Metrobus

GENERAL MANAGER'S REPORT
Regular

August 11th, 2022

1. COVID Update

July was another record month with ridership exceeding July 2019 by 16.3%. GoBus ridership is approximately 73.6% of 2019.

2. Electrification Plan

The detailed Implementation Plan Scope has been reviewed and signed (copy attached). A project kickoff meeting will be scheduled in the near future.

3. RFP – GoBus Service

The successful bidder, PW Transit Canada, has been notified and the contract details are currently being reviewed and finalized. One this is done, we will begin discussions on the transition plan.

4. Third Party Assessments for GoBus Eligibility

As of today's date, 362 existing customers remain to be assessed by September 30, 2022, as require by the contract with Telus. One of the key staff on the account left the company early July which impacted the number of assessments completed in July. Another staff member has been assigned to the account and our Manager, Accessible Transit Services has seen a huge improvement in the past couple of weeks.

5. Status of ICIP Funding Applications

1. Replacement of Paratransit Fleet	Tender awarded
2. Ten Accessible Bus Shelters	Tender awarded
3. Replacement Community Bus	Application submitted April 21st, 2022
4. Hybrid buses (8) 40-foot	Application submitted May 25th, 2022
5. Stop Announcement System	Application submitted July 12th, 2022
6. Radio System Upgrade	To be submitted

6. Regatta Day

Ridership was lower than pre-pandemic but still quite a busy day.

YEAR	Cash	Transfer	10-ride	Monthly	TOTAL
2022	7,880	233	789	3,998	**12,900**
2019	13,580	557	569	2,597	**17,303**
2018	18,663	596	559	2,317	**22,135**
2017	14,735	581	443	2,056	**17,815**
2016	14,687	579	469	1,958	**17,693**

YEAR	Cash	Transfer	10-ride	Monthly	TOTAL
2015	15,362	467	346	2,168	**18,343**
2014	13,521	509	433	1,980	**16,443**
2013	14,929	508	376	1,990	**17,803**
2012	16,121	656	360	2,038	**19,175**
2011	15,810	456	316	1,374	**17,956**
2010	15,152	475	391	1,432	**17,450**

7. Shelter – Gathering Place

Due to an ongoing problem with vandalism and garbage at the shelter near The Gathering Place, notices were placed in the shelter and in The Gathering Place that the shelter would be removed if the problems continued. There has not been any improvement and, if anything, the situation has deteriorated. People are now lining the shelter with cardboard and using it as an overnight sleeping area. When removed, it is back the next day. Maintenance staff often do not clean or maintain the shelter as they do not feel it is safe to do so. Under current circumstances, transit customers are not using the shelter which is the purpose for which it is installed. Notices will be posted this week that the shelter will be removed by the end of the month.

CUTRIC's Performance Simulation and ZEB implementation/Rollout Planning Project St. John's Transportation Commission (Metrobus) Full Fleet ZEB Implementation Plan Scope	
Client	St. John's Transportation Commission (Metrobus) Judy Powell General Manager judy.powell@metrobus.com
Service Provider	Canadian Urban Transit Research & Innovation Consortium (CUTRIC) Dr. Josipa Petrunić President & CEO CUTRIC josipa.petrunic@cutric-crituc.org
Project Scope Statement	This scope specifies the preparation of a comprehensive, full fleet, and low carbon fleet transition plan in five (5) phases. These phases focus on the economic, technological, and environmental, benefits, risks, and constraints associated with the transition to a low carbon fleet of vehicles. All deliverables would be included in the final presentation and report to the client. **Project description and inclusions – Scope Phases** 1. **Phase I: Current state assessment (Voice of Customer (VOC) and existing site assessment)** a) **VOC:** Requirement gathering related to assets (bus replacement cycles, diesel fleet retirement plans, fleet mix requirements (40-footer vs 60-footer), infrastructure, real estate, on route charger location), safety, cost, resources (training needs and constraints) along with additional constraints relating to the process to transition (if applicable). b) **Existing site assessment:** Involves assessment of existing site conditions for the readiness of electrification based on the following: 1) Exterior assessment (to see the potential for installing electrical infrastructure, substation/transformer units, equipment, outdoor switchyard, space requirements for hydrogen fuelling yard, dispensing station) 2) Interior assessment (to see the potential for installing appropriate charging infrastructure, space constraints for electrical/charger room, switchgear, energy storage, and the strength of roof structure) 3) The existing site assessment would assess the facility and propose actions required to deploy the first few buses on a pilot program (number of assets to be determined) and the required modifications to allow full fleet electrification.

2. **Phase II: Advanced feasibility and optimization study**

   a. **Feasibility analysis – Part 1:** ZEB performance simulation involving GIS analysis, duty cycle generation and energy consumption analysis to assess the energy needs for St. John's Transportation Commission (Metrobus) for battery electric and hydrogen fuel cell electric bus solutions.

   b. **Charger optimization:** Estimation of the total number of chargers (depot and on-route) required by transit agency based on the success rate of BEB

   c. **Schedule analysis:** Schedule analysis using the recovery time and rotation time for BEB considering overnight depot charging and on-route charging during round trips or single trips and one refuelling episode for FCEBs

   d. **Technical/electrical analysis:** Assessment of the total power demand at each facility, cost of electricity[1] considering power and energy requirements at each facility, charging profile considering charging schedule, the maximum number of chargers connected in the depot, and power demand profile throughout the day for each facility. This assessment includes an on-route charger installation assessment from the technical/electrical standpoint. Energy storage systems and smart charging systems[2] will be evaluated to reduce operational expenditure.

   e. **Electrical distribution system capacity:** liaising with the electrical utility to ensure adequate distribution capacity at potential charging sites, and required costs and timelines to upgrade electrical system if adequate capacity does not exist.

   f. **Facility modification assessment:** Outputs from Phase I will be utilized to provide recommendations on upgrading/modifying the existing facility for transition to ZEBs.

3. **Phase III: Fleet development concept**[3]

Development of two conceptual fleet designs with the short-to-long term vision and conduct a comparative evaluation considering the following elements:

1. Total cost of ownership (TCO) of assets and associated infrastructure
2. Anticipated maintenance needs assessment (based on literature and industry survey data)
3. Refurbishment/replacement of critical components (batteries, fuel cell stacks)
4. Facility modification needs assessment (electrical and civil works) – Class 3 assessment
5. Optimal charging/fuelling schedule assessment
6. City planning/real estate considerations around installing on route chargers

Note: Diesel-electric hybrid vehicles are not included in the scope of this work as those vehicles are not zero emissions transportation solutions.

18 King Street East, Suite 1400
Toronto, ON M5C 1C4

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4. Phase IV: Fleet concept – benefits and risk evaluation

Assessment of risks and benefits associated with the two fleet designs proposed in Phase III with focus on the following:

1. Social standpoint (community benefits, noise pollution)
2. Economic standpoint (cost savings, funding/financing options)
3. Environmental standpoint (Life cycle GHG emission reduction analysis) – reported on augmented GHG+PLUS module format
4. Service delivery standpoint (maintaining a mixed fleet, retiring diesel fleet, customer and driver familiarizing with ZEB implementation)

5. Phase V: Implementation plan and recommendations

The implementation plan includes recommended solutions based on the robust analyses performed during Phase I-IV considering the short-to-long term needs and opportunities. It will include:

1. Fleet replacement rollout timelines and budgets for both a pilot/demonstration project and the replacement of the entire fleet in a phased manner.
2. Characterize distinct capitalization phases for the replacement of entire fleet and charging infrastructure implementation. Capital investment section to outline a timeline of capital expenditures based on the proposed transition timeline. Output involves include a replacement schedule for existing buses, and a proposed facility charging deployment capitalization schedule.
3. Recommendations on upfront cost efficiencies that may exist from a scalable charging infrastructure rollout (e.g., energy management solutions, or other distribution solutions, compact secondary substations).
4. Easiness of electrification assessment identifying the portions of the service according to the level of difficulty of electrification. This would permit the transit agency to select the most appropriate routes to deploy the first buses in the pilot as well as provide the most sensible order for electrifying the entire system, leveraging potential future technological developments for the most challenging routes.

Note: All scope elements will be combined and presented only in the Final Report and the Project Finale Meeting presentation.

[1] Cost estimation based on current rates provided by the local utility

[2] Smart charging program details are not included, nor are the program fees included in operational costs

[3] All costs exclude labour costs, workforce development costs and relations management

Deliverables (In Canadian English only)

1. One Final Report (anonymized) in PDF format – Submitted on the 36th week after scope execution and funding approval

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	2. One Project Finale Presentation (anonymized) in PDF format – Submitted on the 36th week after scope execution and funding approval 3. Progress Meeting Presentations in PDF format – Submitted after progress meetings 4. One Council/Board presentation for St. John's Transportation Commission (Metrobus) – To be scheduled based on CUTRIC's availability and Board/council meeting timing 5. Additional outputs in Excel, CSV format where noted - Submitted on 36th week after scope execution and funding approval
Project Inclusions	Listed in this document as included
Project Exclusions	All aspects not explicitly listed as being included are excluded. Any further change requests would be evaluated on a case-by-case basis to determine whether they would be included in the scope or not.
Conditions and Acceptance Criteria	1. CUTRIC will deliver all outputs/deliverables to the client as agreed to in the scope document. 2. CUTRIC will request any changes to the proposed project scope (cost, schedule, deliverable etc.) in writing via email to the client with the titles 'Change Request' and receive written approval. CUTRIC requests that: 1. The client understands and agrees to the project scope as outlined 2. The client understands and accepts the assumption log provided 3. The client understands that the project schedule is noted in 'weeks' as the project can be initiated once the scope is executed and funding is approved 4. The client agrees to sign an NDA or makes an equivalent non-disclosure commitment 5. The client attends all progress meetings and project finale meeting 6. The client understands that project scope changes would necessitate the project's cost and schedule to change accordingly 7. The client will formally accept the deliverables at the end of the project once they are submitted/reviewed upon the client's satisfactory completion 8. The client understands that CUTRIC deliverables are not to be shared on public platforms as they contain proprietary details that are shared with the client exclusively for their internal use 9. The client agrees to allow CUTRIC to engage in public relations effort to advertise this project
Communication Protocols	1. CUTRIC PM will communicate with the client primarily over email. 2. All meetings will be organized considering the client's convenience and CUTRIC team availability 3. All materials would be shared over email only 4. All meetings will be digital via the Zoom teleconference platform

Project Schedule and Cost

Project Phase	Task	Invoice Amount	Invoice Date
Scoping	• Scope confirmation • Funding approval		
Scoping	• Project kick-off meeting	$30,000	Week 3
Phase I	• Reviewing modelling assumptions • Data collection (VOC, status review)		
Phase II	• Feasibility and optimization assessment	$105,000	Week 14
Phase III	• Fleet concept development		
Phase IV	• Fleet concepts – benefits and risks assessment	$35,000	Week 26
Phase V	• Recommended solution and implementation plan • Project Finale meeting • Project finale report	$30,000	Week 36
Total project cost including contingency		**$200,000 + tax**	
City of St John's contribution	20%[4] of eligible expenditure	**$40,000 + tax**	

[4]The contribution could be more than 20% if ZETF eligible expenditure does not cover 80% of the project cost.

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Project Inclusions (All items highlighted are included)

Literature review
- Included
- Not included

Blocks Considered
- Weekdays
- Saturday
- Sunday

Blocks Eliminated (need to be confirmed after GIS work)
- None
- -- %

Non-revenue Mileage (Pull in, Pull out, Deadheading)
- Included
- Not included

Passenger Data/Ridership Data
- Provided
- Not provided (CUTRIC will use estimates if ridership is not provided)

Bus Configurations Simulated [St. John's Transportation Commission (Metrobus) to select three configurations]

Battery-Electric Buses (BEBs) and Hydro Fuel Cell Electric buses (FCEBs)
a) 40-foot New Flyer - XE40 466 kWh - [Bus 1]
b) 60-foot New Flyer - XE60 600 kWh - [Bus 2]
c) 40-foot Nova bus - LFSe 76 kWh - [Bus 3]
d) 40-foot Nova Bus – NOVA LFSe+ 594 kWh - [Bus 4]
e) 25-foot Green Power Motor – EV Star 118 kWh [Bus 5]
f) 40-foot New Flyer - XHE40, 100 kWh, H2 37.5 kg [Bus 6]
g) 60-foot New Flyer- XHE60, 150 kWh, H2 60 kg [Bus 7]
h) Others – please specify

Electricity Pricing Calculation and TCO
- Included (CUTRIC requests to be introduced to the local hydro)
- Not included

LCA GHG Emission Reduction
- Included
- Not included

Charging Options (ABB and Siemens)
a) 150 kW in Depot
b) 300 kW in Depot
c) 450 kW Opp Charge/J3105-1

Charging analysis of opportunity charging/charging time optimization
- 5- min charging
- 3-min charging

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Note: Any changes to the scope, quality or cost after signing this document will be communicated, and formal approval will be requested.

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Work Breakdown Structure (WBS)

Please note: All work is Finish-to-Start and each module will not result in a complete client deliverable as all outputs would be integrated into the final report and finale meeting presentation. The progress meeting presentations will be shared with the client after each meeting. Project progress meetings and the finale meeting will be scheduled after the project kick-off based on client preference and availability. The WBS below follows a horizontal decomposition technique with each scope module identified on Page 1-2 having its corresponding activity listing, dates, personnel allocation, work package/deliverable, along with the control account of invoicing. Most of the activities listed use proprietary algorithms and complex mathematical modelling tools, and this WBS feeds into a comprehensive confidential WBS that is internal to CUTRIC operations.

Scope Module	WBS Activity	Milestone/Deliverables	Tasks	Start Date	Finish Date	Staff Allocation	Eligible costs	Employees/Pre-approved vendors
Scoping	Reviewing modelling assumptions, confirming scope	• Project Kick-off Meeting presentation and minutes	• Preparing assumptions log • Preparing presentation and minutes	0	3	• Lead GIS Analyst – Lead • Lead Data Scientist • Program Manager • CEO	Direct labour	Employees Pre-approved vendors
Additional	Literature review of Canadian electric buses landscape and major global initiatives	• Included in the final report	• Literature survey, analysis and review preparation	0	4	• Lead Data Scientist • QC scientist	Direct labour	Employees
Phase I	Data collection and clean up	• Data collection completion notice • Draft literature review	• Preparing data request documents • Inspecting data, identifying gaps, and communicating with the client	3	8	• Lead GIS Analyst • Lead Data Scientist	Direct labour	Employees Pre-approved vendors

			• Cleaning up data obtained and tailoring it to the needs of the project					
Phase II	GIS mapping[5] of the entire fleet GIS data complexity score: 1 (No issues) 1 -1.25 (low data quality data) 1.25 - 1.5 (data collection gaps) 1.5 - 1.75 (operational issues) 2.0 (data gap mending)	• Progress Meeting 1 presentation and meeting minutes	• Mathematical modelling and analysis • Preparing presentation and minutes • Quality assurance	9	12	• Lead GIS Analyst • GIS Technician • Project/Program Manager	Direct labour	Employees
Phase II	Duty cycle generation	• Progress Meeting 2 presentation and meeting minutes	• Mathematical modelling and analysis • Quality assurance	13	14	• Lead Data Scientist • Data Scientists • Project/Program Manager	Direct labour	Employees
Phase II, III	Energy consumption analysis	• Progress Meeting 3 presentation and meeting minutes	• Mathematical modelling and analysis	15	21	• Lead Data Scientist • Data Scientist	Direct labour	Employees Pre-approved vendors

	Site/facility assessment		• Travel costs • Site visit coordination • Quality assurance			• QC scientist • Project /Program Manager • Project coordinator • Electrical/facility engineers	Travel	
Phase III, IV	1. Cost, GHG and opportunity charger analysis 2. LCA and TCO analysis 3. Economic analysis (needs, cost, benefit, risks) 4. Social business case	• Progress Meeting 4 presentation and meeting minutes	• Mathematical, economic and LCA modelling and analysis • Preparing presentation and minutes • Quality assurance	21	28	• Data Scientist – Lead • Data Scientist • QC scientist • Electrical/facility engineers • LCA engineers • Economic analyst • Social scientist • Project /Program Manager	Direct labour	Employees Pre-approved vendors
Phase V	Electrification plan	• Progress Meeting 5 presentation and meeting minutes	• Mathematical modelling and analysis • Quality assurance • Preparing presentation and minutes	28	31	• Lead Data Scientist • Data Scientists • Lead GIS Analyst • GIS technician	Direct labour	Employees Pre-approved vendors

						• Project /Program Manager		
Phase V	Final report and presentation preparation	• Project finale meeting presentation • Project final report and CSV files	• Final QC • Preparing presentation and minutes • Quality assurance and quality control	31	36	• Data Scientist – Lead • Data Scientist • GIS Analyst • Program Manager • CEO	Direct labour	Employees Pre-approved vendors
Phase V	Presentation to council	• Project report and presentation to the council	• Preparing summary report and presentation	36	40	• CEO • Program Manager	Direct labour Travel	Employees Pre-approved vendors/ contractors

[5] The calculation expects that **St. John's Transportation Commission (Metrobus)** would have a complexity score of 1 – if data collection shows gaps or issues, the complexity score would be considered in the calculation. Prior to any adjustments to the complexity score, CUTRIC shall discuss with **St. John's Transportation Commission (Metrobus)** to seek approval. Such approval will not be unreasonably withheld.

Note: Timeline is subject to change should there be unforeseen challenges with collecting and processing the transit data.

Confidentiality and Intellectual Property

1. The Client agrees that any intellectual property relating to Rout∑.i™/CloudTransit ™ development arising from the project remains the sole property of CUTRIC. CUTRIC will have the exclusive ownership of any new variables added-in, any variable changes, any methodological refinements or any other developments or modifications added to the Rout∑.i™ algorithm, the modelling methodology or otherwise in connection with this Scope of Work or its associated agreements. These include, without limitation, inputs of the methodology and the algorithm relating to the GIS modelling, duty cycle generation, energy consumption analyses, and all post-simulation analytics and other additional attributes including, but not limited to GHG emissions, cost profile, LCA, scheduling optimization methodologies, validation undertaken using the Rout∑.i™/CloudTransit ™ tool, lessons learned, empirical analytics and best practice knowledge, each of which will be solely owned by CUTRIC.
2. The Client agrees that it owns all input data provided by the Client and the outputs of research activities in this project that emerge in the form of literature review, graphs, charts, tables, descriptions in the report, PowerPoint presentations, and CSV files. The Client agrees that while all information, simulation outputs, and deliverables provided by CUTRIC remain the sole property of the Client, CUTRIC will have the rights to share anonymized results for non-profit business development, government relations, and research needs. The Client agrees that in the event that the ownership rights contained in this paragraph overlap with the items in the preceding paragraph, CUTRIC shall remain the sole owner, notwithstanding the foregoing, of such items with conflicting ownership claims.
3. The Client shall from time to time as and when requested by CUTRIC, (i) execute all papers and documents and perform all other acts necessary or appropriate, in the discretion of CUTRIC, to evidence or further document CUTRIC's ownership of the items described in these paragraphs, where applicable, and (ii) assist CUTRIC in obtaining, registering, maintaining and defending for CUTRIC's benefit, all intellectual property rights in the items described in these paragraphs in any and all countries as CUTRIC may determine in its sole discretion.

18 King Street East, Suite 1400
Toronto, ON M5C 1C4

CUTRIC-CRITUC.ORG
E info@cutric-crituc.org

ST JOHN'S TRANSPORTATION COMMISSION (METROBUS)

DocuSigned by:
Judy Powell
B69F6D49385D463...

Judy Powell

General Manager

Executed on: 8/10/2022

CANADIAN URBAN TRANSIT RESEARCH & INNOVATION CONSORTIUM

DocuSigned by:
Josipa Petrunic
5E3EAC1060094CC...

Josipa Petrunić

President & CEO

Executed on: 8/11/2022