CITIZEN'S COOLKIT
ON CLIMATE CHANGE & URBAN FORESTRY

A VISUAL "DO-IT-YOURSELF"
TOOLKIT FOR ENGAGING NEIGHBOURS
ON YOUR BLOCK

FULL VERSION

(January 2019)

facebook.com/CoolkitVancouver/

citizenscoolkit

UBC CALP

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WHY WE NEED THE COOLKIT:

Our communities are changing. How can we understand and manage that change? This Coolkit is designed to help you:

- Learn about your block and how climate change affects it
- Meet your neighbours and talk to them about climate change
- Improve quality of life on your block
- Climate-proof your home and neighbourhood
- Cut your carbon footprint together with your neighbours
- Have fun along the way!

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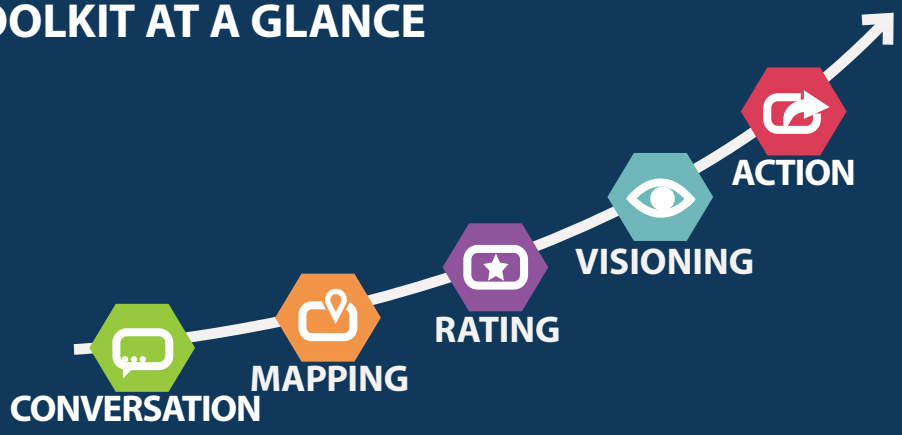
WHO IS THIS FOR?

- **Community members wanting to have meaningful interaction with their neighbours in caring for the places where they live**
- **High school students and youth groups wanting to get involved**
- **Practitioners, teachers, librarians, and community leaders running neighbourhood engagement programs**

COOLKIT AT A GLANCE



A do-it-yourself process on climate change that gradually ramps up community engagement in several steps

HOW TO USE

Scope

This booklet aims to help you climate-proof your neighbourhood while improving the urban forests that surround your home. This booklet is full of fun tools and hands-on activities that are organized into 5 steps: chatting, mapping, rating, visioning and acting. These activities aim to help you see your neighbourhood in a new way, make climate change visible, and re-imagine your future. Pick the activities that you find the most interesting - or do them all if you wish!

Icons

Find the icons at the top right corner of each activity guide.

These icons suggest who the actvities are best suited for. Individual activities are suited for one person, while group activities can be conducted with your family or neighbours. Children may find activities for families fun!

Where can I use the Coolkit?

Most of the activities here are simple, easy, and fun to do with family, friends and neighbours!

Consider introducing the Coolkit at a block party, when spending time with neighbors or friends, or on Facebook. Don't forget to bring a copy of the Coolkit along with some pens, markers, and other required materials.

Block Party

A good place to start the conversation and hold introductory games or exercises with your neighbours.

Informal Gathering

Over coffee, wine, or supper at someone's home or a cozy meeting place nearby to discuss further activities.

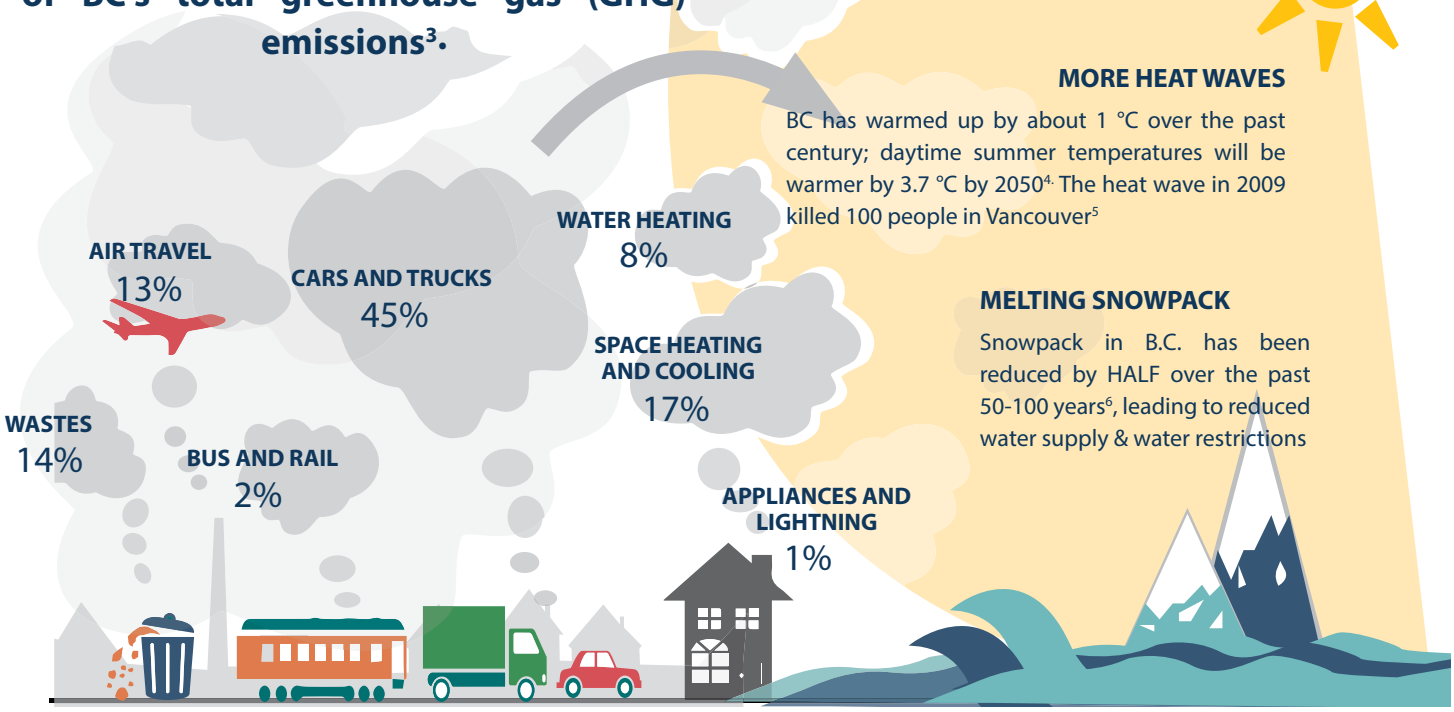
If it is hard to meet in person, don't give up! Consider online options such as creating and using a Facebook group or meeting regularly on Skype. You can also follow us on Facebook (**facebbok.com/CoolkitVancouver/**) and Instergram (**citizenscoolkit**) to keep an eye on the upcoming events and share your ideas under the posts.

WHY BOTHER ABOUT CLIMATE CHANGE?

CLIMATE CHANGE IS HAPPENING

The main **CAUSE** of climate change is carbon emissions produced from human activities (e.g. driving cars, building houses), which adds to the greenhouse effect, trapping heat and further warming the Earth's surface. Canada has committed to keep global warming to below 2 °C (relative to pre-industrial levels)[1].

Households directly account for 40% of BC's total greenhouse gas (GHG) emissions[3].



WHAT WILL HAPPEN IF GLOBAL TEMPERATURES RISE MORE THAN 2 °C

MORE HEAT WAVES

BC has warmed up by about 1 °C over the past century; daytime summer temperatures will be warmer by 3.7 °C by 2050[4]. The heat wave in 2009 killed 100 people in Vancouver[5]

MELTING SNOWPACK

Snowpack in B.C. has been reduced by HALF over the past 50-100 years[6], leading to reduced water supply & water restrictions

MORE FLOODS & DROUGHTS

Hotter, drier summers, & more intense rainstorms will cause more severe and frequent floods and droughts[6].

RISING SEA LEVEL

Estimated increase of sea level in coastal BC by 2100 is 1m or more[7]. We will lose homes, communities, and ecosystems (an estimated total damage $30 billion by 2050)[7]

British Columbia has committed to reduce its carbon emissions to[8]:

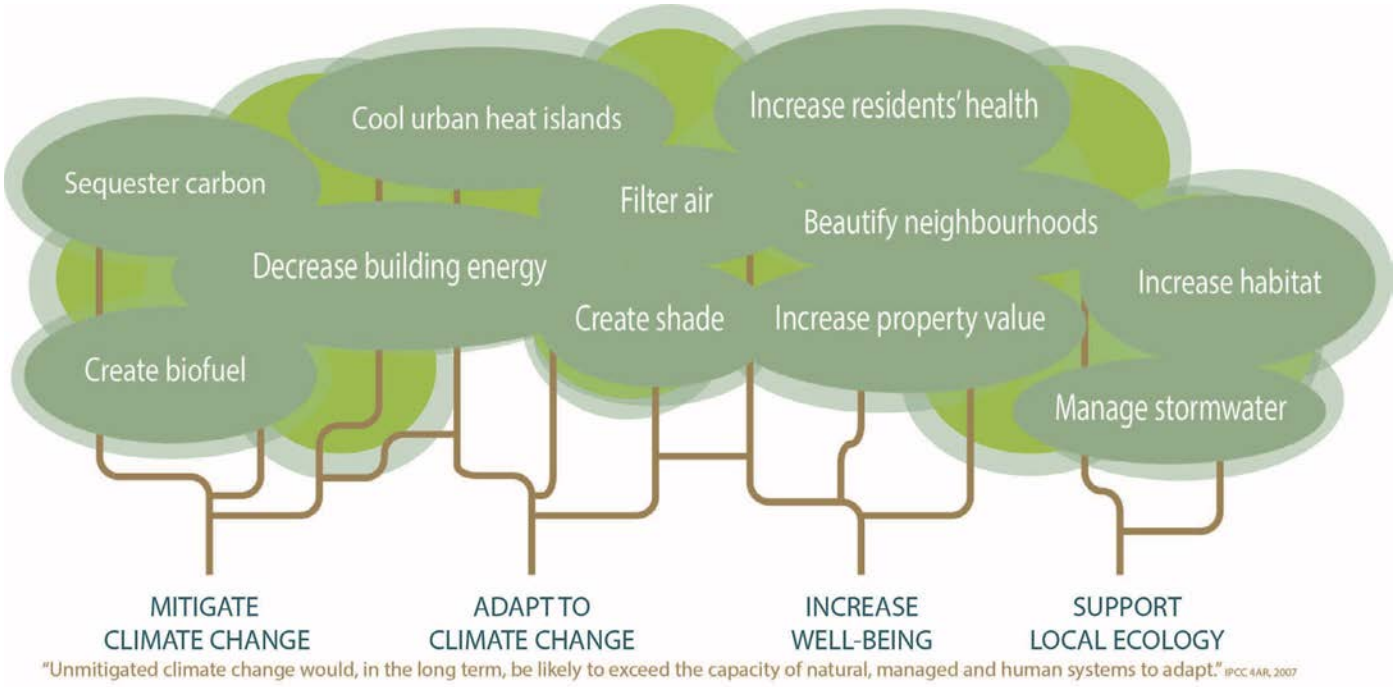
- **40% below** 2007 levels by 2030
- **80% below** 2007 levels by 2050

HOW CAN URBAN FORESTS HELP?

What is an urban forest?

The urban forest includes a variety of vegetation and landscape types such as parks, streetscapes, natural areas, and private yards, which together form a complex system of urban greenery.

A healthy urban forest will be vital in a hotter, unpredictable future to protect human health during heatwaves, reduce our reliance on air conditoning, reduce flooding, absorb carbon, and provide habitat to wildlife. An urban forest also increases property value and happiness. Our gardens can further help us adapt to climate change by growing food (reducing reliance of imported produce).



Infograph by Sara Barron

How large is our urban forest?

Vancouver's urban forest today is made up of:[9]

140,000 street trees

300,000 park trees

Unknown number of private trees

18% of Vancouver is covered by tree canopy, as calculated and mapped by the City:[10]

11% of canopy on streets

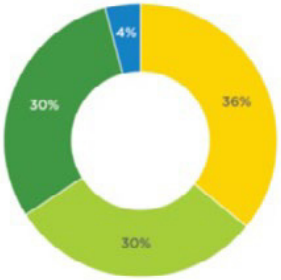
27% of canopy in parks

62% of canopy on private property

BUT, WE ARE LOSING HEALTHY TREES EVERYDAY, MOSTLY ON PRIVATE PROPERTY

Vancouver aims to increase tree canopy from **18% to 22%** by 2055

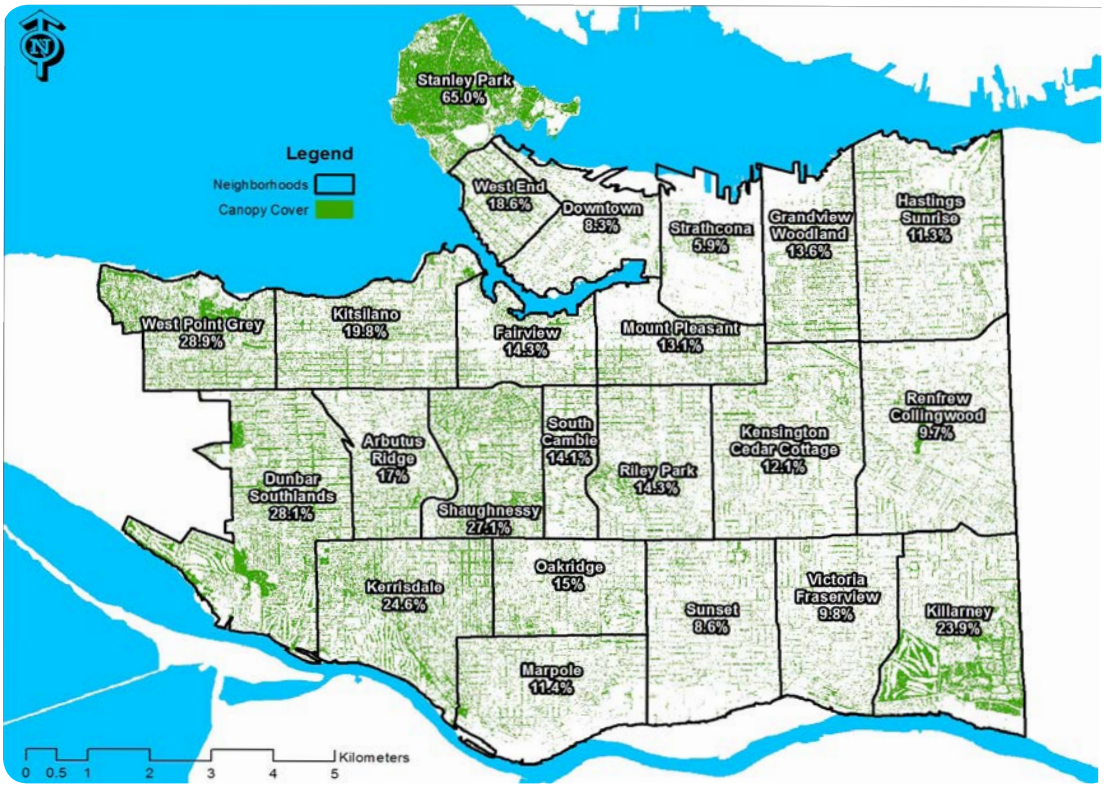
through better management and replanting **150,000** trees by 2020[10].



150,000 NEW TREES
54,000 (36%) TREES ON PRIVATE LAND
45,000 (30%) STREET TREES
45,000 (30%) TREES IN PARKS
6,000 (4%) TREES ON OTHER PUBLIC LAND
by Gurtej Tung

"Over the last two decades, 23,490 healthy, mature trees were removed on private properties (including residential, institutional, commercial and industrial land)"
- City of Vancouver

HOW MUCH CANOPY COVER DOES YOUR NEIGHBOURHOOD HAVE?



Map of tree canopy cover (%) across Vancouver neighbourhoods

WHAT CAN WE DO?

BC's carbon reduction targets and tree planting targets are for all of our benefits; we must do our share to keep to 2°C of warming.

We also need to prepare for the impacts of climate change. We can begin to cut our emissions, for example, by taking better care of trees in our neighbourhood, switching to renewable energy sources, driving less, or switching to hybrids or electric vehicles, and taking better care of our neighbourhood trees. Flip to the next page to begin the journey!

HOW CAN RENEWABLE ENERGY HELP?

What is renewable energy?

Renewable energy is the energy generated from natural processes that is continuously replenished. This includes sunlight, geothermal heat, wind, tides, water, and various forms of biomass, which will not be exhausted and is constantly renewed.

Renewable energy will become one of the most effective tools for us to combat climate change as these sources displace traditional carbon-intensive fossil fuels (the main cause of anthropogenic climate change). Furthermore, the technologies can save us money and increase job opportunities in the long run.

Learn more about Renewable City Strategies at: http://vancouver.ca/green-vancouver.aspx

Lower energy cost

Reduce electricity bills

Support domestic green jobs

Decrease air pollution

Lower GHG emissions

Provide recreation/ educational values

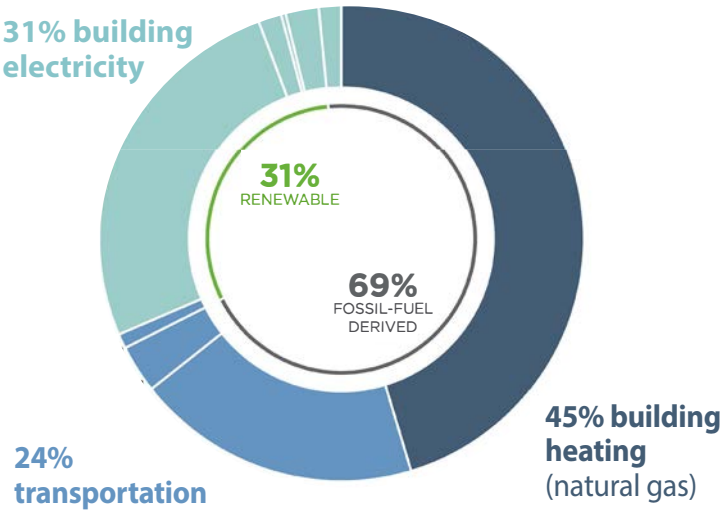
Improve reliability for future generations

Potential economic and environmental impact of renwable energy

UBC's CALP team has developed a tool called **Community Energy Explorer** (CEE), which is a web resource, designed to provide communities and citizens with information and tools for local energy planning and carbon emission mitigation. To learn more about CEE, please visit: http://calp.forestry.ubc.ca/home/community-energy-explorer/

BUT, THE MAJORITY OF ENERGY WE USE TODAY IS STILL UNSUSTAINABLE

In 2014, 69% of energy used in Vancouver is fossil-fuel derived:



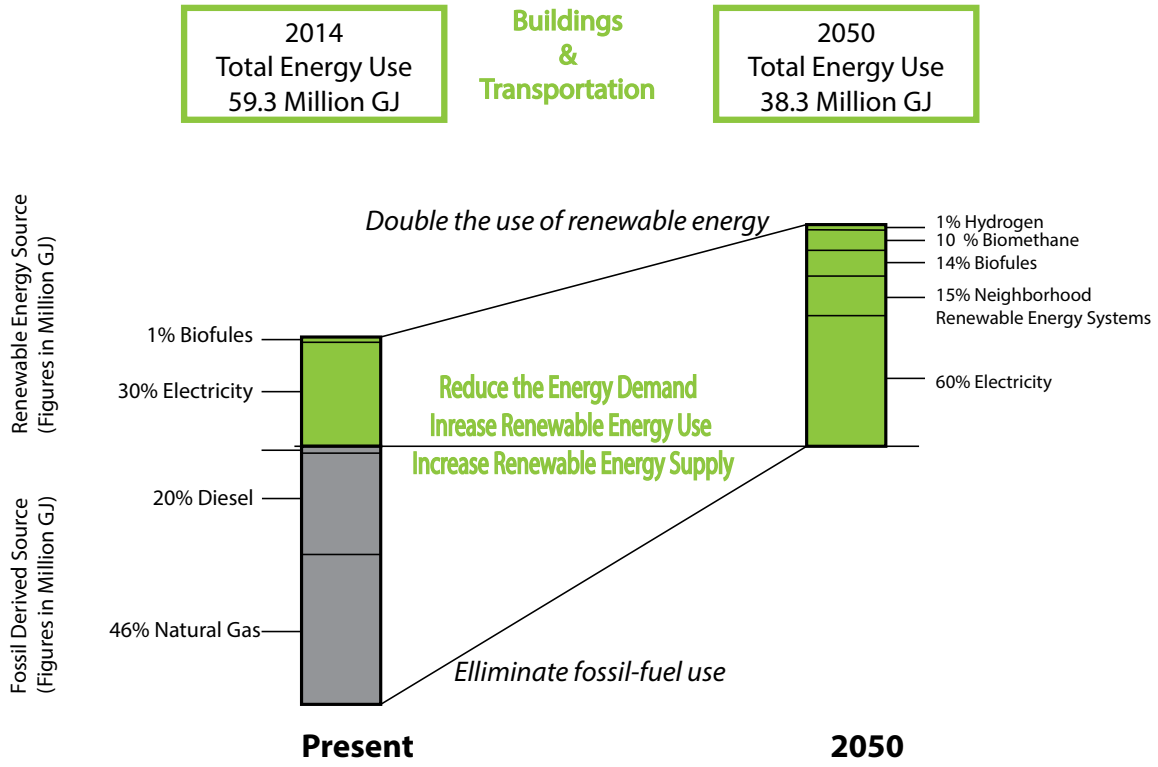
By 2050, Vancouver aims to:

- Derive **100%** of the energy used in Vancouver from renewable sources before 2050[48].

- Reduce greenhouse gas emissions by at least **80%** below 2007 levels before 2050[48].

by Renewable City Stategy[@]

How will Vancouver get to 100% renewable energy by 2050?



Why do we need renewable energy? Renewable energy sources diversify and localize energy supplies, emit little or no carbon into the atmosphere, and lower the costs of buildingmaintenance. They are also less detrimental to human health than fossil fuels[49].

Why does Vancouver aim to achieve this goal? Metro Vancouver, has massive capacity (rich in natural resources such as wind power, hydrology and biomass) to provide its own renewable energy within the borders, but this potential is currently barely utilized. As cities continue to grow, we must look at local sources of heat, cooling, and electricity that are sustainable in

STEP 1: START A CONVERSATION

Now that you know how important climate change and urban forests are to the future of our city, it's time to share that knowledge with your family, friends, and neighbours. Here we provide some activities to help you start a conversation with others on climate change and urban forests.

1. **COLLECTING STORIES** about changes that have happened on your block over time
2. **PHOTO GALLERY** to discuss changes on your block
3. **PHOTO QUIZ** to look for signs of climate change on your block
4. **NON-TRIVIA QUIZ** to test your knowledge on urban forests and climate change

START A CONVERSATION
STORY COLLECTION

Why do this? To recognize how much your neighbourhood has changed over the past decades, through changes in urban development, lifestyles, tree growth, and climate change impacts.

Collect stories of the changes that have happened on your block:

More greenery or less greenery? Smaller houses or larger houses? Changes in weather patterns? More cars or less cars? How do you feel about this?

You will need:

- 1-2 hours
- Grab a pen and a notebook
- Spend a pleasant afternoon with your relatives or your neighbour(s) who have lived in the area for a while
- Record the stories you hear and what you see
- Share your collections online.


Photo by Joshua Ness on Unsplash

STORY #1 (example):

STORY #2 (write down your own story here) :

START A CONVERSATION
PHOTO GALLERY

Why do this? To recognize things you value around your block and how they relate to climate change.

PHOTO GALLERY HOMEWORK ASSIGNMENT

Each person/family takes a picture of:

1. Their favourite place or view on the block
2. Their favourite tree on the block
3. Something on the block that they connect to climate change

Option: Collect old photos of the block to compare changes over time

OPTION 1: A photo gallery

1-1.5 hours

Bring prints of photos into a room or public location with a bulletin board. Display your photos for all to see, and have each person describe their own photos.

If easier, keep a scrapbook or 3-ring binder of all photos - portable and easy to store!
What do you notice?

OPTION 2: An online album

1-3 hours, depends on how many photos and how often you update

Several options exist for making free online photo albums, such as Facebook, Flickr, or Instagram.

WHAT TO DO NEXT:

After reviewing the photos, discuss what you learned and decide if you want to compile the photos and findings into an album that can be shared by meeting in person, or via email, Facebook, or Skype.

* This follow up session would be a great time to complete the Photo Quiz on page 14-15!

START A CONVERSATION
PHOTO QUIZ

Why do this? To find signs of climate change in your block.

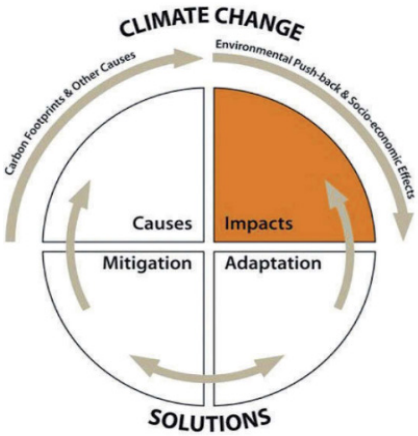
Here we are looking for signs of "CIMA".

Causes: anything that produces high carbon emissions

Impacts: consequences of climate change & vulnerability to future impacts

Mitigation: ways to reduce carbon emissions

Adaptation: ways to deal with the impacts of climate change



Examples of what to look for

Consider potential impacts based on **possible threats** in different seasons, or what activities related to mitigation or adaptation could potentially take place. For instance, as seen in the photo below, mature trees can be a potential **impact** if they are unhealthy and blow down in wind storms, but are more often an **adaptation** against the effects of climate change by reducing the impacts of heat waves and stormwater floods.

Recognizing climate change in the neighborhood: West 13th Avenue near Maple street

Causes
- Automobiles
- Concrete (production)
- Heating - natural gas/wood burning
- Home energy use

Potential impacts
- Increased home cooling costs
- Tree decline/death
- Tree failure - damage to property
- Drought - water restrictions

Mitigation
- Car pool or car-share
- Limit use of automobiles
- Travel by bike or on foot
- Retrofit home for energy efficiency

Adaptation
- Plant trees for shade & insulation
- Grow a vegetable garden
- Plant drought resistant plant varieties

Example: Planter box on W. 14th Ave near Maple

PHOTO QUIZ SHEET

YOUR NAME: _____

You will need:

- 30 minutes
- Pick 3 photos to examine
- For each photo of your block, write down which of the CIMA (page 14) features you identify
- Add a small version of each photo to place next to the description if you like
- Use your photos to quiz each other on signs of climate change on your block

PHOTO #1 _____

_____

_____

SAMPLE PHOTO

1

PHOTO #2 _____

_____

_____

SAMPLE PHOTO

2

PHOTO #3 _____

_____

_____

SAMPLE PHOTO

3

Compare your results with other group members:

- Did anyone see an actual impact of climate change in the photos?
- Did anyone see what is the biggest vulnerability around the block?
- Did anyone see visible adaptation taking place in the photos?
- Would you consider your block a high or low carbon area?

START A CONVERSATION
NON-TRIVIA QUIZ

YOUR NAME: _____

You will need:

- 30 minutes
- Read the Cookit package to answer questions 1-4
- Walk around your block and search for answers online for questions 5 & 6

The questions below are just examples - feel free to come up with your own that match the interests and issues in your own community. Once complete, discuss the answers with the group. Hold a trivia quiz activity at someone's home or a community event, and share answers.

1. What is BC's 2050 carbon emissions reduction target?

_____

2. What produces the most carbon emissions from households in BC?

_____

3. What is the average carbon footprint of residents in BC?

_____

4. How many trees is Vancouver planning to plant from 2010 to 2020?

_____

5. What kind of tree provides the biggest canopy on your street?

_____

6. Are there any trees on your street that are native to your region (coastal BC)?
If yes, what kind?

_____

STEP 2: MAP YOUR BLOCK

Do you know much about the trees on your block? Have you ever tried to inventory important things on your block and consider their links to climate change? Do you live on a high carbon or low carbon block? The activities in this section will help you see your surroundings in a new way, and learn to use some simple mapping techniques.

1. **URBAN FOREST QUEST** allows you to investigate "squirrel habitat" (tree canopy) and other features of your urban forest
2. **CLIMATE CHANGE DETECTIVE QUEST** allows you to investigate "car habitat" and other signs of climate change
3. **MAP DIFFERENT HABITAT TYPES** in your block to see how green or grey it is and where it could be improved
4. **VULNERABILITY MAPPING** allows you to find parts of your block which would be under the greatest threat from climate change

MAP YOUR BLOCK
URBAN FOREST QUEST

30 minutes

DO YOU KNOW...

How much squirrel habitat is on your block?
How many trees there are on your block?
Why trees are important to us and squirrels?

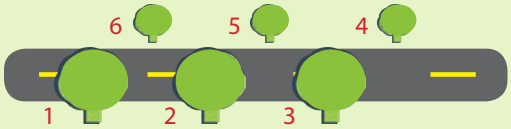
Your name/team name

_____

_____

1) COUNT THE TREES

Street trees are trees alongside the curb in the public right-of-way. Count the number of street trees on your block.



Total # of street trees: _____

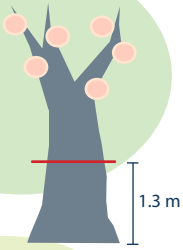
Total # of trees in gardens: _____

2) MEASURE TRUNK SIZE

Measure the circumference (girth) of the biggest and smallest trees. At around 1.3 metres (or 4.5 ft) up from the ground, measure around the tree's stem.

Girth of biggest tree: _____cm

Girth of smallest tree: _____cm



Important because...

Larger trees have bigger canopies and so more benefits. Smaller trees are also important since they will replace existing big trees one day.

3) THE LEAPING SQUIRREL TEST

Check out your block's street tree canopy by using the distance a squirrel leaps. Squirrels live up in the trees and are safer there than on the ground. Assume squirrels can leap about 2 metres (6 ft or a person's height) between branches:

Can a squirrel make it from one end of the block to the other and cross the street at least twice, without coming down to the ground?

Yes / No

If "No", how many gaps (greater than 2 metres) between canopies did you see?

_____

Important because...

A continuous canopy has more shade during the summer for cooling and reduces stormwater flooding.

To read more: http://forestry.ohiodnr.gov/portals/forestry/urbantoolbox/articles/BigTrees_SEOhio.pdf

FINISHED!

MAP YOUR BLOCK
CLIMATE CHANGE DETECTIVE QUEST

30 minutes

DO YOU KNOW...

How many carbon-emitting cars park on your block?
How much local food is grown on your block?
Whether your roof is suitable for solar panels?

Your name/team name

_____

_____

CASE 1: TRANSPORTATION

Difficulty ★

1. How many cars are on your block? **Total**: _____

2. How many cars are electric, hybrid vehicles, or carshares (eg. Modo)?

Total: _____

***% of sustainable cars on your block:**
Simply divide your Q2 answer with Q1!
Ex. If Q1 is 8 and Q2 is 2: 2/8 = 1/4 = 0.25 **Total**: _____

3. How many people are riding bikes in /through your block?

Total: _____

Important because...

Vehicles using gasoline or diesel account for 47% of household emissions in BC.

To read more:
http://www.davidsuzuki.org/issues/climate-change/science/climate-solutions/transportation-solutions/

CASE 2: FOOD

Difficulty ★★

1. How many households have gardens (planted areas with shrubs and/or trees) on your block? (If gardens are out of sight, try asking your neighbours!)

Front yard: _____ Backyard: _____ **Total**: _____

2. How many households are growing food (vegetables, fruit...)?

Total: _____

***% of food gardens on your block:**
Divide your Q2 answer with Q1! **Total**: _____

3. What is the most commonly grown vegetable on your block?

_____

How does local food help climate change?

Carbon emissions come from meat production, use of pesticides and fertilizers, and the transportation of food.

To read more:
http://www.davidsuzuki.org/what-you-can-do/food-and-our-planet/

CASE 3: SOLAR ENERGY

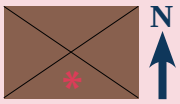
Difficulty ★★★

1. How many buildings have solar panels on their roofs?
Count the number of buildings with solar panels.

_____

2. How many buildings have roofs suitable for solar energy? Count the number of buildings with south-facing roofs large enough for solar panels.

_____



Roof

* This side faces South

You've cracked all the cases!

UBC CALP
calp.forestry.ubc.ca/

MAP YOUR BLOCK
CARBON VISUAL QUEST

30 minutes

DO YOU KNOW...

How much carbon dioxide is emitted in your neiborhood?
How much carbon is absorbed ?
Do you want to know how big your carbon footprint ?

Your name/team name

_____

_____

Q1. CARBON EMISSION

Please go to this website ***https://www.carbon-footprint.com/calculator.aspx*** and check your own carbon footprint!

1) what is the household footprint in one year?

(based on the family electric bills)

2) what is the carbon footprint of your daily transportation within one year?

3) what is the total carbon footprint of your family per year?

Q1+Q2 (add all the transportation modes)

Important because...

The average Canadian annual carbon dioxide emissions per person were 20 metric tons, compared to a world average of four tons.

To read more:
https://www.theguardian.com/environment/datablog/2009/sep/02/carbon-emissions-per-person-capita

Q2. CARBON ABSORPTION

Calculate the amount of carbon dioxide absorbed by the trees around your home/school or along your street. A tree can absorb approximately 48 pounds of carbon per year.

1) how many trees in your property?

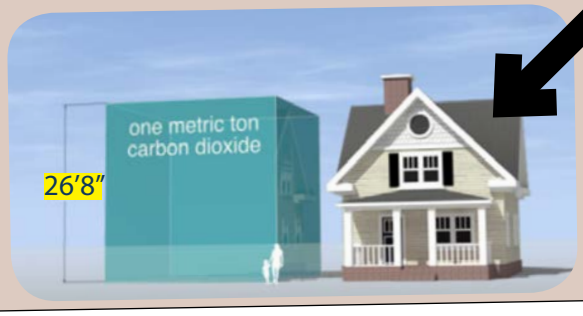
Front yard:____ Back yard:____ Street:____ Total:____

2) How much carbon dioxide can those trees absorb

Learn more about what trees absorb the most carbon dioxide:

https://www.hunker.com/12557632/what-trees-absorb-the-most-carbon-dioxide

Q3. CARBON VISUALIZATION



Draw your own carbon picture here

(You can take extra paper if you need more space)

Important because...

Carbon emissions, air pollution and other environmental 'invisibles' need to be seen. We want our images and films to be used and shared as widely as possible.

To read more:
http://www.carbonvisuals.com/resources/

You have completed your urban forest and climate change detective quests.

Share this completed form with others and see how you did!

Think about your urban forest quest results a bit more...

1. Are there enough trees on the block?
2. How old do you think that big tree is? How much longer do you think it will live?
3. Why is safe squirrel habitat (tree canopy) important to us, not just squirrels? What do large trees give us?
4. What would it look like if all the trees were gone?
5. How can these trees survive droughts like the one we had in 2015? Do they need our help?

Think about your climate change detective quest results a bit more...

1. Are people using sustainable forms of transportation such as bicycles, carshares, or electric vehicles?
2. How can growing your own food help mitigate and adapt to climate change?
3. Did you see any homes with solar panels on your block? Would your house be suitable for solar panels?
4. How could roads and alleys surrounding your block affect air temperature in the summer? List two ways trees can help to reduce temperatures.

Think about your carbon visual quest results a bit more...

1. Do you feel suprised about the carbon visual image? Why?
2. What would it look like in 5/10 years? What methods can you think of to make the size of this carbon cube smaller?
3. Are you interested in global carbon offset options (e.g. reforestation in Kenya or UK tree planting)? List the activities that you are interested in.

MAP YOUR BLOCK
HOW TO MAP

Mapping is a great way to identify issues and resources in your neighbourhood by helping you think in a bigger picture. There are also many things you can map on your block. In the Coolkit, we introduce two mapping exercises:

1. VULNERABILITY MAPPING **to find areas prone to impacts of climate change - page 25**

2. HABITAT MAPPING **to explore different habitats on your block - page 23**

Mapping Tools

Method 1: with markers (easiest and quickest)

1. Identify areas on the map as the habitat that you would like to map
2. Colour in parts of your block with different colours to show different types of habitats
3. Think about your results, and what you could do to help improve conditions for the future - show your neighbours and discuss

Method 2: with Google Earth

(simple mapping and visualization)

Page 65 (in the Appendix)

Method 3: i-tree Canopy

(Simple and more complete measurement of different land covers and benefits of trees)

Page 66 (in the Appendix)

MAP YOUR BLOCK
HABITAT MAPPING

Why do this? To quickly identify different types of "habitats" or surfaces in your neighbourhood.

You will need:

- 0.5-1.5 hours
- Several colourful markers and satellite photos of your block/yard for mapping. Depending on the mapping tools you use, you will need a computer or some hard copies of photos (you can print them on regular paper instead of photo paper. Recommended size: 11" by 17" or 18" by 24"

What is habitat mapping?

There are many different habitats (other than human habitat) on your block. Here are some examples of different habitats that you can map in this exercise:

An example of habitat mapping using Google Earth - please see the Appendix page 65 for detailed instructions

"Squirrel Habitat" - Trees & Canopy

Now that you have an idea of how safe it is for squirrels on your block after the Urban Forest Quest (page 18), examine all the trees on your neighbourhood map and figure out how much canopy cover you have. Urban tree canopies have many important benefits, such as lowering temperatures and reducing storm effects.

30% of total area is squirrel habitat

"Worm Habitat" - Lawns & Soil

These soft pervious surfaces allow water to pass into the ground, reducing the flooding and amount of contaminants entering streams all at once. Soil provides important habitat for many types of underground creatures, and space for trees, plants, and fungi to grow.

35% of total area is worm habitat

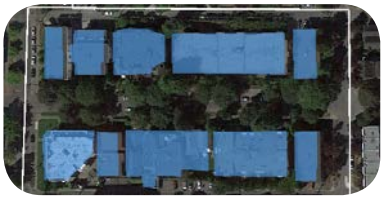
"Car Habitat" - Hard pavement

Pavement is an impervious surface, which forces stormwater into sewers or pipes rather than into the soil. This can result in chemicals from the road entering streams and heavy water flow damaging stream banks. Roads and parking lots also take up a lot of space and increase temperatures.

20% of total area is car habitat

"Pigeon Habitat" - Buildings & Roofs

These hard surfaces also affect storm water drainage, often directing rainwater straight into to the drains and not to the plants which need it during droughts. Roofs can also provide space for solar panels or green roof installation, which can help mitigate and adapt to the effects of climate change.



45% of total area is pigeon habitat

Use this sheet to record the percentages of different habitats from Google Earth and/or i-Tree (to find the percentage of habitats, please see the Appendix "Calculating the area of a polygon").

RESULTS for habitat mapping

_____% of your block & _____% of your yard is squirrel habitat (tree canopy)

_____% of your block & _____% of your yard is car habitat (hard paving)

_____% of your block & _____% of your yard is _____ habitat

_____% of your block & _____% of your yard is _____ habitat

_____% of your block & _____% of your yard is _____ habitat

Note: try to aim for rough estimates, and don't strain yourself to get precise results!

Think about your Google Maps/Earth results a bit more...

Which habitat had the highest %? Which had the lowest?

_____

18% of Vancouver is covered by tree canopy. How does this compare with your block?

_____

Are there any findings that surprise you?

_____

_____

Think about your i-Tree results a bit more...

What was the proportion of all of your classes? Was this surprising?

_____

_____

Are there any connections between the maps you created?

How are the habitats related to climate change? Which are causes and which are impacts? And are any influenced by climate change?

_____

_____

MAP YOUR BLOCK
VULNERABILITY MAPPING

Why do this? To quickly identify possible risks to the neighbourhood from climate change.

You will need:

- 1-1.5 hours
- Coloured pens and a paper print-out of an aerial photo of your block (VanMap or Google Earth)

What is vulnerability mapping?

Vulnerability mapping shows the areas which may be susceptible to damage from environmental or manmade threats, such as climate change. This type of mapping can help you think differently about the kind of risks that could affect your block and help you label things you may want to change[26]. This is a simple mapping exercise in which you will identify high and low risk areas of your block based on one or more climate change threats of your interest.

Procedure (see detailed mapping instructions in the Appendix Page 65):

1. Print out an aerial photo of your block (8.5x11 landscape)
2. Choose one or more risk features from the diagram below such as urban heat island effect (UHI), drought, or floods. Refer to page 6 for climate change risks likely to occur in Vancouver
3. Identify parts of your block that would be most susceptible to these threats
4. Identify parts of your block which would be least susceptible to these threats, such as dense canopy, white roofs, and pervious surfaces - refer to page 23 for descriptions of these surfaces
5. Colour in or mark high and low risk features with your own colours or symbols
6. Think about your results, how vulnerable your block is, and what you could do to help improve conditions for the future

Aerial photo of a neighbourhood block with some high and low risk features labeled

MAP YOUR BLOCK
VULNERABILITY MAPPING

More examples of high & low risk features to map

Hint: Walk around the block, or look at Google Earth/Map Street View to see conditions on the ground

HIGH RISK: Heat Island Effect (UHI)

In this photo

Pavement & concrete
Absorb more solar heat
Reduce evapotranspiration

Dark surfaces (e.g. roads, roofs)
Absorb more solar heat

Other subtle features to look for

Tall buildings in dense cities
Trap more heat through the absorption and reflection of sun on multiple surfaces
Block cool air flow

HIGH RISK: Flooding

In this photo

Pavement & concrete
Reduce storm water infiltration

Low laying/flat areas
Can overfill with storm water

Poor drainage
Causes pooling of water

Other features to look for

Streams
Can cause flooding if peak flows exceed surface level

Sewers/drains
Blockages can cause pooling

HIGH RISK: Drought

In this photo

Drought intolerant species
Require frequent watering (e.g. turf grass)
Consider summer water restrictions

Low precipitation/dry season
Especially July-August in Vancouver

High sun exposure
Especially south and south-west facing areas

Human modified soil
Soil in built environments is often shallow and eroded
Holds less water

LOW RISK Cooling effects, storm water mitigation

In this photo

Large trees growing together
Cool the air (evapotranspiration)
Insulate against storms
Reduce storm water runoff

White roofs
Reflect heat - reduce UHI

Pervious surfaces
Reduce storm water runoff
Store water
Filter contaminants

Trees near south-facing windows
Provide shade - reduce cooling costs

Other subtle features to look for

Food gardens
Increase foods security
Reduce carbon emissions

Small trees
Will grow and provide more shade
Reduce cooling costs

Solar panels
Reduce carbon emissions

STEP 3: RATE YOUR BLOCK

This section contains two **SCORECARDS** to let you assess whether your block is prepared for climate change, and how green it is, by answering some questions about your household and block.
Compare your results with other blocks - and see who has the highest score!

1. **RATE YOUR HOUSEHOLD**

2. **RATE YOUR BLOCK**

Do you know your carbon footprint?

We strongly recommend that you find your carbon footprint so you know your biggest areas of resource consumption.

Visit http://www.footprintnetwork.org/resources/footprint-calculator/
(You need an account to access the calculator)

RATE YOUR HOUSEHOLD

CLIMATE CHANGE
CAUSES & MITIGATION

1. How much floor area for heating and cooling per person is in your home?
   - a. <50 m^2 — 3
   - b. 50-120 m^2 — 2
   - c. >120 m^2 — 1

2. How do you heat/cool your home?
   - a. Mostly renewable energy (e.g. solar, hydro, air-sourced heat pumps) — 3
   - b. Combination of renewable energy and fossil fuels — 2
   - c. Mostly fossil fuels (e.g. natural gas) — 1

3. How many flights do you take in a year
   - a. More than 1 long-haul flights (generate about 2-4 t of CO_2, that's above the global average carbon footprint) — 3
   - b. One long-haul flight or 2-3 short range flights — 2
   - c. One short range flight or none — 1

4. % of your house shaded by trees in your yard or block in summer:
   - a. >60% — 3
   - b. 30-60% — 2
   - c. <30% — 1

5. % of trips by foot/bike/bus in one week:
   - a. >60% — 3
   - b. 30-60% — 2
   - c. <30% — 1

Add up the points. A higher score indicates a lower carbon footprint. Your subtotal score for *mitigation* at the household level is:

SUBTOTAL /15

RATE YOUR HOUSEHOLD

CLIMATE CHANGE
IMPACTS & ADAPTATION

6. What colour is your roof?
   - a. Light (reflecting heat) — 3
   - b. Medium — 2
   - c. Dark (absorbing heat) — 1

7. How do you use and store water for you gardens?
   - a. Using roof rainwater capture (waterbutts) and rain gardens — 3
   - b. Part of the garden is irrigated with tapwater — 2
   - c. Garden fully irrigated with tap water — 1

8. How many mature trees are on your property?
   - a. >3 — 3
   - b. 1-3 — 2
   - c. 0 — 1

9. How much green or pervious area ('worm habitat') is on your entire lot?
   (Refer to page 23 for more information on the different habitats)
   - a. >40% — 3
   - b. 20-40% — 2
   - c. <20% — 1

10. How much of what you eat do you grow by yourself?
    - a. I can make a green salad for an entire week — 3
    - b. I can find some carrots and a potted mint plant — 2
    - c. I don't grow any of my food — 1

Add up the points. A higher score indicates more climate-proofedness. Your subtotal score for *adaptation* at the household level is:

SUBTOTAL /15

RATE YOUR BLOCK

CLIMATE CHANGE
CAUSES & MITIGATION

1. What is the most common house type?
   - a. Multi-story apartment 3
   - b. Multiple units on each lot (e.g. duplex, townhouse, coach-house) 2
   - c. Single family homes 1

2. % of homes on your block using solar panels:
   - a. >40% 3
   - b. 20-40% 2
   - c. <20% 1

3. % of cars on your block that are EVs, hybrids, or car-shares:
   - a. >40% 3
   - b. 20-40% 2
   - c. <20% 1

4. How far is your house to the closest public transit (e.g. bus) or local shops?
   - a. Very far (over 30 minutes of walk) 3
   - b. Fair distance (15-30 minutes of walk) 2
   - c. Very close (0-15 minutes of walk) 1

5. What is the amount of tree canopy on your block?
   - a. >40% (*check page 18 for the 'leaping squirrel quest'*) 3
   - b. 20-40% 2
   - c. <20% (little connected squirrel habitat) 1

Add up the points. A higher score indicates a lower carbon footprint. Your subtotal score for *mitigation* at the block level is:

SUBTOTAL /15

RATE YOUR BLOCK

CLIMATE CHANGE
IMPACTS & ADAPTATION

6. What type of trees are on your block?
   - a. Mostly large & mature trees 3
   - b. Mostly small ornamental trees 2
   - c. Very few trees are on my block 1

7. Do the trees on your block look healthy?
   - a. Yes (vigorous growth, dense foliage) 3
   - b. Somewhat/mixed 2
   - c. No (stunted, dried out, thin foliage) 1

8. What is the overall extent of impervious surface (grey car & pigeon habitat)?
   - a. <30% 3
   - b. 30-60% 2
   - c. >60% 1

9. How many rain gardens and/or swales are on your block?
   - a. 3 or more 3
   - b. 1-2 2
   - c. None 1

10. % of homes growing food (visible from the street):
   - a. >40% 3
   - b. 20-40% 2
   - c. <20% 1

Add up the points. A higher score indicates more climate-proofedness. Your subtotal score for *adaptation* at the block level is:

SUBTOTAL /15

RESULTS for habitat mapping

TOTAL for HOUSEHOLD _____/30

Add up the subtotals and write the number on the right

TOTAL for BLOCK _____/30

Add up the subtotals and write the number on the right

Think about your household results a bit more...

Were you surprised by your score? How does it compare with other households on your block?

Is there any action you could do or avoid immediately?

Is there obvious potential for further reducing your carbon footprints and climate-proofing?

Think about your block results a bit more...

Is this a high or low carbon neighbourhood? Were you surprised by your score?

How does it compare with other nearby blocks?

Is there obvious potential for decreasing your collective carbon footprint and adapting to climate change together?

STEP 4: VISION YOUR FUTURE

Now that you know more about your block and home, you might have some ideas about making some improvements in your own property. In this section, we will provide examples of visioning what you can do for your home and neighbourhood, with real-life and hypothetical examples - you can also try making your own "dream scenarios" using software such as Photoshop or GIMP!

In this exercise, you will learn how to change photos of your block/community to share the ideas you have been talking about with your neighbours. Through the visioning examples, you can explore your block's potential future scenarios with climate change impacts, and possible green and sustainable solutions, and see what your friends and neighbours think!

Solar panels installed

Improved Air Quality
Problematic gaseous pollutants are absorbed through the stomata on the underside of leaves.

Energy Conservation
Natural cooling in summer from mature trees, and insulatic potential in winter from rooftop gardens.

Improved Water Quality
Improved water quality - reduction in stormwater quantity due to increased evaporation on leaf surfaces.

Reduction in Noise Pollution
Natural buffer from noise of people and cars.

New trees and shrubs
+
food garden

Improved Wildlife Habitat
Nesting and food sources.

Improved Appearances
Vegetation breaks up hard lines of built structures.

Enhanced Psychological Well-Being
Green spaces have been shown to lower stress levels.

Increased Property Value
5% to 25% increase in value with increased canopy cover.

by Yancey Chen, Iris Jiang, Shuyan Jing, Jennifer Reid (20

VISION YOUR FUTURE
HOW TO VISUALIZE

***Why do this*?** To imagine what your yard or block will look like by using a visualization tool.

In this exercise, you will try to change photos of your block/community to share the ideas you have been talking about with your neighbours. Through the visioning examples, you can explore your block's potential future scenarios with climate change impacts, and possible green and sustainable solutions, and see what your friends and neighbours think!

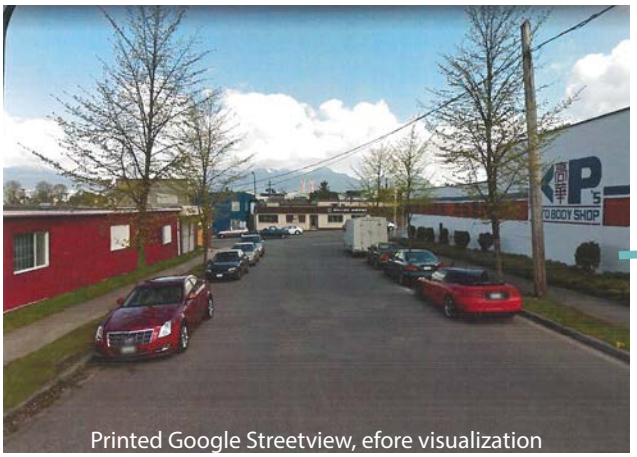
If you have done the vulnerability mapping or the scorecard, please look back to your vulnerability map and/or your score, think about things that you can do or changes that you want to see in your community to help tackle the risk features or improve your score, and visualize them!

There are different ways to visualize your ideas:

- With **markers** (easiest and quickest)
- With **photo editing programs** such as Adobe Photoshop or GIMP: please see the intruction of GIMP on page 70-72)

Here is the instruction of visualizing with **markers**:

1. Take a picture or download the Google Streetview of the areas that you want to visualize on
2. Print the photo(s) or picture(s) out in colour
3. Draw your idea on the printed copy (see examples below)
4. Share the product with others!



Printed Google Streetview, efore visualization

Printed Google Streetview, after visualization w/ markers

In this visualization, you can see several features are added to the existing scene, such as:

- Larger trees with bigger canopy
- Speed bumps
- Bike lanes
- Curb extensions for greening

You can add other features in your own visualization as you wish. See more examples next page to get you started!

VISION YOUR FUTURE
WHAT TO VISUALIZE

Example of features to visualize

Some examples for you to start with:

Sustainable features, such as:

- Greenspace (converted from hard pavement)
- A community garden/orchard
- Solar panels or other renewable energy equipment
- Bike lanes, bus stops, or eletric vehicle charging station

Unsustainable features (possile if we don't take action), such as:

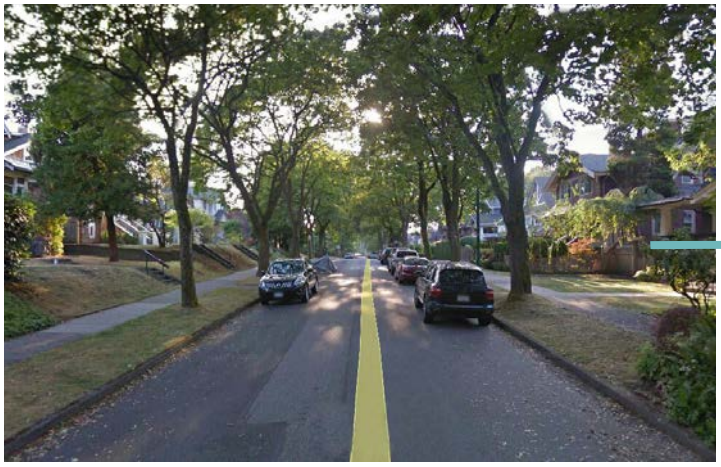
- Less or none mature trees
- Wider streets to allow for more cars
- Potential flooding if close to the sea level
- More street parking on your street

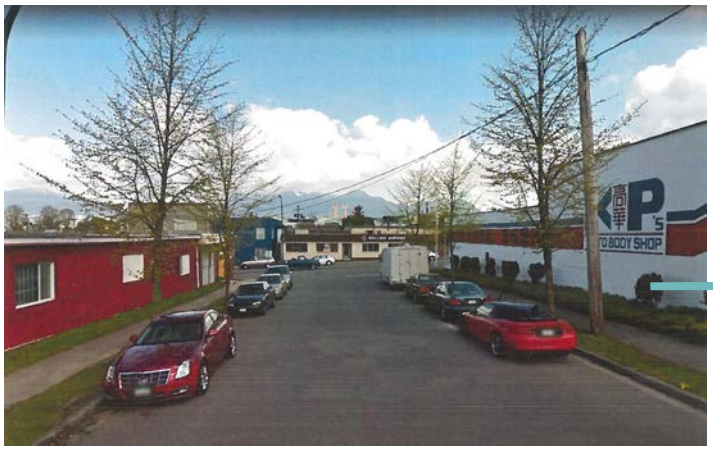
Visualization Examples

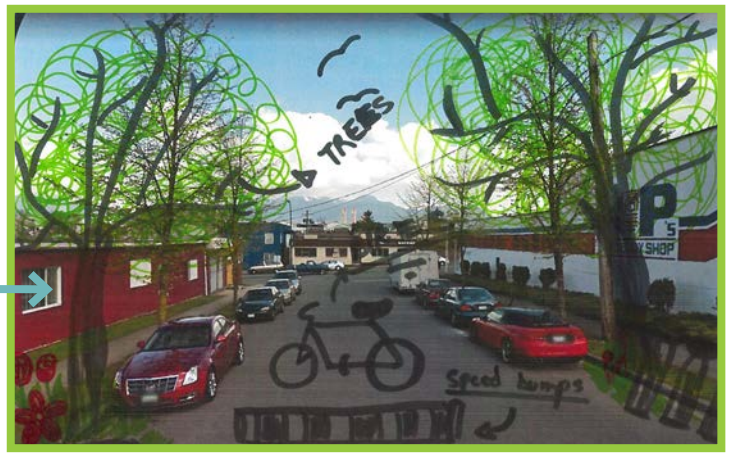
by Yancey Chen, Iris Jiang, Shuyan Jiang, Jennifer Reid (2017)

by Weicong Fu (2017)

VISION YOUR FUTURE
BEFORE AND AFTER







EXISITING SCENE

POSSIBLE FUTURE

VISION YOUR FUTURE
FROM VISIONING TO REALITY

Why do this? Start thinking of what you want for your yard and neighbourhood. Along with your maps, visualize what features you want and where you want them. Are your ideas low-cost and low-carbon, or grandiose and high-carbon?

Examples: from vision to reality

Before

The lawn in this part of the yard was on a shady slope beside the house. Problems included:

- Often damp and muddy
- Required frequent mowing
- Not aesthetically pleasing
- Required sprinklers in the summer
- Very few ecological benefits

After

Installation of a rain garden to replace lawn space. Benefits include

- Aesthetically pleasing
- Less maintenance
- Creates habitat
- Water conservation
- Filters pollution

VISION YOUR FUTURE
CHANGE YOUR TRANSPORTAION

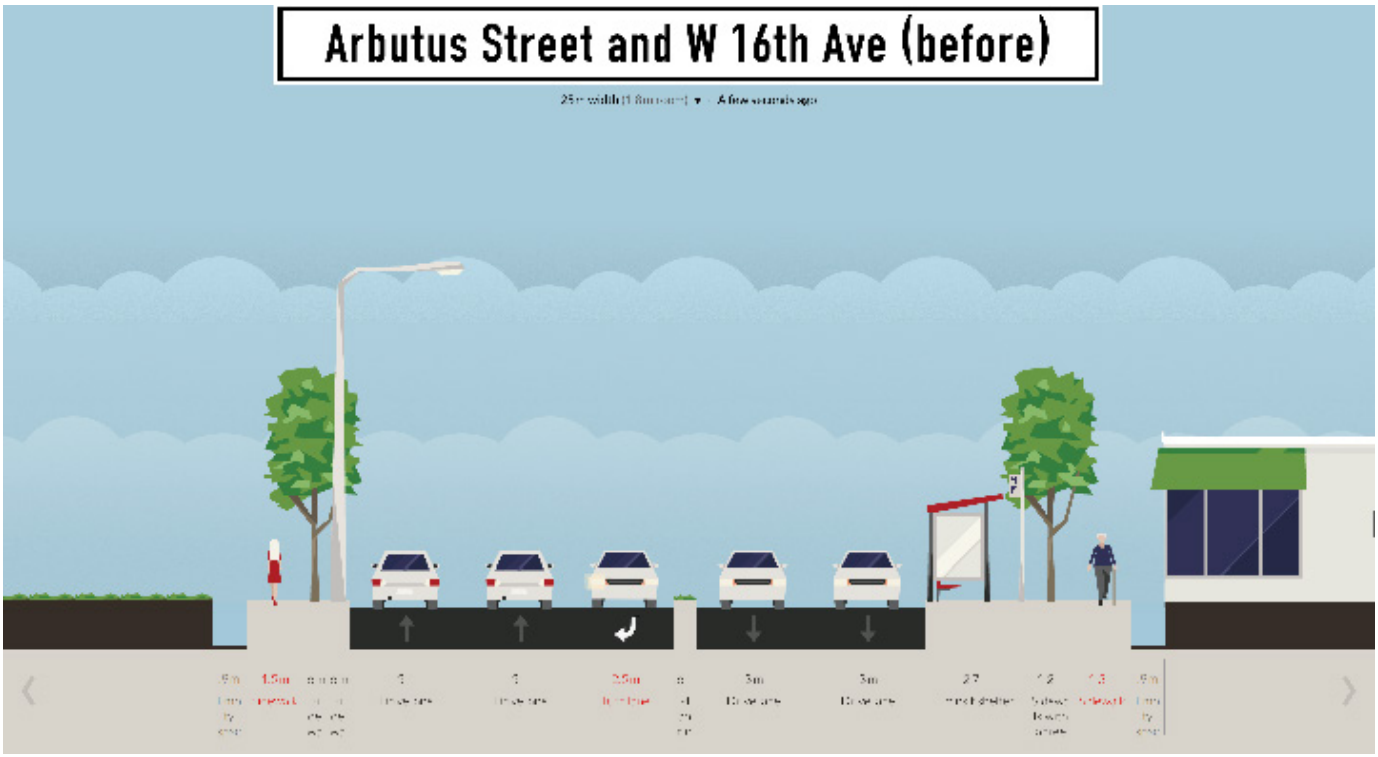
Visualize your neighborhood street

Why do this? To realize the full potential of a completed road that supports sustainable active transportation and lower the carbon emission.

You will need:

1-1.5 hours

- Pick a street that you are interested in re-designing
- Walk around your block or look at Google Earth/ Map Street View to see conditions on the ground
- Go to ***www. Street mix*** (a handy tool that helps you interact with different street elements)
- Identify the basic characters of your street views and emulate those in the street mix
- Identify parts of the street (e.g. pedestrain views) that encourage or discourage sustainble transportations ink those features as well as other relevant factors to climate change
- Think about what kind of street design (e.g. street width) could help improve conditions in the future

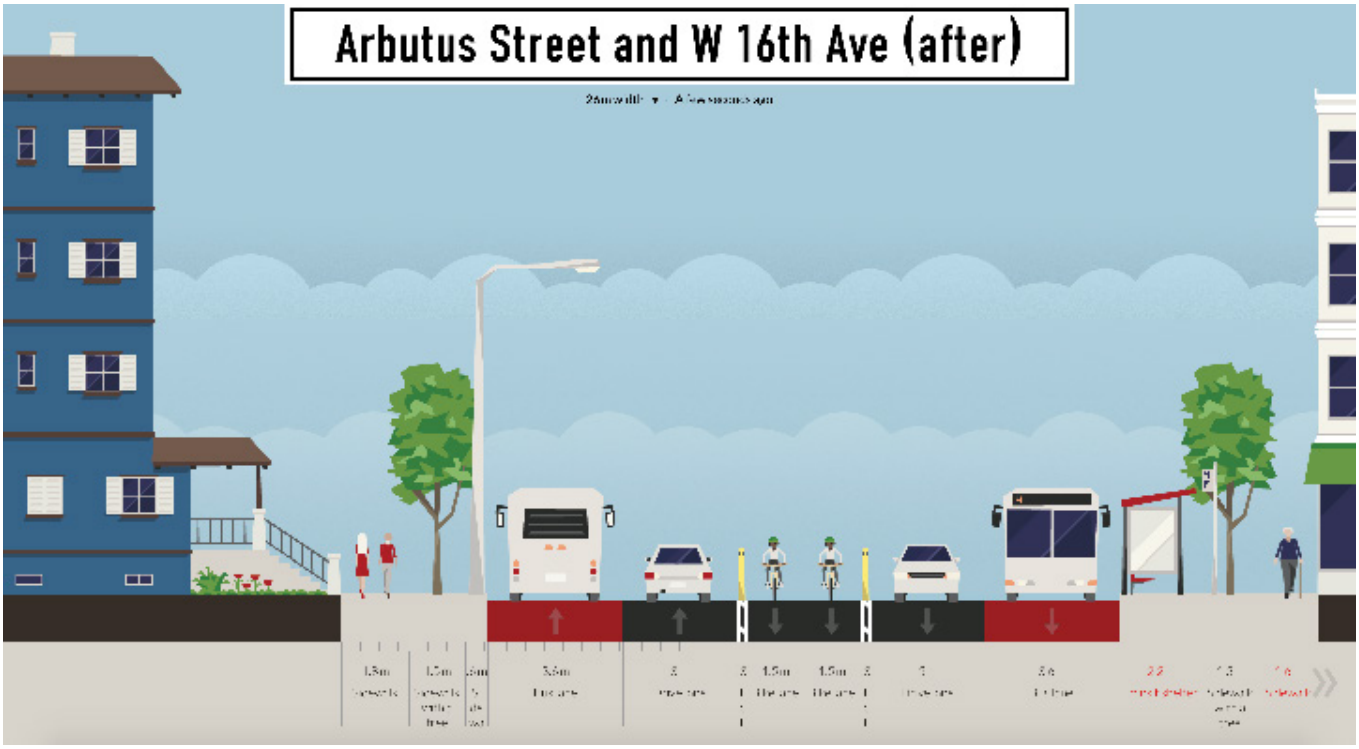


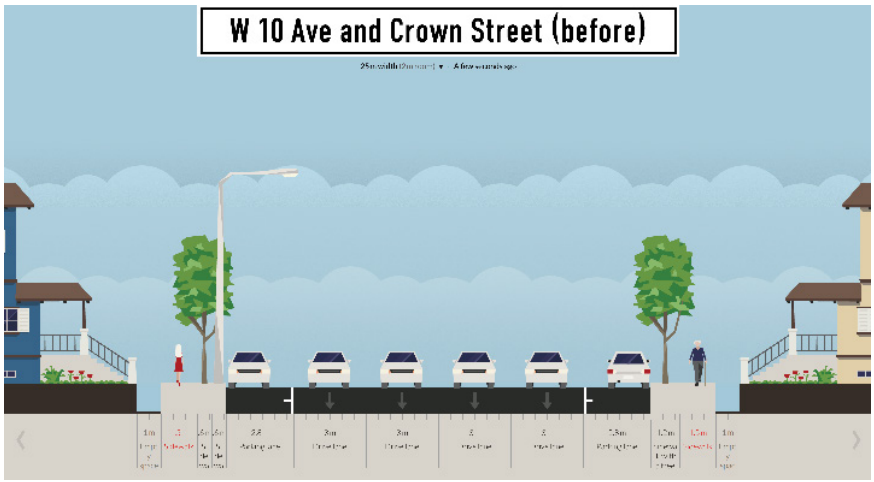
Four driving lanes and two parking lanes
- produce large amount of GHG emissions and energy cosumption
- bicyclist and pedestrain unfriendly
- lack green connections with surrounding green open space

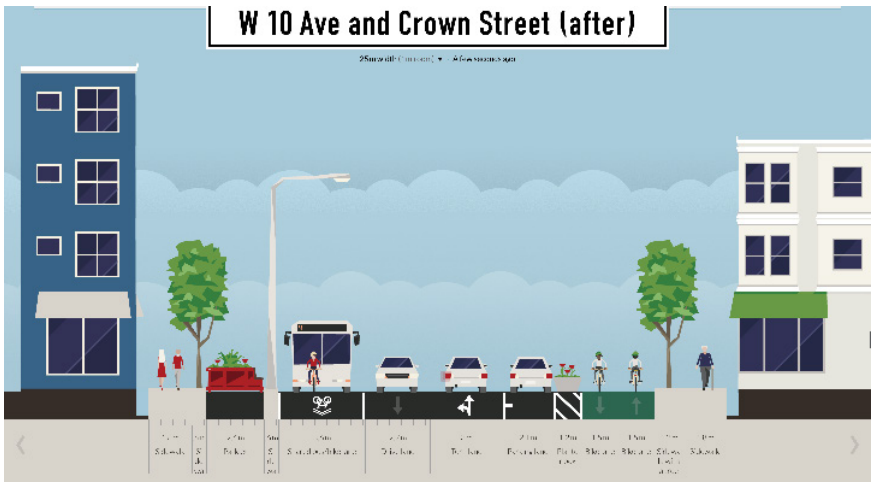
Unhealthy trees living in a limited compacted space
- lack necessary nutrients and water
- increase vulnerabilities during extreme weather events
-discourage people to walk and bike

High percentage of concrete pavement
- abosorbs solar heat
- reduces evaporation
- reduces water infiltration

Inefficient low building
- spread carbon footprint
- lack connectivity, compaction and communication


Arbutus Street and W 16th Ave (after)


W 10 Ave and Crown Street (before)


W 10 Ave and Crown Street (after)

STEP 5: ACT ON THE GROUND

Now that we know the urgency of combating climate change, and the importance of urban trees in climate-proofing our communities, how could you **take action** together?

This section provides you tips and external resources on what you can do to help.

1. **PRIORITIZE AND MAKE A PLEDGE** so you can list your goals and tasks
2. **MAKE A PLAN** and quickly see what goals you plan to accomplish and when
3. **BEAUTIFY & CLIMATE-PROOF YOUR HOME** with an array of different activities, each involving a way to act on the ground
4. **BEAUTIFY YOUR BLOCK** with you neighbours after you've made a difference in your own home!
5. **RETROFIT YOUR HOME AND YOUR COMMUNITY** to further reduce your GHG emissions

by laura.ouimette
https://www.flickr.com/photos/8244126@N06/512532859

ACT ON THE GROUND
PRIORITIZE & MAKE A PLEDGE

Why do this? To prioritize the ideas you have from your visioning and scorecard.

What goals are you planning to achieve in the new year? Are they about preparing your house for climate change, or protecting trees in your yard or block? Find out what your neighbours have been pledging, and work towards the goals together!

Write them down!

I PLEDGE

#1

e.g. plant a suitable tree that I like in my yard and take good care of it

_____

_____

_____

#2

e.g. water street trees on my block during dry seasons

_____

_____

_____

#3

e.g. volunteer at least once at a City tree planting event with my family and/or neighbours

_____

_____

_____

_____

DO YOU KNOW?

Vancouver has a Climate Change Action Pledge:
http://vancouver.ca/green-vancouver/climate-change-action-pledge.aspx

ACT ON THE GROUND
MAKE A PLAN

What will you do by when?

Make a calendar to plan small steps that can help you achieve your climate action goal(s), and put your plan in a place where you can see it everyday! When setting a goal, try addding a deadline to make actions bite-sized and more achievable. Use a wall calendar hung in an obvious location, or go digital with an Excel calendar template. Here is one resident's action plan for part of the month.

MYGREEN PLAN

WEEK 1:

Buy and plant some sweet peas in back yard tomorrow

Get bike fixed by this weekend

Week 1	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
	buy pea seeds after work		prepare soil for peas and plant			fix bike	

WEEK 2:

Buy and plant an Eastern redbud by this weekend

Ride bike to work this week

Volunteer at a City tree planting this or next week

Week 2	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
Water peas	Buy digging shovel, mulch...		bike to work!		Buy and plant the tree **WATER & MULCH		City Tree planting @ 10

WEEK 3:

Replace some of front lawn with native plants this week

Ride bike to work two times this week

Discuss gardening workshop idea with neighbours Thursday latest

Week 3	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28
Water peas and tree	bike! read up on native plants		dig up front lawn order topsoil	Workshop plan w Evelyn @ 6	bike!	buy native plants ask kids to water yard	

ACT ON THE GROUND
MAKE A PLAN - CALENDAR

THIS MONTH

01 02 03 04 05 06 07 08 09 10 11 12

WEEK 1: eg. Read the Coolkit pages 7-8 on urban forests tonight.

Week 1	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7

WEEK 2:

Week 2	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14

WEEK 3:

Week 3	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21

WEEK 4:

Week 4	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28

A. Pick up an appropriate tree

Why do this? To plant trees that are easy to maintain and able to survive the future impacts of climate change[13 14]:

'Forest pansy' eastern redbud[15]

(Cercis canadensis)

Medium-size (6 to 9 m tall) deciduous tree with beautiful pink flowers and heart-shape leaves

- Can survive well in a very dry environment
- Prefer full or partial shade
- Grows in well-drained sandy/clay soil

'Elegant warrior' Japanese snowbell[16]

(Styrax japonicus)

Medium-size (9 m) deciduous tree with upward foliage and drooping flower clusters

- Can survive in harsh conditions with little care
- Pefers full sun to part shade
- Prefers organically rich, acidic, medium moisture, well-drained soils

'Workhorse' european hornbeam[16]

(Carpinus betulus)

Large (can be over 12 m) deciduous tree with pointy oval leaves, and a beautiful canopy

- Can survive in harsh conditions with little care
- Tolerant to various levels of light exposure and soil pHs
- Prefers moist and well-drained soil

'Tough Survivor' Honey Locust'[17]

(Gleditsia triacanthos)

Medium- to large-sized deciduous tree that can grow over 20 m with beautiful bright yellow flowers in the fall. It is fast-growing and easy to plant.

- Flood and drought tolerant
- Prefers to grow with full sun exposure
- Grows in various types of soil

'Pollution fighter' garry oak'[18 19]

(Quercus garryana)

The only native oak species in BC. It can grow over 20 m tall a with majestic large canopy. It is great for improving air and water quality, and provides habitat for a number of rare plants and animals.

- Once established, minimal maintenance is needed
- Can tolerate very dry conditions
- Prefers open space with full or partial sunlight
- Grows in well-drained coarse sandy soil

WHERE CAN I GET A TREE?

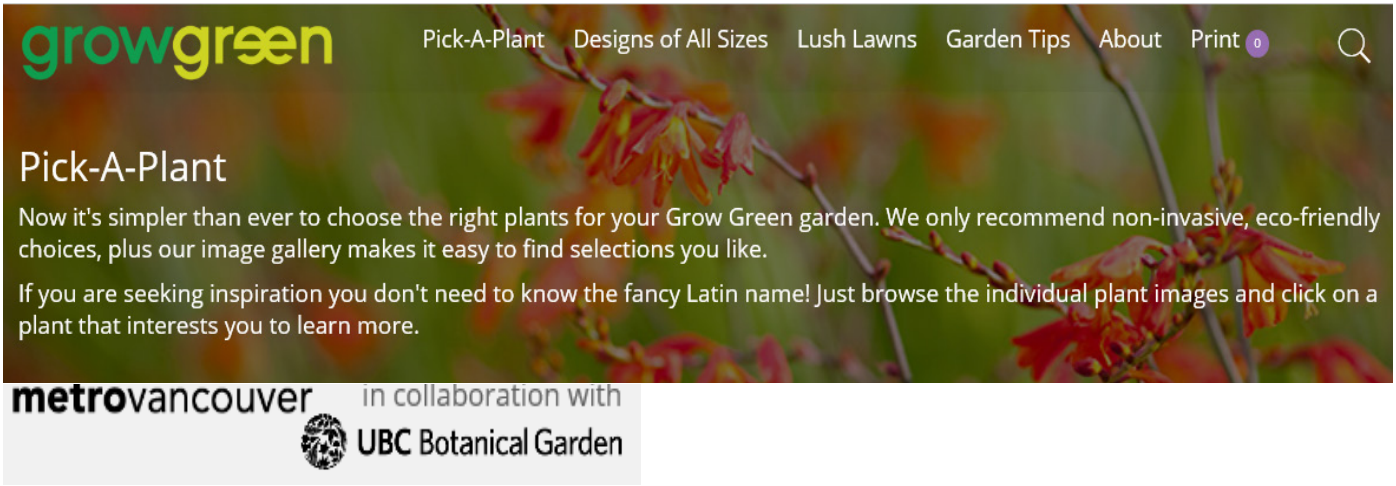
You can buy trees for only **$10** at Vancouver's Tree Sale Events, which happen three or four times a year. Check the City's website for more information: http://vancouver.ca/parks-recreation-culture/vancouver-tree-weekend.aspx

WANT TO KNOW MORE SPECIES?

Trees in B.C. and identification keys:
https://www.for.gov.bc.ca/hfd/library/documents/treebook/trees.htm

Tree Keepers:
http://treekeepers.ca/plant-a-tree/

Native plants in BC:
http://www.npsbc.ca/



B. HOW TO PLANT A TREE

Need some help planting a tree? Here are some guidelines from the Vancouver Board of Parks and Recreation[22]:

1. DIG A SAUCER-SHAPEd HOLE 3-4 times wider than the container or rootball. Make sure it is the same depth as the root ball.

2. PLACE THE TREE IN THE CENTRE of the hole. The top of the rootball must rest at ground level. If your tree is in a container, gently tap the sides of container to help loosen the edge and slide the tree out carefully.

Ensure you remove the tree from its container before planting

*** DON'T PLANT TOO DEEP!** Roots require air as well as water to grow. The tree's root flare (the bottom part of the trunk that flares out) should be above the soil.

* To prevent the roots from growing in a circular pattern (known as girdling roots), cut a few vertical slices along the sides of the rootball. You can also gently spread the roots making sure not to break them.

Girdling roots can cause harm to your tree

*** FOR BALLED & BURLAPPED TREES**, cut away any twine or wires wrapped around the rootball and peel back the burlap.

3. BACKFILL THE HOLE WITH NATIVE SOIL FROM THE TREE PIT. If the soil is of marginal quality, ensure that topsoil amendment is thoroughly mixed with native soil.

SOME MORE TIPS ON TREE CARE[22]:

1. **MULCH** is an invaluable tool to improve the soil and provide more nutrients for the trees.

2. **BEWARE OF THE WEED EATER**. They can do devastating damage to trees.

3. **REMOVE THE GRASS** growing right around the base of your tree. Grass competes with the tree for water and nutrients, causing more stress for the tree.

4. If you want to prune your tree, it's best to **CALL THE CITY**! They have tree experts to advise on making your tree feel good and look good. Contact them at 3-1-1.

FOR MORE TIPS, please see the full version: http://vancouver.ca/files/cov/vancouver-tree-week-caring-for-your-tree.pdf

C. PICK UP A NATIVE SHRUB YOU LIKE

Why do this? To introduce the benefits of native species.

Native plants are those that are found naturally in a particular area, and are well adapted to its climate[40]. Native plants help mitigate climate change because they require less resources (less watering for you!), are low maintenance, and provide habitat for birds and other wildlife[41]. Beautify your yard with some!

Nootka rose[42] *(Rosa nutkana)*

Growing up to 2.5 m tall, this rose makes a great shurb for hedges or barriers. It bears velvety pink flowers in summer, each 5 to 8 cm accross. Leaves are light green and toothed at the edges.

- Enjoys wet conditions
- Tolerates full sun to partial shade exposure

Red elderberry[42] *(Sambucus racemosa)*

This plant bears pyramidal clusters of small white flowers in early spring, and the bright red berries attract birds. It forms a large shrub once mature and grows quickly once established.

- Enjoys moist but drained conditions
- Shade tolerant

Salmonberry[42] *(Rubus spectabilis)*

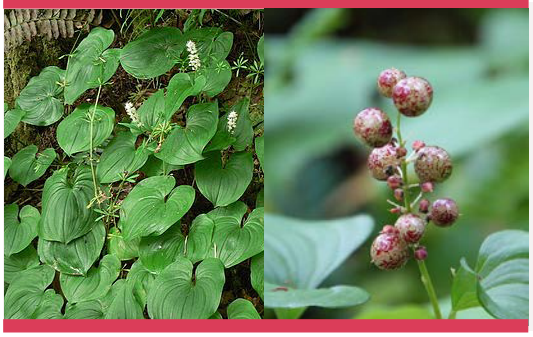
This fast-growing shrub bears yellow or orange-red raspberry-like fruit. The fruit can be used in wines and jam. The end leaf is larger than the two side leaflets.

- Enjoys moist or well-drained sois
- Requires full shade

Red-osier dogwood[42] *(Cornus stolonifera)*

Clusters of small white flowers span 3 to 6 cm in diameter, and bear small white berries. Interesting fact: wherever the bright red branches touch the ground, new plants grow.

- Enjoys well-drained soils
- Full sun exposure



False lily of the valley[42] *(Maianthemum dilatatum)*

A deciduous plant that acts as a superb groundcover, forming an ocean of dark green leaves. The heart-shaped leaves are glossy, and tiny white star-shaped flowers are borne on stalks in late spring. Immature berries are speckled and flush red after late spring. Fast grower.

- Moist soil
- Prefers shade

D. IDENTIFY INVASIVE SPECIES

Why do this? To familiarize with some invasive species in order to remove them.

Invasive plants are those that have been introduced from other parts of the world and create substantial negative impacts on **native plants**[43]. Here are some plants you may have seen before:

Can you find me?

Play a game of I-spy and find out how dominant the invasives are in:

(a) your block (b) your front/back yard

Next to each invasive plant, rate their dominance with 0 as low and 5 as high

ex. English Ivy

(a) __1__

(b) __3__

(a) _____

(b) _____

Morning glory[42] (bindweed)

(Calystegia sepium)

A long trailing vine bearing large bell-shaped white flowers that bloom in June. Ensure that roots are dug out and no remains are left - any leftover plant material can regrow.

(a) _____

(b) _____

English holly[42]

(Ilex aquifolium)

Dark green leaves contrast with the bright red berries for this holly. This shrub can grow up to 10 m tall, depriving other plants of sunlight

(a) _____

(b) _____

English ivy[42]

(Hedera helix)

Once a common wallcover, English ivy is now seen as an annoying invasive. It grows horizontally but will climb given the opportunity. All *Hedera* plants are potentially invasive.

(a) _____

(b) _____

Himalayan blackberry[42]

(Rubus armeniacus)

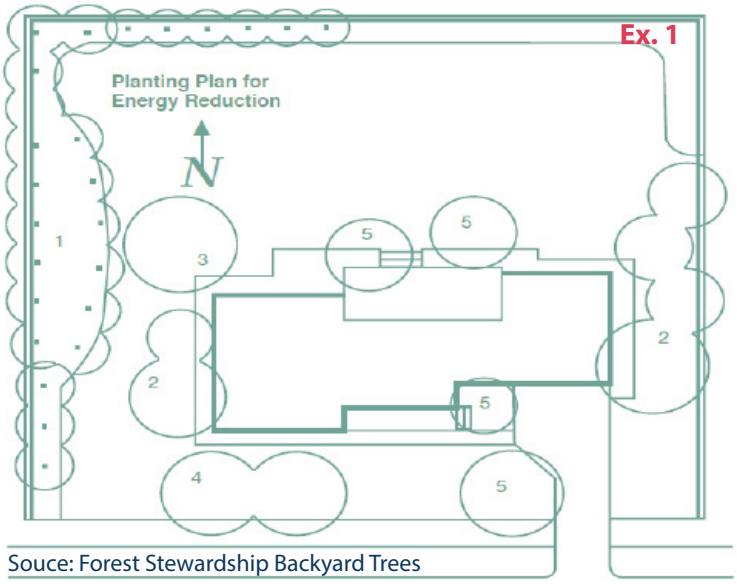
While it provides berries for wildlife, its fast-growing nature prevents the establishment of native groundcovers. This blackberry has 5 oval or oblong leaflets and prickles on the stems.

To learn more about invasives, please visit: http://www.surrey.ca/files/Invasive_Plants_Brochure.pdf

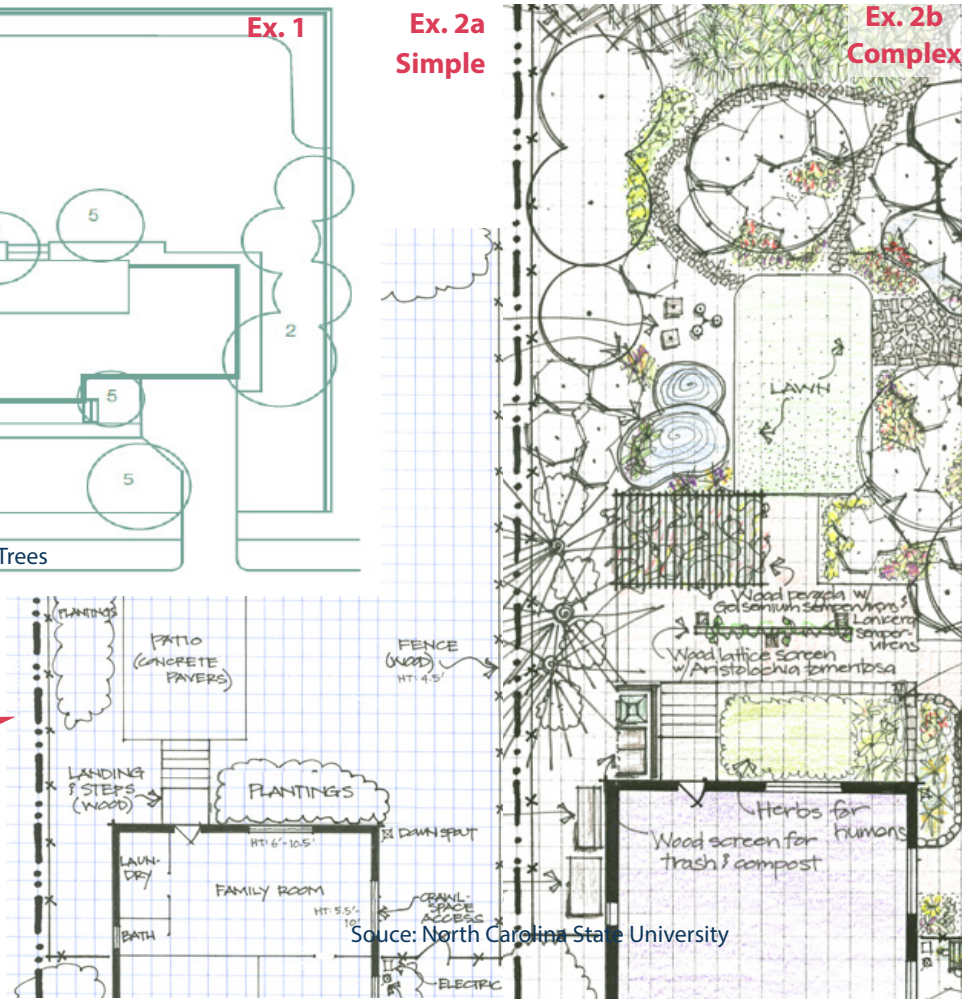
E. WHERE TO PLANT

Why do this? To aquaint yourself with your yard, and enhance the benefits that the trees provide.

Here are some tips and examples of how you can organize and design your yard, along with some helpful tips on where to plant your tree for energy use and comfort.



Souce: Forest Stewardship Backyard Trees



Souce: North Carolina State University

To learn how to design your garden in detail, as seen in this photo, visit: https://ncsu.edu/goingnative/howto/mapping/index.html

KEY

1. Coniferous **windbreaks** to the north and west block winter winds.
2. Trees on the east and west sides provide cooling effects with **summer shade**.
3. A tree here will provide cool **shade** as the sun sets in midsummer.
4. A variety of deciduous trees to the south should grow tall to shade the building and pruning of the lower branches will allow the lower **winter sun** to strike the roof, walls, and windows uninterrupted.

*Adapted from Forest Stewardship Backyard Trees (see above image)[21]

ACTIVITY: GET TO KNOW YOUR YARD

In the space below, roughly draw your front or backyard and its main features (large trees, benches, walls, slopes, etc...). Keep the drawing simple as you will be adding notes and plants!

Use different coloured pens or highlighters to mark each section. Along with the Key on page 47, indicate:

1. Areas with most sunshine - good for vegetable growing or drought-tolerabt plants
2. Areas with least sunshine - a possible shade garden for cooling
3. Wet and dry areas (areas prone to flooding or drying out easily) - rain gardens for wet areas

   *With the above information, you can plan where to place your native plants (page 45)

4. Existing large trees (the larger the tree, the more shade there will be around it
5. Other locations you have/want in your yard (e.g. a private retreat, child's play area, deck for hosting outdoor events...)

HOW TO CARE FOR YOUR YARD & GARDEN

Why do this? To create an eco-friendly yard and save time and money!

BE WATER WISE

A rain water collection barrel By Benoit Rochon

- Spring loaded shut-off nozzles are required on hoses all year[37]
- Select drought resistant plants in areas which are dry in the summer[28, 29]
- Install a rain barrel to collect water - use in your garden during water restrictions[28]
- Apply mulch around plants which are not drought resistant to reduce evaporation[28, 29]
- Consider installing a rain garden in part of your garden - it will filter pollution and reduce surface run-off[38]

Learn how to be waterwise:

Waterwise gardening:

www.metrovancouver.org/services/waterWaterPublications/

RESPONSIBLE LAWNS

Micro clover lawn

- Reduce how often you mow - mowers require fossil fuels and can release more carbon emissions than grass absorbs[34]
- Consider replacing some lawn area with garden beds for trees and flowers - they add beauty and important ecological benefits
- Seed your lawn with micro clover - it will stay green longer, and support other plants by enriching the soil[39]
- European chaffer beetles can be effectively treated with beneficial nematodes[27]

See more on lawn alternatives at:

Grow Green Guide - Lush Lawns:

http://www.growgreenguide.ca/lawns

SUPPORT YOUR SOIL

A backyard composter

- Get a composter for your yard - leaves and trimmings will become a natural fertilizer for your garden[30, 31]
- Ensure your soil is well drained - compact soils can hold too much moisture and may restrict root growth[31]
- Organic fertilizers are released slowly and help improve soil structure over time[32]

Want to know more about composting?

Backyard Composting:

http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/HeresTheDirt.pdf

REDUCE DISEASE & PESTS

Lady bugs - effective aphid control

- The City of Vancouver does not allow the use of pesticides for cosmetic reasonsin home gardens or lawns[33]
- Select plant varieties resistent to pests and disease[33]
- There are natural, biological ways to control pests that are safe and effective, for instance lady bugs and beneficial nematodes[27]

Want to know more?

Pesticide-free lawns and gardens:

http://vancouver.ca/home-property-development/gardening-naturally.aspx

ACT ON THE GROUND
GREEN & CLIMATE-PROOF YOUR BLOCK

A. CREATE A STREET GARDEN

Why do this? You can easily create a street garden in traffic circles or even on the street in front of your place by planting vegetation that you like! Creating this type of green space can benefit you and your block in various ways[23]:

by Erin MacDonald

1. Boost the character of your block by personalizing gardens
2. Slow down traffic on your block
3. Provide free compost for your own garden, and sometimes even free food (depending on the species that you plant)
4. Strengthen the bonds with your neighbours and friends
5. Provide habitat for important pollinators
6. Add to summer shade with deciduous tree(s)

STEPS TO CREATE A STREET GARDEN[23]:

1. **Decide** what type of garden you and your neighbours want to create: e.g. food gardens, bee hives, ornamental gardens...

2. **Pick** plants that you like.

Recommended plant list: http://vancouver.ca/home-property-development/recommended-plant-list.aspx

3. **Plan** a day with your neighbours to plant!

Watch out for traffic when you are working. Stay visible and stay alert.

For more specific rules and guides, please visit http://vancouver.ca/home-property-development/gardening-guidelines.aspx

You can also volunteer for the **City's Green Streets Program** to help them take care of street gardens near you. You will weed and water the gardens, make new friends, receive free training on gardening, and go to various fun events by the Green Streets[23].

Sign up here: http://vancouver.ca/home-property-development/green-streets-volunteer-application-form.aspx

HOW CAN I HELP MY TREE?

BE CAREFUL WHEN USING A LAWNMOWER OR WEED TRIMMER[12]

It can do detrimental damages to the base of the tree. Severe damage (like the picture) can kill a mature tree.

WATER STREET TREES OVER THEIR ROOTS IN FRONT OF YOUR YARD [12]

Two watering cans or 5-10 minutes from a slow-running hose during summer. Twice per week per tree will do.

PARTICIPATE IN ARBOR WEEK TREE-PLANTING ACTIVITIES[12]

The City and various organizations e.g. TreeKeepers organize at least one tree-planting event per year.

TELL THE CITY IF YOU HAVE ANY QUESTIONS OR CONCERNS[12]

You can request maintenance of trees in parks and on streets online http://vancouver.ca/home-property-development/trees.aspx

ACT ON THE GROUND
DEVELOP A LOW-CARBON LIFESTYLE

TRANSPORTATION AND ENERGY CONSUMPTION are the two biggest contributors to BC household's carbon footprint. Here are 2 ways to help you reduce your carbon footprint and become more sustainable:

1. TRAVEL MORE SUSTAINABILY

Our transportation (cars, trucks, planes etc.) contributes to more than half of the average BC household's carbon footprint. It also accounts for noxious air pollution, common air contamination, and water toxicity[44]

Walk or bike more

in 10 minutes, you can walk 1 km or bike 3.5 km. In the same time, you can:

- Keep fit
  A125-lb (57kg) person walking at brisk pace for 30 minutes burns about 150 calories[45]
- Save money (gym fees or car expenses)
- Save time
  For short distances (< 10 km), cycling is usually the fastest way to travel in the city

Calculate the calories you can burn by walking here:
http://www.shapesense.com/fitness-exercise/calculators/walking-calorie-burn-calculator.shtml

Take public transit

Read the news, chat with friends, or take a nap! Taking transit is much cheaper than owning a car: the average savings are $586 per month for a family using public transit instead of driving.

Carshare or carpool

It's a great way to bypass traffic congestions (by driving in HOV lanes), save expenses and meet new people!

2. REDUCE ENERGY CONSUMPTION AND INCREASE RENEWABLES

Canada is No. 1 when it comes to energy consumption per capita. We are consuming as much as the continent of Africa, which has double the population of Canada[44]! In BC, energy use accounts for a quarter of the household's carbon footprint on average.

Install solar pannels and solar PVs

Rooftop solar – uses photovoltaic cells to harvest the sun's energy and convert that into electricity.

Solar hot water system – solar thermal collectors circulate a fluid which is heated by the sun's radiant energy.

To read more: https://www.forbes.com/sites/houzz/2014/05/17/everything-you-need-to-know-about-adding-solar-panels-at-home/#46ad17b8740e

Use more Energy Star appliances[46]

An Energy Star certified CFL or LED bulb saves up to 30% energy and lasts 10-25 times longer. An Energy Star certified laundry machine can save 35% on energy and water.

Turn off electronics when you are not in the room

It costs $20 per year to keep one light on 8 hours everyday for a year.

Turn your thermostat down by 2 degrees

That is equivalent to a 5% reduction in heating energy

Seal the heat leaks and insulate your home

Check walls, doors, and windows for draft. If you don't know how, this video can help: http://www.youtube.com/watch?v=mGPg-uxl5qk.

You can also get a thermal image of your house to identify heat leaks and opportunities for energy efficiency upgrades. What is a thermal image? A thermal image is "a picture of the heat that comes off objects[47]". To request a thermal image of your home, please contact the City at thermal.imaging@vancouver.ca.

Insulate the roof, floors, walls, and the basement to keep your house cool in the summer and warm in the winter.

Think about district energy systems:

Networks of hot and cold water pipes, typically buried underground, that are used to efficiently heat and cool building using less energy than if the individual buildings were to each have their own boilers and chillers

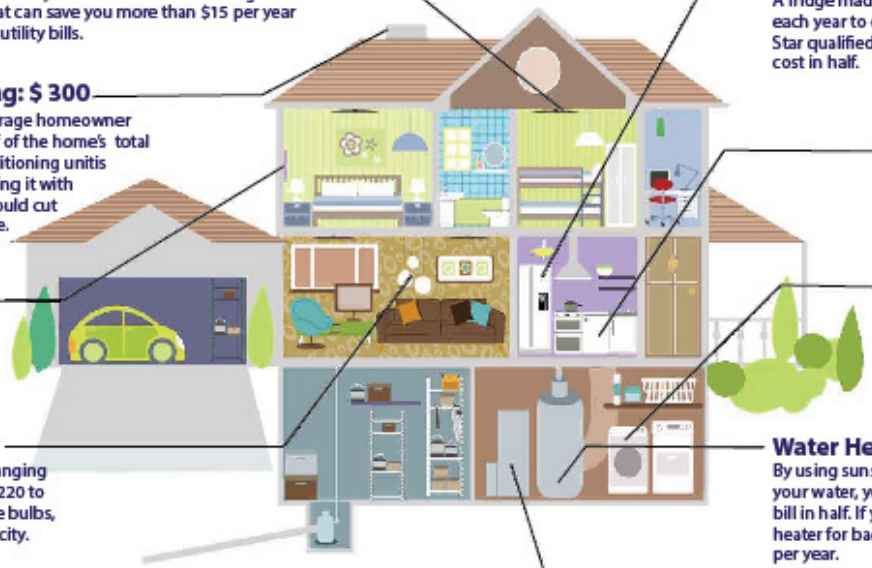
To read more: http://energy.ubc.ca/projects/district-energy/

Use heat pumps and geo-exchange:

Heat pumps can take heat from the air or ground and use it to provide space heat or hot water.

ACT ON THE GROUND
DEVELOP A LOW-CARBON LIFESTYLE

Energy Efficient Home savings in one year



Ceiling fans $15
Ceiling fan/light combination unit that have earned the Energy Star are about 50% more efficiently thatn conventional fan/light units. That can save you more than $15 per year on utility bills.

Central Air Conditioning: $ 300
Heating and cooling cost the average homeowner about $1000 per year- nearly half of the home's total energy bill. If you central air conditioning unitis is more than 12 years old. Replacing it with an Energy Star qualified model could cut yor cooling cost by 30 percentage.

Room Air Conditioner: $23
Switching to an Energy Star rated room air conditioner can save $23 per year

CFL Light Bulbs: $125
A house that invested $45 in changing 15 fixtures to CFLs would save $220 to $750 over the five-year life of the bulbs, depending on the cost of electricity.

Refigerator: $50
A fridge made before 1993 could cost you over $100 each year to operate. Replace it with a new Energy Star qualified model and cut your related energy cost in half.

Dishwasher $10
You can save $ 10 per year running the average Energy Star rated dishwasher vs. a non Energy Star dishwasher.

Washer: $135
Is you washer over 10 years old? Replace it with a new Energy-Star qualified washer and you could save over $135 each year on your utility bills.

Water Heater: $250
By using sunshine to heat or preheat your water, you can cut your water heating bill in half. If you have an electric tant water heater for back-up, you will save about $250 per year.

Furnace: $100
Switching to an Energy Star rated gas furnace can save $ 100 per year.

Do you know that?
The total amount saved in one year by switching to new, energy-efficient appliances and fixures is a little over $1000. With that money, after 1 year 4 ceiling fans, CFL light bulbs, the dishwasher, and the single room air conditioner would be paid for. After 9 years, all the appliances and fixtures could be paid for. By living in an energy efficient home, your appliances pay for themselves.

Source:
www.sears.com
www.energystar.gov
www.usenews.com

ACT ON THE GROUND
RETROFIT YOUR HOME

City of Vancouver's Renewable City Strategy on zero emission building priorities →

1. New buildings to be zero-emissions by 2030
2. Retrofit existing buildings to perform like new constructions

A. Make your home energy efficient

Retrofits are enhancements and changes to existing buildings to make them more comfortable and energy efficient. Because most buildings today will be around in 50 years, increasing their efficiency is a crucial step to low-carbon resilience, lower energy bills, and meeting community GHG reduction targets[50].

Energy smart green building

Green buildings refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort[51].

Basic retrofits include:

Attic

- Add insulation
- Seal major air leakage issues in chimney bypasses, recessed lighting, HVAC dicts, etc.
- Fix water leakage

Basement and Utility Room

- Replace with more efficient model and/or airsource heat-pump
- Improve insulation on water heater and piping
- Seal leaks from duct system and dryer venting

Other Rooms and Walls

- Seal air leaks around outlets, fixtures, doors, windows and fireplace
- Increase wall insulation (internal or external)
- Replace lights with LED bulbs

Do you know that?

Basic building retrofits, such as adding solar hot water can reduce total energy use by up to 30% and greenhouse gases by 33%. Major building retrofits, such as air source heat pumps and other renewable energy appliances can reduce total energy use by 75% and GHG emissions by 80%[52].

by Community Energy Explorer[@]

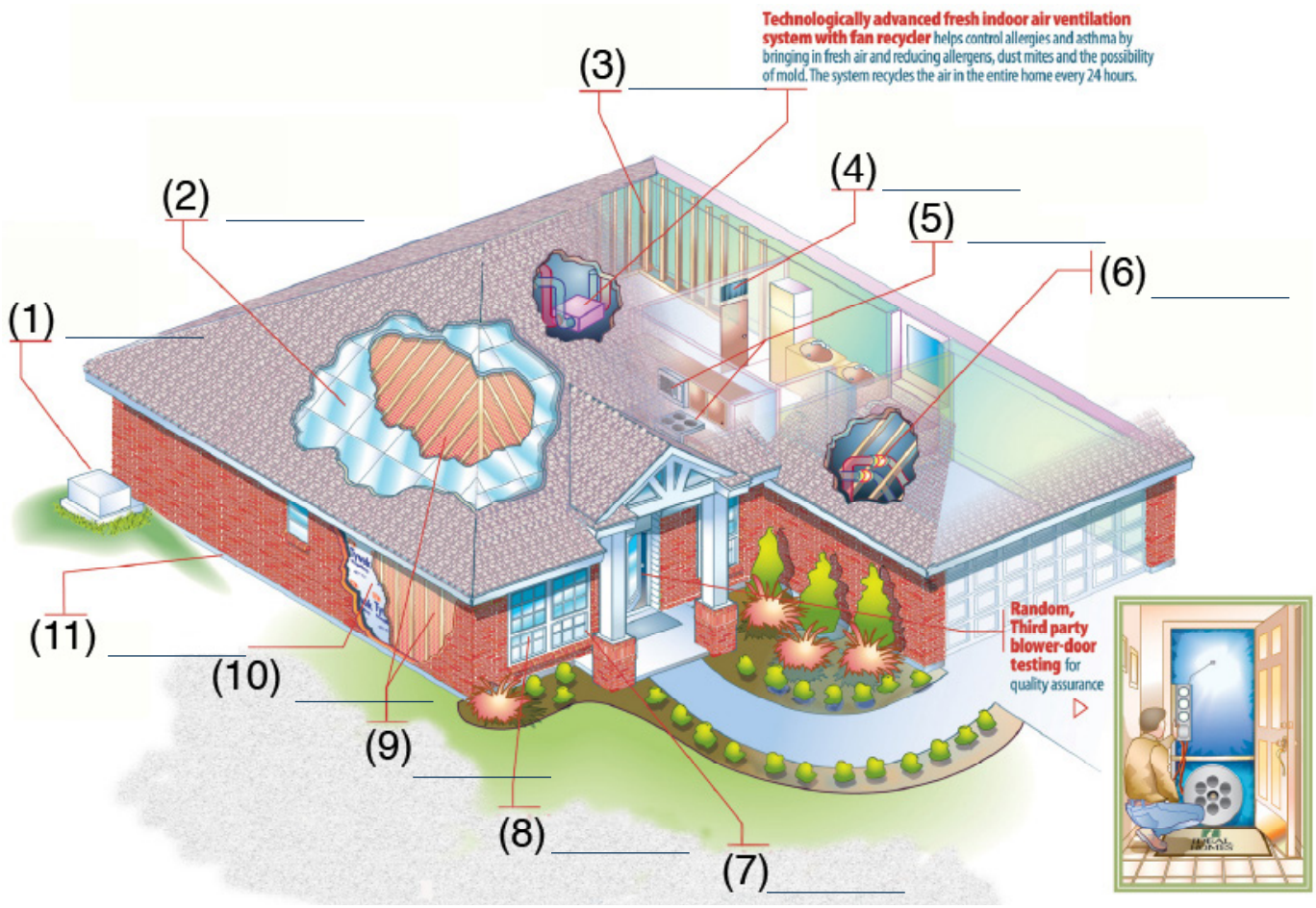
Do you have a better idea about home energy efficiency?
Bear the principles in mind and let's start our game!

ACT ON THE GROUND
RETROFIT YOUR HOME

Why do this? To gain more knowledge about how to retrofit your home into an energy smart green house.

You will need:

- 0.5- 1hours
- Think about new design possibilities and fill the blank spaces with your brilliant ideas about retrofitting this building (hints are given by lines connecting to the installations)
- Check the answers on page 58 to see if you can recognize all of the smart ideas



by ideal homes@

Interested in home retrofit?

Here are some relevant links to help you to change behaviors and redesign your house!

Ways to save heat and fuel at home: http://www.nef.org.uk/knowledge-hub/energy-in-the-home/ways-to-save-heat-fuel-at-home

Top 11 things you didn't know about saving energy at home: https://energy.gov/articles/top-11-things-you-didnt-know-about-saving-energy-home-summer-edition

Brilliant ideas about how to reduce your building carbon footprint and reduce energy consumptions: http://www.metalarchitecture.com/articles/8-tips-to-reduce-your-building-carbon-footprint

ACT ON THE GROUND
RETROFIT YOUR COMMUNITY

City of Vancouver's Renewable City Strategy on zero emission building priorities

→

1. Expand existing and develop new neighbourhood renewable energy systems
2. Ensure grid supplied electricity is 100% renewable

B. Redesign your community

Why do this? To identify solutions and create a more efficient, sustainable and cost-effective neighborhood through collective action at the community level

What is community energy?

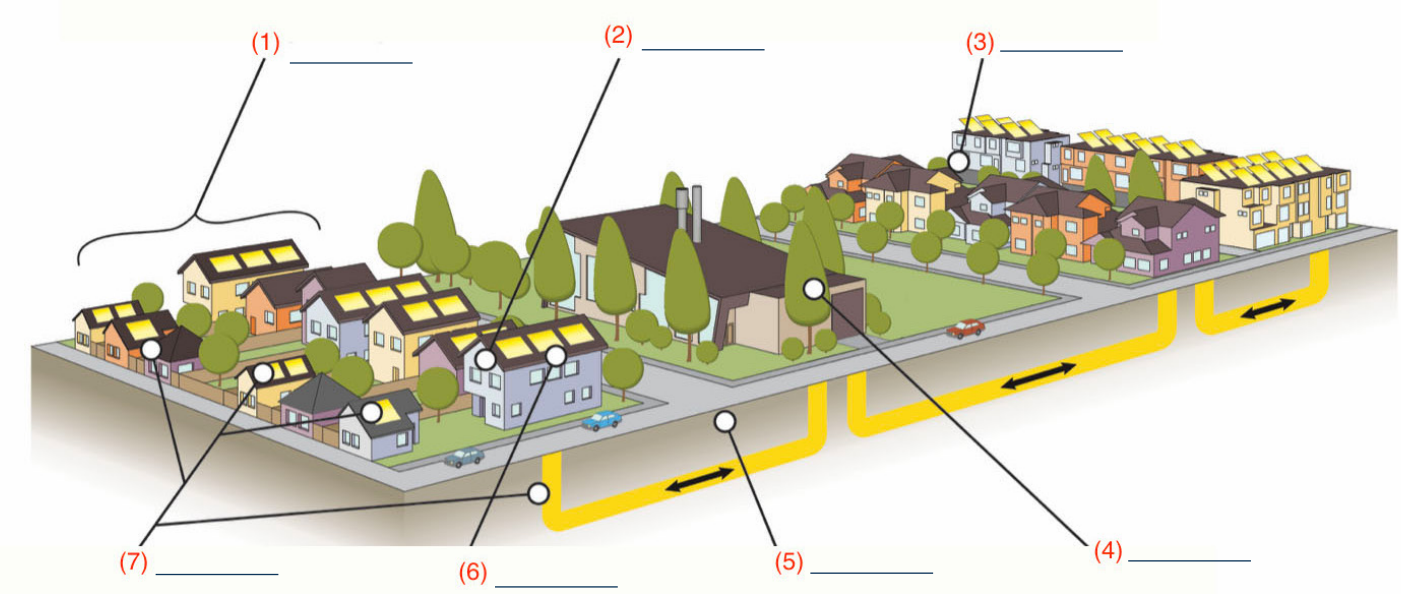
Community energy refers to multiple energy sources and distribution networks that are shared between various members of a geographic neighborhood, with at least part of the energy generated in the local area [54].

You will need:

- 0.5-1hours
- Think about new design possibilities and fill in the blanks with your brilliant ideas about energy use in your neighborhood enhancement (hints are given by arrows pointing to the sketch)
- Check the answer on page 59 to see if you can recognize all the smart idea

Supporting Indicators:

housing type/ residential density/ commute by mode/ green space/ floor area/ walkscore (where available)



Interested in the animation of climate change and community design? Explore the following wesite: http://www.climateandcommunity.ca/#first

VISION YOUR FUTURE
RETROFIT YOUR HOME-ANSWERS

Answers

Did you get it?

1. high-efficiency gas heating/ air conditioning

2. Roof sheathing
Reduce radiant heat transfer through the roof by 97%. Read more: https://energy.gov/energysaver/radiant-barriers

3. Advanced framing techniques
Reduce air linkage and ensure a tight envelope

4. Pressure balancing

5.Energy star appliances
To read more: https://www.energystar.gov/products/appliances

6. Mastic sealed a/c ducts
Wrap the ducts in mylar and reduce the duct leakage

7. Polycell caulking
Cut down leaks and air infiltration - makes a more energy efficient home
Read more: https://www.todayshomeowner.com/video/how-to-caulk-and-seal-gaps-and-cracks/

8. Vinyl window with low-E glass
Keep warm air in during the winter and hot solar rays out during summer.
Read more: https://energy.gov/energysaver/energy-efficient-windows

9. Blown-in insulation
Eliminate gaps by completely filling wall cavities with insulation and reduce air filtration.

10. Tyvek
Provide a breathable moisture barrier around the house

11. Perimeter insulation
Reduce the heat loss through the slab
Read more: https://buildingscience.com/documents/information-sheets/slab-edge-insulation

ACT ON THE GROUND
RETROFIT YOUR COMMUNITY-ANSWERS

Answers

Did you get it?

1. Completed and connected community

About 2500 residents are within a 5 minute walk of shops, services and offices in two neighborhood centres

2. Building retrofit

See detailed installations in the house/apartment modules

3. Enfficient housing type

Households in duplex, townhouse, and apartment dwellings located near services can reduce household energy costs by about 60% compared to suburb households

4. Tree shading

Trees on the east and west side provide cooling effects with summer shade – saving energy for air conditioning; pruning lower branches of deciduous trees to the south will allow the lower winter sun to strike the walls – saving energy for heating

5.Pumps and geo-exchange

Heat pumps can take heat from the air or ground and use it to provide space heat or hot water

6. Solar energy/ solar water hot system

Rooftop solar – uses photovoltaic cells to harvest the sun energy and convert that into electricity.

7. District energy system

Networks of hot and cold water pipes, typically buried underground, that are used to efficiently heat and cool buildings using less energy than if the individual buildings were to each have their own boilers and chillers. See an example in downtown Vancouver: http://vancouver.ca/home-property-development/southeast-false-creek-neighbourhood-energy-utility.aspx

VISION YOUR FUTURE
RETROFIT YOUR HOME-ANSWERS

Think about those new designs a bit more...

Are you familiar with all those installations?
Which ones do you know a lot about and which ones you have never heard of?

Have you or your family installed these retroftis at home?

Which ones do you want to install at your home in the future?

List the 3 most likely and 3 least likely, and discuss this with your friends.

(Think about factors such as cost/ livibility/ community support)

Do you think your family and your neighbours can work together to decrease the carbon footprints for your family and your community to 33% by 2020 (Remember: the City of Vancouver and BC also have the same target)?

Are there any other sustainable home energy efficiency designs that you can think of?

ACT ON THE GROUND
RETROFIT YOUR COMMUNITY-ANSWERS

Renewable City Strategy on Strategic active transportation → 1. Reduce energy use. 2. Increase the use of renewable energy. 3. Increase the supply of renewable energy.

350 calories

On 350 calories a cyclist can travel 16 kilometres, a pedestrian 5.6 kilometres, and an automobile 30.4 metres.
Source: Transportation Alternatives - Bicycle Blueprint, 1998

Energy Use By Mode (mJ/Passenger km)

MODE	EMBODIED	FUEL	TOTAL
Bicycle	0.5	0.3	0.8
Light Rail	0.7	1.4	2.1
Bus	0.7	2.1	2.8
Heavy Rail	0.9	1.9	2.8
Car, Petrol	1.4	3.0	4.4
Car, Diesel	1.4	3.3	4.8
Ferry	1.2	4.3	5.5

Source: Victoria Transportation Policy Institute, "Energy Conservation and Emission Reduction Strategies"

Active and sustainable transportations benefit you and your block in various ways

- Lower GHG emissions
- Reduce pollutions emitted by motorized vehicles
- BIOPHILIA: build connections with nature
- Increase urban forest/tree canopy and promote walking
- Mimic natural hydrology and facilitate water infiltration

ACT ON THE GROUND
ADDITIONAL RESOURCES

Here are some additional resources that you may find interesting. Reading materials refer to resources that contain articles or documents, while online or interactive tools involve clicking around exploration of different information resources..

READING MATERIALS

- Vancouver's Renewable Energy Strategy:
  http://vancouver.ca/files/cov/renewable-city-strategy-booklet-2015.pdf
  Incorporating environmental, social, and economic pillars of sustainability, the Renewable Energy Strategy lays out goals and tasks Vancouver must take to achieve 100% renewable energy in 2050 and reduce GHG emissions by 80% before 2050.
- Vancouver's Greenway Network: http://vancouver.ca/streets-transportation/city-greenways.aspx
  Learn more about Vancouver's many greenways, and where the nearest one to you is located. Once complete, the greenway network will reach 140 km long and span from Marpole to False Creek!
- Urban Forest Climate Adaptation Framework for Metro Vancouver:
  http://www.metrovancouver.org/services/regional-planning/PlanningPublications/UrbanForestClimateAdaptationFrameworkTreeSpeciesSelection.pdf
  What are the risks facing urban forests? How can we build resilience going forward? This strategy outlines the current condition of our urban forests, labels the threats, and describes how to move towards a more resilient future.
- Climate Action in BC: http://engage.gov.bc.ca/climateleadership/climateaction/
  What has BC done to fight against climate change? Visit this site to see what has been done in the built environment, transportation, and industry sectors as well as across sectors.

ONLINE or INTERACTIVE

- Community Energy Explorer: http://energyexplorer.ca/
  An interactive website that allows you to explore community energy. Zoom in on your neighbourhood and see what the energy potentials are for each community .
- World Bank GHG Emissions Map:
  http://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?end=2012&start=2012&view=map
  Curious about the emissions of other countries? Discover the emission levels of all countries and economies..
- Leafsnap (app): leafsnap.com
  Snap a photo of a leaf, seed, or flower from an unknown tree and this app will help you identify it.
- Grow Your Garden or Find the Right Plant: http://www.growgreenguide.ca/
  This website gives you a variety of beautiful garden-bed layouts, and helps you find the perfect plant for any corner in your garden.
- Treepedia: http://senseable.mit.edu/treepedia/greenindex/london/d7laGxAA2RAQgVPDrL1uwQ
  Just how much canopy cover does Vancouver have relative to other cities? This website shows you the approximate green canopy cover of over twenty major cities, including Berlin, Seattle, Tel Aviv, and Cape Town.

CONGRATULATIONS!

_____

(Full name)

HAS COMPLETED ALL COOLKIT STEPS!

Starting date: _____

Finishing date: _____

Wow - you have finished the Coolkit!

How do you feel? What did you learn after this journey?

Let us know your thoughts at our website http://calp.forestry.ubc.ca/home/urban-forestry-toolkit/

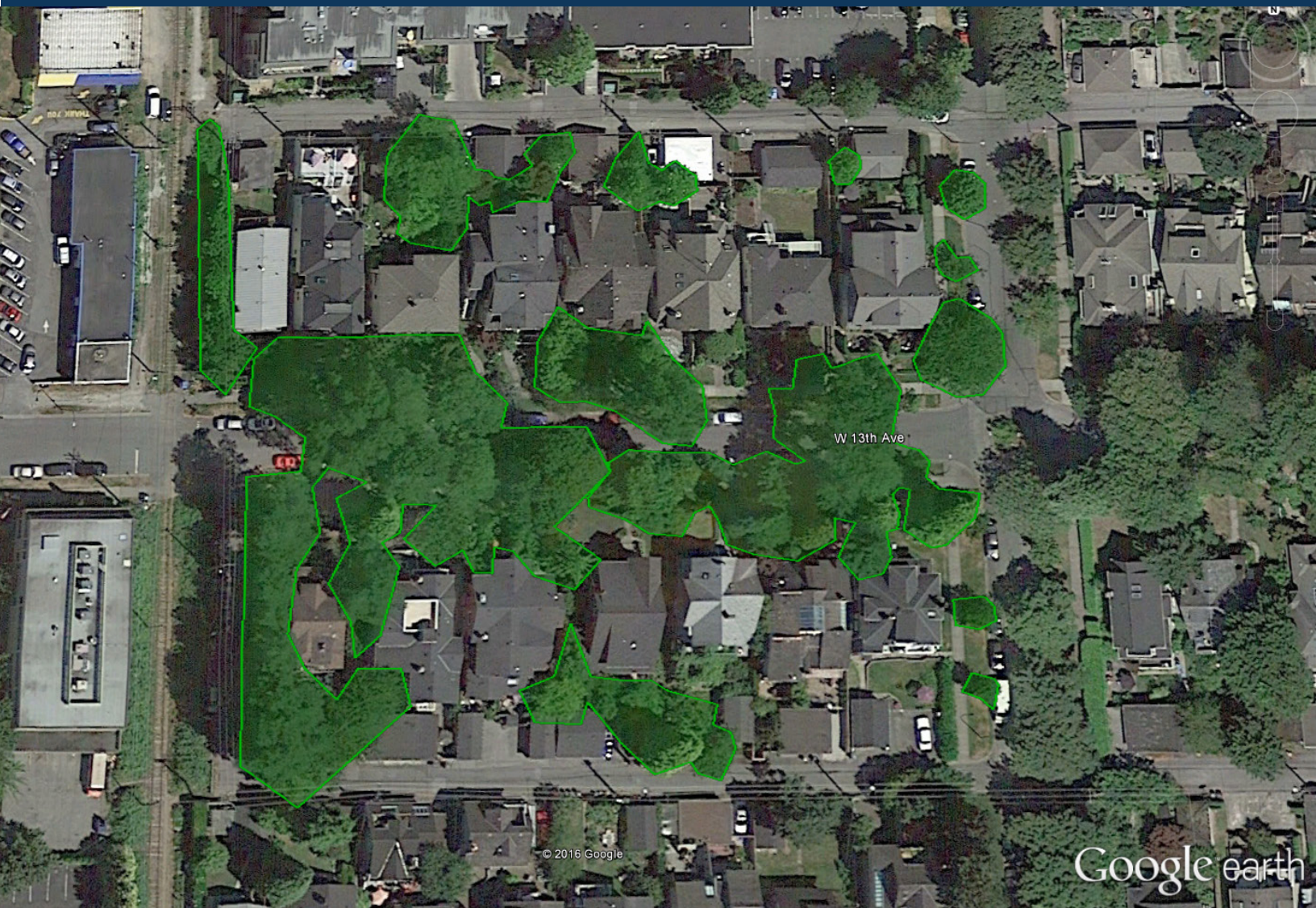
OR

email us at citizenscoolkit.vancouver@gmail.com

APPENDIX

You've made it this far! This is the section for those interested in going the extra mile in their activities or are more computer-oriented. Here are further instructions for activities requiring the use of computer software.

1. **HOW TO MAP** with Google Earth
2. **HOW TO MAP** with i-Tree
3. **HOW TO MAP** with Vanmaps
4. **HOW TO VISUALIZE** with GIMP



MAP YOUR BLOCK

HOW TO MAP WITH GOOGLE EARTH

You will need:

- 1-2 hours
- A computer connected to the Internet

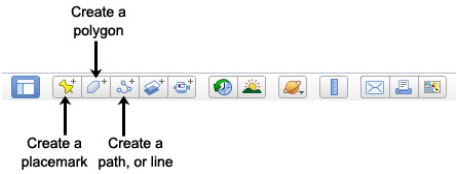
CREATING POLYGONS (HABITAT)

Here we use canopy mapping of squirrel habitat as an example:

1. Download Google Earth Pro (free) on your computer first. You can download it here: http://www.google.com/earth/download/gep/agree.html.

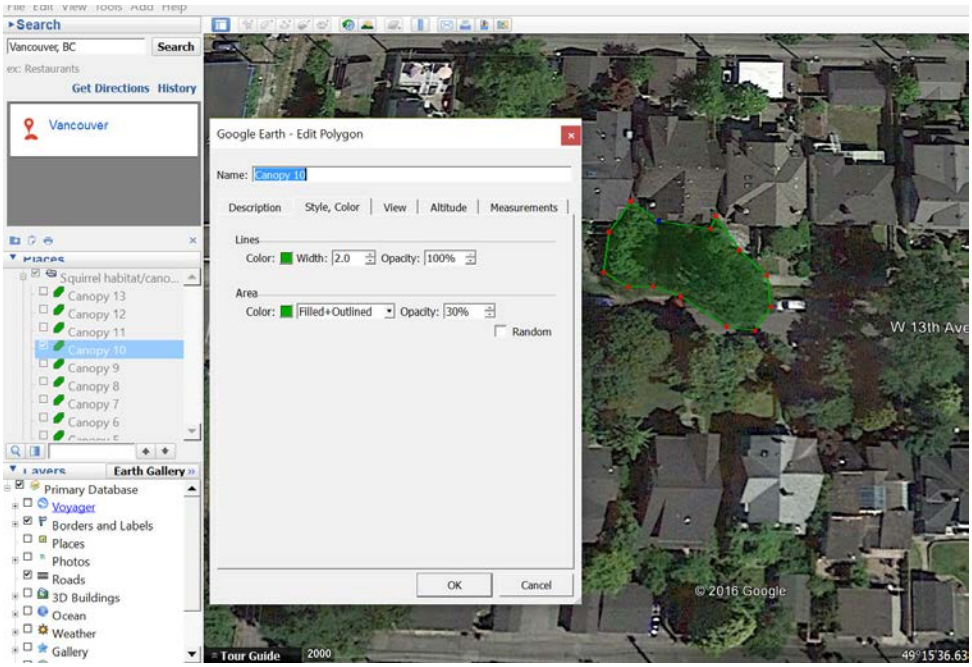
2. Type your address in the search bar on the left panel of Google Earth to find your place.

3. Menu bar:



4. Use the button to add and create a polygon. Click points around the border of the canopy that you would like to mark. Left-click adds a new vertex (point), right-click removes the last vertex that you added. Click OK to finish tracking.

5. Continue adding polygons for each area of canopy. You will see them show up in your Places menu on the left panel. Map all trees or tree clumps on your property, and give each tree/canopy a unique name as you like.



Want to learn more? Please go here: https://www.google.com/earth/learn/

MAP YOUR BLOCK
HOW TO MAP WITH I-TREE

You will need:

- 1-1.5 hours
- A computer connected to the Internet

What is i-Tree?

i-Tree (http://www.itreetools.org/) is software developed by the US Forest Service to provide urban/rural forestry analysis and assessment. Here we will use one of the i-Tree tools, i-Tree Canopy, for this exercise. You will find out the % coverage of each habitat and estimated ecosystem services of greenspaces on your block by using this tool.

MEASURING LANDUSE TYPE COVER

Here we use canopy mapping (squirrel habitat) again as an example:

1. Go to https://www.itreetools.org/canopy/index.php. You should see the webpage on the right.

2. Click Define Project Area › when the pop-up appears, and click Accept

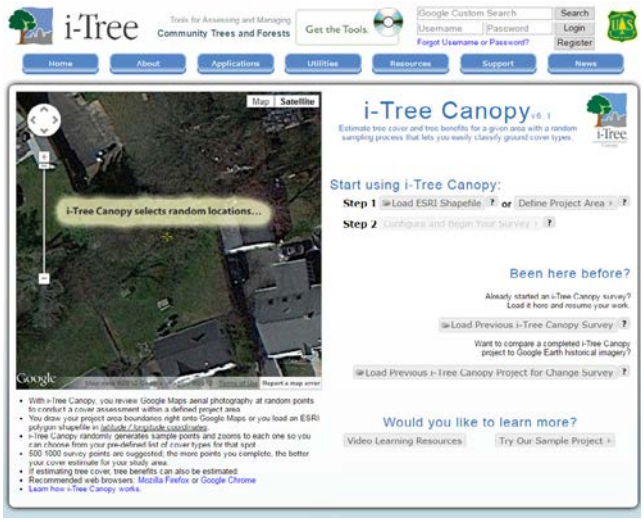
3. When the map appears, enter any address into the search bar on the top right (or zoom onto Vancouver) and make a polygon of your block. Click Finish when you are done.

4. The website will bring you back to the main i-Tree Canopy page. Click Configure and Begin Your Survey ›

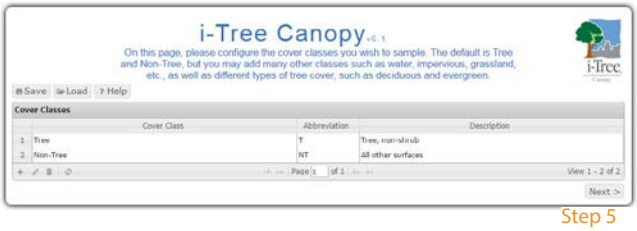
5. A new page will open with your i-Tree classes. The default classes are Tree and Non-Tree. Change the classes as squirrel habitat, car habitat, worm habitat, and pigeon habitat by selecting one of the four icons directly under your classes.

   Feel free to use these classes or make your own (some suggestions are: water, buildings, grass, and soil).

   Note that some classes may be difficult to distinguish from each other by just using the images, so make sure that you can tell the classes apart.



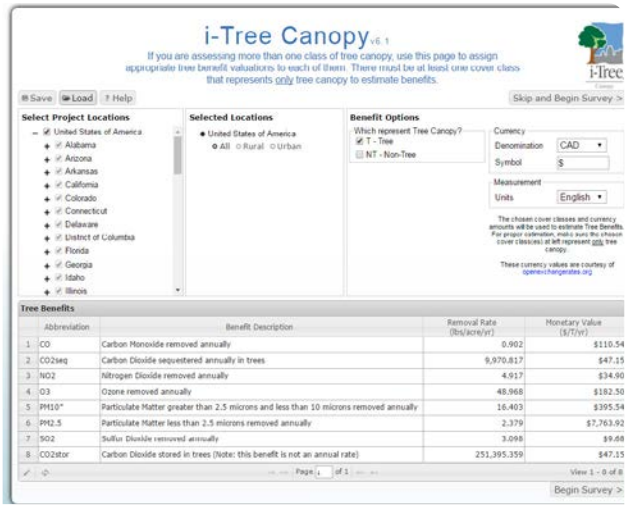
Step 1



Step 5

6. A new page will open asking you questions about how to quantify the benefits of your urban forest. Change the currency to Canadian dollars (CAD).

   Keep the project location as the USA., as that is currently the only available location.



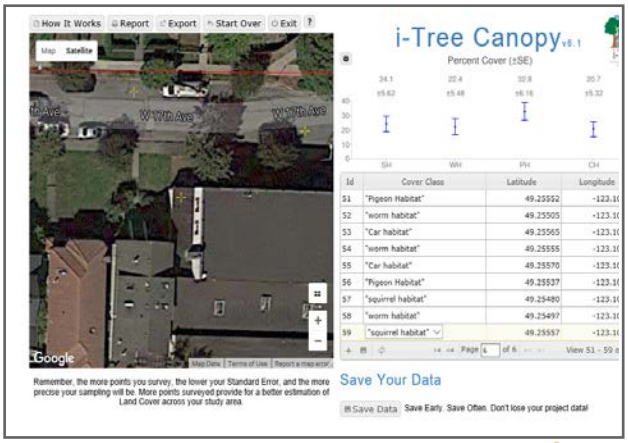
Step 6

7. Now we get to place random points and classify them!

   Under Id click the + symbol.

   Which one of your classes does this point correspond to? Change the *Cover Class* to the class you want and click the + symbol again. Do this at least **100 times** to get a good representation of points for each class (at least 30 for each class). Do it more than 100 times if you're having fun!

   Save your data *to make sure that you don't lose it*



Step 7

8. Click Report to see the ecosystem services provided by the trees and greenspace in your area, such as pollutant removal, carbon sequestration.

Cover Class	Description	Abbr.	Points	% Cover
"squirrel habitat"	Tree, non-shrub	SH	23	21.9 ±4.04
"worm habitat"	grasses & soil - pervious surfaces	WH	24	22.9 ±4.10
"Pigeon Habitat"	Rooftops - impervious surfaces	PH	38	36.2 ±4.69
"Car habitat"	Roads & driveways - impervious surfaces	CH	20	19.0 ±3.83

Tree Benefit Estimates

Abbr.	Benefit Description	Value	±SE	Amount	±SE
CO	Carbon Monoxide removed annually	$0.05	±0.01	14.54 oz	±2.6
NO2	Nitrogen Dioxide removed annually	$0.09	±0.02	4.96 lb	±0.9
O3	Ozone removed annually	$4.74	±0.87	49.35 lb	±9.0
PM2.5	Particulate Matter less than 2.5 microns removed annually	$9.79	±1.80	2.40 lb	±0.4
SO2	Sulfur Dioxide removed annually	$0.02	±0.00	3.12 lb	±0.5
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$3.44	±0.63	16.53 lb	±3.0
CO2seq	Carbon Dioxide sequestered annually in trees	$242.93	±44.76	5.02 T	±0.9
CO2stor	Carbon Dioxide stored in trees (Note: this benefit is not an annual rate)	$6,124.95	±1,128.63	126.68 T	±23.3

Step 8

The tree benefits estimate table provides insight into the ecosystem services provided by trees on your block - trees remove many com- - pounds from the air, such as pollutants and greenhouse gases, which would otherwise be very costly to manage

NOW YOU CAN TELL PEOPLE QUANTITATIVELY HOW IMPORTANT TREES ARE TO THE CITY!

Want to learn more? Please visit:
https://www.itreetools.org/resources/

CALCULATING THE AREA OF A POLYGON - GOOGLE EARTH

Google Earth Pro is free to download

1. Once you have created a polygon in Google Earth, right-click it in the Places menu (on the left of the screen). Select "Get Info" and a Google Earth – Edit Polygon window opens up. You can see the measurements of the polygon's area and perimeter by looking under the button Measurements

   You can also change polygon styles (e.g. colour, transparency) in the Properties window under Style, Color tab (see picture in the previous page).

2. Measure the area covered by trees in your property, and divide this by the total area of your property:

$$\text{Tree canopy cover (\%)} = \frac{\text{Tree canopy (total area of the polygons)}}{\text{total area of your place}} \times 100\%$$

   You will get a percentage of area covered by tree canopies, which is the **tree canopy cover**.

   You can also measure the tree canopy cover of your block and compare with the city's average (18%).

DON'T FORGET TO SAVE YOUR WORK: click *File> Save> Save my places*, and all of the polygons will be saved to the *My Places* section of the Places menu.

CALCULATING THE AREA OF A POLYGON - EARTH POINT

**To use Earth Point, you need Google Earth installed on your computer.*

1. Open a new tab on your browser and visit http://www.earthpoint.us/Shapes.aspx.
2. Go back to your polygon in Google Earth, right-click and click "Copy".
3. In your Earth Point website, paste into the text box.
4. Choose your preferred dimensions
5. Calculate and view the results


```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2" xmlns:gx="http://www.google.com/kml/ext/2.2"
xmlns:kml="http://www.opengis.net/kml/2.2" xmlns:atom="http://www.w3.org/2005/Atom">
<Document>
    <name>KmlFile</name>
    <StyleMap id="m_ylw-pushpin">
        <Pair>
            <key>normal</key>
            <styleUrl>#s_ylw-pushpin</styleUrl>
        </Pair>
```


Step 3

	Name	Shape Type	Number of Points	Area (Sq Meters)	Perimeter/Length (Kilometers)	Centroid/Mid-Point (Degrees)	Bounding Box Maximum (Degrees)	Bounding Box Minimu (Degrees)
1	Test1	Polygon	4	25,318	0.65	49.2476416°, -123.0886581°	49.2485490°, -123.0877336°	49.2467158°, -123.0

Step 5

MAP YOUR BLOCK
HOW TO MAP WITH VANMAP

You will need:

- 1/2 - 1 hour
- A computer connected to the Internet

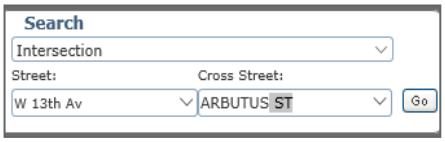
What is VanMap?

VanMap is an interactive mapping tool available on the City of Vancouver's website. It allows you to view many different features such as property lines, zoning districts, streets, traffic counts, water utilities, and many more. You can also view high quality aerial photos of the Vancouver area which provides photo detail not accessible on Google Earth - this can be very useful in cases where you want to look at various features in you neighbourhood more closely.

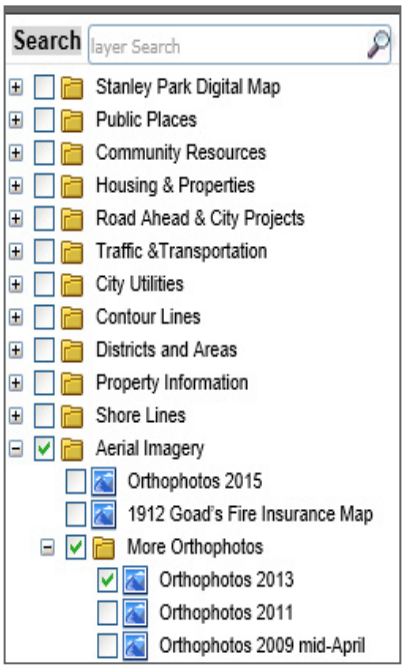
FINDING AERIAL PHOTOS & CREATING POLYGONS

1. Go to http://Vancouver.ca/your-government/vanmap.aspx and click on Start VanMap
2. Enter your cross street or address at the top left search field to find your block on the map and zoom in by clicking
3. Uncheck all the legend boxes except 'Aerial Imagery' and select an orthophoto of your choice
4. You can move around the map using the pan tool
5. You can create polygons by selecting in the tool box. These can be used to map areas of risk or habitats. Skip this step if you would like to draw on your map by hand
6. Print out the image by clicking in the toolbox
7. If you are having fun, try exploring the different features and tools available to learn more about your block and neighbourhood!

Detailed aerial photo with street names overlayed



Step 2



Step 3

Step 5

VISION YOUR FUTURE
HOW TO VISUALIZE

There are many ways to visualize your block in the future. Here are two common ways:

1. With markers (easiest and quickest) – Page 22
2. With GIMP (free alternative to Photoshop) – Page 70

1. VISUALIZE with markers

Print a few copies of the street views on your block, and use markers to draw out the following scenarios. Please see detailed instructions on page 22.

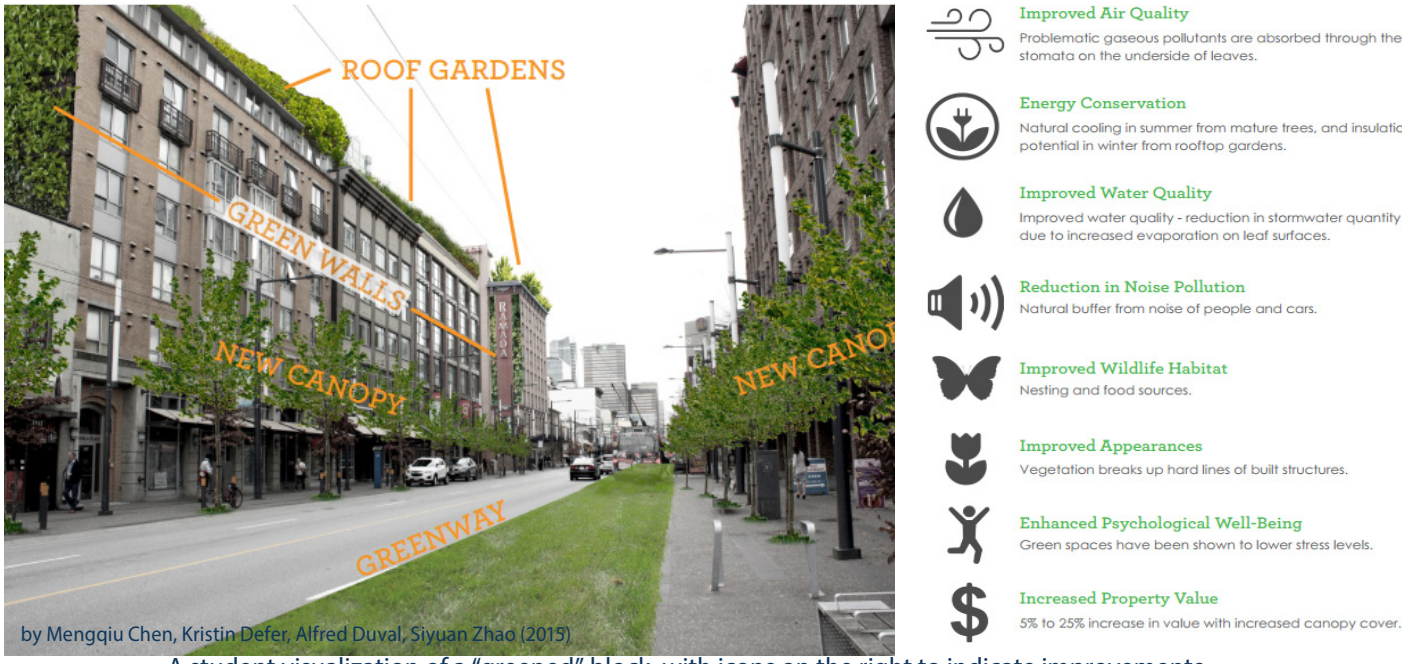
You will need:

- 30 minutes
- Several colourful markers
- Several photos of your block/yard to map on
  You can print them on regular paper instead of photo paper. Recommended size: 11" by 17" or 18" by 24".

2. VISUALIZE with GIMP

There are several kinds of visualization tools that are easy to access and use, e.g. GIMP, Photoshop, Sketchup...
Here are some useful tutorials if you want to try them out:

- Adobe Photoshop: https://helpx.adobe.com/photoshop/tutorials.html
- Google Sketchup: http://www.sketchup.com/learn



by Mengqiu Chen, Kristin Defer, Alfred Duval, Siyuan Zhao (2015)

A student visualization of a "greened" block, with icons on the right to indicate improvements

VISION YOUR FUTURE
VISUALIZE WITH GIMP

You will need:

- 1-1.5 hours
- A computer connected to the Internet
- Pictures in which you want to visualize potential futures

What is GIMP?

GIMP (https://www.gimp.org/) is free image editing software that allows you to compose and retouch digital images.

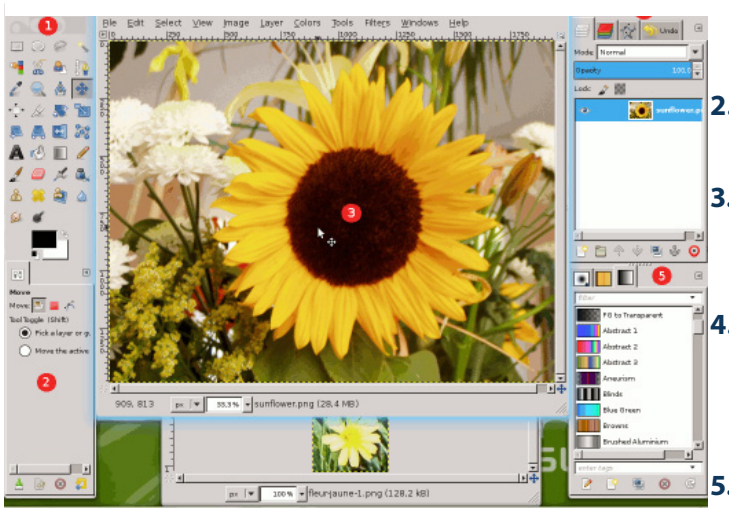
Here are some quick tutorials to help you visualize with GIMP (the following content is adapted from the **GIMP User Manual**[11]:

GIMP QUICKIES: FIRST AND FOREMOST...

Go to https://www.gimp.org/downloads/ to download the installation package and install GIMP by following the instructions.

Here is a quick intro of some key concepts and the interface of GIMP:

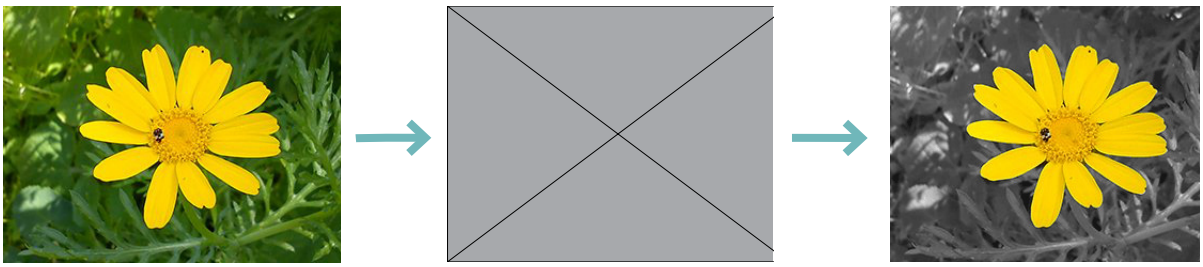
- IMAGE - basic entity to display and retouch in GIMP. It is like a single sheet of paper where you can draw.
- LAYER - similar to digital tracing paper stacked on top of the other, so you can draw on each paper (i.e. image) but still see and preserve the original the content of the other sheets.
- UNDOING - this is very important to know especially when you do something wrong, try the keyboard shortcut: *Ctrl+Z*.
- SAVING YOUR WORK - DON'T FORGET TO SAVE YOUR FILES: go to *File* > *Save as...* an .xcf (will save layers) or *File* > *Export as...* a .jpg (flattens layers).



Basic arrangement of GIMP Windows (multiple-window mode)

1. **The Main Toolbox:** Contains a set of icon buttons to select tools. You can use *Edit>Preferences>*Toolbox to enable, or disable the extra items.
2. **Tool Options:** Shows options for the currently selected tool (in this case, the Move tool).
3. **Image Windows:** Shows the image that you open in GIMP. You can display multiple images at the same time.
4. **Layers, Channels, Paths, Undo History Dock:** They are shown as tabs. The layers tab shows the layer structure of the currently active image, allowing it to be manipulated in different ways.
5. **Brushes/Patterns/Gradients:** Shows the dialogs (tabs) for manging brushes, patterns and gradients.

Work with images: separating an object from its background



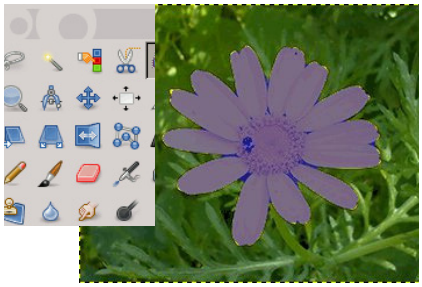
Sometimes you need to separate the subject of an image from its background, and use it on an existing background. To do this:

1. Select the object using the following tools:

Free Select Tool that allows you to create a selection by drawing the boundary free-hand with the pointer.

Intelligent Scissors Select Tool that uses edge-recognition algorithms to better fit the border around the object.

Foreground Select Tool that lets you mark areas as "Foreground" or "Background" and refines the selection automatically.



2. Once you have selected your subject successfully, use *Select* > *Invert*. Now, instead of the subject, the background is selected.

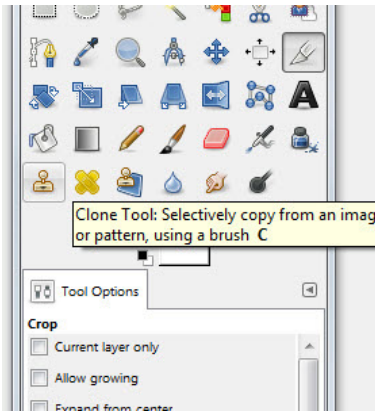
3. Use *Layer* > *Transparence* > *Add Alpha Channel* to add an alpha channel. Next, use *Edit Clear* or hit the *Del* key on the keyboard to remove the background. Please note that only a small subset of file formats support transparent areas. Your best bet is to save your image as PNG.

Work with images: combining elements from more than one image

Using the *Clone* tool, adjust opacity, brush type and size, and then while holding the *Ctrl* key, sample part of an image, then clone it to a different part of the image.

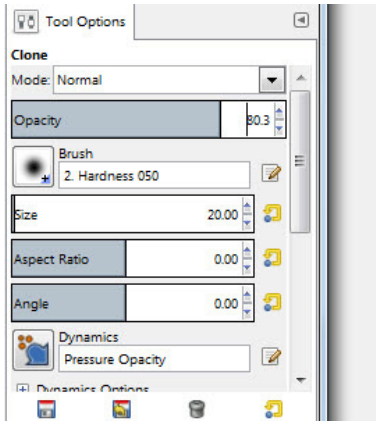
Open a new image and duplicate the layer (right-click > *duplicate*). Drag the layer into the first image.

Under *Image* > *Canvas Size*, double the canvas size, and then move the new layer to the side. Clone stamp elements of one layer over the other.



The Clone Tool in the Main Toolbox

Detail Setting of the Clone Tool



Want to learn more tools and functions of GIMP, please check **GIMP User Manual** at https://docs.gimp.org/en/index.html

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