

**Measuring Sustainability: Why and How Public-Private Partnerships Achieve  
Envision's Platinum Verification**

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## **Measuring Sustainability: Why and How Public-Private Partnerships Achieve Envision's Platinum Verification**

### **Abstract**

Public-private partnerships (P3) are outperforming other delivery methods in their ability to meet sustainability objectives. The main driver for decisions in any project has been seen as linked to a cost analysis. This research aims to determine why and how P3 projects are more likely to implement more effective sustainable decisions throughout a project's lifecycle. In this context, the decision-making is directed explicitly at the project team's reasoning for implementing sustainable practices beyond cost-effectiveness.

The researcher generated questions to ask potential project teams to understand why and how P3 projects were better at implementing sustainable decisions. Sustainability was operationalized using Envision's framework. Interviews with project teams that utilized the P3 project delivery method and received the highest sustainability rating provided a first-hand account of the decision-making process. The interviews are analyzed utilizing framework analysis. The results identify the motivations for implementing sustainability.

The results suggest that the P3 contract structure is the most compelling reason these projects can implement sustainable decisions better than other project delivery methods. The written requirements from the contract documents or legislative requirements and the Contractor's desire to perform well are other drivers for this increased sustainability.

# **Measuring Sustainability: Why and How Public-Private Partnerships Achieve Envision's Platinum Verification**

## **General Audience Abstract**

The infrastructure in the United States is reaching the end of its useful life. These assets need significant investments to continue serving their original function. Various project delivery methods exist that either deliver a product or a service. Delivery methods such as design-bid-build or design-build focus on delivering an asset such as a bridge or road at the end of the contract. The public-private partnership (P3) delivery method focuses on delivering an asset and operating that asset for an extended period until the end of the contract, typically no less than 25 years. Building these assets sustainably will help drive down costs and increase useful life.

Sustainability goals cover the economic, environmental, and social aspects of the project. The economic goals include providing a responsible cost-benefit to the users or taxpayers and lasting for an extended period. The environmental goals include minimizing the project's impact on the environment. The social goals include building the right project so that it solves the correct community issue.

The P3 delivery method of delivering an asset and service has outperformed other delivery methods in sustainability. This paper explored the reasons that project teams make decisions to include sustainable choices throughout their project contract.

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## Introduction

Infrastructure must be enhanced to support the steadily increasing economy that it supports and not just fixed to prevent failure. Deficiencies may cost the average household \$3,300 a year in disposable income due to decreased capacity and increased infrastructure unavailability (“Failure to Act Report,” 2017). The infrastructure supports the population and economy of the past, and for this problem to be solved, the current fixes need to rehabilitate and expand the current infrastructure. Without applying more funds to address the growing infrastructure problem, infrastructure failure's risk continues to grow.

Increasing infrastructure investment will grow the gross domestic product (GDP), increase employment, and maintain other socio-economic factors that society values. The United States has spent 2.6% of its GDP on infrastructure investments; however, to keep pace with current growth trends, that number needs to be increased to exceed 3.6% (Dobbs et al., 2013). A minimum of 1% of GDP increase in infrastructure investment is required to support the country's economy and increase the needed costs to replace and correct infrastructure deficiencies. The increase in spending does not need to come from one source, both public and private funds can help bridge the gap between current levels and required levels of spending.

Inviting investment from both public and private sectors will enable more opportunities to optimize lifecycle benefits, decrease the cost of infrastructure, and increase the useful life of these assets. Utilizing Public-Private Partnerships (P3) increases the project team's ability to implement lifecycle cost-saving innovations during the design and construction phase that results in better lifecycle performance during the operations and maintenance (O&M) phase (Antillon et al., 2017). Projects show better performance in the operations stage when delivered with the P3 project delivery method, maximizing potential while minimizing future problems.

The funding gap cannot be fixed by just using P3s, and the infrastructure problem also needs to be fixed through sustainable practices. Inviting public and private sector groups to become involved and invest in infrastructure throughout the project's lifecycle increases the chance for better sustainability and efficiency (Solheim-Kile et al., 2019). The P3s ability to share cost and risk among stakeholders is one of the best solutions to provide the infrastructure to serve its function while meeting sustainability objectives.

Achieving sustainability is easiest when multiple stakeholders are all working towards maximizing their positions. The increased number of project stakeholders through the P3 project delivery method improves large infrastructure projects' sustainability (Cheng et al. 2020). The cost to fix the infrastructure problem is costly and continues to grow, and a sustainable solution is needed to fix the physical and funding issues.

## Background

P3s are like other types of project delivery methods, and they provide Owners the ability and means to procure large infrastructure projects. The traditional project procurement methods such as DBB or DB all focus on providing the Owner with a project at the lowest bid that meets the bid and contract requirements (Aziz, 2007, 920). All project delivery methods share the common theme of producing quality products, making the difference between how each project team makes their decisions research worthy.

There is limited research on the incentives that motivate P3 project teams to make sustainable decisions throughout the lifecycle of their infrastructure project as seen in Figure 1. As Aziz (2007) pointed out, a motive for better performance throughout P3 contracts is placing the financial risk with the private sector. The multi-year terms of the contract would provide additional quality assurance. A more detailed understanding of the reasoning behind making sustainable decisions throughout the lifecycle of a project is needed.

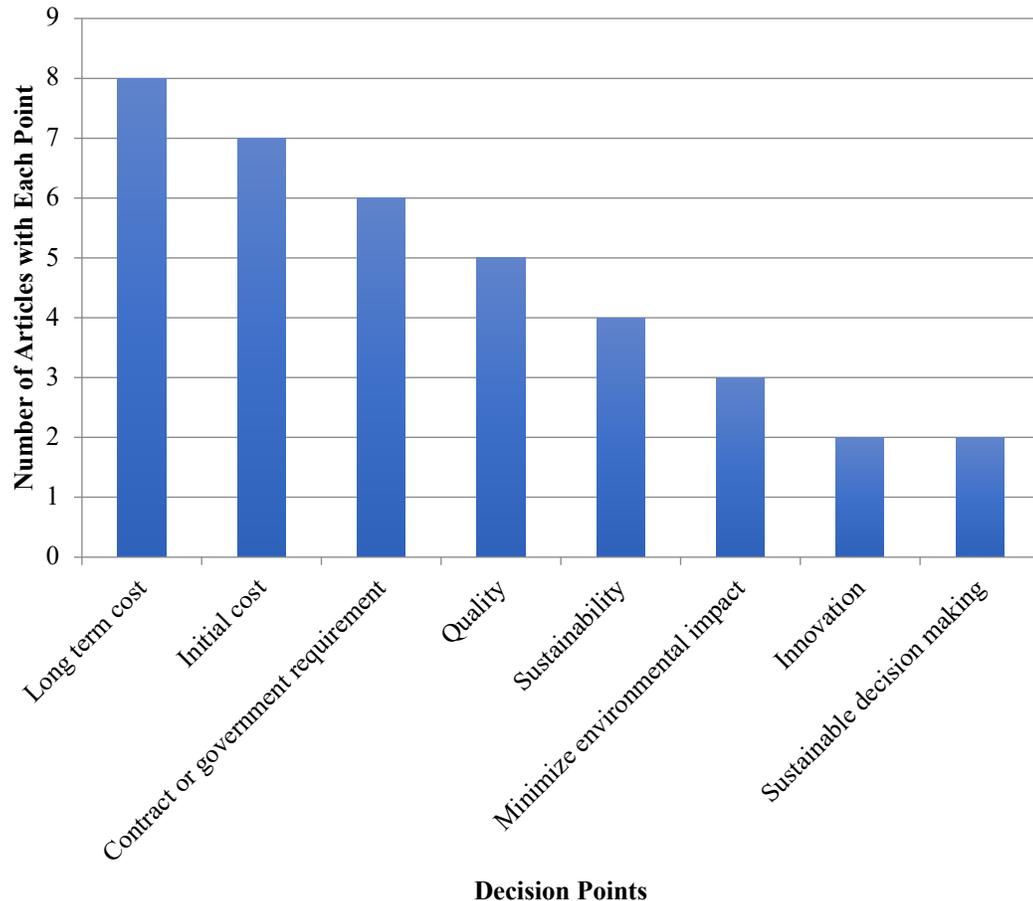


Figure 1: Literature Review Summary

The current literature is limited in explaining why P3s implement sustainable practices; however, a common theme is that the companies want to maximize their profits throughout the contract's life. The P3 project delivery method is at a crossroads for its “development direction

and value orientation.” Studies utilized the economic benefits as the primary driver to determine the benefits and effectiveness of P3s contracts (Cheng et al., 2019). The research conducted thus far has offered few explanations for sustainable decisions beyond the profit and economic factors. For P3 contracts to continue to thrive, understanding benefits beyond the economic factors are essential for their continued success.

P3s provide a unique ability to include the private sector to help solve the Governments’ and Owners’ inability to close the funding gap for these projects. As Solheim-Kyle and Wald (2019) wrote, the first step in getting the private and public sectors to work together is aligning their interests by providing monetary incentives to grab the private sector's interest to get involved. The monetary incentives are the building block for the decisions linked to P3 projects. Determining, categorizing, and ordering the additional criteria in this process will provide a more holistic view of how these P3 project teams operate sustainably.

P3s provide a space for the private sector companies to operate from the start through an extended operations phase, which forces them to care about the long-term effectiveness of these projects. To realize the maximum benefit of the P3 relationship, the Owner must involve the Contractor or Concessionaire early when developing the project’s goals and design to include the handover or decommissioning activities. This involvement will help increase the autonomy and competence of individuals working on the project that is not achievable with other project delivery methods (Solheim-Kyle & Wald, 2019, p. 10). The collaborative difference from other project delivery methods enables multiple parties to influence the project instead of merely following a design-bid-build (DBB) or design-build (DB) contract’s prescriptive requirements.

Understanding why project teams make sustainable decisions will enable the research to show what aspects of the contract are most effective when Owners or project teams want to incorporate sustainable decisions in their projects. Additional information beyond the finances of a project can improve the project’s transparency which will benefit the public and other stakeholders (Ahmadjian & Collura, 2012). Increasing the availability of data and decision-making criteria will provide a complete picture for all stakeholders to better implement sustainable decisions.

Exploring the implementation of sustainable practices will help explain the positive impact this type of contract and decision-making can have on solving the infrastructure problem by showing how infrastructure can work better for the public. An overarching goal of the P3 delivery method is to improve the Public Sector Owner’s understanding of the inner workings of this type of contract, explaining the potential shortfalls and benefits of using this method (Ahmadjian & Collura, 2012). Filling the existing literature’s gap by explaining the decision-making processes will lead to more sustainable infrastructure projects.

Filling the gap in decision-making understanding will provide information to accomplish sustainable projects effectively and efficiently. Projects need as much information upfront to influence their decisions. Learning as they go in infrastructure projects is ineffective because as the projects move through their various phases, it becomes increasingly difficult to implement changes to increase sustainability (Antillon et al., 2016). Making the correct sustainable choices

at the beginning of a project is crucial to meeting sustainability objectives because there usually is no money available for rework, which requires efficient construction.

Understanding the factors that influence decision-making that will allow us to see their actual impact on sustainability. As Ahmadjian and Collura (2012) explained, decision-making tied to a monetizable measurement is the first step beyond a lump-sum analysis of a large infrastructure project. Assessing additional components of the decision-making process is necessary to build upon this framework to provide a more comprehensive understanding of the decisions that go into P3 contracts and sustainability.

Sustainability is measured by assessing the impact of a project on factors such as the economy, society, and environment as seen in Figure 2. While there is a lack of theoretical development, the use of these three factors, or pillars, has been used to define the groundwork of sustainable development (Purvis et al., 2019). This definition will generate the subjective evaluation criteria for the effectiveness of the sustainability of each project.

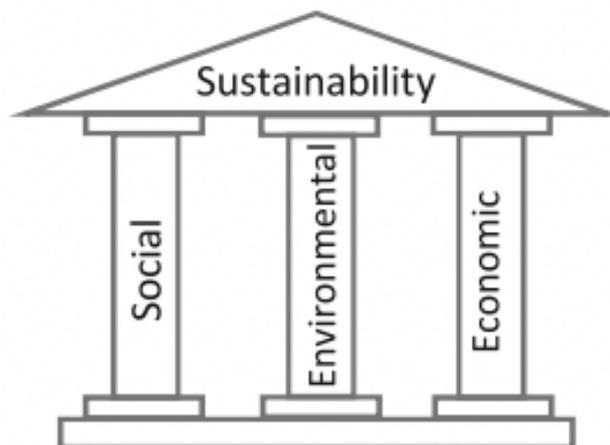


Figure 2: Three Pillars of Sustainability (Purvis et al., 2019)

Understand how P3s implement sustainable practices beyond building with quality will help understand the path forward to repeat this practice with other projects. Antillon et al. (2016) provided research on three large infrastructure projects. They determined that all three projects incorporated some range of changes to their projects to improve sustainability and the projects' long-term performance. This explanation provided insight into the actual actions taken to increase sustainability; this research will add to that body of knowledge.

Further defining the sustainable decision-making process associated with these infrastructure P3 projects can provide the more critical factors that Owners consider when deciding on including sustainability in their projects. The literature defines current limiting factors as the complexity of specification for design or pre-determined project parameters (Antillon et al., 2017, p. 10). The current focus on designing the contract performance specifications to maximize the effect of the P3 contract structure on large infrastructure projects

excludes the decision-making processes involved with meeting those specifications. This focus limits the ability of the contract specifications to drive a sustainable project.

The decision-making process for sustainability in P3 delivered large infrastructure projects will show how the various stakeholders define and navigate the process together with competing interests. Various uncertainties that arise throughout a project can strain the complex relationships that exist within P3 projects. Project optimization and conflicts may arise between the various parties due to those uncertainties (Soomro and Zhang, 2014). Increasing the knowledge base of this process can help minimize the number of conflicts projects experience and lead to the more effective execution of the project.

The Institute for Sustainable Infrastructure's (ISI) Envision Framework provides a tool to assess a project's impact on economic viability, environmental protection, and social equity to accurately measure the success of the project's sustainability aspects objectively. Envision is a framework and rating system for infrastructure developed by the Institute for Sustainable Infrastructure (*"Envision Sustainable,"* 2018). Envision's Framework helps project team members implement resource-efficient and eventually cost-efficient design strategies throughout their long-term infrastructure investments, leading to a cost-efficient design (*"Envision Sustainable,"* 2018). Envision, which any of the stakeholders can use, allows any type or size project to implement sustainable choices.

Envision's Framework provides project stakeholders with goals to reach that will improve the efficiency of their infrastructure throughout the project's lifecycle. The Framework focuses on the question "are we doing the right project?" (*"Envision Sustainable,"* 2018) and not just "is this what the customer wants?" Project teams Utilize this Framework to measure more than just project cost and time, it provides them with objectives to meet to construct a more sustainable project by measuring the impact on the environment.

Many rating rubrics and programs exist for various projects, but none provide as much potential benefit as Envision. Envision's Framework has been the most effective and appropriate third-party sustainability rubric for infrastructure projects due to its applicability to larger projects with multiple components and disciplines (Sheane & Woodruff, 2017). Envision's Framework provides the tools and guidance needed to shift the infrastructure system to focus on sustainability through its 64 sustainability and resilience indicators (*"Envision Sustainable,"* 2018). The sustainability choices tied to these projects have a more significant impact due to the projects' size that showcases the sustainability criteria highlighted by Envision.

Current literature on Envision and its Framework does not explain which credits each project obtained and its impact on the project and the surrounding environment. The literature analysis revealed that only one paper on the Louisville-Southern Indiana Ohio River Bridges project discussed the decision-making process that utilized Envision for their P3 project (Sheane & Woodruff, 2017). Researchers have not explored the decision-making tied to using the Envision Framework or the decision-making tied to each Envision credit. Traditional project decisions were limited to the bounds of the plans and specifications. P3 projects offer much more room for team member decisions to shape the project.

## Research questions

The first research question (RQ1) is, *why are project teams motivated to measure sustainability?* The purpose of this research is to examine why P3 projects are motivated to measure sustainability. Previously projects have measured energy efficiency using LEED to subjectively assess the monetary savings a building will experience over its lifetime (Green Building Council). However, no tool existed to measure the complete sustainability of a project as defined in the 1987 UN World Commission, “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” As recently as 2015 (Institute for Sustainable Infrastructure), the Envision Framework has become available to measure complete infrastructure projects' sustainability. Considering the recent trend in measuring projects' sustainability, we focused on P3 projects evaluated using Envision's Framework.

The second research question (RQ2) is *why P3 projects more frequently reach the Envision platinum verification award than non-P3 projects?* The research focused on why most P3 projects evaluated using Envision rated their highest verification award level: Platinum. While any project can reach the platinum verification award level, the P3 projects listed in ISIs directly are twice as likely to achieve the platinum verification award level. The researcher reviewed the project team's decision-making and how it aligned with these projects' characteristics to understand why the project reached this certification level. Focus areas for this question will include the P3 project's long-term focus, many stakeholders, project scale, and constraints placed on these types of projects.

The third research question (RQ3) is *how do P3 projects receive the Envision platinum verification award?* The researcher's next question was how a P3 project reaches the platinum verification award level. The research will explore the steps taken throughout a project's design and construction phases to meet a sustainable project definition. Providing this answer will help address this knowledge gap. This is important due to the increase in funding shortages, making obtaining a third-party sustainability certification difficult since it will cost any project more money. However, it will enable a project to begin moving in the direction of sustainability and use the framework from the beginning of any project to increase its success.

## Methodology

The literature review conducted covered infrastructure and sustainability. The knowledge gap identified was the decision-making that linked those two objects. An analysis of the projects that met the criteria uncovered that P3 projects using Envision were more likely to receive the Envision platinum award verification than other project delivery methods.

Envision provides a consistent and objective definition of sustainability. Viewing sustainability projects as judged by this Framework will provide a coherent measuring stick to determine practical sustainability. Envision's framework provides Owners and Builders a list of project components that require decision-making to effectively meet the sustainability goals set forward ("*Envision Sustainable*," 2018). Utilizing this framework to operationalize sustainability will assist in identifying and understanding the logic behind sustainable decisions.

	Total	Verified/Bronze	Silver	Gold	Platinum
P3	7	1	0	1	5
All Projects	94	15	27	20	32

Table 1: Project numbers by verification level as of February 2021

Large-scale P3 projects tend to outperform other projects when measuring their sustainability using Envision's Framework. Out of the 120 Envision verified projects listed on the Institute of Sustainable Infrastructure's (ISI) website, 35% received the platinum verification award level, while 72% of P3 projects received the platinum verification award. To successfully obtain an Envision credit, the project teams must submit the proof in meeting minutes or design specifications that are easier to compile with more extensive project staff. To facilitate a more straightforward implementation of this Framework, project teams should use this Framework from the project's onset as a guiding tool, as seen in the projects listed in Table 2.

Project Name	Location	Cost	Main Component	Construction Start Date	Duration	P3 length
LaGuardia Central Terminal Building	New York City, New York	\$4B	Airport Terminal	June 2016	6 years	35 years
New Champlain Bridge	Montreal, Canada	\$4.2B	Bridge	June 2015	3 years	35 years
Ohio River Bridge East End Crossing	Louisville, Kentucky	\$2.3B	Bridge	May 2013	3 years	40 years
Surrey Biofuel Facility *Not Explored	Surrey, Canada	\$68M	Waste Conversion Facility	Late 2014	4 years	30 years
I-4 Ultimate Highway Project *Not Explored	Orlando, FL	\$2.3B +	Highway	Fall 2014	7 years + (still ongoing)	40 years

Table 2: Table with specific project information as of April 2021

The research team contacted each projects' sustainability lead coordinator for interviews. The interviews were approved by Virginia Tech's IRB (#20-970), provided in Appendix A. The size and scope of the Surrey Biofuel Facility are narrow and small, which would not provide a project and sustainability cross-section large enough to analyze with this methodology. The I-4 Ultimate Highway project's sustainability team was not willing to discuss the project's Envision achievement. The remaining three projects agreed to meet with the research team to conduct interviews.

The research team conducted semi-structured interviews with the sustainability managers from the three projects. Interviews lasted about 60 minutes. The research questions and literature guided the interview on each project through various aspects of why the project team wanted to measure sustainability and why the projects could receive an Envision platinum verification award level. The interviews were recorded and transcribed in accordance with Appendix B.

The transcripts were then analyzed and coded to pull out information related to the research questions. The coding focused on the project sustainability team's decisions in conjunction with the management team throughout the project's design, construction, operation, and maintenance phases. The research questions asking why project teams were motivated to measure sustainability and why P3 projects received a platinum verification award level were answered with this data.

The next step was to analyze the project and owner documents related to the Ohio River Bridge East End Crossing project. In conjunction with the interview, these documents provided the answer to research question 3.

The Louisville-Southern Indiana Ohio River Bridges (ORB) project highlights how the benefits of the P3 delivery method can solve the issues linked directly to sustainability throughout its 39-year Design-Build-Finance-Operate-Maintain contract. The project produced many jobs for the community, increased mobility throughout the area, and provided a 23% discount in project delivery cost (Sheane & Woodruff, 2017). Exploring how the project achieved sustainably was possible because of the project's results.

The researcher collected files for the other projects identified as platinum as listed in Table 3, such as the Owner's (ex. Indiana Finance Authority) Resiliency Plan and Sustainability Plan for all of the Department's construction project, project-specific Request for Proposal (RFP), Request for Quote (RFQ), Sustainability Management Plan (SMP), National Environmental Policy Act (NEPA) Documents, and Envision credit scores. Including these documents enables the researcher to understand the timeline for decision-making throughout the project.

Project Name	# Project Documents	# Owner Documents	# NEPA/CEPA Documents	Interview conducted by
LGA.	7	6	0	Research Team
NCB.	65	2	5	Research Team
ORB.	14	7	22	Research Team
SBF *Not Explored	6	2	0	Other Entity
I-4U *Not Explored	0	0	0	None

Table 3: Project documents found for review

## Findings (Results & Discussion)

The transcribed interviews were coded into categories to understand why project teams are motivated to measure sustainability and why P3 projects are more sustainable than other project delivery methods. These sustainable decisions ultimately led to each project receiving a platinum verification award level through Envision. The research explored how each of these significant themes influenced the heightened sustainability rating in the interviews conducted with the industry.

The interviews provided an insight into the project team's decision-making throughout the execution of the project. As P3 projects evolve, so has the thinking within the project teams to focus on the project's performance beyond the cost factor. Integrated project delivery methods like the P3 method enhance the efficiency and performance of the project (Antillon et al., 2018, p. 2). This section will explore the evolving transition from cost-driven decisions to sustainability-driven decisions.

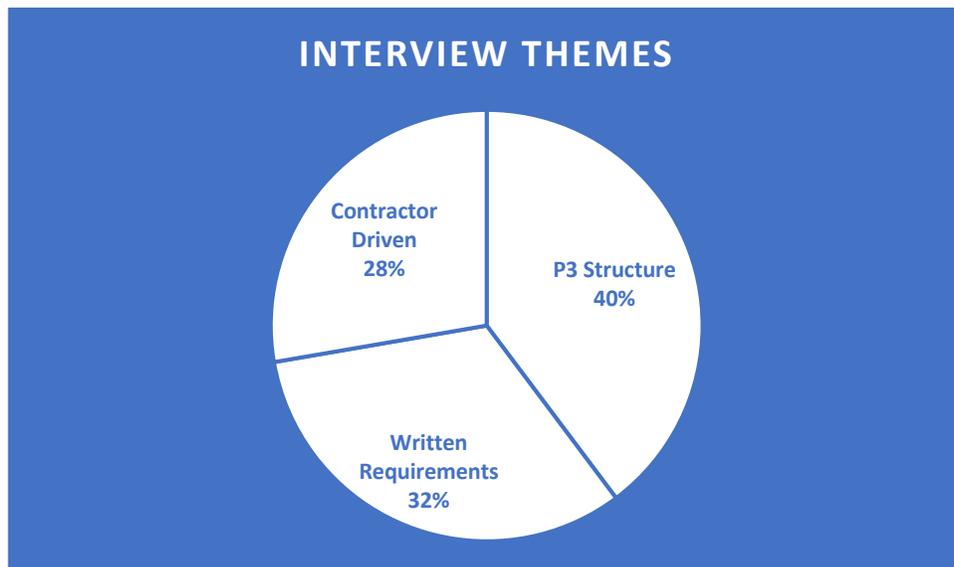


Figure 3: Overview of Interview Themes

### *A Project Team's motivation to measure sustainability*

The interviews showed that the written requirements played a significant role in the project team's motivation to measure sustainability. Figure 1 shows the breakdown of topics discussed during the interviews that relate reaching Envision's platinum verification award level to the structure of the written requirements for the project.

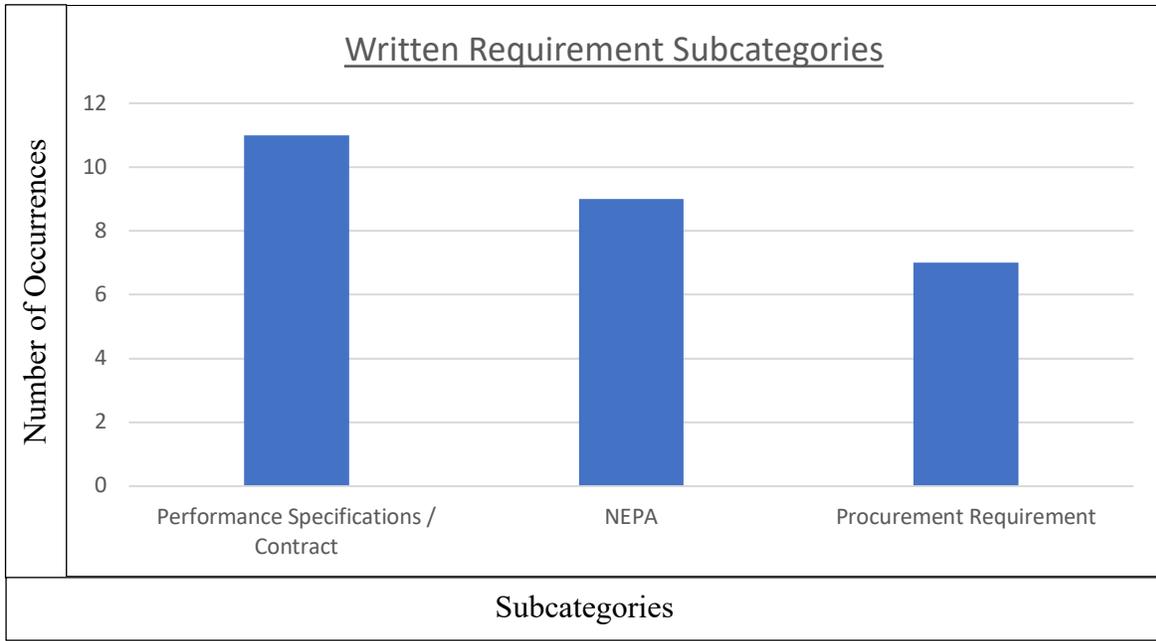


Figure 4: Interview subcategories related to the Written Requirements

Theme	Theory	Quote	Interview Frequency
Document success	Conducting assessments from the start of the project enable the stakeholders to maximize sustainability (Liu et al., 2017).	They are all competing against each other, and they are trying to have a better product than the next person (LGA SMT).	2
NEPA	None	Most of these projects have stringent environmental requirements due to the CEPA [or NEPA] requirements (NCB SMT).	3
Size and scope	Quality in construction increases with the P3 project delivery method compared to other delivery methods (DeCorla-Souza et al., 2017).	The size and extensive transit occurring throughout the LaGuardia Central Terminal enabled this megaproject to utilize its size to incorporate more sustainable decisions than smaller projects of similar disciplines (LGA SMT).	2
Long term	When the project's design and construction process keep the operations phase in mind ... the project's sustainability is positively affected (Hewitt, 2017)	“[When] you are operating something for 35 years, you are more likely to consider how much you invest [initially] and how that will save you money down the line” (ORB SMT).	3

Table 4: Theory on measuring sustainability with written requirements

*Document success*

The results tell us the principal driver for measuring sustainability was the written requirements provided by the contract and local procurement laws, policies, and directives. The

project teams pursued measuring their project's sustainability when required or would prove their work met sustainability objectives as defined by the requirements. These requirements, often included as performance specifications, acted as the Owner's assurance that the project will meet a certain level of performance at the end of the P3 concession period (LaGuardia Sustainability Management Team, LGA SMT). Measuring sustainability to document the impact directly connects to measuring for written requirements because, without the latter, this work will not be possible.

The New Champlain Bridge and LaGuardia Terminal projects measured sustainability because the project Owners have included sustainability measurement as a requirement in their infrastructure guidelines and contract documents. Some jurisdictions have answered the call for increased legislative support for P3s and sustainability by requiring and providing training. As Zhang (2005a) pointed out, to see an increased use of P3s and sustainability, the legislative authorities in these jurisdictions should provide training on the utilization of P3s and make recommendations for removing unnecessary requirements and establish guidelines to improve their use. The P3 projects explored through this research leaned on the Envision Framework to measure sustainability and ensure project teams executed their P3 project correctly.

Measuring sustainability is essential to document the Concessionaire's fulfillment of the Owner's sustainability goals, such as in the LaGuardia Terminal and East End Crossing projects. A project team cannot add sustainability at the end of the project, requiring consistent evaluation and application. Conducting assessments and utilizing frameworks at the beginning of the project enable the stakeholders to identify the essential issues they will encounter early (Liu et al., 2017, p. 9). Utilization of the Envision Framework early in a project enables the Project Team to evaluate their sustainability early and often leads to doing the right project correctly (Shivakumar et al., 2014, p. 2255). The Concessionaire will see where a project needs to be adjusted to meet the sustainability end goals by measuring sustainability. If the project is not measured, then the team runs a risk of not fully achieving the sustainability goals it set out to reach.

The researcher expected most of the reasons for measuring sustainability to focus on receiving a third-party certification to document their sustainability. "... in the sustainability requirements, [there were] some mandatory LEED and Envision [credits] and then [the contract] gave a minimum certification or award level, and in between the mandatory credits and the minimum certification level, the P3 developer could build their [sustainability management] plan," said the Ohio River Bridge Sustainability Manager. The Ohio River Bridge Sustainability Management Team (ORB SMT) discussed their contract requiring some minimum certification level and some mandatory credits within their contract between LEED and Envision; however, they were free to generate the required sustainability management plan saw fit. The majority of reasons explored throughout the interviews were tied to some other existing requirement; obtaining the certification just to have the certification was limited.

The Concessionaire's Company for the East End Crossing wanted to document its positive impacts on sustainability because of all the work they put into the project to meet the project's sustainability objectives. We know documenting the project by utilizing Envision's Framework will provide the most efficient method to demonstrate the sustainability achieved throughout the project and increased efficiencies experienced in the project. When a

Concessionaire is responsible for additional risk from the Operations and Maintenance phase, they will "make the right investments and secure long-term quality," leading to measuring sustainability to prove their accomplishments (Solheim-Kile & Wald, 2019, p. 1). Envision's Framework is more than a grading sheet, and it enables decision-makers of projects to best balance design, construction, and operational impacts and priorities to deliver the best project (Georgoulas, 2015, p. 13). As Shivakumar et al. 2014 argued, Envision will provide the best route to building a sustainable project and increasing its knowledge to produce more of these projects. The private sector brings efficiencies to infrastructure assets through the P3 delivery method that public sector Owners have difficulty doing because of political or financial reasons (Levy, 2011). Utilizing a third-party verification system to measure sustainability enables the project team to prove that they met the sustainability goals set for the project.

No matter what the underlying driver was for creating a sustainable asset, the project teams wanted to show that their push for a sustainable project was successful by measuring it against a subjective rubric. The LaGuardia Central Terminal's Sustainability Manager notes, "pay[ing] for Envision and people's time to pull the documentation together for the award is no big thing. What the Owner] was really concerned about ... is if we're going to select 30 credits to go after in this project, what is that going to cost or save the project by doing those things?" The LGA SMT project highlighted their desire to attempt to make the project sustainable in the right places by achieving the specific envision credits for the project that would benefit the project in the long run. The team did not want to introduce sustainability if it would not truly benefit the project and would only expend more time, money, and effort than it would save.

The Owner wants to provide evidence that they and the asset have had no impact or a positive impact on the surrounding environment and have worked with the community to bring an infrastructure asset that solves their problems for a long time. Private companies will bring new technology and better equipment to the project that enables innovation and sustainability (Mitchell, 1990, p. 34) to meet their goals. The project's success increases when the meaningful engagement of all stakeholders occurs. The project team addressed the long-term concerns in the planning and design phases of the project (Shivakumar et al., 2014, p. 2255). The structure of the P3 contract requires the Concessionaire to deliver value to the project by ensuring all stakeholders are involved in the process (Liu et al., 2017, p. 6). Using various public consultation techniques ensures the project stakeholders participate and take actual ownership of the project to enable P3 sustainability (Rwelamila, 2015, p. 91). Working with the stakeholders to align their expectations with the project requirements early on will ensure success at the Request for Proposal (RFP) and beyond (Brown, 2015, p. 115). This effectiveness of P3 projects is rooted in the coordination required of the Concessionaire to bring together all stakeholders throughout the project's complete lifecycle (Antillon et al., 2018, p. 13). Each project had a specific intent for involving the community and ensuring minimal impact on the surroundings. Envision's evaluation and these project's subsequent platinum award verification ensured these projects minimized their impact.

### *NEPA*

The results also showed that sustainability focuses on assessing alternatives just like the NEPA (US) and CEPA (Canada) processes for environmental assessments that owners must

complete when they benefit from federal funding on a project. “I think that that puts infrastructure projects or public projects that have federal regulatory requirements concerning planning evaluations in a very, very good position from the LD and QL category perspective, and so the risk has been just building in the technical requirements of the remaining credits into your project agreement,” noted the Ohio River Bridge Project Sustainability Manager. The ORB project benefited from the years of alternative studies conducted to complete their environmental impact statement (EIS). The extensive work was rich with stakeholder involvement documentation, enabling the project to score high in the leadership and quality of life categories (ORB SMT). The LGA project similarly benefited from the Environmental Assessment EAA documents because the NEPA process supports many Envision work. Both projects achieved the platinum verification award level because the NEPA process provided them with the first assessment directly tied to the environmental aspect of sustainability.

### *Size and scope*

The size and investment of these projects ranged from \$2 Billion to \$4 Billion, and each of the projects’ Owners utilized a sustainable measuring system to prove the project’s economic sustainability. Justifying the initial investment by showing its’ effect on long-term saving builds public support for the current and future projects. Generally, Owners want to see "reduced costs and accelerated construction," the drive for innovation and sustainability in construction projects has primarily been linked to those requirements (González & Garvin, 2016, p. 4). Projects constructed with sustainability and quality often realize savings later on in the project regarding reduced usage of natural resources. Quality in construction increases with the P3 project delivery method compared to other delivery methods (DeCorla-Souza et al., 2017, p. 271). To realize and prove these cost savings, measuring the project’s sustainability is needed. Measuring sustainability can help users and owners understand how an asset or investment will save them money in the long term.

The P3 projects all had a relatively large size and scale, which enabled the project team to have more space to implement sustainable choices and measure them. The LaGuardia Central Terminal Sustainability Manager pointed out, “When you talk about scale, [the project has] the head house, both concourses, the roadways, the parking garage, the utility work, those in and of themselves are mega projects going on at once. So, what was nice about Envision is that we were able to capitalize on the Port Authority's sustainable building guidelines, the Port Authority's sustainable infrastructure guidelines, LEED, and use Envision to tie all that together under one umbrella.” The New Champlain Bridge was able to incorporate features usable by public transit, pedestrians, and bicyclists previously unavailable on the old project due to the large footprint of the project (NCB SMT). The size and extensive transit occurring throughout the LaGuardia Central Terminal enabled this megaproject to utilize its size to incorporate more sustainable decisions than smaller projects of similar disciplines (LGA SMT). The project teams responsibly handled more giant footprints provided to them by the project owners by ensuring the components throughout the projects worked together and contributed to the project’s sustainability to achieve the highest level of sustainability per Envision.

The Owner wants to prove that the asset will save money in the long term through the sustainable practices implemented throughout the project. P3s were utilized to save money for

the public sector and have shifted to saving everyone money throughout the project's contract by analyzing the alternative solutions and choosing the best option. P3s enable multiple advantages, including optimized life cycle costs via innovative and sustainable design (Kyvelou & Kokkoni, 2011, p. 12). P3s in the US were introduced in the 1990s to address the funding gap for infrastructure (Aziz, 2007, p. 2). P3s are limited in the US due to project teams' lack of familiarity with this type of project delivery method, government rules and regulations restricting its use, and the natural misalignment of private and public sector goals (Aziz, 2007, p. 3). P3s were utilized as the innovative solution to bridge the funding gap (Levy, 2011, p. 14). More than just the design responsibility is needed to drive innovation and sustainability in P3s (Antillon et al., 2017, p. 4). The use of P3s has evolved from providing the means to fill a funding gap to saving all stakeholders money through innovation and sustainability. Measuring this is essential to provide proof due to the long-term nature of the savings, as was seen in the 125-year life of the New Champlain Bridge.

One of the most consistently applicable drivers for measuring sustainability throughout the projects was procurement or contracted requirements. “Prior to 2015 [the start of construction], there was a proposal with terms ... [where] Envision needed to be obtained prior to the end of the project,” said the New Champlain Bridge Corridor Sustainability Management team (NCB SMT). The project teams agreed that the owners of the various agencies were driving the sustainability practices (ORB SMT). When they had additional sustainability guidelines, the Owner that provided the guidelines exhibited leadership (LGA SMT) that helped the project teams more efficiently fulfill legislative requirements (NCB SMT). The requirements that the various funding agencies provide can be challenging to decipher. However, if the project owner has aligned their contract with all of those requirements, the project teams found it easier to meet those sustainability goals.

The New Champlain bridge project team demonstrated that measuring sustainability was essential to build a reputation as the go-to Company for Canadians to use in future P3 contracts. Measuring sustainability shows that the Company is continuously committed to meeting the sustainability goals set out in each project. As the Envision rating system becomes recognized as the go-to system, the projects rated by it will drive additional sustainable P3 projects. A P3 project or a company's ability to remain a go-to project or Company must excel in all aspects of customer service (Aziz, 2007, p. 5). Effective sustainability solutions include increasing connectivity and safety to improve a project's appeal to users (Smith et al., 2013, p. 628). Any project utilizing a broadly recognized rating system will ensure the project's status is the best and entice owners to take steps to invest in more sustainable practices (Behr, 2014, p. 744). The project's attractiveness benefits from measuring it against a sustainability system as it will grow the Contractor's reputation as a sustainable contractor.

### *Long term*

Each project team had a long-term focus because the P3 project delivery method required these teams to operate and maintain the project for a period beyond the construction phase. “[When] you are operating something for 35 years, you are more likely to consider how much you invest [initially] and how that will save you money down the line,” said the Ohio River Bridge East End Sustainability Manager. The ORB SMT discussed how the Owner's direction

for long-term operation drove their design and construction decision-making process. The NCB SMT had to manage a 25-year operation and maintenance phase and ensure the significant components of the project lasted for 125 years at the direction of the Owner. The need to focus on the long-term operation is one of the drivers for these Project Teams to ensure they sustainability build the asset to minimize their future costs during the other project phases.

Measuring sustainability was seen as necessary so that projects like the East End Crossing and New Champlain Bridge could ensure they met their respective 40- and 125-year goals. The practice of continually measuring these project's sustainability was helpful to ensure the projects stayed on the same track to achieve the sustainability they set out to achieve at the projects' start. Success in infrastructure needs to include more sustainable development and construction; applying new ways of thinking to challenge the status quo is the only way to positively impact the triple bottom line (Shealy & McWhirter, 2017, p. 419). When the project's design and construction process keep the operations phase in mind and focus on the project's health, safety, and livability, the project's sustainability is positively affected (Hewitt, 2017, p. 1). To develop and mature projects' ability to be sustainable, the way teams think needs to change, and the measuring tool Envision provides will help teams make the right decisions to meet the required goals.

Overall, it was evident that the Owner or the funding agency had the most input into whether the Owner wanted their project measured against a sustainability rubric. "Envision[ 's framework] capitalize[d] on the [Owner's] sustainability guidelines, sustainable infrastructure guidelines ... Envision was used to tie all [of those requirements] together," said the LaGuardia Central Terminal Project Sustainability Manager. The ORB SMT discussed that in their Envision platinum verification award level P3 project and others, the Owner had specifically wanted the project to be known for its sustainable features. Building on why sustainability is measured, the researcher explored why P3 projects specifically achieve platinum verification award levels much more frequently than other projects.

#### *Why P3 projects receive a platinum verification more frequently*

The interviews also showed that the Contractor performing the work played a significant role in the project's sustainable design, construction, and operations. Figure 2 below shows the breakdown of topics discussed during the interviews that relate reaching Envision's platinum verification award level to the Contractor's objectives and drivers.

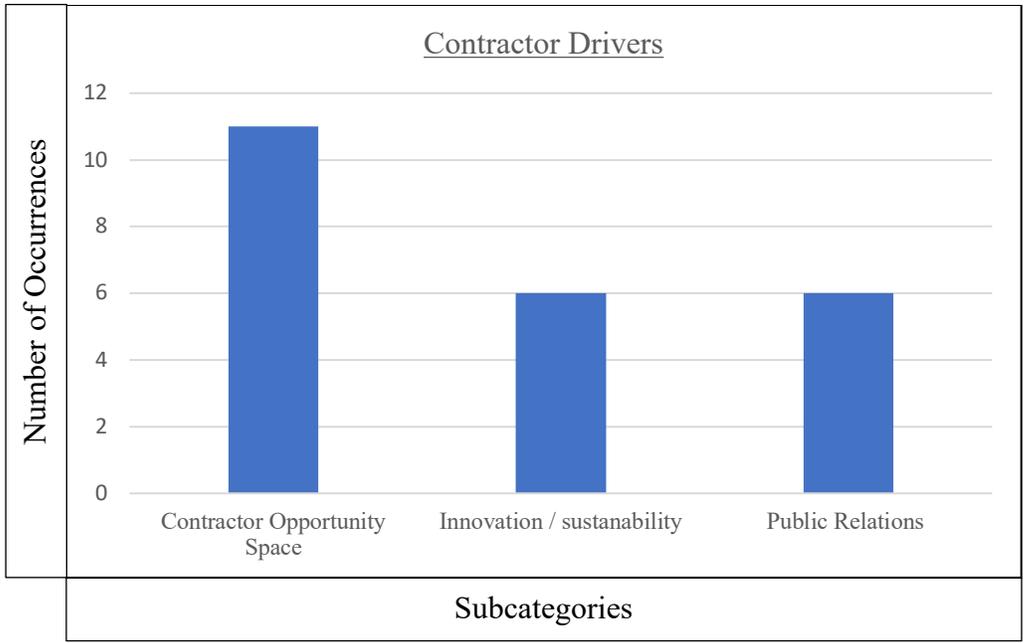


Figure 5: Interview subcategories related to the Contractor

Theme	Theory	Quote	Interview Frequency
Forming a team	P3s succeed with their sustainability objectives because of the relationship they require the Concessionaire to enter with the Owner (Rwelamila, 2015).	“In a P3 contract, there is a single point of contact for the entirety of the design, construction and operational period, or at least for a certain part of the operational life cycle of the project,” ORB SMT.	3
Public relations	As Companies see the benefits of sustainable P3 projects, they seek ways to build more resilient and sustainable infrastructure (Bradford et al., 2017).	“They are all competing against each other, and they are trying to have a better product than the next person,” LGA SMT.	2
Contract size	As governments' perspectives shift to enable projects to be delivered using P3s, the long-term benefits and sustainability of using this method will be better realized (Zhang, 2005b).	A P3 contractor [will say] that is me. I will have to deal with the maintenance problem later, so I am going to build it better now,” LGA SMT.	1

Table 5: Theory on why projects achieve sustainability

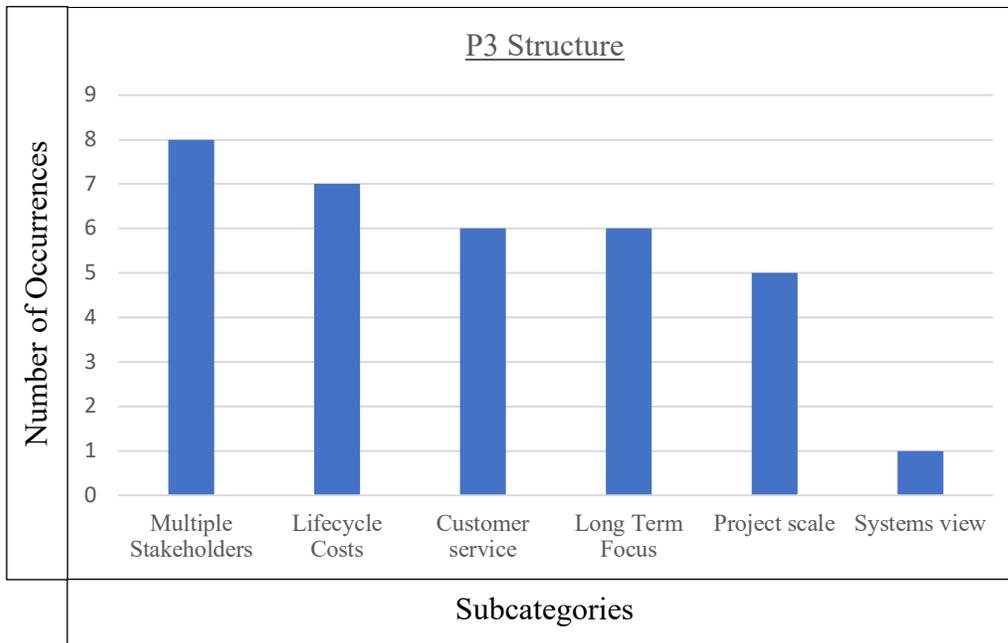


Figure 6: Interview subcategories related to the P3 Structure

### *Forming a team*

The results showed that the Contractor’s early push for collaboration alongside the Indiana Finance Authority in the Ohio River Bridge project played a huge role in the project outperforming others in terms of sustainability. Research indicated that increasing the chance of meeting the sustainability goals was done by successfully gathering all the stakeholders. Projects experienced issues bringing all the required stakeholders together to decide; coordinating was vital to motivate previously independent personnel to work with others (Antillon et al., 2018, p. 13). The early inclusion of stakeholders in the design of a project has shown to provide the most motivation for designing and building per the project goals (Solheim-Kile & Wald, 2019, p. 8). P3s succeed with their sustainability objectives because of the relationship they require the Concessionaire to enter with the Owner (Rwelamila, 2015, p. 82). The P3 success in China is measured by reaching sustainable goals and relying upon the relationship between the public and private sectors (Cheng et al., 2020, p. 6). They were using Envision to guide the decision-making process results in greater sustainability returns and more resilient projects (Williams, 2014, p. 784). The strong relationships in P3 projects between all the stakeholders are due to incorporating sustainable practices as measured by Envision's Framework. This collaboration leads to more people working to reach sustainable goals resulting in a higher chance of getting the platinum verification award level than other delivery methods.

Significant accomplishments in P3 projects are seen and measured when collaborators come together early and keep an eye on all project phases. The theory showed that early collaboration is not always easy, as seen in the East End Crossing Project, and may require the Contractor to lobby the Owner to buy into this practice. When projects do not experience communication or collaboration issues, partnering in P3 projects leads to technical and process innovations compared to other procurement methods (González & Garvin, 2016, p. 7). Recently,

the Concessionaires have begun committing themselves to public welfare and creating the best asset for the Owner (Shah, 2017, p. 12). Contractors and Concessionaires need to show project Owners the benefits of this early collaboration if they want to impact sustainability. P3s and the DBFOM maximize the early and frequent collaboration, as evidenced by their minimal cost changes compared to other project delivery methods (Martinez & Walton, 2015, p. 228). The overall project can see improved long-term considerations if the O&M contractors are involved early in the project (Antillion, 2010, p. 30). The collaboration among all the numerous stakeholders involved throughout the project's life provided the project with more informed sustainability decisions ("*Envision Sustainable*," 2018, p. 4). The unhindered collaboration P3 projects experience leads to higher sustainability scores. The team can keep track of the project's entire life cycle with people from all aspects of the project involved early and often.

The composition of a P3 project contract requires that all components of a project's life are designed from the onset, similar to the alternative assessment NEPA (or CEPA) requires for all applicable projects. Early on in projects, the lifecycle cost evaluation can benefit sustainably developing P3 projects, but team members can hinder this process with a lack of experience using this procurement method (Antillion, 2010, p. 60); Envision provides the tools to help navigate some of those waters. Of interest in this study is the promise of P3s' ability to implement lifecycle cost-saving innovations during the design and construction phase. These innovations should result in better lifecycle performance during the operations and maintenance (O&M) phase (Antillon et al., 2017, p. 1). The requirement of the P3 to account for all the project's components at the start, due to NEPA or their desire to build the most sustainable project, leads to a better design and planning process. This more thorough planning process leads P3 projects to outperform other delivery methods when measured using Envision's sustainability framework.

Collaboration was needed according to theory. In practice aligning the Owner and Concessionaire's goals enabled the builders to utilize innovative technologies to contribute better to efficiency and long-term sustainability. In the New Champlain Bridge case, the Engineers came to the Government to push for a 125-year bridge. In the LaGuardia Terminal project, the Concessionaire implemented high-quality construction methods to minimize the work they would have to do during the maintenance phase. Including this sustainably-minded thought process at an earlier stage of a P3 project is more likely to implement sustainability or "radical lifecycle-design innovations" (Antillon et al., 2017, pp. 9-10). P3s objectives include appropriate risk transfer (Aziz, 2007, p. 7), often resulting in Concessionaires finding creative ways to meet the Owner's sustainability goals. This sustainability risk is transferred by including performance specifications with the contract documents (Aziz, 2007, p. 10). Martinez and Walton 2015 explored the maximization of resources, concluding that discussing their use early in the project led to more sustainably sourced and managed resources. Innovative methods and technologies brought into the project early on significantly impacted these projects, resulting in increased sustainability by effectively meeting performance specifications.

The results showed that the relatively new concept of introducing sustainability into projects would require the project teams to lobby the project owner and require the Contractor to work extra hard to prove the viability of their idea. The New Champlain Bridge Corridor Sustainability Manager said, "That Envision was starting ... the consultants and the people

working on the condition of the project just said they had an order from the Government of Canada to make this bridge more sustainable ... so they found Envision and then they said [they] can now do something with it [to meet these goals]." The project teams need to talk with the Owner to encourage innovation, prove that the performance requirements later in the project's life would benefit from this (ORB SMT), show the Owner how their project meets each of the three pillars of sustainability (NCB SMT), or how the Owner's existing guidelines capitalize on the sustainability framework set up by others (LGA SMT). The long-term benefits are not yet realized since the concept of sustainable design and construction is still new, and that this kind of work provides require the Contractor to explain how they will be achieved.

### *Large Group*

The results showed that the project was treated as one complete entity by the project team throughout its lifecycle. The LaGuardia Terminal Project Sustainability Manager discussed, "You could almost treat them as one-offs, but what is nice about Envision is that it is much more holistic, and the Terminal itself is treated as a piece of transit because people do not live in it. Yes, people are working there, but people are transiting through it, so it is nice... It is thinking of it as a hub, but it is not easy." This systems view enables the team to incorporate sustainability more quickly than having various teams work on separate components. The ORB SMT and NCB SMT noted that they could see how a specific component affects the entire project when everyone is working together. The LG SMT focused on their ability to see the project holistically and enable the Company to shift to a holistic thinking process and utilize a process with aspects of stakeholder engagement, resilience planning, and complete risk assessments. This thought process enabled the project team to utilize all the Envision credits throughout the design and construction phases to excel in meeting many industry-recognized and contract-required sustainability goals.

P3 project teams consist of members from every phase of the project life cycle and a sizeable portion of the community due to the larger footprint, leading to increased sustainable performance. The New Champlain Bridge Corridor Sustainability Manager said, "There was no need to have a communication plan based on transparency. We did it ... a project of that size would cause a lot of noise for all residents. The Mayor talked about the project as he was part of the project. There was a lot of [involvement with] the community; there was a lot of empowerment of the community ... there were public information sessions. Yes, but there was undoubtedly a good neighbor[hood] relation." Between the large project team to include the design-build Contractor (ORB SMT) and operations and maintenance contractor, the community, and affected businesses, there are more eyes on the project plans to (NCB SMT). Listening to and empowering all the stakeholders has resulted in more sustainable ideas presented and executed to the project team. Most of the stakeholders outside of the design-build team will invest in the project's future and integrate into the community on a scale not typical of other projects, which results in the increased sustainability and platinum verification award level.

P3 projects outperform projects delivered with other delivery methods due to the various amendments that the P3 structure has emphasized with project procurement. The structure of P3 contracts provides an easier path to sustainability for the Concessionaire than a Contractor working on a project with a different delivery method. The overwhelmingly influential

component of the P3 structure leading to the pronounced sustainability performance included all the stakeholders from the project's inception (NCB SMT). P3 projects include components that are not in other delivery methods, and the Concessionaires utilize these to meet sustainability objectives with much more success than projects delivered in other ways.

The interviews revealed that the project teams could outperform other delivery methods and reach the Envision platinum verification award level primarily due to the P3 contract's structure. Figure 4 shows the breakdown of topics discussed during the interviews that relate reaching Envision's platinum verification award level to the structure of the P3 delivery method.

The P3 projects studied incorporate life cycle considerations because of the systems thinking needed to execute this project and the Federal environmental permitting requirements. Any use of Federal money or land in the US and Canada requires a project to conduct assessments to determine the environmental impact of the project and explore alternatives. P3 projects build on that and incentivize the private partner to use lifecycle-design strategies to bundle the design, construction, and O&M into a single contract (Antillon et al., 2017, p. 8). Sustainability considerations are a by-product of the Envision Framework and the required Federal planning tools needed for infrastructure projects (McVoy et al., 2010, p. 472). Reviewing the alternatives related to environmental impact is a sustainable action and provides a clear path to review economic and social alternatives. The assessments enable P3 projects to outperform other project delivery methods because of the wide range of sustainable principles this touches. When measured by Envision, it covers many requirements in the Quality of Life, Leadership, and Climate and Risk sections, helping propel the project to a platinum verification.

### *Public Relations*

The Contractor or Concessionaire stands to gain the public relations implications and benefits by meeting the highest sustainability standards set by Envision motivate the Company and project to meet those goals. As the LaGuardia Terminal project team pointed out, the Concessionaires are there to prove that they can do the best job. As Companies see the benefits of sustainable P3 projects, they seek ways to build more resilient and sustainable infrastructure (Bradford et al., 2017, p. 225). P3s tend to provide better products for the purchaser because any failures beyond construction are the Concessionaires. Any reduced confidence in the Concessionaire leads to fewer Owners using this Company for infrastructure projects (Soomro & Zhang, 2015, p.9). Companies who want to move into the P3 project delivery method space need to ensure they continue to set themselves up for success. Companies like CH2M Hill [and the Port Authority of New York and New Jersey] are developing their processes to infuse Envision's Framework into their business practices to enable more sustainable decision making (Bradford et al., 2017, p. 228). The large size and cost of these P3 projects thrust them center stage in the infrastructure discussion. Companies only need to build their reputation by doing their best to meet the sustainability goals when they execute the project.

The long-term effects the project will have on the Contractor's Company was another motivation why the projects met sustainability objectives with great success. As the Ohio River Bridge Sustainability Manager notes, "they [the Contractors] are not going above and beyond their contracts' durability requirements, just to benefit the Owner's maintenance process further

down the line. Whereas a P3 Contractor [knows] that is me, I am going to have to deal with that maintenance problem later, so I am going to build it better now." Similarly, the LaGuardia Terminal Project Sustainability Manager stated, "creating those tools to be able to connect technical engineering to financial instruments and financial models and understanding lifecycle cost is a big one. Oftentimes, just the speed at which these assets need to be designed and built, lifecycle tends not to be as big of a focus as it should be. Furthermore, from what I have been told by a lot of agency folks, their operations and maintenance budgets dwarf their capital budgets." The ORB project's Contractors saw the public relations benefit for the Company (ORB SMT). The NCB project's Contractor saw the financial models, saw the potential upside to the sustainable construction choices, and wanted to set the Company for future success (NCB SMT). The Contractor's drive to ensure their Company outpaced other companies in any way possible regarding sustainability practices.

One of the primary reasons these P3 projects outperform other projects with different delivery methods and receive the Envision platinum verification award level is that their project teams want to do the best job maximizing everyone's goals. As described by the LG SMT, whether sustainable construction uses that term, value-add, or innovative, "they are all competing against each other, and they are trying to have a better product than the next person." This desire to do better also forces them to think about the entire lifecycle, the surrounding community, and the overall project impact. Whether using Envision or not, the product that comes out of the bid phase "is in a much better place for an Envision award." Other project delivery methods use their contract to maximize profits. The internal desire for the P3 project teams to meet the public and private goals and prove that their technologies outperform the competitors sums up why these P3 projects are achieving platinum verification award levels more frequently than other delivery methods.

### *Contract Length*

The P3 Concessionaire's involvement extends beyond the design and construction and into the operations and maintenance of an asset which drives them to incorporate quality into their planning. The long-term nature of the contract allows potential new customers to judge the outcomes of Concessionaire's work, driving up the Concessionaire's desire for quality as described in the East End Crossing project. Drivers for innovation in P3s included design freedom, collaborative working, risk transfer, and long-term commitment (Antillon et al., 2017, p. 4). Contractors think long-term when they are responsible for the service output of a project (Solheim-Kile & Wald, 2019, p. 2). The East End Crossing project team would not have met the same level of quality that they had if there was no long-term risk. As governments' perspectives shift to enable projects to be delivered using P3s, the long-term benefits and sustainability of using this method will be better realized (Zhang, 2005b, p. 7). Greece experienced more effective and sustainable projects using this P3 method, saving time, money, and resources (Kyvelou & Kokkoni, 2011, p. 13). The benchmark may be tough to measure against due to the long-term nature of the contract. The project will see changes in the requirements throughout the contract's life (Martinez & Walton, 2015, p. 231). The long-term exposure the Concessionaire's assume with P3 projects requires sustainable solutions more than other project delivery methods.

The opportunity the P3 project provides to allow the contractor freedom to operate with less stringent construction methods enabled the projects to excel when they incorporated sustainability into their plan. “A P3 contractor [will say] that is me. I will have to deal with the maintenance problem later, so I am going to build it better now,” said the LaGuardia Central Terminal Project Sustainability Manager. The ORB project was provided with performance specifications, allowing the ORB SMT to work with the design-build Contractor to meet the highest levels of sustainability and fulfill the contract. The NCB Project’s alternative design studies showed the NCB SMT that building a new bridge instead of overhauling the old bridge would provide a lot more opportunity to obtain various Envision credits. The freedom to operate within performance specifications allowed these projects to work their way to the platinum verification award level more easily.

While Envision is a system designed for all types and sizes of projects (“*Envision Sustainable*,” 2018, 7), the more significant value and timeline of the projects researched had more construction activities to impact. This size led to involving more stakeholders and allowed the projects to make more sustainable changes. The P3 structure and size are inherently innovative (Antillon et al., 2017, p. 3), leading to greater sustainability than other project delivery methods. The Concessionaires have maximum flexibility to achieve sustainability because Envision allows a broad range of evidence to prove sustainability achievements with the Framework (Gaughan, 2012, p. 1527). Many avenues existed for these projects to achieve and document their sustainable practices. The larger P3 projects more easily obtained the platinum verification because of the project's increased opportunities for incorporating sustainability.

*Other motivations*

This document review reinforced the written documents’ significant role in enabling P3 projects to outperform other projects with different delivery methods. Starting from the sustainability written requirements and environmental permitting process leads to a more comprehensive sustainability management plan, leading to a more sustainable project. As stated in the ORB Sustainability Management Plan, Technical Proposal Volume 2 page 34, “The SMP is reviewed and updated at all monthly ... team meetings to ensure it remains relevant, meets regulatory requirements and delivers [Owner’s] expectations.” The Sustainability Management Plan the Ohio River Bridge East End Crossing used is a one-stop shop for project executers. It is built on all the requirements before it ensures the project team can meet all the objectives.

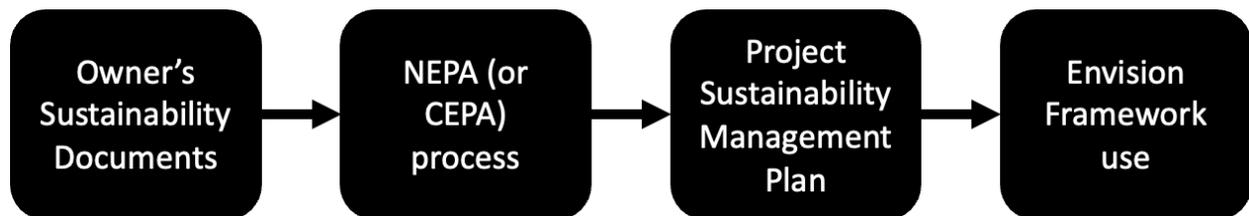


Figure 7: Typical project route to creating sustainability plans

Contractors and Concessionaires are required in some areas of the country to incorporate Envision's Framework. Project documents revealed that LaGuardia’s Owner directed using

Envision, the East End Crossing's Owner, required meeting sustainability performance specifications. The new Champlain Bridge's Owner had sustainability goals linked to environmental permitting wanted to expand. Companies are only as willing to enter P3s and reach sustainability goals if the local business practices support this type of contract (Zhang, 2005a, p. 73). Using Envision in jurisdictions with new staff, as seen in the Ohio River Bridge and New Champlain Bridge projects, requires continual training, often leading to increased sustainable development (Sheppard et al., 2019, p. 362). The use of Envision to direct the sustainability process for the New Champlain Bridge led to the Canadian Government's desire to continue the practice. Increasing training on the Envision Framework could lead to a better understanding of making sustainable decisions throughout the project (Shealy & McWhirter, 2017, p. 429). Using the Envision framework and receiving the platinum verification award was possible because each project had at least one funding source or Owner who required the project to measure the project's sustainability.

#### *How a project reaches platinum*

There are many reasons why P3 projects can reach Envision's platinum verification award level, understanding how a project reaches that verification level is the goal of exploring the Ohio River East End Crossing Project. Answering research question 3, how P3 projects reach platinum, will be completed by utilizing the interview in conjunction with the contract documents, owner documents, and NEPA documents.

Theme	Theory	Quote	Interview Frequency
NEPA and alternative assessments	Reviewing and addressing long-term concerns at the start of a project leads to increased sustainability (Shivakumar et al., 2014).	“[The project is] required by law to go through the NEPA process. That puts infrastructure projects [with a] federal regulatory requirements for planning evaluations in a very good position,” ORB SMT.	3
Including sustainability goals	P3 projects include value drivers that prioritize output-based specifications, introducing innovative solutions to a project that can yield favorable cost and quality impacts (DeCorla-Souza et al., 2017).	“as long as you meet this performance requirement, how you get there is up to you,” ORB SMT.	2
Use of Envision	Since decision criteria for P3 projects shift from cost control to including sustainability goals providing clear goals enabled the project team to prioritize their most essential items (Behr, 2014, p. 744).	“We all have sustainability teams, Sustainability Management Plan ... it was the Contractor's sustainability lead who did the research [into Envision],”	3

Table 6: Theory on why projects achieve sustainability

### *NEPA*

The ORB project took advantage of the NEPA process by leveraging the alternative analyses completed for the environmental permits and fulfilled the environmental aspect of sustainability. The alternatives addressed in the Environmental Impact Statement (EIS) varied to address different environmental impacts and assess various cost-saving proposals (Indiana Finance Authority Bridges Library). “[The project is] required by law to go through the NEPA process ... that puts infrastructure projects or public projects that have federal regulatory requirements for planning evaluations in a very, very good position,” said the ORB SMT. The

Owner and Contractor used these analyses and the process to generate them to meet the Envision framework's assessment requirements.

The Federally mandated NEPA process at the start of the Ohio River Bridge projects was the first step the Project Team took towards building a highly sustainable project. As the Ohio River bridge Sustainability Team described, the detailed analysis of all the alternatives' environmental impacts was a part of the Environmental Impact Statement approved by the Federal Government. The NEPA process provided the team's first holistic project view, leading to the project's success. As Shivakumar et al. (2014) explained, reviewing and addressing long-term concerns at the start of a project leads to increased sustainability. While this would not be the last complete view the Project Team would evaluate, the NEPA process demonstrated the benefit of this practice to the Project Team. This would ensure they would look at the project entirely throughout its lifecycle to ensure it met the highest sustainability standards.

#### *Including sustainability goals*

The Owner (Indiana Finance Authority) wrote the contract for the P3 Contractor to meet the sustainability goals they determined were most effective for the performance of the contract. The ORB SMT noted a conversation with the Owner, "as long as you meet this performance requirement, how you get there is up to you," the Contractor further discussed that "the idea of encouraging innovation [was] on the part of the P3 developer ... with the contractual requirements, but also seeing an opportunity to clearly document the good things that the project was going to achieve." The project's Request for Qualification (RFQ) (Indiana Finance Authority RFQ) required that any interested party "demonstrates an understanding of and sound approach to the operations, maintenance, and total life cycle costing." This requirement would later be clarified in the Public-Private Agreement (PPA) by listing the main objectives of the performance requirements for sustainability, as seen in Table D (Indiana Finance Authority PPA). The parameters provided to the Contractor were limited in specificity to provide them with the risk and the ability to meet the requirements in the best way possible.

<b><i>Sustainability Management Plan Requirements</i></b>	
<b>Sustainability Goals</b>	<b>Sustainability Objectives</b>
Safety	Maintain a safe environment for the public and workers.
Optimize lifecycle costs	Use durable materials.
	Use recyclable materials.
	Minimize waste.
	Consider the impact of ice and snow control materials.
Provide economic opportunity	Achieve diverse workforce goals.
	Create DBE, small business opportunities, and subcontracting.
	Consider the source of materials based on sustainability principles.
Protects and conserve environmental resources	Use of recycled, recyclable, and waste materials.
	Use of green infrastructure stormwater management design principles.
	Protect, conserve, and enhance all environmentally sensitive areas.
	Minimize and eliminate waste.
	Optimize energy efficiency in construction and operations.
Improve cross-river accessibility and mobility	Consider access and amenities along multi-use pathways.
	Provide and enhance the level of service.
	Communicate the goals and achievements of the sustainability plan with the public.
Proactive engagement with the public	Include sustainability goals, efforts, and activities in the Public Involvement Plan.

Table 7: ORB EEC Public-private Agreement Sustainability Requirements (Indiana Finance)

The Ohio River Bridge East End Crossing project relied on the inclusion of sustainability requirements in the contract documents to achieve the platinum verification award level. Chasing and ultimately meeting the Owner’s goals provided the means and motivation for this project to achieve a high level of sustainability. P3 projects include value drivers that prioritize output-based specifications, introducing innovative solutions to a project that can yield favorable cost and quality impacts (DeCorla-Souza et al., 2017, p. 266). The sustainability goals were met for the project's entire life because of their inclusion in the contract documents (Sheane & Woodruff, 2017, p. 108). Performance specifications were used with the sustainability goals to afford the Concessionaire flexibility to meet those goals as they saw fit (Sheane & Woodruff, 2017, p. 102). Using the P3 approach with the sustainability performance specifications encouraged the project team to incorporate sustainable aspects to the best of their ability.

*The use of Envision*

The Concessionaire benefited from the Owner by providing them with clear sustainability goals to better understand the path towards sustainability success and achieve a high verification level. A critical component of P3s is sharing goals and risks (Kyvelou & Kokkoni, 2011, p. 5). Since decision criteria for P3 projects are shifting from cost control to including sustainability goals (Behr, 2014, p. 744), providing clear goals enabled the project team to prioritize their most essential items. Coming together to meet the goals and mitigate the risks tied to long-term maintenance and the climate was necessary to show each other their commitment to sustainability. The project team pursued an Envision verification because of the buy-in from the sustainability team and senior management across the entire project (Sheane & Woodruff, 2017, p. 104). Since the plans were deeply rooted in sustainability, the project received Envision’s top sustainability award by working together to minimize the risks associated with the project.

<b><u>Envision Award Verification Score: Ohio River Bridge East End Crossing</u></b>			
	<i>Points Received</i>	<i>Points Possible</i>	<i>%</i>
Quality of Life (QL) 13 Credits	165	181	91%
Leadership (LD) 10 Credits	99	121	82%
Resource Allocation (RA) 14 Credits	33	182	18%
Natural World (NW) 15 Credits	93	203	46%
Climate and Risk (CR) 8 Credits	70	122	57%
<b>OVERALL SCORE:</b>	460	809	57%

Table 8: Ohio River Bridge East End Crossing Envision score

The Owner’s commitment to sustainability and community engagement led to 82% attainment in the Leadership category. The ORB SMT said that the long-term savings the project will experience are due to the long-term savings that additional work can offer the Concessionaire, “You are more likely to consider how much you invest in it in your first cost to save more down the line.” They also noted that “the product performed incredibly well in the LD and QL categories because those environmental impact statement documents cover so much of the QL and LD-related requirements from stakeholder engagement.” The commitment derived from the Owner’s clear sustainability goals and the up-front investments in the project drove this project to receive the platinum verification award level through collaborative design, delivery, decision-making, and long-term monitoring, ultimately leading to increased project resiliency.

The main driver for the construction of this bridge was to improve the accessibility of cross-river transportation. The inclusion of alternative transportation options significantly improved the quality of life in the area. It enabled a high score in the QL category, an outcome directly tied to the East End Crossing Project Team’s desire to increase mobility by leaning on community engagement to do it the right way. Envision has been very adaptable to complex projects containing multiple infrastructure components (Sheane & Woodruff, 2017, p. 103). Increasing the area's mobility required the project to do so in multiple ways due to the existence of multimodal residents. The need for the project to focus on vehicle mobility and pedestrian, cyclist, and public transportation permitted it to meet many sustainability goals.

The PPA’s objectives of increasing mobility and proactive engagement with the community were the driving forces that enabled the project to achieve 91% of the credits related to Quality of Life, fulfilling the social component of sustainability. As the ORB SMT noted, “infrastructure projects or public projects that have federal regulatory requirements with respect to planning evaluations in a very good position from the LD and QL category perspective, and so the risk has been just building in the technical requirements of the remaining credits into your

project agreement.” The high score achieved in the QL category is evidence of the Owner’s correct use and the Contractor’s effective implementation of the PPA objectives alongside the Federal requirements.

The Ohio River Bridge East End Crossing experienced the most significant benefit from implementing community engagement practices from the project's onset due to the additional input other stakeholders provided. Before using Envision, the project team held sustainability charettes with all the stakeholders to develop sustainability goals, objectives, and performance measures for bid packages and the Technical Provisions (Sheane & Woodruff, 2017, p. 102). The project team can use the Envision guidance manual to initiate or refine discussions and steer decisions related to sustainability because of the manual’s flexibility (Sheane & Woodruff, 2017, p. 109). Early and frequent engagement with the community ensured that the project met the correct goals, maximizing its sustainability. This engagement allowed the project to meet many of the requirements for Envision verification. It provided the project team with the most impactful solutions to the problem that this bridge would solve.

The alternative assessments required as a part of the Environmental Impact Statement and the NEPA process aided the project’s successes in protecting and preserving wetlands, farmland, aquifers, Greenfields, stormwater, and groundwater.

“We are all required to go through an intense and expansive environmental planning phase ... a lot of that protection of aquatic and land-based habitats and water quality and all that stuff is covered in it. All of that is covered in the environmental impact statements, and ... I think the projects are becoming more able to achieve those credits as there is more focus on long-term carbon performance,” said the ORB SMT.

The requirements NEPA imposed on the project ensured that the project began tracking its’ impact on the surrounding environment during the project’s early stages.

Transferring risk to the Contractor in a P3 project delivery due to the changing climate is a shared priority throughout a project’s lifecycle and can increase the project’s overall resiliency. “The structure of the contract is important, but also the priorities of the client have a great influence on which of, in particular, the climate and resilience credits can be achieved ... trying to require or develop a full resilience risk assessment and mitigation plan is going to be more likely if you are in a P3 project because, again, the person who just designs and builds the things does not really care much about long-term carbon performance or resilience to climate change or any of that stuff because they do not have to be.” The lifecycle and risk assessment of the climate on this project due to the PPA’s requirement that Concessionaires demonstrated an understanding of the total lifecycle effects of this project. This overall risk mitigation approach played a significant role throughout the project and helped ensure the project obtained the Envision platinum verification award level.

The road to sustainability was not free of obstacles. The project did experience some issues when it attempted to reach heightened levels of sustainability related to Resource Allocation. The project's ability to conserve water, the local environment, and other resources did not appear to contribute to the project's overall sustainability and other aspects. Utilizing

Envision showed the Project Team that the RA category is challenging for most projects due to the tracking required by additional contractors early in the design phase. The difficulty in fulfilling the RA credits can lead to projects working to achieve other more manageable credits (Bradford et al., 2017, p. 232). Tracking all the required resources from the start of a project ensures Envision is used to its fullest potential (Sheane & Woodruff, 2017, 110); however, it requires subcontractors to have a detailed planning phase. The Ohio River Bridge's inability to track all the required items was due to the lack of experience of their Subcontractors. Overcoming the lack of tracking resources from the project's start was not possible. Other components would need to improve their sustainability performance to maximize the sustainability of the project.

P3 projects have leaped, providing money to fill the government funding gap to bridging the sustainability gap Users and Owners are looking to fill. Responsibly taking on this funding and financing risk requires the Contractors to have previous experience in this field. P3 studies initially focused on cost and schedule, which are commonly mismanaged with other procurement methods (Martinez & Walton, 2015, p. 227). They have shifted to focus on collaboration, investment sharing, and transparency. (Solheim-Kile & Wald, 2019, p. 1). Academic literature and government reports have proven P3s benefit from private sector innovation, specifically enhancing their long-term lifecycle performance (Antillon et al., 2017, pp. 2-10). The financial and economic components of the project are the backbone of the project's sustainability because if there is not enough money to complete the project, it will never serve its intended purpose. Envision's focus on the project's lifecycle made it compatible with the scope and structure of this P3 project which included a 35-year operating term (Sheane & Woodruff, 2017, p. 108). Projects incorporated sustainability to mitigate the risk of potential failures and the cost of those failures and bring them both down to acceptable levels (Brown, 2015, p. 116). The Ohio River Bridge East End Crossing Team utilized their experience with P3 projects to ensure they could responsibly meet the financial responsibility as best as possible to provide a sustainable project that outperformed other delivery methods.

Early collaboration ensures that information is clear and that everyone communicates appropriately throughout the project. The Ohio River Bridge Project Team utilized their experience to bring the entire team together early on. As Solheim-Kyle mentioned in 2019, a project is more likely to reach its specific goals due to the decreased confusion with information. Companies such as CH2M developed tools to help project team members better analyze alternatives through a lens of resiliency and sustainability (Bradford et al., 2017, p. 230). P3 projects offer the ability for project teams to benefit from the best of the public and private sectors. The private sector brings flexibility, innovation, and efficiency (Mitchell, 1990, p. 34). Early and frequent collaboration exhibited in the Ohio River Bridge East End Crossing enabled the project team to quickly and easily shift from meeting the project's sustainability goals to meeting Envision's platinum verification award level requirements.

The collaborative process the Concessionaire used to bring all the stakeholders together from the onset due to the use of the P3 contract structure worked to the project's benefit because everyone could see how they affected each other. The inclusion of a design decision-making process that enhances project integration improves the project's lifecycle if included early on (Antillon et al., 2018, p. 11 and Trop, 2017, p. 711). Working together ensures the

Concessionaire feels like the Owner and will work to the same end as trust is continually built (Solheim-Kile & Wald, 2019, pp. 3-8). The feeling of inclusion motivated everyone on the team to do the best job they could. The integrated nature of the P3 project leads to the project team members focusing on creating a more strategic lifecycle design (Antillon et al., 2018, p. 4). The Ohio River Bridge East End Crossing project ensured collaboration was a significant priority for the project team. This work led to them working toward a highly sustainable solution and achieving the platinum verification level.

The Contractor possessed an existing capability to incorporate sustainability into the process, which led to their superior performance in meeting the contract requirements. “We all have sustainability teams, Sustainability Management Plan ... it was the Contractor's sustainability lead who did the research [into Envision],” said the ORB SMT. The Contractor's Sustainability Management Team was able to analyze the requirements for the contract and link them to Envision. The Contractor's team capitalized on this opportunity and linked all the existing contractual requirements to Envision credits to receive the highest score they could.

The resource allocation section proved to be difficult for the Concessionaire to fulfill this large project due to the size of the project and the number of Subcontractors needed to complete the work. This category contains stringent requirements on reducing and reusing resources throughout the construction and operation phases. The project's sustainability team had trouble meeting the objective of these credits because of the buy-in required from other contractors, “We [had] more challenges with the RA category because it requires documentation by contractors [throughout the project].” The lifecycle project material and energy consumption require early buy-in from all Stakeholders. Due to the relative size of some Subcontractors, the consumption was not able to be tracked from the onset. The lack of tracking led to the RA section not contributing to the overall sustainability measured by the Envision verification framework.

The East End Crossing project highlights an owner's success who sought to procure a sustainably designed, constructed, and operated asset. Achieving sustainability was a success with this P3 contract and the associated collaboration because of the experienced Concessionaire. “I think the motivation was partially complying with the contractual requirements, but also seeing an opportunity to clearly document the good things that the project was going to achieve anyway,” said the ORB SMT. Utilizing a Contractor with experience in sustainability and cradle-to-grave management of assets with many other Stakeholders maximized the ability. It ensured the project reached Envision's platinum verification award level.

## **Conclusion**

This research has expanded or reinforced knowledge of why project teams measure their sustainability, why P3 projects are more likely to received Envision's highest (platinum) verification level, and how a P3 project could receive Envision's highest (platinum) verification level.

The findings showed that P3 project teams measured sustainability and scored highly with Envision's Framework for similar reasons. Due to the additional risk, the project teams managed an asset through the O&M phase, and the teams were more likely to spend money and build a quality product. Mitigating the risk assumed in the O&M phase was done through additional investment and more stringent QA and QC requirements throughout the design and construction phases. The long-term structure of the P3 contract was a primary driver to measure sustainability as it helps prove the contract met all performance requirements. The long-term structure also aided in achieving the Envision platinum verification award level because it forced the Concessionaire to build sustainably to have a minimal impact on the environment and last longer.

Project teams also scored highly with Envision's Framework because they wanted to do the best job possible. The relatively new sustainable environment that P3 projects operate in will continue to grow as more infrastructure projects turn to the P3 delivery method to solve their funding and infrastructure problems. For these companies to continue to operate in this space, they need to continue to prove they are continuously innovative in their pursuit of sustainability. The Concessionaires are no longer just construction companies trying to deliver a project under budget and on time. As the LaGuardia Team put it, they are building systems, and "they are all competing against each other, and they are trying to have a better product than the next person."

The decision to measure and chase sustainability is a costly one that requires buy-in from all the stakeholders. Each of the paths taken by the project teams utilized resources that were not organic to the project management team. With an already large gap between project cost and available funding, the additional costs associated with the sustainability activities and verification process need to benefit the entity paying for the asset. Persuading owners to fund this was a relatively easy hurdle to overcome due to each already utilizing a sustainability management plan. That is because those plans served the same end goal as Envision, "to influence owners, planners, engineers, and other stakeholders to increase the resiliency and sustainability of physical infrastructure."

The Owner of the Ohio River Bridge East End Crossing project, the Indiana Finance Authority, ensured that sustainability goals played a part in shaping the RFP and Technical Specifications of the project's contract. The environmental permitting process required by NEPA and the sustainability charettes held throughout the project's lifetime as required by the Owner played vital roles in the project's platinum award verification. These two processes played the most considerable role in fulfilling the Envision requirements, including complete lifecycle assessments, community engagement, assessing project alternatives, and analyzing energy and resource usage. The project achieved the platinum verification award level because of the work it accomplished during those two evolutions.

Overall the structure of the P3 contracts provided the Concessionaires with the most motivation to construct sustainable assets. The follow-up motivations were the written requirements of the contract and local laws, as well as the Contractor's reasons.

### *Limitations*

The research had limited data points because it focused on exploring how Envision's relatively new Framework influenced P3 projects' evolutions. Envision was created approximately ten years ago and has evaluated projects for the past six years. As more projects use Envision and it matures, the sample size available for this research will grow and provide a better cross-sectional view of P3 projects and sustainability.

The limited data available on these projects' O&M phases does not provide researchers any information about the effectiveness of the decision points during the design and construction phases. The projects reviewed had a minimum of 35-year concession periods. The decisions explored in this research were limited to the start of the project. They were all assumed to be valid throughout the project's life. As projects reach the end of their concession periods, more data will be available to understand the full effect of these sustainable decisions.

This research focused on the decision-making process of P3 projects. To better understand the unique characteristics of this process, conducting a comparison against non-P3 methods is needed. Including other project delivery methods and their decision-making process would lead to a more comprehensive understanding of the differences and benefits P3 projects have concerning sustainability.

### *Future Research*

Interviews conducted with the project teams occurred after the design and construction phases. To gain a complete picture for future research, working with the project team from the onset of a project's conception would provide the researchers a better insight into the decisions made in real-time. The timing of collecting data may also surface other factors related to decision-making lost in interviews conducted after the fact.

Following a project through its concession period or to its end-of-life can provide more data points. The exploration of each decision's effect on the project through the O&M phase can provide a better understanding of its actual impact. Tracking the projects' ability to assess how well it is kept on track to meet sustainability goals can provide more insight into each decision's effectiveness.

Researching projects with a similar scope but different procurement methods will distinguish which positive factors are solely related to the P3 procured projects. The inclusion of non-P3 project delivery methods will provide a comprehensive understanding of how decisions affect each type of project delivery method.

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Appendix A. Approved IRB Letter



**Division of Scholarly Integrity and  
Research Compliance**  
Institutional Review Board  
North End Center, Suite 4120 (MC 0497)  
300 Turner Street NW  
Blacksburg, Virginia 24061  
540/231-3732  
irb@vt.edu  
<http://www.research.vt.edu/sirc/hrpp>

**MEMORANDUM**

**DATE:** February 26, 2021  
**TO:** Michael J Garvin, Tripp Shealy III, Nicolas Vicchio  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires October 29, 2024)  
**PROTOCOL TITLE:** Analyzing Sustainable Decision Making in Public-Private Partnerships Utilizing ISI's Envision Framework  
**IRB NUMBER:** 20-970

Effective February 26, 2021, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104 (d) category(ies) 2(ii),4(i).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<https://secure.research.vt.edu/external/irb/responsibilities.htm>

(Please review responsibilities before beginning your research.)

**PROTOCOL INFORMATION:**

Determined As: **Exempt, under 45 CFR 46.104(d) category(ies) 2(ii),4(i)**  
Protocol Determination Date: **February 26, 2021**

**ASSOCIATED FUNDING:**

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

*Invent the Future*

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY  
*An equal opportunity, affirmative action institution*

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

\* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this protocol is to cover any other grant proposals, please contact the HRPP office ([irb@vt.edu](mailto:irb@vt.edu)) immediately.

Appendix B. Interview Transcriptions

<u>Interviewee</u>	<u>Time</u>	<u>Quote</u>
1	01:37	In a P3 contract, there's a single point of contact for the entirety of the design, construction and operational period, or at least for a certain part of the operational life cycle of the project.
1	01:37	Agreement doesn't get very specific about how the owner wants the asset to be maintained and what state it needs to be in when it is handed back to the agency or whoever the owner is, then it's like a free-for-all and the funding agency won't have any control over how they get it back when the operational period of the P3 contract is over.
1	01:37	P3 project is having that, being able to define those performance and maintenance and operational requirements within the overall contract versus a design/bid/build or design build where once it's constructed, they send it back to the agency, and the reality is that usually that entity doesn't really care how durable it is or how resilient it is, because they don't have to deal with it.
1	04:28	You're more likely to consider how much you invest in it in your first cost in order to save more down the line. So from a life cycle costing perspective.
1	04:28	They're not going to go above and beyond durability requirements of their contracts, <b>just to</b> benefit the owner's maintenance process further down the line. Whereas a P3 contractor is like, "That's me, I'm going to have to deal with that maintenance problem later, so I'm going to do it, I'm going to build it better now.
1	06:30	Including sustainability, there was kind of a sense that some stuff needed to be prescriptive, but some stuff was like, "Well, as long as you meet this performance requirement, how you get there is up to you", and I do recall in discussions with the owner, the idea of encouraging innovation on the part of the P3 developer proposers was part of that thinking that as long as the performance requirements.
1	07:51	And then in the sustainability requirements, we did include some mandatory credit in LEED and Envision and then gave a minimum certification or award level, and in between the mandatory credits and the minimum certification level, the P3 developer could build their own plan basically.
1	07:51	But you could make mandatory some of these operational credits as well in your project agreement, if that's what the client wanted to do and because the P3 developer has the purview over the operational phase.
1	10:34	We're all required to go through an intense and expansive environmental planning phase.
1	10:34	I don't think it existed when the product agreement was written, the product performed incredibly well in the leadership and quality of life categories, because those environmental impact statements documents cover so much of the quality of life and leadership-related requirements from stakeholder engagement.
1	11:45	And see what proportion of them are required by law to go through the NEPA process and any other.

1	11:45	So, I think that that puts infrastructure projects or public projects that have federal regulatory requirements with respect to planning evaluations in a very, very good position from the LD and QL category.
1	13:12	The RA category because it requires documentation by contractors and the climate and risk section or resilience section is... It's becoming more, I think the projects are becoming more able to achieve those credits as there's more focus on long-term carbon performance and depends on where the product is also like our non-US clients tend to be a little more interested in doing environmental.
1	13:57	I think the projects are becoming more able to achieve those credits as there's more focus on long-term carbon performance and depends on where the product is also like our non-US clients tend to be a little more interested in doing environmental LCAs and stuff like that. But I do think coming back to the P3 component of it, trying to require or develop a full resilience risk assessment and mitigation plan is going to be more likely if you're in a P3 project because again.
1	15:20	And so I think the structure of the contract is important, but also the priorities of the client have a great influence on which of in particular, the climate and resilience credits can be achieved.
1	15:20	Vulnerability evaluation and maybe not a full-fledged mitigation plan, but they're already ahead of the game compared to some of our other clients and so that is assisting with our ability to do well in the CR section.
1	17:40	Anecdotally, I would say it's the owners of the agencies that are driving it more than the responding design build or P3 contractors.
1	18:00	We all have sustainability teams, Sustainability Management Plan, We brought the idea to them.
1	19:28	It just sort of depends on the maturity of the agency, the location of the agency, as you pointed out, the awareness of risks that are in there, their region specifically.
1	19:28	To educate them and to demonstrate the value in order to get it into some of the RFPs.
1	21:04	Sustainability Management Plan into the contract was a desirable thing. And not just making a plan, but measuring it with some kind of industry accepted third-party rating system. And so that's about as specific as I can be because I wasn't present. And I don't know what was the convincing factor. I know that someone at Parsons or the Parsons team had conversations with the owner and were able to make the pitch.
1	21:04	It was the contractor's sustainability lead who did the research.
1	22:45	With the contractual requirements, but also seeing an opportunity to clearly document the good things that the project was going to achieve any way.
1	24:09	It's somewhat of a PR motivation.
1	28:35	But Vinci Construction I would probably say was the initial driver and a very key participant in selecting and then making sure the Envision application was done correctly, ... But the initial enthusiasm and commitment came from Vinci, which was the design-build contractor.

1	29:38	The contractual requirement came from the top down, from the owners, from the INDOT side, so that the idea that you had to use a third-party rating system was written into the contract, but yes, the selection of the initial proposal to use Envision as that third-party system came from Vinci. But Vinci also somehow must have.
1	29:38	Vinci was responsible within the design-build team for writing the Sustainability Management Plan, and therefore within that purview was completing the Envision application.
1	30:36	NEPA requirements that drove those, and it just happened to be that Envision gave you points for some of the NEPA requirements.
1	31:21	Because of all the environmental impact analyses that had occurred, but I do think there were things like I think earthwork balance, for example. I'm trying to think of other more in the construction practices area, because while we weren't able to get as many of the resource allocation points as we would have liked.
1	34:52	I mean it's certainly a priority in our sort of corporate marketing.
1	35:37	Envision covers everything. We don't need to do LEED." But everyone likes LEED and the general public recognizes it as a stamp of approval for sustainability. So that's also like a two-fold.
1	35:37	But I certainly see our clients asking for it more. And whenever we put a proposal in, I try to work with the business development teams to at least include some blurb about what we do for sustainability and the value add we see for applying Envision and other third-party rating systems.
1	38:26	It depends on who the client is, to be honest ... So in a recent proposal that I was helping out with, the client has a mandate to be the most sustainable port.
1	42:00	I definitely lean more towards Envision, given the nature of the work that Parsons does, and as I mentioned earlier, if they're building... If they are horizontal and vertical components to a project, and they're sort of integrated in the same system, then I'm more inclined to just say, let's do Envision because it covers it all and we don't have to break it down into these little discreet parts and talk about their performance outside of the whole.
1	50:07	Do all six these projects like achieve, always achieve these credits and is it because of NEPA.
2	09:02	So what was nice about Envision is we were able to capitalize on the Port Authority's sustainable building guidelines, the Port Authority's sustainable infrastructure guidelines, LEED, and use Envision to tie all that together under one umbrella.
2	11:08	Hey, the contract requires that we do this stuff." We just took advantage of that position and said, "Let's do even more." So we used Envision early on to create.
2	11:08	You could almost treat them as one-offs, but what's nice about Envision is that it's much more holistic and the terminal itself is treated as a piece of transit, because people don't live in it. Yes, there's people working in there, but people are transiting through it, so it's a really nice.

2	12:49	Because of my involvement with ISI and also having been on mega projects before, but if you don't have that experience, it's really hard. And I've often heard of people describe the Envision process as reverse engineering.
2	13:39	How do we ingrain Envision into our project?" It's not easy. And part of it has to do with the way... And you guys are on the right path, looking at contract language and procurement, ways to procure a project, because a lot of the struggle is, or historically has been, the way projects are sliced up into terms of planning and design, and it goes out for a hard bid, and then it's bid-build, and you have an operator and maintaining contractor.
2	15:53	Oftentimes, just the speed at which these assets need to be designed and built, lifecycle tends to not be as big of a focus as it should be. And from what I've been told by a lot of agency folks, their operations and maintenance budgets dwarf their capital budgets.
2	18:34	I need a certain guarantee that I'm going to have a certain level of performance, and at the end of the concession period, I'm going to need a certain level of comfort that you're going to hand me back an asset that is up to a certain standard.
2	19:34	With ways to really easily translate what it is we're thinking of doing from a sustainability standpoint back into performance criteria and financial models
2	23:10	They like that, and they like to work in an environment where there are known constraints and known coefficients and known loads and known ways to approach a problem.
2	25:19	Communication and flat out leadership at the Port Authority level and at LaGuardia Gateway Partners, and at the Skanska-Walsh JV, you had strong leadership that said, "We want this." ... so leadership is key.
2	27:19	To pay for Envision and people's time to pull the documentation together and pay for the award is no big thing." What they were really concerned about, and I think it's the right thing to be thinking, is, "If we're going to select 30 credits to go after in this project, what is that going to cost or save the project by doing those things?"
2	29:45	The Port Authority level, because if you look at particularly leadership and the climate categories, there's so much that needs to be done way upfront that if you start the Envision process in design, or even worse, in construction, there's no chance you're getting higher levels of achievement in a lot of those categories, because you would have had to do that sometimes years prior to you getting started.
2	32:06	The teams that are going to chase that work are holistic in their thinking. They're going into the project already doing some level of stakeholder engagement, doing some level of resilience planning and trying to... It's a much different process than a strict bid-build.

2	35:24	So whether or not they're doing it under the word sustainability or they're doing it under the words "value-add", or they're doing it under the words "innovative ... they're all competing against each other and they're trying to have a better product than the next person ... And like I said, that's so often overlooked because people look to, and it makes sense, they look to the design process and the construction process in O&M, but even just the product that you get coming out of the bid phase is in a better place for an Envision award than a typical bid-build situation.
2	37:46	Or I should say Envision takes advantage of... And I don't mean that negatively, it's just the way it works. The NEPA process supports a lot of the Envision work.
2	39:09	A lot of the EA, and the NEPA process in general, you have to say that the project will commit to certain things. And a lot of times, that commitment may be to go for a LEED designation. I've yet to see a NEPA process come out and require a need to go for Envision, but that could be worth looking at. I don't know. I haven't come across that yet. But there's definitely some truth to that. because we're talking about the same things.
3	02:40	But you need to know that prior to 2015, there was a proposal with terms of reference that were made, and in those terms of reference, we knew that Envision needed to be... Envision needed to be obtained prior the end of the project. So of course, it was into the different... How do you say? Schedule of the project.
3	03:56	So there was a big team under this project and I was specifically dedicated to Envision but at the same time, because Envision has a lot of work at the beginning of the project and the end of the project, between that I gave a big hand on the environmental management system.
3	07:18	For the next now 25 years in Montreal. Not only do we have the design built at the same time, which is a win-win for Envision and sustainability, but we also have in hand all the condition to make sure that maintenance will follow the top of that we are promising in Envision.
3	07:51	The former Champlain Bridge was built only 50 years ago, was out of date, not up to standard for seismic risk. This does not have any place for cars to stop.
3	08:55	Building a new bridge beside the former bridge would be economically more interesting than restoring and repairing and repairing the former Champlain Bridge. And this study was really important because for Envision, it really gave me a lot of points and different credit, because this is a basic justification of how come such an important infrastructure.
3	11:04	You need a maintenance plan and you need to make sure that the component that will not last for 125 years, that they will be replaced. Like the lights on this bridge will not last for 125 years. That's impossible. Neither the roads, and neither... But the structure, the basic structure of the bridge will last for 125 years.
3	11:56	The people working on the condition of the project just said, they had an order from the Government of Canada to make this bridge more sustainable.
3	14:28	We have a large territory in human and in natural environment.

3	14:28	Have a smallest budget and smallest location, so it does not impact as much sensitive component as this big bridge.
3	15:19	Oh, I'm not so sure. It's the first time, maybe the verifier will be really stringent and we won't have the points, so let's try for a higher score, to make sure that we don't have to redo it.
3	16:25	This is how I sell Envision now, I'm really telling them: " Listen, I know your design is almost finished, but let's go and assess Envision. Let's look where the footprint of your project is using the Envision framework."
3	17:28	The government of Canada and pursued by SSL. So it's not SSL who decided the 125 years old, but it's SSL who developed the design and who insured the development of the sustainability plan to make sure that the bridge keeps it's promise for the 125 years.
3	19:52	We really have stringent condition for environment. Such as for dust, which was not only the legal... The basis... The basic legal requirement for dust, but that was put higher, because the people just think, "What does Envision ask?"
3	20:53	The CEO of the company and you say, "Okay, I'm in big trouble, the CEO... " I'm a mouse in this company, this is something. And then I run to my director, which is a fabulous person. And so I run to him and say, "Okay, we were in trouble. They want platinum. I just don't know how to get platinum for this bridge.
3	23:34	[Very stringent contract requirements] ... They really enhanced the requirement with the Envision framework.
3	25:42	We have an organization in Quebec, which is called "Velo Quebec" which means Cycling Quebec, and this organization is making a lot of, is a stakeholder, major stakeholder for all bridges, and they make a lot of pressure to make sure that all the new infrastructures that are being build or all restored infrastructure would include the cycle path on it, and not only a cycle path, it needs to have certain slope degree that is cyclable.
3	28:58	It's not only enhancing public space, it's creating new public space. Those were not initiated by us. It was initiated, of course, by the terms of... By the reference of the... The terms of reference. Yeah, not the project. Yeah, so it's a mix between those two. Here is something that was an obligation.
3	31:33	You have here an example of a decision made because the construction had the responsibility for the next 25 years. So it's a financial decision not to try to find a solution of that because we are the owner of this bridge for the next 25 years, so we made sure we didn't have to do maintenance with the cable.
3	33:36	Climatic. You know they have all those kind of course risk of terrorism, risk of accident, traffic disruption. They also have strike... Risk due to strikes, so that basically, it's a risk assessment matrix.

3	35:19	So with the ice, was the ice, was it cheaper to construct it that way, or cheaper on the operation and maintenance side and reduction of accidents? ... Well, the accident, you have to de-ice your bridge. ... So because of accident, so the cheapest way is to put traditional salt.
3	36:37	So the embodied carbon assessment is really a tool for my other project as well that I try to push because instead of just looking at the financial impact of the project, you're looking also at the carbon footprint impact, which is one of the priority of our government and priority also about EPA, like how can we reduce our impact. So this is really interesting, but it was not used for Champlain Bridge, their decision.
3	40:38	Actually, New York City, California and Quebec have a lot of stringent obligation about environment, which helps us respect and correspond to some of the Envision credit. Some of the credit are easy for us, because the regulation is aligned with the Envision framework.
3	41:36	Yeah, so this is a candy credit and depending on the legislation where you are using Envision, some credit may be easier to get because the legislation is there for you, which is okay because... This is how it work.
3	44:29	And we did more than they wanted because our communication team really worked just good. ... There was no need to have a communication plan based on transparency. We did it, and it win. And it's pretty rare that a project of that size, that would be caused a lot of noises to all residents. Those people they hear trucks, noise, dust, traffic, and they could not go on the bridge at any time because you know, that's a construction, you know, all noises with it, with mobility. But the Mayor talked for the project as he was part of the project. There was a lot of promise about the community, there was a lot of empowerment of the community, because... Because the project led the place for those people of the community to get into the project. So there was public information session. Yes, but there was certainly a good neighbor relation.
3	46:21	The project led the place for those people of the community to get into the project. So there was public information session. Yes, but there was certainly a good neighbor relation ... We had really and, you know, we live in a world where there's a lot of negative people bashing on everything and we did not have that so clearly in this project. ... actually, the results of air quality and noise are directly into the website. You can go and see after. You can go and see on the project is there.
3	49:17	I find that for my other project, I really try to make the clients aware that with community engagement strategy, identifying who are your stakeholders, what they do, what they need to receive as the message, when they need to receive it, what kind of message should be given to them. Do we need to inform or to communicate or to identify needs before construction, during planning? When do we need to communicate them? So I find that communicate engagement plan gives, has an incidence.
3	50:47	I'm talking about sustainability and how our different activity may have an impact on this footprint.

3	52:41	In 25 years, we need to show success for this vegetation. So the work is done with a lot of prevention, because if those trees are dying, the cost of replacement is on the shoulder of the SSL. It's not on the shoulder of whoever you give the hat after.
3	53:52	There's a lot of precaution also to make sure that when this 25 years period will be end, we need to make sure that we're doing correct maintenance because there will be an audit and we need... We have some standard to have in 25 years to make sure that the structure is as it was supposed to be. So there's a lot of advantage having... Because the responsibility and the money comes on the owner, then you take care. You take care of your... It's our role, we better take care of it, because if not, then we will pay more and we'll make less money. So that's the P3 advantage for sure.
3	53:52	Were there more stakeholders too at the table for this project compare to the average project? I don't know, but there was a lot of stakeholders.
3	59:35	And this is my job now, fighting to work with a client that say, "Hey listen, you do what you want, but your project will be verified." But if you ask for more stringent condition into construction, then you can be maybe gold, up to you. ... it takes leadership.