Roger Caiazza Personal Comments on the
Proposal to Incorporate Carbon Pricing into New York Wholesale Energy Markets
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Via email to NYISO at IPP_feedback@nyiso.com
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Introduction

I am motivated to submit these comments so that there is at least one voice of the unaffiliated public whose primary interest is an evidence-based balance between environmental goals and costs to ratepayers for New York State energy policy. As the sole active independent citizen involved with this process I have reviewed documents and provided comments for over a year. Based on my review and analysis I conclude that the original criteria for success defined last year are not met. The small CO2 reduction benefits estimated do not support implementation given the potential for significant costs to consumers, considerable implementation issues and likelihood of unintended consequences.

These comments are submitted as a private retired citizen. They do not reflect the position of any of my previous employers or any other company I have been associated with, these comments are mine alone. The majority of New York State (NYS) ratepayers are unaware of the ramifications of this proceeding or have any idea of the ramifications of incorporating the cost of carbon emissions into New York State (NYS) wholesale electricity markets. Unfortunately, the majority of the stakeholders and the parties who will vote in the next phase of the NYISO implementation process do not represent the interests of ratepayers so I fear that this flawed proposal will eventually be implemented.

The question I address in these comments is whether the proposed program to price CO2 in the wholesale electric market is an appropriate response for New York State policy. Since the August 10, 2017 release of Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals (hereinafter the "Brattle Report") there has been an active stakeholder process to examine that proposal for using carbon pricing within wholesale markets to further New York's energy goals. The NYISO and DPS agreed in the preamble to the Brattle Report that in order to be successful, "Any carbon pricing proposal must contribute to achieving New York State's public policies, while providing the greatest benefit at the least cost to consumers while also providing appropriate price signals to incentivize investment and maintain grid reliability."

New York's energy policies are driven by Reforming the Energy Vision (REV) which is Governor Cuomo's plan to "rebuild, strengthen and modernize New York's energy system" in order to" build a clean, more resilient, and affordable energy system". The 2030 goals for REV are:

- 40% reduction in greenhouse gas emissions from 1990 levels;
- 50% of electricity must come from renewable sources; and
- 600 trillion Btu increase in statewide energy efficiency.

The REV 2050 emission goal is an 80% reduction in greenhouse gas emissions from 1990 levels.

On November 7, 2018 NYISO posted a presentation entitled "The Brattle Group, Daymark Energy Advisors, and Resources for the Future Carbon Charge Analysis Summaries and Synthesis" (hereinafter "Synthesis Report") that summarized the approach methodology, analyses and results for three independent studies of the proposed carbon pricing initiative. I have relied primarily on that report for data referenced in these comments.

Summary

The carbon pricing initiative proposes to add the Social Cost of Carbon (SCC) to CO2 emissions from electric generators. My criteria for evaluating the success of the carbon pricing initiative are:

- Will its CO2 emission reductions effectively help meet the REV 40% reduction goal;
- Does the program incentivize renewable energy?; and
- Does the program provide the greatest benefit at the least cost to the consumer?

The ultimate goal of this program is to reduce CO2 emissions. In order to meet the REV 40% reduction goal I estimate that the electric sector must reduce its emissions by 676,599 tons per year. The emission reductions projected by Brattle (0.3 million tons) and RFF (0.2 million tons) as a result of this policy fall well short of that level and are well within normal annual variation. New York State cannot replace existing programs with this initiative and hope to meet the REV 2030 goal.

This carbon pricing initiative proposes to set a price on carbon for one sector in one state whereas the ideal approach is to cover all sectors globally. That major shortcoming reduces the effectiveness of this policy to increase renewable energy development. I believe that there are existing programs in place that will be more effective incentivizing renewable energy.

In order to provide the greatest benefit to the consumer the cost of carbon reductions must be less than the social cost of carbon. This program fails to meet that criterion. With regards to cost, the modeling analyses claim minor costs to the consumer but there are significant uncertainties that I think all would tend to increase the final cost. This program is only more effective than RGGI investments if the offsetting benefits modeling results come true. I don't have as much faith in the prospective cost effectiveness rates as the observed RGGI rates. Therefore, I think the risks of substantial consumer impacts make this a less attractive option than existing programs that can target economically-disadvantaged ratepayers who stand to lose the most with this regressive carbon tax proposal.

The potential for implementation issues and unintended consequences should also be considered. Examples of implementation issues include: border treatments, determining the RGGI price used, calculating emissions for the program, and addressing double payments. Unintended consequences include negative impact on beneficial electrification, the potential to game the system, and decreased economic viability of new fossil-fired generation that is likely needed to maintain system reliability.

In conclusion, I believe that the results of the stakeholder process indicate that this is a risky approach that will have high costs and could have unintended consequences that might hurt consumers and businesses in New York. As a result I cannot recommend implementing the policy as proposed.

Consistency with REV 40% Goal

Although one would think that there would be some place where there is a roadmap for how the state plans to meet the 2030 REV 40% goal I have been unable to find it so I made my own estimate. The NYSERDA report New York State Greenhouse Gas Inventory: 1990-2015 provides the data needed to quantify the REV goals.

Table S-2. New York State GHG Emissions, 1990–2015 (MMtCO2e) in that document lists values for 1990 through 2015 based on historical data. Table 1 lists the 1990, 2015 and 2030 fuel combustion CO2 emissions (1000 tons) converted from those values in Table S-2. For the purposes of this estimate I assume that the REV 40% goal applies only to CO2 from fuel combustion. I am not sure what to do about emissions from electricity imports so I included those values too.

The baseline for REV is the 1990 total CO2 emissions or 222.2 million tons. If those emissions are reduced 40% the REV target is 133.3 million tons. The 2015 data show the status of CO2 emissions and it shows that the reductions from 1990 to 2015 are only 12.2%. On the other hand, the electric generation sector has gone down over 53% so they have already met their share of the 40% goal. If we assume that in order for the state to meet the 40% target all sectors have to come down equally from the 2015 level to meet the 2030 goal, then another 10,148,981 ton reduction in CO2 is necessary from the electric sector. If that reduction is apportioned equally across the 15 years between 2015 and 2030 then the annual average reduction needs to be at least 676,599 tons per year.

Table 1: New York State CO2 Fuel Combustion Emissions (1000 tons CO2)

Gas and Category	1990	2015	Reduction 1990 - 2015	% Reduction 1990 - 2015	Goal 2030	Reduction 2015-2030	% Reduction 2015-2030
Fuel Combustion Total	222.2	195.1	-27.1	-12.2%	133.3	-61.8	-31.7%
Electricity Generation	69.2	32.0	-37.1	-53.7%	21.9	-10.1	-31.7%
Net Imports of Electricity	1.8	8.8	7.0	392.0%	6.0	-2.8	-31.7%
Transportation	63.0	79.5	16.4	26.1%	54.3	-25.2	-31.7%
Residential	37.2	38.9	1.7	4.4%	26.6	-12.3	-31.7%
Commercial	29.1	23.9	-5.1	-17.6%	16.4	-7.6	-31.7%
Industrial	21.9	12.0	-9.9	-45.2%	8.2	-3.8	-31.7%

There are three independent estimates of future CO_2 reductions expected from the proposed policy to price CO_2 in the wholesale electric market:

- The Brattle Group provided their latest estimate on 10/12/2018;
- The Daymark Energy Advisors provided their latest estimate for NY UIU on 10/29/2018; and
- Resources for the Future (RFF) provided their latest estimate on 9/24/2018.

There were subsequent updates but I did not incorporate them into the following table.

Table 2: 2025 CO2 Emissions Reductions

Brattle (10/12/2018)	
	(tons)
	Scenario D 2025
Intermediate Results ($/Mwh) Tab	**Reference**
NYCA CO2 Emissions, base case	25,526,138
NYCA CO2 Emissions, simple change case	25,306,984
Reduction in CO2 emissions (tons)	-219,154

Resources for the Future (9/24/18)	
Slide 30 Effects of Policy on Emissions and Their Damages	(tons)
NY emission reductions	-242,000

Daymark (10/29/18)	
Slide 77 Total NY CO2 Emissions	(tons)
Status Quo (2025)	26,455,440
Carbon Charge	27,557,750
Difference	2,204,620

The ultimate goal of this program is to reduce CO_2 emissions. Frankly, the emission reductions projected by Brattle and RFF as a result of this policy are well within normal annual variation so if they are incorrect this policy is ineffective. On the 11/9/18 IPPTF conference call Daymark said that they predicted “no material change in CO_2”. None of these projections satisfy the annual average reduction of 676,599 tons per year necessary if all sectors reduce emissions equally to meet the REV 2030 goal. As a result, New York State cannot replace existing programs with this and hope to meet the REV 2030 goal.

Incentives for renewable energy

The theory for carbon dioxide taxation is that when the cost of fossil-fueled energy reflects the social cost of carbon then the market will produce alternatives. Unfortunately there is a large gap between this theory and the proposal to set a price on carbon in the New York wholesale electric market. The first problem is estimating the external cost of CO_2 to establish the rate. The NYISO process ignores that problem by simply relying on the state value. I have shown previously (here, here, and here) that the fundamental problem is that the Integrated Working Group SCC value that has been proposed does not accurately reflect the current state of the science relative to the probability of temperature being highly sensitive to CO_2. Secondly, while the theory might work for an entire economy covering all sectors and all regions, this proposal covers only the wholesale electric sector and just the New York region. The most likely outcome is that emissions will simply re-locate.

The New York public policy has a 2030 target for CO_2 reductions. This approach relies on an indirect incentive for renewable energy. There is a lag between the necessary carbon price market signal for the private investments and the availability of the new infrastructure. The question is whether other programs might provide more timely and effective investment signals. For example, the National Grid System Data Portal includes a "collection of maps to help customers, contractors and developers identify potential project sites. Each map provides the location and specific information for selected electric distribution lines and associated substations within the National Grid NY electric service area." The Joint Utilities of New York are working together to provide the same sort of information for all service territories. I don't believe the vague signal provided by the carbon price proposal could ever provide more timely and effective investments than the site-specific signals provided by the Joint Utilities. As a result, there are existing programs that are more effective meeting the REV goals.

Cost Benefit Comparison

In order to determine whether the carbon pricing proposal provides the greatest benefit at the least cost to the consumer we have to consider costs. The Synthesis Report reported costs in two ways: changes in consumer costs and changes in system production costs. All three analyses claim that there won't be significant cost increases.

For the changes in consumer costs the Synthesis Report notes:

> Brattle and RFF both find aggregate customer costs would increase slightly in 2025 due to a carbon charge, increasing $0.7/MWh and $0.8/MWh respectively. Brattle finds customer cost impacts fall over time. Daymark does not report changes in customer costs.

For changes in the system production costs the Synthesis Report notes:

> The Brattle study finds negligible changes in annual system production costs (+/- $10 million) due to a carbon charge. The RFF estimate is within this range and finds that the policy would increase production costs by $7.2 million in the Eastern Interconnect in 2025. Daymark similarly finds system production costs change by +/- $30 million through 2025, increasing to $148 million by 2035.

The ultimate measure of success for any carbon dioxide emission reduction program is whether or not the cost per ton of CO_2 reduced exceeds the Social Cost of Carbon. According to the NYISO power trends 2018 document the 2017 annual energy usage in New York was 156,370 GWh. In order to estimate the total increase wholesale energy prices due to the carbon charge I assume 150,000,000 MWh and so the expected cost to the consumer will range between $105 million and $120 million. The Brattle Group predicts a 0.3 million ton reduction at a cost of $105 million for a $350 per ton of CO_2

reduced rate. RFF predicts a 0.2 million ton reduction at a cost of $120 million for a $600 per ton of CO2 reduced rate. The cost of a ton of CO2 reduced by this program approaches an order of magnitude higher value than the SCC proposed for this program.

In order to evaluate effectiveness of the carbon pricing initiative we should compare it to other similar regulatory programs. The RGGI Report: 2016 RGGI Investments Generate Environmental and Economic Benefits, provides information that can be used for a comparison. According to the Executive Summary in this report:

> Proceeds from the Regional Greenhouse Gas Initiative (RGGI) have powered a major investment in the energy future of the New England and Mid-Atlantic states. This report reviews the benefits of programs funded in 2016 by $436.4 million in RGGI investments, which have reduced harmful carbon dioxide (CO2) pollution while spurring local economic growth and job creation.

For this analysis I have included data from both 2015 and 2016. Although the RGGI report includes lifetime benefits I only provide the annual benefits because the REV target is an annual target. This report says there were $436.4 million in RGGI investments funded programs in 2016 as compared to $410.2 million in 2015. In both Proceeds reports (2015 and 2016), Table 1 Benefits of RGGI Investments list the annual reported benefits for energy savings, electrical use and CO2 emissions reductions. In Table 3 I list that data and calculate the CO2 emissions reductions cost per ton.

Table 3 Comparison of 2015 and 2016 RGGI Proceeds Funding and Benefits

	Units	2015	2016
Annual Savings			
Program funding	Million $	$ 410.20	$ 436.40
Energy savings	Million mmBtu	1.5	1.6
	$/mmBtu	$ 273.47	$ 272.75
Electricity savings	MWh	505,761	409,630
	$/MWh	$ 811.06	$ 1,065.35
CO2 Emissions	tons	298,410	382,266
	$/ton	$ 1,374.62	$ 1,141.61

Compared to RGGI investments the carbon pricing initiative appears to be more efficient. If we could confidently rely on the carbon pricing initiative model estimates of cost then there might be evidence supporting this approach because of the relative effectiveness despite the minor CO2 reduction benefits projected.

In Synthesis Report Table 1, Comparison of State-Wide Increase in Wholesale Energy Prices Due to Carbon Charge, the total wholesale energy cost ranges from $17.9 per MWh to $22.2 per MWh. In order to estimate the total increase wholesale energy prices due to the carbon charge I assumed 150,000,000 MWh so the expected cost of the will range between $2.7 billion and $3.3 billion in 2025. Table 4 in the Synthesis Report lists the collected carbon revenue.

Table 4 below lists the total energy price increase, the collected carbon revenue, the energy price difference which is a windfall for the generators, the projected change to the customer and the residual after the change to the customer is subtracted out. The energy price difference is due to the high LBMP prices. This is the crux of my concern. The generator windfall is $1-2 Billion or about $15/MWH on average! So we end up with a fleet where the average subsidy from carbon price is $15/MWH, existing RECs get $20/MWH, existing Nukes get $17-$25/MWH, and who knows what the subsidies will be for new RECs.

Table 4: 2025 Total Energy Prices Due to the Carbon Charge ($ millions)

	Total Energy Price Increase	Collected Carbon Revenue	Generator Windfall Difference	Change to Customer	Residual
Brattle	$ 2,685	$ 1,592	$ 1,093	$ 105	$ 988
Daymark	$ 3,300	$ 1,086	$ 2,214		
RFF	$ 3,330	$ 1,528	$ 1,802	$ 120	$ 1,682

The plan is that the collected carbon revenue will be returned to the consumers. The modeling results claim that the final customer costs (change to customer) will only be between $105 and $120 million. That leaves between $988 million and $1.68 billion in energy prices that the analyses model away because there are "offsetting factors that provide customer benefits". The CO2 reduction costs (between $350 and $600 per ton) calculated previously are only that low when you assume that there will in fact be offsetting factors that reduce those costs. On the other hand the upper bound, assuming no effective offsets to reduce costs, has CO2 reduction costs of between $3,600 and $9000 per ton. That order of magnitude difference concerns me.

Unfortunately there are issues with all three analyses that make me skeptical that the offsetting factors will indeed provide the customer benefits necessary to lower consumer prices to an acceptable level. They all rely on dynamic production cost models to evaluate the effects on dispatch, emissions, and LBMPs. In my opinion this kind of model is not well-suited to handle a major change to the electric system like adding a price on CO2. All three analyses ran a "business as usual" scenario and then one or more scenarios where the carbon price was added with various assumptions. My experience is that these models necessarily rely on averaged input that invariably do not reflect the range of input values. That is a problem because there are normal situations that are missed. For example, in the late 1980's and early 1990's when natural gas was usually a little more expensive than residual oil and both were not that much higher than coal, production cost model operating projections for the large oil-fired units in the state always under-estimated how much they would run simply because there were variations in price and those variations on occasion made oil economic. I have no doubt that similar unforeseen situations will occur so I think these modeling results have to be viewed with caution.

Even if you have more faith than I on the ability of these models to predict the future outcome for such a drastic change in the system, there are significant differences in the assumptions between the three modeling analyses. For example, even the price of RGGI allowances differs significantly. In 2030, NYISO and Brattle assume that a RGGI price of $24 per ton whereas Daymark assumes $12. That assumption makes a big difference in the amount of money that is supposed to be returned to the customer. Consequently, my confidence in the results is lowered. Furthermore, it is not only the assumptions but also the post-processing analysis that can lead to erroneous conclusions.

Previously I have provided comments based on my static calculation of the impact on cost. I used 2015 and 2016 load and marginal emission rate data to estimate the effect of the carbon charge. The carbon charge increases costs not only due to the carbon price itself but also increases generator net revenues. My analysis showed that in 2015 the total cost of the net revenues due to higher LBMP prices is $3.027 billion as compared to $1.321 billion calculated by applying the SCC to actual CO_2 emissions. The carbon charge residuals are supposed to be returned to the ratepayers but the increase in costs due to the change in market clearing price will not. The impact of increases to energy costs as it relates to energy producers with costs lower than the clearing price has not been addressed. In particular, what portion of the increased LBMP goes to the existing renewables, nukes, and all the fossil gens with costs lower than the clearing price? The ultimate efficiency value to determine the efficacy of this program is the program cost divided by the new renewable MWHs estimated to be added. I have not seen any estimates of this.

This program is only more effective than RGGI investments if the offsetting benefits modeling results come true. I don't have as much faith in the prospective cost effectiveness rates as the observed RGGI rates. I think the risks of substantial consumer impacts make this a less attractive option than existing programs that can target economically-disadvantaged ratepayers who stand to lose the most with this regressive carbon tax proposal. In addition, existing programs can provide support for the electric system exactly where needed. Moreover, all the cost estimates assume that all the carbon price money will be returned to the consumer. New York does not have a good record investing proceeds from RGGI as originally intended. New York lawmakers have twice diverted RGGI proceeds directly into the general fund. Moreover, as shown by the Environmental Advocates of New York, the Cuomo Administration has used RGGI funds to replace other funding sources for existing programs rather than funding the original intent which was for additional programs.

Another major issue with all three models is how to handle the border. As noted previously, while the theory for pricing carbon might work for an entire economy covering all sectors and all regions, this proposal covers only the wholesale electric sector and just the New York region. The most likely outcome is that emissions will simply re-locate and the proposal has to address this issue. While this issue is beyond my area of expertise it is clear from the discussions that amongst the people who do understand this issue there is wide disagreement. Moreover, my modeling experience has been that it is extraordinarily difficult to anticipate all the nuances of actual implementation and correctly incorporate them into any model for the future. As a result I have no confidence that the models will correctly handle what actually happens and because this has so much of an increased impact on cost I believe that however it turns out will be more expensive than the models predict.

In order to provide the greatest benefit to the consumer the cost of carbon reductions must be less than the social cost of carbon. This program fails to meet that criterion for even the State of New York SCC values proposed which I believe the significantly over-value the impact of today's CO2 emissions on future society. With regards to cost, the modeling analyses claim minor costs to the consumer but there are significant uncertainties that I think all would tend to increase the final cost. As a result, even though this program appears to be more cost effective than RGGI investments, I think the modeled values are speculative whereas the RGGI values are based on reality. Also, the risks of substantial consumer impacts make this a less attractive option than existing programs that can target economically-disadvantaged ratepayers and provide support for the electric system exactly where needed.

Implementation Issues

There are significant implementation issues. I have already commented on the border issue which is biggest and most obvious one. However there are others that also should be considered when the decision is made whether to proceed with this proposal.

One key component is the RGGI price. The initiative proposes to set the carbon price equal to the SCC price minus the RGGI price. The most appropriate RGGI price has only been superficially addressed. The only value I have seen proposed was a suggestion to use the quarterly allowance auction price. However, I do not believe that represents the true price of the allowances on a day to day basis. As I have commented before, I think it is more appropriate to use the price that a source would have had to pay on a daily basis, in other words some secondary market price. RGGI provides market monitoring reports including quarterly reports on the secondary market. which note that:

> The secondary market is important for several reasons. First, it gives firms an ability to obtain CO2 allowances at any time during the three months between the RGGI auctions. Second, it provides firms a way to protect themselves against the potential volatility of future auction clearing prices. Third, it provides price signals that assist firms in making investment decisions in markets affected by the cost of RGGI compliance.

There are at least two options for a daily price: the RGGI CO_2 Allowance Tracking System (RGGI COATS) has a public report for transaction prices and the RGGI quarterly secondary market reports define CO2 allowance prices as a function of futures prices. The final recommendations for the RGGI allowance price should address whether the quarterly auction price or a secondary market price is the more appropriate value to use for wholesale electric market carbon pricing and explain the rationale why the choice proposed is the most equitable. This is one instance where using the appropriate daily variation rather than an average or quarterly value will make a difference and it has not been modeled.

Another implementation issue that I think is more of an issue than the NYISO, and certainly most stakeholders, understand is a problem is how to handle CO2 emissions measurements. The Environmental Energy Alliance of New York has addressed this issue and I support their comments. In brief, the generators affected by this rule have made significant investments in order to insure that their submittals to regulatory agencies are as accurate as possible. However, the regulatory process to validate that data is incompatible with the NYISO proposed schedule. As a result there is the potential for two sets of data. In addition, there are other affected sources that report to regulatory agencies annually and they will have issues with feasibility and reporting burden.

Others have addressed the problem of double payments. I believe that this is another implementation issue that should be considered in the light of what is best for ratepayers.

Unintended Consequences

The decision whether to proceed with the carbon pricing initiative should also address unintended consequences.

There was one stakeholder presentation with a recommendation to consider beneficial electrification. As shown previously, in order to meet the NYS REV goal of a 40% CO2 reduction by 2030, fossil fuel emissions from the transportation and residential heating sectors will be required. The general approach to that is electrification. The unintended consequence of making the cost of fossil-fired generation more expensive with a CO2 price is that will make beneficial electrification more expensive. Any attempt to address that will make an already complicated system worse.

I also suggest that the complexity and novelty of the carbon pricing initiative opens the possibility to game the system. Given the amount of money involved, the potential for someone to use an oversight in the rules to make money to the detriment of the consumers should also be considered.

There have been stakeholders who have suggested that increasing the carbon price would have benefits related to reductions from other pollutants in general and in particular with emissions from peaking units during high energy demand days. However, the fact is that the New York generating system has markedly reduced emissions for all pollutants (Table 5) and any further reductions are likely to be small.

More important is an unintended consequence vis-à-vis the peaking units. In Point 3 of the *Initial Comments of City of New York in Response to the Energy Storage Roadmap*, Case 18-E-0130 – In the Matter of Energy Storage Deployment Program submitted on September 18, 2018, the "clean peak" issue was addressed. The comments pointed out that system reliability must be maintained whatever happens to reducing emissions in the City. To that end consider that the price of carbon initiative will make existing fossil fuel generators less competitive and, importantly, will also affect the viability of investment in replacement development within the City. The City's comments describe the difficulties of replacing the existing generators with fossil-free generation. Because the NYS DEC has plans to force the retirement of the existing peaking turbines, this initiative could impair the replacement of those necessary units with cleaner and more efficient fossil-fired turbines.

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Table 5: New York State Emissions (EPA CAMD data https://ampd.epa.gov/ampd/)

Year	Gross Load (MW-h)	Steam Load (1000lb)	SO2 (tons)	NOx (tons)	CO2 (short tons)	Heat Input (MMBtu)	SO2 (lbs/mmBtu)	NOx (lbs/mmBtu)	CO2 (lbs/mmBtu)
1990	0	0	414,789	0	0	831,924,327	0.997		
1995	0	0	239,183	120,138	54,000,913	524,454,046	0.912	0.458	206
1996	0	0	240,324	71,776	45,348,891	518,447,098	0.927	0.277	175
1997	51,471,754	5,624,976,433	253,314	73,317	48,784,638	609,850,501	0.831	0.240	160
1998	57,875,762	8,417,373,104	309,775	87,027	57,228,699	710,376,407	0.872	0.245	161
1999	70,805,133	85,785,960	276,333	98,014	58,507,243	900,041,852	0.614	0.218	130
2000	67,530,964	112,865,443	283,345	102,182	57,114,439	875,799,541	0.647	0.233	130
2001	68,925,255	97,075,024	250,928	93,292	53,195,854	850,881,174	0.590	0.219	125
2002	65,064,101	96,350,125	231,985	85,917	51,546,524	828,954,811	0.560	0.207	124
2003	66,585,254	74,214,156	253,803	88,186	53,240,989	808,383,761	0.628	0.218	132
2004	68,271,228	76,245,115	228,267	82,813	55,125,941	812,936,792	0.562	0.204	136
2005	77,904,063	63,900,514	177,349	78,788	56,018,928	832,783,370	0.426	0.189	135
2006	74,112,212	50,139,655	108,686	58,035	47,912,271	727,666,116	0.299	0.160	132
2007	77,850,741	48,344,919	107,210	58,569	49,575,411	750,232,478	0.286	0.156	132
2008	65,374,328	45,681,285	65,427	47,556	42,844,448	668,129,489	0.196	0.142	128
2009	57,738,755	34,460,702	46,344	35,675	38,295,368	565,301,331	0.164	0.126	135
2010	64,883,058	36,569,316	49,568	36,143	42,563,848	630,695,526	0.157	0.115	135
2011	61,275,085	30,031,312	40,756	31,062	37,445,417	575,599,488	0.142	0.108	130
2012	64,017,117	26,911,472	17,637	24,823	35,800,053	584,286,844	0.060	0.085	123
2013	59,063,066	29,257,671	16,878	24,082	33,991,141	550,791,111	0.061	0.087	123
2014	60,104,983	29,293,688	16,676	22,214	34,692,213	559,289,034	0.060	0.079	124
2015	59,385,850	29,490,634	8,777	20,990	33,271,739	554,572,796	0.032	0.076	120
2016	56,732,911	28,967,715	4,533	16,222	31,440,502	532,559,844	0.017	0.061	118
2017	46,376,239	27,042,071	2,561	11,253	25,301,757	433,704,578	0.012	0.052	117