

EB-2018-0085 Sustainability-Journal Submission re. Reconsideration of Dec 28/2017 Decision on EB-2016-0152

Ontario Power Generation has requested that the OEB Decision of 28 December, 2017 regarding EB-2016-0152 be reviewed. The OEB has in the interim published a further Order dated March 12, 2018 on some aspects of the earlier Decision.

Rule 42.01 provides the grounds upon which a motion may be raised with the OEB:

42.01 Every notice of a motion made under Rule 40.01, in addition to the requirements under Rule 8.02, shall:

(a) set out the grounds for the motion that raise a question as to the correctness of the order or decision, which grounds may include:

(i) error in fact;

(ii) change in circumstances;

(iii) new facts that have arisen;

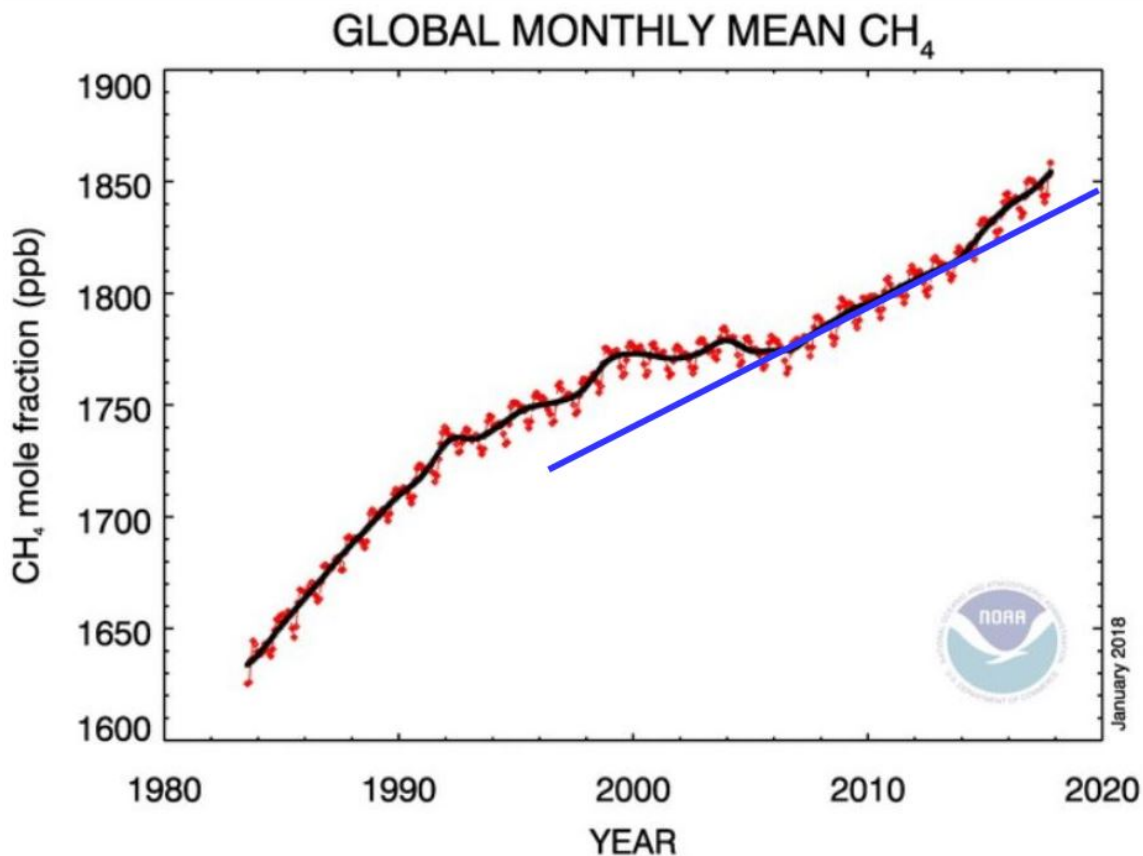
(iv) facts that were not previously placed in evidence in the proceeding and could not have been discovered by reasonable diligence at the time.

Sustainability-Journal proposes that articles (ii), (iii) and (iv) all apply in this case:

(ii) change in circumstances A fundamental premise of the OPG plan is that there will not be any change in the basic energy sources – i.e. nuclear power for electricity and natural gas for heating applications. It is highly likely that natural gas will cease being the source of heat in the near future. It is universally accepted that this would eventually happen in any case but circumstances have now changed so that the use of natural gas needs to be terminated as quickly as possible. The most likely replacement for natural gas is stored summer heat, which would greatly reduce the demand for electricity, and in particular the large summer and winter demand peaks (which are created by thermal demands) and also the daily demand peak, thanks to exergy storage of excess nighttime power. Those reductions are likely to be large enough to enable the relatively expensive use of nuclear power to be phased out, possibly completely.

(iii) new facts that have arisen In the past the natural gas that was being released from shale rock by the fracking process was not visibly reaching the surface so government agencies have mistakenly assumed that it should be dismissed in determining the GHG emissions that result from Ontario's uses of natural gas. In June of this year the Rover pipeline from the Marcellus source will be completed to the Dawn Hub in Ontario so the province's use of fracked gas will soon thereafter account for nearly 100% of the total being used for both heating and power generation purposes. In the fracking process about half of the released natural gas (which is mostly methane) is captured for commercial use and the other half is released into the surrounding rocks, which have permeabilities that are about one million times higher than that of the shale. The actual amounts are typically measured by the well operators because that is their primary objective, but it appears that such data is never published publicly. However, considering that it is now known that the gas is coming to the surface there is a duty for the monitoring agencies to require that this information must be released. That uncaptured methane is mobile enough to eventually reach the surface via diffusion, passage via porous rock layers, flow via faults in the rock, via water entrainment and dissolution and via thousands of boreholes that are known to be unable to present a barrier to the escape of the gas.

(iv) facts that were not previously placed in evidence in the proceeding and could not have been discovered by reasonable diligence at the time. The oral hearings for EB-2016-0152 were held in November of 2016 and March of 2017. At that time the potential for releasing large amounts of methane from fracking was understood in principle but since there was only anecdotal evidence available (for example, in the form of reports of flammable well water) it was not taken seriously. In recent months reports have become available showing that the permeability of the rock types above and below the thin shale layer is substantial, that ethane measurements are showing that the methane in deep wells is coming from the fracking process rather than from surface generation (which does not produce ethane), that the ground, aerial and satellite methane measurements are greater than expected, and that the linear increases in global measurements made by NASA (January, 2018) and attributed to fugitive emissions (from production pipes) are changing to an exponential growth pattern (see the graph below). This growth shows that the rate of release to the atmosphere is accelerating, with the expectation that it will come into equilibrium when it equals the release rate 2 km underground. That will amount to over 3000 megatonnes of GHG per year for the amount of natural gas that is being consumed by Ontario, which is about 100 times greater than the amount of GHG presently being attributed, primarily related to the CO₂ produced by burning the gas.

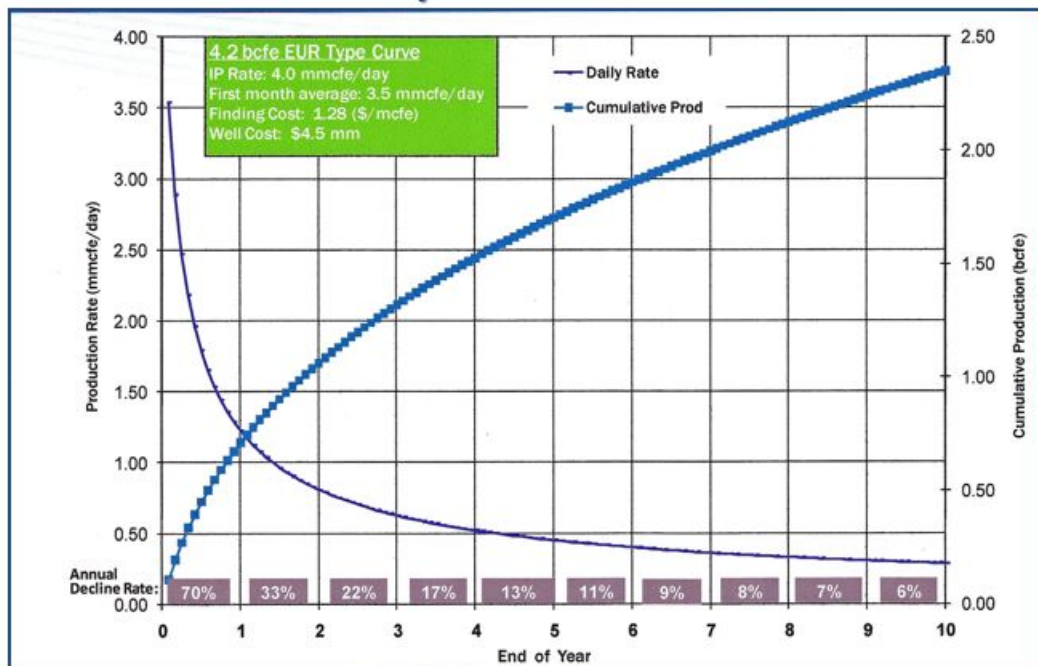


At the present time the amounts of uncaptured fracked gas that are escaping to the atmosphere are still quite modest as shown by the NASA graph but the amounts of fugitive gas (from the production pipelines) has been increasing rapidly. The fugitive gas reaches the atmosphere quickly because it does not have to diffuse through the overburden. However, like the uncaptured methane the upstream fugitive emissions are not being reported, and the quantities would be grossly in error even if they were being reported because the Ministry of Environment and Climate Change is using an incorrect value for the GWP of methane (25 vs. 105). Even though the fugitive releases are minor in comparison with the

upcoming releases of uncaptured methane they still account for Ontario's biggest single source of GHG and they already demonstrate that we need to terminate the use of fracked natural gas as quickly as is humanly possible.

The estimate of 3000 megatonnes per year for uncaptured methane is almost certainly low. The records for the number of producing wells is almost constant in spite of the fact that the output from the individual wells drops rapidly during the first year of production. The implications are that the older wells are being taken out of service at approximately the same rate as new ones are drilled and that the production lifetimes are very short. The problem is that taking a well out of service does not stop the flow of gas out of the shale. That will continue for many decades even though there is no commercial production from the well. This post-production leakage is theoretically much greater than the losses that occur during production but the question has not yet been adequately studied.

Key Data for Estimation of Well Productivity and Economics: PA



From: Chesapeake Energy (CHK) published *pro forma* data

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A rapidly growing practice for power grids is to install battery regulators that regulate the grid voltage against sudden load or distribution fluctuations. Such regulators are very expensive because the batteries have a short lifetime of about 12 years. Some European systems use the batteries from electric vehicles (EV's) for this purpose so that the charging stations also serve as regulation points. Since the car owners buy the batteries this greatly reduces the regulator costs while at the same time it can make charging cheaper and more widely available. Such regulator/chargers fit particularly well into thermal storage systems, using both the batteries and the exergy storage to store the electricity. Recent proposals show a five-fold increase in the storage capacity that can be achieved with such systems as compared to pure battery systems. This development is important to EV drivers, to the electricity

suppliers and to the efforts to reduce the large amounts of GHG that are currently being released in the transportation sector.

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