

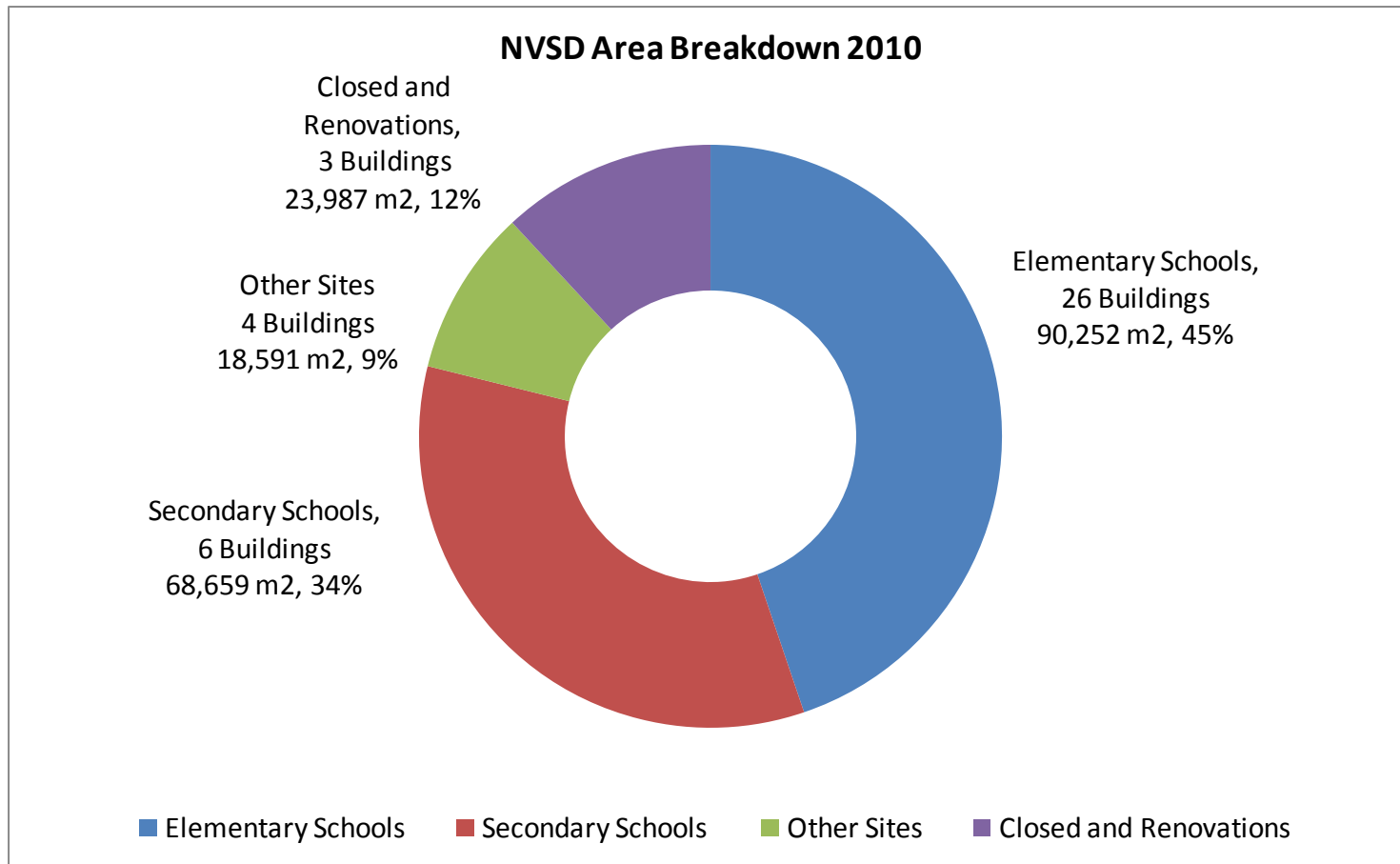


BC Hydro Energy Manager Program Update to Finance and Facilities Subcommittee

Robert Greenwald, PEng – Energy Manager
Prism Engineering Ltd.
September 13, 2011

- Annual Energy Use and Costs
- Benchmarking Analysis
- Review of Past Energy Savings and Planned Targets
- Summary of Initiatives
- List of Projects
- Draft Energy Management Plan
- Next Steps
- Questions & Discussion

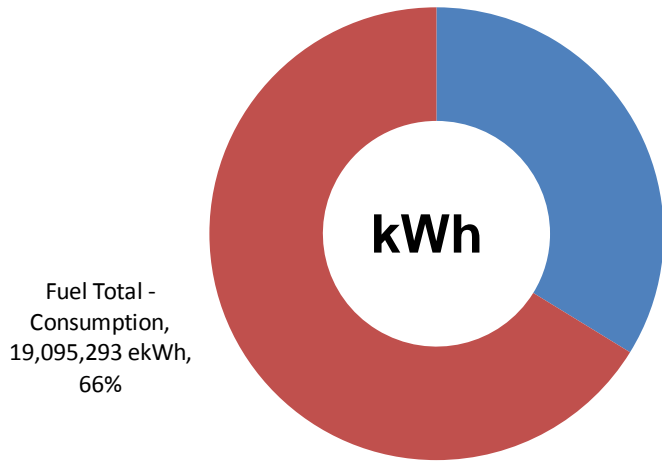
NVSD Buildings Overview



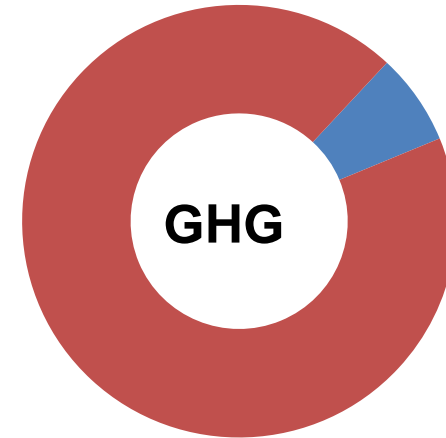
Total as at March 2011: 39 sites and approx. 200,000 m²

Note: all data excludes 4 leased locations, Leo/LMCC 1 site

Energy Consumption and Costs 2010 **BC Hydro**

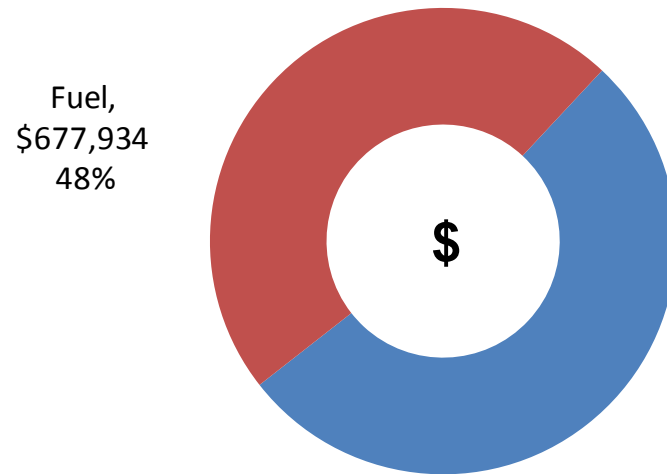


Electrical - Consumption,
9,724,452 kWh,
34%



Electricity,
252.85 tCO₂e, 7%

Fuel,
3448.60 tCO₂e,
93%



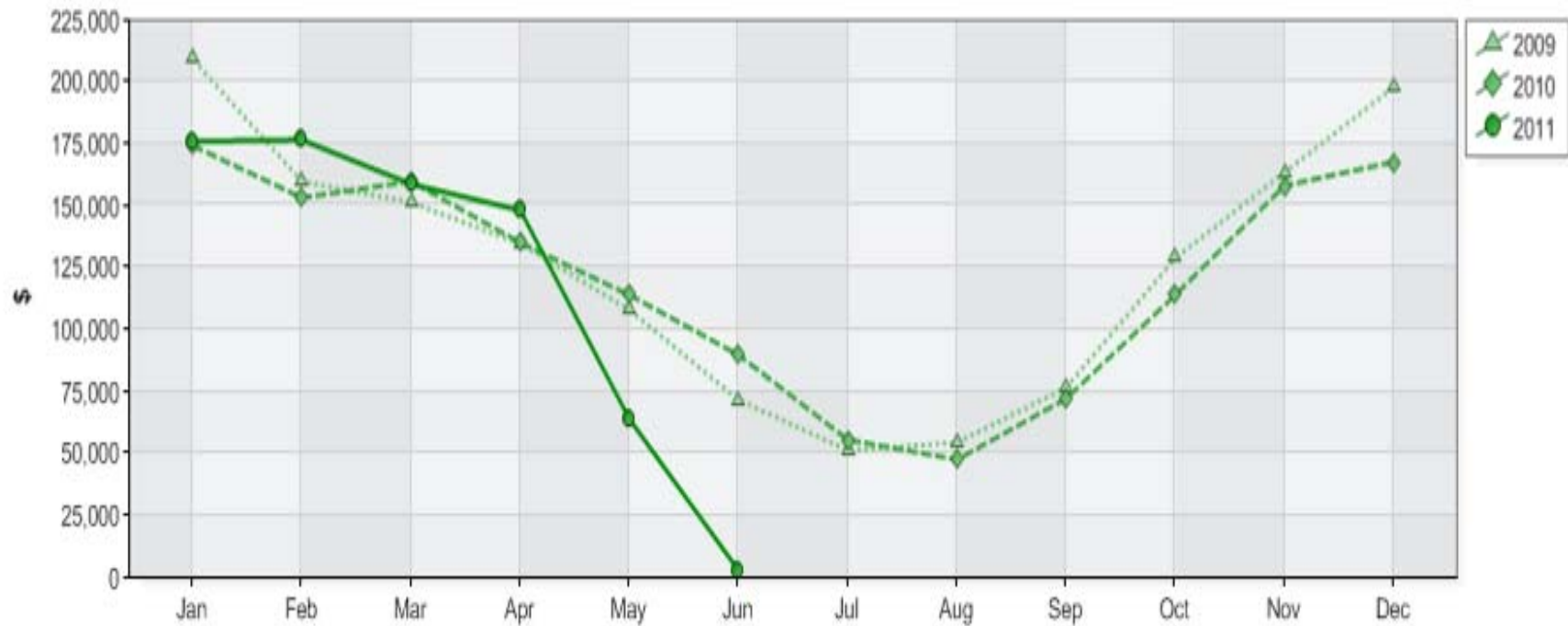
Fuel,
\$677,934
48%

Electricity,
\$748,517
52%

■ Electricity ■ Fuel

Average Rates:
7.7 cents/kWh
9.86 \$/GJ

Three year cost overview



Notes:

- 2011 data only complete up to April
- Carbon Taxes not included
- Leased schools not included

Chronology of Energy Management Activities

1999	Detailed Energy Audit Report of all schools
2001	\$3.3 million Comprehensive Lighting and DDC upgrade contract carried out with savings of 3,400,000 kWh and 17,446 GJ . \$1.0 million Water metering and conservation project also carried out
2006	New Lynn Valley Elementary school opens
2007	New Westview Elementary school opens
2008	New Sutherland Secondary school opens
2009	New Highlands Elementary school opens
Up to 2010	To consolidate student enrolment, five schools closed (Fromme, Maplewood, Monterey, Westover, Plymouth) and all except Plymouth leased out to third parties. Increased usage of other schools contributed to lower district wide energy use.
2011	Major retrofit of Ridgeway Elementary (LEED Gold target)
2011	Planned completion of new Environmental Learning Center at Outdoor School (LEED Gold target)
2012	Planned completion of new Carson Graham Secondary (LEED Gold target)
2012	Planned completion of new Artist for Kids and Education Services Building (LEED Gold target)
2013	Planned completion of new Queen Mary Elementary (LEED Gold target)

Where We Have Been.... Historical Energy Savings

Utility	2000	2007-2010 Average	Decrease	2010
Electricity	12,000,000 kWh	10,500,000 kWh	12.5%	9,700,000 kWh
Fuel	111,000 GJ	77,000 GJ	30.0%	69,000 GJ
Total				

kWh = one kilowatt for one hour
GJ = one gigajoule

Note: absolute numbers, not adjusted for closures, area changes etc...

Recent Progress (2008-10)

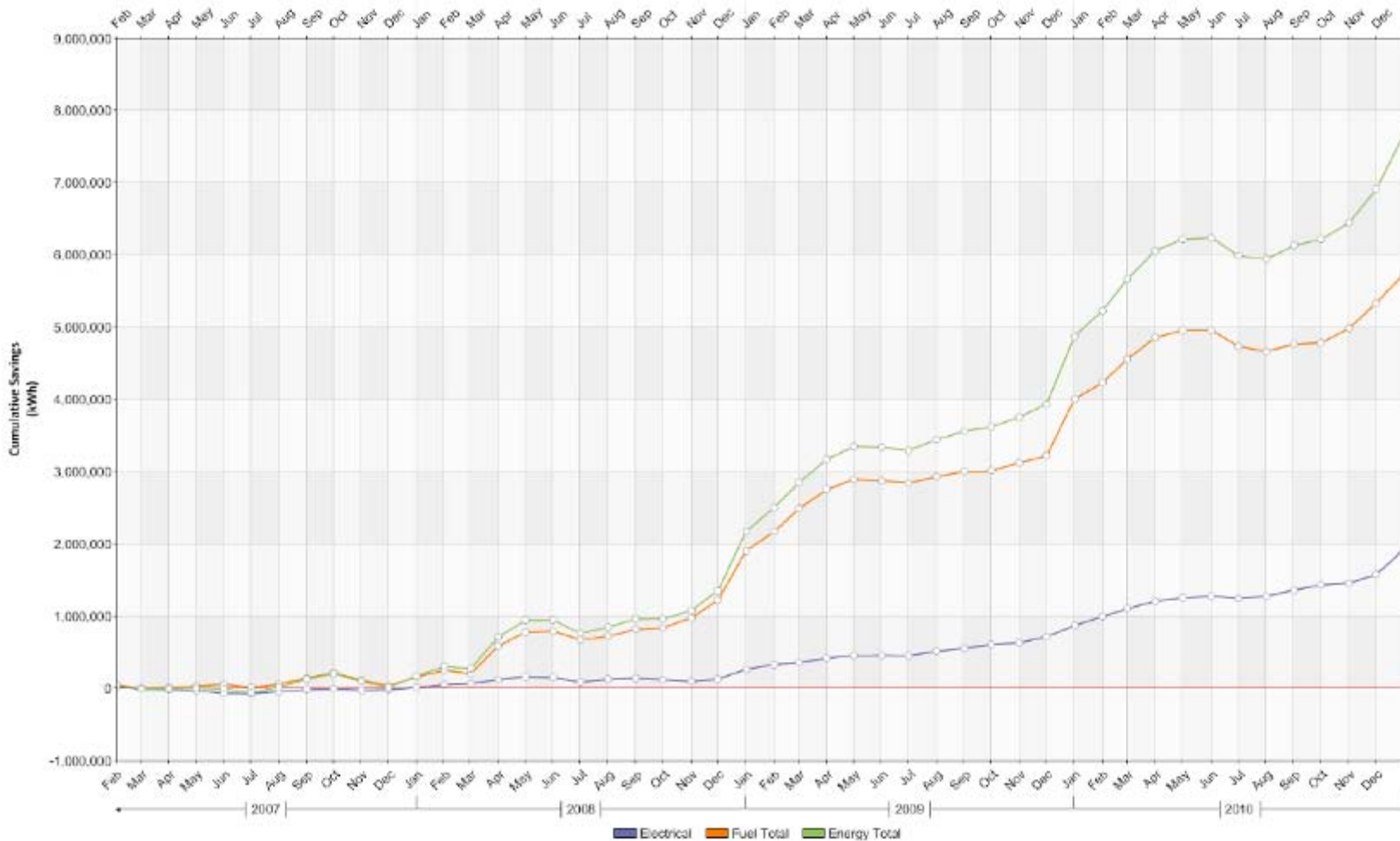
2007 Baseline – weather adjusted savings

Year	Electrical Savings	Fuel Savings	Total Savings
2008	2%	7%	5%
2009	5%	8%	7%
2010	10%	8%	9%

Cumulative Savings (2008 -2010)

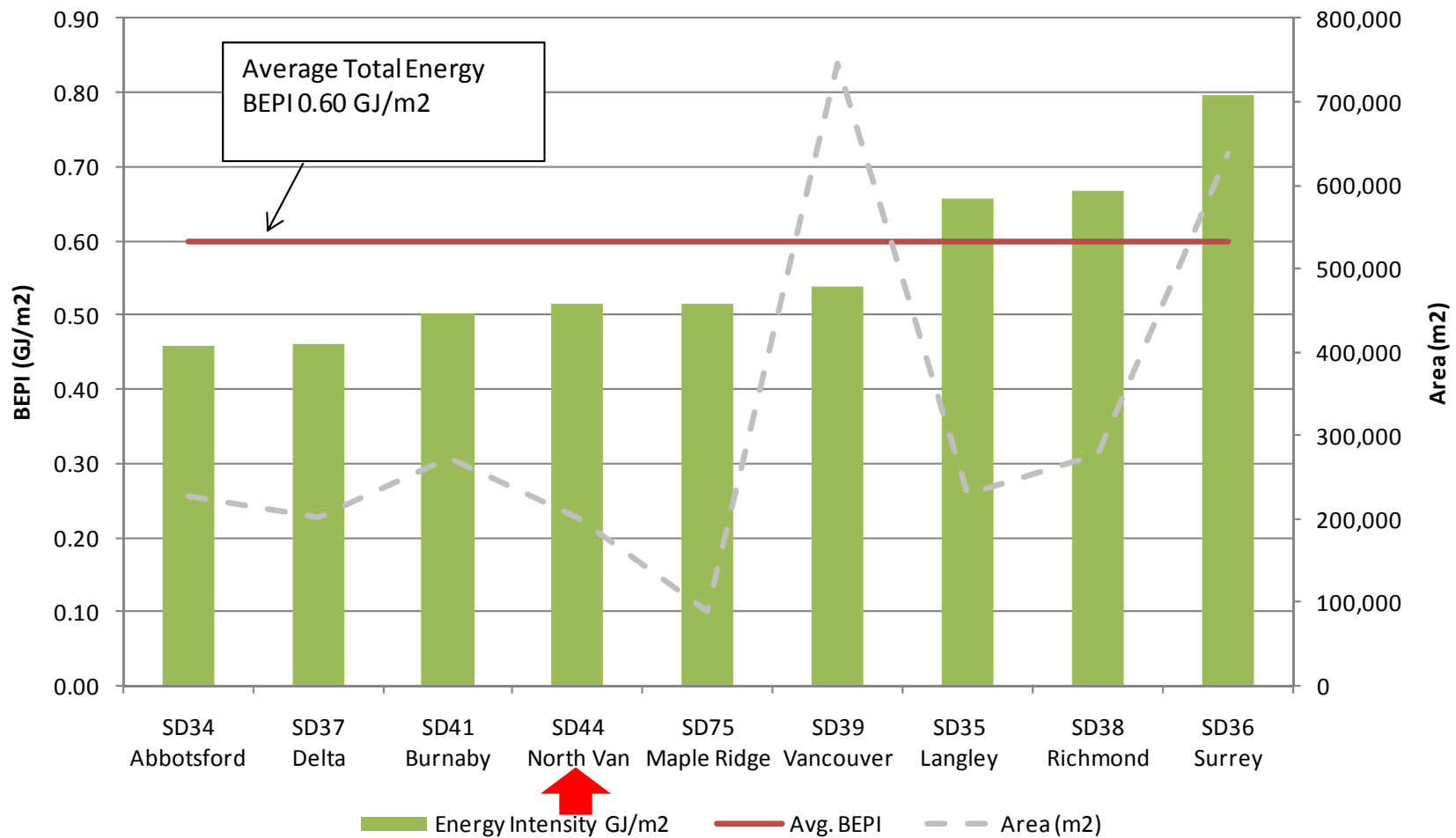
Savings By Project By Month (2007 - 2010)

Project: SD#44 - North Vancouver - Energy Manager (2011111)



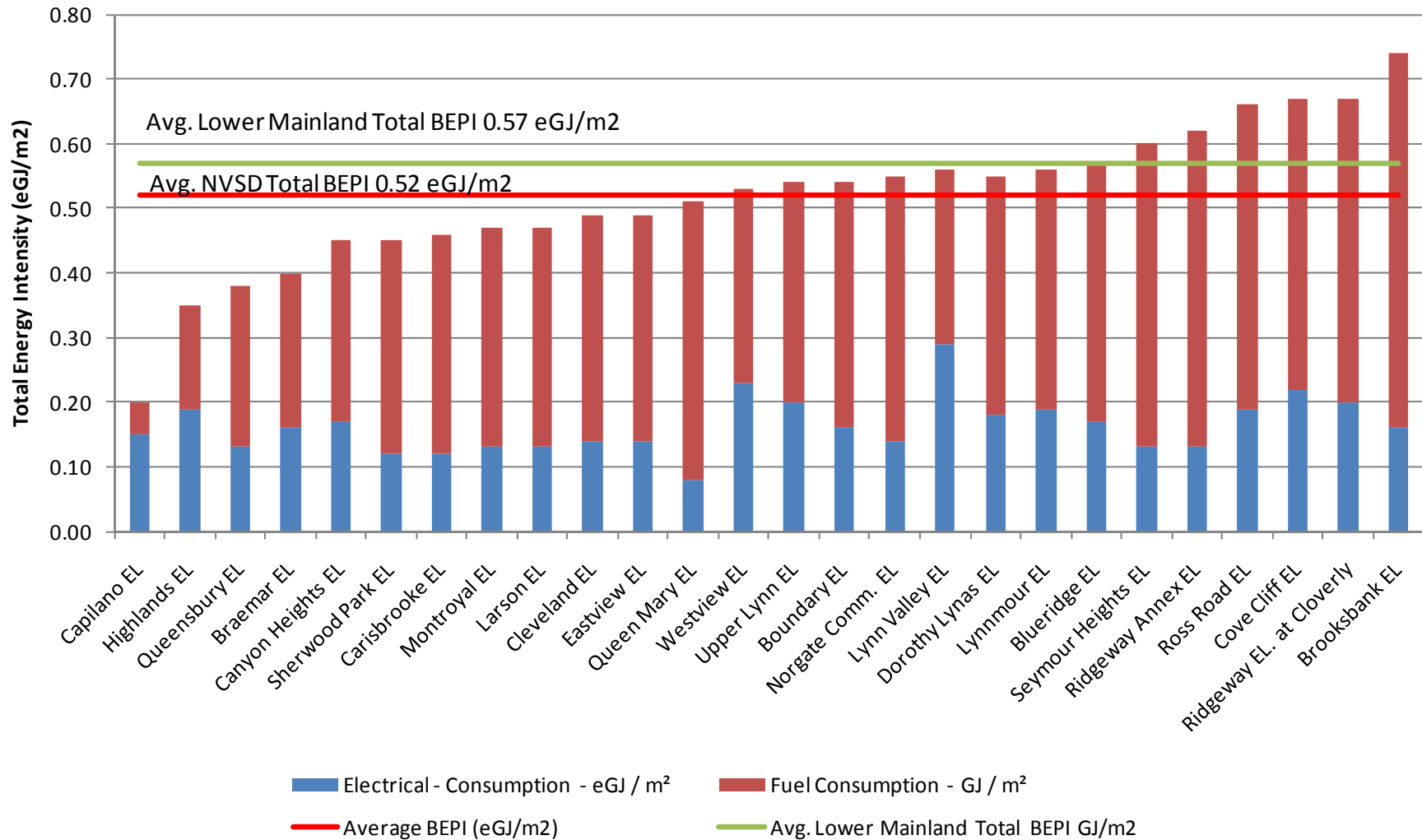
Comparison to Other School Districts

Lower Mainland School District Benchmarking
All Schools - Total Energy Intensity (GJ/m²)
2010



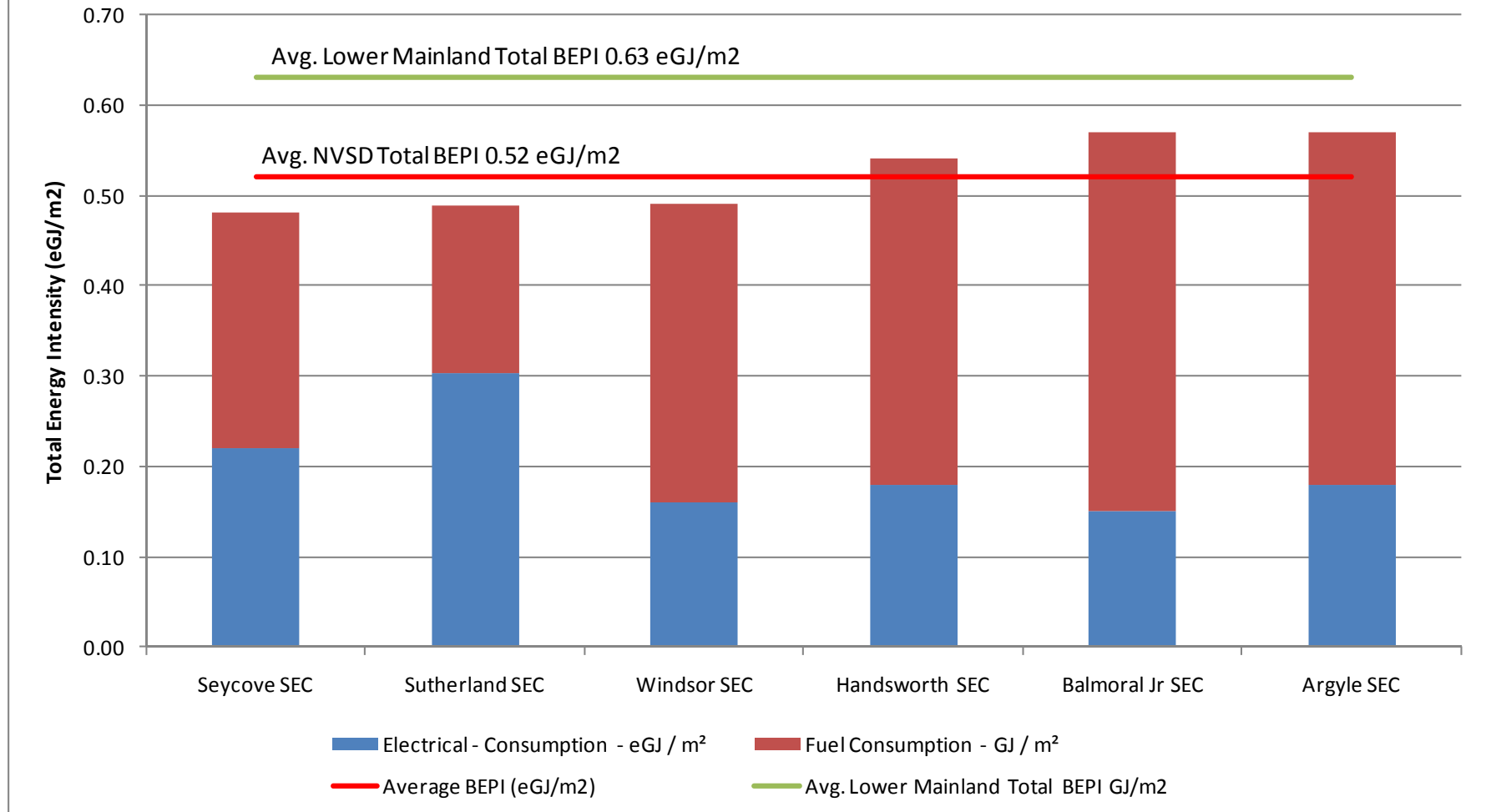
Elementary Schools – Energy Benchmarking

NVSD Total Energy Intensity - Elementary Schools 2010



Secondary Schools – Energy Benchmarking

NVSD Total Energy Intensity - Secondary Schools 2010



Six Month Update on BC Hydro Initiatives from Energy Management Assessment (EMA)

The EMA Process – 10 Building Blocks



★ NVSD Energy Manager 5 Priorities

Demonstrated Leadership Commitment



“Our SD is deeply committed to environmental sustainability and Energy Management practices”

-John Lewis, Superintendent

- Review of existing NVSD policy related documents.
 - 10 year Strategic Plan
 - Letter of commitment to energy management
- Research and prepare a 'Chronology of Energy Management Events'
- Draft updated Letter of Commitment
- Draft Energy Management Plan



September 9, 2010

Wayne Cousins
Senior Key Account Manager
Customer Care & Conservation
BC Hydro
Suite 900 – 4555 Kingsway
Burnaby BC V5H 4T8

Dear Wayne:

Subject: Energy Management Assessment (EMA) – Confirmation of Interest and Commitment

It was a great pleasure to receive and read the *Energy Management Assessment: Final Report and Action Plan* of May 2010 for the North Vancouver School District. I believe that the report fairly represents our current conditions related to Energy Management and provides sound preliminary directions for the future. I was pleased to be able to participate in the May workshop and received positive feedback from others regarding the follow-up meeting that I was unfortunately unable to attend.

Our School District is deeply committed to environmental sustainability and energy management practices. The opportunity for us to extend our long-standing relationship with BC Hydro will afford us further opportunities to demonstrate our School District's commitment and leadership towards these positive ends.

I would like to formally confirm our sincere interest in pursuing the opportunity to proceed with the implementation of the identified recommendations to support our energy management activities. As the Superintendent and Chief Executive Officer, one of my responsibilities is to serve as the Chair of the Policy Review Committee. At our first meeting of the year we will be reviewing an initial draft copy of a Sustainability Policy that responds to the EMA Report's recommendation [1.1] regarding *Demonstrated Leadership Commitment*.

On behalf of the North Vancouver School District and the many interested parties, thank you for providing the opportunity for us to move forward with the optimization of energy management within our School District. I look forward to proceeding with the next steps to continue our positive working relationship.

Yours sincerely,


John Lewis
Superintendent of Schools
JCL:ps

.../2

6 Goals:

1. Encourage the growth of collaborative and adaptive learning environments
2. Expand the availability of best instructional practices and enriched curriculum
3. Develop and promote innovative and sustainable programs
4. Nurture an inspiring and healthy workplace
5. Provide leadership in environmental education and sustainability practices
6. Strengthen and expand reciprocal community relations

5 includes 2 key objectives related to Energy Management:

- Integrate environmental education and sustainability into the curriculum.
- Integrate sustainability as a priority in all business practices.



Both objectives include short term strategies related to EM

In March 2011, the Board adopted Policy 613-Sustainability.

Policy

The Board will strive to maintain and operate its facilities and services in a sustainable manner, and seek opportunities in its short- and long-term planning to reduce its environmental footprint. The Board is committed to working in ways that do not jeopardize current and future social, environmental, and economic resources. It will integrate economic, environmental, and social considerations into its decision-making.

Definition

Four pillars of sustainability:

1. Support environmental education and sustainability initiatives
2. Decrease dependencies upon the earth's finite resources
3. Reduce waste and harmful emissions into the environment
4. Respect green space through responsible stewardship.



Understanding Performance and Opportunities

Existing Buildings

- Review of HVAC systems via DDC system and identification of opportunities
- Energy use index comparisons to other School Districts (benchmarking) in the Lower Mainland
- Lighting relamping specification and tender for 24 buildings;
- Power Smart incentive applications for lighting retrofits (3)
- Continuous Optimization program approved for 4 largest energy using secondary schools
- Green IT meetings and program launch

Understanding Performance and Opportunities

Capital Projects

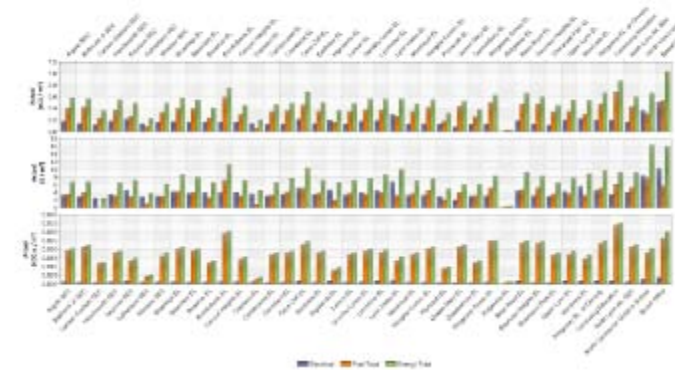
- Review plans and opportunities for five Capital projects.
- New Construction Program Lighting Applications (3 projects submitted)
- Input into Solar hot water heating at CG for Solar BC project
- Input into Measurement and Verification scope for AFK/ESC project
- Review of Mechanical options report for Queen Mary
- Review of Design Guidelines for Capital Projects

- Hired Energy Manager for 6-month review
- Hired Energy Manager for 12-month term (Oct 1-11 to Sept 30-12)
- Hired Vice-Principal on the behaviour side (2 days/week)

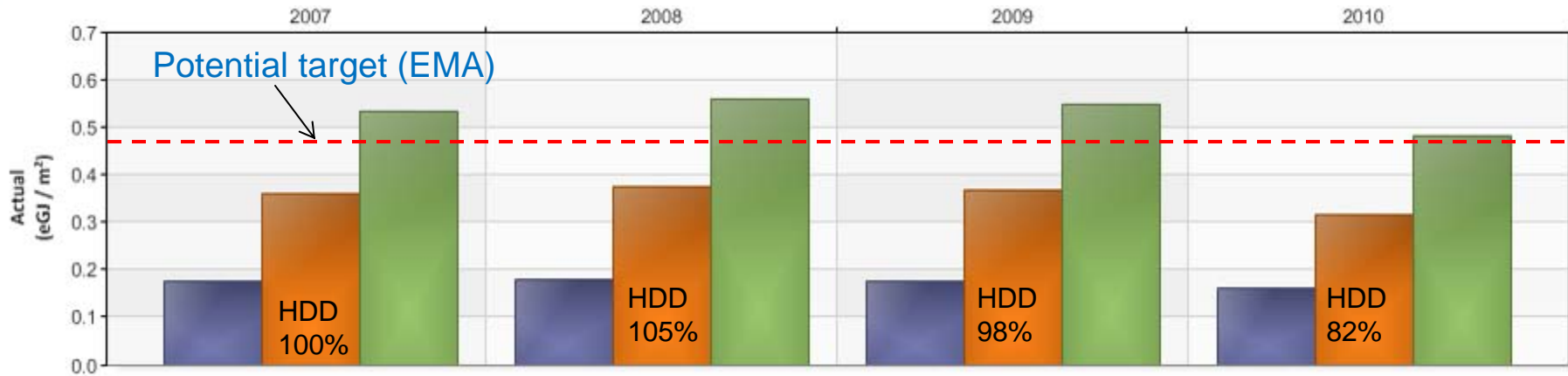
- Not addressed as yet

- Updated account history records in Prism's PUMA energy database to the end of April, 2011;
- Setup online access for NVSD to all energy accounts and conducted demo;
- Completed regression analysis and developed base-period models (2007) for tracking energy use and savings (CUSUM analysis)
- Inter district energy benchmarking
- Intra district energy benchmarking (electricity, fuel, school type)

Performance Index: Site Comparison (2008)
Project: SD44 - North Vancouver - Energy Manager (201111)
Year: 2008



Energy Intensity and Targets – eGJ/m²



	eGJ/m ²
NVSD 2007-10 Average	0.54
NVSD 2010	0.51
Lower Mainland Benchmarking 2010	0.60
Difference (Below) Lower Mainland 2010	15%
Target based on EMA vs. 4 Yr Avg	0.48

Based on Energy Management Assessment (EMA), there is potential for 10 -14% savings. **Using 13% as a target...**

Equivalent to **0.06 eGJ/m²** reduction compared to 4 year average.

If this applies equally to Electricity and Fuel, equivalent to savings of **1,250,000 kWh/yr** on a base of 10,500,000 kWh and **9,200 GJ** on a base of 77,000 GJ

Note weather impact in 2010

1. Using BC Hydro EMA: 10-14% overall energy
2. Using Benchmarking: 7% electrical savings (based on all schools that are above average for NVSD benchmark being reduced to the average)
3. Project Investigation: from the ground up!

3 year Target:

- **13% overall energy savings**
 - > \$186,000 annual cost savings
- **16% electrical savings**
 - 1,700,000 kWh annual savings
 - > \$100,000 annual cost savings

Technical and Behaviour Projects Overview

	Potential Electrical Savings (kWh)	Potential Fuel Savings (GJ)	Potential Total Cost Savings (\$)	Projected Total Cost (\$)	Potential BC Hydro Incentive (\$)
Potential Projects					
Totals	900,751	6,301	\$ 122,755	\$ 92,016	\$ 41,544
Approved Projects					
Totals	421,651	1,315	\$ 38,449	\$ 166,000	\$ 46,369
Projects In Progress					
Totals	398,930	-	\$ 23,936	\$ 258,749	\$ 80,824
Grand Totals					
Totals	1,721,332	7,616	\$ 185,140	\$ 516,765	\$ 168,736
Baseline	10,750,000	77,000	\$1,400,000		
Percentage	16%	10%	13%		

Lighting Projects Overview

Project	Status	Savings (kWh/yr)	Savings Starting
Relamping to energy efficient fluorescent lighting - 27 locations	Under Construction	347,076	Aug-11
Lynn Valley school lighting upgrade	Under Construction	14,978	Oct-11
Canyon Heights, Carisbrook, Westview	Under Construction	36,876	Sep-11
Lighting for High School Gyms (CG Gym, Handsworth, Seycove, Sutherland)	Prelim Analysis Complete	25,357	TBA/Jan-12

Note: only electrical savings included

New Construction Projects Overview

Project	Status	Savings (kWh/yr)	Savings Starting
Energy efficient lighting for Carson Graham new construction	Approved	75,625	Jan-12
Energy efficient lighting for AFK new construction (3 floors)	Approved	38,972	Jan-12
Energy efficient lighting for NVOS ELC new construction PSI114107	Approved	43,121	Jan-12
Queen Mary Renovation	Design Phase	50,000	Sep-12

Note: only electrical savings included

Mechanical Projects Overview

Project	Status	Savings (kWh/yr)	Savings Starting
DDC at 35 Locations	Under NVSD Review	214,722	Jan-12
HVAC at Lynn Valley school	Under NVSD Review	25,672	Apr-12
Windsor, Handsworth, Seycove, Sutherland schools COP11-462 to 5	Selected Vendor and Consultant	263,933	Jan-13

Note: only electrical savings included

Project	Status	Savings (kWh/yr)	Savings Starting
All Locations	Draft RFP Prepared	285,000	April 2012 (phased savings)

Potential Green IT Conservation Measures for NVSD

- Power Management Software
- Energy Eff. Notebooks or Mini Computers
- Top 10% Energy Star Equipment
- Virtual Servers



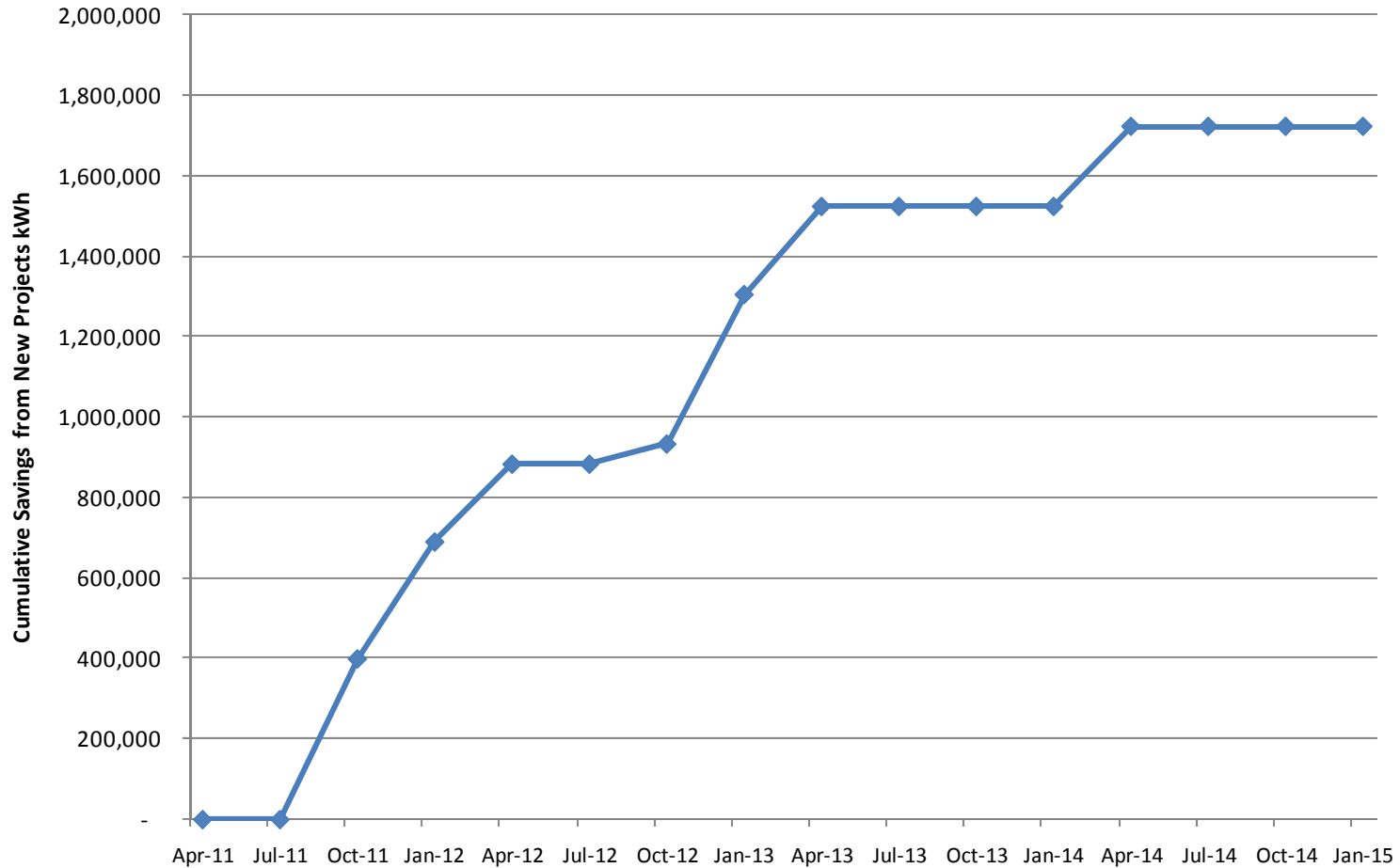
Note: only electrical savings included

Project	Status	Savings (kWh)	Savings Starting
All Locations	Planning Phase	300,000	April 2012

Note: only electrical savings included

Savings Timeline...Getting to 16%

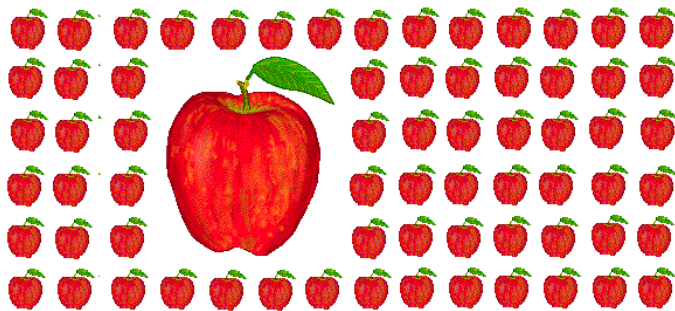
NVSD Electrical Savings Plan (2011 to 2015)



Note: only electrical savings included

What the Energy Savings Means (Electrical and Fuel)

- **\$186,000 in annual cost savings*** is equivalent to the average annual salary** of 3 BC teachers.



X 3 teachers
a year

- **3,800,000 kWh saved annually*** is equivalent to enough electrical energy to power 380 BC homes for a year.



X 380 BC
homes for a
year

Thank You BC Hydro!



Project	Incentive (\$)	Status
Green IT study (estimate)	\$20,000	Not submitted
Align DDC to Occupancy	\$20,000	Not submitted
Lighting Upgrade for High School Gyms	\$5,000	Not submitted
Lighting New Construction - Queen Mary Renovation	\$15,000	Not submitted
Energy efficient lighting for New construction (3)	\$46,369	Approved
Consultant fees for new construction	\$3,000	Approved
Upgrade to energy eff. fluorescent lighting - 27 locations (PSPX)	\$71,090	Approved
Lighting Upgrades - Lynn Valley school, Canyon Heights, Carisbrook, Westview (PSPX)	\$9,733	Approved
COP consulting at 4 sites	\$106,000	Approved
COP EMIS at 4 sites for 5 years (Estimate)	\$50,000	Approved
Energy Manager 18 month contract	\$160,000	Approved
Total estimated over this next <u>3 year period</u>	~\$500,000	

Plan for the Next 12 Months

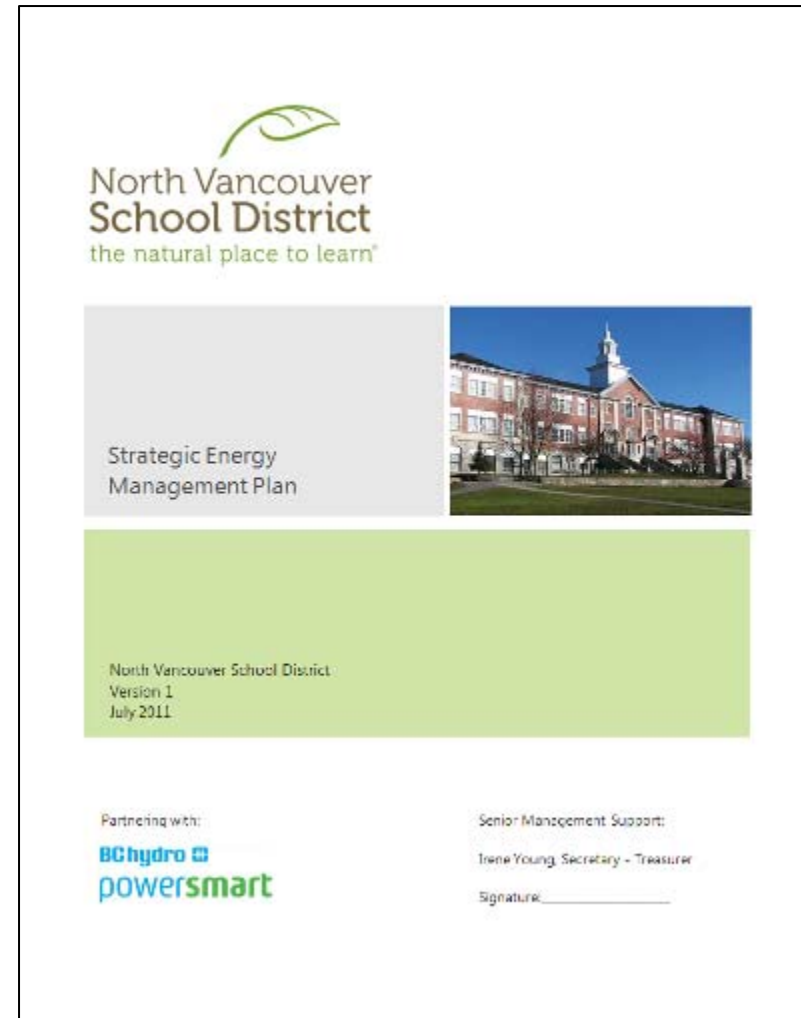
Area of Effort	12 Months
Energy Tracking (PUMA): Weather Analysis, trends and benchmarking	200 hours
Identifying and implement Opportunities: DDC, incentives, capital projects, Green IT	400 hours
Set up and implement behaviour program. Include energy team and curriculum connections	**100 hours
Strategic initiatives regarding executive buy in and board support. Adoption of SEMP.	100 hours
Project Management: meetings, events, Quarterly reviews, interface with BC Hydro	200 hours
Total	1,000 hours

** Plus over 500 hours on sustainability through Sustainability Leader

Strategic Energy Management Plan



- Draft
- Final expected in 3 – 6 months





Potential Behaviour Change Programs for NVSD

- Destination Conservation
- BC Hydro's FirstWave program
- BC Hydro's Workplace Conservation Awareness Program