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Empowering Economic Development through Advanced Natural Language Processing and Artificial Intelligence

A test case of applied Natural Language Processing (NLP) modeling to Comprehensive Economic Development Strategies (CEDS)

National Economic Research and Resilience Center
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Empowering Economic Development through Advanced Natural Language Processing and Artificial Intelligence

A test case of applied Natural Language Processing (NLP) modeling to Comprehensive Economic Development Strategies (CEDS)

prepared by

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Acronyms and Abbreviations

AI	Artificial Intelligence
BERT	Bidirectional Encoder Representations from Transformers
BLS	Bureau of Labor Statistics
CARES	Coronavirus Aid, Relief, and Economic Security Act
CEDS	Comprehensive Economic Development Strategies
ChatGPT	Chat Generative Pre-trained Transformer
EAA	Economic Adjustment Assistance
EDA	Economic Development Administration
EDD	Economic Development District
HPC	High-performance computing
LLM	Large language models
LTSM	Long-term short memory networks
ML	Machine learning
NER	Named Entity Recognition
NERDE	National Economic Resilience Data Explorer
NERRC	National Economic Research and Resilience Center
NLP	Natural Language Processing
NWCCOG	Northwest Colorado Council of Governments
RNN	Recurrent neural networks
SWOT	Strengths, Weaknesses, Opportunities, and Threats assessment

Executive Summary

The National Economic Research and Resilience Center (NERRC) at Argonne National Laboratory was formed in October 2022 to conduct innovative research designed to support economic development needs and priorities across the nation. This study leverages Argonne's expertise and capabilities in Artificial Intelligence (AI), and specifically Natural Language Processing (NLP), to assist the EDA in quickly assessing CEDS documents from across the nation in light of evolving policies and situational factors. This study aimed to utilize advanced technologies to interpret vast amounts of economic development content, providing insights into current CEDS, identifying areas for improvement, and better understanding how AI can be applied in the economic development domain.

NLP is employed to bridge human-computer communication gaps by interpreting and generating human language. In recent years, this technology has evolved significantly alongside advances in machine learning, enhancing its applications across various sectors. This project utilizes NLP models like Google's Bidirectional Encoder Representations from Transformers (BERT) and transformer architectures to process and analyze data efficiently. While NLP models can have different uses, in this project NERRC sought to develop NLP models that could achieve human-level understanding of text from CEDS documents. Other NLP models capable of more general language processing and text generation, such as large language models (LLMs), were not used because the analysis did not involve generating new text. Potential use cases of LLMs in economic development are discussed in the Future Research section.

CEDS are instrumental in fostering regional economic development and resilience across the United States. These strategies involve an array of stakeholders, including local governments and private entities. The strategic plans encompass infrastructure, community empowerment, and resilience and are regularly updated to keep action plans relevant.

This study looked to provide valuable insights into the effectiveness of current CEDS, seeking to identify both strengths and areas for improvement across various EDA regions. Limitations to early models' capabilities did not make that possible, but the analysis presented here demonstrates the feasibility and benefits of using NLP to analyze CEDS documents. Ultimately, the technologies and methodologies employed in this analysis are at the forefront of AI. Therefore, a significant insight from the study is to help define and shape the potential for future uses of AI within the EDA and among the broader economic development community.

Challenges Encountered

As with any pioneering initiative, this study faced several challenges in its efforts to apply advanced AI technologies to complex economic documents. From model limitations to data complexity, these challenges shaped the direction of the analysis and led to innovative solutions.

- **Model Limitations:** NERRC's initial models struggled to effectively capture nuanced insights from the CEDS documents, leading to the exploration of different analytical approaches such as fixed chunking and semantic chunking.

- **Data and Model Complexity:** The study faced complexities related to data validation, the need for substantial computational resources, and the challenge of tuning the models to handle specific elements of economic strategy documents without losing context or relevance.

Outcomes and Advancements

Despite the challenges, this study yielded significant advancements in the application of NLP for analyzing CEDS. The outcomes not only demonstrated the feasibility of using AI in economic development but also paved the way for future enhancements in methodology and tool development.

- **Insights into CEDS Effectiveness:** Despite initial challenges with model capabilities, the project demonstrated the feasibility of using NLP to analyze CEDS documents, highlighting both strengths and areas for improvement across various regions.
- **Methodological Shifts:** Due to the initial challenges with model accuracy, the study's focus shifted more towards refining the methodology and exploring different techniques to improve the model's output.
- **Future Research Directions:** The study results provide a foundation for future research, suggesting potential enhancements in model development and the integration of more dynamic data sources to better align economic strategies with real-time economic conditions.

Strategic Implications

The study underscored the potential of AI and NLP in shaping economic development policy by providing a scalable tool for assessing and refining economic strategies, thus supporting more informed decision-making at the EDA and other economic development entities.

Possible Applications

The insights gained from this study highlight a range of potential applications for NLP in economic development. Both CEDS creators and the EDA can benefit from tailored content development, streamlined document review processes, and enhanced data-driven decision-making.

Possible applications for CEDS creators include the following:

- **Tailored Content Development**: Creators can use NLP insights to identify and focus on areas that are consistently underrepresented or overemphasized in current CEDS documents, ensuring a more balanced approach.
- **Guideline Adherence**: NLP analysis can help CEDS creators ensure their strategies are aligned with the latest EDA Content Guidelines, improving the likelihood of approval and funding.
- **Strategic Improvement**: By understanding trends and gaps highlighted through NLP, creators can strategically improve their economic development plans, making them more effective and comprehensive.

- **Performance Metrics Development**: Creators can develop more accurate and relevant performance metrics based on common themes and successful strategies identified through NLP analysis.

Possible applications for the EDA include the following:

- **Efficient Document Review**: The EDA can streamline the review process of CEDS by using NLP to quickly identify whether documents meet required guidelines and focus areas.
- **Policy Impact Analysis**: NLP enables the EDA to analyze the impact of policy changes over time by observing how newly introduced Content Guidelines are incorporated into CEDS.
- **Enhanced Oversight and Compliance**: Through systematic NLP reviews, the EDA can better monitor compliance and overall effectiveness of economic development strategies across different regions.
- **Data-Driven Decision Making**: By aggregating insights from NLP analysis, the EDA can make informed decisions on where to allocate resources and which strategies to promote for regional economic development.

Key Lessons

This study offers several key lessons regarding the transformative potential of NLP and AI in economic development. From the power of automated analysis to the importance of ethical AI usage, the findings underscore both the opportunities and responsibilities involved in integrating these technologies into strategic planning.

- **Transformative Impact of NLP:** NLP offers a significant opportunity for the EDA to enhance the efficiency of analyzing extensive text-based strategy documents by streamlining the review process and providing deep insights into community priorities and strategies.
- **Integration of Generative AI:** Combining generative AI with NLP can further amplify the analysis capabilities in economic development. This integration allows for automated large-scale analysis, aiding in strategic reviews, decision-making, and report synthesis. However, it necessitates rigorous validation by subject matter experts to ensure the accuracy and relevance of the data.
- **Challenges in Data Validation and Ethical Use:** The use of NLP and generative AI introduces challenges such as ensuring data validation and maintaining ethical standards. A robust policy framework is required to address issues related to data privacy, accuracy of generated content, and transparency in AI-driven decisions. This framework must also ensure that human experts validate AI outputs to align with subject matter expertise.
- **Balancing Innovation with Compliance:** To effectively leverage the benefits of NLP and generative AI, the EDA should foster a culture of innovation while ensuring compliance with ethical standards. This balance involves continuous training on AI technologies and maintaining checks and balances like bias audits and ongoing reviews of AI outputs.

Study Background

The onset of COVID-19 in early 2020 and its sustained impact on economic conditions resulted in a marked escalation by Congress of the resources available to the Economic Development Administration (EDA) to help communities strategically rejuvenate and boost their local and regional economies. With the enactment of the Coronavirus Aid, Relief, and Economic Security (CARES) Act in March 2020, approximately $1.5 billion in Economic Adjustment Assistance (EAA) was channeled to the EDA. EDA also received an additional approximately $3 billion via the American Rescue Plan Act to further assist with recovery from the Coronavirus pandemic. This injection of funds was designated to assist communities in managing and mitigating the economic consequences of the COVID-19 pandemic.

In October 2022, EDA provided Argonne National Laboratory (Argonne) with grant award ED22HDQ3120191 to establish the National Economic Research and Resilience Center (NERRC), through which this study was completed. The aim of this study was to utilize Argonne's distinctive capabilities in natural language processing (NLP) and artificial intelligence (AI) to perform a nationwide evaluation of Comprehensive Economic Development Strategies (CEDS). By harnessing these advanced technologies, the study sought to:

- interpret and analyze large volumes of economic development strategy content more efficiently and accurately than ever before,
- provide valuable insights into the effectiveness of current CEDS, identifying both strengths and areas for improvement across various EDA regions, and
- develop potential pathways for applying AI technologies to economic development use cases.

CEDS Overview

A CEDS is a regionally developed and implemented plan to build economic development capacity and guide the economic prosperity and resiliency of an area or region. CEDS are pivotal in advancing effective economic development across multiple communities and regions, utilizing a place-based, regionally driven planning approach. Foundational to EDA's approach to economic development, CEDS foster community leader engagement, private sector involvement, and strategic regional collaboration. A CEDS is instrumental for regional stakeholders, including local governments, educational institutions, and private entities, to collaboratively identify and implement capacity-building initiatives that bolster economic development. It integrates various regional planning efforts, leveraging federal, state, and private resources to achieve common economic objectives.

A CEDS is a prerequisite for designation by EDA as an Economic Development District (EDD). Regular updates, at least every five years, are mandatory to align with requirements under EDA's Partnership Planning program. Adhering to the EDA's regulations, the content of a CEDS must include:

- a summary of regional economic conditions,
- a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to evaluate strengths, weaknesses, opportunities, and threats,

- a strategic direction and action plan derived from this analysis, and
- an evaluation framework with performance metrics.

The EDA CEDS Content Guidelines emphasizes strategic visioning, goal setting, objective measurement, and prioritized actions, focusing on economic development capacity building and sustainable economic practices. They recommend an asset-based perspective, recognizing the interplay between economic growth and other development areas. Additionally, they aim to inspire effective CEDS formulation but recognize that CEDS should be tailored to each region's unique context, avoiding direct replication to ensure relevance and effectiveness. Beyond required elements, the CEDS Content Guidelines provide guidance for how regions can address critical topics such as economic resilience, climate resilience, workforce development, and equity. Economic resilience, reflecting a region's ability to recover from disruptions, is a critical theme and content requirement that should permeate the CEDS, ensuring a proactive approach to economic stability.

Situating NLP within the AI Landscape

NLP is an AI technology that is instrumental in automating processes that involve language, such as translating texts, generating responses in chatbots, and summarizing large documents. As AI continues to evolve, NLP plays an important role in making these technologies accessible and useful across various sectors, including healthcare, finance, customer service, and education. By processing and analyzing the complexities of human language, NLP applications not only seek to enhance operational efficiencies but also unlock new avenues for human-machine interaction.

Recent advancements in NLP are largely driven by developments in machine learning (ML), a subset of AI that involves training algorithms to make decisions based on data. ML models are trained on vast datasets of text, learning patterns, and structures of language that enable them to perform tasks like sentiment analysis, entity recognition, and language translation. The effectiveness of these models is highly dependent on the quality and size of the training data, as well as the sophistication of the algorithms used, which can range from simple linear regressions to complex neural networks.

Recently, NLP has been at the heart of generative AI advancements. Generative AI refers to algorithms that can generate text, images, or other media outputs that are largely indistinguishable from human-created content. Generative AI models have the capability to write coherent and contextually relevant paragraphs, simulate dialogue, or even generate creative poetry. These models, such as GPT (Generative Pre-trained Transformer), utilize deep learning techniques to produce outputs that are increasingly sophisticated and human-like.

Understanding the Potential and Boundaries of NLP

NLP's effectiveness is contingent upon the quality of the underlying data and the specific applications for which it is designed. As NLP continues to evolve, understanding its capabilities and limitations is necessary for leveraging its potential to the fullest.

One of NLP's standout capabilities is processing extensive volumes of content efficiently. This characteristic makes it invaluable for organizations dealing with vast amounts of data but constrained in their ability to quickly process that data. NLP technologies are also adept at identifying underlying patterns and trends across multiple documents. This ability is crucial for

applications like sentiment analysis, market research, and more, where understanding broad trends is as important as the granular details. By analyzing document structures, some NLP models are capable of pinpointing where topics are typically discussed within texts, as this study was initially designed to measure. NLP can evaluate how thoroughly topics are addressed within documents, aiding in the quality assessment and ensuring comprehensive coverage of subject matter. In the context of this analysis, part of the original research design was to identify whether certain topics were addressed within specific, sometimes required, structural elements of a CEDS, such as the SWOT.

NLP also comes with inherent limitations. No machine-automated process can determine the subjective 'quality' of a document or replace values-based thinking that human policymakers must engage in. An NLP analysis is based purely on structural and content-based parameters, not on the stylistic, creative, ethical, or moral merits of the text. Moreover, the effectiveness of NLP is directly tied to the quality and breadth of the data it has been trained on. Limited or biased data sets can significantly impair its performance and the accuracy of its outputs. Finally, NLP models are only as insightful as their structural design allows. In cases of limited data, the insights provided may lack depth, but as these models are exposed to more data over time, their outputs typically become more sophisticated and accurate. As the training data set increases in size, however, more computational resources are required to train the model.

Implications for Policy and Governance

As NLP technologies become more integrated into everyday tools and platforms, they raise important considerations around privacy, security, and ethical use. For instance, the ability of generative NLP systems to create persuasive text can be used beneficially for educational tools or customer service enhancements. At the same time, they could also be misused for generating misleading information or manipulating public opinion.

Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence

The Executive Order on the "Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence" aims to guide the responsible development and implementation of AI technologies across various sectors. Issued by President Biden on October 30, 2023, it emphasizes AI's dual potential.to significantly benefit society while also posing risks like exacerbating societal harms and threatening national security. The order sets forth a coordinated federal approach to harness AI's advantages while mitigating its risks, involving stakeholders from government, industry, academia, and civil society. It reflects a commitment to ethical governance and leadership in AI, aligning technological advances with societal and security interests, both domestically and globally.

The Executive Order has several implications for using NLP for document analysis. Principally, the order mandates safe, secure, and trustworthy AI development, directly influencing how NLP tools must be designed, developed, and deployed. Given the focus on protecting civil liberties and preventing bias, NLP research needs to incorporate robust mechanisms to ensure that the document analysis does not inadvertently propagate or exacerbate discrimination or bias. These requirements guide responsible innovation while harnessing AI's capabilities to improve governmental functions and services.

This research employs NLP to highlight trends in the content of CEDS, and to measure how closely CEDS content matches key requirements and recommendations in the CEDS Content Guidelines. The NLP model has not been deployed as part of EDA's official decision-making workflow. Further, the model does not interact with any critical infrastructure or systems related to national security; it does not use any personally identifiable information (PII) or proprietary data. It is not used to determine eligibility or ineligibility for any federal government assistance opportunities. Finally, the NLP technology developed and used for this research is not generative.

Key Questions Driving the CEDS Content Analysis

The purpose of this study is to leverage Argonne's unique NLP and AI capabilities to assess CEDS from across the United States, as well as to develop and test NLP applications to economic development use cases. Using current guidelines and recommendations from EDA for what makes an effective CEDS, Argonne developed an NLP model to conduct comprehensive content analysis and identify key trends and omissions that provided insights into whether implementation strategies match identified priorities. The assessment also took into consideration recent changes to the CEDS Content Guidelines as of July 2023, and how well existing CEDS align to the new requirements.

NERRC and EDA collaboratively identified several core research questions for this project. The questions were intended to be open-ended and broad to accommodate the exploratory nature of the effort.

Ultimately the research team identified four primary research questions, with two secondary questions to be investigated if time and resources permitted. The questions were not ranked by any additional priority, but there is some dependency between successful results and the ability to answer subsequent questions. Those connections were revealed through the analysis and are discussed in the Results section.

Primary Research Questions

1. How does CEDS content relate to current and future CEDS Content Guidelines?
    a. What aspects of the Content Guidelines are more thoroughly addressed than others?
    b. Are there areas of new Content Guidelines that CEDS are already addressing?
    c. What are the gaps?
2. Do the CEDS reveal any key trends or topics that go beyond current guidance that should be prioritized by the EDA?
3. How are CEDS addressing EDA's equity, resilience (climate and other disruptions), and workforce development investment priorities from concept to strategy to outcome?
4. Do third party data sources align with areas of focus in CEDS? For example, do priority clusters in CEDS align with identified local and traded clusters in Bureau of Labor Statistics (BLS) data?

Secondary Research Questions

5. What common strengths, weaknesses, opportunities, and threats are addressed? What changes have occurred over multiple CEDS planning cycles? What topics have emerged and what topics have been de-emphasized?
6. What strategies do regions with x weaknesses or threats commonly undertake or apply as a remedy? What strategies do regions adopt to build on strengths or opportunities?

The strategic formulation of these research questions serves as a cornerstone for the analysis. These questions not only probe the current state of economic development strategies but also aim to uncover deeper insights into how these strategies can evolve to meet future challenges and opportunities. The Results section will delve into the practical implications of the findings.

Statement of Transparency in the Use of AI

In preparing this study, NERRC utilized generative AI technologies to improve clarity in certain sections that do not impact the analytical methodology or results of our study, consistent with Argonne's Research Code of Conduct. This approach was employed to enhance discussion of more technical or specialized topics. This method allowed us to efficiently present complex concepts in a manner that is both accessible and informative, ensuring that all readers—regardless of their technical background—can engage with the material effectively.

The Mechanics of NLP: Transformer Architectures and the Role of Bidirectional Encoder Representations from Transformers in Text Analysis

NLP exists at the intersection of linguistics and AI, representing a critical area of study and application in the realm of computer science. At its core, NLP is the technology that enables machines to understand, interpret, and respond to human language in a meaningful way. This field encompasses a range of techniques and tools that allow computers to process, analyze, and even generate human language, whether in the form of text or spoken words. The significance of NLP lies in the ability to bridge the gap between human communication and digital data, unlocking a myriad of applications that range from simple tasks like spell check to complex operations like sentiment analysis, language translation, and conversational agents.

The evolution of NLP has been propelled by advancements in computing power, machine learning, and deep learning, leading to more sophisticated and nuanced language models. These models, trained on vast datasets of human language, can identify patterns in the subtleties and intricacies of language, including context, tone, and intent. As technology continues to advance, NLP is becoming increasingly adept at handling the complexities of human language, making interactions between humans and machines more seamless and intuitive. As much of this research focused on using NLP models to process and analyze CEDS documents, the next sections will discuss some important elements of different NLP models that NERRC investigated.

Transformer Architecture

The transformer is a groundbreaking model architecture that has significantly advanced the capabilities of machine learning in both understanding and generating human language.[1] Before transformer context architectures, recurrent neural networks (RNN) and long-term short memory (LTSM) networks were standard models but suffered from long training times and limited ability to perceive long-range dependencies in meaning throughout a text. Recent developments, specifically attention mechanisms, improved the ability of RNNs and LTSMs to handle semantic connections over longer text. However, these developments did not solve computational efficiency and scalability issues.[2] The transformer architecture developed by Vaswani et al (2017), a type of deep-learning model, is considerably more computationally efficient while still able to capture meaning and context over longer passages.

Core Concepts of Transformers

The first key innovation in transformers is the attention mechanism, specifically the self-attention and multi-head attention mechanisms. The self-attention mechanism involves processing each word in comparison to every other word in a piece of text, and unlike RNNs and LSTMs, the transformer architecture can process bi-directionally (i.e., it can capture relationships going left to right and right to left in a piece of text). A single self-attention mechanism identifies similarity based on a single dimension, such as position, sentiment, or meaning. Multi-head attention allows for multiple self-attention mechanisms to process data simultaneously, with each head capturing similarity along one dimension. In combination, the multi-head self-attention mechanism enables the transformer architecture to better capture context and nuance. Whereas RNNs and LSTMs process data sequentially, transformers process all parts of the input text simultaneously, enabling parallel processing and leading to significant improvements in training speed and efficiency.

The second key innovation in the transformer architecture is the encoder-decoder structure. An encoder processes input data (such as a sentence in a language) into a vector representation, and the decoder generates an output (such as a translated sentence in another language) from the vector representation computed by the encoder. As an example, in a translation task the encoder might convert an English sentence into a numeric vector representation, and the decoder would then turn that numeric representation into a Spanish sentence. As NERRC sought to analyze similarity between CEDS documents and CEDS guidelines, this work relied upon the encoder to create numeric representations of CEDS text, while the decoder was not necessary for the analysis (the model NERRC used does not include a decoder). The section on Understanding Cosine Similarity will explain how these numeric representations were used.

Both encoder and decoder are composed of identical processing layers, each of which contains two sub-layers: the multi-head self-attention mechanism and a fully connected feed-forward network. While RNNs and LSTMs also use an encoder-decoder structure, the transformer architecture's encoder-decoder structure is built on the multi-head self-attention mechanism, affording improved contextual understanding and computational efficiency.

Third, because transformers process data simultaneously as opposed to sequentially, the position of words is captured with positional encodings. RNNs and LTSM models inherently

[1] Introduced by Vaswani et al. in their 2017 paper titled "Attention Is All You Need,"
[2] Bahdanau et al. in 2014

capture position as they process data sequentially, but when meaning spans long passages or the meaning of one piece of text depends on later text, these models can fall short. The transformer's positional encoding, together with the multi-head self-attention mechanism and the improved encoder-decoder structure, give the transformer architecture significant computational and analytic advantages over RNNs and LTSMs.

Encoding and Embeddings in NLP

One further concept that requires discussion is that of embeddings, which play a role in the specific NLP model that NERRC used in this analysis. Embeddings are closely related to encodings (discussed previously) but the term embedding may be used synonymously with encoding or may reference a slightly different concept, depending on the source. While all embeddings are a type of encoding—transforming that input text into a numerical vector—n encoding may not qualify as an embedding. When the two terms are used differently, an embedding is a type of encoding that captures semantics and context, whereas an encoding captures a single word or token but not its semantic context. An embedding may consider any length of text, such as a single word, sentence, or entire document.

Bidirectional Encoder Representations from Transformers (BERT)

NERRC chose to use the Bidirectional Encoder Representations from Transformers (BERT) model developed at Google and introduced in their 2018 paper titled "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." BERT is a transformer architecture like those discussed in the previous section. For this study, NERRC used a fixed context window approach. However, BERT is also capable of capturing context surrounding a piece of text via a sliding context window approach. Utilizing BERT's sliding context could be considered for future research.

To learn the set of weights that best capture semantic relationships between different pieces of text, BERT uses two key model training steps: pre-training and fine-tuning. During pre-training, the model is trained on a large corpus of text with two unsupervised tasks: masked language modeling and next sentence prediction, discussed below. Together, these two steps allow the model to learn weights that perform best on predictive tasks, which in turn implies the model has captured the latent structure of the text.

In the first pre-training task, called Masked Language Modeling (MLM), random words in a sentence are hidden from the model, and the model must predict the missing words based on the context provided by the other words in the sentence. Over many iterations of this process, if the model's ability to predict masked words improves then the model is said to be learning weights that capture the semantics of the input text.

The second pre-training task, called Next Sentence Prediction (NSP), requires the model to understand relationships between sentences. The model is given pairs of consecutive sentences and must predict which sentences appears first in the input text. Similarly to MLM, the model's ability to improve NSP prediction accuracy over many iterations determines the extent to which the model is learning the semantic structure of the text.

An additional advantage of using BERT is that these pre-training tasks are done for the analyst on a large body of text. The HuggingFace company, which maintains the BERT code modules, releases pre-trained BERT models for use in comprehensive and production-grade packages. When using BERT to analyze semantic similarity, an analyst can employ the fine-tuning step to

essentially re-estimate (or fine-tune) the pre-trained model's weights on relevant text. This can be useful when the input text is a specific style of writing, for example a CEDS document or other scientific report. In this study, NERRC did not fine-tune the default BERT weights, but future research could assess whether doing so can improve model performance.

Primary Uses of BERT

BERT is primarily intended for use cases such as:

1. **Sentiment Analysis:** BERT's deep understanding of context makes it highly effective for determining the sentiment of text.
2. **Question Answering:** It can be used as part of systems that answer questions posed in natural language, providing precise answers.
3. **Named Entity Recognition (NER):** BERT excels at identifying and classifying proper nouns in text.
4. **Text Summarization:** Its ability to understand context means it can be used to generate accurate and coherent summaries of texts.

Importantly, BERT is intended for tasks that require understanding text as opposed to generating text. Recent developments such as generative AI and large-language models are based on the same transformer architecture as BERT, but unlike BERT, are also capable of generating text.

Challenges with BERT

BERT's nuanced, context-aware approach to understanding human language offers significant advancements in various language processing tasks. However, employing BERT also presents certain challenges. Training or fine-tuning the default BERT model on large data sets necessitates substantial computational resources, which can limit its accessibility for smaller organizations or individual researchers. Additionally, fine-tuning the model for specific tasks can be complex and demands a robust understanding of both the model architecture and the task at hand.

Another limitation is its handling of longer texts, as BERT can only process inputs up to a typical limit of 512 tokens, which poses a challenge for analyzing longer documents. Tokens are substrings of text that are grouped together in the NLP model, and different NLP architectures use different tokenization schemes. BERT in particular uses an implementation of the WordPiece tokenization scheme, which leaves common words or strings of characters (such as common prefixes or suffixes) as their own unique token and combines less common strings into unique tokens. It is worth highlighting that in the WordPiece tokenization scheme employed by BERT, there is no direct conversion between the number of tokens and the number of characters (e.g., letters, numbers, special characters). As a result, users must carefully structure or segment their input to fit within BERT's 512-token limit, often by truncating, summarizing, or dividing longer texts into smaller parts for analysis.

Lastly, like many AI models, BERT can inherit and potentially amplify biases present in its training data, raising concerns regarding fairness and ethics. These challenges underscore the need for careful implementation and ongoing research to mitigate the potential for biases and enhance the effectiveness of BERT in diverse applications.

Using BERT to Analyze CEDS Documents

As the previous sections outline, researchers can use BERT to capture the complex and nuanced relationships within a single piece of text. However, this work is focused on comparing different pieces of text: a CEDS document and the CEDS guidelines. To make these comparisons, NERRC used BERT's default weighting scheme (i.e., without fine-tuning) and standard encoding methodology to generate a vector representation of each relevant piece of text. Then, using cosine similarity, NERRC was able to generate a single score ranging from -1 to 1 that captured the similarity between any two pieces of text (with 1 being complete similarity and -1 being complete dissimilarity).

Understanding Cosine Similarity

Cosine similarity is a metric widely used to measure the degree of similarity between two entities, usually vectors, regardless of their size. In short, this method calculates the cosine of the angle between two non-zero vectors in an inner product space, essentially judging the orientation rather than magnitude. A higher cosine value, indicating a smaller angle, suggests a greater similarity between the vectors. This metric is particularly useful in natural language processing for applications such as information retrieval, text mining, and document clustering.

For example, imagine two vectors representing two different sentences. The magnitude of these vectors refers to their length, which represents the amount of information or frequency of certain features. Direction refers to the specific combination of these features. Two vectors could have the same direction (representing similar topics) but different magnitudes (one vector might represent a longer, more detailed text, while the other is a shorter, less detailed version). Cosine similarity focuses on the direction, not the magnitude, so if the two sentences discuss the same topic, even if one is much longer than the other, they will still have a high cosine similarity score.

The process first involves using the BERT encoder to generate a vector representation of a piece of text. A vector has both a direction and magnitude, and two vectors are the same when both their magnitude and direction are the same. Cosine similarity calculates the cosine of the angle formed between the two vectors, which serves as a measure of similarity between the two encoded pieces of text.

The formula for cosine similarity is:

$$\text{Cosine Similarity (A, B)} = \frac{A \cdot B}{||A||\,||B||} = \frac{\sum_{i=1}^{n} A_i B_i}{\sqrt{\sum_{i=1}^{n} A_i^2}\sqrt{\sum_{i=1}^{n} B_i^2}}$$

where A and B are vectors with n elements each, and $||A||$ denotes the Euclidean norm, or magnitude, of the vector A.

Importantly, cosine similarity does not depend on the magnitude or length of either vector, but only on their direction.

Figure 1 illustrates an example of two-dimensional vectors, which can be visualized in the standard two-dimensional plane.

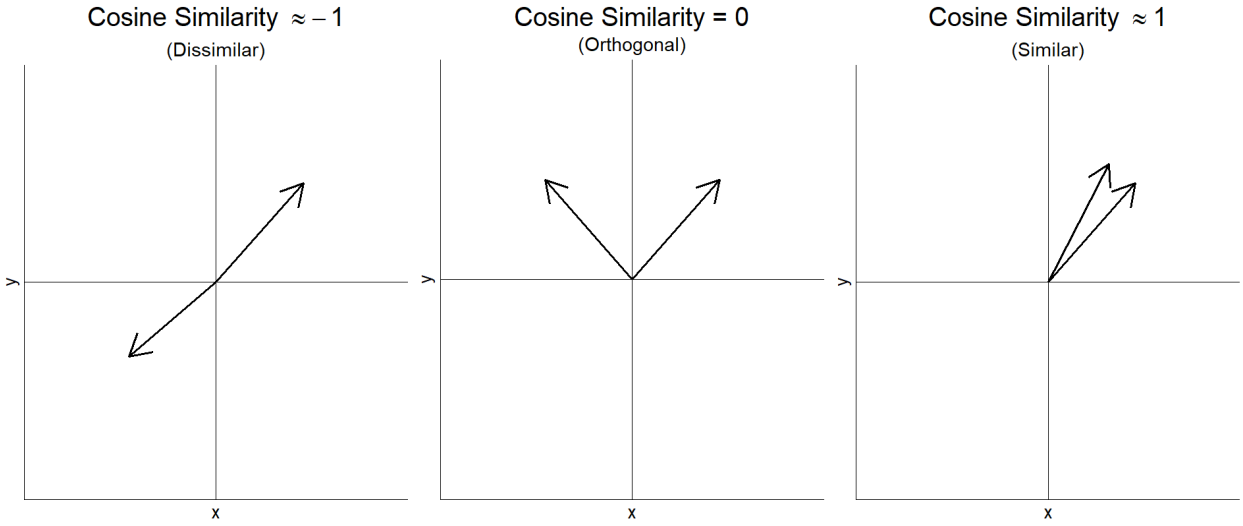

Figure 1: An example depicting two-dimensional vectors[i].

On the left, the two vectors A and B are generally pointing in the same direction and thus would have a cosine similarity close to 1. In contrast, the two vectors on the right A and B are pointing in nearly exact opposite directions, and therefore would have a cosine similarity near -1. The case where the two vectors A and B are unrelated, depicted in the middle, would have a cosine similarity near 0.

Cosine similarity has several practical applications in NLP:

- **Document Clustering:** It can be utilized as a metric in machine learning clustering algorithms to group similar documents together.
- **Information Retrieval:** Search engines and recommendation systems use cosine similarity to find documents that are similar to a query or align with a user's interests.
- **Plagiarism Detection:** Comparing cosine similarity between documents can help identify potential plagiarism.
- **Semantic Textual Similarity:** It is used in tasks that require determining how closely two pieces of text are related in terms of their meaning.

Semantic textual similarity application is most relevant to this work.

There are challenges and considerations associated with the use of cosine similarity:

- **Context and Nuance:** Simpler methods like cosine similarity may not effectively capture the context or nuances of the text, potentially leading to less accurate similarity assessments.
- **High-Dimensional Space:** Computations involving large sets of numbers, such as those produced from BERT, can become resource-intensive.
- **Preprocessing:** The quality of preprocessing text input can significantly impact the results.

Despite these challenges, cosine similarity remains a valuable tool in NLP for comparing textual data, offering a quantitative way to gauge the similarity between documents or words. Its effectiveness, however, heavily depends on the vectorization method used and the nature of the text being analyzed. A final consideration when using BERT to analyze full-document texts is determining how to divide the input text into pieces for the model to analyze, which is discussed in the next section.

Fixed Chunking vs. Semantic Chunking

When an NLP model processes input text, it may process the entire text, sequential sections of fixed length, manually identified sections of interest, or use various techniques to determine relevant passages automatically. NERRC explored three approaches to dividing CEDS documents, or chunking, which will be discussed in this section.

The first approach, which was used in the initial versions of the NLP model, processed each CEDS document as an entire chunk of text. Each complete CEDS document was given a single numerical representation, or embedding, and a single cosine similarity score for each key term of interest. While this simple approach requires no assumptions about the relevant structure of the input text on the part of the researcher, after reviewing these model outputs NERRC analysts found that this simplicity was unable to capture a sufficient level of nuance and granularity to produce meaningful results. CEDS documents that had high cosine similarity scores under this approach often had insufficient coverage of topics, whereas low-scoring documents frequently had sufficient coverage of topics. Given the poor performance of the whole-document chunking approach, NERRC moved to explore two more advanced approaches: fixed chunking and semantic chunking.

Fixed chunking involves splitting a document into sequential pieces of text, each of a fixed character length. Unlike the whole-document approach, fixed chunking requires subject matter knowledge to generate trial chunk sizes that reflect the desired level of detail in the types of documents under study. Whereas the whole-document approach treats the entire document as a single input text, the fixed chunking approach allows for many different passages to be analyzed independent of one another. In a typical CEDS there may be several sections each with a distinct purpose in the document, such as a SWOT analysis or summary background, so dividing the document into smaller chunks can allow for greater nuance and granularity in the analysis. For this work, NERRC chose three-character lengths for the fixed chunk approach: 300, 900, and 3,000 characters. The model outputs for each chunk size will be discussed in the Model Validation section. One limitation of the fixed chunk approach is that because it divides the text automatically into pieces of the same length, a given chunk may begin or end mid-sentence or mid-passage, which can hamper the model's ability to learn that chunk's latent semantic structure. One approach to overcome this limitation that NERRC explored is semantic chunking.

Semantic chunking refers to the technique of extracting and grouping together phrases from a text that constitute meaningful and coherent multi-word units. Unlike the whole-document or fixed chunk approaches, semantic chunking uses machine learning to understand, process, analyze, and group text into chunks that share common semantics. This approach can enhance the ability of NLP systems to process natural language in a way that mirrors human understanding, making it crucial for tasks like information extraction, question answering, and summarization, where understanding the relationship between different parts of text is essential.

NERRC explored different implementations of semantic chunking, but ultimately chose to proceed with the fixed chunking approach given the computational burden required. Future research could employ recent semantic chunking tools to assess the feasibility and benefits of semantic chunking over fixed chunking.

Structured Analysis of CEDS Using NLP

At a high level, the goal of the CEDS analysis is to use NLP to determine whether an individual CEDS sufficiently covers the core principles and recommended content in the EDA CEDS Content Guidelines. This analytical workflow encompasses data preparation, model development, analysis, and validation, with the goal of categorizing each CEDS document as either 'sufficient' or 'insufficient' in their treatment of the content elements. Recognizing that a document's coverage of a topic may be explicit or implicit adds a layer of complexity to the task. As NLP technology has advanced, particularly with the introduction of transformer models, its ability to understand language's subtleties has significantly improved.

This NLP-driven analysis provides a systematic and scalable approach to evaluate the incorporation of core principles in strategic documents. By combining machine learning with manual validation, the process aims to achieve both efficiency and accuracy. This approach not only enhances the thoroughness and objectivity of the analysis but also offers a replicable framework that can be adapted to other types of document evaluations, can scale over time with new CEDS documents or guidance, and can incorporate more advanced techniques as they are developed.

Data Preparation

The initial step, data preparation, involved gathering CEDS documents and the CEDS Content Guidelines and ensuring that the text was digitized and in a suitable format for NLP analysis. NERRC collected most of the CEDS from the CEDS Resource Library at StatsAmerica.[3] The research team also collected CEDS documents from the EDA directly or downloaded from individual Economic Development District (EDD) websites. To ensure the text was in a suitable format for NLP analysis, NERRC converted CEDS PDFs into plain text via Optical Character Recognition (OCR). Then, the plain text was processed by removing irrelevant elements like headers, footers, bullet points, or most non-textual content.

Corpus Collection

The corpus of CEDS documents used for this analysis contained 366 CEDS documents from 44 states. No CEDS were available from Delaware, Hawaii, New York, Pennsylvania, Rhode Island, Wyoming or any tribes or territories via the collection methods used, and therefore those jurisdictions were not represented in the analysis. The analysis used documents that were active CEDS as of July 18, 2023. No additional active CEDS were added to the analysis after this date, regardless of their approval by EDA. The register of documents can be found in Appendix C.

An additional training corpus of historical CEDS documents was also collected from the CEDS Resource Library and individual EDDs, as available. A CEDS was considered historical if it had been superseded by a current, active version approved by EDA. Typically, a CEDS document is

[3] https://www.statsamerica.org/ceds/

considered active for 5 years after submission and approval. However, in practice there is leeway, particularly during the 2020 Coronavirus pandemic so that several current CEDS may be older than 2018. The register of historical CEDS can be found in Appendix D.

Identification of Key Terms

For the purposes of developing and training the initial NLP model, NERRC used several resources to identify key terms for analysis. Most of the key terms and associated content used to train the NLP model are from the EDA CEDS Content Guidelines. EDA publishes CEDS Content Guidelines to assist in efforts to develop the content of a CEDS document. [4] It suggests how to develop the document's format and substance to make the strongest, most useful, and effective CEDS possible. The most recent CEDS guidelines were updated and made publicly available in April 2023. Most of the active CEDS in the corpus predate the release of the new Content Guidelines, which added guidance on incorporating climate resilience and greater emphasis on equity, among other changes.

NERRC also reviewed the EDA Investment Priorities to identify additional key terms. EDA's investment priorities establish a comprehensive framework to ensure that its grant investment portfolio, which spans from planning to infrastructure construction, supports local initiatives aimed at developing, enhancing, or more effectively utilizing economic assets that enable businesses to thrive and regional economies to flourish. Successful grant applications will align with the evaluation criteria specified in each funding announcement and must address at least one of the investment priorities. The Investment Priorities are subject to change and revision. The terms used to support the NLP analysis were pulled for those priorities that were current as of July 18, 2023. They can be found in Appendix A.

Finally, NERRC consulted with EDA staff and subject matter experts to review, refine, address gaps, and prioritize the key terms for analysis. Not all the recommended concepts from the CEDS Content Guidelines or all the Investment Priorities were identified as key terms for this NLP analysis. The research team ultimately prioritized terms associated with resilience, equity, and workforce development. The enhanced focus on equity within the CEDS Content Guidelines and its elevation as the organization's top Investment Priority in particular, made it an issue of immediate importance.

NERRC ultimately selected 46 key terms for analysis. For each term, NERRC analysts created a structured input for the model. The input included definitions, related terms, and questions needed to properly contextualize each term. In some cases, sub-terms with their own definitions were required based either on the complexity of the term, or the need to address the term in multiple areas of a CEDS. For example, 'equity' can be defined in a financial context as the residual value of an asset after liabilities or debt value is removed, which would be proper but not responsive to the issues of fairness, justice, and inclusion at the heart of EDA's consideration in the Investment Priorities or CEDS Content Guidelines. Equity as term was divided into four sub-definitions to allow for the model to identify nuances in the treatment of such a complex topic. Table 1 shows the categorizations of equity and their associated training

[4] https://www.eda.gov/resources/comprehensive-economic-development-strategy?q=/grant-resources/tools/comprehensive-economic-development-strategy

questions to better illustrate the perceived nuance. NERRC used an overarching definition of equity based on the EDA Investment Priorities.

Table 1: Socio-economic equity was defined and contextualized in different ways within the model.

Equity Sub-Term	Questions/Phrase from CEDS Content Guidelines
Process	Does the CEDS document implement economic development plans that support workforce education, skills training, and career pathways that connect to the hiring and skills need of the community?
Summary Background	Does the CEDS document diversify the voices at the table and mirror the groups most impacted by implementation of the strategies?
Strategic Direction/ Action Plan	Does the CEDS document introduce the economic history of the region, creating a shared understanding of the critical questions, "What have we done?" and "Where have we been?"
Equity (Investment Priority)	Does the CEDS document provide discussion and advance equity plans for those in underserved communities, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality?

Similarly, resilience is a concept that is nuanced and lacks a singular common and widely understood definition. Additionally, resilience is used in several different contexts within the source documents, including issues associated with economic resilience and those related to climate resilience. As such, NERRC developed five resilience sub-term definitions for vulnerabilities, built environment, infrastructure, workforce, and assets. An example of the full structured input for a climate resilience sub-term definition, is in Table 3.

Table 2: The full definition of the 'Vulnerabilities' sub-definition of climate resilience for model input.

Questions/Phrase from CEDS Content Guidelines	NLP Criteria	Related Terms and Phrases	AI Input Phrase
What are the dominant stresses and existing vulnerabilities facing the region, independent of future potential climate change risks?	Dominant stresses, existing vulnerabilities, and potential climate change risks are identified in the CEDS document.	Natural hazards; extreme heat; floods; droughts; inland flooding; past weather events; sea level rise; coastal flooding; storm surge; drying trend; precipitation variability trend; dry days; severe convective storms; thunderstorms and tornados; lightning; extreme winds; heavy precipitation; hail; hailstorm; wildfires; tropical cyclones; hurricanes; extreme rainfall; coastal flooding; Extreme heat event; urban heat island; heat waves; rising sea levels; increased surface temperatures;	Define what are the climate stresses and existing climate vulnerabilities facing a region, independent of future potential climate change.

The initial research design for the project included assessing whether key terms and concepts, such as those noted above, were included in the proper place within a CEDS document. For example, NERRC attempted to assess if the SWOT analysis portion of a document includes sufficient treatment of possible climate resilience considerations on the built environment. There are several component sections of a CEDS that are required to be approved by EDA, including a summary background, a SWOT assessment, a strategic direction/action plan, and an evaluation framework. The placement of these required sections forms the basis for research question 1A – (*What aspects of the Content Guidelines are more thoroughly addressed than others?*) and to some degree research question 3 – (*How are CEDS addressing EDA's equity, resilience (climate and other disruptions), and workforce development investment priorities from concept to strategy to outcome?).* Consequently, the key term definitions include consideration of where within the document each term could be found (Appendix B).

Table 4 shows the list of terms identified for analysis.

Table 3: The final list of all key terms for the NLP model.

Priority Terms	Other Terms	
• Climate Resilience (including 5 sub-terms) • Equity (including 4 sub-terms) • Workforce Development	• Action Plan • Demographic and Socioeconomic • Emerging or Declining Clusters or Industry Sectors • Energy Needs • Environmental, Geographic, Climatic, and Cultural (including historic preservation) and Natural Resource Profiles • Environmentally Sustainable Development • Evaluation Framework • Exports and FDI • External Trends and Forces • General evaluations framework • Goals and Objectives • Infrastructure Assets • Institutions of Higher Education/HBCUs	• Manufacturing • Natural Hazards • Opportunities • Partners for Economic Development • Process • Recovery and Resilience • Regional Clusters • Resources for Economic Development • Spatial Efficiencies/ Sustainability • Strategic Direction/Action Plan • Strengths • Summary Background • Technology-Based Economic Development • Threats/ Challenges • Vision Statement • Weaknesses

The spreadsheet used to structure the model inputs had the following organizational headers. Table 5 shows each header and explains how data within each section is distinct from others.

Table 4: Organizational headers from the data structuring spreadsheet.

Spreadsheet Header	Data
Source	Where the key term comes from
Section of the CEDS	Where the term should be located within the CEDS document
Key Areas	The key term of interest
Questions/Phrase from CEDS Content Guidelines	The context of the term within the CEDS
NLP Criteria	The threshold consideration for sufficient or insufficient treatment with a CEDS
NLP Terms and Phrases	Terms and phrases to help contextualize the key area term of interest
AI Input Phrase	A structured input optimized for Artificial Intelligence
AI Definition	A structured term definition optimized for Artificial Intelligence

AI Input Phrase and AI Definition inputs were deemed repetitive and ultimately not used in the modeling or analysis. An additional header, Priority, was added later to focus the analysis on the most salient definitions/concepts and their locations. Eleven terms were deemed the highest priority, including the five definitions of Climate Resilience noted above, the four definitions of Equity noted above, Demographic and Socioeconomic Characteristics, and Workforce Development.

A full documentation of the key terms identified, including their assigned term number, is available in Appendix C.

Model Development and Training

With the input data processed and the terms of interest defined, NERRC proceeded with developing the BERT model. For each of the chunk sizes (300, 900, and 3,000 characters), each CEDS document was processed using BERT resulting in a numeric vector representing each piece of CEDS text and each key term used as reference text. Then, using cosine similarity, the numeric vector representation of each CEDS chunk was compared to the numeric vector representation of each piece of reference text, which generated a single numeric score between -1 and 1. As previously discussed, this score represents the semantic similarity between each CEDS chunk and each reference term, with scores closer to 1 denoting greater similarity and scores closer to -1 denoting greater dissimilarity. To conduct this analysis, the computational demands of processing large text chunks required the use of Argonne's LCRC advanced computing resources. Leveraging this high-performance infrastructure was essential due to the NLP model's computational intensity, especially when working with extensive text datasets.

Model Validation and Refinement

Validation and refinement of the model are crucial to ensure accuracy and reliability. NERRC conducted a manual review of a random sample of the documents to verify the accuracy of the model's classifications to assess the degree to which the model's outputs aligned with human subject matter expert understanding.

Clusters and Thresholds

Clusters and thresholds play a crucial role in organizing and interpreting the model's output. Clusters refer to the grouping of document embeddings based on their degree of similarity to the reference terms, which are categorized into High (H), Medium (M), Low (L), and Not Applicable (NA) groups. Thresholds, on the other hand, are the specific cutoff values used to determine the boundary between these groups, with scores above a set threshold indicating a higher degree of similarity for the corresponding term.

Manual Review Process #1: Whole-Document Chunking

NERRC undertook two separate manual review processes. The first review was conducted on the whole document chunking output, using all 46 terms, in September and October 2023. Model outputs were structured in several Excel spreadsheet worksheets:

1. Paper_Guidelines Worksheet: This sheet provides a comparison of CEDS chunk embeddings to the Content Guidelines embeddings.
2. Term_Embeddings Worksheet: Thie sheet provides a comparison of CEDS chunk embeddings with guideline embeddings.
3. Cluster_By_Term Worksheet: For each term, NERRC clustered the embeddings four groups based on the degree of similarity: High (H), Medium (M), Low (L), and Not Applicable (NA).
4. Cluster_With_Score Worksheet: Since the clusters in the previous worksheet were unordered, this worksheet rearranges all the scores for a given term according to cluster groups. For example, for Term 0, documents that scored 0.1997 or above where in the highest ranked cluster, indicating the most similarity.
5. Cluster_With_Score_Describe Worksheet: This sheet provides group statistics for each of the cluster assignments. Additionally, the maximum value from each group serves as the threshold for cluster definition.
6. Min_Threshold_By_Term Worksheet: Utilizing the aforementioned thresholds (e.g., 0.1997 for term 0), this method has been repeated for all terms (0-46), resulting in a column listing terms alongside their respective thresholds. An average threshold of approximately 0.301 has been calculated, indicating a typical cutoff for top groups.
7. Cluster_By_SWOT Worksheet: A similar methodology is employed here, grouping terms into categories based on SWOT analysis, and applying multi-dimensional clustering for each group of terms. This type of analysis can be replicated for various groups as needed.

Using the suite of worksheets above, NERRC used the following process:

1. Select a term by consulting the Min_Threshold_By_Term worksheet. For example, if an analyst selects term 7 (Strengths as defined as a requirement of the SWOT section) the minimum threshold is 0.25.
2. In the Scores worksheet, the documents are sorted by descending scores in the column assigned to term 7. Any document with a score above 0.25 might be considered in the top group.
3. Paper 220 (Southeastern New Mexico Economic Development District), with the lowest qualifying score, is then located in the Papers worksheet. If this paper aligns well with the characteristics associated with term 7, it indicates the analysis is on track. If it is not a suitable match, further adjustments may be necessary, either by modifying the threshold or redefining the term criteria.

NERRC analysts conducted manual review for all 11 Highest Priority terms. Table 6 lists the CEDS documents found to be *directly* above and *directly* below the threshold value for each term.

Table 5: CEDS documents directly above and below the threshold for each of the 11 priority terms.

Term Number	***Threshold Value***	**ABOVE**			**BELOW**		
		Paper Number	***CEDS Document***	***State***	***Paper Number***	***CEDS Document***	***State***
0	0.19972	245	High Country Council of Governments_2016	NC	84	Southeastern Indiana Regional Planning Commission_2015	IN
22	0.253783	239	Southwest New Mexico Council of Governments_2010	NM	365	Northwest Regional Planning Commission_2015	WI
23	0.190839	143	Androscoggin Valley Council of Governments_2015	ME	23	Central Arkansas Planning and Development District_2009	AK
24	0.283694	337	Accomack-Northampton Planning District Commission_2014	VA	324	South East Texas Regional Planning Commission_2010	TX
25	0.25508	290	Waccamaw Regional Council of Governments_2012	SC	84	Southeastern Indiana Regional Planning Commission_2015	IN
26	0.206929	365	Northwest Regional Planning Commission_2015	WI	232	Mid Region Council of Governments_2015	NM

Term Number	Threshold Value	ABOVE			BELOW		
		Paper Number	CEDS Document	State	Paper Number	CEDS Document	State
34	0.390619	65	Three Rivers Regional Commission_2012	GA	78	Southern Five Regional Planning District and Development Commission_2016	IL
36	0.431201	364	North Central Wisconsin Regional Planning Commission_2014	WI	231	Eastern Plains Council of Governments_2017	NM
41	0.303734	83	Region III-A Development and Regional Planning Commission_2014	IN	252	Southwestern Commission_2017	NC
42	0.351791	128	Lake Cumberland Area Development District_2017	KY	4	Central Alabama Regional Planning and Development Commission_2017	AL
44	0.403806	4	Central Alabama Regional Planning and Development Commission_2017	AL	284	Central Midlands Council of Governments_2012	SC

The model did not detect a significant difference between the treatment of each term in the documents immediately above and below the threshold. In some cases, the research team reviewed additional documents sequentially above and below the thresholds in search of a clear and notable distinction, but again one was not identifiable. This level of term similarity at or near the threshold limit was not unexpected and, in fact, the subtle undetectable difference by human analysis is a common outcome of NLP models. Had there been significant difference between documents directly above and below the threshold, this would have indicated an important potential flaw in the NLP model.

Next, reviewers sought to verify the model's output by reviewing the extreme upper and lower valued documents for each term. Because some low scoring documents receive values that are rated "null" for the lack of inclusion of a concept or term, the lower valued documents were drawn from those with the lowest viable score.

This review produced an obvious difference in the sufficiency of the treatment of each term between the extremes, largely validating the model's ability to identify the depth and robustness of each concept. However, additional random spot checks of papers ranked relatively high for terms associated with Climate Resilience were subjectively determined to be widely variant in the actual treatment of the term.

Finally, NERRC conducted a manual review of CEDS that were identified by CEDS Central, a resource maintained by the National Association of Development Organizations (NADO) Research Foundation as best practices for their treatment of “equity and inclusion” and “resilience and recovery planning” under the assumption that those CEDS robustly addressed those terms.[5] Table 7 lists the CEDS document and its NLP model rank for each of the tested terms associated with climate resilience and Table 8 lists the CEDS document and its NLP model rank for each of the tested terms associated with equity and inclusion. Not all of the CEDS documents identified as best practices by CEDS Central were tested since some were not included in the test corpus of documents.

Table 6: CEDS Central's 'Best Practice' document' scores and ranks for Climate Resilience terms

CEDS Document		Term 22	Term 23	Term 24	Term 25	Term 26
Eastern Maine Development Corporation	Score	0.334089	0.238984	0.3736	0.331052	0.311062
	Rank	16	28	25	25	4
Greater Portland EDD	Score	0.162776	0.109742	0.278674	0.231163	0.132312
	Rank	348	361	337	340	331
Region Five Development Commission	Score	0.234146	0.154188	0.324581	0.290293	0.226413
	Rank	108	114	61	62	48
Southeast Conference	Score	0.27837	0.16716	0.330579	0.291333	0.190679
	Rank	52	97	58	60	94
Western Nevada Development District	Score	0.347046	0.246717	0.290442	0.29351	0.212136
	Rank	13	21	87	57	61
Coastal Bend Development District Comprehensive Economic Development Strategy 2	Score	0.236017	0.099643	0.21331	0.23608	0.177783
	Rank	106	205	173	120	109

[5] https://www.cedscentral.com/

Table 7: CEDS Central's 'Best Practice' document scores and ranks for Equity and Inclusion terms

CEDS Document		Term 34	Term 41	Term 42	Term 44
Metropolitan Area Planning Council	Score	0.523207	0.442749	0.442749	0.187771
	Rank	20	19	22	6
Northeast Ohio Areawide Coordinating Agency	Score	-0.02866	0.090038	0.090038	-0.1116
	Rank	365	336	334	366
Racial Disparity in the Land of Sky Region	Score	0.512719	0.416932	0.416932	0.180871
	Rank	23	116	40	20
Region Five Development Commission	Score	0.465987	0.435887	0.435887	0.267555
	Rank	51	33	25	51

The best practice documents tested were inconclusive in their ability to validate the NLP model scoring due to wide variation in ranking. As a result, NERRC engaged with NADO Research Foundation staff responsible for maintaining CEDS Central to learn about the best practice designation process. They found that, generally, a best practice designation may be about how the topic was addressed in a specific section of a CEDS but may not consider how the topic is addressed throughout the plan. Therefore, a document with a ‘best’ identifier may or may not comprehensively treat the terms of interest in a way that the model could detect.

Ultimately, the manual review of the whole-document chunking NLP model outputs yielded mixed results. The model clearly identified important differences across all terms at the outer ends of the rankings, as expected. As expected, it was difficult to distinguish substantive differences in content near the term thresholds. However, the spot checking and the general unevenness of the term treatment outside of the highest and lowest bounds of results led NERRC to revise the modeling approach from a full document analysis to one of comparing chunks of text within each document to the term definitions and inclusions criteria.

Manual Review Process #2: Fixed Chunking

The second review process was conducted in May 2024. Rather than a full document analysis, the model outputs included text chunks at fixed 300-, 900-, and 3,000-character lengths. For computational reasons, 3000 characters was the maximum allowable for this analysis. Artifacts, such as page numbers or image captions, were occasionally captured within a chunk. Below are examples of 300-, 900-, and 3,000-character text chunks derived for term 22—the Climate Resilience sub-definition for ‘vulnerability’. No manipulations are made to the examples other than condensing spacing for clarity and comprehension

1. Example 300-character chunk from the Eastern Maine Development Corporation CEDS. Ranked number 2 for term 22:

   “Climate changes poses a number of threats to the region, including: The warming of the Gulf of Maine Rising sea levels Increases in annual surface temperatures Increased precipitationSevere storms Flooding events To protect the health and wellbeing of residents, communities, and businesses, it is critical to protect the environment in which they operate.”

2. Example 900-character chunk text from Flint Hills Regional Council. Ranked number 3 for term 22:

   “e of the five Strategic Directions of this Plan is Recovery, Disaster Preparedness, and Resiliency. Throughout the formulation of our Plan and based on the results of our SWOT, we have created a strategic framework of resilience-related items and their associated actions. Resilience-related actions are not confined to the Recovery, Disaster Preparedness, and Resiliency Strategic Direction, rather several cross-cutting actions and initiatives have been identified. These actions are a combination of steady-state and responsive initiatives to ensure resilience is properly integrated into our Plan. Threats to Resilience Shocks or disruptions can have an impact on the region’s economy, society, and environment. Our SWOT analysis identified 16 regional threats which have been categorized as either an economic or societal risk. More information about these threats and their”

3. Example 3,000-character chunk text from the Northwest Colorado Council of Governments. Ranked number 1 for term 22:

   “onomic durability of the region Objective: Prepare for and develop recovery strategies for natural disasters, economic shocks, and their aftermaths Priority/Timeframe: ST: Short-term (Year 1); MT: Medium-term (Year 2-4); LT: Long-term (Year 5); OG: On-going (throughout the 5 year period) | 50 NWCCOG Economic Development District - Comprehensive Economic Development Strategy - 2021-2026 Resilience NWCCOG Economic Development District - Comprehensive Economic Development Strategy - 2021-2026 | 51 Resilience: The Region’s Key Vulnerabilities Threats identified in the SWOT fall into four main themes: Adapting to our changing climate Wildfires Drought Loss of snowpack runoff affects water supply and water-based recreation Climate change affect on daily life and tourism: smoky skies from wildfires more prevalent; campfire bans; burned forests; low rivers and lakes; shortened ski season Understanding risks from natural and other hazards Pandemic: continued economic impacts; long-term recovery from; threat of more in the future Drought: wildfires and subsequent threat of mudslides and flooding Addressing social inequities and unique community needs Incoming location-neutral workers will not be filling local jobs and will outcompete local workers for housing. This hurts the ability for local businesses to find, keep, and attract employees, lowering the level and quality of services they can provide to residents and visitors alike

   Overcrowding on public lands Possible surge in permanent, year-round population due to pandemic (driven by remote work; remote school, internet connectivity) – could lead to increased demand in public services Rising cost of living overall Declining/stagnant population in some remote communities in the region Rising mental health challenges and

> substance abuse Pursuing economic diversity and vibrancy Housing: in-migration driving up housing prices making it difficult for workforce to afford housing; Impacts of increase in short-term rentals (loss of workforce housing) Loss of workforce due to pandemic Growth in wealth/permanent population creates more demand for low-paying service jobs to support growing permanent population (i.e. restaurant, recreation services, retail jobs) Finding employees to fill resident and visitor service jobs necessary to maintain a community will likely become even more challenging
>
> Small businesses closing their doors due to inability to survive the pandemic Ongoing inability of our service businesses and tourist economy to accommodate professionally and in a timely manner the demands of the ever-increasing number of tourist and second homeowners. Dependence on oil and gas revenues in some of the region's counties Federal and State legislation negatively affecting some key industries in the region (e.g. hunting and ranching)
>
> NWCCOG Economic Development District - Comprehensive Economic Development Strategy - 2021-2026 | 52 Resilience, Recovery and the COV"

These examples highlight the large differences between the various fixed chunk sizes. While thematically similar to the reference text, the 300-character chunk size does not allow enough space to fully address issues like climate resilience and vulnerability in sufficient detail. Additionally, because the fixed chunk approach automatically divides each CEDS into chunks of fixed length regardless of where those divisions occur in the text, most chunks in this approach begin and/or end mid-sentence. Future research into semantic chunking could alleviate this issue.

NERRC again conducted a systematic review of the model outputs to determine whether they were sufficiently capturing the intent of the term definitions. The research team also used the review to assess whether a particular chunk size was substantively more accurate in its capture of the term intent than the others, including the previous full document analysis. Unlike the whole document chunking approach, which produced a single cosine similarity score for each CEDS on each reference term, the fixed chunk approach produced a single cosine similarity score for each chunk in each CEDS on each reference term. Therefore, for a CEDS document with 100 chunks of a given size, there were 100 similarity scores for each reference term. This required NERRC analysts to develop a methodology to convert individual chunk scores into representative document-level scores, so that whole CEDS documents could be compared.

Aggregate Scoring and Ranking

Before analyzing the CEDS documents across different themes or topics, it was necessary to aggregate chunk-level scores into document-level scores. Because the NLP model generated one score for each chunk on each term, and a CEDS document might contain tens or hundreds of chunks, NERRC considered two different methodologies to create aggregate chunk-level scores to document-level scores. The concern around aggregation of similar sub-terms within an overarching term was a result of decisions made early in the project to segment complex and nuanced themes, such as equity or resilience, that have no singular definition to allow the model to identify various aspects within an individual CEDS.

The first approach, referred to as the average chunk approach, involved taking the average of all chunk scores across each document and for all the relevant terms. For example, if a

document had 150 chunks scored by the model, and each chunk received one score for each of three thematically related terms, there would be 450 chunk-level scores. The average chunk approach would take the mean of those 450 scores and consider that to be the aggregated document score on the thematic topic comprised of those three terms. Because each individual score is bound between -1 and 1, the average chunk approach will always be between -1 and 1.

The second approach, referred to as the summed maximum chunk approach, instead finds the single chunk in each CEDS that scored highest on each of the relevant terms. Considering the same example of a document with 100 scored chunks and three reference terms of interest, the summed maximum chunk approach would take the highest score for each of the three terms and add them up. Unlike the average chunk approach, which will always give a score between -1 and 1, the summed maximum chunk score depends on the number of reference terms analyzed. With three terms, the summed maximum chunk score would be between -3 (if each reference term had a score of -1) and 3 (if each reference term had a score of 1); more generally, with *n* terms the summed maximum chunk score will be between *-n* and *n*. To compare summed maximum chunk scores between topics with a different number of terms, scores were normalized by dividing by the number of terms *n* so that all scores will be between -1 and 1.

As suggested by the example chunk outputs above, in-depth review suggested that the 300-character chunk size of text is too narrow to adequately capture the full intent of the key term. In some cases, the highest ranked 300-character chunks were simply statements that summarized EDA requirements or restated the term definition from the CEDS Content Guidelines.

The 900-character chunks often captured more of the overall intent but were frequently misplaced within the larger document. In example 2 in the previous section, the 900-character chunk example was ranked third for the size on climate resilience vulnerabilities (term 22) but failed to provide any specifics about whether vulnerabilities were identified within the SWOT. The SWOT itself is well referenced in the example chunk, and the SWOT section of that report contains a more detailed treatment of identified climate vulnerabilities, but the high scoring chunk merely referenced another section of the document where the content of interest was fully discussed.

To understand how sensitive CEDS rankings were to different chunk sizes, NERRC calculated the percent of documents that scored in the top *n* for different combinations of chunk sizes and scoring methodologies. Figures ***2, and 3*** and ***4*** show the comparisons between the 300 and 900, 300 and 3,000, and 900 and 3,000 chunks for top *n* scoring documents. These visuals show that there is little agreement in CEDS rankings produced by different chunk sizes, so that determining a satisfactory chunk size is crucial to model development.

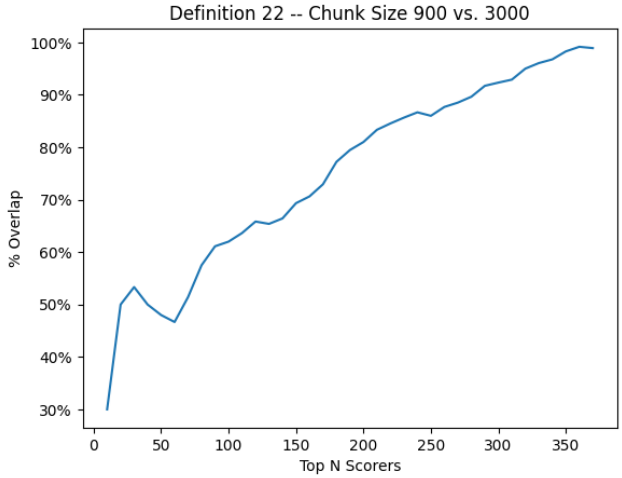

Figure 2: Percent overlap of CEDS rankings for chunk sizes 900 vs. 3000

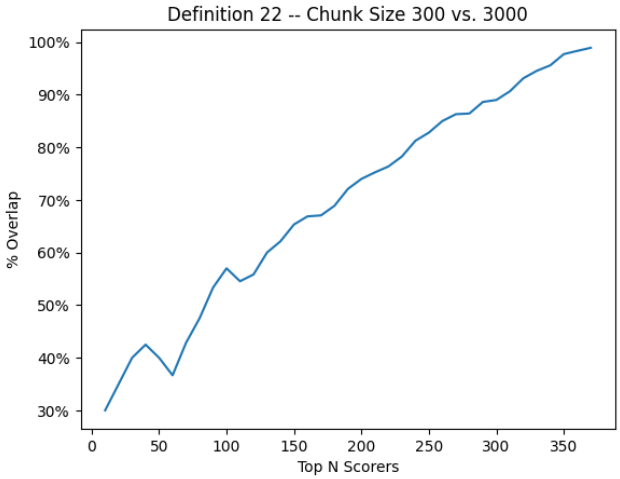

Figure 3: Percent overlap of CEDS rankings for chunk sizes 300 vs. 3000

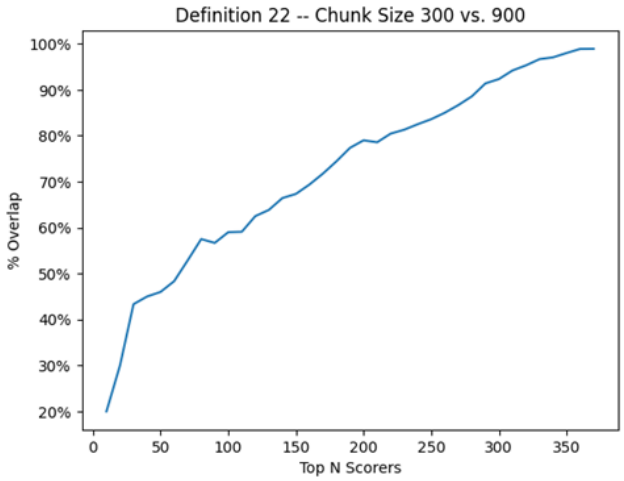

Figure 2: Percent overlap of CEDS rankings for chunk sizes 300 vs. 900

Based on the results of the model validation process, NERRC chose to use the 3,000-character chunk size for the analysis, as this level was deemed to capture a sufficient level of discussion without including extraneous content. Below is the distribution of summed maximum chunk scores for the 300, 900, and 3,000 chunk sizes.

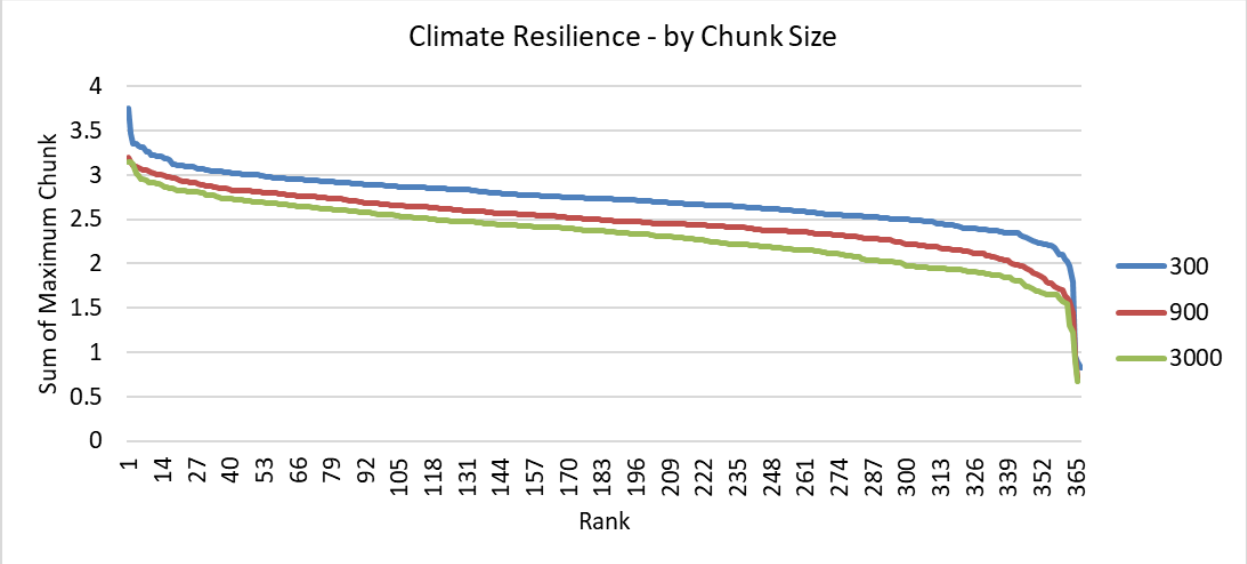

Figure 3: Relative performance of chunk sizes for climate resilience term 22.

Overall, the distribution of scores is similar across the different chunk sizes, with the smaller chunk sizes scoring higher (i.e., better) than the 3,000-character chunk size. However, as discussed in the previous section, NERRC determined that the 3,000-character chunk size best captured a sufficient level of detail and context. While the 300-character chunk and to a lesser extent the 900-character chunk give higher importance to individual words or phrases, thus contributing to the higher scores shown above, NERRC determined the 3,000-character chunk size best aligned with subject matter expert (SME) findings and offered an acceptable result.

Furthermore, the above graph reveals the lack of natural “breakpoints” in scores that could be used to classify CEDS documents, save for the small number of extremely high-scoring or low-scoring documents noticeable at the right and left ends of the curves. Because the NLP model employed in this analysis assigns chunks continuous scores between -1 and 1 given their similarity to a reference text, this result is to be expected. However, close reading of the body of CEDS documents can find cut-off points noticeable to the human reader but not to the NLP scoring model.

Evaluating CEDS Content for Alignment and Emerging Trends

After conducting model validation, selecting the best chunk size, and choosing an appropriate scoring methodology, NERRC proceeded to answer the following primary research questions:

1. How does CEDS content relate to current and future CEDS Content Guidelines?
    a. What aspects of the content guidelines are more thoroughly addressed than others?
    b. Are there areas of new content guidelines that CEDS are already addressing?
    c. What are the gaps?

2. Do the CEDS reveal any key trends or topics that go beyond current guidance that should be prioritized by the EDA?
3. How are CEDS addressing EDA's equity, resilience (climate and other disruptions), and workforce development investment priorities from concept to strategy to outcome?
4. Do third party data sources align with areas of focus in CEDS? For example, do priority clusters in CEDS align with identified local and traded clusters in BLS data?

The research questions were proposed before the NLP model was fully developed, so that the extent to which the methodology would be able to answer them was not fully known. After fully developing the fixed chunking NLP model, NERRC can answer research questions 1a and 1c with the model outputs, while answering the remaining research questions requires additional input or research.

Primary Research Question 1a: What aspects of the content guidelines are more thoroughly addressed than others?

As an experimental model, the analysis required significant manual validation. Consequently, NERRC analysts chose to focus on three high priority thematic areas: climate resilience (5 individual terms), workforce development (3 individual terms), and equity (4 individual terms). Figure 6 below shows the distribution of summed maximum chunk scores for each thematic area (note that due to the different number of terms in each thematic area, the range of possible scores differs between themes).

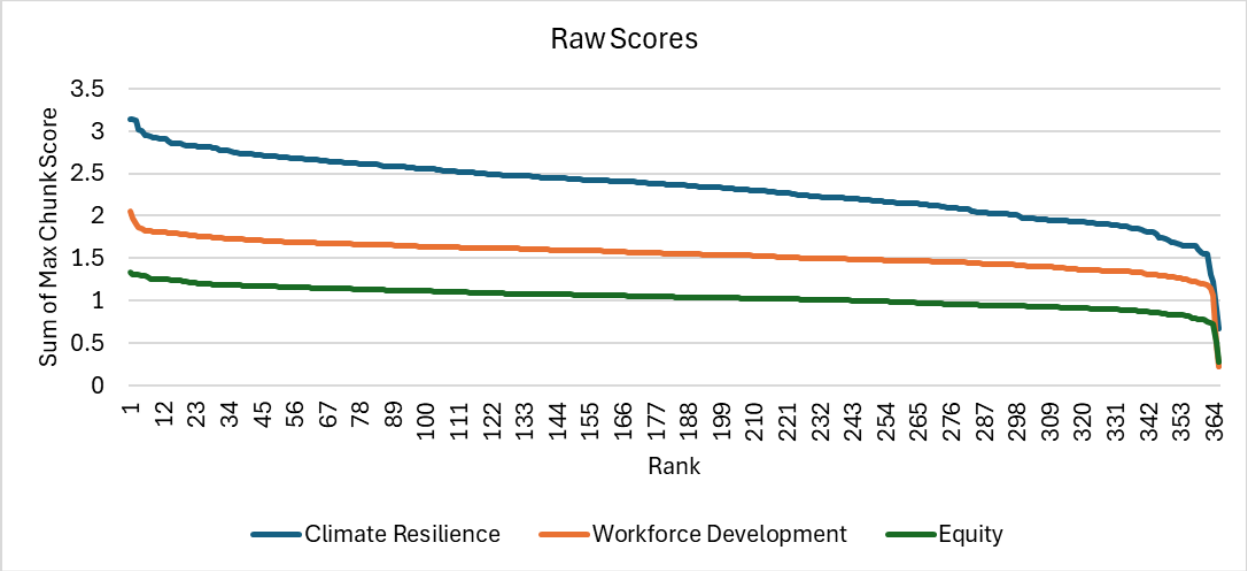

Figure 4: Distribution of summed maximum chunk scores for each thematic area.

Overall, the distributions of scores reveals that there are a small number of low-scoring CEDS documents for each topic (depicted by the sharp downward trajectory at the right-hand side), and relatively minor differences in scores between high-scoring and low-scoring documents (depicted by the nearly straight segments in the middle of each curve). Table 8 identifies the top 10 CEDS at the extreme high end of the scoring spectrum for each of the key terms and at the 3,000-character chunk size, with each document's raw summed maximum chunk score in parenthesis.

Table 8: The top 10 CEDS at the extreme high end of the scoring spectrum for each of the key terms and at the 3,000-character chunk size, with each document's raw summed maximum chunk score in parenthesis.

Rank	Climate Resilience	Workforce Development	Equity
1	Northwest Colorado Council of Governments (0.6289)	South Central Dakota Regional Council (0.6824)	MO-KAN Regional Council (0.4467)
2	Metropolitan Area Planning Council (0.6285)	Two Rivers Economic Development District (0.6585)	Merrimack Valley Planning Commission (0.4381)
3	Southwest Arkansas Planning and Development District (0.6252)	Central Savannah River Area Regional Commission (0.6343)	Southern Tier West Regional Planning and Development Board (0.4358)
4	Southeast Nebraska Development District (0.6028)	Regional Planning Commission (0.6219)	Southern Georgia Regional Commission (0.4336)
5	Rockingham Economic Development Corporation (0.5995)	Central Puget Sound Economic Development District (0.6156)	Oregon Cascades West Council of Governments (0.4329)
6	Planning & Development District III (0.5907)	Central Upper Peninsula Planning and Development Regional Commission (0.6096)	Panhandle Regional Planning Commission (0.4324)
7	Upper Savannah Council of Governments (0.5904)	Mid Columbia Economic Development District (0.6077)	Central Upper Peninsula Planning and Development Regional Commission (0.4285)
8	North Country Council (0.5877)	Gulf Coast Economic Development District (0.6067)	Roanoke Valley-Alleghany Economic Development District (0.4195)
9	South Alabama Regional Planning Commission (0.5841)	Northwest Pennsylvania Regional Planning and Development Commission (0.6034)	Siouxland Interstate Metropolitan Planning Council (0.4185)
10	South Florida Regional Planning Council (0.5832)	Area 15 Regional Planning Commission (0.6033)	South Central Planning and Development Commission (0.4182)

Next, NERRC normalized the scores to lie between -1 and 1 so that inferences about the strength of coverage between different thematic areas could be assessed. Figure 7 below shows a normalized scores.

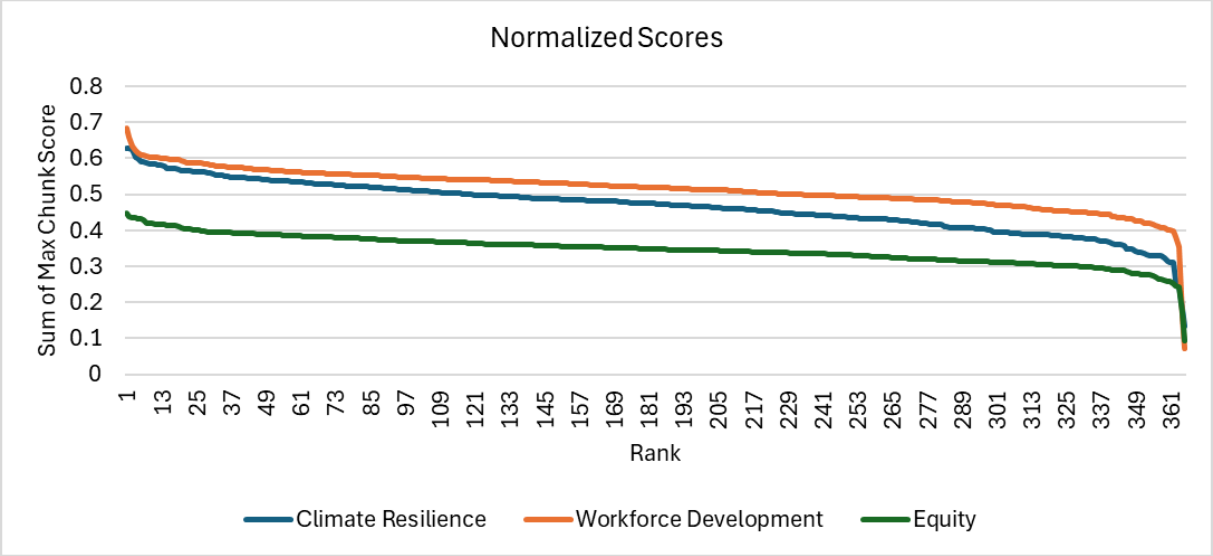

Figure 5: Distribution of summed maximum chunk scores for each thematic area with normalized scores.

Here, it is apparent that the body of CEDS documents scored highest on the inclusion of concepts related to workforce development, followed closely by climate resilience terms and concepts. However, scores on the equity component were noticeably lower across nearly all documents. From this NERRC concludes that, in general, the workforce development and climate resilience portions of the CEDS content guidelines are covered more thoroughly. This result might be expected, as workforce and development were first incorporated into the CEDS Content Guidelines in 2015, whereas equity was not incorporated until 2023.

Primary Research Question 1c: What are the gaps?

Figures 6 and 7 reveal that equity topics are not covered as thoroughly when compared to workforce development or climate resilience, as the normalized scores are consistently lower. Beyond the recency of the term equity being incorporated into the CEDS Content Guidelines—meaning that many CEDS documents evaluated in this study predate the new Content Guidelines—there are two primary methodological explanations for this finding. First, topics of equity are more abstract than topics of workforce development, lacking a unified and well-developed coherent definition on which to train the model. During the manual model validation phase of the analysis, NERRC analysts observed that definitions or terms covering discrete or concrete concepts, such as infrastructure or labor markets, were typically scored more accurately by the NLP model than the more contextual or abstract concepts, such as equity, thus potentially explaining the relatively lower scores. Due to this same distinction, it may also be that writers of CEDS documents have a harder time explicitly discussing concepts like equity, particularly in the context of their economic development strategies or SWOT analyses.

Second, although NERRC chose to use the summed maximum chunk approach to construct a document-level ranking for this study, that approach may be less appropriate for a concept like equity. Whereas some concepts like climate risks (e.g., hurricanes or flooding) might be covered

in a single comprehensive section of a CEDS, equity might instead be a component of many different sections of a CEDS. Therefore, each individual chunk may score lower on equity because equity does not fit neatly into a single section of a CEDS but is instead a common point of discussion in many sections of a CEDS, so that the average chunk approach may be more suitable. However, because analyzing different topics requires a common scoring methodology to make valid comparisons, the summed maximum chunk score was used for each topic.

Remaining Primary Research Questions

The NLP model employed in this work requires the analyst to provide the model with reference text that CEDS documents can be compared against. For this study, NERRC, in consultation with EDA, created a list of topics and terms of interest and constructed relevant summaries and definitions for the NLP model to use as reference text. This contrasts with other AI technologies, namely large-language models (LLMs), which are better suited for fielding open-ended inquiries on-the-fly.

Within the timeframe of this study, NERRC was unable to fully answer additional primary research questions, as it would have required significant additional research and development to achieve the level of model sophistication required. Specifically, the remaining primary research questions—1b, and 2, 3 and 4—require additional structure, including improved key term definition and manual reviews. In addition, more source documents are needed to better train the model on nuanced concepts and requirements. For example, to answer question 1d requires collecting relevant requirements for each of the three elements of the question (i.e., statutory requirements, content requirements from funding, other pieces of guidance loosely defined). Then, the analyst would have to create summaries and definitions of those requirements for the model to reference. The additional requirements would have to be sufficiently different from the primary requirements, otherwise the model would not be able to adequately differentiate coverage of each group of requirements.

Similarly, to answer question 2 and identify topics that go beyond current guidelines would require identifying some topics outside of those included in current and historical CEDS Content Guidelines and creating reference text to further train the model. It is fully feasible to do this analysis; however, care and time must be taken to anticipate and identify topics of interest and in crafting their reference texts. Since this work is focused on assessing the feasibility of using NLP models to understand CEDS, NERRC has not yet taken these additional steps.

Question 3, which seeks to identify how well CEDS link concepts to strategy and outcomes, requires more nuanced definitions of both strategies and outcomes. Strategies can manifest in different ways, but typically involve some sort of action and may not be contained exclusively within a CEDS section entitled ‘strategy’ or a derivative. Outcomes are even more difficult to define, ranging from observed changes in a particular metric to the avoidance of a negative outcome. Capturing these nuances requires careful consideration of the reference texts used by the model. Furthermore, capturing the linkages between concepts and strategies, and between strategies and outcomes, requires explicitly defining how those linkages should appear in the text. This type of analysis is feasible but requires significant care, time, and resources to capture adequate definitions of strategy, outcome, and their linkages. If the reference texts are not meaningful to the analyst, then the model outputs will be of little value.

Unlike the proceeding questions, question 4 requires integrating external data sources. Unless the analyst captures each location's relevant statistics and feeds them into the model as reference, the NLP techniques employed by NERRC are unable to incorporate external data. Other technologies, such as LLMs, may be better suited to such types of analysis.

Summary of Findings

Although the scope of this study shifted from analytical to methodological, the work generated significant insights and advancements in the use of NLP for economic development purposes.

Finding 1: NLP offers valuable tools for analyzing economic development documents but requires tailored approaches.

NLP has significant potential in the field of economic development by automating the analysis of key documents like CEDS. However, this study shows that a one-size-fits-all approach is not effective for this kind of research. Different document sections—such as SWOT analyses or strategic plans—require customized NLP strategies to accurately capture their nuances. For example, fixed chunking allowed NERRC to process CEDS documents more effectively by tailoring the analysis to specific sections rather than treating the entire document uniformly.

Finding 2: NLP model design requires significant human input.

Despite advancements in AI/ML, this study highlights that human expertise is crucial throughout the NLP model design, testing, and validation phases. Early in the study, the model outputs did not align well with expert opinions, as evidenced by differences between the automated rankings of CEDS documents and subject matter expert rankings. This underscores the need for ongoing expert validation to ensure accuracy and relevance in NLP outputs.

Finding 3: Whole-document chunking approaches were ineffective for CEDS.

Initial attempts to process entire CEDS documents as a single chunk proved inadequate due to the broad scope of the documents and the specificity of the CEDS Content Guidelines. This finding highlights the limitations of simplistic approaches in NLP and emphasizes the importance of fine-tuning models to handle diverse content with greater granularity.

Finding 4: Fixed chunking produced better results but came with increased computational requirements.

Switching to fixed chunking, particularly at the 3,000-character size, improved model accuracy by providing more granular insights. However, this approach introduced additional complexities, such as the need to select appropriate chunk sizes—a decision without empirical rules, thus requiring subject matter expertise. Testing multiple chunk sizes, as NERRC did, also tripled the computational requirements, raising concerns about resource accessibility for practitioners lacking high-performance computing (HPC) solutions.

Finding 5: Topic and term selection impacts NLP model outcomes.

Choosing the appropriate topics and terms for NLP analysis is critical and requires careful consideration. Different definitions or slightly altered terms can yield significantly different results, making NLP models highly sensitive to their inputs. This highlights the values-based nature of term selection and the need for stakeholder engagement and alignment with policy guidance to ensure the model reflects the desired outcomes.

Finding 6: Different methods of score aggregation affect analysis results.

When aggregating the scores from fixed chunking to produce document-level rankings, different methods—such as averaging chunk scores or using the summed maximum chunk score—lead to varying results. NERRC favored the summed maximum chunk approach, but the appropriate aggregation method may depend on the specific use case, highlighting another key decision point in NLP analysis that influences outcomes.

Conclusion: NLP requires iterative development and human involvement at every stage.

This study demonstrates that incorporating NLP in economic development analysis demands a cyclical process of model design, basic research, testing, and expert validation. There are no universal rules for NLP analysis, and different stakeholders or contexts may require distinct approaches. Consequently, there is a high up-front cost in developing NLP solutions, which must be carefully balanced against the potential benefits.

Next Steps in Furthering the CEDS Analysis

There are several directions for future research that could expand on this work. The first pathway would be to enhance the BERT model used for this study by incorporating reference text from outside its immediate context window, which refers to the span of text the model can process at once to understand the meaning based on surrounding words or sentences. By including text beyond this limited range, BERT could capture a broader range of contextual information. Although NERRC did not employ that strategy here, future work could explore whether doing so improves the model's semantic understanding of CEDS documents or if the additional model complexity comes at little benefit. Second, recent advances in semantic chunking and open-source code libraries to implement semantic chunking mean that more advanced chunking strategies may be viable with additional time and resources. More research is needed to assess whether semantic chunking can improve results over fixed chunking, and what additional computational resources are required to implement this approach.

Implications of Using NLP for the EDA

As this exploratory study shows, NLP can be employed to systematically analyze the content of CEDS documents but there are important limitations. By automating the extraction of key information, NLP has the potential to not only streamline the review process for program managers but also to ensure that decision-making is informed by comprehensive and nuanced insights into the strategies that communities are prioritizing. For economic development practitioners in the field, the same types of analysis could also be used to provide feedback on draft CEDS documents, highlighting concepts given sufficient treatment and suggesting topics that could benefit from further discussion.

NLP and generative AI have the potential to provide EDA with substantial improvements in processing and analyzing economic development strategies. However, this technological adoption must be underpinned by a dynamic, responsive, and values-based policy framework that addresses the rapid advancements in AI technology. By doing so, the EDA can ensure that its use of AI tools advances its mission effectively while adhering to the highest standards of ethical practice and regulatory compliance.

NLP has the potential to transform how the EDA processes, analyzes, and derives insights from large volumes of text-based economic development strategy documents. This technology can

enable the automated analysis of textual data at scale, offering the opportunity to enhance the efficiency and effectiveness of the EDA's strategic reviews and decision-making processes. And although this analysis did not directly answer all primary research questions, the lessons learned have important implications for the EDA and can help guide future work.

First, some of the unanswered research questions require the analyst to input additional content into the model. For example, question 1d attempts to understand how well CEDS documents cover statutory requirements or follow other pieces of guidance. While it is possible for analysts or stakeholders to conduct a review for relevant legislation and external guidance, it may also be possible to use generative AI tools to quickly compile, summarize, and define topics or sources not currently included. Subject matter experts should validate the generative AI output, but combining generative and non-generative AI tools can allow researchers to quickly probe open-ended research questions.

Second, research question 4 seeks to validate certain elements of a CEDS with third-party, open-source quantitative data. Given concerns over accuracy with current NLP technologies, validating data is an important hurdle to clear before comfortably integrating NLP into economic development work. Often, finding and accessing such data can take considerable time and effort, although the process is improving with tools such as the National Economic Resilience Data Explorer (NERDE). This is another area where integrating generative AI can yield substantial benefit, as these tools can quickly suggest websites, resources, or even computer code to download data. Alternatively, simply ensuring users have access to data aggregation tools like the NERDE Data Explorer as they use NLP technologies could simplify the process of acquiring data to validate. With data in hand, users can prompt generative AI with the data and ask open-ended questions.

Lastly, while conceptual discussion is important, a CEDS document can contribute real impact by connecting key concepts to concrete strategies and measurable success outcomes. However, analyzing strategies and outcomes requires a fundamentally different set of reference text than that of concepts and topics. This is an area where more work, possibly with the help of generative AI tools, can clarify and improve understanding of how CEDS documents discuss strategies and concepts, and how their linkages to key concepts and each other appear in the text.

Generative AI can further augment the EDA's capabilities by generating synthetic text based on the vast data it has accumulated. For instance, it can auto-generate reports, executive summaries, and even draft strategic responses tailored to specific community needs. This not only reduces the workload on staff but also speeds up the dissemination of critical information and feedback to communities looking for guidance and approval on their projects.

The adoption of NLP and generative AI technologies necessitates the development of robust policy and usage guidelines. As these technologies evolve rapidly, the policy framework governing their use must be equally adaptive, ensuring it can respond to new ethical considerations, technological capabilities, and potential risks. Key policy areas include data privacy, accuracy of generated content, and the transparency of AI-driven decisions, ensuring they are explainable and justifiable to stakeholders. Additionally, any NLP tool should undergo human-expert validation to ensure that the model's learned semantic understanding aligns with subject matter expert understanding.

To capitalize on the benefits of NLP and generative AI, the EDA should foster a culture of innovation balanced with compliance. This involves regular training for staff on emerging AI technologies and their implications, coupled with strong partnerships with academia and industry experts to stay abreast of the latest developments and best practices in AI utilization.

Given that AI and NLP systems learn from existing data, there is a risk of perpetuating existing biases or inaccuracies present in the model training materials. It will be crucial for to implement checks and balances in the form of bias audits and ongoing reviews of AI outputs. These measures will help mitigate risks associated with automated content generation and decision-making, ensuring that strategies and recommendations are equitable and grounded in accurate, bias-free analysis.

The Use of Generative AI and NLP in the Economic Development Community

For economic developers, the thoughtful integration of NLP and generative AI into the creation of strategic documents, reports, and other work products offers a promising avenue to enhance efficiency and effectiveness. However, it is imperative to navigate this integration with a strong commitment to ethical practices, regulatory guidelines, and benefiting local communities. By doing so, economic developers not only safeguard the interests and rights of the communities they serve but also harness the full potential of AI to foster innovative and equitable economic development.

By automating the analysis of extensive datasets and previously compiled documents, NLP can help even novice users identify key trends, successful strategies, and common pitfalls, informing the development of more effective and tailored economic strategies. This capability not only likely enhances the quality of documentation but when used properly also helps ensure that strategies are aligned with both historical data and emerging economic conditions.

Generative AI can assist economic developers by drafting sections of documents, refining content to improve clarity and readability, or creating entire reports based on specified guidelines and data inputs. For routine reports and standard grant applications, this can significantly streamline administrative tasks, allowing professionals to focus more on strategic decision-making and less on the burdens of bureaucratic processes. Generative AI can produce comprehensive first drafts that developers can then refine, ensuring that the final output is both high-quality and contextually relevant.

However, the deployment of generative AI without adequate formal restrictions or adherence to informal best practices presents significant risks. Unregulated use of this technology can lead to the generation of content that is misleading, ethically questionable, or outright incorrect. Without constraints, AI might replicate or amplify biases present in the training data, potentially leading to unfair or prejudiced recommendations within strategy documents or grant proposals. Additionally, the unchecked use of AI in document creation might compromise the authenticity of the narrative or obviate the strategy development engagement processes, making it less reflective of the community's actual needs and values.

Conversely, when bounded by ethical guidelines and best practices, the use of generative AI in economic development can be highly productive. By establishing clear rules regarding data usage, transparency, and oversight, economic development officials can leverage AI to enhance document accuracy and inclusivity while maintaining ethical standards. Ethical use includes regular audits for bias, adherence to privacy laws, and transparency about AI's role in the

document creation process. These steps ensure that AI acts as a support tool that enhances human expertise rather than replacing it.

Advancing AI in Economic Development: Future Strategies and Ethical Frameworks

While this study highlights major theoretical and technological strides in the use of these technologies, it is crucial to discuss their practical applications within the economic development space.

During the lifespan of this project, approximately 18 months, commercially available generative AI, such as OpenAI's ChatGPT have become largely mainstream, forever altering how individuals and organizations can access machine learning technology and generative AI technologies.[6] The speed of emergence and adoption of these technologies also requires current and future users to develop and implement sufficient guidelines to govern thoughtful and ethical use. The rapid integration of these AI technologies brings with it a set of challenges. Foremost among these is the issue of data privacy and security, a critical concern as more personal and sensitive information is processed by AI systems. Additionally, there is the risk of perpetuating existing biases in data, which can lead to skewed AI outputs that might exacerbate social and economic disparities rather than alleviate them. Addressing these challenges requires a robust framework that not only includes technological solutions but also comprehensive policy measures.

As AI technologies continue to advance, it is imperative to establish a set of guidelines that govern the ethical use of AI. This includes ensuring transparency in AI-driven decisions, equitable access to AI technologies, and ongoing monitoring of AI applications to prevent unintended consequences. Collaborative efforts between technologists, policymakers, and community stakeholders will be essential to navigate the ethical landscapes and harness AI's potential responsibly.

Looking forward, the field of AI in economic development is ripe for further exploration. Future research beyond the next steps associated with this analysis noted earlier could focus on developing more advanced models that incorporate real-time data feeds to dynamically adjust economic strategies. Moreover, there is significant potential in exploring cross-sectoral applications of NLP and AI, such as integrating economic data with environmental and health data to develop holistic community development plans. Specific future research steps could include the following:

- **Develop Ethical AI Deployment Frameworks:** Given the critical nature of economic development, a fundamental first step would be to establish frameworks for the ethical use of AI in the economic development field. These frameworks should address data privacy, bias mitigation, and ensure that AI tools are used to enhance equity and inclusivity in economic opportunities.

[6] https://chatgpt.com/

- **Enhance Model Development and Integration:** Building on the foundational NLP models used, EDA can explore more advanced machine learning algorithms that incorporate dynamic learning capabilities. This could include real-time adaptation to new data inputs and feedback mechanisms that continuously refine model accuracy and relevance.
- **Expand Training Datasets:** To improve the robustness and diversity of NLP outputs, expanding and diversifying the training datasets can provide a broader spectrum of economic conditions and strategic responses. This includes integrating more varied regional economic strategies and outcomes. Similarly, a dedicated corpus specific to the needs and associated challenges of the economic development field could be developed to support a more 'fit-for-use' dataset.
- **Automate Real-Time Analysis Systems:** Develop automated systems that can provide real-time feedback on CEDS documents as they are being drafted. This system would alert users to potential improvements or omissions based on current and evolving guidelines, ensuring compliance and enhancing strategic relevance before submission.
- **Develop Predictive Analytics Tools:** Utilize AI to develop predictive tools that can anticipate economic downturns or identify emerging economic opportunities based on current global trends and historical data patterns.
- **Create Custom AI Tools for Local or Regional Partners:** Develop bespoke AI tools tailored to the specific needs of local governments and economic development agencies. These tools could help improve analysis of local data, prediction of economic trends, and formulation of region-specific development strategies. In addition, these tools could help under-resourced jurisdictions with a variety of tasks including CEDS and grant application development or review.
- **Partner with Academic Institutions:** Forge partnerships with universities and research centers to explore cutting-edge AI applications in economic development. These partnerships could focus on developing new models that predict economic shifts or assess the impact of global events on local economies.
- **Integrate Public Data Platforms:** Establish platforms that integrate economic data from various public sources using AI. Such platforms could provide communities with better access to relevant data, enhancing their ability to make informed decisions and tailor their economic strategies effectively.
- **Link with National and International Economic Databases:** Enhance the NLP models by integrating broader economic databases that include national and international economic indicators. This would provide a more comprehensive view of how local strategies fit into larger economic contexts.

By pursuing these future research directions and supporting efforts, the EDA can significantly advance its capabilities in harnessing AI and machine learning for economic development, ultimately leading to more informed, effective, and adaptable economic strategies at all levels.

Operationalizing the Existing Research and Analysis Effort

EDA and NERRC can take actionable steps to operationalize what has been done to date without requiring next steps to involve additional research. Some examples include:

1. **Utilize the NLP Model for Immediate Applications**: The NLP models developed in this study, particularly the chunking techniques, could be used to immediately assess existing CEDS documents to identify gaps or areas of improvement. This could help streamline the document review process for the EDA and provide actionable insights to local governments and economic development planners.
2. **Customize the NLP Model for Ongoing Evaluations**: While some future enhancements will require research, the current model can be operationalized by refining their use in specific cases. For example, fixed chunking has been identified as an effective method for document analysis and could be deployed to evaluate new CEDS documents as they are submitted, allowing for real-time assessment and feedback.
3. **Train Stakeholders in Using the NLP Tools**: An operational step would involve training EDA staff and local economic development practitioners to use the NLP tools developed during this project. This could reduce reliance on further research and immediately apply the insights gathered in this study to improve future CEDS submissions.
4. **Implement Automated Review Processes**: The insights gained from this NLP model regarding key areas like equity, resilience, and workforce development can be used to automate portions of the CEDS document review process. This operationalization would not require additional research but could leverage the model's current capabilities to create a more efficient review system.

Developing an actionable tool leveraging the model developed for this study is feasible. This would require several design-focused steps to transition it into a production-level enterprise or a publicly accessible tool. First and foremost, it is critical to clearly define the intended user base and specific use cases. This clarity will help shape the tool's functionality, ensuring that the user interface is intuitive and allows stakeholders—whether EDA staff, local governments, or other practitioners—to easily interact with the model and extract meaningful insights from CEDS documents. Moreover, defining the use case will inform the IT and network infrastructure; for example, a publicly available tool will require different access controls, security protocols, and backend configurations compared to an internal-use tool for EDA staff.

Second, with a well-defined user base and use cases in place, a tool can be developed iteratively. Starting with static mock-ups of the user interface and core functionalities, a feedback loop with the intended users should be established to refine the design and ensure it meets their needs. This iterative process would help create a tool that is both user-friendly and efficient in delivering the expected outcomes.

Third, while engaging users in the design process, development of the networking and computational architecture can proceed in parallel. Key considerations include defining user roles, setting access privileges, and ensuring adequate computational power to handle the significant demands of NLP processes. Since the analysis of large text documents can be resource-intensive, it is essential to allocate sufficient computational capacity to guarantee smooth performance.

Finally, a robust system for ongoing monitoring and maintenance of the model's performance should be established. This includes processes for retraining the model on new data, updating the underlying code, and ensuring continuous support from analysts. Given the evolving nature of economic development strategies and NLP techniques, these ongoing updates will be critical to maintaining the model's relevance and effectiveness.

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Appendix A: EDA Investment Priorities (July 2023)

EDA's Investment Priorities can change over time. Because they helped define key terms used to construct the NLP model at a particular moment in time, those definitions are captured here:

Equity: Economic development planning or implementation projects that advance equity across America through investments that directly benefit 1) one or more traditionally underserved populations (PDF), including but not limited to women, Black, Latino, and Indigenous and Native American persons, Asian Americans, and Pacific Islanders or 2) underserved communities within geographies (PDF) that have been systemically and/or systematically denied a full opportunity to participate in aspects of economic prosperity such as Tribal Lands, Persistent Poverty Counties (XLSX), and rural areas with demonstrated, historical underservice.

For more information on these populations and geographies see: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/.

Recovery & Resilience: Economic development planning or implementation projects that build economic resilience to and long-term recovery from economic shocks, like those experienced by coal and power plant communities, or other communities impacted by the decline of an important industry or a natural disaster, that may benefit from economic diversification-focused resilience.

Workforce Development: Economic development planning or implementation projects that support workforce education and skills training activities directly connected to the hiring and skills needs of the business community and that result in well-paying, quality jobs (PDF).

Manufacturing: Economic development planning or implementation projects that encourage job creation, business expansion, technology and capital upgrades, and productivity growth in manufacturing, including efforts that contribute to the competitiveness and growth of domestic suppliers or to the domestic production of innovative, high-value products and production technologies.

Technology-Based Economic Development: Economic development planning or implementation projects that foster regional knowledge ecosystems that support entrepreneurs and startups, including the commercialization of new technologies, that are creating technology-driven businesses and high-skilled, well-paying jobs of the future.

Environmentally-Sustainable Development: Economic development planning or implementation projects that help address the climate crisis including through the development and implementation of green products (PDF), green processes (PDF), including green infrastructure, green buildings (PDF), and green places (PDF), including an emphasis on density in the vicinity of the development.

Exports & FDI: Economic development planning or implementation projects that enhance or build community assets to support growth in US exports or increased foreign direct investment.

Appendix B: Key Terms for NLP Analysis

Insert excel sheet – CEDS TERMS FOR APPENDIX

Appendix C: List of Current CEDS Documents for Analysis

#	EDD Name	State	Link
1	Central Alabama Regional Planning and Development Commission	Alabama	https://carpdc.com/resources-documents/
2	South Alabama Regional Planning Commission	Alabama	https://sarpc.org/
3	Southeast Alabama Regional Planning and Development Commission	Alabama	https://www.searpdc.org/data-center/#toggle-id-2
4	West Alabama Regional Commission	Alabama	https://www.warc.info/planning-documents
5	Regional Planning Commission of Greater Birmingham	Alabama	https://www.rpcgb.org/comprehensive-economic-development-strategy
6	South Central Alabama Development Commission	Alabama	https://scadc.net/documents/
7	East Alabama Regional Planning and Development Commission	Alabama	https://www.earpdc.org/regional-library/
8	Alabama-Tombigbee Regional Commission	Alabama	https://www.atrcregion6.com/2022/09/atrc-2022-ceds/
9	Northwest Alabama Council of Local Governments	Alabama	https://www.nacolg.org/document-room
10	North-Central Alabama Council of Governments	Alabama	https://www.narcog.org/serving-communities/communities
11	Top of Alabama Regional Council of Governments	Alabama	https://tarcog.us/economic-development-district/
12	Southwest Alaska Municipal Conference	Alaska	https://swamc.org/ceds/
13	Southeast Conference	Alaska	https://www.seconference.org/publication/southeast-alaska-2025-economic-plan/
14	Kenai Peninsula Economic Development District	Alaska	https://kpedd.org/
15	Prince William Sound Economic Development District	Alaska	https://www.pwsedd.org/pws-ceds-update-project

#	EDD Name	State	Link
16	Northern Arizona Council of Governments	Arizona	https://nacog.org/nacog-economic-development-district-ceds-document/
17	SouthEastern Arizona Governments Organization	Arizona	https://southeastarizonaeconomy.com/ceds
18	Central Arizona Association of Government	Arizona	http://www.cagaz.org/plans.html
19	Western Arizona Economic Development District	Arizona	Doesn't appear to be an EDD from EDA's website and google search
20	Southeast Arkansas Economic Development District	Arkansas	https://www.southeastarkansas.org/economic-development
21	Northwest Arkansas Economic Development District, Inc.	Arkansas	https://nwaedd.org/comprehensive-economic-development-strategy/
22	Southwest Arkansas Planning and Development District	Arkansas	https://arkansaseconomicregions.org/districts/swapdd
23	West Central Arkansas Planning and Development District	Arkansas	https://www.statsamerica.org/ceds/Default.aspx
24	East Arkansas Planning and Development District	Arkansas	https://arkansaseconomicregions.org/districts/eapdd
25	White River Planning and Development District	Arkansas	https://arkansaseconomicregions.org/districts/wrpdd
26	Western Arkansas Planning and Development District	Arkansas	https://arkansaseconomicregions.org/districts/wapdd
27	Central Arkansas Planning and Development District	Arkansas	https://www.capdd.org/ceds
28	Greater Bay Area Economic Development District	California	Cannot locate website
29	Central Sierra Economic Development District	California	https://www.csedd.org/ceds
30	3Core Economic Development Corporation (CA)/Tri-County EDD	California	Full document not located on website, emailed EDD to obtain.
31	Sierra Economic Development District	California	https://www.sierrabusiness.org/archives/sierra-economic-development-district-sedd-comprehensive-economic-development-

#	EDD Name	State	Link
			strategy-ceds/
32	Sonoma-Mendocino Economic Development District	California	https://sonomaedb.org/current-initiatives/sonoma-mendocino-economic-development-district-(smedd)
33	Superior California Economic Development District	California	https://www.scedd.org/economic-planning
34	Yuba-Sutter Economic Development Corporation	California	https://www.ysedc.org/strategy
35	San Luis Valley Development Resource Group	Colorado	https://www.slvdrg.org/comprehensive-economic-development-strategy/
36	Region 9 Economic Development District of Southwest Colorado, Inc.	Colorado	https://www.region9edd.org/comprehensive-economic-development-strategy
37	Southern Colorado Economic Development District	Colorado	https://www.scedd.com/project/comprehensive-economic-development-strategy/
38	East Central Council of Local Governments	Colorado	https://www.eccog.com/about-us/
39	Region 10 League for Economic Assistance and Planning, Inc.	Colorado	https://region10.net/community-resources/community-development/regional-economic-development-planning/
40	Northwest Colorado Council of Governments/EDD	Colorado	https://nwccog.org/edd/data-center/comprehensive-economic-development-strategy/
41	Associated Governments Of Northwest Colorado	Colorado	https://agnc.org/economic-development-district/comprehensive-economic-development-strategy-ceds/
42	Western Connecticut Economic Development District	Connecticut	https://westcog.org/meetings/wcedd/
43	Central Connecticut EDD	Connecticut	Cannot locate website
44	Naugatuck Valley Corridor Economic Development District	Connecticut	https://nvcogct.gov/wp-content/uploads/2021/06/2021-NVC-EDD-CEDS-REEPORT.pdf

#	EDD Name	State	Link
45	Southeastern Connecticut Enterprise Region Corporation	Connecticut	https://www.secter.org/what-we-do/ceds/
46	North Central Florida Regional Planning Council	Florida	http://www.ncfrpc.org/
47	Northeast Florida Regional Council	Florida	https://www.nefrc.org/ceds2022
48	West Florida Regional Planning Council dba Emerald Coast Regional Council	Florida	https://www.ecrc.org/programs/community_and_economic_development/economic_development/comprehensive_economic_development_strategy_(ceds).php
49	East Central Florida Regional Planning Council	Florida	https://www.ecfrpc.org/economicdevelopment
50	South Florida Regional Planning Council	Florida	https://sfregionalcouncil.org/portfolio-items/economic-dev-district-edd/
51	Apalachee Regional Planning Council	Florida	https://www.arpc.org/economical-development
52	Southwest Florida Regional Planning Council	Florida	https://www.swfrpc.org/programs/economic_development/
53	Tampa Bay Regional Planning Council	Florida	https://www.tbrpc.org/ceds/
54	Central Florida Regional Planning Council	Florida	https://www.cfrpc.org/programs/economic-development-district/
55	Treasure Coast Regional Planning Council	Florida	https://cms5.revize.com/revize/treasurecoastcrp/programs___services/economic_development/treasure_coast_ceds/comprehensive_economic_development_strategy.php
56	Heart of Georgia Altamaha Regional Commission	Georgia	Website not available
57	Southern Georgia Regional Commission	Georgia	https://www.sgrc.us/community-and-economic-development.html
58	Southwest Georgia Regional Commission	Georgia	https://www.swgrcplanning.org/ceds.html
59	Middle Georgia Regional Commission	Georgia	https://www.middlegeorgiarc.org/economic-development/ceds/

#	EDD Name	State	Link
60	Georgia Mountains Regional Commission	Georgia	https://www.gmrc.ga.gov/ceds
61	Northeast Georgia Regional Commission	Georgia	https://negrc.org/home/resources/?et_open_tab=et_pb_tab_0#my-tabs|0
62	Northwest Georgia Regional Commission	Georgia	https://www.nwgrc.org/publications/northwest-georgia-economic-development-strategy-ceds-2022/
63	Coastal Georgia Regional Commission	Georgia	https://www.coastalrc.ga.gov/regional-plan
64	Central Savannah River Area Regional Commission	Georgia	https://csrarc.ga.gov/economic-workforce-development
65	Three Rivers Regional Commission	Georgia	Not available on website
66	River Valley Regional Commission	Georgia	Not available in pdf format.
67	Atlanta Regional Commission	Georgia	https://www.statsamerica.org/ceds/
68	Southeast Idaho Council of Governments	Idaho	https://sicog.org/community-economic-development/region-v-ceds/
69	Panhandle Area Council, Inc.	Idaho	http://www.pacni.org/
70	Region IV Development Association Inc	Idaho	Unable to download CEDS from website
71	East-Central Idaho Planning and Development Association	Idaho	https://alturaidaho.com/ceds
72	Clearwater Economic Development Association	Idaho	https://clearwater-eda.org/regional-development/
73	Two Rivers Economic Development District	Illinois	https://www.trrcopo.org/community-development/economic-development/ceds/
74	Southern Five Regional Planning and Development Commission	Illinois	https://www.southernfive.org/comprehensive-economic-development-strategy.html
75	Southwestern Illinois Metropolitan and Regional Planning Commission	Illinois	No CEDS available available on website or StatsAmerica

#	EDD Name	State	Link
76	North Central Illinois Council of Governments	Illinois	https://www.ncicg.org/eddistrict-main/eddistrict/
77	Blackhawk Hills Resource Conservation and Development	Illinois	https://www.blackhawkhills.com/ceds/
78	South Central Illinois Regional Planning and Development Commission	Illinois	https://www.scirpdc.com/newceds.htm
79	Greater Wabash Regional Planning and Development Commission	Illinois	http://www.gwrpc.com/services/ceds.html
80	Greater Egypt Regional Planning and Development Commission	Illinois	https://greateregypt.org/comprehensive-economic-development-strategy/
81	Western Illinois Regional Council	Illinois	https://wirpc.org/ceds/
82	Southeastern Illinois Regional Planning and Development Commission	Illinois	https://www.sirpdc.org/?s=ceds
83	BI-State Regional Commission	Illinois	https://bistateonline.org/2013-05-03-14-11-33/ceds-comprehensive-economic-development-strategy.html
84	Greater Peoria EDC	Illinois	https://data.greaterpeoria.us/ceds/
85	Kankakee Iroquois Regional Planning Commission	Indiana	https://www.statsamerica.org/ceds/
86	River Hills Economic Development District and Regional Planning Commission	Indiana	http://riverhills.cc/community-data/
87	West Central Indiana Economic Development District	Indiana	https://thrivewestcentral.com/economic/#CEDS
88	Indiana 15 Regional Planning Commission	Indiana	Couldn't find 5-year plan, used the 2022 annual CEDS.
89	Southern Indiana Development Commission	Indiana	https://www.statsamerica.org/ceds/
90	Southeastern Indiana Regional Planning Commission	Indiana	https://www.sirpc.org/resources
91	Michiana Area Council of Governments	Indiana	http://www.macog.com/docs/economic_devel/CEDS2024_Final.pdf

#	EDD Name	State	Link
92	Region III-A Development and Regional Planning Commission	Indiana	https://www.statsamerica.org/ceds/
93	Northwestern Indiana Regional Planning Commission	Indiana	https://nirpc.org/2040-plan/economy-and-place/nwiedd/comprehensive-economic-development-strategy/
94	Southern Iowa Council of Governments, Inc.	Iowa	https://www.sicog.com/wp-content/uploads/2022/09/CEDS-Final-1.pdf
95	Upper Explorerland Regional Planning Commission	Iowa	https://uerpc.org/economic-development.html
96	Region XII Council of Governments	Iowa	https://region12cog.org/plans/
97	East Central Iowa Council of Governments	Iowa	https://envision-eastcentraliowa.org/
98	Iowa Northland Regional Economic Development Commission	Iowa	http://www.inrcog.org/econdev.htm
99	Northwest Iowa Planning and Development Commission	Iowa	https://www.nwipdc.org/index.php
100	Mid-Iowa Development Association Council of Governments	Iowa	https://midiowaplanningalliance.com/ceds/
101	Southwest Iowa Planning Council	Iowa	https://www.swipco.org/publications/ceds/
102	East Central Intergovernmental Association	Iowa	https://www.ecia.org/programs/economic_development.php
103	North Iowa Area Council of Governments	Iowa	https://www.niacog.org/resources
104	Siouxland Interstate Metropolitan Planning Council	Iowa	https://simpco.org/divisions/economic-development/comprehensive-economic-development-strategy/
105	Area 15 Regional Planning Commission	Iowa	https://www.area15rpc.com/docs
106	Southeast Iowa Regional Planning Commission	Iowa	Page could not be loaded.

#	EDD Name	State	Link
107	Region 6 Planning Commission	Iowa	https://www.region6resources.org/online-library-2/planning-documents/
108	Omaha-Council Bluffs Metropolitan Area Planning Agency	Iowa	https://www.statsamerica.org/ceds/
109	Southeast Kansas Regional Planning Commission	Kansas	https://sekrpc.org/news-events/comprehensive-economic-development-strategy-ceds.html
110	MO-KAN Regional Council	Kansas	https://www.mo-kan.org/community/comprehensive-economic-development-strategy-plan/
111	Great Plains Development Inc	Kansas	https://gpdionline.com/ceds
112	South Central Kansas Economic Development District, Inc.	Kansas	https://www.statsamerica.org/ceds/
113	Flint Hills Regional Council	Kansas	https://flinthillsregion.org/flint-hills-economic-development-district/
114	Northwest Kansas Planning and Development Commission	Kansas	https://www.statsamerica.org/ceds/
115	North Central Regional Planning Commission	Kansas	https://www.ncrpc.org/about/abouttheregion/ceds/
116	Mid-America Regional Council	Kansas	https://www.marc.org/sites/default/files/2022-05/Comprehensive-Economic-Development-Strategy-Plan.pdf
117	Lake Cumberland Area Development District (KY DLG/Gold)	Kentucky	https://www.lcadd.com/
118	Barren River Area Development District (KY DLG/Gold)	Kentucky	2022 version not available in pdf.
119	Bluegrass Area Development District (KY DLG/Gold)	Kentucky	https://bgadd.org/
120	Purchase Area Development District (KY DLG/Gold)	Kentucky	https://www.purchaseadd.org/local-government/comprehensive-economic-development-strategy/
121	Gateway Area Development District (KY	Kentucky	2022 version not available in pdf.

#	EDD Name	State	Link
	DLG/Gold)		
122	Cumberland Valley Area Development District (KYDLG/Gold)	Kentucky	http://cvadd.org/comprehensive-economic-development-strategy.html
123	Northern Kentucky Area Development District (KY DLG/Gold)	Kentucky	https://www.nkadd.org/ceds/
124	FIVCO Area Development District (KY DLG/Gold)	Kentucky	https://fivco.org/economic-development/
125	Buffalo Trace Area Development District (KY DLG/Gold)	Kentucky	https://www.statsamerica.org/ceds/
126	Kentucky River Area Development District (KY DLG/Gold)	Kentucky	https://www.statsamerica.org/ceds/
127	Lincoln Trail Area Development District (KY DLG/Gold)	Kentucky	https://ltadd.org/docs/
128	Kentuckiana Regional Planning and Development Agency (KY DLG/Gold)	Kentucky	2022 version not available in pdf.
129	Pennyrile Area Development District (KY DLG/Gold)	Kentucky	https://www.peadd.org/comprehensive-econ-dev-strategy-ceds
130	Green River Area Development District (KY DLG/Gold)	Kentucky	https://gradd.com/committees-councils/economic-development-corporation/
131	Big Sandy Area Development District (KY DLG/Gold)	Kentucky	https://www.statsamerica.org/ceds/
132	Acadiana Planning Commission	Louisiana	https://planacadiana.org/community-economic-development-strategy/
133	Imperial Calcasieu Regional Planning and Development Commission	Louisiana	http://www.planswla.com/CEDS.php
134	Capital Region Planning Commission	Louisiana	https://cdrpc.org/programs/economic-development/economic-development-district/ceds
135	South Central Planning and Development Commission	Louisiana	https://www.scpdc.org/departments/planning/ceds/

#	EDD Name	State	Link
136	Kisatchie-Delta Regional Planning and Development District	Louisiana	https://www.statsamerica.org/ceds/
137	Coordinating & Development Corporation	Louisiana	https://www.cdconline.org/
138	North Delta Regional Planning and Development District, Inc.	Louisiana	https://northdelta.org/eda/
139	Regional Planning Commission	Louisiana	https://www.statsamerica.org/ceds/
140	Androscoggin Valley Council of Governments	Maine	https://www.avcog.org/943/Comprehensive-Economic-Development-Strat
141	Aroostook-Washington Economic Development District	Maine	https://www.nmdc.org/ceds/
142	Midcoast Economic Development District	Maine	https://www.midcoastcog.com/grants
143	Eastern Maine Development Corporation	Maine	https://www.emdc.org/resources/comprehensive-economic-development-strategy/
144	Kennebec Valley Council of Governments	Maine	https://www.kvcog.org/municipal-services/economic-community-development
145	Southern Maine Regional Planning Commission	Maine	https://smpdc.org/economic
146	Tri-County Council for Western Maryland, Inc	Maryland	https://www.statsamerica.org/ceds/
147	Mid-Shore Regional Council	Maryland	PDF not available
148	Tri-County Council for Lower Eastern Shore	Maryland	https://tcclesmd.org/comprehensive-economic-development-strategy-ceds/
149	Cape Cod Economic Development District	Massachusetts	https://www.capecodcommission.org/our-work/ceds
150	Old Colony Planning Council	Massachusetts	http://www.ocpcrpa.org/ceds.html
151	Merrimack Valley Planning Commission	Massachusetts	https://mvpc.org/ceds/

#	EDD Name	State	Link
152	Franklin Regional Council of Governments	Massachusetts	https://frcog.org/program-services/economic-development-planning/
153	Pioneer Valley Planning Commission	Massachusetts	https://www.pvpc.org/content/draft-ceds-now-available-public-reviewcomment
154	Metropolitan Area Planning Council	Massachusetts	https://www.mapc.org/get-involved/economic-development/
155	Montachusett Regional Planning Commission	Massachusetts	https://www.mrpc.org/comprehensive-economic-development-strategy-committee-mrceds
156	Northeast Michigan Council of Governments	Michigan	http://www.discovernortheastmichigan.org/ceds.asp
157	Central Upper Peninsula Planning and Development Regional Commission	Michigan	https://cuppad.org/ceds-draft-review/
158	West Michigan Regional Planning Commission	Michigan	No CEDS earlier than 2012 available
159	Northwest Michigan Council of Governments (Networks Northwest)	Michigan	https://www.networksnorthwest.org/community/growth-and-investment/growth-investment.html
160	East Central Michigan Council of Governments	Michigan	http://www.emcog.org/ceds_2021.asp
161	Western Upper Peninsula Planning and Development Regional Commission	Michigan	https://www.wuppdr.org/ceds
162	Southwest Michigan Planning Commission	Michigan	https://www.swmpc.org/ceds.asp
163	Eastern Upper Peninsula Regional Planning and Development Commission	Michigan	http://www.eup-planning.org/eup-ceds-rpi
164	Tri-County Regional Planning Commission	Michigan	https://www.mitcrpc.org/ceds
165	Region 2 Planning Commission	Michigan	https://www.region2planning.com/economic-development/
166	West Michigan Shoreline Regional Development Commission	Michigan	https://wmsrdc.org/project/ceds-2018/

#	EDD Name	State	Link
167	Arrowhead Regional Development Commission	Minnesota	https://www.statsamerica.org/ceds/
168	West Central Initiative	Minnesota	https://wcif.org/wp-content/uploads/2021/07/CEDS-2017-2021-Final.pdf
169	Headwaters Regional Development Commission	Minnesota	https://hrdc.org/wp-content/uploads/2021/02/2017-2021-HRDC-CEDS.pdf
170	Upper Minnesota Valley Regional Development Commission	Minnesota	https://umvrdc.org/wp-content/uploads/2018/04/CEDS-Final.pdf
171	Region 9 Development Commission	Minnesota	https://www.rndc.org/what-we-do/economic-development/ceds/
172	Region 5 Development Commission	Minnesota	https://www.regionfive.org/creds
173	East Central Regional Development Commission	Minnesota	https://ecrdc.org/strategy/
174	Southwest Regional Development Commission	Minnesota	No link for their CEDS on their website.
175	Mid-Minnesota Development Commission	Minnesota	https://www.statsamerica.org/ceds/
176	Northwest Regional Development Commission	Minnesota	https://www.nwrdc.org/
177	Southwest Mississippi Planning and Development District	Mississippi	http://www.swmpdd.com/services/2017-2022%20ceds.final.cut.pdf
178	Northeast Mississippi Planning and Development District	Mississippi	https://www.nempdd.com/pdf/NEMPDD_CEDS.pdf
179	North Central Mississippi Planning and Development District	Mississippi	2022 CEDS not availablein pdf format.
180	South Delta Planning and Development District	Mississippi	https://sdpdd.com/
181	Three Rivers Planning and Development District	Mississippi	http://trpdd.com/ceds/

#	EDD Name	State	Link
182	Golden Triangle Planning and Development District	Mississippi	http://www.gtpdd.com/publications
183	East Central Planning and Development District	Mississippi	https://www.statsamerica.org/ceds/
184	North Delta Planning and Development District	Mississippi	https://www.statsamerica.org/ceds/ceds_files/2017_00_1_1_205.pdf
185	Central Mississippi Planning and Development District	Mississippi	https://cmpdd.org/images/publications/CEDS_2018-2022.pdf
186	Southern Mississippi Planning and Development District	Mississippi	http://smpdd.com/economic-workforce-development/
187	Northeast Missouri Regional Planning Commission	Missouri	Link not working on website
188	Northwest Missouri Regional Council of Governments	Missouri	https://nwmorcog.org/programs/economic-development/#ceds-report
189	Mark Twain Regional Council of Governments	Missouri	https://www.marktwaincog.com/publications-reports
190	Southwest Missouri Council of Governments	Missouri	https://www.smcog.org/single-post/2017/02/08/comprehensive-economic-development-strategy-ceds
191	Harry S. Truman Coordinating Council	Missouri	https://www.hstcc.org/ceds
192	Kaysinger Basin Regional Planning Commission	Missouri	https://kaysinger.com/planning/ceds/
193	Southeast Missouri Regional Planning and Economic Development Commission	Missouri	http://www.semorpc.org/economic_development.html
194	Mid-Missouri Regional Planning Commission	Missouri	https://www.midmorpc.org/plans-publications-master/2021-comprehensive-economic-development-strategy
195	Ozark Foothills Regional Planning Commission	Missouri	https://www.statsamerica.org/ceds/
196	Green Hills Regional Planning Commission	Missouri	https://ghrpc.org/about-us/ghrpc/programs/economic-development/

#	EDD Name	State	Link
197	Lake of the Ozarks Council of Local Governments	Missouri	https://loclg.org/comprehensive-economic-development-strategy/
198	Meramec Regional Planning Commission	Missouri	https://www.meramecregion.org/comprehensive-economic-development-strategy-2018-update/
199	South Central Ozarks Council of Governments	Missouri	https://www.scocog.org/comprehensive-economic-development-strategy.html
200	Bootheel Regional Planning & Economic Development Commission	Missouri	https://www.statsamerica.org/ceds/
201	Pioneer Trails Regional Planning Commission	Missouri	https://www.trailsrpc.org/economic-development/comprehensive-economic-development-strategy/
202	Boonslick Regional Planning Commission	Missouri	https://www.statsamerica.org/ceds/
203	Headwaters Resource Conservation & Development Area, Inc.	Montana	https://www.headwatersrcd.org/economic-development-1
204	Beartooth Resource Conservation & Development Area, Inc.	Montana	https://www.beartooth.org/
205	Bear Paw Development Corporation of Northern Montana	Montana	https://www.statsamerica.org/ceds/
206	Montana Business Assistance Connections, Inc.	Montana	https://www.mbac.biz/initiatives/
207	Eastern Plains Economic Development Corporation	Montana	https://www.epedc.com/ceds
208	North Central Montana Economic Development District, Inc. dba Sweetgrass Development	Montana	https://www.sweetgrassdevelopment.org/
209	Southeastern Montana Development Corporation	Montana	https://semdc.org/resources/ceds-information/
210	Great Northern Development Corporation	Montana	https://gndc.org/about-us/
211	Snowy Mountain Development Corporation	Montana	https://www.statsamerica.org/ceds/

#	EDD Name	State	Link
212	Northern Rocky Mountain Economic Development District	Montana	http://nrmedd.org/wp-content/uploads/2017/11/CEDS-for-December-2017-for-CEDS-Committee-Review-and-Public-Comment.pdf
213	South Central Economic Development District	Nebraska	https://www.scedd.us/about
214	Northeast Nebraska Economic Development District	Nebraska	https://nenedd.org/
215	West Central Nebraska Economic Development District	Nebraska	https://west-central-nebraska.com/ceds/
216	Panhandle Area Development District	Nebraska	https://nepadd.com/ceds/
217	Central Nebraska Economic Development District	Nebraska	https://cnedd.org/ceds/
218	Southeast Nebraska Development District	Nebraska	https://www.sendd.org/ceds
219	Western Nevada Development District	Nevada	https://wndd.org/about-western-nevada/our-mission/
220	North Country Council	New Hampshire	http://www.nccouncil.org/services/economic-development/north-country-comprehensive-economic-development-strategy-ceds/
221	Rockingham Economic Development Corporation	New Hampshire	https://www.exeternh.gov/ed/rockingham-economic-development-corporation-ceds-report
222	Strafford Economic Development District	New Hampshire	https://strafford.org/docs/ceds-2021-2025/
223	South Jersey Economic Development District	New Jersey	https://www.sjedd.com/
224	Mid Region Council of Governments	New Mexico	https://www.mrcog-nm.gov/357/Five-Year-Economic-Development-Strategy-
225	Southwest New Mexico Council of Governments	New Mexico	https://swnmcog.org/comprehensive-economic-development-strategy/

#	EDD Name	State	Link
226	Southeastern New Mexico Economic Development District	New Mexico	https://www.snmedd.com/eda/
227	Northwest New Mexico Council of Governments	New Mexico	https://www.nwnmcog.org/economic-development.html
228	North Central New Mexico Economic Development District	New Mexico	No website available and no CEDS available on StatsAmerica
229	Eastern Plains Council of Governments	New Mexico	https://www.epcog.org/document-library
230	South Central New Mexico Council of Governments	New Mexico	https://www.sccog-nm.com/economic-strategy
231	Capital District Regional Planning Commission	New York	https://cdrpc.org/programs/economic-development/economic-development-district/ceds
232	Southern Tier West Regional Planning and Development Board	New York	https://www.southerntierwest.org/economic-development.html
233	Southern Tier 8 Regional Board	New York	https://southerntier8.org/regional-news/resources
234	Central New York Regional Planning and Development Board	New York	https://www.cnyrpdb.org/
235	Southern Tier Central Regional Planning and Development Board	New York	https://www.stcplanning.org/document/stcs-2020-comprehensive-economic-development-strategy/
236	Lake Champlain-Lake George Regional Planning and Development Board	New York	https://www.lclgrpb.org/comprehensive-economic-development-strategy
237	Hudson Valley Regional Council	New York	https://hudsonvalleyregionalcouncil.org/resources-publications/#cedslist
238	Mohawk Valley Economic Development District	New York	https://mvedd.org/ceds
239	Genesee Finger Lakes Regional Planning Council	New York	https://www.gflrpc.org/current_projects/comprehensive_economic_development.php
240	Piedmont Triad Regional Development Corporation	North Carolina	https://www.ptrc.org/services/economic-development/comprehensive-economic-development-strategy

#	EDD Name	State	Link
241	Western Piedmont Council of Governments	North Carolina	https://www.wpcog.org/ceds
242	High Country Council of Governments	North Carolina	No CEDS earlier than 2016 available
243	Centralina Economic Development Commission	North Carolina	https://www.statsamerica.org/ceds/
244	Mid East Economic Development Commission	North Carolina	http://www.mideastcom.org/planning-economic-development-community-service/
245	Southeastern Economic Development Commission	North Carolina	https://www.sedcnc.org/ceds
246	Land of Sky Regional Council	North Carolina	http://www.landofsky.org/ceds.html
247	Albemarle Regional Planning Commission	North Carolina	https://albemarlecommission.org/economic-development/
248	Eastern Carolina Council	North Carolina	https://eccog.org/economic-development-planning/
249	Triangle J Council of Governments	North Carolina	https://storymaps.arcgis.com/stories/ff3fe7b20305460f9bde6e35d454f17d/print
250	Southwestern Commission	North Carolina	https://regiona.org/ceds/
251	Upper Coastal Plain Council of Governments	North Carolina	https://www.ucpcog.org/news_detail_T9_R173.php
252	Kerr-Tar Regional Council of Governments	North Carolina	https://www.kerrtarcog.org/departments/community-economic-development/comprehensive-economic-development-strategy-ceds/
253	South Central Dakota Regional Council	North Dakota	https://www.statsamerica.org/ceds/
254	North Central Planning Council	North Dakota	http://www.northcentralplanningcouncil.com/comprehensive-economic-development-strategy.html
255	Souris Basin Planning Council	North Dakota	https://www.sourisbasin.org/documents

#	EDD Name	State	Link
256	Lewis and Clark Regional Development Council	North Dakota	https://lcdgroup.org/lewis-clark-rdc-releases-comprehensive-economic-development-strategy-for-2019-2023/
257	Lake Agassiz Regional Council	North Dakota	https://www.lakeagassiz.com/wp-content/uploads/2017/12/CEDS-Final-Version.pdf
258	Tri-County Regional Development Council	North Dakota	https://www.tricountyrdc.com/2017-2021-CEDS-Document
259	Red River Regional Council	North Dakota	https://www.redriverrc.com/about/
260	Ohio Valley Regional Development Commission	Ohio	https://www.ovrdc.org/ceds
261	Eastgate Regional Council of Governments	Ohio	https://eastgatecog.org/programs/regional-planning/economic-development-planning
262	Buckeye Hills-Hocking Valley Regional Development District	Ohio	https://buckeyehills.org/ceds
263	Ohio Mid-Eastern Government Association	Ohio	https://omegadistrict.org/reports/
264	Northeast Ohio Four County Regional Planning and Development Organization	Ohio	https://www.nefcoplanning.org/Comprehensive-Economic-Development-Strategy-CEDS
265	Eastern Oklahoma Development District	Oklahoma	No available CEDS before 2010
266	Northern Oklahoma Development Authority	Oklahoma	https://noda-ok.org/ceds/
267	Southern Oklahoma Development Association	Oklahoma	https://www.soda-ok.org/ced/
268	Oklahoma Economic Development Authority	Oklahoma	http://www.oeda.org/eda/
269	Southwestern Oklahoma Development Authority	Oklahoma	https://www.statsamerica.org/ceds/
270	Association of South Central Oklahoma Governments	Oklahoma	http://www.ascog.org/community-and-economic-development/

#	EDD Name	State	Link
271	Association of Central Oklahoma Governments	Oklahoma	https://www.acogok.org/ceds/
272	Kiamichi Economic Development District of Oklahoma	Oklahoma	https://www.keddo.org/ceds
273	Grand Gateway Economic Development Association	Oklahoma	https://www.grandgateway.org/SERVICES/REGIONAL-COMPREHENSIVE-PLANNING/Regional-Comprehensive-Planning/Comprehensive-Economic-Development-Strategy-CEDS
274	Indian Nations Council of Governments	Oklahoma	https://www.incog.org/AboutUs/about.html
275	Central Oklahoma Economic Development District (COEDD)	Oklahoma	No CEDS available on website or StatsAmerica
276	Northeast Oregon Economic Development District	Oregon	https://www.neoedd.org/ceds/
277	Oregon Cascades West Council of Governments	Oregon	https://www.ocwcog.org/economic-development/cascades-west-economic-development-district/ceds/
278	Greater Portland Inc.	Oregon	https://www.greaterportlandinc.com/regional-strategy/
279	Columbia-Pacific Economic Development District	Oregon	https://nworegon.org/ceds/
280	CCD Business Development Corporation	Oregon	https://www.ccdbusiness.org/edd/
281	Central Oregon Intergovernmental Council	Oregon	https://www.coic.org/ceds/
282	Greater Eastern Oregon Development Corporation	Oregon	https://www.geodc.net/
283	Mid Columbia Economic Development District	Oregon	https://www.gorgeeconomy.org/
284	Southern Oregon Regional Economic Development Inc.	Oregon	https://soredi.org/about/regionalstrategy/
285	South Central Oregon Economic Development District	Oregon	https://www.scoedd.org/publications

#	EDD Name	State	Link
286	Mid Willamette Valley Council of Governments	Oregon	https://www.mwvcog.org/documents/
287	Southwestern Pennsylvania Corporation	Pennsylvania	https://www.spcregion.org/programs-services/planning-development/
288	Southern Alleghenies Planning and Development Commission	Pennsylvania	https://sapdc.org/comprehensive-economic-development/
289	Northern Tier Regional Planning and Development Commission	Pennsylvania	http://www.northerntier.org/publications.php
290	North Central Pennsylvania Planning and Development Commission	Pennsylvania	https://www.ncentral.com/ceds/
291	Northeastern Pennsylvania Alliance	Pennsylvania	https://www.nepa-alliance.org/ceds/
292	SEDA-Council of Governments	Pennsylvania	https://seda-cog.org/departments/economic-development/comprehensive-economic-development-strategy/
293	Northwest Pennsylvania Regional Planning and Development Commission	Pennsylvania	https://www.northwestpa.org/community_development/comprehensive_economic_development_strategy_(ceds)/index.php
294	Upper Savannah Council of Governments	South Carolina	https://www.uppersavannah.com/documents/
295	Lower Savannah Council of Governments	South Carolina	https://www.lscog.org/economic-development
296	South Carolina Appalachian Council of Governments	South Carolina	https://www.scacog.org/economic-development-services
297	Low Country Council of Governments	South Carolina	https://www.lowcountrycog.org/community_and_economic_development/related_documents/index.php
298	B-C-D Council of Governments	South Carolina	https://bcdcog.com/economic-development/
299	Catawba Regional Council of Governments	South Carolina	http://catawbacog.org/wp-content/uploads/2021/01/CEDS2020.pdf
300	Pee Dee Regional Council of Governments	South Carolina	https://peedeecog.org/planning_community___economic_development_/regional_econ

#	EDD Name	State	Link
			omic_development/ceds.php
301	Santee-Lynches Regional Council of Governments	South Carolina	https://www.statsamerica.org/ceds/
302	Central Midlands Council of Governments	South Carolina	https://centralmidlands.org/about/economic-community-development.html
303	Waccamaw Regional Council of Governments	South Carolina	https://wrcog.org/2023-2027-comprehensive-economic-development-strategy-ceds-now-available/
304	Planning & Development District III	South Dakota	https://www.districtiii.org/district/ceds.php
305	Northeast Council of Governments	South Dakota	https://necog.org/
306	Black Hills Council of Local Governments	South Dakota	https://www.blackhillscouncil.com/
307	First District Association of Local Governments	South Dakota	https://association.1stdistrict.org/2022-2024ceds/
308	South Eastern Council of Governments	South Dakota	https://secog.org/files/8315/5421/4842/2019__SECOG_CEDS_FINAL.pdf
309	Central South Dakota Enhancement District	South Dakota	https://csded.org/
310	East Tennessee Development District	Tennessee	https://www.etdd.org/services/community-economic-development/comprehensive-economic-development-strategy/
311	South Central Development District	Tennessee	https://www.statsamerica.org/ceds/
312	Northwest Tennessee Development District	Tennessee	https://nwtdd.org/nwtdd/comprehensive-economic-development-strategy-ceds/
313	Southeast Tennessee Development District	Tennessee	https://www.sedev.org/published-reports/
314	Upper Cumberland Development District	Tennessee	https://www.statsamerica.org/ceds/

#	EDD Name	State	Link
315	First Tennessee Development District	Tennessee	Newest CEDS not available in pdf format
316	Greater Nashville Regional Council	Tennessee	https://www.gnrc.org/286/Economic-Development-Strategy
317	Southwest Tennessee Development District	Tennessee	https://swtdd.org/economic-community-development/
318	Memphis Area Association of Governments	Tennessee	https://www.maagov.org/economic-development-2/
319	East Texas Economic Development District	Texas	https://www.etedd.org/CEDS
320	Permian Basin Regional Planning Commission	Texas	http://www.pbrpc.org/economic_development.php
321	Deep East Texas Council of Governments	Texas	https://www.detcog.gov/economic-development
322	Coastal Bend Council of Governments	Texas	http://www.coastalbendcog.org/node/44
323	Nortex Regional Planning Commission	Texas	https://nortexrpc.org/community-economic-development-and-solid-waste/
324	Panhandle Regional Planning Commission	Texas	https://theprpc.org/Programs/EconomicDevelopment/default.html
325	Alamo Area Council of Governments	Texas	http://tx-aacog.civicplus.com/716/CEDS-Committee
326	Gulf Coast Economic Development District	Texas	https://www.h-gac.com/gulf-coast-economic-development-district/regional-economic-development-plan
327	South Plains Association of Governments	Texas	https://spagstrategies.org/ceds/
328	Capital Area Economic Development District	Texas	https://www.capcog.org/divisions/community-economic-development#economic-development
329	Development District of Central Texas	Texas	https://ddoct.org/comprehensive-economic-development-strategy-ceds/

#	EDD Name	State	Link
330	Heart of Texas Council of Governments	Texas	https://www.hotcog.org/hotedd/ceds/
331	Northeast Texas Economic Development District	Texas	https://www.statsamerica.org/ceds/
332	Brazos Valley Council of Governments	Texas	https://www.bvcog.org/programs/economic-community-development/ceds
333	West Texas Economic Development District	Texas	https://www.wctcog.org/wctedd/docs/flip_ceds/mobile/index.html
334	West Central Texas Economic Development District	Texas	https://www.statsamerica.org/ceds/
335	Golden Crescent Regional Planning Commission	Texas	http://www.gcrpc.org/ceds.html
336	Lower Rio Grande Valley Development Council	Texas	No full CEDS available
337	Concho Valley Economic Development District	Texas	https://www.cvcog.org/cvcogedd/whatisceds.htm
338	North Central Texas Council of Governments	Texas	https://www.nctcog.org/nctedd/regional-ceds
339	Texoma Council of Governments	Texas	https://www.tcog.com/news/publications/other/2022/04/2022-2027-comprehensive-economic-development-strategy/
340	Middle Rio Grande Development Council	Texas	https://www.mrgdc.org/
341	South East Texas Regional Planning Commission	Texas	https://www.setrpc.org/comprehensive-economic-development-strategy/
342	South Texas Development Council	Texas	https://stdc.cog.tx.us/economic-development/
343	Five County Association of Governments	Utah	https://fivecountyecon.org/ceds/
344	Bear River Association of Governments	Utah	https://www.statsamerica.org/ceds/
345	Southeastern Utah Economic Development District	Utah	http://seualg.utah.gov/index.php/economic-development/1493-2/

#	EDD Name	State	Link
346	Uintah Basin Economic Development District	Utah	https://www.ubaog.org/economic-development-district
347	Wasatch Front Regional Council/Wasatch Front Economic Development District	Utah	https://wfrc.org/programs/wasatch-front-economic-development-district/
348	Six County Economic Development District	Utah	https://sixcounty.com/edd-board-economic-development-district-board/ceds-comprehensive-economic-development-strategy/
349	Mountainland Economic Development District	Utah	https://mountainland.org/mountainland-economic-development/
350	East Central Vermont Economic Development District	Vermont	https://www.ecvedd.org/ceds/
351	Northern Vermont Economic Development District	Vermont	https://nvedd.org/resources-data/
352	Accomack-Northampton Planning District Commission	Virginia	http://a-npdc.org/edplan/
353	Roanoke Valley-Alleghany Economic Development District	Virginia	https://rvarc.org/ceds
354	Central Shenandoah Planning District Commission	Virginia	https://www.cspdc.org/programs-services/comprehensive-economic-development-strategy/
355	Mount Rogers Planning District Commission	Virginia	https://mrpdc.org/ceds/
356	Southside Planning District Commission	Virginia	https://www.southsidepdc.org/services/economic-development/ceds
357	Cumberland Plateau Planning District Commission	Virginia	https://www.cppdc.org/Reports.html
358	Crater Planning District Commission	Virginia	https://craterpdc.org/our-works/economic-development/ceds/
359	New River Valley Planning District Commission	Virginia	https://nrvrc.org/economy
360	West Piedmont Planning District Commission	Virginia	https://westpiedmontpdc.org/ceds/

#	EDD Name	State	Link
361	Northern Neck Planning District Commission	Virginia	https://northernneck.digitalceds.com/
362	Lenowisco Planning District Commission	Virginia	http://www.lenowisco.org/reports-and-media.html
363	Southeast Washington Economic Development Association	Washington	https://seweda.org/
364	Benton-Franklin Council of Governments	Washington	https://www.bfcog.us/regional-economic-strategy
365	North Central Washington Economic Development District	Washington	https://ncwedd.com/ceds/
366	Peninsula Development District	Washington	Could not locate website, no CEDS available on StatsAmerica earlier than 2017
367	Cowlitz-Wahkiakum Council of Governments	Washington	https://www.cwcog.org/resources/
368	Tri County Economic Development District (WA)	Washington	https://tricountyedd.com/economic-development/comprehensive-strategy/
369	Central Puget Sound Economic Development District	Washington	https://www.psrc.org/planning-2050/regional-economic-strategy
370	Region VII Planning and Development Council	West Virginia	https://www.regionvii.com/plans-strategies
371	Eastern Panhandle Regional Planning and Development Commission (Region 9)	West Virginia	https://region9wv.com/ceds
372	BCKP Regional Intergovernmental Council (Region 3)	West Virginia	http://wvregion3.org/economic-plans/
373	Brooke-Hancock Regional Planning and Development Commission	West Virginia	https://www.bhjmpc.org/regional-council/
374	Region II Planning and Development Council	West Virginia	http://www.region2pdc.org/council-information/development-documents/
375	Mid-Ohio Valley Regional Council (Region 5)	West Virginia	https://www.movrc.org/cdp
376	Region VI Planning and Development Council	West Virginia	http://www.regionvi.com/RDPCEDSReport.cfm

#	EDD Name	State	Link
377	Region 4 Planning and Development Council	West Virginia	https://reg4wv.org/ceds-updates/
378	Region 8 Planning and Development Council	West Virginia	https://www.regioneight.org/regional-development-update
379	Region I Planning and Development Council	West Virginia	https://www.regiononepdc.org/plans
380	Belomar Regional Council (Region 10)	West Virginia	https://www.belomar.org/ms/comprehensive-economic-development-strategy-ceds/
381	North Central Wisconsin Regional Planning Commission	Wisconsin	https://www.ncwrpc.org/
382	Northwest Regional Planning Commission	Wisconsin	https://nwrpc.com/64/Economic-Development
383	West Central Wisconsin Regional Planning Commission	Wisconsin	https://www.statsamerica.org/ceds/
384	Bay-Lake Regional Planning Commission	Wisconsin	https://baylakerpc.org/CEDS
385	Mississippi River Regional Planning Commission	Wisconsin	https://mrrpc.com/studies-plans/comprehensive-economic-development-strategy/
386	East Central Wisconsin Regional Planning Commission	Wisconsin	https://www.ecwrpc.org/programs/economic-development-housing/ceds/
387	Southwest Wisconsin Regional Planning Commission	Wisconsin	https://www.swwrpc.org/services/economic-development/comprehensive-economic-development-strategy

Appendix D: List of Historical CEDS Documents for Analysis

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
1	Central Alabama Regional Planning and Development Commission	Alabama	2017	2015	2006		
2	South Alabama Regional Planning Commission	Alabama	2017				
3	Southeast Alabama Regional Planning and Development Commission	Alabama	2007				
4	West Alabama Regional Commission	Alabama	2017				
5	Regional Planning Commission of Greater Birmingham	Alabama	2013				
6	South Central Alabama Development Commission	Alabama	2018	2009			
7	East Alabama Regional Planning and Development Commission	Alabama	2017				
8	Alabama-Tombigbee Regional Commission	Alabama	2017	2007			
9	Northwest Alabama Council of Local Governments	Alabama	2018	2007			
10	North-Central Alabama Council of Governments	Alabama	2018				
11	Top of Alabama Regional Council of Governments	Alabama	N/A				
12	Southwest Alaska Municipal Conference	Alaska	2014				
13	Southeast Conference	Alaska	2016	2011			
14	Kenai Peninsula Economic Development District	Alaska	2010				
15	Prince William Sound Economic Development District	Alaska	2011				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
16	Northern Arizona Council of Governments	Arizona	2015				
17	SouthEastern Arizona Governments Organization	Arizona	2016				
18	Central Arizona Association of Government	Arizona	2012				
19	Western Arizona Economic Development District	Arizona	N/A				
20	Southeast Arkansas Economic Development District	Arkansas	N/A				
21	Northwest Arkansas Economic Development District, Inc.	Arkansas	N/A				
22	Southwest Arkansas Planning and Development District	Arkansas	N/A				
23	West Central Arkansas Planning and Development District	Arkansas	2014				
24	East Arkansas Planning and Development District	Arkansas	N/A				
25	White River Planning and Development District	Arkansas	2014				
26	Western Arkansas Planning and Development District	Arkansas	2014				
27	Central Arkansas Planning and Development District	Arkansas	2009				
28	Greater Bay Area Economic Development District	California	N/A				
29	Central Sierra Economic Development District	California	N/A				
30	3Core Economic Development Corporation (CA)/Tri-County EDD	California	2016	2010			
31	Sierra Economic Development District	California	2013				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
32	Sonoma-Mendocino Economic Development District	California	N/A				
33	Superior California Economic Development District	California	N/A				
34	Yuba-Sutter Economic Development Corporation	California	2015				
35	San Luis Valley Development Resource Group	Colorado	2018	2013			
36	Region 9 Economic Development District of Southwest Colorado, Inc.	Colorado	N/A				
37	Southern Colorado Economic Development District	Colorado	N/A				
38	East Central Council of Local Governments	Colorado	2015	2009			
39	Region 10 League for Economic Assistance and Planning, Inc.	Colorado	2019	2014			
40	Northwest Colorado Council of Governments/EDD	Colorado	2017	2011			
41	Associated Governments of Northwest Colorado	Colorado	N/A				
42	Western Connecticut Economic Development District	Connecticut	N/A				
43	Central Connecticut EDD	Connecticut	2011	2005			
44	Naugatuck Valley Corridor Economic Development District	Connecticut	2015	2010			
45	Southeastern Connecticut Enterprise Region Corporation	Connecticut	2011	2004			
46	North Central Florida Regional Planning Council	Florida	2013				
47	Northeast Florida Regional Council	Florida	2014				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
48	West Florida Regional Planning Council dba Emerald Coast Regional Council	Florida	N/A				
49	East Central Florida Regional Planning Council	Florida	2017	2015	2013		
50	South Florida Regional Planning Council	Florida	2017	2012			
51	Apalachee Regional Planning Council	Florida	2018				
52	Southwest Florida Regional Planning Council	Florida	2017	2012			
53	Tampa Bay Regional Planning Council	Florida	2013				
54	Central Florida Regional Planning Council	Florida	N/A				
55	Treasure Coast Regional Planning Council	Florida	N/A				
56	Heart of Georgia Altamaha Regional Commission	Georgia	N/A				
57	Southern Georgia Regional Commission	Georgia	2018				
58	Southwest Georgia Regional Commission	Georgia	2012				
59	Middle Georgia Regional Commission	Georgia	2017	2012			
60	Georgia Mountains Regional Commission	Georgia	2020				
61	Northeast Georgia Regional Commission	Georgia	N/A				
62	Northwest Georgia Regional Commission	Georgia	2012				
63	Coastal Georgia Regional Commission	Georgia	2012				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
64	Central Savannah River Area Regional Commission	Georgia	N/A				
65	Three Rivers Regional Commission	Georgia	2012				
66	River Valley Regional Commission	Georgia	2013				
67	Atlanta Regional Commission	Georgia	N/A				
68	Southeast Idaho Council of Governments	Idaho	2013				
69	Panhandle Area Council, Inc.	Idaho	2014				
70	Region IV Development Association Inc	Idaho	2014				
71	East-Central Idaho Planning and Development Association	Idaho	2014				
72	Clearwater Economic Development Association	Idaho	N/A				
73	Two Rivers Economic Development District	Illinois	2012				
74	Southern Five Regional Planning and Development Commission	Illinois	2016				
75	Southwestern Illinois Metropolitan and Regional Planning Commission	Illinois	N/A				
76	North Central Illinois Council of Governments	Illinois	2012				
77	Blackhawk Hills Resource Conservation and Development	Illinois	2014				
78	South Central Illinois Regional Planning and Development Commission	Illinois	N/A				
79	Greater Wabash Regional Planning and Development Commission	Illinois	2011				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
80	Greater Egypt Regional Planning and Development Commission	Illinois	2010				
81	Western Illinois Regional Council	Illinois	N/A				
82	Southeastern Illinois Regional Planning and Development Commission	Illinois	2011				
83	Bi-State Regional Commission	Illinois	2016				
84	Greater Peoria EDC	Illinois	2015	2012			
85	Kankakee Iroquois Regional Planning Commission	Indiana	2015	2010			
86	River Hills Economic Development District and Regional Planning Commission	Indiana	N/A				
87	West Central Indiana Economic Development District	Indiana	2017				
88	Indiana 15 Regional Planning Commission	Indiana	2013				
89	Southern Indiana Development Commission	Indiana	N/A				
90	Southeastern Indiana Regional Planning Commission	Indiana	2015				
91	Michiana Area Council of Governments	Indiana	N/A				
92	Region III-A Development and Regional Planning Commission	Indiana	2014				
93	Northwestern Indiana Regional Planning Commission	Indiana	N/A				
94	Southern Iowa Council of Governments, Inc.	Iowa	2021	2015			
95	Upper Explorerland Regional Planning Commission	Iowa	2015				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
96	Region XII Council of Governments	Iowa	2016	2010			
97	East Central Iowa Council of Governments	Iowa	2018	2011			
98	Iowa Northland Regional Economic Development Commission	Iowa	2017	2012			
99	Northwest Iowa Planning and Development Commission	Iowa	2015				
100	Mid-Iowa Development Association Council of Governments	Iowa	2017	2012			
101	Southwest Iowa Planning Council	Iowa	2015	2009			
102	East Central Intergovernmental Association	Iowa	2021				
103	North Iowa Area Council of Governments	Iowa	2019	2014	2008		
104	Siouxland Interstate Metropolitan Planning Council	Iowa	2020	2015			
105	Area 15 Regional Planning Commission	Iowa	2012				
106	Southeast Iowa Regional Planning Commission	Iowa	2012				
107	Region 6 Planning Commission	Iowa	2013				
108	Omaha-Council Bluffs Metropolitan Area Planning Agency	Iowa	2014				
109	Southeast Kansas Regional Planning Commission	Kansas	2019	2014			
110	MO-KAN Regional Council	Kansas	2014	2008			
111	Great Plains Development Inc	Kansas	2015				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
112	South Central Kansas Economic Development District, Inc.	Kansas	2017	2006			
113	Flint Hills Regional Council	Kansas	2019				
114	Northwest Kansas Planning and Development Commission	Kansas	2013				
115	North Central Regional Planning Commission	Kansas	2019	2014			
116	Mid-America Regional Council	Kansas	N/A				
117	Lake Cumberland Area Development District (KY DLG/Gold)	Kentucky	2017	2013			
118	Barren River Area Development District (KY DLG/Gold)	Kentucky	N/A				
119	Bluegrass Area Development District (KY DLG/Gold)	Kentucky	2017				
120	Purchase Area Development District (KY DLG/Gold)	Kentucky	2017				
121	Gateway Area Development District (KY DLG/Gold)	Kentucky	N/A				
122	Cumberland Valley Area Development District (KYDLG/Gold)	Kentucky	2017	2012			
123	Northern Kentucky Area Development District (KY DLG/Gold)	Kentucky	N/A				
124	FIVCO Area Development District (KY DLG/Gold)	Kentucky	N/A				
125	Buffalo Trace Area Development District (KY DLG/Gold)	Kentucky	N/A				
126	Kentucky River Area Development District (KY DLG/Gold)	Kentucky	N/A				
127	Lincoln Trail Area Development District (KY DLG/Gold)	Kentucky	2020				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
128	Kentuckiana Regional Planning and Development Agency (KY DLG/Gold)	Kentucky	2012				
129	Pennyrile Area Development District (KY DLG/Gold)	Kentucky	2017				
130	Green River Area Development District (KY DLG/Gold)	Kentucky	2017				
131	Big Sandy Area Development District (KY DLG/Gold)	Kentucky	2017				
132	Acadiana Planning Commission	Louisiana	N/A				
133	Imperial Calcasieu Regional Planning and Development Commission	Louisiana	2016				
134	Capital Region Planning Commission	Louisiana	2014				
135	South Central Planning and Development Commission	Louisiana	2016	2014	2012	2010	2008
136	Kisatchie-Delta Regional Planning and Development District	Louisiana	N/A				
137	Coordinating & Development Corporation	Louisiana	2017	2013			
138	North Delta Regional Planning and Development District, Inc.	Louisiana	2015	2010			
139	Regional Planning Commission	Louisiana	2014				
140	Androscoggin Valley Council of Governments	Maine	2015				
141	Aroostook-Washington Economic Development District	Maine	2015	1998			
142	Midcoast Economic Development District	Maine	2014				
143	Eastern Maine Development Corporation	Maine	2014				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
144	Kennebec Valley Council of Governments	Maine	2008				
145	Southern Maine Regional Planning Commission	Maine	2014				
146	Tri-County Council for Western Maryland, Inc	Maryland	N/A				
147	Mid-Shore Regional Council	Maryland	N/A				
148	Tri-County Council for Lower Eastern Shore	Maryland	2018				
149	Cape Cod Economic Development District	Massachusetts	2014	2009			
150	Old Colony Planning Council	Massachusetts	2012				
151	Merrimack Valley Planning Commission	Massachusetts	2013				
152	Franklin Regional Council of Governments	Massachusetts	N/A				
153	Pioneer Valley Planning Commission	Massachusetts	2014				
154	Metropolitan Area Planning Council	Massachusetts	2015				
155	Montachusett Regional Planning Commission	Massachusetts	2014				
156	Northeast Michigan Council of Governments	Michigan	2015				
157	Central Upper Peninsula Planning and Development Regional Commission	Michigan	2016				
158	West Michigan Regional Planning Commission	Michigan	2012				
159	Northwest Michigan Council of Governments (Networks Northwest)	Michigan	2015				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
160	East Central Michigan Council of Governments	Michigan	N/A				
161	Western Upper Peninsula Planning and Development Regional Commission	Michigan	2017	2011			
162	Southwest Michigan Planning Commission	Michigan	2013	2012			
163	Eastern Upper Peninsula Regional Planning and Development Commission	Michigan	2015				
164	Tri-County Regional Planning Commission	Michigan	2013				
165	Region 2 Planning Commission	Michigan	2017	2010			
166	West Michigan Shoreline Regional Development Commission	Michigan	N/A				
167	Arrowhead Regional Development Commission	Minnesota	2010				
168	West Central Initiative	Minnesota	2011				
169	Headwaters Regional Development Commission	Minnesota	N/A				
170	Upper Minnesota Valley Regional Development Commission	Minnesota	2016	2013			
171	Region 9 Development Commission	Minnesota	2016				
172	Region 5 Development Commission	Minnesota	2016	2015			
173	East Central Regional Development Commission	Minnesota	2016	2011			
174	Southwest Regional Development Commission	Minnesota	N/A				
175	Mid-Minnesota Development Commission	Minnesota	2016				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
176	Northwest Regional Development Commission	Minnesota	2016				
177	Southwest Mississippi Planning and Development District	Mississippi	2017	2013			
178	Northeast Mississippi Planning and Development District	Mississippi	2018				
179	North Central Mississippi Planning and Development District	Mississippi	N/A				
180	South Delta Planning and Development District	Mississippi	N/A				
181	Three Rivers Planning and Development District	Mississippi	2017	2012			
182	Golden Triangle Planning and Development District	Mississippi	2018				
183	East Central Planning and Development District	Mississippi	N/A				
184	North Delta Planning and Development District	Mississippi	2012				
185	Central Mississippi Planning and Development District	Mississippi	N/A				
186	Southern Mississippi Planning and Development District	Mississippi	2018	2013			
187	Northeast Missouri Regional Planning Commission	Missouri	N/A				
188	Northwest Missouri Regional Council of Governments	Missouri	2013				
189	Mark Twain Regional Council of Governments	Missouri	2014	2007			
190	Southwest Missouri Council of Governments	Missouri	N/A				
191	Harry S. Truman Coordinating Council	Missouri	2014	2009			

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
192	Kaysinger Basin Regional Planning Commission	Missouri	N/A				
193	Southeast Missouri Regional Planning and Economic Development Commission	Missouri	2013	2007			
194	Mid-Missouri Regional Planning Commission	Missouri	2016				
195	Ozark Foothills Regional Planning Commission	Missouri	2013				
196	Green Hills Regional Planning Commission	Missouri	2012				
197	Lake of the Ozarks Council of Local Governments	Missouri	2012	2002			
198	Meramec Regional Planning Commission	Missouri	N/A				
199	South Central Ozarks Council of Governments	Missouri	2014	2007			
200	Bootheel Regional Planning & Economic Development Commission	Missouri	N/A				
201	Pioneer Trails Regional Planning Commission	Missouri	2017	2012			
202	Boonslick Regional Planning Commission	Missouri	N/A				
203	Headwaters Resource Conservation & Development Area, Inc.	Montana	2012				
204	Beartooth Resource Conservation & Development Area, Inc.	Montana	2019				
205	Bear Paw Development Corporation of Northern Montana	Montana	2015	2012			
206	Montana Business Assistance Connections, Inc.	Montana	2014				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
207	Eastern Plains Economic Development Corporation	Montana	2017	2012			
208	North Central Montana Economic Development District, Inc. dba Sweetgrass Development	Montana	2012				
209	Southeastern Montana Development Corporation	Montana	2011				
210	Great Northern Development Corporation	Montana	2017	2012			
211	Snowy Mountain Development Corporation	Montana	N/A				
212	Northern Rocky Mountain Economic Development District	Montana	N/A				
213	South Central Economic Development District	Nebraska	2019				
214	Northeast Nebraska Economic Development District	Nebraska	2019	2014			
215	West Central Nebraska Economic Development District	Nebraska	2019	2014			
216	Panhandle Area Development District	Nebraska	2019	2014			
217	Central Nebraska Economic Development District	Nebraska	2018	2014			
218	Southeast Nebraska Development District	Nebraska	2018	2012			
219	Western Nevada Development District	Nevada	2014				
220	North Country Council	New Hampshire	2013				
221	Rockingham Economic Development Corporation	New Hampshire	N/A				
222	Strafford Economic Development District	New Hampshire	N/A				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
223	South Jersey Economic Development District	New Jersey	2011				
224	Mid Region Council of Governments	New Mexico	2015				
225	Southwest New Mexico Council of Governments	New Mexico	2010				
226	Southeastern New Mexico Economic Development District	New Mexico	2011	2007			
227	Northwest New Mexico Council of Governments	New Mexico	2009				
228	North Central New Mexico Economic Development District	New Mexico	2002				
229	Eastern Plains Council of Governments	New Mexico	2017				
230	South Central New Mexico Council of Governments	New Mexico	2017	2015			
231	Capital District Regional Planning Commission	New York	2012				
232	Southern Tier West Regional Planning and Development Board	New York	2019	2007			
233	Southern Tier 8 Regional Board	New York	N/A				
234	Central New York Regional Planning and Development Board	New York	2013				
235	Southern Tier Central Regional Planning and Development Board	New York	2016				
236	Lake Champlain-Lake George Regional Planning and Development Board	New York	N/A				
237	Hudson Valley Regional Council	New York	2013				
238	Mohawk Valley Economic Development District	New York	N/A				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
239	Genesee Finger Lakes Regional Planning Council	New York	2016	2014	2008		
240	Piedmont Triad Regional Development Corporation	North Carolina	2014				
241	Western Piedmont Council of Governments	North Carolina	2017				
242	High Country Council of Governments	North Carolina	2016				
243	Centralina Economic Development Commission	North Carolina	2012				
244	Mid East Economic Development Commission	North Carolina	2015				
245	Southeastern Economic Development Commission	North Carolina	2012				
246	Land of Sky Regional Council	North Carolina	2015				
247	Albemarle Regional Planning Commission	North Carolina	2017	2012			
248	Eastern Carolina Council	North Carolina	2017	2012			
249	Triangle J Council of Governments	North Carolina	2013				
250	Southwestern Commission	North Carolina	2017	2012			
251	Upper Coastal Plain Council of Governments	North Carolina	2012				
252	Kerr-Tar Regional Council of Governments	North Carolina	2013				
253	South Central Dakota Regional Council	North Dakota	2014				
254	North Central Planning Council	North Dakota	2017	2012			

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
255	Souris Basin Planning Council	North Dakota	N/A				
256	Lewis and Clark Regional Development Council	North Dakota	2013				
257	Lake Agassiz Regional Council	North Dakota	2013				
258	Tri-County Regional Development Council	North Dakota	N/A				
259	Red River Regional Council	North Dakota	2014				
260	Ohio Valley Regional Development Commission	Ohio	2012				
261	Eastgate Regional Council of Governments	Ohio	2020	2013			
262	Buckeye Hills-Hocking Valley Regional Development District	Ohio	2015				
263	Ohio Mid-Eastern Government Association	Ohio	2017				
264	Northeast Ohio Four County Regional Planning and Development Organization	Ohio	2013				
265	Eastern Oklahoma Development District	Oklahoma	2010				
266	Northern Oklahoma Development Authority	Oklahoma	N/A				
267	Southern Oklahoma Development Association	Oklahoma	N/A				
268	Oklahoma Economic Development Authority	Oklahoma	N/A				
269	Southwestern Oklahoma Development Authority	Oklahoma	2014				
270	Association of South Central Oklahoma Governments	Oklahoma	2010				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
271	Association of Central Oklahoma Governments	Oklahoma	N/A				
272	Kiamichi Economic Development District of Oklahoma	Oklahoma	N/A				
273	Grand Gateway Economic Development Association	Oklahoma	N/A				
274	Indian Nations Council of Governments	Oklahoma	2013				
275	Central Oklahoma Economic Development District (COEDD)	Oklahoma	N/A				
276	Northeast Oregon Economic Development District	Oregon	2013				
277	Oregon Cascades West Council of Governments	Oregon	2015	2010			
278	Greater Portland Inc.	Oregon	2011				
279	Columbia-Pacific Economic Development District	Oregon	N/A				
280	CCD Business Development Corporation	Oregon	2014				
281	Central Oregon Intergovernmental Council	Oregon	2007				
282	Greater Eastern Oregon Development Corporation	Oregon	2014				
283	Mid Columbia Economic Development District	Oregon	2017				
284	Southern Oregon Regional Economic Development Inc.	Oregon	2019				
285	South Central Oregon Economic Development District	Oregon	2013				
286	Mid Willamette Valley Council of Governments	Oregon	2012				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
287	Southwestern Pennsylvania Corporation	Pennsylvania	N/A				
288	Southern Alleghenies Planning and Development Commission	Pennsylvania	2012				
289	Northern Tier Regional Planning and Development Commission	Pennsylvania	2008				
290	North Central Pennsylvania Planning and Development Commission	Pennsylvania	N/A				
291	Northeastern Pennsylvania Alliance	Pennsylvania	2013				
292	SEDA-Council of Governments	Pennsylvania	2015				
293	Northwest Pennsylvania Regional Planning and Development Commission	Pennsylvania	2014				
294	Upper Savannah Council of Governments	South Carolina	2018	2014			
295	Lower Savannah Council of Governments	South Carolina	2012				
296	South Carolina Appalachian Council of Governments	South Carolina	N/A				
297	Low Country Council of Governments	South Carolina	2017				
298	B-C-D Council of Governments	South Carolina	N/A				
299	Catawba Regional Council of Governments	South Carolina	2014				
300	Pee Dee Regional Council of Governments	South Carolina	2017				
301	Santee-Lynches Regional Council of Governments	South Carolina	N/A				
302	Central Midlands Council of Governments	South Carolina	2012				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
303	Waccamaw Regional Council of Governments	South Carolina	2017	2012			
304	Planning & Development District III	South Dakota	2014				
305	Northeast Council of Governments	South Dakota	2014				
306	Black Hills Council of Local Governments	South Dakota	2014				
307	First District Association of Local Governments	South Dakota	2017	2012			
308	South Eastern Council of Governments	South Dakota	2014	2009			
309	Central South Dakota Enhancement District	South Dakota	2013				
310	East Tennessee Development District	Tennessee	2018	2015			
311	South Central Development District	Tennessee	2013				
312	Northwest Tennessee Development District	Tennessee	N/A				
313	Southeast Tennessee Development District	Tennessee	2015				
314	Upper Cumberland Development District	Tennessee	N/A				
315	First Tennessee Development District	Tennessee	2012				
316	Greater Nashville Regional Council	Tennessee	N/A				
317	Southwest Tennessee Development District	Tennessee	2017				
318	Memphis Area Association of Governments	Tennessee	2017	2012			

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
319	East Texas Economic Development District	Texas	N/A				
320	Permian Basin Regional Planning Commission	Texas	2015	2008			
321	Deep East Texas Council of Governments	Texas	2011				
322	Coastal Bend Council of Governments	Texas	N/A				
323	Nortex Regional Planning Commission	Texas	2015				
324	Panhandle Regional Planning Commission	Texas	N/A				
325	Alamo Area Council of Governments	Texas	2012	2007			
326	Gulf Coast Economic Development District	Texas	2014				
327	South Plains Association of Governments	Texas	N/A				
328	Capital Area Economic Development District	Texas	2015				
329	Development District of Central Texas	Texas	2013				
330	Heart of Texas Council of Governments	Texas	2015	2013	2003		
331	Northeast Texas Economic Development District	Texas	N/A				
332	Brazos Valley Council of Governments	Texas	2006				
333	West Texas Economic Development District	Texas	2011				
334	West Central Texas Economic Development District	Texas	N/A				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
335	Golden Crescent Regional Planning Commission	Texas	N/A				
336	Lower Rio Grande Valley Development Council	Texas	N/A				
337	Concho Valley Economic Development District	Texas	2006				
338	North Central Texas Council of Governments	Texas	2016				
339	Texoma Council of Governments	Texas	N/A				
340	Middle Rio Grande Development Council	Texas	2015				
341	South East Texas Regional Planning Commission	Texas	2010				
342	South Texas Development Council	Texas	2006				
343	Five County Association of Governments	Utah	2014				
344	Bear River Association of Governments	Utah	N/A				
345	Southeastern Utah Economic Development District	Utah	2015	2008			
346	Uintah Basin Economic Development District	Utah	2013				
347	Wasatch Front Regional Council/Wasatch Front Economic Development District	Utah	N/A				
348	Six County Economic Development District	Utah	2014				
349	Mountainland Economic Development District	Utah	N/A				
350	East Central Vermont Economic Development District	Vermont	2015	2011			

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
351	Northern Vermont Economic Development District	Vermont	2016				
352	Accomack-Northampton Planning District Commission	Virginia	2014	2012			
353	Roanoke Valley-Alleghany Economic Development District	Virginia	N/A				
354	Central Shenandoah Planning District Commission	Virginia	2000				
355	Mount Rogers Planning District Commission	Virginia	2013				
356	Southside Planning District Commission	Virginia	2015				
357	Cumberland Plateau Planning District Commission	Virginia	N/A				
358	Crater Planning District Commission	Virginia	2014				
359	New River Valley Planning District Commission	Virginia	2015	2014			
360	West Piedmont Planning District Commission	Virginia	2019	2015			
361	Northern Neck Planning District Commission	Virginia	2013				
362	Lenowisco Planning District Commission	Virginia	N/A				
363	Southeast Washington Economic Development Association	Washington	2013				
364	Benton-Franklin Council of Governments	Washington	N/A				
365	North Central Washington Economic Development District	Washington	2007				
366	Peninsula Development District	Washington	N/A				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
367	Cowlitz-Wahkiakum Council of Governments	Washington	N/A				
368	Tri County Economic Development District (WA)	Washington	2018	2013			
369	Central Puget Sound Economic Development District	Washington	2017				
370	Region VII Planning and Development Council	West Virginia	2016	2015			
371	Eastern Panhandle Regional Planning and Development Commission (Region 9)	West Virginia	2014				
372	BCKP Regional Intergovernmental Council (Region 3)	West Virginia	2014				
373	Brooke-Hancock Regional Planning and Development Commission	West Virginia	2013				
374	Region II Planning and Development Council	West Virginia	N/A				
375	Mid-Ohio Valley Regional Council (Region 5)	West Virginia	2016	2012			
376	Region VI Planning and Development Council	West Virginia	N/A				
377	Region 4 Planning and Development Council	West Virginia	2015				
378	Region 8 Planning and Development Council	West Virginia	N/A				
379	Region I Planning and Development Council	West Virginia	2014				
380	Belomar Regional Council (Region 10)	West Virginia	N/A				
381	North Central Wisconsin Regional Planning Commission	Wisconsin	2014				
382	Northwest Regional Planning	Wisconsin	2015				

#	EDD Name	State	Year 1	Year 2	Year 3	Year 4	Year 5
	Commission						
383	West Central Wisconsin Regional Planning Commission	Wisconsin	2015				
384	Bay-Lake Regional Planning Commission	Wisconsin	N/A				
385	Mississippi River Regional Planning Commission	Wisconsin	2017	2012			
386	East Central Wisconsin Regional Planning Commission	Wisconsin	2013				
387	Southwest Wisconsin Regional Planning Commission	Wisconsin	N/A				

Appendix E: Top Ranked CEDS by Chunk Size

Term 22: Climate Resilience Vulnerability			
Chuck 300	***Chunk 900***	***Chunk 3000***	***Full Document***
Regional Planning Commission	Southwest Arkansas Planning and Development District	Northwest Colorado Council of Governments	New River Valley Planning District Commission
Eastern Maine Development Corporation	Northeastern Pennsylvania Alliance	Metropolitan Area Planning Council	Bootheel Regional Planning & Economic Development Commission
Northwest New Mexico Council of Governments	Flint Hills Regional Council	New River Valley Planning District Commission	West Alabama Regional Commission
Flint Hills Regional Council	Coastal Bend Council of Governments	Upper Savannah Council of Governments	Southwestern Oklahoma Development Authority
Genesee Finger Lakes Regional Planning Council	Northeast Oregon Economic Development District	Southwest Arkansas Planning and Development District	Blackhawk Hills Resource Conservation and Development
Metropolitan Area Planning Council	New River Valley Planning District Commission	Coastal Bend Council of Governments	Southwest Arkansas Planning and Development District
Franklin Regional Council of Governments	Sierra Economic Development District	Rockingham Economic Development Corporation	Kaysinger Basin Regional Planning Commission
Headwaters Resource Conservation & Development Area Inc	Northwest Regional Development Commission	Upper Coastal Plain Council of Governments	Southwest Iowa Planning Council
Southeastern Montana Development Corporation	Sonoma Mendocino Economic Development District	Southeast Nebraska Development District	Upper Explorerland Regional Planning Commission
Franklin Regional Council of Governments	North Country Council	Northwest Colorado Council of Governments	Southwestern Commission

Term 23: Climate Resilience Built Environment			
Chuck 300	*Chunk 900*	*Chunk 3000*	*Full Document*
Genesee Finger Lakes Regional Planning Council	Central South Dakota Enhancement District	Rockingham Economic Development Corporation	Blackhawk Hills Resource Conservation and Development
Genesee Finger Lakes Regional Planning Council	CCD Business Development Corporation	Northwest Colorado Council of Governments	New River Valley Planning District Commission
Greater Nashville Regional Council	Franklin Regional Council of Governments	Upper Savannah Council of Governments	Southwestern Oklahoma Development Authority
Eastern Maine Development Corporation	Rockingham Economic Development Corporation	Metropolitan Area Planning Council	Bootheel Regional Planning & Economic Development Commission
Mid-America Regional Council	Mid-America Regional Council	Northwest Colorado Council of Governments	Great Northern Development Corporation
Region 9 Economic Development District of Southwest Colorado Inc	Northeastern Pennsylvania Alliance	Mid-America Regional Council	Region 2 Planning Commission
Planning & Development District III	Southwest Arkansas Planning and Development District	New River Valley Planning District Commission	Upper Explorerland Regional Planning Commission
Two Rivers Economic Development District	Southwest New Mexico Council of Governments	North Country Council	Region 2 Planning Commission
Northeast Oregon Economic Development District	Southwest Arkansas Planning and Development District	Southwest Arkansas Planning and Development District	Central New York Regional Planning and Development Board
Mid-America Regional Council	Northeast Oregon Economic Development District	Kitsatchie-Delta Regional Planning and Development District	North Iowa Area Council of Governments

Term 24: Climate Resilience Infrastructure			
Chuck 300	*Chunk 900*	*Chunk 3000*	*Full Document*
Hudson Valley Regional Council	Metropolitan Area Planning Council	Hudson Valley Regional Council	Blackhawk Hills Resource Conservation and Development
South Florida Regional Planning Council	BI-State Regional Commission	CCD Business Development Corporation	Southwestern Oklahoma Development Authority
Metropolitan Area Planning Council	North Central Montana Economic Development District Inc dba Sweetgrass Development	First Tennessee Development District	Southwest Iowa Planning Council
Cape Cod Economic Development District	Montana Business Assistance Connections Inc	Southeastern Montana Development Corporation	Southeast Tennessee Development District
Region 5 Development Commission	Hudson Valley Regional Council	Central South Dakota Enhancement District	New River Valley Planning District Commission
East Central Iowa Council of Governments	Southeast Nebraska Development District	North Country Council	Southwest Alaska Municipal Conference
Mid Columbia Economic Development District	Northwest Missouri Regional Council of Governments	Greater Portland Inc	Northwest Missouri Regional Council of Governments
Hudson Valley Regional Council	Northern Arizona Council of Governments	Area 15 Regional Planning Commission	Region 2 Planning Commission
Brooke-Hancock Regional Planning and Development Commission	Headwaters Resource Conservation & Development Area Inc	Hudson Valley Regional Council	Columbia-Pacific Economic Development District
Strafford Economic Development District	Coastal Georgia Regional Commission	Northwest Colorado Council of Governments	Northwest Michigan Council of Governments (Networks Northwest)

Term 25: Climate Resilience Workforce			
Chuck 300	*Chunk 900*	*Chunk 3000*	*Full Document*
Siouxland Interstate Metropolitan Planning Council	Metropolitan Area Planning Council	Metropolitan Area Planning Council	Bootheel Regional Planning & Economic Development Commission
Metropolitan Area Planning Council	Mid Columbia Economic Development District	Planning & Development District III	New River Valley Planning District Commission
Sonoma Mendocino Economic Development District	Metropolitan Area Planning Council	Southwest Arkansas Planning and Development District	Blackhawk Hills Resource Conservation and Development
Sonoma Mendocino Economic Development District	Eastern Maine Development Corporation	Eastern Maine Development Corporation	West Alabama Regional Commission
Eastern Maine Development Corporation	Eastern Maine Development Corporation	South East Texas Regional Planning Commission	Southwest Iowa Planning Council
Upper Explorerland Regional Planning Commission	Cape Cod Economic Development District	Eastern Maine Development Corporation	Central New York Regional Planning and Development Board
Southwest Alaska Municipal Conference	Sonoma Mendocino Economic Development District	Metropolitan Area Planning Council	Southwestern Oklahoma Development Authority
Eastern Maine Development Corporation	Region 2 Planning Commission	East Central Wisconsin Regional Planning Commission	Southeast Tennessee Development District
Metropolitan Area Planning Council	Old Colony Planning Council	Northeast Florida Regional Council	Southwestern Commission
Sonoma Mendocino Economic Development District	Eastern Maine Development Corporation	Upper Explorerland Regional Planning Commission	Southwest Arkansas Planning and Development District

Term 26: Climate Resilience Assets			
Chuck 300	*Chunk 900*	*Chunk 3000*	*Full Document*
Upper Explorerland Regional Planning Commission	Upper Explorerland Regional Planning Commission	Upper Explorerland Regional Planning Commission	Bootheel Regional Planning & Economic Development Commission
Siouxland Interstate Metropolitan Planning Council	Upper Explorerland Regional Planning Commission	Southwest Arkansas Planning and Development District	New River Valley Planning District Commission
Southwest Iowa Planning Council	East Central Intergovernmental Association	Southeast Nebraska Development District	Great Northern Development Corporation
Souris Basin Planning Council	Northwest Colorado Council of Governments	Sierra Economic Development District	Eastern Maine Development Corporation
Genesee Finger Lakes Regional Planning Council	Coastal Bend Council of Governments	North-Central Alabama Council of Governments	Mid Columbia Economic Development District
Upper Explorerland Regional Planning Commission	SouthEastern Arizona Governments Organization	Piedmont Triad Regional Development Corporation	Aroostook-Washington Economic Development District
Association of Central Oklahoma Governments	Northeastern Pennsylvania Alliance	West Central Wisconsin Regional Planning Commission	Southwestern Oklahoma Development Authority
Southwest Iowa Planning Council	Flint Hills Regional Council	Upper Coastal Plain Council of Governments	Blackhawk Hills Resource Conservation and Development
Big Sandy Area Development District	Southwest Iowa Planning Council	Lake of the Ozarks Council of Local Governments	Southwest Arkansas Planning and Development District
Region 6 Planning Commission	Franklin Regional Council of Governments	Sonoma Mendocino Economic Development District	Central New York Regional Planning and Development Board

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