



Lithuanian approach on reducing air pollution from residential heating

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Lithuanian national emission ceilings

| Pollutant | Goal 2020 (CLRTAP GP and NEC Directive) | Goal 2030 (NEC Directive) | Current status of 2016 |
|------------------|--|--------------------------------------|-----------------------------------|
| PM2.5 | 20 % | 36 % | 18 % |
| SO ₂ | 55 % | 60 % | 42 % |
| NMVOC | 32 % | 47 % | 24 % |
| NO _x | 48 % | 51 % | 13 % |
| NH ₃ | 10 % | 10 % | 10 % |



Air pollution from residential heating

| Pollutant | CLRTAP Protocol | Share of total national emissions |
|----------------------|---|-----------------------------------|
| <u>PM2.5</u> | 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol), as amended on 2012 | <u>75 %</u> |
| SO2 | | 12.6 % |
| NMVOG | | 21.9 % |
| NOx | | 4.8 % |
| NH3 | | 5 % |
| <u>PCCD/F</u> | 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs), as amended on 2009 | <u>65.2 %</u> |
| <u>PAH</u> | | <u>77.3 %</u> |
| HCB | | 28.5 % |
| PCB | | 12.9 % |
| Hg | 1998 Aarhus Protocol on Heavy Metals, as amended on 2012 | 11 % |
| <u>Cd</u> | | <u>33.9 %</u> |
| Pb | | 19.8 % |





Measures to reduce air pollution from residential combustion

To achieve major reduction of pollution from residential heating, in particular of PM_{2.5} emissions, several different measures were developed:

- **solid fuel quality requirements (legislation)**
- **modernization of residential solid fuel heating appliances (economic incentives)**
- **public awareness campaigns on consequences of solid fuel combustion (education)**

Some measures already are being implemented, others is foreseen to be started in 2018.

The main expectation of these measures is to reduce the emissions at least to the levels, which would ensure achievement of Lithuanian national PM_{2.5} emission reduction goals





More than 90 % of all solid fuel consumed is wood biomass



Solid biofuel requirements

- **Since 2018 solid biofuel quality requirements were established to prevent environmentally undesirable solid biofuel entering the market or to be used in combustion plants.**

Requirements sets limit values for fuel composition and other criteria, which are variable depending on combustion installation for end use (i.e. industrial or residential plant).

However, requirements are set only for solid biofuel, while quality of other solid fuels, including fuels „made of“ engineered wood residues (particleboards), aren't regulated. Conditions and limitations for using engineered wood residues directly for energy production yet to be established based on scientific study, which is foreseen to be completed by the end of 2018. Study will include emission analysis of combustion products of different engineered wood types.



Solid biofuel content limits

| Element | Combustion plant | | |
|-----------|--|-----------------------------------|--------------------------|
| | Residential or industrial up to 120 kW | Industrial from 120 kW up to 1 MW | Industrial from 1 MW |
| N | 1 % | 2 % | 2 %* |
| S | 0.2 % | 0.3 % | 0.6 % |
| Cl | 0.1 % | 0.1 % | 0.3 % |
| As, mg/kg | 1 | 2 | 2 |
| Cd, mg/kg | 0.5 | 2 | 2 |
| Cr, mg/kg | 50 (10 for wood biomass) | 50 (15 for wood biomass) | 60 (30 for wood biomass) |
| Cu, mg/kg | 20 | 20 | 100 |
| Pb, mg/kg | 10 | 20 | 20 |
| Hg, mg/kg | 0.1 | 0.1 | 0.1 |
| Ni, mg/kg | 10 | 10 | 10 |
| Zn, mg/kg | 100 | 200 | 200 |



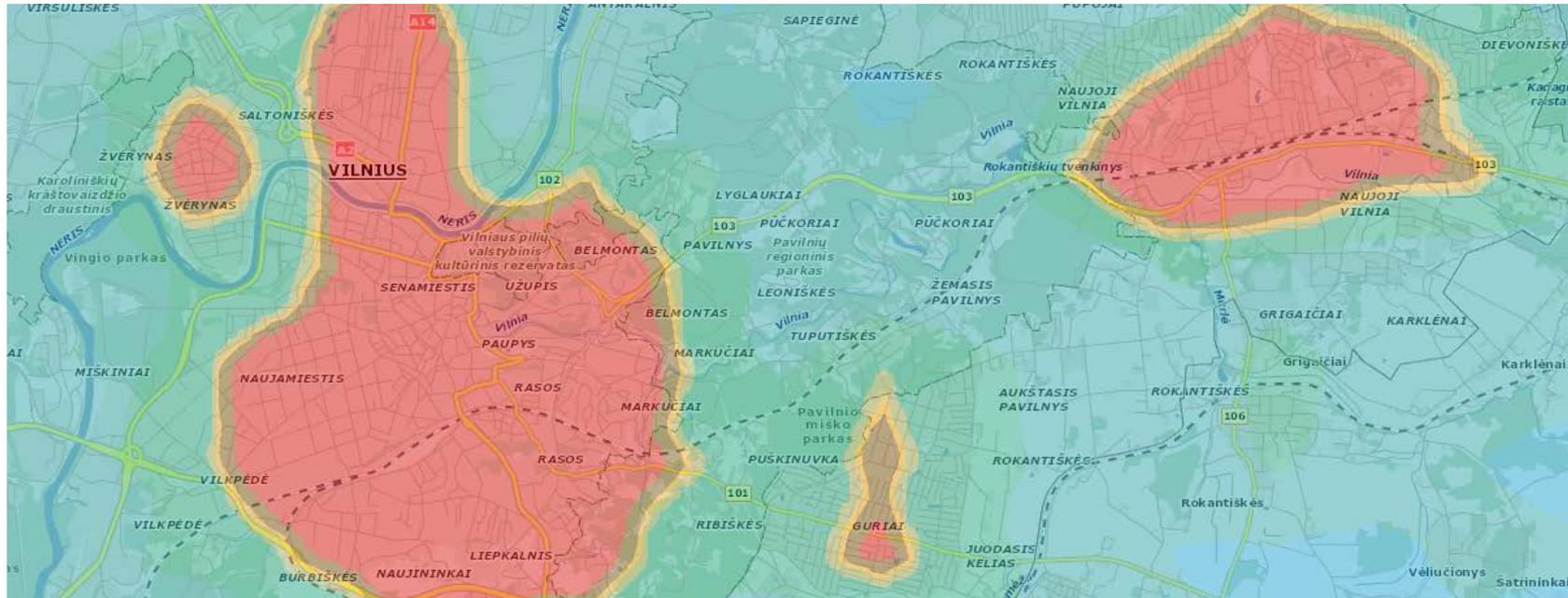
Economic incentives for modernizing residential solid fuel heating appliances

- Residential boiler replacement program is under development and is expected to be launched in 2019.
- Main goal of the program is to increase energy efficiency (to reduce gross energy consumption every year by 1.5 %), however environmental criteria will be applied.
- Preliminary 15 million Euros from EU Structural fund are allocated for solid fuel boiler replacement program.
- Financial subsidies will be available for households, which are going to replace an old solid biofuel boiler / stove to a modern boiler or other renewable energy heating system (e.g. heat pumps).

Only less than 5 % residential solid fuel boilers comply with principles of eco-design. According 2014 data, there are about 550 thousand residential households in Lithuania (40 % of all households)



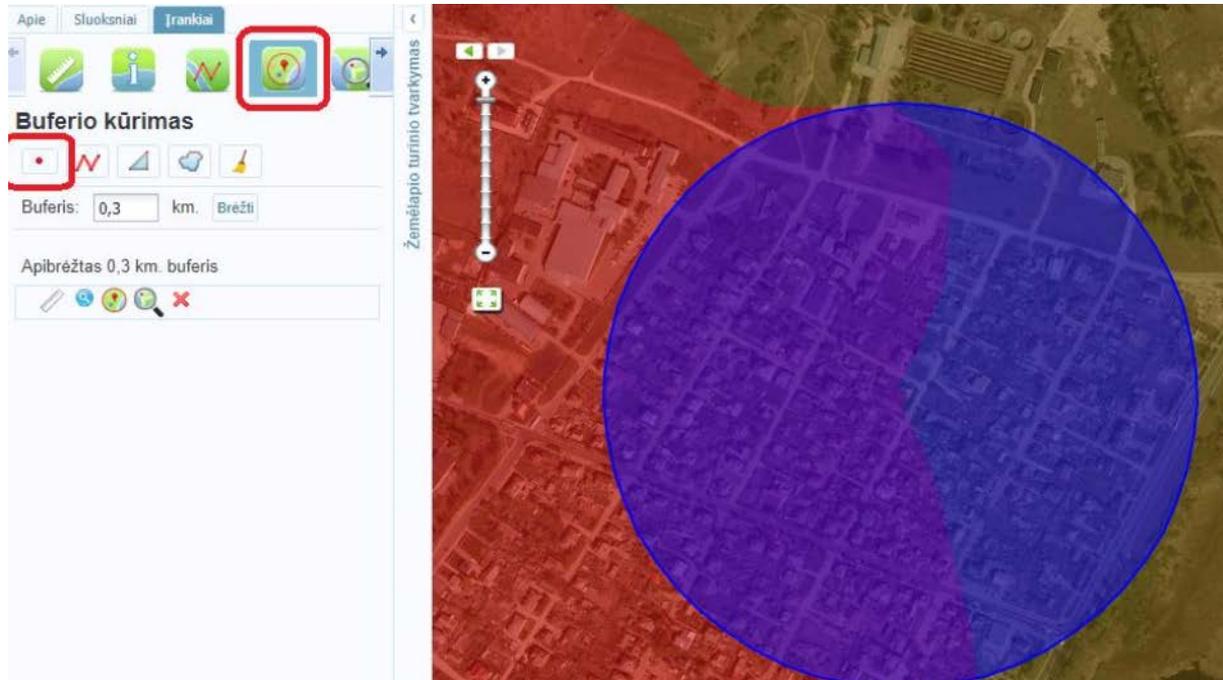
Criteria for economic incentive



- Subsidy will not be available for households, located in highly polluted urban areas, identified according modelled PM10 dispersion maps during cold season.
- Higher priority for renewable heating systems, other than biomass boilers, will be given for households, located in highly polluted urban areas.
- Energy efficiency will be main parameter for deciding priority between different installations.



Criteria for economic incentive



Radius of 300 meters from household location is applied as uncertainty.



Fossil fuel boiler replacement fund (Climate change special program)

An economic incentive that is already available for households, replacing fossil fuel boilers to a renewable energy heating systems, including biomass boilers. Program is aiming to increase renewable energy share in gross energy production.

Biomass boilers requires to comply with V stage energy efficiency and emission values, established in EN 303-5:2012 standard.

From 2018 incentive will not be available for households, intended to upgrade boilers, that are located in before mentioned pollution zones.

For 2018 period 3.3 million Euros are available for subsidies (up to 50 % cost of installation).

2017 data:

**106 biofuel boilers (V stage) (14 in urban areas) and
198 heat pumps (56 in urban areas) were installed.**



Public awareness campaigns

Public information on possibilities for society involvement in reducing air pollution and improving air quality, as well as information about consequences of irresponsible actions. Program provides EU funding for municipalities to perform awareness campaign. At this moment none were initiated. It's expected at least 4 major campaigns will completed by 2023.

Annual enforcement campaign “Chimney”. During cold season more than a thousand households and small industry subjects are inspected. Officers are also advising households and industries on good practises of solid fuel combustion and waste management. Results of campaign are widely published.

| Year | Infringements | Inspections |
|-------------|----------------------|--------------------|
| 2018 | 62 | 1371 |
| 2017 | 85 | 1368 |
| 2016 | 190 | 1352 |



Conclusions

Key for effective residential heating air pollution reduction should be combination of economic, legislative and educational measures implemented simultaneously.

As a part of national air pollution control program (in development according NEC Directive), more measures could be introduced in near future, such as mandatory heating system annual maintenance, elimination of solid fuel installations in central heating zones, residential solid fuel boiler inventory and register establishment or incentives for connecting households to centralized heating system where possible.

Despite raising public awareness, waste burning in households still remains a common environmental issue.

Long term goal – no solid fuel combustion in highly populated urban areas.