St. Jean 315KV/25KV Power Station/Line – Briefing May 17th BAPE Hearing

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Introduction

- The goal of this project should be to implement a balanced solution that will meet the power needs of the West Island, the business goals of HQ, while striving to minimize the impact to the residents and the environment from a socio-economic perspective.

- Is HQ doing really enough to meet this goal? I do not believe that they are.

- Herein are some thoughts from a DDO resident …

Average Current, Maximum Current, Potential Power and alignment with EMF and needs of West Island

	Existing 120KV ine	Proposed 315KV line
Average "max" current per circuit (10)	141A & 214A	300A & 300A
Full Transformer capacity (2)	~130MVA	~540MVA
Current at full transformer capacity (3 phase)	~640A	~1000A
Maximum current (11)	n/a	3500A
Maximum power on line (11)	n/a	1910MW 1920MW

power load at SS (9) MVA	CLT	2015	2030	2090
Baie D'Urfe	217	188	216	~300
Sources	542	491	531	~542
St. Jean (w/ min xfer from Sources)	142	119	127	~250

Does not address power losses
approximate numbers
Data in green provided by HQ
*Assume growth reduced 20% every 15years until 2090 (see Appendix 1).

-315KV Sub Station (SS) solution at St. Jean will provide more than 4.5 times more power than the existing 120KV line and SS.

-Power load requirements in Baie D'Urfe in next 15 years barely meet the load capacity (9);

- It clearly requires more transformer or possibly line changes in the next 15 years.
- How is this not be part of HQ's plans today as was contra indicated during BAPE sessions ?(1)

-The average current on the line in future years especially in the later part of the 80 yr period when Baie D'Urfe is "connected" will be higher than the average current recently quoted by HQ of 300A (x2) especially when additional power load will be moved from Sources to St. Jean (power will be upwards of 550MVA) . **As well it is important to note that the Regie de L'Energie approved the 315KV project based on an average current of 146A as provided by HQ.**(3) Far from what it will be!

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-In fact, current on the 315KV **line** :

- ~ 11 times higher than the average max current
- Enough to transport an equivalent of 4 times more power than the **full sub station** capacity.

-This is especially important when we consider HQ's strategy for a 315KV ring around Montreal island , as the St. Jean potential power will be leveraged during critical situations.

-Though these high currents will not be under continuous use, during these situations EMFs will be substantially higher. **The public needs to know the impact of this on EMFs. In fact, we need to know EMFs from 600A to 3500A.**

Who will protect future generations if it not people like us bringing this up now!

*See notes on previous slide

Average Current, Maximum Current Potential Power and alignment with EMF and needs of West Island

capacity on line [11] **MVA***	Aerial	Under ground first 40years	Under ground next 40years	Capacity on line 2090
St. Jean (stopping at St. Jean)	1920	1090	1790	~250
St. Jean continuing to BD	1920	1090	1790	~550

Only including transfer of power loads from Sources to make Sources functional.

-Finally, the underground solution can provide the power loads needed by St. Jean's and Baie D'Urfe when we compare with the capacity they can provide .[11] (even if we shift some power capacity from Sources to St. Jean.)

- **In fact, the more expensive conductors (providing more power) suggested by HQ in the 2nd, 40 year tranche [7] may not be required reducing the cost of the underground solution**. (also see next slides)

-Unless HQ wants to transport the extra power for other purposes….

The 315KV aerial solution proposed by HQ can provide more than 3 times more power than what is needed by the West Island. There could be solutions that have less impact on the environment especially for residents closest to the line. Could there not be a WIN-WIN solution that addresses our concerns and achieves HQ's evolution plans.

*See notes on previous slide

Pricing Comparisons of Underground Projects

Need clarity with respect to the table provided by HQ:

- We would like data on de Lormier and Limoilou for last 40yr tranche to do a fair comparison as **it is definite that these will be be replaced after 40years.**

- First, (based on a 40yr analysis) the data shows that Limoilou was more expensive to build unlike what we were told at the April BAPE sessions. (1)

- In the same vain, recall that as part of the Limoilou project, existing lines/pylons/servitude were not leveraged but replaced with an underground solution with less power than DDO and at a higher price.

- See photo

D27

Ligne d'alimentation du poste St-Jean à 315 kV
Analyse comparative de deux projets souterrains avec l'estimation paramétrique du projet St-Jean

	Projet Viger/De Lorimier	Projet Limoilou	Projet St-Jean (0 à 40 ans)	Projet St-Jean (41 à 80 ans)
Tension	315 kV	230 kV	315 kV	315 kV
Nombre de circuits	2	2	2	2
Longueur totale de circuit (km)	14,3	10,8	7,5	7,5
Section d'âme	1775 mm²	800 mm²	1000 mm²	2500 mm²
localisation	Centre-ville de Montréal	zone urbaine de Québec	ouest de l'île de Montréal	ouest de l'île de Montréal
Coûts (k$)				
Avant-projet	1 039 k$	1 475 k$	1 122 k$	1 122 k$
Ingénierie	2 459 k$	1 581 k$	879 k$	879 k$
Expertise immobilière	81 k$	260 k$	90 k$	90 k$
Approvisionnement	25 862 k$	13 723 k$	11 205 k$	13 432 k$
Travaux	13 738 k$	14 435 k$	6 255 k$	7 687 k$
Gérance de projet	2 454 k$	2 126 k$	1 639 k$	1 639 k$
Frais financier et autres	13 611 k$	7 137 k$	5 887 k$	6 886 k$
Cout total	59 243 k$	40 736 k$	27 076 k$	31 735 k$
Cout total, St-Jean				58 811 k$
Cout (M$/km de circuit)	4,14	3,77	3,61	4,23

- This also implies that when Mr. Jean-Marc Darveau shared the 3M cost per km/line in press releases (15), he was understating the cost by over 100% over 80years that "we" the QC public would be paying!
- Interested to note that Mr. Darveau was quoted saying: **"C'est d'ailleurs le choix qui est fait dans 99 % des cas de passage de lignes en milieu urbain, «** (13) regarding going underground.

Pricing Comparisons of Underground Projects (Cont'd)

- Costs for the 2nd 40 years of the St. Jean appear high
  - Agree that the 2500mm cables cost more but
  - Should there not be some efficiencies
- Also based on power needs (see earlier comments slide 5) cost of 2nd 40yr tranche should be similar or less than first 40yrs.
- Finally, how was the 7.5 km distance calculated…it is not more that 3.2 x2 km at most.

This all points to a much lower cost than what was quoted by HQ for an underground solution.

D27

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- There seems to be a bias regarding how the data is presented & transmitted to the public to ensure that solutions appear better than others at HQ's discretion. In this case, as many others and for the sake of all parties concerned, we should be given more time to study the **complete and accurate data.**

All these conclusions point to the fact that the DDO underground solution should be reconsidered. If HQ was willing to pay for the Limoilou solution at a higher cost for less voltage/power then, why not for the West Island!

Remove 120KV Line into St. Jean SS - Facts

- HQ indicated that it cannot build the 2 separate underground 315KV lines in the ROW as there is not enough room and that it must build along the road [2][4] thus burdening the project with additional costs.
- HQ indicated that the 120KV line passing through the St. Jean substation will eventually (2024/2025) be decoupled and continue on to Baie D'Urfe. [2]
- With 315KV planned line, we will have potentially 4 times more power capacity at St. Jean. (see earlier slide and reference (2))
- Pre 1998, the 315KV sub station at Sources was transmitting 120KV on the old 315KV line. [1]
- HQ's intent is eventually, as part of the "Plan d'évolution du réseau de l'île de Montréal « and as demand increases, to extend the 315KV line to Baie D'Urfe and remove the aging 120 KV line. [1][2]

Remove 120KV Line into St. Jean SS (cont'd)

- Based on these facts, it is possible to drive the 120KV line to Baie D'Urfe directly from the proposed 315KV St. Jean station. This would allow the removal of the 120KV line presently leading into the St. Jean station.
- This would achieve a primary goal of creating the space required to place the 2 underground lines more cost effectively.
- It would also achieve several other goals. All of this requiring investments balanced with some cost savings as presented in the next slides.

Remove 120KV Line into St. Jean SS– Other Benefits for DDO Residents

Topic	Impact
EMF	Reduced (for the same total power requirement, lower current required, driving lower EMF)
Visual	Reduced pylons in ROW and residents "backyards" reducing visual pollution
NET Property Value (not including impact of 315KV line)	Reduced impact on property value or increase in some property values.
Noise	Reduced noise on the line particularly for residents on the South side of de Salaberry.

In principle, this is aligned with HQ commitments to the community.

And to quote Mr. Davreau again regarding Limoilou [14] :

«Ce projet-là, de toute évidence, n'a pas été accueilli favorablement par les citoyens», convenait jeudi le responsable du projet et conseiller aux relations avec le milieu chez Hydro-Québec, Jean-Marc Darveau. Or, les chantiers de la société d'État doivent absolument satisfaire trois critères: l'aspect économique, l'aspect environnemental et l'aspect social. Clairement, c'est le troisième critère qui a fait achopper le tout. Le projet initial prévoyait démanteler 16 km de lignes aériennes pour les remplacer par 9 km de lignes souterraines, enfouies sous les rues résidentielles. Les citoyens se sont mobilisés en raison des craintes liées aux effets des champs magnétiques sur la santé. «On va faire quelque chose de mieux», promet M. Darveau.

And we know the final solution in Limoilou (30km removed and 11km Underground) !!

Remove 120KV Line into St. Jean SS– Other Hydro Specific Benefits

Benefit	Explanation	Estimated Cost Impact
Lower power loss	Low voltage lines lose more power than high voltage ones over distance.	Based on HQ figures in the Regie de l'Energie report [3],the estimated power loss for a new 120KV line from sources to St. Jeans is **9.8 M**. In our case, not a new line with identical characteristics , but a line that comes from a longer distance (Saraguay), as such we are still talking about significant multi million dollar savings.
Lower Maintenance Costs	Less lines /pylons need to be maintained	Not able to estimate but keep in mind that most of the line is original material from the 50s.
Standardization	Aligned with HQ strategy to convert ring around the island from 120KV to 315KV and remove all old 120KV equipment.	

Based on similar HQ estimates, HQ can have significant cost reductions by removing a portion of the 120KV line.

Remove 120KV Line into St. Jean SS– Burden on Hydro

Burden	Estimated Cost Impact
2 Transformers required to allow either an additional step down in voltage or dedicated 120KV conversion only	• Based on industry figures (source : ABB), the differential in price between a 2 step and 3 step transformer is ~ 1M per transformer. • There may be an alternative to use the planned transformer #3 and #4 only for 120KV power to Baie D'Urfe until line to Baie D'Urfe gets converted to 315KV. This is aligned with the fact that capacity at St. Jean will not be significant (recall earlier slides) so no need to distribute locally rather, convert and send off to BD. This alternative may not increase net transformer costs over the life of the sub station. (more technical validation required)

There is a cost associated for the transformers to feed the 120KV line to Baie D'Urfe.

Remove 120KV Line into St. Jean SS– Burden on Hydro

Burden	Explanation	Estimated Cost Impact
Pylon Removal	Effort to remove pylons	• The equivalent of 30km of pylons in Limoilou.[6] Some of which were replaced side by side with underground solutions . Not only did they go underground in areas where overhead would have been adequate using existing lines, but they also made all the citizens of QC pay the cost of removing the no longer used pylons. • As well, It appears based on HQ's Montreal BAPE meetings [1], HQ intent is to eventually replace the 120KV line with the 315KV line. As such, Pylons will eventually be removed; **all we are asking is to do this earlier**.

There is an additional cost to removing the pylons but it is a cost that will eventually be borne as part of future expansions. As well, it is a cost that QC has borne for other projects like Limoilou.

Remove 120KV Line into St. Jean SS– Summary

- Removal of a portion of 120KV line would allow for the space required by Hydro to put the two underground 315KV lines more cost effectively.
- **Regardless of the 315 KV solution implemented** (Underground or Aerial) , removal of a portion of the 120KV line would:
  - Reduce EMFs
  - Reduce Visual Disturbance
  - Increase Property Value (impact of 120KV only) — $$ (residents)
  - Decrease in Noise (impact of 120KV only)
  - Reduce power losses — $$ (HQ)
  - Reduce Maintenance costs — $$ (HQ)
  - Requires new/different transformers — $$ (HQ)
  - Removing the old pylons — included in future plans already

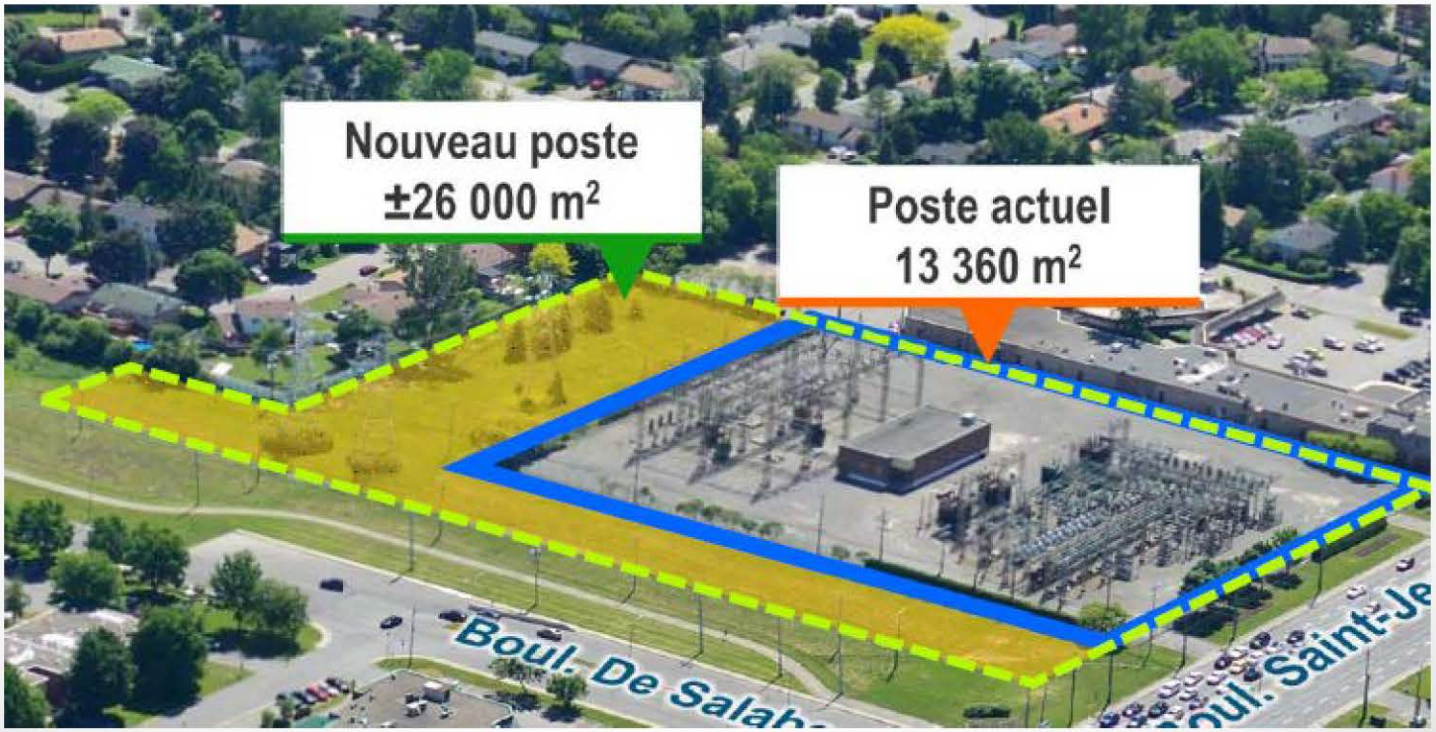
Removal of a portion of the 120KV line as part of the 315KV project would have an overall positive environmental, social and economic benefit with no significant impact to HQ and would reduce cost of going underground!

St. Jean Sub Station

- Sub station is to be expanded whereby homes facing substations will have their backyards practically abutted with the station.
- 9ft "architectural" walls will be placed on the edge of their property lines blocking visibility to the substation but significantly impacting their western sun exposure.
- The 50M empty space they had between them and the 120KV station will be reduced to less than 3M, if that!
- To date, no EMF impact information has been provided for the area in proximity to the Sub-Station.

old

Large green space



new

St. Jean Sub Station

- Compare this to previous projects such as the recent Blainville substation:

L'étude d'impact sur l'environnement démontre que le poste aura peu d'impacts. En effet, le poste respectera les normes de bruit, ne sera pas visible des résidences à proximité et ne présentera aucun danger en matière d'exposition aux champs électriques et magnétiques. Les dimensions totales du terrain seront d'environ 168 m sur 218 m, alors que le périmètre clôturé du poste sera d'environ 138 m sur 188 m. L'espace à l'extérieur de la clôture pourra accueillir le système de drainage et permettra de réaliser un aménagement paysager, en plus de faciliter les travaux d'entretien. (5)

- In fact, no new substation (in or around MTL) in the last 7 years or planned (St. Patrick) has been developed as close to residents as the planned St. Jean Sub Station. (see Hydro Site for details)

HQ has indicated that there are no alternate sub station locations. As such, HQ/ BAPE/Gov't should ensure that the residents along the sub station get compensated as they will be significantly impacted. This includes their quality of life and well being but as well as their home resale values. Otherwise, HQ should revisit the search for an alternate location.

Conclusions

The West Island deserves a more equitable solution that is aligned with previous projects that HQ has undertaken… **precedence**.

Let's finish with HQs comment regarding underground solutions: **"C'est d'ailleurs le choix qui est fait dans 99 % des cas de passage de lignes en milieu urbain, «** [13]

References

- (1) – BAPE Mtg Transcripts (DT1,DT2,DT3) April 21st/22nd , 2016.
- (2) – Impact Report (PR3), October 2015
- (3) – Regie de L'Energie Report, D-2016-013, R-3946-2015, 2016 01 29
- (4) – Call between BUIDDO Lynette Gibeau (resident)and Jean-phillippe Rousseau (HQ), March 9th, 2016
- (5) – Blainville sub Station: INFORMATION SUR LA SOLUTION RETENUE, Feb 2012. (HQ site)
- (6) – Radio Canada Article « **Un nouveau poste d'électricité en construction à Limoilou »** published July 11th, 2011.
- (7) HQ Document, Ligne d'alimentation du poste St-Jean à 315 KV - Analyse comparative de deux projets souterrains avec l'estimation paramétrique du projet St-Jean, D27
- (8 | HQ site: http://www.hydroquebec.com/learning/transport/grandes-distances.html
- (9) Tableau de l'évolution de la charge aux postes Saint-Jean et Des Sources pour les 15 prochaines années. DA39
- (10)Champs Magnetiques, DA35
- (11), Ligne d'alimentation du poste St-Jean à 315 KV, Comparaison des capacités maximales de transport, DA28
- (12) Aerial photos DDO, DB7
- (13), **Enfouissement des fils à Limoilou : à la demande de la Ville, mais à l'insu des élus** (monlimoilou.com), 24 mars 2011
- (14) **Enfouissement des lignes à haute tension dans Limoilou: Hydro repart à zéro,** Le Soleil, 06 mai 2011
- (15), **Projet majeur d'Hydro-Québec dans Limoilou,** Quebec Express**,** 08 mars 2011

Tableau R1.3
Prévisions de la charge de la zone d'étude

	Historique 14-15 (MVA)		Prévisions 2015-2029 – HQD rév. septembre 2015 (MVA)														
Installation	CLT	Pte	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30
Baie-d'Urfé 12 kV	90	83	84	84	85	85	85	86	86	86	86	87	87	87	87	87	88
Baie-d'Urfé 25 kV	127	105	111	121	121	122	123	123	124	125	125	125	126	126	127	127	128
Des Sources 25 kV	542	491	498	504	511	513	516	518	520	521	523	524	526	527	529	530	531
Saint-Jean 12 kV	142	119	119	121	122	123	93	74	74	39	19	0	0	0	0	0	0
Saint-Jean 25 kV	190	0	0	0	0	0	30	50	50	86	106	125	126	126	126	127	127

Total Peak Power over the next 85years (calculated data) ↓

based on predictions for the future

	demand 2030	assume 20% reduction each 15years	demans 2045	assume 20% reduction each 15years	demans 2060	assume 20% reduction each 15years	demand 2075	assume 20% reduction each 15years	demand 2090
BD	216	12%	242	9.53%	265	7.63%	285	6.10%	302
sources & St jean	658	6.3%	699	5.04%	735	4.03%	764	3.22%	789

Summary of Sub Station and Line Capacities ↓

capacity at stations in mva	2015 capacity CLT	2015 demand	2090 demand	increase in CLT	conclusion
BD	217	188	302	39%	BD needs to double transformer capacity
St.jean / Sources	684	610	789	15%	sources SS cannot increase so load must go to St. Jean
St. Jean only	142		247	74%	need a lot more capacity --hence this project

capacity on line in mva	future capacity	2090 demand	conditions
st .jean line *	1910, 1090,1790	247	line stops at St. John
st.jean line*	1910, 1090,1790	549	line goes to BD

* power in aerial, underground 1st 40years, underground 2nd 40 years.

Losses not included