

RE: BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030

From: Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>, Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>, Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>, Sarauer, Ashley ENV:EX <Ashley.Sarauer@gov.bc.ca>
Sent: October 4, 2022 8:55:43 AM PDT
The layers in this monster are starting to get to me.

I am leery of entrenching any new practices of producing more than one set of results. Dan has been clear that this adds a lot of work for every analysis, whether related or not.

However.

I think you're saying we really have two pools of notional RNG. One that is directly attributable to GHGRS, and one that is in the reference case but could fairly be said to be driven at least in part by the expectation of GHGRS coming in. We've discussed the former pool, but not the second.

The second is in the reference case, but won't be attributed to 2025, and to sectors unless we do that manually.

Do I have it right so far?

So the Q is do we count the reference case notional toward 2025?

s.13

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 4, 2022 8:41 AM
To: Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>; Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Sarauer, Ashley ENV:EX <Ashley.Sarauer@gov.bc.ca>
Subject: RE: BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030

I'd also like to keep the discussion going on how notional RNG should be applied towards BC's overall GHG targets. We instructed Navius to include the contracts that Fortis has already signed in the reference case. I think this makes sense since these weren't signed in response to the GHGRS (but arguably could have been, to a degree, in response to policy measures since 2017). There would be ~24PJ of notional RNG starting 2024. If we are counting this notional RNG abatement towards the 2030 target then I would assume this is also applied towards the 2025 target? We'll need to make clear the distinction between notional and BC based reductions. When we're asked to produce content for CCAR or briefing decks should we be providing two versions of all gap to target estimates?

-Ryan

From: Kadowaki, Ryan ENV:EX
Sent: October 3, 2022 4:45 PM
To: Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>; Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Sarauer, Ashley ENV:EX <Ashley.Sarauer@gov.bc.ca>
Subject: RE: BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030

Re: Jotham's RNG cost assumption proposal. I've told him to go ahead with 90% assumption (moving away from fixed \$27.35/GJ assumption) if that is the most straightforward approach that will enable our timelines. His rationale is that moving away from achieving these costs endogenously will make it very difficult to design future GHGRS sensitivities that build on this CleanBC scenario. We'll note this in our documentation and can try to estimate potential implications of this assumption.

Let me know if you have any questions.

Thanks,

Ryan

From: Jotham Peters <jotham@naviusresearch.com>

Sent: October 3, 2022 4:31 PM

To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>

Cc: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>; Yunguang Chen <yunguang@naviusresearch.com>

Subject: Re: BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Ryan,

My comments are below in blue.

J

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Jotham Peters

604-683-1255

naviusresearch.com

410 - 355 Burrard St. Vancouver

On Mon, Oct 3, 2022 at 2:32 PM Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca> wrote:

Hi Yunguang,

Thanks very much for the updated results.

Would you be able to provide the GHG abatement level associated with the notional RNG volume (24.39 PJ) under c03a-CleanBC? In v1.0 you provided an estimate of 1.85 Mt in 2030 but I'm not clear what RNG volume that was associated with.

Yunguang will have these values to you ASAP.

We are aware that a few scenarios achieved slightly less notional RNG in 2025 than you were intending. 2/5 scenarios were perfect; 2/5 had RNG at 24 PJ in 2025, instead of 24.4; and 1/5 scenario had RNG 22 PJ. All values in 2030 are perfect.

To get the value in 2025 perfect in all scenarios, I'm wondering if you would accept an assumption that notional RNG can be imported at a slight discount (e.g., 27.53 CAD per GJ * 90%)?

Ryan, I will structure the model so that LNG production NEVER exceeds the calibration value (e.g., 14 mtpa, 37 mtpa, etc).

And can you confirm that you are aiming to share IESD results out to 2050 with us tomorrow morning?

We are currently running the following to provide you with IESD results:

- c01-ref2017 and c02-ref2018 under reference case LNG to 2050
- c03a-CleanBC and c03b-CleanBC under reference case LNG to 2045. Some of the policies are very stringent in 2050, and we will need to either model them differently or slightly ease up on the stringency. (Right now, 2050 is taking upwards of 9 hours to solve, which is a really bad thing on many levels).

Thanks,

I still have some outstanding action items before final runs (due Friday) that are not mentioned above. Our work plan is:

- Incorporate all outstanding items by end of day tomorrow; and have a new set of results to you by Wednesday at noon. This gives you a chance to provide feedback before we start final runs early Thursday.

Outstanding items:

- Triple and quadruple check of all of our policy settings. Please expect some calls from me to discuss these.
- I haven't had a chance to address the BC industrial electrification policy yet.
-

Ryan

From: Yunguang Chen <yunguang@naviusresearch.com>

Sent: October 3, 2022 12:36 PM

To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>

Cc: Jotham Peters <jotham@naviusresearch.com>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>

Subject: BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Ryan,

Please see the attachment of the BC 2022 core updates gTech + IESD Version 2.0 Priority A results with updates and simulation to 2030. The updates addressed your comments on notional RNG, Public Electricity and Heat Production, and market share of gasoline services.

I noticed that one of the comments asks about the LNG volume under c01-ref2017 (c01-Reference). The model was calibrated under the c02-ref2018 (c02-Calibration) scenario with all current emission reduction measures. Thus, in the c01-Reference, the LNG production would be higher because only federal Renewable Fuels Regulation and FortisBC's current RNG contracts are in action. Please let me know if you would like the LNG trajectories (both ref and sensitivities) to be calibrated under c01-Reference instead of c02-Calibration. Btw, I will update the labels of c01-ref2017 and c02-ref2018 in the next deliverable to avoid confusion. Sorry about that and thanks for your patience.

Best,

Yunguang Chen
Analyst

672-999-8021
naviusresearch.com
410 - 355 Burrard St. Vancouver

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Jotham Peters

604-683-1255
naviusresearch.com
410 - 355 Burrard St. Vancouver

RE: Selected gTech + IESD results for electricity assumption review

From: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
To: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>, Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 4, 2022 2:16:55 PM PDT
Yes, I get all the same values too

From: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Sent: October 4, 2022 11:41 AM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>; Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Subject: RE: Selected gTech + IESD results for electricity assumption review

Looks correct to me

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 4, 2022 11:05 AM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: FW: Selected gTech + IESD results for electricity assumption review

Notional RNG abatement provided below for 2030. Hilary was asking for an update on the new tentative gap to target. Can you confirm that this is correct?

	2030
C03a-CleanBC (incl. deforestation)- raw	44.15
Post modelling adjustments	-3.21
Notional RNG	-1.21
BC Total (incl notional RNG)	39.73
BC Total (excl notional RNG)	40.94
BC 2030 target	39.28
% to target (incl notional RNG)	98%
% to target (excl notional RNG)	94%

From: Yunguang Chen <yunguang@naviusresearch.com>
Sent: October 4, 2022 10:45 AM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Jotham Peters <jotham@naviusresearch.com>
Subject: Re: Selected gTech + IESD results for electricity assumption review

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Ryan,

We do not have Peak Demand at Storage Capacity outputs available at this time.

The GHG abatement level associated with the notional RNG volume (24.39 PJ) under c03a-CleanBC is 1.21 MT CO2eq.

Best,
Yunguang Chen
Analyst

672-999-8021
naviusresearch.com
410 - 355 Burrard St. Vancouver

On Tue, Oct 4, 2022 at 9:45 AM Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca> wrote:

Confirming that you don't have Peak Demand at Storage Capacity outputs available at this time?

And would it be possible to get the notional RNG estimates (GHG abatement associated with the provided PJ amounts) this morning?

Thanks again,

Ryan

From: Kadowaki, Ryan ENV:EX
Sent: October 4, 2022 8:34 AM
To: 'Yunguang Chen' <yunguang@naviusresearch.com>
Cc: Jotham Peters <jotham@naviusresearch.com>
Subject: RE: Selected gTech + IESD results for electricity assumption review

Thanks very much, Yunguang. I've passed on to Jack and he is going to finalize his review by tomorrow morning.

-Ryan

From: Yunguang Chen <yunguang@naviusresearch.com>
Sent: October 4, 2022 8:22 AM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Jotham Peters <jotham@naviusresearch.com>
Subject: Selected gTech + IESD results for electricity assumption review


[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Ryan,

Please see the attachment of the selected gTech + IESD results for electricity assumption review.

Thanks,

Yunguang Chen
Analyst

 672-999-8021
naviusresearch.com
410 - 355 Burrard St. Vancouver

Re: Your gTech runs are done!

From: Yunguang Chen <yunguang@naviusresearch.com>
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Jotham Peters <jotham@naviusresearch.com>
Sent: October 7, 2022 1:32:25 PM PDT

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Yes.

Yunguang Chen
Analyst
www.naviusres.com

■ 672-999-8021
■ naviusresearch.com
■ 410 - 355 Burrard St. Vancouver

On Fri, Oct 7, 2022 at 12:57 PM Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca> wrote:

Thanks Yunguang. And can you just confirm that for the results sent this morning that the notional RNG amount under c03a-CleanBC (24.39 PJ) still equates to 1.21 Mt of abatement towards the GHGRS policy?

-Ryan

From: Yunguang Chen <yunguang@naviusresearch.com>
Sent: October 7, 2022 12:45 PM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Jotham Peters <jotham@naviusresearch.com>
Subject: Re: Your gTech runs are done!

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Ryan,

ETA update: we will deliver the gTech + IESD results by 2:30 pm today. Thanks for your patience!

Best,

Yunguang Chen
Analyst

- 672-999-8021
- naviusresearch.com
- 410 - 355 Burrard St. Vancouver

On Fri, Oct 7, 2022 at 9:36 AM Yunguang Chen <yunguang@naviusresearch.com> wrote:

Hi Ryan,

We will deliver the gTech results in an hour and the gTech + IESD results by 1pm today.

Best,

Yunguang Chen
Analyst

- 672-999-8021
- naviusresearch.com
- 410 - 355 Burrard St. Vancouver

On Fri, Oct 7, 2022 at 9:26 AM Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca> wrote:

Thanks for the update. Do you have a rough ETA?

From: Jotham Peters <jotham@naviusresearch.com>

Sent: October 7, 2022 9:15 AM

To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>; Yunguang Chen <yunguang@naviusresearch.com>

Subject: Your gTech runs are done!

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

We are in the process of compiling them and running IESD.

J

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--

Jotham Peters

- 604-683-1255
- naviusresearch.com
- 410 - 355 Burrard St. Vancouver

RE: Emission reduction range

From: Dale, Daniel ENV:EX
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>, Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>, Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Sent: October 11, 2022 4:15:30 PM PDT
Attachments: image002.png, image001.png

I am generally in agreement that sticking with the model runs is the right thing to do. However, if we present a range in the chart and then present the 97% pathway in the rest of the CCAR, it will appear to outsiders as if we are intentionally presenting the best case scenario to make it look like we are getting close to targets. This is obviously not our intent, but it could be perceived that way.

I'm wondering if instead of a emissions range we present something like a downside scenario in a separate chart based around fossil fuel use. We could use natural gas/RPP fuel volumes in c03 and compare them to fuel volumes in c06 and graphically show the change in fuel use and emissions reductions under these scenarios. Framing could then be something to this effect: "under B.C.'s climate plan, natural gas use and gasoline/diesel consumption are forecast to decline by X%. This level of decline is likely necessary for B.C. to achieve it's 2030 targets. If policyies and programs that incent fuel switching are not as effective as anticipate, fuel use may decline as sharply as anticipated and B.C. may fall short of it's targets by xMt etc". There is not a perfect link between fossil fuel use and emissions, but it's about a pretty good proxy.

Just an idea, so open to thoughts on this.

From: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Sent: October 11, 2022 2:15 PM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Subject: RE: Emission reduction range

s.13

Chris

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 11, 2022 1:56 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Subject: RE: Emission reduction range

Hi folks,

s.13

-Ryan

From: Kadowaki, Ryan ENV:EX
Sent: October 7, 2022 3:53 PM
To: Turner, Jennifer ENV:EX <Jennifer.Turner@gov.bc.ca>; Horne, Matt ENV:EX <Matt.Horne@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Subject: RE: Emission reduction range

In thinking about this further, I don't know if we should be communicating our emissions totals and gap to target using ranges like we did last year. Last year's CCAR didn't include Roadmap measures so we were projecting a much larger gap to target. In this year's report we are very close to the 2030 target (97%) and medium close to 2025 (84%). If we provide ranges that suggest we could significantly exceed target (2030) or come very close to achieving target (2025) I think this will be misleading based on the current state of policy development.

So I would lean towards no range or providing ranges that are weighted more to a lower emissions projection that represents the potential risks to targets.

Any thoughts on this?

Thanks,

Ryan

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 7, 2022 2:12 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>; Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Cc: Turner, Jennifer ENV:EX <Jennifer.Turner@gov.bc.ca>
Subject: Emission reduction range

Hello folks,

In the 2021 CCAR we provided our progress to the 2030 target as a range:

“Each year, we update our model with the most recent data and develop revised estimates. For the 2021 report, B.C. estimates existing CleanBC climate actions will result in a 2030 emissions total of approximately 55.2 Mt CO₂ e, roughly equal to 40% of the way to B.C.’s 2030 target. Due to uncertainties in emissions modelling, B.C. expresses these projections as a range of between 53.2 Mt CO₂ e and 57.2 Mt CO₂ e. This is between 32% and 48% of B.C.’s 2030 target.”

s.13

Does anyone have strong feelings on this one?

Thanks,

Ryan

Ryan Kadowaki

(he/him)

Senior Economic Advisor | Climate Action Secretariat

Ministry of Environment & Climate Change Strategy

Tel: 778-698-4790 | Email: ryan.kadowaki@gov.bc.ca

**CLIMATE ACTION
SECRETARIAT**

A CLEAN, COMPETITIVE, CLIMATE-READY B.C.

RE: gap to target

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>, Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Sent: October 17, 2022 11:59:19 AM PDT
Attachments: image001.png

I'm sharing the revised table (incorporating clarification from Chris on CIF adjustment). This should align with the v3 version of the Modelling Analysis spreadsheet. Assuming no issues with this let's ensure we're sharing these % gap to target figures when requested to avoid confusion.

Thanks,

Ryan

	2025	2030	Notes
C03a-CleanBC (incl. deforestation)- raw	58.61	44.49	14 MTPA LNG scenario
Post modelling adjustments	-0.80	-3.21	
Notional RNG	-1.21	-1.21	
BC Total (incl notional RNG)	56.60	40.07	
BC Total (excl notional RNG)	57.81	41.28	
BC 2030 target	54.99	39.28	
% to target (incl notional RNG)	85%	97%	
% to target (excl notional RNG)	73%	92%	

From: Kadowaki, Ryan ENV:EX
Sent: October 11, 2022 3:33 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Thanks

From: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Sent: October 11, 2022 3:33 PM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Yeah, the CIF adjustment calculation is automatic in the workbook to give a total of 3 MtCO₂e from the policy, the same as last year.

Chris

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 11, 2022 3:30 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

And can you confirm how you're calculating the CIF post modelling adjustment? I see we're getting less abatement from p09a-CIF in v.3 and it looks like you've made a corresponding adjustment to the post-modelling adjustment to get total abatement to sum to 3 Mt. Is that correct?

I didn't make that adjustment in the numbers I provided Hilary but will use your numbers going forward.

Thanks,

Ryan

From: Kadowaki, Ryan ENV:EX
Sent: October 11, 2022 1:31 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Thanks Chris!

No ETA yet on the remaining items in the run. Mikela is back today so I'll check in with her soon so we can workplan around the availability of that data.

-Ryan

From: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Sent: October 11, 2022 1:19 PM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Hi both,

The updated analysis workbook is [here](#). I'll update the Accountability Report with these results and graphs now.

Do we have an estimated timeline from Navius on the remaining update pieces (primarily results to 2050, the b versions of scenarios, and the updates to the results template)?

Thanks,
Chris

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 11, 2022 8:55 AM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Cc: Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Hi Chris

Are you able to prioritize the updating of the Modelling Analysis worksheet today with the 10-07 run and the short-term forecast for CCAR? Dan and I both reviewed the run on Friday but nothing major jumped out aside from the LCFS as noted below.

Dan will be updating the briefing deck including several of the charts from your analysis (Dan we can discuss at our check in. File is saved in the Core Run folder).

For the core scenario we'll be using the 14 MTPA LNG sensitivity and adjusting by 1.21 Mt to represent notional RNG abatement. Post modelling adjustments are same as previous version with the exception of lowering the AGRI estimate to 0.08 Mt.

Let me know if you want to discuss at all.

Thanks,

Ryan

From: Kadowaki, Ryan ENV:EX
Sent: October 7, 2022 2:16 PM
To: Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Cc: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: RE: gap to target

Hi Hilary,

Here are what I believe to be the final numbers that we'll be using for the CCAR. Not much different from the previous version. Slightly closer to the 2025 target and slightly further from 2030. Main difference is we lost a small amount of LCFS abatement due to improvements made by Jotham.

-Ryan

	2025	2030	Notes
C03a-CleanBC (incl. deforestation)- raw	58.61	44.49	14 MTPA LNG scenario
Post modelling adjustments	-0.74	-3.11	We've lowered agriculture adjustment from previous version from 0.20 to 0.08 Mt to reflect assumptions book feedback from AFF.
Notional RNG	-1.21	-1.21	
BC Total (incl notional RNG)	56.66	40.17	
BC Total (excl notional RNG)	57.87	41.38	
BC 2030 target	54.99	39.28	
% to target (incl notional RNG)	84%	97%	
% to target (excl notional RNG)	72%	92%	

From: Kadowaki, Ryan ENV:EX
Sent: October 4, 2022 2:28 PM
To: Hop Wo, Hilary ENV:EX <Hilary.HopWo@gov.bc.ca>
Cc: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>; Dale, Daniel ENV:EX <Daniel.Dale@gov.bc.ca>
Subject: gap to target

Hi Hilary,

Here is the latest estimate of gap to target (incl/excl notional RNG).

	2025	2030
CleanBC (incl. deforestation)- raw	58.91	44.15
Post modelling adjustments	-0.80	-3.21
Notional RNG	-1.21	-1.21
BC Total (incl notional RNG)	56.90	39.73
BC Total (excl notional RNG)	58.11	40.94
BC target	54.99	39.28
% to target (incl notional RNG)	82%	98%
% to target (excl notional RNG)	70%	94%

I'm planning to structure the model update deck to compare these updated results to the run that was published in the Roadmap (August 2021) rather than the updated run from December 2021. Rationale is that decision makers and others are more likely to remember the published results and the claim that it fully achieved the 2030 target. The August 2021 run didn't include all of the final Roadmap policy design elements/assumptions. This resulted in more post modelling

adjustments to approximate the full impact of the RM and a slight overestimation of emission reductions in the August 2021 run (30.0 Mt of remaining emissions in 2030, 102% to target) vs December 2021 (39.6 Mt, 99% to target). I'm thinking this can be communicated as the main driver behind the slightly lower progress to target in the updated run. Do you think that will fly or do we need to dig into attribution more? NIR changes and removed policies are also factors but may be difficult to quantify.

-Ryan

Ryan Kadowaki

(he/him)

Senior Economic Advisor | Climate Action Secretariat

Ministry of Environment & Climate Change Strategy

Tel: 778-698-4790 | Email: ryan.kadowaki@gov.bc.ca

**CLIMATE ACTION
SECRETARIAT**

A CLEAN, COMPETITIVE, CLIMATE-READY B.C.

RE: CCAR Graphs

From: Bosson, Chris ENV:EX
To: Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Cc: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 20, 2022 12:06:04 PM PDT
Attachments: CCAR 2022 Forecast Charts.xlsx, CCAR 2022 Inventory Charts.xlsx
Hi Deb,

Here are the files containing the CCAR charts from both the forecast and inventory.

Thanks,
Chris

From: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Sent: October 19, 2022 2:13 PM
To: Bosson, Chris ENV:EX <Chris.Bosson@gov.bc.ca>
Cc: Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Subject: FW: CCAR Graphs

Hi Chris,

Are you able to compile the CCAR chart data for the desktopper?

On Friday, Matt requested that the progress to target chart embed the notional RNG within the CleanBC wedge so I made that change in the attached version in Sheet 1. But you may want to just create your own version within your analysis worksheet.

Thanks,

Ryan

From: Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Sent: October 19, 2022 1:39 PM
To: Kadowaki, Ryan ENV:EX <Ryan.Kadowaki@gov.bc.ca>
Subject: FW: CCAR Graphs

Hi Ryan,

The CCAR desktopper has asked for the Excel files/data used to create the graphs in the CCAR. Are you able to share those with me?

Thanks,
Deb

From: Turner, Jennifer ENV:EX <Jennifer.Turner@gov.bc.ca>
Sent: October 19, 2022 1:36 PM
To: Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Subject: RE: CCAR Graphs

Yes, please reach out to Ryan K to get these

From: Sandy Reber <sandy@reberco.com>
Sent: October 19, 2022 1:07 PM
To: Clement, Alana ENV:EX <Alana.Clement@gov.bc.ca>; Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>

Cc: Todesco, Tara ENV:EX <Tara.Todesco@gov.bc.ca>

Subject: Re: Delay

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Alana and Deborah,

Thanks so much for getting the photos and the latest draft to me. Would it also be possible to get the Excel files for the graphs? That will help us build the graphs in the most accurate and efficient way possible.

Thanks again,
Sandy

Sandy Reber
Reber Creative
Ph: 250 216-1092

On Oct 18, 2022, at 12:31 PM, Clement, Alana ENV:EX <Alana.Clement@gov.bc.ca> wrote:

Hi Sandy,

Apologies for the delay in getting these to you. Was hoping to send them in a Zip file but there are too many and they are too big so I created [a Dropbox account](#). Please let me know if have trouble accessing.

The photos that Deb suggested can be found in the DAM and project folders. The first part of the report will require photos, as well as the cover.

Others to consider:

Under stock photos:

- family cycling (family of four on e-bikes)
- Seniors hiking
- Family harvesting fruit
- Little kid exploring nature
- Wet'suweten fishing site...2
- Corn farmer
- Woman energy efficiency
- Pulp mill
- Lillooet

DAM photos:

RS3429 (EV charging)

RS45404 – (fire fighters)

There's also photos of a Purolator electric bike and electric mining trucks that we used in Roadmap but they can also be used in here as examples of clean transportation/economy and clean industry.

Thanks!!
Alana

From: Sandy Reber <sandy@reberco.com>
Sent: October 18, 2022 9:13 AM
To: Clement, Alana ENV:EX <Alana.Clement@gov.bc.ca>
Cc: Todesco, Tara ENV:EX <Tara.Todesco@gov.bc.ca>; Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Subject: Re: Delay

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Alana,

Thank you, that's great! We won't place all the draft text, but it will give us a sense of where the graphs and images might go.

Cheers,
Sandy

Sandy Reber
Reber Creative
Ph: 250 216-1092

On Oct 18, 2022, at 9:01 AM, Clement, Alana ENV:EX <Alana.Clement@gov.bc.ca> wrote:

Hi Sandy,

I can certainly send you graphs and images today. Deb, do you know if there are major changes to the report since the last draft?

Thanks,

Alana

From: Sandy Reber <sandy@reberco.com>
Sent: October 17, 2022 4:36 PM
To: Clement, Alana ENV:EX <Alana.Clement@gov.bc.ca>
Cc: Todesco, Tara ENV:EX <Tara.Todesco@gov.bc.ca>; Carroll, Deborah ENV:EX <Deborah.Carroll@gov.bc.ca>
Subject: Re: Delay

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Hi Alana,

These dates will work for us, but if you have the photos and any graphics we could be working on ahead of time, that would be help us turn around the first desktopped draft more quickly.

And if the copy of the report won't be ready Wed or Thurs, maybe you could send it in its draft state if there have been major changes since the last rough draft?

I'm just thinking how we can keep progressing while we are standing by... but if the above is cumbersome, then not to worry, we should be able to meet the timeline anyway.

Thanks for keeping me posted.

Cheers,
Sandy

Sandy Reber
Reber Creative
Ph: 250 216-1092

On Oct 17, 2022, at 4:11 PM, Clement, Alana ENV:EX
<Alana.Clement@gov.bc.ca> wrote:

Hi Sandy,

There are still quite a few revisions coming in for the CCAR. We hope to provide a copy of the report later this week (Wed or Thurs) and won't need the first desktop version until the end of the following week. Please see below for a revised timeline for desk topping below.

Revised Desk topping Timeline:

- Sept 26-Oct 6 – Design concepts – COMPLETE
- Sept 26-Oct 14 – COMPLETE
- Oct 19 – version 9 CCAR available – send to Sandy
- Oct 20-28 – First draft desktop version
- Oct 28-Nov 1 – Review desktop version with GCPE input
- Oct 31 – version 10 CCAR available – Send to Sandy
- Nov 1-4 – Second draft desktop version
- Nov 4-8 – Copy edit and minor updates
- Nov 8-11 – Exec approvals
- Nov 14-17 – Final/third desktop version

Please let me know if these revised dates will work for you or if you have any concerns.

Thanks,

Alana

Alana Clement (she/her)

Senior Policy Analyst | Climate Action Secretariat
Ministry of Environment & Climate Change Strategy
Tel: 236-478-1692 | Email: alana.clement@gov.bc.ca

I respectfully acknowledge the lək'wəŋən (Lekwungen) People whose traditional territory I am grateful to live and work on.

Greenhouse Gas Emissions in BC (MtCO₂e)

Land-use change																																							
Include offsets																																							
TOTAL	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2007→2019	+1%	2007→2020	-2.0	-3%	2019→2020	-2.7	-4%
ENERGY: STATIONARY COMBUSTION SOURCES	19.3	18.1	16.9	19.1	19.2	21.5	21.9	19.5	20.0	21.9	22.6	24.4	22.1	21.4	21.9	21.2	20.9	20.7	20.5	20.1	19.7	20.5	20.1	19.9	19.9	19.4	21.0	21.6	21.6	21.1	20.4	+0.7	+4%	-0.4	-2%	-0.7	-3%		
Public Electricity and Heat Production	0.8	0.5	0.9	2.0	1.8	2.2	0.4	0.7	1.5	0.8	1.9	2.5	0.9	1.0	1.2	1.3	1.5	1.1	1.5	1.3	1.2	0.8	0.5	0.6	0.6	0.5	0.7	0.7	0.9	0.4	-0.1	-17%	-0.7	-62%	-0.5	-55%			
Petroleum Refining Industries	1.2	1.2	1.0	0.7	0.7	0.6	0.7	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.5	0.4	-0.2	-26%	-0.3	-40%	-0.1	-19%				
Oil and Gas Extraction	2.1	1.4	0.7	0.8	1.6	2.7	3.4	2.1	3.0	4.3	3.2	4.3	4.5	4.8	5.2	5.1	5.7	6.2	6.3	6.5	6.8	7.0	6.9	6.9	7.0	6.8	7.2	7.4	7.4	6.7	6.9	+0.5	+8%	+0.7	+12%	+0.2	+4%		
Mining	0.6	0.6	0.4	0.5	0.4	0.5	0.7	0.6	0.5	0.6	0.5	0.6	0.6	0.7	0.7	0.7	0.4	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.7	0.6	+0.1	+11%	+0.0	+6%	-0.0	-4%				
Manufacturing Industries	6.5	6.2	5.5	6.0	6.2	7.0	7.6	7.1	6.6	7.3	7.8	7.8	6.7	6.8	6.4	6.1	4.6	4.5	3.8	3.8	3.8	4.0	4.1	4.1	4.4	4.4	4.7	4.9	5.0	4.5	4.0	+0.0	+1%	-0.4	-10%	-0.5	-11%		
Construction	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-0.0	-19%	-0.0	-19%	-0.0	-0%			
Commercial and Institutional	2.9	3.2	3.3	3.7	3.4	3.5	3.6	3.4	3.0	3.1	3.5	3.5	4.1	3.4	3.3	3.1	3.1	3.0	3.2	2.9	2.6	2.9	2.9	2.7	2.6	2.4	2.7	2.9	2.8	2.9	3.0	-0.1	-3%	-0.0	-1%	+0.1	+3%		
Residential	4.5	4.4	4.2	4.8	4.5	4.5	5.1	4.7	4.6	4.9	4.7	4.6	4.4	4.1	4.0	4.5	4.5	4.5	4.4	4.4	3.6	4.4	4.1	4.0	3.8	3.8	3.9	4.3	4.0	4.2	4.3	-0.3	-6%	-0.2	-5%	+0.1	+2%		
Agriculture and Forestry	0.3	0.4	0.4	0.4	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	+0.5	+697%	+0.5	+705%	+0.0	+1%			
ENERGY: TRANSPORT	18.7	18.8	18.8	19.3	20.3	21.3	22.1	23.1	23.5	23.4	23.5	23.4	22.8	23.4	24.9	24.0	23.6	24.2	24.4	22.5	22.9	22.1	23.2	24.6	24.6	25.6	26.8	27.6	29.4	29.4	27.3	+5.3	+22%	+3.1	+13%	-2.2	-7%		
Domestic Aviation	1.3	1.2	1.2	1.1	1.1	1.3	1.4	1.5	1.5	1.6	1.5	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.4	1.2	1.2	1.1	1.3	1.3	1.3	1.3	1.5	1.6	1.6	0.9	+0.1	+10%	-0.5	-37%	-0.7	-43%		
Road Transport	9.6	9.6	9.7	10.0	10.6	11.0	11.5	12.5	13.4	13.6	13.8	14.1	14.3	14.9	15.8	15.5	15.5	15.7	16.0	14.9	14.9	15.1	14.6	15.3	16.3	16.3	16.8	18.0	18.2	19.2	19.0	17.5	+3.3	+21%	+1.8	+11%	-1.5	-8%	
Light-Duty Gasoline Vehicles	3.9	3.9	4.0	4.1	4.3	4.3	4.3	4.5	4.6	4.5	4.5	4.5	4.5	4.5	4.5	4.7	4.5	4.3	4.2	4.1	4.1	3.9	3.6	3.6	3.7	3.7	3.8	4.1	4.0	4.0	3.8	-0.5	-11%	-1.1	-26%	-0.6	-17%		
Light-Duty Gasoline Trucks	2.1	2.2	2.3	2.4	2.7	2.8	3.0	3.2	3.5	3.6	3.6	3.7	3.8	3.8	4.1	3.9	3.9	4.0	4.0	4.1	4.0	3.9	4.0	4.2	4.4	4.7	5.3	5.4	5.5	5.6	5.2	+1.6	+41%	+1.2	+30%	-0.4	-8%		
Heavy-Duty Gasoline Vehicles	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.8	1.9	1.9	1.9	1.9	1.8	1.7	1.8	1.8	1.8	1.7	2.0	2.0	2.0	2.0	2.0	+0.1	+6%	+0.1	+6%	-0.0	-0%		
Motorcycles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.0	+35%	+0.0	+19%	-0.0	-12%		
Light-Duty Diesel Vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	+0.0	+24%	-0.0	-11%	-0.0	-29%	
Light-Duty Diesel Trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	+0.1	+279%	+0.1	+241%	-0.0	-10%	
Heavy-Duty Diesel Vehicles	1.9	1.9	1.8	1.8	1.9	2.1	2.4	2.8	3.1	3.4	3.5	3.7	3.9	4.4	4.7	4.9	5.1	5.4	5.8	4.6	5.1	5.2	5.7	6.4	6.3	6.3	6.3	6.5	7.3	7.3	7.0	+2.0	+36%	+1.6	+30%	-0.3	-5%		
Propane and Natural Gas Vehicles	0.6	0.6	0.4	0.4	0.5	0.4	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-95%	-0.1	-98%	-0.0	-57%		
Railways	1.9	1.8	1.8	1.8	1.7	1.6	1.7	1.7	1.5	1.6	1.5	1.4	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.7	1.7	1.9	1.9	1.9	1.8	1.7	1.9	2.1	2.2	2.1	+0.5	+30%	+0.4	+21%	-0.2	-7%			
Domestic Navigation	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.2	1.2	1.4	1.4	+0.6	+79%	+0.6	+79%	+0.0	+0%		
Off-Road Transport	4.4	4.5	4.5	4.7	4.9	5.3	5.3	5.2	4.7	4.5	4.3	3.8	3.8	4.0	4.2	3.7	3.5	3.5	3.6	3.0	3.3	2.8	2.8	3.0	2.9	3.2	3.1	3.4	4.0	3.8	4.0	+0.3	+9%	+0.5	+14%	+0.2	+5%		
Off-Road Agriculture and Forestry	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.0	1.0	0.9	0.8	0.9	0.8	0.9	1.0	0.9	0.8	0.8	0.8	0.8	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.8	-0.0	-4%	+0.0	+3%	+0.1	+8%		
Off-Road Commercial and Institutional	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	-0.0	-3%	+0.0	+2%	+0.0	+5%		
Off-Road Manufacturing, Mining, and Construct	1.3	1.4	1.4	1.5	1.6	1.8	1.9	1.9	1.5	1.4	1.5	1.4	1.5	1.6	1.6	1.5	1.4	1.4	1.5	1.2	1.4	1.3	1.2	1.3	1.3	1.4	1.4	1.7	2.0	2.0	2.0	+0.5	+38%	+0.6	+43%	+0.1	+4%		
Off-Road Residential	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	-0.0	-16%	-0.0	-10%	+0.0	+7%		
Off-Road Other Transportation	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	1.8	1.7	1.5	1.1	1.1	1.0	1.1	0.9	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.7	-0.2	-21%	-0.1	-16%	+0.0	+7%		
Pipeline Transport	0.9	1.1	1.1	1.1	1.3	1.4	1.5	1.5	1.6	1.4	1.7	1.9	1.4	1.1	1.1	1.0	0.8	0.9	0.9	0.9	0.8	0.8	0.8	1.0	1.0	1.3	1.4	1.4	1.3	1.4	1.3	+0.4	+48%	+0.4	+41%	-0.1	-5%		
ENERGY: FUGITIVE SOURCES	4.4	4.3	4.3	4.2	5.5	5.8	6.3	6.6	6.5	6.2	6.2	6.5	6.2	6.0	6.0	6.4	6.4	6.5	7.0	6.3	6.2	6.7	6.3	6.3	6.0	5.6	4.9	4.7	4.9	4									