CINDY ALLEN
COUNCILWOMAN

R-16

Date: March 8, 2022

To: Honorable Mayor and Council

From: Councilwoman Cindy Allen, Second District
Councilwoman Mary Zendejas, First District
Councilmember Roberto Uranga, Seventh District

Subject: Committee Review of Infrastructure Funding Alliance "Freedom Villages" Goods Movement Enhanced Infrastructure Finance District Proposal

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RECOMMENDED ACTION:

Request the Climate Action and Environmental Committee to work with appropriate City staff, the Infrastructure Funding Alliance, Southern California Edison, labor organizations, and other stakeholders to be identified to better understand the potential regional and local impacts of the proposed "Freedom Villages" project and consider the formation of an Enhanced Infrastructure Finance District, and forward recommendations to the Ports, Transportation, and Infrastructure Committee, and;

Request the Ports, Transportation, and Infrastructure Committee to review the recommendations of the Climate Action and Environmental Committee, working with appropriate City staff, the Infrastructure Funding Alliance, Southern California Edison, labor organizations, and other stakeholders to be identified, and forward recommendations to the City Council.

DISCUSSION:

The Infrastructure Funding Alliance approached Harbor staff and City Council offices in 2021 regarding a Zero-Emissions freight corridor project white paper, originally prepared for Edison International, that would reduce truck trips into the Port complex and provide a significant, grid-level electricity storage element to help with regional power grid resiliency. Harbor staff were generally supportive of the idea in concept but did not at the time have the capacity nor the direction to engage further with the proposal.

Throughout 2021 and into 2022, the Infrastructure Funding Alliance has been in active communication with local elected leaders, labor unions, Harbor staff, and other regional partners about their proposal. The response from each has been generally positive. The project is proposed to be financed by the formation of an Enhanced Infrastructure Financing District, which is an incremental tax mechanism. Such a structure would

affect both the City's and the County's tax base and needs to be further analyzed by staff in conjunction with County staff.

The project would implement project development, environmental analysis, and business plan development. It would include transportation technology that facilitates bi-directional "Free Flow "of containers between docks and shipping terminals using carbon-free electric transportation. The technology that enables the bi-directional free flow of containers between the docks and shipping terminals would reduce truck traffic on the 710 freeway and idling in the Port complex. The 710 freeway is an overwhelmed portion of the regional system. This project would increase capacity in "last mile movement".

Marine containers would move quickly from the Port terminals along an elevated concrete aerial span guideway to transshipment nodes, described in the proposal as Freight Villages, to expedite delivery to cargo owners, customers, and new manufacturing centers in the immediate Port area.

The concrete aerial span guideway is also proposing to house new high-temperature superconducting wire (HTS). This superconducting wire HTS as proposed would take the place of old high-voltage power lines that deliver electricity to the ports, freeing up as many as 1,200 acres of valuable right-of-way land immediately adjacent to the Port, which could be repurposed for new uses.

This zero-emissions goods movement project as described would reduce emissions from goods transportation, directly benefiting local impacted communities, predominantly communities of color who have suffered for decades. The regional air quality would also be considerably improved, and the proposed grid-scale energy storage system is promising, especially as continuity of operations at our ports is extremely important. The surge capacity of stored power could provide stability to assist with the regional transition to zero-emission energy sources.
*As a note of historical context, when the state power grid is stressed due to cloudy, windless days with high summer temperatures, there have been times when ships in the Ports were ordered to disconnect from shore power to reduce demand on the electrical grid, unfortunately increasing local pollution as ships switched to onboard generators. Grid-scale electricity storage could potentially alleviate this issue.

The labor community is a critical part of this project. The proposers have conducted significant outreach to the labor community, and so far, have obtained letters of support from IBEW-NECA Local 11, Teamsters Local 848, and UAW-LETC, and outreach to ILWU and others continues.

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Finally, given the cargo surge recently and still impacting our local air quality severely, with effects rippling throughout the entire national supply chain, it is crucial to explore additional efficiencies and capacity in our Port complex to improve cargo throughput via zero-emission systems.

This proposal is promising and deserves further consideration and analysis by this City Council. The City Council should broadly support this proposal and utilize the Committee structure to undertake further analysis with staff and the proposers.

This matter was reviewed by Budget Manager Grace H. Yoon on February 28, 2022.

FISCAL IMPACT:

This recommendation requests the Climate Action and Environmental Committee to work with the appropriate stakeholders to better understand the potential regional and local impacts of the proposed "Freedom Villages" project and consider the formation of an Enhanced Infrastructure Finance District. The recommendation also requests the Ports, Transportation, and Infrastructure Committee to review the recommendations of the Climate Action and Environmental Committee. The future formation of an Enhanced Infrastructure Financing District may require significant resources from the City; therefore, staff will require further research to determine the impact of implementation. The requested action is anticipated to have a minimal impact on staff hours beyond the budgeted scope of duties and is expected to have a minimal impact on existing City Council priorities. There is no local job impact associated with the recommendation.

EQUITY LENS STATEMENT:

Staff will consider issues of equity and access with any program proposals brought forward to ensure the City's commitment for everyone reaching their highest level of health and potential for a successful life, regardless of background, neighborhood, or identity.

Freedom Villages

White Paper

Developed by the Infrastructure Funding Alliance

Prepared for Edison International

By
Mark Pisano
Chairman, IFA

January 15, 2020

Preface

Over fifteen years ago, Fran Inman, Senior Vice President of Majestic Realty Co. and member of the Infrastructure Funding Alliance (IFA) Board, recommended that an "infill two-percent strategy" for goods movement and manufacturing be developed.

> Infill development occurs in a built-up neighborhood, often using vacant land or rehabilitating existing properties. Infill development can bring many benefits, including financial savings for municipalities, increased property values for residents and businesses, easier travel, reduced pollution, and economic stabilization of neighborhoods.[1]

Such a strategy would complement the Southern California Association of Governments' (SCAG) regional growth and transportation plan. The "Freedom Villages" initiative is the first and long overdue attempt to do this. An economic-development policy must be developed that will benefit the entire population and not just those who work in high-tech industries. A job-growth strategy for manual-skills workers, who represent the majority, is desperately needed. This paper is the first attempt at crafting such a program. Mike Peevey, former chairman of the California Public Utilities Commission (CPUC), who started his career as a labor leader and is currently an advisor to this effort, said that this initiative would promote job growth and economic freedom while fostering much-needed equity. His views inspired the choice of the title "Freedom Villages."

This initiative builds on the work that was done in the region by SCAG, which had done extensive work developing the basic elements of this strategy in the adopted Regional Transportation Plan (RTP) in 2008. These provisions were not ultimately implemented primarily due to the lack of institutional capacity to implement the strategy and were removed from the plan in 2013. Since then, new State legislation has provided the region with the authority to achieve the stated goals and objectives described in the Executive Summary.

Acknowledgements

[1] U.S. E.PA, Attracting Infill Development in distressed Communities: 30 Strategies, May 2015. https://www.epa.gov/sites/production/files/2015-05/documents/fresno_final_report_042215_508_final.pdf

This effort to develop a zero-emission goods movement strategy was supported by a grant from Edison International philanthropic program to advance electric transportation in Southern California. This supported the educational assistance to the public, governmental, labor and environmental leadership needed to develop the strategy and assist in forming the institutional capacity to begin the implementation of the effort. This assistance, along with participation of Southern California Edison retired employees described below, was essential in developing this effort.

Input from Project Advisory Team

The members of the Project Advisory Team that developed the concepts and ideas for the development of the preliminary business plan for "Freedom Villages." Many of the members were part of the team that developed the provisions of the SCAG RTP plan described above, and many are members of the IFA Board. Special thanks to Jan Perry, the President of IFA, who managed the educational program that helped to make this strategy a reality.

- Greg Devereaux, the former CEO of San Bernardino County International Brotherhood of Electrical Workers (IBEW) Administrative Office (CAO) and IFA Board Member;
- John DiBernardo, retired Vice President of SSA Terminals in Long Beach;
- Gill Hicks, ex-SCAG Lead Planner for Goods Movement, who developed the Alameda Corridor planning provisions and then became General Manager and Chief Operating Officer of the Alameda Corridor Transportation Authority (ACTA), leading the effort to build the Alameda Corridor;
- Fran Inman, Senior Vice President of Majestic Realty Co. and IFA Board Member;
- Larry Kosmont, CEO of Kosmont and Associates, who assisted in developing and implementing the EIFD policy structure and Board member of IFA;
- Tony Morris, the CEO of American Maglev Technology and the CEO of American Supermagnetics, the lead in developing the original proposal and volunteered to assist in identifying the expertise needed;

- Russell Neal, retired Chief Engineer at Southern California Edison and now a lecturer at UC Irvine and a consultant;
- Felix Oduyemi, a former staff member at Southern California Edison and SCAG and IFA Board Member;
- Mike Peevey, past President of Southern California Edison and past chairman of the California Public Utility Commission;
- Bev Perry, the former mayor of Brea and Chairman of SCAG and IFA Board member;
- Dr. Chris Rey, professor at Florida State University, previously at Brookhaven, where the original research and development on Superconducting Magnetic Energy Storage (SMES) took place;
- Dave Rogers, Retired Managing Partner of Latham & Watkins LLP and for the last five years a lecturer at Stanford in clean energy and finance projects;
- Antonio Sanchez, and Tommy Faavae, IBEW Local 11;
- Dr. Venkat Selvamanickam, a professor at the University of Houston, and the developer of the new high temperature superconducting (HTS) tape;
- Eric Tate, Secretary-Treasurer, Teamsters Local 848, who took the lead in bringing union suggestions on the design of this initiative; and
- Jay Todisco, Executive Vice President, Ware Malcomb, designer of the Brooklyn Yards Transloading Center.

The analytical framework of the Project is the same even though it was removed from the RTP in 2013. Additionally, the advisory team has brought insights and contributions that have been incorporated into this paper. Insights and analysis in the business plan are derived from their input.

Executive Summary

Freedom Villages are about transformational change that will correct several critical problems in the region. This is made possible by taking several of the most serious problems in the region and combining them into an integrative strategy, creating the synergy needed to address the multiple problems. The legislative authority to undertake such a bold and challenging approach is made possible by the establishment through State law of Enhanced Infrastructure Financing Districts (EIFDs) whose Board is a Public Financing Authority. These provisions provide local political leadership of local government — counties, cities and special districts — the institutional and financing authority to take the leadership to address the problems and create the following outcomes:

- quickly move containers to and from the Ports of Los Angeles and Long Beach (POLA/POLB) using emission-free technology for all modes, which will eliminate all air quality pollutants, reduce noise and substantially increase transportation access throughout the port and the region,
- increase capacity of port facilities by allowing existing capital facilities to be used more effectively,
- enable battery storage technology that will make renewables become the lowest-cost base-load energy source and allow State-established renewable goals to be met,
- reduce transportation modes' (trucks, trains, and cars) dependency on carbon-based fuels by providing a battery technology that increases range, can be charged as quickly as carbon-based fuels, is not flammable and is less costly, and
- make optimal use of land near the ports for transloading centers, housing and new employment centers — advanced manufacturing and advanced logistics — and create products that address climate change and resiliency.

These villages can provide the building blocks for a sustainable, carbon-free, zero-emission logistics future with good living-wage jobs and employment opportunities that can shape the region in the 21st century. Labor has been involved in the development of this initiative and has committed to be a part of the critical labor force development process.

The Vision

This vision begins with a ***Project*** to be built immediately within and adjacent to the port. For purposes of this initiative, the ***Project*** will be the focus of the implementation and project development, environmental analysis and the business plan development of this white paper. It includes a new transportation technology that facilitates bi-directional “Free-Flow” of containers between the docks and shipping terminals using carbon-free electric transportation. The marine containers would move directly from Port terminals along an elevated guideway to Freight Villages that would quickly unpack the goods, place the contents in larger domestic containers, and expedite the delivery to cargo owners, customers, and new manufacturing centers within the immediate Port area.

In the concrete aerial-span guideway used as the roadway for Free-Flow, new high-temperature superconducting wire (HTS) will take the place of old, high-voltage power lines that deliver electricity to the ports, currently consuming over 600 acres of valuable land immediately adjacent to the ports. Land will be repurposed for new and more valuable Freight Village uses.

The guideway will also hold a new, grid-scale energy storage system that allows renewable energy to be stored and used as needed. The battery is sized at two gigawatt hours (GWh) to store the energy from a ten-hour period from adjacent natural gas-fired peaking plants.[2] At a regional scale, the storage would be sufficient for the State to meet its 100% renewable goal. The initial cost structure of this storage unit and renewables will be substantially less expensive than conventional power currently used in the region and throughout the nation. By placing the storage in the guideway, valuable land required by existing energy storage will spared. The design characteristics of these batteries have the size, weight and easy recharging capacity — as fast as existing fuels — allowing for smaller batteries that can enable cars, trucks, trains, and buses to operate competitively with the cost and performance of traditional fuel sources. This will enable all the goods movement associated with the Ports, as well as all transportation modes, to have an alternative to carbon-based fuels. This is an important element of the zero-emission goods goal as well as other goals for the region and the state.

[2] The battery is a Superconducting Magnetic Energy Storage System (SMES) and will be described in this paper.

Implementing energy technologies and supply-chain improvements, even if only on the scale of the ***Project***, requires an organization that can be the "conductor," leading, orchestrating and helping others finance these important new investments. The Infrastructure Funding Alliance (IFA) is working with the local governments in the Project area to establish a new entity called a Public Finance Authority (PFA), the Board of a new Enhanced Infrastructure Financing District (EIFD). The IFA will utilize the new statutes recently enacted by the [3]legislature and signed into law by Governor Brown.[4] Governor Newsom highlighted in his Budget message a need to reform and accelerate use of these statutes. By using these new legislative authorities, regional leadership, with state partnership, can generate new public resources by capturing revenue streams from the benefits created by the transformational ***Freedom Villages*** and enter into partnerships with the private sector that are authorized by the new statutes. These partnerships will involve active participation of the labor unions and environmental and community groups so that accelerated implementation can be achieved.

The PFA can provide new financing structures that can partner with: developer and financing organizations to build the Freight Villages; utility providers like SCE, DWP and NRG; beneficial cargo owners who orchestrate the just-in-time economy; terminal operators and the Port authorities; the Class I railroads and trucking companies. With service to both the Class I railroads (Union Pacific and BNSF), the Project builds on the immense investment of the Ports and the railroads while supporting container transloading, which has in recent years driven transportation volumes in container movements toward trucks, overly impacting our constrained regional highway system. ***Freedom Villages*** can move truck traffic off the freeways, the overwhelmed portion of the regional system, and take advantage of local and regional roadways for last-mile movements, where more capacity exists to handle the distributions to regional customers and to loading centers for longer-distance rail service. This new mode can complement existing modes and increase their

[3] IFA working with Calfwd has developed a legislative proposal to be introduced this session that would rebrand these districts as Community Investment Authorities (CIFA) and include the State as an active investment partner.

[4] The statutes are: SB628, the author is Senator Jim Beall and was enacted in 2016, and AB313 the author is Speaker Toni Atkins and was enacted in 2017.

efficiency and reduce travel times, making the region more competitive in the global marketplace.

The emission-reduction benefits from renewable energy storage capacity, the elimination of peaking plants throughout the region, and the reduction in truck, train, car, and bus emissions can fill the missing gap in the South Coast AQMD and SCAG's regional Air Quality Management Plan (AQMP), as well as the critical CARB climate-change initiative.

Changing the Region's Economic Base

Freedom Villages will allow the economic base of the region to be transformed into a 21st-century economy. The innovations of the strategy will transform logistics and manufacturing to become more advanced, taking their place with the digital and technology advances that are occurring in the region and the nation. This investment strategy will enable California to become the leader in these sectors as it has in the digital and high-tech sectors. The result of the transformation to advanced logistics and advanced manufacturing, will create higher-paying jobs and alter the economic base of the region. The increased productivity of these systems and the efficiencies they create will not only support increasing the higher wage cost structure but also improve the competitiveness of the region and substantially increase the size of these sectors. On a regional scale, the amount of land recaptured by the coupling of logistics systems with energy transmission is significant, which will support an economic base change in the region. The combination of new Freight Villages with both manufacturing and logistics, integrated with transportation and energy storage that creates new advanced construction jobs will create higher-income-making opportunities that are sorely needed in the region, state and country. An evaluation of the employment trends shows that middle-income jobs have been declining over the past ten years.

It could be the transformational catalyst for the State's regional economies, particularly the inland and southern regions, and alter the precipitous decline in the regional real per capita income. The change in the economic base will create the much-needed employment opportunities for the communities in the Southern California region that surround the Project. The southeast sub-region of Los Angeles County has been severely impacted by industrial employment and is in dire need of economic and environmental recovery. Over the past three decades, the region's per

capita income has declined from the highest to one of the lowest among the nation's large regions. Finally, the scale of the battery installed in the guideway, if expanded throughout the region, could enable the renewable targets established by State law to be achieved without increasing the cost of energy. In fact, the reverse will happen. The expansion of this approach could actually lead to the reduction of energy costs in the region.

The innovations contained in the vision are using new technologies that can be implemented using PFAs in a discrete, 4.6-mile Project from the terminals at the Port of Long Beach to a destination near the Intermodal Container Transfer Facility (ICTF). Moreover, portions of the area of the Project are located in designated Opportunity Zone Districts that can take advantage of the beneficial tax treatment of capital gains that was established by federal tax law.

These new institutional arrangements will enable the region and the State to create investment programs that will meet the State's key goals:

- Economic: spurring job growth and economic well-being,
- Equity: serving the entire population, and
- Environment: achieving environmental goals and not sacrificing them.

Background and History

Provisions in Adopted Regional Plans

The shuttle concept was initially developed by the SCAG upon the completion of the Alameda Corridor at the turn of the millennium. The concept was included as part of the 2008 RTP.[5] This section of the plan was further developed in a business plan conducted by IBI Group in 2007.[6]

The business plan has been developed to support a revenue-backed project, not unlike the approach that the PFA would use. In order to establish a PFA, the financial plan must spell out how revenues generated by the investment will be sufficient to amortize the investments. This business plan is based on structuring the approach (i.e., arranging the organizations in our society) so that the benefits of the investment are captured as revenue streams. This approach is called "institutional design," a new evolving field in public administration developed by Nobel prize recipient Douglas C. North. It is based on the observation that if the economic path that we are on is not working, such as funding our infrastructure and the development of our economic base, then by changing the rules of the game for those involved (through legislation), a pathway that works can be created.[7]

The business approach for the goods-movement portion of the investment program was based on the newly developing, evolving practice of transloading by the beneficial cargo owners (BCOs) to improve inventory management in the just-in-time revolution. The practice was first identified in a seminal study performed by University of California researcher Robert Leachman in 2005 for SCAG in preparation of the upcoming RTP.[8]

Transloading is the practice of taking the contents of marine 40-foot containers and transferring them to 53-foot domestic containers or trailers to increase efficiency. Additionally, replacement inventory for fast-selling products is sent from the San Pedro Bay (SPB) Ports, which is then sorted,

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[5] http://rtpscs.scag.ca.gov/Documents/2008/fHighSpeedRegionalTransport.pdf

[6] http://rtpscs.scag.ca.gov/Documents/2008/fFinance_AppF_03_HSRT.pdf.

[7] Douglas C. North, *Institutions, Institutional Change, and Economic Performance (New York, Cambridge University Press, 1990).*

[8] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.410.1598&rep=rep1&type=pdf

stored and repackaged from marine containers to the larger containers and shipped to multiple regional distribution centers throughout the nation, quickly restocking these fast-selling items. This is the key to the new just-in-time marketing world that has evolved over the past twenty years.

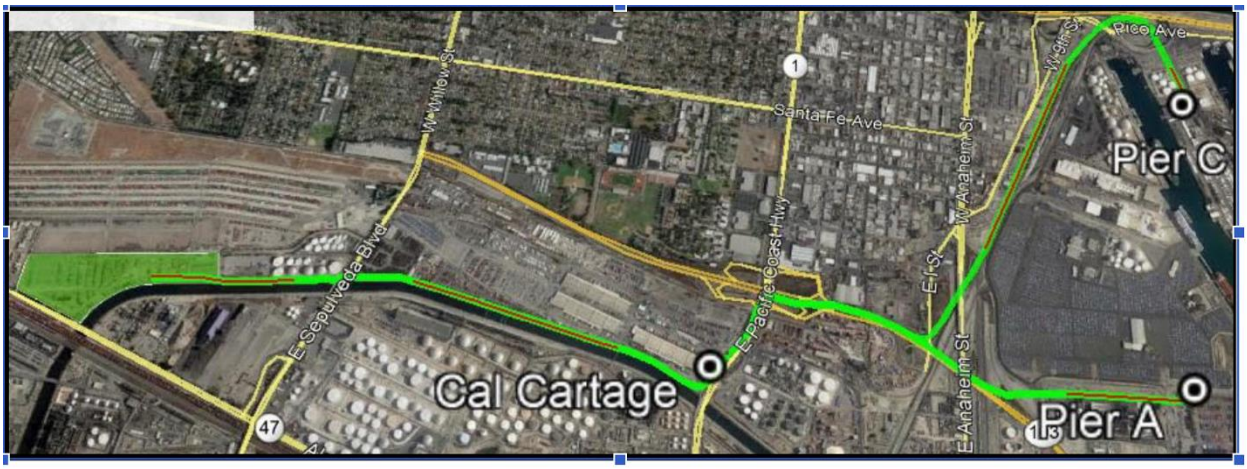
Time savings, efficiency, and just-in-time delivery are required to make this strategy work. Time savings has value, and investment strategies that produce this additional value have increased worth. Leachman's analysis showed that this value is considerable and equivalent to the profitability of the BCOs. Multiple alternatives were considered to achieve these efficiencies in the SCAG planning process of the 2008 RTP. Since the regional highway system was developed decades prior to the expansion of the Ports into the global role that the SPB Ports have assumed, the region's highway system was not originally designed to handle the impacts of the accelerated port and goods-movement distribution. The alternative analysis concluded that a different mode would be needed to address this deficiency, including a regional system of truck-only lanes and a regional higher-speed, grade-separated transportation system. A Request for Interest (RFI) was posted in 2006 to develop a modal alternative to take the load off the regional system. Three proposals were submitted, but the only alternative that contained a business plan capable of financing and meeting the regional parameters was submitted by American Maglev Technology (AMT).

Diagram 1

The long-range proposed system included a route from the Ports up the I-710 Freeway to the BNSF and UP rail yards near Downtown Los Angeles, then east on the SR-60 Freeway to the UP railyard in Colton. From there, one line extended out I-10 to the Coachella Valley, and another went north on I-15 to Barstow. Additionally, a line was proposed from the Downtown yards north on I-710 to I-10 West and I-5 to SR-14 on the new green energy corridor to Barstow. The entire system was grade-separated using a pier structure with columns five feet in diameter. (See Diagram 1.)

The Free-Flow system **Project** will be a 4.6-mile bi-directional segment of the AMT-designed zero-emission system to connect the ICTF, formally the California Cartage Company ("Cal Cartage") site ,now operated by Toll Trucking and piers A and C. Above-grade sections are shown below (Map 1) in green; at-grade sections are indicated by a red stripe. For startup, testing, and commissioning, two vehicles will be used in "shuttle mode," growing to six vehicles. These vehicles will then ultimately operate in a "pinched-loop mode" with operating switches to achieve its capacity milestones. The alignment is on publicly owned rights-of-way. The aerial structure and at-grade sections will be constructed along the Dominguez Channel and along public rights-of-way (Pacific Coast Highway, Terminal Island Freeway, Alameda Street, and Pico Avenue) as well as the north side of railroad right-of-way owned by the SPB Ports and operated by Pacific Harbor Line.

Map 1: Route Alignment

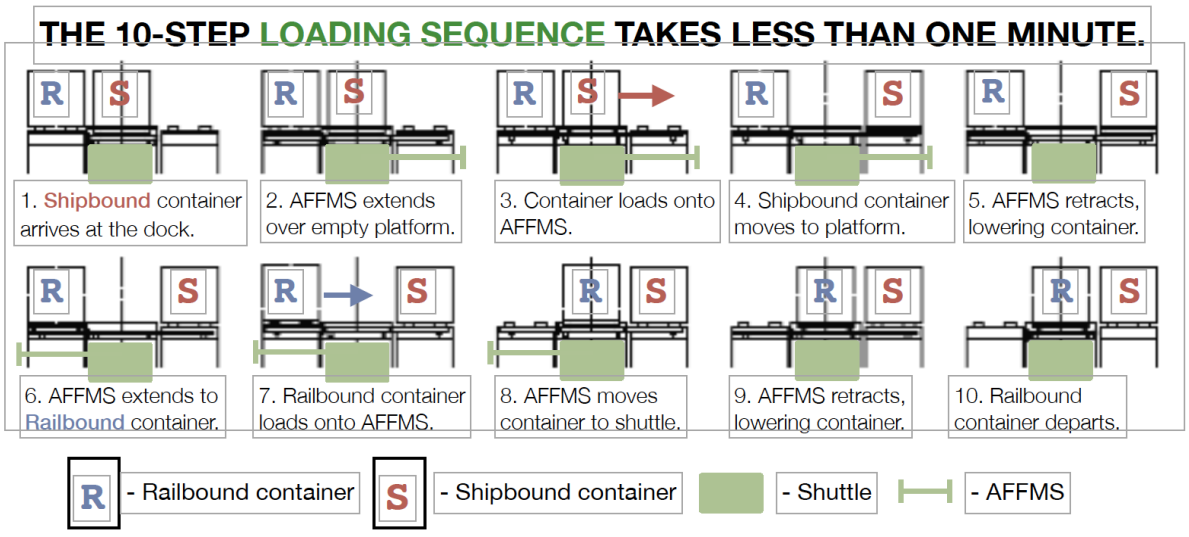


The new Free-Flow, zero-emission container shuttle system will deploy all-American transport technology based on magnetic levitation, or "maglev," a service-proven technology currently in commercial operation in passenger-carrying systems in urban China, Japan and South Korea. Having undergone more than 10 years of full-scale testing using simulated payloads representing that of full-sized oceangoing containers, the technology is well suited for developing a conveyance network of zero-emission freight operations. Maglev operates with an electrical requirement that is 60% lower than that of a conventional vehicle with a diesel engine and steel wheels. The primary reason for this efficiency is that the motor is not in the track but is a linear induction motor on the vehicle which is

elevated by magnets. This design significantly reduces the weight of the system, thus reducing the size of the elevated structure, which in turn reduces the cost and the size of the support structure's piers, only requiring a five-foot footprint. The proposal makes a compelling argument for the use of these container shuttles with the potential to reduce the costs of drayage trucks to and from the Port terminals, the ICTF and local drayage yards by 30 to 50%.

The Advisory Team has designed a second-lift system, a hydraulic system that moves containers on and off the vehicle, enabling more trips, resulting in time and costs savings, along with more job opportunities directly linked to the Project. The loading with fail-safe operation, requires manual override by human intervention in case of failure of a multiple backup locking system. Once the container is locked to the shuttle using the second-lift subsystem, the shuttle loaded with a container is dispatched by central control to move to its destination by dynamic moving-block shuttle supervisory control. The ability to handle second-lift operations enhances the overall feasibility of the Project and ensures that throughput is maximized along the corridor. The loading and unloading sequence of containers is presented in Chart 1.

Chart 1: Loading Sequence

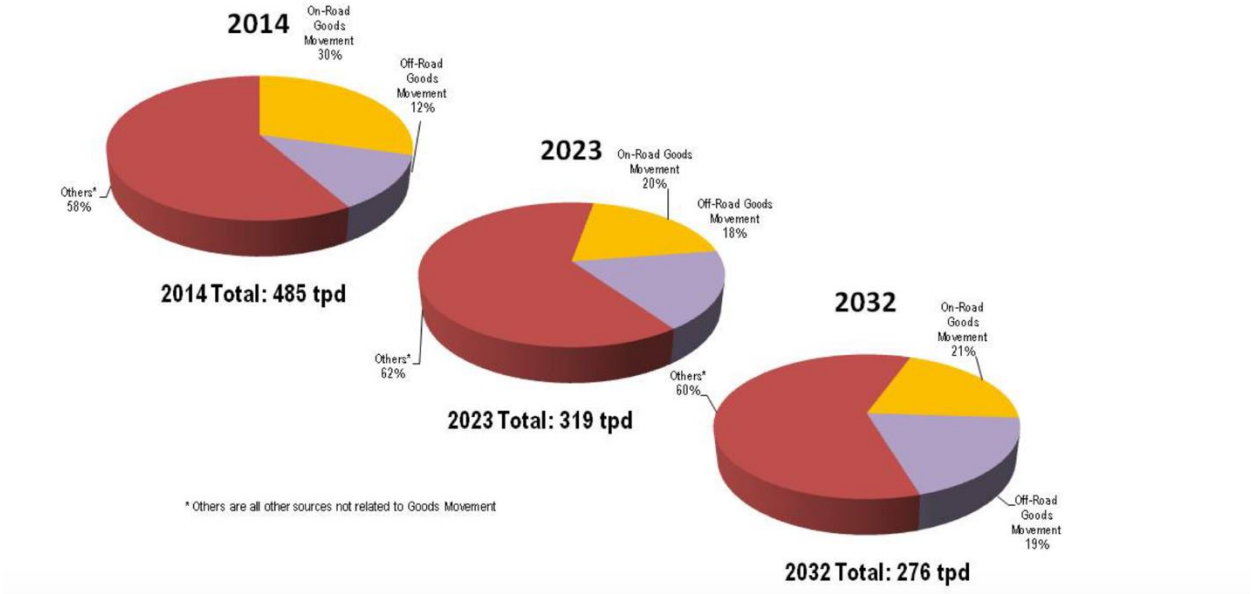


No existing governmental agency was willing to take on the task of implementing the program, and as a result, the provisions were removed from the 2013-14 RTP and its EIR. As of now, no investments have been

initiated to deal with both the capacity demands and the air-quality mitigation required to enable the region to handle the expanded role that the ports and transloading places on the regional system. The other chosen option of building the truck lane system also failed. The first leg of the truck lane proposal on I-710, an $8 billion project, was not funded by MTA. Private investments, like BNSF's Southern California International Gateway (SCIG), a rail container transfer facility near the ports, have been blocked by environmental and labor conflicts. Resulting in increasing freeway congestion and uncontrolled air quality emissions by NOx, particulate matter, and CO_2. Chart 2 shows the NOx emissions from Goods Movement for the region from the 2012 Air Quality Plan for the South Coast Region.

Chart 2

Goods Movement Sector NOx Emissions Contribution to the Total NOx Emissions for 2014, 2023, and 2032 (Source: 2012 AQMP)

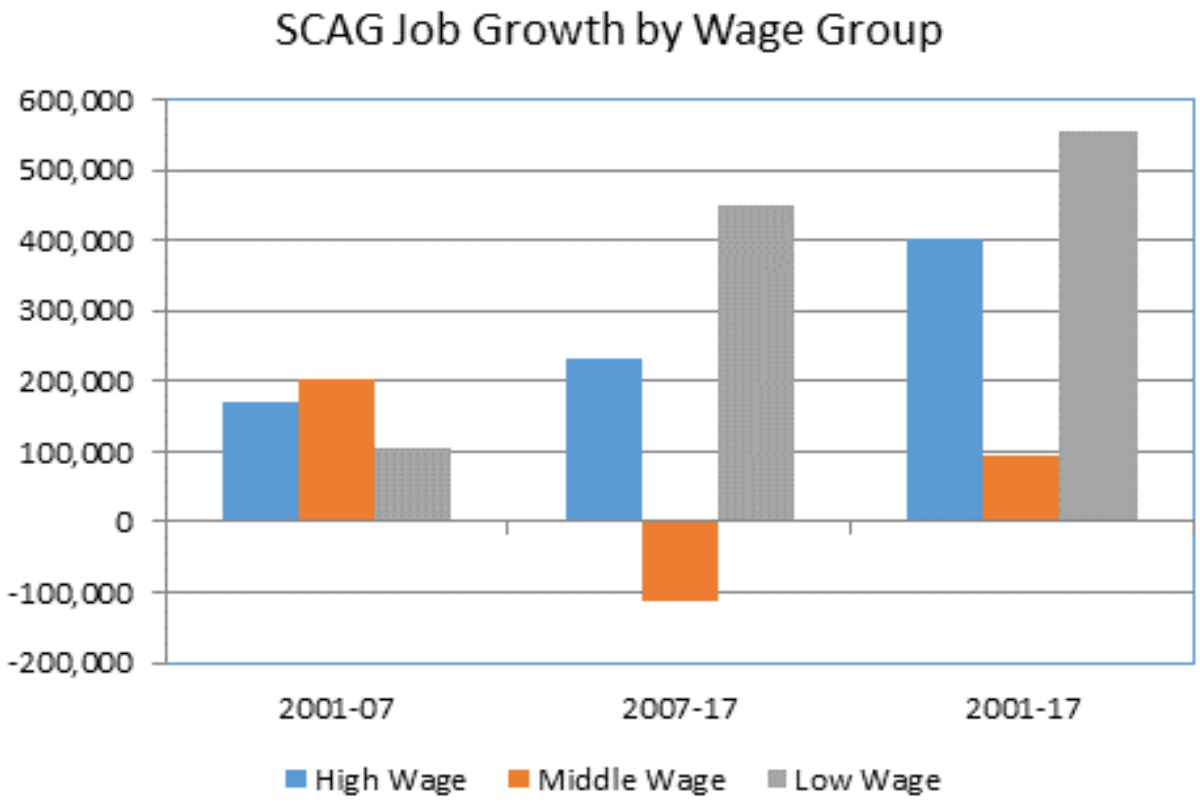


Economic Losses to the Region's Economy

Another loss for the region is the inability to expand the logistics sector to its full economic potential. While logistics now accounts for 18% of the employment in the region, limitations imposed by inefficiencies and increased cost have led to loss of market share to other ports and regions in the country. The expansion of the Panama Canal and increased cost and time delays are hurting the competitive position of the region. Investments to remove these limitations have not received funding priority by public agencies; e.g., "Operation Jump Start" was proposed by SCAG to accelerate the development of truck lanes, but it too lacked the needed public funding. Moreover, trucking interests did not support the necessary privately paid tolls. The two-decade lack of any progress in logistics and a simultaneous reduction in manufacturing in Southern California further added to the loss of job opportunities for middle-income workers. The region lost over 800,000 manufacturing jobs from 1980-2000 and has gained back only 300,000 to date. The regional economic strategy in the last SCAG 1990 Comprehensive Plan noted that logistics would be key to the region's economic growth and rebuilding our economic base.

The absence of the economic strategy suggested by this initiative has had consequential impacts on the region. Table 1 shows the result of not being able to expand the sectors discussed in this white paper. Over the last ten years, the region has actually lost 111,000 middle-income jobs and, since the turn of the millennium, only 92,830 middle income jobs have been added. The table shows the job growth by high, middle and low incomes in the SCAG region. Compounding the economic difficulty of the majority of the population living in the region, more than 60% of job growth that did occur during this period was for low-wage jobs: less than $18 per hour and less than $36,000 per year. The region's inability to develop an economic base to support all its population has caused the region's per capita income to slip from the highest of the 28 largest regions to 24th over the past thirty years.

Table 1 SCAG Job Growth by Table Wage Group



High Wage	1,280,870	1,450,810	1,682,420
Middle Wage	2,630,360	2,834,560	2,723,190
Low Wage	2,892,030	2,996,190	3,446,720
	2001-07	**2007-17**	**2001-17**
High Wage	169,940	231,610	401,550
Middle Wage	204,200	-111,370	92,830
Low Wage	104,160	450,530	554,690

Source: California EDD

Low wage: under $18 per hour. Middle wage: from $18 -$30 per hour. High wage: above $30 per hour.

All the above implications suggest that the region needs a strategy to increase employment in advanced logistics and advanced manufacturing, and construction — all possible with the Freedom Village initiative. Employment opportunities created by cleaner, faster-moving advanced logistics and Freight Villages would enable the Port to expand. The storage and battery technologies could be the dynamics that lead to the much-needed increase in advanced manufacturing. The grid innovation not only would open much-needed land, but it would also increase efficiencies and safety in our grid, particularly the use of micro-girds and grid-scale batteries as a fire avoidance strategy. These changes, along with the construction employment they create, will provide the necessary restructuring of the region's economic base. On a regional scale, the amount of land is significant, which will support an economic base change in the region that is transformational. The combination of new Freight Villages with both manufacturing and logistics, integrated with transportation and energy storage that creates new advanced construction jobs will alter the economic base and create higher incomes.

Continuing the status quo will not create the change needed for the majority of region's population, nor will it reduce the cost and efficiency of the logistics and energy sectors.

Developing Organizational Institutional Capacity: Public Finance Authority Development

The IFA, a nonprofit that was founded in 2010, provided technical and educational assistance to California Forward's successful efforts for legislation to establish an entity that could take the leadership in implementing Freedom Villages and other economic development, housing, infrastructure and environmental mitigation investments. Once the necessary authorities were enacted, the IFA undertook the effort to educate local political, business, labor and environment leadership on how an EIFD and its Board, the PFA, could utilize the provisions to implement "Freedom Villages," as well as other investments in the region and the state. The eligibility authority of these provisions includes: all infrastructure except schools, any environmental mitigation needed, all economic development investments and housing and commercial development. Governor Brown and the legislature enacted two bills — Enhanced Infrastructure Financing Districts, SB628, by Senator James Beall in 2016 and Public Funding Authorities, AB313, by Assemblywoman Pat Atkins in 2017 — that provide

the region with the capacity to address the gap in institutional authority and leadership needed to implement the strategy. The first bill enables districts to be established to fund investment programs that have a business plan and to carry out the provisions of an investment plan. Multiple funding authorities are available to the district, enabling funding streams to be created to amortize debt that the district can issue. The districts also have the capacity to enter into partnerships with other sectors to carry out the investment program. The second bill provides the legislative authority for cities, counties and special districts to serve as members of the board of these authorities, provided that they bring resources to the table to enable the investments to be realized. The Board also can have community and labor interests represented. The institutional provisions of these combined bills create the most innovative legislative authority in the country and positions California to create the leadership authority to undertake the transformational investments called out in this initiative.

PFAs can be established by actions of cities and counties that will enable them to undertake an investment program for any purpose in the built environment (except schools). In forming the district, whose board is the PFA. This is the only statute in the country that enables general-purpose and special-purpose government to jointly establish a separate governmental entity without having to obtain a separate legislative authorization. The IFA is undertaking the educational effort of working with the cities of Long Beach and Los Angeles and the County of Los Angeles to establish a PFA for the initiative. It is working with labor, environmental and business leaders in this effort. Copies of letters that have been received from Unions supporting this work are contained as attachments to this paper.

This white paper is also developing the preliminary business plan information that will be needed to begin the process of establishing the PFA that can implement the project. The following section contains the summary information for each component of the business plan. More detailed information is available for each of the sections upon request. For several of the sections, more detailed consultant and research reports are also available upon request.

Enabling investment in logistics, both the movement of containers and transloading fees, along with energy revenues from both transmission and storage, freeing-up land that has very valuable best uses, and rents could

generate revenues that could amortize debt that the PFA is able to issue. The financing capacity of the PFA, along with the ability to champion the initiative and to deal with the governmental dynamics of a multi-use investment strategy, provides an opportunity to overcome the most significant limitations confronting this effort in the past. The limitations were almost no funding, no political or organizational champion, and no way to put multiple problems together and reap the benefits of multiple problem solving. Most importantly, under the status quo there is no way to achieve critical goals.

California jurisdictions and organizations have the authority and tools to be the “institutional design” and governance leaders in the nation and possibly the globe.

The Business Plan Prospectus for the Project
Key Insights gained from the Advisory Committee

Supporting the societal benefits of the ***Project*** is an attractive financial proposition for public and private investors. The advisory team bought insights and knowledge which are key in putting this integrated strategy together. From these insights financial benefits for private investors are developed but significant public benefits are realized. The ***Project*** can:

- Transition logistics companies and the supply chain to a green and sustainable future,
- Create an energy-efficient and time-efficient goods movement transportation system,
- Create battery manufacturing for the grid and smaller-scale batteries for all mobile sources,
- Reduce inventory costs for BCOs by accelerating the speed in moving inventory.

The organizational design capacity of the PFA enables these benefits to be captured. In summary, by putting public and private sectors differently, benefits and funding streams can be realized to amortize debt. The key transportation, air-quality and Port-capacity insights that were gained through this collaborative effort are described below.

Transportation Insights

In 2015, Leachman updated his pioneer study with the observation that the practice of transloading marine containers to larger domestic containers was growing rapidly.[9] Leachman estimated that in 2015 over 38% of all import containers were transloaded to domestic rail, and almost all this growth has occurred since the turn of the millennium. (See Chart 2.) Movement of intact marine containers (no transloading) via Inland Point Intermodal (IPI) accounted for 36.53% of imports. Total imports were 7.78 million 20-foot equivalent units (TEUs) in 2015. In the future, the trend of increasing transloading and declining IPI will accelerate and dominate the growth of the Port. Reducing the time delays and increasing flexibility in the just-in-time logistics system will become increasingly important to BCOs,

9 http://www.freightworks.org/DocumentLibrary/Port%20and%20Modal%20Elasticity%20Study%20Phase%20II%20-%20Final%20Report.pdf

who will gravitate to distribution centers/ports and regions that provide this service. This evolution defines the “advanced logistics” system that will enable both logistics and advanced manufacturing to grow. However, the transition to transloading has led to an increased utilization of trucks in the movement of containers.

Chart 2 Import Container Movements by Market in Southern California, 2015

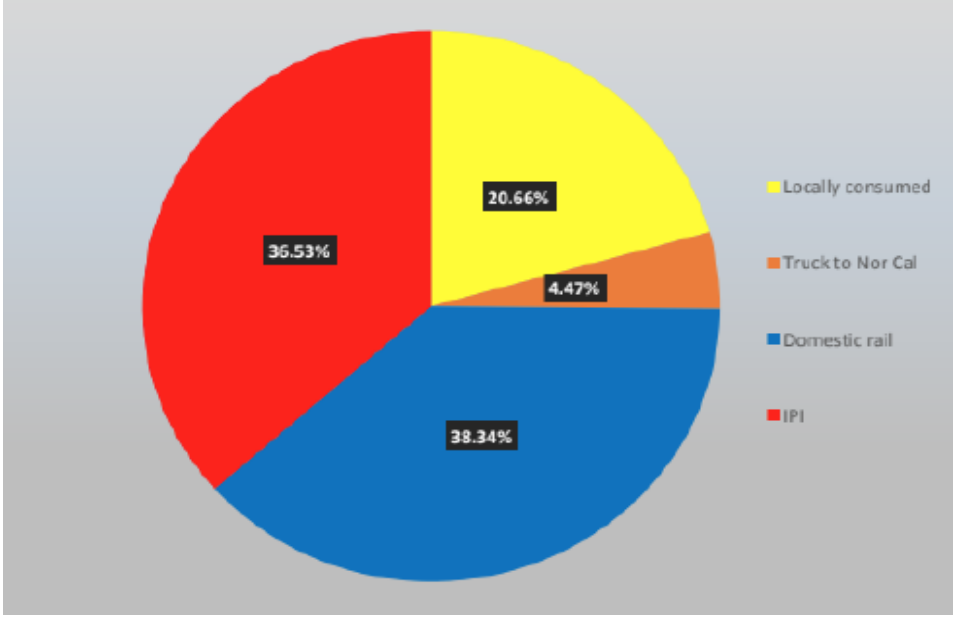
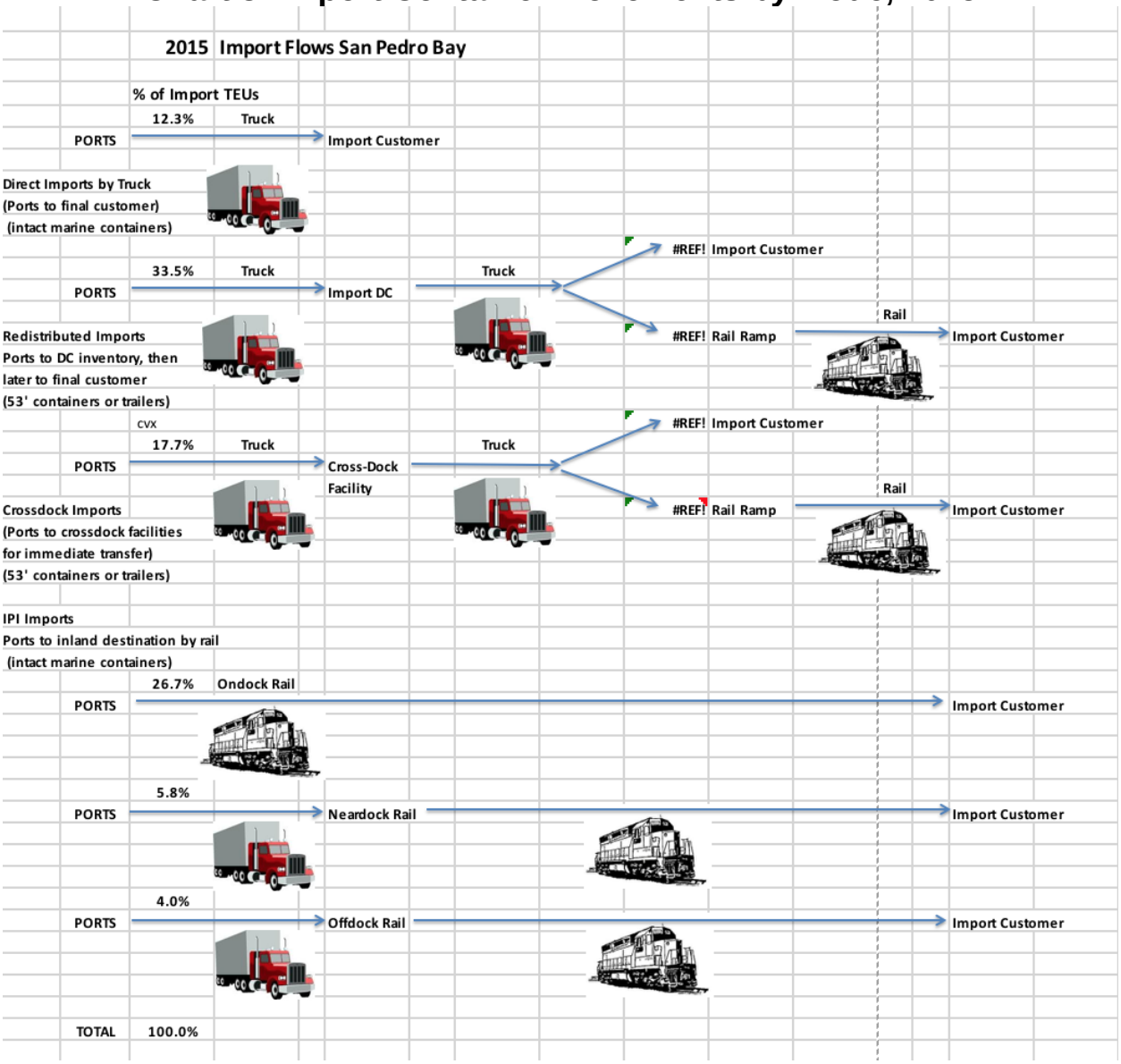


Chart 3 shows a more detailed breakdown of 2015 containerized imports. Not only do trucks handle 61.6% all movement of containers from the ports, but they also make over 38% of the second and third movement of containers in the advanced logistics system. Chart 3 also portrays the total movement of containers from the port through the regional system. The chart provides the background and understanding of how significant the changes are and demonstrates why the regional highway system is under such stress.

This accelerated move to trucks is creating bottlenecks and difficulties for a regional highway system that was never designed to handle the demands of the Ports or deal with the challenges of the advanced logistics system, with multiple truck trips and a vast array of transloading, warehouses and distribution centers. The existing congestion and delay times on the

region's highway system will only increase unless a system of inland ports is developed in the region, preferably as close to the port as possible.

Chart 3: Import Container Movements by Mode, 2015



Air Quality Energy Insights

In addition to the delay and congestion limitations, the air-quality impacts will only increase. The inventory of air-quality emissions associated with the Port area has been reduced by both Ports over the past decade, and they are committed to further reductions. The remaining challenge is the

emissions from the movement of containers in the region. A major limitation is the scarcity of land immediately near the port to handle transloading. Currently 1.7 million marine containers are trucked long distances to these centers, repositioned into 53-foot containers and then trucked back to the ports. Leachman's 2017 analysis shows the significant improvements in cost and air quality that can be made by eliminating these truck trips.[10]

In order to accelerate the air quality improvements of the initiative, the Advisory Team suggested that the energy transmission and supply issues associated with port activities be integrated. The possible synergy of joining energy and logistics planning and strategy became immediately clear, considering that this major constraint on both infrastructure systems can potentially be solved with an integrated strategy.

The Advisory Team suggested that the transmission lines to the port be shifted from their kV towers to a Superconducting cable that would be placed on the elevated structure supporting the Free-Flow shuttle system. This shift could improve grid movement and safety and would free up significant amounts of land near the ports that could be used to handle the region's immediate and future transloading demand. The Advisory Team conducted the shift analysis that would make such a move possible, described below.

The State of California has committed to renewable sources of energy by 2030.[11] The limiting factor is not cost or availability, but rather an adequate means to store the energy that would enable renewables to operate as base load. The Advisory Team suggested that a Superconducting Magnetic Energy Storage (SMES) battery be placed on the underside of the elevated transportation structure. The leading researchers and practioners in the field of superconductivity were added to the team to assess the feasibility of this move. The conclusion is that the system could, in fact, hold a battery that would enable current and future renewables of the state to be developed and stored, converting them to base load and improving the grid system. A preliminary cost analysis of this system also showed that the approach is cost effective (see below). Integrating infrastructure systems

[10] Robert C. Leachman, "Strategic Initiatives for Inland Movement of Containerized Imports at San Pedro Bay" Institute of Transportation Studies, University of California at Berkeley, January 12, 2017

[11] SB100 passed in 2018 as established that by 2013 renewables will comprise 60 percent of our energy supply and by 2045 all sectors will be carbon neutral.

that previously were separated and stove-piped showed that new possibilities could be created that would advance both systems.

In the process of solving this integrated approach, insights were gathered that these SMES batteries could also be constructed to store energy for other transportation modes such as cars, trucks, trains, and buses, which could meet service needs and be cost competitive with existing sources of fuels. Moreover, they could be charged as quickly as existing modes are refueled.

Port Capacity Thoughts

In looking at the future capacity of the Ports, there are three factors that need to be examined. The first is how Labor works together and within the region so that income of those working in the region can be improved. The second deals with managing the land area of the port more effectively so that the region can expand capacity. The final issue examines improvements that can be made in cost structures and throughput increases.

Labor coordination

The ultimate success of the Freedom Villages is increasing the income of workers by improving the economic base of the region. Finding ways that Labor unions can work with the system and with each another is important to this success. Income increases for the majority of those who live in the region is the main outcome of Freedom Villages, making returns to workers a key element of the strategy and requiring Labor to be part of the undertaking. In the development of the Freedom Village concept, Jan Perry, the Executive Director of the IFA, brought Labor into the process. She contracted with Ed Rendon of Spiker Rendon Consulting to undertake an outreach and involvement effort with the Labor unions in the goods movement, electrical, and construction sectors to provide input for the white paper in the early development stages. These discussions revealed the divisions among the various unions that prevent cooperative arrangements, thus hindering the integration of the separate parts of the goods movement and electrical systems. The working relation with Labor provided insights and recommendations to overcome these limitations. Enabling the needed improvements to make Freedom Villages work and achieve the increases in throughput would reduce costs for both energy and goods movement.

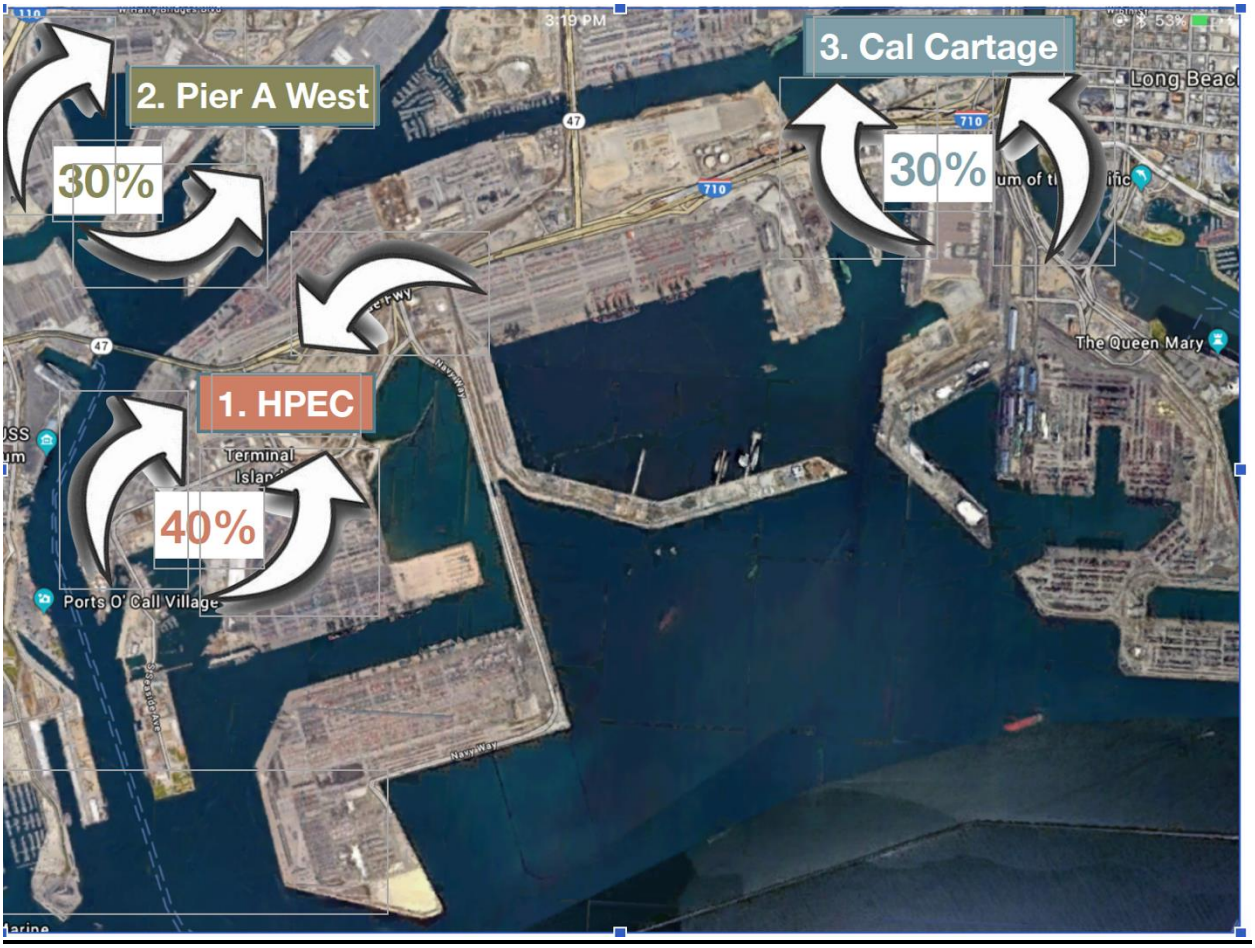
The breakthrough advice from labor came from Eric Tate of the Teamsters. He noted that the first Free-Flow line would bring containers from the Port to the Freight Village, where it would be unloaded at a terminal — preferably a transloading center — and then distributed per Map 1. His suggestion was to have the International Longshore and Warehouse Union (ILWU) make not only the initial unloading on the dock within the Port fence but also the top handling moves external to the fence. The shuttle would make all moves of containers inside the fence including among piers, and the Teamsters would handle the other truck moves in Map 1. He also provided suggestions on how the full system could be developed within the port, taking full advantage of the Free-Flow system. The strategy provides the opportunity for the longstanding conflicting union interests between the Teamsters and the ILWU to be resolved.

Similar discussions are underway with the International Brotherhood of Electrical Workers (IBEW) on how the integration of electrical transmission and storage and goods movement could be implemented to create new opportunities. The result of this reconfiguration of the generation, storage, manufacturing and installation of this system would generate increased employment opportunities within the region. A successful implementation of this reconfiguration could create an approach that would have national and international impacts. Additionally, the development of storage and renewalable generation could provide decentralized energy systems that could assist the Southern California region and other regions in dealing with the increasing fire safety issue confronting the energy sector.

Land Management

John DiBernardo, retired Vice President of SSA Terminals in Long Beach, noted that the most significant limitation the terminals face in their operations is managing the land near the docks more effectively — and specifically, finding ways to quickly move containers out of the Port to inland terminals. Today, the size of ships and the high unloading demand is leaving too many containers within the Port area. As a result, the unloading cranes are able to work only four to five days a month. With larger ships that can utilize as many as four cranes, each unloading as many as 25 containers per hour with multiple shifts, a 12,000-TEU ship can be unloaded in three days — but there is not sufficient land available to continue operating the cranes until the dock is cleared.

Map 3: The Three Portal Free-Flow System



The “Free-Flow” system is designed to handle 180 containers leaving the Port per hour. With three possible shuttles in the Port (see Map 3 above), the system could be able to assist all the terminals in mitigating this land-management issue. The coordinated operation of the three portals becomes possible with the coordination of functions that became possible from the input of our Labor advisors, particularly the advice of Eric Tate from the Teamsters. He also suggested using Terminal Island, which is adjacent to both ports as one of the staging areas. Combined, the three portals could handle 540 containers leaving the port per hour and create a real system of Free-Flow for the cranes and docks.

Given the bidirectional design of the system, the backloads of empties or full containers can be moved out and returned just as quickly. It would be possible for the cranes to operate more days per month, possibly even doubling (or more) the days of operation.

The efficiency of the Freight Villages themselves also contributes to the increased productivity of the entire logistics operations with the region. Most significantly is the location of the cross-dock transloading centers. Labor advisors have suggested using the former Cal Cartage property in Wilmington, land on Terminal Island, and other properties made available by the integration of electrical and logistics system. By introducing the design of the advanced logistics transloading concepts that are now being implemented in the United States, this extremely valuable land would be used to its best and highest uses. Not only would this lead to an enormous reduction in trips in the region, but it would also create the opportunity for higher-paying jobs in this activity.

Increase the Size of Three Sectors in the Southern California Economic Base

These discussions lead to the third dimension: the size of the Port and the advanced logistics industry sector. The work of Leachman illustrates the enormous productivity changes that have been made in this sector over the past few decades. His work also identifies how competitive the sector has become and finds that profitability of the BCOs is dependent on the razor-thin margins created in their operations. Thus, these firms are constantly searching for locations and operations that maintain or even increase these margins. Southern California has geographical location advantages and economy-of-scale advantages, but the limitations and inefficiencies identified in this white paper, mitigated with the strategies of the Freedom Villages, are important in the competitive dynamic. Thus, accelerated throughput changes and the contribution of new technology are important. The challenge is to implement these changes in ways that increase productivity and profitability of the firms and — equally importantly — the number of workers and their income. The increase in income per capita will be the outcome of a correctly designed strategy.

The Ports are now operating at 17.5 million TEUs per year. Increasing the utilization of the cranes and existing berths could more than double the capacity of the Port and address the struggles with both transportation and environmental constraints. Implementation of this strategy enables the Ports to achieve their long-run growth potential. The projected level of operations over the next several decades could be realized by utilizing existing investments more effectively. Moreover, the air quality and congestion concerns of existing operations would also be addressed.

When the three dimensions are evaluated together in light of the Freedom Village strategy, the Port increases in size to handle the projected demand over the next 20 years. As a result, the number of higher-paid workers will rise (although they could be doing their jobs differently), and the firms will be more profitable. By changing the way our governmental units and our sector work together, we can overcome our limitations and address our goals, which are stated on page 9 and are repeated below:

- Economic: spurring job growth and economic well-being
- Equity: serving the entire population, and
- Environment: achieving environmental goals and not sacrificing them.

Calculating The Business Plan

Funding Stream Calculation that Enables the Project to Happen[12]

The need for a mission-oriented, problem-solving set of actions that make up Freedom Villages is clear. The State of California has enacted the legal authority for the region to move forward and make this a reality. Over the past decade, a vision has evolved to utilize these tools. The following is the business and financing plan that will be needed to establish the EIFD and PFA to start the implementation of Freedom Villages.

The PFA, once established, will follow the procurement provisions of the enabling statutes that provide for multiple forms of procurement, ranging from competitive procurements to entering into public-private contractual arrangements following specified procedures.

The following suggestions are provided as preliminary information to guide the formation process of the EIFD and the establishment of the PFA. To initiate the process, an investment finance plan must first be developed.

The First Step — Implementing Free-Flow, Zero-Emission Container Shuttles. Free-Flow movement of goods is designed to increase efficiencies and the throughput of the Ports. Rather than making new, expensive investments in Port terminals and infrastructure, by simply creating flow-like movement of containers out of the Ports and away from some of the most expensive land in the region, we can transform the entire operation of the Ports. The Port terminals will not be laden with containers that remain stubbornly stuck to the docks, waiting for the drayage trucks that perpetually sit in traffic on the region's highways. Faster Free-Flow of the containers opens up valuable space on the docks and terminal areas, allowing the terminal operators to load and unload more ships, move more cargo, and make more money. Containers that move within hours of delivery (rather than days) place goods in the hands of beneficial cargo owners more quickly. In retail more than many other industries, time and the attendant inventory costs make all the difference in maintaining sustainable profit margins while keeping prices for the consumer competitive and low. Without the transformational change brought about by

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12 There will be two versions of this white paper. The first to be sent to SCE and posted on the IFA web. The second will include the following Business Plan which is a summary of more detailed reports that can be accessed by readers upon request.

the Free-Flow system, it is unlikely that the Ports could achieve their growth projection of 31.8 million TEUs per year by 2035 — nearly double today's volume.

The cost of the Free-Flow system is shown in Table 2. The total capital cost for the 4.6-mile system is $198.4 million and handles 1,200 containers one direction or 2,400 bi-directionally on a daily basis coming from pier A and C. The capacity for this route, once more piers from Long Beach and more Free-Flow shuttles are added, is 5,000 containers one way and 10,000 bi-directionally. The revenue from the initial 1,200 daily containers will be sufficient to finance the capital cost and cover the operation and maintenance of this phase, and it will also be sufficient to amortize the debt of the PFA. The Free-Flow project will handle more than 450,000 containers by 2023, and the business plan will be profitable and cash positive as a standalone operation.

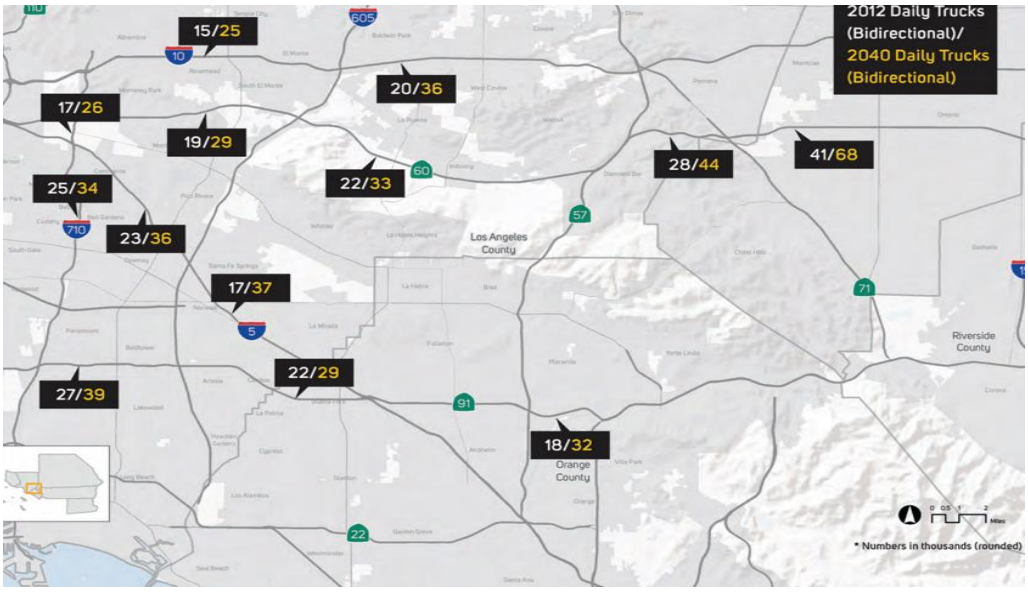
Table 2: Business Plan Summary for Free-Flow Step

Capital Cost	$198.4	million
Construction Period	18	months
Guideway Length	7.04	miles
Vehicles	10	shuttles
Peak Daily Capacity	1,200	containers
Top Speed	60	mph

Once the system is expanded, it will provide for the avoidance of 30,000 daily truck trips on the freeways and 10.8 million trips annually. These reductions will enable trips on the I-710 freeway north and south from the Port, and trips on the CA-60 freeway east and west, to be made in less congestion.

Congestion on those freeways in Map 4 is among the highest in the region in both 2012 and 2040. The reduction of 30,000 trips per day, mainly on these two freeways, will relieve this excessive congestion. As this system is expanded, more trips will be eliminated, and the unforeseen congestion on the regional system could be mitigated. While there will be reductions of truck trips on the region's limited highway system, there will be an increase on arterials and the region's distribution system by last-mile movements from Freight Villages on zero-emission trucks.

MAP 4 Freeway Congestion Map (2012 and 2040)



Air emission reductions are contained in all four steps of the business plan and will be discussed after all the steps of the business plan are presented.

The Second Step — the Deployment of a New Freight Village. For this Project, the ultimate destination is the ICTF and a new, 40-acre "Inland Depot" site adjacent to it on land owned by Southern California Edison (Map 5, Site A). This is the best destination for the ***Project.*** The reason being that this site allows demonstration of all the elements of the strategy. Discussions are underway with Southern California Edison on the feasibility of a lease. The Advisory Team also identified the “Gun Club” site (Map 5, Site B), which is owned by the Watson Land Company and leased by Union Pacific Railroad, as a potential site for its inland depot.

Map 5: Freight Village

As part of this proposal, and with the assistance of the POLB, a lease of this land or another mutually acceptable property will be negotiated as an Inland Depot to sort containers coming into and out of the ICTF on Union Pacific Railroad. There are additional sites in the Port area that could be used to further develop the system, including the

Toll Trucking site, Terminal Island, and sites that will be made available by the removal of peaking plants and kV lines in and adjacent to the Ports.

A Transloading Revolution-Freight-Villages

As part of the Project and as a successor to the need left by the demise of Cal Cartage, the IFA advisors recommend a new Freight Village. The design would be a 400,000-square-foot, two-story transloading/warehouse/ light manufacturing facility that will be automated and purpose-built with an output that will be three times the capacity of the Cal Carthage operation — 180,000 containers per year (See Diagram 2). Advisory Board member Jay Todisco suggested developing this new facility as a two-story structure, a direct response to the scarcity and high cost of land in the general Port area. While this approach is new for the region, it is consistent with a growing trend for purpose-designed and purpose-built facilities in other high-cost regions like the Port of New York and New Jersey. This compact, vertical design integrates well with the Free-Flow container shuttle operations, so that import containers can be placed by automated lifting equipment from the shuttles atop aerial-span guideway bridges to the second-floor level. These import containers can be quickly unloaded with a high degree of mechanization using the top loading mechanisms and ILWU labor, and the empty containers can be quickly returned to Port staging areas at Pier A-West and Terminal Island so that demurrage charges, chassis rental fees, and other added costs can be reduced.

Diagram 3: Advanced Cross Dock Transloading

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Once import containers are unloaded, goods move on high-speed conveyor systems through laser scanning and sortation for transloading into 53-foot domestic trucks and containers. The sorting system minimizes errors and allows containers to be packed with goods bound for distribution centers and big-box retail outlets. As domestic outbound containers are packed, containers move by Free-Flow to trains at the ICTF (Union Pacific), Hobart (BNSF), or East Los Angeles (Union Pacific). Containers destined for Hobart or East Los Angeles can move on the Alameda Corridor on the space for the third rail, now unused. There is sufficient area in the corridor for bi-directional movements.[13] The corridor fees on these containers would enable the Alameda Corridor to correct the financial issues facing it today. Domestic containers with regional destinations will move from the Freight Village transloading centers near the Port and at Hobart and East LA on arterial roadways, avoiding freeway bottlenecks. Containers destined for the interior or northern parts of the country would move directly to railyards at the ICTF or Hobart-East LA switching yards. From ship to domestic train, time is reduced from days and even weeks to no more than 24 to 48 hours.

Business Plan for Second Step of the Project

Based on development cost estimates provided by Goldman Sachs for like-kind, two-story facilities in Brooklyn, NY, the cost for these Freight Villages net of leased land costs is anticipated to be $250-275 per square foot. Each of the first two phases of Freight Village represents a $100-110 million total development cost. These facilities will be the new high-tech supply chain and transloading home for the BCOs throughout the region that are currently being served by Cal Cartage and other cross-dock transloading facilities in the region. New supply-chain strategies also create new light assembly and manufacturing operations.

The total number of containers today that could utilize these near-Port opportunities currently is 700,000, as shown in Table 4. The design and efficiency of the facility increases the capacity of new transloading facility to 180,000 containers, as opposed to the 60,000 containers at Cal Cartage. Using the cost figures for processing and transportation from Cal Carthage adjusted to reflect union wage costs, coupled with the transportation cost

[13] Over the past 15 years the growth in container movement out of the port has been by trucks and has by passed the Alameda Corridor. This configuration would alter this trend and enable trucks to be removed from the 710 freeway. Trucks would move containers from the Freight Villages to their final destination.

reduction of the Free-Flow system (30-50%), this generates sufficient revenues to cover the cost of investment in the capital facility and the increase in additional labor cost. There is sufficient land available in the immediate Port area to handle all the existing cross-dock transloading and projected growth near the Port.

There is sufficient land located between the ICTF and Hobart-East LA to locate the current non-cross-dock transloading of containers (1.3 million per year). The revenue and cost analysis for the business plan would be similar to the cross-dock analysis. Growth in the system could be handled by extending the elements of the business plan to the eastern and northern portions of the region.

The transportation and air quality benefits of the Freight Village strategy is substantial. Leachman's report to SCAG in 2017 calculated the air quality and transportation saving that would accrue to the region if a strategy similar to this was implemented.[14]

Table 4 Business Plan Summary for Second Step

[14] Ibid, Leachman, pgs. 38-55

Transloading: Crossdock vs. Non-Crossdock

- Crossdock (1/3 of business) cargo is transferred from 40-ft to 53-ft containers within 24h (700,000 import boxes)
  - Cal Cartage: 60,000 import boxes per year
  - Import Drayage $350 ($21 million annually)
  - Transloading Fee $800 ($48 million annually)
- Non-Crossdock (2/3 of business) cargo is stored for longer periods before loading (1,300,000 import boxes)

Imports Needing Warehousing	Import TEUs	Sq. Feet
Non-Crossdock	2,607,842	57,035,124
Crossdock	1,377,546	4,067,252
Total Transload	3,985,389	61,102,376
Non-Transload Local	955,788	20,903,682
Total Port-Related Import Warehousing	4,941,177	82,006,058

Source: Leachman (2015)

A new Crossdock transloading facility with higher labor wages and automation capable of processing 180,000 boxes per year at $500 per box would yield $90 million year in costs. When coupled with costs associated with the new automated center ($12 million per year), the total annual costs would be $102 million per year. With a retail price of $600 per box ($200 less than Cal Cartage), revenues would exceed $108 million per year.

Step Three Business Plan — Energy Grid Integration

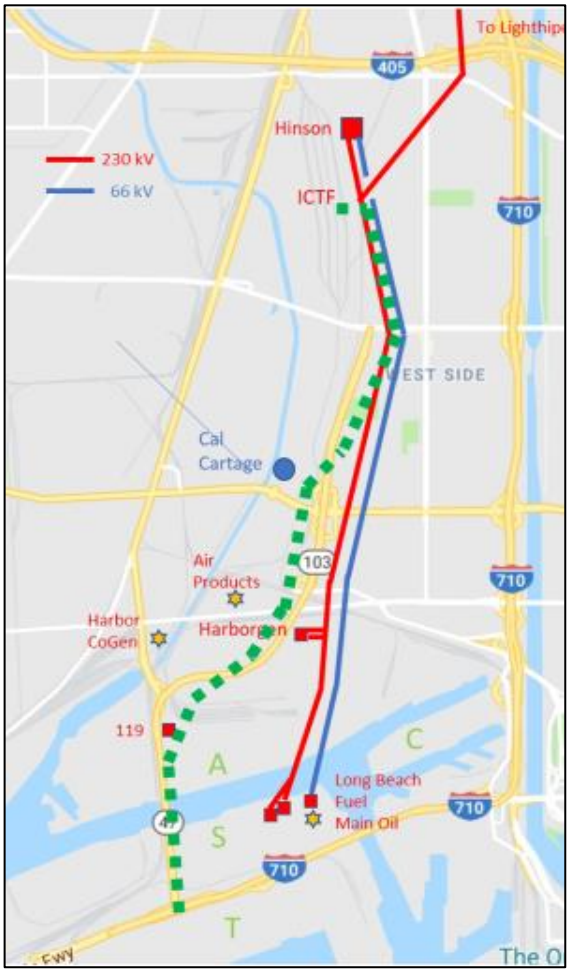
HTS Transmission and SMES. The project concept involves replacing all SCE overhead 230 kV and 66 kV conductors and towers south of the Hinson substation with 66 kV superconducting cables of greater capacity than the existing system**.** Russell Neal, who previously was a Lead Engineer in the Advanced Technology and Transportation Unit at SCE, provided the design of this step.

Map 6: Electrical Grid Relocation

In Map 6, the existing system south of Hinson consists of two 230 kV lines (shown in red) — one from Hinson looped into Harborgen and terminating at Main Oil, and one from Lighthipe terminating at Fuel. A set of four 66 kV lines (shown in blue) parallel this run from Hinson to Long Beach where the 220 MW NRG Peaker plant is located. The Main Oil, Fuel, and Long Beach substations supply a 66kV distribution on Terminal Island and includes interconnection with LADWP at their Substation 119. Harborgen is a 230-kV substation connecting a 66-kV distribution that includes several generators including Air Products, a 32 MW gas-fired generator, and the Hanjin and Carbongen substations.

Proposed System

The proposed system consists of superconducting 66 kV cables contained in the elevated magnetic levitation container movement system depicted as the dashed green line. All the 230 kV and 66 kV lines south of Hinson would be replaced by superconducting 66 kV cables. This would presumably require an additional A bank at Hinson to help supply the 66 kV. The 230-kV line from Lighthipe to Fuel would likewise be replaced with a superconducting 66 kV cable system. A SMES embedded in the Free-Flow support structure would be included in the project. Other energy storage options may also be considered, including load rolling to balance the new 66 kV loads and new Hinson A bank and energy storage facilities. In particular, it is recognized that replacing the Lighthipe to Fuel 230 kV line with a 66-kV superconducting cable might overload Lighthipe A banks absent load rolling, local generation, or other mitigation.



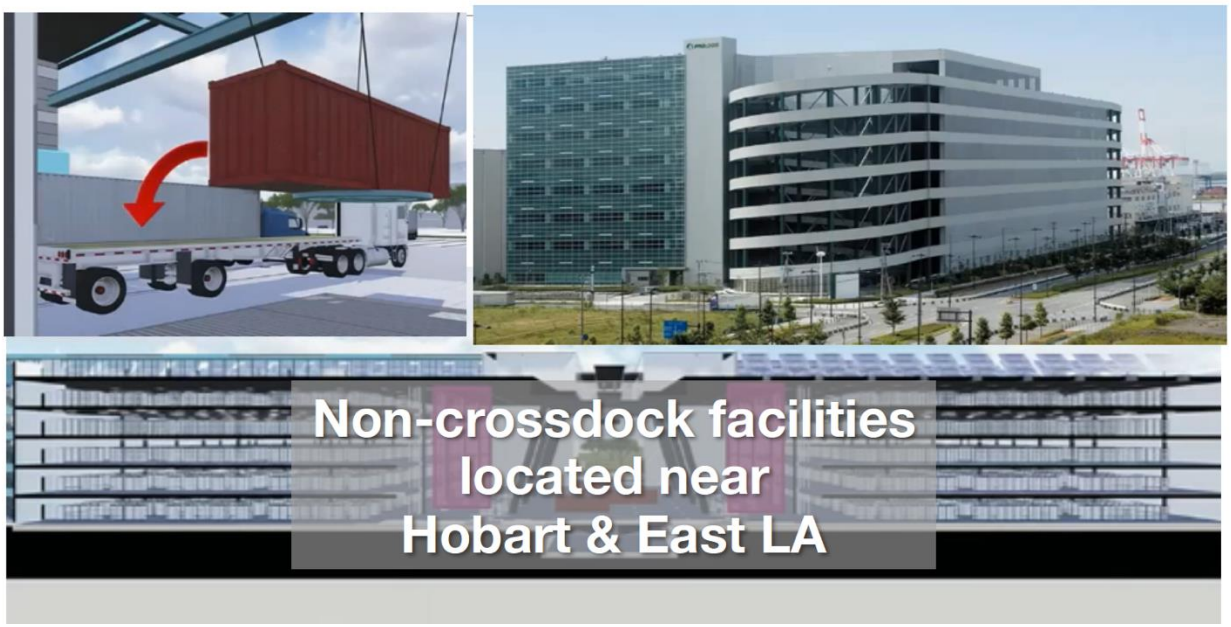
Within the project area, 260 acres of land with immediate proximity to the

Port could be opened up. One of the key conclusions from the 2017 Leachman Study performed for SCAG is that land near the Port for cross-dock immediate transloading accounts for 17.7% of the imports leaving the Ports. Additionally, when this land is combined with the other potential sites that are near or in the Port area shown in Maps 2 and 4, including Terminal Island, Cal Cartage, Gun Club, and removed peaking plants, the potentially available land increases to over 600 acres of extremely valuable real estate. In the long term and as the Project is extended 23 miles north along I-710 to Hobart and the East LA rail yards and Downtown Los Angeles, an additional 1,200 acres along I-710 between the Ports and Downtown Los Angeles could be become available.

Land currently used for high-voltage power lines will open up.

The land in and near the Port could be used for cross-dock transloading. There is sufficient land area available to provide for the existing and future needs within the region. Based on the input from Jay Todisco of Ware Malcomb, the land area between the Port and Downtown LA could be used for non-cross-dock transloading and advanced manufacturing that could take advantage of the close proximity to the Ports and the transportation accessibility provided by the Free-Flow system. Given the value of the land and its proximity to the Ports, the intensity of development can be financed, based on examples in Brooklyn, New York, that have recently been developed by Goldman Sachs.

Diagram 3



Land that is immediately adjacent to the Los Angeles River could be used for river development purposes and for housing.

If this strategy works and is extended to the remainder of the region, the land area controlled by public policy could be a significant asset used by the State and local jurisdictions to help meet the housing shortages and for the development of the advanced manufacturing addition to the economic base.

Cost and Revenues for Step Three

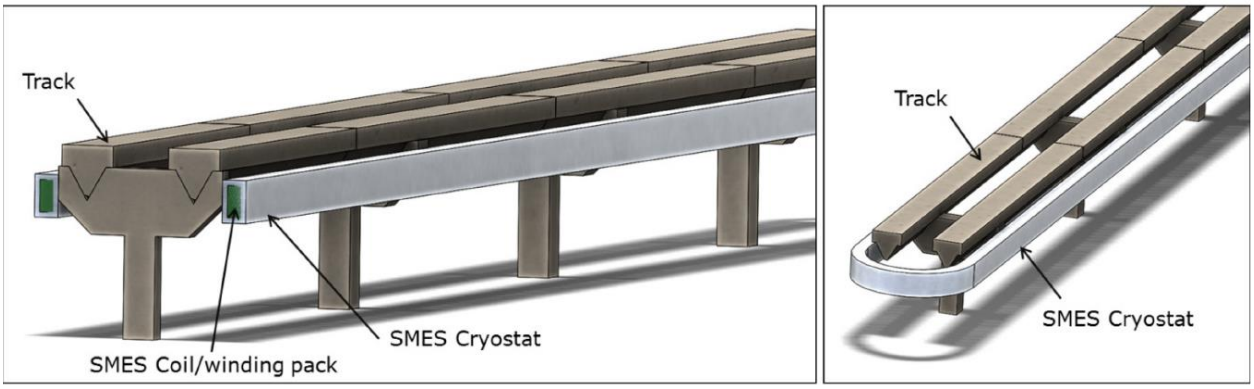
There are multiple ways of presenting the business plan for this step. The cost estimate from the current producer of this tape, American Superconductor, is $60 million including installation. The revenues for this step could be derived from multiple possible sources. One is from the sale or lease of the land made available. Another is from revenues from the rule 20 structure of the Public Utility Commission. Hanging the tape has the same effect as undergrounding, so it may be possible to place the expenditure in the rate base. Since these lines have been in place for an extended period, another possibility is that the replacement is needed on the infrastructure replacement schedule of the utility. Given the transformation of the Ports to zero-emission operation, including all the transportation modes serving the Port, there is a need to increase the capacity of the system, which could be placed in the rate structure. A final thought is that the integration of the battery and the cable transfer (discussed in Step 4 below) produces system

improvements that could lead to cost reductions, fire safety and system improvements for the utilities.

***The Fourth Step — Development of Superconducting Magnetic Energy Storage* (SMES)**

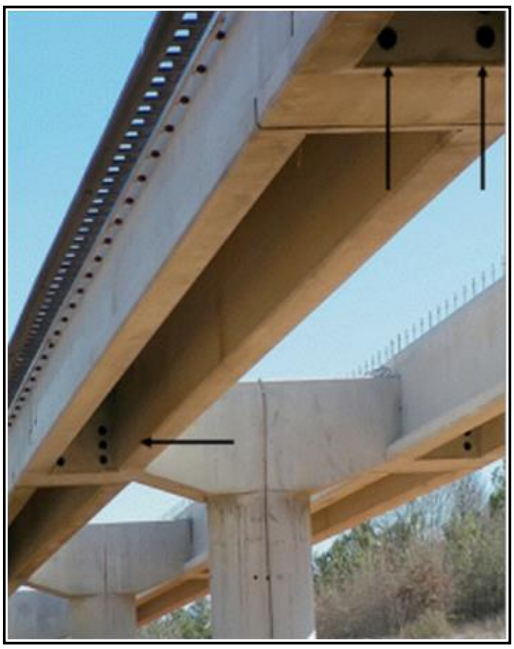
An opportunity with the proposed project is the potential of including a SMES loop in the outer edges of the Free-Flow support structure.

Diagram 4



Storage of energy is made possible by placing superconducting tape in a coil with multiple wraps of the wire. The wire is cooled to a very low temperature using cryogenic devices, creating a resistance-free, circular-shaped racetrack for the energy. Electrons are introduced by smart controllers into this resistance-free track and can circulate almost indefinitely until another smart controller releases them to be used in the electrical system. This energy-storage facility would require little or no extra real estate beyond the structure already required. This is a significant advantage of this approach. Current technology for large storage systems, (about 10% of the size of SMES) requires land sites the size of warehouses. Other advantages of SMES relative to other energy-storage technology include rapid power flow in either the charging or discharging direction, very high round-trip efficiencies exceeding 95%, and no loss of capacity over an exceptionally long life. These storage systems are not new technology and have been in existence for decades. The difficulty with this storage approach has been the lack of superconducting tape that is long enough and is available at an affordable cost. Members of the advisors have been working to overcome these obstacles, and summary material of this work will be presented in this white paper.

Diagram 5: Free-Flow Guideway



The concept covers the 4.5 miles of aerial-span guideway (see Diagram 5 at right) in the port project, and it will store 7,200 gigajoules of energy, which is about 2GWh. The adjacent diagram shows the elevated guideway for the Free-Flow shuttle system for the containers that will house the superconducting tape that will be used to enable the high voltage wire conversion that is described in Step Three described above.

Benefits to the Utilities and Community of Steps 3 and 4

By adding the battery to the system, multiple benefits are generated. The first and most important is that the energy storage that will allow renewable energy generated throughout the southland to be converted into baseload energy supplies. This initial battery was sized to be able to store the energy from the 220 MW NRG peaker plant. The elimination of the peaking plant will have two additional project benefits: reducing the air emissions for these facilities and opening up the land near the Port that can be used for cross-dock transloading and port-related purposes. A successful demonstration of this scalable storage technology can enable California's renewable energy goals and allow other conversions of peaking plants in the region and the state to be removed.

The integrated investment program of the conversion of conventional high-voltage transmission into the SMES system generates significant improvements to the efficiency of the entire system, principally in managing peak circuit loading. Without the battery, the transformer capacity south of the Hinson switching may not have sufficient capacity and would need expensive improvements to enable the system to operate. Installation of the battery would eliminate the need for transformer improvements. Operational improvement will be derived by the elimination of unsightly overhead 230 kV and 66 kV lines along the I-710 corridor by reducing weather and aircraft threats to the line. Also, superconducting cables do not

emit electromagnetic fields, resulting in an elimination of EMFs for this transmission corridor. There is an avoidance of oil or SF6, which adds additional environmental improvements.

The visual improvements and the attendant EMF and SF6 eliminations will have an impact on the value of surrounding real estate. Studies have shown that there is a 10 to 15% increase in property values when high-voltage transmission lines are removed in urban areas. Add to this a reduction in air-quality emissions, particularly the toxicity emissions of diesel-related transportation modes and the elimination of electricity-generation emissions, and the surrounding land area will experience an improvement in property values. When these increases are added to the amount of land both in and near the Port and between the Port and Downtown LA, which is either public land or land not at its highest and best use, there will be a significant increase in the value of the tax base that will be created. Given the land areas that will be improved and the uses in these areas, the value improvements could be extremely large.

Grid and Small-Scale SMES Batteries — Feasibility and Improvement

In order to test the engineering feasibility of building a SMES at the scale described in Step Four, the IFA procured the service of Dr. Chris Rey, a professor at University of Florida, a leader researcher, and designer or SMES at Brookhaven Lab that has developed smaller-scale SMES. Until now, no one has explored a SMES at this scale. Additionally, the advisors suggested that the SMES could be co-located within the infrastructure of the guideway for the Free-Flow shuttle therefore not requiring scarce land be utilized. An initial assessment was undertaken on whether the electrical components of the shuttle, superconducting cable and SMES battery would affect each other, and whether there would there be a cost increase to the structure. The Advisory Team concluded that it was feasible, and furthermore, that there would not be a cost increase to the structure. The design criteria for the battery were developed by the Advisory Team.

Dr. Chris Rey was asked to suggest multiple alternatives configurations of the battery, using superconducting tape available in the market today, that could meet the criteria developed by the Advisory Team. He tested the performance characteristics of multiple models, provide the engineering parameters and, finally, develop the cost structure for each of the models.

From this analysis, he was able to determine if a battery at this scale and located on the infrastructure was feasible. He then calculated the design characteristics and cost of the optimal design. The models evaluated are contained in the following table 5 with the design characteristics on the vertical columns and the performance on the horizontal rows. [15]

Table 5: Alternatives Evaluated

	5K HTS	5K Clocked HTS	5K LTS	2.2K LTS
Inner Diameter (m)	10	10	10	10
Outer Diameter (m)	16.66	16.84	14.76	13.9
$L_{straight}$ (m)	500	1000	6500	6500
Coil Height (m)	4.5	3.6	4.9	4.55
Turn Spacing (mm)	90	90	70	65
Radial Turns	37	38	34	30
Axial Turns	50	40	70	70
Operating Current (kA)	102.39	86.41	22.37	24.89
$L_{conduit}$ (km)	1927.47	3104.08	31032.57	27378.84
Number of tapes/wires	63	10	75	32
$L_{tape/wire}$ Total (m)	1.21E+08	3.10E+07	2.33E+09	8.76E+08

From this analysis, it was determined that the best-performing model was the 5K Clocked HTS. The total amount of superconducting tape needed was 310,000 meters, and the total number of tapes in the coil would be 10. The costliest item in the model is the HTS 5K Clocked tape, and the most significant issue is the volume of HTS purchased, which greatly influences the total cost of the system. Today there are only small amounts of HTS tape produced in the US and the most significant cost issue is increasing the demand for large amounts of HTS tape so that larger production runs

[15] Chris Rey, "**Infrastructure Funding Alliance (IFA) SMES Coil Study, May 30,2019**

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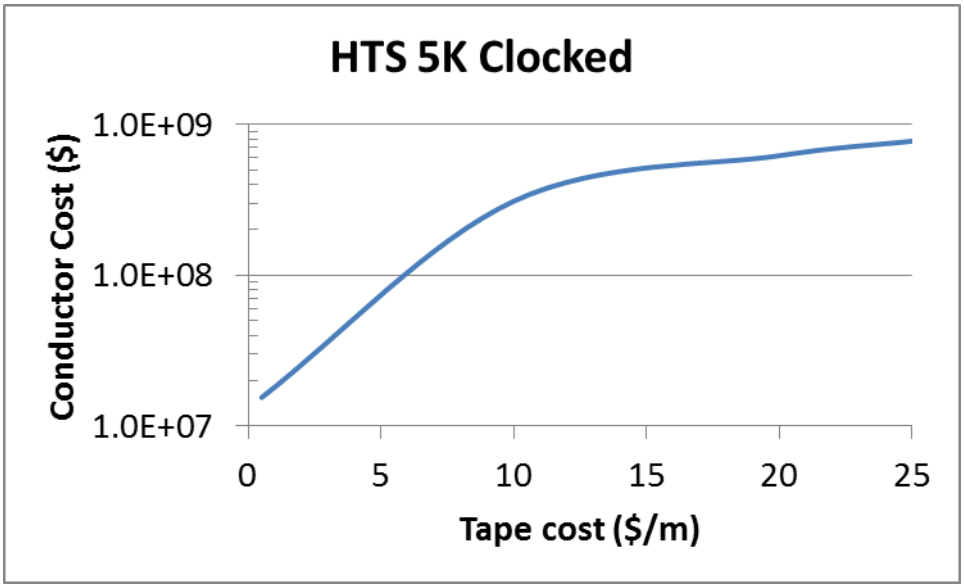
would reduce the cost of this component of the battery. Dr Rey provided the cost curve of increasing the amount of tape, reflected in Table 6 below.

Table 6: Range of material costs of the HTS tape for the top 5K HTS Clocked SMES coil design as a function of price per meter.



Note: The right of the x-axis is the current price of the HTS tape as purchased today in smaller quantities. The cost is reduced as the volume is increased.

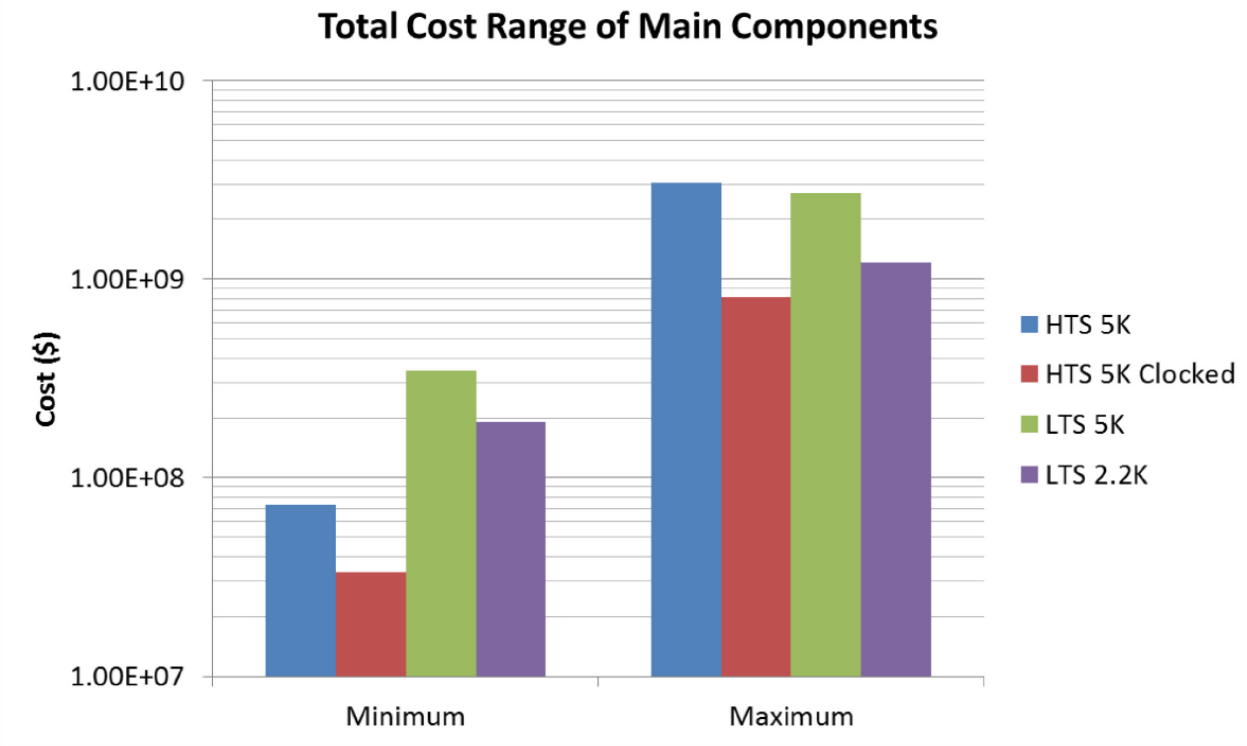
Cost and Revenue Summary of Step Four

No one has suggested building SMES batteries at this scale, which would push the purchase to the left on the tape cost structure. The amount of HTS tape required for the battery would be 31,000 meters. With that assumption, the minimum cost for the HTS 5K Clocked was used to calculate the cost of the SMES using existing tape. From this table, the cost of the SMES would be $60 million for a 2 million-kWh battery using existing HTS tape.

The current cost of storage in California averages about 6 cents per kWh. Since the electricity can be extremely quickly entered into the battery and discharged quickly, 2GWh of storage would bring in $180,000 in daily revenue and $65 million in annual sales. If the PFA finances this with public

debt, the cost per kWh could be less than 1 cent per kWh, making the cost of storage and reduced renewables competitive with other forms of energy.

Chart 4: Cost of Alternatives for a 2 GW Storage System



Possible Innovations in HTS Tape for Grid and Small-Scale SMES Batteries

Given the advantages of HTS tape, the international community of researchers in this field has been attempting to improve HTS performance over the past several decades. Dr. Venkat Selvamanickam, a professor at the University of Houston and a member of the Advisory Group, has developed, test and submitted a new high-temperature superconducting (HTS) tape that has been reviewed by an international group and found to be superior to all existing tape.[16] This tape has an increase of 300% in transmission capacity and a 700% increase in the magnetic field and the number of electrons that the tape can store. Small quantities of this tape have been generated. This tape is now under development for larger production runs finance by the Department of Energy. Within 14 months,

[16] K.Tsuchiya et al., "Critical current measurement of commercial REBC at 4.2 K." Cryogenics, May5,2017

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longer lengths will be developed along with advancements in manufacturing methods, and it will be ready for manufacturing.

These improvements will reduce the amount of tape that is needed both for transmission and storage elements of the initiative and will reduce the cost estimate for both transmission and storage. This reduction in amount will also lead to a reduction in size and weight of batteries, making these batteries feasible at a smaller scale. Another advantage of this tape is the materials that would be used are readily available in the United States. Only trace amounts of rare earth are used, and nickel can be replaced by stainless steel. All other materials are available in the United States. Production on a large scale is possible without interruption from material suppliers.

Based on preliminary analysis, this could reduce the size and cost of the grid-scale SMES described above. The reduction in size and weight makes smaller-scale batteries possible enabling the goal for a total zero emission goods movement strategy possible. A second phase study was conducted by Dr. Chris Rey evaluating the new HTS tape developed by Dr. Venkat Selvamanickam. A 2 GWh battery as well as a 80kWh-car/light duty truck battery, and a 300kWh-truck and train battery-including the Pacific Harbor line train and the unit trains leaving the port were designed and evaluated.[17]

The results of this evaluation concluded that all three scales of batteries are technically feasible and could be commercially viable. A summary of the cost of the tape is presented in Table 7. The difference between the min and max reflect the main development issue described above in Table 6, producing the HTS tape in sufficient scale. The maximum cost would be based on current costs and the minimum costs based on production of larger volumes of tape using the volumes needed by grid scale batteries. Added to the cost of the HTS will be increase in O&M coolant regeneration costs.

For the grid scale battery, the coolant strategy recommended in the report is to use a cryogenic cooler, for the train/large truck and the car and small truck the suggested approach is to use a coolant which would need to be

[17] Chris Rey, "**Infrastructure Funding Alliance (IFA) SMES Coil Study 2, December 15, 2019**

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regenerated on an operating basis. The capital cost for the grid would be $48 million dollars,[18] the train would be $25 thousand and the car $12 thousand. The on-going cost of the truck and car would need to include the regeneration of the coolant operating cost which will be done when the battery is recharged.

The smaller scale batteries will be sized so that the range and duty cycles are comparable to existing fleets and the charging times are comparable to existing refueling times. Since there is no degradation from use and recharging of these electronic batteries their life span is indefinite.

Table 7. Cost of HTS Tape for Grid, Train/Large Truck, Car/Small Truck Batter

SCALE:	Grid		Train		Car	
Configuration:	Racetrack		Racetrack Clocked		Vertical Solenoid no conduit	
	Min	Max	Min	Max	Min	Max
Conductor	$29,230,410	$730,804,100	$19,798	$494,980	$11,566	$289,155

Combined Air Emission Improvements of the Four Steps

A primary objective of Freedom Villages is development of a zero-emission goods movement strategy, particularly in the San Pedro Port Complex. If successful, the elements of the strategy could be extended to the broader region. The Project's first step demonstrates that movement of containers out of the port by Free-Flow shuttles reduce trip making can be totally zero-emission and that 30,000 trucks would be removed from the freeway daily. The location of all forms of transloading, Step 2, near or in the port will substantially reduce trips and their emissions, made possible by Step 3. Finally, for Step 4, batteries — grid and smaller — will enable:

- peaking plants in the area to be removed;
- the energy supply for the area by using grid size storage for renewables to be zero-emission; and

[18] If the grid scale battery is configured to be placed in a solar panel farm in a 100 meter circle the cost of the battery would be half this amount. The cost per kwh would be significantly less than one cent perkwh.

- smaller batteries to be used for the Harbor Line Rail and for trucks that access the transloading and docking facilities.

The air quality analysis from these strategies is divided into two parts, those achievable for the Freight Village strategy and those from electrification of the transportation of containers. Table 8 contains the savings that can be achieved by the Freight Village strategy. These reductions are based on the analysis contained in the Leachman report are derived from the strategy of moving all the transloading near to the port. Table 9 includes the reductions from the development of the batteries for transportation equipment are included in this analysis, made possible by the SMES smaller scale batteries. These calculations are derived from the same Leachman report.

Table 8 Emission Reductions of Freight Villages

	CO_2	HC	CO	NOx	PM2.5
Savings	238.4 million	30,700	248,000	988,000	83,600

Reductions are in kilograms

Table 9 Potential Emission Reductions from Electrification of Equipment and Transportation

	CO_2	HC	CO	NOx	PM2.5
Savings – marine boxes only	256.6 million	17,600	233,000	871,000	86,000
Savings – marine boxes only, with hybrid RTGs at rail terminals	282.8 million	24,500	276,000	1,072,000	91,000
Savings – marine boxes only, with electric RMCs at rail terminals	293.3 million	27,200	293,000	1,153,000	93,000
Savings – marine boxes plus domestic boxes	263.2 million	13,800	226,000	812,000	89,000
Savings – marine boxes plus domestic boxes, with electric RMCs at rail terminals	308.0 million	25,500	300,000	1,156,000	97,000

There are additional reductions that are possible in the port area and throughout the region if the grid scale battery/s are included and the total use of renewable energy. These emissions and emission from eliminating peaking plants are not included.

Capturing the Wealth Created by these Improvements

The PFA of the district established to implement the Freedom Village investment plan has authority to capture the benefits described in this section. This increases the tax base, including increases in the assessed valuation of the property made available to be put to a higher use, as well as existing uses where the assessed valuation is improved. For purposes of this white paper, the business plan (i.e., the cost of the investment and revenues from these investments) has not included the benefits from any appreciation caused or enhanced by the strategy, nor has there been any calculation of the revenue that could be accrued from property that would be made available.

From work on case studies in other areas and existing formed districts, the possible revenues from these calculations would likely exceed the entire expenditure plan.[19] SCAG has developed the analytical tools in their Envision Tomorrow model to undertake this evaluation by the PFA. The land area involved is near the Los Angeles River and is part of the study area of Frank Gehry's reconceptualization of how the river could be developed in the future. The IFA is in discussions with the Los Angeles River Development Authority on how these two efforts could be coordinated. In addition to the transloading and manufacturing opportunities, land could become available for residential and housing uses.

The IFA is also advising the City of Long Beach in establishing an EIFD covering the Central Business District, which is immediately adjacent to the Port EIFD district. The reductions in truck traffic and the zero-emission goods movement strategy will have a substantial impact on the value of this area of the City — and in fact, on the whole City. Given the increase in valuation and the amount of land area, the financial gain from these improvements could be staggering. This increase in the assessed value of the Central District and the tax increment that it adds will benefit the entire city and can be captured with this approach by organizing ourselves to capture them.

[19] The first EIFD in Laverne demonstrates the leveraging capacity of the tax increment provisions. A $33 million investment catalyzes $600 million of increased assessed evaluation and $50 million of new tax revenues from the investment. Source Kosmont Company analysis.

Summary and Conclusions

The State of California has given the individual jurisdictions the authority to create the institutional arrangements to undertake the innovations needed to address the problems they face. This authority is based on investments that have business plans associated with them, requiring the Boards of these entities to not only identify the projects and investments, but to also think through the wealth and revenues the investments will generate. The legislation gives these boards the authority to issue debt that could be amortized with these revenue streams. The investment programs can be integrated strategies that create multiple funding streams that enable truly innovative actions to proceed. The structure of the Board can include general-purpose and special districts, provided that they bring resources to assist in implementing the program. Included on the Board would be public members from Labor, environment, and the local communities involved. The PFAs have the authority to enter into contractual arrangements with the private sector, and fees from these contractual agreements are another funding source for the issuance of public debt. The transformational nature of the four-step element of the Freedom Village strategy could not happen without such a structure.

Freedom Villages become possible using this approach. The PFA can become:

- the champion and the political leadership to solve our problems;
- the coordinating entity for integrative approaches that involve multiple agencies to solve today's complex problems;
- the funding entity to bring multiple streams together to fund debt; and most importantly,
- an entity with accountability to both public constituencies and private funders.

These new institutional arrangements do not need to wait for the intergovernmental system to fund these improvements nor for governmental agencies to decide to take the leadership to solve several of the region's most pressing problems. But they will need the involvement of the existing entities, the County, the Cities of the Long Beach and Los

Angeles along with the ports, the energy suppliers-Southern California Edison and Department of Water and Power to support the effort.

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