BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition for Determination of Need for Citrus County Combined Cycle Power Plant	)))	DOCKET NO. _____ Submitted for filing: May 27, 2014

DUKE ENERGY FLORIDA, INC.'S NOTICE OF FILING

Duke Energy Florida, Inc. ("DEF" or the "Company") hereby gives notice of filing the Direct Testimony of Ed Scott with Exhibits ES-1 through ES-3 in support of DEF's Petition for Determination of Need for the Citrus County Combined Cycle Power Plant.

Respectfully submitted this 27th day of May, 2014.

/s/ James Michael Walls

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

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DIRECT TESTIMONY
OF ED SCOTT

ON BEHALF OF
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IN RE: PETITION FOR DETERMINATION OF NEED

BY DUKE ENERGY FLORIDA

FPSC DOCKET NO. _____

DIRECT TESTIMONY OF ED SCOTT

I. INTRODUCTION AND QUALIFICATIONS.

Q. Please state your name, employer, and business address.

A. My name is Ed Scott and I am employed by Duke Energy Florida, Inc. ("DEF" or the "Company"). My business address is 6565 38th Avenue North, St. Petersburg, Florida 33710.

Q. Please tell us your position with Duke Energy and describe your duties and responsibilities in that position.

A. I am the Director --- Transmission Planning Florida. In this role, I am responsible for all transmission planning for DEF. I am responsible for ensuring that long-range transmission plans, studies, and assessments are performed in accordance with all applicable Federal Energy Regulatory Commission ("FERC"), North American Electric Reliability Corporation ("NERC"), Florida Reliability Coordinating Council ("FRCC"), and DEF planning standards and requirements. Areas of additional focus include development of Generation and Transmission Integrated Siting Strategies and evaluation of Transmission Service and Generator Interconnection Requests. I also represent DEF on the FRCC Planning Committee, and Investor Owned Utilities on the NERC Planning Committee.

Q. Please summarize your educational background and employment experience.

A. I have been with the Company (and its predecessor companies Progress Energy Florida and Florida Power Corp.) since 2001 in positions of increasing responsibility. In my previous role as Manager of System Operations at the Florida Energy Control Center, I oversaw the real time, electric system operations of the Florida utility, including generation dispatch, transmission reliability, and transmission service transactions. I have held prior leadership roles as Manager of Bulk Transmission Planning, and Supervisor System Operations for the Company. I also held several Company engineering positions with increasing responsibility in Operations Network Reliability, Operations Planning, and Operations Training. Prior to joining the Company, I was a staff engineer with the FRCC.

I earned bachelor and master of science degrees in electrical engineering from the Florida Institute of Technology in 1998 and 1999. I also earned a master of science degree in business administration from the University of Florida in 2007. I am a licensed Professional Engineer in Florida and North Carolina.

II. PURPOSE AND SUMMARY OF TESTIMONY.

Q. What is the purpose of your testimony in this proceeding?

A. I am testifying on behalf of DEF in support of its Petition for Determination of Need for the Citrus County Combined Cycle Power Plant. I will provide an overview of the transmission requirements and costs for the Citrus County Combined Cycle Power Plant that the Company proposes to build to meet its need in 2018 in the most cost-effective manner for its customers. I will also address the transmission system impacts associated

with the various alternative supply-side generation alternatives that the Company evaluated as part of its Request for Proposals for Long-term Power Supply Resources with an In-Service Year of 2018 ("2018 RFP"), to determine that the Company's next planned generating unit ("NPGU"), its Citrus County Combined Cycle Power Plant, is the most cost-effective resource option to meet the Company's need commencing in 2018.

Q. Are you sponsoring any sections of Duke Energy Florida's Need Study?

A. Yes. I am sponsoring the section describing the Company's transmission and distribution facilities and the section describing the transmission requirements associated with the Citrus County Combined Cycle Power Plant and the alternative supply-side proposals received in response to the 2018 RFP, respectively, in the Company's Need Study.

Q. Are you sponsoring any exhibits to your testimony?

A. Yes. I am sponsoring the following exhibits to my testimony:

- Exhibit No. ___ (ES-1), a copy of the FRCC Evaluation of Transmission Impact of the Environmental Protection Agency's ("EPA") Mercury and Air Toxics Standard ("MATS") --- Transmission Impact Study for Shutdown of Crystal River Units 1 & 2 with retirement of Crystal River Unit 3 ("MATS Study");
- Exhibit No. ____ (ES-2), the confidential transmission groups evaluated in the Company's transmission screening studies of the 2018 RFP proposals in accordance with the 2018 RFP; and

- Exhibit No. ___ (ES-3), the confidential description of the transmission system upgrades, modifications, or additions and their costs for the transmission groups evaluated in the Company's transmission screening studies of the 2018 RFP proposals in accordance with the 2018 RFP .

Each of these exhibits was prepared under my direction and control, and each is true and accurate.

Q. Please summarize your testimony.

A. The Citrus County Combined Cycle Power Plant will be installed in Citrus County adjacent to the Crystal River Energy Complex ("CREC"). With the Company's current and planned generation power plant retirements at the CREC, the existing transmission infrastructure for the CREC will support the Citrus County Combined Cycle Power Plant. The only transmission work that is necessary for the Citrus County Combined Cycle Power Plant is the switchyard and transmission bus line work to actually connect that plant with DEF's existing transmission facilities that are already connected to DEF's transmission system and the electric power grid in Florida.

The Company evaluated the impact of the 2018 RFP bidder proposals to the DEF transmission system to determine the necessary modifications, if any, to incorporate the proposed generation into the DEF transmission system. The Company explained in the 2018 RFP that the preferred location for new generation was in the vicinity of Citrus County because of the current and planned generation plant retirements at the CREC. None of the 2018 RFP bidders proposed generation in the vicinity of Citrus County to take advantage of the existing Company transmission facility capacity in that area. As a

result, all of the 2018 RFP bidder proposals would have a substantial impact on DEF's transmission system, requiring extensive transmission modifications at substantial costs.

III. TRANSMISSION ANALYSIS FOR CITRUS COUNTY COMBINED CYCLE POWER PLANT.

Q. Was a transmission analysis performed for the Company's Citrus County Combined Cycle Power Plant?

A. Yes, but it was a more limited analysis because the FRCC performed a transmission impact analysis called the MATS Study in mid-2013 that supported the location of new generation in Citrus County from a transmission perspective. The FRCC's MATS Study demonstrated that Citrus County was a beneficial location for new generation for both DEF's transmission system and the state-wide electric grid. The Company, of course already knew that Citrus County was a beneficial new generation plant location and the FRCC transmission impact analyses in the MATS Study confirmed it. As a result, limited additional transmission analysis was necessary, indeed the Company only performed the transmission analysis necessary to confirm that there were only transmission interconnection costs associated with the Citrus County Combined Cycle Power Plant.

Q. How did the Company know that Citrus County was a beneficial new generation location prior to the FRCC transmission impact study?

A. DEF is, of course, familiar with its own transmission system. There are substantial Company transmission substation facilities, lines, and other structures and facilities in

Citrus County and the surrounding area to transmit the generation at the CREC from the CREC across DEF's system to DEF's customers. At the beginning of 2013, there was over 3,000 MegaWatts ("MW") of summer generation capacity from the Company's nuclear and coal-fired generation plants located at the CREC. All of this generation was supported by DEF transmission facilities, structures, and lines in the vicinity of the CREC.

In February 2013, the Company decided to retire Crystal River Unit 3 ("CR3"), its nuclear power plant, located at the CREC. CR3 alone accounted for over 800 MW of the CREC's summer generation capacity. In addition, enhanced emissions regulations by the EPA challenged the Company's ability to cost-effectively operate all of its coal-fired generation located at the CREC. The Company's oldest coal-fired generation plants, its Crystal River Unit 1 ("CR1") and Unit 2 ("CR2") plants, cannot comply with the EPA MATS regulations in their current configuration and as they are currently operated. As a result, the Company faced potential, additional generation plant retirements at the CREC in the immediate future. The existing and potential retirements of substantial CREC generation capacity freed up some of the existing transmission capacity that was built to support the CREC generation capacity. This existing transmission capacity was available to support new generation in Citrus County or the surrounding area.

Q. Why did the FRCC perform the transmission analyses in the MATS Study?

A. FRCC is the regional entity with delegated authority from NERC to propose and enforce electric grid reliability standards within the FRCC region. NERC is the certified Electric Reliability Organization ("ERO") established by Congress in the Energy Policy Act of

2005 to create and enforce reliability standards for the bulk power system in North America. The FRCC enforces the NERC reliability standards in the FRCC region, which is essentially the State of Florida, and ensures that the bulk power system in peninsular Florida is reliable, adequate, and secure.

The FRCC performed the MATS Study as part of its responsibility to ensure that the Florida bulk power system is reliable and adequate. The FRCC MATS Study analyzed the impact to DEF's transmission system and the state-wide electric power grid as a result of the retirement of CR3 and the potential shutdown of DEF's Crystal River Units 1 and 2 coal-fired generation plants to comply with MATS. The FRCC MATS Study purposes were, among others, to (1) determine whether an available, one-year extension of the EPA's MATS compliance deadline was needed to ensure grid reliability; and (2) evaluate the potential reliability benefits of a new combined cycle power plant constructed in the vicinity of the existing CREC site.

The FRCC found that the available, one-year extension of the MATS compliance deadline was needed to alleviate significant transmission reliability issues. Based on the FRCC's transmission analyses in the MATS Study, the FRCC determined that transmission reliability problems commenced in the 2015 timeframe if the MATS compliance deadline extension was not granted. The FRCC also determined in the MATS Study that transmission reliability issues created by the CR1, CR2, and CR3 retirements at the CREC were resolved by the addition of a combined cycle power plant by the summer of 2018 in the vicinity of the CREC site. A copy of the FRCC MATS study is included as Exhibit No. ___ (ES-1) to my direct testimony.

Q. Why are there transmission reliability issues if a power plant is not installed in the vicinity of the CREC site after the retirements of the Company's nuclear power plant and oldest coal-fired generation plants?

A. If additional generation is not installed in the vicinity of Citrus County to replace the CR1, CR2, and CR3 power plants when they are retired, then, DEF must replace it with new or existing generation elsewhere on its system. This additional generation elsewhere on DEF's system reduces the flow of electric power north-to-south to the Tampa Bay high-load area and from west-to-east to the high-load areas around Orlando. In addition, the Florida grid has been planned with the assumption that those three major base load generation units – CR1, CR2, and CR3 – are available. This assumption has allowed DEF and other Florida utilities to optimize their future transmission expansion plans. Similar to the power shifts on DEF's system, there are power shifts on neighboring utility systems caused by the CR1, CR2, and CR3 retirements that were not previously accounted for in their transmission expansion plans. These shifts in the power flows overload transmission lines and equipment under most operational conditions, over-stressing or exceeding available mitigation measures and tools. The result will be potential brown-outs or black-outs along these corridors. Exhibit No. ___ (ES-1) to my direct testimony explains this in more detail.

The results of the FRCC MATS Study are intuitively correct. If substantial transmission facilities were built to handle the flow of power from several large generation resources that are removed and not replaced, then, those transmission facilities become stranded and other transmission facilities on the system that were not built to carry this additional power must now handle the additional power flows that result from

replacing the removed generation with that of new or existing generation elsewhere on the system. Intuitively, the way to redress this situation is to add replacement generation in the same area where the generation resources were removed to take advantage of the existing transmission facilities and equipment initially built to handle the removed generation resources.

Q. Where is the Citrus County Combined Cycle Power Plant located?

A. The proposed Citrus County Combined Cycle Power Plant is located adjacent to the CREC site in Citrus County, Florida.

Q. Are there any transmission requirements associated with the Citrus County Combined Cycle Power Plant?

A. The only transmission work that is necessary for the Citrus County Combined Cycle Power Plant is the switchyard and transmission bus line work to actually connect that plant with the existing DEF transmission facilities that are already connected to DEF's transmission system and the electric power grid in Florida. One 820 MW block of the 1,640 MW Citrus County Combined Cycle Power Plant will be connected to the existing 500 kV transmission system located at the CREC effectively replacing the generation from the retired CR3 unit. The other 820 MW block will be connected to the existing CREC 230 kV transmission system effectively replacing the CR1 and CR2 generation when it is retired.

Q. What are the transmission costs for the Citrus County Combined Cycle Power Plant?

A. The estimated transmission interconnection costs for the Citrus County Combined Cycle Power Plant are $44 million, excluding the Allowance for Funds Used During Construction ("AFUDC"). These transmission interconnection costs are included in the total Citrus County Combined Cycle Power Plant project cost.

IV. TRANSMISSION ANALYSIS FOR 2018 RFP PROPOSALS.

Q. Were transmission requirements a part of the 2018 RFP?

A. Yes. DEF required all proposed resources in response to the 2018 RFP to procure firm transmission service to serve all their proposed generation loads. They were required to provide for transmission interconnection with DEF's transmission system and, if they were located outside DEF's service territory, transmission interconnection service with other Florida utility transmission providers. In sum, all potential bidders were responsible for the transmission of their proposed generation at their cost from their existing or proposed facilities to the DEF system. These transmission requirements were made clear to the potential bidders in the Company's 2018 RFP. A copy of the Company's 2018 RFP is included as an exhibit to Mr. Borsch's testimony in this proceeding.

Q. Were transmission analyses performed for the 2018 RFP proposals?

A. Yes. Consistent with the 2018 RFP, transmission analyses were performed for all RFP proposals, including the Company's next planned generating unit, the Citrus County

Combined Cycle Power Plant.

Q. Who performed the transmission analyses for the 2018 RFP proposals?

A. The transmission analyses were performed by my department. Actual transmission modeling work for the transmission analyses was performed by Power Grid Engineering LLC ("Power Grid"), an independent engineering company, under my direct supervision. Power Grid is a recognized electric utility engineering company with substantial expertise in modeling transmission systems and performing the standard electric utility transmission system analyses for any proposed generation additions to a transmission system. Power Grid used industry-leading transmission planning engineering tools similar to our own transmission planning engineering tools to perform these analyses and I reviewed and validated their models and model results.

Q. What transmission analyses were performed for the 2018 RFP proposals?

A. DEF initially performed a transmission screening study for all proposals to the 2018 RFP. For the 2018 RFP proposals within DEF's system, a power flow analysis was performed. For the 2018 RFP proposals that were not interconnected with DEF's transmission system, preliminary transfer analyses were performed. Both sets of transmission screening studies assessed the impacts to the DEF transmission system by providing a list of required transmission facility additions or modifications and an estimate of the cost of the transmission facility additions or modifications. These transmission screening studies were industry-standard studies consistent with DEF's internal standards and both FRCC and NERC reliability standards. For example, the latest available FRCC peak load flow

case, including the latest available information, was used as the baseline to determine what transmission system network upgrade facilities or modifications were needed. The cost estimates were also based on industry-standard transmission facility estimation standards consistent with DEF's experience with such transmission facilities. DEF employed the same industry-standard transmission facility cost estimation standards to the 2018 RFP proposals that DEF uses for all of its planned or projected transmission facility additions or upgrades on its own transmission system. All potential solutions were then subsequently introduced into the appropriate case and tested in order to verify the completeness of the solution. These transmission screening studies are explained in more detail in the Company's 2018 RFP that is included as an exhibit to Mr. Borsch's testimony in this proceeding.

Q. Were the 2018 RFP proposals evaluated separately in the Company's transmission system screening studies?

A. No. All of the 2018 RFP proposals, except the Company's self-build next planned generating unit proposal, were evaluated in transmission groups. The Company's self-build next planned generating unit was the only 2018 RFP proposal that satisfied the Company's 1,640 MW generation reliability need. None of the other 2018 RFP proposals met the Company's generation reliability need in 2018. In fact, the total generation capacity was only 1,328 MW for all 2018 RFP proposals other than the Company's self-build next planned generation unit. Grouped together, all 2018 RFP proposals, other than the Company's self-build next planned generation unit proposal, combined did not meet the Company's generation reliability need in 2018.

Q. Why were the other 2018 RFP proposals grouped together for the transmission system screening analyses?

A. DEF contemplated that there was the potential to receive one or more 2018 RFP individual proposals in response to the Company's RFP that may not meet the Company's 2018 generation reliability need. Rather than eliminate such proposals at the outset, DEF provided the opportunity to group 2018 RFP proposals to meet the Company's 2018 reliability need in its 2018 RFP in order to assess if any group of 2018 RFP proposals might be a more cost-effective generation option for the Company and its customers. As a result, DEF proposed to group single or multiple 2018 RFP proposals together for the transmission screening studies to determine their overall impact on the Company's transmission system and the Bulk Electric System ("BES"). This approach was explained to potential bidders to the 2018 RFP in the Company's 2018 RFP included as an exhibit to Mr. Borsch's testimony in this proceeding. DEF did not expect that all 2018 RFP proposals other than the self-build next planned generating unit proposal together would not meet DEF's generation reliability need in 2018. DEF, however, still evaluated these 2018 RFP proposals in transmission groups with generic DEF generation units to meet the Company's 2018 generation reliability need to determine if any of them were cost-effective for DEF and its customers.

Q. What were the transmission groups that DEF evaluated in its transmission screening studies?

A. The transmission groups DEF evaluated in its transmission screening studies are identified in confidential Exhibit No. ___ (ES-2) to my direct testimony. Exhibit No. ___

(ES-2) identifies the bidder, summer and winter bidder generation capacity, and the transmission groups of the bidders together with generic combustion turbine or combined cycle generating units to meet the Company's generation reliability needs in 2018. Beneficial sites from a transmission perspective were assumed for the Company's generic units in the transmission groups studied even though those sites were not necessarily available to the Company since, by definition, the units were generic and the Company had not planned their development.

Q. Where were the beneficial sites for generic units for purposes of the transmission screening studies?

A. They were located in Citrus County or at the Company's existing Central Florida Substation. The Central Florida Substation is located approximately 50 miles east of the CREC and is a major transmission hub for the CREC generation. These locations are beneficial to the Company from a transmission perspective because they allow the Company to use the substantial, existing transmission facility resources in those areas that were built for the CREC generation. These generic locations for additional generation on DEF's system are consistent with the location of additional generation in the FRCC MATS Study to alleviate transmission reliability issues associated with the generation retirements at the CREC.

Q. Were potential bidders told about the beneficial locations for additional generation on DEF's system in the 2018 RFP?

A. Yes. DEF explained in the 2018 RFP that Citrus County was the preferred location for

new generation on DEF's system specifically because of the need to replace generation in the Citrus County area that was being retired. DEF further explained that this location provided transmission reliability benefits to DEF and to the adjacent utility transmission systems. Potential bidders were told that areas near Citrus County were expected to have similar transmission reliability benefits and that the further away from Citrus County the generation was located the more significant DEF expected the required transmission system facility upgrades to be. Potential bidders were specifically told that they should take advantage of the available transmission capacity in this area with the generation retirements. See Section V in the Company's 2018 RFP is included as an exhibit to Mr. Borsch's testimony in this proceeding.

Q. Did any bidder take advantage of the information DEF provided in the 2018 RFP regarding the beneficial location for generation in the bidder's proposal in response to the 2018 RFP?

A. No. All but one of the bidders in response to the 2018 RFP proposed generation from existing facilities that were not located in or near Citrus County. The one bidder who proposed to build a new generation plant did not propose to build that plant in or near Citrus County.

Q. Were there any 2018 RFP proposals that did not require additions or modifications to DEF's transmission facilities?

A. Only one, the Company's self-build generation proposal, the Citrus County Combined Cycle Power Plant next planned generating unit. All of the other 2018 RFP proposals,

when grouped together to meet DEF's generation reliability need, required transmission facility upgrades or modifications to add the proposed generation to DEF's system.

Q. What were the required transmission facility additions and modifications associated with the Company's review of the 2018 RFP proposals in the transmission groups studied in the transmission screening studies?

A. Confidential Exhibit No. ___ (ES-3) to my direct testimony contains a description of the transmission system facility upgrades, modifications, or additions for each of the 2018 RFP proposal transmission groups analyzed in the Company's transmission screening studies. All of these groups (other than the self-build next planned generating unit proposal) required significant transmission system upgrades, modifications, or additions as described in confidential Exhibit No. ___ (ES-3). The costs for these transmission system upgrades, modifications, and additions were developed using the same industry-standard transmission cost estimates the Company uses for its own transmission planning and transmission projects. Those costs ranged from a low of approximately $130 million to a high of approximately $202 million for the transmission groups in the transmission screening studies. These costs are also included in Exhibit No. ___ (ES-3) to my direct testimony.

Q. Was any further transmission analysis work done for the Company's evaluation of the 2018 RFP proposals?

A. No. There was no need for any further transmission analyses. The transmission screening studies were sufficient for the 2018 RFP evaluation team in resource planning

to identify the most cost-effective alternative for DEF and its customers.

V. CONCLUSION.

Q. In your opinion, are the results of the transmission screening studies you performed for the Company's evaluation of the 2018 RFP proposals reasonable and accurate?

A. Yes. In my professional opinion, and based on my experience and evaluation of the impact to DEF's transmission system and the BES of adding the bidders' proposed generation projects or the Company's self-build NPGU to DEF's system, the results of the Company's transmission screening studies are reasonable and accurate.

Q. Does this conclude your direct testimony?

A. Yes, it does.

FRCC's Evaluation of Transmission Impact of the EPA's Mercury and Air Toxics Standard (MATS)

(Transmission Impact Study for Shutdown of Crystal River Units 1 & 2, with retirement of Crystal River Unit 3)

Performed by the FRCC TWG

Prepared by TWG	**June 3, 2013**
Accepted by MSPC	**February 4, 2014**

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Summary

The FRCC TWG, under direction of the FRCC PC, has performed a study to determine the transmission reliability impact to the FRCC Region of the EPA MATS regulation. In order to comply with the MATS regulation, Duke Energy Florida's ("DEF") Crystal River 1 & 2 ("CR 1 & 2") coal-fired units are subject to shutdown in April 2015 (or April 2016 if a one year extension is granted). In addition to the potential impacts of the MATS regulation, DEF announced in early 2013 that it would retire the Crystal River 3 nuclear unit ("CR 3"). The impact of shutting down CR 1 & 2, the retirement of CR 3, and replacing this generation with DEF reserves (as was analyzed in this evaluation) is a significant shift in power flow patterns causing reliability concerns in areas not previously identified.

The FRCC TWG finds the following with respect to the three MATS Study deliverables:

- An extension of at least one year on the EPA's MATS compliance deadline is needed for Crystal River 1 & 2. This will alleviate significant reliability issues that would begin in the summer 2015 timeframe (without such extension), ensuring BES reliability in the FRCC Region as various transmission projects and operational mitigation procedures are implemented.

- In 2016 and 2017, significant reliability issues continue to exist with the retirement/shutdown of the Crystal River units. The TWG requests that All entities with unresolved thermal and/or voltage criteria exceptions further investigate and develop mitigation plans.

- The results of the summer 2018 analysis for the potential addition of a combined cycle facility of 1,179 MW in the vicinity of the existing Crystal River plant, combined with the accelerated projects and previously identified operating solutions, finds that the reliability issues that are created by the potential shutdown of CR 1 & 2 and announced retirement of CR 3 are resolved.

Purpose of Study

On December 16, 2011 the Environmental Protection Agency ("EPA") issued their Mercury and Air Toxics Standards ("MATS") regulation. The MATS regulation is designed to reduce mercury, other metals and acid gas emissions from coal- and oil-fired power plants. The MATS regulation became effective on April 16, 2012, and the initial compliance deadline is three years after the effective date, or April 16, 2015. In order to comply with the MATS rule, Duke Energy Florida's ("DEF") Crystal River 1 & 2 ("CR 1 & 2") coal-fired units are subject to shutdown in April 2015 (or April 2016 if a one year extension is granted). The MATS rule does offer a one year extension, to be approved by the state permitting authority (Florida Department of Environmental Protection), if reliability issues warrant an extension.

In addition to the potential impacts of the MATS rule, DEF announced in early 2013 that it would retire the Crystal River 3 nuclear unit ("CR 3"), instead of repairing it as previously planned. The unit has been off-line since 2009, and has been previously modeled in the FRCC Databank as returning to service in 2015.
As a result of these events, and their potential impact(s) to the FRCC Region, the FRCC Planning Committee ("PC") directed the Transmission Working Group ("TWG") to perform an analysis determining the impact(s) to the Bulk Electric System ("BES") and the 69 kV transmission system within the FRCC.

The primary deliverables of the evaluation were:

- Determine whether a one year extension on the EPA's MATS compliance deadline is needed to ensure reliability.

- Assess the transmission reliability impact for the 2015 through 2017 timeframe and develop potential solutions.

- Evaluate the potential reliability benefits of a new combined cycle constructed in the vicinity of the existing Crystal River site, starting operations in summer of 2018.

Case Description and Sensitivities

The initial load flow cases selected for the evaluation were the 2012 FRCC Load Flow Databank (LFDB) cases (revision 1B), which were utilized for the FRCC's 2012 Long Range Study. These cases were slightly modified to reflect known assumptions and information about the system, including long-term resource and transmission plans, as well as correcting any issues that were identified during the Long Range Study effort.

The following years and loading conditions were selected for the analysis:

- Summer - 2015, 2016 (Peak and 60%), 2017, 2018
- Winter - 2015/16, 2016 /17

The following scenarios and sensitivities were analyzed:

- Base/Study scenarios – Generation economically dispatched by respective Balancing Authority area
  - Base cases include CR 1 & 2 and CR 3 on-line and fully dispatched
  - Study cases model CR 1 & 2 and CR 3 off-line with generation replaced with DEF available reserves. Minority owners of CR 3 replaced the generation from other resources.

- Base/Study scenarios – System response at the Florida / Southern import limit
  - Timeframe - summer 2016
  - Increased Southern to Florida transfer beyond firm commitments to 3,700 MW limit with remaining resources dispatched economically

- Polk Firm sensitivity – Stress Central Florida area
  - Timeframe - winter 2016/17 and summer 2017
  - Maximize all firm resources in the Polk area
    - FPL's Manatee unit evaluated at both economic dispatch and full output

- Crystal River site combined cycle sensitivity – DEF self-build alternative
  - Model a new 1,179 MW combined cycle resource assumed in-service by the summer of 2018, this correlates to DEF's latest Ten-Year Site Plan filed at the FPSC. The location is not specified in the Ten-Year Site Plan, so based on the FRCC PC study directive the unit was placed at the Crystal River plant with the combustion turbines connected to the 230 kV bus and the steam turbine connected to the 500 kV bus, with remaining DEF generation resources economically dispatched

- Unit Out scenarios (C3-Gens analysis)
  - Bayside 2, Crystal River 4, Crystal River 5, Fort Myers 2, Sanford 5 and Stanton 2, for winter 2015 and summer 2016.

Study Methodology

The TWG analysis was performed by conducting a power flow analysis under normal and various contingency conditions using Siemens Power System Simulator for Engineering ("PSS/E") and PowerGEM's Transmission Adequacy and Reliability Assessment ("TARA") software program. All system elements 69 kV and above within the FRCC region were modeled for NERC Category A, B, and selected C contingency events using steady state methods. All branches' (including transformers and ties) thermal loadings were monitored to be within System Operating Limits ("SOL"). Thermal loadings greater than 100% of a facility's applicable rating that were materially aggravated (more than 3%) when compared to the reference case or thermal overloads that did not exist in the reference case, for the same contingency, are attributed to the impact of the CR 1 & 2 shutdowns and the CR 3 retirement. Similarly, all system busses were monitored for applicable voltage criteria, including nuclear plant interface requirements. Voltages outside of transmission owner criteria that were materially lower (more than 2%) when compared to the reference case, for the same contingency, are attributed to the impact of the CR 1 & 2 shutdowns and the CR 3 retirement.

The TWG performed the following steps for the analysis:

- Verified that under normal operating conditions (NERC Category A criteria), all facilities remained within applicable ratings.

- Performed a "Rate C" contingency screening in order to identify any conditions that would indicate potential SOL limitations which would require pre-contingency mitigation measures. Any potential limitation required a remedy before any further analysis, in order to represent the pre-contingency condition.

- Performed a NERC Category B contingency analysis on all Base and Study cases and sensitivities using the criteria described above.

- Performed NERC Category C (C2, C5, C3 Gen and C3 Lines) event analysis on all Base and Study cases and sensitivities using the criteria described above.

General Findings

The impact of shutting down CR 1 & 2, the retirement of CR 3, and replacing this generation with DEF reserves (as was analyzed in this evaluation) is generally to reduce the two power injections from (1) the north to the Tampa Bay load area, and from (2) west central Florida to the western portions of the Orlando load area. Utilizing DEF's available reserves causes a shift in the power flow patterns with issues. The specific findings for the timeframes analyzed are discussed in subsequent sections.

Deliverable 1 - Findings and potential solutions for summer 2015 & winter 2015/16

DEF's System

The summer and winter of 2015 results indicate that with CR 1 & 2, and CR 3 retirement, the flow of power from the DEF Central Florida Substation into the Greater Orlando Area is reduced significantly. That coupled with the operation of the base load units at FPL's Sanford Plant and DEF's dispatch of Debary, results in significantly increased flows in the 230 kV corridor between the generation at Debary and Sanford, and the load to the south (West Greater Orlando Area). With the previously described conditions, this path experiences significant pre-contingency loading (99% of Rate A) and post-contingency thermal overloads. Additional post-contingency thermal overloads were also observed on other elements within DEF's system, which can be resolved using various switching mitigation procedures.

A combination of the previously stated 230 kV line rebuilds, significant 69 kV and 230 kV switching (sectionalizing), and significant re-dispatch is required to resolve the corridor overloads identified above. Since this corridor is used to transfer bulk power and to serve area load, switching alternatives are limited, and clearance windows would be short, making it very unlikely that the 230 kV rebuild lines could be completed prior to April 2015. In addition, re-dispatch options are also very limited due to the absence of the three base load resources at Crystal River that results in utilizing nearly all available reserves. What remains of the identified mitigations is a less desirable option to address the identified post-contingency corridor issues: a severe combination of 69 kV and 230 kV switching (sectionalizing), combined with limited re-dispatch at Debary.

If DEF were granted an extension to delay the shutdown of CR 1 & 2, the ability to run these units will resolve these significant issues on the system through April 2016.

Seminole Electric Cooperative, Inc.'s (SECI) System

During the 2012 Long Range Study, Seminole's 69 kV transmission line located in north Sumter County was projected to experience thermal overload conditions starting in the summer of 2016 and increasing slightly through the end of the planning horizon. Seminole's plan was to reconductor the 0.3 miles of 336 ACSR with 556 ACSR prior to the start of the summer of 2016 season. However, with the loss of CR 1 & 2, the thermal overload on the respective Seminole facility begins in the summer of 2015.

Seminole's original plan was to reconductor the 0.3 miles prior to the start of the summer 2016 season; however, with the assumption that CR 1 & 2 will be shutdown by 2015, Seminole would need to accelerate the reconductor project to be complete prior to the start of the summer 2015 season. This project could remain on its current schedule per the 2012 Long Range Study if DEF was granted an extension to delay the shutdown of CR1 & 2.

Tampa Electric Company's (TEC) System
Prior to proceeding with the study analysis, the cases were assessed for potential Rate C overloads by running all contingencies (B, C2, C5 & C3 Gens) against the Rate C. TEC addressed potential BES screening overloads using one of four possible methods: pre-contingency switching, pre-contingency dispatch adjustment, documentation of a higher Rate C or automatic action schemes (i.e., SPS, UVLS, etc.).

The results for the summer 2015 and winter of 2015/16 indicate significant overloads in the corridor flowing power from east to west towards the Lake Tarpon area. While numerous thermal overloads appear to be satisfactorily resolved using various switching mitigations, additional TEC transmission lines resulted in Rate B overloads under contingency events that are still outstanding. Each is fully mitigated with the ability to run CR 1 & 2.

Running CR 1 & 2 at the current generation capacity, as it had been projected in the 2012 LFDB models, resolves the overloads on many of the effected TEC facilities or reduces the impact on the thermal overloads on the remaining facilities, so that switching solutions would resolve the remaining overloads.

Determination

The TWG has determined that in the summer 2015 and winter 2015/16 scenarios, with the order to comply with the MATS regulation and subsequent shutdown of Crystal River unit 1 and unit 2, in addition to the announced retirement of Crystal River 3, severe reliability issues exist. The shutdown of CR 1 & 2 will cause new overloads and increase the magnitude of known contingency overloads, many of which cannot be remedied by existing operational procedures. These post-contingency overloads will require new transmission facilities to be constructed and/or existing transmission facilities to be rebuilt or re-conductored in order to accommodate new flow patterns that have not been previously observed.

The TWG finds that a one year extension for the operation of CR units 1 & 2 is justified and necessary to maintain the integrity and the reliability of the BES within the FRCC. This extension will allow additional time to construct transmission projects to resolve many of the issues and aid in mitigating significant post-contingency overloads allowing for operational procedures to be implemented.

Deliverable 2 - Transmission impacts and potential solutions in 2016 & 2017

DEF's System
The results for the summer and winter of 2016 and 2017 indicate significant overloads in:

- The 230 kV tie-line between Lakeland Electric (LAK) and DEF.
- The 230 kV corridor between the generation in the area of Debary (DEF) and Sanford (FPL) and the load to the south.

By summer 2016, DEF plans to rebuild the LAK / DEF 230 kV tie-line and remove the limiting elements to resolve the worst overloads in this area, although DEF will still need to use some switching mitigation procedures for other issues downstream. DEF also plans to eliminate its most limiting elements on the addition LAK / DEF 230 kV tie-line by April 2016.

DEF is currently developing plans to have the corridor located north of Orland in southwest Seminole County rebuilt by summer of 2016. The rebuild of these segments in this corridor will improve area conditions, but until the last rebuild project is completed along this corridor, DEF will still have to depend on some combination of 69 kV and 230 kV switching and limited re-dispatch at Debary. If generation were made available by some means in the Crystal River area, this could resolve most, if not all, of the issues on this corridor and significantly reduce the negative impact in many other areas as well.

As observed in the summer 2015 and winter 2015/16, some additional less significant thermal overloads remain in DEF's system, but can be satisfactorily resolved using various switching mitigation procedures.

TEC's System
Similar to the summer of 2015 and winter of 2015/16 cases, the summer of 2016 & 2017 and winter of 2016/17 cases were assessed for possible Rate C overloads. TEC addressed potential BES screening overloads using one of four possible methods: pre-contingency switching, pre-contingency dispatch adjustment, documentation of a higher Rate C or automatic protection system (i.e., SPS, UVLS, etc.). s:

In addition to the BES Rate C overloads, the 69 kV system is also assessed for any potential Rate C overloads that may potentially impact the BES, but not required to be resolved prior to proceeding with the study analysis.. TEC would be able to address the 69 kV overloads by choosing to uneconomically increase the Pasco Cogen generation to its maximum as pre-contingency in all the cases.

The results for the summer of 2016 & 2017 and winter of 2016/17 indicate significant overloads in the corridor flowing power from east to west towards the Lake Tarpon area. While numerous thermal overloads appear to be satisfactorily resolved using various switching mitigations, additional TEC transmission lines resulted in Rate B overloads that remain outstanding. If generation were made available by some means in the Crystal River area, this could resolve most, if not all, of the issues and significantly reduce the negative impact in other areas as well.

Determination

In the 2016 and 2017 timeframe, severe reliability issues exist with the shutdown of CR 1 & 2. The most severe issues revolve around the Polk Firm and the Unit Out scenarios (most notably, Bayside 2). In these scenarios TWG has identified Rate C overloads and numerous post-contingency overloads in the TEC area for which mitigations have not yet been developed.

Deliverable 3 - Reliability impact of a new combined cycle built at Crystal River in 2018

TEC's System
The results for the summer of 2018 show the elimination of the Rate B and Rate C overloads shown in the previous cases with the exception of one 230 kV transmission line under a double contingency event in the Study scenario.

The effect of installing a combined cycle facility of 1,179 MW by the summer of 2018 in the Crystal River vicinity partially alleviates the thermal overload on TEC's 230 kV transmission line to 101% and a switching solution would resolve the remaining overload.

Determination

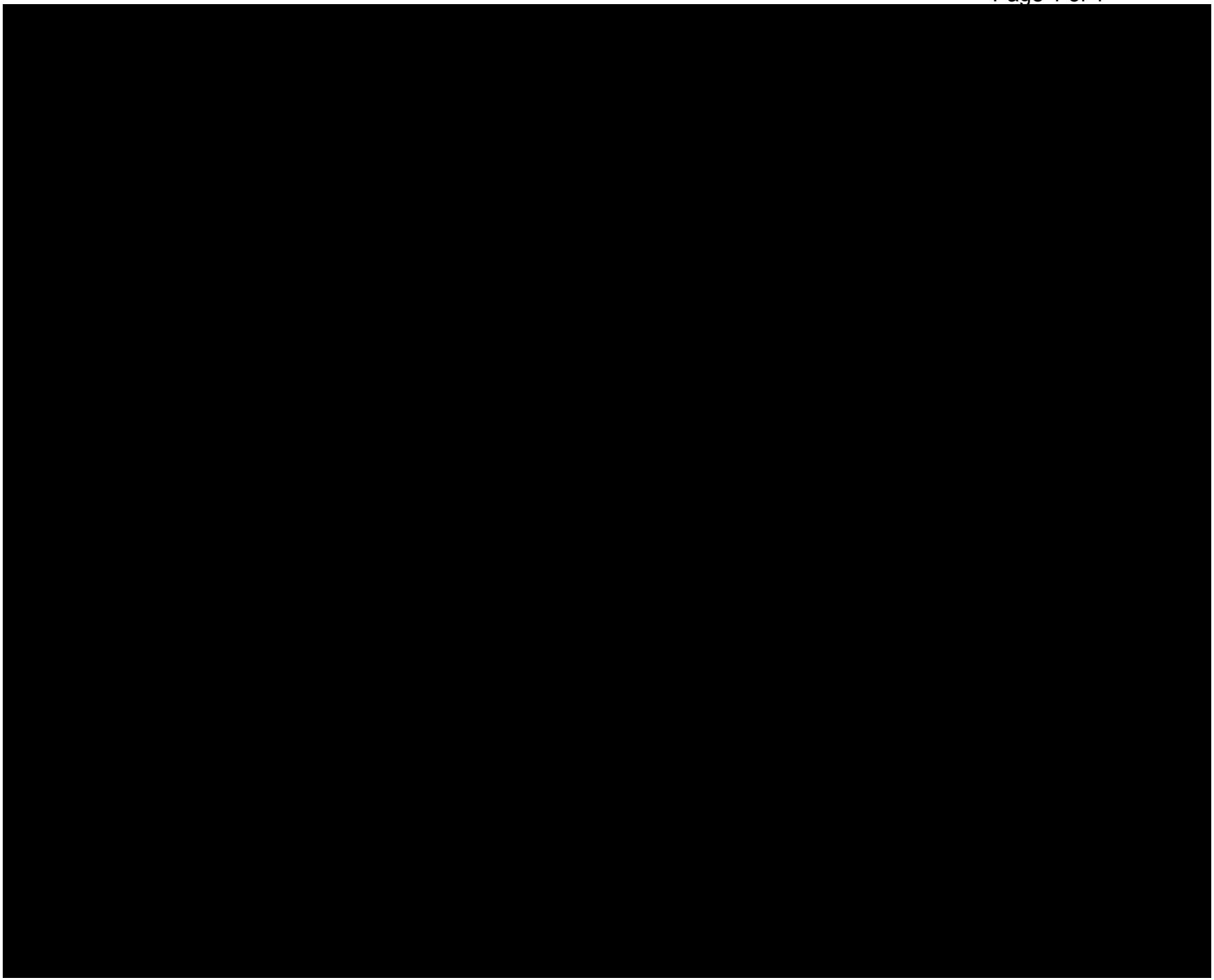
The TWG's evaluation of the transmission impact associated with the addition of a combined cycle facility of 1,179 MW by summer 2018 in the vicinity of the existing Crystal River plant, combined with the accelerated projects and previously identified operating solutions, finds that the reliability issues that are created by the potential shutdown of CR 1 & 2 and announced retirement of CR 3 are resolved

Effect on future studies

This study identified several concerns without providing firm resolutions for various contingency types and system conditions. For future studies that will have to incorporate the Crystal River shutdowns and retirements, including the FRCC Long Range Study, the issues identified in this analysis will need to have adequate remedies. Additionally, any future TSR/NITS or GISR/NRIS studies will be much more complex when starting with unresolved issues. There is one GISR already underway, and it is anticipated that more will be coming in the near future.

REDACTED

RFP Transmission Resource Plans Groups



REDACTED

2A

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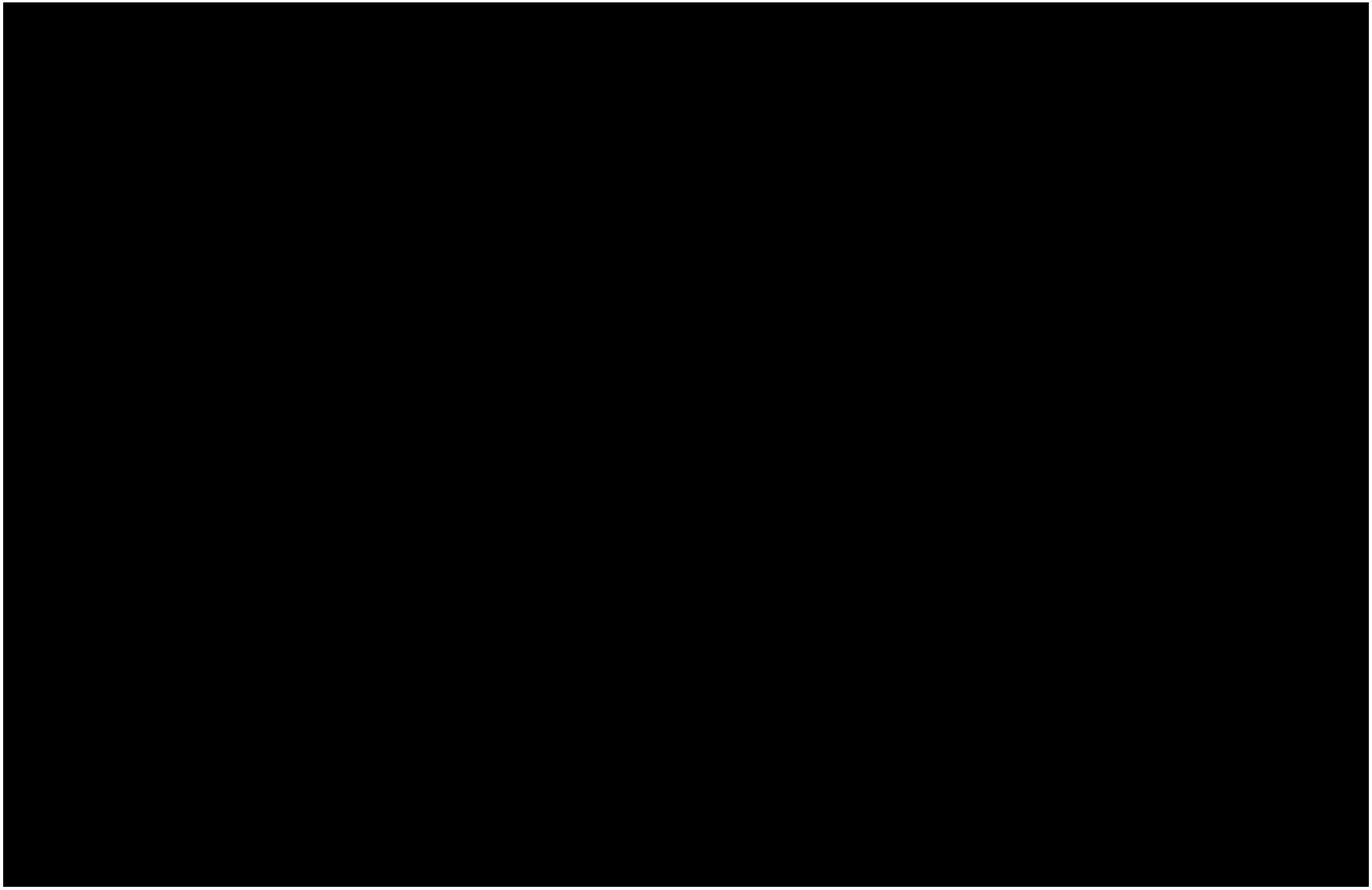
REDACTED

2B

3A

REDACTED



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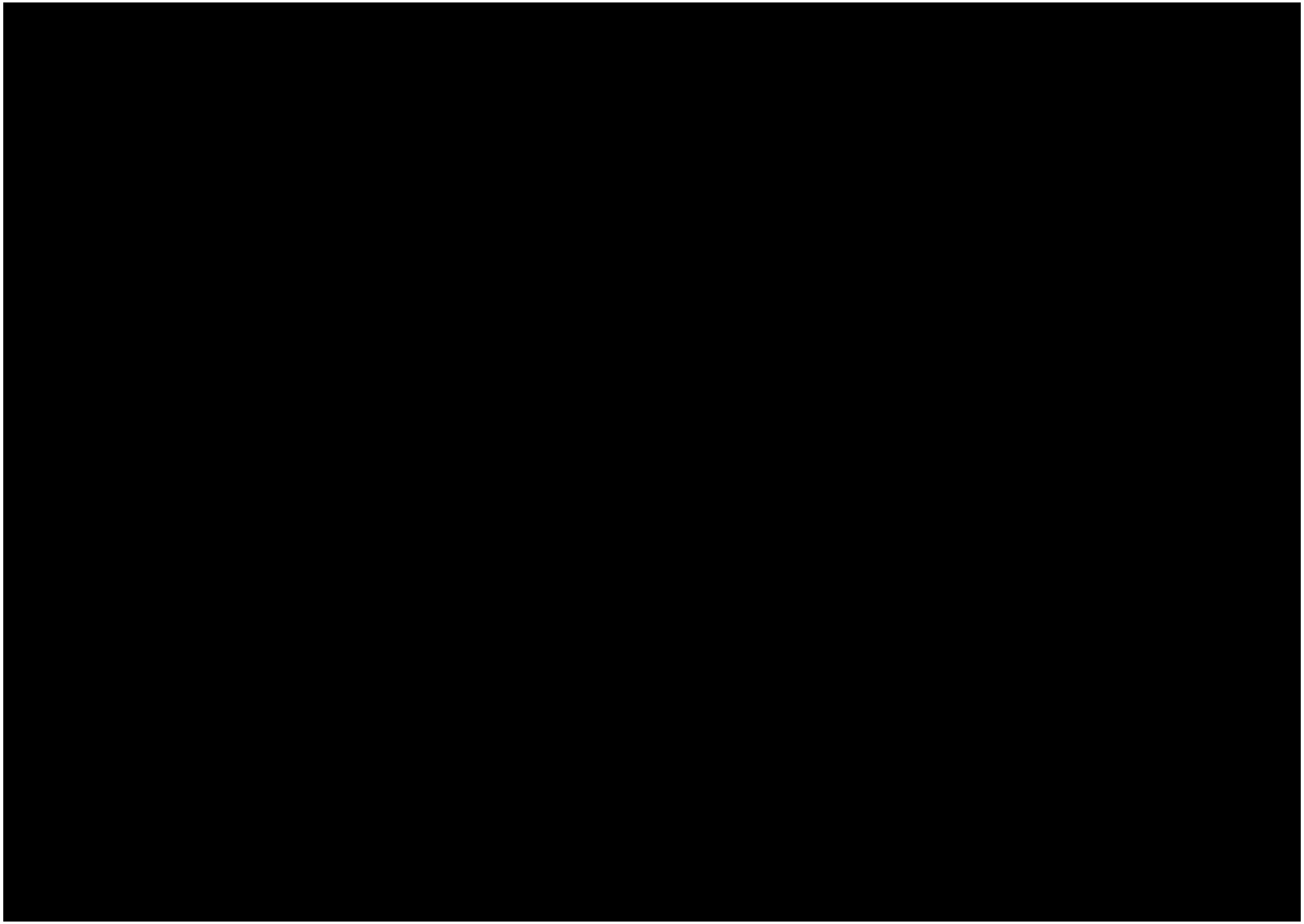

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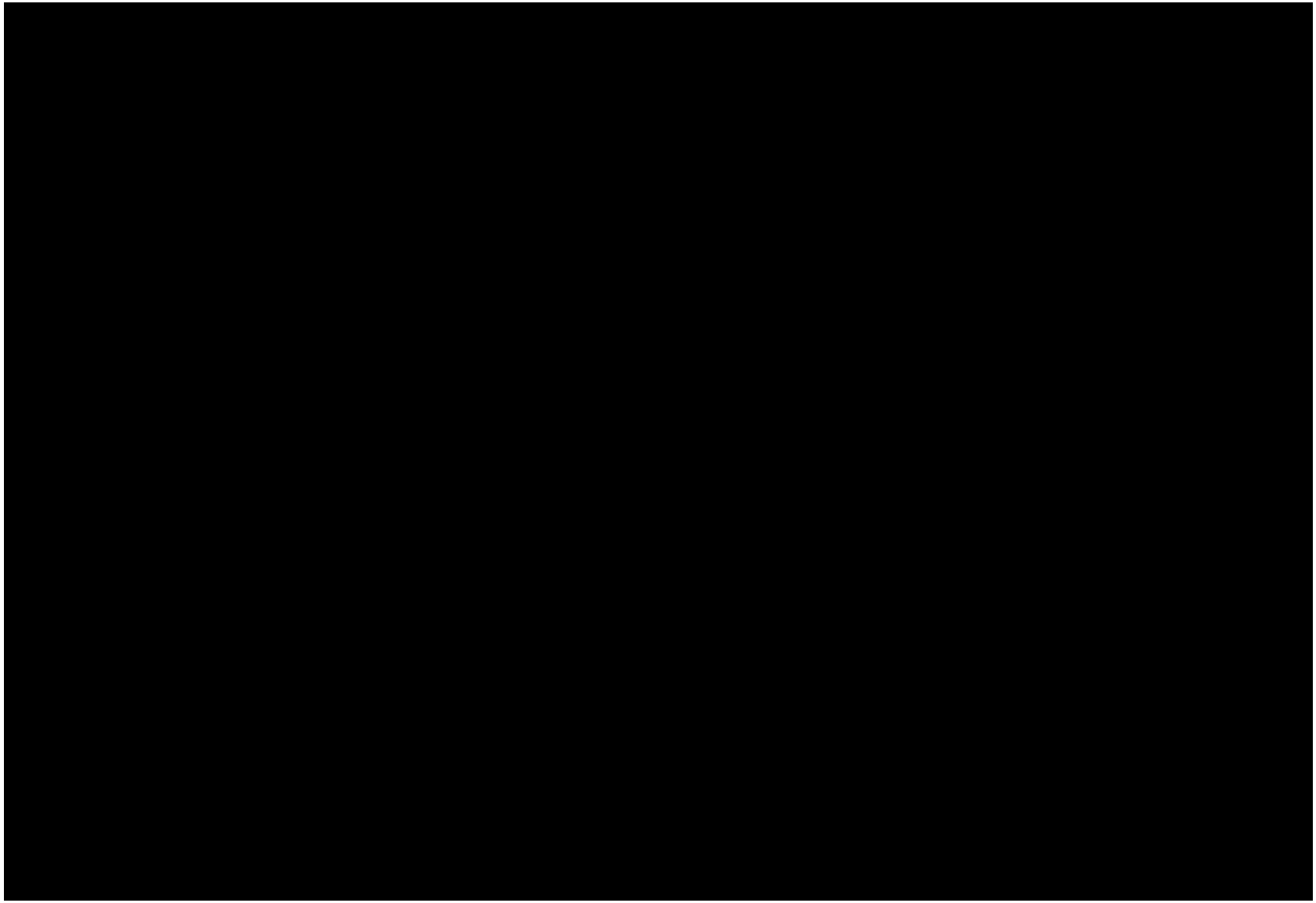

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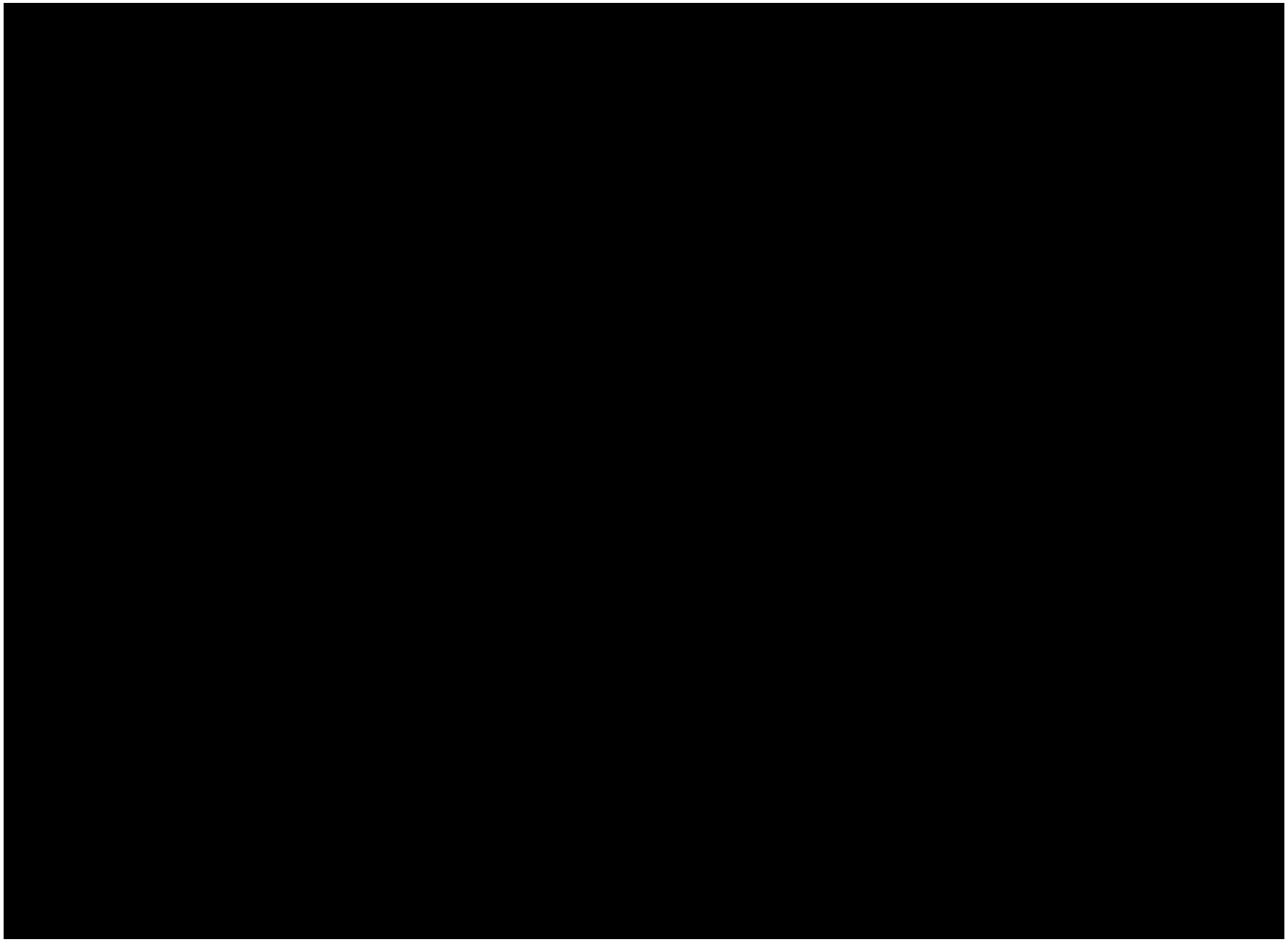

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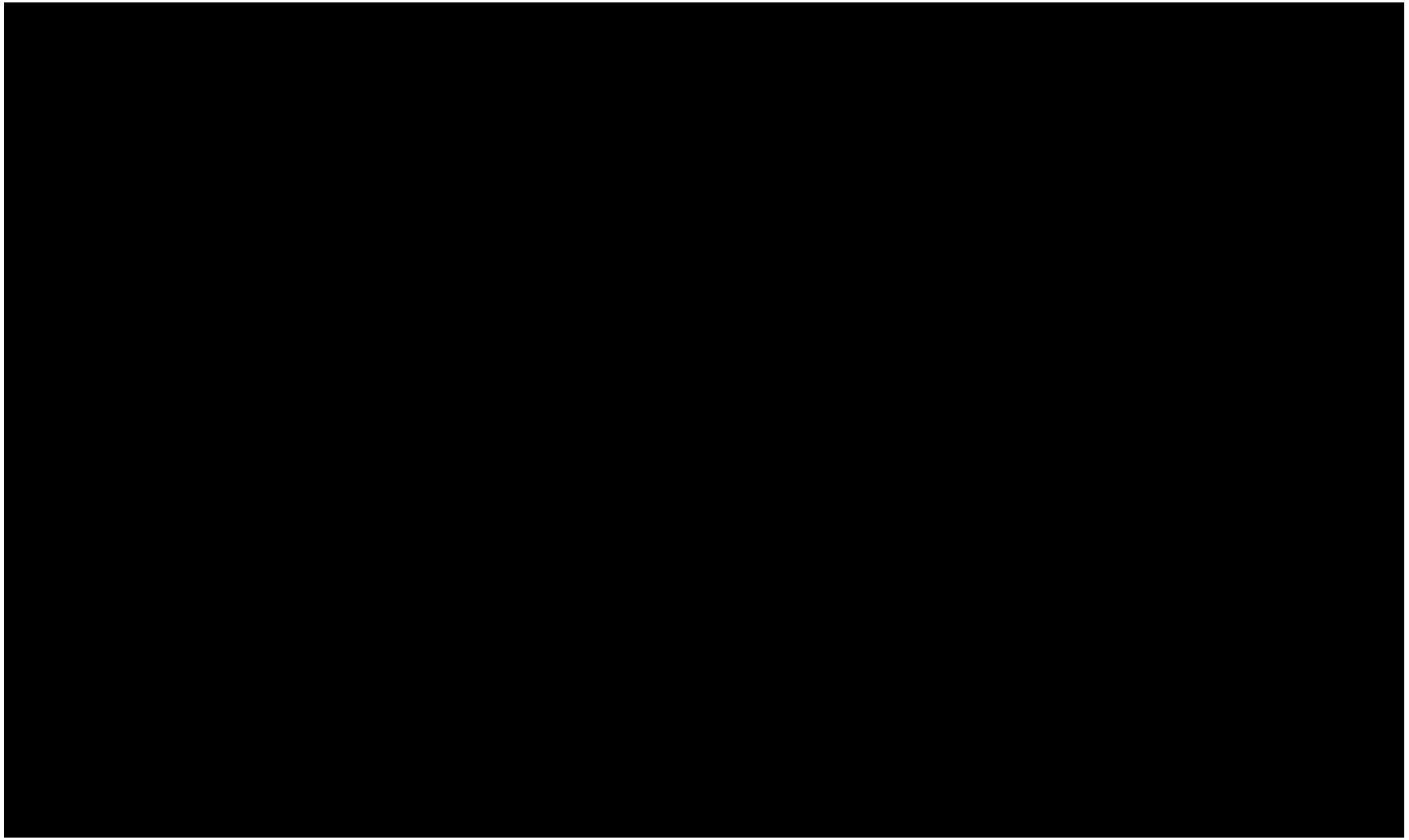
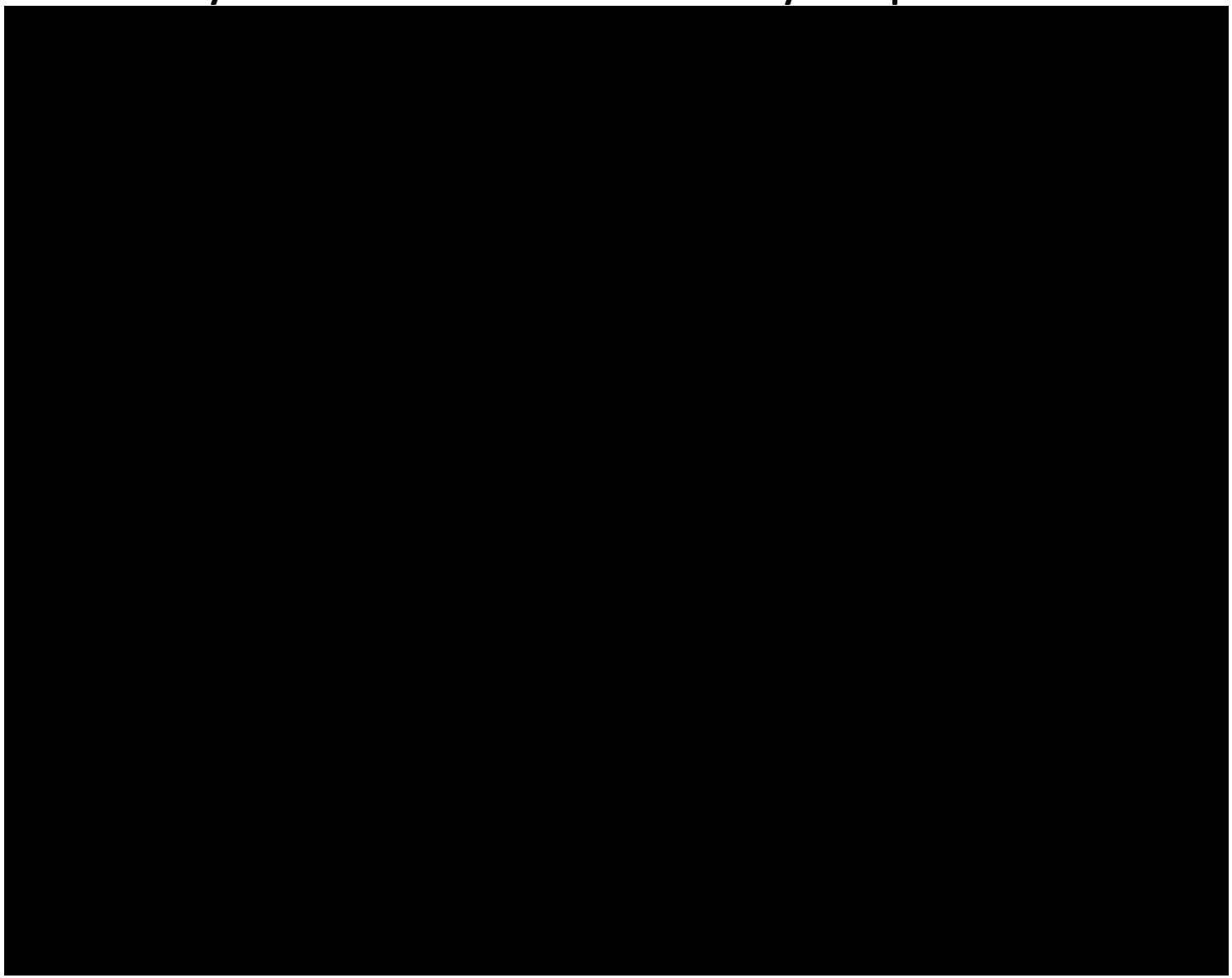


Summary of Estimated Transmission Cost by Group



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