CONTACT FILER REGARDING IMAGE CLARITY

-
-
-

24-05041

Public Utilities Commission of Nevada
Electronic Filing
Submitted: 10/18/2024 1:35:23 PM

Reference: 91cb3f9a-1965-45fd-b7d5-43ac6ecdda74
Payment Reference: fd-b7d5-43ac6ecdda74
Filed For: Advanced Energy United

In accordance with NRS Chapter 719,
this filing has been electronically signed and filed
by: /s Blake Elder

By electronically filing the document(s),
the filer attests to the authenticity of the electronic signature(s) contained therein.

This filing has been electronically filed and deemed to be signed by an authorized agent or
representative of the signer(s) and
Advanced Energy United

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Joint Application of Nevada Power Company d/b/a NV Energy and Sierra Pacific Power Company d/b/a NV Energy for approval of their joint 2025-2044 integrated resource plan, for the three year Action Plan period 2025-2027, and the Energy Supply Plan period of 2025-2027.	))))))	Docket No. 24-05041

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Nevada Power Company d/b/a NV Energy and
Sierra Pacific Power Company d/b/a NV Energy

Docket No. 24-05041

Prepared Direct Testimony of

Maria Roumpani, PhD

on behalf of

Advanced Energy United

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

Q. PLEASE STATE YOUR NAME, OCCUPATION, BUSINESS ADDRESS, AND THE PARTY FOR WHOM YOU ARE FILING TESTIMONY.

A. My name is Maria Roumpani. I am a Founding Partner of Current Energy Group LLC. My business address is 528 North Treat Avenue, Tucson, Arizona 85716. I am filing testimony on behalf of Advanced Energy United ("United").

Q. PLEASE DESCRIBE ADVANCED ENERGY UNITED.

A. United, formerly Advanced Energy Economy, is a national association of businesses involved in the advanced energy industry sector. Its membership represents a broad coalition of large and small companies working across the energy technology spectrum, including energy efficiency, demand response, solar photovoltaics, wind, storage, electric vehicle manufacturer and charging infrastructure providers, advanced metering infrastructure, transmission and distribution developers, enabling software, and more. It also includes large energy customers looking to meet sustainability goals with access to advanced energy resources.

United maintains in-house expertise in resource and transmission planning and procurement, utility regulation, and energy markets. United also draws on the expertise and input of its membership.

Q. PLEASE DESCRIBE ADVANCED ENERGY UNITED'S MEMBERS AND INTERESTS IN NEVADA'S RESOURCE PLANNING.

A. The member companies of United span a wide range of economic interests in NV Energy's ("NVE" or "the Companies") Integrated Resource Plan ("IRP") and associated transmission planning and resource procurement. United's members work with NVE in a wide variety of ways, as large customers and vendors, as development partners and competitors, and as providers of direct-to-consumer technologies with large impacts and dependencies on NVE's systems and rates. Each of these relationships may affect, and is affected by, NVE's IRP planning and related transmission and procurement decisions discussed in this Application.

As United members' businesses are significantly impacted by NVE's decision-making, United members benefit from transparency into the needs and plans of NVE as well as confidence in the thoroughness of NVE's decision-making process and the prudency of its decisions. In particular, United's developer members have specific interests and expertise in the resource planning and procurement process for NVE.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL BACKGROUND AND EXPERIENCE.

A. I specialize in the economic and technical analysis of grid planning and operations issues. I have conducted analysis and submitted expert testimony or comments on integrated resource planning, plant economics, unit commitment practices, and power cost issues before state utility regulators in Arizona, Colorado, Kentucky, Michigan, Minnesota, North Carolina, Oregon, South Carolina, and Virginia.

Prior to co-founding Current Energy Group in 2024, I was the Technical Director at Strategen. While at Strategen, I led economic and technical grid modeling engagements, including capacity expansion, production cost, and energy storage dispatch modeling. My clients included government entities and state bodies, including the Oregon Public Utility Commission, the Kentucky Public Service Commission, the Maryland Office of People's Counsel, the South Carolina Office of Regulatory Staff, non-governmental organizations, and trade associations, as well as large energy buyers.

Before joining Strategen in 2018, I contributed to the development of analytical tools used in energy impact assessment studies. I have a Ph.D. from the Management Science and Engineering Department at Stanford University and a Master of Science in Electrical and Computer Engineering from the National Technical University of Athens, Greece. My full resume is attached to this testimony as **Attachment MR-1**.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA ("COMMISSION")?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I provide a review and critique of NVE's supply-side resource planning efforts in the Companies' 2025-2044 IRP. I explain how NVE's selection of the Balanced Plan (which includes the proposed Valmy combustion turbine ("CT") additions) does not minimize cost or risk as much as other potential portfolio options. I discuss how a modified version of the Renewable Plan would be a superior option. I also explain how NVE's IRP process is not well suited for identifying future portfolio needs or creating a robust and competitive procurement process. Finally, I discuss the role of flexible load resources and "next generation" transmission solutions in the IRP context. My testimony includes a few references to information NVE has designated as confidential; as such, all text referencing such confidential information has been redacted in this public version of my testimony, and all corresponding, unredacted information is being submitted separately pursuant to NAC 703.5274(1)(a).

Q. WHAT ARE UNITED'S SPECIFIC RECOMMENDATIONS IN PHASE III OF THIS PROCEEDING?

A. I recommend the following:

1. The Commission should reject the Balanced Plan as the Preferred Plan.

2. The Commission should order NVE to adopt the Renewable Plan as the Preferred Plan, with the following modifications:
    - Consistent with the Renewable Plan, NVE should procure approximately 500 megawatts ("MW") of standalone battery energy storage system ("BESS") resources in lieu of the Companies' proposed CT additions at Valmy.
    - NVE should accelerate the procurement of these BESS resources from 2030 to 2028 to better address NVE's open position in 2028 and 2029.
    - As part of this BESS procurement, NVE should consider targeting the Valmy location as a means of partially or wholly reducing the must-run constraint.

3. The Commission should order NVE to issue an all-source Request for Proposals ("RFP") as soon as possible to procure additional resources consistent with the needs identified in the Renewable Plan and this testimony. These specific needs should include:
    - Capacity resources that would reduce the Companies' open position in the 2028 timeline (for example, accelerating the BESS resources included in the Renewable Plan);

- Local capacity at the Valmy location. The RFP should specify the resource capabilities needed to partially or wholly alleviate the must-run constraint by 2031 when the Companies' modeling shows that removing the constraint would result in reduced operations of the Valmy steam units;
- Flexible load resources by 2027, as described in Section VI; and
- Incremental renewable resources as soon as practicable (the Companies' analysis shows that renewable resources, including 952 MW of Idaho wind added in 2029, would be part of an optimal portfolio).

After the Companies receive the bids, a new capacity expansion modeling run should be conducted in PLEXOS LT and presented to the Commission. This capacity expansion modeling run should allow the model to select from all qualified resource bids *in parallel* while reflecting their actual cost and performance characteristics. The portfolio results should be presented to the Commission within six months of receipt of the RFP bids through an IRP amendment. This amendment should also include a procurement plan for contracting with or acquiring the selected resources.

4. The Commission should order NVE to defer the 2028 Valmy CT additions and instead pursue the incremental near-term BESS additions contemplated in the Renewable Plan.
5. The Commission should direct NVE to evaluate alternative solutions to alleviating the Valmy must-run constraint at a future date, including through transmission upgrades, long-duration storage resource additions, interruptible load demand response, and contractual arrangements with other local generators.

6. The Commission should order the following changes to NVE's future IRP and resource procurement processes:
    - The Commission should require NVE to revise its IRP and resource procurement processes to more closely reflect the two-step process implemented in Colorado.
    - The Commission should require NVE to better identify system needs in the near- and medium-term based on more robust capacity expansion modeling in step one of future processes.
    - The Commission should require NVE to more clearly link its future RFPs to the needs identified in step one of future processes.
    - Following the RFP results, in step two of future processes the Commission should require NVE to conduct additional capacity expansion modeling that simultaneously selects from the full range of project bids.
    - For long-term resource needs, the Commission should require NVE to evaluate a more complete range of dispatchable options, including long-duration energy storage, advanced geothermal systems, and flexible loads.
7. The Commission should adopt all of United's recommendations set forth in its Phase II testimony regarding the near-term deployment of flexible load resources.
8. The Commission should order NVE to modify its PLEXOS modeling going forward to include higher amounts of flexible load resources.
9. The Commission should set a longer-term demand reduction target (*e.g.*, for 2030 and/or 2040) that is greater than 680 MW in 2030 and greater than 1657 MW in 2040.

10. The Commission should require NVE to conduct a study (to be completed within six months) of the benefits of "next generation" transmission solutions, including Grid Enhancing Technologies ("GETs"). At a minimum, the study should include the following parameters consistent with my testimony in Section VII:

- A clearly stated objective that includes 1) identifying where solutions can minimize operating costs, and 2) identifying where solutions can defer or avoid future transmission upgrades.
- A sufficient time horizon in the evaluation (*i.e.*, 5, 10, and 20 years into the future).
- A specified geographic focus (*i.e.*, the entirety of NVE's transmission system).
- A minimum list of benefits to be evaluated, as enumerated in my testimony.
- A near-term action plan for implementing solutions that are found to be beneficial.
- A Technical Advisory Group to help guide the study process that would include members from the Bureau of Consumer Protection ("BCP"), the Commission Staff, the advanced transmission solution industry, and other stakeholders.

II. BACKGROUND: NVE'S DEVELOPMENT OF PORTFOLIO OPTIONS.

Q. HOW DOES NVE PRESENT ITS PREFERRED RESOURCE PORTFOLIO FOR THE COMMISSION'S CONSIDERATION?

A. NVE presents its selection of a preferred resource portfolio as essentially a choice between four alternative plan options: 1) Balanced Plan, 2) Renewable Plan, 3) Low Carbon

Plan, and 4) No Open Position Plan.[1] Within these, the Companies further seem to suggest that there are really two primary choices: the Balanced Plan (NVE's "preferred" option) and the Renewable Plan (NVE's "alternate" option).[2]

Q. ARE THERE OTHER REASONABLE OPTIONS OR VARIATIONS OF RESOURCE PORTFOLIOS BEYOND THE FOUR PORTFOLIOS NVE PRESENTS?

A. Yes. There are many feasible portfolio options that were not explored by NVE's analysis or presented in its findings. Some of these unexplored options are likely to be superior to NVE's preferred plan across multiple dimensions.

Q. SETTING ASIDE WHETHER THERE ARE ANY ALTERNATIVE PORTFOLIOS SUPERIOR TO THOSE NVE CHOSE TO PRESENT, CAN YOU DESCRIBE SOME OF THE KEY FEATURES OF AND KEY DIFFERENCES BETWEEN NVE'S BALANCED PLAN AND ITS RENEWABLE PLAN?

A. Yes. Both plans are relatively similar since they were derived from the same initial Base Case portfolio developed in PLEXOS.[3] However, there are some key differences. The most notable difference is that the Balanced Plan includes a 411 MW gas CT addition in 2028, while the Renewable Plan does not include this addition at all and instead includes 502 MW of incremental BESS additions in 2030, as well as other incremental BESS additions in subsequent years. Despite its name, the Renewable Plan does not contain more renewable energy resources

---

1 Supply Plan (Volume 8), Pages 6-7 of 393.
2 Supply Plan (Volume 8), Page 7 of 393.
3 Supply Plan (Volume 8), Page 240 of 393.

than NVE's preferred plan. In fact, the Renewable Plan contains 1,000 MW *less* solar by year 2050 than the Balanced Plan. In the medium-term the higher levels of BESS additions in the Renewable Plan are relatively modest (*i.e.*, 502 MW by 2030), but this differential increases significantly by year 2050, with BESS additions that are 6,169 MW greater than the corresponding level in the Balanced Plan.

Table 1: Difference in Resources Between the Renewable and Balanced Plans (MW) [4]

	Difference between the Renewable Plan and the Balanced Plan (MW)				
	2025	2028	2030	2040	2050
Coal	0	0	0	0	0
Gas	0	-411	-411	-411	-411
Firm	0	0	0	0	0
Other	0	0	0	0	0
Hydro	0	0	0	0	0
Geo	0	0	0	0	0
Wind	0	0	0	-1	-1
Solar	0	0	0	0	-1000
PSH	0	0	0	0	0
BESS	0	0	502	1460	6169

Q. HAVE YOU REVIEWED THE ANALYTICAL PROCESS THROUGH WHICH NVE CONSTRUCTED THESE PORTFOLIOS?

A. Yes, I have conducted a detailed review of NVE's analysis and approach to constructing the portfolios. The sequence steps for constructing the portfolios can be summarized as follows:

1. **Base Case developed**: This step constitutes the only true economic optimization of the resource portfolio by modeling generic resource additions in the PLEXOS LT capacity expansion model. Adjustments to the Base Case are then made in Steps 2, 3, and 4 below.

---

[4] Table created based on information in Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-7,30,33,36,39 Installed Cap."

2. **Screening Evaluation performed**: This step adds potential projects[5] to the Base Case and adjusts placeholder resources to assess how the potential projects compare against each other. In NVE's analysis, several CTs and three paired photovoltaic ("PV")/BESS resources passed the screening and advanced to the next step.

3. **Combination Cases developed**: This step develops alternative portfolios through different combinations of the potential projects that advanced from Step 2.

4. **Alternative Plans developed**: This step identifies the four portfolios to be considered for final evaluation.

5. **Preferred Plan selected**

I discuss each of these steps further in Section V below.

Q. DO YOU THINK NVE'S APPROACH TO CONSTRUCTING THESE PORTFOLIOS REFLECTS INDUSTRY BEST PRACTICES?

A. No, I do not believe NVE followed industry best practices. I have many critiques of NVE's methodology, which I will describe in greater detail below.

---

5 NVE compiled a set of "potential projects" that could fill a portion of the Companies' near-term need for additional capacity and renewable credits. These resource options were developed from a combination of self-development efforts, request for proposal bid responses, and bilateral negotiations. They include: CTs at Valmy, CTs at Ft. Churchill, CTs at Harry Allen, CTs at Higgins, Dry Lake East PV/BESS, Boulder Solar III PV/BESS, Libra PV/BESS, Geo-1, Solar-1, Battery-1, Solar-2, Wind-1. Supply Plan (Volume 8), Pages 229-231 of 393.

III. <u>NVE'S BALANCED PLAN RESULTS IN HIGHER COSTS, EMISSIONS, AND RISKS IN THE NEAR TERM THAN ITS RENEWABLE PLAN.</u>

A. *<u>NVE'S EVALUATION OF THE RENEWABLE PLAN VERSUS THE BALANCED PLAN FAILS TO ACCURATELY ASSESS THE COSTS ASSOCIATED WITH THESE PLANS.</u>*

Q. CAN YOU SUMMARIZE HOW THE BALANCED PLAN AND RENEWABLE PLAN WERE DEVELOPED BY NVE?

A. The Balanced Plan and the Renewable Plan both reflect updated Combination Cases developed by NVE as described above. The Companies note that most of the future resource additions, which are identified as "named placeholders,"[6] are identical in both plans.[7] Meanwhile, the Renewable Plan was presented as "an option that adds no near-term thermal projects."[8] In other words, it appears that the purpose of developing the Renewable Plan was to evaluate an option that was nearly identical to NVE's preferred plan, but did not include the proposed new gas CTs at Valmy.

Q. OTHER THAN REMOVING THE VALMY CTS, DID NVE MAKE OTHER CHANGES WHEN DEVELOPING THE RENEWABLE PLAN?

A. Yes. NVE made other changes beyond removing the 411 MW Valmy CT additions. As mentioned above, NVE added significant amounts of battery storage to the Renewable Plan, particularly in the later years. For instance, 3,400 MW of BESS was added between 2044-2050.

---

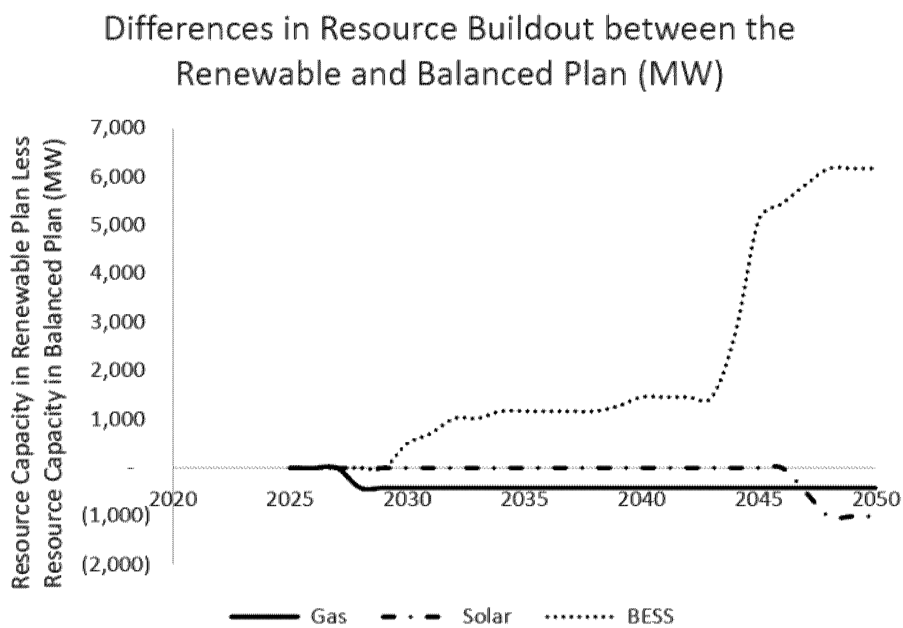
6 According to NVE, "Named placeholders are provided to represent reasonably known projects in progress or requested and to reflect anticipated Company-owned projects." Volume 8, Narrative - Supply Plan, page 240 of 393.

7 Volume 8, Narrative - Supply Plan, page 241 of 393.

8 Volume 8, Narrative - Supply Plan, page 241 of 393.

The chart below shows the steep ramp up in BESS for the Renewable Plan after 2040, which is absent from the Balanced Plan.

Figure 1: Differences in Resource Buildout between the Renewable and Balanced Plans (MW)[9]



Q. WHAT DID NVE'S ANALYSIS FIND WHEN COMPARING THE COST OF THE TWO PORTFOLIOS?

A. NVE's analysis found that the Renewable Plan has a 20-year Present Worth of Revenue Requirement ("PWRR") that is $321 million higher than the Balanced Plan (a 1.0% increase), and a 26-year PWRR that is $1,047 million higher than the Balanced Plan (a 2.5% increase).[10]

---

[9] Figure created based on information in Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-7,30,33,36,39 Installed Cap."

[10] Volume 8, Narrative – Supply Plan, pages 271-272 of 393.

Q. HOW DO YOU INTERPRET THIS COST DIFFERENCE?

A. Without further consideration, one might interpret these findings to suggest that excluding the proposed Valmy CTs results in a slightly more expensive portfolio. However, the PWRR cost differential is primarily driven by other factors. In particular, the 4,700 MW of BESS additions that NVE chose to add during the 2044-2050 timeframe play a significant role in driving up the PWRR of the Renewable Portfolio relative to the Balanced Portfolio. Based on NVE's assumptions, I estimate these late-term BESS additions to add over [redacted] billion in capital costs.[11] Moreover, there is not a clear justification for such substantial additions of short-duration BESS resources in these later years since 1) the Renewable Plan does not contain any additional renewable resources that might require battery storage for integration, 2) the implied Effective Load Carrying Capability ("ELCC") value of incremental BESS resources in these later years is very low and does not provide significant capacity value relative to other possible resource options, and 3) these BESS additions were included through hand-picked adjustments made by NVE and were not part of any economic optimization (*e.g.*, via PLEXOS LT).

Regarding the ELCC value, it is worth noting that the initial 502 MW of incremental BESS by 2030 included in the Renewable Plan results in 418 MW of incremental firm capacity (or approximately 83%).[12] However, adding another 5,658 MW of incremental BESS to the Renewable Plan by 2050 (6,160 MW total increase between the Renewable and Balanced Plan)

---

[11] Based on NVE's assumption of [redacted]/kW for Battery-Standalone resources in 2040 as shown in ECON-10, (*i.e.*, 4,700 MW x [redacted]/kW = [redacted] billion).

[12] Comparing the firm capacity of "PPA.Placeholders.Storage.BESS-4" in 2030 between the VBDL1 and BDL2 tables in ECON-5, pages 2 and 5 of 88.

results only in incremental firm capacity of 338 MW (or approximately 5%).[13] Given the very low value of this firm capacity contribution, the Companies' decision to keep adding short-duration BESS does not appear logical. Instead, a more logical approach would have been to add other types of "clean firm" resources in these later years that provide higher capacity value (*e.g.*, Long Duration Energy Storage ("LDES"), Advanced Geothermal, hydrogen capable CTs, etc.). Furthermore, although it is reasonable to assume that the ELCC of energy storage declines due to saturation, the Companies' assumptions, approximated in Table 2 below, are quite puzzling, with 5.5 gigawatts ("GW") of incremental energy storage in the Renewable Plan *reducing* the total BESS firm capacity by 10 MW, *i.e.*, reducing the total BESS firm capacity from 348 MW in 2030 to 338 MW in 2050.[14]

---

[13] Calculation based on Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-31,34,37,40 2050 Firm Cap."

[14] Based on information from the L&R tables (ECON-5) and Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-31,34,37,40 2050 Firm Cap."

Table 2: Nameplate and Firm Capacity of BESS additions in the Balanced and Renewable Plans[15]

	Nameplate Capacity (MW)			Firm Capacity (MW)		
	Balanced Plan	Renewable Plan	Difference	Balanced Plan	Renewable Plan	Difference
2025	946	946	-	946	946	-
2026	1,343	1,343	-	1,185	1,185	-
2027	1,746	1,746	-	1,502	1,502	-
2028	2,515	2,515	-	2,148	2,148	-
2029	2,573	2,573	-	2,195	2,195	-
2030	2,733	3,235	502	2,368	2,716	348
2031	3,198	3,908	710	2,721	3,050	329
2032	3,739	4,759	1,020	2,989	3,309	320
2033	3,995	5,015	1,020	3,116	3,435	319
2034	4,479	5,647	1,168	3,320	3,621	301
2035	4,509	5,677	1,168	3,340	3,639	299
2036	4,539	5,707	1,168	3,358	3,661	303
2037	4,569	5,737	1,168	3,371	3,672	301
2038	4,517	5,685	1,168	3,355	3,656	301
2039	4,844	6,120	1,276	3,455	3,774	319
2040	6,127	7,587	1,460	3,791	4,111	320
2041	6,908	8,368	1,460	3,985	4,309	324
2042	8,366	9,826	1,460	4,322	4,657	335
2043	9,390	10,850	1,460	4,563	4,896	333
2044	10,522	13,300	2,778	4,830	5,162	332
2045	11,407	16,517	5,110	5,069	5,374	305
2046	12,167	17,611	5,444	5,158	5,472	314
2047	13,439	19,277	5,838	5,265	5,595	330
2048	13,627	19,796	6,169	5,303	5,639	336
2049	14,070	20,239	6,169	5,318	5,654	336
2050	15,413	21,582	6,169	5,425	5,763	338
2030-2050	12,840	19,009	6,169	3,230	3,568	338
2045-2050	4,891	8,282	3,391	595	601	6
2031-2050	12,680	18,347	5,667	3,057	3,047	-10

15 **Attachment MR-2** (Public) (Table2_AEUWorkpaper).

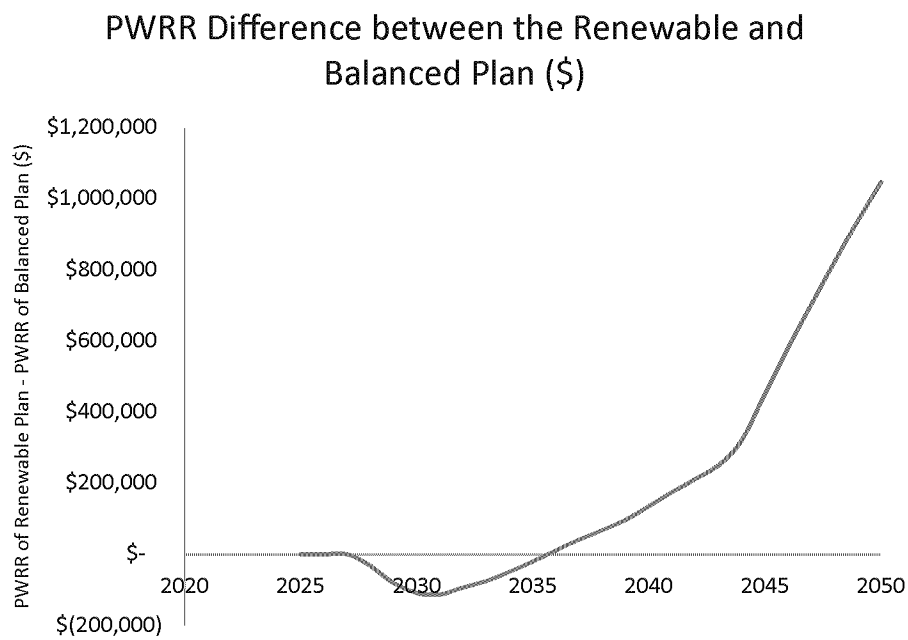
Q. BASED ON THIS ANALYSIS, WHAT IS YOUR OVERALL ASSESSMENT OF NVE'S APPROACH?

A. Overall, I'm concerned that NVE's hand-selected portfolio adjustments inappropriately inflated the cost of the Renewable Plan by including these very late-term BESS resources that have little portfolio value and are very uncertain relative to any near-term actions. This gives the false impression that near-term CT additions are more economic than they truly are, and that near-term BESS resource additions are less valuable than they truly are. The economics of the portfolio are largely driven by the ELCC assumptions, which raise several questions.

Q. HOW DO THE ECONOMICS OF THE TWO PORTFOLIOS COMPARE IN THE NEAR-TERM AND MEDIUM-TERM?

A. The following graph shows the difference in the cumulative PWRR between the two plans. As shown, the PWRR of the Renewable Plan is lower in cost than the Balanced Plan at least through 2035, and only becomes higher in cost than the Balanced Plan *after* the Companies begin to include significant amounts of BESS towards the 2040 timeframe. These late-term additions are not linked to the absence of the CTs (which have already been cost-effectively replaced by BESS in earlier years) and should not dictate the Companies' overall portfolio selection.

Figure 2: Differences in PWRR between the Renewable and Balanced Plans ($)[16]



Q. BASED ON THIS ANALYSIS DO YOU AGREE WITH NVE THAT THE BALANCED PLAN IS THE LEAST COST PORTFOLIO?

A. No. As I demonstrated above, based on NVE's own analysis, the Renewable Plan is the least cost portfolio at least through 2035. After 2035, the Renewable Plan may become more costly, but that is only true if one accepts NVE's questionable and unsupported assumptions about the need for significant BESS resource additions in the 2035-2050 timeframe, and the absence of more economic alternatives in that timeline. Thus, NVE's conclusion that the Balanced Plan is least cost depends heavily upon extending the timeframe of the IRP analysis to

---

16 Figure created based on information in ECON-7.

20 years or longer, rather than focusing on a shorter period. Furthermore, NVE's conclusion depends heavily on NVE's cost assumptions and on NVE's assumptions that those hand-selected BESS additions are economically optimal even though the Companies have not re-optimized the portfolio in PLEXOS LT to confirm this.

Q. COULD A DIFFERENT SET OF LATE-TERM RESOURCE ADDITIONS (*I.E.*, 2045-2050) COULD BE MORE COST-EFFECTIVE THAN THE 3,400 MW OF BESS NVE CHOSE?

A. Yes. Reviewing the nameplate and firm capacity provided by BESS in the two plans, the Renewable Plan adds 3.4 GW of nameplate capacity from 4-hour BESS more than the Balanced Plan in years 2045-2050. This leads to more than $600 million of incremental PWRR.[17] However, these additions result in firm capacity from BESS of 6 MW and are thus simply not necessary (no significant capacity difference exists between the Renewable and Balanced Plan during any year for this period). If all of the incremental BESS additions beyond the 502 MW of BESS additions in 2030 were removed from the Renewable Plan, then the Plan's PWRR would be reduced by more than $1.2 billion, and would be approximately $200 million lower than the Balanced Plan's PWRR.[18] It is worth repeating that the incremental BESS additions in the Renewable Plan after the first 502 MW lead to a reduction in the overall firm capacity based on the Companies' assumptions, and thus the resulting PWRR should not be relied upon to inform the selection of the Preferred Portfolio. Given that the Companies did not re-optimize the Plan

---

[17] *See* **Attachment MR-2** (Confidential) (CONFIDENTIAL_BESSCost_AEUWorkpaper).
[18] *See* **Attachment MR-2** (Confidential) (CONFIDENTIAL_BESSCost_AEUWorkpaper).

after including the 2030 BESS (instead of the CTs), there could be a plan in which optimized capacity additions would result in a Plan with lower PWRR over the entire planning period. Those could include longer duration energy storage options, as well as flexible load resources, which I further discuss in Section VI, or even firm capacity based on other emerging technologies.

B. THE INITIAL MODEL RUN UNDERPINNING THE BALANCED PLAN'S ADDITION OF NEW GAS CT GENERATION BY 2028 (I.E., THE PLEXOS LT BASE CASE) WAS BASED ON ERRONEOUS COST ASSUMPTIONS.

Q. CAN YOU EXPLAIN HOW NVE JUSTIFIED THE INCLUSION OF 411 MW OF NEW GAS GENERATION BY 2028 IN ITS PREFERRED PORTFOLIO?

A. The inclusion of 411 MW of new gas generation stems initially from NVE's PLEXOS LT model run that was performed to develop the Base Case, which was ultimately used to develop the Balanced Plan (*i.e.*, the Preferred Portfolio) after some adjustments. PLEXOS LT is a capacity expansion model that uses mathematical optimization to identify the least cost portfolio of resources based on a set of input assumptions. Based on the modeling assumptions NVE chose, the PLEXOS LT model economically selected to add a 420 MW gas CT resource by 2027 in the Base Case. Notably, this result persists in subsequent steps of NVE's analysis. These subsequent steps include manual adjustments to add or subtract resources, but none of them "re-optimize" the plan to determine if the gas addition is still part of a least cost portfolio. Thus, the CT addition is "baked in" from the initial Base Case model run.

Q. WHAT ARE SOME OF THE KEY MODELING ASSUMPTIONS PLEXOS USED TO DETERMINE RESOURCE ADDITIONS IN THE BASE CASE?

A. Some of the most important modeling assumptions include the timing of resource needs (*e.g.*, MW by year) and the cost of candidate resources that can meet those needs (*e.g.*, $/kW capital costs). Since NVE has a significant open position, its capacity resource needs are essentially immediate. As such, capacity cost ($/kW) and year of availability are undoubtedly the driving factors determining model-selected resource additions in the Base Case.

Q. DO YOU THINK THE CAPACITY COST ASSUMPTIONS NVE USED IN ITS PLEXOS LT MODELING WERE CORRECT?

A. No. NVE's cost assumptions for the Base Case were inconsistent with both reputable public data sources and NVE's own estimates of capital costs.

Q. CAN YOU EXPLAIN FURTHER WHY THE COMPANIES' CANDIDATE RESOURCE COSTS WERE ERRONEOUS?

A. Yes. Technical Appendix ECON-10 includes information regarding candidate resources considered in the Companies' PLEXOS modeling. Those inputs informed the development of the Base Case, which resulted in the selection of 420 MW of new CT capacity. According to the Appendix, the capital cost NVE assumed for new CT capacity was [redacted]/kW (in 2024 dollars).[19] This is significantly lower than the actual Valmy CT costs, which the Companies reported as

---

[19] ECON-10 – Candidate Resources.

being $1,433/kW.[20] Additionally, the 2024 Advanced Technology Baseline ("ATB")[21]—a publicly available database of technology costs developed by the National Renewable Energy Laboratory that the Companies relied upon for many of their cost assumptions[22]— projects the capital cost for a CT resource in 2027 to be $1,462/kW.[23] In other words, the Companies' cost assumptions for new CT units that led to the selection of new CTs in the Base Case were [redacted]% too low.

Meanwhile, the Companies' cost assumptions for potential alternatives the model could select instead of the CTs were too high. For example, for a paired resource of BESS and PV, the Companies assume capital expenses of $[redacted]/kW (in 2024 dollars) for the solar asset in 2030, and $[redacted]/kW (in 2024 dollars) for the battery asset in 2030,[24] thus leading to a combined capital cost of $3,564/kW.[25] This estimate does not adequately reflect the synergistic effects of a paired resource that reduce its capital costs, and it also assumes high costs for solar. In contrast, the ATB projects a combined capital cost for a paired BESS and PV resource with similar

---

[20] Volume 8, Narrative - Supply Plan, Page 19 of 393.

[21] Electricity Annual Technology Baseline, *available at* https://data.openei.org/files/6006/2024%20v2%20Annual%20Technology%20Baseline%20Workbook%20Errata%207-19-2024.xlsx.

[22] *See, e.g.*, Volume 8, Narrative - Supply Plan, page 90 of 393 (the Companies' cost assumptions for renewable energy and energy storage resources were based on the ATB).

[23] ATB projects a cost of $1,300/kW in 2022$. This was converted to 2024$ using inflation of 8% in 2022 and 4.1% in 2023. *See* https://www.usinflationcalculator.com/inflation/annual-averages-for-rate-of-inflation/.

[24] ECON-10 – Candidate Resources.

[25] Calculated based on a PV:BESS ratio of [redacted] which NVE assumes prior to 2028 (see ECON-10 – Candidate Resources). Starting in 2028 NVE assumes a [redacted] ratio which I calculated to equal to a combined capital cost of [redacted]/kW.

configuration to be $2,645/kW in 2030.[26] This suggests that the Companies modeled paired BESS and PV resources using a cost that was [redacted]% higher than what the ATB estimates.

Q. ARE THERE OTHER POTENTIAL FACTORS THAT MAY HAVE LED NVE TO OVER-ESTIMATE THE COST OF ALTERNATIVES TO NEW CTS?

A. Yes, my review suggests there may be additional factors. First, although, I have not performed an in-depth review of the Companies' ELCC study, its results are quite puzzling as shown in Table 2, and should not be relied upon to inform the selection of the preferred portfolio. The ELCC is a critical input in the capacity expansion model, which based on these assumptions perceives the alternative to CTs to be an unreasonably high amount of BESS.

Furthermore, based on my review of ECON-10 and the Companies' Supply Plan Narrative, I was unable to find any indication that the Companies' cost assumptions for BESS resources properly reflected the recently enacted Inflation Reduction Act tax credits in the capacity expansion modeling (although they are reflected in the screening analysis). These credits would significantly reduce the cost of renewable resources and energy storage – potentially lowering capital expenses for standalone storage by 30 percent or more – and should have been included as part of the initial resource selection step. Meanwhile, these credits would have no impact on the capital cost of fossil fuel additions, including the proposed CTs. An additional critical factor that leads to an overestimation of the cost of alternatives to new CTs is the assumed firm capacity of the different resource types, as discussed in Section III(a).

---

[26] Based on a PV:BESS ratio of [redacted]. Applying a PV:BESS ratio of [redacted] under the ATB assumptions leads to a combined capital cost of $1,947/kW (adjusted for inflation to reflect 2024 dollars).

Q. WHAT ARE THE IMPLICATIONS OF THESE ERRONEOUS COST ASSUMPTIONS FOR THE BASE CASE MODEL RESULTS FROM WHICH NVE DERIVED ITS RESOURCE PORTFOLIO?

A. Taken together, these erroneous assumptions have the effect of biasing the model towards selecting new CTs and away from selecting other options such as BESS or BESS paired with PV. Although the costs of specific projects might differ from either the ATB or placeholder costs, these erroneous assumptions are informing the Base Case, resulting in a suboptimal initial portfolio and impacting all subsequent steps and results.

C. THE RENEWABLE PLAN PERFORMS BETTER THAN THE BALANCED PLAN IN TERMS OF EMISSIONS.

Q. DOES THE RENEWABLE PLAN RESULT IN LOWER EMISSIONS THAN THE BALANCED PLAN?

A. Yes. According to NVE's analysis, the Renewable Plan yields a reduction in societal costs (relative to the Balanced Plan) of approximately $3 million from conventional and toxic air emissions and $64 million from CO2 emissions.[27]

Q. HOW DOES THE RENEWABLE PLAN ACHIEVE THESE REDUCTIONS?

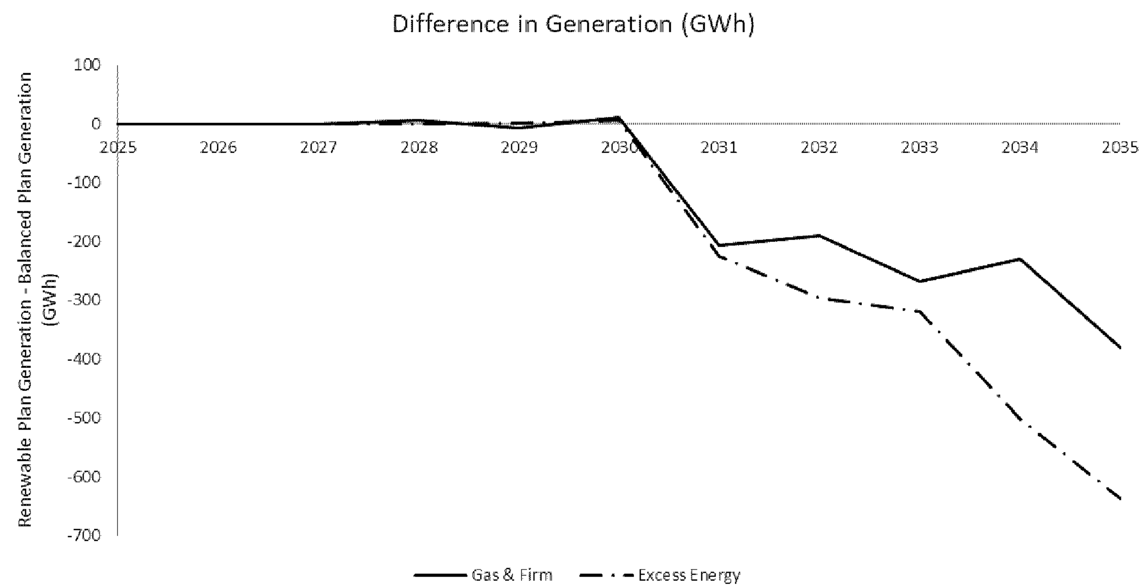
A. The Renewable Plan, despite its name, does not include higher levels of renewable resources (as shown in Table 1). To the contrary, it includes *less* solar than the Balanced Plan: 500 MW less of solar in 2047 and 1 GW less in 2048 and beyond. Still, the Renewable Plan

---

[27] Volume 8, Supply Plan, pages 276 and 280 of 393.

results in lower emissions than the Balanced Plan. The reduced emissions can largely be explained by the reduction in gas generation, as illustrated in the figure below.

Figure 3: Difference in Gas Generation and Excess Energy between the Renewable and Balanced Plans (GWh)[28]



The energy used to displace gas is not provided by increased renewable resources, as there are no incremental renewable resources in the Renewable Plan; rather, it seems to be associated with lower levels of "excess energy" in the system. This is likely due to the incremental BESS additions included in the Renewable Plan starting in 2030, which can absorb "excess" renewable energy that would otherwise be curtailed and dispatch that energy when it is needed. The BESS

[28] Figure created based on information in Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-29,32,35,38 Energy Alt Plan." (Excess Energy is reported as a negative value in the Companies' workpapers as it is unneeded - Volume 8- Supply Plan, Page 254 of 393. In this graph, the reduction of excess energy corresponds to a reduction of excess/unneeded energy in the Renewable Plan.)

additions also add flexibility to the system, which can reduce costs and inefficiences associated with ramping up or down thermal generation that would otherwise have to respond to the changing grid needs.

D. <u>THE SELECTION OF THE BALANCED PLAN DOES NOT ACCOUNT FOR ALL THE RISKS ASSOCIATED WITH NEW GAS RESOURCE ADDITIONS.</u>

Q. DO YOU BELIEVE THE ANALYSIS PRESENTED BY NVE OF THE BALANCED PLAN FULLY ACCOUNTS FOR THE RISKS ASSOCIATED WITH INVESTING IN NEW GAS CAPACITY?

A. No.

Q. WHAT ARE SOME OF THE RISKS ASSOCIATED WITH INVESTING IN NEW GAS CAPACITY THAT HAVE NOT BEEN PROPERLY ASSESSED OR PRESENTED?

A. There are three risk factors of particular concern to me that I did not find to be adequately represented in the analysis NVE provided. They are as follows:

1. *H2 feasibility and cost risk*: The Companies refer to the proposed CTs as hydrogen-capable but have presented no plan or analysis that can support the units' operation on hydrogen. Without a plan to operate on hydrogen, the proposed CTs introduce some risk as to the Companies' ability to achieve a net zero future by 2050.
2. *Stranded cost risk*: Investing in new fossil fuel resources carries the risk that, if additional regulations on carbon emissions are implemented in the future, these resources could become stranded assets.
3. *Opportunity cost risk*: The proposed CT units represent a substantial capital investment of $573 million that will put significant upward pressure on customer rates in exchange for a

system benefit that has not been properly quantified (*i.e.*, relieving the Valmy must-run constraint). For the same investment dollars, NVE customers might be able to capture greater benefits through alternative investment options.

Q. REGARDING THE FIRST OF THESE RISKS (H2 FEASIBILITY AND COST), HAVE THE COMPANIES PRESENTED ANY ANALYSIS OR DATA ABOUT THEIR PLANS TO OPERATE THE NEW CT UNITS BURNING HYDROGEN?

A. No. While the Companies mention that the new units would be "hydrogen-capable", they have presented no evidence or analysis around the technical feasibility, the cost implications, and the availability of fuel if the units were to operate on hydrogen. Specifically, in their response to WRA 6-02, the Companies state that:

- "NV Energy does not currently have a plan to source and blend hydrogen at the Valmy Generating Station."
- "Since hydrogen manufacturing and supply is not available in Nevada at the scale necessary for the operation of these units at this time, NV Energy cannot make plans or develop costs and benefits for a hydrogen fuel supply at this time."[29]

Q. WHAT IS THE COMPANIES' RATIONALE FOR NOT INCLUDING H2-RELATED COSTS IN THEIR ANALYSIS?

A. The Companies imply that the conversion costs do not need to be included since "[t]he economic analysis for the Valmy Simple Cycle Units is based on natural gas operation. The

---

[29] *See* **Attachment MR-3** (Companies Response to WRA 6-02).

ability of the units to operate on hydrogen is a secondary benefit, not included in the economic analysis."[30] However, this is contradictory to Nevada's state goal of meeting its electricity demand with 100% zero carbon resources by 2050. Thus, the units could become a stranded cost well before their projected end of life (assumed to be 30 years) due to policy restrictions, or result in significant additional costs if the Companies convert them to hydrogen. These risks are present not only for the proposed near-term CT additions, but also for the future Combined Cycle units the Companies' preferred plan includes in the 2045 timeframe.

Q. HAVE THE COMPANIES EVALUATED OTHER AVAILABLE OR EMERGING TECHNOLOGIES THAT CAN PROVIDE FIRM DISPATCHABLE CAPACITY IN LIEU OF THE PROPOSED NEAR-TERM CT ADDITIONS OR THE FUTURE COMBINED CYCLE UNITS?

A. No. The Companies' portfolio analysis includes new CT and Combined Cycle ("CC") units with the notion that they could at some point burn hydrogen. However, the Companies' analysis fails to consider other options that could provide firm dispatchable capacity. Thus, I am concerned that a rush to install the Valmy CTs now presents an opportunity cost risk since these installations would crowd out other viable technology options that could provide similar or greater benefits without carrying the same risks discussed above. For example, while candidate resources in the Companies' modeling include battery storage of four-hour duration, no batteries or energy storage assets of longer duration (*i.e.*, long-duration energy storage, or "LDES") were

[30] *See* **Attachment MR-3** (Companies Response to United 3-02).

considered. Similarly, there was insufficient consideration of advanced geothermal resources, particularly in light of Nevada's significant geothermal potential. I discuss this in further detail in Section V herein.

E. THE BENEFITS OF ALLEVIATING THE MUST-RUN CONSTRAINT AT VALMY VIA NEW CT INVESTMENTS ARE SMALL COMPARED TO THE SYSTEM-WIDE BENEFITS OF AN ALTERNATIVE INVESMENT IN NEW BESS RESOURCES.

Q. DOES THE EXISTENCE OF THE MUST-RUN REQUIREMENT AT VALMY HAVE A NEGATIVE EFFECT ON NVE'S OPERATING COSTS AND EMISSIONS?

A. All else being equal, the existence of a must-run requirement like the one at Valmy is likely to exacerbate both costs and emissions to some degree due to the fact that it forces an older, less-efficient gas-fired steam generator to operate more frequently than it otherwise would without the must-run constraint. Thus, any steps that could eliminate this must-run constraint, such as NVE's proposal to install new CTs at Valmy under its preferred portfolio, might have a positive effect on overall costs and emissions. However, such positive benefits should not be considered in isolation. Rather, these benefits must be compared to the benefits that could be produced by alternative investment choices.

Q. HOW DO THE POTENTIAL BENEFITS OF ELIMINATING THE VALMY MUST-RUN REQUIREMENT VIA NEW CT INVESTMENTS COMPARE TO THE BENEFITS THAT COULD BE GENERATED FROM AN ALTERNATIVE INVESTMENT, SUCH AS ADDITIONAL BESS?

A. Such a comparison can be readily accomplished by evaluating NVE's Balanced Plan (which includes the Valmy CTs) versus NVE's Renewable Plan, which essentially substitutes the

Valmy CTs for a 502 MW BESS addition in 2030. As demonstrated above in Sections III.a and III.c herein, the Renewable Plan likely outperforms the Balanced Plan in terms of both cost and emissions.

Thus, the positive effect from alleviating the must-run constraint via the Valmy CTs does not appear to be significant enough to outweigh the positive effects of the near-term BESS additions. In other words, there is an opportunity cost to investing in the Valmy CTs in the near-term, when a similarly sized BESS investment can produce a greater number of system benefits. Below is a qualitative comparison of the benefits that could be provided by each alternative:

System Benefits Provided	**411 MW Valmy CT**	**502 MW BESS**
Capacity (Resource Adequacy)	Yes	Yes
10-min Operating Reserves	Yes	Yes
Alleviates Valmy Must-Run Constraint	Yes	Not Fully Evaluated
Reduced Curtailment (system-wide)	No	Yes
Reduced Gas Generation (system-wide)	No	Yes

Q. ARE THERE OTHER INVESTMENTS, BESIDES CTS, THAT COULD ALLEVIATE THE VALMY MUST-RUN CONSTRAINT AT A LATER DATE BEYOND 2028?

A. Yes. This might include additional transmission upgrades, long-duration storage, interruptible load demand response, or contractual arrangements with other local generation facilities. To my knowledge, NVE has not evaluated these as potential alternatives to the Valmy

CTs.[31] Furthermore, NVE did not consider a resource combination or alternative resource plan that included only one of the two Valmy CTs plus a solar/storage resource.[32]

Q. IS THERE ANY URGENCY OR INCREASED BENEFIT FROM REMOVING THE MUST-RUN CONSTRAINT BY 2028 THAT WOULD JUSTIFY INSTALLING THE VALMY CT INVESTMENTS BY THAT DATE?

A. No. In fact, when comparing NVE's own analysis of the Balanced Plan (which installs the Valmy CTs by 2028) to the Renewable Plan (which does not include the Valmy CTs), I found that there is no meaningful reduction in the amount of gas-fired generation (*i.e.*, MWh) produced at Valmy until 2031. In other words, there appears to be little downside from a cost or emissions perspective to deferring the proposed CT investments for at least three years, which would allow for other solutions to be properly evaluated.

---

31 *See* **Attachment MR-3** (Companies Response to United 3-06).

32 *See* **Attachment MR-3** (Companies Response to IEA 002).

Table 3: Projected Gas Generation and Fuel Offtake at Valmy Station in Balanced and Renewable Plans[33]

[redacted]

F. RECOMMENDATIONS

Q. WHAT ARE YOUR RECOMMENDATIONS WITH RESPECT TO THE COMPANIES' PREFERRED PORTFOLIO AND THE VALMY CTS?

A. My recommendations are:

1. The Commission should reject the Balanced Plan as the Preferred Plan.
2. The Commission should order NVE to defer the 2028 Valmy CT additions and instead pursue the incremental near-term BESS additions contemplated in the Renewable Plan.

---

33 Tables created based on information in workpapers "2024IRP - BDL2 Alternative-Plan_PLEXOUT14194" and "2024IRP - VBDL1 Alternative-Plan_PLEXOUT14167." United's analysis is included in **Attachment MR-2** (Confidential) (CONFIDENTIAL_ValmyGeneration_AEUWorkpaper).

3. The Commission should direct NVE to evaluate alternative solutions to alleviating the Valmy must-run constraint at a future date, including through transmission upgrades, long-duration storage resource additions, interruptible load demand response, and contractual arrangements with other local generators.

IV. THE RENEWABLE PLAN SHOULD BE ADOPTED AS THE PREFERRED PLAN AND MODIFIED TO ACCELERATE BESS RESOURCE ADDITIONS FROM 2030 TO 2028.

Q. YOU EXPLAINED HOW THE NEAR-TERM ACTIONS OF THE RENEWABLE PLAN OUTPERFORM THOSE OF THE BALANCED PLAN (*I.E.*, NVE'S PREFERRED PLAN) IN TERMS OF EMISSIONS, COST, AND VARIOUS RISK FACTORS. ARE THERE ANY ASPECTS OF THE RENEWABLE PLAN THAT ARE LESS FAVORABLE?

A. The Balanced Plan, as NVE has conceived of it, has modestly reduced reliability risk during years 2028 and 2029 due to a smaller open position. However, I believe this result arises primarily due to arbitrary limits in NVE's modeling assumptions rather than any insurmountable practical limits.

Q. CAN YOU EXPLAIN HOW THE RELIABILITY RISK DIFFERS BETWEEN THE PORTFOLIOS IN 2028 AND 2029?

A. Yes. As NVE explains, "placeholder resources in the combination cases are adjusted to ensure similar open positions are present in each case to the extent possible. This adjustment ensures that the cases are similarly reliable."[34] In other words, during the Combination Case step,

---

[34] Volume 8, Supply Plan, page 238 of 393.

NVE made adjustments to all candidate portfolios to ensure they had similar open positions in most years. However, as shown in the table below, the Companies did not do so for years 2028 and 2029.[35]

Table 4: Open Position of Balanced and Renewable Plans (MW)[36]

	Open Position (MW)							
	2025	2026	2027	2028	2029	2030	2040	2050
Balanced Plan	1396	1226	1024	265	254	615	635	716
Renewable Plan	1396	1226	1024	644	633	614	631	739

As a result, the Renewable Plan that NVE constructed does have a larger open position in years 2028 and 2029. This is due to the fact that NVE allows the 411 MW Valmy CTs to come online by 2028 in the Balanced Plan, but does not allow the 502 MW of additional BESS resources in the Renewable Plan to come online until 2030. If NVE's methodology had allowed these incremental BESS resources to come online by 2028, the discrepancy in open position between the two plans would be eliminated.

Q. DID NVE'S MODELING METHODOLOGY ALLOW FOR INCREMENTAL BESS RESOURCES TO BE ADDED PRIOR TO 2030?

A. NVE's initial PLEXOS modeling assumptions included limits on storage additions of 139 MW in 2026 and 117 MW in 2027. These limits are described as being based on "potential projects."[37] However, these specific MW values do not appear to be linked to a list of potential

---

[35] Workpaper "2024 IRP Economic Analysis Narrative Figures" tab "EA-23 Open Position Alt Plan."

[36] Table created based on information in Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-23 Open Position Alt Plan."

[37] Volume 8, Supply Plan, page 224 of 393.

projects[38] or named placeholders[39] that NVE identified elsewhere in its plan. Additionally, in the Combination Case stage of its modeling, NVE arbitrarily decided to eliminate incremental new resources additions (*i.e.*, “placeholder resources”) in 2028.[40] This arbitrary limit precludes most new resource additions (including BESS and BESS paired with PV) from being considered until at least 2029. Importantly, however, NVE did not apply this limitation to new gas CTs by 2028.

Thus, NVE applied unequal treatment to potential new resource additions in the 2028 timeframe. In addition, 2028 is the year that NVE applied a more restrictive limit (*i.e.*, 750 MW) to its open position, driving additional resource need in that year.[41] Taken together, these near-term limits in NVE’s modeling assumptions – many of which are arbitrary – seem geared towards driving a singular possible outcome: the addition of 420 MW of new CTs in 2028.

Q. CONTRARY TO THESE ASSUMPTIONS, COULD THE COMPANIES REALISTICALLY PURSUE A NEW BESS PROJECT PRIOR TO 2028?

A. Yes. The U.S. Energy Information Administration (“EIA”) estimates the lead time needed for battery storage systems to be one year.[42] Furthermore, several recent IRPs include battery storage as an option selectable in 2028. Specifically:

---

[38] Volume 8, Supply Plan, pages 229-231 of 393.

[39] Volume 8, Supply Plan, page 241 of 393.

[40] Volume 8, Supply Plan, page 236 of 393.

[41] In the Companies’ Response to Staff 99, the Companies recognize the use of a higher open position in previous IRPs, and that determining an open position is not an exact science. *See* **Attachment MR-3** (Companies Response to Staff 99).

[42] US EIA, Cost and Performance Characteristics of New Generating Technologies, Annual Energy Outlook 2023, Table 1, https://www.eia.gov/outlooks/aeo/assumptions/pdf/elec_cost_perf.pdf.

- PacifiCorp estimates the construction period for a BESS to be 12 months and indicates that in their upcoming 2025 IRP they will assume the soonest commercial operation date possible for BESS to be 2028.[43] It is also worth noting that PacifiCorp has shared its intention to include longer duration options, including gravity batteries, Compressed Air Energy Systems, and Iron air 100-hour batteries with the soonest operation dates possible being 2028, 2030, and 2032.[44]
  - Duke Energy Progress and Duke Energy Carolinas, in their 2023 Resource Plan allowed the capacity expansion model to select standalone storage in 2027.[45] This includes 4-hour, but also 6- and 8-hour options.
  - In the draft and upcoming 2025 IRP, the Tennessee Valley Authority ("TVA") will assume lithium-ion batteries to be available beginning 2029.[46] TVA assumes that advanced chemistry batteries (10-hour) will also be available beginning 2029.

---

[43] 2025 PacifiCorp Integrated Resource Plan Public Input Meeting July 17-18, 2024, https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2025-irp/PacifiCorp_2025_IRP_PIM_July_17-18_2024.pdf.

[44] 2025 PacifiCorp Integrated Resource Plan Public Input Meeting August 14-15, 2024, https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2025-irp/PacifiCorp_2025_IRP_PIM_August_14-15_2024.pdf.

[45] Duke Carolinas Resource Plan, Appendix C (Quantitative Analysis), Table C-24, https://www.duke-energy.com/-/media/pdfs/our-company/carolinas-resource-plan/appendix-c-quantitative-analysis.pdf?rev=635a32c849544b98a9653fdf972967b7.

[46] 2025 Draft IRP, at 3-17, https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/integrated-resource-plan/2025/draft-2025-irp-volume-1-092324.pdf?sfvrsn=26f01b64_1.

- In the 2023 Clean Energy and Integrated Resource Plan, Portland General Electric included storage with a commercial operation date of 2026.[47] The Plan includes options of 2-, 4-, 6-, 8-, 16-, and 24-hour durations.

Q. IF THE COMMISSION REQUIRES NVE TO ACCELERATE THE NEAR-TERM BESS PROCUREMENT AS YOU HAVE RECOMMENDED, ARE THERE ADDITIONAL ASPECTS OF THIS PROCUREMENT THAT SHOULD BE CONSIDERED?

A. Yes. NVE should be required to evaluate the potential for BESS targeted at the Valmy site to alleviate the must-run constraints there. This evaluation should consider whether these constraints could be alleviated either partially or fully if short-duration (*i.e.*, <4hrs) storage is used. If short-duration storage is insufficient, the evaluation should consider whether other technology options would be sufficient (*e.g.*, long-duration storage).

Q. ASIDE FROM ACCELERATING THE NEAR-TERM BESS PROCUREMENT, ARE THERE OTHER WAYS THAT THE RENEWABLE PLAN COULD BE IMPROVED?

A. Yes. There should be more consideration of resource adjustments to the Renewable Plan in the longer-term (*i.e.*, 2035 and beyond), beyond the short-duration BESS additions used to minimize NVE's open position. At a minimum, this should include long-duration battery storage,

---

[47] Portland General Electric Clean Energy Plan and Integrated Resource Plan 2023, Chapter 8, Table 33, https://downloads.ctfassets.net/416ywc1laqmd/6B6HLox3jBzYLXOBgskor5/63f5c6a615c6f2bc9e5df78ca27472bd/PGE_2023_CEP-IRP_REVISED_2023-06-30.pdf.

advanced geothermal, and flexible load resources. It could also include hydrogen capable CTs or CCs, since there would be ample time to evaluate the risk factors described above.

Q. WHAT ARE YOUR SPECIFIC RECOMMENDATIONS REGARDING HOW THE RENEWABLE PLAN SHOULD BE IMPROVED?

A. I recommend that the Commission order NVE to adopt the Renewable Plan as the Preferred Plan, with the following modifications:

1. Consistent with the Renewable Plan, NVE should procure approximately 500 MW of standalone BESS resources in lieu of the Companies' proposed CT additions at Valmy.
2. NVE should accelerate the procurement of these BESS resources from 2030 to 2028 to better address NVE's open position in 2028 and 2029.
3. As part of this BESS procurement, NVE should consider targeting the Valmy location as a means of partially or wholly reducing the must-run constraint.

V. <u>NVE'S IRP PROCESS IS NOT DESIGNED TO IDENTIFY FUTURE PORTFOLIO NEEDS AND ALLOW THOSE NEEDS TO DRIVE A ROBUST PROCUREMENT PROCESS.</u>

A. NVE'S 2023 SOLICITATION PROCESS HAD SIGNIFICANT SHORTCOMINGS THAT LIKELY LED TO A SUBOPTIMAL 2024 RESOURCE PORTFOLIO.

Q. CAN YOU DESCRIBE NVE'S RECENT SOLICITATION PROCESS AND HOW IT RELATES TO THE RESOURCES ULTIMATELY INCLUDED IN THE COMPANIES' PREFERRED PLAN?

A. In 2023, NVE conducted a solicitation for new resources called the Open Resource RFP. This RFP resulted in a number of project proposals. However, many were eliminated based on due diligence evaluations. As NVE stated:

> For example, of the 84 project proposals that the Companies evaluated in the RFP, over a third were identified to have critical flaws due to transmission constraints that delayed proposed in-service dates beyond the interconnection date. Additionally, most new generation projects require significant transmission network upgrades that are long duration and costly to implement.[48]

According to the Supply Plan Narrative, this due diligence evaluation was concurrent with the Screening Analysis step of NVE's IRP evaluation, and ultimately, it led to many potential projects being removed from portfolio consideration, including Battery-1, Solar-1, Solar-2, Wind-1, and Geo-1. This left the Companies with a very small set of potential projects to meet the Companies' growing load. In total, out of the 84 bids received via the 2023 RFP, 28 made the

---

[48] Volume 8, Supply Plan, Page 47 of 393.

RFP shortlist, and only three were further analyzed for potential inclusion in the Preferred Portfolio.[49]

Q. WHAT IS YOUR IMPRESSION OF THE FACT THAT ONLY THREE PROJECTS FROM THE 2023 RFP WERE INCLUDED IN THE IRP ANALYSIS?

A. Only a very limited number of projects advanced from NVE's due diligence evaluations and thus could be considered for further analysis in this IRP. Unfortunately, this deprives the Companies and their ratepayers of opportunities to further reduce costs, emissions, and exposure to the market. By contrast, Xcel Colorado's 2022 RFP yielded over 1,000 bids with over 380 advancing to further modeling phases. Moreover, in Xcel's case, "Bids that raised due diligence concerns were further evaluated and provided the opportunity to clarify and/or cure deficiencies, and ultimately, relatively few bids were discarded."[50]

Q. WAS THE 2023 RFP CONDUCTED IN RESPONSE TO ANY ANALYSIS NVE PERFORMED IN THE CURRENT IRP CYCLE TO IDENTIFY OPTIMAL PORTFOLIO NEEDS?

A. No. If anything, the 2023 RFP would have been responsive to resource needs identified in the previous IRP cycle, though it's not clear to me that the RFP appropriately targeted those needs. Moreover, the IRP portfolio was not reoptimized based on bids received. Thus, there is a significant mismatch between the analysis NVE conducted in PLEXOS LT in the current IRP

---

49 *See* **Attachment MR-3** (Companies Response to IEA 007).

50 *See* https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/PUBLIC%202021%20ERP%20&%20CEP_120-Day%20Report_FINAL.pdf.

cycle to identify a least cost portfolio and the resources that it sought or the bids it received through its 2023 RFP.

Q. WERE THERE OTHER PROBLEMS WITH THE 2023 RFP PROCESS THAT COULD HAVE LED TO A SUBOPTIMAL 2024 PORTFOLIO?

A. Even for the resource types for which NVE did receive qualified bids, the RFP led to suboptimal results. For example, NVE's analysis shows that the Battery-1 screening analysis performed better than the Base Case and could have been used to further strengthen the Companies' portfolio.[51] Unfortunately, however, this project was removed after the due diligence evaluation.

Overall, the high number of projects rejected through the due diligence process raises questions as to whether a better designed RFP process could have resulted in more robust bids that would have proactively addressed transmission or other issues that emerged during the due diligence phase. Any RFP process that does not clearly specify system needs, identify potential barriers (*e.g.*, transmission limits), or provide opportunities to cure due diligence concerns is less likely to yield a robust pool of competitive bids and more likely to yield a suboptimal portfolio. Moreover, a poorly structured RFP process can create a vicious cycle: developers can become hesitant to dedicate time and resources to develop bids towards an NVE RFP given these bids might be rejected based on information that was not proactively described in the RFP.

---

[51] Supply Plan, Figure EA-10.

Moreover, the nature of the screening analysis, which evaluates projects one by one in a piecemeal fashion, meant that there was no opportunity to identify a complete portfolio based on simultaneously optimization of multiple project bid costs. This may have revealed multiple projects in combination yielding an overall lower cost portfolio, even if a single project did not perform well during the screening analysis.

B. <u>NVE'S SELECTIVE USE OF INFORMATION FROM PROJECT BIDS IN ITS PORTFOLIO OPTIMIZATION MODELING YIELDS BIASED RESULTS.</u>

Q. IS NVE'S INITIAL PORTFOLIO OPTIMIZATION MODELING (*I.E.*, THE PLEXOS LT BASE CASE) INFORMED BY ACTUAL PROJECT BID INFORMATION?

A. Not in any logical or consistent manner. As explained in Section II, the Companies perform a capacity expansion model run in PLEXOS LT that results in the Base Case. The Base Case then serves as the starting point for all portfolio development. Through a series of subsequent individual project screening cases and combination screening cases, NVE claims to evaluate the potential projects against each other to develop the alternative plans. However, the initial PLEXOS modeling uses assumptions that selectively reflect or deviate from identified projects attributes, thus creating the potential for bias towards specific resources.

For example, as explained above, NVE included annual build limits on future BESS projects that the Companies claim were based on potential projects identified to date.[52] Furthermore, the modeled cost of future BESS resources (as well as other resources) is "based

---

[52] "The buildout for the first few years is based on potential projects, with a build limit in 2026 and 2027 of 139 MW and 117 MW, respectively." Supply Plan, page 224 of 393.

upon NREL data and is adjusted based upon results of recent RFPs."[53] On the contrary, the cost of CTs significantly deviates from the Companies' own estimate for the identified Valmy CT projects.[54] Thus, it appears that the Base Case reflects real-world project limitations and costs for all resource types *except* for the CTs, which are represented by an artificially low cost estimate that is untethered from reality.

Q. ARE THERE VALID REASONS TO CONSIDER MODELING GENERIC RESOURCES IN THE NEAR TERM, RATHER THAN JUST SPECIFICALLY IDENTIFIED PROJECTS?

A. Yes. In most cases, modeling generic resources is more appropriate for identifying medium or long-term portfolio needs. However, including generic resources (*i.e.*, "placeholders") could allow the model to identify near-term resources that would be optimal to add – beyond just the specific potential projects already known to the Companies. This would be a reasonable approach, especially if the Companies were open to pursuing near-term solicitations (*e.g.*, by 2028) for new resources that could improve portfolio performance. However, this does not seem to be the intention in NVE's case. As described above, with the exception of the CTs, the portfolios NVE designed did not allow for new placeholder resources from 2025 through 2028.[55] Thus, the sole purpose of modeling generic placeholder resources in the years 2025

---

53 Supply Plan, page 225 of 393.
54 *See* discussion above in Section III.b.
55 Supply Plan, page 236 of 393.

through 2028 appears to be to allow the inclusion of new CTs in the resource portfolio (albeit at an artificially lowered cost).

Q. DO YOU HAVE ADDITIONAL CONCERNS WITH HOW THE COMPANIES EVALUATED THE POTENTIAL PROJECTS?

A. Yes. In addition to the Base Case development being informed by erroneous assumptions, the Companies further screen potential resources using screening cases that include manual adjustments of resources. These adjustments are not limited to one-for-one swaps of generic resources with specific projects of the same type but can instead include a series of adjustments for any screening case. The Companies' Supply Plan states that screening cases "were developed by adding these projects individually to the Base Case, then adjusting placeholder resources to achieve similar open positions and similar amounts of renewable energy in each screening case."[56] These adjustments are not the result of re-optimizing the portfolio while including the specific project, but rather of NVE-imposed changes that might be suboptimal. Thus, any difference in the PWRR of the screening cases cannot be confidently attributed to the specific project being screened. This approach results in PWRR tables in the Supply Plan Narrative that are of low informational value and undermines confidence in the screening case results and the ranking of the alternative portfolios.

---

[56] Volume 8, Narrative - Supply Plan, Page 229 of 393.

Q. WHAT WOULD BE A MORE REASONABLE MODELING APPROACH?

A. In most IRP analyses, utilities model generic resources to be selected in the capacity expansion step (*e.g.*, PLEXOS LT). These generic resources are meant to be representative of the available technology options and can be used to identify system needs to be targeted in subsequent RFPs. However, in this case NVE already conducted its RFP prior to modeling its system needs. While this sequence is not ideal, the fact is that the Companies now have information on a set of near-term projects that can be used as inputs for portfolio optimization. There is no need for the additional abstraction NVE has included in its initial Base Case modeling.

Moreover, a better overall process would start with the identification of capacity and other system needs, as well as relevant transmission constraints and local issues that need to be addressed, *before* the RFP is issued. After the RFP, a second phase of modeling can be conducted reflecting attributes of the actual bids. During this second phase of modeling, generic placeholder resources can still be included after the Action Plan period.

C. OTHER JURISDICTIONS HAVE MORE ROBUST PROCUREMENT PROCESSES THAT ARE MORE CLEARLY LINKED TO THE RELEVANT RESOURCE PLANNING ANALYSES.

Q. DO YOU KNOW OF OTHER UTILITIES CONDUCTING RESOURCE MODELING USING ACTUAL BIDS?

A. Yes. Public Service Company of Colorado ("Xcel Colorado") conducts portfolio modeling in two phases. In Phase II of its Energy Resource Plan process, Xcel Colorado conducts modeling to evaluate projects bids received through a previously issued RFP. The twophased approach in Colorado's energy planning serves as an example of how resource procurement can be more effectively linked to resource planning and can more effectively engage the market, resulting in a robust set of projects to be evaluated.

In Phase I, the Colorado Commission reviews and decides on:[57]

> [T]he utility's assessment of need for additional resources in the resource acquisition period; the utility's plans for acquiring additional resources through an all-source competitive acquisition process or through an alternative acquisition process; components of the utility's proposed RFP, such as the model contracts and the proposed evaluation criteria; and, the alternate scenarios for assessing the costs and benefits from the potential acquisition of increasing amounts of renewable energy resources, demand-side resources, energy storage systems, or Section 123 resources.[58]

Phase I is a litigated proceeding in which intervenors submit testimony before the Commission on issues that could potentially improve the final resource selection. Once the RFP is issued, and bids are received, the utility reviews whether each potential resource meets the requirements specified in the resource solicitation and performs an initial assessment of the bids. The utility may also participate in the competitive resource acquisition process by proposing the development of a new utility resource that the utility will own as a rate base investment. The utility also shares the information with an independent evaluator who can verify the findings or further investigate certain issues.

In Phase II of the Resource Plan proceeding, the utility conducts modeling to identify the cost-effective plans that conform to the range of scenarios, assessing the costs and benefits from

[57] 4 CCR § 723-3, 3617(c).

[58] "Section 123 resources" means new energy technology or demonstration projects, including new clean energy or energy-efficient technologies.

the potential acquisition of increasing amounts of renewable energy resources, demand-side resources, energy storage systems, or Section 123 resources. Within 120 days, the utility files a report with the Commission describing its findings.

It is worth noting that all bids that are advanced to Phase II modeling are modeled simultaneously as candidate resources under the assumptions approved in Phase I, allowing the model to select the least cost combination of resources. This process stands in stark contrast with NVE's approach, which selectively evaluates projects one-by-one in a step-wise procedure, not allowing various resource complementarities to emerge as options for consideration. For example, in the individual project screening step, NVE screens capacity resources, which are defined as either CTs or standalone batteries. Battery-1 is the only battery evaluated in this step, and although its screening results are favorable, it is rejected based on the Companies' due diligence evaluation. Other resources such as paired solar and storage could also provide the same capacity (while also providing energy), but these resources are not considered during this step.

Finally, it is important to highlight that modeling of specific bids can result in very different outcomes as compared to the modeling of generic resources.[59] This is because actual bids can be very different (*e.g.*, lower or higher in cost) than the generic candidate resources.

---

[59] J.D. Wilson, M. O'Boyle, R. Lehr, and M. Detsky, Making the most of the power plant market: Best Practices for All-Source Electric Generation Procurement, https://energyinnovation.org/wp-content/uploads/2020/04/All-Source-Utility-Electricity-Generation-Procurement-Best-Practices.pdf.

This was indeed the case for the CT capacity in NVE's analysis. Thus, it is important to conduct the second phase of modeling with the actual project bids. The table below provides a high-level comparison of the contrasting processes.

NVE's Process	Xcel Colorado's Process
• RFP conducted • Capacity Expansion modeling identifies generic resource additions • RFP results screened, and many rejected • Screened RFP projects substituted for generic resources additions from modeling • Manual selections made to determine final portfolio	• Phase 1 modeling: Capacity Expansion model identifies needs using generic resource assumptions • RFP conducted based on Phase 1 needs with opportunities to cure deficiencies • Phase 2 modeling: Capacity Expansion model using RFP results • Final modeled portfolio determined project short list

D. <u>NVE'S CANDIDATE RESOURCES FOR MEDIUM- AND LONG-TERM NEEDS DO NOT CAPTURE RECENT ADVANCEMENTS FOR LONG-DURATION ENERGY STORAGE OR ADVANCED GEOTHERMAL.</u>

Q. YOU ALSO EXPRESSED CONCERNS ABOUT THE CANDIDATE RESOURCES IN THE LONG TERM. PLEASE ELABORATE.

A. As I mentioned in Section III(d), the Companies' candidate resources do not include LDES and the economic analysis does not properly evaluate advanced geothermal options.

Q. DO YOU AGREE WITH THE COMPANIES' EXCLUSION OF LDES TECHNOLOGIES FROM THEIR CANDIDATE RESOURCES?

A. No. The Companies' exclusion of additional storage alternatives, particularly LDES, for the totality of the period studied is inconsistent with the pace at which LDES technologies are becoming commercially available and economically viable, the Companies' need for additional capacity alternatives, and the policy and reliability risks of thermal assets. Beyond lithium-ion assets, a suite of LDES technologies, like iron-air storage systems, are commercially ready for the planning period and have been procured or are in planning stages. For example, Georgia Power has announced a 15 MW / 1.5 GWh iron-air battery;[60] Xcel in Minnesota has received approval for a 10 MW / 1 GWh battery; [61] Dominion Energy is piloting two storage technologies with 12 and 100 hours of duration;[62] and Puget Sound Energy is exploring a 10 MW /1 GWh battery.[63]

In this context, it is unreasonable for the Companies to exclude said storage alternatives with durations beyond four hours for the totality of the period studied. In fact, the longer duration of these battery resources suggests that they may even be good candidates for alleviating the must-run constraints at the Valmy location (discussed further in Section III.e).

---

60 Michael Schoeck, Form Energy to deploy 100-hour iron-air battery system in Georgia, PV-Magazine (June 12, 2023), https://pv-magazine-usa.com/2023/06/12/form-energy-to-deploy-100-hour-iron-air-battery-system-in-georgia/.

61 Ethan Howland, Minnesota PUC Approves Xcel's Plan to Install a 10-MW/1,000-MWh Form Energy Battery System, Utility Dive (Jul. 7, 2023), https://www.utilitydive.com/news/minnesota-puc-xcel-form-energy-battery-sherco-solar/685460/.

62 Andy Colthorpe, Dominion Energy in 'innovative and timely' pilot of long-duration energy storage technologies, Energy Storage News, (Sept. 20, 2023), https://www.energy-storage.news/dominion-energy-in-innovative-and-timely-pilot-of-long-duration-energy-storage-technologies/.

63 Kavya Balaraman, Puget Sound Energy, Form Energy explore 10-MW, 100-hour iron-air battery pilot, Utility Dive, (Jan. 9, 2024), https://www.utilitydive.com/news/puget-sound-energy-form-energy-long-duration-iron-battery/704026/.

Q. WHAT DO YOU RECOMMEND WITH RESPECT TO LDES TECHNOLOGIES?

A. I recommend that the Companies' analysis be revised to include LDES technologies in the near- to medium-term (*e.g.*, 2030), as the availability of these resources in a few years could have an impact on the selection of resources during the 2025-2027 action plan.

Q. DO YOU AGREE WITH THE COMPANIES' EXCLUSION OF ADVANCED GEOTHERMAL TECHNOLOGIES FROM THEIR CANDIDATE RESOURCES?

A. No. While NVE does include geothermal as a candidate resource in its PLEXOS modeling, the assumptions used to represent future geothermal additions do not appear representative of recent advancements in Advanced Geothermal System technologies that could improve performance and cost relative to traditional geothermal resources. As NVE confirmed, the performance profiles were based on historical performance, and no modifications were made to represent improvements for future resources.[64] Based on the data NVE provided, the Companies appear to assume future geothermal resources will have a capacity factor of approximately 58%[65] and an ELCC value of 41-42%.[66] This contrasts with recent data from EIA showing that capacity factors for geothermal power plants in the U.S. are approximately 76% on average.[67]

---

[64] *See* **Attachment MR-3** (Response to WRA 6-05).

[65] *See* **Attachment MR-3** (Attachment to WRA 6-05).

[66] Calculation based on Workpaper "2024 IRP Economic Analysis Narrative Figures" Tab "EA-31,34,37,40 2050 Firm Cap."

[67] *See* https://www.eia.gov/todayinenergy/detail.php?id=42036.

Developments in advanced geothermal technology may also further improve performance and/or reduce costs for future geothermal resource additions in Nevada. For example, the 115 MW Corsac Enhanced Geothermal System ("EGS") project currently under development through a partnership between NVE, Google, and Fervo is expected to operate "anywhere from 70-97% of nameplate."[68] As part of this particular project, NVE also contemplates a novel Clean Transition Tariff ("CTT") that would "allow large energy users to pay a premium for 24/7 clean energy from new resources."[69] If this CTT construct is approved by the Commission, any premium paid by large users to develop EGS systems could be considered a reduction in the overall cost of EGS resources from NVE ratepayers' perspective. Such a reduction in resource costs should be reflected in NVE's future IRP modeling assumptions.

E. RECOMMENDATIONS

Q. BASED ON YOUR ASSESSMENT, CAN YOU SUMMARIZE YOUR CONCERNS WITH NVE'S ANALYTICAL PROCESS IN THIS IRP?

A. Yes, I am concerned that NVE's IRP analysis is not designed for identifying future system needs and using that analysis to develop a robust and competitive resource procurement process. Instead, it appears that NVE has conducted a poorly designed RFP; identified some of the resources resulting from that RFP that it would like to procure; and then wrapped its IRP

---

[68] *See* https://ecms.nv.gov/puc/api/Document/AdYRPeH9myaCJOFDy2hEmAkfb8RRrD9FRQNaYwUlJO4EzfeB1APBk%C3%81P9iLTqb1YFxAgo0YRdlb56cU6baMGzAWY=/?OverlayMode=View.

[69] *See* https://www.utilitydive.com/news/google-fervo-nv-energy-nevada-puc-clean-energy-tariff/719472/.

analysis around those predetermined results. Unsurprisingly, this deeply flawed process has resulted in a suboptimal portfolio.

Q. IS NVE PLANNING TO ISSUE ANOTHER OPEN RESOURCE RFP?

A. According to the Companies' response to Staff 63, issued on July 8, 2024, NVE was planning to issue an all source (formerly open resource) RFP in August 2024. To my knowledge this has not yet been issued.

Q. DO YOU HAVE A RECOMMENDATION WITH RESPECT TO THE COMPANIES' NEXT RFP?

A. Yes. As detailed above, this IRP started with a limited pool of near-term projects that NVE identified. NVE then followed a process that included erroneous assumptions and methodological choices to develop a portfolio around those identified projects. Meanwhile, in the near-term the Renewable Plan outperforms the Balanced Plan in terms of emissions, costs, and risk mitigation. Accelerating the procurement of energy storage to 2028 or earlier would further strengthen the portfolio and reduce the Companies' open capacity position. Thus, while this adjusted Renewable Plan may not be the optimal portfolio out of all possible futures NVE could have pursued, it is currently the best available portfolio, derived from a model, that has identified general system needs. The Renewable Plan could be considered somewhat analogous to the first step of the model results used in Colorado.

To further strengthen the Renewable Plan, I recommend that the Companies issue an all-source RFP as soon as possible to procure additional resources consistent with the specific needs identified in the adjusted Renewable Plan. These specific needs should include:

- Capacity resources that would reduce the Companies' open position in the 2028 timeline (for example, accelerating the BESS resources included in the Renewable Plan);
- Local capacity at the Valmy location. The RFP should specify the resource capabilities needed to alleviate the must-run constraint by 2031 when the Companies' modeling shows that removing the constraint would result in reduced operations of the Valmy steam units;
- Flexible load resources by 2027, as described in Section VI; and
- Incremental renewable resources as soon as practicable (for example, the Companies' analysis shows that renewable resources, including 952 MW of Idaho wind added in 2029 would be part of an optimal portfolio).

After the Companies receive the bids, a new capacity expansion modeling run should be conducted in PLEXOS LT and presented to the Commission. This capacity expansion modeling run should allow the model to select from all qualified resource bids *in parallel* while reflecting their actual cost and performance characteristics. The portfolio results should be presented to the Commission within six months of receiving the RFP bids through an IRP amendment. This amendment should also include a procurement plan for contracting with or acquiring the selected resources.

Q. WHAT DO YOU RECOMMEND WITH RESPECT TO NVE'S FUTURE IRP AND RESOURCE PROCUREMENT PROCESSES BEYOND THE NEAR-TERM RFP?

A. I recommend the Commission order the following changes to NVE's future IRP and resource procurement processes:

- The Commission should require NVE to revise its IRP and resource procurement processes to more closely reflect the two-phase process implemented in Colorado.
- The Commission should require NVE to better identify system needs in the near-and medium-term based on more robust capacity expansion modeling in the first step of future processes.
- The Commission should require NVE to more clearly link its future RFPs to the needs identified in the first step of future processes.
- Following the RFP results, in the second step of future processes the Commission should require NVE to conduct additional capacity expansion modeling that simultaneously selects from the full range of project bids.
- For long-term resource needs, the Commission should require NVE to evaluate a more complete range of dispatchable options, including long-duration energy storage, enhanced geothermal systems, and flexible loads.

VI. NVE'S SUPPLY PLAN FAILS TO SUFFICIENTLY CONSIDER FLEXIBLE LOAD RESOURCES THAT COULD ADDRESS NEAR-TERM CAPACITY NEEDS, RESULT IN ADDITIONAL BENEFITS, AND MITIGATE RISK EXPOSURE.

Q. DID NVE'S IRP MODELING IN PLEXOS INCLUDE FLEXIBLE LOAD RESOURCES?

A. Yes, but there were significant limitations to what was included. United addressed this issue more extensively in its testimony in Phase II of this proceeding.[70] To reiterate, NVE witness Steele explained that "the Companies introduced flexible load technologies and distributed resources as supply resources, rather than load modifiers" when modeling their system in PLEXOS.[71] However, this did not lead to any meaningful difference in the near-term level of flexible load resources selected in the candidate portfolios. In effect, the amount of flexible load resources appears to have been "baked in" prior to 2030. Thus, only a single level of demand-side resources was meaningfully considered in the near-term. In fact, NVE confirmed that these flexible load resources were "not 'economically optimized'" and were "not modeled as a candidate resource to be selected in the resource expansion analysis using PLEXOS LT."[72]

Q. HOW DOES NVE REPRESENT FLEXIBLE LOAD RESOURCES IN ITS SUPPLY-SIDE MODELING IN PLEXOS?

A. Although it does not allow PLEXOS to adjust or optimize flexible load resources, NVE does include two flexible load resource types in its model runs: AC Load Management

---

[70] Burgess Direct, pages 34-37.

[71] Steele Direct, page 6.

[72] *See* **Attachment MR-3** (Companies Response to United DR 1-09).

("ACLM") and Behind the Meter ("BTM") Storage. My understanding is that ACLM is primarily intended to reflect NVE's demand response programs targeting smart thermostats (or other controllable devices), whereas BTM Storage is intended to reflect batteries paired with rooftop solar PV as well as EV managed charging.

Q. IN ITS IRP MODELING, WHAT LEVEL OF FLEXIBLE LOAD RESOURCES DOES NVE ASSUME IS ON ITS SYSTEM NOW, AND WHAT ADDITIONAL AMOUNTS DOES IT ASSUME WOULD BE DEPLOYED OVER THE NEXT 5 YEARS AND NEXT 15 YEARS?

A. Under its preferred portfolio, NVE assumed that approximately 219 MW of ACLM resources would be on its system in 2025.[73] This is roughly consistent with the Companies' targets as presented in their Demand Side Plan, and their recent achievement of over 150 MW of controllable demand response resources in 2023.[74] Going forward, NVE's preferred portfolio assumes 561 MW of flexible load resources will be deployed by 2030, and 743 MW will be deployed by 2040, representing an increase of about 342 MW over the next 5 years and an increase of 524 MW over the next 15 years.

---

[73] *See* Load and Resource tables presented in ECON-5.

[74] Demand Side Plan (Volume 9).

Table 4. Flexible Load Resources (MW) Selected in NVE's Supply-Side Plan Modeling Versus NVE-identified Economic Potential.[75]

	2025	2026	2027	2030	2040
Balanced Portfolio ("VBDL1")					
AC Load Management ("DR/DSM.ACLM")	219	234	249	283	342
BTM Storage ("DR/DSM.BESS")	0	52	117	278	401
Total	219	286	366	561	743
NVE-identified Economic Potential (incl. EV-MC)	307	380	446	680	1657
Difference (MW)	88	94	80	119	914
Difference (%)	40%	33%	22%	21%	123%

Q. HOW DOES THIS COMPARE TO THE POTENTIAL FOR FLEXIBLE LOAD RESOURCES THAT NVE IDENTIFIED IN NVE'S MARKET POTENTIAL STUDY?

A. It is significantly lower. For example, by 2030 NVE identified 680 MW of potential from cost-effective flexible load resources plus EV managed charging (which is also cost effective).[76] This represents a difference (*i.e.*, an underestimate) of approximately 120 MW, or about 21%. The magnitude of this underestimate becomes 914 MW by 2040, or about 123%.

Q. DO YOU THINK THAT NVE'S MARKET POTENTIAL STUDY CORRECTLY IDENTIFIED THE AMOUNT OF COST-EFFECTIVE FLEXIBLE LOAD RESOURCES THAT NVE CAN AND SHOULD ACHIEVE OVER THE NEXT 5 YEARS OR 15 YEARS?

A. No. United discusses the MPS limitations extensively in its Phase II testimony in this proceeding. Based on that analysis, I believe that NVE significantly underestimated the amount

[75] *See* **Attachment MR-2** (Public) (Flexible Load MW Tables).

[76] *See* **Attachment MR-2** (Public) (Flexible Load MW Tables).

of cost-effective flexible load resources that it could achieve in the future. Thus, the estimates for economic flexible load resources potential included in the MPS likely represent a lower bound for what NVE should include in its IRP modeling. However, as I mentioned above, NVE's IRP modeling assumed an *even lower* amount of flexible load resources than its own MPS suggests is economic.

Q. BASED ON THESE OBSERVATIONS AND CONCLUSTIONS, WHAT DO YOU RECOMMEND THE COMMISSION DO?

A. 1. First and foremost, the Commission should adopt all of United's recommendations set forth in its Phase II testimony. Bolstering near-term deployment of flexible load resources, as United recommended in Phase II, should minimize NVE's open position and provide greater assurance that NVE's reliability needs can be met. These greater levels of flexible load resources can be pursued in conjunction with the near-term procurement of incremental BESS resources, as recommended above. Pursuing both these strategies in parallel should afford greater assurance that NVE's reliability needs will be met, even while the Companies defer their proposed investments in Valmy CTs.

2. The Commission should order NVE to modify its PLEXOS modeling going forward to include higher amounts of flexible load resources, as this would be more consistent with the long-term economic potential values of these resources.

3. The Commission should set a longer-term demand reduction target (*e.g.*, for 2030 and/or 2040) that is greater than 680 MW in 2030 and greater than 1657 MW in 2040.

VII. ADDITIONAL TRANSMISSION OPTIONS COULD UNLOCK RELIABILITY, COST, AND CLEAN ENERGY BENEFITS FOR NVE.

Q. PLEASE PROVIDE A BRIEF SUMMARY OF THE COMPANIES' TRANSMISSION PLAN.

A. The Companies are continuing to develop the Greenlink Nevada Transmission project, which consists of both Greenlink West and Greenlink North. Although the Greenlink transmission project has experienced significant cost escalation, the Companies maintain that it remains the best option to provide optimal resource options to its retail, interconnection, and network customers. Therefore, the Companies request approval to construct Greenlink.

Q. DO YOU AGREE THAT THE GREENLINK PROJECT WILL UNLOCK SIGNIFICANT BENEFITS FOR THE COMPANIES AND THEIR RATEPAYERS?

A. Yes. According to the Companies, the Greenlink projects "facilitate a reduced overall PRM ["Planning Reserve Margin"] requirement for NV Energy, systemwide access to the diverse renewable resources abundant in Nevada, and systemwide access to the benefits of WRAP ["Western Resource Adequacy Program"] and a future market or RTO ["Regional Transmission Organization"]."[77] In general, I agree that transmission can unlock significant benefits, including increased reliability, reduced capacity needs, access to additional renewable resources, and increased operational efficiency. Consequently, I support the Companies' request for approval of the Greenlink project.

---

[77] Supply Plan, page 295 of 393.

Q. ARE THERE OTHER STRATEGIES THAT NVE COULD EMPLOY TO ENHANCE THE TRANSMISSION CAPABILITY OF ITS SYSTEM, AND IN TURN ENHANCE ACCESS TO NEW GENERATING RESOURCES?

A. Yes. I think the Companies' analysis could be further improved through a more thorough assessment of various transmission-related strategies that could assist with either accommodating new resources, minimizing costs, or both. A recent 20-year transmission planning study by Energy Strategies, Connected West, focused on identifying "next generation" transmission investments, targeting the identification of portfolios of new transmission expansion projects that represent investment above and beyond upgrades that have been previously proposed by Western utilities and developers.[78] Connected West found that to support an electrified and deeply decarbonized Western grid in 2045, significant transmission expansion is required, although "results indicate that a significant portion of new transmission capacity across the West can be met with a blend of reconductoring existing lines, co-locating upgrades, and selective use of advanced conductors, HVDC solutions, advanced transmission technologies, along with continued use of traditional transmission expansion approaches."[79]

One set of advanced transmission technologies that should be considered along these lines is frequently referred to as GETs. Some of these solutions may be able to help alleviate some of the issues facing project proposals NVE received in response to its 2023 RFP that were

---

78 Energy Strategies, The Connected West Study (2024), *available at* www.energystrat.com.
79 *Id.*

transmission related. Considering these kinds of technologies in addition to other more traditional solutions would lead to a more robust and competitive resource procurement process.

Q. WHAT ARE GETS?

A. GETs include several technologies that can enhance transmission planning and operations by improving the real-time capacity of existing transmission infrastructure, helping to maximize cost-efficiency for these assets. GETs can also be deployed more rapidly relative to transmission expansion projects (*i.e.*, in a matter of months), lowering time costs associated with upgrades and providing additional near-term transmission capacity to complement long-term transmission infrastructure buildout. Some examples of GETs include:

- Advanced Power Flow Control: Technologies that push or pull power away from overloaded lines and onto underutilized corridors within the existing transmission network. This is achieved by injecting voltage in series with a facility to increase or decrease effective reactance, thereby pushing power off overloaded facilities or pulling power on to underutilized facilities.
- Dynamic Line Ratings: Adjusts thermal ratings based on actual weather conditions, including ambient temperature and wind, in conjunction with real-time monitoring of resulting line behavior.
- Topology Optimization: Automatically finds reconfiguration to re-route flow around congested or overloaded facilities while meeting reliability criteria.

By unlocking normally unused transmission capacity, these technologies can reduce production and congestion costs, as well as defer capital costs for transmission system upgrades to drive significant short-term savings. Thus, utilization of GETs can potentially reduce operating costs through lower production costs, as well as capital costs through deferred transmission upgrades. Additionally, GETs may be able to facilitate integration of new resources. For example, a 2021 study by Brattle focused on the Southwest Power Pool found that, by implementing the three aforementioned GETs, Kansas and Oklahoma will be able to integrate an additional 2,670 MW / 8,776 GWh of renewables—more than twice the amount of renewables to be integrated under a scenario without GETs—while yielding $175 million in annual production cost savings.[39]

Q. WHAT WERE THE ESTIMATED COSTS OF INSTALLING THESE GETS MEASURES?

A. Brattle estimated the costs to be $90 million, with annual operations and maintenance costs of approximately $10 million.[80] Thus, based on operating cost savings alone, GETs installed in SPP would have a very short simple payback period of approximately six months and would yield continued net benefits to customers thereafter.

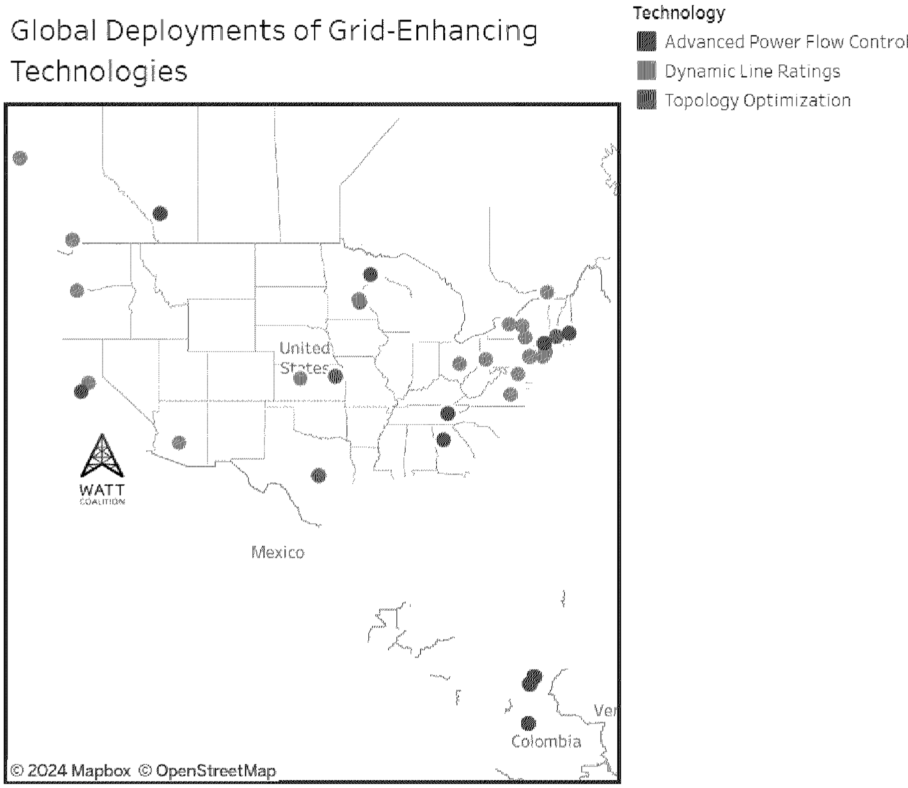
Q. HAVE OTHER UTILITIES IN THE U.S. DEPLOYED GETS?

A. Yes. The map below, created by the Watt Coalition, shows a high-level summary of utilities that have deployed GETs in the U.S.[81]

---

[80] *See* https://watt-transmission.org/wp-content/uploads/2021/02/Brattle__Unlocking-the-Queue-with-Grid-Enhancing-Technologies__Final-Report_Public-Version.pdf90.pdf.

[81] WATT Coalition Global Deployments of Grid-Enhancing Technologies, *available at* https://public.tableau.com/app/profile/abby.sherman/viz/WATTCoalitionGlobalDeploymentsofGrid-EnhancingTechnologies/Dashboard1.



Q. WHAT SHOULD NVE DO TO TAKE ADVANTAGE OF "NEXT GENERATION" TRANSMISSION SOLUTIONS, INCLUDING GETS, GOING FORWARD?

A. NVE should accelerate deployment solutions that maximize net benefits to its customers while helping to achieve its long-term clean energy targets. At a minimum, the Companies should conduct a robust evaluation of these solutions in a timely manner (*e.g.*, 6 months).

Q. ARE THERE ANY SPECIFIC PARAMETERS THAT SHOULD GUIDE THIS STUDY OR EVALUATION?

A. Yes. In particular, I recommend that the study should have a clearly stated objective, a sufficient time horizon in the evaluation, a specified geographic focus, and a minimum list of benefits to be evaluated. It should also include a near-term action plan for implementing solutions that are found to be beneficial. In addition to NVE, it may be prudent to identify a

Technical Advisory Group to help guide the study process; this group could include members from the BCP, the Commission Staff, the advanced transmission solution industry, and other stakeholders.

Q. WHAT DO YOU RECOMMEND FOR THE STUDY'S OBJECTIVE?

A. The objective should be two-fold: one objective should be to identify where on NVE's transmission system deployment of GETs or other advanced transmission solutions would be most effective at minimizing operating costs. The second objective should be to identify where deploying these solutions would be most effective at maximizing the capacity of the existing transmission system.

Q. WHAT DO YOU RECOMMEND FOR THE STUDY'S TIME HORIZON AND GEOGRAPHIC FOCUS?

A. I recommend that the study look 5, 10, and 20 years out. I also recommend that the study evaluate the entirety of NVE's transmission system.

Q. WHAT BENEFITS DO YOU RECOMMEND THE STUDY INCLUDE IN ITS EVALUATION?

A. I recommend that the study include the following, at a minimum:

- Estimated increases in line ratings for NVE's existing transmission system.
- Estimated increases in line ratings of proposed new transmission projects.
- Estimated increases in incremental renewable resources that could be integrated, based on the capacity gains realized through increased line ratings.
- Estimated reduction in operating expenses through production cost savings.

- Estimated reduction in capital costs through deferred or avoided cost of new deferred transmission upgrades.
- Reliability benefits.

VIII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS TO THE COMMISSION REGARDING PHASE III OF THIS PROCEEDING.

A. I recommend the following:

1. The Commission should reject the Balanced Plan as the Preferred Plan.
2. The Commission should order NVE to adopt the Renewable Plan as the Preferred Plan, with the following modifications:
   - Consistent with the Renewable Plan, NVE should procure approximately 500 MW of standalone BESS resources in lieu of the Companies' proposed CT additions at Valmy.
   - NVE should accelerate the procurement of these BESS resources from 2030 to 2028 to better address NVE's open position in 2028 and 2029.
   - As part of this BESS procurement, NVE should consider targeting the Valmy location as a means of partially or wholly reducing the must-run constraint.
3. The Commission should order NVE to issue an all-source RFP as soon as possible to procure additional resources consistent with the needs identified in the Renewable Plan and this testimony. These specific needs should include:

- Capacity resources that would reduce the Companies' open position in the 2028 timeline (for example, accelerating the BESS resources included in the Renewable Plan);
- Local capacity at the Valmy location. The RFP should specify the resource capabilities needed to partially or wholly alleviate the must-run constraint by 2031 when the Companies' modeling shows that removing the constraint would result in reduced operations of the Valmy steam units;
- Flexible load resources by 2027, as described in Section VI; and
- Incremental renewable resources as soon as practicable (the Companies' analysis shows that renewable resources, including 952 MW of Idaho wind added in 2029, would be part of an optimal portfolio).

After the Companies receive the bids, a new capacity expansion modeling run should be conducted in PLEXOS LT and presented to the Commission. This capacity expansion modeling run should allow the model to select from all qualified resource bids *in parallel* while reflecting their actual cost and performance characteristics. The portfolio results should be presented to the Commission within six months of receipt of the RFP bids through an IRP amendment. This amendment should also include a procurement plan for contracting with or acquiring the selected resources.

4. The Commission should order NVE to defer the 2028 Valmy CT additions and instead pursue the incremental near-term BESS additions contemplated in the Renewable Plan.

5. The Commission should direct NVE to evaluate alternative solutions to alleviating the Valmy must-run constraint at a future date, including through transmission upgrades, long-duration storage resource additions, interruptible load demand response, and contractual arrangements with other local generators.
6. The Commission should order the following changes to NVE's future IRP and resource procurement processes:
    - The Commission should require NVE to revise its IRP and resource procurement processes to more closely reflect the two-step process implemented in Colorado.
    - The Commission should require NVE to better identify system needs in the near- and medium-term based on more robust capacity expansion modeling in step one of future processes.
    - The Commission should require NVE to more clearly link its future RFPs to the needs identified in step one of future processes.
    - Following the RFP results, in step two of future processes the Commission should require NVE to conduct additional capacity expansion modeling that simultaneously selects from the full range of project bids.
    - For long-term resource needs, the Commission should require NVE to evaluate a more complete range of dispatchable options, including long-duration energy storage, advanced geothermal systems, and flexible loads.
7. The Commission should adopt all of United's recommendations set forth in its Phase II testimony regarding the near-term deployment of flexible load resources.

8. The Commission should order NVE to modify its PLEXOS modeling going forward to include higher amounts of flexible load resources.

9. The Commission should set a longer-term demand reduction target (*e.g.*, for 2030 and/or 2040) that is greater than 680 MW in 2030 and greater than 1657 MW in 2040.

10. The Commission should require NVE to conduct a study (to be completed within six months) of the benefits of "next generation" transmission solutions, including GETs. At a minimum, the study should include the following parameters consistent with my testimony in Section VII:

    - A clearly stated objective that includes 1) identifying where solutions can minimize operating costs, and 2) identifying where solutions can defer or avoid future transmission upgrades.
    - A sufficient time horizon in the evaluation (*i.e.*, 5, 10, and 20 years into the future).
    - A specified geographic focus (*i.e.*, the entirety of NVE's transmission system).
    - A minimum list of benefits to be evaluated, as enumerated in my testimony.
    - A near-term action plan for implementing solutions that are found to be beneficial.
    - A Technical Advisory Group to help guide the study process that would include members from the BCP, the Commission Staff, the advanced transmission solution industry, and other stakeholders.

Q. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY?

A. Yes.

CURRENT ENERGY GROUP

Maria Roumpani

Partner mroumpani@currentenergy.group

Professional Summary

Maria is an expert in energy system planning and an energy modeler. She focuses on the economic and technical analysis of grid planning and operations issues and has experience in capacity expansion optimization, production cost simulations, and energy storage dispatch modeling. Maria has submitted expert testimony and comments on integrated resource planning, plant economics, unit commitment practices, and power cost issues and her clients include consumer advocates, public interest organizations, energy project developers, government agencies, and large energy buyers.

Education

PhD, Management Science & Engineering
Stanford University, 2018

MSc, Electrical and Computer Engineering
National Technical University of Athens, 2009

Work Experience

Founding Partner, Current Energy Group, (May 2024 – Present)

- Founding partner specializing in the economic and technical analysis of grid planning and operations issues, including capacity expansion, production cost, and energy storage dispatch modeling.

Founder, ELO Engineering Consulting (March 2024 – May 2024)

- Works on energy planning and regulatory issues.

Technical Director | Strategen Consulting (2018 – March 2024)

- Led firmwide technical and economic modeling and analysis to support consulting engagements. Specialized in the use of modeling tools to inform grid planning and decarbonization issues.

Research Assistant | Precourt Institute for Energy, Stanford University (2011 – 2017)

- Conducted research in a wide range of topics, from game theoretical approaches in electricity markets to behavioral economics.

Researcher | Energy, Economics, & Environment Modeling laboratory, National Technical University of Athens, (2009-2010, 2015)

- Contributed to the development of mathematical models:
    - Capacity expansion of electricity supply
    - Wholesale electricity market competition model

Expert Testimony

- Duke Energy Carolinas and Duke Energy Progress 2023 Integrated Resource Plans, on behalf of Sierra Club, South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, Upstate Forever, and Vote Solar
  Public Service Commission of South Carolina,
  Docket No. 2023-8-E & No. 2023-10-E, Testimony
- Biennial Consolidated Carbon Plan and Integrated Resource Plans of Duke Energy Carolinas, and Duke Energy Progress, on behalf of the Southern Alliance for Clean Energy, Sierra Club, Natural Resources Defense Council, and North Carolina Sustainable Energy Association
  North Carolina Utilities Commission, Docket E-100, Sub 190, Testimony
- Biennial Consolidated Carbon Plan and Integrated Resource Plans of Duke Energy Carolinas, LLC, and Duke Energy Progress, LLC, on behalf of Southern Alliance For Clean Energy, Sierra Club, Natural Resources Defense Council, And North Carolina Sustainable Energy Association,
  North Carolina Utilities Commission, Docket No. E-100, SUB 190, Testimony
- Annual Review of Base Rates for Fuel Costs of Dominion Energy South Carolina, Inc. on behalf of the South Carolina Office of Regulatory Staff,
  Public Service Commission of South Carolina, Docket No 2023-2-E, Testimony
- Annual Review of Base Rates for Fuel Costs of Duke Energy Progress, LLC, on behalf of the South Carolina Office of Regulatory Staff,
  Public Service Commission of South Carolina, Docket No 2023-1-E, Testimony
- Virginia Electric and Power Company 2023 IRP, on behalf of Advanced Energy United
  Virginia State Corporation Commission, Case No. PUR-2023-00066, Testimony
- PacifiCorp's Transition Adjustment Mechanism,
  Oregon Public Utilities Commission, Docket No. UE 420, Testimony
- DTE 2022 IRP, on behalf of the Michigan Energy Innovation Business Council
  Michigan Public Service Commission, Case U-21193, Testimony
- Duke Energy Carolinas and Duke Energy Progress 2022 Carbon Plan, on behalf of the Tech Customers

North Carolina Utilities Commission, Docket E-100, Sub 179, Testimony

- Public Service Company of Colorado, on behalf of Sierra Club
  Colorado Public Utilities Commission, Proceeding No. 21A-0141E, Testimony

Selection of other Relevant Experience

- Assessment of Clean Energy Alternatives to New Natural Gas Resources: Duke Energy Indiana Combined Cycle Project (2023)
- Assessment of Clean Energy Alternatives to New Natural Gas Resources: Part 2 (2023)
- Alternative Resource Plan for Salt River Project's Integrated System Plan (2022)
- Analysis of Arizona Public Service's Integrated Resource Plan (2021)
- Alternative Resource Plan Analysis for Tucson Electric Power (2020)
- Long Duration Energy Storage for California's Clean Reliable Grid (2020)
- Energy Storage Alternatives for a Proposed Peaking Power Plant, Report (2021) | Additional Analysis (2022)

	Nameplate Capacity (MW)			Firm Capacity (MW)		
	Balanced Plan	Renewable Plan	Difference	Balanced Plan	Renewable Plan	Difference
2025	946	946	-	946	946	-
2026	1,343	1,343	-	1,185	1,185	-
2027	1,746	1,746	-	1,502	1,502	-
2028	2,515	2,515	-	2,148	2,148	-
2029	2,573	2,573	-	2,195	2,195	-
2030	2,733	3,235	502	2,368	2,716	348
2031	3,198	3,908	710	2,721	3,050	329
2032	3,739	4,759	1,020	2,989	3,309	320
2033	3,995	5,015	1,020	3,116	3,435	319
2034	4,479	5,647	1,168	3,320	3,621	301
2035	4,509	5,677	1,168	3,340	3,639	299
2036	4,539	5,707	1,168	3,358	3,661	303
2037	4,569	5,737	1,168	3,371	3,672	301
2038	4,517	5,685	1,168	3,355	3,656	301
2039	4,844	6,120	1,276	3,455	3,774	319
2040	6,127	7,587	1,460	3,791	4,111	320
2041	6,908	8,368	1,460	3,985	4,309	324
2042	8,366	9,826	1,460	4,322	4,657	335
2043	9,390	10,850	1,460	4,563	4,896	333
2044	10,522	13,300	2,778	4,830	5,162	332
2045	11,407	16,517	5,110	5,069	5,374	305
2046	12,167	17,611	5,444	5,158	5,472	314
2047	13,439	19,277	5,838	5,265	5,595	330
2048	13,627	19,796	6,169	5,303	5,639	336
2049	14,070	20,239	6,169	5,318	5,654	336
2050	15,413	21,582	6,169	5,425	5,763	338

2030-2050	12,840	19,009	6,169	3,230	3,568	338
2045-2050	4,891	8,282	3,391	595	601	6
2031-2050	12,680	18,347	5,667	3,057	3,047	-10

Row Labels	Sum of Technical - 2025	Sum of Economic - 2025	Sum of Technical - 2026	Sum of Economic - 2026	Sum of Technical - 2027	Sum of Economic - 2027	Sum of Technical - 2030	Sum of Economic - 2030	Sum of Technical - 2040	Sum of Economic - 2040
Batteries	6,253	5,648	12,336	11,728	18,780	18,136	44,054	42,816	220,799	214,271
EVs	14,038	0	28,719	0	38,106	0	73,892	0	239,696	0
Other	30,342	0	30,645	0	31,261	0	32,856	0	38,144	25,959
Pool Pumps	7,299	7,299	14,596	14,596	21,965	21,965	29,558	29,558	37,945	37,945
Thermostats	283,785	279,595	328,843	324,617	371,998	367,736	534,131	529,759	1,132,007	1,127,249
Water Heaters	3,916	0	7,830	0	11,528	0	22,928	3,964	62,086	12,016
Grand Total	**345,633**	**292,543**	**422,969**	**350,941**	**493,639**	**407,837**	**737,419**	**606,097**	**1,730,678**	**1,417,440**
Econ DR + EVs		306,581		379,660		445,944		679,989		1,657,136

Values copied from NVE Workpaper: "NVEnergy TEA RDS Hore Post Processing Workbook - FINAL.xlsx"

Pathways Scenario: Mid

Portfolio Option: GV GVReal

Program Costs Reference

GV?	Original ID	Description	2025	2025	2025	2025
			149	41	41	41
			589,150	391,994	145,889	135,508
					$120,052,182	$114,802,513
				67%	25%	23%
					37%	35%
Yes	1	NPC 001 Energy Ed - Events	0	0	0	0
Yes	2	NPC 002 Energy Ed - Kits	815	0	0	0
Yes	3	NPC 003 Energy Ed - SW LED (Recycling event)	0	0	0	0
Yes	4	NPC 004 HER - Energy Reports	13,097	13,097	7,348	4,409
Yes	5	NPC 005 OEAA - Online	27,319	0	0	0
Yes	6	NPC 006 IHEA - In-home	18,330	0	0	0
Yes	7	NPC 007 HES - Advanced PowerStrip	238	0	0	0
Yes	8	NPC 008 HES - Clothes Dryer	19	0	0	0
Yes	9	NPC 009 HES - Clothes Washer	840	0	0	0
Yes	10	NPC 010 HES - Energy Star Air Purifier	12	0	0	0
Yes	11	NPC 011 HES - Energy Star Room Air Conditioner	25,854	0	0	0
Yes	12	NPC 012 HES - Freezer	56	0	0	0
Yes	13	NPC 013 HES - Refrigerator	143	0	0	0
Yes	14	NPC 014 HES - Heat Pump Dryer	8	0	0	0
Yes	15	NPC 015 HES - Heat Pump Water Heater	2,045	0	0	0
Yes	16	NPC 016 HES - Low Income - AC Tune Up	2,204	2,204	1,592	1,592
Yes	17	NPC 017 HES - Low Income - HP Tune Up	1	1	1	1
Yes	18	NPC 018 HES - Retrofit - AC Replacement	5,314	0	0	0
Yes	19	NPC 019 HES - Retrofit - AC Tune Up	4,547	4,547	3,503	3,291
Yes	20	NPC 020 HES - Retrofit - HP Replacement	673	0	0	0

	2025	2026	2027	2030	2040
Balanced Portfolio ("VBDL1")					
AC Load Management ("DR/DSM.ACLM")	219	234	249	283	342
BTM Storage ("DR/DSM.BESS")	0	52	117	278	401
Total	219	286	366	561	743
NVE-identified Economic Potential (incl. E	307	380	446	680	1657
Difference (MW)	88	94	80	119	914
Difference (%)	40%	33%	22%	21%	123%

Values copied from NVE Workpaper: "2024 IRP Economic Analysis Narrative Figures.xlsx"

1 **NV Energy**
2 **LOADS AND RESOURCES TABLE**
3 *Balanced Plan*

#		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
4		**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
5	Gross Peak	8,840	8,993	9,173	9,522	9,833	10,409	10,797	11,275	11,383	11,701	11,847	12,291	12,563	12,691	12,988	13,397	13,762	13,867	14,294	14,436	14,877	15,040	15,554	15,682	16,044	16,446
6	DSM Energy Efficiency Savings	109	165	211	266	342	403	457	515	537	587	609	725	768	752	774	795	870	807	912	885	899	882	996	923	990	1,022
7	DR Energy Efficiency Savings	10	10	11	9	11	12	12	13	13	14	15	16	16	18	17	18	19	20	20	22	20	22	22	23	25	24
8	Private Generation	31	33	36	41	41	47	48	50	55	17	18	62	61	63	69	21	73	26	73	74	24	24	84	30	82	89
9	Forecast System Peak	8,690	8,785	8,916	9,206	9,439	9,948	10,278	10,698	10,778	11,084	11,205	11,488	11,718	11,858	12,128	12,563	12,800	13,015	13,290	13,454	13,934	14,112	14,452	14,707	14,947	15,311
10	Sales Obligations																										
11	**NET System Peak**	8,690	8,785	8,916	9,206	9,439	9,948	10,278	10,698	10,778	11,084	11,205	11,488	11,718	11,858	12,128	12,563	12,800	13,015	13,290	13,454	13,934	14,112	14,452	14,707	14,947	15,311
12	Planning Reserves (12.5%)	1,086	1,098	1,115	1,151	1,180	1,243	1,285	1,337	1,347	1,385	1,401	1,436	1,465	1,482	1,516	1,570	1,600	1,627	1,661	1,682	1,742	1,764	1,807	1,838	1,868	1,914
13	**REQUIRED RESOURCES**	9,776	9,883	10,031	10,357	10,619	11,191	11,563	12,035	12,125	12,469	12,605	12,924	13,183	13,340	13,644	14,134	14,400	14,642	14,951	15,136	15,676	15,876	16,259	16,545	16,815	17,225
14	OATT Reserves	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
15	**AVAILABLE RESOURCES**	8,380	8,657	9,007	10,092	10,365	10,576	10,998	11,491	11,657	11,953	12,961	12,982	13,089	13,174	13,082	13,499	13,757	13,983	14,287	14,433	15,211	15,332	15,749	15,948	16,095	16,509
16	OPEN Position	1,396	1,226	1,024	265	254	615	565	544	468	516	-	-	94	166	562	635	643	659	664	703	465	544	510	597	720	716
17	OPEN/(LONG) Position	1,396	1,226	1,024	265	254	615	565	544	468	516	(356)	(58)	94	166	562	635	643	659	664	703	465	544	510	597	720	716

19 Company (All)

21 Sum of L&R MW

#		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
22		**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
23	Owned																										
24	NVE.Owned.Coal.Steamer	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	NVE.Owned.Diesel.Gen	5	5	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	NVE.Owned.Gas.CC	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	3,457	2,892	-
27	NVE.Owned.Gas.CC-int	735	735	735	735	735	735	735	735	735	735	735	735	735	735	735	735	735	735	735	542	348	348	348	348	348	-
28	NVE.Owned.Gas.CT	1,548	1,548	1,548	1,548	1,548	1,548	1,548	1,548	1,548	1,548	1,548	1,502	1,502	1,502	1,502	1,502	1,502	1,298	1,298	1,298	1,170	1,170	1,048	1,048	1,048	436
29	NVE.Owned.Gas.Steamer	261	503	503	503	503	503	503	503	503	503	503	503	503	503	242	242	242	242	242	242	242	242	242	242	242	-
30	NVE.Owned.Renewable.PV	40	42	98	93	94	80	75	78	70	70	67	63	63	65	62	62	57	55	55	53	51	46	43	41	43	29
31	NVE.Owned.Storage.BESS-4	110	450	433	434	433	442	434	408	398	378	378	377	377	378	364	314	292	260	244	229	221	40	33	32	31	-
32	NVE.Owned.Storage.BESS-2	220	194	192	190	190	191	187	176	172	163	163	163	162	163	157	136	127	114	107	-	-	-	-	-	-	-
33	NVE.Owned.Renewable.WH	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	-	-	-	-	-	-	-	-	-	-
34	NVE.Owned.DR/DSM.ACLM	219	234	249	262	274	283	292	298	303	309	314	320	325	331	336	342	347	353	358	364	369	375	380	386	391	397
35	NVE.Owned.DR/DSM.PV	-	-	4	5	5	4	4	4	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	1	-	-
36	NVE.Owned.DR/DSM.BESS-2	-	52	117	175	226	278	322	333	353	364	386	407	428	448	447	401	387	352	334	318	312	301	282	275	265	251
37	Owned Total	6,842	7,225	7,346	7,412	7,470	7,526	7,562	7,545	7,547	7,535	7,559	7,535	7,560	7,590	7,310	7,199	7,148	6,868	6,832	6,505	6,172	5,981	5,835	5,830	5,260	1,113
38	Contracted																										
39	PPA.Contracted.Diesel.Gen	11	11	11	11	11	11	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	PPA.Contracted.Renewable.CSP	15	16	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	PPA.Contracted.Renewable.Geo	176	200	213	223	224	173	173	163	110	110	110	110	110	105	105	105	105	105	105	105	105	105	105	105	93	93
42	PPA.Contracted.Renewable.Hydro	148	142	142	138	136	136	136	136	136	136	136	136	136	136	136	136	135	135	135	135	135	135	135	135	135	135
43	PPA.Contracted.Renewable.LFG	15	15	15	15	15	15	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	PPA.Contracted.Renewable.PV	630	632	523	475	475	388	356	364	331	329	313	293	288	261	241	243	227	227	228	220	181	155	119	91	53	-
45	PPA.Contracted.Renewable.Wind	17	17	17	17	17	17	17	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	PPA.Contracted.Storage.BESS-4	616	489	483	479	477	479	469	424	413	394	393	392	391	338	325	282	263	235	222	209	203	193	179	178	144	-
47	PPA.Contracted.DR/DSM.PV	-	-	6	5	5	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-	-
48	Contracted Total	1,628	1,522	1,423	1,363	1,360	1,223	1,181	1,123	993	972	955	934	928	843	810	769	733	705	693	672	627	591	538	509	425	228
49	Proposed																										
50	NVE.Proposed.GAS.CT																										
51	2058 - Valmy CTs - North - SPPC	-	-	-	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379	379
52	PPA.Proposed.Renewable.PV																										
53	2051 - *Dry Lake East PV Paired - South - NPC	-	-	31	31	31	27	26	26	24	24	23	21	22	22	21	21	20	20	20	19	18	17	16	15	15	15
54	2052 - *Boulder Solar III PV Paired - South - NPC	-	-	20	20	20	17	16	17	15	15	15	14	14	14	13	14	13	13	13	12	12	11	10	10	10	9
55	2052 - *Libra PV Paired - North - NPC	-	-	-	107	108	95	90	93	84	83	80	75	76	78	73	74	69	69	70	67	64	59	55	53	54	51
56	PPA.Proposed.Storage.BESS-4																										
57	2046 - *Dry Lake East BESS Paired - South - NPC	-	-	169	169	169	173	170	160	156	148	148	148	148	149	143	124	115	103	97	92	89	85	-	-	-	-
58	2047 - *Boulder Solar III BESS Paired - South - NPC	-	-	108	108	108	111	109	102	100	95	95	95	94	95	91	79	74	66	62	59	57	54	-	-	-	-
59	2047 - *Libra BESS Paired - North - NPC	-	-	-	593	592	605	596	559	546	519	519	518	516	520	499	433	404	362	340	321	311	297	274	-	-	-
60	Proposed Total	-	-	328	1,407	1,407	1,407	1,386	1,336	1,304	1,263	1,259	1,250	1,249	1,257	1,219	1,124	1,074	1,012	981	949	930	902	734	457	458	454
61	Placeholders																										
62	NVE.Placeholders.Other.TBD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	798	798	1,197	1,197	1,596	5,962
63	NVE.Placeholders.Renewable.PV	-	-	-	-	-	-	26	26	72	96	92	85	87	88	84	84	80	80	80	77	72	68	64	60	61	59
64	PPA.Placeholders.Renewable.GEO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	139	453	453
65	PPA.Placeholders.Renewable.PV	-	-	-	-	-	203	281	289	343	371	401	454	460	471	540	611	709	798	854	938	1,046	1,114	1,194	1,248	1,274	1,376
66	PPA.Placeholders.Renewable.WIND	-	-	-	-	218	218	218	435	510	547	547	576	660	771	800	800	800	800	800	800	800	800	800	800	800	800
67	PPA.Placeholders.Storage.PSH	-	-	-	-	-	-	-	-	-	-	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980	980
68	PPA.Placeholders.Storage.BESS-4	-	-	-	-	-	89	264	267	276	444	444	444	442	446	644	1,341	1,689	2,263	2,623	3,096	3,387	3,721	4,067	4,390	4,461	4,788
69	NVE.Placeholders.Storage.BESS-4	-	-	-	-	-	-	170	560	702	815	814	814	813	818	785	681	634	567	534	506	489	467	430	428	417	386
70	Placeholders Total	-	-	-	-	218	510	959	1,577	1,903	2,273	3,278	3,353	3,442	3,574	3,833	4,497	4,892	5,488	5,871	6,397	7,572	7,948	8,732	9,242	10,042	14,804

Source 2024 IRP Economic Analysis Narrative Figures

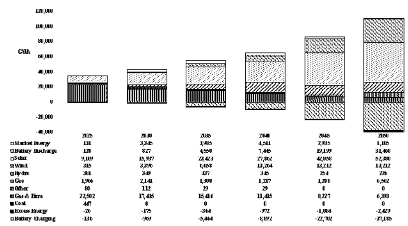
Case	Chart Type	2025	2030	2035	2040	2045	2050
Renewable Plan	Coal	447	0	0	0	0	0
Renewable Plan	Gas & Firm	22,502	17,435	15,416	11,415	8,227	6,393
Renewable Plan	Other	80	112	29	29	0	0
Renewable Plan	Geo	1,966	2,141	1,300	1,217	1,208	6,562
Renewable Plan	Hydro	381	349	337	345	254	226
Renewable Plan	Wind	315	3,398	6,658	13,284	13,212	13,212
Renewable Plan	Solar	9,109	15,937	23,423	27,862	42,058	52,380
Renewable Plan	Battery Discharge	120	827	4,550	7,445	19,199	31,468
Renewable Plan	Market Energy	131	3,345	3,985	4,511	2,935	1,105
Renewable Plan	Emergency Energy	0	0	0	0	0	0
Renewable Plan	Battery Charging	-136	-969	-5,464	-8,892	-22,702	-37,185
Renewable Plan	Excess Energy	-26	-175	-384	-972	-1,084	-2,429

Case	Chart Type	2025	2030	2035	2040	2045	2050
LowCarbon Plan	Coal	447	0	0	0	0	0
LowCarbon Plan	Gas & Firm	22,500	7,837	7,285	6,308	6,246	7,036
LowCarbon Plan	Other	80	112	29	29	0	0
LowCarbon Plan	Geo	1,966	2,141	1,300	1,217	1,208	6,567
LowCarbon Plan	Hydro	381	333	311	335	319	297
LowCarbon Plan	Wind	315	13,559	13,212	13,284	13,212	13,212
LowCarbon Plan	Solar	9,109	18,872	30,088	39,183	48,890	53,862
LowCarbon Plan	Battery Discharge	120	4,558	9,036	12,715	16,837	20,678
LowCarbon Plan	Market Energy	132	1,711	2,135	2,806	2,739	1,437
LowCarbon Plan	Emergency Energy	0	0	0	0	0	0
LowCarbon Plan	Battery Charging	-136	-5,359	-10,825	-15,159	-19,999	-24,442
LowCarbon Plan	Excess Energy	-26	-1,388	-2,703	-4,474	-6,144	-6,687

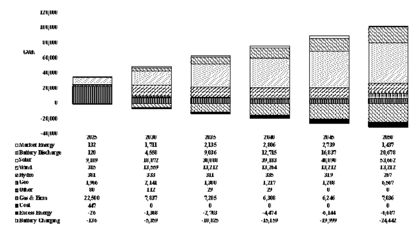
Case	Chart Type	2025	2030	2035	2040	2045	2050
No Open Position Plan	Coal	445	0	0	0	0	0
No Open Position Plan	Gas & Firm	22,503	17,640	15,638	11,406	8,309	6,766
No Open Position Plan	Other	80	112	29	29	0	0
No Open Position Plan	Geo	1,966	2,141	1,300	1,217	1,208	7,062
No Open Position Plan	Hydro	381	349	340	339	333	258
No Open Position Plan	Wind	315	3,398	4,122	13,284	13,212	13,212
No Open Position Plan	Solar	9,109	15,705	26,263	28,087	42,857	52,486
No Open Position Plan	Battery Discharge	120	634	4,552	5,842	13,314	21,896
No Open Position Plan	Market Energy	131	3,354	4,029	4,802	4,283	1,187
No Open Position Plan	Emergency Energy	0	0	0	0	0	0
No Open Position Plan	Battery Charging	-136	-741	-5,538	-7,064	-15,879	-25,360
No Open Position Plan	Excess Energy	-26	-193	-885	-1,677	-4,329	-5,187

Case	Chart Type	2025	2030	2035	2040	2045	2050
Balanced Plan	Coal	446	0	0	0	0	0
Balanced Plan	Gas & Firm	22,502	17,642	15,698	11,285	8,377	6,012
Balanced Plan	Other	80	112	29	29	0	0
Balanced Plan	Geo	1,966	2,141	1,300	1,217	1,208	6,562
Balanced Plan	Hydro	381	349	341	339	336	282
Balanced Plan	Wind	315	3,398	6,658	13,284	13,212	13,212
Balanced Plan	Solar	9,109	15,931	23,403	27,823	41,961	54,793
Balanced Plan	Battery Discharge	120	175	3,421	6,351	14,180	22,874
Balanced Plan	Market Energy	132	3,251	3,941	4,928	4,109	1,168
Balanced Plan	Emergency Energy	0	0	0	0	0	0
Balanced Plan	Battery Charging	-136	-200	-4,154	-7,655	-16,884	-26,882
Balanced Plan	Excess Energy	-26	-399	-767	-1,356	-3,191	-6,070

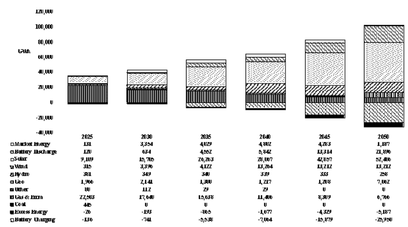
Renewable Plan



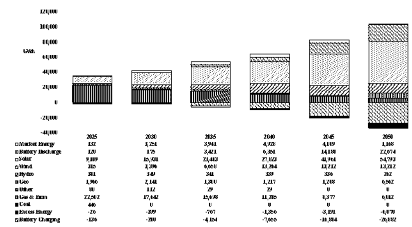
LowCarbon Plan



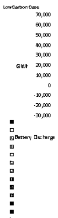
No Open Position Plan



Balanced Plan



LowCarbon Case



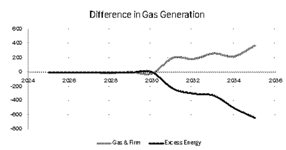
Attachment MR-2 (PUBLIC): Public Workpapers of Maria Roumpani

Figure 3

Case	ChartType	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	0
Renewable Plan	Coal	446.8248	446.8248	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	#REF!	0
Renewable Plan	Gas & Firm	22501.72	22501.72	23767.67	23025.53	22068.54	19571.32	17435.33	17079.44	16960.15	16357.807	15467.836	15415.81	14200.96	14263.476	13883.079	12284.815	11415.484	10812.46	10406.96	10492.96	9342.8101	8227.0187	7152.1882	7559.9262	6934.1535	6757.1274	6393.015	#REF!	0
Renewable Plan	Other	79.77501	79.77501	79.77501	79.77501	112.453	112.1157	112.1157	112.1157	112.45299	28.79307	28.79307	28.79307	28.89729	28.79307	28.79307	28.79307	28.89729	0	0	0	0	0	0	0	0	0	0	#REF!	0
Renewable Plan	Geo	1966.206	1966.206	2229.522	2363.372	2574.251	2563.818	2140.805	2139.72	2074.7842	1301.8761	1300.7914	1299.7066	1302.8237	1297.5371	1215.6645	1214.5798	1217.4501	1212.41	1211.326	1210.241	1213.0976	1208.0713	1206.9865	1205.9018	2901.5244	6562.1346	6562.135	#REF!	0
Renewable Plan	Hydro	380.7797	380.7797	386.9834	387.0934	372.2666	355.2515	349.3557	339.3587	334.61467	335.62595	327.07936	336.60611	336.12319	335.93001	338.26952	338.51707	344.50386	340.3617	335.7345	328.9078	304.91833	253.68314	242.99102	239.38927	227.61204	228.11075	225.7799	#REF!	0
Renewable Plan	Wind	315.3154	315.3154	315.3154	315.3154	347.4586	1980.076	3396.448	3396.448	5494.4636	5953.8597	6657.6073	6657.6073	7255.986	9045.7762	11893.795	13212.369	13264.159	13212.37	13212.37	13212.37	13264.159	13212.369	13212.369	13212.369	13264.159	13212.369	13212.37	#REF!	0
Renewable Plan	Solar	9108.674	9108.674	8812.337	10568.55	12601.5	12521.55	15936.58	18571.42	18650.68	21130.543	22389.097	23422.974	25350.282	24893.499	24060.011	26349.906	27862.383	31485.44	33919.63	35268.47	38225.379	42057.81	46023.204	48863.553	50559.076	49057.984	52379.81	#REF!	0
Renewable Plan	Battery Discharge	119.8684	119.8684	136.6159	152.506	148.8149	150.2002	827.2698	1440.717	2358.7409	2605.8359	3179.8467	4550.2818	5297.3329	5094.717	5281.3093	6037.6613	7444.9391	7752.787	9651.499	10868.31	15083.71	19199.333	22406.966	25452.819	27507.594	27841.616	31467.64	#REF!	0
Renewable Plan	Market Energy	130.9988	130.9988	115.7405	151.9672	523.2553	2959.614	3344.516	3712.498	4132.9714	3814.1854	3914.5255	3985.0947	4328.2753	3893.4075	3545.1001	3603.9219	4510.8968	4279.438	4050.499	3905.816	3488.5507	2935.1506	2794.0479	1903.8832	1688.8234	1348.5336	1105.21	#REF!	0
Renewable Plan	Emergency Energy	0	0	0	0	0	0	0	0	0	0	0	0	6.35E-07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#REF!	0
Renewable Plan	Battery Charging	-135.824	-135.824	-154.79	-173.452	-169.585	-171.4	-968.827	-1691.15	-2772.263	-3063.496	-3738.757	-5464.433	-6386.627	-6138.663	-6370.58	-7266.486	-8892.461	-9214.9	-11436	-12861.5	-17866.24	-22702.23	-26482	-30067.21	-32486.81	-32870.94	-37185.4	#REF!	0
Renewable Plan	Excess Energy	-26.2077	-26.2077	-15.2522	-25.5513	-41.7042	-13.4935	-174.524	-318.8	-174.3596	-471.7623	-636.2609	-363.6347	-723.3353	-698.3993	-556.1679	-1132.312	-971.7931	-2304.15	-2262.71	-2105.74	-1061.408	-1083.834	-1668.076	-1886.861	-2233.65	-2186.515	-2429.45	#REF!	0

Case	ChartType	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	#REF!	0
Balanced Plan	Coal	445.5913	445.5913	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	#REF!	0
Balanced Plan	Gas & Firm	22502.18	22502.18	23767.44	23019.9	22075.93	19559.9	17642.44	17269.16	17227.735	16588.36	15848.117	15697.923	14269.257	14415.304	14026.248	12326.73	11284.566	10549.58	10168.97	10249.72	9325.273	8377.292	7516.6903	7669.4974	6602.3784	6098.3223	6012.31	0	0
Balanced Plan	Other	79.77501	79.77501	79.77501	79.77501	112.453	112.1157	112.1157	112.1157	112.45299	28.79307	28.79307	28.79307	28.89729	28.79307	28.79307	28.79307	28.89729	0	0	0	0	0	0	0	0	0	0	2051	0
Balanced Plan	Geo	1966.206	1966.206	2229.522	2363.372	2574.251	2563.818	2140.805	2139.72	2074.7842	1301.8761	1300.7914	1299.7066	1302.8237	1297.5371	1215.6645	1214.5798	1217.4501	1212.41	1211.326	1210.241	1213.0976	1208.0713	1206.9865	1205.9018	2901.5244	6562.1346	6562.135	#REF!	0
Balanced Plan	Hydro	380.7797	380.7797	386.9834	387.0934	372.2666	355.2515	349.3557	349.3557	338.28832	341.04196	339.16826	341.2437	341.15074	340.6212	336.39931	338.59876	338.81423	339.4462	341.3357	338.8872	335.57374	336.16525	328.56101	337.24278	343.68728	273.28118	262.3686	#REF!	0
Balanced Plan	Wind	315.3154	315.3154	315.3154	315.3154	347.4586	1980.076	3396.448	3396.448	5494.4636	5953.8597	6657.6073	6657.6073	7255.986	9045.7762	11893.795	13212.369	13264.159	13212.37	13212.37	13212.37	13264.159	13212.369	13212.369	13212.369	13264.159	13212.369	13212.37	#REF!	0
Balanced Plan	Solar	9108.684	9108.684	8812.35	10568.22	12595.06	12521.65	15930.87	18575.55	18640.591	21122.529	22388.013	23402.892	25308.366	24827.312	23984.086	26281.972	27823.348	31305.53	33743.65	35041.22	38123.461	41960.885	45812.877	49840.775	52862.628	51387.692	54792.74	#REF!	0
Balanced Plan	Battery Discharge	119.9079	119.9079	136.7162	152.3275	149.1242	154.6303	175.4561	475.6337	1081.2284	1262.7983	1621.3783	3421.414	4135.9895	4073.7998	4093.5625	4651.3459	6351.1842	7568.589	9519.456	10886.72	12793.661	14180.473	15867.965	17709.821	19263.096	20092.187	22673.61	#REF!	0
Balanced Plan	Market Energy	131.769	131.769	115.9711	157.921	520.4306	2963.943	3250.906	3632.058	3963.1687	3849.4255	3884.2906	3941.052	4341.6918	3817.5318	3586.8542	3815.5236	4927.8257	4706.946	4457.576	4304.602	4397.0612	4108.986	4021.5763	3043.545	2500.25	1721.3129	1167.751	#REF!	0
Balanced Plan	Emergency Energy	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	#REF!	0
Balanced Plan	Battery Charging	-135.868	-135.868	-154.903	-173.25	-169.942	-176.079	-199.855	-553.484	-1266.474	-1482.338	-1905.326	-4153.999	-5050.411	-4974.005	-4995.71	-5664.656	-7654.998	-9102.38	-11390.2	-12985.9	-15235.28	-16883.88	-18865.49	-21021.19	-22858.38	-23836.82	-26882.3	#REF!	0
Balanced Plan	Excess Energy	-26.2077	-26.2077	-15.2522	-25.5677	-39.4541	-6.36068	-399.465	-614.643	-493.5904	-972.8038	-1272.108	-767.3221	-942.6059	-856.376	-850.0931	-1533.305	-1356.207	-2215.64	-2174.3	-1937.01	-2220.469	-3191.168	-4211.227	-5512.975	-6514.935	-5557.744	-6069.86	#REF!	0

Difference		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Coal	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gas & Firm	0	0	0	-6	7	-11	207	190	268	231	380	282	68	152	143	42	-131	-263	-238	-243	-18	150	365	110	-332	-659
	Other	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
	Geo	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
	Hydro	0	0	0	0	0	0	0	10	4	5	12	5	5	5	-2	0	-6	-1	6	10	31	82	86	98	116	45
	Wind	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
	Solar	0	0	0	0	-6	0	-6	4	-10	-8	-1	-20	-42	-66	-76	-68	-39	-180	-176	-227	-102	-97	-210	977	2304	2330
	Battery Discharge	0	0	0	0	0	4	-652	-965	-1278	-1343	-1558	-1129	-1161	-1021	-1188	-1386	-1094	-184	-132	18	-2290	-5019	-6539	-7743	-8244	-7749
	Market Energy	1	1	0	6	-3	4	-94	-80	-170	35	-30	-44	13	-76	42	212	417	428	407	399	909	1174	1228	1140	811	373
	Emergency Energy	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
	Battery Charging	0	0	0	0	0	-5	769	1138	1506	1581	1833	1310	1336	1165	1375	1602	1237	113	46	-124	2631	5818	7617	9046	9628	9034
	Excess Energy	0	0	0	0	2	7	-225	-296	-319	-501	-636	-404	-219	-158	-294	-401	-384	89	88	169	-1159	-2107	-2543	-3626	-4281	-3371



Source 2024 IRP Economic Analysis Narrative Figures

Case	Chart-Type	2025	2030	2035	2040	2045	2050
BASE	Coal	261	-	-	-	-	-
BASE	Gas	6,318	6,999	6,999	6,657	5,854	864
BASE	Firm	-	-	-	-	840	6,276
BASE	Other	256	315	319	347	369	397
BASE	Hydro	148	136	136	136	135	135
BASE	Geo	422	415	264	252	252	1,325
BASE	Wind	152	1,104	2,372	4,953	4,953	4,953
BASE	Solar	3,146	5,873	8,719	10,524	15,942	19,970
BASE	PSH	-	-	1,000	1,000	1,000	1,000
BASE	BESS	946	2,756	4,532	6,150	11,430	15,923

Case	Chart-Type	2025	2030	2035	2040	2045	2050
Balanced Plan	Coal	261	-	-	-	-	-
Balanced Plan	Gas	6,318	6,990	6,990	6,648	5,845	855
Balanced Plan	Firm	-	-	-	-	840	6,276
Balanced Plan	Other	256	315	319	347	369	397
Balanced Plan	Hydro	148	136	136	136	135	135
Balanced Plan	Geo	422	415	264	252	252	1,325
Balanced Plan	Wind	152	1,104	2,372	4,953	4,953	4,953
Balanced Plan	Solar	3,146	5,872	8,719	10,524	15,943	20,971
Balanced Plan	PSH	-	-	1,000	1,000	1,000	1,000
Balanced Plan	BESS	946	2,733	4,509	6,127	11,407	15,413

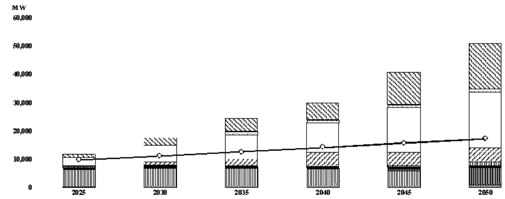
Case	Chart-Type	2025	2030	2035	2040	2045	2050
Renewable Plan	Coal	261	-	-	-	-	-
Renewable Plan	Gas	6,318	6,579	6,579	6,237	5,434	444
Renewable Plan	Firm	-	-	-	-	840	6,276
Renewable Plan	Other	256	315	319	347	369	397
Renewable Plan	Hydro	148	136	136	136	135	135
Renewable Plan	Geo	422	415	264	252	252	1,325
Renewable Plan	Wind	152	1,104	2,372	4,952	4,952	4,952
Renewable Plan	Solar	3,146	5,872	8,719	10,524	15,943	19,971
Renewable Plan	PSH	-	-	1,000	1,000	1,000	1,000
Renewable Plan	BESS	946	3,235	5,677	7,587	16,517	21,582

Case	Chart-Type	2025	2030	2035	2040	2045	2050
LowCarbon	Coal	261	-	-	-	-	-
LowCarbon	Gas	6,318	6,579	6,579	6,237	5,434	444
LowCarbon	Firm	-	-	-	-	1,260	6,696
LowCarbon	Other	256	315	319	347	369	397
LowCarbon	Hydro	148	136	136	136	135	135
LowCarbon	Geo	422	415	264	252	252	1,326
LowCarbon	Wind	152	5,104	4,952	4,952	4,952	4,952
LowCarbon	Solar	3,146	6,918	11,191	14,883	18,556	20,376
LowCarbon	PSH	-	-	1,000	1,000	1,000	1,000
LowCarbon	BESS	946	6,497	7,791	10,379	13,300	15,202

Case	Chart-Type	2025	2030	2035	2040	2045	2050
No Open Position	Coal	261	-	-	-	-	-
No Open Position	Gas	6,318	7,435	7,435	7,093	6,290	1,300
No Open Position	Firm	-	-	-	766	1,186	6,622
No Open Position	Other	256	315	319	347	369	397
No Open Position	Hydro	148	136	136	136	135	135
No Open Position	Geo	422	415	264	252	252	1,424
No Open Position	Wind	152	1,104	1,374	4,952	4,952	4,952
No Open Position	Solar	3,146	5,777	9,773	10,613	16,293	20,051
No Open Position	PSH	-	-	1,000	1,000	1,000	1,000
No Open Position	BESS	946	2,989	4,590	5,491	10,503	14,629

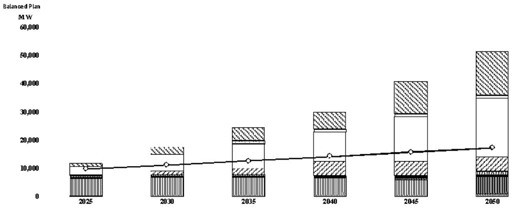
	2025	2030	2035	2040	2045	2050
PRMR	9,866	11,281	12,695	14,224	15,766	17,315
from L&R REQUIRED RESOU	9,776	11,191	12,605	14,134	15,676	17,225
from L&R OATT Reserves	90	90	90	90	90	90

Base Case



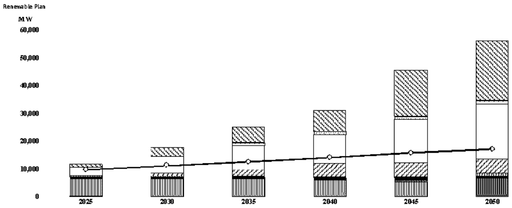
	2025	2030	2035	2040	2045	2050
BESS	946	2,756	4,532	6,150	11,430	15,923
PSH	-	-	1,000	1,000	1,000	1,000
Solar	3,146	5,873	8,719	10,524	15,942	19,970
Wind	152	1,104	2,372	4,953	4,953	4,953
Geo	422	415	264	252	252	1,325
Hydro	148	136	136	136	135	135
Other	256	315	319	347	369	397
Firm	-	-	-	-	840	6,276
Gas	6,318	6,999	6,999	6,657	5,854	864
Coal	261	-	-	-	-	-
PRMR	9,866	11,281	12,695	14,224	15,766	17,315

Balanced Plan



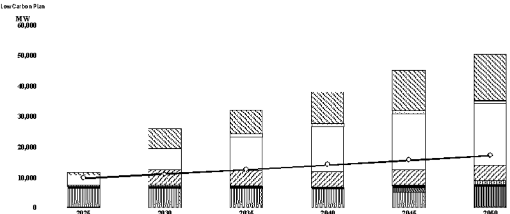
	2025	2030	2035	2040	2045	2050
BESS	946	2,733	4,509	6,127	11,407	15,413
PSH	-	-	1,000	1,000	1,000	1,000
Solar	3,146	5,872	8,719	10,524	15,943	20,971
Wind	152	1,104	2,372	4,953	4,953	4,953
Geo	422	415	264	252	252	1,325
Hydro	148	136	136	136	135	135
Other	256	315	319	347	369	397
Firm	-	-	-	-	840	6,276
Gas	6,318	6,990	6,990	6,648	5,845	855
Coal	261	-	-	-	-	-
PRMR	9,866	11,281	12,695	14,224	15,766	17,315

Renewable Plan



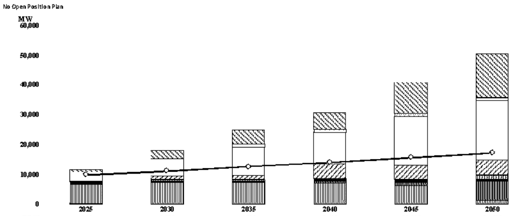
	2025	2030	2035	2040	2045	2050
BESS	946	3,235	5,677	7,587	16,517	21,582
PSH	-	-	1,000	1,000	1,000	1,000
Solar	3,146	5,872	8,719	10,524	15,943	19,971
Wind	152	1,104	2,372	4,952	4,952	4,952
Geo	422	415	264	252	252	1,325
Hydro	148	136	136	136	135	135
Other	256	315	319	347	369	397
Firm	-	-	-	-	840	6,276
Gas	6,318	6,579	6,579	6,237	5,434	444
Coal	261	-	-	-	-	-
PRMR	9,866	11,281	12,695	14,224	15,766	17,315

Low Carbon Plan



	2025	2030	2035	2040	2045	2050
BESS	946	6,497	7,791	10,379	13,300	15,202
PSH	-	-	1,000	1,000	1,000	1,000
Solar	3,146	6,918	11,191	14,883	18,556	20,376
Wind	152	5,104	4,952	4,952	4,952	4,952
Geo	422	415	264	252	252	1,326
Hydro	148	136	136	136	135	135
Other	256	315	319	347	369	397
Firm	-	-	-	-	1,260	6,696
Gas	6,318	6,579	6,579	6,237	5,434	444
Coal	261	-	-	-	-	-
PRMR	9,866	11,281	12,695	14,224	15,766	17,315

No Open Position Plan



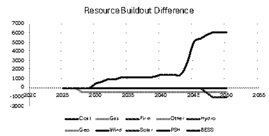
	2025	2030	2035	2040	2045	2050
BESS	946	2,989	4,590	5,491	10,503	14,629
PSH	-	-	1,000	1,000	1,000	1,000
Solar	3,146	5,777	9,773	10,613	16,293	20,051
Wind	152	1,104	1,374	4,952	4,952	4,952
Geo	422	415	264	252	252	1,424
Hydro	148	136	136	136	135	135
Other	256	315	319	347	369	397
Firm	-	-	-	766	1,186	6,622
Gas	6,318	7,435	7,435	7,093	6,290	1,300
Coal	261	-	-	-	-	-
PRMR	9,866	11,281	12,695	14,224	15,766	17,315

Table 1

Case	Chart-Type	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Balanced Pl	Coal	261	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
Balanced Pl	Gas	6318	6579	6579	6990	6990	6990	6990	6990	6990	6990	6990	6936	6936	6936	6648	6648	6648	6417	6417	6202	5845	5845	5697	5697	5124	855
Balanced Pl	Firm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	840	840	1260	1260	1680	6276
Balanced Pl	Other	256	271	286	298.5	306	315	324	317.5	308	313.5	319	324.5	330	335.5	341	346.5	347	352.5	358	363.5	369	374.5	380	385.5	391	396.5
Balanced Pl	Hydro	148	142	142	138	136	136	136	136	136	136	136	136	136	136	136	136	135	135	135	135	135	135	135	135	135	135
Balanced Pl	Geo	422	480	512	534	536	415	415	392	264	264	264	264	264	252	252	252	252	252	252	252	252	252	252	586	1325	1325
Balanced Pl	Wind	152	152	152	152	1104	1104	1104	1921	2095	2372	2372	2596	3312	4433	4953	4953	4953	4953	4953	4953	4953	4953	4953	4953	4953	4953
Balanced Pl	Solar	3146	3036	3812	4454	4454	5872	6823	6823	7876	8352	8719	9447	9347	9046	9950	10524	11876	12792	13296	14464	15943	17442	19007	20123	19612	20971
Balanced Pl	PSH	0	0	0	0	0	0	0	0	0	0	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Balanced Pl	BESS	946.27	1342.603	1745.937	2515.27	2572.603	2732.937	3198.27	3739.27	3995.27	4479.27	4509.27	4539.27	4569.27	4517.27	4844.27	6127.27	6908.27	8365.77	9390.27	10521.77	11407.27	12166.77	13439.27	13626.77	14070.27	15412.77

Case	Chart-Type	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Renewable	Coal	261	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
Renewable	Gas	6318	6579	6579	6579	6579	6579	6579	6579	6579	6579	6579	6525	6525	6525	6237	6237	6237	6006	6006	5791	5434	5434	5286	5286	4713	444
Renewable	Firm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	840	840	1260	1260	1680	6276
Renewable	Other	256	271	286	298.5	306	315	324	317.5	308	313.5	319	324.5	330	335.5	341	346.5	347	352.5	358	363.5	369	374.5	380	385.5	391	396.5
Renewable	Hydro	148	142	142	138	136	136	136	136	136	136	136	136	136	136	136	136	135	135	135	135	135	135	135	135	135	135
Renewable	Geo	422	480	512	534	536	415	415	392	264	264	264	264	264	252	252	252	252	252	252	252	252	252	252	586	1325	1325
Renewable	Wind	152	152	152	152	1104	1104	1104	1921	2095	2372	2372	2596	3312	4433	4952	4952	4952	4952	4952	4952	4952	4952	4952	4952	4952	4952
Renewable	Solar	3146	3036	3812	4454	4454	5872	6823	6823	7876	8352	8719	9447	9347	9046	9950	10524	11876	12792	13296	14464	15943	17442	18507	19123	18612	19971
Renewable	PSH	0	0	0	0	0	0	0	0	0	0	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Renewable	BESS	946.27	1342.603	1745.937	2515.27	2572.603	3234.937	3908.27	4759.27	5015.27	5647.27	5677.27	5707.27	5737.27	5685.27	6120.27	7587.27	8368.27	9825.77	10850.27	13299.77	16517.27	17610.77	19277.27	19795.77	20239.27	21581.77

Difference		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Coal	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
	Gas	0	0	0	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411	-411
	Firm	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
	Other	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
	Hydro	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
	Geo	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
	Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-500	-1000	-1000	-1000
	PSH	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
	BESS	0	0	0	0	0	502	710	1020	1020	1168	1168	1168	1168	1168	1276	1460	1460	1460	1460	2778	5110	5444	5838	6169	6169	6169



NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	08-06-2024
REQUEST NO:	IEA 002	**KEYWORD:**	vol 4 p96-97 williams direct; resource combination alternative valmy CT
REQUESTER:	Harris	**RESPONDER:**	DeMaggio, Jonai (NV Energy)

REQUEST:

According to Kimberly Williams' testimony, NV Energy evaluated several alternative resource plans, including those with solar/storage resources (Volume 4, pages 96 and 97–100).

a. Did NV Energy consider a resource combination or alternative resource plan that included one of the two Valmy CTs plus a solar/storage resource?

b. Did NV Energy consider a resource combination or alternative resource plan that included only one CT at any candidate location?

c. If the answer to subpart (a) or (b) is yes, please provide the details of this consideration, including the criteria and outcomes of such an analysis.

RESPONSE CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

a. No, NV Energy did not consider a resource combination or alternative resource plan that included only one of the two Valmy CTs plus a solar/storage resource.

b. Assuming the question refers to proposed projects as opposed to placeholder resources, no, NV Energy did not consider a resource combination or alternative resource plan that included only one CT at any candidate location.

c. N/A

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	08-06-2024
REQUEST NO:	IEA 007	**KEYWORD:**	2023 open resource RFP bids projects shortlist contract types
REQUESTER:	Harris	**RESPONDER:**	Spitzer, Sean (NV Energy)

REQUEST:

The summary of the IRP describes the number of bids and selected projects.

a. How many bids were received via the 2023 Open Resource RFP?

b. Of those, how many projects made the RFP shortlist?

c. How many were chosen from the shortlist?

d. List the generation technology types and MW amounts in aggregate for bids at each stage.

e. Enumerate the number of differing contract types (BTA, PPA, Company-build) evaluated by the Company for each stage.

RESPONSE CONFIDENTIAL (yes or no): No

ATTACHMENT CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: One (Zipped)

RESPONSE:

a) 84 bids
b) 28 bids
c) 3 bids
d) Please see the attached “24-05041 - IEA 007-Attach 01.xlsx”.
e) Please refer to the attached “24-05041 - IEA 007-Attach 01.xlsx” provided in d.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	06-21-2024
REQUEST NO:	Staff 63	**KEYWORD:**	issue next open resource RP; current bilateral negotiations renewables
REQUESTER:	Olesky	**RESPONDER:**	Spitzer, Sean (NV Energy)

REQUEST:

Reference: RFP

Question: Please state when NV Energy plans to issue its next open resource RFP. Please state if NV Energy is currently involved in any bilateral negotiations with renewable project developers.

RESPONSE CONFIDENTIAL (yes or no): No

ATTACHMENT CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

NV Energy is currently planning to issue an all source (formerly open resource) RFP in August 2024. NV Energy is not currently involved in bilateral negotiations with any renewable project developers.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	07-01-2024
REQUEST NO:	Staff 99	**KEYWORD:**	open capacity position target vol 8 p217; 750MW guideline
REQUESTER:	Venkat	**RESPONDER:**	Runyan, Joe (NV Energy)

REQUEST:

Reference: Open Capacity Position Target

Question: Volume 8, Page 217 of 393 states that the Companies set an open capacity position target of no more than 750 MW in 2028 and every year thereafter. Please answer the following questions:

A. Please explain why the Company chose a guideline of 750 MW.

B. Did the Company consider any different guidelines for an open position? If so, what other guidelines were considered and why was 750 MW chosen?

C. In Docket No. 21-06001, the Companies chose a guideline of 2,000 MW for the open position. Please explain in detail the reason for the change from 2,000 MW in the last IRP to 750 MW in the instant filing.

RESPONSE CONFIDENTIAL (yes or no): No

ATTACHMENT CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

A. The Companies chose to set an open position capacity target of no more than 750 MW starting in 2028 as stated in the narrative on page 217 of 393 and elsewhere in Volume 8 due to ongoing concern about the uncertain availability and deliverability of market capacity and energy as well as the requirement to be resource sufficient in WRAP with the initial binding season in winter 2027-2028, which is also an expected requirement of a future regional market or RTO.

Western Markets are in considerable flux since the last IRP which has led to more uncertainty in market availability and deliverability. The testimony of Ryan Atkins, in his Q&A 11 in this filing, discusses the risk of having a large open position and points to the testimony of Nicolai Schlag. In testimony in the Fifth Amendment to the 2021 IRP (Docket No. 23-08015), Mr. Schlag discussed risks associated with maintaining a large open position as well as evidence to support the notion that the supply of capacity in western wholesale markets is growing increasingly constrained. He also discussed the extent to which other utilities in the west count on short-term market purchases to meet their needs in their resource plans and signaled intent by utilities that currently hold large open positions to reduce those positions over time. In his Q&A 17-19 in the instant docket, Mr. Schlag explains the evidence that led to his conclusion that the Companies' plans to reduce the open position were reasonable in the Fifth Amendment and states additional evidence to support this position as well as support of the Companies continued efforts to reduce its open position in this filing.

While in the 2021 IRP, a larger open position of 2,000 MW was deemed reasonable, the current market landscape and experience in recent years suggest that availability and deliverability of external market capacity and energy will be more limited and uncertain. The open positions in alternative plans in the Companies' more recent filings have been lower than the 2,000 MW target in the 2021 IRP. Open positions of the alternative plans in the Fourth and Fifth Amendments to the 2021 IRP were reduced to near or below 600 MW in the first 20 years of the plans. The open position target in this filing is consistent with recent filings.

In addition to concerns about uncertain market availability and deliverability, there is risk in relying on market purchases to meet resource sufficiency requirements in WRAP as stated on page 351 of 393 in the narrative:

> "Any participant that fails the forward showing will be subject to penalties that utilize a cost of new entry charge, which is equal to the amount that it would cost to build new generation. It is important to note that market purchases may apply towards the forward showing, however, any contracts will need to satisfy strict requirements and limited market supply is available that meets the guidelines. Contracts must be in place ahead of the seven-month deadline to submit the forward showing for the binding season in order to count towards qualifying capacity for the forward showing. The contract must also include an identified source committed to the supply, provide assurance the capacity is not used for another entity's resource adequacy requirements, provide assurance the seller will not fail to deliver, and also commit that the energy will be delivered on firm transmission. Therefore, it may not always be possible for an entity to close forward showing shortfalls with contractual supply."

The Companies sent out a Request for Information ("RFI") in mid-November 2023 seeking to purchase source specific energy, consistent with WRAP requirements for qualifying capacity, for June-September 2026-2028. Response was received from three counterparties as shown below.

- Counterparty A – 85 MW firm and source specific, was ready to be executed but not cost

competitive compared to forward pricing we were seeing
- Counterparty B – No firm price or quantity given, additional negotiation needed, indicated an openness to begin negotiations for up to 300 MW
- Counterparty C – No actual energy offered, more of a ‘conversation starter’ with no price or quantity given, just stating they would be interested if they could find source specific energy to sell to us

Informed by the concerns and evidence presented as well as the results of the RFI, the Companies chose to set an open position capacity target of no more than 750 MW starting in 2028.

B. Determining an open position target is not an exact science. For that reason, the Companies worked to determine a balanced approach that reduced the risk of relying too heavily on market purchases while not being overly conservative. The topic was discussed with subject matter experts within the Companies and the 750 MW target was agreed upon.

C. See response to item A.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	09-11-2024
REQUEST NO:	United 1-09	**KEYWORD:**	Steele direct p6; varying levels flexible load technologies distributed resource
REQUESTER:	Kantor	**RESPONDER:**	Steele, Marie

REQUEST:

Reference: Steele – Direct, page 6

Question: Referring to Steele – Direct, page 6, which states: “the Companies introduced flexible load technologies and distributed resources as supply resources, rather than as load modifiers … These resources are modeled the same in all cases and plans”:

(a) Please explain whether varying levels of “flexible load technologies and distributed resources” could be selected by PLEXOS as part of the economic optimization. If not, please explain how the level of these resources (in MW) was determined for each portfolio modeled in PLEXOS.

(b) If these resources were economically selectable in PLEXOS, please explain why the amount of DSM-ACLM resource was identical in both the VBDL1 and BDL2 scenarios.

(c) If these resources were economically selectable in PLEXOS, please explain why the amount of DSM-BESS resource was identical in both the VBDL1 and BDL2 scenarios through 2029.

RESPONSE CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

a. No, the resources were not "economically optimized." Flexible load technologies and distributed resources were not modeled as a candidate resource to be selected in the resource expansion analysis using PLEXOS LT. They were, however, modeled in all production cost analyses using PLEXOS ST for the alternative plans and at levels determined by the Integrated Energy Services group that is described in Question 11 of the direct testimony of Marie Steele.

b. The resources were not economically selectable.

c. The resources were not economically selectable

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	09-24-2024
REQUEST NO:	United 3-02	**KEYWORD:**	supply plan p17 OEM 15 percent hydrogen mixture CT capability, pinyon lateral
REQUESTER:	Kantor	**RESPONDER:**	Lescenski, John

REQUEST:

Reference: Supply Plan, page 17

Question: Referring to the Supply Plan, page 17, which states: "Information from the Original Equipment Manufacturer ('OEM') for this unit states that the unit is capable of operating on a 15 percent hydrogen mixture, with the OEM planning a path towards allowing the unit to operate on 100 percent hydrogen":

(a) Please explain whether the 15 percent hydrogen mixture is by volume or energy content.

(b) Please explain whether the Company has included in its analysis a cost estimate for the conversion of the unit from 15% to 100% hydrogen capable.
   i. If yes, please provide the estimate and explain whether it is included in the $573 million estimate.
   ii. If not, please explain why not.

(c) Please provide the timeline during which the Company expects to convert the units to burn 100 hydrogen.

(d) Please explain whether the Pinyon natural gas lateral will be capable of delivering hydrogen and the costs associated with any necessary upgrades for it to deliver volumes for the 15% hydrogen CT capability, the 100% capability, and any other percentage mixtures the Company has evaluated.

(e) Please explain whether the Company's analysis has evaluated how the hydrogen will be produced. If the hydrogen is assumed to be green hydrogen, please explain whether the availability and cost of the necessary renewable resources has been incorporated in the Company's analysis.

RESPONSE CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

(a) The 15 percent is by volume (See the manufacturers website for more information - https://www.gevernova.com/gas-power/future-of-energy/hydrogen-fueled-gas-turbines)

(b) The Company did not include the cost to upgrade to 100 percent in its cost estimate. The conversion could be completed through normal parts replacement (i.e., burners) in a future outage when a hydrogen fuel source is available.

(c) The Company does not have a timeline for conversion to hydrogen. The Company is not developing a hydrogen fuel source.

(d) The Pinon natural gas lateral is currently designed to deliver natural gas to the site. The Company is not involved in the design and is not aware of design considerations to deliver a hydrogen mixture, or associated costs

(e) The Company's analysis did not evaluate how the future hydrogen would be produced. The economic analysis for the Valmy Simple Cycle Units is based on natural gas operation. The ability of the units to operate on hydrogen is a secondary benefit, not included in the economic analysis. The Company continues to monitor developments in hydrogen as a fuel source and could further investigate hydrogen fueling of its generating units as the market develops.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	09-24-2024
REQUEST NO:	United 3-06	**KEYWORD:**	evaluate other resource type than CTs eliminate must-run requirement, cost emiss
REQUESTER:	Kantor	**RESPONDER:**	Williams, Kimberly

REQUEST:

Reference: Supply Plan, page 235

Question: Referring to the Supply Plan, page 235, which states: "Of all the siting options studied for the addition of two CTs, only the Valmy location has the benefit of eliminating the existing Valmy steamer must-run requirement as described in the Transmission Section of the narrative":

(a) Please explain whether the Company evaluated any other resource types (other than CTs) for the elimination of the must-run requirement. If not, why not?

(b) Please explain why and how the construction of the CTs will eliminate the must-run requirement.

(c) Please explain whether the Company has estimated the costs and emission savings from eliminating the must-run requirement. If so, please provide these estimates and all supporting analyses/workpapers. If not, why not?

RESPONSE CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

a) No other resource types were evaluated for the elimination of the Valmy must-run requirement. See the description of the Valmy must-run requirement on page 177 of 393 in Volume 8 and response to data request AEU 1-08. Only the presence of resources near the Carlin Trend load pocket that are able to rapidly ramp up generation to reduce system imports following certain contingencies, as described in response to AEU 1-08, will allow the termination of the Valmy must-run requirement as it is currently known. Clearly, these resources must be able to respond to these contingencies whenever they may occur and therefore variable resources and/or storage are not considered to be viable options to allow the Valmy must-run requirement to be removed.

b) See response to item a above and data request United 1-08.

c) See response to data request United 1-08 item b.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	08-19-2024
REQUEST NO:	WRA 6-02	**KEYWORD:**	Hydrogen blending proposed facility, potential costs benefits risks
REQUESTER:	Holman	**RESPONDER:**	Lescenski, John

REQUEST:

Reference: Hydrogen Blending

Question: Please answer the following questions:

1. What is NV Energy's plan, if any, to source and blend hydrogen for the proposed facility?

2. What are the potential costs, benefits, and risks associated with potential hydrogen blending at the proposed facility?

RESPONSE CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: None

RESPONSE:

1. NV Energy does not currently have a plan to source and blend hydrogen at the Valmy Generating Station.

2. Since hydrogen manufacturing and supply is not available in Nevada at the scale necessary for the operation of these units at this time, NV Energy cannot make plans or develop costs and benefits for a hydrogen fuel supply at this time. NV Energy continues to follow developments in the hydrogen fuel industry and will develop and plan in the future when it is prudent to pursue hydrogen supply at the Valmy Generating Station.

NV Energy noted in the Supply Side Narrative of this filing that the Valmy Simple Cycle Units proposed for the project would be capable of operation on a 15 percent blend of hydrogen and that the equipment manufacturer is pursuing a path to the units being capable of operation on 100 percent hydrogen when that option is available.

NV Energy

RESPONSE TO INFORMATION REQUEST

DOCKET NO:	24-05041	**REQUEST DATE:**	08-19-2024
REQUEST NO:	WRA 6-05	**KEYWORD:**	PLEXOS LT ST firm capacity geothermal operational profiles ELCC values
REQUESTER:	Holman	**RESPONDER:**	Wasiuta, Matthew (NV Energy)

REQUEST:

Reference: Firm Capacity of Geothermal

Question: Please provide and answer the following:

1. The operational profiles for geothermal used for the development of ELCC values and used for candidate resource assessment in PLEXOS LT and PLEXOS ST.

2. Are all values used intended to reflect historical performance of the existing geothermal fleet? Are modifications made to represent performance of future resources?

RESPONSE CONFIDENTIAL (yes or no): No

ATTACHMENT CONFIDENTIAL (yes or no): No

TOTAL NUMBER OF ATTACHMENTS: One (Zipped)

RESPONSE:

1. Please see the attached Excel file “24-05041 WRA 6-05 – Attach 01”.

2. Yes. No modifications were made to represent performance of future resources.

Attachment MR-3: Selected Data Request Responses

Units are in %

Month	Day	Period	Value
1	1	1	68.289
1	1	2	68.408
1	1	3	68.534
1	1	4	68.583
1	1	5	68.612
1	1	6	68.664
1	1	7	68.648
1	1	8	68.792
1	1	9	67.993
1	1	10	66.971
1	1	11	66.376
1	1	12	65.411
1	1	13	64.857
1	1	14	64.449
1	1	15	63.94
1	1	16	63.786
1	1	17	64.325
1	1	18	64.979
1	1	19	65.755
1	1	20	66.615
1	1	21	67.354
1	1	22	67.535
1	1	23	67.784
1	1	24	67.989
1	2	1	68.289
1	2	2	68.408
1	2	3	68.534
1	2	4	68.583
1	2	5	68.612
1	2	6	68.664
1	2	7	68.648
1	2	8	68.792
1	2	9	67.993
1	2	10	66.971
1	2	11	66.376
1	2	12	65.411
1	2	13	64.857
1	2	14	64.449
1	2	15	63.94
1	2	16	63.786
1	2	17	64.325
1	2	18	64.979
1	2	19	65.755
1	2	20	66.615
1	2	21	67.354
1	2	22	67.535
1	2	23	67.784
1	2	24	67.989
1	3	1	68.289
1	3	2	68.408
1	3	3	68.534
1	3	4	68.583
1	3	5	68.612
1	3	6	68.664
1	3	7	68.648
1	3	8	68.792
1	3	9	67.993
1	3	10	66.971
1	3	11	66.376
1	3	12	65.411
1	3	13	64.857
1	3	14	64.449
1	3	15	63.94
1	3	16	63.786
1	3	17	64.325
1	3	18	64.979
1	3	19	65.755
1	3	20	66.615
1	3	21	67.354
1	3	22	67.535
1	3	23	67.784
1	3	24	67.989
1	4	1	68.289
1	4	2	68.408
1	4	3	68.534
1	4	4	68.583
1	4	5	68.612
1	4	6	68.664
1	4	7	68.648
1	4	8	68.792
1	4	9	67.993
1	4	10	66.971
1	4	11	66.376
1	4	12	65.411
1	4	13	64.857
1	4	14	64.449
1	4	15	63.94

1	4	16	63.786
1	4	17	64.325
1	4	18	64.979
1	4	19	65.755
1	4	20	66.615
1	4	21	67.354
1	4	22	67.535
1	4	23	67.784
1	4	24	67.989
1	5	1	68.289
1	5	2	68.408
1	5	3	68.534
1	5	4	68.583
1	5	5	68.612
1	5	6	68.664
1	5	7	68.648
1	5	8	68.792
1	5	9	67.993
1	5	10	66.971
1	5	11	66.376
1	5	12	65.411
1	5	13	64.857
1	5	14	64.449
1	5	15	63.94
1	5	16	63.786
1	5	17	64.325
1	5	18	64.979
1	5	19	65.755
1	5	20	66.615
1	5	21	67.354
1	5	22	67.535
1	5	23	67.784
1	5	24	67.989
1	6	1	68.289
1	6	2	68.408
1	6	3	68.534
1	6	4	68.583
1	6	5	68.612
1	6	6	68.664
1	6	7	68.648
1	6	8	68.792
1	6	9	67.993
1	6	10	66.971
1	6	11	66.376
1	6	12	65.411
1	6	13	64.857
1	6	14	64.449
1	6	15	63.94
1	6	16	63.786
1	6	17	64.325
1	6	18	64.979
1	6	19	65.755
1	6	20	66.615
1	6	21	67.354
1	6	22	67.535
1	6	23	67.784
1	6	24	67.989
1	7	1	68.289
1	7	2	68.408
1	7	3	68.534
1	7	4	68.583
1	7	5	68.612
1	7	6	68.664
1	7	7	68.648
1	7	8	68.792
1	7	9	67.993
1	7	10	66.971
1	7	11	66.376
1	7	12	65.411
1	7	13	64.857
1	7	14	64.449
1	7	15	63.94
1	7	16	63.786
1	7	17	64.325
1	7	18	64.979
1	7	19	65.755
1	7	20	66.615
1	7	21	67.354
1	7	22	67.535
1	7	23	67.784
1	7	24	67.989
1	8	1	68.289
1	8	2	68.408
1	8	3	68.534
1	8	4	68.583
1	8	5	68.612
1	8	6	68.664
1	8	7	68.648

Attachment MR-3: Selected Data Request Responses

1	8	8	68.792
1	8	9	67.993
1	8	10	66.971
1	8	11	66.376
1	8	12	65.411
1	8	13	64.857
1	8	14	64.449
1	8	15	63.94
1	8	16	63.786
1	8	17	64.325
1	8	18	64.979
1	8	19	65.755
1	8	20	66.615
1	8	21	67.354
1	8	22	67.535
1	8	23	67.784
1	8	24	67.989
1	9	1	68.289
1	9	2	68.408
1	9	3	68.534
1	9	4	68.583
1	9	5	68.612
1	9	6	68.664
1	9	7	68.648
1	9	8	68.792
1	9	9	67.993
1	9	10	66.971
1	9	11	66.376
1	9	12	65.411
1	9	13	64.857
1	9	14	64.449
1	9	15	63.94
1	9	16	63.786
1	9	17	64.325
1	9	18	64.979
1	9	19	65.755
1	9	20	66.615
1	9	21	67.354
1	9	22	67.535
1	9	23	67.784
1	9	24	67.989
1	10	1	68.289
1	10	2	68.408
1	10	3	68.534
1	10	4	68.583
1	10	5	68.612
1	10	6	68.664
1	10	7	68.648
1	10	8	68.792
1	10	9	67.993
1	10	10	66.971
1	10	11	66.376
1	10	12	65.411
1	10	13	64.857
1	10	14	64.449
1	10	15	63.94
1	10	16	63.786
1	10	17	64.325
1	10	18	64.979
1	10	19	65.755
1	10	20	66.615
1	10	21	67.354
1	10	22	67.535
1	10	23	67.784
1	10	24	67.989
1	11	1	68.289
1	11	2	68.408
1	11	3	68.534
1	11	4	68.583
1	11	5	68.612
1	11	6	68.664
1	11	7	68.648
1	11	8	68.792
1	11	9	67.993
1	11	10	66.971
1	11	11	66.376
1	11	12	65.411
1	11	13	64.857
1	11	14	64.449
1	11	15	63.94
1	11	16	63.786
1	11	17	64.325
1	11	18	64.979
1	11	19	65.755
1	11	20	66.615
1	11	21	67.354
1	11	22	67.535
1	11	23	67.784

1	11	24	67.989
1	12	1	68.289
1	12	2	68.408
1	12	3	68.534
1	12	4	68.583
1	12	5	68.612
1	12	6	68.664
1	12	7	68.648
1	12	8	68.792
1	12	9	67.993
1	12	10	66.971
1	12	11	66.376
1	12	12	65.411
1	12	13	64.857
1	12	14	64.449
1	12	15	63.94
1	12	16	63.786
1	12	17	64.325
1	12	18	64.979
1	12	19	65.755
1	12	20	66.615
1	12	21	67.354
1	12	22	67.535
1	12	23	67.784
1	12	24	67.989
1	13	1	68.289
1	13	2	68.408
1	13	3	68.534
1	13	4	68.583
1	13	5	68.612
1	13	6	68.664
1	13	7	68.648
1	13	8	68.792
1	13	9	67.993
1	13	10	66.971
1	13	11	66.376
1	13	12	65.411
1	13	13	64.857
1	13	14	64.449
1	13	15	63.94
1	13	16	63.786
1	13	17	64.325
1	13	18	64.979
1	13	19	65.755
1	13	20	66.615
1	13	21	67.354
1	13	22	67.535
1	13	23	67.784
1	13	24	67.989
1	14	1	68.289
1	14	2	68.408
1	14	3	68.534
1	14	4	68.583
1	14	5	68.612
1	14	6	68.664
1	14	7	68.648
1	14	8	68.792
1	14	9	67.993
1	14	10	66.971
1	14	11	66.376
1	14	12	65.411
1	14	13	64.857
1	14	14	64.449
1	14	15	63.94
1	14	16	63.786
1	14	17	64.325
1	14	18	64.979
1	14	19	65.755
1	14	20	66.615
1	14	21	67.354
1	14	22	67.535
1	14	23	67.784
1	14	24	67.989
1	15	1	68.289
1	15	2	68.408
1	15	3	68.534
1	15	4	68.583
1	15	5	68.612
1	15	6	68.664
1	15	7	68.648
1	15	8	68.792
1	15	9	67.993
1	15	10	66.971
1	15	11	66.376
1	15	12	65.411
1	15	13	64.857
1	15	14	64.449
1	15	15	63.94

1	15	16	63.786
1	15	17	64.325
1	15	18	64.979
1	15	19	65.755
1	15	20	66.615
1	15	21	67.354
1	15	22	67.535
1	15	23	67.784
1	15	24	67.989
1	16	1	68.289
1	16	2	68.408
1	16	3	68.534
1	16	4	68.583
1	16	5	68.612
1	16	6	68.664
1	16	7	68.648
1	16	8	68.792
1	16	9	67.993
1	16	10	66.971
1	16	11	66.376
1	16	12	65.411
1	16	13	64.857
1	16	14	64.449
1	16	15	63.94
1	16	16	63.786
1	16	17	64.325
1	16	18	64.979
1	16	19	65.755
1	16	20	66.615
1	16	21	67.354
1	16	22	67.535
1	16	23	67.784
1	16	24	67.989
1	17	1	68.289
1	17	2	68.408
1	17	3	68.534
1	17	4	68.583
1	17	5	68.612
1	17	6	68.664
1	17	7	68.648
1	17	8	68.792
1	17	9	67.993
1	17	10	66.971
1	17	11	66.376
1	17	12	65.411
1	17	13	64.857
1	17	14	64.449
1	17	15	63.94
1	17	16	63.786
1	17	17	64.325
1	17	18	64.979
1	17	19	65.755
1	17	20	66.615
1	17	21	67.354
1	17	22	67.535
1	17	23	67.784
1	17	24	67.989
1	18	1	68.289
1	18	2	68.408
1	18	3	68.534
1	18	4	68.583
1	18	5	68.612
1	18	6	68.664
1	18	7	68.648
1	18	8	68.792
1	18	9	67.993
1	18	10	66.971
1	18	11	66.376
1	18	12	65.411
1	18	13	64.857
1	18	14	64.449
1	18	15	63.94
1	18	16	63.786
1	18	17	64.325
1	18	18	64.979
1	18	19	65.755
1	18	20	66.615
1	18	21	67.354
1	18	22	67.535
1	18	23	67.784
1	18	24	67.989
1	19	1	68.289
1	19	2	68.408
1	19	3	68.534
1	19	4	68.583
1	19	5	68.612
1	19	6	68.664
1	19	7	68.648

1	19	8	68.792
1	19	9	67.993
1	19	10	66.971
1	19	11	66.376
1	19	12	65.411
1	19	13	64.857
1	19	14	64.449
1	19	15	63.94
1	19	16	63.786
1	19	17	64.325
1	19	18	64.979
1	19	19	65.755
1	19	20	66.615
1	19	21	67.354
1	19	22	67.535
1	19	23	67.784
1	19	24	67.989
1	20	1	68.289
1	20	2	68.408
1	20	3	68.534
1	20	4	68.583
1	20	5	68.612
1	20	6	68.664
1	20	7	68.648
1	20	8	68.792
1	20	9	67.993
1	20	10	66.971
1	20	11	66.376
1	20	12	65.411
1	20	13	64.857
1	20	14	64.449
1	20	15	63.94
1	20	16	63.786
1	20	17	64.325
1	20	18	64.979
1	20	19	65.755
1	20	20	66.615
1	20	21	67.354
1	20	22	67.535
1	20	23	67.784
1	20	24	67.989
1	21	1	68.289
1	21	2	68.408
1	21	3	68.534
1	21	4	68.583
1	21	5	68.612
1	21	6	68.664
1	21	7	68.648
1	21	8	68.792
1	21	9	67.993
1	21	10	66.971
1	21	11	66.376
1	21	12	65.411
1	21	13	64.857
1	21	14	64.449
1	21	15	63.94
1	21	16	63.786
1	21	17	64.325
1	21	18	64.979
1	21	19	65.755
1	21	20	66.615
1	21	21	67.354
1	21	22	67.535
1	21	23	67.784
1	21	24	67.989
1	22	1	68.289
1	22	2	68.408
1	22	3	68.534
1	22	4	68.583
1	22	5	68.612
1	22	6	68.664
1	22	7	68.648
1	22	8	68.792
1	22	9	67.993
1	22	10	66.971
1	22	11	66.376
1	22	12	65.411
1	22	13	64.857
1	22	14	64.449
1	22	15	63.94
1	22	16	63.786
1	22	17	64.325
1	22	18	64.979
1	22	19	65.755
1	22	20	66.615
1	22	21	67.354
1	22	22	67.535
1	22	23	67.784

Attachment MR-3: Selected Data Request Responses

1	22	24	67.989
1	23	1	68.289
1	23	2	68.408
1	23	3	68.534
1	23	4	68.583
1	23	5	68.612
1	23	6	68.664
1	23	7	68.648
1	23	8	68.792
1	23	9	67.993
1	23	10	66.971
1	23	11	66.376
1	23	12	65.411
1	23	13	64.857
1	23	14	64.449
1	23	15	63.94
1	23	16	63.786
1	23	17	64.325
1	23	18	64.979
1	23	19	65.755
1	23	20	66.615
1	23	21	67.354
1	23	22	67.535
1	23	23	67.784
1	23	24	67.989
1	24	1	68.289
1	24	2	68.408
1	24	3	68.534
1	24	4	68.583
1	24	5	68.612
1	24	6	68.664
1	24	7	68.648
1	24	8	68.792
1	24	9	67.993
1	24	10	66.971
1	24	11	66.376
1	24	12	65.411
1	24	13	64.857
1	24	14	64.449
1	24	15	63.94
1	24	16	63.786
1	24	17	64.325
1	24	18	64.979
1	24	19	65.755
1	24	20	66.615
1	24	21	67.354
1	24	22	67.535
1	24	23	67.784
1	24	24	67.989
1	25	1	68.289
1	25	2	68.408
1	25	3	68.534
1	25	4	68.583
1	25	5	68.612
1	25	6	68.664
1	25	7	68.648
1	25	8	68.792
1	25	9	67.993
1	25	10	66.971
1	25	11	66.376
1	25	12	65.411
1	25	13	64.857
1	25	14	64.449
1	25	15	63.94
1	25	16	63.786
1	25	17	64.325
1	25	18	64.979
1	25	19	65.755
1	25	20	66.615
1	25	21	67.354
1	25	22	67.535
1	25	23	67.784
1	25	24	67.989
1	26	1	68.289
1	26	2	68.408
1	26	3	68.534
1	26	4	68.583
1	26	5	68.612
1	26	6	68.664
1	26	7	68.648
1	26	8	68.792
1	26	9	67.993
1	26	10	66.971
1	26	11	66.376
1	26	12	65.411
1	26	13	64.857
1	26	14	64.449
1	26	15	63.94

1	26	16	63.786
1	26	17	64.325
1	26	18	64.979
1	26	19	65.755
1	26	20	66.615
1	26	21	67.354
1	26	22	67.535
1	26	23	67.784
1	26	24	67.989
1	27	1	68.289
1	27	2	68.408
1	27	3	68.534
1	27	4	68.583
1	27	5	68.612
1	27	6	68.664
1	27	7	68.648
1	27	8	68.792
1	27	9	67.993
1	27	10	66.971
1	27	11	66.376
1	27	12	65.411
1	27	13	64.857
1	27	14	64.449
1	27	15	63.94
1	27	16	63.786
1	27	17	64.325
1	27	18	64.979
1	27	19	65.755
1	27	20	66.615
1	27	21	67.354
1	27	22	67.535
1	27	23	67.784
1	27	24	67.989
1	28	1	68.289
1	28	2	68.408
1	28	3	68.534
1	28	4	68.583
1	28	5	68.612
1	28	6	68.664
1	28	7	68.648
1	28	8	68.792
1	28	9	67.993
1	28	10	66.971
1	28	11	66.376
1	28	12	65.411
1	28	13	64.857
1	28	14	64.449
1	28	15	63.94
1	28	16	63.786
1	28	17	64.325
1	28	18	64.979
1	28	19	65.755
1	28	20	66.615
1	28	21	67.354
1	28	22	67.535
1	28	23	67.784
1	28	24	67.989
1	29	1	68.289
1	29	2	68.408
1	29	3	68.534
1	29	4	68.583
1	29	5	68.612
1	29	6	68.664
1	29	7	68.648
1	29	8	68.792
1	29	9	67.993
1	29	10	66.971
1	29	11	66.376
1	29	12	65.411
1	29	13	64.857
1	29	14	64.449
1	29	15	63.94
1	29	16	63.786
1	29	17	64.325
1	29	18	64.979
1	29	19	65.755
1	29	20	66.615
1	29	21	67.354
1	29	22	67.535
1	29	23	67.784
1	29	24	67.989
1	30	1	68.289
1	30	2	68.408
1	30	3	68.534
1	30	4	68.583
1	30	5	68.612
1	30	6	68.664
1	30	7	68.648

1	30	8	68.792
1	30	9	67.993
1	30	10	66.971
1	30	11	66.376
1	30	12	65.411
1	30	13	64.857
1	30	14	64.449
1	30	15	63.94
1	30	16	63.786
1	30	17	64.325
1	30	18	64.979
1	30	19	65.755
1	30	20	66.615
1	30	21	67.354
1	30	22	67.535
1	30	23	67.784
1	30	24	67.989
1	31	1	68.289
1	31	2	68.408
1	31	3	68.534
1	31	4	68.583
1	31	5	68.612
1	31	6	68.664
1	31	7	68.648
1	31	8	68.792
1	31	9	67.993
1	31	10	66.971
1	31	11	66.376
1	31	12	65.411
1	31	13	64.857
1	31	14	64.449
1	31	15	63.94
1	31	16	63.786
1	31	17	64.325
1	31	18	64.979
1	31	19	65.755
1	31	20	66.615
1	31	21	67.354
1	31	22	67.535
1	31	23	67.784
1	31	24	67.989
2	1	1	67.189
2	1	2	67.223
2	1	3	67.45
2	1	4	67.487
2	1	5	67.358
2	1	6	67.354
2	1	7	67.183
2	1	8	66.361
2	1	9	65.676
2	1	10	65.032
2	1	11	64.449
2	1	12	64.064
2	1	13	63.562
2	1	14	63.204
2	1	15	62.876
2	1	16	63.935
2	1	17	64.586
2	1	18	65.59
2	1	19	66.197
2	1	20	66.619
2	1	21	66.919
2	1	22	67.011
2	1	23	67.35
2	1	24	67.306
2	2	1	67.189
2	2	2	67.223
2	2	3	67.45
2	2	4	67.487
2	2	5	67.358
2	2	6	67.354
2	2	7	67.183
2	2	8	66.361
2	2	9	65.676
2	2	10	65.032
2	2	11	64.449
2	2	12	64.064
2	2	13	63.562
2	2	14	63.204
2	2	15	62.876
2	2	16	63.935
2	2	17	64.586
2	2	18	65.59
2	2	19	66.197
2	2	20	66.619
2	2	21	66.919
2	2	22	67.011
2	2	23	67.35

2	2	24	67.306
2	3	1	67.189
2	3	2	67.223
2	3	3	67.45
2	3	4	67.487
2	3	5	67.358
2	3	6	67.354
2	3	7	67.183
2	3	8	66.361
2	3	9	65.676
2	3	10	65.032
2	3	11	64.449
2	3	12	64.064
2	3	13	63.562
2	3	14	63.204
2	3	15	62.876
2	3	16	63.935
2	3	17	64.586
2	3	18	65.59
2	3	19	66.197
2	3	20	66.619
2	3	21	66.919
2	3	22	67.011
2	3	23	67.35
2	3	24	67.306
2	4	1	67.189
2	4	2	67.223
2	4	3	67.45
2	4	4	67.487
2	4	5	67.358
2	4	6	67.354
2	4	7	67.183
2	4	8	66.361
2	4	9	65.676
2	4	10	65.032
2	4	11	64.449
2	4	12	64.064
2	4	13	63.562
2	4	14	63.204
2	4	15	62.876
2	4	16	63.935
2	4	17	64.586
2	4	18	65.59
2	4	19	66.197
2	4	20	66.619
2	4	21	66.919
2	4	22	67.011
2	4	23	67.35
2	4	24	67.306
2	5	1	67.189
2	5	2	67.223
2	5	3	67.45
2	5	4	67.487
2	5	5	67.358
2	5	6	67.354
2	5	7	67.183
2	5	8	66.361
2	5	9	65.676
2	5	10	65.032
2	5	11	64.449
2	5	12	64.064
2	5	13	63.562
2	5	14	63.204
2	5	15	62.876
2	5	16	63.935
2	5	17	64.586
2	5	18	65.59
2	5	19	66.197
2	5	20	66.619
2	5	21	66.919
2	5	22	67.011
2	5	23	67.35
2	5	24	67.306
2	6	1	67.189
2	6	2	67.223
2	6	3	67.45
2	6	4	67.487
2	6	5	67.358
2	6	6	67.354
2	6	7	67.183
2	6	8	66.361
2	6	9	65.676
2	6	10	65.032
2	6	11	64.449
2	6	12	64.064
2	6	13	63.562
2	6	14	63.204
2	6	15	62.876

2	6	16	63.935
2	6	17	64.586
2	6	18	65.59
2	6	19	66.197
2	6	20	66.619
2	6	21	66.919
2	6	22	67.011
2	6	23	67.35
2	6	24	67.306
2	7	1	67.189
2	7	2	67.223
2	7	3	67.45
2	7	4	67.487
2	7	5	67.358
2	7	6	67.354
2	7	7	67.183
2	7	8	66.361
2	7	9	65.676
2	7	10	65.032
2	7	11	64.449
2	7	12	64.064
2	7	13	63.562
2	7	14	63.204
2	7	15	62.876
2	7	16	63.935
2	7	17	64.586
2	7	18	65.59
2	7	19	66.197
2	7	20	66.619
2	7	21	66.919
2	7	22	67.011
2	7	23	67.35
2	7	24	67.306
2	8	1	67.189
2	8	2	67.223
2	8	3	67.45
2	8	4	67.487
2	8	5	67.358
2	8	6	67.354
2	8	7	67.183
2	8	8	66.361
2	8	9	65.676
2	8	10	65.032
2	8	11	64.449
2	8	12	64.064
2	8	13	63.562
2	8	14	63.204
2	8	15	62.876
2	8	16	63.935
2	8	17	64.586
2	8	18	65.59
2	8	19	66.197
2	8	20	66.619
2	8	21	66.919
2	8	22	67.011
2	8	23	67.35
2	8	24	67.306
2	9	1	67.189
2	9	2	67.223
2	9	3	67.45
2	9	4	67.487
2	9	5	67.358
2	9	6	67.354
2	9	7	67.183
2	9	8	66.361
2	9	9	65.676
2	9	10	65.032
2	9	11	64.449
2	9	12	64.064
2	9	13	63.562
2	9	14	63.204
2	9	15	62.876
2	9	16	63.935
2	9	17	64.586
2	9	18	65.59
2	9	19	66.197
2	9	20	66.619
2	9	21	66.919
2	9	22	67.011
2	9	23	67.35
2	9	24	67.306
2	10	1	67.189
2	10	2	67.223
2	10	3	67.45
2	10	4	67.487
2	10	5	67.358
2	10	6	67.354
2	10	7	67.183

Attachment MR-3: Selected Data Request Responses

2	10	8	66.361
2	10	9	65.676
2	10	10	65.032
2	10	11	64.449
2	10	12	64.064
2	10	13	63.562
2	10	14	63.204
2	10	15	62.876
2	10	16	63.935
2	10	17	64.586
2	10	18	65.59
2	10	19	66.197
2	10	20	66.619
2	10	21	66.919
2	10	22	67.011
2	10	23	67.35
2	10	24	67.306
2	11	1	67.189
2	11	2	67.223
2	11	3	67.45
2	11	4	67.487
2	11	5	67.358
2	11	6	67.354
2	11	7	67.183
2	11	8	66.361
2	11	9	65.676
2	11	10	65.032
2	11	11	64.449
2	11	12	64.064
2	11	13	63.562
2	11	14	63.204
2	11	15	62.876
2	11	16	63.935
2	11	17	64.586
2	11	18	65.59
2	11	19	66.197
2	11	20	66.619
2	11	21	66.919
2	11	22	67.011
2	11	23	67.35
2	11	24	67.306
2	12	1	67.189
2	12	2	67.223
2	12	3	67.45
2	12	4	67.487
2	12	5	67.358
2	12	6	67.354
2	12	7	67.183
2	12	8	66.361
2	12	9	65.676
2	12	10	65.032
2	12	11	64.449
2	12	12	64.064
2	12	13	63.562
2	12	14	63.204
2	12	15	62.876
2	12	16	63.935
2	12	17	64.586
2	12	18	65.59
2	12	19	66.197
2	12	20	66.619
2	12	21	66.919
2	12	22	67.011
2	12	23	67.35
2	12	24	67.306
2	13	1	67.189
2	13	2	67.223
2	13	3	67.45
2	13	4	67.487
2	13	5	67.358
2	13	6	67.354
2	13	7	67.183
2	13	8	66.361
2	13	9	65.676
2	13	10	65.032
2	13	11	64.449
2	13	12	64.064
2	13	13	63.562
2	13	14	63.204
2	13	15	62.876
2	13	16	63.935
2	13	17	64.586
2	13	18	65.59
2	13	19	66.197
2	13	20	66.619
2	13	21	66.919
2	13	22	67.011
2	13	23	67.35

2	13	24	67.306
2	14	1	67.189
2	14	2	67.223
2	14	3	67.45
2	14	4	67.487
2	14	5	67.358
2	14	6	67.354
2	14	7	67.183
2	14	8	66.361
2	14	9	65.676
2	14	10	65.032
2	14	11	64.449
2	14	12	64.064
2	14	13	63.562
2	14	14	63.204
2	14	15	62.876
2	14	16	63.935
2	14	17	64.586
2	14	18	65.59
2	14	19	66.197
2	14	20	66.619
2	14	21	66.919
2	14	22	67.011
2	14	23	67.35
2	14	24	67.306
2	15	1	67.189
2	15	2	67.223
2	15	3	67.45
2	15	4	67.487
2	15	5	67.358
2	15	6	67.354
2	15	7	67.183
2	15	8	66.361
2	15	9	65.676
2	15	10	65.032
2	15	11	64.449
2	15	12	64.064
2	15	13	63.562
2	15	14	63.204
2	15	15	62.876
2	15	16	63.935
2	15	17	64.586
2	15	18	65.59
2	15	19	66.197
2	15	20	66.619
2	15	21	66.919
2	15	22	67.011
2	15	23	67.35
2	15	24	67.306
2	16	1	67.189
2	16	2	67.223
2	16	3	67.45
2	16	4	67.487
2	16	5	67.358
2	16	6	67.354
2	16	7	67.183
2	16	8	66.361
2	16	9	65.676
2	16	10	65.032
2	16	11	64.449
2	16	12	64.064
2	16	13	63.562
2	16	14	63.204
2	16	15	62.876
2	16	16	63.935
2	16	17	64.586
2	16	18	65.59
2	16	19	66.197
2	16	20	66.619
2	16	21	66.919
2	16	22	67.011
2	16	23	67.35
2	16	24	67.306
2	17	1	67.189
2	17	2	67.223
2	17	3	67.45
2	17	4	67.487
2	17	5	67.358
2	17	6	67.354
2	17	7	67.183
2	17	8	66.361
2	17	9	65.676
2	17	10	65.032
2	17	11	64.449
2	17	12	64.064
2	17	13	63.562
2	17	14	63.204
2	17	15	62.876

2	17	16	63.935
2	17	17	64.586
2	17	18	65.59
2	17	19	66.197
2	17	20	66.619
2	17	21	66.919
2	17	22	67.011
2	17	23	67.35
2	17	24	67.306
2	18	1	67.189
2	18	2	67.223
2	18	3	67.45
2	18	4	67.487
2	18	5	67.358
2	18	6	67.354
2	18	7	67.183
2	18	8	66.361
2	18	9	65.676
2	18	10	65.032
2	18	11	64.449
2	18	12	64.064
2	18	13	63.562
2	18	14	63.204
2	18	15	62.876
2	18	16	63.935
2	18	17	64.586
2	18	18	65.59
2	18	19	66.197
2	18	20	66.619
2	18	21	66.919
2	18	22	67.011
2	18	23	67.35
2	18	24	67.306
2	19	1	67.189
2	19	2	67.223
2	19	3	67.45
2	19	4	67.487
2	19	5	67.358
2	19	6	67.354
2	19	7	67.183
2	19	8	66.361
2	19	9	65.676
2	19	10	65.032
2	19	11	64.449
2	19	12	64.064
2	19	13	63.562
2	19	14	63.204
2	19	15	62.876
2	19	16	63.935
2	19	17	64.586
2	19	18	65.59
2	19	19	66.197
2	19	20	66.619
2	19	21	66.919
2	19	22	67.011
2	19	23	67.35
2	19	24	67.306
2	20	1	67.189
2	20	2	67.223
2	20	3	67.45
2	20	4	67.487
2	20	5	67.358
2	20	6	67.354
2	20	7	67.183
2	20	8	66.361
2	20	9	65.676
2	20	10	65.032
2	20	11	64.449
2	20	12	64.064
2	20	13	63.562
2	20	14	63.204
2	20	15	62.876
2	20	16	63.935
2	20	17	64.586
2	20	18	65.59
2	20	19	66.197
2	20	20	66.619
2	20	21	66.919
2	20	22	67.011
2	20	23	67.35
2	20	24	67.306
2	21	1	67.189
2	21	2	67.223
2	21	3	67.45
2	21	4	67.487
2	21	5	67.358
2	21	6	67.354
2	21	7	67.183

2	21	8	66.361
2	21	9	65.676
2	21	10	65.032
2	21	11	64.449
2	21	12	64.064
2	21	13	63.562
2	21	14	63.204
2	21	15	62.876
2	21	16	63.935
2	21	17	64.586
2	21	18	65.59
2	21	19	66.197
2	21	20	66.619
2	21	21	66.919
2	21	22	67.011
2	21	23	67.35
2	21	24	67.306
2	22	1	67.189
2	22	2	67.223
2	22	3	67.45
2	22	4	67.487
2	22	5	67.358
2	22	6	67.354
2	22	7	67.183
2	22	8	66.361
2	22	9	65.676
2	22	10	65.032
2	22	11	64.449
2	22	12	64.064
2	22	13	63.562
2	22	14	63.204
2	22	15	62.876
2	22	16	63.935
2	22	17	64.586
2	22	18	65.59
2	22	19	66.197
2	22	20	66.619
2	22	21	66.919
2	22	22	67.011
2	22	23	67.35
2	22	24	67.306
2	23	1	67.189
2	23	2	67.223
2	23	3	67.45
2	23	4	67.487
2	23	5	67.358
2	23	6	67.354
2	23	7	67.183
2	23	8	66.361
2	23	9	65.676
2	23	10	65.032
2	23	11	64.449
2	23	12	64.064
2	23	13	63.562
2	23	14	63.204
2	23	15	62.876
2	23	16	63.935
2	23	17	64.586
2	23	18	65.59
2	23	19	66.197
2	23	20	66.619
2	23	21	66.919
2	23	22	67.011
2	23	23	67.35
2	23	24	67.306
2	24	1	67.189
2	24	2	67.223
2	24	3	67.45
2	24	4	67.487
2	24	5	67.358
2	24	6	67.354
2	24	7	67.183
2	24	8	66.361
2	24	9	65.676
2	24	10	65.032
2	24	11	64.449
2	24	12	64.064
2	24	13	63.562
2	24	14	63.204
2	24	15	62.876
2	24	16	63.935
2	24	17	64.586
2	24	18	65.59
2	24	19	66.197
2	24	20	66.619
2	24	21	66.919
2	24	22	67.011
2	24	23	67.35

2	24	24	67.306
2	25	1	67.189
2	25	2	67.223
2	25	3	67.45
2	25	4	67.487
2	25	5	67.358
2	25	6	67.354
2	25	7	67.183
2	25	8	66.361
2	25	9	65.676
2	25	10	65.032
2	25	11	64.449
2	25	12	64.064
2	25	13	63.562
2	25	14	63.204
2	25	15	62.876
2	25	16	63.935
2	25	17	64.586
2	25	18	65.59
2	25	19	66.197
2	25	20	66.619
2	25	21	66.919
2	25	22	67.011
2	25	23	67.35
2	25	24	67.306
2	26	1	67.189
2	26	2	67.223
2	26	3	67.45
2	26	4	67.487
2	26	5	67.358
2	26	6	67.354
2	26	7	67.183
2	26	8	66.361
2	26	9	65.676
2	26	10	65.032
2	26	11	64.449
2	26	12	64.064
2	26	13	63.562
2	26	14	63.204
2	26	15	62.876
2	26	16	63.935
2	26	17	64.586
2	26	18	65.59
2	26	19	66.197
2	26	20	66.619
2	26	21	66.919
2	26	22	67.011
2	26	23	67.35
2	26	24	67.306
2	27	1	67.189
2	27	2	67.223
2	27	3	67.45
2	27	4	67.487
2	27	5	67.358
2	27	6	67.354
2	27	7	67.183
2	27	8	66.361
2	27	9	65.676
2	27	10	65.032
2	27	11	64.449
2	27	12	64.064
2	27	13	63.562
2	27	14	63.204
2	27	15	62.876
2	27	16	63.935
2	27	17	64.586
2	27	18	65.59
2	27	19	66.197
2	27	20	66.619
2	27	21	66.919
2	27	22	67.011
2	27	23	67.35
2	27	24	67.306
2	28	1	67.189
2	28	2	67.223
2	28	3	67.45
2	28	4	67.487
2	28	5	67.358
2	28	6	67.354
2	28	7	67.183
2	28	8	66.361
2	28	9	65.676
2	28	10	65.032
2	28	11	64.449
2	28	12	64.064
2	28	13	63.562
2	28	14	63.204
2	28	15	62.876

2	28	16	63.935
2	28	17	64.586
2	28	18	65.59
2	28	19	66.197
2	28	20	66.619
2	28	21	66.919
2	28	22	67.011
2	28	23	67.35
2	28	24	67.306
3	1	1	66.687
3	1	2	66.901
3	1	3	64.942
3	1	4	66.886
3	1	5	67.283
3	1	6	67.489
3	1	7	67.706
3	1	8	67.768
3	1	9	67.13
3	1	10	66.067
3	1	11	64.793
3	1	12	63.849
3	1	13	62.933
3	1	14	62.206
3	1	15	61.704
3	1	16	61.442
3	1	17	61.634
3	1	18	62.2
3	1	19	62.678
3	1	20	63.651
3	1	21	64.371
3	1	22	64.939
3	1	23	65.572
3	1	24	66.124
3	2	1	66.687
3	2	2	66.901
3	2	3	64.942
3	2	4	66.886
3	2	5	67.283
3	2	6	67.489
3	2	7	67.706
3	2	8	67.768
3	2	9	67.13
3	2	10	66.067
3	2	11	64.793
3	2	12	63.849
3	2	13	62.933
3	2	14	62.206
3	2	15	61.704
3	2	16	61.442
3	2	17	61.634
3	2	18	62.2
3	2	19	62.678
3	2	20	63.651
3	2	21	64.371
3	2	22	64.939
3	2	23	65.572
3	2	24	66.124
3	3	1	66.687
3	3	2	66.901
3	3	3	64.942
3	3	4	66.886
3	3	5	67.283
3	3	6	67.489
3	3	7	67.706
3	3	8	67.768
3	3	9	67.13
3	3	10	66.067
3	3	11	64.793
3	3	12	63.849
3	3	13	62.933
3	3	14	62.206
3	3	15	61.704
3	3	16	61.442
3	3	17	61.634
3	3	18	62.2
3	3	19	62.678
3	3	20	63.651
3	3	21	64.371
3	3	22	64.939
3	3	23	65.572
3	3	24	66.124
3	4	1	66.687
3	4	2	66.901
3	4	3	64.942
3	4	4	66.886
3	4	5	67.283
3	4	6	67.489
3	4	7	67.706

3	4	8	67.768
3	4	9	67.13
3	4	10	66.067
3	4	11	64.793
3	4	12	63.849
3	4	13	62.933
3	4	14	62.206
3	4	15	61.704
3	4	16	61.442
3	4	17	61.634
3	4	18	62.2
3	4	19	62.678
3	4	20	63.651
3	4	21	64.371
3	4	22	64.939
3	4	23	65.572
3	4	24	66.124
3	5	1	66.687
3	5	2	66.901
3	5	3	64.942
3	5	4	66.886
3	5	5	67.283
3	5	6	67.489
3	5	7	67.706
3	5	8	67.768
3	5	9	67.13
3	5	10	66.067
3	5	11	64.793
3	5	12	63.849
3	5	13	62.933
3	5	14	62.206
3	5	15	61.704
3	5	16	61.442
3	5	17	61.634
3	5	18	62.2
3	5	19	62.678
3	5	20	63.651
3	5	21	64.371
3	5	22	64.939
3	5	23	65.572
3	5	24	66.124
3	6	1	66.687
3	6	2	66.901
3	6	3	64.942
3	6	4	66.886
3	6	5	67.283
3	6	6	67.489
3	6	7	67.706
3	6	8	67.768
3	6	9	67.13
3	6	10	66.067
3	6	11	64.793
3	6	12	63.849
3	6	13	62.933
3	6	14	62.206
3	6	15	61.704
3	6	16	61.442
3	6	17	61.634
3	6	18	62.2
3	6	19	62.678
3	6	20	63.651
3	6	21	64.371
3	6	22	64.939
3	6	23	65.572
3	6	24	66.124
3	7	1	66.687
3	7	2	66.901
3	7	3	64.942
3	7	4	66.886
3	7	5	67.283
3	7	6	67.489
3	7	7	67.706
3	7	8	67.768
3	7	9	67.13
3	7	10	66.067
3	7	11	64.793
3	7	12	63.849
3	7	13	62.933
3	7	14	62.206
3	7	15	61.704
3	7	16	61.442
3	7	17	61.634
3	7	18	62.2
3	7	19	62.678
3	7	20	63.651
3	7	21	64.371
3	7	22	64.939
3	7	23	65.572

3	7	24	66.124
3	8	1	66.687
3	8	2	66.901
3	8	3	64.942
3	8	4	66.886
3	8	5	67.283
3	8	6	67.489
3	8	7	67.706
3	8	8	67.768
3	8	9	67.13
3	8	10	66.067
3	8	11	64.793
3	8	12	63.849
3	8	13	62.933
3	8	14	62.206
3	8	15	61.704
3	8	16	61.442
3	8	17	61.634
3	8	18	62.2
3	8	19	62.678
3	8	20	63.651
3	8	21	64.371
3	8	22	64.939
3	8	23	65.572
3	8	24	66.124
3	9	1	66.687
3	9	2	66.901
3	9	3	64.942
3	9	4	66.886
3	9	5	67.283
3	9	6	67.489
3	9	7	67.706
3	9	8	67.768
3	9	9	67.13
3	9	10	66.067
3	9	11	64.793
3	9	12	63.849
3	9	13	62.933
3	9	14	62.206
3	9	15	61.704
3	9	16	61.442
3	9	17	61.634
3	9	18	62.2
3	9	19	62.678
3	9	20	63.651
3	9	21	64.371
3	9	22	64.939
3	9	23	65.572
3	9	24	66.124
3	10	1	66.687
3	10	2	66.901
3	10	3	64.942
3	10	4	66.886
3	10	5	67.283
3	10	6	67.489
3	10	7	67.706
3	10	8	67.768
3	10	9	67.13
3	10	10	66.067
3	10	11	64.793
3	10	12	63.849
3	10	13	62.933
3	10	14	62.206
3	10	15	61.704
3	10	16	61.442
3	10	17	61.634
3	10	18	62.2
3	10	19	62.678
3	10	20	63.651
3	10	21	64.371
3	10	22	64.939
3	10	23	65.572
3	10	24	66.124
3	11	1	66.687
3	11	2	66.901
3	11	3	64.942
3	11	4	66.886
3	11	5	67.283
3	11	6	67.489
3	11	7	67.706
3	11	8	67.768
3	11	9	67.13
3	11	10	66.067
3	11	11	64.793
3	11	12	63.849
3	11	13	62.933
3	11	14	62.206
3	11	15	61.704

3	11	16	61.442
3	11	17	61.634
3	11	18	62.2
3	11	19	62.678
3	11	20	63.651
3	11	21	64.371
3	11	22	64.939
3	11	23	65.572
3	11	24	66.124
3	12	1	66.687
3	12	2	66.901
3	12	3	64.942
3	12	4	66.886
3	12	5	67.283
3	12	6	67.489
3	12	7	67.706
3	12	8	67.768
3	12	9	67.13
3	12	10	66.067
3	12	11	64.793
3	12	12	63.849
3	12	13	62.933
3	12	14	62.206
3	12	15	61.704
3	12	16	61.442
3	12	17	61.634
3	12	18	62.2
3	12	19	62.678
3	12	20	63.651
3	12	21	64.371
3	12	22	64.939
3	12	23	65.572
3	12	24	66.124
3	13	1	66.687
3	13	2	66.901
3	13	3	64.942
3	13	4	66.886
3	13	5	67.283
3	13	6	67.489
3	13	7	67.706
3	13	8	67.768
3	13	9	67.13
3	13	10	66.067
3	13	11	64.793
3	13	12	63.849
3	13	13	62.933
3	13	14	62.206
3	13	15	61.704
3	13	16	61.442
3	13	17	61.634
3	13	18	62.2
3	13	19	62.678
3	13	20	63.651
3	13	21	64.371
3	13	22	64.939
3	13	23	65.572
3	13	24	66.124
3	14	1	66.687
3	14	2	66.901
3	14	3	64.942
3	14	4	66.886
3	14	5	67.283
3	14	6	67.489
3	14	7	67.706
3	14	8	67.768
3	14	9	67.13
3	14	10	66.067
3	14	11	64.793
3	14	12	63.849
3	14	13	62.933
3	14	14	62.206
3	14	15	61.704
3	14	16	61.442
3	14	17	61.634
3	14	18	62.2
3	14	19	62.678
3	14	20	63.651
3	14	21	64.371
3	14	22	64.939
3	14	23	65.572
3	14	24	66.124
3	15	1	66.687
3	15	2	66.901
3	15	3	64.942
3	15	4	66.886
3	15	5	67.283
3	15	6	67.489
3	15	7	67.706

3	15	8	67.768
3	15	9	67.13
3	15	10	66.067
3	15	11	64.793
3	15	12	63.849
3	15	13	62.933
3	15	14	62.206
3	15	15	61.704
3	15	16	61.442
3	15	17	61.634
3	15	18	62.2
3	15	19	62.678
3	15	20	63.651
3	15	21	64.371
3	15	22	64.939
3	15	23	65.572
3	15	24	66.124
3	16	1	66.687
3	16	2	66.901
3	16	3	64.942
3	16	4	66.886
3	16	5	67.283
3	16	6	67.489
3	16	7	67.706
3	16	8	67.768
3	16	9	67.13
3	16	10	66.067
3	16	11	64.793
3	16	12	63.849
3	16	13	62.933
3	16	14	62.206
3	16	15	61.704
3	16	16	61.442
3	16	17	61.634
3	16	18	62.2
3	16	19	62.678
3	16	20	63.651
3	16	21	64.371
3	16	22	64.939
3	16	23	65.572
3	16	24	66.124
3	17	1	66.687
3	17	2	66.901
3	17	3	64.942
3	17	4	66.886
3	17	5	67.283
3	17	6	67.489
3	17	7	67.706
3	17	8	67.768
3	17	9	67.13
3	17	10	66.067
3	17	11	64.793
3	17	12	63.849
3	17	13	62.933
3	17	14	62.206
3	17	15	61.704
3	17	16	61.442
3	17	17	61.634
3	17	18	62.2
3	17	19	62.678
3	17	20	63.651
3	17	21	64.371
3	17	22	64.939
3	17	23	65.572
3	17	24	66.124
3	18	1	66.687
3	18	2	66.901
3	18	3	64.942
3	18	4	66.886
3	18	5	67.283
3	18	6	67.489
3	18	7	67.706
3	18	8	67.768
3	18	9	67.13
3	18	10	66.067
3	18	11	64.793
3	18	12	63.849
3	18	13	62.933
3	18	14	62.206
3	18	15	61.704
3	18	16	61.442
3	18	17	61.634
3	18	18	62.2
3	18	19	62.678
3	18	20	63.651
3	18	21	64.371
3	18	22	64.939
3	18	23	65.572

3	18	24	66.124
3	19	1	66.687
3	19	2	66.901
3	19	3	64.942
3	19	4	66.886
3	19	5	67.283
3	19	6	67.489
3	19	7	67.706
3	19	8	67.768
3	19	9	67.13
3	19	10	66.067
3	19	11	64.793
3	19	12	63.849
3	19	13	62.933
3	19	14	62.206
3	19	15	61.704
3	19	16	61.442
3	19	17	61.634
3	19	18	62.2
3	19	19	62.678
3	19	20	63.651
3	19	21	64.371
3	19	22	64.939
3	19	23	65.572
3	19	24	66.124
3	20	1	66.687
3	20	2	66.901
3	20	3	64.942
3	20	4	66.886
3	20	5	67.283
3	20	6	67.489
3	20	7	67.706
3	20	8	67.768
3	20	9	67.13
3	20	10	66.067
3	20	11	64.793
3	20	12	63.849
3	20	13	62.933
3	20	14	62.206
3	20	15	61.704
3	20	16	61.442
3	20	17	61.634
3	20	18	62.2
3	20	19	62.678
3	20	20	63.651
3	20	21	64.371
3	20	22	64.939
3	20	23	65.572
3	20	24	66.124
3	21	1	66.687
3	21	2	66.901
3	21	3	64.942
3	21	4	66.886
3	21	5	67.283
3	21	6	67.489
3	21	7	67.706
3	21	8	67.768
3	21	9	67.13
3	21	10	66.067
3	21	11	64.793
3	21	12	63.849
3	21	13	62.933
3	21	14	62.206
3	21	15	61.704
3	21	16	61.442
3	21	17	61.634
3	21	18	62.2
3	21	19	62.678
3	21	20	63.651
3	21	21	64.371
3	21	22	64.939
3	21	23	65.572
3	21	24	66.124
3	22	1	66.687
3	22	2	66.901
3	22	3	64.942
3	22	4	66.886
3	22	5	67.283
3	22	6	67.489
3	22	7	67.706
3	22	8	67.768
3	22	9	67.13
3	22	10	66.067
3	22	11	64.793
3	22	12	63.849
3	22	13	62.933
3	22	14	62.206
3	22	15	61.704

3	22	16	61.442
3	22	17	61.634
3	22	18	62.2
3	22	19	62.678
3	22	20	63.651
3	22	21	64.371
3	22	22	64.939
3	22	23	65.572
3	22	24	66.124
3	23	1	66.687
3	23	2	66.901
3	23	3	64.942
3	23	4	66.886
3	23	5	67.283
3	23	6	67.489
3	23	7	67.706
3	23	8	67.768
3	23	9	67.13
3	23	10	66.067
3	23	11	64.793
3	23	12	63.849
3	23	13	62.933
3	23	14	62.206
3	23	15	61.704
3	23	16	61.442
3	23	17	61.634
3	23	18	62.2
3	23	19	62.678
3	23	20	63.651
3	23	21	64.371
3	23	22	64.939
3	23	23	65.572
3	23	24	66.124
3	24	1	66.687
3	24	2	66.901
3	24	3	64.942
3	24	4	66.886
3	24	5	67.283
3	24	6	67.489
3	24	7	67.706
3	24	8	67.768
3	24	9	67.13
3	24	10	66.067
3	24	11	64.793
3	24	12	63.849
3	24	13	62.933
3	24	14	62.206
3	24	15	61.704
3	24	16	61.442
3	24	17	61.634
3	24	18	62.2
3	24	19	62.678
3	24	20	63.651
3	24	21	64.371
3	24	22	64.939
3	24	23	65.572
3	24	24	66.124
3	25	1	66.687
3	25	2	66.901
3	25	3	64.942
3	25	4	66.886
3	25	5	67.283
3	25	6	67.489
3	25	7	67.706
3	25	8	67.768
3	25	9	67.13
3	25	10	66.067
3	25	11	64.793
3	25	12	63.849
3	25	13	62.933
3	25	14	62.206
3	25	15	61.704
3	25	16	61.442
3	25	17	61.634
3	25	18	62.2
3	25	19	62.678
3	25	20	63.651
3	25	21	64.371
3	25	22	64.939
3	25	23	65.572
3	25	24	66.124
3	26	1	66.687
3	26	2	66.901
3	26	3	64.942
3	26	4	66.886
3	26	5	67.283
3	26	6	67.489
3	26	7	67.706

3	26	8	67.768
3	26	9	67.13
3	26	10	66.067
3	26	11	64.793
3	26	12	63.849
3	26	13	62.933
3	26	14	62.206
3	26	15	61.704
3	26	16	61.442
3	26	17	61.634
3	26	18	62.2
3	26	19	62.678
3	26	20	63.651
3	26	21	64.371
3	26	22	64.939
3	26	23	65.572
3	26	24	66.124
3	27	1	66.687
3	27	2	66.901
3	27	3	64.942
3	27	4	66.886
3	27	5	67.283
3	27	6	67.489
3	27	7	67.706
3	27	8	67.768
3	27	9	67.13
3	27	10	66.067
3	27	11	64.793
3	27	12	63.849
3	27	13	62.933
3	27	14	62.206
3	27	15	61.704
3	27	16	61.442
3	27	17	61.634
3	27	18	62.2
3	27	19	62.678
3	27	20	63.651
3	27	21	64.371
3	27	22	64.939
3	27	23	65.572
3	27	24	66.124
3	28	1	66.687
3	28	2	66.901
3	28	3	64.942
3	28	4	66.886
3	28	5	67.283
3	28	6	67.489
3	28	7	67.706
3	28	8	67.768
3	28	9	67.13
3	28	10	66.067
3	28	11	64.793
3	28	12	63.849
3	28	13	62.933
3	28	14	62.206
3	28	15	61.704
3	28	16	61.442
3	28	17	61.634
3	28	18	62.2
3	28	19	62.678
3	28	20	63.651
3	28	21	64.371
3	28	22	64.939
3	28	23	65.572
3	28	24	66.124
3	29	1	66.687
3	29	2	66.901
3	29	3	64.942
3	29	4	66.886
3	29	5	67.283
3	29	6	67.489
3	29	7	67.706
3	29	8	67.768
3	29	9	67.13
3	29	10	66.067
3	29	11	64.793
3	29	12	63.849
3	29	13	62.933
3	29	14	62.206
3	29	15	61.704
3	29	16	61.442
3	29	17	61.634
3	29	18	62.2
3	29	19	62.678
3	29	20	63.651
3	29	21	64.371
3	29	22	64.939
3	29	23	65.572

3	29	24	66.124
3	30	1	66.687
3	30	2	66.901
3	30	3	64.942
3	30	4	66.886
3	30	5	67.283
3	30	6	67.489
3	30	7	67.706
3	30	8	67.768
3	30	9	67.13
3	30	10	66.067
3	30	11	64.793
3	30	12	63.849
3	30	13	62.933
3	30	14	62.206
3	30	15	61.704
3	30	16	61.442
3	30	17	61.634
3	30	18	62.2
3	30	19	62.678
3	30	20	63.651
3	30	21	64.371
3	30	22	64.939
3	30	23	65.572
3	30	24	66.124
3	31	1	66.687
3	31	2	66.901
3	31	3	64.942
3	31	4	66.886
3	31	5	67.283
3	31	6	67.489
3	31	7	67.706
3	31	8	67.768
3	31	9	67.13
3	31	10	66.067
3	31	11	64.793
3	31	12	63.849
3	31	13	62.933
3	31	14	62.206
3	31	15	61.704
3	31	16	61.442
3	31	17	61.634
3	31	18	62.2
3	31	19	62.678
3	31	20	63.651
3	31	21	64.371
3	31	22	64.939
3	31	23	65.572
3	31	24	66.124
4	1	1	61.262
4	1	2	61.736
4	1	3	62.096
4	1	4	62.582
4	1	5	62.92
4	1	6	62.915
4	1	7	61.833
4	1	8	60.068
4	1	9	58.559
4	1	10	57.195
4	1	11	55.942
4	1	12	54.894
4	1	13	54.161
4	1	14	53.521
4	1	15	53.116
4	1	16	53.32
4	1	17	53.62
4	1	18	54.403
4	1	19	55.728
4	1	20	57.189
4	1	21	58.403
4	1	22	59.179
4	1	23	60.155
4	1	24	60.792
4	2	1	61.262
4	2	2	61.736
4	2	3	62.096
4	2	4	62.582
4	2	5	62.92
4	2	6	62.915
4	2	7	61.833
4	2	8	60.068
4	2	9	58.559
4	2	10	57.195
4	2	11	55.942
4	2	12	54.894
4	2	13	54.161
4	2	14	53.521
4	2	15	53.116

4	2	16	53.32
4	2	17	53.62
4	2	18	54.403
4	2	19	55.728
4	2	20	57.189
4	2	21	58.403
4	2	22	59.179
4	2	23	60.155
4	2	24	60.792
4	3	1	61.262
4	3	2	61.736
4	3	3	62.096
4	3	4	62.582
4	3	5	62.92
4	3	6	62.915
4	3	7	61.833
4	3	8	60.068
4	3	9	58.559
4	3	10	57.195
4	3	11	55.942
4	3	12	54.894
4	3	13	54.161
4	3	14	53.521
4	3	15	53.116
4	3	16	53.32
4	3	17	53.62
4	3	18	54.403
4	3	19	55.728
4	3	20	57.189
4	3	21	58.403
4	3	22	59.179
4	3	23	60.155
4	3	24	60.792
4	4	1	61.262
4	4	2	61.736
4	4	3	62.096
4	4	4	62.582
4	4	5	62.92
4	4	6	62.915
4	4	7	61.833
4	4	8	60.068
4	4	9	58.559
4	4	10	57.195
4	4	11	55.942
4	4	12	54.894
4	4	13	54.161
4	4	14	53.521
4	4	15	53.116
4	4	16	53.32
4	4	17	53.62
4	4	18	54.403
4	4	19	55.728
4	4	20	57.189
4	4	21	58.403
4	4	22	59.179
4	4	23	60.155
4	4	24	60.792
4	5	1	61.262
4	5	2	61.736
4	5	3	62.096
4	5	4	62.582
4	5	5	62.92
4	5	6	62.915
4	5	7	61.833
4	5	8	60.068
4	5	9	58.559
4	5	10	57.195
4	5	11	55.942
4	5	12	54.894
4	5	13	54.161
4	5	14	53.521
4	5	15	53.116
4	5	16	53.32
4	5	17	53.62
4	5	18	54.403
4	5	19	55.728
4	5	20	57.189
4	5	21	58.403
4	5	22	59.179
4	5	23	60.155
4	5	24	60.792
4	6	1	61.262
4	6	2	61.736
4	6	3	62.096
4	6	4	62.582
4	6	5	62.92
4	6	6	62.915
4	6	7	61.833

4	6	8	60.068
4	6	9	58.559
4	6	10	57.195
4	6	11	55.942
4	6	12	54.894
4	6	13	54.161
4	6	14	53.521
4	6	15	53.116
4	6	16	53.32
4	6	17	53.62
4	6	18	54.403
4	6	19	55.728
4	6	20	57.189
4	6	21	58.403
4	6	22	59.179
4	6	23	60.155
4	6	24	60.792
4	7	1	61.262
4	7	2	61.736
4	7	3	62.096
4	7	4	62.582
4	7	5	62.92
4	7	6	62.915
4	7	7	61.833
4	7	8	60.068
4	7	9	58.559
4	7	10	57.195
4	7	11	55.942
4	7	12	54.894
4	7	13	54.161
4	7	14	53.521
4	7	15	53.116
4	7	16	53.32
4	7	17	53.62
4	7	18	54.403
4	7	19	55.728
4	7	20	57.189
4	7	21	58.403
4	7	22	59.179
4	7	23	60.155
4	7	24	60.792
4	8	1	61.262
4	8	2	61.736
4	8	3	62.096
4	8	4	62.582
4	8	5	62.92
4	8	6	62.915
4	8	7	61.833
4	8	8	60.068
4	8	9	58.559
4	8	10	57.195
4	8	11	55.942
4	8	12	54.894
4	8	13	54.161
4	8	14	53.521
4	8	15	53.116
4	8	16	53.32
4	8	17	53.62
4	8	18	54.403
4	8	19	55.728
4	8	20	57.189
4	8	21	58.403
4	8	22	59.179
4	8	23	60.155
4	8	24	60.792
4	9	1	61.262
4	9	2	61.736
4	9	3	62.096
4	9	4	62.582
4	9	5	62.92
4	9	6	62.915
4	9	7	61.833
4	9	8	60.068
4	9	9	58.559
4	9	10	57.195
4	9	11	55.942
4	9	12	54.894
4	9	13	54.161
4	9	14	53.521
4	9	15	53.116
4	9	16	53.32
4	9	17	53.62
4	9	18	54.403
4	9	19	55.728
4	9	20	57.189
4	9	21	58.403
4	9	22	59.179
4	9	23	60.155

4	9	24	60.792
4	10	1	61.262
4	10	2	61.736
4	10	3	62.096
4	10	4	62.582
4	10	5	62.92
4	10	6	62.915
4	10	7	61.833
4	10	8	60.068
4	10	9	58.559
4	10	10	57.195
4	10	11	55.942
4	10	12	54.894
4	10	13	54.161
4	10	14	53.521
4	10	15	53.116
4	10	16	53.32
4	10	17	53.62
4	10	18	54.403
4	10	19	55.728
4	10	20	57.189
4	10	21	58.403
4	10	22	59.179
4	10	23	60.155
4	10	24	60.792
4	11	1	61.262
4	11	2	61.736
4	11	3	62.096
4	11	4	62.582
4	11	5	62.92
4	11	6	62.915
4	11	7	61.833
4	11	8	60.068
4	11	9	58.559
4	11	10	57.195
4	11	11	55.942
4	11	12	54.894
4	11	13	54.161
4	11	14	53.521
4	11	15	53.116
4	11	16	53.32
4	11	17	53.62
4	11	18	54.403
4	11	19	55.728
4	11	20	57.189
4	11	21	58.403
4	11	22	59.179
4	11	23	60.155
4	11	24	60.792
4	12	1	61.262
4	12	2	61.736
4	12	3	62.096
4	12	4	62.582
4	12	5	62.92
4	12	6	62.915
4	12	7	61.833
4	12	8	60.068
4	12	9	58.559
4	12	10	57.195
4	12	11	55.942
4	12	12	54.894
4	12	13	54.161
4	12	14	53.521
4	12	15	53.116
4	12	16	53.32
4	12	17	53.62
4	12	18	54.403
4	12	19	55.728
4	12	20	57.189
4	12	21	58.403
4	12	22	59.179
4	12	23	60.155
4	12	24	60.792
4	13	1	61.262
4	13	2	61.736
4	13	3	62.096
4	13	4	62.582
4	13	5	62.92
4	13	6	62.915
4	13	7	61.833
4	13	8	60.068
4	13	9	58.559
4	13	10	57.195
4	13	11	55.942
4	13	12	54.894
4	13	13	54.161
4	13	14	53.521
4	13	15	53.116

4	13	16	53.32
4	13	17	53.62
4	13	18	54.403
4	13	19	55.728
4	13	20	57.189
4	13	21	58.403
4	13	22	59.179
4	13	23	60.155
4	13	24	60.792
4	14	1	61.262
4	14	2	61.736
4	14	3	62.096
4	14	4	62.582
4	14	5	62.92
4	14	6	62.915
4	14	7	61.833
4	14	8	60.068
4	14	9	58.559
4	14	10	57.195
4	14	11	55.942
4	14	12	54.894
4	14	13	54.161
4	14	14	53.521
4	14	15	53.116
4	14	16	53.32
4	14	17	53.62
4	14	18	54.403
4	14	19	55.728
4	14	20	57.189
4	14	21	58.403
4	14	22	59.179
4	14	23	60.155
4	14	24	60.792
4	15	1	61.262
4	15	2	61.736
4	15	3	62.096
4	15	4	62.582
4	15	5	62.92
4	15	6	62.915
4	15	7	61.833
4	15	8	60.068
4	15	9	58.559
4	15	10	57.195
4	15	11	55.942
4	15	12	54.894
4	15	13	54.161
4	15	14	53.521
4	15	15	53.116
4	15	16	53.32
4	15	17	53.62
4	15	18	54.403
4	15	19	55.728
4	15	20	57.189
4	15	21	58.403
4	15	22	59.179
4	15	23	60.155
4	15	24	60.792
4	16	1	61.262
4	16	2	61.736
4	16	3	62.096
4	16	4	62.582
4	16	5	62.92
4	16	6	62.915
4	16	7	61.833
4	16	8	60.068
4	16	9	58.559
4	16	10	57.195
4	16	11	55.942
4	16	12	54.894
4	16	13	54.161
4	16	14	53.521
4	16	15	53.116
4	16	16	53.32
4	16	17	53.62
4	16	18	54.403
4	16	19	55.728
4	16	20	57.189
4	16	21	58.403
4	16	22	59.179
4	16	23	60.155
4	16	24	60.792
4	17	1	61.262
4	17	2	61.736
4	17	3	62.096
4	17	4	62.582
4	17	5	62.92
4	17	6	62.915
4	17	7	61.833

4	17	8	60.068
4	17	9	58.559
4	17	10	57.195
4	17	11	55.942
4	17	12	54.894
4	17	13	54.161
4	17	14	53.521
4	17	15	53.116
4	17	16	53.32
4	17	17	53.62
4	17	18	54.403
4	17	19	55.728
4	17	20	57.189
4	17	21	58.403
4	17	22	59.179
4	17	23	60.155
4	17	24	60.792
4	18	1	61.262
4	18	2	61.736
4	18	3	62.096
4	18	4	62.582
4	18	5	62.92
4	18	6	62.915
4	18	7	61.833
4	18	8	60.068
4	18	9	58.559
4	18	10	57.195
4	18	11	55.942
4	18	12	54.894
4	18	13	54.161
4	18	14	53.521
4	18	15	53.116
4	18	16	53.32
4	18	17	53.62
4	18	18	54.403
4	18	19	55.728
4	18	20	57.189
4	18	21	58.403
4	18	22	59.179
4	18	23	60.155
4	18	24	60.792
4	19	1	61.262
4	19	2	61.736
4	19	3	62.096
4	19	4	62.582
4	19	5	62.92
4	19	6	62.915
4	19	7	61.833
4	19	8	60.068
4	19	9	58.559
4	19	10	57.195
4	19	11	55.942
4	19	12	54.894
4	19	13	54.161
4	19	14	53.521
4	19	15	53.116
4	19	16	53.32
4	19	17	53.62
4	19	18	54.403
4	19	19	55.728
4	19	20	57.189
4	19	21	58.403
4	19	22	59.179
4	19	23	60.155
4	19	24	60.792
4	20	1	61.262
4	20	2	61.736
4	20	3	62.096
4	20	4	62.582
4	20	5	62.92
4	20	6	62.915
4	20	7	61.833
4	20	8	60.068
4	20	9	58.559
4	20	10	57.195
4	20	11	55.942
4	20	12	54.894
4	20	13	54.161
4	20	14	53.521
4	20	15	53.116
4	20	16	53.32
4	20	17	53.62
4	20	18	54.403
4	20	19	55.728
4	20	20	57.189
4	20	21	58.403
4	20	22	59.179
4	20	23	60.155

4	20	24	60.792
4	21	1	61.262
4	21	2	61.736
4	21	3	62.096
4	21	4	62.582
4	21	5	62.92
4	21	6	62.915
4	21	7	61.833
4	21	8	60.068
4	21	9	58.559
4	21	10	57.195
4	21	11	55.942
4	21	12	54.894
4	21	13	54.161
4	21	14	53.521
4	21	15	53.116
4	21	16	53.32
4	21	17	53.62
4	21	18	54.403
4	21	19	55.728
4	21	20	57.189
4	21	21	58.403
4	21	22	59.179
4	21	23	60.155
4	21	24	60.792
4	22	1	61.262
4	22	2	61.736
4	22	3	62.096
4	22	4	62.582
4	22	5	62.92
4	22	6	62.915
4	22	7	61.833
4	22	8	60.068
4	22	9	58.559
4	22	10	57.195
4	22	11	55.942
4	22	12	54.894
4	22	13	54.161
4	22	14	53.521
4	22	15	53.116
4	22	16	53.32
4	22	17	53.62
4	22	18	54.403
4	22	19	55.728
4	22	20	57.189
4	22	21	58.403
4	22	22	59.179
4	22	23	60.155
4	22	24	60.792
4	23	1	61.262
4	23	2	61.736
4	23	3	62.096
4	23	4	62.582
4	23	5	62.92
4	23	6	62.915
4	23	7	61.833
4	23	8	60.068
4	23	9	58.559
4	23	10	57.195
4	23	11	55.942
4	23	12	54.894
4	23	13	54.161
4	23	14	53.521
4	23	15	53.116
4	23	16	53.32
4	23	17	53.62
4	23	18	54.403
4	23	19	55.728
4	23	20	57.189
4	23	21	58.403
4	23	22	59.179
4	23	23	60.155
4	23	24	60.792
4	24	1	61.262
4	24	2	61.736
4	24	3	62.096
4	24	4	62.582
4	24	5	62.92
4	24	6	62.915
4	24	7	61.833
4	24	8	60.068
4	24	9	58.559
4	24	10	57.195
4	24	11	55.942
4	24	12	54.894
4	24	13	54.161
4	24	14	53.521
4	24	15	53.116

4	24	16	53.32
4	24	17	53.62
4	24	18	54.403
4	24	19	55.728
4	24	20	57.189
4	24	21	58.403
4	24	22	59.179
4	24	23	60.155
4	24	24	60.792
4	25	1	61.262
4	25	2	61.736
4	25	3	62.096
4	25	4	62.582
4	25	5	62.92
4	25	6	62.915
4	25	7	61.833
4	25	8	60.068
4	25	9	58.559
4	25	10	57.195
4	25	11	55.942
4	25	12	54.894
4	25	13	54.161
4	25	14	53.521
4	25	15	53.116
4	25	16	53.32
4	25	17	53.62
4	25	18	54.403
4	25	19	55.728
4	25	20	57.189
4	25	21	58.403
4	25	22	59.179
4	25	23	60.155
4	25	24	60.792
4	26	1	61.262
4	26	2	61.736
4	26	3	62.096
4	26	4	62.582
4	26	5	62.92
4	26	6	62.915
4	26	7	61.833
4	26	8	60.068
4	26	9	58.559
4	26	10	57.195
4	26	11	55.942
4	26	12	54.894
4	26	13	54.161
4	26	14	53.521
4	26	15	53.116
4	26	16	53.32
4	26	17	53.62
4	26	18	54.403
4	26	19	55.728
4	26	20	57.189
4	26	21	58.403
4	26	22	59.179
4	26	23	60.155
4	26	24	60.792
4	27	1	61.262
4	27	2	61.736
4	27	3	62.096
4	27	4	62.582
4	27	5	62.92
4	27	6	62.915
4	27	7	61.833
4	27	8	60.068
4	27	9	58.559
4	27	10	57.195
4	27	11	55.942
4	27	12	54.894
4	27	13	54.161
4	27	14	53.521
4	27	15	53.116
4	27	16	53.32
4	27	17	53.62
4	27	18	54.403
4	27	19	55.728
4	27	20	57.189
4	27	21	58.403
4	27	22	59.179
4	27	23	60.155
4	27	24	60.792
4	28	1	61.262
4	28	2	61.736
4	28	3	62.096
4	28	4	62.582
4	28	5	62.92
4	28	6	62.915
4	28	7	61.833

4	28	8	60.068
4	28	9	58.559
4	28	10	57.195
4	28	11	55.942
4	28	12	54.894
4	28	13	54.161
4	28	14	53.521
4	28	15	53.116
4	28	16	53.32
4	28	17	53.62
4	28	18	54.403
4	28	19	55.728
4	28	20	57.189
4	28	21	58.403
4	28	22	59.179
4	28	23	60.155
4	28	24	60.792
4	29	1	61.262
4	29	2	61.736
4	29	3	62.096
4	29	4	62.582
4	29	5	62.92
4	29	6	62.915
4	29	7	61.833
4	29	8	60.068
4	29	9	58.559
4	29	10	57.195
4	29	11	55.942
4	29	12	54.894
4	29	13	54.161
4	29	14	53.521
4	29	15	53.116
4	29	16	53.32
4	29	17	53.62
4	29	18	54.403
4	29	19	55.728
4	29	20	57.189
4	29	21	58.403
4	29	22	59.179
4	29	23	60.155
4	29	24	60.792
4	30	1	61.262
4	30	2	61.736
4	30	3	62.096
4	30	4	62.582
4	30	5	62.92
4	30	6	62.915
4	30	7	61.833
4	30	8	60.068
4	30	9	58.559
4	30	10	57.195
4	30	11	55.942
4	30	12	54.894
4	30	13	54.161
4	30	14	53.521
4	30	15	53.116
4	30	16	53.32
4	30	17	53.62
4	30	18	54.403
4	30	19	55.728
4	30	20	57.189
4	30	21	58.403
4	30	22	59.179
4	30	23	60.155
4	30	24	60.807
5	1	1	61.28
5	1	2	61.765
5	1	3	62.132
5	1	4	62.68
5	1	5	63.04
5	1	6	63.059
5	1	7	61.822
5	1	8	60.227
5	1	9	58.79
5	1	10	57.589
5	1	11	56.514
5	1	12	55.583
5	1	13	54.959
5	1	14	54.643
5	1	15	54.2
5	1	16	53.86
5	1	17	53.94
5	1	18	54.495
5	1	19	55.473
5	1	20	56.987
5	1	21	58.08
5	1	22	59.158
5	1	23	59.998

Attachment MR-3: Selected Data Request Responses

5	1	24	60.807
5	2	1	61.28
5	2	2	61.765
5	2	3	62.132
5	2	4	62.68
5	2	5	63.04
5	2	6	63.059
5	2	7	61.822
5	2	8	60.227
5	2	9	58.79
5	2	10	57.589
5	2	11	56.514
5	2	12	55.583
5	2	13	54.959
5	2	14	54.643
5	2	15	54.2
5	2	16	53.86
5	2	17	53.94
5	2	18	54.495
5	2	19	55.473
5	2	20	56.987
5	2	21	58.08
5	2	22	59.158
5	2	23	59.998
5	2	24	60.807
5	3	1	61.28
5	3	2	61.765
5	3	3	62.132
5	3	4	62.68
5	3	5	63.04
5	3	6	63.059
5	3	7	61.822
5	3	8	60.227
5	3	9	58.79
5	3	10	57.589
5	3	11	56.514
5	3	12	55.583
5	3	13	54.959
5	3	14	54.643
5	3	15	54.2
5	3	16	53.86
5	3	17	53.94
5	3	18	54.495
5	3	19	55.473
5	3	20	56.987
5	3	21	58.08
5	3	22	59.158
5	3	23	59.998
5	3	24	60.807
5	4	1	61.28
5	4	2	61.765
5	4	3	62.132
5	4	4	62.68
5	4	5	63.04
5	4	6	63.059
5	4	7	61.822
5	4	8	60.227
5	4	9	58.79
5	4	10	57.589
5	4	11	56.514
5	4	12	55.583
5	4	13	54.959
5	4	14	54.643
5	4	15	54.2
5	4	16	53.86
5	4	17	53.94
5	4	18	54.495
5	4	19	55.473
5	4	20	56.987
5	4	21	58.08
5	4	22	59.158
5	4	23	59.998
5	4	24	60.807
5	5	1	61.28
5	5	2	61.765
5	5	3	62.132
5	5	4	62.68
5	5	5	63.04
5	5	6	63.059
5	5	7	61.822
5	5	8	60.227
5	5	9	58.79
5	5	10	57.589
5	5	11	56.514
5	5	12	55.583
5	5	13	54.959
5	5	14	54.643
5	5	15	54.2

5	5	16	53.86
5	5	17	53.94
5	5	18	54.495
5	5	19	55.473
5	5	20	56.987
5	5	21	58.08
5	5	22	59.158
5	5	23	59.998
5	5	24	60.807
5	6	1	61.28
5	6	2	61.765
5	6	3	62.132
5	6	4	62.68
5	6	5	63.04
5	6	6	63.059
5	6	7	61.822
5	6	8	60.227
5	6	9	58.79
5	6	10	57.589
5	6	11	56.514
5	6	12	55.583
5	6	13	54.959
5	6	14	54.643
5	6	15	54.2
5	6	16	53.86
5	6	17	53.94
5	6	18	54.495
5	6	19	55.473
5	6	20	56.987
5	6	21	58.08
5	6	22	59.158
5	6	23	59.998
5	6	24	60.807
5	7	1	61.28
5	7	2	61.765
5	7	3	62.132
5	7	4	62.68
5	7	5	63.04
5	7	6	63.059
5	7	7	61.822
5	7	8	60.227
5	7	9	58.79
5	7	10	57.589
5	7	11	56.514
5	7	12	55.583
5	7	13	54.959
5	7	14	54.643
5	7	15	54.2
5	7	16	53.86
5	7	17	53.94
5	7	18	54.495
5	7	19	55.473
5	7	20	56.987
5	7	21	58.08
5	7	22	59.158
5	7	23	59.998
5	7	24	60.807
5	8	1	61.28
5	8	2	61.765
5	8	3	62.132
5	8	4	62.68
5	8	5	63.04
5	8	6	63.059
5	8	7	61.822
5	8	8	60.227
5	8	9	58.79
5	8	10	57.589
5	8	11	56.514
5	8	12	55.583
5	8	13	54.959
5	8	14	54.643
5	8	15	54.2
5	8	16	53.86
5	8	17	53.94
5	8	18	54.495
5	8	19	55.473
5	8	20	56.987
5	8	21	58.08
5	8	22	59.158
5	8	23	59.998
5	8	24	60.807
5	9	1	61.28
5	9	2	61.765
5	9	3	62.132
5	9	4	62.68
5	9	5	63.04
5	9	6	63.059
5	9	7	61.822

5	9	8	60.227
5	9	9	58.79
5	9	10	57.589
5	9	11	56.514
5	9	12	55.583
5	9	13	54.959
5	9	14	54.643
5	9	15	54.2
5	9	16	53.86
5	9	17	53.94
5	9	18	54.495
5	9	19	55.473
5	9	20	56.987
5	9	21	58.08
5	9	22	59.158
5	9	23	59.998
5	9	24	60.807
5	10	1	61.28
5	10	2	61.765
5	10	3	62.132
5	10	4	62.68
5	10	5	63.04
5	10	6	63.059
5	10	7	61.822
5	10	8	60.227
5	10	9	58.79
5	10	10	57.589
5	10	11	56.514
5	10	12	55.583
5	10	13	54.959
5	10	14	54.643
5	10	15	54.2
5	10	16	53.86
5	10	17	53.94
5	10	18	54.495
5	10	19	55.473
5	10	20	56.987
5	10	21	58.08
5	10	22	59.158
5	10	23	59.998
5	10	24	60.807
5	11	1	61.28
5	11	2	61.765
5	11	3	62.132
5	11	4	62.68
5	11	5	63.04
5	11	6	63.059
5	11	7	61.822
5	11	8	60.227
5	11	9	58.79
5	11	10	57.589
5	11	11	56.514
5	11	12	55.583
5	11	13	54.959
5	11	14	54.643
5	11	15	54.2
5	11	16	53.86
5	11	17	53.94
5	11	18	54.495
5	11	19	55.473
5	11	20	56.987
5	11	21	58.08
5	11	22	59.158
5	11	23	59.998
5	11	24	60.807
5	12	1	61.28
5	12	2	61.765
5	12	3	62.132
5	12	4	62.68
5	12	5	63.04
5	12	6	63.059
5	12	7	61.822
5	12	8	60.227
5	12	9	58.79
5	12	10	57.589
5	12	11	56.514
5	12	12	55.583
5	12	13	54.959
5	12	14	54.643
5	12	15	54.2
5	12	16	53.86
5	12	17	53.94
5	12	18	54.495
5	12	19	55.473
5	12	20	56.987
5	12	21	58.08
5	12	22	59.158
5	12	23	59.998

5	12	24	60.807
5	13	1	61.28
5	13	2	61.765
5	13	3	62.132
5	13	4	62.68
5	13	5	63.04
5	13	6	63.059
5	13	7	61.822
5	13	8	60.227
5	13	9	58.79
5	13	10	57.589
5	13	11	56.514
5	13	12	55.583
5	13	13	54.959
5	13	14	54.643
5	13	15	54.2
5	13	16	53.86
5	13	17	53.94
5	13	18	54.495
5	13	19	55.473
5	13	20	56.987
5	13	21	58.08
5	13	22	59.158
5	13	23	59.998
5	13	24	60.807
5	14	1	61.28
5	14	2	61.765
5	14	3	62.132
5	14	4	62.68
5	14	5	63.04
5	14	6	63.059
5	14	7	61.822
5	14	8	60.227
5	14	9	58.79
5	14	10	57.589
5	14	11	56.514
5	14	12	55.583
5	14	13	54.959
5	14	14	54.643
5	14	15	54.2
5	14	16	53.86
5	14	17	53.94
5	14	18	54.495
5	14	19	55.473
5	14	20	56.987
5	14	21	58.08
5	14	22	59.158
5	14	23	59.998
5	14	24	60.807
5	15	1	61.28
5	15	2	61.765
5	15	3	62.132
5	15	4	62.68
5	15	5	63.04
5	15	6	63.059
5	15	7	61.822
5	15	8	60.227
5	15	9	58.79
5	15	10	57.589
5	15	11	56.514
5	15	12	55.583
5	15	13	54.959
5	15	14	54.643
5	15	15	54.2
5	15	16	53.86
5	15	17	53.94
5	15	18	54.495
5	15	19	55.473
5	15	20	56.987
5	15	21	58.08
5	15	22	59.158
5	15	23	59.998
5	15	24	60.807
5	16	1	61.28
5	16	2	61.765
5	16	3	62.132
5	16	4	62.68
5	16	5	63.04
5	16	6	63.059
5	16	7	61.822
5	16	8	60.227
5	16	9	58.79
5	16	10	57.589
5	16	11	56.514
5	16	12	55.583
5	16	13	54.959
5	16	14	54.643
5	16	15	54.2

5	16	16	53.86
5	16	17	53.94
5	16	18	54.495
5	16	19	55.473
5	16	20	56.987
5	16	21	58.08
5	16	22	59.158
5	16	23	59.998
5	16	24	60.807
5	17	1	61.28
5	17	2	61.765
5	17	3	62.132
5	17	4	62.68
5	17	5	63.04
5	17	6	63.059
5	17	7	61.822
5	17	8	60.227
5	17	9	58.79
5	17	10	57.589
5	17	11	56.514
5	17	12	55.583
5	17	13	54.959
5	17	14	54.643
5	17	15	54.2
5	17	16	53.86
5	17	17	53.94
5	17	18	54.495
5	17	19	55.473
5	17	20	56.987
5	17	21	58.08
5	17	22	59.158
5	17	23	59.998
5	17	24	60.807
5	18	1	61.28
5	18	2	61.765
5	18	3	62.132
5	18	4	62.68
5	18	5	63.04
5	18	6	63.059
5	18	7	61.822
5	18	8	60.227
5	18	9	58.79
5	18	10	57.589
5	18	11	56.514
5	18	12	55.583
5	18	13	54.959
5	18	14	54.643
5	18	15	54.2
5	18	16	53.86
5	18	17	53.94
5	18	18	54.495
5	18	19	55.473
5	18	20	56.987
5	18	21	58.08
5	18	22	59.158
5	18	23	59.998
5	18	24	60.807
5	19	1	61.28
5	19	2	61.765
5	19	3	62.132
5	19	4	62.68
5	19	5	63.04
5	19	6	63.059
5	19	7	61.822
5	19	8	60.227
5	19	9	58.79
5	19	10	57.589
5	19	11	56.514
5	19	12	55.583
5	19	13	54.959
5	19	14	54.643
5	19	15	54.2
5	19	16	53.86
5	19	17	53.94
5	19	18	54.495
5	19	19	55.473
5	19	20	56.987
5	19	21	58.08
5	19	22	59.158
5	19	23	59.998
5	19	24	60.807
5	20	1	61.28
5	20	2	61.765
5	20	3	62.132
5	20	4	62.68
5	20	5	63.04
5	20	6	63.059
5	20	7	61.822

5	20	8	60.227
5	20	9	58.79
5	20	10	57.589
5	20	11	56.514
5	20	12	55.583
5	20	13	54.959
5	20	14	54.643
5	20	15	54.2
5	20	16	53.86
5	20	17	53.94
5	20	18	54.495
5	20	19	55.473
5	20	20	56.987
5	20	21	58.08
5	20	22	59.158
5	20	23	59.998
5	20	24	60.807
5	21	1	61.28
5	21	2	61.765
5	21	3	62.132
5	21	4	62.68
5	21	5	63.04
5	21	6	63.059
5	21	7	61.822
5	21	8	60.227
5	21	9	58.79
5	21	10	57.589
5	21	11	56.514
5	21	12	55.583
5	21	13	54.959
5	21	14	54.643
5	21	15	54.2
5	21	16	53.86
5	21	17	53.94
5	21	18	54.495
5	21	19	55.473
5	21	20	56.987
5	21	21	58.08
5	21	22	59.158
5	21	23	59.998
5	21	24	60.807
5	22	1	61.28
5	22	2	61.765
5	22	3	62.132
5	22	4	62.68
5	22	5	63.04
5	22	6	63.059
5	22	7	61.822
5	22	8	60.227
5	22	9	58.79
5	22	10	57.589
5	22	11	56.514
5	22	12	55.583
5	22	13	54.959
5	22	14	54.643
5	22	15	54.2
5	22	16	53.86
5	22	17	53.94
5	22	18	54.495
5	22	19	55.473
5	22	20	56.987
5	22	21	58.08
5	22	22	59.158
5	22	23	59.998
5	22	24	60.807
5	23	1	61.28
5	23	2	61.765
5	23	3	62.132
5	23	4	62.68
5	23	5	63.04
5	23	6	63.059
5	23	7	61.822
5	23	8	60.227
5	23	9	58.79
5	23	10	57.589
5	23	11	56.514
5	23	12	55.583
5	23	13	54.959
5	23	14	54.643
5	23	15	54.2
5	23	16	53.86
5	23	17	53.94
5	23	18	54.495
5	23	19	55.473
5	23	20	56.987
5	23	21	58.08
5	23	22	59.158
5	23	23	59.998

5	23	24	60.807
5	24	1	61.28
5	24	2	61.765
5	24	3	62.132
5	24	4	62.68
5	24	5	63.04
5	24	6	63.059
5	24	7	61.822
5	24	8	60.227
5	24	9	58.79
5	24	10	57.589
5	24	11	56.514
5	24	12	55.583
5	24	13	54.959
5	24	14	54.643
5	24	15	54.2
5	24	16	53.86
5	24	17	53.94
5	24	18	54.495
5	24	19	55.473
5	24	20	56.987
5	24	21	58.08
5	24	22	59.158
5	24	23	59.998
5	24	24	60.807
5	25	1	61.28
5	25	2	61.765
5	25	3	62.132
5	25	4	62.68
5	25	5	63.04
5	25	6	63.059
5	25	7	61.822
5	25	8	60.227
5	25	9	58.79
5	25	10	57.589
5	25	11	56.514
5	25	12	55.583
5	25	13	54.959
5	25	14	54.643
5	25	15	54.2
5	25	16	53.86
5	25	17	53.94
5	25	18	54.495
5	25	19	55.473
5	25	20	56.987
5	25	21	58.08
5	25	22	59.158
5	25	23	59.998
5	25	24	60.807
5	26	1	61.28
5	26	2	61.765
5	26	3	62.132
5	26	4	62.68
5	26	5	63.04
5	26	6	63.059
5	26	7	61.822
5	26	8	60.227
5	26	9	58.79
5	26	10	57.589
5	26	11	56.514
5	26	12	55.583
5	26	13	54.959
5	26	14	54.643
5	26	15	54.2
5	26	16	53.86
5	26	17	53.94
5	26	18	54.495
5	26	19	55.473
5	26	20	56.987
5	26	21	58.08
5	26	22	59.158
5	26	23	59.998
5	26	24	60.807
5	27	1	61.28
5	27	2	61.765
5	27	3	62.132
5	27	4	62.68
5	27	5	63.04
5	27	6	63.059
5	27	7	61.822
5	27	8	60.227
5	27	9	58.79
5	27	10	57.589
5	27	11	56.514
5	27	12	55.583
5	27	13	54.959
5	27	14	54.643
5	27	15	54.2

5	27	16	53.86
5	27	17	53.94
5	27	18	54.495
5	27	19	55.473
5	27	20	56.987
5	27	21	58.08
5	27	22	59.158
5	27	23	59.998
5	27	24	60.807
5	28	1	61.28
5	28	2	61.765
5	28	3	62.132
5	28	4	62.68
5	28	5	63.04
5	28	6	63.059
5	28	7	61.822
5	28	8	60.227
5	28	9	58.79
5	28	10	57.589
5	28	11	56.514
5	28	12	55.583
5	28	13	54.959
5	28	14	54.643
5	28	15	54.2
5	28	16	53.86
5	28	17	53.94
5	28	18	54.495
5	28	19	55.473
5	28	20	56.987
5	28	21	58.08
5	28	22	59.158
5	28	23	59.998
5	28	24	60.807
5	29	1	61.28
5	29	2	61.765
5	29	3	62.132
5	29	4	62.68
5	29	5	63.04
5	29	6	63.059
5	29	7	61.822
5	29	8	60.227
5	29	9	58.79
5	29	10	57.589
5	29	11	56.514
5	29	12	55.583
5	29	13	54.959
5	29	14	54.643
5	29	15	54.2
5	29	16	53.86
5	29	17	53.94
5	29	18	54.495
5	29	19	55.473
5	29	20	56.987
5	29	21	58.08
5	29	22	59.158
5	29	23	59.998
5	29	24	60.807
5	30	1	61.28
5	30	2	61.765
5	30	3	62.132
5	30	4	62.68
5	30	5	63.04
5	30	6	63.059
5	30	7	61.822
5	30	8	60.227
5	30	9	58.79
5	30	10	57.589
5	30	11	56.514
5	30	12	55.583
5	30	13	54.959
5	30	14	54.643
5	30	15	54.2
5	30	16	53.86
5	30	17	53.94
5	30	18	54.495
5	30	19	55.473
5	30	20	56.987
5	30	21	58.08
5	30	22	59.158
5	30	23	59.998
5	30	24	60.807
5	31	1	61.28
5	31	2	61.765
5	31	3	62.132
5	31	4	62.68
5	31	5	63.04
5	31	6	63.059
5	31	7	61.822

5	31	8	60.227
5	31	9	58.79
5	31	10	57.589
5	31	11	56.514
5	31	12	55.583
5	31	13	54.959
5	31	14	54.643
5	31	15	54.2
5	31	16	53.86
5	31	17	53.94
5	31	18	54.495
5	31	19	55.473
5	31	20	56.987
5	31	21	58.08
5	31	22	59.158
5	31	23	59.998
5	31	24	54.978
6	1	1	55.906
6	1	2	56.705
6	1	3	57.313
6	1	4	57.81
6	1	5	58.337
6	1	6	58.08
6	1	7	56.231
6	1	8	54.074
6	1	9	52.476
6	1	10	51.055
6	1	11	49.671
6	1	12	48.479
6	1	13	47.706
6	1	14	46.929
6	1	15	46.327
6	1	16	45.996
6	1	17	45.886
6	1	18	46.515
6	1	19	47.95
6	1	20	49.525
6	1	21	50.883
6	1	22	51.979
6	1	23	53.327
6	1	24	54.978
6	2	1	55.906
6	2	2	56.705
6	2	3	57.313
6	2	4	57.81
6	2	5	58.337
6	2	6	58.08
6	2	7	56.231
6	2	8	54.074
6	2	9	52.476
6	2	10	51.055
6	2	11	49.671
6	2	12	48.479
6	2	13	47.706
6	2	14	46.929
6	2	15	46.327
6	2	16	45.996
6	2	17	45.886
6	2	18	46.515
6	2	19	47.95
6	2	20	49.525
6	2	21	50.883
6	2	22	51.979
6	2	23	53.327
6	2	24	54.978
6	3	1	55.906
6	3	2	56.705
6	3	3	57.313
6	3	4	57.81
6	3	5	58.337
6	3	6	58.08
6	3	7	56.231
6	3	8	54.074
6	3	9	52.476
6	3	10	51.055
6	3	11	49.671
6	3	12	48.479
6	3	13	47.706
6	3	14	46.929
6	3	15	46.327
6	3	16	45.996
6	3	17	45.886
6	3	18	46.515
6	3	19	47.95
6	3	20	49.525
6	3	21	50.883
6	3	22	51.979
6	3	23	53.327

6	3	24	54.978
6	4	1	55.906
6	4	2	56.705
6	4	3	57.313
6	4	4	57.81
6	4	5	58.337
6	4	6	58.08
6	4	7	56.231
6	4	8	54.074
6	4	9	52.476
6	4	10	51.055
6	4	11	49.671
6	4	12	48.479
6	4	13	47.706
6	4	14	46.929
6	4	15	46.327
6	4	16	45.996
6	4	17	45.886
6	4	18	46.515
6	4	19	47.95
6	4	20	49.525
6	4	21	50.883
6	4	22	51.979
6	4	23	53.327
6	4	24	54.978
6	5	1	55.906
6	5	2	56.705
6	5	3	57.313
6	5	4	57.81
6	5	5	58.337
6	5	6	58.08
6	5	7	56.231
6	5	8	54.074
6	5	9	52.476
6	5	10	51.055
6	5	11	49.671
6	5	12	48.479
6	5	13	47.706
6	5	14	46.929
6	5	15	46.327
6	5	16	45.996
6	5	17	45.886
6	5	18	46.515
6	5	19	47.95
6	5	20	49.525
6	5	21	50.883
6	5	22	51.979
6	5	23	53.327
6	5	24	54.978
6	6	1	55.906
6	6	2	56.705
6	6	3	57.313
6	6	4	57.81
6	6	5	58.337
6	6	6	58.08
6	6	7	56.231
6	6	8	54.074
6	6	9	52.476
6	6	10	51.055
6	6	11	49.671
6	6	12	48.479
6	6	13	47.706
6	6	14	46.929
6	6	15	46.327
6	6	16	45.996
6	6	17	45.886
6	6	18	46.515
6	6	19	47.95
6	6	20	49.525
6	6	21	50.883
6	6	22	51.979
6	6	23	53.327
6	6	24	54.978
6	7	1	55.906
6	7	2	56.705
6	7	3	57.313
6	7	4	57.81
6	7	5	58.337
6	7	6	58.08
6	7	7	56.231
6	7	8	54.074
6	7	9	52.476
6	7	10	51.055
6	7	11	49.671
6	7	12	48.479
6	7	13	47.706
6	7	14	46.929
6	7	15	46.327

6	7	16	45.996
6	7	17	45.886
6	7	18	46.515
6	7	19	47.95
6	7	20	49.525
6	7	21	50.883
6	7	22	51.979
6	7	23	53.327
6	7	24	54.978
6	8	1	55.906
6	8	2	56.705
6	8	3	57.313
6	8	4	57.81
6	8	5	58.337
6	8	6	58.08
6	8	7	56.231
6	8	8	54.074
6	8	9	52.476
6	8	10	51.055
6	8	11	49.671
6	8	12	48.479
6	8	13	47.706
6	8	14	46.929
6	8	15	46.327
6	8	16	45.996
6	8	17	45.886
6	8	18	46.515
6	8	19	47.95
6	8	20	49.525
6	8	21	50.883
6	8	22	51.979
6	8	23	53.327
6	8	24	54.978
6	9	1	55.906
6	9	2	56.705
6	9	3	57.313
6	9	4	57.81
6	9	5	58.337
6	9	6	58.08
6	9	7	56.231
6	9	8	54.074
6	9	9	52.476
6	9	10	51.055
6	9	11	49.671
6	9	12	48.479
6	9	13	47.706
6	9	14	46.929
6	9	15	46.327
6	9	16	45.996
6	9	17	45.886
6	9	18	46.515
6	9	19	47.95
6	9	20	49.525
6	9	21	50.883
6	9	22	51.979
6	9	23	53.327
6	9	24	54.978
6	10	1	55.906
6	10	2	56.705
6	10	3	57.313
6	10	4	57.81
6	10	5	58.337
6	10	6	58.08
6	10	7	56.231
6	10	8	54.074
6	10	9	52.476
6	10	10	51.055
6	10	11	49.671
6	10	12	48.479
6	10	13	47.706
6	10	14	46.929
6	10	15	46.327
6	10	16	45.996
6	10	17	45.886
6	10	18	46.515
6	10	19	47.95
6	10	20	49.525
6	10	21	50.883
6	10	22	51.979
6	10	23	53.327
6	10	24	54.978
6	11	1	55.906
6	11	2	56.705
6	11	3	57.313
6	11	4	57.81
6	11	5	58.337
6	11	6	58.08
6	11	7	56.231

6	11	8	54.074
6	11	9	52.476
6	11	10	51.055
6	11	11	49.671
6	11	12	48.479
6	11	13	47.706
6	11	14	46.929
6	11	15	46.327
6	11	16	45.996
6	11	17	45.886
6	11	18	46.515
6	11	19	47.95
6	11	20	49.525
6	11	21	50.883
6	11	22	51.979
6	11	23	53.327
6	11	24	54.978
6	12	1	55.906
6	12	2	56.705
6	12	3	57.313
6	12	4	57.81
6	12	5	58.337
6	12	6	58.08
6	12	7	56.231
6	12	8	54.074
6	12	9	52.476
6	12	10	51.055
6	12	11	49.671
6	12	12	48.479
6	12	13	47.706
6	12	14	46.929
6	12	15	46.327
6	12	16	45.996
6	12	17	45.886
6	12	18	46.515
6	12	19	47.95
6	12	20	49.525
6	12	21	50.883
6	12	22	51.979
6	12	23	53.327
6	12	24	54.978
6	13	1	55.906
6	13	2	56.705
6	13	3	57.313
6	13	4	57.81
6	13	5	58.337
6	13	6	58.08
6	13	7	56.231
6	13	8	54.074
6	13	9	52.476
6	13	10	51.055
6	13	11	49.671
6	13	12	48.479
6	13	13	47.706
6	13	14	46.929
6	13	15	46.327
6	13	16	45.996
6	13	17	45.886
6	13	18	46.515
6	13	19	47.95
6	13	20	49.525
6	13	21	50.883
6	13	22	51.979
6	13	23	53.327
6	13	24	54.978
6	14	1	55.906
6	14	2	56.705
6	14	3	57.313
6	14	4	57.81
6	14	5	58.337
6	14	6	58.08
6	14	7	56.231
6	14	8	54.074
6	14	9	52.476
6	14	10	51.055
6	14	11	49.671
6	14	12	48.479
6	14	13	47.706
6	14	14	46.929
6	14	15	46.327
6	14	16	45.996
6	14	17	45.886
6	14	18	46.515
6	14	19	47.95
6	14	20	49.525
6	14	21	50.883
6	14	22	51.979
6	14	23	53.327

6	14	24	54.978
6	15	1	55.906
6	15	2	56.705
6	15	3	57.313
6	15	4	57.81
6	15	5	58.337
6	15	6	58.08
6	15	7	56.231
6	15	8	54.074
6	15	9	52.476
6	15	10	51.055
6	15	11	49.671
6	15	12	48.479
6	15	13	47.706
6	15	14	46.929
6	15	15	46.327
6	15	16	45.996
6	15	17	45.886
6	15	18	46.515
6	15	19	47.95
6	15	20	49.525
6	15	21	50.883
6	15	22	51.979
6	15	23	53.327
6	15	24	54.978
6	16	1	55.906
6	16	2	56.705
6	16	3	57.313
6	16	4	57.81
6	16	5	58.337
6	16	6	58.08
6	16	7	56.231
6	16	8	54.074
6	16	9	52.476
6	16	10	51.055
6	16	11	49.671
6	16	12	48.479
6	16	13	47.706
6	16	14	46.929
6	16	15	46.327
6	16	16	45.996
6	16	17	45.886
6	16	18	46.515
6	16	19	47.95
6	16	20	49.525
6	16	21	50.883
6	16	22	51.979
6	16	23	53.327
6	16	24	54.978
6	17	1	55.906
6	17	2	56.705
6	17	3	57.313
6	17	4	57.81
6	17	5	58.337
6	17	6	58.08
6	17	7	56.231
6	17	8	54.074
6	17	9	52.476
6	17	10	51.055
6	17	11	49.671
6	17	12	48.479
6	17	13	47.706
6	17	14	46.929
6	17	15	46.327
6	17	16	45.996
6	17	17	45.886
6	17	18	46.515
6	17	19	47.95
6	17	20	49.525
6	17	21	50.883
6	17	22	51.979
6	17	23	53.327
6	17	24	54.978
6	18	1	55.906
6	18	2	56.705
6	18	3	57.313
6	18	4	57.81
6	18	5	58.337
6	18	6	58.08
6	18	7	56.231
6	18	8	54.074
6	18	9	52.476
6	18	10	51.055
6	18	11	49.671
6	18	12	48.479
6	18	13	47.706
6	18	14	46.929
6	18	15	46.327

6	18	16	45.996
6	18	17	45.886
6	18	18	46.515
6	18	19	47.95
6	18	20	49.525
6	18	21	50.883
6	18	22	51.979
6	18	23	53.327
6	18	24	54.978
6	19	1	55.906
6	19	2	56.705
6	19	3	57.313
6	19	4	57.81
6	19	5	58.337
6	19	6	58.08
6	19	7	56.231
6	19	8	54.074
6	19	9	52.476
6	19	10	51.055
6	19	11	49.671
6	19	12	48.479
6	19	13	47.706
6	19	14	46.929
6	19	15	46.327
6	19	16	45.996
6	19	17	45.886
6	19	18	46.515
6	19	19	47.95
6	19	20	49.525
6	19	21	50.883
6	19	22	51.979
6	19	23	53.327
6	19	24	54.978
6	20	1	55.906
6	20	2	56.705
6	20	3	57.313
6	20	4	57.81
6	20	5	58.337
6	20	6	58.08
6	20	7	56.231
6	20	8	54.074
6	20	9	52.476
6	20	10	51.055
6	20	11	49.671
6	20	12	48.479
6	20	13	47.706
6	20	14	46.929
6	20	15	46.327
6	20	16	45.996
6	20	17	45.886
6	20	18	46.515
6	20	19	47.95
6	20	20	49.525
6	20	21	50.883
6	20	22	51.979
6	20	23	53.327
6	20	24	54.978
6	21	1	55.906
6	21	2	56.705
6	21	3	57.313
6	21	4	57.81
6	21	5	58.337
6	21	6	58.08
6	21	7	56.231
6	21	8	54.074
6	21	9	52.476
6	21	10	51.055
6	21	11	49.671
6	21	12	48.479
6	21	13	47.706
6	21	14	46.929
6	21	15	46.327
6	21	16	45.996
6	21	17	45.886
6	21	18	46.515
6	21	19	47.95
6	21	20	49.525
6	21	21	50.883
6	21	22	51.979
6	21	23	53.327
6	21	24	54.978
6	22	1	55.906
6	22	2	56.705
6	22	3	57.313
6	22	4	57.81
6	22	5	58.337
6	22	6	58.08
6	22	7	56.231

6	22	8	54.074
6	22	9	52.476
6	22	10	51.055
6	22	11	49.671
6	22	12	48.479
6	22	13	47.706
6	22	14	46.929
6	22	15	46.327
6	22	16	45.996
6	22	17	45.886
6	22	18	46.515
6	22	19	47.95
6	22	20	49.525
6	22	21	50.883
6	22	22	51.979
6	22	23	53.327
6	22	24	54.978
6	23	1	55.906
6	23	2	56.705
6	23	3	57.313
6	23	4	57.81
6	23	5	58.337
6	23	6	58.08
6	23	7	56.231
6	23	8	54.074
6	23	9	52.476
6	23	10	51.055
6	23	11	49.671
6	23	12	48.479
6	23	13	47.706
6	23	14	46.929
6	23	15	46.327
6	23	16	45.996
6	23	17	45.886
6	23	18	46.515
6	23	19	47.95
6	23	20	49.525
6	23	21	50.883
6	23	22	51.979
6	23	23	53.327
6	23	24	54.978
6	24	1	55.906
6	24	2	56.705
6	24	3	57.313
6	24	4	57.81
6	24	5	58.337
6	24	6	58.08
6	24	7	56.231
6	24	8	54.074
6	24	9	52.476
6	24	10	51.055
6	24	11	49.671
6	24	12	48.479
6	24	13	47.706
6	24	14	46.929
6	24	15	46.327
6	24	16	45.996
6	24	17	45.886
6	24	18	46.515
6	24	19	47.95
6	24	20	49.525
6	24	21	50.883
6	24	22	51.979
6	24	23	53.327
6	24	24	54.978
6	25	1	55.906
6	25	2	56.705
6	25	3	57.313
6	25	4	57.81
6	25	5	58.337
6	25	6	58.08
6	25	7	56.231
6	25	8	54.074
6	25	9	52.476
6	25	10	51.055
6	25	11	49.671
6	25	12	48.479
6	25	13	47.706
6	25	14	46.929
6	25	15	46.327
6	25	16	45.996
6	25	17	45.886
6	25	18	46.515
6	25	19	47.95
6	25	20	49.525
6	25	21	50.883
6	25	22	51.979
6	25	23	53.327

6	25	24	54.978
6	26	1	55.906
6	26	2	56.705
6	26	3	57.313
6	26	4	57.81
6	26	5	58.337
6	26	6	58.08
6	26	7	56.231
6	26	8	54.074
6	26	9	52.476
6	26	10	51.055
6	26	11	49.671
6	26	12	48.479
6	26	13	47.706
6	26	14	46.929
6	26	15	46.327
6	26	16	45.996
6	26	17	45.886
6	26	18	46.515
6	26	19	47.95
6	26	20	49.525
6	26	21	50.883
6	26	22	51.979
6	26	23	53.327
6	26	24	54.978
6	27	1	55.906
6	27	2	56.705
6	27	3	57.313
6	27	4	57.81
6	27	5	58.337
6	27	6	58.08
6	27	7	56.231
6	27	8	54.074
6	27	9	52.476
6	27	10	51.055
6	27	11	49.671
6	27	12	48.479
6	27	13	47.706
6	27	14	46.929
6	27	15	46.327
6	27	16	45.996
6	27	17	45.886
6	27	18	46.515
6	27	19	47.95
6	27	20	49.525
6	27	21	50.883
6	27	22	51.979
6	27	23	53.327
6	27	24	54.978
6	28	1	55.906
6	28	2	56.705
6	28	3	57.313
6	28	4	57.81
6	28	5	58.337
6	28	6	58.08
6	28	7	56.231
6	28	8	54.074
6	28	9	52.476
6	28	10	51.055
6	28	11	49.671
6	28	12	48.479
6	28	13	47.706
6	28	14	46.929
6	28	15	46.327
6	28	16	45.996
6	28	17	45.886
6	28	18	46.515
6	28	19	47.95
6	28	20	49.525
6	28	21	50.883
6	28	22	51.979
6	28	23	53.327
6	28	24	54.978
6	29	1	55.906
6	29	2	56.705
6	29	3	57.313
6	29	4	57.81
6	29	5	58.337
6	29	6	58.08
6	29	7	56.231
6	29	8	54.074
6	29	9	52.476
6	29	10	51.055
6	29	11	49.671
6	29	12	48.479
6	29	13	47.706
6	29	14	46.929
6	29	15	46.327

6	29	16	45.996
6	29	17	45.886
6	29	18	46.515
6	29	19	47.95
6	29	20	49.525
6	29	21	50.883
6	29	22	51.979
6	29	23	53.327
6	29	24	54.978
6	30	1	55.906
6	30	2	56.705
6	30	3	57.313
6	30	4	57.81
6	30	5	58.337
6	30	6	58.08
6	30	7	56.231
6	30	8	54.074
6	30	9	52.476
6	30	10	51.055
6	30	11	49.671
6	30	12	48.479
6	30	13	47.706
6	30	14	46.929
6	30	15	46.327
6	30	16	45.996
6	30	17	45.886
6	30	18	46.515
6	30	19	47.95
6	30	20	49.525
6	30	21	50.883
6	30	22	51.979
6	30	23	53.327
6	30	24	48.889
7	1	1	49.918
7	1	2	50.717
7	1	3	51.616
7	1	4	52.244
7	1	5	52.8
7	1	6	52.645
7	1	7	50.694
7	1	8	47.989
7	1	9	46.175
7	1	10	43.78
7	1	11	43.065
7	1	12	41.747
7	1	13	40.988
7	1	14	40.453
7	1	15	39.847
7	1	16	39.815
7	1	17	39.61
7	1	18	39.912
7	1	19	41.158
7	1	20	42.752
7	1	21	44.209
7	1	22	45.871
7	1	23	47.44
7	1	24	48.889
7	2	1	49.918
7	2	2	50.717
7	2	3	51.616
7	2	4	52.244
7	2	5	52.8
7	2	6	52.645
7	2	7	50.694
7	2	8	47.989
7	2	9	46.175
7	2	10	43.78
7	2	11	43.065
7	2	12	41.747
7	2	13	40.988
7	2	14	40.453
7	2	15	39.847
7	2	16	39.815
7	2	17	39.61
7	2	18	39.912
7	2	19	41.158
7	2	20	42.752
7	2	21	44.209
7	2	22	45.871
7	2	23	47.44
7	2	24	48.889
7	3	1	49.918
7	3	2	50.717
7	3	3	51.616
7	3	4	52.244
7	3	5	52.8
7	3	6	52.645
7	3	7	50.694

7	3	8	47.989
7	3	9	46.175
7	3	10	43.78
7	3	11	43.065
7	3	12	41.747
7	3	13	40.988
7	3	14	40.453
7	3	15	39.847
7	3	16	39.815
7	3	17	39.61
7	3	18	39.912
7	3	19	41.158
7	3	20	42.752
7	3	21	44.209
7	3	22	45.871
7	3	23	47.44
7	3	24	48.889
7	4	1	49.918
7	4	2	50.717
7	4	3	51.616
7	4	4	52.244
7	4	5	52.8
7	4	6	52.645
7	4	7	50.694
7	4	8	47.989
7	4	9	46.175
7	4	10	43.78
7	4	11	43.065
7	4	12	41.747
7	4	13	40.988
7	4	14	40.453
7	4	15	39.847
7	4	16	39.815
7	4	17	39.61
7	4	18	39.912
7	4	19	41.158
7	4	20	42.752
7	4	21	44.209
7	4	22	45.871
7	4	23	47.44
7	4	24	48.889
7	5	1	49.918
7	5	2	50.717
7	5	3	51.616
7	5	4	52.244
7	5	5	52.8
7	5	6	52.645
7	5	7	50.694
7	5	8	47.989
7	5	9	46.175
7	5	10	43.78
7	5	11	43.065
7	5	12	41.747
7	5	13	40.988
7	5	14	40.453
7	5	15	39.847
7	5	16	39.815
7	5	17	39.61
7	5	18	39.912
7	5	19	41.158
7	5	20	42.752
7	5	21	44.209
7	5	22	45.871
7	5	23	47.44
7	5	24	48.889
7	6	1	49.918
7	6	2	50.717
7	6	3	51.616
7	6	4	52.244
7	6	5	52.8
7	6	6	52.645
7	6	7	50.694
7	6	8	47.989
7	6	9	46.175
7	6	10	43.78
7	6	11	43.065
7	6	12	41.747
7	6	13	40.988
7	6	14	40.453
7	6	15	39.847
7	6	16	39.815
7	6	17	39.61
7	6	18	39.912
7	6	19	41.158
7	6	20	42.752
7	6	21	44.209
7	6	22	45.871
7	6	23	47.44

7	6	24	48.889
7	7	1	49.918
7	7	2	50.717
7	7	3	51.616
7	7	4	52.244
7	7	5	52.8
7	7	6	52.645
7	7	7	50.694
7	7	8	47.989
7	7	9	46.175
7	7	10	43.78
7	7	11	43.065
7	7	12	41.747
7	7	13	40.988
7	7	14	40.453
7	7	15	39.847
7	7	16	39.815
7	7	17	39.61
7	7	18	39.912
7	7	19	41.158
7	7	20	42.752
7	7	21	44.209
7	7	22	45.871
7	7	23	47.44
7	7	24	48.889
7	8	1	49.918
7	8	2	50.717
7	8	3	51.616
7	8	4	52.244
7	8	5	52.8
7	8	6	52.645
7	8	7	50.694
7	8	8	47.989
7	8	9	46.175
7	8	10	43.78
7	8	11	43.065
7	8	12	41.747
7	8	13	40.988
7	8	14	40.453
7	8	15	39.847
7	8	16	39.815
7	8	17	39.61
7	8	18	39.912
7	8	19	41.158
7	8	20	42.752
7	8	21	44.209
7	8	22	45.871
7	8	23	47.44
7	8	24	48.889
7	9	1	49.918
7	9	2	50.717
7	9	3	51.616
7	9	4	52.244
7	9	5	52.8
7	9	6	52.645
7	9	7	50.694
7	9	8	47.989
7	9	9	46.175
7	9	10	43.78
7	9	11	43.065
7	9	12	41.747
7	9	13	40.988
7	9	14	40.453
7	9	15	39.847
7	9	16	39.815
7	9	17	39.61
7	9	18	39.912
7	9	19	41.158
7	9	20	42.752
7	9	21	44.209
7	9	22	45.871
7	9	23	47.44
7	9	24	48.889
7	10	1	49.918
7	10	2	50.717
7	10	3	51.616
7	10	4	52.244
7	10	5	52.8
7	10	6	52.645
7	10	7	50.694
7	10	8	47.989
7	10	9	46.175
7	10	10	43.78
7	10	11	43.065
7	10	12	41.747
7	10	13	40.988
7	10	14	40.453
7	10	15	39.847

7	10	16	39.815
7	10	17	39.61
7	10	18	39.912
7	10	19	41.158
7	10	20	42.752
7	10	21	44.209
7	10	22	45.871
7	10	23	47.44
7	10	24	48.889
7	11	1	49.918
7	11	2	50.717
7	11	3	51.616
7	11	4	52.244
7	11	5	52.8
7	11	6	52.645
7	11	7	50.694
7	11	8	47.989
7	11	9	46.175
7	11	10	43.78
7	11	11	43.065
7	11	12	41.747
7	11	13	40.988
7	11	14	40.453
7	11	15	39.847
7	11	16	39.815
7	11	17	39.61
7	11	18	39.912
7	11	19	41.158
7	11	20	42.752
7	11	21	44.209
7	11	22	45.871
7	11	23	47.44
7	11	24	48.889
7	12	1	49.918
7	12	2	50.717
7	12	3	51.616
7	12	4	52.244
7	12	5	52.8
7	12	6	52.645
7	12	7	50.694
7	12	8	47.989
7	12	9	46.175
7	12	10	43.78
7	12	11	43.065
7	12	12	41.747
7	12	13	40.988
7	12	14	40.453
7	12	15	39.847
7	12	16	39.815
7	12	17	39.61
7	12	18	39.912
7	12	19	41.158
7	12	20	42.752
7	12	21	44.209
7	12	22	45.871
7	12	23	47.44
7	12	24	48.889
7	13	1	49.918
7	13	2	50.717
7	13	3	51.616
7	13	4	52.244
7	13	5	52.8
7	13	6	52.645
7	13	7	50.694
7	13	8	47.989
7	13	9	46.175
7	13	10	43.78
7	13	11	43.065
7	13	12	41.747
7	13	13	40.988
7	13	14	40.453
7	13	15	39.847
7	13	16	39.815
7	13	17	39.61
7	13	18	39.912
7	13	19	41.158
7	13	20	42.752
7	13	21	44.209
7	13	22	45.871
7	13	23	47.44
7	13	24	48.889
7	14	1	49.918
7	14	2	50.717
7	14	3	51.616
7	14	4	52.244
7	14	5	52.8
7	14	6	52.645
7	14	7	50.694

7	14	8	47.989
7	14	9	46.175
7	14	10	43.78
7	14	11	43.065
7	14	12	41.747
7	14	13	40.988
7	14	14	40.453
7	14	15	39.847
7	14	16	39.815
7	14	17	39.61
7	14	18	39.912
7	14	19	41.158
7	14	20	42.752
7	14	21	44.209
7	14	22	45.871
7	14	23	47.44
7	14	24	48.889
7	15	1	49.918
7	15	2	50.717
7	15	3	51.616
7	15	4	52.244
7	15	5	52.8
7	15	6	52.645
7	15	7	50.694
7	15	8	47.989
7	15	9	46.175
7	15	10	43.78
7	15	11	43.065
7	15	12	41.747
7	15	13	40.988
7	15	14	40.453
7	15	15	39.847
7	15	16	39.815
7	15	17	39.61
7	15	18	39.912
7	15	19	41.158
7	15	20	42.752
7	15	21	44.209
7	15	22	45.871
7	15	23	47.44
7	15	24	48.889
7	16	1	49.918
7	16	2	50.717
7	16	3	51.616
7	16	4	52.244
7	16	5	52.8
7	16	6	52.645
7	16	7	50.694
7	16	8	47.989
7	16	9	46.175
7	16	10	43.78
7	16	11	43.065
7	16	12	41.747
7	16	13	40.988
7	16	14	40.453
7	16	15	39.847
7	16	16	39.815
7	16	17	39.61
7	16	18	39.912
7	16	19	41.158
7	16	20	42.752
7	16	21	44.209
7	16	22	45.871
7	16	23	47.44
7	16	24	48.889
7	17	1	49.918
7	17	2	50.717
7	17	3	51.616
7	17	4	52.244
7	17	5	52.8
7	17	6	52.645
7	17	7	50.694
7	17	8	47.989
7	17	9	46.175
7	17	10	43.78
7	17	11	43.065
7	17	12	41.747
7	17	13	40.988
7	17	14	40.453
7	17	15	39.847
7	17	16	39.815
7	17	17	39.61
7	17	18	39.912
7	17	19	41.158
7	17	20	42.752
7	17	21	44.209
7	17	22	45.871
7	17	23	47.44

7	17	24	48.889
7	18	1	49.918
7	18	2	50.717
7	18	3	51.616
7	18	4	52.244
7	18	5	52.8
7	18	6	52.645
7	18	7	50.694
7	18	8	47.989
7	18	9	46.175
7	18	10	43.78
7	18	11	43.065
7	18	12	41.747
7	18	13	40.988
7	18	14	40.453
7	18	15	39.847
7	18	16	39.815
7	18	17	39.61
7	18	18	39.912
7	18	19	41.158
7	18	20	42.752
7	18	21	44.209
7	18	22	45.871
7	18	23	47.44
7	18	24	48.889
7	19	1	49.918
7	19	2	50.717
7	19	3	51.616
7	19	4	52.244
7	19	5	52.8
7	19	6	52.645
7	19	7	50.694
7	19	8	47.989
7	19	9	46.175
7	19	10	43.78
7	19	11	43.065
7	19	12	41.747
7	19	13	40.988
7	19	14	40.453
7	19	15	39.847
7	19	16	39.815
7	19	17	39.61
7	19	18	39.912
7	19	19	41.158
7	19	20	42.752
7	19	21	44.209
7	19	22	45.871
7	19	23	47.44
7	19	24	48.889
7	20	1	49.918
7	20	2	50.717
7	20	3	51.616
7	20	4	52.244
7	20	5	52.8
7	20	6	52.645
7	20	7	50.694
7	20	8	47.989
7	20	9	46.175
7	20	10	43.78
7	20	11	43.065
7	20	12	41.747
7	20	13	40.988
7	20	14	40.453
7	20	15	39.847
7	20	16	39.815
7	20	17	39.61
7	20	18	39.912
7	20	19	41.158
7	20	20	42.752
7	20	21	44.209
7	20	22	45.871
7	20	23	47.44
7	20	24	48.889
7	21	1	49.918
7	21	2	50.717
7	21	3	51.616
7	21	4	52.244
7	21	5	52.8
7	21	6	52.645
7	21	7	50.694
7	21	8	47.989
7	21	9	46.175
7	21	10	43.78
7	21	11	43.065
7	21	12	41.747
7	21	13	40.988
7	21	14	40.453
7	21	15	39.847

7	21	16	39.815
7	21	17	39.61
7	21	18	39.912
7	21	19	41.158
7	21	20	42.752
7	21	21	44.209
7	21	22	45.871
7	21	23	47.44
7	21	24	48.889
7	22	1	49.918
7	22	2	50.717
7	22	3	51.616
7	22	4	52.244
7	22	5	52.8
7	22	6	52.645
7	22	7	50.694
7	22	8	47.989
7	22	9	46.175
7	22	10	43.78
7	22	11	43.065
7	22	12	41.747
7	22	13	40.988
7	22	14	40.453
7	22	15	39.847
7	22	16	39.815
7	22	17	39.61
7	22	18	39.912
7	22	19	41.158
7	22	20	42.752
7	22	21	44.209
7	22	22	45.871
7	22	23	47.44
7	22	24	48.889
7	23	1	49.918
7	23	2	50.717
7	23	3	51.616
7	23	4	52.244
7	23	5	52.8
7	23	6	52.645
7	23	7	50.694
7	23	8	47.989
7	23	9	46.175
7	23	10	43.78
7	23	11	43.065
7	23	12	41.747
7	23	13	40.988
7	23	14	40.453
7	23	15	39.847
7	23	16	39.815
7	23	17	39.61
7	23	18	39.912
7	23	19	41.158
7	23	20	42.752
7	23	21	44.209
7	23	22	45.871
7	23	23	47.44
7	23	24	48.889
7	24	1	49.918
7	24	2	50.717
7	24	3	51.616
7	24	4	52.244
7	24	5	52.8
7	24	6	52.645
7	24	7	50.694
7	24	8	47.989
7	24	9	46.175
7	24	10	43.78
7	24	11	43.065
7	24	12	41.747
7	24	13	40.988
7	24	14	40.453
7	24	15	39.847
7	24	16	39.815
7	24	17	39.61
7	24	18	39.912
7	24	19	41.158
7	24	20	42.752
7	24	21	44.209
7	24	22	45.871
7	24	23	47.44
7	24	24	48.889
7	25	1	49.918
7	25	2	50.717
7	25	3	51.616
7	25	4	52.244
7	25	5	52.8
7	25	6	52.645
7	25	7	50.694

7	25	8	47.989
7	25	9	46.175
7	25	10	43.78
7	25	11	43.065
7	25	12	41.747
7	25	13	40.988
7	25	14	40.453
7	25	15	39.847
7	25	16	39.815
7	25	17	39.61
7	25	18	39.912
7	25	19	41.158
7	25	20	42.752
7	25	21	44.209
7	25	22	45.871
7	25	23	47.44
7	25	24	48.889
7	26	1	49.918
7	26	2	50.717
7	26	3	51.616
7	26	4	52.244
7	26	5	52.8
7	26	6	52.645
7	26	7	50.694
7	26	8	47.989
7	26	9	46.175
7	26	10	43.78
7	26	11	43.065
7	26	12	41.747
7	26	13	40.988
7	26	14	40.453
7	26	15	39.847
7	26	16	39.815
7	26	17	39.61
7	26	18	39.912
7	26	19	41.158
7	26	20	42.752
7	26	21	44.209
7	26	22	45.871
7	26	23	47.44
7	26	24	48.889
7	27	1	49.918
7	27	2	50.717
7	27	3	51.616
7	27	4	52.244
7	27	5	52.8
7	27	6	52.645
7	27	7	50.694
7	27	8	47.989
7	27	9	46.175
7	27	10	43.78
7	27	11	43.065
7	27	12	41.747
7	27	13	40.988
7	27	14	40.453
7	27	15	39.847
7	27	16	39.815
7	27	17	39.61
7	27	18	39.912
7	27	19	41.158
7	27	20	42.752
7	27	21	44.209
7	27	22	45.871
7	27	23	47.44
7	27	24	48.889
7	28	1	49.918
7	28	2	50.717
7	28	3	51.616
7	28	4	52.244
7	28	5	52.8
7	28	6	52.645
7	28	7	50.694
7	28	8	47.989
7	28	9	46.175
7	28	10	43.78
7	28	11	43.065
7	28	12	41.747
7	28	13	40.988
7	28	14	40.453
7	28	15	39.847
7	28	16	39.815
7	28	17	39.61
7	28	18	39.912
7	28	19	41.158
7	28	20	42.752
7	28	21	44.209
7	28	22	45.871
7	28	23	47.44

Attachment MR-3: Selected Data Request Responses

7	28	24	48.889
7	29	1	49.918
7	29	2	50.717
7	29	3	51.616
7	29	4	52.244
7	29	5	52.8
7	29	6	52.645
7	29	7	50.694
7	29	8	47.989
7	29	9	46.175
7	29	10	43.78
7	29	11	43.065
7	29	12	41.747
7	29	13	40.988
7	29	14	40.453
7	29	15	39.847
7	29	16	39.815
7	29	17	39.61
7	29	18	39.912
7	29	19	41.158
7	29	20	42.752
7	29	21	44.209
7	29	22	45.871
7	29	23	47.44
7	29	24	48.889
7	30	1	49.918
7	30	2	50.717
7	30	3	51.616
7	30	4	52.244
7	30	5	52.8
7	30	6	52.645
7	30	7	50.694
7	30	8	47.989
7	30	9	46.175
7	30	10	43.78
7	30	11	43.065
7	30	12	41.747
7	30	13	40.988
7	30	14	40.453
7	30	15	39.847
7	30	16	39.815
7	30	17	39.61
7	30	18	39.912
7	30	19	41.158
7	30	20	42.752
7	30	21	44.209
7	30	22	45.871
7	30	23	47.44
7	30	24	48.889
7	31	1	49.918
7	31	2	50.717
7	31	3	51.616
7	31	4	52.244
7	31	5	52.8
7	31	6	52.645
7	31	7	50.694
7	31	8	47.989
7	31	9	46.175
7	31	10	43.78
7	31	11	43.065
7	31	12	41.747
7	31	13	40.988
7	31	14	40.453
7	31	15	39.847
7	31	16	39.815
7	31	17	39.61
7	31	18	39.912
7	31	19	41.158
7	31	20	42.752
7	31	21	44.209
7	31	22	45.871
7	31	23	47.44
7	31	24	49.523
8	1	1	50.467
8	1	2	51.25
8	1	3	52.265
8	1	4	53.053
8	1	5	53.502
8	1	6	53.839
8	1	7	52.274
8	1	8	49.316
8	1	9	47.305
8	1	10	45.256
8	1	11	43.573
8	1	12	42.271
8	1	13	41.118
8	1	14	40.441
8	1	15	40.004

8	1	16	39.974
8	1	17	40.13
8	1	18	40.289
8	1	19	41.629
8	1	20	43.28
8	1	21	45.194
8	1	22	46.585
8	1	23	48.198
8	1	24	49.523
8	2	1	50.467
8	2	2	51.25
8	2	3	52.265
8	2	4	53.053
8	2	5	53.502
8	2	6	53.839
8	2	7	52.274
8	2	8	49.316
8	2	9	47.305
8	2	10	45.256
8	2	11	43.573
8	2	12	42.271
8	2	13	41.118
8	2	14	40.441
8	2	15	40.004
8	2	16	39.974
8	2	17	40.13
8	2	18	40.289
8	2	19	41.629
8	2	20	43.28
8	2	21	45.194
8	2	22	46.585
8	2	23	48.198
8	2	24	49.523
8	3	1	50.467
8	3	2	51.25
8	3	3	52.265
8	3	4	53.053
8	3	5	53.502
8	3	6	53.839
8	3	7	52.274
8	3	8	49.316
8	3	9	47.305
8	3	10	45.256
8	3	11	43.573
8	3	12	42.271
8	3	13	41.118
8	3	14	40.441
8	3	15	40.004
8	3	16	39.974
8	3	17	40.13
8	3	18	40.289
8	3	19	41.629
8	3	20	43.28
8	3	21	45.194
8	3	22	46.585
8	3	23	48.198
8	3	24	49.523
8	4	1	50.467
8	4	2	51.25
8	4	3	52.265
8	4	4	53.053
8	4	5	53.502
8	4	6	53.839
8	4	7	52.274
8	4	8	49.316
8	4	9	47.305
8	4	10	45.256
8	4	11	43.573
8	4	12	42.271
8	4	13	41.118
8	4	14	40.441
8	4	15	40.004
8	4	16	39.974
8	4	17	40.13
8	4	18	40.289
8	4	19	41.629
8	4	20	43.28
8	4	21	45.194
8	4	22	46.585
8	4	23	48.198
8	4	24	49.523
8	5	1	50.467
8	5	2	51.25
8	5	3	52.265
8	5	4	53.053
8	5	5	53.502
8	5	6	53.839
8	5	7	52.274

8	5	8	49.316
8	5	9	47.305
8	5	10	45.256
8	5	11	43.573
8	5	12	42.271
8	5	13	41.118
8	5	14	40.441
8	5	15	40.004
8	5	16	39.974
8	5	17	40.13
8	5	18	40.289
8	5	19	41.629
8	5	20	43.28
8	5	21	45.194
8	5	22	46.585
8	5	23	48.198
8	5	24	49.523
8	6	1	50.467
8	6	2	51.25
8	6	3	52.265
8	6	4	53.053
8	6	5	53.502
8	6	6	53.839
8	6	7	52.274
8	6	8	49.316
8	6	9	47.305
8	6	10	45.256
8	6	11	43.573
8	6	12	42.271
8	6	13	41.118
8	6	14	40.441
8	6	15	40.004
8	6	16	39.974
8	6	17	40.13
8	6	18	40.289
8	6	19	41.629
8	6	20	43.28
8	6	21	45.194
8	6	22	46.585
8	6	23	48.198
8	6	24	49.523
8	7	1	50.467
8	7	2	51.25
8	7	3	52.265
8	7	4	53.053
8	7	5	53.502
8	7	6	53.839
8	7	7	52.274
8	7	8	49.316
8	7	9	47.305
8	7	10	45.256
8	7	11	43.573
8	7	12	42.271
8	7	13	41.118
8	7	14	40.441
8	7	15	40.004
8	7	16	39.974
8	7	17	40.13
8	7	18	40.289
8	7	19	41.629
8	7	20	43.28
8	7	21	45.194
8	7	22	46.585
8	7	23	48.198
8	7	24	49.523
8	8	1	50.467
8	8	2	51.25
8	8	3	52.265
8	8	4	53.053
8	8	5	53.502
8	8	6	53.839
8	8	7	52.274
8	8	8	49.316
8	8	9	47.305
8	8	10	45.256
8	8	11	43.573
8	8	12	42.271
8	8	13	41.118
8	8	14	40.441
8	8	15	40.004
8	8	16	39.974
8	8	17	40.13
8	8	18	40.289
8	8	19	41.629
8	8	20	43.28
8	8	21	45.194
8	8	22	46.585
8	8	23	48.198

8	8	24	49.523
8	9	1	50.467
8	9	2	51.25
8	9	3	52.265
8	9	4	53.053
8	9	5	53.502
8	9	6	53.839
8	9	7	52.274
8	9	8	49.316
8	9	9	47.305
8	9	10	45.256
8	9	11	43.573
8	9	12	42.271
8	9	13	41.118
8	9	14	40.441
8	9	15	40.004
8	9	16	39.974
8	9	17	40.13
8	9	18	40.289
8	9	19	41.629
8	9	20	43.28
8	9	21	45.194
8	9	22	46.585
8	9	23	48.198
8	9	24	49.523
8	10	1	50.467
8	10	2	51.25
8	10	3	52.265
8	10	4	53.053
8	10	5	53.502
8	10	6	53.839
8	10	7	52.274
8	10	8	49.316
8	10	9	47.305
8	10	10	45.256
8	10	11	43.573
8	10	12	42.271
8	10	13	41.118
8	10	14	40.441
8	10	15	40.004
8	10	16	39.974
8	10	17	40.13
8	10	18	40.289
8	10	19	41.629
8	10	20	43.28
8	10	21	45.194
8	10	22	46.585
8	10	23	48.198
8	10	24	49.523
8	11	1	50.467
8	11	2	51.25
8	11	3	52.265
8	11	4	53.053
8	11	5	53.502
8	11	6	53.839
8	11	7	52.274
8	11	8	49.316
8	11	9	47.305
8	11	10	45.256
8	11	11	43.573
8	11	12	42.271
8	11	13	41.118
8	11	14	40.441
8	11	15	40.004
8	11	16	39.974
8	11	17	40.13
8	11	18	40.289
8	11	19	41.629
8	11	20	43.28
8	11	21	45.194
8	11	22	46.585
8	11	23	48.198
8	11	24	49.523
8	12	1	50.467
8	12	2	51.25
8	12	3	52.265
8	12	4	53.053
8	12	5	53.502
8	12	6	53.839
8	12	7	52.274
8	12	8	49.316
8	12	9	47.305
8	12	10	45.256
8	12	11	43.573
8	12	12	42.271
8	12	13	41.118
8	12	14	40.441
8	12	15	40.004

8	12	16	39.974
8	12	17	40.13
8	12	18	40.289
8	12	19	41.629
8	12	20	43.28
8	12	21	45.194
8	12	22	46.585
8	12	23	48.198
8	12	24	49.523
8	13	1	50.467
8	13	2	51.25
8	13	3	52.265
8	13	4	53.053
8	13	5	53.502
8	13	6	53.839
8	13	7	52.274
8	13	8	49.316
8	13	9	47.305
8	13	10	45.256
8	13	11	43.573
8	13	12	42.271
8	13	13	41.118
8	13	14	40.441
8	13	15	40.004
8	13	16	39.974
8	13	17	40.13
8	13	18	40.289
8	13	19	41.629
8	13	20	43.28
8	13	21	45.194
8	13	22	46.585
8	13	23	48.198
8	13	24	49.523
8	14	1	50.467
8	14	2	51.25
8	14	3	52.265
8	14	4	53.053
8	14	5	53.502
8	14	6	53.839
8	14	7	52.274
8	14	8	49.316
8	14	9	47.305
8	14	10	45.256
8	14	11	43.573
8	14	12	42.271
8	14	13	41.118
8	14	14	40.441
8	14	15	40.004
8	14	16	39.974
8	14	17	40.13
8	14	18	40.289
8	14	19	41.629
8	14	20	43.28
8	14	21	45.194
8	14	22	46.585
8	14	23	48.198
8	14	24	49.523
8	15	1	50.467
8	15	2	51.25
8	15	3	52.265
8	15	4	53.053
8	15	5	53.502
8	15	6	53.839
8	15	7	52.274
8	15	8	49.316
8	15	9	47.305
8	15	10	45.256
8	15	11	43.573
8	15	12	42.271
8	15	13	41.118
8	15	14	40.441
8	15	15	40.004
8	15	16	39.974
8	15	17	40.13
8	15	18	40.289
8	15	19	41.629
8	15	20	43.28
8	15	21	45.194
8	15	22	46.585
8	15	23	48.198
8	15	24	49.523
8	16	1	50.467
8	16	2	51.25
8	16	3	52.265
8	16	4	53.053
8	16	5	53.502
8	16	6	53.839
8	16	7	52.274

Attachment MR-3: Selected Data Request Responses

8	16	8	49.316
8	16	9	47.305
8	16	10	45.256
8	16	11	43.573
8	16	12	42.271
8	16	13	41.118
8	16	14	40.441
8	16	15	40.004
8	16	16	39.974
8	16	17	40.13
8	16	18	40.289
8	16	19	41.629
8	16	20	43.28
8	16	21	45.194
8	16	22	46.585
8	16	23	48.198
8	16	24	49.523
8	17	1	50.467
8	17	2	51.25
8	17	3	52.265
8	17	4	53.053
8	17	5	53.502
8	17	6	53.839
8	17	7	52.274
8	17	8	49.316
8	17	9	47.305
8	17	10	45.256
8	17	11	43.573
8	17	12	42.271
8	17	13	41.118
8	17	14	40.441
8	17	15	40.004
8	17	16	39.974
8	17	17	40.13
8	17	18	40.289
8	17	19	41.629
8	17	20	43.28
8	17	21	45.194
8	17	22	46.585
8	17	23	48.198
8	17	24	49.523
8	18	1	50.467
8	18	2	51.25
8	18	3	52.265
8	18	4	53.053
8	18	5	53.502
8	18	6	53.839
8	18	7	52.274
8	18	8	49.316
8	18	9	47.305
8	18	10	45.256
8	18	11	43.573
8	18	12	42.271
8	18	13	41.118
8	18	14	40.441
8	18	15	40.004
8	18	16	39.974
8	18	17	40.13
8	18	18	40.289
8	18	19	41.629
8	18	20	43.28
8	18	21	45.194
8	18	22	46.585
8	18	23	48.198
8	18	24	49.523
8	19	1	50.467
8	19	2	51.25
8	19	3	52.265
8	19	4	53.053
8	19	5	53.502
8	19	6	53.839
8	19	7	52.274
8	19	8	49.316
8	19	9	47.305
8	19	10	45.256
8	19	11	43.573
8	19	12	42.271
8	19	13	41.118
8	19	14	40.441
8	19	15	40.004
8	19	16	39.974
8	19	17	40.13
8	19	18	40.289
8	19	19	41.629
8	19	20	43.28
8	19	21	45.194
8	19	22	46.585
8	19	23	48.198

8	19	24	49.523
8	20	1	50.467
8	20	2	51.25
8	20	3	52.265
8	20	4	53.053
8	20	5	53.502
8	20	6	53.839
8	20	7	52.274
8	20	8	49.316
8	20	9	47.305
8	20	10	45.256
8	20	11	43.573
8	20	12	42.271
8	20	13	41.118
8	20	14	40.441
8	20	15	40.004
8	20	16	39.974
8	20	17	40.13
8	20	18	40.289
8	20	19	41.629
8	20	20	43.28
8	20	21	45.194
8	20	22	46.585
8	20	23	48.198
8	20	24	49.523
8	21	1	50.467
8	21	2	51.25
8	21	3	52.265
8	21	4	53.053
8	21	5	53.502
8	21	6	53.839
8	21	7	52.274
8	21	8	49.316
8	21	9	47.305
8	21	10	45.256
8	21	11	43.573
8	21	12	42.271
8	21	13	41.118
8	21	14	40.441
8	21	15	40.004
8	21	16	39.974
8	21	17	40.13
8	21	18	40.289
8	21	19	41.629
8	21	20	43.28
8	21	21	45.194
8	21	22	46.585
8	21	23	48.198
8	21	24	49.523
8	22	1	50.467
8	22	2	51.25
8	22	3	52.265
8	22	4	53.053
8	22	5	53.502
8	22	6	53.839
8	22	7	52.274
8	22	8	49.316
8	22	9	47.305
8	22	10	45.256
8	22	11	43.573
8	22	12	42.271
8	22	13	41.118
8	22	14	40.441
8	22	15	40.004
8	22	16	39.974
8	22	17	40.13
8	22	18	40.289
8	22	19	41.629
8	22	20	43.28
8	22	21	45.194
8	22	22	46.585
8	22	23	48.198
8	22	24	49.523
8	23	1	50.467
8	23	2	51.25
8	23	3	52.265
8	23	4	53.053
8	23	5	53.502
8	23	6	53.839
8	23	7	52.274
8	23	8	49.316
8	23	9	47.305
8	23	10	45.256
8	23	11	43.573
8	23	12	42.271
8	23	13	41.118
8	23	14	40.441
8	23	15	40.004

8	23	16	39.974
8	23	17	40.13
8	23	18	40.289
8	23	19	41.629
8	23	20	43.28
8	23	21	45.194
8	23	22	46.585
8	23	23	48.198
8	23	24	49.523
8	24	1	50.467
8	24	2	51.25
8	24	3	52.265
8	24	4	53.053
8	24	5	53.502
8	24	6	53.839
8	24	7	52.274
8	24	8	49.316
8	24	9	47.305
8	24	10	45.256
8	24	11	43.573
8	24	12	42.271
8	24	13	41.118
8	24	14	40.441
8	24	15	40.004
8	24	16	39.974
8	24	17	40.13
8	24	18	40.289
8	24	19	41.629
8	24	20	43.28
8	24	21	45.194
8	24	22	46.585
8	24	23	48.198
8	24	24	49.523
8	25	1	50.467
8	25	2	51.25
8	25	3	52.265
8	25	4	53.053
8	25	5	53.502
8	25	6	53.839
8	25	7	52.274
8	25	8	49.316
8	25	9	47.305
8	25	10	45.256
8	25	11	43.573
8	25	12	42.271
8	25	13	41.118
8	25	14	40.441
8	25	15	40.004
8	25	16	39.974
8	25	17	40.13
8	25	18	40.289
8	25	19	41.629
8	25	20	43.28
8	25	21	45.194
8	25	22	46.585
8	25	23	48.198
8	25	24	49.523
8	26	1	50.467
8	26	2	51.25
8	26	3	52.265
8	26	4	53.053
8	26	5	53.502
8	26	6	53.839
8	26	7	52.274
8	26	8	49.316
8	26	9	47.305
8	26	10	45.256
8	26	11	43.573
8	26	12	42.271
8	26	13	41.118
8	26	14	40.441
8	26	15	40.004
8	26	16	39.974
8	26	17	40.13
8	26	18	40.289
8	26	19	41.629
8	26	20	43.28
8	26	21	45.194
8	26	22	46.585
8	26	23	48.198
8	26	24	49.523
8	27	1	50.467
8	27	2	51.25
8	27	3	52.265
8	27	4	53.053
8	27	5	53.502
8	27	6	53.839
8	27	7	52.274

8	27	8	49.316
8	27	9	47.305
8	27	10	45.256
8	27	11	43.573
8	27	12	42.271
8	27	13	41.118
8	27	14	40.441
8	27	15	40.004
8	27	16	39.974
8	27	17	40.13
8	27	18	40.289
8	27	19	41.629
8	27	20	43.28
8	27	21	45.194
8	27	22	46.585
8	27	23	48.198
8	27	24	49.523
8	28	1	50.467
8	28	2	51.25
8	28	3	52.265
8	28	4	53.053
8	28	5	53.502
8	28	6	53.839
8	28	7	52.274
8	28	8	49.316
8	28	9	47.305
8	28	10	45.256
8	28	11	43.573
8	28	12	42.271
8	28	13	41.118
8	28	14	40.441
8	28	15	40.004
8	28	16	39.974
8	28	17	40.13
8	28	18	40.289
8	28	19	41.629
8	28	20	43.28
8	28	21	45.194
8	28	22	46.585
8	28	23	48.198
8	28	24	49.523
8	29	1	50.467
8	29	2	51.25
8	29	3	52.265
8	29	4	53.053
8	29	5	53.502
8	29	6	53.839
8	29	7	52.274
8	29	8	49.316
8	29	9	47.305
8	29	10	45.256
8	29	11	43.573
8	29	12	42.271
8	29	13	41.118
8	29	14	40.441
8	29	15	40.004
8	29	16	39.974
8	29	17	40.13
8	29	18	40.289
8	29	19	41.629
8	29	20	43.28
8	29	21	45.194
8	29	22	46.585
8	29	23	48.198
8	29	24	49.523
8	30	1	50.467
8	30	2	51.25
8	30	3	52.265
8	30	4	53.053
8	30	5	53.502
8	30	6	53.839
8	30	7	52.274
8	30	8	49.316
8	30	9	47.305
8	30	10	45.256
8	30	11	43.573
8	30	12	42.271
8	30	13	41.118
8	30	14	40.441
8	30	15	40.004
8	30	16	39.974
8	30	17	40.13
8	30	18	40.289
8	30	19	41.629
8	30	20	43.28
8	30	21	45.194
8	30	22	46.585
8	30	23	48.198

8	30	24	49.523
8	31	1	50.467
8	31	2	51.25
8	31	3	52.265
8	31	4	53.053
8	31	5	53.502
8	31	6	53.839
8	31	7	52.274
8	31	8	49.316
8	31	9	47.305
8	31	10	45.256
8	31	11	43.573
8	31	12	42.271
8	31	13	41.118
8	31	14	40.441
8	31	15	40.004
8	31	16	39.974
8	31	17	40.13
8	31	18	40.289
8	31	19	41.629
8	31	20	43.28
8	31	21	45.194
8	31	22	46.585
8	31	23	48.198
8	31	24	55.076
9	1	1	55.99
9	1	2	56.789
9	1	3	57.398
9	1	4	57.908
9	1	5	58.272
9	1	6	58.652
9	1	7	58.06
9	1	8	55.812
9	1	9	53.818
9	1	10	52.005
9	1	11	50.418
9	1	12	49.067
9	1	13	48.162
9	1	14	47.819
9	1	15	47.642
9	1	16	47.43
9	1	17	47.805
9	1	18	49.031
9	1	19	50.566
9	1	20	52.013
9	1	21	53.011
9	1	22	53.742
9	1	23	54.64
9	1	24	55.076
9	2	1	55.99
9	2	2	56.789
9	2	3	57.398
9	2	4	57.908
9	2	5	58.272
9	2	6	58.652
9	2	7	58.06
9	2	8	55.812
9	2	9	53.818
9	2	10	52.005
9	2	11	50.418
9	2	12	49.067
9	2	13	48.162
9	2	14	47.819
9	2	15	47.642
9	2	16	47.43
9	2	17	47.805
9	2	18	49.031
9	2	19	50.566
9	2	20	52.013
9	2	21	53.011
9	2	22	53.742
9	2	23	54.64
9	2	24	55.076
9	3	1	55.99
9	3	2	56.789
9	3	3	57.398
9	3	4	57.908
9	3	5	58.272
9	3	6	58.652
9	3	7	58.06
9	3	8	55.812
9	3	9	53.818
9	3	10	52.005
9	3	11	50.418
9	3	12	49.067
9	3	13	48.162
9	3	14	47.819
9	3	15	47.642

9	3	16	47.43
9	3	17	47.805
9	3	18	49.031
9	3	19	50.566
9	3	20	52.013
9	3	21	53.011
9	3	22	53.742
9	3	23	54.64
9	3	24	55.076
9	4	1	55.99
9	4	2	56.789
9	4	3	57.398
9	4	4	57.908
9	4	5	58.272
9	4	6	58.652
9	4	7	58.06
9	4	8	55.812
9	4	9	53.818
9	4	10	52.005
9	4	11	50.418
9	4	12	49.067
9	4	13	48.162
9	4	14	47.819
9	4	15	47.642
9	4	16	47.43
9	4	17	47.805
9	4	18	49.031
9	4	19	50.566
9	4	20	52.013
9	4	21	53.011
9	4	22	53.742
9	4	23	54.64
9	4	24	55.076
9	5	1	55.99
9	5	2	56.789
9	5	3	57.398
9	5	4	57.908
9	5	5	58.272
9	5	6	58.652
9	5	7	58.06
9	5	8	55.812
9	5	9	53.818
9	5	10	52.005
9	5	11	50.418
9	5	12	49.067
9	5	13	48.162
9	5	14	47.819
9	5	15	47.642
9	5	16	47.43
9	5	17	47.805
9	5	18	49.031
9	5	19	50.566
9	5	20	52.013
9	5	21	53.011
9	5	22	53.742
9	5	23	54.64
9	5	24	55.076
9	6	1	55.99
9	6	2	56.789
9	6	3	57.398
9	6	4	57.908
9	6	5	58.272
9	6	6	58.652
9	6	7	58.06
9	6	8	55.812
9	6	9	53.818
9	6	10	52.005
9	6	11	50.418
9	6	12	49.067
9	6	13	48.162
9	6	14	47.819
9	6	15	47.642
9	6	16	47.43
9	6	17	47.805
9	6	18	49.031
9	6	19	50.566
9	6	20	52.013
9	6	21	53.011
9	6	22	53.742
9	6	23	54.64
9	6	24	55.076
9	7	1	55.99
9	7	2	56.789
9	7	3	57.398
9	7	4	57.908
9	7	5	58.272
9	7	6	58.652
9	7	7	58.06

9	7	8	55.812
9	7	9	53.818
9	7	10	52.005
9	7	11	50.418
9	7	12	49.067
9	7	13	48.162
9	7	14	47.819
9	7	15	47.642
9	7	16	47.43
9	7	17	47.805
9	7	18	49.031
9	7	19	50.566
9	7	20	52.013
9	7	21	53.011
9	7	22	53.742
9	7	23	54.64
9	7	24	55.076
9	8	1	55.99
9	8	2	56.789
9	8	3	57.398
9	8	4	57.908
9	8	5	58.272
9	8	6	58.652
9	8	7	58.06
9	8	8	55.812
9	8	9	53.818
9	8	10	52.005
9	8	11	50.418
9	8	12	49.067
9	8	13	48.162
9	8	14	47.819
9	8	15	47.642
9	8	16	47.43
9	8	17	47.805
9	8	18	49.031
9	8	19	50.566
9	8	20	52.013
9	8	21	53.011
9	8	22	53.742
9	8	23	54.64
9	8	24	55.076
9	9	1	55.99
9	9	2	56.789
9	9	3	57.398
9	9	4	57.908
9	9	5	58.272
9	9	6	58.652
9	9	7	58.06
9	9	8	55.812
9	9	9	53.818
9	9	10	52.005
9	9	11	50.418
9	9	12	49.067
9	9	13	48.162
9	9	14	47.819
9	9	15	47.642
9	9	16	47.43
9	9	17	47.805
9	9	18	49.031
9	9	19	50.566
9	9	20	52.013
9	9	21	53.011
9	9	22	53.742
9	9	23	54.64
9	9	24	55.076
9	10	1	55.99
9	10	2	56.789
9	10	3	57.398
9	10	4	57.908
9	10	5	58.272
9	10	6	58.652
9	10	7	58.06
9	10	8	55.812
9	10	9	53.818
9	10	10	52.005
9	10	11	50.418
9	10	12	49.067
9	10	13	48.162
9	10	14	47.819
9	10	15	47.642
9	10	16	47.43
9	10	17	47.805
9	10	18	49.031
9	10	19	50.566
9	10	20	52.013
9	10	21	53.011
9	10	22	53.742
9	10	23	54.64

9	10	24	55.076
9	11	1	55.99
9	11	2	56.789
9	11	3	57.398
9	11	4	57.908
9	11	5	58.272
9	11	6	58.652
9	11	7	58.06
9	11	8	55.812
9	11	9	53.818
9	11	10	52.005
9	11	11	50.418
9	11	12	49.067
9	11	13	48.162
9	11	14	47.819
9	11	15	47.642
9	11	16	47.43
9	11	17	47.805
9	11	18	49.031
9	11	19	50.566
9	11	20	52.013
9	11	21	53.011
9	11	22	53.742
9	11	23	54.64
9	11	24	55.076
9	12	1	55.99
9	12	2	56.789
9	12	3	57.398
9	12	4	57.908
9	12	5	58.272
9	12	6	58.652
9	12	7	58.06
9	12	8	55.812
9	12	9	53.818
9	12	10	52.005
9	12	11	50.418
9	12	12	49.067
9	12	13	48.162
9	12	14	47.819
9	12	15	47.642
9	12	16	47.43
9	12	17	47.805
9	12	18	49.031
9	12	19	50.566
9	12	20	52.013
9	12	21	53.011
9	12	22	53.742
9	12	23	54.64
9	12	24	55.076
9	13	1	55.99
9	13	2	56.789
9	13	3	57.398
9	13	4	57.908
9	13	5	58.272
9	13	6	58.652
9	13	7	58.06
9	13	8	55.812
9	13	9	53.818
9	13	10	52.005
9	13	11	50.418
9	13	12	49.067
9	13	13	48.162
9	13	14	47.819
9	13	15	47.642
9	13	16	47.43
9	13	17	47.805
9	13	18	49.031
9	13	19	50.566
9	13	20	52.013
9	13	21	53.011
9	13	22	53.742
9	13	23	54.64
9	13	24	55.076
9	14	1	55.99
9	14	2	56.789
9	14	3	57.398
9	14	4	57.908
9	14	5	58.272
9	14	6	58.652
9	14	7	58.06
9	14	8	55.812
9	14	9	53.818
9	14	10	52.005
9	14	11	50.418
9	14	12	49.067
9	14	13	48.162
9	14	14	47.819
9	14	15	47.642

9	14	16	47.43
9	14	17	47.805
9	14	18	49.031
9	14	19	50.566
9	14	20	52.013
9	14	21	53.011
9	14	22	53.742
9	14	23	54.64
9	14	24	55.076
9	15	1	55.99
9	15	2	56.789
9	15	3	57.398
9	15	4	57.908
9	15	5	58.272
9	15	6	58.652
9	15	7	58.06
9	15	8	55.812
9	15	9	53.818
9	15	10	52.005
9	15	11	50.418
9	15	12	49.067
9	15	13	48.162
9	15	14	47.819
9	15	15	47.642
9	15	16	47.43
9	15	17	47.805
9	15	18	49.031
9	15	19	50.566
9	15	20	52.013
9	15	21	53.011
9	15	22	53.742
9	15	23	54.64
9	15	24	55.076
9	16	1	55.99
9	16	2	56.789
9	16	3	57.398
9	16	4	57.908
9	16	5	58.272
9	16	6	58.652
9	16	7	58.06
9	16	8	55.812
9	16	9	53.818
9	16	10	52.005
9	16	11	50.418
9	16	12	49.067
9	16	13	48.162
9	16	14	47.819
9	16	15	47.642
9	16	16	47.43
9	16	17	47.805
9	16	18	49.031
9	16	19	50.566
9	16	20	52.013
9	16	21	53.011
9	16	22	53.742
9	16	23	54.64
9	16	24	55.076
9	17	1	55.99
9	17	2	56.789
9	17	3	57.398
9	17	4	57.908
9	17	5	58.272
9	17	6	58.652
9	17	7	58.06
9	17	8	55.812
9	17	9	53.818
9	17	10	52.005
9	17	11	50.418
9	17	12	49.067
9	17	13	48.162
9	17	14	47.819
9	17	15	47.642
9	17	16	47.43
9	17	17	47.805
9	17	18	49.031
9	17	19	50.566
9	17	20	52.013
9	17	21	53.011
9	17	22	53.742
9	17	23	54.64
9	17	24	55.076
9	18	1	55.99
9	18	2	56.789
9	18	3	57.398
9	18	4	57.908
9	18	5	58.272
9	18	6	58.652
9	18	7	58.06

9	18	8	55.812
9	18	9	53.818
9	18	10	52.005
9	18	11	50.418
9	18	12	49.067
9	18	13	48.162
9	18	14	47.819
9	18	15	47.642
9	18	16	47.43
9	18	17	47.805
9	18	18	49.031
9	18	19	50.566
9	18	20	52.013
9	18	21	53.011
9	18	22	53.742
9	18	23	54.64
9	18	24	55.076
9	19	1	55.99
9	19	2	56.789
9	19	3	57.398
9	19	4	57.908
9	19	5	58.272
9	19	6	58.652
9	19	7	58.06
9	19	8	55.812
9	19	9	53.818
9	19	10	52.005
9	19	11	50.418
9	19	12	49.067
9	19	13	48.162
9	19	14	47.819
9	19	15	47.642
9	19	16	47.43
9	19	17	47.805
9	19	18	49.031
9	19	19	50.566
9	19	20	52.013
9	19	21	53.011
9	19	22	53.742
9	19	23	54.64
9	19	24	55.076
9	20	1	55.99
9	20	2	56.789
9	20	3	57.398
9	20	4	57.908
9	20	5	58.272
9	20	6	58.652
9	20	7	58.06
9	20	8	55.812
9	20	9	53.818
9	20	10	52.005
9	20	11	50.418
9	20	12	49.067
9	20	13	48.162
9	20	14	47.819
9	20	15	47.642
9	20	16	47.43
9	20	17	47.805
9	20	18	49.031
9	20	19	50.566
9	20	20	52.013
9	20	21	53.011
9	20	22	53.742
9	20	23	54.64
9	20	24	55.076
9	21	1	55.99
9	21	2	56.789
9	21	3	57.398
9	21	4	57.908
9	21	5	58.272
9	21	6	58.652
9	21	7	58.06
9	21	8	55.812
9	21	9	53.818
9	21	10	52.005
9	21	11	50.418
9	21	12	49.067
9	21	13	48.162
9	21	14	47.819
9	21	15	47.642
9	21	16	47.43
9	21	17	47.805
9	21	18	49.031
9	21	19	50.566
9	21	20	52.013
9	21	21	53.011
9	21	22	53.742
9	21	23	54.64

9	21	24	55.076
9	22	1	55.99
9	22	2	56.789
9	22	3	57.398
9	22	4	57.908
9	22	5	58.272
9	22	6	58.652
9	22	7	58.06
9	22	8	55.812
9	22	9	53.818
9	22	10	52.005
9	22	11	50.418
9	22	12	49.067
9	22	13	48.162
9	22	14	47.819
9	22	15	47.642
9	22	16	47.43
9	22	17	47.805
9	22	18	49.031
9	22	19	50.566
9	22	20	52.013
9	22	21	53.011
9	22	22	53.742
9	22	23	54.64
9	22	24	55.076
9	23	1	55.99
9	23	2	56.789
9	23	3	57.398
9	23	4	57.908
9	23	5	58.272
9	23	6	58.652
9	23	7	58.06
9	23	8	55.812
9	23	9	53.818
9	23	10	52.005
9	23	11	50.418
9	23	12	49.067
9	23	13	48.162
9	23	14	47.819
9	23	15	47.642
9	23	16	47.43
9	23	17	47.805
9	23	18	49.031
9	23	19	50.566
9	23	20	52.013
9	23	21	53.011
9	23	22	53.742
9	23	23	54.64
9	23	24	55.076
9	24	1	55.99
9	24	2	56.789
9	24	3	57.398
9	24	4	57.908
9	24	5	58.272
9	24	6	58.652
9	24	7	58.06
9	24	8	55.812
9	24	9	53.818
9	24	10	52.005
9	24	11	50.418
9	24	12	49.067
9	24	13	48.162
9	24	14	47.819
9	24	15	47.642
9	24	16	47.43
9	24	17	47.805
9	24	18	49.031
9	24	19	50.566
9	24	20	52.013
9	24	21	53.011
9	24	22	53.742
9	24	23	54.64
9	24	24	55.076
9	25	1	55.99
9	25	2	56.789
9	25	3	57.398
9	25	4	57.908
9	25	5	58.272
9	25	6	58.652
9	25	7	58.06
9	25	8	55.812
9	25	9	53.818
9	25	10	52.005
9	25	11	50.418
9	25	12	49.067
9	25	13	48.162
9	25	14	47.819
9	25	15	47.642

9	25	16	47.43
9	25	17	47.805
9	25	18	49.031
9	25	19	50.566
9	25	20	52.013
9	25	21	53.011
9	25	22	53.742
9	25	23	54.64
9	25	24	55.076
9	26	1	55.99
9	26	2	56.789
9	26	3	57.398
9	26	4	57.908
9	26	5	58.272
9	26	6	58.652
9	26	7	58.06
9	26	8	55.812
9	26	9	53.818
9	26	10	52.005
9	26	11	50.418
9	26	12	49.067
9	26	13	48.162
9	26	14	47.819
9	26	15	47.642
9	26	16	47.43
9	26	17	47.805
9	26	18	49.031
9	26	19	50.566
9	26	20	52.013
9	26	21	53.011
9	26	22	53.742
9	26	23	54.64
9	26	24	55.076
9	27	1	55.99
9	27	2	56.789
9	27	3	57.398
9	27	4	57.908
9	27	5	58.272
9	27	6	58.652
9	27	7	58.06
9	27	8	55.812
9	27	9	53.818
9	27	10	52.005
9	27	11	50.418
9	27	12	49.067
9	27	13	48.162
9	27	14	47.819
9	27	15	47.642
9	27	16	47.43
9	27	17	47.805
9	27	18	49.031
9	27	19	50.566
9	27	20	52.013
9	27	21	53.011
9	27	22	53.742
9	27	23	54.64
9	27	24	55.076
9	28	1	55.99
9	28	2	56.789
9	28	3	57.398
9	28	4	57.908
9	28	5	58.272
9	28	6	58.652
9	28	7	58.06
9	28	8	55.812
9	28	9	53.818
9	28	10	52.005
9	28	11	50.418
9	28	12	49.067
9	28	13	48.162
9	28	14	47.819
9	28	15	47.642
9	28	16	47.43
9	28	17	47.805
9	28	18	49.031
9	28	19	50.566
9	28	20	52.013
9	28	21	53.011
9	28	22	53.742
9	28	23	54.64
9	28	24	55.076
9	29	1	55.99
9	29	2	56.789
9	29	3	57.398
9	29	4	57.908
9	29	5	58.272
9	29	6	58.652
9	29	7	58.06

9	29	8	55.812
9	29	9	53.818
9	29	10	52.005
9	29	11	50.418
9	29	12	49.067
9	29	13	48.162
9	29	14	47.819
9	29	15	47.642
9	29	16	47.43
9	29	17	47.805
9	29	18	49.031
9	29	19	50.566
9	29	20	52.013
9	29	21	53.011
9	29	22	53.742
9	29	23	54.64
9	29	24	55.076
9	30	1	55.99
9	30	2	56.789
9	30	3	57.398
9	30	4	57.908
9	30	5	58.272
9	30	6	58.652
9	30	7	58.06
9	30	8	55.812
9	30	9	53.818
9	30	10	52.005
9	30	11	50.418
9	30	12	49.067
9	30	13	48.162
9	30	14	47.819
9	30	15	47.642
9	30	16	47.43
9	30	17	47.805
9	30	18	49.031
9	30	19	50.566
9	30	20	52.013
9	30	21	53.011
9	30	22	53.742
9	30	23	54.64
9	30	24	57.524
10	1	1	57.898
10	1	2	58.099
10	1	3	58.282
10	1	4	58.56
10	1	5	58.762
10	1	6	58.971
10	1	7	58.905
10	1	8	57.793
10	1	9	56.135
10	1	10	54.735
10	1	11	53.179
10	1	12	51.999
10	1	13	51.219
10	1	14	50.55
10	1	15	50.239
10	1	16	50.415
10	1	17	51.29
10	1	18	52.839
10	1	19	54.172
10	1	20	55.208
10	1	21	55.878
10	1	22	56.597
10	1	23	57.126
10	1	24	57.524
10	2	1	57.898
10	2	2	58.099
10	2	3	58.282
10	2	4	58.56
10	2	5	58.762
10	2	6	58.971
10	2	7	58.905
10	2	8	57.793
10	2	9	56.135
10	2	10	54.735
10	2	11	53.179
10	2	12	51.999
10	2	13	51.219
10	2	14	50.55
10	2	15	50.239
10	2	16	50.415
10	2	17	51.29
10	2	18	52.839
10	2	19	54.172
10	2	20	55.208
10	2	21	55.878
10	2	22	56.597
10	2	23	57.126

10	2	24	57.524
10	3	1	57.898
10	3	2	58.099
10	3	3	58.282
10	3	4	58.56
10	3	5	58.762
10	3	6	58.971
10	3	7	58.905
10	3	8	57.793
10	3	9	56.135
10	3	10	54.735
10	3	11	53.179
10	3	12	51.999
10	3	13	51.219
10	3	14	50.55
10	3	15	50.239
10	3	16	50.415
10	3	17	51.29
10	3	18	52.839
10	3	19	54.172
10	3	20	55.208
10	3	21	55.878
10	3	22	56.597
10	3	23	57.126
10	3	24	57.524
10	4	1	57.898
10	4	2	58.099
10	4	3	58.282
10	4	4	58.56
10	4	5	58.762
10	4	6	58.971
10	4	7	58.905
10	4	8	57.793
10	4	9	56.135
10	4	10	54.735
10	4	11	53.179
10	4	12	51.999
10	4	13	51.219
10	4	14	50.55
10	4	15	50.239
10	4	16	50.415
10	4	17	51.29
10	4	18	52.839
10	4	19	54.172
10	4	20	55.208
10	4	21	55.878
10	4	22	56.597
10	4	23	57.126
10	4	24	57.524
10	5	1	57.898
10	5	2	58.099
10	5	3	58.282
10	5	4	58.56
10	5	5	58.762
10	5	6	58.971
10	5	7	58.905
10	5	8	57.793
10	5	9	56.135
10	5	10	54.735
10	5	11	53.179
10	5	12	51.999
10	5	13	51.219
10	5	14	50.55
10	5	15	50.239
10	5	16	50.415
10	5	17	51.29
10	5	18	52.839
10	5	19	54.172
10	5	20	55.208
10	5	21	55.878
10	5	22	56.597
10	5	23	57.126
10	5	24	57.524
10	6	1	57.898
10	6	2	58.099
10	6	3	58.282
10	6	4	58.56
10	6	5	58.762
10	6	6	58.971
10	6	7	58.905
10	6	8	57.793
10	6	9	56.135
10	6	10	54.735
10	6	11	53.179
10	6	12	51.999
10	6	13	51.219
10	6	14	50.55
10	6	15	50.239

10	6	16	50.415
10	6	17	51.29
10	6	18	52.839
10	6	19	54.172
10	6	20	55.208
10	6	21	55.878
10	6	22	56.597
10	6	23	57.126
10	6	24	57.524
10	7	1	57.898
10	7	2	58.099
10	7	3	58.282
10	7	4	58.56
10	7	5	58.762
10	7	6	58.971
10	7	7	58.905
10	7	8	57.793
10	7	9	56.135
10	7	10	54.735
10	7	11	53.179
10	7	12	51.999
10	7	13	51.219
10	7	14	50.55
10	7	15	50.239
10	7	16	50.415
10	7	17	51.29
10	7	18	52.839
10	7	19	54.172
10	7	20	55.208
10	7	21	55.878
10	7	22	56.597
10	7	23	57.126
10	7	24	57.524
10	8	1	57.898
10	8	2	58.099
10	8	3	58.282
10	8	4	58.56
10	8	5	58.762
10	8	6	58.971
10	8	7	58.905
10	8	8	57.793
10	8	9	56.135
10	8	10	54.735
10	8	11	53.179
10	8	12	51.999
10	8	13	51.219
10	8	14	50.55
10	8	15	50.239
10	8	16	50.415
10	8	17	51.29
10	8	18	52.839
10	8	19	54.172
10	8	20	55.208
10	8	21	55.878
10	8	22	56.597
10	8	23	57.126
10	8	24	57.524
10	9	1	57.898
10	9	2	58.099
10	9	3	58.282
10	9	4	58.56
10	9	5	58.762
10	9	6	58.971
10	9	7	58.905
10	9	8	57.793
10	9	9	56.135
10	9	10	54.735
10	9	11	53.179
10	9	12	51.999
10	9	13	51.219
10	9	14	50.55
10	9	15	50.239
10	9	16	50.415
10	9	17	51.29
10	9	18	52.839
10	9	19	54.172
10	9	20	55.208
10	9	21	55.878
10	9	22	56.597
10	9	23	57.126
10	9	24	57.524
10	10	1	57.898
10	10	2	58.099
10	10	3	58.282
10	10	4	58.56
10	10	5	58.762
10	10	6	58.971
10	10	7	58.905

10	10	8	57.793
10	10	9	56.135
10	10	10	54.735
10	10	11	53.179
10	10	12	51.999
10	10	13	51.219
10	10	14	50.55
10	10	15	50.239
10	10	16	50.415
10	10	17	51.29
10	10	18	52.839
10	10	19	54.172
10	10	20	55.208
10	10	21	55.878
10	10	22	56.597
10	10	23	57.126
10	10	24	57.524
10	11	1	57.898
10	11	2	58.099
10	11	3	58.282
10	11	4	58.56
10	11	5	58.762
10	11	6	58.971
10	11	7	58.905
10	11	8	57.793
10	11	9	56.135
10	11	10	54.735
10	11	11	53.179
10	11	12	51.999
10	11	13	51.219
10	11	14	50.55
10	11	15	50.239
10	11	16	50.415
10	11	17	51.29
10	11	18	52.839
10	11	19	54.172
10	11	20	55.208
10	11	21	55.878
10	11	22	56.597
10	11	23	57.126
10	11	24	57.524
10	12	1	57.898
10	12	2	58.099
10	12	3	58.282
10	12	4	58.56
10	12	5	58.762
10	12	6	58.971
10	12	7	58.905
10	12	8	57.793
10	12	9	56.135
10	12	10	54.735
10	12	11	53.179
10	12	12	51.999
10	12	13	51.219
10	12	14	50.55
10	12	15	50.239
10	12	16	50.415
10	12	17	51.29
10	12	18	52.839
10	12	19	54.172
10	12	20	55.208
10	12	21	55.878
10	12	22	56.597
10	12	23	57.126
10	12	24	57.524
10	13	1	57.898
10	13	2	58.099
10	13	3	58.282
10	13	4	58.56
10	13	5	58.762
10	13	6	58.971
10	13	7	58.905
10	13	8	57.793
10	13	9	56.135
10	13	10	54.735
10	13	11	53.179
10	13	12	51.999
10	13	13	51.219
10	13	14	50.55
10	13	15	50.239
10	13	16	50.415
10	13	17	51.29
10	13	18	52.839
10	13	19	54.172
10	13	20	55.208
10	13	21	55.878
10	13	22	56.597
10	13	23	57.126

10	13	24	57.524
10	14	1	57.898
10	14	2	58.099
10	14	3	58.282
10	14	4	58.56
10	14	5	58.762
10	14	6	58.971
10	14	7	58.905
10	14	8	57.793
10	14	9	56.135
10	14	10	54.735
10	14	11	53.179
10	14	12	51.999
10	14	13	51.219
10	14	14	50.55
10	14	15	50.239
10	14	16	50.415
10	14	17	51.29
10	14	18	52.839
10	14	19	54.172
10	14	20	55.208
10	14	21	55.878
10	14	22	56.597
10	14	23	57.126
10	14	24	57.524
10	15	1	57.898
10	15	2	58.099
10	15	3	58.282
10	15	4	58.56
10	15	5	58.762
10	15	6	58.971
10	15	7	58.905
10	15	8	57.793
10	15	9	56.135
10	15	10	54.735
10	15	11	53.179
10	15	12	51.999
10	15	13	51.219
10	15	14	50.55
10	15	15	50.239
10	15	16	50.415
10	15	17	51.29
10	15	18	52.839
10	15	19	54.172
10	15	20	55.208
10	15	21	55.878
10	15	22	56.597
10	15	23	57.126
10	15	24	57.524
10	16	1	57.898
10	16	2	58.099
10	16	3	58.282
10	16	4	58.56
10	16	5	58.762
10	16	6	58.971
10	16	7	58.905
10	16	8	57.793
10	16	9	56.135
10	16	10	54.735
10	16	11	53.179
10	16	12	51.999
10	16	13	51.219
10	16	14	50.55
10	16	15	50.239
10	16	16	50.415
10	16	17	51.29
10	16	18	52.839
10	16	19	54.172
10	16	20	55.208
10	16	21	55.878
10	16	22	56.597
10	16	23	57.126
10	16	24	57.524
10	17	1	57.898
10	17	2	58.099
10	17	3	58.282
10	17	4	58.56
10	17	5	58.762
10	17	6	58.971
10	17	7	58.905
10	17	8	57.793
10	17	9	56.135
10	17	10	54.735
10	17	11	53.179
10	17	12	51.999
10	17	13	51.219
10	17	14	50.55
10	17	15	50.239

10	17	16	50.415
10	17	17	51.29
10	17	18	52.839
10	17	19	54.172
10	17	20	55.208
10	17	21	55.878
10	17	22	56.597
10	17	23	57.126
10	17	24	57.524
10	18	1	57.898
10	18	2	58.099
10	18	3	58.282
10	18	4	58.56
10	18	5	58.762
10	18	6	58.971
10	18	7	58.905
10	18	8	57.793
10	18	9	56.135
10	18	10	54.735
10	18	11	53.179
10	18	12	51.999
10	18	13	51.219
10	18	14	50.55
10	18	15	50.239
10	18	16	50.415
10	18	17	51.29
10	18	18	52.839
10	18	19	54.172
10	18	20	55.208
10	18	21	55.878
10	18	22	56.597
10	18	23	57.126
10	18	24	57.524
10	19	1	57.898
10	19	2	58.099
10	19	3	58.282
10	19	4	58.56
10	19	5	58.762
10	19	6	58.971
10	19	7	58.905
10	19	8	57.793
10	19	9	56.135
10	19	10	54.735
10	19	11	53.179
10	19	12	51.999
10	19	13	51.219
10	19	14	50.55
10	19	15	50.239
10	19	16	50.415
10	19	17	51.29
10	19	18	52.839
10	19	19	54.172
10	19	20	55.208
10	19	21	55.878
10	19	22	56.597
10	19	23	57.126
10	19	24	57.524
10	20	1	57.898
10	20	2	58.099
10	20	3	58.282
10	20	4	58.56
10	20	5	58.762
10	20	6	58.971
10	20	7	58.905
10	20	8	57.793
10	20	9	56.135
10	20	10	54.735
10	20	11	53.179
10	20	12	51.999
10	20	13	51.219
10	20	14	50.55
10	20	15	50.239
10	20	16	50.415
10	20	17	51.29
10	20	18	52.839
10	20	19	54.172
10	20	20	55.208
10	20	21	55.878
10	20	22	56.597
10	20	23	57.126
10	20	24	57.524
10	21	1	57.898
10	21	2	58.099
10	21	3	58.282
10	21	4	58.56
10	21	5	58.762
10	21	6	58.971
10	21	7	58.905

10	21	8	57.793
10	21	9	56.135
10	21	10	54.735
10	21	11	53.179
10	21	12	51.999
10	21	13	51.219
10	21	14	50.55
10	21	15	50.239
10	21	16	50.415
10	21	17	51.29
10	21	18	52.839
10	21	19	54.172
10	21	20	55.208
10	21	21	55.878
10	21	22	56.597
10	21	23	57.126
10	21	24	57.524
10	22	1	57.898
10	22	2	58.099
10	22	3	58.282
10	22	4	58.56
10	22	5	58.762
10	22	6	58.971
10	22	7	58.905
10	22	8	57.793
10	22	9	56.135
10	22	10	54.735
10	22	11	53.179
10	22	12	51.999
10	22	13	51.219
10	22	14	50.55
10	22	15	50.239
10	22	16	50.415
10	22	17	51.29
10	22	18	52.839
10	22	19	54.172
10	22	20	55.208
10	22	21	55.878
10	22	22	56.597
10	22	23	57.126
10	22	24	57.524
10	23	1	57.898
10	23	2	58.099
10	23	3	58.282
10	23	4	58.56
10	23	5	58.762
10	23	6	58.971
10	23	7	58.905
10	23	8	57.793
10	23	9	56.135
10	23	10	54.735
10	23	11	53.179
10	23	12	51.999
10	23	13	51.219
10	23	14	50.55
10	23	15	50.239
10	23	16	50.415
10	23	17	51.29
10	23	18	52.839
10	23	19	54.172
10	23	20	55.208
10	23	21	55.878
10	23	22	56.597
10	23	23	57.126
10	23	24	57.524
10	24	1	57.898
10	24	2	58.099
10	24	3	58.282
10	24	4	58.56
10	24	5	58.762
10	24	6	58.971
10	24	7	58.905
10	24	8	57.793
10	24	9	56.135
10	24	10	54.735
10	24	11	53.179
10	24	12	51.999
10	24	13	51.219
10	24	14	50.55
10	24	15	50.239
10	24	16	50.415
10	24	17	51.29
10	24	18	52.839
10	24	19	54.172
10	24	20	55.208
10	24	21	55.878
10	24	22	56.597
10	24	23	57.126

10	24	24	57.524
10	25	1	57.898
10	25	2	58.099
10	25	3	58.282
10	25	4	58.56
10	25	5	58.762
10	25	6	58.971
10	25	7	58.905
10	25	8	57.793
10	25	9	56.135
10	25	10	54.735
10	25	11	53.179
10	25	12	51.999
10	25	13	51.219
10	25	14	50.55
10	25	15	50.239
10	25	16	50.415
10	25	17	51.29
10	25	18	52.839
10	25	19	54.172
10	25	20	55.208
10	25	21	55.878
10	25	22	56.597
10	25	23	57.126
10	25	24	57.524
10	26	1	57.898
10	26	2	58.099
10	26	3	58.282
10	26	4	58.56
10	26	5	58.762
10	26	6	58.971
10	26	7	58.905
10	26	8	57.793
10	26	9	56.135
10	26	10	54.735
10	26	11	53.179
10	26	12	51.999
10	26	13	51.219
10	26	14	50.55
10	26	15	50.239
10	26	16	50.415
10	26	17	51.29
10	26	18	52.839
10	26	19	54.172
10	26	20	55.208
10	26	21	55.878
10	26	22	56.597
10	26	23	57.126
10	26	24	57.524
10	27	1	57.898
10	27	2	58.099
10	27	3	58.282
10	27	4	58.56
10	27	5	58.762
10	27	6	58.971
10	27	7	58.905
10	27	8	57.793
10	27	9	56.135
10	27	10	54.735
10	27	11	53.179
10	27	12	51.999
10	27	13	51.219
10	27	14	50.55
10	27	15	50.239
10	27	16	50.415
10	27	17	51.29
10	27	18	52.839
10	27	19	54.172
10	27	20	55.208
10	27	21	55.878
10	27	22	56.597
10	27	23	57.126
10	27	24	57.524
10	28	1	57.898
10	28	2	58.099
10	28	3	58.282
10	28	4	58.56
10	28	5	58.762
10	28	6	58.971
10	28	7	58.905
10	28	8	57.793
10	28	9	56.135
10	28	10	54.735
10	28	11	53.179
10	28	12	51.999
10	28	13	51.219
10	28	14	50.55
10	28	15	50.239

10	28	16	50.415
10	28	17	51.29
10	28	18	52.839
10	28	19	54.172
10	28	20	55.208
10	28	21	55.878
10	28	22	56.597
10	28	23	57.126
10	28	24	57.524
10	29	1	57.898
10	29	2	58.099
10	29	3	58.282
10	29	4	58.56
10	29	5	58.762
10	29	6	58.971
10	29	7	58.905
10	29	8	57.793
10	29	9	56.135
10	29	10	54.735
10	29	11	53.179
10	29	12	51.999
10	29	13	51.219
10	29	14	50.55
10	29	15	50.239
10	29	16	50.415
10	29	17	51.29
10	29	18	52.839
10	29	19	54.172
10	29	20	55.208
10	29	21	55.878
10	29	22	56.597
10	29	23	57.126
10	29	24	57.524
10	30	1	57.898
10	30	2	58.099
10	30	3	58.282
10	30	4	58.56
10	30	5	58.762
10	30	6	58.971
10	30	7	58.905
10	30	8	57.793
10	30	9	56.135
10	30	10	54.735
10	30	11	53.179
10	30	12	51.999
10	30	13	51.219
10	30	14	50.55
10	30	15	50.239
10	30	16	50.415
10	30	17	51.29
10	30	18	52.839
10	30	19	54.172
10	30	20	55.208
10	30	21	55.878
10	30	22	56.597
10	30	23	57.126
10	30	24	57.524
10	31	1	57.898
10	31	2	58.099
10	31	3	58.282
10	31	4	58.56
10	31	5	58.762
10	31	6	58.971
10	31	7	58.905
10	31	8	57.793
10	31	9	56.135
10	31	10	54.735
10	31	11	53.179
10	31	12	51.999
10	31	13	51.219
10	31	14	50.55
10	31	15	50.239
10	31	16	50.415
10	31	17	51.29
10	31	18	52.839
10	31	19	54.172
10	31	20	55.208
10	31	21	55.878
10	31	22	56.597
10	31	23	57.126
10	31	24	64.158
11	1	1	64.158
11	1	2	64.492
11	1	3	64.604
11	1	4	64.659
11	1	5	64.753
11	1	6	64.9
11	1	7	65.009

11	1	8	64.887
11	1	9	63.467
11	1	10	61.816
11	1	11	60.406
11	1	12	59.026
11	1	13	58.221
11	1	14	57.705
11	1	15	57.572
11	1	16	57.708
11	1	17	58.745
11	1	18	59.966
11	1	19	60.962
11	1	20	61.99
11	1	21	62.762
11	1	22	63.271
11	1	23	63.62
11	1	24	63.926
11	2	1	64.158
11	2	2	64.492
11	2	3	64.604
11	2	4	64.659
11	2	5	64.753
11	2	6	64.9
11	2	7	65.009
11	2	8	64.887
11	2	9	63.467
11	2	10	61.816
11	2	11	60.406
11	2	12	59.026
11	2	13	58.221
11	2	14	57.705
11	2	15	57.572
11	2	16	57.708
11	2	17	58.745
11	2	18	59.966
11	2	19	60.962
11	2	20	61.99
11	2	21	62.762
11	2	22	63.271
11	2	23	63.62
11	2	24	63.926
11	3	1	64.158
11	3	2	64.492
11	3	3	64.604
11	3	4	64.659
11	3	5	64.753
11	3	6	64.9
11	3	7	65.009
11	3	8	64.887
11	3	9	63.467
11	3	10	61.816
11	3	11	60.406
11	3	12	59.026
11	3	13	58.221
11	3	14	57.705
11	3	15	57.572
11	3	16	57.708
11	3	17	58.745
11	3	18	59.966
11	3	19	60.962
11	3	20	61.99
11	3	21	62.762
11	3	22	63.271
11	3	23	63.62
11	3	24	63.926
11	4	1	64.158
11	4	2	64.492
11	4	3	64.604
11	4	4	64.659
11	4	5	64.753
11	4	6	64.9
11	4	7	65.009
11	4	8	64.887
11	4	9	63.467
11	4	10	61.816
11	4	11	60.406
11	4	12	59.026
11	4	13	58.221
11	4	14	57.705
11	4	15	57.572
11	4	16	57.708
11	4	17	58.745
11	4	18	59.966
11	4	19	60.962
11	4	20	61.99
11	4	21	62.762
11	4	22	63.271
11	4	23	63.62

11	4	24	63.926
11	5	1	64.158
11	5	2	64.492
11	5	3	64.604
11	5	4	64.659
11	5	5	64.753
11	5	6	64.9
11	5	7	65.009
11	5	8	64.887
11	5	9	63.467
11	5	10	61.816
11	5	11	60.406
11	5	12	59.026
11	5	13	58.221
11	5	14	57.705
11	5	15	57.572
11	5	16	57.708
11	5	17	58.745
11	5	18	59.966
11	5	19	60.962
11	5	20	61.99
11	5	21	62.762
11	5	22	63.271
11	5	23	63.62
11	5	24	63.926
11	6	1	64.158
11	6	2	64.492
11	6	3	64.604
11	6	4	64.659
11	6	5	64.753
11	6	6	64.9
11	6	7	65.009
11	6	8	64.887
11	6	9	63.467
11	6	10	61.816
11	6	11	60.406
11	6	12	59.026
11	6	13	58.221
11	6	14	57.705
11	6	15	57.572
11	6	16	57.708
11	6	17	58.745
11	6	18	59.966
11	6	19	60.962
11	6	20	61.99
11	6	21	62.762
11	6	22	63.271
11	6	23	63.62
11	6	24	63.926
11	7	1	64.158
11	7	2	64.492
11	7	3	64.604
11	7	4	64.659
11	7	5	64.753
11	7	6	64.9
11	7	7	65.009
11	7	8	64.887
11	7	9	63.467
11	7	10	61.816
11	7	11	60.406
11	7	12	59.026
11	7	13	58.221
11	7	14	57.705
11	7	15	57.572
11	7	16	57.708
11	7	17	58.745
11	7	18	59.966
11	7	19	60.962
11	7	20	61.99
11	7	21	62.762
11	7	22	63.271
11	7	23	63.62
11	7	24	63.926
11	8	1	64.158
11	8	2	64.492
11	8	3	64.604
11	8	4	64.659
11	8	5	64.753
11	8	6	64.9
11	8	7	65.009
11	8	8	64.887
11	8	9	63.467
11	8	10	61.816
11	8	11	60.406
11	8	12	59.026
11	8	13	58.221
11	8	14	57.705
11	8	15	57.572

11	8	16	57.708
11	8	17	58.745
11	8	18	59.966
11	8	19	60.962
11	8	20	61.99
11	8	21	62.762
11	8	22	63.271
11	8	23	63.62
11	8	24	63.926
11	9	1	64.158
11	9	2	64.492
11	9	3	64.604
11	9	4	64.659
11	9	5	64.753
11	9	6	64.9
11	9	7	65.009
11	9	8	64.887
11	9	9	63.467
11	9	10	61.816
11	9	11	60.406
11	9	12	59.026
11	9	13	58.221
11	9	14	57.705
11	9	15	57.572
11	9	16	57.708
11	9	17	58.745
11	9	18	59.966
11	9	19	60.962
11	9	20	61.99
11	9	21	62.762
11	9	22	63.271
11	9	23	63.62
11	9	24	63.926
11	10	1	64.158
11	10	2	64.492
11	10	3	64.604
11	10	4	64.659
11	10	5	64.753
11	10	6	64.9
11	10	7	65.009
11	10	8	64.887
11	10	9	63.467
11	10	10	61.816
11	10	11	60.406
11	10	12	59.026
11	10	13	58.221
11	10	14	57.705
11	10	15	57.572
11	10	16	57.708
11	10	17	58.745
11	10	18	59.966
11	10	19	60.962
11	10	20	61.99
11	10	21	62.762
11	10	22	63.271
11	10	23	63.62
11	10	24	63.926
11	11	1	64.158
11	11	2	64.492
11	11	3	64.604
11	11	4	64.659
11	11	5	64.753
11	11	6	64.9
11	11	7	65.009
11	11	8	64.887
11	11	9	63.467
11	11	10	61.816
11	11	11	60.406
11	11	12	59.026
11	11	13	58.221
11	11	14	57.705
11	11	15	57.572
11	11	16	57.708
11	11	17	58.745
11	11	18	59.966
11	11	19	60.962
11	11	20	61.99
11	11	21	62.762
11	11	22	63.271
11	11	23	63.62
11	11	24	63.926
11	12	1	64.158
11	12	2	64.492
11	12	3	64.604
11	12	4	64.659
11	12	5	64.753
11	12	6	64.9
11	12	7	65.009

11	12	8	64.887
11	12	9	63.467
11	12	10	61.816
11	12	11	60.406
11	12	12	59.026
11	12	13	58.221
11	12	14	57.705
11	12	15	57.572
11	12	16	57.708
11	12	17	58.745
11	12	18	59.966
11	12	19	60.962
11	12	20	61.99
11	12	21	62.762
11	12	22	63.271
11	12	23	63.62
11	12	24	63.926
11	13	1	64.158
11	13	2	64.492
11	13	3	64.604
11	13	4	64.659
11	13	5	64.753
11	13	6	64.9
11	13	7	65.009
11	13	8	64.887
11	13	9	63.467
11	13	10	61.816
11	13	11	60.406
11	13	12	59.026
11	13	13	58.221
11	13	14	57.705
11	13	15	57.572
11	13	16	57.708
11	13	17	58.745
11	13	18	59.966
11	13	19	60.962
11	13	20	61.99
11	13	21	62.762
11	13	22	63.271
11	13	23	63.62
11	13	24	63.926
11	14	1	64.158
11	14	2	64.492
11	14	3	64.604
11	14	4	64.659
11	14	5	64.753
11	14	6	64.9
11	14	7	65.009
11	14	8	64.887
11	14	9	63.467
11	14	10	61.816
11	14	11	60.406
11	14	12	59.026
11	14	13	58.221
11	14	14	57.705
11	14	15	57.572
11	14	16	57.708
11	14	17	58.745
11	14	18	59.966
11	14	19	60.962
11	14	20	61.99
11	14	21	62.762
11	14	22	63.271
11	14	23	63.62
11	14	24	63.926
11	15	1	64.158
11	15	2	64.492
11	15	3	64.604
11	15	4	64.659
11	15	5	64.753
11	15	6	64.9
11	15	7	65.009
11	15	8	64.887
11	15	9	63.467
11	15	10	61.816
11	15	11	60.406
11	15	12	59.026
11	15	13	58.221
11	15	14	57.705
11	15	15	57.572
11	15	16	57.708
11	15	17	58.745
11	15	18	59.966
11	15	19	60.962
11	15	20	61.99
11	15	21	62.762
11	15	22	63.271
11	15	23	63.62

11	15	24	63.926
11	16	1	64.158
11	16	2	64.492
11	16	3	64.604
11	16	4	64.659
11	16	5	64.753
11	16	6	64.9
11	16	7	65.009
11	16	8	64.887
11	16	9	63.467
11	16	10	61.816
11	16	11	60.406
11	16	12	59.026
11	16	13	58.221
11	16	14	57.705
11	16	15	57.572
11	16	16	57.708
11	16	17	58.745
11	16	18	59.966
11	16	19	60.962
11	16	20	61.99
11	16	21	62.762
11	16	22	63.271
11	16	23	63.62
11	16	24	63.926
11	17	1	64.158
11	17	2	64.492
11	17	3	64.604
11	17	4	64.659
11	17	5	64.753
11	17	6	64.9
11	17	7	65.009
11	17	8	64.887
11	17	9	63.467
11	17	10	61.816
11	17	11	60.406
11	17	12	59.026
11	17	13	58.221
11	17	14	57.705
11	17	15	57.572
11	17	16	57.708
11	17	17	58.745
11	17	18	59.966
11	17	19	60.962
11	17	20	61.99
11	17	21	62.762
11	17	22	63.271
11	17	23	63.62
11	17	24	63.926
11	18	1	64.158
11	18	2	64.492
11	18	3	64.604
11	18	4	64.659
11	18	5	64.753
11	18	6	64.9
11	18	7	65.009
11	18	8	64.887
11	18	9	63.467
11	18	10	61.816
11	18	11	60.406
11	18	12	59.026
11	18	13	58.221
11	18	14	57.705
11	18	15	57.572
11	18	16	57.708
11	18	17	58.745
11	18	18	59.966
11	18	19	60.962
11	18	20	61.99
11	18	21	62.762
11	18	22	63.271
11	18	23	63.62
11	18	24	63.926
11	19	1	64.158
11	19	2	64.492
11	19	3	64.604
11	19	4	64.659
11	19	5	64.753
11	19	6	64.9
11	19	7	65.009
11	19	8	64.887
11	19	9	63.467
11	19	10	61.816
11	19	11	60.406
11	19	12	59.026
11	19	13	58.221
11	19	14	57.705
11	19	15	57.572

11	19	16	57.708
11	19	17	58.745
11	19	18	59.966
11	19	19	60.962
11	19	20	61.99
11	19	21	62.762
11	19	22	63.271
11	19	23	63.62
11	19	24	63.926
11	20	1	64.158
11	20	2	64.492
11	20	3	64.604
11	20	4	64.659
11	20	5	64.753
11	20	6	64.9
11	20	7	65.009
11	20	8	64.887
11	20	9	63.467
11	20	10	61.816
11	20	11	60.406
11	20	12	59.026
11	20	13	58.221
11	20	14	57.705
11	20	15	57.572
11	20	16	57.708
11	20	17	58.745
11	20	18	59.966
11	20	19	60.962
11	20	20	61.99
11	20	21	62.762
11	20	22	63.271
11	20	23	63.62
11	20	24	63.926
11	21	1	64.158
11	21	2	64.492
11	21	3	64.604
11	21	4	64.659
11	21	5	64.753
11	21	6	64.9
11	21	7	65.009
11	21	8	64.887
11	21	9	63.467
11	21	10	61.816
11	21	11	60.406
11	21	12	59.026
11	21	13	58.221
11	21	14	57.705
11	21	15	57.572
11	21	16	57.708
11	21	17	58.745
11	21	18	59.966
11	21	19	60.962
11	21	20	61.99
11	21	21	62.762
11	21	22	63.271
11	21	23	63.62
11	21	24	63.926
11	22	1	64.158
11	22	2	64.492
11	22	3	64.604
11	22	4	64.659
11	22	5	64.753
11	22	6	64.9
11	22	7	65.009
11	22	8	64.887
11	22	9	63.467
11	22	10	61.816
11	22	11	60.406
11	22	12	59.026
11	22	13	58.221
11	22	14	57.705
11	22	15	57.572
11	22	16	57.708
11	22	17	58.745
11	22	18	59.966
11	22	19	60.962
11	22	20	61.99
11	22	21	62.762
11	22	22	63.271
11	22	23	63.62
11	22	24	63.926
11	23	1	64.158
11	23	2	64.492
11	23	3	64.604
11	23	4	64.659
11	23	5	64.753
11	23	6	64.9
11	23	7	65.009

11	23	8	64.887
11	23	9	63.467
11	23	10	61.816
11	23	11	60.406
11	23	12	59.026
11	23	13	58.221
11	23	14	57.705
11	23	15	57.572
11	23	16	57.708
11	23	17	58.745
11	23	18	59.966
11	23	19	60.962
11	23	20	61.99
11	23	21	62.762
11	23	22	63.271
11	23	23	63.62
11	23	24	63.926
11	24	1	64.158
11	24	2	64.492
11	24	3	64.604
11	24	4	64.659
11	24	5	64.753
11	24	6	64.9
11	24	7	65.009
11	24	8	64.887
11	24	9	63.467
11	24	10	61.816
11	24	11	60.406
11	24	12	59.026
11	24	13	58.221
11	24	14	57.705
11	24	15	57.572
11	24	16	57.708
11	24	17	58.745
11	24	18	59.966
11	24	19	60.962
11	24	20	61.99
11	24	21	62.762
11	24	22	63.271
11	24	23	63.62
11	24	24	63.926
11	25	1	64.158
11	25	2	64.492
11	25	3	64.604
11	25	4	64.659
11	25	5	64.753
11	25	6	64.9
11	25	7	65.009
11	25	8	64.887
11	25	9	63.467
11	25	10	61.816
11	25	11	60.406
11	25	12	59.026
11	25	13	58.221
11	25	14	57.705
11	25	15	57.572
11	25	16	57.708
11	25	17	58.745
11	25	18	59.966
11	25	19	60.962
11	25	20	61.99
11	25	21	62.762
11	25	22	63.271
11	25	23	63.62
11	25	24	63.926
11	26	1	64.158
11	26	2	64.492
11	26	3	64.604
11	26	4	64.659
11	26	5	64.753
11	26	6	64.9
11	26	7	65.009
11	26	8	64.887
11	26	9	63.467
11	26	10	61.816
11	26	11	60.406
11	26	12	59.026
11	26	13	58.221
11	26	14	57.705
11	26	15	57.572
11	26	16	57.708
11	26	17	58.745
11	26	18	59.966
11	26	19	60.962
11	26	20	61.99
11	26	21	62.762
11	26	22	63.271
11	26	23	63.62

11	26	24	63.926
11	27	1	64.158
11	27	2	64.492
11	27	3	64.604
11	27	4	64.659
11	27	5	64.753
11	27	6	64.9
11	27	7	65.009
11	27	8	64.887
11	27	9	63.467
11	27	10	61.816
11	27	11	60.406
11	27	12	59.026
11	27	13	58.221
11	27	14	57.705
11	27	15	57.572
11	27	16	57.708
11	27	17	58.745
11	27	18	59.966
11	27	19	60.962
11	27	20	61.99
11	27	21	62.762
11	27	22	63.271
11	27	23	63.62
11	27	24	63.926
11	28	1	64.158
11	28	2	64.492
11	28	3	64.604
11	28	4	64.659
11	28	5	64.753
11	28	6	64.9
11	28	7	65.009
11	28	8	64.887
11	28	9	63.467
11	28	10	61.816
11	28	11	60.406
11	28	12	59.026
11	28	13	58.221
11	28	14	57.705
11	28	15	57.572
11	28	16	57.708
11	28	17	58.745
11	28	18	59.966
11	28	19	60.962
11	28	20	61.99
11	28	21	62.762
11	28	22	63.271
11	28	23	63.62
11	28	24	63.926
11	29	1	64.158
11	29	2	64.492
11	29	3	64.604
11	29	4	64.659
11	29	5	64.753
11	29	6	64.9
11	29	7	65.009
11	29	8	64.887
11	29	9	63.467
11	29	10	61.816
11	29	11	60.406
11	29	12	59.026
11	29	13	58.221
11	29	14	57.705
11	29	15	57.572
11	29	16	57.708
11	29	17	58.745
11	29	18	59.966
11	29	19	60.962
11	29	20	61.99
11	29	21	62.762
11	29	22	63.271
11	29	23	63.62
11	29	24	63.926
11	30	1	64.158
11	30	2	64.492
11	30	3	64.604
11	30	4	64.659
11	30	5	64.753
11	30	6	64.9
11	30	7	65.009
11	30	8	64.887
11	30	9	63.467
11	30	10	61.816
11	30	11	60.406
11	30	12	59.026
11	30	13	58.221
11	30	14	57.705
11	30	15	57.572

11	30	16	57.708
11	30	17	58.745
11	30	18	59.966
11	30	19	60.962
11	30	20	61.99
11	30	21	62.762
11	30	22	63.271
11	30	23	63.62
11	30	24	63.926
12	1	1	65.422
12	1	2	65.599
12	1	3	65.469
12	1	4	65.597
12	1	5	65.708
12	1	6	65.664
12	1	7	65.593
12	1	8	65.578
12	1	9	65.171
12	1	10	64.533
12	1	11	64.1
12	1	12	63.392
12	1	13	62.92
12	1	14	62.618
12	1	15	62.541
12	1	16	62.801
12	1	17	63.257
12	1	18	63.744
12	1	19	64.248
12	1	20	64.705
12	1	21	64.768
12	1	22	64.862
12	1	23	65.068
12	1	24	65.145
12	2	1	65.422
12	2	2	65.599
12	2	3	65.469
12	2	4	65.597
12	2	5	65.708
12	2	6	65.664
12	2	7	65.593
12	2	8	65.578
12	2	9	65.171
12	2	10	64.533
12	2	11	64.1
12	2	12	63.392
12	2	13	62.92
12	2	14	62.618
12	2	15	62.541
12	2	16	62.801
12	2	17	63.257
12	2	18	63.744
12	2	19	64.248
12	2	20	64.705
12	2	21	64.768
12	2	22	64.862
12	2	23	65.068
12	2	24	65.145
12	3	1	65.422
12	3	2	65.599
12	3	3	65.469
12	3	4	65.597
12	3	5	65.708
12	3	6	65.664
12	3	7	65.593
12	3	8	65.578
12	3	9	65.171
12	3	10	64.533
12	3	11	64.1
12	3	12	63.392
12	3	13	62.92
12	3	14	62.618
12	3	15	62.541
12	3	16	62.801
12	3	17	63.257
12	3	18	63.744
12	3	19	64.248
12	3	20	64.705
12	3	21	64.768
12	3	22	64.862
12	3	23	65.068
12	3	24	65.145
12	4	1	65.422
12	4	2	65.599
12	4	3	65.469
12	4	4	65.597
12	4	5	65.708
12	4	6	65.664
12	4	7	65.593

12	4	8	65.578
12	4	9	65.171
12	4	10	64.533
12	4	11	64.1
12	4	12	63.392
12	4	13	62.92
12	4	14	62.618
12	4	15	62.541
12	4	16	62.801
12	4	17	63.257
12	4	18	63.744
12	4	19	64.248
12	4	20	64.705
12	4	21	64.768
12	4	22	64.862
12	4	23	65.068
12	4	24	65.145
12	5	1	65.422
12	5	2	65.599
12	5	3	65.469
12	5	4	65.597
12	5	5	65.708
12	5	6	65.664
12	5	7	65.593
12	5	8	65.578
12	5	9	65.171
12	5	10	64.533
12	5	11	64.1
12	5	12	63.392
12	5	13	62.92
12	5	14	62.618
12	5	15	62.541
12	5	16	62.801
12	5	17	63.257
12	5	18	63.744
12	5	19	64.248
12	5	20	64.705
12	5	21	64.768
12	5	22	64.862
12	5	23	65.068
12	5	24	65.145
12	6	1	65.422
12	6	2	65.599
12	6	3	65.469
12	6	4	65.597
12	6	5	65.708
12	6	6	65.664
12	6	7	65.593
12	6	8	65.578
12	6	9	65.171
12	6	10	64.533
12	6	11	64.1
12	6	12	63.392
12	6	13	62.92
12	6	14	62.618
12	6	15	62.541
12	6	16	62.801
12	6	17	63.257
12	6	18	63.744
12	6	19	64.248
12	6	20	64.705
12	6	21	64.768
12	6	22	64.862
12	6	23	65.068
12	6	24	65.145
12	7	1	65.422
12	7	2	65.599
12	7	3	65.469
12	7	4	65.597
12	7	5	65.708
12	7	6	65.664
12	7	7	65.593
12	7	8	65.578
12	7	9	65.171
12	7	10	64.533
12	7	11	64.1
12	7	12	63.392
12	7	13	62.92
12	7	14	62.618
12	7	15	62.541
12	7	16	62.801
12	7	17	63.257
12	7	18	63.744
12	7	19	64.248
12	7	20	64.705
12	7	21	64.768
12	7	22	64.862
12	7	23	65.068

12	7	24	65.145
12	8	1	65.422
12	8	2	65.599
12	8	3	65.469
12	8	4	65.597
12	8	5	65.708
12	8	6	65.664
12	8	7	65.593
12	8	8	65.578
12	8	9	65.171
12	8	10	64.533
12	8	11	64.1
12	8	12	63.392
12	8	13	62.92
12	8	14	62.618
12	8	15	62.541
12	8	16	62.801
12	8	17	63.257
12	8	18	63.744
12	8	19	64.248
12	8	20	64.705
12	8	21	64.768
12	8	22	64.862
12	8	23	65.068
12	8	24	65.145
12	9	1	65.422
12	9	2	65.599
12	9	3	65.469
12	9	4	65.597
12	9	5	65.708
12	9	6	65.664
12	9	7	65.593
12	9	8	65.578
12	9	9	65.171
12	9	10	64.533
12	9	11	64.1
12	9	12	63.392
12	9	13	62.92
12	9	14	62.618
12	9	15	62.541
12	9	16	62.801
12	9	17	63.257
12	9	18	63.744
12	9	19	64.248
12	9	20	64.705
12	9	21	64.768
12	9	22	64.862
12	9	23	65.068
12	9	24	65.145
12	10	1	65.422
12	10	2	65.599
12	10	3	65.469
12	10	4	65.597
12	10	5	65.708
12	10	6	65.664
12	10	7	65.593
12	10	8	65.578
12	10	9	65.171
12	10	10	64.533
12	10	11	64.1
12	10	12	63.392
12	10	13	62.92
12	10	14	62.618
12	10	15	62.541
12	10	16	62.801
12	10	17	63.257
12	10	18	63.744
12	10	19	64.248
12	10	20	64.705
12	10	21	64.768
12	10	22	64.862
12	10	23	65.068
12	10	24	65.145
12	11	1	65.422
12	11	2	65.599
12	11	3	65.469
12	11	4	65.597
12	11	5	65.708
12	11	6	65.664
12	11	7	65.593
12	11	8	65.578
12	11	9	65.171
12	11	10	64.533
12	11	11	64.1
12	11	12	63.392
12	11	13	62.92
12	11	14	62.618
12	11	15	62.541

12	11	16	62.801
12	11	17	63.257
12	11	18	63.744
12	11	19	64.248
12	11	20	64.705
12	11	21	64.768
12	11	22	64.862
12	11	23	65.068
12	11	24	65.145
12	12	1	65.422
12	12	2	65.599
12	12	3	65.469
12	12	4	65.597
12	12	5	65.708
12	12	6	65.664
12	12	7	65.593
12	12	8	65.578
12	12	9	65.171
12	12	10	64.533
12	12	11	64.1
12	12	12	63.392
12	12	13	62.92
12	12	14	62.618
12	12	15	62.541
12	12	16	62.801
12	12	17	63.257
12	12	18	63.744
12	12	19	64.248
12	12	20	64.705
12	12	21	64.768
12	12	22	64.862
12	12	23	65.068
12	12	24	65.145
12	13	1	65.422
12	13	2	65.599
12	13	3	65.469
12	13	4	65.597
12	13	5	65.708
12	13	6	65.664
12	13	7	65.593
12	13	8	65.578
12	13	9	65.171
12	13	10	64.533
12	13	11	64.1
12	13	12	63.392
12	13	13	62.92
12	13	14	62.618
12	13	15	62.541
12	13	16	62.801
12	13	17	63.257
12	13	18	63.744
12	13	19	64.248
12	13	20	64.705
12	13	21	64.768
12	13	22	64.862
12	13	23	65.068
12	13	24	65.145
12	14	1	65.422
12	14	2	65.599
12	14	3	65.469
12	14	4	65.597
12	14	5	65.708
12	14	6	65.664
12	14	7	65.593
12	14	8	65.578
12	14	9	65.171
12	14	10	64.533
12	14	11	64.1
12	14	12	63.392
12	14	13	62.92
12	14	14	62.618
12	14	15	62.541
12	14	16	62.801
12	14	17	63.257
12	14	18	63.744
12	14	19	64.248
12	14	20	64.705
12	14	21	64.768
12	14	22	64.862
12	14	23	65.068
12	14	24	65.145
12	15	1	65.422
12	15	2	65.599
12	15	3	65.469
12	15	4	65.597
12	15	5	65.708
12	15	6	65.664
12	15	7	65.593

12	15	8	65.578
12	15	9	65.171
12	15	10	64.533
12	15	11	64.1
12	15	12	63.392
12	15	13	62.92
12	15	14	62.618
12	15	15	62.541
12	15	16	62.801
12	15	17	63.257
12	15	18	63.744
12	15	19	64.248
12	15	20	64.705
12	15	21	64.768
12	15	22	64.862
12	15	23	65.068
12	15	24	65.145
12	16	1	65.422
12	16	2	65.599
12	16	3	65.469
12	16	4	65.597
12	16	5	65.708
12	16	6	65.664
12	16	7	65.593
12	16	8	65.578
12	16	9	65.171
12	16	10	64.533
12	16	11	64.1
12	16	12	63.392
12	16	13	62.92
12	16	14	62.618
12	16	15	62.541
12	16	16	62.801
12	16	17	63.257
12	16	18	63.744
12	16	19	64.248
12	16	20	64.705
12	16	21	64.768
12	16	22	64.862
12	16	23	65.068
12	16	24	65.145
12	17	1	65.422
12	17	2	65.599
12	17	3	65.469
12	17	4	65.597
12	17	5	65.708
12	17	6	65.664
12	17	7	65.593
12	17	8	65.578
12	17	9	65.171
12	17	10	64.533
12	17	11	64.1
12	17	12	63.392
12	17	13	62.92
12	17	14	62.618
12	17	15	62.541
12	17	16	62.801
12	17	17	63.257
12	17	18	63.744
12	17	19	64.248
12	17	20	64.705
12	17	21	64.768
12	17	22	64.862
12	17	23	65.068
12	17	24	65.145
12	18	1	65.422
12	18	2	65.599
12	18	3	65.469
12	18	4	65.597
12	18	5	65.708
12	18	6	65.664
12	18	7	65.593
12	18	8	65.578
12	18	9	65.171
12	18	10	64.533
12	18	11	64.1
12	18	12	63.392
12	18	13	62.92
12	18	14	62.618
12	18	15	62.541
12	18	16	62.801
12	18	17	63.257
12	18	18	63.744
12	18	19	64.248
12	18	20	64.705
12	18	21	64.768
12	18	22	64.862
12	18	23	65.068

12	18	24	65.145
12	19	1	65.422
12	19	2	65.599
12	19	3	65.469
12	19	4	65.597
12	19	5	65.708
12	19	6	65.664
12	19	7	65.593
12	19	8	65.578
12	19	9	65.171
12	19	10	64.533
12	19	11	64.1
12	19	12	63.392
12	19	13	62.92
12	19	14	62.618
12	19	15	62.541
12	19	16	62.801
12	19	17	63.257
12	19	18	63.744
12	19	19	64.248
12	19	20	64.705
12	19	21	64.768
12	19	22	64.862
12	19	23	65.068
12	19	24	65.145
12	20	1	65.422
12	20	2	65.599
12	20	3	65.469
12	20	4	65.597
12	20	5	65.708
12	20	6	65.664
12	20	7	65.593
12	20	8	65.578
12	20	9	65.171
12	20	10	64.533
12	20	11	64.1
12	20	12	63.392
12	20	13	62.92
12	20	14	62.618
12	20	15	62.541
12	20	16	62.801
12	20	17	63.257
12	20	18	63.744
12	20	19	64.248
12	20	20	64.705
12	20	21	64.768
12	20	22	64.862
12	20	23	65.068
12	20	24	65.145
12	21	1	65.422
12	21	2	65.599
12	21	3	65.469
12	21	4	65.597
12	21	5	65.708
12	21	6	65.664
12	21	7	65.593
12	21	8	65.578
12	21	9	65.171
12	21	10	64.533
12	21	11	64.1
12	21	12	63.392
12	21	13	62.92
12	21	14	62.618
12	21	15	62.541
12	21	16	62.801
12	21	17	63.257
12	21	18	63.744
12	21	19	64.248
12	21	20	64.705
12	21	21	64.768
12	21	22	64.862
12	21	23	65.068
12	21	24	65.145
12	22	1	65.422
12	22	2	65.599
12	22	3	65.469
12	22	4	65.597
12	22	5	65.708
12	22	6	65.664
12	22	7	65.593
12	22	8	65.578
12	22	9	65.171
12	22	10	64.533
12	22	11	64.1
12	22	12	63.392
12	22	13	62.92
12	22	14	62.618
12	22	15	62.541

12	22	16	62.801
12	22	17	63.257
12	22	18	63.744
12	22	19	64.248
12	22	20	64.705
12	22	21	64.768
12	22	22	64.862
12	22	23	65.068
12	22	24	65.145
12	23	1	65.422
12	23	2	65.599
12	23	3	65.469
12	23	4	65.597
12	23	5	65.708
12	23	6	65.664
12	23	7	65.593
12	23	8	65.578
12	23	9	65.171
12	23	10	64.533
12	23	11	64.1
12	23	12	63.392
12	23	13	62.92
12	23	14	62.618
12	23	15	62.541
12	23	16	62.801
12	23	17	63.257
12	23	18	63.744
12	23	19	64.248
12	23	20	64.705
12	23	21	64.768
12	23	22	64.862
12	23	23	65.068
12	23	24	65.145
12	24	1	65.422
12	24	2	65.599
12	24	3	65.469
12	24	4	65.597
12	24	5	65.708
12	24	6	65.664
12	24	7	65.593
12	24	8	65.578
12	24	9	65.171
12	24	10	64.533
12	24	11	64.1
12	24	12	63.392
12	24	13	62.92
12	24	14	62.618
12	24	15	62.541
12	24	16	62.801
12	24	17	63.257
12	24	18	63.744
12	24	19	64.248
12	24	20	64.705
12	24	21	64.768
12	24	22	64.862
12	24	23	65.068
12	24	24	65.145
12	25	1	65.422
12	25	2	65.599
12	25	3	65.469
12	25	4	65.597
12	25	5	65.708
12	25	6	65.664
12	25	7	65.593
12	25	8	65.578
12	25	9	65.171
12	25	10	64.533
12	25	11	64.1
12	25	12	63.392
12	25	13	62.92
12	25	14	62.618
12	25	15	62.541
12	25	16	62.801
12	25	17	63.257
12	25	18	63.744
12	25	19	64.248
12	25	20	64.705
12	25	21	64.768
12	25	22	64.862
12	25	23	65.068
12	25	24	65.145
12	26	1	65.422
12	26	2	65.599
12	26	3	65.469
12	26	4	65.597
12	26	5	65.708
12	26	6	65.664
12	26	7	65.593

12	26	8	65.578
12	26	9	65.171
12	26	10	64.533
12	26	11	64.1
12	26	12	63.392
12	26	13	62.92
12	26	14	62.618
12	26	15	62.541
12	26	16	62.801
12	26	17	63.257
12	26	18	63.744
12	26	19	64.248
12	26	20	64.705
12	26	21	64.768
12	26	22	64.862
12	26	23	65.068
12	26	24	65.145
12	27	1	65.422
12	27	2	65.599
12	27	3	65.469
12	27	4	65.597
12	27	5	65.708
12	27	6	65.664
12	27	7	65.593
12	27	8	65.578
12	27	9	65.171
12	27	10	64.533
12	27	11	64.1
12	27	12	63.392
12	27	13	62.92
12	27	14	62.618
12	27	15	62.541
12	27	16	62.801
12	27	17	63.257
12	27	18	63.744
12	27	19	64.248
12	27	20	64.705
12	27	21	64.768
12	27	22	64.862
12	27	23	65.068
12	27	24	65.145
12	28	1	65.422
12	28	2	65.599
12	28	3	65.469
12	28	4	65.597
12	28	5	65.708
12	28	6	65.664
12	28	7	65.593
12	28	8	65.578
12	28	9	65.171
12	28	10	64.533
12	28	11	64.1
12	28	12	63.392
12	28	13	62.92
12	28	14	62.618
12	28	15	62.541
12	28	16	62.801
12	28	17	63.257
12	28	18	63.744
12	28	19	64.248
12	28	20	64.705
12	28	21	64.768
12	28	22	64.862
12	28	23	65.068
12	28	24	65.145
12	29	1	65.422
12	29	2	65.599
12	29	3	65.469
12	29	4	65.597
12	29	5	65.708
12	29	6	65.664
12	29	7	65.593
12	29	8	65.578
12	29	9	65.171
12	29	10	64.533
12	29	11	64.1
12	29	12	63.392
12	29	13	62.92
12	29	14	62.618
12	29	15	62.541
12	29	16	62.801
12	29	17	63.257
12	29	18	63.744
12	29	19	64.248
12	29	20	64.705
12	29	21	64.768
12	29	22	64.862
12	29	23	65.068

12	29	24	65.145
12	30	1	65.422
12	30	2	65.599
12	30	3	65.469
12	30	4	65.597
12	30	5	65.708
12	30	6	65.664
12	30	7	65.593
12	30	8	65.578
12	30	9	65.171
12	30	10	64.533
12	30	11	64.1
12	30	12	63.392
12	30	13	62.92
12	30	14	62.618
12	30	15	62.541
12	30	16	62.801
12	30	17	63.257
12	30	18	63.744
12	30	19	64.248
12	30	20	64.705
12	30	21	64.768
12	30	22	64.862
12	30	23	65.068
12	30	24	65.145
12	31	1	65.422
12	31	2	65.599
12	31	3	65.469
12	31	4	65.597
12	31	5	65.708
12	31	6	65.664
12	31	7	65.593
12	31	8	65.578
12	31	9	65.171
12	31	10	64.533
12	31	11	64.1
12	31	12	63.392
12	31	13	62.92
12	31	14	62.618
12	31	15	62.541
12	31	16	62.801
12	31	17	63.257
12	31	18	63.744
12	31	19	64.248
12	31	20	64.705
12	31	21	64.768
12	31	22	64.862
12	31	23	65.068
12	31	24	65.145

AFFIRMATION

Pursuant to the requirements of NRS 53.045 and NAC 703.710, I, Maria Roumpani, hereby affirm that I am the person identified in the foregoing prepared testimony and/or exhibits; that such testimony and/or exhibits were prepared by me or under my direction; that the answers and/or information appearing therein are true to the best of my knowledge and belief; and that if asked the questions appearing therein, my answers thereto would, under oath, be the same.

I declare under penalty of perjury under the law of the State of Nevada that the foregoing is true and correct.

Date: October 18, 2024

/s/ Maria Roumpani
Maria Roumpani

CERTIFICATE OF SERVICE

I hereby certify that on the 18th day of October 2024, I caused the foregoing Prepared Direct Testimony of Maria Roumpani, PhD on behalf of Advanced Energy United to be sent via e-mail to the following:

NV Energy	aaron.schaar@nvenergy.com jfedinec@nvenergy.com Sandra.blain@nvenergy.com Timothy.clausen@nvenergy.com roman.borisov@nvenergy.com regulatory@nvenergy.com
Staff Counsel Division Public Utilities Commission of Nevada	pucn.sc@puc.nv.gov dlomoljo@puc.nv.gov
Attorney General's Office Bureau of Consumer Protection	bcpserv@ag.nv.gov ajwalsh@ag.nv.gov msaunders@ag.nv.gov mbadorine@ag.nv.gov
Advanced Energy United	bturner@advancedenergyunited.org sdunbar@keyesfox.com jkantor@keyesfox.com shallstrom@advancedenergyunited.org
Google LLC	ezuckerman@google.com jcaviglia@parsonsbehle.com rshaffer@parsonsbehle.com Carolyn.berry@bateswhite.com
Nevada Workers	nathan@rrvlawyers.com hls5@ibew1245.com nring@stranchlaw.com
Sierra Club	Maddie.lipscomb@sierraclub.org Nihal.shrinath@sierraclub.org Patrick.woolsey@sierraclub.org Joe.halso@sierraclub.org
Western Resources Advocates	Emily.walsh@westernresources.org George.cavros@westernresources.org Hunter.holman@westernresources.org rnichols@westernresources.org

Vote Solar	claudine@votesolar.org dbender@earthjustice.org rick@votesolar.org
Western Power Association	dlc@dvclaw.com maw@dvclaw.com rds@dvclaw.com
Caesars Enterprise Services LLC	jruskowitz@caesars.com lkgranier@hollandhart.com
Clark County	Catherine.jorgenson@clarkcountyda.com mhenson@clarkcountynv.gov
Interstate Renewable Energy Council	mari@irecusa.org kmilks@kcnvlaw.com sgoldman@smwlaw.com yzakai@smwlaw.com
Interwest Energy Alliance	dah@dvclaw.com rikki@interwest.org sam@interwest.org
Las Vegas Convention and Visitors	cdavis@mcdonaldcarano.com lfoletta@mcdonaldcarano.com
MGM Resorts International	hshields@mgmresorts.com lkgranier@hollandhart.com
Microsoft Corporation	hsaltman@microsoft.com jeffriles@microsoft.com jordanw@microsoft.com kpeterson@allisonmackenzie.com kloehr@perkinscoie.com waldok@microsoft.com
Mt. Wheeler Power, Inc.	katie@kmlawnv.com kevinr@mwpower.org info@kmlawnv.com
Nevada Resort Association	lkgranier@hollandhart.com valentine@nevadaresorts.org
Nevada Rural Electric Association	apongracz@sklar-law.com cmturner@nrea.coop

	mfox@sklar-law.com
Smart Energy Alliance	crl@dvclaw.com
Tract Management Company	Dennis.bartlett@tract.com legal@tract.com rds@dvclaw.com
Amanda Sanchez	alsanchez@hollandhart.com
Carolyn Tanner	lina@tanner1nv.com
Collin Thomas	collin@tripleoakpower.com
Joanne Bradley	jbradley@lspower.com
Southwestern Energy Efficiency Project	jbrant@swenergy.org cgatchalian@swenergy.org c.mixson@kempjones.com ralatorre@swenergy.org tmadsen@swenergy.org vmandell@comcast.net
Lisa Hickey	lisa@interwest.org
Robbin Palmer	rpalmer@nnps.reno.nv.us
Wil Gehl	wgehl@seia.org
Andrea Black Elizabeth Helms Micki Arguelllo	ablack@ormat.com ehelms@ormat.com marguello@ormat.com ljacobsen@ormat.com
Christopher Cox Derek Stenclik	Christopher.cox@telos.energy.com Derek.stenclik@telos.energy.com
Elysia Vannoy	Elysia.vannoy@renewhome.com

/s/ Blake Elder
Blake Elder
Keyes & Fox LLP
belder@keyesfox.com