FEASIBILITY PLAN FOR IMPROVEMENTS IN SCHOOLS

Slovenia

Version 1

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OUTPUT O.T3.2

DELIVERABLE T3.3.8

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1. Introduction

As a case study we chose primary school in Ljubljana, Primary school Karel Destovnik Kajuh, which is also involved in the project InAirQ as a partner. School was involved also in the monitoring campaign in the winter period 2017/2018.

Feasibility plan has following elements:

- Vulnerability assessment
- Field campaign
- Action plans

Each action plan is evaluated and for each action plan the level of feasibility is defined (see Table 1).

Level of feasibility	Cost	Time
1 REALLY FEASIBLE	Cheap, less than 10.000 EUR	Could be done really fast - *less than one year*
2 FEASIBLE	Between 10.000 and 50.000 EUR	It takes *around one-three years* for implementation
3 HARDLY FEASIBLE	Really expensive, more than 50.000 EUR	A lot of time is needed for its implementation - *more than three years*

Table 1: Levels of feasibility

2. Vurnelability assessment

Urban planning, architecture and interior design have a big influence on the indoor air quality. Based on the analysis we defined possible pollutants and feasible improvements.

As a case study we chose primary school, which is located in the suburbs of Ljubljana, in the residential environment and was built from brick and concrete in 1976. The school was partially renovated only twice and it has no mechanical ventilation.

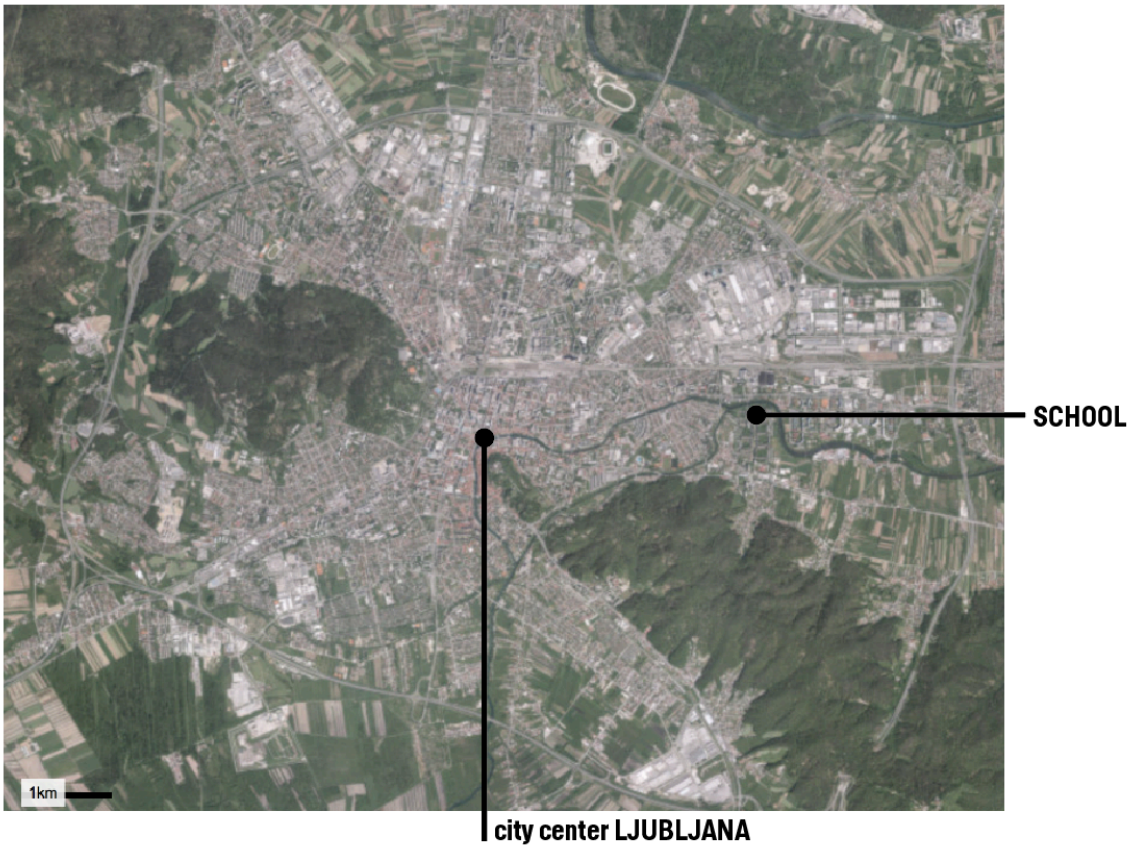

Figure 1: Location of the school

BASIC INFO

ADDRESS	Jakčeva ulica 42, Ljubljana
LOCATION	residential area, near city center
YEAR OF CONSTRUCTION	1976
CONSTRUCTION MATERIAL	brick, concrete
NUMBER OF STOREYS	1
BUILDING AREA (m²)	4.475,2
TYPE OF HEATING SYSTEM	central or district heating
AIR CONDITIONING	in some parts of the building
MECHANICAL VENTILATION	only in some parts: kitchen
RENOVATION	2006 - windows 2008 - roof renovation

STRENGTHS
- light traffic
- a lot of greenery
- central or district heating
- cleaning in the afternoon
- natural ventilation before school day, in the morning
- no dusty places

WEAKNESSES
- age of the building
- hazard materials
- air conditioning and mechanical ventilation only in some parts of the building
- chemicals for cleaning

OPPORTUNITIES
- additional renovation
- mechanical ventilation in all parts of building

THREATS
- heating plant nearby

Figure 2: Basic characteristics of the school

2.1. Urban planning

School is located in residential area, near the river Ljubljanica and close to a busy road. On the north there is bigger area of production activities and energy infrastructure. The main industrial point source is heating plant, which has a big influence on indoor air quality.

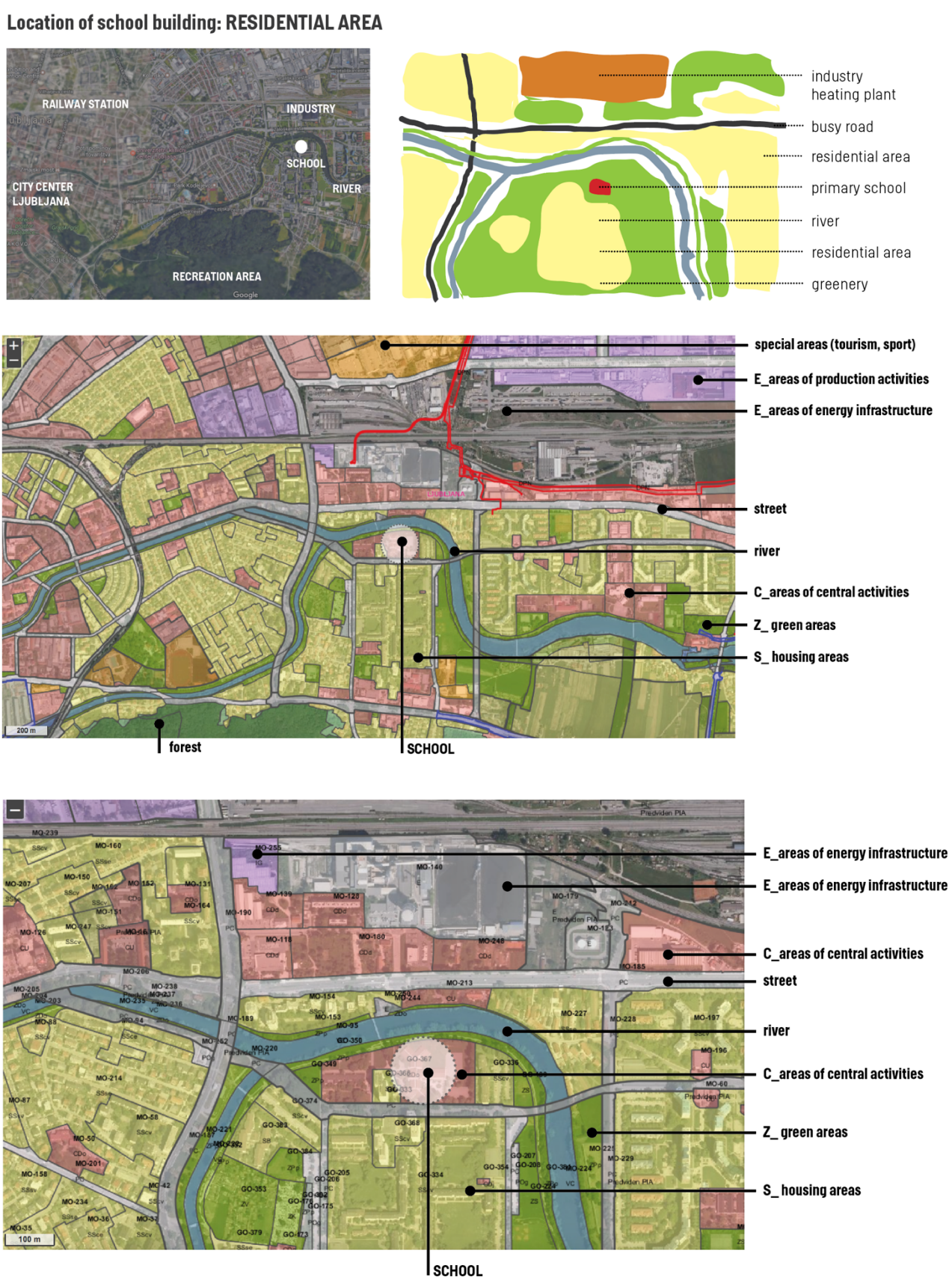

Figure 3: Location of school and use of the space in the surroundings (bigger and smaller scale)

The biggest outdoor pollutants are busy road, heating plant and parking lot. Unfortunately, it is not in our power to change anything with busy road and heating plant, however we could have the influence on the parking lots nearby.

Figure 4: Potential sources of indoor air pollution (outdoor sources)

School is located in the residential environment, where there is lack of parking spaces. With a new urban plan and traffic strategy for the whole neighborhood we could reduce the number of cars nearby and increase the amount of greenery.

Figure 5: School building

Feasible improvements:

Change the location of parking lots.

2/feasible: municipality should change the traffic strategy for the whole neighborhood

Increase the number of trees in front of the school.

1/really feasible: small amount of money, it should be decided by the municipality, could be done really fast.

2.2. Architecture

The school building was built from brick and concrete at the end of the 18th century (1976). It was renovated in 2006 (windows) and 2008 (roof renovation). Air conditioning and mechanical ventilation is only in some parts of the building: kitchen.

The main indoor pollutants are odour from kitchen in the middle of the building and lead water pipes.

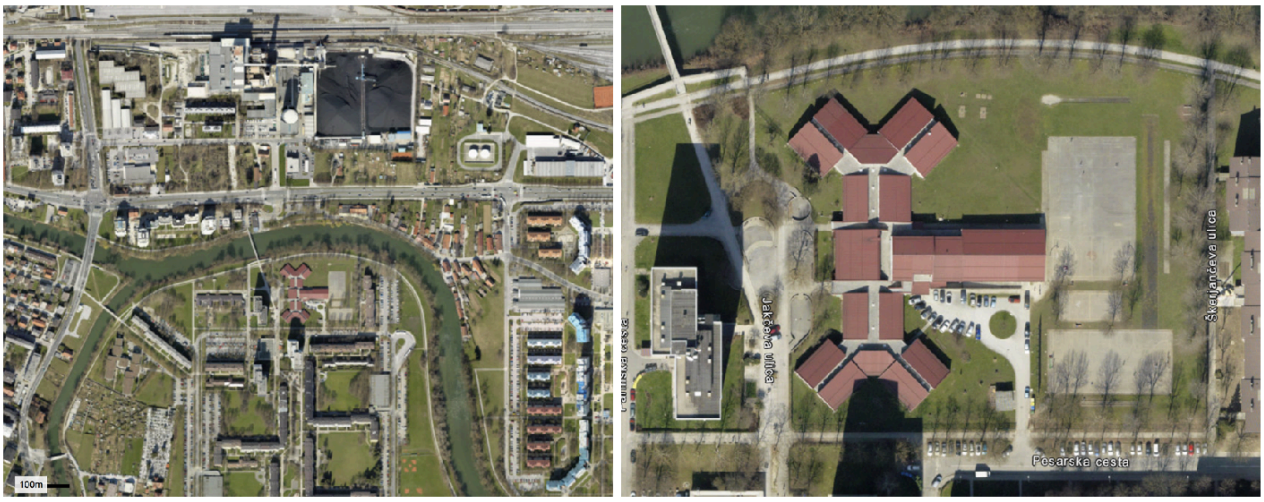

Figure 6: School building

Feasible improvements:

Natural ventilation: Extraction of air (air outlet) from the kitchen (the smell of food).

2/feasible - some physical changes should be done (new walls/ doors) in order to separate kitchen from another school

3/hardly feasible - to move kitchen on another location

Mechanical ventilation: Plan for maintenance of HVAC system. The plan should include monitoring, inspecting and cleaning HVAC components such as outside air intakes, outside air dampers, air filters, drain

pans, heating and cooling coils, the interior of air handling units, fan motors and belts, air humidification, controls and cooling towers.

3/hardly feasible - placement of mechanical ventilation in all classrooms (really expensive)

Flooring: Change of flooring with healthy building materials

3/hardly feasible - could be done only in summer, as the building is quite old, when starting this renovation some other problems could appear

2.3. Interior design

In most of the classrooms we noticed curtains, linoleum, chalk, old furniture, decoration (arts, glues) and some plants.

Figure 7: Example of classroom

The main indoor pollutants are chemicals for cleaning, a lot of decorations and chalkboards. Also, school bags and all the material pupils bring to school could be the potential source of indoor pollutants.

Potential sources of indoor air pollution: INDOOR SOURCES

- kitchen is located in the middle of the building
- lead water pipes
- floor and desk cleaning with chemicals
- a lot of decoration
- odour
- chalkboards

SELF ASSESSMENT **5** *0=extremely poor, 6=extremely good*

Figure 8: The main sources of indoor air pollution (indoor sources)

Feasible improvements:

New protocols for cleaning.

1/really feasible - clean in the late afternoon, open windows after cleaning etc.

3/hardly feasible - moving kitchen on another location

New cleaning agents for cleaning tables, flooring etc.

1/really feasible - agreement with cleaning company, small investment (new cleaning agents if necessary, first assessment of what is being used)

Remove the decorations (for example curtains, art products etc.).

1/really feasible - remove all curtains, art products, check the plants (if there is dust on them) etc.

Change of chalkboards with other appropriate boards (with markers).

1/really feasible - change chalkboard with the boards for markers .

3. Field study

The field study was done in the winter season 2017/2018. We made measurements of the following parameters: air temperature and relative humidity, particles ($PM_{2.5}$), CO_2, aldehydes (formaldehyde), VOC (volatile organic compounds) (benzene), NO_2, radon.

3.1. Monitoring campaign

The indoor air quality was in the moderate category based on the indoor health index. The main air pollutants were benzene, formaldehyde, CO_2 and particulate matter ($PM_{2.5}$). The concentration of formaldehyde was 15,74 µg/m3 and CO_2 1396 ppm. It should be noted that the outdoor value for the $PM_{2.5}$ and benzene mass concentrations were also high (benzene indoor 3,11 µg/m3; outdoor 4,61 µg/m3; $PM_{2.5}$ indoor 12 µg/m3; outdoor 19 µg/m3), thus the inappropriate indoor air quality was mainly caused by the outdoor air pollution.

Furthermore, all the comfort parameters were in the healthy range. [1]

[1] For more about the field campaign check the National IAQ Action plan Slovenia.

Feasible improvements:

Additional monitoring campaigns

1/really feasible - new protocol for regular monitoring of IAQ

Technical and process improvements

**See the table 2 and 3.*

Pollutant	Action plan	Level of feasibility
Benzene	"Prevention" of the entry of benzene from the outside air (location of parking lots, cigarette smoke, etc.: traffic, gas stations, industries (coal, oil, natural gas, chemicals, steel)	3/hardly feasible – move the industry 2/feasible - Change location of parking lots
	During and after using products that are the source of benzene, the living areas are well ventilated (e.g. during painting/ use of colours).	1/really feasible – protocols for using paints and other products
	Avoid the possible source of benzene: building materials and furniture, particleboard furniture and polymeric materials (vinyl, PVC and rubber floorings, as well as nylon carpets and SBR-latex-backed carpets), remodelling and decorating, plywood, fiberglass, flooring adhesives, paints, wood panelling, caulking and paint remover.	1/really feasible – prepare guidelines for renovation process
	Avoid the possible source of benzene: stored solvents and various human activities: cleaning, painting, use of consumer products, photocopying and printing, the storage and use of solvents	1/really feasible – prepare guidelines and protocols
Formaldehyde	"Prevention" of the entry of formaldehyde from the outside air.	2/feasible
	We select suitable, dedicated furniture and linings - we equip the rooms with interior equipment that does not contain formaldehyde or as little as possible.	1/really feasible – prepare guidelines for interior design process and purchase of furniture and other equipment
	The rooms are ventilated, in particular new, refurbished or equipped with new furniture.	1/really feasible – protocols for natural ventilation 3/hardly feasible – mechanical ventilation
	During and after the use of products that are source of formaldehyde, the school environments are well ventilated.	1/really feasible – protocols for natural ventilation 3/hardly feasible – mechanical ventilation
	Maintain the temperature and relative humidity of the school environments at the lowest comfort levels (formaldehyde concentrations increase with increasing temperature and humidity).	1/really feasible – monitoring T and RH in classrooms, control T and RH

	Remove materials that contain formaldehyde: building materials that emit formaldehyde, furniture and wooden products containing formaldehyde-based resins such as particleboard, plywood and medium-density fibreboard; insulating materials; textiles.	2/feasible – replacement of elements that contain formaldehyde
	Remove do-it-yourself products such as paints, wallpapers, glues, adhesives, varnishes and lacquers.	1/really feasible
	Use household cleaning products such as detergents, disinfectants, softeners, carpet cleaners and shoe products that doesn't emit formaldehyde	1/really feasible – protocols for using cleaning products
	Remove electronic equipment, including computers and photocopiers	2/feasible – find appropriate location for computers, photocopiers, out of the classrooms
CO_2	specific frequency and type of natural ventilation (change of protocol)	1/really feasible – change of protocol
	reduce the number of children in the class	2/feasible
	add air quality sensors (CO_2, T, RH)	1/really feasible
$PM_{2,5}$	limit the ventilation of the rooms during the increased traffic, and during the temperature inversion	1/really feasible – define protocols
	reduce biomass heating	*not in this school, because there is central heating system
	change filters regularly in mechanical ventilation	1/really feasible – define protocols

Table 2: Action plans based on the field campaign

Pollutant	Action plan	Level of feasibility
Radon	avoid the classrooms in lower floors of the building - nearest to the source (basement).	*no basement
	repair cracks in the floor, wall joints, and the drainage system in the building (school)	1/really feasible – maintenance
	specific frequency and type of natural ventilation (change of protocol)	1/really feasible – define protocols
Visible mould	remove possible mould sources	1/really feasible – maintenance
	prevent water ingress into the building (roof, construction), condensation	1/really feasible – maintenance
	control humidity and temperature (humidity 43-67%, temperature between 18,5 and 25,5 C	1/really feasible – define protocols

	remove potted plants with a large amount of soil (fungi can pass from the soil of pot plants to air),	1/really feasible
	specific frequency and type of natural ventilation (change of protocol)	1/really feasible – define protocols
VOCs	minimize the use of paints, varnishes, adhesives, artificial floor coverings (plastics), wood glued panels	1/really feasible – define guidelines
	do not use air refreshers, scents, etc.	1/really feasible – define guidelines
	use more natural cleaners for cleaning	1/really feasible – define guidelines
	add mechanical ventilation	3/hardly feasible
	specific frequency and type of natural ventilation (change of protocol)	1/really feasible – define protocols

Table 3: Preventive action plans (proposed because of the lack of results of monitoring campaign)

3.2. Observation

As part of the field campaign we also visited the school and prepared the list of elements that could have influence on IAQ. Based on observation we prepared and evaluated action plans.

Elements that could have influence on IAQ		**Action plan &** **Level of feasibility**
BASIC CHARACTERISTICS	The school is about 40 years old. All windows in school were changed in 2007/08, all are plastic. Most of the floor surfaces are original, in some places the floor coverings were replaced. Furniture is also much more original. General renovation was carried out in the area where the pupils of the first triad are located.	3/hardly feasible - Comprehensive renovation of the entire building 2/feasible – partial renovations: furniture, flooring
EQUIPMENT	Art decorations on glass windows (large surface windows are covered with pictures/other art products - the question: is the space enough illuminated; what is the quality of the colours for glass?).	1/feasible – remove art decorations from windows
TEMPERATURE CONDITIONS	In two classrooms on the eastern part of the building, in an area which is not covered by surrounding objects or trees, there are extremely high temperatures in summers (over 30°C, even 33°C).	2/feasible – plant new trees near these classrooms
CLEANING MODE	Cleaning is performed before or after lectures, in the afternoon or in the gym in the evening. Annually general cleaning is carried out during the summer holidays (according to the cleaning plan).	1/really feasible – new cleaning protocols

	Cleaning products are ordered by the public procurement system; the cleaning staff have to attend training on the use of cleaners. The personnel who clean the school are part of the collective.	
VENTILATION	It is carried out by teachers, and in some cases, pupils are also in charge. It is important topic in school, supported by all staff. All rooms are naturally ventilated in the morning, further individually according to the interest of the teacher and, if necessary, depending on the activities that are carried out in the classroom.	1/really feasible – protocols for natural ventilation, pupils' involvement 2/feasible – regular monitoring of T, RH, CO_2
ART SUPPLIES	Each student has his own colours, in the first triad in the drawers in the classroom.	1/really feasible – requirements for colours and other art material; storage out of the classroom
POTTED PLANTS	Potted plants are allowed, their presence depends on the teacher's interest.	1/really feasible – new protocols
PETS	There are no pets in the school. There is a small aquarium in the corridor where there were no fish at the time of the visit.	

Table 4: Elements that could have influence on IAQ (observation method) and proposed action plans

Specific observations (self-assessment on IAQ in different rooms)		**Action plan & Level of feasibility**
GENERAL	a lower IAQ at the office entrance (smell from nearby toilet facilities and distribution kitchen)	3/hardly feasible – physical intervention (new walls/ distribution of rooms/ mechanical ventilation)
	a lower IAQ in the corridor of the first triad (smell of softer and damp clothes and shoes - because of the wardrobes in the corridors)	2/feasible – move of wardrobe to another location
	a lower IAQ in the corridor in the central part of the school (smell of food, cooking - the vicinity of the dining room and distribution kitchen).	3/hardly feasible – physical intervention (new walls/ distribution of rooms/ mechanical ventilation)
CLASSROOM 1 (in the warm part of the year the temperature measured is the highest)	inadequate shading (only internal shades)	3/hardly feasible – new shading systems
	Art decorations on glass windows (large surface windows are covered with pictures/other art products - the question: is the space enough illuminated; what is the quality of the colours for glass?).	1/feasible – remove art decorations from windows

	a lot of potted plants - some moulds on the ground	1/feasible – remove inadequate potted plants
	in the area of the washbasin, the cleaner is within the reach of children	1/feasible – move cleaner on the higher position or in the save place (not in the reach of children)
	waste bins do not have a lid	1/feasible – add lid to waste bins
	the smell of the food (unprotected sandwiches on the plates – they bring them in the classroom before the snack break)	1/feasible – protocols/requirements for the snacks
CLASSROOM 2 **(in the warm part of the year the temperature measured is the highest)**	inadequate shade (internal shades only)	3/hardly feasible – new shading systems
	paintings on glass windows	1/feasible – remove art decorations from windows
	the smell of the food (unprotected sandwiches on the plates – they bring them in the classroom before the snack break)	1/feasible – protocols/requirements for the snacks
CLASSROOM 3	inadequate shade (fabric curtains, transparent and cotton curtains)	3/hardly feasible – new shading systems
	waste bins do not have a lid	1/feasible – add lid to waste bins
	in the area of the washbasin, cleaning equipment is within the reach of children (broom, garbage dump)	1/feasible – move cleaning equipment in the closed spaces (not in the reach of children)
SMALL GYM	Odour	3/hardly feasible – mechanical ventilation
BIG GYM	Nothing special	/
WARDROBES IN THE BASEMENT	Odour	3/hardly feasible – mechanical ventilation
Other observations		**Action plan &** **Level of feasibility**
PREPARING AND DISTRIBUTING SNACKS	When preparing a snack that has been waiting for the youngest since the morning in the classroom, it should be prepared in such a way that no subsequent food contamination is possible (the food on the tray must be protected - for example, covered with foil). At the same time, the film will at least partially prevent the spread of the odour of food in the classroom. Food storage time should also be taken into account in order to ensure the safety of foodstuffs at room temperature.	1/feasible – protocols/requirements for the snacks

FIRE EXTINGUISHERS IN THE CORRIDORS	The hydrants are locked and there are no keys in the key store windows. The hydrants must be equipped with keys immediately.	1/feasible – add key
BRIGHTNESS AND SHADING OF ROOMS	Effective shading is achieved by placing the shades on the outer parts of the windows. At the same time we can contribute a bit to reducing the temperature (direct influence of sunlight) in the classroom in the spring and summer part of the year.	3/hardly feasible – new shading systems

Table 5: Observations based on the field study and proposed action plans

4. Action plans

Based on the field campaign we propose some action plans and assessed them from the point of view of feasibility.

	Action plan	Level of feasibility
Technical improvements	**Natural ventilation:** • Extraction of air (air outlet) from the kitchen (the smell of food).	3/hardly feasible – kitchen is located in the centre of schools, physical barriers are hard to be implemented, need for comprehensive reconstruction of the building
	Mechanical ventilation: • Plan for maintenance of HVAC system. The plan should include monitoring, inspecting and cleaning HVAC components such as outside air intakes, outside air dampers, air filters, drain pans, heating and cooling coils, the interior of air handling units, fan motors and belts, air humidification, controls and cooling towers.	1/really feasible – define protocols 3/hardly feasible – installation of HVAC system in the classrooms and other parts of the building
	Flooring: • Change of flooring with healthy building materials	3/hardly feasible – need for comprehensive reconstruction of the building
Process improvements	**Operational improvements**: • modifying the mode of some activities that can affect the quality of the indoor environment (e.g., increasing air exchange rate, limiting the number of people in the room, changing the cleaning period).	1/really feasible – define protocols
	Systemic improvements: • Regular measures that will lead to the removal of the source (e.g., replacement of	1/really feasible – define protocols

	floor coverings, prohibition of using some detergents).	
	Cleanliness of the rooms: • Select cleaning methods that are effective for the given need. • Buy products with the least adverse impact on human health. • It is important that the housekeeping staff are trained on how your housekeeping procedures and products may affect IAQ. • Have written procedures, know what equipment and products are used in your building and purchasing safer products. • The use of more natural cleaners, avoid using colours, paints	1/really feasible – define protocols and guidelines
	Maintenance (cleanliness, quality) of the roof, gutters, drainage: • Regular inspection of the rooms and quick action and remediation in case of leakage of water and accumulation of moisture in the premises	1/really feasible – define protocols and guidelines
	Art classes/ use of specific materials for lectures: • After activities using adhesives, glues, paints, etc. (art lessons) ventilate the classroom well	1/really feasible – define protocols and guidelines
Other improvements	**Legislations:** • Establishing the law regulations - monitoring parameters (CO2, T, RH), regulations for schools (number of pupils in classroom).	3/hardly feasible – new laws/ regulations
	Awareness raising: • Improve knowledge about the importance of indoor air pollution (ventilation, materials, behavioural, etc) – different actions for different groups of people.	1/really feasible

Table 6: Action plans

In the design, maintenance and use of school building are involved different people, from government to profession and public. Following are proposed different actions that could be done by different stakeholders.

GOVERNMENT	PROFESSION	PUBLIC (=users)
AUTHORITIES: - Ministry for education, science and sport - Ministry of health	**EMPLOYEES:** - management - teaching staff - technical/ support staff (janitor, cleaners)	**PARENTS** (indirect impact) **PUPILS** (direct impact) **COMMUNITY**

- Ministry of the Environment and Spatial Planning **NATIONAL INSTITUTIONS:** - National institute of Public Health - Slovenian Environment Agency - Universities (Medical faculty, Faculty of health science, Faculty of Civil and Geodetic Engineering, Faculty of Architecture) **MUNICIPALITIES:** - Municipality of Ljubljana	**DESIGNERS:** - architects - civil and geodetic engineers - mechanical engineers - urban planners - contractors **HEALTH CARE WORKERS** (part of Healthy school iniciative) **PUBLIC HEALTH PROFESIONALS** - public health experts - pediatrics - environmental health engineers	

Table 7: Different people from government to profession and public that are involved in the design, maintenance and use of school building

4.1. Government

Government: responsible for new laws/ regulations; municipalities are owners of the buildings and decide on money issues.

	Action	Improvement	Level of feasibility
GOVERNMENT	Time plan of building renovation		**1/really feasible**
	Providing parking spots for employees (not near classrooms)	↓ **CO**	**2/ feasible**
	Roof replacement, thermal insulation, replacing windows	↓ **energy consumption**	**2/ feasible**
	Regular inspections/ maintenance: Public buildings that were built 30-50 years ago are mostly in poor condition due to irregular internal and external maintenance.		**2/ feasible**
	Comprehensive reconstruction of building: Ensure regular reconstruction of public buildings from the municipal budget and European budget (schools, health centres, kindergartens etc.).		**3/hardly feasible**

4.2. Profession

Management board: they have authority to make decisions, define protocols, invest in smaller technical improvements.

	Action	Improvement	Level of feasibility
MANAGEMENT BOARD	Establishment of IAQ team	The feeling of belonging of school staff, regular checking of school building, improvements preparation	1/really feasible
	Awareness raising actions about IAQ in schools	General awareness about IAQ	1/really feasible
	Efficient ventilation of offices with photocopier machine	↓ O3	1/really feasible
	Classroom distribution Appropriate number of pupils in each classroom (avoid overcrowding)	↓ CO2, benzene	2/feasible
	Adequate ventilation of sanitary facilities and kitchen	↓ mould and moisture	2/feasible
	Rare use of basement for learning process	↓ PM, benzene, toluene, Na, Cl, ethanol	1/really feasible

Teachers: they are bond between parents and children, their role is to educate both of them (raise awareness on the importance of IAQ).

	Action	Improvement	Level of feasibility
TEACHERS	Organized food distribution in Mensa, not in the classrooms	↓ unpleasant odour and appearance of pests	1/really feasible
	Natural ventilation every 45 minutes (opening windows and doors)	↓ CO2	1/really feasible
	Prohibited smoking near the school building	↓ NO, CO	1/really feasible
	Avoiding hanging different elements near windows	↑ level of air condition and frequency of fresh air supply	1/really feasible
	Plants in the classrooms	↓ formaldehyde, benzene, trichlorethylene, carbon monoxide, carbon dioxide	1/really feasible
	Using tables with markers	↑ PO4 ↓ benzene	1/really feasible
	Using tables with caulk	↑ Cl, benzene ↓ F	1/really feasible

Maintenance staff: they could prevent bad IAQ with regular inspections.

	Action	Improvement	Level of feasibility
MAINTAINANCE STAFF	Periodic checking/inspection of the school building	A quick solution, removing moulds and moisture odours	1/really feasible
	Installation of air dehumidifier in basement	↓ relative humidity and preventing the appearance of moulds	2/feasible
	Installation of doormats on the school entrance	↓ amount of outdoor pollutants	1/really feasible

	Natural ventilation in the morning	↑ **fresh air supply and control of pollutants that accumulate in the room at night**	**1/really feasible**
	Pests control	Knowledge of lures, marked places for placing lures, education of pupils in school about the danger of handling lures	**1/really feasible**
	Adequate temperature (20 - 22 °C) and relative humidity (30-50%) in the room	↓ **the appearance of mould and moisture - the installation of measuring devices (involving kids in measurement procedures)**	**1/really feasible**
	Regular control/inspection of filters in mechanical ventilation systems	↓ **particulate matters**	**1/really feasible**

Cleaning staff: they have their rules, all cleaning materials are set; when they clean the classroom, they open the window; they need to attend the trainings about cleaning materials, elements.

	Action	Improvement	Level of feasibility
CLEANING STAFF	Regular removal of waste from the classrooms	↓ **unpleasant odour and appearance of pests**	**1/really feasible**
	Inspection of all technical data of all chemicals (appropriate concentration, use of materials)	↓ **VOC, Cl2, NH3**	**1/really feasible**
	Frequency of cleaning	↓**Na, Cl, NO3, benzene**	**1/really feasible**
	Education about the importance of effective cleaning	Improvement of cleaning process	**1/really feasible**
	No fragrances in the sanitary facilities	↓ **phthalates, VOC**	**1/really feasible**
	Use of safe cleaning products	↓ **ammonia, chlorine, VOC**	**1/really feasible**

Designers: they have a big influence in the planning stage when they can educate investors and future users about the importance of indoor air quality.

	Action	Improvement	Level of feasibility
PROFESSIONALS	Good construction management (time plans etc.)		**2/ feasible**
	Insulation of external wall and pipes		**2/ feasible**
	Use of wood Use of plastic building materials	↓ **PM, K, toluene** ↑ Mg, VOC. NO3. K , Mg	**2/ feasible**
	Use of safe colours, interior furnishing	↓ **VOC**	**1/really feasible**

4.3. Public

Parents: they can donate some equipment or furniture; they are the bond between pupils and teachers; they can raise awareness on indoor air quality among their pupils.

Community: In general, the community is bigger and more involved in the school in smaller towns.

	what	improvement	Level of feasibility
PARENTS	Surveillance of health status of children (asthma, severe breathing, problems with eyes)		1/really feasible
	health status of children survey (questionnaires)		
	in case of health problem identification informing the employees of the school		1/really feasible

5. Conclusion

To conclude, we propose following feasibility plan, from more to less feasible actions:

1. Awareness raising and capacity building trainings.
2. Protocol for opening the windows (Opening the windows after cleaning; Do not open the windows (ventilation) during the hours when traffic is increased (heavy) etc.).
3. Remove decorations in classrooms.
4. Reduce use of paints, varnishes, adhesives, artificial floor coverings for art class.
5. Use of natural cleaners. New protocols for cleaning.
6. Regular monitoring of IAQ.
7. Regular control/inspections of maintenance.
8. Add mechanical ventilation.
9. Move parking lot away from school, more greenery around school (trees – also for shading).
10. Physical barriers between kitchen and classrooms. Other physical barriers.
11. Comprehensive renovation of interior design: flooring, furniture, etc.
12. Change of legislations.

School	What do we want to improve	Improvements			Who can do it?		*Level of feasibility*
		Technical improvements	Process improvements	Other (law, etc.)	School personnel	Outdoor expert	
01	Lower the concentrations of Benzene Formaldehyde $PM_{2,5}$ CO_2		Reducing use of paints, varnishes, adhesives, artificial floor coverings (art decoration) (formaldehyde).		Teachers, all employees, Head (leadership) of school		**1/really feasible**
		Dislocation of parking lot	Dislocation of parking lot	Dislocation of parking lot		Experts	**2/ feasible**
		Balanced ventilation and positive pressure - mechanical ventilation (PM, benzene, CO_2)					**3/ hardly feasible**
			Use of natural cleaners (formaldehyde) Opening the windows after cleaning (formaldehyde)		Cleaners, head (leadership) of school		**1/really feasible**
			More frequent ventilation (CO2, formaldehyde)	Concentrations of CO_2 based on law	Teachers (All employees of the school)		**1/really feasible**
			Do not open the windows (ventilation) during the hours when traffic is increased (heavy) (PM, benzene)		Teachers (All employees of the school)		**1/really feasible**