

Appendix P
Global Climate Change Technical Report



Appendices

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Irvine Business Complex

Global Climate Change Technical Report

Prepared for

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December 17, 2009

Overview of Climate Change Documentation

A number of factors have converged over the past few years to create new requirements for the consideration of climate change and greenhouse gas (GHG) emissions in the design of projects, particularly during the preparation of environmental documentation. Key issues include:

- State goals for greenhouse gas emissions reduction articulated in California's Global Warming Solutions Act (AB 32).
- Interpretations of these new goals with respect to existing environmental policy, most notably the California Environmental Quality Act (CEQA).
- Forthcoming state-wide policy, including requirements for project-level GHG analysis (SB 97).
- Publication of the California Air Resources Board (ARB) Scoping Plan for the implementation of AB 32.
- Private legal action against individual projects, such as lawsuits by non-profit groups.

These factors, along with others, have created expectations that land-use and building projects will:

- Discuss the implications of climate change for a project, including the contributions of the Proposed Project to greenhouse gas emissions and the consequences of changing climatic conditions for the performance of the Proposed Project.
- Quantify and report greenhouse gas emissions.
- Develop and implement strategies that demonstrate consistency with state goals for greenhouse gas emissions reductions.

We provide the following information to support environmental documentation for the Proposed Project:

Section 1. An introductory discussion of the implications of climate change for the Proposed Project, including:

- Sources of greenhouse gas emissions.
- Historic context of emissions on the site.
- Review of the implications of climate change for the operation of the Proposed Project, including rising temperatures, changing precipitation patterns, and altered fire regimes.

Section 2. A quantitative greenhouse gas inventory, including existing conditions and five scenarios:

- *IBC Existing Conditions* - 2008 existing development.
- *Existing General Plan buildout (No Project)* - including current development and current entitlement anticipated through 2030, without State and Federal Actions.
- *Existing General Plan buildout, State and Federal (No Project)* - including current development and current entitlement anticipated through 2030, with State and Federal Actions.
- *Proposed General Plan Amendment business-as-usual* - including current development and current entitlement plus proposed project land uses anticipated for 2030 without State and Federal Actions (General Plan Amendment - BAU).

- *Proposed General Plan Amendment reduction scenario* - including current development and current entitlement plus proposed project land uses and GHG reduction measures anticipated for 2030, without State and Federal Actions.
- *Proposed General Plan Amendment reduction scenario, State and Federal* - including current development and current entitlement plus proposed project land uses and GHG reduction measures anticipated for 2030, including State and Federal Actions.

Section 3. Analysis of emission reductions associated with project design features, including:

- Identification of specific project performance goals.
- Analysis of alternative project design features.

Section 4. Conclusions, including:

- Cumulative impacts of the Proposed Project

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Section 1. Overview of Project and Project Site

Project Overview

The Irvine Business Complex (IBC) is a 2,800-acre site in the western portion of the City of Irvine. The IBC is bounded by the former Tustin Marine Corps Air Station (MCAS) to the north, the San Diego Creek channel to the east, John Wayne Airport and Campus drive to the south, and State Route 55 to the west. In addition, a 40-acre parcel of the IBC is detached to the south of the main IBC boundaries. This parcel is bounded by Jamboree Road, Fairchild Road, Macarthur Boulevard, and the San Joaquin Marsh.¹

The IBC site currently includes medium to high-density residential, commercial, office, and industrial land uses. The most prominent existing land use in the IBC is office and industrial, with over 41 million square feet of office/industrial development, including the company headquarters for several prominent companies like Allergan, Edwards Life Sciences, St. John Knits, and Taco Bell. Due to the IBC's close proximity to John Wayne Airport, other land uses such as restaurants and hotels have also developed in the IBC. In fact, there are currently over 1.3 million square feet of commercial space and 2,496 hotel rooms on the site. Finally, the site currently has high density housing, with 5,011 residential dwelling units.²

In 1988, the City of Irvine approved a General Plan amendment and rezoning project for the IBC, which was envisioned to be the “urbanized” area in Irvine. These 1988 approvals included 48.255 million square feet for nonresidential development and 3,571 dwelling units. In 2004, however, the City embarked upon the process to ensure proper planning for residential uses in the IBC; this included transforming the site into a mixed-use neighborhood. The result of this effort was the Draft IBC Residential/Mixed-Use Vision Plan and Overlay Zoning Code, which was released in October of 2005. By February 2008, the City Council voted to proceed with preparation of a Program EIR for the Residential/Mixed-Use Vision Plan and Overlay Zoning Code.

The Residential/Mixed-Use Vision Plan and Overlay Zoning Code outlined goals to promote a pedestrian and transit-friendly environment, while protecting the existing job base. In order to do this, the document proposes an increase in total residential units in the IBC from 9,455 units to 17,038 units, including density bonus units.³ This increase in residential units would be offset by a 4,337,727 square foot decrease in nonresidential buildout potential.

There would be two main districts in the proposed plan IBC: the Urban Neighborhood (UN) District and the Business Complex (BC) District. The UN District, located generally between Jamboree Road and Von Karman Avenue, would house the mixed use core of the IBC with a variety of land uses and buildings types. The UN would be primarily mixed use buildings, with retail, offices, and restaurants on the first floor, and housing above. In contrast, the BC District would encompass the areas with existing industrial and commercial uses, and would accommodate an expansion of new industrial and commercial uses.

¹ “IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR,” Page 3-1

² “IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR,” Page 4-7.

³ “IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR,” Page 3-9.

Table 1, below, provides a development summary for residential and non-residential buildings in the existing general plan buildout and the Proposed Project buildout.

Table 1: Comparison of Existing General Plan and Proposed Project

IBC Development Summary					
Residential					
	Existing General Plan			Proposed Project	
	Existing	Under Construction	Approved	Pending ¹	Potential ²
Base Units	4,779	1,814	2,422	2,035	3,950
Density Bonus Units ³	232	78	130	215	1,383
Subtotal	5,011	1,892	2,552	2,250	5,333
Total	9,455			7,583	
Total Cap for the IBC				15,000	
Total IBC Units at Buildout including Density Bonus				17,038	
Nonresidential					
	Existing General Plan		Proposed Project		
	Existing Development	Remaining Buildout Potential	Remaining Buildout Potential		
Nonresidential Square Footage	42,771,000	10,354,389	6,016,662		
Total Nonresidential	53,125,389		48,787,662		
Hotel Rooms					
	Existing General Plan		Proposed Project		
	Existing Development	Remaining Buildout Potential	Remaining Buildout Potential		
	2,496	610	372		
Total Hotel Rooms	3,106		3,478		

¹ Pending units are those for which development applications are currently on file with the City.

² Potential units are those remaining to reach the 15,000 unit cap. No development applications have been received for these units.

³ Density bonus units are exempt by state law from local regulatory limitations on development intensity but are included and analyzed in this EIR.

¹ Pending units are those for which development applications are currently on file with the City.

² Potential units are those remaining to reach the 15,000 unit cap. No development applications have been received for these units.

³ Density bonus units are exempt by state law from local regulatory limitations on development intensity but are included and analyzed in this EIR.

Source: "IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR" Page 3-10

Project Impacts – GHG Emissions

Climate change is a long-term, multi-faceted issue with global impacts caused by the accumulation of innumerable individual decisions regarding the use of energy. It has been called the world's foremost economic externality. In other words, the costs of emitting greenhouse gas (GHG) emissions currently do not account for their costs on present and future generations. In most jurisdictions, lead agencies and state regulators have articulated that climate change should be considered in California Environmental Quality Act (CEQA) documentation. However, most lead agencies have yet to provide explicit guidance on the evaluation of GHG emissions or climate change vulnerabilities.

The analysis of GHGs is significantly different from the analysis of criteria pollutants for the following reasons. For criteria pollutants, significance thresholds are based on daily emissions because

determinations of attainment or non-attainment are based on daily exceedances of applicable ambient air quality standards. Further, several ambient air quality standards are based on relatively short-term exposure effects on human health, e.g., one-hour and eight-hour exposures. Since the half-life of a GHG is quite long (e.g., for CO₂, approximately 100 years), GHGs affect global climate over a relatively long time frame. As a result, the South Coast Air Quality Management District's (SCAQMD) current position is to evaluate GHG effects over a longer timeframe than a single day.

While current and future GHG emissions can be estimated, such emissions cannot be precisely correlated with specific impacts based on currently available science. No air agency, including the SCAQMD,⁴ or municipality, including the City of Los Angeles, has yet established project-level significance thresholds for GHG emissions. In its January 2008 CEQA and Climate Change white paper, the California Air Pollution Control Officers Association (CAPCOA) identified a number of potential approaches for determining the significance of GHG emissions in CEQA documents. In this white paper, CAPCOA suggests making significance determinations on a case-by-case basis when no significance thresholds have been adopted. The Governor's Office of Planning and Research (OPR), in its June 19, 2008 Technical Advisory, recognizes that CEQA Guidelines have not been adopted to provide guidance as to how climate change is to be addressed under CEQA. OPR also notes that it is continuing to consult with ARB technical staff regarding appropriate thresholds of significance to use for climate change analysis, but that such guidance is not yet available. OPR has provided the following "informal guidance" regarding the steps for addressing climate change impacts under CEQA:

- (1) Identify and quantify the GHG emissions;
- (2) Assess the significance of the impact on climate change; and
- (3) If significant, identify alternatives and/or mitigation measures that will reduce impacts below significance.⁵

On April 13, 2009, OPR transmitted proposed CEQA Guidelines Amendments to the Natural Resources Agency for a formal rulemaking process to certify and adopt said amendments. Notably, the proposed amendments do not establish a threshold of significance. The proposed guidelines also clarify "that the effects of greenhouse gas emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impact analysis."⁶

For all these reasons, in the absence of regulatory guidance, and before the resolution of various legal challenges related to global climate change analysis and the selection of significance thresholds, a significance determination will be made on a case-by-case basis.

In addition, the regulations required to meet the goals under AB 32 are still under development, but are expected to be implemented no later than January 1, 2012.⁷ At this time, there are no

⁴ The SCAQMD has formed a GHG Significance Threshold Working Group. More information on this Working Group is available at <http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html> (last visited 5/5/2008).

⁵ OPR Technical Advisory, p. 5.

⁶ Letter from Cynthia Bryant, Director of OPR, to Mike Chrisman, Secretary for Natural Resources (April 13, 2009) at 4.

⁷ ARB's list of discrete early action measures that can be adopted and implemented before January 1, 2010, was approved on June 21, 2007. The three adopted discrete early action measures are: (1) a low-carbon fuel standard, which reduces carbon intensity in fuels state-wide; (2) reduction of refrigerant losses from motor vehicle air conditioning system

universally accepted standards by which the approval of a real estate development project can be judged to support or hinder attainment of the State's goals relating to GHG abatement.

Impact of Changing Climatic Conditions

This report assesses the relationship between the Proposed Project and GHG emissions, the primary drivers of anthropogenic climate change, and the focus of California's climate change policy. It is important to recognize that the climatic conditions experienced by the Proposed Project over its designed lifetime are likely to be substantially different from those observed over the past century. Consequently, it is useful to consider the implications of changing climatic conditions for Project performance. Scenarios⁸ for 2100 modeled in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (FAR) include:

Temperature Increase

- Low Emissions Scenario: 1.8°C (best estimate), with a range of 1.1°C to 2.9°C
- High Emissions Scenario: 4.0°C (best estimate), with a range of 2.4°C to 6.4°C

Sea Level Rise

- Low Emissions Scenario: 0.18 to 0.38 meters (range)
- High Emissions Scenario: 0.26 to 0.59 meters (range)

Potential implications for the Proposed Project include:

Sea level: Rising sea levels are unlikely to directly impact the Proposed Project due to its distance from the coast and relative elevation.

Temperature: Rising temperatures could have a variety of impacts, including stress on sensitive populations (e.g., sick and elderly), additional burden on building systems (e.g., demand for conditioning), and, indirectly, increasing emissions of greenhouse gases and criteria pollutants associated with energy generation. It is not possible to reliably quantify these risks at this time.

Precipitation: Climate change is expected to alter seasonal and inter-annual patterns of precipitation. These changes continue to be one of the most uncertain aspects of future scenarios. For this Project, the most relevant direct impacts are likely to be changes in the timing and volume of stormwater runoff and changes in demand for irrigation. It is not possible to reliably quantify the implications of these changes at this time.

maintenance; and (3) increased methane capture from landfills, which includes requiring the use of state-of-the-art capture technologies.

⁸ Future GHG emissions are the product of very complex dynamic systems, determined by driving forces such as demographic development, socio-economic development, and technological change. Their future evolution is highly uncertain. Scenarios are alternative images of how the future might unfold and are an appropriate tool with which to analyze how driving forces may influence future emission outcomes and to assess the associated uncertainties. They assist in climate change analysis, including climate modeling and the assessment of impacts, adaptation, and mitigation. The possibility that any single emissions path will occur as described in scenarios is highly uncertain. More information on the IPCC's selection of scenarios is available at <http://www.ipcc.ch/ipccreports/sres/emission/index.htm>.

Wildfire: Changes in temperature and precipitation may combine to alter risks of wildfire. Changes in wildfire hazard have the potential to impact the Project; however, it is not possible to reliably quantify the implications of these changes at this time.

Water supply reliability: Changes in temperature and precipitation may also influence seasonal and inter-annual availability of water supplies. Consequently, it is reasonable to consider that climate change may affect water supply reliability. It is not possible to reliably quantify these risks for the Project at this time.

GHG Emissions Inventory Methodology

Greenhouse gas emissions were calculated for the Irvine Business Complex using a subset of the greenhouse gas inventory calculated for the purpose of developing a Draft Irvine Climate Action Plan (CAP). Where applicable, the information used in the Draft Irvine CAP has been supplemented with information as described in the IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR. These methodologies are consistent with emissions calculation direction provided by the State of California.

ARB believes that consideration of both direct and indirect emissions provides a more complete picture of the GHG footprint of a facility: *“As facilities consider changes that would affect their emissions – addition of a cogeneration unit to boost overall efficiency even as it increases direct emissions, for example – the relative impact on total (direct plus indirect) emissions by the facility should be monitored. Annually reported indirect energy usage also aids the conservation awareness of the facility and provides information”* to ARB to be considered for future strategies by the industrial sector.⁹ For these reasons, ARB has proposed requiring the calculation of direct and indirect GHG emissions as part of the AB 32 reporting requirements.

Direct emissions are those resulting from the on-site combustion of fossil fuels (e.g., natural gas, propane, gasoline, and diesel). Indirect emissions include off-site emissions associated with purchased electricity or purchased steam, as well as other emissions sources, such as third-party vehicles and the embodied energy.¹⁰

ARB’s requirements are supported by interpretations of settlements between local jurisdictions and the California Attorney General. For example, the County of San Bernardino is preparing a comprehensive GHG inventory that includes *“...all direct (all stationary, area, and mobile source emissions) and indirect (emissions resulting from the use of electricity, pumping and treatment of water and wastewater, and the transport and disposal of solid waste) sources of GHG emissions...”*¹¹

Additionally, OPR has recommended that lead agencies *“make a good-faith effort, based on available information, to calculate, model, or estimate...GHG emissions from a project, including the*

⁹ California Air Resources Board (ARB), 2007a. Initial Statement of Reasons for Rulemaking, Proposed Regulation for Mandatory Reporting of Greenhouse Gas Emissions Pursuant to the California Global Warming Solutions Act of 2006 (Assembly Bill 32). Planning and Technical Support Division Emission Inventory Branch, October 19, 2007.

¹¹ Request for Countywide GHG Emissions Reduction Plan. County of San Bernardino, June 13, 2008.

*emissions associated with vehicular traffic, energy consumption, water usage and construction activities.”*¹² Therefore, direct and indirect emissions have been calculated for the Proposed Project.

A fundamental difficulty in analysis of GHG emissions is the global nature of the existing and cumulative future conditions. Changes in GHG emissions can be difficult to attribute to a particular planning program or project because the planning effort or project may cause a shift in the locale for some type of GHG emissions, rather than causing “new” GHG emissions. Whether this represents a net global increase, reduction, or no change depends on the GHGs that would exist if the project were not implemented.

Sources of GHG Emissions

As indicated in the Climate Change Scoping Plan adopted by the California Air Resources Board in December 2008 (“Adopted Scoping Plan” or “Scoping Plan”),¹³ buildings and land use are major contributors to California’s GHG emissions. The existing Irvine Business Complex and the Proposed Project are associated with direct and indirect GHG emissions that cut across different types of industries and emissions sources, including:

- *Building operations:* emissions associated with space heating and cooling, water heating, and lighting
- *Transportation:* emissions associated with residential, service and commercial vehicles, and transit
- *Construction:* emissions associated with site preparation, excavation, grading, and construction-related vehicular activity (construction-related solid waste removal)
- *Water:* emissions associated with energy used to pump, convey, treat, deliver, and re-treat water (embodied energy of water)
- *Solid waste:* emissions associated with residential and commercial waste streams (embodied energy of materials)

Conventional GHG emissions accounting protocols spread the ownership and control of emissions across many actors (e.g., land owners, vehicle owners, construction contractors, utilities, etc.). However, as suggested by the Adopted Scoping Plan, this analysis recognizes that buildings and land-use represent a nexus that brings these factors together and offer opportunities to reduce emissions through changes in transportation, land use, building design, construction, and operations. This technical report also utilizes the Scoping Plan’s approach to establishing a “business-as-usual” (BAU) level of emissions, using it as the basis for estimating project-related emissions at build out. The difference between BAU and “reduction scenario” emissions represents a combination of project design features and renewable energy and existing building efficiency programs.

¹² OPR Technical Advisory, p. 5.

¹³ Available at <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm> (last visited 5/12/2009).

Figure 1, below illustrates the Scoping Plan's approach to establishing a "business-as-usual" (represented in the left hand column) and how the recommended emission reduction measures listed in the center favorably position California towards achieving the 2020 goal (right hand column).

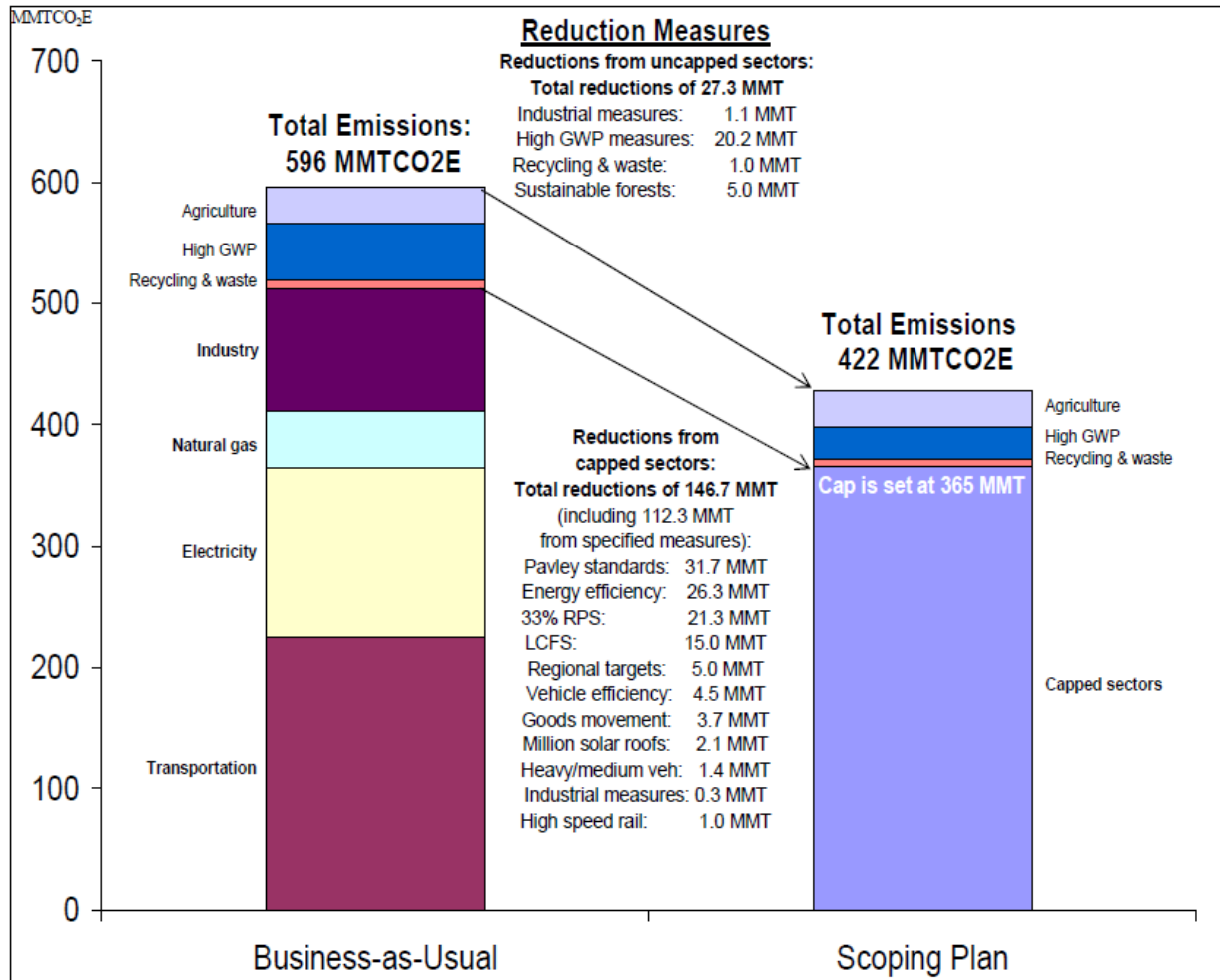


Figure 1: California Greenhouse Gas Emissions in 2020 and Recommended Reduction Measures¹⁴

¹⁴ Available at <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm> (last visited 5/12/2009).

Section 2. Baseline Greenhouse Gas Inventory

Inventory Preparation

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Inventory Protocol

The following items have been extracted from the Draft Irvine Climate Action Plan and IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR as detailed above.

Inventory Scope

This inventory reflects greenhouse gas emissions associated with the Proposed Project as described in the IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR. Herein forward, “Proposed Project” refers to analysis performed for the General Plan Amendment. Direct and indirect emissions are reported by land use. Direct emissions include those resulting from on-site combustion of fuels, including natural gas, diesel, and gasoline. Indirect emissions include those resulting from the purchase of electricity and occur off-site in response to the Proposed Project demand and those resulting from third-party activity associated with the Proposed Project, including embodied energy of water and, most importantly, transportation. Emissions associated with construction are episodic. They include on-site emissions from construction equipment and emissions associated with construction waste removal. They are presented in the report annualized the period of 2008-2030 (i.e., total construction emissions divided by 22 years).

Overview of Greenhouse Gas Emissions Calculations

This report provides several sets of greenhouse gas estimates in order to demonstrate that the project’s cumulative impacts are less than significant. Specifically, in order to be considered less than significant, the proposed project with reduction measures is demonstrated to be in line with the guidance provided in ARB’s Scoping Plan, which suggest that local governments achieve 15% below

current levels of emissions. In order to demonstrate the reductions associated with the proposed project, six sets of greenhouse gas emissions estimates are presented:

- (1) IBC Existing Conditions (2008);
- (2) Existing General Plan business-as-usual buildout (No Project) (2030);
- (3) Existing General Plan business-as-usual buildout (No Project) with State and Federal Actions (2030);
- (4) Proposed Project business-as-usual buildout (2030);
- (5) Proposed Project “reduction scenario” buildout (including PDFs *without* State and Federal Actions) (2030); and
- (6) Proposed Project “reduction scenario” buildout (including both PDFs and State and Federal Actions) (2030).

The BAU inventories for the Existing General Plan and Proposed Project plan provide a measure of “business-as-usual” emissions for similar projects, but lack project specific emission reducing project design features. The “reduction scenario” case evaluates relative emissions reductions from the Proposed Project plan associated with project design features. The “reduction scenario” emissions must comply with ARB’s Scoping Plan emissions reduction goal of 15% reduction below current levels. A summary of the emissions reduction strategies included in this report well as the estimated annual emissions is shown below.

Table 2: Annual metric tCO₂e emissions for the IBC Buildout Scenarios.

Scenario	Annual metric tCO ₂ e
Existing Conditions (2008)	909,352
15% Below Existing Conditions (2030 Target)	772,949
Existing General Plan without State and Federal Actions (2030)	1,213,181
Existing General Plan with State and Federal Actions (2030)	845,577
Proposed Project BAU without State and Federal Actions (2030)	1,288,960
Proposed Project with PDFs, without State and Federal Actions (2030)	1,075,928
Proposed Project with PDFs and State and Federal Actions (2030)	668,671

GHG Emissions Baseline

The CEQA Guidelines specify that the physical environmental conditions at the time the notice of preparation (NOP) is published “will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant.” CEQA Guidelines § 15125(a). This report takes a conservative approach and uses the physical environmental conditions at the time of Publication of the Proposed Project’s NOP as the CEQA baseline.

The baseline land uses and emissions by land use for the Irvine Business Complex are detailed below.

Table 3: 2008 Existing development in the IBC by land use (current conditions).

<i>Land Use</i>	<i>2008 Quantity</i>	<i>Measured Unit</i>
Residential	5,011	Dwelling Unit
Non-residential	42,771,000	Square Feet
Hotel	2,496	Rooms
Infrastructure	24,848,719	Kilowatt hour
Water	1,714	Million gallons
Solid Waste	112,433	Tons
Transportation	3,047,574	VMT

Table 4: Existing, baseline GHG emissions by Land Use in metric tCO₂e.

	<i>Existing Emissions 2008</i>	<i>% of Total Annual Emissions</i>
Residential	13,957	2%
Non-residential	159,742	18%
Hotel	6,410	0.7%
Infrastructure	7,229	1%
Water	3,319	0.4%
Solid Waste	35,196	4%
Transportation	683,499	75%
TOTAL	909,352	100%

Consistency with AB 32 (“Business-As-Usual”)

As discussed above, there currently are no adopted significance thresholds for GHG emissions. Based on the currently available guidance, this report assesses whether the Proposed Project’s GHG impacts are significant based on the Proposed Project’s consistency with California’s goals to reduce GHG emissions under AB 32. A particularly illustrative method to determine consistency with AB 32, and one that has the co-benefit of being based on quantification of emissions, is to compare a

project's emissions as proposed to that project's emissions if it were to be built utilizing "business-as-usual" (BAU) design, methodology, and technology.

If a project constitutes an equivalent or larger break from BAU than has been determined by ARB to be necessary to meet AB 32's goals, then that project can be considered consistent with AB 32 and, therefore, will not have a significant impact on the environment due to its GHG emissions. The Scoping Plan is based on a state-wide goal of reducing absolute GHG emissions 10% below current conditions (measured against emissions for the period 2002-2005). Based on state-wide growth projections, achieving AB 32's goals may require approximately a 28.4% "break from business-as-usual." The level of reduction required for any given local or sector may vary. This analysis utilizes this 'break from BAU' method to present relative emissions reductions and to evaluate consistency with AB 32.

Because the notion of state-wide target is not directly applicable at local or regional scales, ARB has also created Local Government Targets in its Scoping Plan. Specifically, ARB recommends a greenhouse gas reduction goal of 15% below current levels to ensure their emissions match statewide targets. This essentially requires two complementary GHG emissions inventories:

- "Business-As-Usual" Proposed Project GHG emissions by 2030, with and without state and federal actions (expected to be implemented by 2030).
- "Reduction scenario" Proposed Project GHG emissions by 2030, with and without state and federal actions plus project design features (expected to be implemented by 2030).

The following analysis includes potential emissions under BAU scenarios for the Existing General Plan and Proposed Project at build-out under two conditions: one without state and federal actions, and one based on actions and mandates expected to be in force in 2030. The emissions estimates considering mandates expected to be in force in 2030 reflect the best possible current estimate of mandated conditions based on requirements through 2030. Given the state's aggressive goals for 2050, it is likely that emissions reductions strategies for 2030 will need to continue and intensify through 2050. However, since specific requirements are not defined for this period, this technical report takes a conservative approach by assuming full implementation of practices required for 2030, but no additional measures for the period 2030 to approximately 2050.

Federal and State Actions for 2030

It is useful to consider the performance of the Existing General Plan and Proposed Project "business-as-usual" and the Proposed Project "reduction scenario" with respect to both current and anticipated future regulatory conditions. Consideration of the business-as-usual growth under regulatory conditions anticipated for 2030 provides a more realistic measure of actual emissions associated with the Proposed Project in operation. California and the Federal government have established a number of mandates that will help reduce GHG emissions from the Proposed Project and State overall by 2030. This analysis assumes full implementation of current federal and state mandates by 2030. Three of the most important quantifiable factors include California's state-wide Renewable Portfolio Standard (RPS), California's Low Carbon Fuel Standard (LCFS), the Federal CAFE fuel economy standards, and Title 24 Code Cycles.

California Renewable Portfolio Standard

The ARB Adopted Scoping Plan makes it clear that implementation of the Renewable Portfolio Standard (RPS) is a foundational element of the State's emissions reduction plan. In 2002, Senate Bill 1078 established the California RPS program, requiring 20% renewable energy by 2017. In 2006, Senate Bill 107 advanced the 20% deadline to 2010, a goal which was expanded to 33% by 2020 in the 2005 Energy Action Plan II. On September 15, 2009, Governor Arnold Schwarzenegger signed Executive Order S-21-09 directly the California Air Resources Board (CARB) to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. These mandates apply directly to investor-owned utilities, in this case Southern California Edison (SCE).¹⁵ Consequently, the scenario with 2020 State mandates considered in this analysis assumes that utilities will reduce the carbon intensity of delivered electricity equivalent to meeting the 33% RPS goal by 2020.

California Low Carbon Fuel Standard

On January 18, 2007, Governor Arnold Schwarzenegger issued Executive Order S-1-07 requiring the establishment of a Low Carbon Fuel Standard (LCFS) for transportation fuels. This statewide goal requires that California's transportation fuels reduce their carbon intensity by at least 10 percent by 2020.¹⁶ Regulatory proceedings and implementation of the LCFS have been directed to the California ARB. The LCFS has been identified by the ARB as a discrete early action item in the Adopted Scoping Plan. ARB expects the LCFS to achieve the minimum 10 percent reduction goal; however, many of the early action items outlined in the Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493 (Pavley), the Scoping Plan has modified the aggregate reduction expected from the LCFS to 9.1 percent.¹⁷ In accordance with the Scoping Plan, this analysis incorporates the modified reduction potential for the LCFS.

Federal Corporate Average Fuel Economy (CAFE) Standards

The 2007 Energy Bill creates new Federal requirements for increases in fleet-wide fuel economy for passenger vehicles and light trucks. The Federal legislation requires a fleet-wide average of 35 miles per gallon (mpg) to be achieved by 2020. The National Highway Traffic Safety Administration is directed to phase-in requirements to achieve this goal. Analysis by the California Air Resources Board suggests that this will require an annual improvement of approximately 3.4% between now and 2020.¹⁸

California Assembly Bill 1493 – Pavley Standards

On July 22, 2002, Governor Gray Davis signed Assembly Bill 1493 requiring the California Air Resources Board to develop and adopt regulations designed to reduce greenhouse gases emitted by

¹⁵ SCE Renewable Energy (source: <http://www.sce.com/PowerandEnvironment/renewables/>)

¹⁶ California Low Carbon Fuel Standard (source <http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>) (last visited 6/8/2009).

¹⁷ Available at <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm> (last visited 5/12/2009).

¹⁸ California Air Resources Board comparison between Pavley AB 1493 and the Federal 2007 CAFE standards (source http://www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf)

passenger vehicles and light-duty trucks beginning with the 2009 model year.¹⁹ The standards set within the Pavley regulations are expected to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016²⁰. California had petitioned the USEPA in December 2005 to allow these more stringent standards and California executive agencies have repeated their commitment to higher mileage standards. On July 1, 2009, the USEPA granted California a waiver which will enable the state to enforce stricter tailpipe emissions on new motor vehicles. Proposed amendments are currently being discussed in order to achieve the originally approved regulations and goals on a more condensed timeline. Proposed amendments have not gone through final approval process therefore; this analysis does not take credit for the anticipated reduction in greenhouse gas emissions that will result from full implementation of these stricter standards given the Proposed Project's build out timeline. In addition, on May 19, 2009, President Barack Obama announced a new National Fuel Efficiency Policy aimed at increasing fuel economy and reducing greenhouse gas pollution.²¹ The new standards are expected to increase fuel economy by more than 5% by requiring a fleet-wide average of 35.5 mpg by 2016 starting with model years 2012.²² However, Federal fuel economy standards have not yet been promulgated establishing specific benchmarks; therefore, the Proposed Project does not take credit for any related reductions in greenhouse gas emissions. Consequently, this analysis utilizes a conservative assumption and incorporates Federal Corporate Average Fuel Economy standards to estimate California fleet fuel economy in 2020.

Title 24 Code Cycles: Net-Zero Buildings (Residential & Non-Residential)

The California Public Utilities Commission adopted its "Long-Term Energy Efficiency Strategic Plan on September 18, 2008 presenting a roadmap for all new residential and commercial construction to achieve a zero-net energy standard²³. This Plan outlines the goal of reaching zero net energy in residential construction by 2020 and in commercial construction by 2030. Achieving this goal will require increased stringency in each code cycle of California's Energy Code (Title-24). This analysis assumes the 2020 residential and 2030 commercial goals will be fully achieved and implemented during each code cycle revisions up to and including the year 2020 and 2030 respectively.

Existing General Plan Business-As-Usual

The existing and future land uses under the Existing General Plan buildout include:

¹⁹ California Climate Change Portal, Assembly Bill 1493 Chaptered (source http://www.climatechange.ca.gov/publications/legislation/ab_1493_bill_20020722_chaptered.pdf)

²⁰ California Air Resources Board comparison between Pavley AB 1493 and the Federal 2007 CAFE standards (source http://www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf)

²¹ The White House, Office of the Press Secretary (source: http://www.whitehouse.gov/the_press_office/President-Obama-Announces-National-Fuel-Efficiency-Policy/)

²² California Air Resources Board comparison between Pavley AB 1493 and the Federal 2007 CAFE standards (source http://www.arb.ca.gov/cc/ccms/ab1493_v_cafe_study.pdf)

²³ Available at <https://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>

Table 5: Development summary for the Existing General Plan Buildout 2030, by Land Use.

<i>Existing General Plan Buildout</i>	<i>Existing Development</i>	<i>Existing GP Buildout</i>	<i>Measured Unit</i>	<i>% Growth (2008-2030)</i>
Residential	5,011	9,455	Dwelling Unit	89%
Non-residential	42,771,000	53,125,389	Square Feet	24%
Hotel	2,496	3,106	Rooms	24%
Infrastructure	24,848,719	28,405,141	Kilowatt hour	14%
Water	1,714	2,364	Million gallons	38%
Solid Waste	112,433	144,601	Tons	29%
Transportation	3,047,57	3,974,097	VMT	30%

Table 6 summarizes Existing General Plan Business-as-Usual (BAU) GHG emissions by land use. Although construction emissions are an episodic event (occurring only during physical construction of the IBC) total construction emissions have been annualized in this table over a performance period of 22 years (e.g., total emissions divided by 22 years) to maintain consistency as the other emissions in the table are also reported annually.

Table 6: Annual Existing General Plan BAU Emissions 2030, by Land Use (All Emissions metric tCO₂e).

<i>Existing General Plan BAU</i>	<i>BAU Emissions 2030 (No State and Federal)</i>	<i>BAU Emissions 2030 (With State and Federal)</i>
Residential	32,006	17,189
Non-residential	206,496	117,643
Hotel	7,012	4,365
Infrastructure	8,314	7,898
Water	4,578	4,349
Solid Waste	4,5266	45,266
Transportation	886,536	625,894
Construction ²⁴	22,973	22,973
TOTAL	1,213,181	845,577

As described above, the Business-As-Usual without State and Federal Actions reflects the current generation of electricity and the current characteristics of California's vehicle fleet. The conditions projected for Business-As-Usual with State and Federal Actions build out reflect full implementation of the 33% RPS standard for SCE, the Federal Corporate Average Fuel Economy, California's Low Carbon Fuel Standard, and Title 24 Code Cycles.

Proposed Project Business-As Usual

Existing and future land uses under the Proposed Project buildout include:

²⁴ Construction emissions are annual 2029 emissions from the URBEMIS model of the Existing General Plan Buildout. Construction emissions are not CO₂e; they do not include non-CO₂ emissions (CH₄, N₂O). Due to uncertainty of applicability, mitigation measures not applied to construction emissions in this analysis.

Table 7: Development summary for the Proposed Project Buildout 2030, by Land Use.

Proposed Project BAU Buildout	Existing Development	Proposed Project Buildout	Measured Unit	% Growth (2008-2030)
Residential	5,011	17,038	Dwelling Unit	240%
Non-residential	42,771,000	48,787,662	Square Feet	14%
Hotel	2,496	3,478	Rooms	39%
Infrastructure	24,848,719	28,405,141	Kilowatt hour	14%
Water	1,714	2,839	Million gallons	66%
Solid Waste	112,433	156,379	Tons	39%
Transportation	3,047,574	3,909,327	VMT	28%

Table 8 summarizes Business-as-Usual (BAU) Project GHG emissions by land use. As mentioned above, although construction emissions have been annualized in this table over a performance period of 22 years (e.g., total emissions divided by 22 years) to maintain consistency as the other emissions in the table are also reported annually.

Table 8: Annual Proposed Project BAU Emissions 2030, by Land Use (All Emissions metric tCO_{2e}).

Proposed Project BAU	BAU Emissions 2030 (No State and Federal)
Residential	122,788
Non-residential	191,254
Hotel	7,996
Infrastructure	8,314
Water	5,497
Solid Waste	48,953
Transportation	872,087
Construction ²⁵	32,072
TOTAL	1,288,960

The business-as-usual estimates for the Existing General Plan buildout and the Proposed Project Buildout differ due to the shift in residential and non-residential land uses, and the associated water, solid waste, and transportation emissions that result from those shifting land uses. For example, the Proposed Project includes 240% growth in multi-family residential units, while the Existing General plan only accounts for 89% growth from 2008 to 2030. In addition, the Existing General Plan buildout allows 24% growth of non-residential, with significant allowance for office development. The Proposed Project maintains a similar breakdown between retail, hotel, office, and industrial as the existing development, but only allows for 14% growth of non-residential development.

Based on assumed generation rates, solid waste is forecasted to grow by 29% under the Existing General Plan buildout, while the Proposed Project buildout forecasts 10% higher growth, with 39% growth in solid waste generation from 2008-2030.

²⁵ Construction emissions are annual 2029 emissions from the URBEMIS model of the Proposed Project Buildout. Construction emissions are not CO_{2e}; they do not include non-CO₂ emissions (CH₄, N₂O). Due to uncertainty of applicability, mitigation measures not applied to construction emissions in this analysis.

Similarly, due to the relative amounts of residential and non-residential, assumed water demand duty factors forecast 38% growth in water consumption under the Existing General Plan buildout and 66% growth in water consumption in the Proposed Project. This projected growth is 28% higher than the Existing General Plan buildout largely due to the significant increase in residential units.

Finally, the vehicle miles traveled for the Existing General Plan and the Proposed Project vary due to the mixed use nature of the Proposed Project. VMT data was obtained from the Fehr and Peers analysis of IBC and City VMT. This study estimated a 30% growth in VMT under the Existing General Plan buildout and a 28% growth in VMT for the Proposed Project buildout, slightly lower than the projected 2030 VMT under the Existing General Plan.

Table 9: Comparison of Existing General Plan and Proposed Project Business-As-Usual annual 2030 emissions. (Both scenarios listed without State and Federal Actions).

	<i>Existing General Plan BAU (2030)</i>	<i>Proposed Project BAU (2030)</i>	<i>% Difference (With Respect to Existing GP)</i>
Residential	32,006	122,788	284%
Non-residential	206,496	191,254	-7%
Hotel	7,012	7,996	14%
Infrastructure	8,314	8,314	0%
Water	4,578	5,497	20%
Solid Waste	45,266	48,953	8%
Transportation	886,536	872,087	-2%
Construction	22,973	32,072	40%
TOTAL	1,213,181	1,288,960	6%

Section 3. Emissions Reduction Strategies

The Proposed Project is designed to represent a substantial break from business-as-usual; the IBC Proposed Project is expected to reduce emissions to 15% below 2008 business-as-usual emissions. This is achieved through a combination of Project Design Features, Renewable Energy and Existing Building Retrofits and State and Federal Actions that work together to reduce the relative rate of GHG emissions associated with the Proposed Project. The following sections provide details about emissions-reducing project design features associated with each component of the Proposed Project.

Project Design Features for Reducing Emissions

Project design features explicitly highlighted for incorporation in the Irvine Business Complex (IBC) Vision Plan are detailed below.

Transportation

- **Establish Safe Routes to School Program:** A Safe Routes to School Programs will be developed to encourage the use of other travel modes for students. The IBC project intends to add 4,569 dwelling units within the project. Assuming that the complex attracts families in addition to single households, the Safe Routes to School program can be applied to this project.
- **Provide transit service from the City of Irvine to LAX Airport:** Providing direct transit service from the City to LAX can reduce single passenger trips to this destination. The Los Angeles World Airports will provide non-stop Flyaway shuttles service from the Irvine Metrolink Station to LAX beginning November 16. This service will be available to anyone living or working in or near Irvine, and would therefore be applicable at a city-wide level to the IBC.
- **Provide Additional Fixed Route Shuttle System to Complement the i-Shuttle:** For this strategy, the City would provide additional shuttle service using the Irvine Transit Vision as a guide. Additional shuttles would provide service to the IBC, and would therefore make this reduction applicable.
- **Require establishment of Transportation Management Agency (TMA) for the Irvine Business Complex:** The IBC is one of the larger development areas within the City. The existing IBC employs a substantial number of persons in Irvine and is anticipated to house additional residents, based on the proposed IBC Vision Plan. The City currently has issued an RFP related to the establishment of a TMA for the IBC, which should be completed in spring 2010.
- **Institute a comprehensive signal retiming and coordination program for arterials within the City:** A program to retime and coordinate traffic signals could produce more even traffic flows whereby vehicles are not starting and stopping constantly. These types of programs can improve vehicular Level of Service (LOS), thereby decreasing emissions for the same volume of vehicles. The City plans to enhance signal coordination in the IBC area by the end of 2011, thus this strategy can be applied to both existing and future development.
- **Continue to implement the City's Circulation Phasing Analysis:** This strategy is designed to address those locations whereby significant congestion and delays occur (such as the major intersections along Jamboree Road).
- **Require Developments to Provide Bicycle Lockers and Showers on Site:** Increase requirements to the City's Zoning Code to require new developments provide bicycle lockers and showers on site to incentivize bicycle commuters.

Residential Buildings

- **Require all new residential buildings to be GreenPoint Rated:** All new residential buildings built in the IBC will be required to become GreenPoint Rated.

Non-Residential Buildings

- **Non-residential green building standards:** All new non-residential buildings in the IBC will be required to achieve "Designed to Earn the EnergyStar". In addition, non-residential buildings will be required to provide designated or preferred parking for vanpools and carpools.

Other

- **Develop programs to encourage reduction of solid waste generation and disposal in landfills:** Develop programs to encourage and mandate recycling of construction and demolition materials, composting food and organic waste, and proper disposal of hazardous materials. Provide a discounted rate for residences and businesses that choose smaller trash receptacles.
- **Implementation of Renewable Energy and Existing Building Retrofit Program:** Prior to the issuance of building permits, the City and Project Proponent shall work together to create a renewable energy and existing building retrofit program which will establish a framework for funding and implementing renewable energy projects and energy efficiency retrofits of existing buildings within the IBC or City and accomplish a reduction of 81,850 metric tCO_{2e} by 2030. Alternatively, prior to the issuance of building permits and to the City's satisfaction, the project proponent must demonstrate the equivalent reduction of 6.4% of the project's emissions through the implementation of new renewable energy sources (which may include solar thermal, solar photovoltaics, wind, or other sources approved by the City) or energy efficiency retrofits of existing buildings. The project proponent shall first attempt to accomplish renewable energy production or energy efficiency retrofits of existing buildings within the IBC and may, should the City approve, implement new renewable energy production or energy efficiency retrofits of existing buildings within the City of Irvine. All renewable energy production or energy efficiency must be within the City limits.

Summary of GHG Emissions Reduction from Project Design Features

The emissions reductions associated with the Project Design Features (PDFs) and Renewable Energy and Existing Building Retrofit Program listed in the previous section as well as State and Federal Actions are anticipated to achieve 15% below existing 2008 emissions. The following table shows the emissions summary of all scenarios, broken down by transportation and non-transportation emissions. As shown below, the Proposed Project with State and Federal Actions is able to meet 15% below 2008 emissions for transportation and non-transportation sectors.

Table 10: Annual metric tCO₂e emissions for the IBC Buildout Scenarios.

Scenario	Annual metric tCO ₂ e
Existing Conditions (2008)	909,352
Transportation	683,499
Non-Transportation	225,853
15% Below Existing Conditions (2030 Target)	772,949
Transportation	580,974
Non-Transportation	191,975
Existing General Plan without State and Federal Actions (2030)	1,213,181
Transportation	886,536
Non-Transportation	326,645
Existing General Plan with State and Federal Actions (2030)	845,577
Transportation	625,894
Non-Transportation	219,683
Proposed Project BAU without State and Federal Actions (2030)	1,288,960
Transportation	872,087
Non-Transportation	416,874
Proposed Project with PDFs, without State and Federal Actions (2030)	1,075,928
Transportation	769,349
Non-Transportation	306,579
Proposed Project with PDFs and State and Federal Actions (2030)	668,671
Transportation	512,956
Non-Transportation	155,715

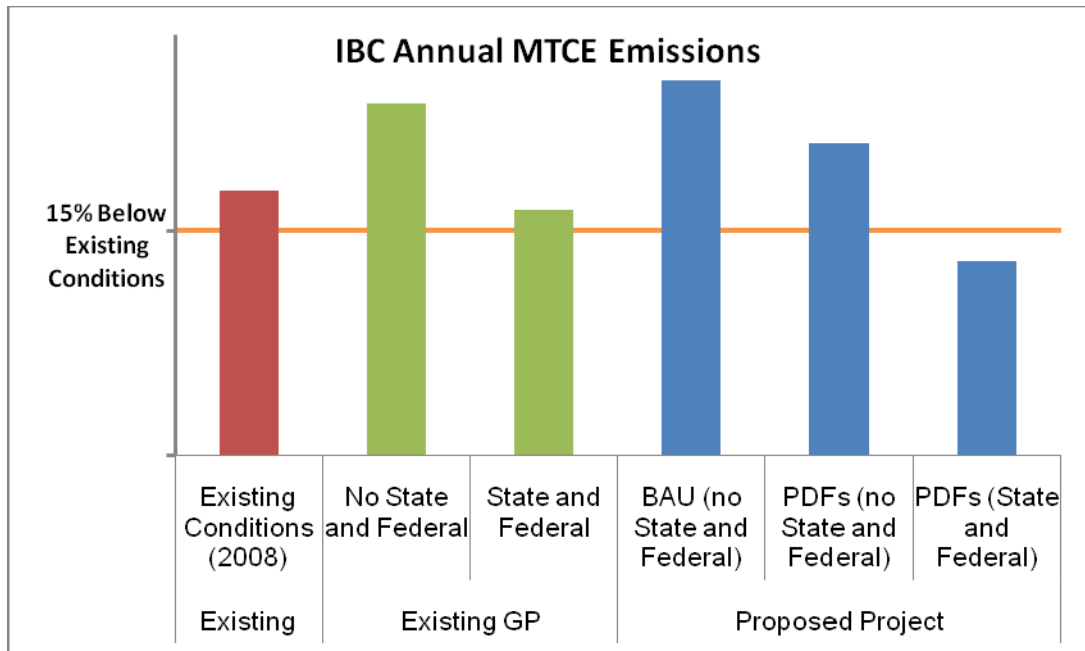


Figure 2: Annual metric tCO_{2e} for IBC Buildout Scenarios relative to the 15% below Existing conditions target.

The following table details the anticipated 2030 metric tCO₂e reductions due to the PDFs, the Renewable Energy and Existing Building Retrofit Program, and State and Federal Actions. It is important to note, however, that the actual performance of each buildout scenario and reduction strategy may vary based on a number of factors, including the details of the developed land use, mixture of building sizes and types, and available technologies.

Table 11: Absolute MTCE reductions from 2030 Business-As-Usual. Reductions occur due to Project Design Features (PDFs), Renewable Energy and Existing Building Retrofits, and State and Federal Actions.

	<i>Annual metric tCO₂e</i>
2030 Project BAU (without State and Federal action)	1,288,960
- PDFs	131,181
TRANSPORTATION	
Provide safe routes to schools	1,747
Provide transit service for the City of Irvine to LAX Airport	2,174
Additional Fixed Route Transit Service	8,723
Require establishment of a TMA for the Irvine Business Center	69,770
Institute a comprehensive signal retiming and coordination program for arterials within the city	8,723
Continue to implement the City's Circulation Phasing Analysis	8,723
Require Developments to Provide Bicycle Lockers and Showers on Site	704
RESIDENTIAL BUILDINGS	
Require all new residential buildings to be GreenPoint Rated	7,303
NON-RESIDENTIAL BUILDINGS	
Non-residential green building standards (achieve EnergyStar Label and reserve percentage of parking spaces for carpool vehicles)	18,426 ²⁶
OTHER	
Develop programs to encourage reduction of solid waste generation and disposal in landfills	4,889
- Renewable Energy and Existing Buildings Retrofits	81,850
= 2030 Reduced Project	1,075,928
- State and Federal Mandates	407,257

²⁶ As part of this measure, 16,252 metric tCO₂e reduction is from residential buildings, and 2,174 metric tCO₂e is transportation reductions due to the parking spaces for carpool vehicles.

STATE AND FEDERAL MANDATES	
Renewable Portfolio Standard	16,792
Low Carbon Fuel Standard	78,493
Corporate Average Fuel Economy	177,900
Title 24 Residential Code Cycle Updates	60,180
Title 24 Non-Residential Code Cycle Updates	73,892
<hr/>	
= 2030 Reduced Project (including State and Federal)	668,671

Table 12: Annual Proposed Project Emissions without State and Federal Action 2030, by Land Use (All Emissions metric tCO₂e). Emissions reductions due to the Renewable Energy and Existing Building Retrofits Program will be applied non-residential land uses throughout the City. (Numbers vary slightly due to rounding).

<i>Proposed Project</i>	<i>PDFs (No State and Federal)</i>
Residential	116,315
Non-residential	175,655
Hotel	7,343
Infrastructure	8,314
Water	4,667
Solid Waste	44,064
Transportation	769,349
Construction ²⁷	32,072
SUB-TOTAL	1,157,779
Renewable Energy and Existing Buildings Retrofits	(81,850)
TOTAL	1,075,928

²⁷ Construction emissions are annual 2029 emissions from the URBEMIS model of the Proposed Project Buildout. Construction emissions are not CO₂e; they do not include non-CO₂ emissions (CH₄, N₂O). Due to uncertainty of applicability, mitigation measures not applied to construction emissions in this analysis.

Table 13: Annual Proposed Project Emissions with State and Federal Action 2030, by Land Use (All Emissions metric tCO₂e). Emissions reductions due to the Renewable Energy and Existing Building Retrofits Program will be applied non-residential land uses throughout the City. (Numbers vary slightly due to rounding).

<i>Proposed Project</i>	<i>PDFs (State and Federal)</i>
Residential	47,359
Non-residential	97,791
Hotel	3,988
Infrastructure	7,898
Water	4,394
Solid Waste	44,064
Transportation	512,956
Construction ²⁸	32,072
SUB-TOTAL	750,522
Renewable Energy and Existing Buildings Retrofits	(81,850)
TOTAL	668,671

²⁸ Construction emissions are annual 2029 emissions from the URBEMIS model of the Proposed Project Buildout. Construction emissions are not CO₂e; they do not include non-CO₂ emissions (CH₄, N₂O). Due to uncertainty of applicability, mitigation measures not applied to construction emissions in this analysis.

Section 4. Greenhouse Gas Emissions Analysis

Conclusions and Cumulative Impact

Comparison of GHG Emissions Analysis

All project scenarios analyzed in this technical report are expected to emit greenhouse gas emissions. While the Proposed Project is expected to emit GHGs, the emission of GHGs by a single project into the atmosphere is not itself necessarily an adverse environmental effect. Rather, it is the increased accumulation of GHGs from many projects and many sources in the atmosphere that cumulatively contribute to global climate change. The resultant consequences of that climate change can cause adverse impacts on people and the environment. A project's GHG emissions typically will be very small in comparison to state or global GHG emissions and, consequently, they will, in isolation, have no significant direct impact on climate change.

This Project's GHG emissions are minimal when compared to statewide GHG emissions. Due to the complex physical, chemical, and atmospheric mechanisms involved in global climate change, it is likely impossible to identify the specific impact, if any, to global climate change from one project's incremental increase in global GHG emissions. As such, the project GHG emissions and the resulting significance of potential impacts are more properly assessed on a cumulative basis. Therefore, the significance of potential impacts from the proposed Project's GHG emissions is determined on a cumulative basis.

The State has mandated a goal of reducing state-wide emissions to 1990 levels by 2020, even though State-wide population and commerce is predicted to continue to expand. In order to achieve this goal, ARB is in the process of establishing and implementing regulations to reduce Statewide GHG emissions. Furthermore, ARB has suggested that local governments achieve emissions 15% below existing conditions in order to be in line with these statewide goals.

Table 11 illustrates that the project design features and reductions strategies identified in this report will contribute to a reduction in greenhouse gas emissions equivalent to this 15% below existing conditions target. These reductions represent a break from BAU and support State goals for emissions reduction. The methods used to establish this relative reduction are consistent with the approach used in the Air Resources Board Adopted Scoping Plan for the implementation of AB 32.

The California Attorney General's Office has taken an active role in addressing climate change via CEQA, including, but not limited to: submitting comment letters on draft CEQA documents; filing CEQA lawsuits; and entering into related settlement agreements. In particular and most pertinent for our purposes here, the Attorney General's Office has created and routinely updates a Fact Sheet listing project design features to reduce GHG emissions.²⁹ The Attorney General's Office created this Fact Sheet primarily for the benefit of local agencies processing CEQA documents, acknowledging that "local agencies will help to move the State away from 'business as usual' and toward a low-

²⁹ CA Attorney General's Office Fact Sheet, *The California Environmental Quality Act – Addressing Global Warming Impacts at the Local Agency Level*. (Source: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf) (Last visited 5/15/2008).

carbon future.” The Fact Sheet explains that the listed “measures can be included as design features of a project,” but emphasizes that they “should not be considered in isolation, but as part of a larger set of measures that, working together, will reduce GHG emissions and the effects of global warming.”

The Proposed Project is consistent with the Fact Sheet and utilizes many of the measures listed therein. The project design features and reductions strategies demonstrate the Proposed Project’s commitment to creating a substantial change from BAU. As recommended by the Attorney General, the Proposed Project does not consider design features in isolation, and the Proposed Project explicitly includes an integrated set of emissions reducing features addressing each land use. The Proposed Project also sets a series of performance targets that can guide design, construction, and operational practices throughout the life of the Project. The result will be substantial reduction in GHG emissions consistent with the goals highlighted in the Adopted Scoping Plan. The Proposed Project also considered and described specific combinations of current technologies that can achieve targeted emissions reductions under current conditions. However, the Proposed Project also explicitly recognizes that the energy-related technologies are changing quickly. Consequently, it is necessary and prudent to provide flexibility to select the most cost-effective options available to meet emissions reduction targets when each phase of development actually takes place. This flexible approach is consistent with the recommendations of the Attorney General, aspirations expressed by the Governor, and AB 32.

The Proposed Project is consistent with the approach outlined in the ARB Adopted Scoping Plan, particularly its emphasis on the identification of emission reduction opportunities that promote economic growth while achieving greater energy efficiency and accelerating the transition to a low-carbon economy. The Proposed Project is also consistent with the reduction goals outlined in the Draft Irvine Climate Action Plan using performance-based targets for emissions reduction.

Irvine Business Complex

Global Climate Change Technical Assumptions Appendix

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December 17, 2009

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IBC GREENHOUSE GAS INVENTORY: TECHNICAL ASSUMPTIONS

The following technical assumptions have been used as the foundation for quantifying the greenhouse gas inventory of the Project. The results of the inventory are presented in the body of the EIR Irvine Business Complex Global Climate Change Technical Report. This section outlines the assumptions, calculations, and information sources underlying the GHG inventory.

- Residential Units – The Planning Center, “IBC Vision Plan and Mixed Use Overlay Zoning Code Draft EIR” Table 3-1
- Non-Residential Square Footage (by building type) – The Planning Center Land Use Comparison Document
- Traffic Lights – Irvine Draft Climate Action Plan
 - Scaled down from Irvine Draft CAP numbers by ratio of dwelling units in IBC to dwelling units in Irvine. Assumed linear growth through 2030.
- Street Lights – Irvine Draft Climate Action Plan
 - Scaled down from Irvine Draft CAP numbers by ratio of dwelling units in IBC to dwelling units in Irvine. Assumed linear growth through 2030.
- Street lanes – Irvine Draft Climate Action Plan
 - Scaled down from Irvine Draft CAP numbers by ratio of dwelling units in IBC to dwelling units in Irvine. Assumed linear growth through 2030.
- Water Usage – The Planning Center water duty demand factors, Table 5.14-6 IBC Vision Plan and Mixed Use Overlay Zoning Code Draft
 - 200 Gal/DU/day Residential
 - 220 Gal/KSF/day Commercial
 - 70 Gal/KSF/day Office and Industrial
 - 200 Gal/Room/day Hotel
 - Assumed same % potable/non-potable as the City of Irvine.
- Solid Waste - The Planning Center water duty demand factors, Table 5.14-20 IBC Vision Plan and Mixed Use Overlay Zoning Code Draft
 - 12.23 lbs/household/day Residential
 - 1 lbs/100 sf/day Office/Industrial
 - 0.046 lbs/sf/day Hotel
 - 0.046 lbs/sf/day Retail
 - The emissions from landfilling depend on whether the landfill where the waste is disposed has a landfill gas (LFG) control system. The "Landfilling, National Average" was used. "National Average" calculates emissions based on the proportions of landfills with LFG control in 2004. For "Other Waste" category, "Mixed MSW" emission factor from the U.S. EPA WARM program was used. Results output was set to Metric Tons of Carbon Dioxide Equivalent (TCO₂E). Source: U.S. EPA's WARM Program's Emission/Energy Factors (Version 8, 8/06)
<http://yosemite.epa.gov/oar/globalwarming.nsf/WARM?OpenForm>.
 - Landfills where IBC's solid waste is sent have National Average landfill recovery rate (based on U.S.EPA data)

- Transportation - Fehr & Peers
 - VMT from Fehr and Peers memorandum "Analysis of IBC and City VMT", October 23, 2009
 - Annual Operational Unmitigated Emissions (metric tons/year) - Urbemis 2007 Version 9.2.4
 - On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
 - Off-Road Vehicle Emissions Based on: OFFROAD2007
 - Average 2007 MTCE/mile - 0.224330892

2006 Emissions Factors

- lbs CO₂ per MWh (megawatt hour)
 - Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Appendix Table G.5.
- lbs CH₄ per MWh & lbs N₂O per MWh
 - CH₄ and N₂O - not available in the LGO Protocol
 - 2004 figures were used. California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Appendix Table G.6.
 - CH₄ emissions are 21 times GWP of CO₂. Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.9

Equations: Electricity

Total CO₂ Emissions (metric tons) = [Electricity Use (MWh) x Electricity Emission Factor (lbs CO₂/MWh)] / 2204.62 pounds/metric ton.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.8.

Total CH₄ Emissions (metric tons) = [Electricity Use (MWh) x Electricity Emission Factor (lbs CH₄/MWh)] / 2204.62 pounds/metric ton.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.8.

Total N₂O Emissions (metric tons) = [Electricity Use (MWh) x Electricity Emission Factor (lbs N₂O/MWh)] / 2204.62 pounds/metric ton.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.8.

Assumptions: Electricity

- N₂O emissions are 310 times GWP of CO₂.
 - Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008.
- Equation 6.9kg CO₂e per MBtu

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Appendix Table G.1.
- g CH₄ per MBTU
 - Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Appendix Table G.3. Natural Gas Commercial/Institutional End-Use Sector

Equations: Natural Gas

1 therm = 100,000 BTU = 0.1 million BTU.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Appendix F.

Total Emissions (metric tons) = [Natural Gas Use (million Btu) x Emission Factor (kg CO₂/million Btu)] x 0.001 metric tons/kg.

- Equation derived from California Climate Action Registry's General Protocol Version 3.0 April 2008 pg 51. LGO Protocol did not provide sufficient guidance for natural gas computation.

Total CH₄ Emissions (metric tons) = [Fuel Use (MMBTU) x Emission Factor (g CH₄/MMBTU)] / 1,000,000 g/metric ton.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.3.

Total N₂O Emissions (metric tons) = [Fuel Use (MMBTU) x Emission Factor (g CH₄/MMBTU)] / 1,000,000 g/metric ton.

- Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.3.

Assumptions: Natural Gas

- CH₄ emissions are 21 times GWP of CO₂.
 - Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.9
- N₂O emissions are 310 times GWP of CO₂.
 - Source: California Air Resources Board's Local Government Operations Protocol. Version 1. September 2008. Equation 6.9
- Water
 - Potable Water - Embodied kWh/Gallon - 0.0058435
 - Reclaimed Water - Embodied kWh/Gallon - 0.0021
 - Untreated Water - Embodied kWh/Gallon - 0.0053725
 - California State Average MTCE/kWh - 0.00034683

Equations: Solid Waste

Generation (tons) = "Total Annual Solid Waste Generation" / % Breakdown

Total Emissions (metric tons) = Solid Waste Generated (tons) x Emission Factor (metric tons of eCO₂ / ton of specified solid waste)

FEDERAL AND STATE ACTIONS

The Existing General Plan BAU, Proposed Project BAU, Existing General Plan “Reduction Scenario, and Proposed Project “Reduction Scenario” include the emissions reductions resulting from the implementation of Federal and State actions. These measures include:

- **Renewable Portfolio Standard (RPS)** – Senate Bill 1078 established the California Renewable Portfolio Standard program, requiring 20% renewable energy by 2020. In 2009, however, California Governor Arnold Schwarzenegger signed an Executive Order directing the California Air Resources Board to adopt regulations that increase the RPS to 33% by 2020. This analysis includes a 33% renewable energy reduction was applied to all buildings without adjustment for the ratio between natural gas and electricity.
- **Low Carbon Fuel Standard** - The statewide Low Carbon Fuel Standard goal requires that California’s transportation fuels reduce their carbon intensity by at least 9.1% by 2020.
- **Corporate Average Fuel Economy** - The Federal Corporate Average Fuel Economy Standards will increase fuel efficiency standards to an average of 35 mpg by 2020, reducing emissions from transportation. The National Highway Traffic Safety Administration is directed to phase-in requirements to achieve this goal. Analysis by the California Air Resources Board suggests that this will require an annual improvement of approximately 3.4% between now and 2020.
- **Title 24 Residential Code Cycle Updates** - Due to the implementation of new Title 24 Residential Codes, there will be a reduction in new residential building emissions. This analysis assumes a 54% reduction in GHG emissions from 2006-2030 due to Title 24 Residential Codes.
- **Title 24 Non-Residential Code Cycle Updates** - Due to the implementation of new Title 24 Non-Residential Codes, there will be a reduction in new non-residential building emissions. This analysis assumes a 67.1% reduction in GHG emissions from 2006-2030 due to Title 24 Non-Residential Codes.

EXISTING GENERAL PLAN BUILDOUT: TECHNICAL ASSUMPTIONS

The 2030 General Plan Buildout is based on the following assumptions, calculations, and information sources.

- Existing 2008 emissions sources - use the emissions factors referenced in this Appendix
- New Emissions Sources- uses emissions factors based on
 - Title 24 Energy Code - code cycle efficiency
 - CAFE - Phasing in of fuel efficiency
 - LCFS - Phasing in of 10% reduction
 - RPS - Phasing in of 33%
 - Decay/major renovations of existing buildings
- Average Building Lifetime - 50 years
- Average Major Renovation Factor 2% (2% of building stock per year)
- Average Car Lifetime - 20 years
- Average Car Replacement Factor 5% (5% of the vehicle fleet)
- Projection Years - 22 years
- Population increases by 89% from 2008 to 2030
- Residential dwelling units increases by 89%
- Non-residential square footage (sq.ft.) increases by 24%
- Traffic Lights increases by 53% in accordance with City of Irvine projected growth
- Street Lane Miles increase by 12% in accordance with City of Irvine projected growth
- Street Lights increases by 12% in accordance with City of Irvine projected growth
- Water increases by 38%
- Solid Waste increases by 29%
- Transportation increases by 30% (Fehr & Peers Traffic modeling)

PROPOSED PLAN: TECHNICAL ASSUMPTIONS

The 2030 Proposed Plan Buildout in 2030 is based on the following assumptions, calculations, and information sources.

- Existing 2008 emissions sources - use the emissions factors referenced in this Appendix
- New Emissions Sources- uses emissions factors based on
 - Title 24 Energy Code - code cycle efficiency
 - CAFE - Phasing in of fuel efficiency
 - LCFS - Phasing in of 10% reduction
 - RPS - Phasing in of 33%
 - Decay/major renovations of existing buildings
- Average Building Lifetime - 50 years
- Average Major Renovation Factor 2% (2% of building stock per year)
- Average Car Lifetime - 20 years
- Average Car Replacement Factor 5% (5% of the vehicle fleet)
- Projection Years - 22 years
- Population increases by 240% from 2008 to 2030
- Residential dwelling units increases by 240%
- Non-residential square footage (sq.ft.) increases by 14%
- Traffic Lights increases by 53% in accordance with City of Irvine projected growth
- Street Lane Miles increase by 12% in accordance with City of Irvine projected growth
- Street Lights increases by 12% in accordance with City of Irvine projected growth
- Water increases by 66%
- Solid Waste increases by 39%
- Transportation increases by 28% (Fehr & Peers Traffic modeling)

EXISTING ENERGY USE INTENSITY (EUI) ASSUMPTIONS

Component	IBC Existing Energy Use Intensity (2008)		Assumptions
	Electricity EUI	Natural Gas EUI	
Multifamily Residential	4,333 kWh/DU	285 Therm/DU	Average EUIs for electricity and natural gas were sourced from the Irvine Draft Climate Action Plan Greenhouse Gas Inventory. Refrigerant emissions not considered.
Retail	11.329 kWh/SF	.0388 Therm/SF	EUIs were defined using the Database for Energy Efficient Resources (DEER) T24 compliant prototypes for “Large 3-Story Retail” 120,000 SF building in Climate Zone 8. Refrigerant emissions not considered.
Industrial	6.995 kWh/SF	.0388 Therm/SF	EUIs were defined using the DEER T24 compliant prototypes for “Light Industrial” 100,000 SF building in Climate Zone 8. Refrigerant emissions not considered.
Office	13.604 kWh/SF	.1173 Therm/SF	EUIs were defined using the DEER T24 compliant prototypes for “Large Office” 175,000 SF building in Climate Zone 8. Refrigerant emissions not considered.
Mini Warehouse	3.700 kWh/SF	.0029 Therm/SF	EUIs were defined using the DEER T24 compliant prototypes for “Conditioned Storage” 500,000 SF building in Climate Zone 8. Refrigerant emissions not considered.
Hotel	10.869 kWh/SF	.1054 Therm/SF	EUIs were defined using the DEER T24 compliant prototypes for “Hotel” 200,000 SF building in Climate Zone 8. Refrigerant emissions not considered.
Traffic Lights	11,835 kWh/traffic light		EUIs for traffic lights were sourced from the Irvine Draft Climate Action Plan Greenhouse Gas Inventory.
Street Lights	3,548 kWh/street light		EUIs for street lights were sourced from the Irvine Draft Climate Action Plan Greenhouse Gas Inventory.

PROJECT DESIGN FEATURES SOURCES AND ASSUMPTIONS

Establish Safe Routes to School Program

Measure Description: Develop Safe Routes to School Programs to encourage the use of other travel modes for students.

Applicability to IBC: The IBC project intends to add 4,569 dwelling units within the project. Assuming that the complex attracts families in addition to single households, the Safe Routes to School program can be applied to this project.

Predicted Reduction: 1,747 tons CO₂e from 2030 BAU

Source: *Marin County Safe Routes to School Program Evaluation*, Nelson-Nygaard, 2004

Provide transit service from City of Irvine to Los Angeles International Airport (LAX)

Measure Description: Providing direct transit service from the City to LAX can reduce single passenger trips to this destination. The Los Angeles World Airports will provide non-stop Flyaway shuttles service from the Irvine Metrolink Station to LAX beginning November 16.

Applicability to IBC: This service will be available to anyone living or working in or near Irvine, and would therefore be applicable at a city-wide level to the IBC.

Predicted Reduction: 2,174 tons CO₂e from 2030 BAU

Source: *Travelers Response to Transportation System Changes-Chapter 12*, Transportation Cooperative Research Program, 2000.

American Community Survey, US Census, 2005-2007

Provide Additional Fixed Route Shuttle System to Complement i-Shuttle

Description: Fehr & Peers is currently preparing a comprehensive study of additional local shuttles designed to complement the existing fixed route bus service operated by OCTA and the existing i-shuttle. This report (*Irvine Transit Vision*, June 2009) identified 6 new shuttle routes for within the City of Irvine that would connect from either the Irvine Metrolink Station or the Tustin Metrolink Station to various destinations in Irvine. For this strategy, the City would provide additional shuttle service using the Irvine Transit Vision as a guide.

Applicability to IBC: Additional shuttles would provide service to the IBC, and would therefore make this reduction applicable.

Predicted Reduction: 8,723 tons CO₂e from 2030 BAU

Require the Establishment of a Transportation Management Agency (TMA) for the Irvine Business Complex

Measure Description: One of the larger development areas within the City is the Irvine Business Complex. The existing Irvine Business Complex employs a substantial number of persons in Irvine and is anticipated to house additional residents, based on the proposed IBC Vision Plan. At this time, the exact schedule for developing this project is unknown. However, we can anticipate that the IBC is likely to see continued development, both residential and commercial prior to 2020. The City currently has issued an RFP related to the establishment of a TMA for the IBC, which should be completed in spring 2010.

Applicability to IBC: This project is directly associated with the Irvine Business Complex. It should be applied to both existing and future development in the area.

Predicted Reduction: 69,770 tons CO₂e from 2030 BAU

Source: Cynthia Pansing, Eric Schreffler, and Mark Sillings (2000), "A Comparative Evaluation of the Cost Effectiveness of 58 TCMs." Transportation Research Record #1520, Transportation Research Board, January 2000.

Spectrumotion e-News, Spring 2008, <http://www.spectrumotion.com/e-News/FY2008/Spring2008.asp>. Accessed 6 November 2009.

Irvine Business Center Draft Environmental Impact Report, City of Irvine, 2009

Implement a Comprehensive Signal Retiming and Coordination Program for traffic signals on arterials in the City

Measure Description: A program to retime and coordinate traffic signals could produce more even traffic flows whereby vehicles are not starting and stopping constantly. These types of programs can improve vehicular Level of Service (LOS), thereby decreasing emissions for the same volume of vehicles.

Applicability to IBC: The City plans to enhance signal coordination in the IBC area by the end of 2011, thus this strategy can be applied to both existing and future development.

Predicted Reduction: 8,723 tons CO₂e from 2030 BAU

Source: NCHRP 25-21

Continue to Implement the City's Circulation Phasing Analysis to identify and implement improvements at major intersections, freeway ramps, and other highly congested locations.

Measure Description: This strategy is designed to address those locations whereby significant congestion and delays occur (such as the major intersections along Jamboree Road).

Applicability to IBC: This strategy can be applied to intersections near the IBC, and is therefore applicable to existing and future development in the IBC.

Predicted Reduction: 8,723 tons CO₂e from 2030 BAU

Source: None.

Require Developments to Provide Bicycle Lockers and Showers on Site

Measure Description: Increase requirements to the City's Zoning Code to require new developments provide bicycle lockers and showers on site to incentivize bicycle commuters.

Prediction Reduction: 704 tons CO₂e from 2030 BAU

Source: Roger Mackett (2000). *"How to Reduce the Number of Short Trips by Car,"* European Transport Conference, Centre for Transport Studies, University College London.

United States Environmental Protection Agency, "State and Local Transportation Resources, Commuter Programs, Bicycle and Pedestrian Programs."
www.epa.gov/otaq/stateresources/erellinks/mms_pedbikeprogs.htm, accessed 6 November 2009.

Require all new residential buildings to be GreenPoint Rated

Measure Description: All new residential buildings built in the IBC will be required to become GreenPoint Rated.

Predicted Reduction: 7,303 tons CO₂e from 2030 BAU

Source: Assumes that for new residential construction, GreenPoint rated homes will achieve 15% below T24 as well as savings from indoor water efficiency such as high efficiency toilets, waterless toilet, plumbing fixtures with below standard flow rates, flow restrictors/control valves.

Non-residential green building standards

Measure Description: All new non-residential buildings in the IBC will be required to achieve EnergyStar Label. In addition, non-residential buildings will be required to provide designated or preferred parking for vanpools and carpools.

Predicted Reduction: 18,426 tons CO₂e from 2030 BAU

Source: Energy Star: Assumes that new non-residential construction will achieve EnergyStar score of 75. The CTG carbon calculator was used to find energy use intensities for EnergyStar rating of 75 under the specific cooling-degree-days and heating-degree-days for Irvine. Assumed the non-residential percent breakdown specific to the IBC, and used electricity and natural gas breakdowns from the 2003 CBECS "National Average Source Energy Use and Performance Comparisons by Building Type" table.

Preferred Parking: Reid Ewing (1993), "TDM, Growth Management, and the Other Four Out of Five Trips," *Transportation Quarterly*, Vol. 47, No. 3, Summer 1993, pp. 343-366.

Develop programs to encourage reduction of solid waste generation and disposal in landfills

Measure Description: Develop programs to encourage and mandate recycling of construction and demolition materials, composting food and organic waste, and proper disposal of hazardous materials. Provide a discounted rate for residences and businesses that choose smaller trash receptacles.

Predicted Reduction: 4,889 tons CO₂e from 2030 BAU

Source: Assumes a 10% reduction in solid waste is achievable through active recycling and recovery programs. (Source: <http://www.usgbc.org/ShowFile.aspx?DocumentID=3930>)

Implementation of Renewable Energy and Existing Building Retrofit Program:

Measure Description: Prior to the issuance of building permits, the City and Project Proponent shall work together to create a renewable energy and existing building retrofit program which will establish a framework for funding and implementing renewable energy projects and energy efficiency retrofits of existing buildings within the IBC or City and accomplish a reduction of 81,850 metric tCO₂e by 2030. Alternatively, prior to the issuance of building permits and to the City's satisfaction, the project proponent must demonstrate the equivalent reduction of 6.4% of the project's emissions through the implementation of new renewable energy sources (which may include solar thermal, solar photovoltaics, wind, or other sources approved by the City) or energy efficiency retrofits of existing buildings. The project proponent shall first attempt to accomplish renewable energy production or energy efficiency retrofits of existing buildings within the IBC and may, should the City approve, implement new renewable energy production or energy efficiency retrofits of existing buildings within the City of Irvine. All renewable energy production or energy efficiency must be within the City limits.

Predicted Reduction: 81,850 tons CO₂e from 2030 BAU

Source: The Draft Irvine Climate Action Plan identifies citywide potential reduction of 181,889 metric tCO₂e due to existing nonresidential retrofits and nonresidential renewable energy installations. This measure assumes that 81,850 metric tCO₂e (45%) of those reductions will be assumed by the IBC.



MEMORANDUM

Date: December 17, 2009

To: Chandra Krout, City of Irvine
Bill Jacobs, City of Irvine
Nicole Vermilion, The Planning Center
Bill Halligan, The Planning Center
Natalia Komar, CTG
Matt Burris, CTG

From: Chris Gray, Fehr & Peers
Tamar Fuhrer, Fehr & Peers

Subject: IBC VMT Estimates and Trip Reduction Strategies- Updated

IE09-0029

This memorandum documents our VMT and Vehicle Trip estimates for the proposed Irvine Business Center (IBC). It also presents a summary of trip reduction measures that can be applied to the IBC. This memorandum is divided into X sections. First, we briefly discuss the context of our work. Next, we present how we estimated VMT and vehicle trips for the IBC and document these estimations. After this, we discuss trip reduction strategies from the Irvine Climate Action Plan that can be applied to the IBC.

SUMMARY

The City of Irvine prepared a Draft Environmental Impact Report (DEIR) for the IBC Residential/Mixed Use Vision Plan in early 2009. As part of the EIR process, the Draft EIR was open to comments from stakeholders. In response to the comments received, the City decided to re-circulate the EIR.

A set of comments received related to VMT and Vehicle Trip estimates. We were scoped to address these comments and to develop new VMT and Vehicle Trip estimates and document them sufficiently. We were also asked to apply trip reduction estimates from the Irvine Climate Action Plan to the IBC project, for inclusion in the EIR.

VMT ESTIMATES

ITAM Model

VMT and Vehicle Trip data was obtained from the Irvine Transportation Analysis Model (ITAM). The ITAM is a computer-based travel demand forecasting model for the City, which includes the full roadway network within the City of Irvine and some streets adjacent to the City. The model is broken into several traffic analysis zones (TAZs), where vehicle trips would enter or leave. Using existing and future-year land use inputs for each TAZ, the model is able to forecast trips traveling along streets throughout the City.

The City of Irvine and PB prepared model runs for four scenarios: Existing (2008), 2030 with General Plan Buildout, 2030 with No Project, and 2030 with Project. Vehicle trips were calculated within the model by applying trip generation rates to land uses. VMT estimations were also calculated in ITAM by using a post-processing modeling script. Within the script were a set of instructions for calculating VMT. The following trip types were identified:

- Trips originating and terminating within the City (100%)
- Trips originating in the City and terminating outside of the City (100%)
- Trips originating outside of the City and terminating within the City (100%)

Trips with both origins and destinations outside of the city (through trips) were not identified, and were therefore omitted from VMT calculations. The VMT for identified trips were then calculated by assessing the distance between a trip's origin TAZ and destination TAZ. This approach is consistent with that used for the Irvine Climate Action Plan.

To ensure reasonableness, we compared ITAM VMT estimates to those from the SCAG TDF model. The SCAG model is a regional model that forecasts trips and VMT for Los Angeles, Orange County, Riverside County, and San Bernardino County. We wanted to ensure that our VMT projections were similar – or within reason – of SCAG VMT estimates, assuming that Irvine VMT was consistent with VMT at the Southern California regional level. In doing so, we found that VMT forecasts were indeed proportional and that ITAM outputs were reasonable.

We compiled VMT projections from ITAM for the Irvine Business Center area and for the City as a whole. The Irvine Business Center included TAZs 395-546 and is also considered Planning Area 36. Data was supplied for four time periods – AM, mid-day, PM, and nighttime – which was combined to obtain daily VMT for both the Irvine Business Center and the City.

VMT Summary

Table 1 presents the VMT, VT, and VMT/Trip summary for the four scenarios analyzed for the IBC EIR.

TABLE 1 VMT SUMMARY FOR IBC AND CITY OF IRVINE				
VMT Calculation	Scenario			
	2008	2030 General Plan	2030 No Project	2030 With Project
IBC VMT	3,047,574	3,974,097	3,064,337	3,909,327
City VMT	11,224,891	16,797,545	16,019,428	16,704,433
IBC VT	508,690	672,309	508,690	697,308
City VT	1,476,141	2,188,335	2,075,550	2,163,809
IBC VMT/Trip	6.67	6.61	6.59	6.33
City VMT/Trip	7.6	7.68	7.72	7.72
Percent of City VMT from IBC	27.20%	23.70%	19.10%	23.40%
Source: ITAM, Fehr & Peers, 2009				

As shown in Table 1, there is an increase in VMT and VT between the 2030 Project and No Project scenarios that can be logically explained; with future growth in the IBC area, more trips will be generated, thus increasing VMT and VT. The 2030 General Plan included more land use for the IBC area than the Vision Plan did, hence the higher VMT and VT estimates. We are therefore confident that the projections from ITAM are reasonable, and believe that the updated

estimates and documentation will address the comments received regarding the original estimates and sources.

TRIP REDUCTION STRATEGIES

Introduction

As part of the Irvine Climate Action Plan, the City has proposed trip reduction strategies that can be applied to reduce VMT, and consequently Greenhouse Gas (GhG) emissions, to baseline levels. Some of the strategies identified in the Climate Action Plan can be applied to the IBC to reduce vehicle trips and VMT. Table 2 identifies strategies that are potentially applicable to the IBC.

TABLE 2 IRVINE CLIMATE ACTION PLAN STRATEGIES			
Strategy	Applicability to IBC		Rationale
	Yes	No	
Create Design Guidelines for shorter block sizes in Heritage Fields		X	Only applies to Heritage Fields
Establish Safe Routes to School Program	X		IBC development will include residential land use
Require designated/preferred parking for carpools and vanpools		X	Would require zoning code changes; not applicable until after CAP implementation
Parking pricing and parking cashout		X	Would require zoning code changes; not applicable until after CAP implementation
Reduce/eliminate parking requirements and establish parking maximums for non-residential development		X	Would require zoning code changes; not applicable until after CAP implementation
Apply additional parking requirement reductions for new developments in areas served by transit service		X	Would require zoning code changes; not applicable until after CAP implementation
Provide additional fixed route shuttle system to complement i-Shuttle	X		Shuttle service will provide additional transit access for IBC.

TABLE 2 IRVINE CLIMATE ACTION PLAN STRATEGIES			
Strategy	Applicability to IBC		Rationale
	Yes	No	
Provide transit service from City of Irvine to LAX	X		IBC residents would have same access to Flyaway as other Irvine residents
Establish TMA for IBC	X		Applies directly to IBC
Designate Citywide Mobility Manager		X	Will not be implemented until after CAP adoption
Implement signal retiming and coordination program	X		Retiming and coordination efforts are expected to be completed by 2011 for IBC area
Implement Circulation Phasing Analysis	X		Applies to locations throughout Irvine and may include routes traveled by IBC residents and employees
Grade Separation		X	Has not been implemented at this time
Complete gaps in City's bicycle network		X	Will not be implemented until after CAP adoption and is dependent on funding
Require developments to provide bicycle lockers and showers on site		X	Would require zoning code changes; not applicable until after CAP implementation
Allow City employees to participate in a Commuter Tax Benefit Program		X	Applies to City employees only
Provide flextime, compress work schedules, and telecommuting for City employees		X	Applies to City employees only

TABLE 2 IRVINE CLIMATE ACTION PLAN STRATEGIES			
Strategy	Applicability to IBC		Rationale
	Yes	No	
Car Sharing and Bicycle Sharing		X	Will not be implemented until after CAP adoption
Guaranteed Ride Home		X	Applies to City employees only
Source: Fehr & Peers, 2009.			

Applicable Strategies

Establish Safe Routes to School Program

Description: The Safe Routes to School program is a federal and state grant program intended to increase the percentage of students walking or cycling to school. Funding is awarded to cities to construct engineering improvements and to start educational, encouragement, and enforcement programs. The City of Irvine has been successful in obtaining grant funding to implement a city-wide program, which includes walking school buses. Walking school buses are groups of students who meet at a designated location and walk to school together, led by a parent at the front and back of the group. This encourages students to walk to school and assuages parents of traffic and crime safety risks that are impediments of walking alone.

Applicability to IBC: The IBC project intends to add 4,569 dwelling units within the project. Assuming that the complex attracts families in addition to single households, the Safe Routes to School program can be applied to this project.

Predicted Reduction: We calculated a VMT reduction city-wide of 0.2%.

Provide Additional Fixed Route Shuttle System to Complement i-Shuttle

Description: Fehr & Peers is currently preparing a comprehensive study of additional local shuttles designed to complement the existing fixed route bus service operated by OCTA and the existing i-shuttle. This report (*Irvine Transit Vision*, June 2009) identified 6 new shuttle routes for within the City of Irvine that would connect from either the Irvine Metrolink Station or the Tustin Metrolink Station to various destinations in Irvine. For this strategy, the City would provide additional shuttle service using the Irvine Transit Vision as a guide.

Applicability to IBC: Additional shuttles would provide service to the IBC, and would therefore make this reduction applicable.

Predicted Reduction: We calculated a VMT reduction city-wide of 1%.

Provide transit service from City of Irvine to Los Angeles International Airport (LAX).

Description: Although the City of Irvine is serviced by John Wayne Airport, Los Angeles International Airport (LAX) is the regional air transportation hub. Providing direct transit service from the City to LAX can reduce single passenger trips to this destination. The Los Angeles World Airports operates three Flyaway shuttles – providing non-stop airport service to and from Westwood, Van Nuys, and Downtown Los Angeles via the Flyaway program. A Flyaway shuttle from the Irvine Metrolink Station to LAX will provide non-stop service beginning November 16.

Applicability to IBC: This service will be available to anyone living or working in or near Irvine, and would therefore be applicable at a city-wide level to the IBC.

Predicted Reduction: We calculated a VMT reduction city-wide of 0.25%.

Require the Establishment of a Transportation Management Agency (TMA) for the Irvine Business Complex.

Description: One of the larger development areas within the City is the Irvine Business Complex. The existing Irvine Business Complex employs a substantial number of persons in Irvine and is anticipated to house additional residents, based on the proposed IBC Vision Plan. At this time, the exact schedule for developing this project is unknown. However, we can anticipate that the IBC is likely to see continued development, both residential and commercial prior to 2020. The City currently has issued an RFP related to the establishment of a TMA for the IBC, which should be completed in Spring 2010.

Applicability to IBC: This project is directly associated with the Irvine Business Complex. It should be applied to both existing and future development in the area.

Predicted Reduction: We calculated the reduction in the IBC to be 8% of projected VMT.

Implement a Comprehensive Signal Retiming and Coordination Program for traffic signals on arterials in the City.

Description: As noted in Strategy #1, emissions are highest at the lowest travel speeds. A program to retime and coordinate traffic signals could produce more even traffic flows whereby vehicles are not staring and stopping constantly. These types of programs can improve vehicular Level Of Service (LOS), thereby decreasing emissions for the same volume of vehicles. The City is currently retiming and coordinating signals throughout Irvine under its ITEMS (Irvine Traffic Engineering System) program.

Applicability to IBC: The City plans to enhance signal coordination in the IBC area by the end of 2011, thus this strategy can be applied to both existing and future development.

Predicted Reduction: We calculated an emissions reduction, resulting from less time spent idling, to be 1% citywide.

Continue to Implement the City's Circulation Phasing Analysis to identify and implement improvements at major intersections, freeway ramps, and other highly congested locations.

Description: This strategy is designed to address those locations whereby significant congestion occurs. As shown in Figure 1 below, the amount of emission increase exponentially as arterial travel speeds decrease. As is the case with many cities in Southern California, there are often defined congestion locations (such as the major intersections along Jamboree Road) where a majority of congestion and delay occurs.

The City currently has a Circulation Phasing Analysis program in place. They collect traffic counts at congested locations on a bi-annual basis and monitor locations every three years. The results of the analysis are used to determine future Capital Improvement Projects.

Applicability to IBC: This strategy can be applied to intersections near the IBC, and is therefore applicable to existing and future development in the IBC.

Predicted Reduction: We have been unable to quantify a reduction in GhG emissions to date, but anticipate it to have a similar benefit of 1% reduction in emission applied citywide.

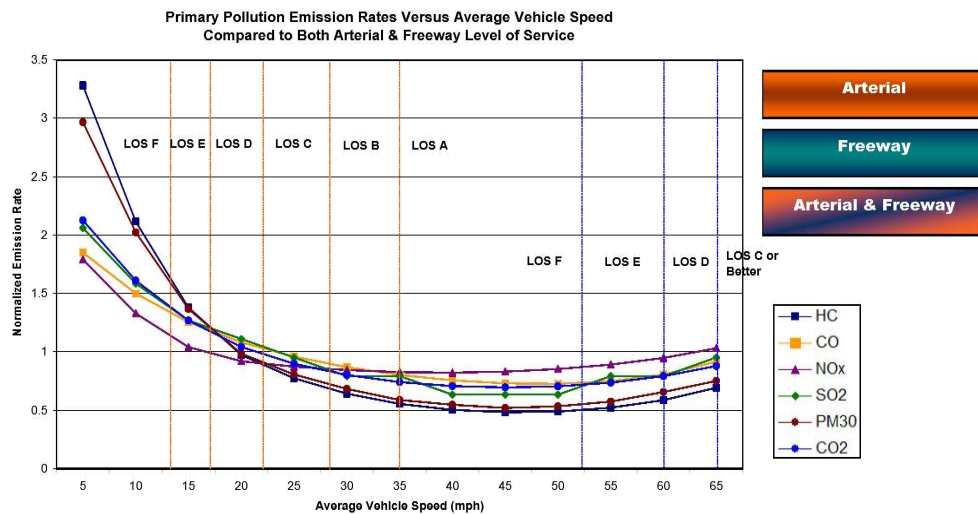


Figure 1- Emission Curves By Speed

Summary of VMT Reductions

Table 2 presents a summary of VMT and GhG reductions from applying reduction strategies to the IBC project.

TABLE 2 SUMMARY OF VMT REDUCTIONS	
Strategy	VMT/GhG Reduction Percentage
Safe Routes to School	0.20%
Additional Fixed Route Transit Service	1%
Provide Flyaway Shuttle Between Irvine and LAX	0.25%
Require TMA for IBC	8%
Implement Signal Timing and Coordination	1%
Implement Circulation Phasing Analysis	1%
<i>Source: Fehr & Peers, 2009</i>	

We hope that you find this information helpful. If you have any additional questions, please contact Chris Gray at (951) 274-4800.