Smarter Cities Challenge

Burlington, VT

April 18th 2013

BURLINGTON VERMONT

Burlington applied for the IBM Smarter Cities Grant

-- Burlington's challenge --

*Burlington's challenge is to **develop a plan** and implement broad based **greenhouse gas reductions** that take advantage of the **smart meter infrastructure** and other **investments** the city has already **made**, and at the same time **strengthen Burlington's economy** and the city's **financial position**.*

April 1-7, 2013
Information Gathering

- **6 facilities tours** incl. the McNeil Generation Plant
- More than **40 individual and group interviews**
  - City, State and Federal **government**
  - **Education and Healthcare** institutions
  - **Utilities, Non-profit, Community** organizations
  - Small and Medium **Business**, IBM-Burlington

April 8-14, 2013
Data Synthesis and Review

April 15-20, 2013
Final Recommendations

Final Report

- Findings
- Recommendations
- Conclusions

Presentation to the City of Burlington

Special Thanks and Acknowledgement


organic
baseline
smart-grid
biomass
engaged
passion
innovation
communication
preservation
islands
wind
Burlington
sustainability
energy
community
hydro
knowledge
technology
efficiency
positive
renewable-resources
health
entrepreneurial
local
nature
weatherization
city
green
stewardship
proud
collaboration
commitment
data
renewable
solar
positive-energy
potential
geothermal
opinions

sustainability

Conservation

Intelligent resource usage

Energy efficiency

Renewable Energy Sources

Distributed and smaller sources

Intermittent versus base load

Storage of energy

Understanding the system

Patterns and insights

Enable consumer choice

New ecosystem

Burlington Climate Action Plan targets

- Stop increase of GHG emission
- 2016: GHG emissions reduced to 2010 levels
- 2025: GHG emissions of Municipal Operations reduced by 20% compared to 2010 levels
- 2025: 10% reduction from 2010 levels by Airport and Community-wide

Burlington Electric (BED)

- 100% from renewable sources

Vermont State Energy Plan

- 90% from renewable sources by 2050

Clear expectations and measureable targets

→ **Data** mandates action

→ **Data** defined what the team focused on

→ **Data** as a prerequisite to sustainability

DATA DRIVEN ALIGNMENT AND COLLABORATION

- Many positive initiatives
- Strengthen through alignment
- Support effective execution

Implement a strictly fact based, data driven approach:

- ✓ Establish baselines and measurable targets
- ✓ Decisions based on data and business cases

Gain new insights:

- ✓ Securely share data across all City departments and utilities
- ✓ Provide open anonymized aggregated data
  - ✓ to the Public
  - ✓ to Institutions of higher learning
  - ✓ to businesses

Leverage deep / predictive analytics, integrated data visualization, and real time collaboration

- ✓ Four focused recommendations
- ✓ A framework to support alignment and achievement of long term GHG goals

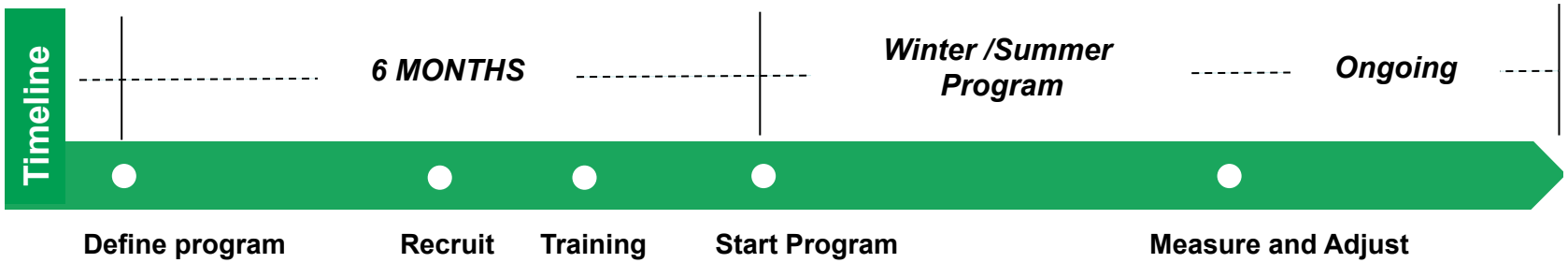
ENERGY EFFICIENCY ENGAGEMENT

- Aged Real Estate
- 57% Renter occupied
- Several disconnected programs
- Challenge to know the "right" program

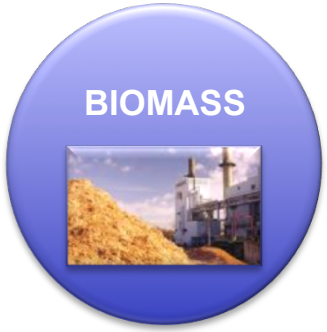
Owner: BURLINGTON ELECTRIC DEPARTMENT

OUTCOMES

- Face to Face engagements
- Team of trained volunteers will proved onsite advice / contacts
- Capture data to improve programs



	Baseline	Achievement	GHG Impact	Programs Used
Electricity	KWH	KWH	% change	Pgm ID(s)
Gas / Fuel Oil	ccf / gallons	ccf / gallons	% change	Pgm ID(s)



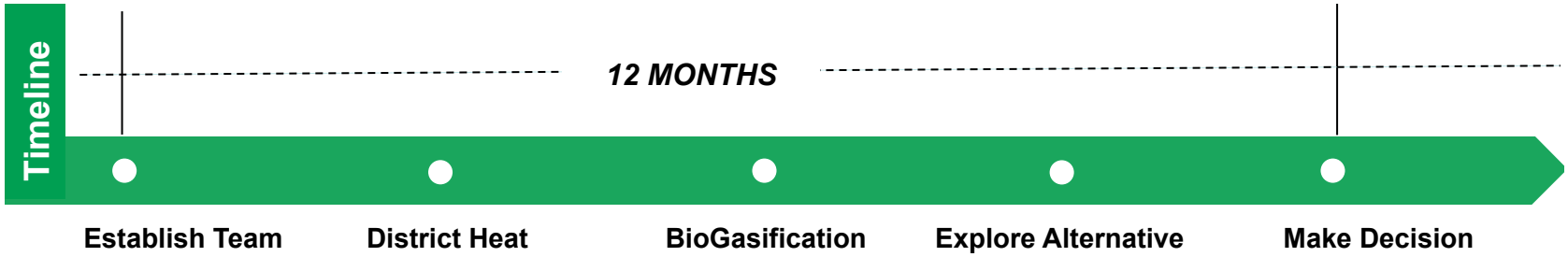
OPTIMIZE USE/EFFICIENCY

- McNeil efficiency at 25%
- Decision pending on how to optimize McNeil
- Unsuccessful pilot for biomass gasification

Owner: MCNEIL PLANT OWNERS

OUTCOMES

- Reach conclusion which optimization(s) to implement
- Resolution of district heating system
- Resolution of biomass gasification
- Discovery of agricultural / alternative usages



	District	BioGas	Agriculture	Alternative(s)
CapEx / OpEx	dollars	dollars	dollars	dollars
Partners	name(s)	name(s)	name(s)	name(s)
GHG impact	tCO2e	tCO2e	tCO2e	tCO2e
Energy Prod.	BTU	CCF	TBD	TBD

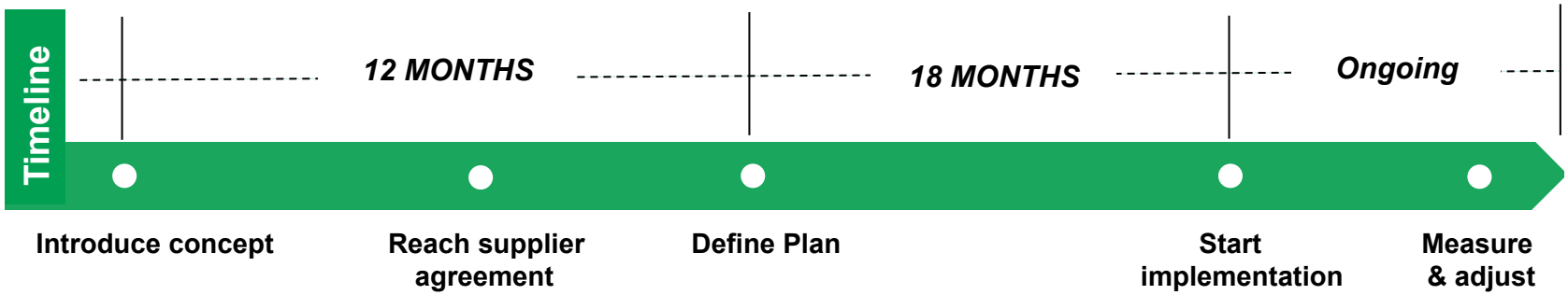
INTEGRATED TRANSPORTATION SOLUTION: ELECTRIC VEHICLES SHARING

- 51% GHG emissions from transportation (2010)
- Traffic and parking issues
- Pervasive usage of single occupancy vehicles

Owner: OFFICE OF THE MAYOR (initial)

OUTCOMES

- Integrate with existing transportation systems
- Built with local technologies
- Easy to use through mobile devices
- High level of acceptance through sizeable fleet



	Before Touch	After Touch	GHG Impact	Programs Used
Distance	Miles	Miles	% changed	Pgm ID
No. of passengers	Number	Number	% changed	Pgm ID
GPS Locations	Time/Location	Time/Location	% changed	Pgm ID

HOLISTIC APPROACH TO RESOURCE CONSUMPTION MANAGEMENT

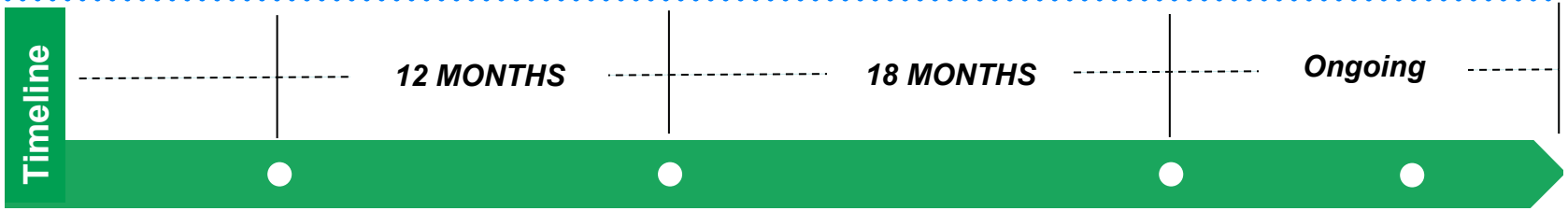
ELECTRICITY, NATURAL GAS, WATER

- Siloed energy usage
- Customers lack data
- Intermittent renewable energy
- High heating bill

Owner: BURLINGTON ELECTRIC DEPARTMENT

OUTCOMES

- Consumers see, manage, make informed decisions on energy mix
- Data available to understand patterns and automate usage
- Utilities better predict and manage energy demand, supply, outages
- Cost reduction through new rate models
- Measurable reduction of resource usage and GHG emissions
- Launching point for data driven City-wide "Intelligent Operations"



	Electricity	Gas / Fuel Oil	Water	Transportation	Total
Current	KWH	ccf	Gallons	VMT	CO2e
GHG Impact	CO2e	CO2e	CO2e	CO2e	CO2e
Renewable	%	%	%	%	%

Detailed Roadmap

	Short Term < 12 months	Medium Term 12 to 36 months	Long Term > 36 months
Smart Grid	• Complete smart grid rollout • Complete the rollout of user portal (Energy Engage)	• Integrate gas and water • Augment user portal to complete energy picture	• Participate in the city-wide operations center • Use analytics with enriched information (weather, humidity, ...)

Biomass	• Make definitive decision:
	  • District heating
	  • Biomass gasification
	  • Other methods to increase efficiency
		• Implement the selected solution	• Optimized use

Transportation	• Develop EV share program value proposition • Identify EV supplier of choice	• Define final business case • Approve and launch program	• EV sharing operation
Energy Efficiency	• Confirm experts to perform trainings on efficiency programs • Train team of volunteers • Launch winter campaign	• Execute summer campaign • Gather data • Establish database	• Analyze data and identify program improvements • Launch adjusted and/or new programs

Framework – alignment – achievement of long term GHG goals

Make Burlington synonymous with Green Tech

ATTRACT BUSINESSES
RETAIN TALENT

- **Common vision**
- **Align all initiatives**
- **Effective execution**

"The whole is greater than the sum of its parts"
Aristotle, 384bc – 322bc

Build on the unique strengths of Burlington, VT

- Innovative, entrepreneurial spirit
- Abundant local sources of renewable energy (biomass, wind, geothermal / hydro, solar)
- Lake protection and Storm Water Management
- Access to nationally recognized institutions of higher learning, research and healthcare (UVM, Champlain College, FAHC etc.)
- Inflow of tourists

Make Burlington synonymous with Green Tech

ATTRACT
BUSINESSES
RETAIN TALENT

- **Understand green technologies**
- **"Package" and provide solutions**
- **Showcase and educate**
- **Marketing and Communication**

Translate Green Technologies into Business outcomes:

- Differentiate Burlington around a strong "Green" theme / "branding"
- Inspire data driven renewable energy curricula
- Showcase newest green technologies

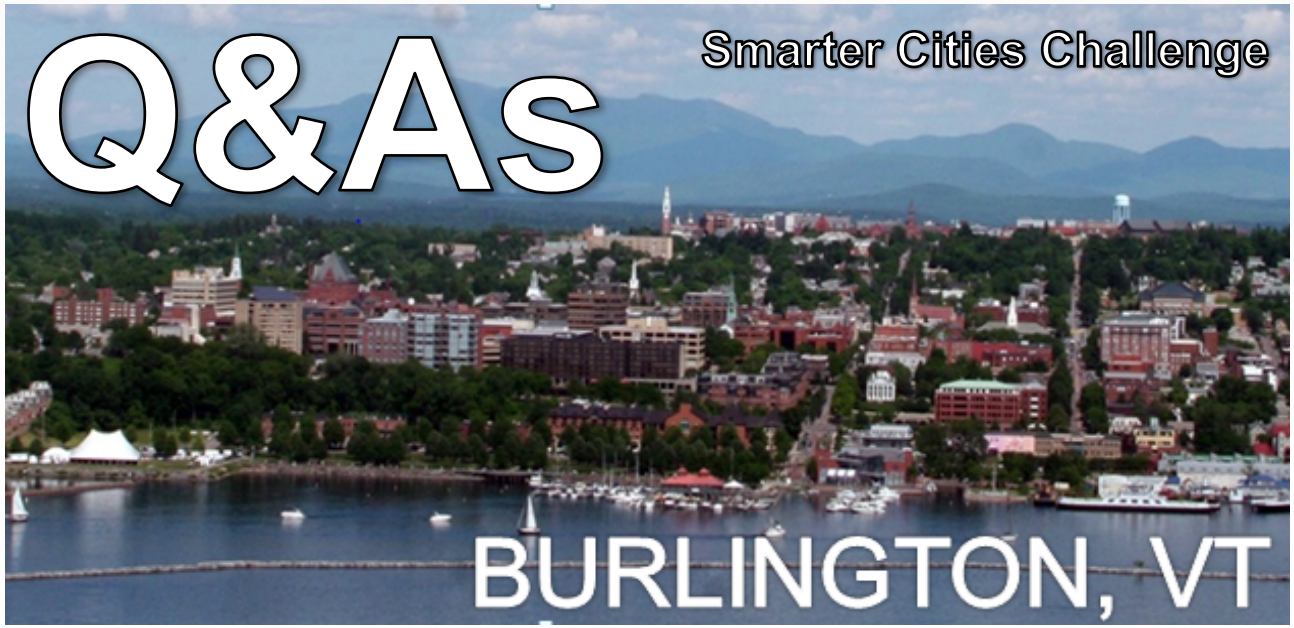
- Attract and support new businesses
  - Pro-green business policies
  - To introduce renewable energy solutions
  - Facilities to display and promote innovations
  - Address a growing market

- Raise attractiveness of Burlington for tourists

Job creation, strengthening Burlington's financial position.

"I skate to where the puck is going to be, not where it has been."

Wayne Gretzky



IBM

Danke

Благодаря

Děkujeme

Merci

Thank you

Obrigado