The Role of Public-Private Partnerships in Large-Scale Renewable Energy Projects

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Abstract

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Public-private partnerships (PPPs) in renewable energy offer an opportunity for the public and private sectors to pool resources and share risks to complete utility-scale projects that would not be feasible otherwise. Though documented in other countries, PPPs are not widely used in the United States to their full potential, as such, research on renewable energy PPPs in the United States is lacking. As attention to PPPs grows with the national interest in renewable energy, determining factors that help predict success of such partnerships—as well as defining what a successful partnership is—becomes important to practitioners in the public and private sectors that are interested in implementing PPPs for future renewable energy projects. Drawing from primary (interviews) and secondary (reports, news articles) sources, this article discusses a comprehensive definition of PPPs in the context of renewable energy, offers a framework for predicting the success of a partnership, and contributes to the evolution of the term "success".

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"Scientific evidence for warming of the climate system is unequivocal."

-Intergovernmental Panel on Climate Change (Alley et al., 2007)

Introduction

As climate change is a recognized trend in the scientific community, efforts to mitigate greenhouse gas emissions, particularly carbon dioxide, become an ever-more important topic for discussion (NASA, 2017). Though emissions come from a variety of sources, the largest source (by economic sector) is due to burning fossil fuels for electricity production, as 30% of all emissions can be attributed to this (US EPA, 2014). In the United States, the use of coal as an energy source has decreased, while the use of nuclear and renewable energy sources has increased to be about 34% in 2015; a gradual shift in energy sources is underway (U.S. Energy Information Administration, 2017). As such, renewable energy has become an important source for the future of American energy.

Increasing the use of renewable energy is a priority across various sectors in the U.S., indeed, the SunShot program (initiated by the U.S. Department of Energy) aims to make solar power cost competitive with fossil fuels by 2020 (Ulrich, 2016). This goal is complemented by the fact that technological advancements in the solar infrastructure sector have decreased the costs of solar panels by an average of 60% since 2010, and the costs are estimated to continue to drop (Ulrich, 2016). However, political agendas and changing priorities in the White House have slowed the adoption of any major federal-level policies, especially with this year's proposed dismantling of Obama's Clean Power Plan (DiChristopher, 2017).

Novel institutional arrangements, such as public-private partnerships (PPPs), are on their way to becoming prominent players in the future of energy procurement, and offer an opportunity to address gaps in current climate change policy. Though PPPs will be defined more

fully in the following section, any arrangement that includes the public and private sectors working together is considered a PPP. PPPs are widely used in Europe, Australia, and other countries as a method to pay for large-scale projects, especially where infrastructure is part of the end goal (PwC, 2016). Accordingly, this trend is moving its way into the United States.

As is the problem with trends, the use of the term PPP is often conflated with programs that do not fall under the strict definition of public-private partnerships, such as instances where the government contracts a project out to a company, or pure privatization schemes (Hodge & Greve, 2010; Roberts & Siemiatycki, 2015; Schaeffer & Loveridge, 2002). Accordingly, current research on PPPs includes some material which is not technically under the umbrella of public-private partnerships. Research that does examine public-private partnerships in the United States—especially in solar energy—is rather limited, because the arrangement in the young solar energy sector has not been established for a long period of time. As such, existing research about the effectiveness of true PPPs in increasing usage of solar power remains largely fragmented, as using PPPs in the energy sector is an idea that has only recently gained popularity.

This paper is split into four broad categories: the first aims to comprehensively define public-private partnerships in the context of renewable energy, the second discusses a framework for determining if a PPP has been successful, as well as the definition of such success, the third compares three PPP cases in the context of this framework, and the fourth offers conclusions and opportunities for future studies. Here, I aim to fill some of the gaps in solar energy PPP research, provide a comprehensive definition of PPPs, and describe a framework for determining the success of PPPs in renewable energy. Ultimately, as the U.S. moves into the future of renewable energy, the PPP arrangement should be considered as a viable option to advance national renewable energy goals.

Chapter One: Defining Public Private Partnerships

In defining PPPs, there is one characteristic consistent in the literature: there is not one definition. One reason this is true is due to the fact that there are no laws at the national level pertaining to PPPs; each state is responsible for their own definition and associated laws (Reitz & Custos, 2010). Additionally, some sources report overuse of the term, further complicating the definition (Hodge & Greve, 2010; Roberts & Siemiatycki, 2015; Schaeffer & Loveridge, 2002). However, there are enough consistencies across the literature to create a workable definition: a contract between the public and private sectors is the core aspect of a PPP, specifically, one "which allows more private sector participation than is traditional" (Reitz & Custos, 2010). Additionally, a PPP refers to an arrangement "whereby the resources, risks and rewards of both the public agency and private company are combined to provide greater efficiency, better access to capital, and improved compliance with a range of government regulations regarding the environment and workplace" (Naditz, 2017). Broadly, a PPP is a "working arrangement based on a mutual commitment...between a public sector organization with any organization outside of the public sector" (Bovaird 2004, page 200, cited in (Roberts & Siemiatycki, 2015). Ultimately, the degree of shared aspects (risk, financial responsibility, and activities) define an arrangement as a PPP, as well as determine the type of PPP in question. The simplest way to think about PPPs is along a continuum. Minow (2003) provides a continuum to describe all potential interactions between the public and private sector (Figure 1).

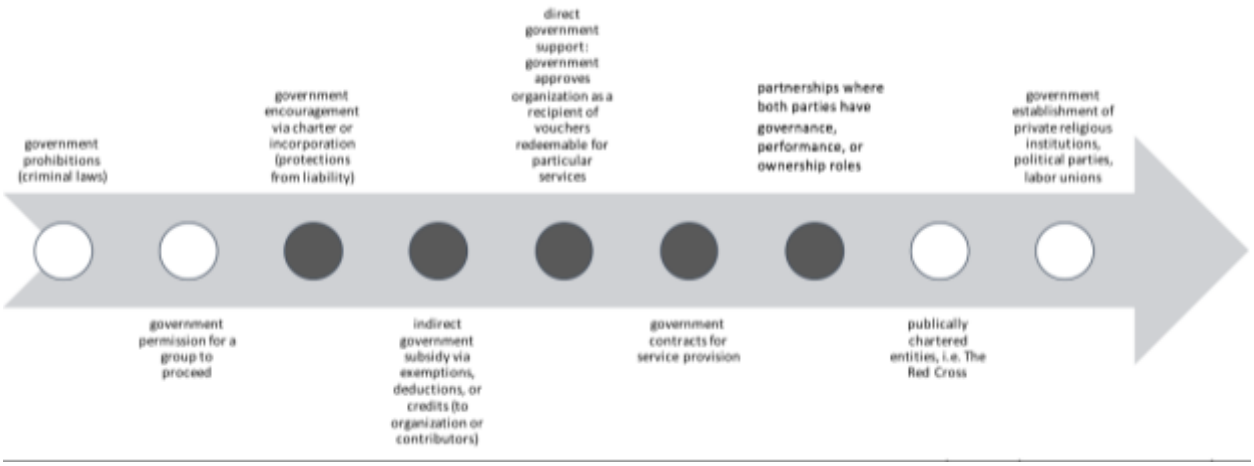

Figure 1: Continuum of all possible public-private interactions. Relationships that fall under the PPP umbrella denoted by filled circle (adapted from Minow, 2003).

In this continuum, which includes the most distant relationship between public and private sectors—criminal laws—to the government establishment of political parties (which is not legal in the United States), potential relationships are categorized based on the private sector's degree of closeness to the government (Minow, 2003). The cases discussed here fall under the furthermost right type of PPP: partnerships where both parties have governance, performance, or ownership roles. This figure is useful to categorize interactions between the public and private sectors, but a true partnership also has three other key factors: risk, ownership of activities, and financial responsibility or investment.

1.1 Key Shared Aspects

1.1.1 *Risk*

In engaging in a PPP, a major incentive is risk sharing; in fact, this is an integral characteristic of PPPs (Osei-Kyei & Chan, 2015; Schaeffer & Loveridge, 2002). Shared risks between the public and private sector are typically political—the risk a project "might not come

to fruition"—and "acts of God": risks associated with events cannot be planned or prepared for, such as intense weather events or terrorist attacks (Sabol & Puentes, 2014). The public sector is typically responsible for regulatory or legislative risk – the responsibility comes with keeping any projects up to date with new laws – and well as the risk of government default: risk of not being able to pay for a project, and acknowledgement that the public sector is responsible for any agreed-upon payments (Sabol & Puentes, 2014). The private sector risk is largely financial, depending on the type of PPP (discussed subsequently).

1.1.2 Financial Responsibility/Ownership of Activities

Categorizing PPPs depends on the number of activities one or the other sector is responsible for. For example, the Bid/Build type of PPP, as identified by Brookings, is a PPP in which the public sector is responsible for the majority of activities in the project (identifying the infrastructure need, prosing the solution, designing the project, operation and maintenance, and ownership); the only activity the private sector is responsible for is construction (Table 1).

Table 1: Brookings Metropolitan Infrastructure Initiative's classification of PPPs, organized by sectoral ownership of activities (Sabol & Puentes, 2014)

Different Levels of Private Sector Engagement in PPP Contracts							
	Identify Infrastructure Need	**Propose Solution**	**Project Design**	**Project Financing**	**Construction**	**Operation/ Maintenance**	**Ownership**
Bid/Build	Public Sector				Private Sector	Public Sector	
Design/Build	Public Sector		Private Sector	Public Sector	Private Sector	Public Sector	
Design/Build/Finance	Public Sector		Private Sector			Public Sector	
Design/Build/Finance/ Operate/Maintain	Public Sector		Private Sector				Public Sector
Source: Brookings analysis and expert interviews							

As the private sector becomes increasingly involved in the project, the type of PPP changes. This classification is consistent across the literature, save the ultimate ownership of the project. While Sabol & Puentes specify the necessity of eventual public ownership for a project to be a true PPP, Yescombe asserts the final ownership being in public or private hold is merely a "legal technicality", and does not "affect the commercial and financial reality that PPP facilities are public-sector assets which cannot normally be sold off to the private sector" (Yescombe, 2011). This case, in which the private sector is the eventual owner of the project, only occurs in the Build-Own-Operate (BOO) contract, as defined by Yescombe (2011). This type of PPP is identical to Sabol & Puentes' (2014) Design/Build/Finance/Operate/Maintain type of project, except the ownership does not revert to the public sector at the end of the contract. This is the type of project discussed in this study.

The sector responsible for financing each activity in the project varies by the PPP in question, but all projects defined as public-private partnerships involve some sort of division of financial responsibility. The financial responsibility is highest for the public sector in Bid/Build projects, and lowest in Design/Build/Finance/Operate/ Maintain projects. The sector responsible for each activity is also responsible for financing of the project, so that particular sector is also subject to "the possibility of unexpected interest rate fluctuations in the capital markets that may undermine the debt structure of the project" (Sabol & Puentes, 2014).

Chapter 2: Framework

Following a robust literature review, I have created a framework to help predict or determine the likelihood of a public-private partnership's success. Critical success factors (CSFs) are factors that have been shown to make a PPP more likely to be successful. Though having

these factors present in a PPP does not guarantee the partnership will be successful, research on past PPPs has shown the presence of some factors to increase the likelihood of success. These factors can be split into internal and external factors: internal factors are under the jurisdiction of the participating parties, while external factors are situational aspects beyond the control of just the participating parties.

2.1 External factors

External factors are those that may be influenced by the public and private sectors engaging in the PPP, but are ultimately decided by other entities, global trends or other forces beyond the partnership's control. As such, external factors may best be used as a guide to choosing the best time to initiate a PPP rather than determinants of a PPP's success. Examples of external factors from the secondary literature include a favorable investment environment, political support, and community support, including NGOs, media, unions, and civil societies (Osei-Kyei & Chan, 2015). However, note that community support can be improved by adjusting transparency (an internal factor, discussed below).

Primary sources confirm the importance of external factors to the success of the project, because without a supportive environment, public-private partnerships are unlikely to be viable at all. The "project...[must be] actually required and important in the market...something that could be reasonably believed would be unlikely to happen without the public participation". If the project might be able to happen without the public sector, "it's going to be subject to a lot of scrutiny, or people might holler about it being too advantageous, or... an unnecessary or unfair subsidy."(Olson, 2017). If the project is required by the market and a good candidate for a partnership, another important factor is the "legislation rights—you need to have Congress or some other body—create the laws that enable participation to happen in the first place" (Cannon,

2017). To standardize these external factors, all cases were chosen from the state of California, where they are in the same regulatory environment and under the same renewable energy mandate (see 3.1.1 for an elaboration).

If all these factors make a partnership possible, the next factor that must be present is "from the corporate side...a willingness to work with governmental agencies", as well as "some tolerance for capitalism [from the government] and bureaucracy [from the private sector] in the respective parties" (Cannon, 2017; Fellman, 2017) Conversely, the government may also aid the private company, via presidential directive, as Cannon (2017) explained: "the BLM also had [a directive] to be more accommodating to private enterprise...cutting through the red tape". Setting the stage for a partnership is very important, as evidenced by both practitioners in the field and the academic literature.

In contrast, internal factors are directly affected by the parties participating in the PPP. Internal factors were gathered from the literature review as well as from primary data sources (interviews), both of which will be discussed in turn for each success factor in the framework.

2.2 Internal factors

2.2.1 Appropriate Risk Allocation

Appropriate risk allocation is one of the drives and a key component of PPP formation. There are a multitude of ways to ensure appropriate risk allocation, but first the risks must be clearly defined, and that risks beyond the private sector's control are held by the public sector (Osei-Kyei & Chan, 2015). Risk allocation is typically defined in a contractual agreement. Contracts should define risk allocation in the following agreements and terms of the contract: concession agreement, shareholder agreement, design and construct contact, loan agreement,

insurance agreement, supply agreement, operation agreement, offtake agreement, and guarantees/comfort letters (X. Zhang & Asce, 2005). This list is an example of where legal considerations should take place while outlining a PPP contract. If risk is not appropriately allocated in each of these legal considerations, the project may be primed for failure. A complete contract will also include a carefully outlined method for dispute resolution, as "all contingencies cannot be foreseen" (NCPPP, 2017).

Though gaining access to contracts between the government and private companies is nearly impossible, interviews with each sector leant some insight to the appropriate risk allocation factor. Independent of the project, many PPP practitioners agree on the importance of all factors listed in the success framework. Appropriate risk allocation is both the most important of the success factors: "if the risk isn't allocated properly, then there's a fail. Either the private company won't make the investment, or the government won't back the project" (Fellman, 2017). Appropriate risk allocation is so important that it's actually considered "a baseline assumption. And so it goes back to, if you didn't have them in place, nobody would lend to the project. And if nobody else is lending to the project, the DOE will not lend." (Cannon, 2017). Additionally, Olson (2017) asserts that "each participant needs to be allocated the risk that is most naturally able to bear", adding that "private parties...[are] the ones trying to make money... so they need to bear more of the risks". In any case, appropriate risk allocation is integral to the viability of a public-private partnership.

2.2.2. Strong Technical Capacity

Typically, internal factors are under the control of both the public and private partners, though there are instances in which one sector is more apt to create a favorable environment for

PPP creation. One such situation occurs when one firm is responsible for design, one for contracting, and another for building. Here, it is important that this private concessionaire consortium has aligned their goals and expectations for the partnership with the public sector, as well as have strong technical capacity: a goal that is largely under the control of the private sector (though the public sector could indicate their preference for this arrangement). If the consortium is well-organized and equipped to take on the demands of the project, the project has a higher likelihood of being successful (Osei-Kyei & Chan, 2015; X. Zhang & Asce, 2005). An unorganized, fragmented consortium of private partners will hinder the success of the partnership. Factors that are largely under the control of the public sector include creating a statutory environment that is supportive of PPPs; best case practices suggest a competitive bidding process is typically the most successful, though unsolicited proposals can also be beneficial in identifying novel ways to approach societal needs (NCPPP, 2017).

The importance of a strong private consortium was also confirmed in the primary data, as "private parties' competency is really important", and, in fact, determines if the public sector will work with the private company in the first place (Olson, 2017). The Department of Energy, the primary funder of the cases discussed here, monitors the "counterparties" in the project, as well as researches the company before they decide to loan out large sums of money. Thus, the DOE is hesitant to work with startups, because they have to determine their "potential longevity"—that is, how long the company has been around and how much longer it seems it will be in business—to be sure the investment is protected (Olson, 2017). Interestingly, the DOE won't guarantee a loan "[until] right before construction....during the pre-construction period, there is no formalized information-sharing process, because the DOE is not officially a party yet. That doesn't mean there isn't informal information sharing... you have to explain why the DOE should participate in

[the project], and how exciting of an opportunity it is for them." (Cannon, 2017). Because of this delay in funding, the strength of the private consortium is mostly the responsibility of the private sector, and mostly takes place as they arrange all the private companies during the construction process. "Even during the development period, there's only one person that speaks... on behalf of the project, and there's only one person that answers the questions for the DOE. So you avoid responses that aren't consistent with each other." (Cannon, 2017). Thus, the strength of the private consortium is tested when the DOE decides it might purse a project with a certain company, and during the construction process, during which all the private companies have to coordinate enough for the lead developer to be able to communicate with the DOE effectively.

2.2.3 *Transparency*

The last widely-cited factor that contributes to success in a PPP contract is a transparent process (NCPPP, 2017; Osei-Kyei & Chan, 2015). This is important for both the partners engaging in the project, as it allows each party to work together to clarify any points in the contract, but also for external stakeholders in the project. Because external parties may be affected by the partnership, open communication about the project is important to avoid misconceptions in the greater societal community, which could lead to lack of support (NCPPP, 2017). Thus, transparency in the project formation can help create favorable political and community support environments, though transparency cannot guarantee support from external parties.

This sentiment is echoed by the primary data, but depending on which sector is asked, transparency is important in different stages of the project. The two aspects of transparency are between the project and the general public and within the partnership itself. In a public-private

partnership, the public has a higher interest than would be expected for a project carried out completely by a private company, due to the involvement of taxpayer dollars. However, because a private company is involved, transparency between the partnership and the general public is "tricky because [the project contains] business-sensitive information" (Olson, 2017). The most important information that can be shared with the public include "what the risks to the government and the taxpayer are, and also how much money's on the line", which is especially important in an emerging market (such as renewable energy), where "corruption can be much more of a problem". As such, "great effort [is] given to the pricing structure" to ensure the success of a project (Olson, 2017).

Consistent across interviews, practitioners state the best way to address this issue is "community engagement and [allowing] people ask...questions, and having a clear place online where that data can be found" (Olson, 2017). In fact, some community engagement is built into the process, during the permitting process "they have hearings and stuff like that...it's an information opportunity for the project to go and present to the county, but it's an open hearing so people can come complain...or if they wanted to voice their opinions, typically against the project..." Again, community engagement is the answer: "to get those permits, yeah, you absolutely need local support. Basically, the best way to get that is through involvement with the community." (Cannon, 2017). Ultimately, transparency is especially important in large-scale renewable energy projects, because "these types of projects...consume a lot of acreage, and they are especially visible....And so the visual impact does certainly allow for people to see it, very directly. I guess typically... nobody calls up their county and says, you know, I love this solar project. Those things never happen, right, they call up their county or their town and say "I hate it" for whatever reason. So, you know, it's an adverse selection process, right, the only ones that

are going to complain... so that's the only kind of people you are interacting with." (Cannon, 2017). This idea was echoed by Fellman (2017): "when you're building a big project in a community, you definitely want to work with them."

Internal transparency between partners was found to be built into the contract creation process, because "to get [a potential partner] excited about the opportunity... to get them to... be a participant in the project... obviously you have to share with them a lot of information" (Cannon, 2017). However, Fellman (2017) notes "that information is competitively sensitive, so if you look at transparency, I'm not sure how far beyond that extends beyond what is essential", meaning that the information sharing process between partners is kept to only the necessary information to get participation in the project. As such, internal transparency was not a factor that had variation between the cases, because a project would not be possible without it.

2. 3 Defining success

The definition of success is comprised of both performance-based measures (outputs) and community-based measures (outcomes). Performance-based measures include determining if the project worked, if it delivered the outputs to the level and extent and standard to which they were contractually defined, and if it was delivered on time and within budget (Roberts & Siemiatycki, 2015). These outputs of the project can be broadly defined as the services or products directly produced by the program itself (Koontz & Thomas, 2012). Though these metrics are useful for identifying if a project has been successful in a conventional sense, the literature has been moving away from this framework that only addresses the outputs of a project to one that actually analyzes outcomes of the project.

Outcomes of the project can be broadly defined as "events or conditions that occur outside the program" (Koontz & Thomas, 2012). These usually depend on the type of program

under consideration, but all outcomes are subject to outside factors aside from the internal aspects of the project (e.g. weather, the economy, or other factors that are not in the project implementer's control). Though Koontz & Thomas (2012) describe how to measure success across multiple types of programs, the grant and cost-sharing program category encompasses all the cases discussed here. The output, outcome, and their intermediates for this type of project are summarized in Table 2. The intermediate output and the end output are both contained in the contracts written for the project, which specifies the necessary energy output, but the intermediate outcome and the end outcome are not part of the contractual process. The intermediate outcome—behavior of partners—contributes to the outcome of a societal improvement if the partners behave in a way that is perceived to be beneficial by the larger public.

Table 2: Measures of success for grant programs (adapted from Koontz & Thomas, 2012).

Intermediate output	End Output	Intermediate Outcome	End Outcome
Contractual agreements	Watts of energy produced	Behavior of partners	Improvement of societal, economic, or environmental conditions

Following the conventional tradition, PPP practitioners tended to focus solely on the intermediate output and the output of the project to determine success: in short, if the project met contractual agreements, it was considered successful (Cannon, 2017; Olson, 2017; Fellman, 2017; Rundquist, 2017). However, aligning with the outcome-based model, Cannon (2017) mentioned another aspect of success aside from the contractual agreement: "the project is meeting its contractual obligations....and, at the same time, [if it's] working for the community". This aligns with the end outcome measure of success, in that societal impact is important to a

successful project, as well. “Success”, as a concept, is multidimensional, in that its definition changes as the project progresses. Cannon (2017) adds that success of each part of the project can also be determined, and offers an example during the infancy of a project: “During the operation...you’re very concerned about employee safety...even during construction, ...one of the first things we always reported on was safety at the site...what we are doing to address safety and to make it better, and what sort of incidents we have had during that month period. ...if anything is wrong from a safety perspective, I don’t think anyone would call that a successful project.” (Cannon, 2017).

Both the primary and secondary data agree that meeting contractual obligations is absolutely necessary for a project to be considered successful, but the current evolution of the term has moved to encompass the impact on the community (Koontz & Thomas, 2012). As such, determining the success of each of the cases discussed in this study follows Table 2, and goes beyond the simple measure of meeting the contractual agreements.

Chapter Three: Case Studies

3.1 Cases

3.1.1 *Case Selection*

All cases are from the state of California, in order to ensure comparability. As such, all cases discussed are under the same federal and state incentives. California, specifically, has mandated that all utilities in the state procure at least 50% of their electricity from renewable sources by 2030 with Senate Bill 350 in 2015 (Union of Concerned Scientists, 2016). Additionally, all projects examined have received around $1-2 billion dollars from the Department of Energy through their Loan Programs Office (loan program Title XVII). Federal

funding for this program came from the American Recovery and Reinvestment Act of 2009 (California Energy Commission, 2015). Though the three selected cases are similar, a major difference is the kind of technology they employ. One program, Ivanpah, employs concentrating solar technology, and the other two—California Valley Solar Ranch and Desert Sunlight—use photovoltaic technology (discussed in 3.2.1).

3.1.2 *Comparability*

Though all the cases exist under similar conditions—similar PPP structures, similar loan amounts, similar policy landscape—one main difference between Ivanpah and the other two cases is the technology used at the plant. Ivanpah is a concentrating solar plant (CSP), while California Valley Solar Ranch and Desert Sunlight employ photovoltaic (PV) technology. CSP has one major advantage over PV: CSP has the potential for energy storage, as it works by using sunlight to create heat, which can be used to convert water to steam (similar to fossil fuel-based energy plants); current PV technology does not offer a storage option, and can only provide energy while the sun is shining (S. Zhang, 2016a). However, PV has a distinct advantage over CSP, in that it is able to be scaled for both residential and commercial-size use, which CSP is really only suitable for utility-level energy generation (Mohaghegh, 2015). However, both types of technology typically take up more land than traditional fossil fuel generators, and require many materials (rare earth metals for PV, iron and cement for CSP). There is not an easy answer to which technology is better (see Mohaghegh for a succinct explanation of the technologies and their individual advantages and disadvantages), but they are different. One difficulty in comparing PPPs that employ different solar technologies is that this may skew the determination of success, as some issues may be unique to a specific kind of technology; the risks associated

with CSP may not be comparable to those associated with PV. However, as the success framework was conceptualized to apply to a variety of large-scale renewable energy projects, comparing two types of solar technology is useful, and contributes to the current literature.

3.2 Case descriptions

3.2.1 *Ivanpah Concentrating Solar Power Plant*

At 3,400 acres, Ivanpah Solar Electric Generating System is the largest concentrating solar power project in the world. Ivanpah uses hundreds of sun-tracking mirrors (heliostats) to heat a 459-foot tall tower of hot water, the steam of which drives a turbine, generating electricity (Davidson, 2014). This $2.2 billion dollar project was supported through the Department of Energy, which granted a $1.6 billion dollar loan, as well as $535 million from the U.S. Treasury, instead of the 30% investment tax credit (Danko, 2015). The six square mile plant is located on public land, which is managed by the US Department of the Interior's Bureau of Land Management. Private partners include Google, NRG Energy, which is also the majority owner, and BrightSource Energy, which also developed the project. The contractor was Bechtel Engineering, and the power purchasers are Pacific Gas & Electric, who purchase 2/3 of the generated power, and Southern California Edison, who purchase the remaining 1/3 (Danko, 2015; Davidson, 2014).

3.2.2 *Desert Sunlight*

Desert Sunlight is the largest PV solar farm in the world—4,000 acres—and employs ground-mounted PV technology (First Solar, 2017; Goldenstein, 2015). The 550 MW project is owned by NextEra Energy, General Electric and & Sumitomo of America, and was supported by

a $1.5 billion dollar partial loan guarantee from the Department of Energy's Loan Program Office. Desert Sunlight is located in Riverside County, California, on federal land managed by the Bureau of Land Management, and power from the plant will be sold to Pacific Gas & Electric and Southern California Edison via a power purchase agreement (PPA) (Renewable Energy World, 2011). Desert Sunlight is the most productive of the plants located in inland California (Danelski, 2016).

3.2.3 *California Valley Solar Ranch*

The California Valley Solar Ranch is one of the world's largest utility-level PV plants and is located in San Luis Obispo, California. Ten sun-tracking solar arrays take up 1,500 acres, while the remainder acreage of the project site is reserved for conservation purposes (NRG Energy, 2013). The energy generated—250 MW—was purchased in a long-term PPA with Pacific Gas & Electric. The Ranch is owned by NRG, and was supported by a $1.2 billion loan guarantee from the Department of Energy.

3.3 Methods

Collection of data followed a triangulation technique, defined by Yeasmin and Rahman as a "combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct" (156, 2012). Triangulation was used in that primary data was collected in the form of interviews, and secondary data was collected in the form of news reports, data published by both the public and private sectors, and other secondary sources. As interviews are known to have "severe limitations, which means they cannot be relied upon as the sole methodology", secondary sources were used to reinforce the

primary data that fit into the success framework (Lilleker, 208, 2003). Interviews were used because they have been documented to fill gaps in data, provide data unavailable from other sources, and is considered to be more efficient in qualitative data collection when compared to other methods (focus groups, surveys) (Harvey, 2010; Lilleker, 2003). Interviews complemented secondary data that was compiled from the previously mentioned sources.

3.3.1 *Primary Data (Interviews)*

The following methods have been reviewed by the University of Washington Human Subjects Committee, and have found to be exempt (Category 2) from the federal human subjects regulations, including the requirement for IRB approval and continuing review.

The interviews for this project were conducted in a mixed method style. Following the elite interviewing methods of Dexter (2006) and Harvey (2010), as well as the techniques for interviewing experts outlined in Meuser & Nagel (2006), semi-structured interviews were conducted via phone, recorded, transcribed, and analyzed. Interviewees were generally selected via the "Contact Us" section on each website, and interviewing techniques were drawn from elite and expert interviewing advice, including establishing rapport, maintaining a professional tone, and ensuring ethical behavior in my methods. Challenges of elite interviews range from gaining access to the interviewee, as well as questions of power and gender dynamics during the interview. Data from these interviews was used to justify the information outlined in Table 4 in the comparison of the cases. Detailed descriptions of all aspects of the interviews previously mentioned, including best practices and challenges associated with elite interviews, analysis, and general methodology can be found in Appendix 2, and complete transcripts of each interview can be found in the Appendix 3.

Four total interviews were conducted for this project. Of the possible sampling frame, these interviews represent a small fraction, as interviews could have been conducted with every private company that was involved at any of the different stages of the project (planning, design, construction, contracting, etc), as well as with every government employee at the federal, state, and local levels. However, to represent perceptions at the most macro-level of both the public and private sectors, only the top officials were interviewed. All interviewees discussed solar power project PPPs in the $1-2 billion dollar range, but the private sector also discussed their company's specific project. The two government employees represented a state and national level government perspective, and the two private company employees represented the three cases discussed in this study, as NRG was involved in two of the three cases (Table 3). Contact with other public sector interviewees through private sector communication was attempted, but many of these requests went unanswered. Additionally, high turnover rate and lack of documentation of project personnel on reports contributed significantly to the difficulty in finding appropriate interviewees. The interviewees and their affiliations are summarized below.

Table 3: Interviewees for primary data collection

Name	*Title and entity represented*	*Topics/project(s) discussed*
Dale Rundquist	Compliance Project Manager, California Energy Commission	All energy projects permitted in California
Lars Olson	Energy Project Finance Portfolio Manager, US Department of Energy	All large-scale energy projects funded by DOE
Diane Fellman	Vice President, West Governmental Affairs, NRG Energy	Ivanpah, California Valley Solar Ranch
Bill Cannon	General Manager, Senior Vice President: Environment and Infrastructure Group, Sumitomo of America	Desert Sunlight

3.3.2 *Secondary Data: Definitions and Framework*

Secondary sources of data were used to compile information about public-private partnerships, including the definition and measures of success, in order to create a framework of determining success for public-private partnerships in large-scale renewable energy projects. According to Gupta (2011), a literature review using secondary sources will help the researcher "gain a fuller view of what other researchers have discovered through their investigations, as well as point to areas that still need to be addressed, identify causal linkages that help explain [the] hypothesis, conceptualize and measure key concepts, and identify data sources" (192). As such, my secondary literature review began with defining, in detail, what a public-private partnership is. The majority of these sources were peer-reviewed journal articles, with the exception of reports from think tank research organizations, such as Brookings. Next, I defined what a successful PPP is, according to the literature, and created a framework of the three most important factors of success ("critical success factors"). Because the majority of sources for these definitions were from peer-reviewed journal articles, these sources were assumed to be largely unbiased.

3.3.3 *Secondary Data: External Transparency and Community Perception*

When the peer-reviewed literature had been exhausted, I turned to reports from the company, the governmental counterpart that worked on the project, and news media articles. Though these sources pertained to the individual cases, there was also a question of bias. Gupta (2011) warns "data may contain deliberate biases stemming from ideological positions or vested interests" (195). In the case of multi-million-dollar renewable energy projects, it is fair to assume that the companies and government entities that contributed (in some cases, taxpayer dollars) to

such large-scale projects may have an interest in representing their work positively. As such, caution should be exercised when reporting data from these sources, but, they are the only data available for individual projects. When online publications (blogs, newspapers, reports from third parties) were used, the same hesitancy to take the reports as fact was present, as many of these sources were from entities that had a clear ideological position on the issue, such as environmental conservation groups, or renewable energy advocates.

To operationalize external transparency, I determined what kind of information the partners involved in the project had published—in a free and easily available way—for the general public. To gather this data, a Google search was conducted with a search query of the complete name of the project ("Ivanpah concentrating solar power plant", rather than just "Ivanpah"). Google was used with the expectation that this is most accessible for the general populace. Partners that kept their websites updated with recent information about the project, its issues, and mitigation attempts and plans were considered to have transparency present. Those that failed to mention any environmental issues and/or mitigation attempts to address such issues constituted a rating of "absent" for external transparency. All sources that were published during and after the inception and construction of the project were considered, and the list of publications, their source, and the link to the website are located in Appendix 3.1.

To operationalize community perception, which was used to gauge the community support for the project, a similar Google search (query term: "Ivanpah concentrating solar power plant news", time period: from the inception of the project to when this thesis was written) was conducted to determine how the community felt about these projects. Stories that applied to all three projects—e.g. negative stories about solar power in general, or against government loan programs for renewable energy—were ignored, because they applied to all three projects.

Additionally, stories with obvious bias—e.g. articles published on conspiracy theory websites—were also excluded from the results. To determine community support, the ratio of negative news stories to neutral or positive news stories was determined, with the assumption that published stories would reflect the general feeling of the community about the project. A story was rated positive if it touted the environmental benefits beyond the energy savings, and discussed the positive environmental benefits of installation; a story was rated neutral if it reported metrics and facts about construction, or acknowledged both the environmental issues and mitigation measures that had been taken; and a story was negative if it only discussed issues with the project without acknowledging benefits, or insinuated that it had been a mistake or waste of money. All stories, their rating, and links for each project are located in Appendix 3.2.

3.4 Results

Each case is contrasted to the success factors as identified in the literature review and through primary data collection. These values were appropriated based on the reports from the literature view and other sources mentioned in the methods section.

Table 4: Results

Case	***Appropriate Risk Allocation***	***Strong Private Consortium***	***Transparency***	***Success***
Ivanpah	Present	Present	Internal: Present External: Absent	Met contract: Yes Community approval: No
Desert Sunlight	Present	Present	Internal: Present External: Present	Met contract: Yes Community approval: Yes
California Valley Solar Ranch	Present	Present	Internal: Present External: Present	Met contract: Yes Community approval: Yes

3.4.1 *Risk Allocation, Strong Private Consortium, and Internal Transparency*

As mentioned previously, appropriate risk allocation and a strong private consortium are considered to be essential factors in PPP creation, and are considered by practitioners to be baseline assumptions of PPPs (Cannon, 2017; Fellman, 2017; Rundquist, 2017). Additionally, internal transparency is necessary for project creation, as partners will not work together if they don't have adequate information about the other members of the partnership (Cannon, 2017; Fellman, 2017). As such, internal transparency is also considered a baseline attribute of the PPP structure. These baseline assumptions were not found to have any variance across cases, thus, could not be used to explain the level of success for each project.

3.4.2 *External Transparency*

However, there was variance across cases in external transparency, as Ivanpah was found to lack external transparency, while California Valley Solar Ranch and Desert Sunlight were found to have external transparency present. Considering that Ivanpah's websites have not been updated since 2013 (BrightSource Energy, 2013), the National Renewable Energy Laboratory page for Ivanpah has not been updated since 2014 (National Renewable Energy Laboratory, 2014), and the Department of Energy page for Ivanpah has not been updated since March 2015 (Department of Energy, 2015), transparency for current information was absent. Additionally, though myriad news stories detail numerous environmental issues with Ivanpah, none of the environmental concerns or mitigation attempts are stated on any official Ivanpah websites (from either the public or private partners). Community engagement – potential mitigation for a lack of external transparency—was complicated by the fact that "Ivanpah doesn't really have a

community around it, so it was mostly state and federal [participants]" (Fellman, 2017). This lack of transparency led to a poor community prreception of the project (see 3.4.3).

California Valley Solar Ranch was found to have external transparency, because information about potential issues with the solar ranch (use of water resources, biodiversity concerns), are addressed on the project's homepages (Bechtel, 2016; Total, 2017). Additionally, to address other environmental concerns—including the presence of endangered San Joaquin kit fox and giant kangaroo rats on the site—private partners worked with the environmental NGO Defenders of Wildlife to come to agreements on how environmental risk could be mitigated, and even added 9,000 acres to the required 17,000 acres of land for conservation, removed 30 miles of fencing to accommodate animal movement, and agreed to finance some land purchase for conservation purposes (Defenders of Wildlife, 2011). Lastly, SunPower created a YouTube video to distribute to stakeholders that explains some of these environmental milestones of the California Valley Solar Ranch (SunPower, 2012). Unlike Ivanpah, "CVSR definitely had a strong community engagement process" (Fellman, 2017).

Desert Sunlight was also found to have external transparency, in that "one of the things that we did at Desert Sunlight is that we built sort of like an information center, so that people can come and take a tour of this building... they can learn about both how sunlight can become electricity, and about the region—about the Mojave Desert" (Cannon, 2017). Beyond the visitor's center, the Desert Sunlight has a table on its website that contains links to the annual reports for air monitoring, biological monitoring, cultural resources monitoring, dust control inspections, and groundwater monitoring (NextEra Energy, 2014). This table clearly delineates any environmental issues that could come up with the project, and provides links to documents that explain what the partnership has done in terms of mitigation.

3.4.3 *Defining Success: Community Perception*

Success, as noted previously, is multidimensional, and consists of if the project met its contracts, and if it had community approval, which was measured by the community perception of the project (as described in the methods). All projects have met their contracts, so there is no variation across this variable. However, Ivanpah was found to have a negative community perception, while both Desert Sunlight and California Valley Solar Ranch had positive community perception. The most negative (both in number and in severity) articles were directed at Ivanpah, and included headlines such as "A Huge Solar Plant Caught Fire, and That's the Least of its Problems" (S. Zhang, 2016b). Many of these negative articles concerned the fact that the owners of Ivanpah had to request an additional year of operation to meet contracts, and the lawsuit against the plant that claimed they had not adequately performed the Environmental Impact Survey required by the National Environmental Protection Act (Al Jazeera America and The Associated Press, 2014; Sweet, 2016). Interviewees acknowledged these issues: "Ivanpah's had some... well, you can research all the operational issues, I won't go into those... that would be another day's worth of conversation" (Fellman, 2017). "We just have seen no end of stories where they kind of miss the point. Yeah, you know, they just don't have all the details. It's an incredibly complex project, and they end up getting bowled incorrectly." (Olson, 2017). Representation of the project was completely negative—in fact, all 12 stories were rated as negative—leading to a conclusion that community support was absent.

California Valley Solar Farm and Desert Sunlight did not have such negative press, and nearly all the articles about these projects simply stated that they are operational (Al Jazeera America, 2015; Ayre, 2015; Sneed, 2013). California Valley Solar Farm had 8 news stories, and all were rated either neutral or positive, and Desert Sunlight had 10 news stories, all of which

were also rated neutral or positive. As such, both projects were found to have community support.

3.4.4 *Mojave*

Mojave is an additional CSP plant located in California that was originally included in this study, but was ultimately excluded because the private company that owns the project did not respond to requests for an interview, so this case did not undergo the same data collection process as the others. However, I include this case here for completeness, and to address the question of if it is the type of technology employed that causes a negative community perception rather than an absence of external transparency. Perhaps more familiar technology, like PV, is less menacing in the public eye, or this kind of technology lends itself to more mechanical issues that are ultimately kept from the public?

Though primary data cannot confirm this, it seems reasonable to assume that risk in the Mojave project was appropriated appropriately, there was a strong private consortium, and internal transparency was present, because the practitioners that were interviewed agreed that these are necessary factors for the inception of a PPP. However, it is possible to analyze the operational variables of external transparency, via company publications, and community perception, via proportion of negative news stories, as these measures are from secondary data. For Mojave, external transparency was not present, as none of the publications from within the partnership acknowledge any environmental issues (see Appendix 4.1)

As predicted by the absence of external transparency, the table in Appendix shows 7 stories published online were negative—less than Ivanpah, but more than the two PV projects. Interestingly, there is one positive article, which Ivanpah certainly did not illicit from the press.

Ivanpah and Mojave's company publications neglected to acknowledge any environmental issues, but the community reception of Mojave was less negative than Ivanpah. This indicates that the CSP technology must not be the deciding factor between having or lacking community support for the project. However, this case also contradicts the importance of external transparency, because Mojave was not transparent with the community either, but that did not seem to affect the community's perception. The other factor that may be at play is the fact that Ivanpah preceded Mojave, so perhaps there was an element of an initial shock that led to public outcry.

Chapter Four: Conclusion

4.1 Findings

The definition of public-private partnerships in the literature is not consistent, and the term is often conflated with contracting or privatization schemes, neither of which are considered to be PPPs here. Instead, shared aspects of risk (including political, legislative, regulatory), financial responsibility, and ownership of activities must be present to constitute an arrangement as a PPP. PPPs are gaining popularity in the United States, which makes a review of these partnerships in renewable energy a relevant addition to the growing body of literature.

Creating a framework for predicting success in PPPs elucidated the difference between the success factors in the literature (appropriate risk allocation, a strong private consortium, and transparency) and those identified by practitioners, which were largely concerned with external factors (policies, legislation, and economic feasibility). Indeed, with the exception of external transparency, PPP practitioners identified appropriate risk allocation and a strong private consortium as factors needed for the inception of a project, rather than factors that would

influence the success of an established partnership. In defining success, practitioners tend to focus on the output of the project (namely, if the contract and the expected electricity output was met), while the literature touts the importance of the project outcome (the impact on the surrounding community). A lack of focus by the partners on the project outcome can lead to decreased external transparency, as demonstrated by the Ivanpah project, which ultimately results in a negative community perception. The definition of success was found to be multidimensional, in that it changes as the project progresses and depends on which measure—output or outcome—is perceived to be the most important.

4.2 Future Studies

This study opens up a variety of potential future studies, such as if (at all) the public and private sectors that often engage in PPPs have changed their practices to reflect the importance of external transparency, i.e. determining how institutional learning has impacted the practice of PPPs. Additionally, a study that investigated the effect of different types of technologies on the community perception of the partnership—are people less supportive of concentrating solar technology because they're more familiar with solar panels used in personal calculators? —would be a great contribution to the literature (though an attempt at answering this question was conducted by investigating Mojave). To bolster the results of this study, a study with variation in the other success factors—in particular, internal transparency—should be conducted to see how this variable effects the success of a project.

Finally, another future study could be an analysis of policies that encourage PPP implementation (at either the state or federal level), as well as the multitude of legislation that could lead to a partnership. This is an important question because the future of PPPs relies on a political and legislative environment that allows government and the private sector to jointly

participate in projects that would not be able to be accomplished otherwise. This situation presents itself as governments and private companies alike grapple with the challenge and opportunity of renewable energy and climate change.

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Appendix

1. Interview Methods

1.1 *Elite interviews*

The interviews for this project were conducted in a mixed method style, in that conventions for interviewing both elites and experts were drawn upon. The definition of an elite—as the elite being present constitutes an elite interview—varies, but the definitions are consistent in asserting that an elite is one that requires special ("VIP") treatment during the interview, meaning that the interviewer allows the interviewee to "structure the account of the situation" (Dexter, 18, 2006). Typically, definitions of elites include they must hold some sort of power, be that within a firm, organization, or in policy-making (Lilleker, 2003), though some authors have offered critiques of defining one as "with power" or "without power" as too dualistic and not reflective of reality (see Smith, 2006). A more rigid definition of elites references "political elites" (most often, members of Congress or others with high political power), which, while it does not exactly match the status of the interviewees here, is useful in situations where collected information may be sensitive (such as proprietary information, or information about a private company). For the purposes of this project, I chose to adopt the broader definition of an elite, in that anyone that could claim expertise (via experience) constituted as an expert. Accordingly, I found that my interviewees could also fall under the umbrella of expert, so techniques outlined in *Interviewing Experts* were drawn upon, as well. Here, an expert is defined as one that possesses an 'institutionalized authority to construct reality (Hitzler, Honer and Maeder, 1994, quoted in Meuser & Nagel, 2006, 19). Accordingly, the interviewing processes for elite and experts "do not differ fundamentally", as both methodologies present similar issues (the main one being gaining access to the interviewee), and both require the interviewer to adopt the role of a learner (Bogner & Menz, 2009). As such, I relied on advice from both bodies of literature.

1.2 *Interviewee Selection*

Elite interviewing poses unique challenges in that gaining access interviews can be difficult, especially if the potential interviewee is high up in the corporate or political structure (Harvey, 2010). As such, researchers suggest pursuing as many options as possible to gain access; today's researchers can even use LinkedIn or email as an effective tool (Yeung, 1995, quoted in Harvey, 2010). Following this advice, I sent emails to project managers mentioned in official reports, as well as messages on the "Contact Us" page of company and government websites. Interestingly, the generic contact forms often resulted in an email from the appropriate person, but when I contacted someone directly, it was likely that they would refer me to another contact within the company. I trusted the person that I was referred to was the best person when I had submitted a generic form, and I trusted the interviewee to reference me to their colleague if they felt I would be better to talk to another person, so, in general, I spoke to the person best suited to answer my questions.

1.3 *Interviewing Techniques*

Following Harvey, I attempted to establish rapport and trust with each interviewee by being transparent with each person: before each interview, I explained my project, the information I was hoping to extract from the interview, and how I planned to use it (2011). Beyond that, I expressed empathy when the interviewee was describing a difficult situation (see interview with Lars Olson at the Department of Energy) and indulged in laughing along to jokes, when appropriate (see interview with Bill Cannon of Sumitomo). Establishing a relationship with each interviewee seemed to make them more comfortable about talking about their experiences, and added depth to the interview. Following Dexter, I adapted the role of a student, and allowed the interviewee to explain concepts and ideas to me (2006). However, being a student did not mean I was uninformed, so I also—following Marshall—conveyed "an air of trustworthiness, savvy, and ethical behavior" in that I explained my background at the beginning, and offered my own insights from my research in the middle of the interview (Marshal, 1984). Accordingly, if the interviewee offered any hesitation at recording the conversation, I offered to send them the transcript for review, allowing them the chance to offer clarification or request omissions. Though no interviewees from government organizations took me up on this offer, one interviewee from the private sector requested the transcript for the company lawyers to review, with which I complied.

All interviews were conducted via phone, and lasted from 20-40 minutes. Though phone calls do not allow for noting body language and mannerisms, Krakauer reports that some interviewees will divulge more information over the phone than they might in person (Boynton, 2005, 172). However, Harvey notes that some interviews over the phone do not last as long as they might in person, but others assert that "they should not be seen as 'second-best' option to face-to-face interviews and in certain circumstances they should be considered as more favourable" (Harvey 2010; Holt, 2010, quoted in Harvey, 2011, 435). Due to time and geographical limitations, these interviews could only be conducted over the phone, though I noted the potential disadvantages with this method.

All interviews were transcribed, and are available in the appendix. The transcripts were minimally edited, with only pauses and injections ("um", "yeah", "so") removed for clarity, as well as removing meandering points irrelevant to the research topic at hand (denoted by the [topic] enclosed in brackets). Ellipses (...) were used to denote pauses, and, when appropriate, other aspects of the conversation (laughing) was denoted where it added to the content (to denote that the speaker was making a joke). I often said "mmhm" or "sure" while the interviewee was talking to indicate my interest and active listening, but I omitted these from the transcripts for clarity.

1.4 *Question methodology*

"Elites especially- but other highly educated people as well—do not like being put in the straightjacket of close-ended questions" (Aberbach & Rockman, 2002). Following this advice, I started with a very open-ended question "in your experience...", followed by a slightly more defined question ("can you comment on the research I've conducted..."), ending with another open-ended question ("how would you define..."). According to Huitt and Peabody, "a semi-structured interview allows more opportunity for probing and gives the respondent considerable freedom to expand on a given question" (quoted in Peabody et al., 1990). I found this to be true,

and because I was asking questions about the interviewee's experience in a particular project, I found semi-structured interviews to be the most useful method of directing the interview without commandeering it.

1.5 *Challenges*

Being a graduate student, other issues had to be addressed, as well: Dexter (2006) suggests that novices should not waste the time of elites by interviewing them, and Harvey (2010) notes that few scholars have commented on this point since, so there is not a definitive answer to this question. Likely, it varies between persons and sectors. As Harvey (2010) notes, "junior researchers... can be seen as 'cutting edge' or 'inexperienced' and senior researchers can be seen as 'world experts' or 'out-of touch'". As I could not change my status of researcher, I relied on my status as a graduate student to gain access, and with one exception, this was successful. Additionally, Harvey suggests that university affiliations may have a negative context, as some universities can be seen as less "down to earth" than others (Harvey, 2010). I don't know that my University of Washington affiliation helped or hurt my chances of getting interview; none of the people I interviewed had gone to the University of Washington, but some were interested to know about the work I was doing at the school (though this may have been true regardless of what school I went to). Overall, I found my status as a University of Washington graduate student beneficial, as people were mostly willing to teach me about their expertise.

The final issues I encountered during interviews were those to do with gender and power. Without exception, all the people I interviewed were men that were in advanced positions in either their government organization or their company. McDowell (1998) suggests that a younger, female interviewer may experience the "classic male-female pattern" when interviewing an older man, where the interviewee acts as a "rather patriarchal figure" with which she may find herself "to some extent 'playing dumb'" (2138). I found this to be true; many men would check that what they had said made sense to me, and in some instances, they explained something I already understood. When this happened, I confirmed that I did understand what they had said, and then acted as though they were teaching me something new rather than repeating my own research back to me. Based on the literature and my intuition, I felt that adopting the role of a student was better than asserting my knowledge during the interview, and this tactic seemed to work well.

1.6 *Analysis of the data*

Karkauer accurately stated "understanding of truth is always in flux and often contradictory." (Boynton, 2005, 180). I found this to be correct, as least philosophically, conducting interviews to discover the truth is fruitless, and at best, one can only gather perceptions of an event. Even if the "truth" is taken at face value, interviewing only results in information that is ultimately subjective, whether that be from lack of accurate memory, perceptions of the event changing after it has occurred, or, in extreme cases, deliberate misrepresentation of the information to protect a reputation, status, or job (Richards, 1996). Indeed, some of the interviewees were not with the organization during the time of the project in question, and could only pass on the institutional knowledge they have gained since taking the job. Most interviewees were present for the project, but the project had happened long ago

enough that some of the details had likely faded from memory. I did not encounter a situation in which I felt I was purposely being misled, but it is important to acknowledge that all projects were a culimation of billions of dollars and countless hours of work, so the incentive to project a positive light on the project was there. That being said, the only way to gain most of the necessary information was to interview those that had been involved, so a preface acknowledging the subjective nature of the data is the only way to address this issue.

Table 4 shows the results from the case studies, including general results from the interviews. Data from interviews is explained in depth below the table, and was analyzed following the techniques from *Interviewing Experts* (Meuser & Nagel, 2006). The first section gives context for the interview (who was interviewed and their role in the organization). The second step in this technique is to provide the transcription of each interview, which can be found in the Appendix. To find themes within each interview, each individual interview was organized into "thematic units... passages with similar topics" (35). Any unclear passages that needed clarification were paraphrased, though I attempted to use the exact phrase from the interview to provide explanation for the data delineated in Table 4. Coding of the interviews consisted of ordering the phrases by theme across all interviews, and "thematically comparable passages from different interviews [were] tied together (36). Sociological conceptualization is the next step, which consists of "[condensing] the commonly shared knowledge of experts...and [forming] categorizations" (36). Finally, theoretical generalizations were created, by taking the "empirically generalized findings" and "fram[ing them] by theoretically inspired perspective"—that is, forming generalizations for Table 4 and explaining the table via snippets from interviews. This technique of analysis is merited by its recursive nature: "while the process of interpretation is progressing it often proves necessary to go back to an earlier stage in order to check the adequacy of generalizations as grounded in data" (36). Thus, by revisiting the data in multiple steps of this process, the legitimacy of the generalizations presented in Table 4 was reinforced.

2 Interview Transcripts

2.1 *Dale Rundquist, Project Manager, California Energy Commission*
April 25, 2017; 11:15 PST

[C]: What, in your experience, have been the factors that lead to successful public-private partnerships... so what kind of aspects of the partnership need to be present in working with private companies to make them successful?
[D]: Well, that's a good question. First of all, we pride ourselves in being open, and above-board, and you know...public access is one of our main... is, what we value. So if we have something that the private company wants kept quiet, we have options for that, I mean, we have confidential filings, and that is mostly that's for cultural—having to do with Indian tribes and stuff like that—but I think mostly just open and frank conversation with the private industries is the best way.
[C]: Okay, so transparency is really important?
[D]: There you go, that's the word I was looking for!
[C]: And so, would you say, is that both within the internal partnership as well as with the general public?
[D]: Oh, yes—has to be.
[C]: Okay, great—in the follow up question—I've done a literature review, and I have three main factors that I found in my research, and so transparency is the second one, so that answers

that question perfectly. Can you think of any other factors that have been really instrumental in successful projects?
[D]: That's mainly the thing... you know, with the Mojave solar project, there was a language barrier, because it was a Spanish project (from Spain)...we had trouble understanding what they wanted, and they had trouble understanding what we wanted, so that was a difficult thing, but other than that, I think they were as open as we were.
[C]: So, if I could just tell you the other two factors that I found, and if you could just comment on them—how important they are, if they've been relevant to your experience...
[D]: Okay.
[C]: The other two are appropriate risk allocation—so, making sure that the partners that are involved have talked about all the different kinds of risk, and allocated them appropriately, which is sort of a broad term, but you can take that to mean whatever it means in the context of your experience, and then the second one is strong technical capacity, meaning that the private companies that are involved are strong in a technical sense, as well as able to take on the challenge that is presented by such large-scale solar projects, especially the ones that you guys have working with. So, do you have any comments on those?
[D]: Not really... the first question that you asked... the risk portion of that... is that monetary, or... what kind of risk are you talking about? Safety?
[C]: Yeah, kind of all of the above—the monetary, I think, is probably the biggest one,
[D]: Yeah.
[C]: But, that could even be reputational risk, yeah, any kind of risk, really at all.
[D]: Yeah, well we don't really have anything to do with the monetary part of it...
[C]: Right.
[D]: But we do have conditions of certification that we require the project owners to adhere to. Those are environmental as well as engineering conditions, so... other than that, the project owners know what kind of risk they're getting into a far as that goes, and they have the ability to comment on those things before the project is certified, so... I think everyone goes into it with an idea of what they're facing.
[C]: Okay, so... for most of these projects... this may be more at a federal level... but all of these projects were funded by the Loan Programs Office at the Department of Energy, but can you say anything about the technical capacity, like was there a bidding process or anything for the private companies to be chosen, or does that happen before the project gets to you?
[D]: That's called the ---- [inaudible] --- California has nothing to do with that.
[C]: Yeah, that what I thought, but for completeness...
[D]: Yeah, that's all federal.
[C]: Okay, and my last question, if you wouldn't mind answering, how does that California Energy Commission define a successful project? What has to happen for you to say, "that was a good project" that is successful?
[D]: To reach production, is one of the thing that would be successful... another thing would be that the project owners followed all the conditions of certification that were put down, or adhere to them, I guess I should say—I would call both of those required for success.
[C]: Okay. When I was talking to the Department of Energy—this just occurred to me—one of the things they said that was difficult about public-private partnerships was—this kind of goes back to what you said about transparency—sometimes there's some proprietary information, since you're dealing with a private company... there have been issues with how the project has been represented in the media. But it's hard to address that, because without releasing those

proprietary documents, you can't really say—no, this is actually what's happening... have you experienced anything like that with any of the projects?
[D]: No, there wasn't any proprietary... I'm trying to think... that I know of, with the Mojave solar project... because it was pretty well tried and true technology, with the heated troughs and mirrors and stuff like that, I mean it's been around for, as far as I know, about 30 years. So I know other projects have had proprietary concerns because it's new technology, and—like the Ivanpah, that had some new technology, so I think there was something there—I can't tell you for sure, because I was not on that project.
[C]: Okay, great, that has been very helpful, so thank you for agreeing to chat with me. [Ends conversation].

2.2 *Lars Olson, Portfolio Manager, U.S. Department of Energy*
April 7, 2017; 11:00 PST.

[C]: what kind of factors need to be present in creating a public-private partnership to make it successful?
[L]: Yeah, good question. Well I think the most fundamental thing is that you have a good project, with a service that is needed, right? So, whether it's a road, or a power plant, or whatever, you have to have something that is actually required and important in the market. I think, you know, there are examples of projects that are public-private partnerships that are actually things that aren't that essential, so that obviously becomes a big problem pretty quickly, if... yeah, it just becomes a big problem, if the thing isn't as needed, and what you end up with is a lower revenue stream, which creates problems for the private party, and then that problem rolls back to the public entities involved, as well. So having a good project makes everything a lot easier.
[C]: Yeah, sure.
[L]: And I think the next thing that's valuable to think about is if this is something that is likely to be supplied by the market anyway? And, if, you know, if it is, well if it's reasonably likely that the marketplace would provide this service anyway, it's more difficult to have it be a good public-private partnership, if that makes sense. In the sense that you have one entity that is involved, but maybe not strictly necessary, does that make sense?
[C]: Right, yeah.
[L]: If you have something that is reasonably likely to happen in the market without public participation, then you kind of have an unbalanced equation in the public-private partnership, and that means that it's going to be subject to a lot of scrutiny, or people might holler about it being too advantageous, or kind of an unnecessary or unfair subsidy, or... I think something that could be reasonably believed would be unlikely to happen without the public participation, you need to have something that is actually a good project, something that would probably not be done without the public participation.
[C]: Okay.
[L]: So those are two, kind of basic starting points, and I guess the way you would think about that in terms of Ivanpah, is that you know, it does actually provide something the market needs, which is renewable power, California needs renewable power, according to state mandates, and just general electricity demand, and then the other part, it is reasonably, well, this is where obviously there's been controversy, but you know, the original lease at the time the loans were made, is that this is not something a private bank would finance. So there was a gap in the

availability of funding for this type of thing, and so therefore, so at the time, it was justified for us to make federal loans, to allow this to happen.
[C]: Right, okay.
[L]: So looking at these two requirements through this lens at Ivanpah...
[C]: So okay, so if you do have a project that meets these needs: it is something the market needs, and couldn't have without public participation, then in the actual partnership, what kind of things need to be present to ensure that it's successful?
[L}: You have to have, kind of, a good risk allocation. So each participant needs to be allocated the risk that is most naturally able to bear. So, I'm trying to think of a good example of this, you would want...for example, in Ivanpah, we as a group, the U.S. government, lent money, but we don't have some of the expertise in negotiating the power purchase agreements. So for Ivanpah, the private parties negotiated the power purchase agreements, and then we, you know, came in after that. So it wasn't based on our competency in negotiating power purchase agreements, so the private party actually did that part.
[explains where to find some other sources based on his previous work]
Well, you need to have the private parties kind of bear... well, they're the ones who stand... they're the ones trying to make money. So they need to have, because they have that upside opportunity, so they need to bear more of the risks. So you don't want to have a situation where, if, things are good, they make money, and if things are bad, they make money. So, maybe an example is toll roads, they have availability payments (actually just roads), so if a private company comes and they have structure there, they're building a road, and payment is just given to the private party for the road being there. So it doesn't really matter how many cars go on it, so you'd want to structure that payment so that the toll road operator still has an interest in having a competitive toll. If they get a flat fee, that's sufficient for them, then they don't care so much about the pricing on the individual vehicles. But the individual vehicles affect the overall usage of the road. So, from the public perspective, if you have a party with an unaligned interest, and the public takes the risk for paying the capacity payment for the road, and potentially losing money, because the individual toll considers people using it, if that makes sense.
[C]: Yeah, yeah that make sense. So, interest alignment, then, would you say, that's also...
[L]: Yeah, yeah, interest alignment, yeah exactly. So you want to make sure that when the private party makes money, the good thing you want to happen as the public entity, happens.
[C]: Okay, yeah.
[L]: So like for Ivanpah, like of course, the power plant has to produce power so they have more money to pay back the debt. So that's obviously an interest alignment. So it gets trickier though, when a project gets money and the owners want to distribute that as a dividend, and the money is there, whereas you know, we [the government/public sector], our natural inclination would be to keep more money in the project for a rainy day. So those are the kinds of things that are negotiated in the loan. But it's really important that those things balance out. So if you ask me if it's reasonable to take the money out of the project to make a return, there also has to be concern for keeping the money in the project, if it's needed for a rainy day fund, or to fix things in the project, or whatever.
[C]: Right. Okay, does anything else come to mind?
[L]: Yeah, so like with the rules and the structure, when money comes in, and you pay the costs, you pay the staff, you pay back the loan, and then there's other money left, well so then what do you do with that. What are the conditions where people can get that money out of the project to

pay their shareholders, or that money might have to stay in, and so that's a lot of where the push and pull is when you start structuring.
[C]: Right... okay. Do any other kind of major factors come to mind, or could you rank, besides having a good project to start, is risk allocation the most important, or are they all kind of important?
[L]: Well, I think having a good project to begin with is the most important.
[C]: Okay, and so that could most accurately predict if the project will be successful?
[L]: Yeah, and so you know, the types of things you need to do for that, is a market study. So you want to have, especially as a public participant, you would want to have the private party show you some really compelling information about why this is important to do, or why it's needed, like for toll roads, you want to have some sort of traffic study on the region, and why people are going to use the road. Or if it's a power plant, you'd want to do some kind of market study on why it's... you know, the expected need or demand of the power. So that, those kinds of things are really important, so that you, everybody knows, or has some view to as why this is actually going to be a good project.
[C]: Right, yeah.. like why the investment should happen in the first place. Okay, great, thank you, that's very helpful. And so, now, if I could kind of tell you about the factors I found, which actually, you've hit on most of them already, through my research, and a lot of that, actually, was from that World Bank publication you had mentioned...
[L]: Oh yeah, okay.
[C]: So, first, the kind of most basic was appropriate risk allocation, which, if you have more comments, feel free to add those, but I think that we've gone through that pretty well so far, and then the other two that I found in my literature search, to be most important, are transparency, whether that's internally, and externally, with the public... if it's taxpayer money, you know, the public, you know, how important is that, and then the importance of a strong private consortium, so you know, especially in a large-scale project like Ivanpah, or you know, any project that requires that you have contractors and builders and all these other different kinds of private partners, how well they work together, and also, if they have strong technical capacity. So, you know, if the private partner that's been chosen to engage in the partnership, is that the best option, are they the most technically sound, kind of so.. if you have comments about those kind of factors?
[L]: Yeah. No, I think that the latter of what you mentioned, about the private parties' competency is really important, because I don't know if you've seen in the news, but the Vogtel Plant in Georgia, that we gave a lot of money to... well, Google it, you'll find it, one of the parties declared bankruptcy (Westinghouse) so, you know, I don't know... I'm not saying that we did our homework wrong..
[C]: Oh, no...
[L]: I mean, there are so many things that can change over time.
[C]: Yeah, of course.
[L]: Obviously the huge problem is that the private party isn't able to fulfill their obligations, so there... well, I should say, one of the things we do, is we monitor our counterparties that we work with. So, people that are the sponsors, most of the people that are purchasing power from the project, we monitor them, and we try to understand that it is important to have a competent counterparty. And, across our portfolio, there's certainly, different degrees.. there are some people we really like to work with, and other people, where, you know, they're not as good to work with, right? And of course, it helps to try to screen ahead of time, but yeah.. having... yeah,

you're right, having so many people that are involved, you might have five different contractors doing different things on a big project, and you also need people that are... these are structures that are... usually long-lived assets, so you need to have some hope that this is going to be an entity that is going to be around for a long time
[C]: Oh, so longevity
[L]: ....so what kind of credit rating they have as an entity, if there's some warranty to the contract, you know, how well are they going to be able to honor those warranties, or obligations, in 5, 10, 15, 20 years down the road, so, obviously, it's really hard to know what companies will be in business in 20 years, but, you know, GE probably will, and, you know, some other companies that are like a start-up, probably won't, so... yeah, that's really important. Especially I think, too, you know, when you have somebody that's been around, and has a longer-term relationship and has interest and has interest in doing future PPPs, they're going to be a lot different partner to work with than somebody that this is kind of a one-off situation for them. So, for us, counterparties that have a couple of deals in our portfolio—those that have been around for a long time—you know, they have other, ongoing relationships with DOE in different ways, it's easier to have a relationship, because they have more at stake.
[C]: Yeah, yeah... that makes sense.
[L]: And you know, to the extent that there's groups that have worked together before, that's obviously helpful, if you have a set of companies that have done things together before, that will just be easier, the thing will probably be built sooner, and will probably be paying back sooner, so that's good.
[C]: Yeah, definitely, so what about...
[L]: Transparency, is that the next one?
[C]: Yeah.
[L]: Yeah, I think, I do think that transparency is important—it's tricky because all the... a lot of business-sensitive information about these things...
[C]: Sure, yeah
[L]: I think, well, it depends a lot on the sector, but I think it's really important to have it be you know, clear, what the risks to the government and the taxpayer are, and also how much money's on the line. You know, I think, it's really important to see in an emerging market, where corruption can be much more of a problem. In an emerging market, you'd really want to go out of your way to prove that whatever tender for the project was done, and that there was great effort given to the pricing structure, so you know, I think having the community engagement and having people ask those questions, and having a clear place online where that data can be found is important, as well.
[C]: Yeah, definitely.
[L]: Kind of one of the other things I can comment on, just about having worked on Ivanpah for a couple of years now, there's a lot of misinformation—kind of, knowing everything about something, and then reading news stories about it regularly, made me appreciate the degree to which news stories can miss the point, pretty regularly, so, I think, you know, it's incumbent upon offices like ours to make sure that the correct information is out there, and people are understanding it and interpreting it correctly, because we just have seen no end of stories where they kind of miss the point. Yeah, you know, they just don't have all the details. It's an incredibly complex project, and they end up getting bowled incorrectly.
[C]: Yeah, that was something we talked about, when I was looking at transparency, and reading the news stories, and, you know, how many grains of salt do I need to take with those, because,

you can't sell a news story that just says, you know, "everything's fine", or "not that many problems", but you know, if they kind of sensationalize, you know...
[L]: Yeah, you know, there's been a lot of news stories about the gas usage?
[C]: Yeah, uh-huh
[L]: And so people are saying, you know, all these complaints about it, but sort of the headline news there... you know, people are talking about that it's higher than they thought. But the point there isn't is that it's higher, the point should be that it's in compliance with all requirements. That kind of, you know, should be the end of the story, and it's up to people if they think the requirements are wrong, well, that's one thing, but it's not necessarily, but when it's cast as like, the project has problems... well, it's not really like that. It's within the requirements, but it's just different than the year before.
[C]: Right, right
[L]: But you know, when people say," well, the gas is x percentage higher than it was", well that's kind of immaterial to the main point...it's different, but it's supposed to be different.
[C]: Yeah, that's kind of a suspicion I had when reading, so it's...
[L]: Yeah
[C]: So, yeah
[L]: And you know, same with the thing about, there're a lot of articles about birds, obviously, but, you know, so the articles will say things like, you know, it killed x number of birds. But, you know, there are regulations about these types of things, and the plant is in compliance with those regulations. So it can have a misleading light cast... but again, I refer you to...I'm not saying that, in this moment, I don't obviously know for 100% until we get our report from them, but at the time when those reports are printed, in those moments, there will be no indication of things being out of compliance. The question you need ask needs to based on what are the requirements that they're required to operate under and are they doing it or not?
[C]: Yeah, that was sort of the sense I... to be frank, I was kind of feeling bad, for all the negative press, but really, it's an impressive project, so I'm glad to kind of get the other side of that... when you read the news, it's all kind of from one side.
[L]: Right. It definitely makes me read the news differently, you know, when you hear about situations at other power plants, or even more generally... you know for example, I don't know if you know much about other portfolio projects, but a couple are sponsored by [explains other situation in which a parent company declared bankruptcy, but the press reported that the company itself had declared bankruptcy, which was not accurate]
[notes that Ivanpah isn't perfect, but a lot of the times the news reports on something that they don't totally understand]
[L]: A lot of the stuff around the CTC filings for Ivanpah, a lot of information was made available, but there's a bunch of business information that's not included, a lot of that, actually, really important information, the way power contracts work is really complicated, lots of times. So writing a news article, they don't have the background to totally understand it...
[C]: Yeah, and it's difficult when you have proprietary information that you can't publish. That was one of the problems I ran into with my research, where I was like, "well, I wonder what the contract looks like?" but you can't just Google the contract, put that doesn't come up, because that would put the private partner at a disadvantage, and that wouldn't work, so...
[L]: Yeah, that's right. [pause]
[C]: [thanks Lars, ends conversation]

2.3 *Diane Fellman, Vice President, West Governmental Affairs, NRG Energy*
May 15, 2017; 1:00 PM PST

[D]: Well, I think what is important about public-private partnerships is that the policy informs and represents what the government is trying to accomplish, and the only way that can be successful is if the private sector can invest capital in the types of projects that will...help the government to meet its policy goals. So, one of the reasons—I used to work for the government—and one of the reasons I left was because I wanted to work with private companies who are interested in making those investments. And the only way... in California...let me just say, even though California is perceived as being so radical, and, you know, over the top, if you look at the California [inaudible] and focus, as you are in your thesis, on specific types of government investment programs, then you can see the statistics...the data shows that you can have these polices that seem so aggressive on decarbonization, but still yield significant profits for private companies. And that's where the success lies.
[C]: Okay, so an alignment of goals on the public and private side?
[D]: I would say, actually, a connection between the goals of the public sector to the profit motives and drivers... the policy drivers are able to align with the economic drivers. And the nexus point is usually some type of incentive program or loan guarantee where the risks of investing in the policy-driven projects are too high for conventional lending...and that helps make a market. For example, NRG was the first company that invested in major, large-scale solar projects, and so the story I tell is... I came to NRG in 2010, just 7 years ago, we owned 21 megawatts of photovoltaic, and that was the largest operating PV project in California.
[C]: Wow.
[D]: And our company was the first company to invest in these large DOE loan guarantee programs, which we allocated between all the different major technology developers, on the solar side, so Ivanpah was solar power tower—solar thermal—and then Sunpower, with their panels, for [another project]. Since then, it's been more... I can remember trying to talk to the banks about financing the 21 megawatt project. Today, in California, we have over 9,000 megawatts of solar, operational. And more to come.
[C]: And so, the success there, was just connecting that profit to policy goals, was the most improtatn thing?
[D]: Yes, right. You can't have the policies without the economic drivers that allow the investment to meet the policy. When you had the NGOs pushing for a certain outcome...they always want to push the edge... but in California, it sometimes ignores economic reality, or even technological reality, you know, because in California, because it's such a large market, it is blessed with natural resources that will support alternative technology and power generation. Plus, the commitment to efficiency and demand response of the last forty years, including building standards, appliance efficiency standards, funding from the government... preferential rate structures... it has allowed California to move forward on decarbonization. We are actually meeting some of our goals, even outside of the AB 32 requirements... like people will say, oh AB 32 is a failure out here, because the carbon price isn't that high, but other people will say, oh AB 32 is a huge success because we don't have a lot of carbon to price.
[D]: That's a larger umbrella issue, with greenhouse gas reductions, but the three pillars for energy reduction in the state of California are decarbonization, affordability, and reliablilty.
[C]: Okay, so zooming in a little bit on the partnership itself—assuming, like is the case in California, that you do have some private incentives lining up with the public policy goals—in

the actual partnership, if you're sitting down and creating something, what kind of things would you want to keep in mind to make sure that it would be successful?
[D]: Well, I think the government has to be able to take some risk, you know, there may be some project failures, but with loan guarantees, there is certainly some payback risk, so what is that? But with respect...but when you look at incentives, the government has made sure that the incentives for solar are made upon investments, and the wind tax credits are paid based only on performance (production credits). So you want to put the money for that government investment, the project cannot go forward.
[C]: So, risk-sharing, is an important factor?
[D]: Absolutely. And risk bearing, on the part of the government, you know they're always like oh, [other project that went bankrupt] didn't operate... well, part of the DOE loan guarantee was designed to advance experimental technology.
[C]: Right, so a different definition of success.
[D]: Right.
[C]: It's been interesting learning the different variations of success depending on who you're talking to, and really depending on what the goal of the project was.
[C]: Do you have any other factors that come to mind besides risk allocation?
[D]: Well, let's see... you're free to prompt me, but... another thing that is important is for government to understand that businesses need to make a profit, and for business to understand that the government has a responsibility to invest money... you know, it's not their money, it's the citizen's money...so they have an obligation—be it citizens, or rate-payer's money—to invest their money wisely. So there needs to be some tolerance for capitalism and bureaucracy in the respective parties.
[C]: That definitely makes sense. Okay, so in my literature review, I'm comparing what has been said in the academic literature with what actually happens on the ground, and so through my reading, I've identified three success factors that people say are the most important when creating a public-private partnership, so if I could just tell you what those are and then if you could just comment on: if you agree, and if you think those are important, specifically with Ivanpah and California Valley, if you found these success factors to be actually instrumental to the success of the projects or not. And so, the first one is appropriate risk allocation, which you already touched on already, if you would consider that more of a baseline necessity to get the project off the ground, or if you think there's a spectrum of appropriate allocation—if you could have a project that has better allocation, versus one that doesn't, and then the second one is a strong private consortium...so what I mean by that is all the private companies that are working together on a project, how important is it that they communicate with each other and sort of, what does that structure of communication look like, and how does that lend itself to the success of a project, and then...
[D]: Let's ask one question, and then we'll answer for both projects...
[D]: I think I touched on the first one... if the risk isn't allocated properly, then there's a fail. Either the private company won't make the investment, or the government won't back the project.
[C]: So, would you consider that more of a baseline that has to happen even before the project gets off the ground, or...
[D]: Absolutely, absolutely.
[C]: Okay, so that answers that. So, what about the strong private consortium?

[D]: I mean, I hear that, I think you want a company that can make the investment and be backed, because even with the loan guarantee, you still have to pay them back. You still do financing, and you have private capitol backing that, so absolutely. So those companies need to be able to do some balance sheet financing...to do equity, rather than debt financing...so portion of that. And put some skin in the game. And those tend to be... I don't know what you mean by strong partnership—can you define that more?
[C]: Sure, yeah. So, a lot of the time when that comes up... it depends on individual projects. So, if NRG and some other... like the Desert Sunlight project, for example, the private company was really in charge of hiring contractors, and construction people, and planners, so the private company did all that. So, is that the case for NRG as well, is that how that usually works?
[D]: Yes, yes. So that's important, because otherwise it's a government-built project.
[C]: Okay, so then the private-to-private relationship, then, what is the process for determining who will be the contractor...
[D]: It depends on the company... I mean, our company is the biggest independent power producer in the country, so we have relationships with the big construction firms, the big manufacturing firms, I mean, that seems to make sense... I wasn't privy to all the rationale that went into investing in solar, but working with the big manufacturers of the solar panels, and who was emerging as a possible player in that market, especially domestically, both SunPower and FirstSolar are domestic... BrightSource is an Israeli company, but yeah, I mean, there are relationships, and frequently there is bidding, like for a government contract, you want the highest value for the best price, so you may restrict the bidding to a number of companies. In my experience—and in some instances, there could be exclusive relationships—but there are preferred providers, but exclusive relationships, I don't think, are that common.
[C]: Okay, so for Ivanpah and California Valley, did those both have bidding schemes to pick the private companies?
[D]: Now... we're a merger and acquisition company, so the elements of engineering and construction were in place prior to our acquisition. So I don't know how SunPower and BrightSource allocated that. And the other thing is, sometime we'll pick the contractor based on who the developer was, so in the instance of FirstSolar, they do a lot of their own construction.
[C]: Oh, okay. So more broadly, is the private consortium is something that is very... I guess what I'm asking is, as a practitioner, is that a factor you would even consider, or is that just the nature of how these projects emerge, so that isn't something you have a lot of control over?
[D]: I think the way I want to answer that is the driver there is, again, risk, but making sure the project owner... as the company responsible for delivering under the Power Purchase Agreement... that you are able to do that [laughs]. So, you have to be able to take on the risk. And I guess that's another dimension I should mention, it's not just the government support, it's having a financing structure that will allow you to...or a revenue stream that allows you to do the construction, put at risk some capitol, and the private entity to construct the facility, operate it, and pay back the debt you incur while building it. And then make some money at the end of the day.
[C]: And that's mostly taken care of during the contracting process, then?
[D]: Yes. So long-term Power Purchase Agreements are absolutely essential for all renewable projects. And fixed pricing terms. There's a relationship that we've haven't mentioned yet, but it's the utility...the offtaker. Whoever the offtaker is, whether it's the utility, a private corporation, or... a utility is either investor-owned, or municipal. And in California, we have community choice advocators, or it could be a retail provider, in competitive states like that.

[C]: Okay, and then the last success factor that I have is transparency, and so this kind of has two dimensions, the first one being within the partnership, so you have the private and the public and developers and utilities and all these people working together, how important transparency is there... and then kind of what I think is the most interesting question, is how important is transparency between the project—the partnership itself—and then the larger community that houses the project.
[D]: Yeah, I don't know what that last question means....I mean the last part of that... with respect to transparency, I do think the government likes to see the books, you know, in a government partnership... any lender wants to see the books and understand, and they have the right to review that... you know, however that information is competitively sensitive, so if you look at transparency, I'm not sure how far beyond that extends beyond what is essential. Because I think companies would rather not disclose their pricing scheme... usually, PPA prices are known, but what kind of profit are you making, how are you doing it, you know, for a private industry, you don't want to disclose that.
[C]: And so, I guess what I mean, with the community question... in some other projects that I've read and interviewed people about... we talked about the importance of community engagement, and outreach-type activities
[D]: Do you mean like people in the community, where the projects are located?
[C]: Sure, yeah, and so during permitting, and when the project is getting started...
[D]: Okay yeah, so you absolutely have to have good government relations at all levels: state, local, federal. And when you're building a big project in a community, you definitely want to work with them.
[C]: And so, for CVSR and Ivanpah, was there a lot of community engagement for both of those projects?
[D]: Yeah, I mean, Ivanpah doesn't really have a community around it, so it was more state and federal, and again, we were tailing some of this, and CVSR definitely had a strong community engagement process.
[C]: Okay, so the last question is how you would define success, from an NRG perspective?
[D]: To me, success is that the project operates, and you're able to repay your loan. And I think, [laughs], Ivanpah, you can look at the [inaudible] website, we were just able to amend the contract, because that has a provision that we have to meet certain guarantee energy performance requirements, and that technology was more experimental as it turned out, so we were able to do that, so I consider that a *real* success, because Ivanpah's had some... well, you can research all the operational issues, I won't go into those... that would be another day's worth of conversation! And then CVSR, of course, has the PV technology, that has moved forward. And if you look at the history of CVSR, there were a lot of biological issues, so they reshaped the configuration of the panel location to accommodate the Carrizo Plain biological requirements, so I do think it's a success. The less that's said about it, the more that it's a success. So that's how I would measure it.
[thanks Diane, ends conversation]

2.4 *Bill Cannon, General Manager, Senior Vice President: Environment and Infrastructure Group, Sumitomo of America*

May 4, 1017; 10:00 PM PST

[C]: So, the first question I have for you – and if you can speak generally, that's fine—and if you can apply to it Desert Sunlight, that would be useful as well, to me, so, the first thing is: in your experience, what factors have led to successful public-private partnerships?
[B]: So, a bit of background—Sumitomo invested into the project after the DOE had already invested, or, sorry, not invested—had already participated.
[C]: Okay.
[B]: So I just want to be sure that you understand that we did not—it was not because of our efforts that the DOE decided to fund the program.
[C]: Right.
[B]: Okay, so our partner, NextEra, which is based in Florida, they were the ones that were principally responsible for bringing DOE into the project. But, in our experience, what makes a project successful for a PPP? I think that, well, first and foremost, of course, is enabling legislation rights—you need to have Congress or some other body—create the laws that enable participation to happen in the first place. That is the most critical aspect of it, and then funding... I guess the story goes without saying, as well...
[C]: Right.
[B]: To have a little bit of scratch there, is useful. I think from the corporate side, you have to have a willingness to work with governmental agencies—in this case, it was the Department of Energy—and the Bureau of Land Management, were the two main government entities that were involved. And, well, you have to have a company willing to engage with parties like that, on a go-forward basis, so that's not an easy thing, right, there are many companies out there that choose to develop their projects in different ways that does not involve the government. It's not that one is right or wrong, but just a different approach to the marketplace, that's all.
[C]: Sure, yeah.
[B]: Also, you may know that the BLM also had... I don't think it was a law, but more of a directive... from the president... to be more accommodating to private enterprise. So, you know, cutting through the red tape, in short. I can't say if it was a law, per se, or if it was more of an executive order—which we seem to hear more about these days than I ever heard in my life—[both laugh]
So, I don't know how that came to be, but that was an effort under President Obama and the Interior Secretary... and... I'm forgetting her name...
[C]: Sally Jewel, is that right?
[B]: Yeah, thank you.
[C]: Yeah, so that make sense, just having a baseline ability to even engage in a partnership is really important?
[B]: Yeah.
[C]: So, can you comment on anything—once that baseline has been set, and a company is thinking about going into a partnership... what are some things you would keep in mind, to ensure that it wouldn't be a waste of time or money for anybody?
[B]: Well, I think the fundamental thing... one of the tests the DOE had done was to confirm that the project can stand alone, on its own, without the DOE support. So that... does the project make sense, economically, feasibly, whatever other rules you want to use for the project itself—does it even make sense before you decide you want to engage with government agencies.
[C]: Right.

[B]: So, I guess what I'm saying is, they can facilitate and help, but they aren't going to solve your problems. Right? So if something's flawed with the project, then there's something flawed with the project! [both laugh]
[C]: Right, exactly.
[B]: But they're not going to come in and fix your problems... but they can help you.
[C]: And is that mostly... what kind of help? Financial, or policies, or...
[B]: Well yeah, sure, the DOE mostly provides financial help. You know, the BLM... we built on BLM land, so they can make certain processes for us to work through faster, or easier, or with less paperwork... whatever it may be... that's a help.
[C]: Yeah, definitely. Are there any kind of last notes you have on successful factors?
[B]: No, I think that is pretty much it.
[C]: Okay, so now, if you don't mind, I've done a literature review on PPPs and what makes them successful, and I've found three main factors that seem to be the most important. So that's from the literature, and just kind of comparing it to what actually happens on the ground, so if I could just go through those, and if you could just comment on.. you know, in your experience, if they've been important, and if so, which has been most important, or are they irrelevant... So the first one is appropriate risk allocation: meaning –and this may be more of a question for a NextEra person, if Sumitomo wasn't involved in the actual creation of the PPP, but if you have any insights on that... just assuring that each party is given the risk that is most appropriate for it... so that's the first one. The second one is a strong private consortium, so this is especially interesting, and important I think, when you have a co-ownership situation like Desert Sunlight: how important is it that the private goals are aligned, and that the lines of communication between each company are open, you know, and if you have developers, and builders, and different kinds of people coming in and working on this project, what does that consortium look like—how important is that? And the last one is transparency, and that can be between the partners, and between the public and private sectors, as well as private and private transparency... and then also greater society, and like news, and media, and other stuff like that.
[B]: Sure. Well, I think the risk allocation is what I was trying to allude to earlier, in that the project has to be financially viable, so that the DOE was very specifically not willing to accept any additional risk other than what a typical lender might assume. So they wouldn't take on a failed project... so if the project doesn't make economic sense... if it's a project that without the DOE's participation would never get financing, than they aren't going to finance it.
[C]: Yeah, sure.
[B]: So you know, it's a very clear allocation for the DOE, at least, that they're only willing to accept—if you will—usual and customary risks that a lender would accept. And that they're not going to take any other risk associated with the project.
[C]: And so when you think about risks... is that typically just finances?
[B]: Well, it is ultimately financial risk... but it gets into, of course, the other risks that impact the ability for the loan to be repaid. For example, you have operational risk. So they're not necessarily taking operational risk directly, but it's more of an indirect risk, in the sense that if it operates poorly, then the ability to generate revenues would be diminished. And, you know, if that's diminished, then the ability to repay the loan is diminished. But, again, just like any other financial entity, they hold a certain amount of cushion there... that, you know, hypothetically, if you owe $100 next year, they want to make sure you make well over $100, so that if there is a degradation of performance, then you can still pay the $100.
[C]: Right

[B]: So, fundamentally, they're taking repayment risk, ultimately. But that manifests itself as operational, or, again, you might have construction risk, so that there might be cost overruns, or delays in construction, etc, and a typical project-level financing such as what is done at Desert Sunlight, all those risks are allocated to the party... so, operational risk is allocated to the operator of the project, so if they don't meet certain standards, they get paid less. If it's really really bad—really extreme—they get financial penalties. You know, during construction, you have an entity that will construct under an EPC vendor—engineering, procurement, and construction vendor. And you know, in that contract, in that main contract, there will be penalties if they are, say, late, and there will be a fixed price contract, so for the entity that is constructing it, they promise to build it for a certain price. And for certain contingencies, like it rains a lot—I don't know—or something that deteriorates the ground...that was not foreseen... that's the risk, or the burden of the contractor. So, there are other risks out there. And they're mitigated as much as you can mitigate them in a standard commercial sense. So the DOE, I'll give you this example, is not assuming those burdens unduly. So they're assuming the same exact burdens that any other lender would assume.
[C]: So in the case of Desert Sunlight, was risk allocation something that was a major factor in contributing to the success, or that kind of a baseline necessity for a partnership to even happen?
[B]: Oh, that's... I would characterize it much more of a baseline assumption going in, right, there would never have been a deal with the DOE or any other lender unless... it's a very standard, a very typical project that allocates off the risks to the party that is best able to absorb those rights. So yes, it is a baseline assumption. And so it goes back to, if you didn't have them in place, nobody would lend to the project. And if nobody else is lending to the project, the DOE will not lend.
[C]: Yeah, okay. Okay, so could you comment on the private consortium factor?
[B]: So, is this a question of did they have the financial wherewithal, that kind of question?
[C]: More the importance of... and then tying back to what happened with Desert Sunlight... how important is it that the private companies that are involved in the project are talking to each other, they've aligned their goals, they're kind of... working together... is that something you've experienced as being really core a successful project?
[B]: Well, yes, of course it is quite important, but, again, it's back to the fundamental precept, before even doing the project. So that you will have a partnership, right, that is formed, so that partnership will make certain commitments to the lenders, or to the Department of Energy. And those commitments will be in writing, right, so "I promise to..." and some of it is information sharing, absolutely, and some of it is financial commitments, as well, as so the information sharing is very standard. I don't know exactly what was in the financial documentation for Desert Sunlight, but a very standard thing is to have monthly updates. To provide, during construction, for sure, updates on how the construction process is going. The Department of Energy doesn't participate financially... so they don't provide the loan guarantee...basically right before construction. So, during the pre-construction period, there is no formalized information-sharing process, because the DOE is not officially a party yet. Now, that doesn't mean there isn't informal information sharing, of course...right, to get them excited about the opportunity... to get them really to... be a participant in the project... obviously you have to share with them a lot of information. And you know, the DOE has other competing interests, as well, I'm sure that this wasn't the only project they were looking at, so... it's sort of a [sales pitch], you have to explain why the DOE should participate in Desert Sunlight, and how exciting of an opportunity it is for them. And so, that is basically sharing information, to get them willing to participate.

[C]: Right. And so when it comes to the private companies all working on the project, was there a formalized information-sharing there, just between the private partners?
[B]: Sure, yes. But there is also a lead, right, so there's always one lead developer, and in this case, it started as FirstSolar as the lead developer of the project. And then when they sold to NextEra, they become NextEra...so specifically, for example, the sharing of the information with the DOE... there's only one party that does that. Otherwise, it's very confusing.
[C]: Yeah, I guess you'd have a lot of monthly reports if everyone sent them in.
[B]: Right, right, so even during the development period, there's only one person that speaks, if you will, on behalf of the project, and there's only one person that answers the questions for the DOE. So you avoid responses that aren't consistent with each other. So from the DOE's perspective, they really only interacted with FirstSolar, at first, and then when NextEra bought it, NextEra, and that's it.
[C]: Okay, so was there kind of a network, or some kind of set up where the companies could communicate to the lead developer? Like, within just the private?
[B]: Yeah, though I think, honestly, FirstSolar did a lot of the development work, before they sold to NextEra. So, it was really just them.
[C]: So they didn't have to do much coordination?
[B]: Correct. And that is pretty standard. It's pretty typical that there's one developer... basically for as long as they can, and then they bring in others, once the capital needs become significant.
[C]: Okay, yeah. That's really interesting. Okay, and then the last factor that I found in the literature, was transparency... so if you have anything else to add, I think the monthly updates and information sharing, that kind of answers that question a little bit...
[B]: Yep, yep.
[C]: So that kind of answers that... so if there's anything else between the project itself, and greater society?
[B]: Yeah, I mean, any project is going to have to get the necessary permits to build, and so, permits, for example, include Riverside County permit, and they have specific things (like any other regulatory entity, right), they have hearings and stuff like that. A., it's an information opportunity for the project to go and present to the County, but it's an open hearing so people can come complain, or if they didn't like the... or if they wanted to voice their opinions, typically against the project...
[C]: Yeah.
[B]: So, there's that open forum, but again, just about every project I can think of has to get a permit from a county level, or maybe a city level, or a local level...so you know, everything is permitted. So to get those permits, yeah, you absolutely need local support. Basically, the best way to get that is through involvement with the community.
[C]: Yeah, so was there a lot of that with Desert Sunlight?
[B]: It was before we entered, but yes, of course.
[C]: And so... beyond the permitting... or maybe what I'm asking is, would you say that during the permitting process is where the project is most transparent, as that's where most of the support is gathered, so you can kind of go forward with the project?
[B]: Yes... I mean once it starts construction, you know, at some point, it is a private enterprise...so you don't disclose confidential information.
[C]: Yeah... and so, the Ivanpah project, which is an NRG project, had some negative press problems, and...
[B]: True. [laughs]

[C]: [laughs] you end up feeling bad when you talk to these poor people, they're just trying to do something good, so... is that an anomaly, or does every project have some kind of pushback, and if so, is there a way that you've found is the best way to address that... or go beyond just the permitting process transparency, or getting more involved some other way, or...
[B]: I would say that these types of projects consume a lot of land. Right, they consume a lot of acreage, and they are especially visible. So you know, you can just visually see the solar panels. Or if you're doing wind, you can see the wind turbines. And so the visual impact does certainly allow for people to see it, very directly. I guess typically, complain... nobody calls up their county and says, you know, I love this solar project. Those things never happen, right, they call up their county or their town and say "I hate it" for whatever reason. So, you know, it's an adverse selection process, right, the only ones that are going to complain... so that's the only kind of people you are interacting with. Does every project have it? It's fairly common, yes, that there's always going to be at least one person, or group of people, that are going to be disappointed. Specifically with Desert Sunlight, right, it is on public land, it's on land that's owned by the Bureau of Land Management, so because of that, it allows for public commentary. Even after the construction has started, and even after operations have started, right, it always allows for the public to comment too. To contact BLM, and to voice their concerns. And for private land, those concerns basically have to be addressed during the permitting process. Once it's permitted, and it's on private land, your avenues for complaints or concerns are a little more limited. I mean, you can still do it, but it has be very specific, like they're violating something, or they're doing something horribly wrong, or they're violating the permit, basically. You know, just not liking the sight of it, isn't good enough if it's on private land. And how do you mitigate it? Myriad ways... so many ways. To generalize: community outreach programs are the best way to mitigate those concerns.
[C]: And did you... or did the company... or did NextEra... do more community outreach than just the permitting process required for Desert Sunlight?
[B]: Sure, yeah. [searches for a specific example online, suggests I search Desert Center, which is the local town]
[C]: Okay, and then the last question I have for you is---of course, if I'm making a framework to define success—I have to define what success is. And so, from the private standpoint, how does a company define a successful project?
[B]: How do we define a successful project... let me ask you... at what time? Like today, looking back on Desert Sunlight, do I perceive it to be successful? Or, you know, say, when we had the groundbreaking ceremony... at that point in time? You know, what period of time do you want success to be determined?
[C]: Oh, that's an interesting question—you're the first person to ask me that! I would say—now. Looking back, you know—they say hindsight is 20/20—so, looking back, would you consider it successful.
[B]: Yeah, okay, that's fair. So I think during the operation, you define success... you know, it's almost like a factory or some sort of process like that, you know, where you're very concerned about employee safety...but, I guess even during construction, too, so both times when we had these reports that we shared with the DOE, I guess one of the first things we always reported on was safety at the site...what we are doing to address safety and to make it better, and what sort of incidents we have had during that month period. So I think that is always going to be an overarching concern. And, basically if anything is wrong from a safety perspective, I don't think anyone would call that a successful project. So I would say that's absolutely critical to what

people call success. These are sort of like, tiered, if you will, or prioritized: so, you know, that would always be the number one thing that I hope those people would say. So when you step down off of that, you know, you say to yourself, okay, is the project meeting its contractual obligations, right, so it promised to sell power to, in this case, Southern California Edison, and Pacific Gas and Electric, is it meeting its contracts with them: is it meeting up with its obligations to the lenders, to the Department of Energy, etc.
[C]: And Desert Sunlight is, is that correct?
[B]: Yes! If you weren't paying our loans to the US government, you would have heard about that by now! [both laugh]
[B]: So yeah, absolutely. So you sort of say, you know, is it working from a contractual or an operational perspective, is it doing what it said it would do. And then, you'd also look at the same time: is it working for the community? Have the people and the town, Desert Center, like I said, have the people and the town sort of taken to it. One of the things that we did at Desert Sunlight is that we built sort of like an information center, so that people can come and take a tour of this building, this structure, you know, that they can learn about both sunlight can become electricity, and about the region—about the Mojave Desert. You know, so from that perspective, you might define success as how many people walk through the door—how many people are actually using it? You know, it's one thing to build it, to make the commitment to build it—it's another thing to have people actually go and experience it. So, for that one, I would define success as people actually using it, or actually going to it. My expectation is that it is successful, from that perspective, it's bringing people into Desert Center, which is not a very big town, per se, and it's bringing tourists, or just people driving by, and they're stopping at the visitor's center. So from that, you'd say, "that's successful". So there are many different ways to define what success means.
[C]: Yes, I am finding that out.
[B]: Yeah, you know, but if you had asked the question right before we started construction: "is this successful" and then the answer would have been completely different. Because at that point, you don't really have any safety issues, you don't really have safety concerns, because there's nothing there, right! [laughs] You don't have any of your contracts signed yet, so you don't have any contractual obligations yet. You haven't done anything, so there's really no way you can be a part of the community directly at that point in time. So you would define success as: do the people that live in the town, are they so far happy with the idea... which is very different than are they happy with it now, which is very different than if they are happy with it now, right?
[C]: Yeah.
[B]: So that's the only reason why I ask how you define success.
[C]: Yeah, that adds a whole other dimension to what my definition would look like, so that's very helpful, so thank you.
[B]:Yeah.
[C]: [closes conversation, requests contact on the public side—is referred to NextEra energy—Bill will pass on a NextEra contact/ask NextEra for a public contact]
[C]: [thanks Bill, ends conversation]

3. Transparency and Community Perception Sources

3.1 Transparency

IVANPAH PUBLICATIONS

Type of report and last update	**Environmental or operational issues mentioned?**	**Source**	**Link**
General info/2015	No	US DOE	https://energy.gov/lpo/ivanpah
General info/2014	No	NREL	https://www.nrel.gov/csp/solarpaces/project_detail.cfm/projectID=62
Update/2013	No	BrightSource	http://www.brightsourceenergy.com/ivanpah-update#.WS3GPRMrIzZ
General info/no date	Yes	BrightSource	http://www.brightsourceenergy.com/stuff/contentmgr/files/0/8a69e55a233e0b7edfe14b9f77f5eb8d/folder/ivanpah_fact_sheet_3_26_14.pdf
General info/no date	No	California Energy Commission	http://www.energy.ca.gov/tour/ivanpah/
General info/ no date	No	California Energy Commission	http://www.energy.ca.gov/sitingcases/ivanpah/
Update/no date	No	Betchel	http://www.bechtel.com/projects/ivanpah-solar-electric-generating-system/

CVSR PUBLICATIONS

Type of report and last update	**Environmental or operational issues mentioned?**	**Source**	**Link**
General info/2016	Yes	Betchel	http://www.bechtel.com/projects/california-valley-solar-ranch/
Monitoring info/2014	Yes	San Luis Obispo County Government	http://www.slocounty.ca.gov/Page11130.aspx
Update/2013	Yes	NRG	http://investors.nrg.com/phoenix.zhtml?c=121544&p=irol-newsArticle&ID=1871038&highlight
General info/no date	Yes	NRG	http://www.nrg.com/documents/renew/FactSheet_CVSR.pdf
General info/no date	No	SunPower	https://us.sunpower.com/utility-scale-solar-power-plants/

General info/no date	Yes	Total	http://www.total.com/en/energy-expertise/projects/solar-power/california-valley-solar-ranch-cvsr

DESERT SUNLIGHT PUBLICATIONS

Type of report and last update	**Environmental or operational issues mentioned?**	**Source**	**Link**
General info/2017	Yes	First Solar	http://www.firstsolar.com/en-IN/Resources/Projects/Desert-Sunlight-Solar-Farm
General Info/2015	No	DOE	https://energy.gov/lpo/desert-sunlight
General info/2014	Yes	Next Era	http://webtest.nexteraenergyresources.com/what/desert-sunlight.shtml#tab_one-tab
General Info/no date	No	California Energy Commission	http://www.energy.ca.gov/tour/desertsunlight/

MOJAVE PUBLICATIONS

Type of report and last update	**Environmental or operational issues mentioned?**	**Source**	**Link**
Update/2014	No	Abengoa Solar	http://www.abengoasolar.com /web/en/plantas_solares/ plantas_para_terceros/estados_unidos/
General info/no date	No	Abengoa	http://www.abengoasolar.com/export/sites/abengoasolar/resources/pdf/Mojave-factsheet-140115.pdf
General info/2015	No	NREL	https://www.nrel.gov/csp/solarpaces/project_detail.cfm/projectID=57
General info/2016	No	US DOE	https://energy.gov/lpo/mojave
Update/2015	No	Abengoa	http://www.abengoa.com/web/en/novedades/mojave/noticias/
Update/no date	No	California Energy Commission	http://www.energy.ca.gov/sitingcases/abengoa/

3.2 Community Perception

IVANPAH NEWS (12/12 negative)

Positive, Neutral, or Negative	**Source**	**Link**
Negative	Forbes	https://www.forbes.com/forbes/2011/0627/technology-brightsource-turtles-energy-solar-spot-tortoise.html
Negative	Governor's Wind/Energy Coalition	http://www.governorswindenergycoalition.org/?p=18185
Negative	The Desert Sun	http://www.desertsun.com/story/tech/science/energy/2015/01/22/abengoa-big-plans-solar-towers-desert/22186683/
Negative	The Daily Caller	http://dailycaller.com/2016/03/17/obama-backed-solar-plant-could-be-shut-down-for-not-producing-enough-energy/
Negative	KCET	https://www.kcet.org/redefine/group-calls-for-strict-limits-on-solar-power-near-national-parks
Negative	The Press-Enterprise	http://www.pe.com/2015/04/17/solar-power-inland-plants-boost-state-to-no-1/
Negative	Wired	https://www.wired.com/2016/05/huge-solar-plant-caught-fire-thats-least-problems/
Negative	The Wall Street Journal	https://www.wsj.com/articles/ivanpah-solar-plant-may-be-forced-to-shut-down-1458170858
Negative	MIT Technology Review	https://www.technologyreview.com/s/601083/ivanpahs-problems-could-signal-the-end-of-concentrated-solar-in-the-us/
Neutral	National Geographic	http://news.nationalgeographic.com/news/energy/2013/07/130725-ivanpah-solar-energy-mojave-desert/
Negative	The Orange County Register	http://www.ocregister.com/2015/10/21/its-not-easy-being-green-ivanpah-solar-plant-near-nevada-burns-a-lot-of-natural-gas-making-it-a-greenhouse-gas-emitter-under-state-law/
Negative	The Atlantic	https://www.theatlantic.com/technology/archive/2014/04/how-to-stop-solar-power-plants-from-incinerating-birds/361318/
Negative	The LA Times	http://www.latimes.com/local/california/la-me-solar-bird-deaths-20160831-snap-story.html

CVSR NEWS (0/8 negative)

Positive, Neutral, or Negative	**Source**	**Link**
Positive	Green Tech Media	https://www.greentechmedia.com/articles/read/California-Valley-Solar-Ranch-NRG-Energy-and-Bechtel-Navigating-Compliance
Neutral	Renewable Energy World	http://www.renewableenergyworld.com/articles/2011/09/doe-closes-on-three-major-solar-projects.html
Neutral	Forbes	https://www.forbes.com/sites/uciliawang/2013/10/31/the-rise-of-a-giant-solar-power-plant-in-californias-central-plain/#5c2f55e93f4b
Neutral	San Luis Obispo Tribune	http://www.sanluisobispo.com/news/local/environment/article39449103.html
Positive	Earth Techling	http://earthtechling.com/tag/california-valley-solar-ranch/
Neutral	San Luis Obispo Tribune	http://www.sanluisobispo.com/news/local/article39153675.html
Positive	Earth Techling	http://earthtechling.com/2013/07/749088-solar-panels-in-place-at-california-site/
Positive	Power Technology	http://www.power-technology.com/projects/california-valley-solar-ranch/

DESERT SUNLIGHT NEWS (0/10 negative)

Positive, Neutral, or Negative	**Source**	**Link**
Neutral	Renewable Energy World	http://www.renewableenergyworld.com/articles/2011/09/doe-closes-on-three-major-solar-projects.html
Positive	Power Magazine	http://www.powermag.com/desert-sunlight-solar-farm-desert-center-california/
Neutral	USA Today	https://www.usatoday.com/story/tech/2015/02/10/worlds-largest-solar-plant-california-riverside-county/23159235/
Positive	Clean Technica	https://cleantechnica.com/2015/02/10/550-mw-desert-sunlight-solar-farm-california-now-online/
Neutral	Power Technology	http://www.power-technology.com/projects/desert-sunlight-solar-farm-california-us/
Neutral	Al Jazeera	http://america.aljazeera.com/articles/2015/2/10/solar-renewable-california.html

Positive	American Infrastructure Magazine	https://americaninfrastructuremag.com/desert-sunlight-solar-farm-now-the-largest-solar-facility-in-u-s/
Neutral	Green Tech Media	https://www.greentechmedia.com/articles/read/desert-sunlight-yet-another-550-mw-solar-farm-from-first-solar-now-fully-op
Neutral	Time	http://time.com/3702615/worlds-largest-solar-power-plant-desert-sunlight-solar-farm/
Positive	Printed Electronics World	http://www.printedelectronicsworld.com/articles/3666/desert-sunlight-solar-farm-a-550-megawatt-mw-solar-power-project

MOJAVE NEWS (2/7 negative)

Positive, Neutral, or Negative	**Source**	**Link**
Neutral	Power Engineering	http://www.power-eng.com/articles/2014/12/mojave-solar-power-plant-enters-operations-in-california.html
Neutral	Inhabit Blog	http://inhabitat.com/grand-opening-today-the-mojave-solar-project-is-officially-fully-operational/
Negative	Forbes	https://www.forbes.com/sites/toddwoody/2011/11/10/california-approves-high-priced-mojave-solar-project-over-objections/#18207f5767b0
Negative	Seattle Times	http://www.seattletimes.com/business/mojave-solar-power-project-sacrifices-the-desert-for-the-earth/
Neutral	Power Technology	http://www.power-technology.com/projects/mojave-solar-thermal-power-california-us/
Positive	The Press-Enterprise	http://www.pe.com/2015/04/17/solar-power-inland-plants-boost-state-to-no-1/
Neutral	PV Magazine	https://www.pv-magazine.com/2014/12/02/abengoa-puts-a-250-mw-solar-csp-plant-online-in-california_100017351/