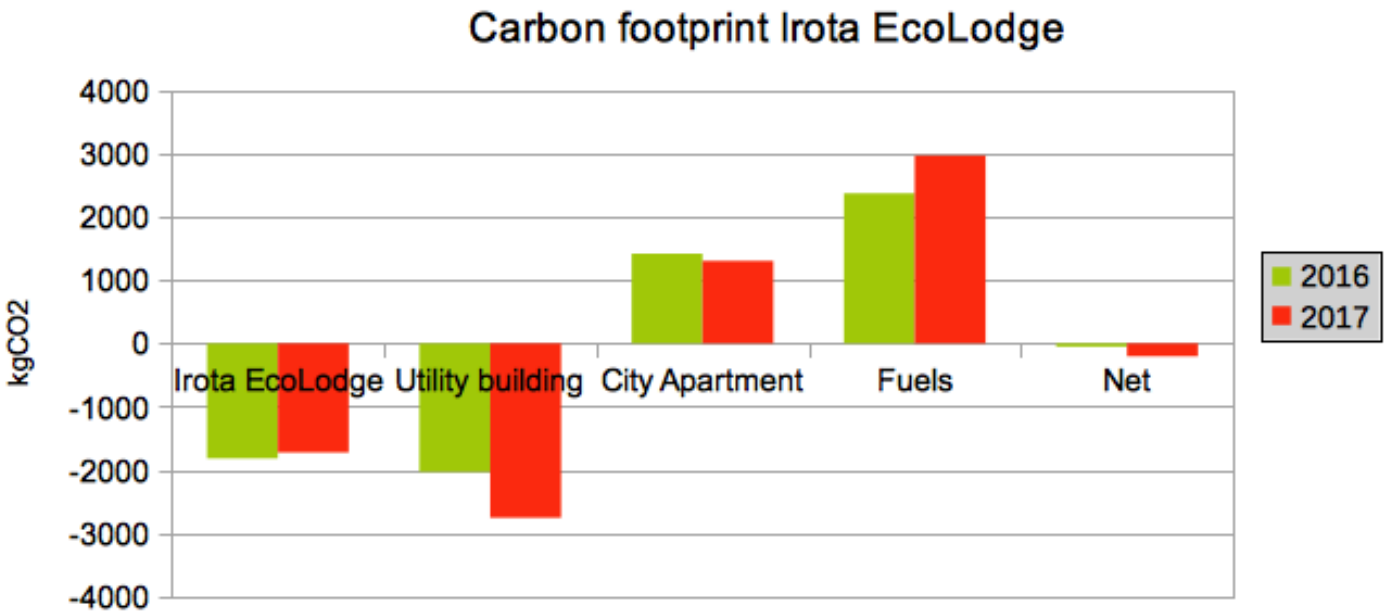
Location and source	quantity	unit	CEF	kgCO2
Irota EcoLodge				
1 Generated electricity	7,360	kWh	-0.566	-4,166
2 Consumed electricity	4,228	kWh	0.566	2,393
3 Cooking	16.5	kg	2.95	49
Utility building				
4 Generated electricity	5,446	kWh	-0.566	-3,082
5 Consumed electricity	556	kWh	0.566	315
6 Cooking	4.2	kg	2.95	12
Budapest City Apartment				
7 Electricity consumption of appliances	853	kWh	0.566	483
8 Gas consumption for heating	5.1	GJ	56.1	285
9 Electricity consumption for cooling	428	kWh	0.566	242
10 Gas consumption for hot water	5.2	GJ	56.1	294
Fuels				
11 Diesel fuel for company car	935	l	2.7	2,544
12 Gasoline fuel for garden tools	134	l	3.2	428
Total				**-203**

Table 2: Calculation of carbon emissions

Picture 5: View on the pool and valley

Result

The net carbon emissions in the second year of operation is -203 $kgCO_2$. This proves that Irota EcoLodge is indeed a climate-neutral resort and even slightly reduces emissions.



Graph 1: Overview of emissions per location.

The main emission source at Irota EcoLodge are fuels for the company car, which is offset by the surplus of electricity generated by the solar panels. A more efficient way to use the surplus solar electricity is to directly fuel an electric car. At the moment full electric cars available (except Tesla) cannot reach Budapest with a full charge, which is a requirement for Irota EcoLodge. It is expected that longer range cars become available by the end of 2018. After switching to full electric driving the carbon footprint of Irota EcoLodge will improve even more.

Irota, 1 March 2018

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