

2018 Carbon Neutral Action Report



Kelly Road Secondary, May 2019



Learning that Enriches the Life
of Each Student

School District No. 57 (Prince George)
PROVINCE OF BRITISH COLUMBIA



www.sd57.bc.ca

Contents

Contents	2
Executive Summary	3
Emissions and Offsets Summary Table / Executive Sign-Off	4
Greenhouse Gas Emissions	5
Emissions Reductions Programs	6-8
Conclusion	9

2018 Carbon Neutral Action Report

School District No. 57 (Prince George)

This Carbon Neutral Action Report for the period January 1st to December 31st 2018 summarizes our emissions profile, the amount of offsets purchased to reach net zero emissions and the actions we have taken in 2018 to reduce our greenhouse gas emissions.

By June 30, 2019, School District No. 57 (Prince George) will again declare itself to be carbon neutral and this Carbon Neutral Action Report will be posted to our website at www.sd57.bc.ca.

Executive Summary

School District No. 57 (Prince George) has been carbon neutral since 2010.

In 2018 we have continued our efforts to reduce our carbon footprint by;

- upgrading inefficient, atmospheric type gas fired boiler systems with high efficient condensing units
- optimizing the use of condensing boilers by installing new low temperature fan coils and panels
- exchanging lighting systems across the district with LED technology
- optimizing the building automations systems to improve operation and reduce energy use

By reducing our gas and electricity consumption we have reduced our carbon footprint. We will return these savings for use on more sustainability projects, which will result in further reductions to our carbon emissions and cost savings to the district.

Our cover page shows the Board of Education and Ministry of Education's commitment to the environment in our new Kelly Road Secondary construction project. Building to LEED Gold standards and showcasing geo-thermal and LED lighting equipment throughout the facility proves that the technology does and can work. When completed it is estimated to have a 95 ekWh/m² energy footprint, it will be exceedingly efficient.

For the year 2018, our District's total emissions were 5229 tCO₂e.

I am pleased to present the following report outlining our efforts forward, to become carbon neutral.



Barry Bepple
Energy & Sustainable
Conservation Coordinator

Emissions and Offsets Summary Table:

School District No. 57 (Prince George) GHG Emissions and Offsets for 2018 (TCO2E)	
GHG Emissions created in Calendar Year 2018	
Total Emissions (TCO2E)	5241
Total Offsets (TCO2E)	5229
Adjustments to GHG Emissions Reported in Previous Years	
Total Emissions (TCO2E)	0
Total Offsets (TCO2E)	0
Total Emissions for Offset for the 2017 Reporting Year	
Total Offsets (TCO2E)	5229

Retirement of Offsets:

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, School District No. 57 (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2018 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment ensuring that these offsets are retired on the Organization's behalf, the Organization will pay the associated invoice to be issued by the Ministry in an amount equal to \$25 per tonne of offsets retired on its behalf plus GST.

Executive sign-off:

 _____ 

Signature Date

 _____ 

Name (Print) Title

2018 Greenhouse Gas Emissions

For the 2018 calendar year, School District No. 57's greenhouse gas emissions (GHG) offsets were 5,229 tonnes of CO₂e.

The following summarizes the greenhouse gas emissions by source:

Out of Scope Emissions

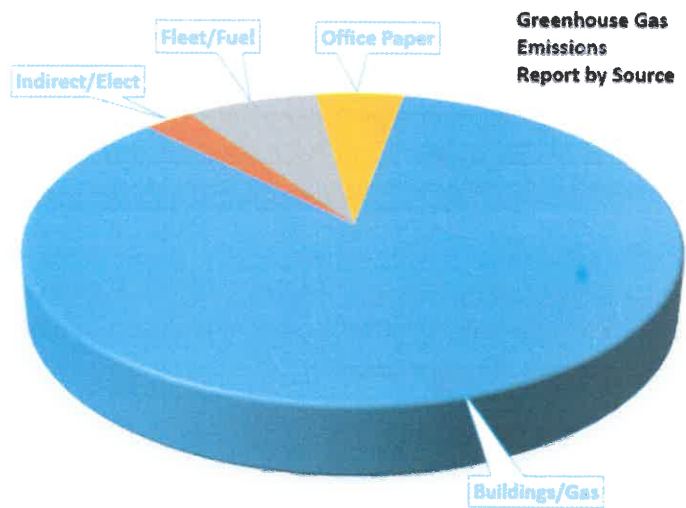
Out-of-Scope Emissions include refrigerants: R-22 (HCFC), R-401a (HCFC), MP-39 (HCFC). Fugitive emissions are estimated to be less than one percent of the District's emissions based on the refrigerant recharge amounts of R-134a and R-404a (HFCs) in the year 2018. Thus, these emissions are deemed to be out of scope and have not been included in the total District's greenhouse gas emissions profile.



Emissions Sources	2016	2017	2018	2018 vs 2017
Buildings	4322	4698	4445	-5.4%
Indirect	143	147	145	-1.4%
Fleet	379	412	392	-4.9%
Office Paper	240	251	259	3.2%
Exemption	-12	-13	-12	
Adjustments	0	0	0	
Total Emissions	5072	5520	5229	-5.3%
HDD	4678	5200	5192	-0.2%

Offsets Applied to Become Carbon Neutral in 2018

The total emissions offset applied to become carbon neutral is 5,229 tCO₂e which includes an offset exemption of 12 tCO₂e for Biomass emissions. The net offsets purchased costs the District \$137,261.25 including GST.



Prince George Heating Degree Days



Annual Heating Degree Days for Prince George—data provided by princegeorgeweatherstats.ca

Heating degree days (HDD) indicate how much energy is required to provide heating compared to another year. Utilizing this information we can normalize weather to find out if our emission reduction projects are working. The data indicates we used 5.3% less energy in 2018 than 2017, while our HDD are virtually the same at 0.2% less. Our largest emission source is Natural Gas and Propane Gas, used for heating, which is a reason we emit as much as we do.

Emissions Reduction Programs

2018 emission reduction projects involved the continuation of replacing equipment that was end-of-life, had a high cost to operate, and contributed to our overall greenhouse gas emissions. Much of the work involves removal of hazardous materials, old equipment, and bringing new building management controls and operation online for the new equipment.

Since our largest emissions source is Fossil Fuel heating equipment, our efforts are targeted towards making this equipment the most efficient possible. Utilizing the most modern, available, Building Management Systems (BMS) Direct Digital Controls (DDC), coupled with condensing, or high efficient boilers and furnaces, we aim to reduce our carbon footprint as much as possible. All equipment is able to be controlled remotely through our Wide Area Network (WAN) and will utilize a new style of graphical interface so that the entire BMS operation is subject to scrutiny at a glance, anywhere in the world. Further reporting features enable us to capture and display information over a time period. This enables us to find problems, correct them, and return the equipment back to full operation more efficiently than was previously possible.

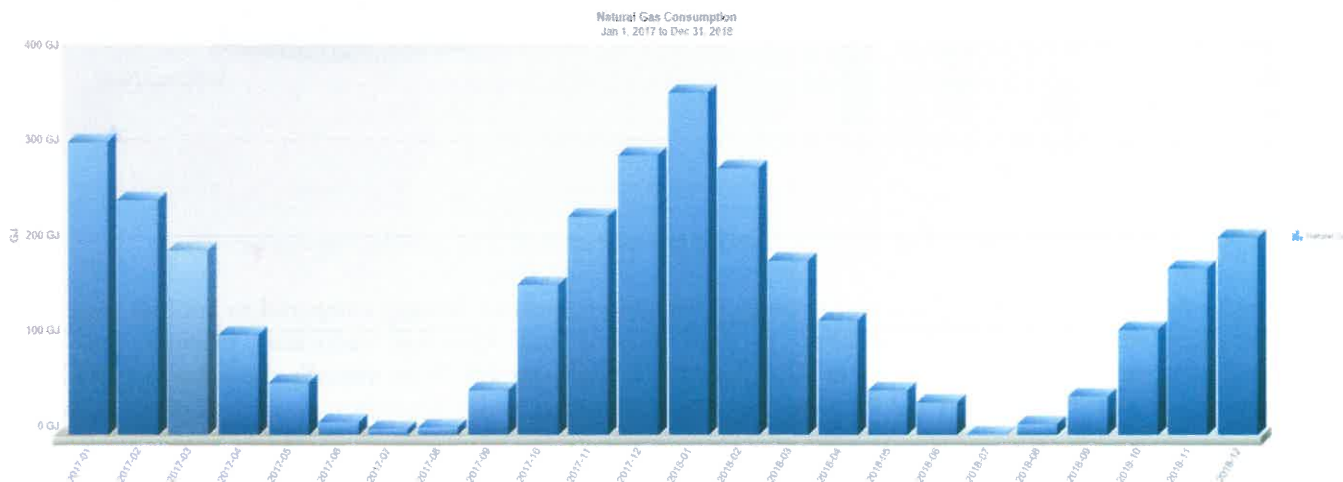
New benchmarking standards compare each building through online data collection software called AssetPlanner. By comparing the consumption data, carbon footprint and trends of the building operation over a long period of time, we can find out if the facility is performing as expected. Data from other school districts, across Canada, is analyzed for further use and comparison through the Energy Star Portfolio Manager software.

Heating Ventilation Air Conditioning

Heritage Elementary

Continuing on the success of past projects, we replaced the natural gas fired atmospheric boilers at Heritage Elementary with new condensing boilers and DDC systems in the summer of 2018. Reducing the amount of natural gas we burn reduces the amount of emissions at the same time, while giving us savings in our utilities budget. This project was assisted in funding by the Fortis BC Energy Inc. Efficient Boiler Program. Efficiencies of up to 30% are expected over the previous boilers.

Further improvements by refining the DDC Controls Systems and adding high-efficient pumping systems resulted in significant, measurable savings as shown in the graph below.



Terminal Units/Fan Coils

If the facility has a single weak link in the heating system, driving the temperatures to operate within its parameters, rather than those of the heat generating units, then you will not have the best and most efficient heating system you paid for. For most of our facilities it means phasing work until you have all the pieces working harmoniously to squeeze the most energy out of the source you can.

At Prince George Senior Secondary the hallways and storage rooms were still using existing equipment that were operating at higher temperatures. These have all been replaced with low temperature units, allowing us to operate the facility at a lower temperature in the shoulder seasons, resulting in greater efficiency.



Lighting Projects

LED ceiling lighting was replaced at Prince George Secondary School in the Learning Commons and computer lab during a recent asbestos management project. We took advantage of one project and did another, sharing the costs, which resulted in both lower electricity consumption and lower ongoing maintenance costs.

LED Gymnasium Lighting replacement was completed at Heather Park Elementary to enhance the function of the lighting system, reduce energy consumption and reduce ongoing maintenance costs.

Direct Digital Controls

Building Management System controls were installed in the 1990's to control our temperature, boilers, furnaces and heating / ventilation equipment. These controls were subject to failures due to the age of the capacitors and other electronic components. The software was outdated and we couldn't take advantage of new strategies that we can now. Therefore we started on a campaign to replace all of these systems with the latest designs. We coupled this with new data collection and reporting features available with the new software and have been able to replace the following systems during 2018;

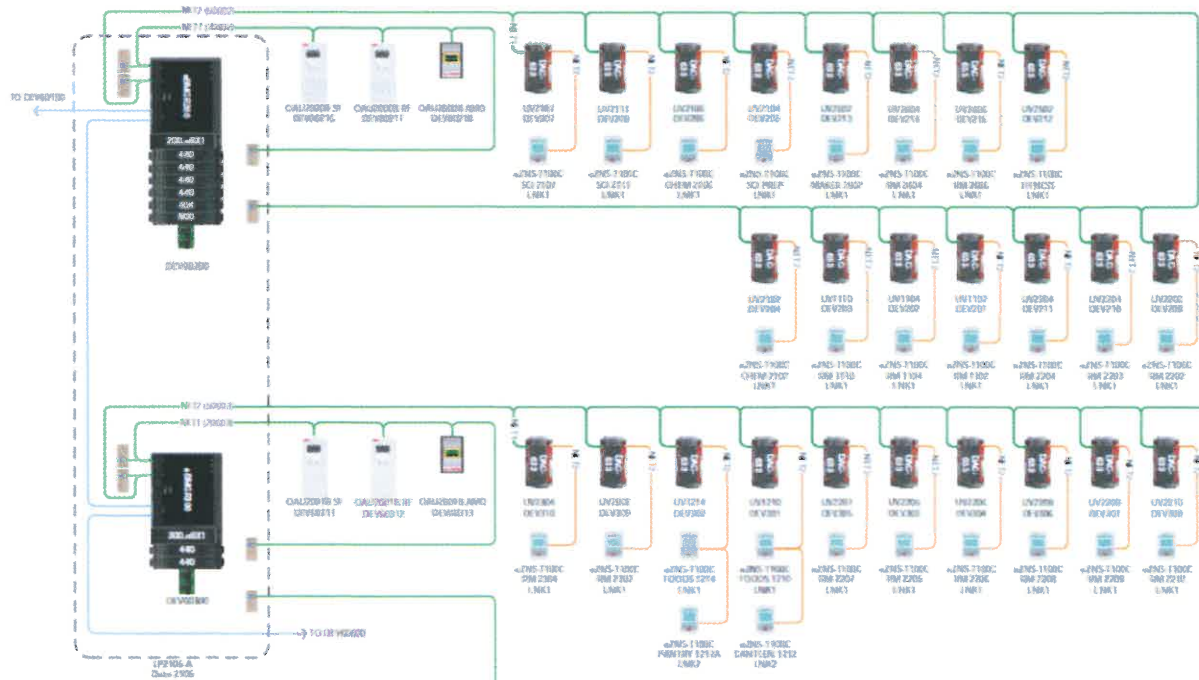
Pinewood Elementary

Vanway Elementary



Our new Kelly Road Secondary will have the latest hardware installed in the school, to control the various components of the HVAC system. These systems are complex and require detailed instructions on how to operate the facility to provide the most efficient use of the energy used, reducing GHG emissions and the costs associated, while providing an environment that supports the learning for students.

Kelly Road Secondary Network Architecture:



In Conclusion

In 2018 we continued to reduce our carbon footprint by installing more efficient heating and lighting systems and then controlling the operation and schedule of them. An additional boiler project is planned for 2019, along with additional low temperature unit ventilator installations, DDC controls upgrades and improved control strategies. This should continue to substantially reduce our use of fossil fuels. Further savings are expected on electricity consumption with additional installations of LED lighting to upgrade our gymnasiums, learning commons and classrooms.

We continue to strive for the most efficient operation of the facilities and will be engaging our partners in education - the Principals, Staff and Students - to accomplish our goals.

We will look forward to another exciting year as we look back at the accomplishments in 2018.

Sincerely,

Barry Bepple
Energy and Sustainable Conservation Coordinator
School District No. 57, Prince George

* MEASURE * REDUCE * OFFSET * REPORT * PLAN *



Part 1: CNAR Survey

1. General Information

Name: Barry Bepple

Contact Email: bbepple@sd57.bc.ca

Organization Name: School District No. 57

Sector: School District

Role - Please select your role(s) below.

If more than one individual completed the survey, multiple categories may be selected:

Energy Manager: No

Sustainability Coordinator: Yes

Administrative Assistant: No

Facilities/Operations Manager/Coordinator: No

CEO/President/Exec Director: No

Treasurer/Accounting: No

Superintendent: No

A. Stationary Sources (e.g. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

1. Actions taken by your organization in 2018 to support emissions reductions from buildings.

a) Do you have a strategy to reduce emissions from stationary sources?

Yes

If yes above, what are the main goals?: Replace aging atmospheric, non condensing boiler systems with new condensing high efficient boilers and terminal units.

b) Whether you have a strategy or not (1.a), briefly describe your organization's plans to continue reducing emissions from stationary sources:

I. Over the medium-term term (1-5 years)

Replace atmospheric type boilers with condensing boiler systems. Improve the DDC control systems to utilize demand ventilation strategies across the district. Add additional CO2 sensors and dampers to suit.

Replace the terminal units that rely on hydronic heating systems with those that are 'low temperature' rated, so that the efficiencies of the condensing boiler systems can be realized.

II. Over the long term (6-10 years)

Improve the building envelope systems by replacing glazing units, wall systems and providing more caulking to reduce air infiltration into the building.

c) Please describe your strategy's goals (if any) related to [energy audits](#).

Energy audits were conducted in mid 2002 and are still used to formulate strategies today in regards to replacing aging equipment and reducing our GHG emissions. Further studies are done on a local scale in determining the feasibility of a project. Ongoing maintenance costs and conservation strategies are continually used for life cycle costing analysis.

Further studies are being contemplated in our long term strategy to target those buildings with a high energy footprint. Monthly data is inputted in our computerized maintenance management system and analyzed to focus our funding on those facilities that are higher than others.

I. What % on average of your building portfolio has an energy audit completed each year (if any)? : 0

d) Please describe your strategy's goals (if any) related to building retrofits.

If a building is being renovated for one reason or another, such as during an asbestos abatement program, we determine if there is a building system that is affected that we can improve while doing work on the system. For instance, if we remove an asbestos pipe wrapping or elbow, we add additional fiberglass pipe insulation to the same pipe and improve the insulation characteristics that were there before. If we remove an asbestos textured ceiling coating that contains recessed lighting fixtures, or has a surface wrap lighting fixture in the same area, then we review the lighting for the whole area and install new LED lighting systems.

I. What % on average of your building portfolio is retrofitted each year in the following categories (if any) - click [here](#) for further information:

Minor retrofits (e.g., low cost, easy to implement measures including caulking, lighting, adding roof insulation, etc.) (%): 7.5

Major retrofits (e.g., replacing windows and doors, equipment replacement such as boilers, etc.) (%): 5

Deep retrofits (e.g., replacing roof, replacing the heating, ventilation and air-conditioning system with a renewable technology like a ground-source heat pump, etc.) (%): 1

e) Please describe your strategy's [re/retro-commissioning](#) goals (if any)?

All building control systems go through a regular continuous optimization program whereby the valves, actuators, panels and sensors are calibrated and commissioned on a preventative maintenance schedule. This will ensure the building management systems control the HVAC equipment properly and optimize any scheduling and control strategies.

Currently we have recommissioned 30% of our buildings when the building management systems have been replaced.

Boiler systems are re-calibrated for efficiencies as we test flue gasses adjusting pressure regulators and doing factory recommended modifications/improvements as necessary. Boilers are serviced as per their recommended frequencies and as required by Technical Safety BC.

I. What % on average of your building portfolio do you recommission each year?: 5

f) Do you keep records of Refrigerant gases category and refilling volumes?

No

g) How many newly constructed buildings received at least LEED Gold certification in 2018 : 0

I. How many newly constructed buildings did not receive LEED Gold certification?: 0

II. Please explain why LEED Gold certification was not obtained.

Certification process is too costly to implement. We also only have one new building currently under construction, so this is not something that happens all the time.

h) Other actions? Please describe briefly.

Electricity use continues to rise as we implement more technology in classrooms and infrastructure that relies on it. Therefore, we are utilizing more efficient pumping systems with ECM type motor systems and control them with frequency drives to reduce the energy it takes to operate them as well. We are also installing and converting hydronic systems to operate as a two pipe system with control over pumping pressure linked to the variable speed drive unit on the pump, thereby reducing pump energy.

B. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:**3. Actions taken by your organization in 2018 to support emissions reductions from mobile sources.****a) Do you have a strategy to reduce emissions from mobile sources?**

Yes

I. If yes, what are its goals?

Fleet vehicles are being reduced in size to become more efficient in operation. We are also contemplating the use of GPS tracking system technology to reduce idling time and travel time.

Bus contractor is also utilizing new transportation software to optimize travel between stops.

b) Whether you have a strategy or not (3.a), briefly describe your organization's plans to continue reducing emissions from mobile sources:**I. Over the medium-term term (1-5 years)**

Continue to downsize our vehicle fleet.

Optimize our operating parameters with the use of GPS tracking software and hardware.

II. Over the long term (6-10 years)

Continue to lease the most efficient vehicle that meets our operational needs.

c) How many fleet vehicles did you purchase from the following categories:

Electric Vehicle – EV - (e.g., Nissan Leaf, Chevy Bolt): 0

"Plug In" Electric Vehicle – PHEV (e.g., plug-in Prius, Chevy Volt): 0

Hybrid vehicle – HEV – non "Plug In"- (e.g., Toyota Highlander Hybrid): 0

Hydrogen fuel cell vehicle : 0

Natural gas/propane: 0

Gas/diesel vehicle: 0

I. If you purchased new gas/diesel vehicles, can you briefly explain why vehicles from the other categories were not chosen?

We lease all our vehicles, however, only gas/diesel vehicles were included in the decision to lease. We have one of the largest geographical school districts in the province. Alternative fuel vehicles can't be used where there are no re-fueling stations.

The fact we lease all vehicles is reflected in the questions in number 4 below. We don't 'purchase' a vehicle a year, but have a 5 year lease program where they are all replaced.

d) How many existing EV charging stations does your organization have in each category:

level 2: 0

level 3: 0

How many level 2 stations (if any) are specifically for your fleet vehicles: 0

How many level 3 stations (if any) are specifically for your fleet vehicles: 0

e) How many EV charging station(s) did you install in 2018 in each category:

level 2: 0

level 3: 0

How many level 2 stations (if any) were installed specifically for your fleet vehicles: 0

How many level 3 stations (if any) were installed specifically for your fleet vehicles: 0

f) Other actions, please describe briefly (e.g. charging station feasibility studies, electrical panel upgrades, etc.)

None taken.

4. Please indicate the number of the vehicles in the following vehicle classes that are in your current fleet (including any purchased in 2018):

Definitions:

- Light duty vehicles (LDVs) are designated primarily for transport of passengers <13 and GVWR<3900kg
- Light duty trucks (LDTs) are designated primarily for transport of light-weight cargo or that are equipped with special features such as four-wheel drive for off-road operation (include SUVs, vans, trucks with a GVWR<3,900kg)
- Heavy duty vehicles (HDV) includes vehicles with a GVWR>3,900 kg (e.g. ¾ tonne pick-up truck, transport trucks)

a) Light duty vehicles (LDVs)

Electric Vehicles – EV - (e.g., Nissan Leaf, Chevy Bolt): 0

"Plug In" Electric Vehicle – PHEV -- (e.g., plug-in Prius, Chevy Volt) : 0

Hybrid vehicles – HEV – (e.g., non "Plug In"- older Toyota Prius, Toyota Camry hybrid): 0

Hydrogen fuel cell vehicles: 0

Natural gas/propane: 0

Gas/diesel: 13

b) Light duty trucks (LDTs)

Electric Vehicles – EV : 0

"Plug In" Electric Vehicle – PHEV: 0

Hybrid vehicles – HEV – (e.g., non "Plug In"- older Ford Escape Hybrid, older Chevrolet Silverado pickup hybrid etc): 0

Hydrogen fuel cell vehicles: 0

Natural Gas/propane: 0

Gas/diesel: 36

c) Heavy duty vehicles (HDV)

Electric Vehicles – EV : 0

"Plug In" Electric Vehicle – PHEV : 0

Hybrid vehicles – HEV – (e.g., non “Plug In”): 0

Hydrogen fuel cell vehicles: 0

Natural Gas/propane: 0

Gas/diesel: 0

5. Please indicate the number of the vehicles you plan to replace in your fleet:

How much do you budget per LDV?: 0

How many LDVs do you plan to procure annually over the next 5 years?: 0

How much do you budget per LDT?: 0

How many LDTs do you plan to replace annually over the next 5 years?: 0

How much do you plan to spend per HDV?: 0

How many HDVs do you plan to replace annually over the next 5 years?: 0

C. Office Paper: Indicate which actions your PSO took in 2018:

6. Actions taken by your organization in 2018 to support emissions reductions from paper supplies.

a) Do you have an Office Paper strategy?

No

b) Whether you have a strategy or not (6.a), briefly describe your organization’s plans to continue reducing emissions from paper use:

I. Over the medium-term (1-5 years)

We are working with our technology teams to try and incorporate more digital media in the school system, thereby reducing the need to print all the instructional materials we do.

II. Over the long term (6-10 years)

Bring your own Device - or BYOD - is a term that we are trying to implement, but unless we can ensure that all students have access to a device they can bring or get in the school system, we can't implement a fully digital society. However, we will continue to work towards that goal, and perhaps in the later school years, get there.

c) Have an awareness campaign focused on reducing office paper use

No

d) Purchased alternate source paper (bamboo, hemp, wheat, etc.)

No

e) Other actions, please specify.

None taken.