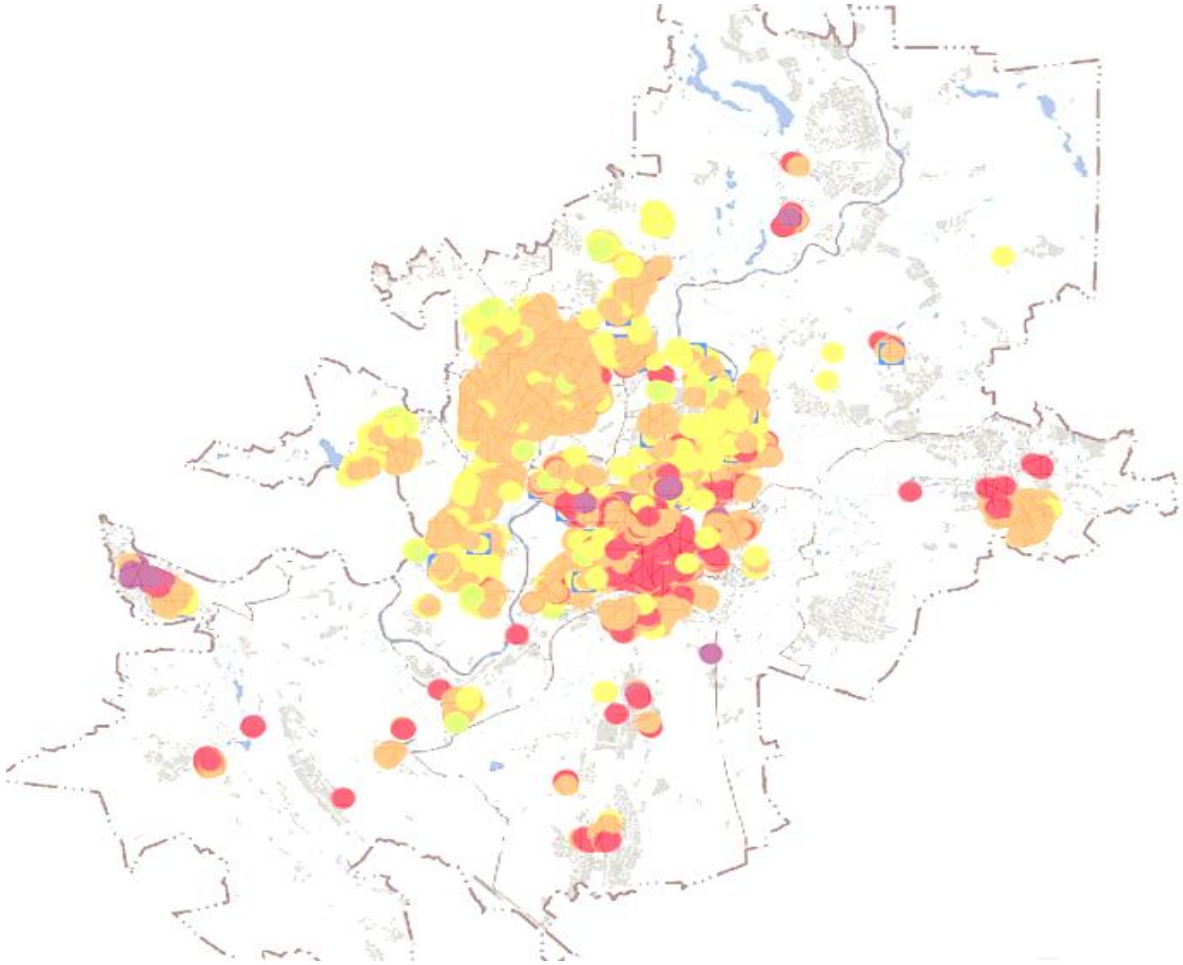


Interactive Energy Classification Map

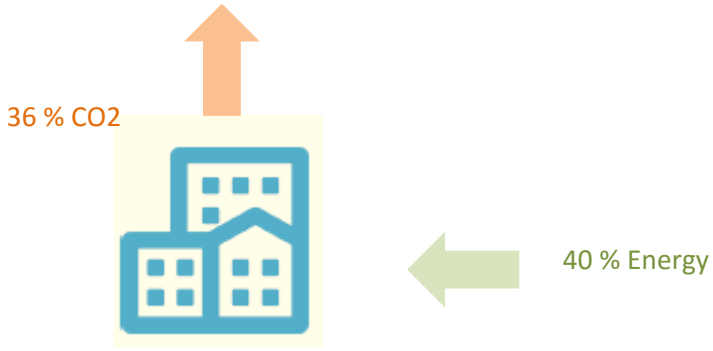
Understanding the problem

EU

- Buildings are responsible for 40 % of energy consumption and 36 % of CO2 emissions in EU
- About 35 % of EU buildings are over 50 years old

Vilnius

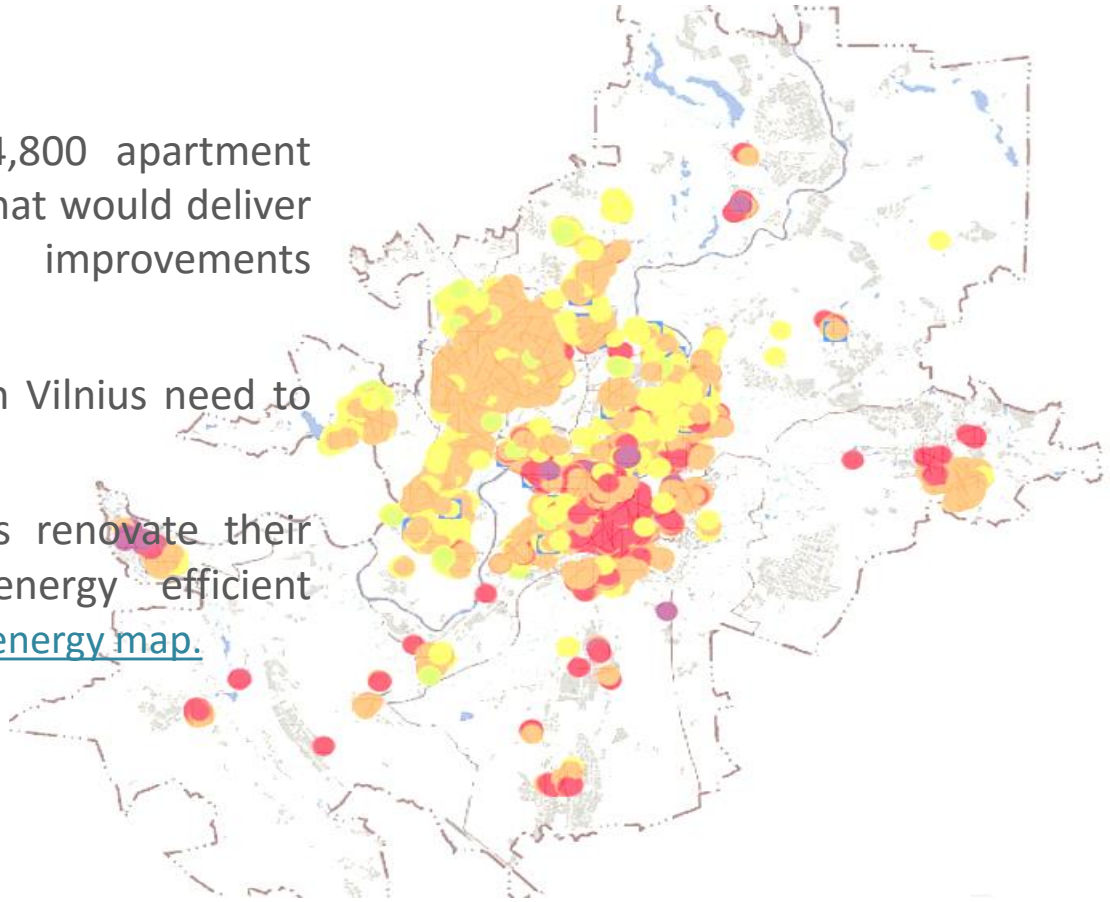
- Over two thirds of Vilnius's 600,000 citizens live in privately owned apartments, in large multi-storey blocks built between 1960 and 1990
- They were constructed with poor thermal insulation and old style centralised heating systems
- Heat is delivered to every apartment, from October to April, with no apartment level metering or controls



- By improving the energy efficiency of buildings, we could reduce total energy consumption and lower CO2 emissions

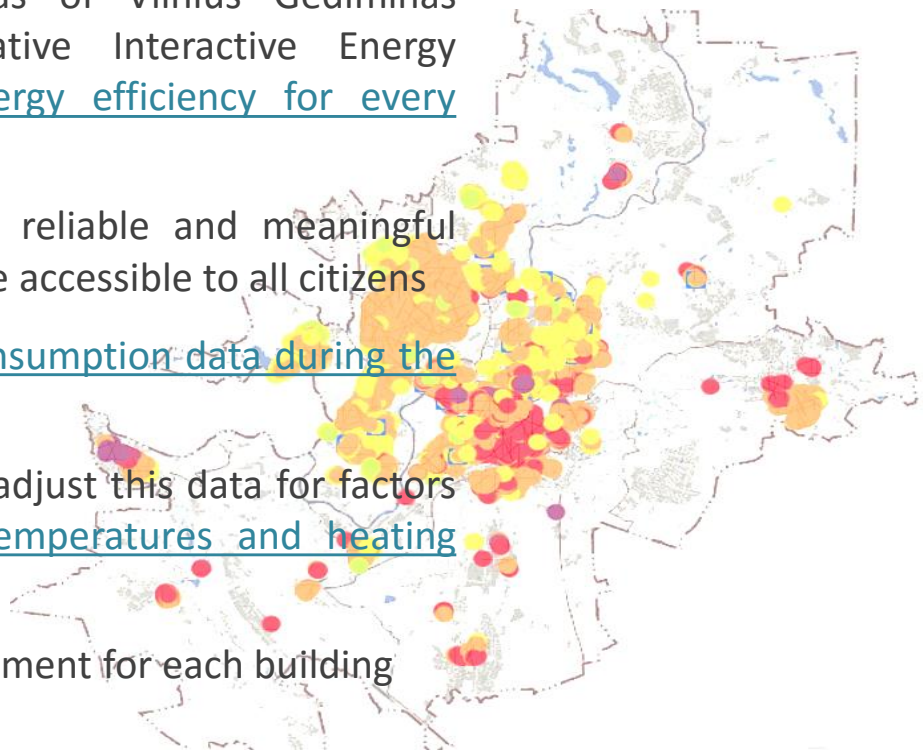
Current situation in Vilnius

- Initial surveys of the city's 4,800 apartment blocks identified 2,800 blocks that would deliver significant energy efficiency improvements through modernisation
- 60 % of all apartment blocks in Vilnius need to be renovated
- In order to encourage citizens renovate their buildings or install more energy efficient technologies we use interactive energy map.



An innovative solution for energy performance data

- Working closely with Vilnius Municipal Government and energy company, professor Dr. Romanas Savickas of Vilnius Gediminas Technical University devised an innovative Interactive Energy Classification Map, displaying actual energy efficiency for every residential block in Vilnius
- The project required the development of reliable and meaningful energy efficiency indicators and making these accessible to all citizens
- The solution uses actual monthly energy consumption data during the heating season
- An advanced methodology is then used to adjust this data for factors such as external temperatures, heating temperatures and heating duration
- The outcome is an energy efficiency measurement for each building



Comparing different buildings

- To make comparison easier, the energy efficiency measurements are grouped into 15 classes: class one for very high energy efficiency down to class 15 for very low energy efficiency
- These 15 classes are further grouped to create six energy efficiency ratings, colour coded for display on the map

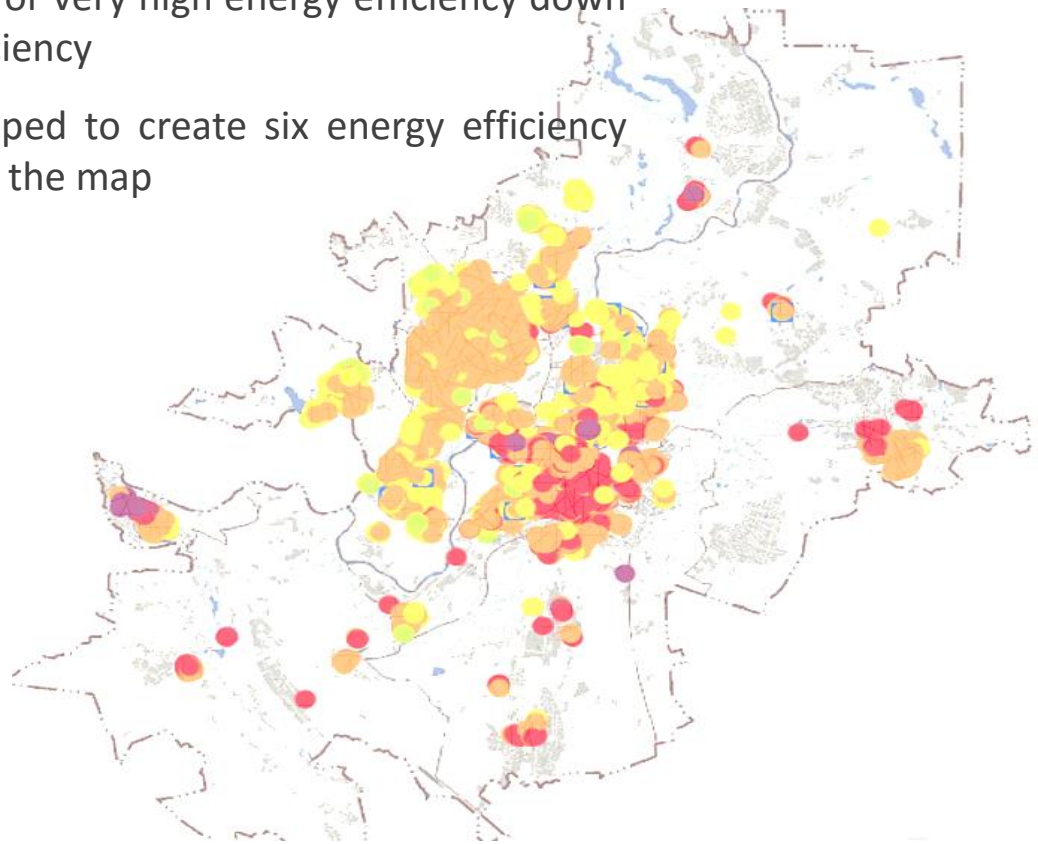
Good (green)

Average (yellow)

Poor (orange)

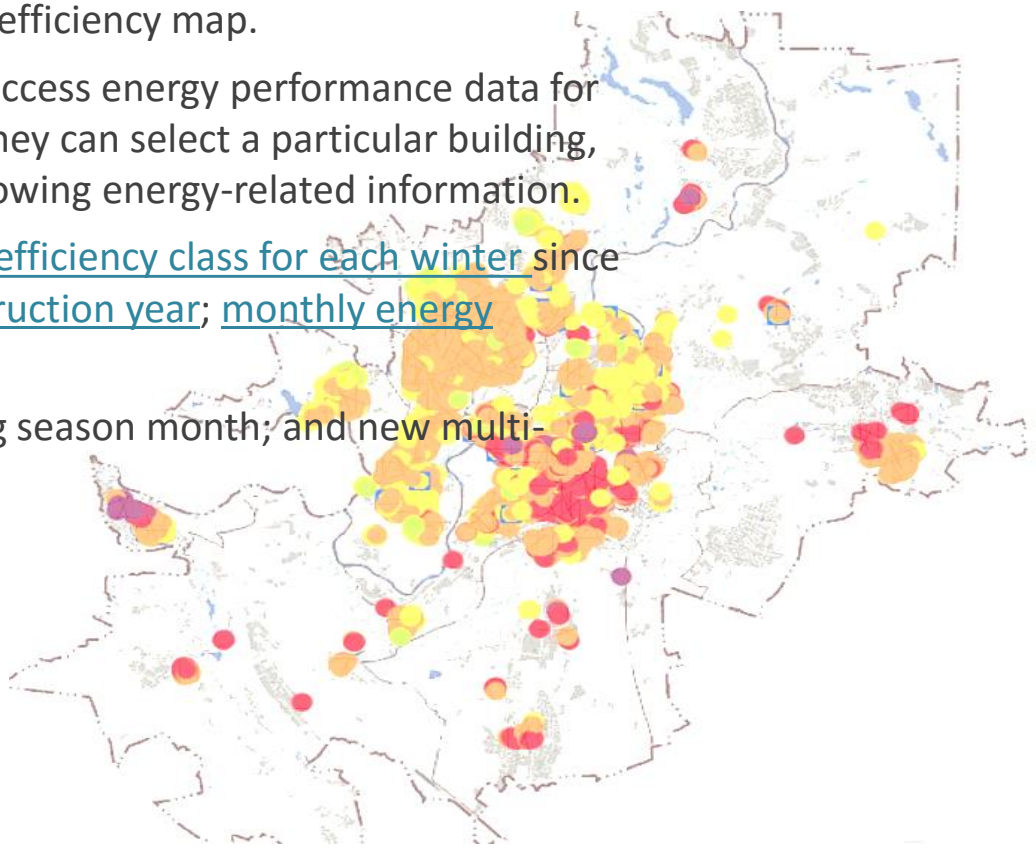
Very poor (red)

Extremely poor (purple)



Comparing different buildings

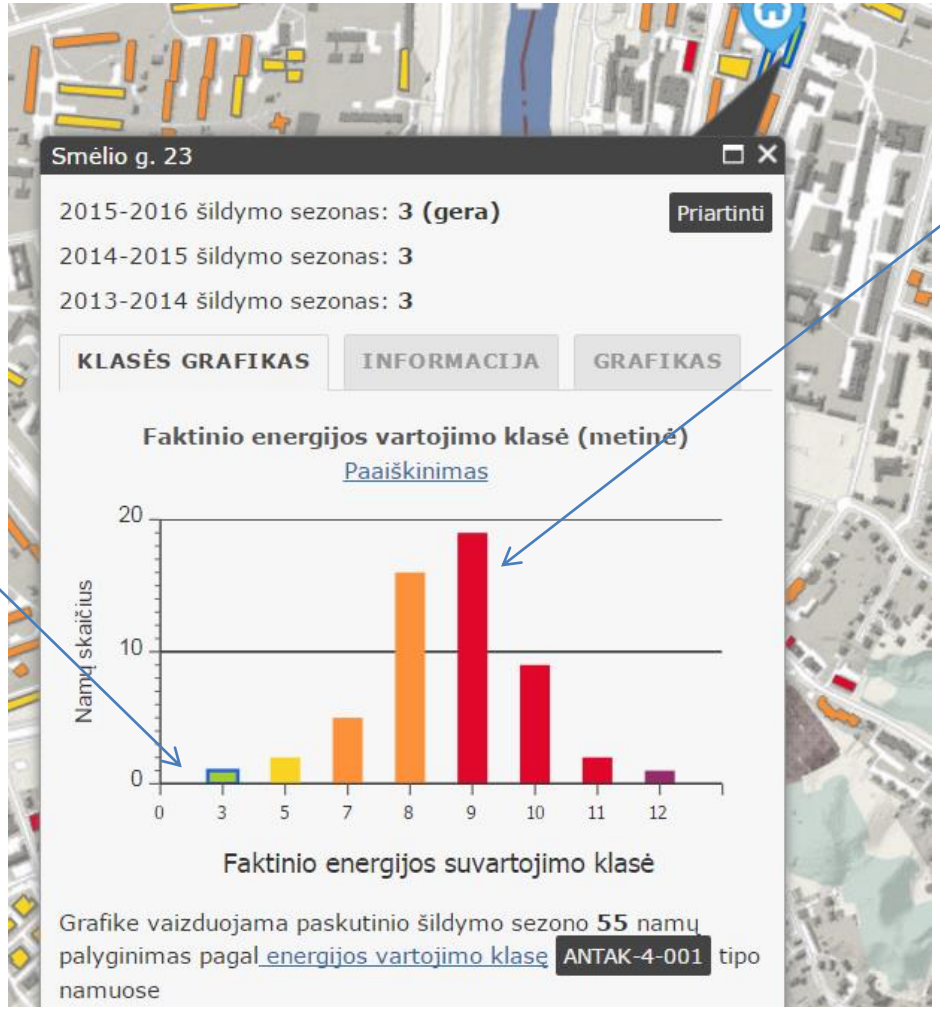
- This energy efficiency information for all apartment buildings is displayed on the interactive energy efficiency map.
- By going online, citizens can freely access energy performance data for every residential block in the city. They can select a particular building, and then view a pop-up window showing energy-related information.
- This includes: the building's energy efficiency class for each winter since 2011-2012; building type and construction year; monthly energy efficiency graphs to date.
- Information is updated each heating season month; and new multi-apartment buildings can be added.



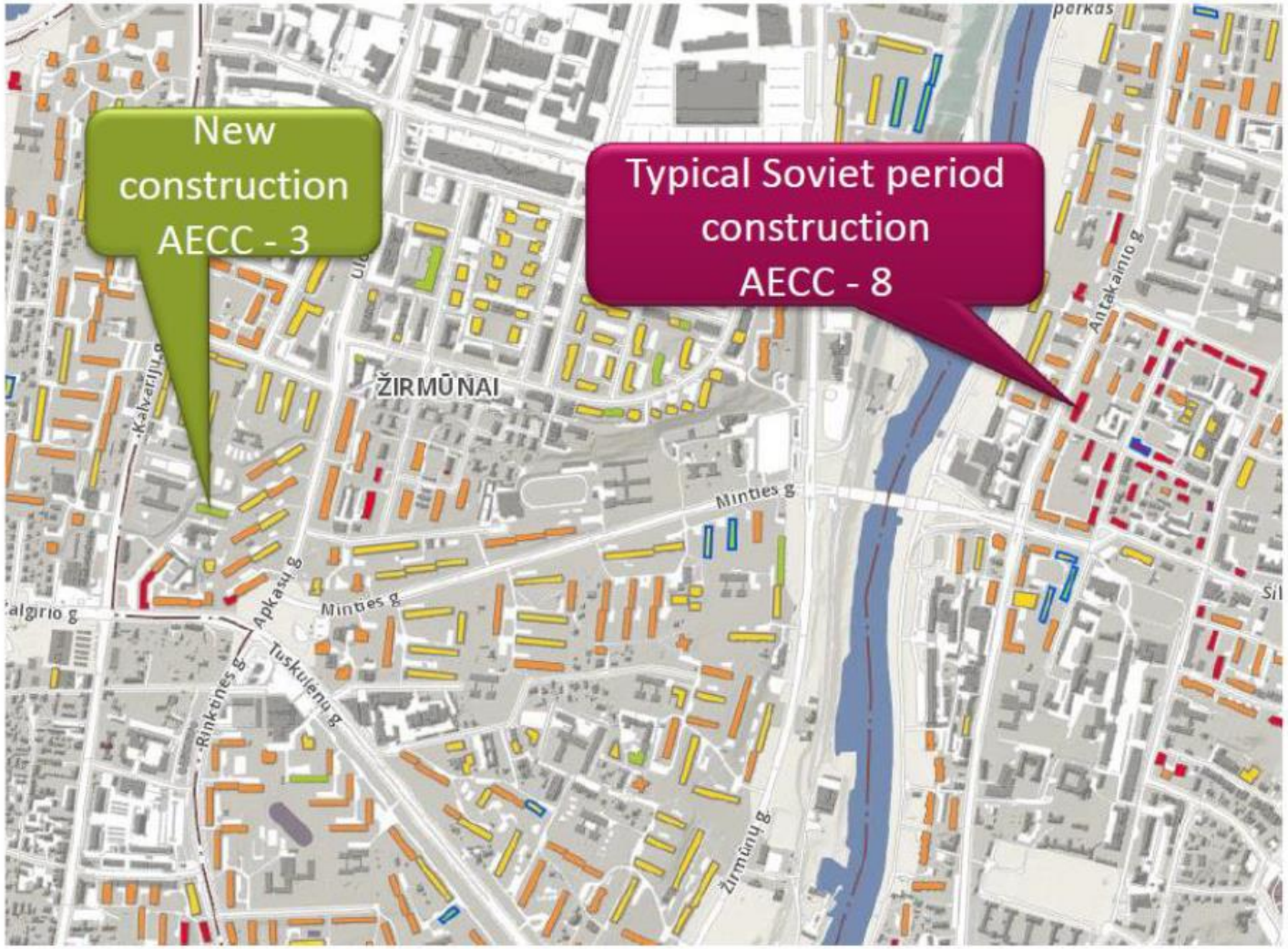
http://www.vilnius.lt/stendas/siluma.html

Building has been renovated

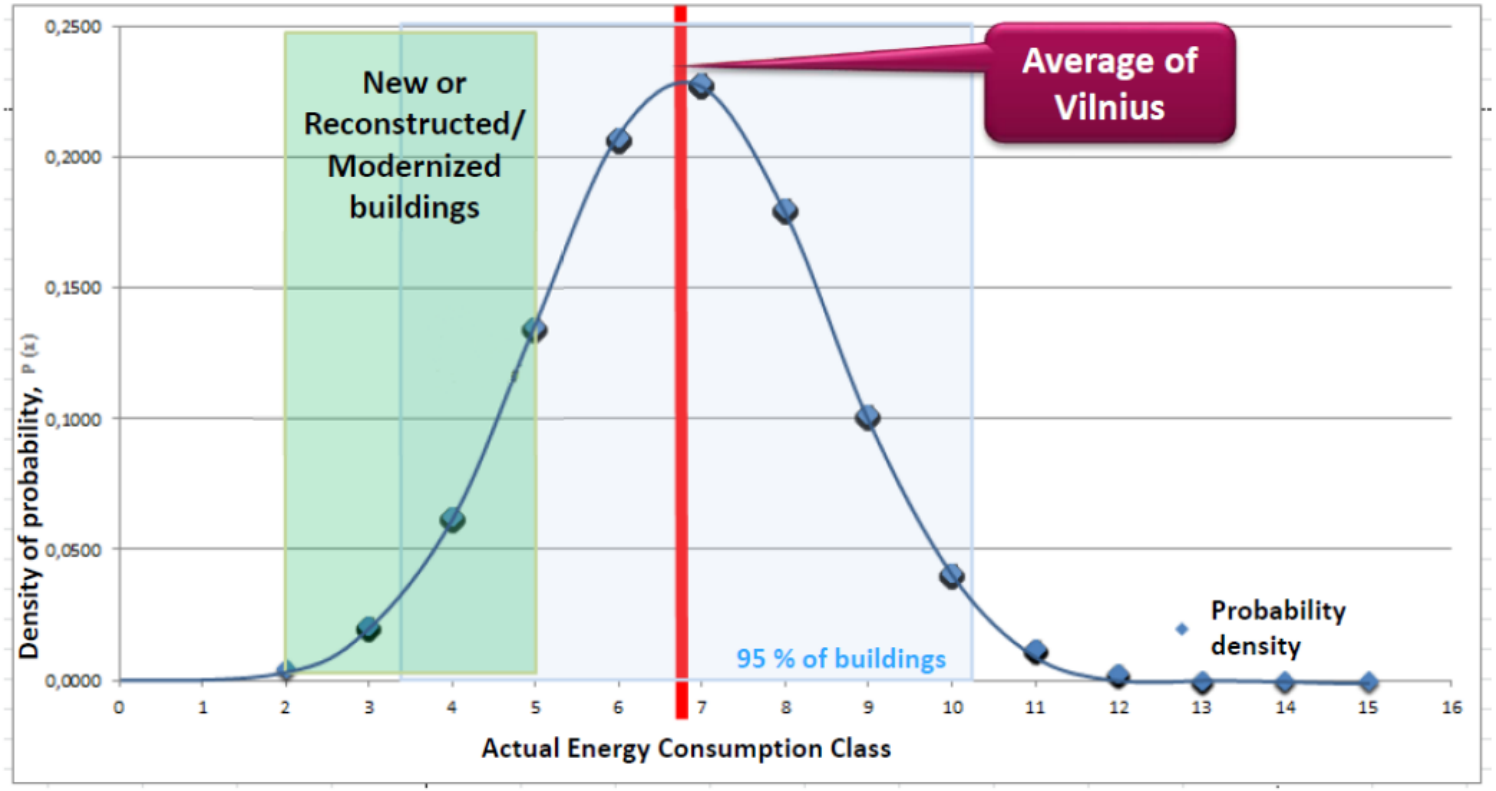
Majority of same type buildings has 9 AECC



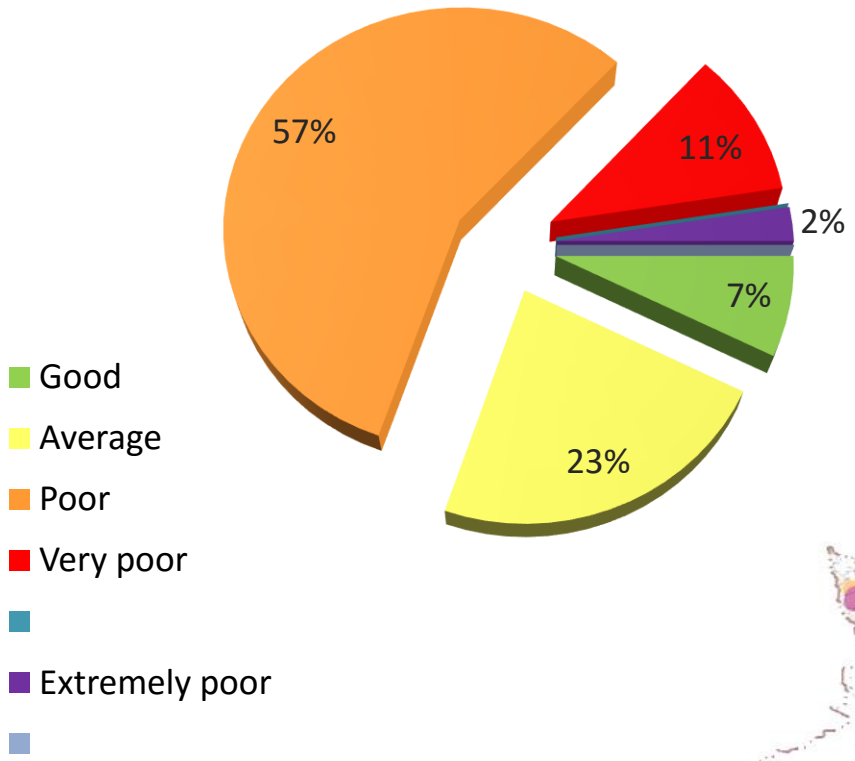
- **City plan**:

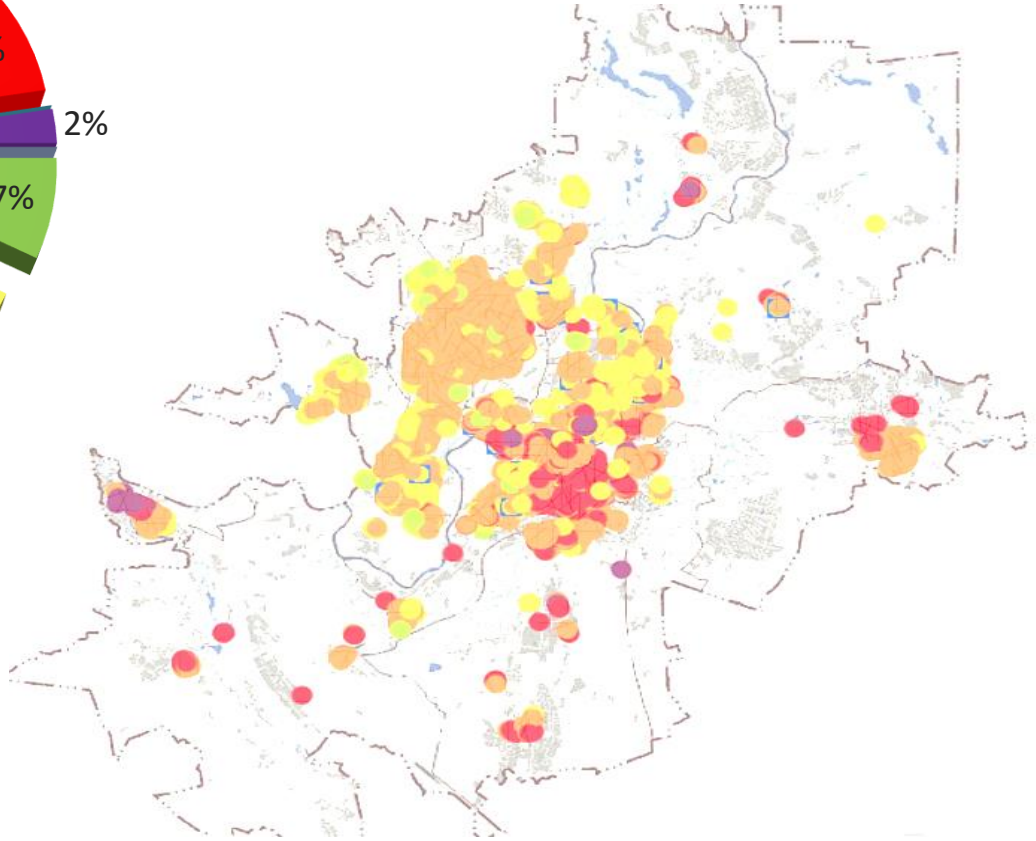

New construction AECC - 3
Typical Soviet period construction AECC - 8
ŽIRMŪNAI
Minties g
Minties g
Apkasu g
Tuskulėnų g
Rinktinės g
Žirmūnų g
Antakalnio g
Kalvarijų g
Algirio g

Average Energy consumption class in Vilnius is 7



Energy efficiency in 2016





Data required determining AECC in building

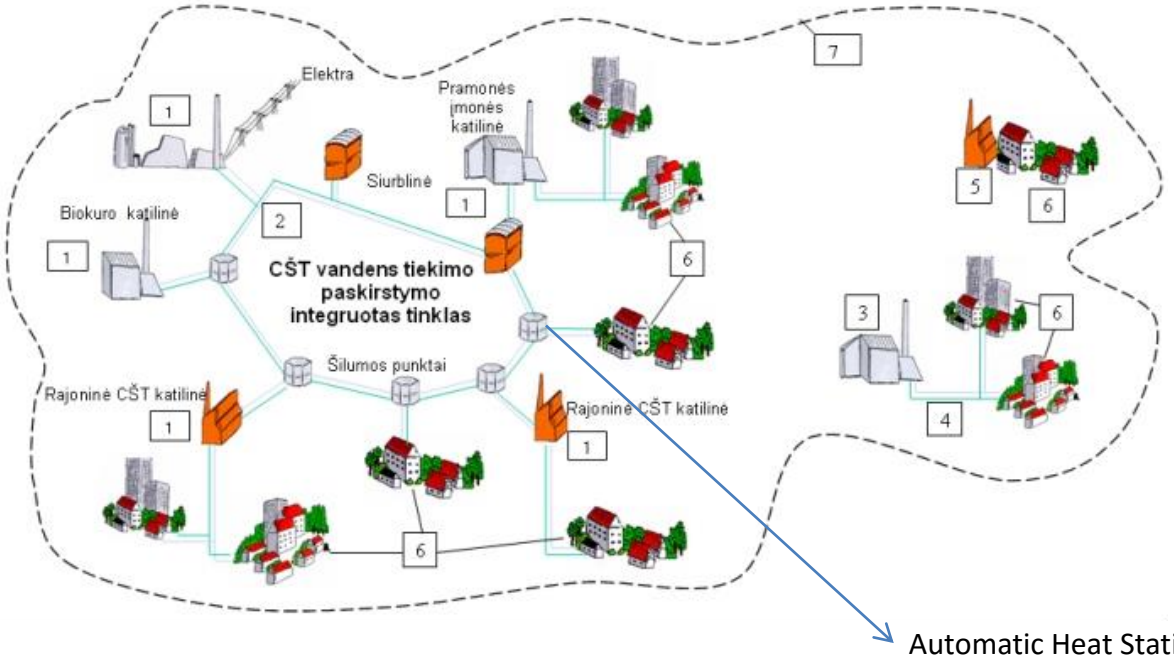
No.	Indicator	Description	Receiving data		Data source
1.	**A**	Heated area in the building, m2	Collect	One time	Building owner/Responsible institution
2.	**Q_{annual}**	Building's annual energy consumption, Wh, kWh, MWh	Collect	Monthly	Heating supplier
3.	**$T_{avg.\ external}$**	Average external temperature, °C	Collect	Monthly	Meteorological data center
4.	**$T_{avg.\ inside}$**	Inside temperature considered a constant, + 18 °C	Collect, if available	Monthly, if available	Owner of the building
5.	**D**	Number of heating days	Collect	Monthly	Heating supplier
6.	**HDD**	Heating degree days, $T_{avg.\ inside} - (T_{avg.\ external}) \times D$	Calculate	Once in a year	Local government
7.	**q_{annual}**	Energy performance indicator, $Q_{annual} / (HDD \times A)$	Calculate	Once in a year	Local government

Energy performance classification

AECC	q, annual	Rating of the building	Colour code
1	<5	Good	
2	5-10		
3	10-15		
4	15-20	Average	
5	20-25		
6	25-30	Poor	
7	30-35		
8	35-40		
9	40-45	Very poor	
10	45-50		
11	50-55		
12	55-60	Extremely poor	
13	60-75		
14	75-80		
15	>80		

District Heating in Vilnius

-max. heat demand is up to 1100 MW during heating season
~ 650 MW during heating season
~ 110 MW during summer time



1. Power Plant
2. District Heating Network
3. Regional Power Plant
4. Regional District Heating Network
5. Local Boiler
6. Consumers
7. City border

Automatic Heat Station

Future task is smart metering implementation for individual flats