

## Calculation and reporting of CO2 emissions and savings attributable to lighting

<b>Municipality</b>	Voru
<b>Country</b>	Estonia
<b>Population</b>	14,554

## Electricity Data

Municipality	Voru
Country	Estonia
Population	14,554

### Office lighting

#### Existing situation

No of lamps (Estimation)	Lamps		Ballast		Total	Service time	Service time	Energy consumption
	Type of lamps	Wattage (kW)	Type of ballast	Power loss (kW)	Power (kW)	(hours/day)	(h/a)	(kWh)
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
		0		0	0		0	0.00

#### Post investment

No of lamps (Estimation)	Lamps		Ballast		Total	Service time	Service time	Energy consumption
	Type of lamps	Wattage (kW)	Type of ballast	Power loss (kW)	Power (kW)	(hours/day)	(h/a)	(kWh)
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
					0.00		0	0
		0		0	0		0	0.00

<b>Voltage (Volt)</b>	
<b>Power factor (cosφ)</b>	

## Electricity Data

### Street lighting

Total length of lighting network (km)

#### Existing situation

No of lamps	Lamps		Ballast		Total	Service time (hours/day)	Service time(*) (h)	Energy consumption (kWh)	cosφ	Total Energy consumption (KWh)
	Type of lamps	Wattage (kW)	Type of ballast	Power loss (kW)	Power (kW)					
1	ME	0.4			0.41		3285	1353.42		
37	ME	0.25			9.53		3285	31297.84		
3	ME	0.25			0.77		3285	2537.66		
2	ME	0.4			0.82		3285	2706.84		
3	ME	0.25			0.77		3285	2537.66		
4	ME	0.4			1.65		3285	5413.68		
9	ME	0.4			3.71		3285	12180.78		
5	ME	0.25			1.29		3285	4229.44		
6	ME	0.25			1.55		3285	5075.33		
6	SO	0.1			0.71		3285	2345.49		
4	ME	0.25			1.03		3285	3383.55		
1	ME	1.05			1.08		3285	3552.73		
1	ME	0.4			0.41		3285	1353.42		
29	ME	0.25			7.47		3285	24530.74		
27	ME	0.25			6.95		3285	22838.96		
1	ME	0.4			0.41		3285	1353.42		
14	ME	0.25			3.61		3285	11842.43		
2	ME	0.25			0.52		3285	1691.78		
13	ME	0.25			3.35		3285	10996.54		
9	ME	0.25			2.32		3285	7612.99		
8	ME	0.25			2.06		3285	6767.10		
1	ME	0.4			0.41		3285	1353.42		
13	ME	0.25			3.35		3285	10996.54		
28	ME	0.25			7.21		3285	23684.85		
13	ME	0.25			3.35		3285	10996.54		
3	SO	0.15			0.54		3285	1759.12		
1	ME	0.4			0.41		3285	1353.42		
4	ME	0.25			1.03		3285	3383.55		
8	ME	0.25			2.06		3285	6767.10		
26	ME	0.25			6.70		3285	21993.08		
31	ME	0.25			7.98		3285	26222.51		
7	ME	0.25			1.80		3285	5921.21		
27	ME	0.25			6.95		3285	22838.96		
3	SO	0.15			0.54		3285	1759.12		
26	ME	0.25			6.70		3285	21993.08		

2	SO	0.15			0.36		3285	1172.75
2	ME	0.4			0.82		3285	2706.84
2	ME	0.4			0.82		3285	2706.84
4	ME	0.25			1.03		3285	3383.55
23	ME	0.25			5.92		3285	19455.41
38	ME	0.25			9.79		3285	32143.73
5	ME	0.25			1.29		3285	4229.44
2	SO	0.15			0.36		3285	1172.75
1	ME	0.4			0.41		3285	1353.42
55	ME	0.25			14.16		3285	46523.81
32	ME	0.25			8.24		3285	27068.40
24	ME	0.25			6.18		3285	20301.30
1	SO	0.15			0.18		3285	586.37
2	SO	0.1			0.24		3285	781.83
8	ME	0.25			2.06		3285	6767.10
20	ME	0.25			5.15		3285	16917.75
5	ME	0.25			1.29		3285	4229.44
21	ME	0.25			5.41		3285	17763.64
23	ME	0.25			5.92		3285	19455.41
29	ME	0.25			7.47		3285	24530.74
1	SO	0.1			0.12		3285	390.92
8	ME	0.25			2.06		3285	6767.10
5	ME	0.5			2.58		3285	8458.88
							3285	0.00
<b>689</b>					181.28			<b>595,491.66</b>
								0.9
								<b>661,657</b>

(\*) provided

**Post investment**

Lamps		Ballast		Total				cosφ	Total Energy consumption (KWh)
No of lamps	Type of lamps	Wattage (kW)	Type of ballast	Power loss (kW)	Power	Service time (*) (h)	Energy consumption (kWh)		
1	Philips SGS	0.1			0.12	3285	390.92		
18	Philips SGS	0.1			2.14	3285	7036.47		
19	Philips SGS	0.07			1.58	3285	5199.17		
3	Philips SGS	0.15			0.54	3285	1759.12		
2	Philips SGS	0.1			0.24	3285	781.83		
3	Philips SGS	0.1			0.36	3285	1172.75		
4	Philips SGS	0.07			0.33	3285	1094.56		
9	Philips SGS	0.1			1.07	3285	3518.24		
5	Philips SGS	0.1			0.60	3285	1954.58		
6	Philips SGS	0.07			0.50	3285	1641.84		
6	Philips SGS	0.07			0.50	3285	1641.84		
4	Philips SGS	0.15			0.71	3285	2345.49		
1	Philips SGS	0.15			0.18	3285	586.37		
1	Philips SGS	0.1			0.12	3285	390.92		
29	Philips SGS	0.15			5.18	3285	17004.80		
27	Philips SGS	0.1			3.21	3285	10554.71		
1	Philips SGS	0.1			0.12	3285	390.92		
14	Philips SGS	0.1			1.67	3285	5472.81		
2	Philips SGS	0.1			0.24	3285	781.83		
13	Philips SGS	0.15			2.32	3285	7622.84		
9	Philips SGS	0.15			1.61	3285	5277.35		
8	Philips SGS	0.1			0.95	3285	3127.32		
1	Philips SGS	0.15			0.18	3285	586.37		
13	Philips SGS	0.15			2.32	3285	7622.84		
28	Philips SGS	0.1			3.33	3285	10945.62		
13	Philips SGS	0.07			1.08	3285	3557.33		
3	Philips SGS	0.1			0.36	3285	1172.75		
1	Philips SGS	0.1			0.12	3285	390.92		
4	Philips SGS	0.1			0.48	3285	1563.66		
8	Philips SGS	0.15			1.43	3285	4690.98		
26	Philips SGS	0.1			3.09	3285	10163.79		
31	Philips SGS	0.1			3.69	3285	12118.37		
7	Philips SGS	0.15			1.25	3285	4104.61		
27	Philips SGS	0.15			4.82	3285	15832.06		
3	Philips SGS	0.1			0.36	3285	1172.75		
26	Philips SGS	0.1			3.09	3285	10163.79		



### Total Actual Energy Demand

Wires' resistance ( $\Omega$ /km)	0.23
Wires' resistance ( $\Omega$ )	NO DATA
Consumption (%)	32.50%
Length of transmission wires (km)	-

#### OFFICE LIGHTING

Total energy demand in buildings for lighting (kwh)	NO DATA
Energy production required (kWh)	-

#### STREET LIGHTING

Total energy demand for street lighting (kwh)	661,657.40
Energy production required (kWh)	876,696.06

#### TOTAL

TOTAL energy DEMAND (KWh)	876,696.06
TOTAL TRANSMISSION LOSSES (KWh)	215,038.66

### Total Post investment Energy Demand

Wires' resistance ( $\Omega$ /km)	0.23
Wires' resistance ( $\Omega$ )	NO DATA
Consumption (%)	32.50%
Length of transmission wires (km)	-

#### OFFICE LIGHTING

Total energy demand in buildings for lighting (kwh)	NO DATA
Energy production required (kWh)	-

#### STREET LIGHTING

Total energy demand for street lighting (kwh)	319,855.34
Energy production required (kWh)	423,808.33

#### TOTAL

TOTAL energy DEMAND (KWh)	423,808.33
TOTAL TRANSMISSION LOSSES (KWh)	103,952.99

## Actual CO2 emissions

### Office lighting

**CO2 emissions**

Type of fuel	Fuel Contribution *	Total electric energy demand (Kwh)	CO2 emissions per electric kWh produced (kg/kwh) **	CO2 emissions per fuel (t)
Coal/Lignite	92.50%	-	0.959	-
Oil	0.30%	-	0.8186	-
Natural gas	6.60%	-	0.4475	-
Nuclear	0.00%	-	0.004	-
RES	0.50%	-	0	-
Other	0.00%	-	0	-
	<b>99.90%</b>	<b>0.00</b>		

**CO2 emissions (t/year)**

**0.00**

### Street lighting

**CO2 emissions**

Type of fuel	Fuel Contribution *	Total electric energy demand (Kwh)	CO2 emissions per electric kWh produced (kg/kwh) **	CO2 emissions per fuel (t)
Coal/Lignite	92.50%	810,943.85	0.959	777.70
Oil	0.30%	2,630.09	0.8186	2.15
Natural gas	6.60%	57,861.94	0.4475	25.89
Nuclear	0.00%	0.00	0.004	0.00
RES	0.50%	4,383.48	0	0.00
Other	0.00%	0.00	0	0.00
	<b>99.90%</b>			

**CO2 emissions (t/year)**

**805.74**

### TOTAL CO2 emissions from lighting

**CO2 emissions (t/year)**

**805.74**

\* Source: Eurostat (2004)

\*\* Source: Fuel and Energy

Production Emission Factors, AEA  
Technology

## Post investment CO2 emissions

### Office lighting

#### CO2 emissions

Type of fuel	Fuel Contribution *	Total electric energy demand (Kwh)	CO2 emissions per electric kWh produced (kg/kwh) **	CO2 emissions per fuel (t)
Coal/Lignite	92.50%	-	0.959	-
Oil	0.30%	-	0.8186	-
Natural gas	6.60%	-	0.4475	-
Nuclear	0.00%	-	0.004	-
RES	0.50%	-	0	-
Other	0.00%	-	0	-
	<b>99.90%</b>	<b>0.00</b>		

CO2 emissions (t/year)

0.00

### Street lighting

#### CO2 emissions

Type of fuel	Fuel Contribution *	Total electric energy demand (Kwh)	CO2 emissions per electric kWh produced (kg/kwh) **	CO2 emissions per fuel (t)
Coal/Lignite	92.50%	392,022.70	0.959	375.95
Oil	0.30%	1,271.42	0.8186	1.04
Natural gas	6.60%	27,971.35	0.4475	12.52
Nuclear	0.00%	0.00	0.004	0.00
RES	0.50%	2,119.04	0	0.00
Other	0.00%	0.00	0	0.00
	<b>99.90%</b>			

CO2 emissions (t/year)

389.51

### TOTAL CO2 emissions from lighting

CO2 emissions (t/year)

389.51

CO2 savings (t/y)

416.23

51.7%

Electricity savings (kWh/y)

452,888

Percentage of lamps changed:

51.9%

\* Source: Eurostat (2004)

\*\* Source: Fuel and Energy  
Production Emission Factors,  
AEA Technology