ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

RESEARCH

CLIMATE ACTION AT THE PROJECT LEVEL

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April 13, 2022

2020-2021

RESEARCH

Assessment of Projects for
a. **mitigation and adaptation to climate change** and
b. attractiveness to investors

2021-2022

RESEARCH

Assessment of Projects for
a. **integrated climate-biodiversity action and**
b. attractiveness to investors

Climate change **is a global issue**

This research bridges performance criteria of global, national, sector, company, **with criteria at the project level** based on Envision®.

LITERATURE REVIEW OF CLIMATE CHANGE Global & National Trends & Commitments

GLOBAL-NATIONAL LEVEL

LITERATURE REVIEW OF ESG (Environmental, Social & Governance) SYSTEMS & TCFD (Task Force on Climate-related Financial Disclosures) **&** **ANALYSIS of selected ESGs & climate-related financial frameworks & standards**

COMPANY & PROJECT PORTFOLIO LEVEL

INPUT **INPUT**

ENVISION REVIEW > PRIORITY CRITERIA & ENVISION CREDITS for identifying the "right" climate-action projects

INFRASTRUCTURE PROJECT LEVEL

The presentation structure is based on the levels relevant to climate change action

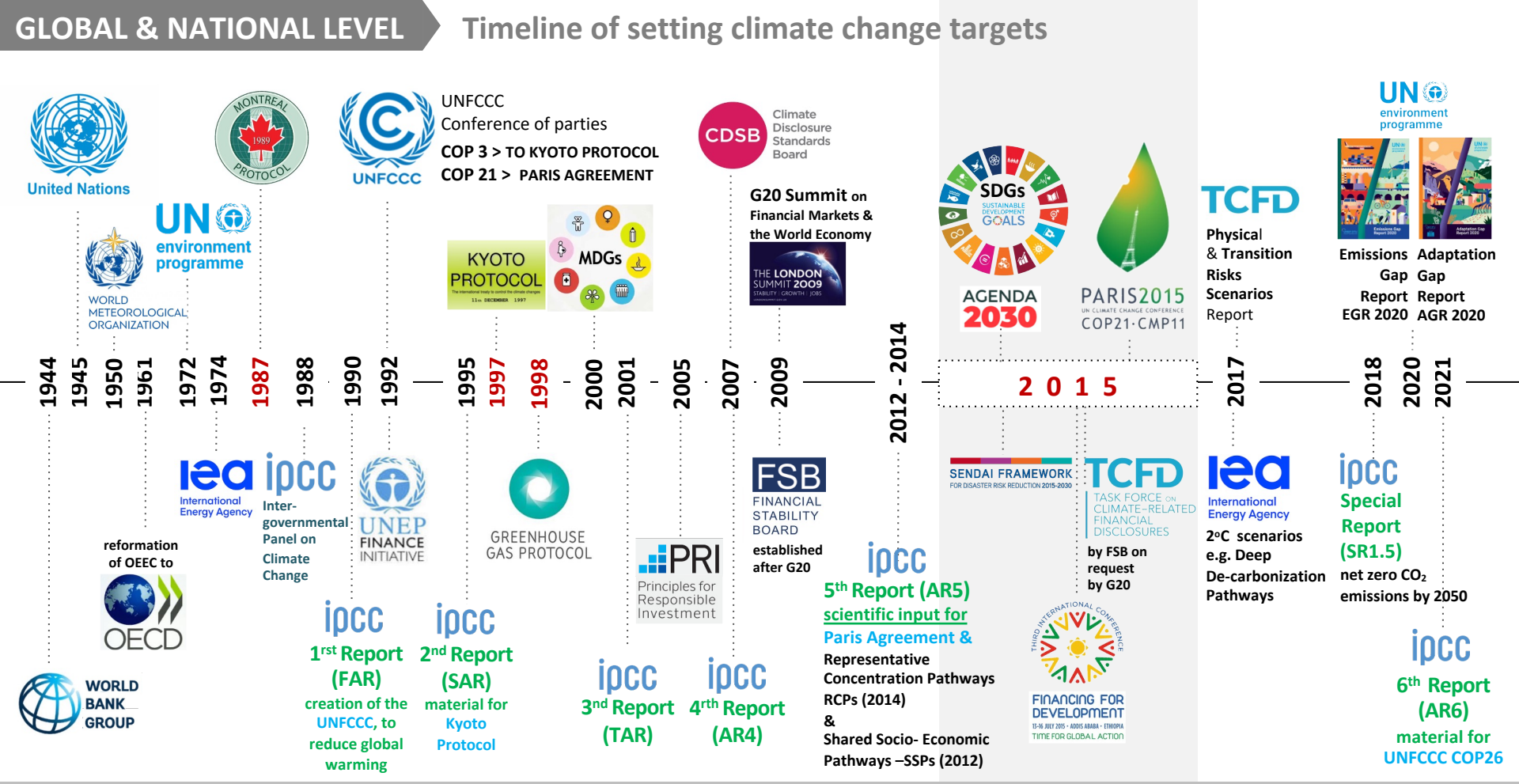
Climate change action

GLOBAL - NATIONAL LEVEL

COMPANY & PROJECT PORTFOLIO LEVEL

INFRASTRUCTURE PROJECT LEVEL BASED ON ENVISION

Timeline of setting climate change targets



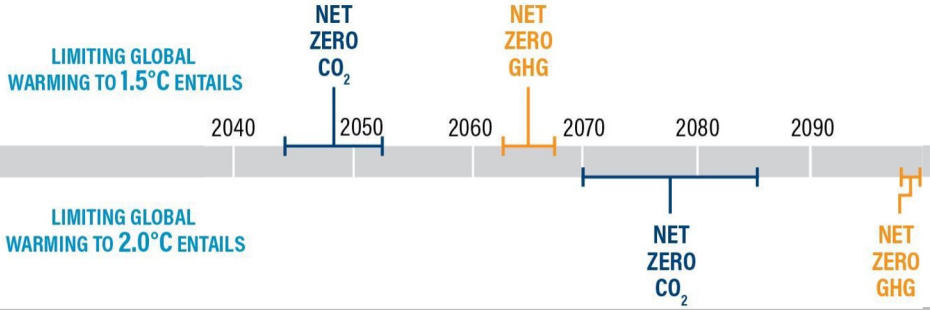
THE PARIS AGREEMENT & NET ZERO EMISSIONS BY 2050

1. Cut GHG emissions **to keep a global average temperature rise** this century **well below 2°C** above pre-industrial levels, **and preferably below 1.5°C.**

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

2. **A global goal to reach net zero emissions by 2050.**
Net-zero emissions will be achieved when all GHG emissions released by humans are counterbalanced by removing GHGs from the atmosphere in a process known as **'carbon removal'. Reaching net-zero emissions is akin to achieving "climate neutrality."**

'Net-zero CO_2 emissions are achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removal. **Net zero CO_2 emissions are also referred to as "carbon neutrality."**



Global timeline to reach net-zero emissions

On Urgency for Climate Action

There is now scientific consensus that global emissions must drop by 50% over the next decade for the world to have a chance of staying at 1.5°C of global warming and avoid the most catastrophic consequences of climate change. **It has clear and immediate implications for businesses.**"

EU Technical Expert Group on Sustainable Finance, Taxonomy: Final report of the Technical Expert Group on Sustainable Finance (March 2020)

Of the 17 SDGs (Sustainable Development Goals), the SDG combating climate change –SDG 13 'CLIMATE ACTION'– has been identified as the most pressing, after adopting the UN Paris Climate Change Agreement.

17 SDGs

AGENDA 2030

‘GHG accounting,’ defined by the Greenhouse Gas Protocol, is a global standardized tool for measuring progress against GHG reduction targets

Scope 1, 2 and 3 emissions

a. assist in creating inventories to estimate the GHG emissions of companies
b. monitor GHG emissions evolution in the long term
c. allow for aggregation and comparability

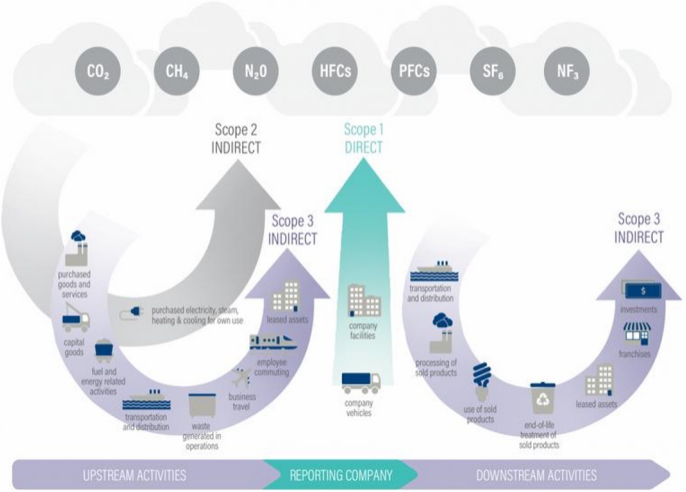


Image source: Greenhouse Gas Protocol, World Resources Institute WRI

Scope 1 emissions

- **Direct** emissions from sources the company owns or controls
- Mandatory accounting and reporting

Scope 2 emissions

- **Indirect** GHG emissions from the generation of purchased energy (electricity, steam, or heat) consumed by the facilities or equipment that the company owns or controls
- Mandatory accounting and reporting

Scope 3 emissions

- **Indirect** GHG emissions from other sources the **company does not own** or control (e.g., waste disposal, outsourced activities, or emissions related to employee commuting) that occur in a company’s value chain
- The largest source of emissions for companies and thus significant opportunities for GHG reductions
- Optional accounting

Measuring progress against GHG reduction targets

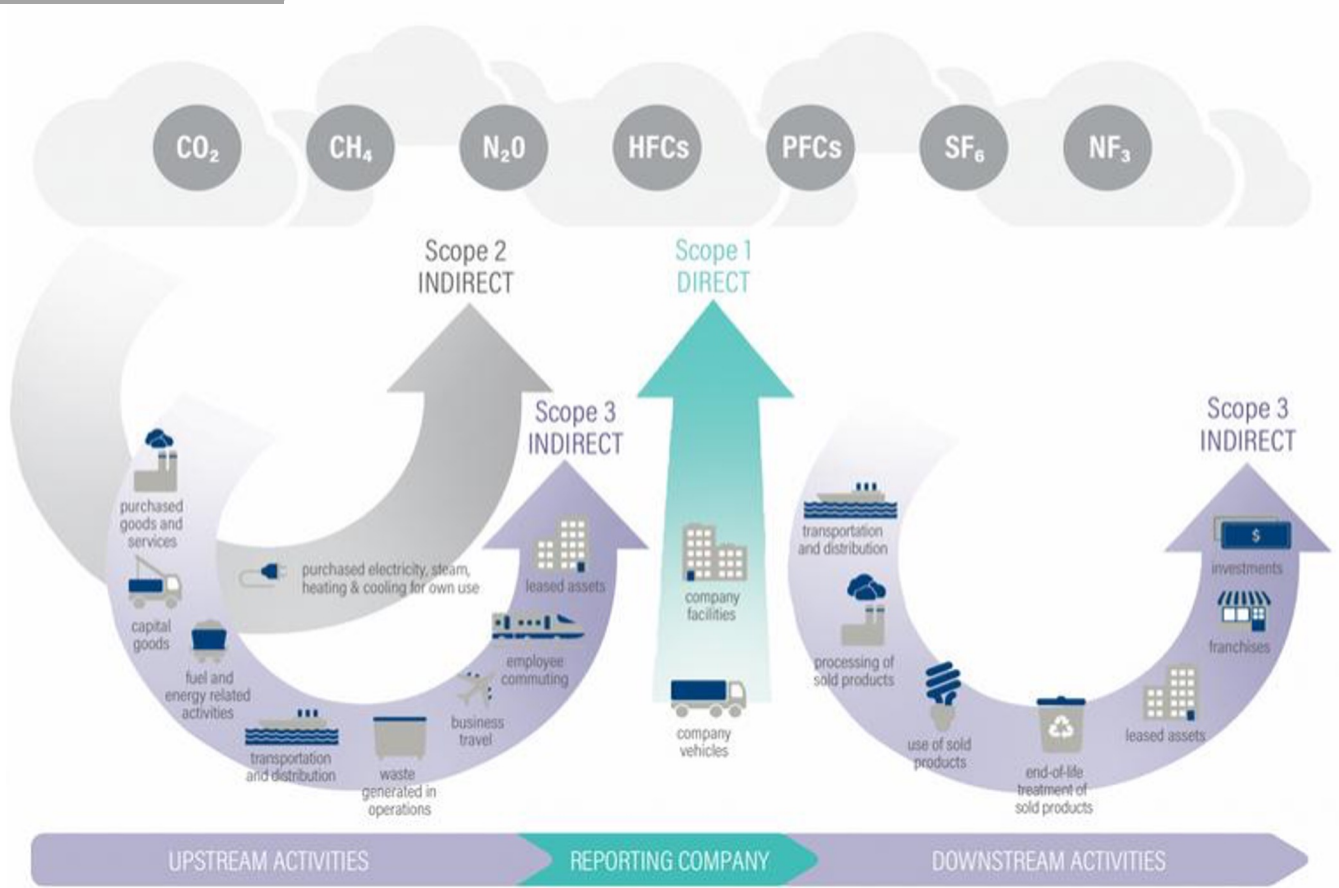


Image source: Greenhouse Gas Protocol, World Resources Institute WRI

Environmental, Social, and Governance (ESG) reporting is a tool for investors to know the sustainability performance of their investments

Non-Financial reporting (or sustainability disclosure, or ESG reporting)

KEY ACTORS

CARBON DISCLOSURE PROJECT

CLIMATE DISCLOSURE STANDARDS BOARD

GLOBAL REPORTING INITIATIVE

SUSTAINABILITY ACCOUNTING STANDARDS BOARD

INTERNATIONAL INTEGRATED REPORTING COUNCIL

GLOBAL REAL ESTATE SUSTAINABILITY BENCHMARK

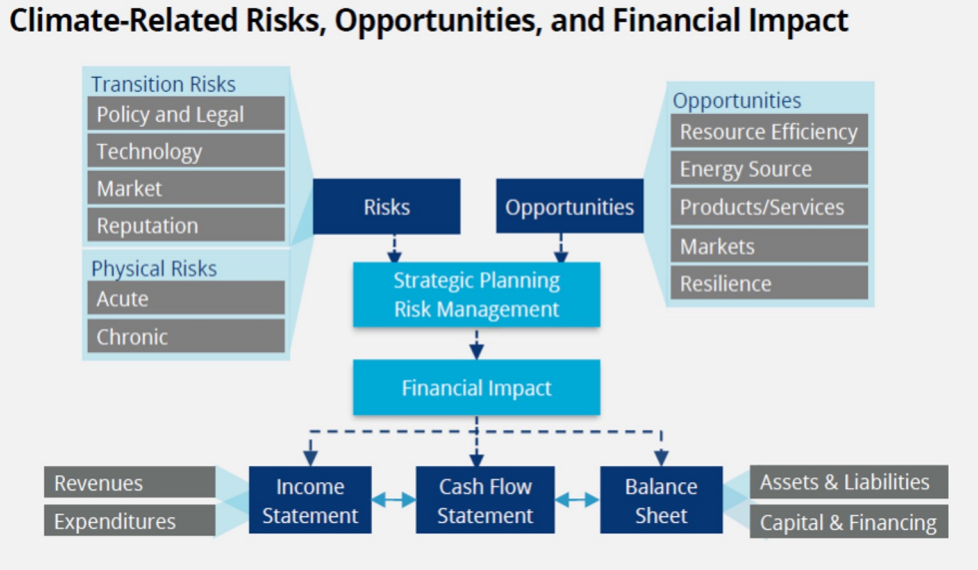
"Corporate reporting is a means by which stakeholders, **including investors**, can understand and evaluate companies' performance, in the same way companies use information internally to inform decision-making."

5ISS (Five Institutional Shareholder Services) Statement of intent to work together

The TCFD recommendations for climate-related risks and opportunities

The investor's demand for climate action has been largely driven by TCFD, a catalyst for awareness of **climate change as a financial risk**

TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES



Climate-related risks are divided in two major categories:

- **Transition risks:** related to the transition to a lower-carbon economy, which affects most economic sectors and industries.
- **Physical risks:** related to the physical impacts of climate change; event driven (acute) or longer-term shifts (chronic) in climate patterns

> Recommendations of the Task Force on Climate-related disclosures (June 2017)

ESG systems evolution reflecting investors' demand for climate action

ESG investing

ESG is about **risk-based investing.** ESG systems **evaluate, in equal measure, the potential risks and drivers of long-term enterprise value**, and assess whether those risks are priced in.

SDG investing

The shift from ESG to SDG investing showcases a trend of moving **from a company agenda to a global agenda**. The SDGs provide a common language; however, no standardized system exists for reporting progress against SDGs and their targets.

TCFD Alignment of ESG Systems

TCFD alignment is investors' explicit request for "international standard-setting bodies to incorporate the TCFD recommendations into their standards."

The Climate-first Approach

Major ESG organizations have prioritized an early consideration of climate-related information, a "climate-first" approach to respond to global action urgency.

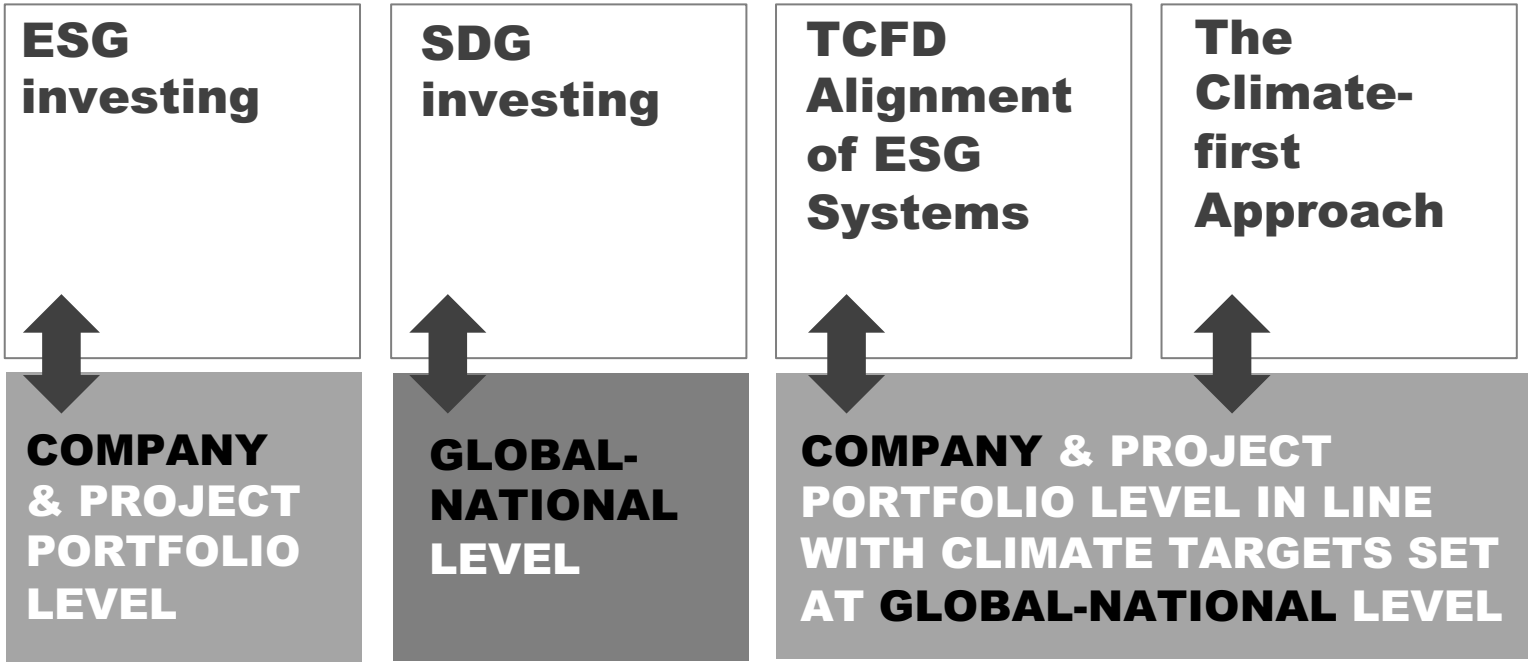
Biodiversity crisis

Though it is a still-nascent ESG consideration for investors, the biodiversity crisis is climbing up investors' agenda as the next priority, mainly for its nexus with climate.

(studied as part of the research focus for 2021-22)

Alignment to global climate targets

The interconnection of action at Global-National-Company levels



High-Priority Criteria for Climate Change Action

The literature review, the analysis of TCFD and selected ESG systems identified
'HIGH-PRIORITY CRITERIA' for assessing the company's performance in climate change mitigation & adaptation

1 assessment of transition risks (mitigation)

A. GHG emissions reduction targets & progress against targets (GHG accounting)

- GHG Scope 1 emissions
- GHG Scope 2 emissions
- GHG Scope 3 emissions
- GHG Scope 3 emissions (user)

B. GHG emissions reduction strategies

1. Energy efficiency
2. Electricity decarbonization using renewable energy sources
3. Electrification (replacement of use of fossil fuels with electricity)
4. Carbon capture and sequestration for the hard-to-electrify portions of systems

2 assessment of physical risks (adaptation)

C. Alignment with TCFD recommended disclosures

1. Report risk evaluation process
2. Report risk management process

D. Exposure to climate-related risks

1. service continuity risk
2. physical asset risk
3. resource availability risk
   - water
   - materials
   - land
   - workforce
4. supply chain continuity risk

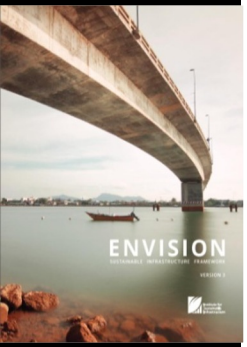
GLOBAL - NATIONAL LEVEL

COMPANY & PROJECT PORTFOLIO LEVEL

THE RESEARCH FOCUSES ON THE PROJECT LEVEL BASED ON ENVISION®

- How do the global/national and company levels translate to the project level?
- Can the global and company level criteria be used to assess climate action at the project level?

Use of the Envision Framework



Quality Of Life
14 Credits

WELLBEING
QL1.1 Improve Community Quality of Life
QL1.2 Enhance Public Health & Safety
QL1.3 Improve Construction Safety
QL1.4 Minimize Noise & Vibration
QL1.5 Minimize Light Pollution
QL1.6 Minimize Construction Impacts

MOBILITY
QL2.1 Improve Community Mobility & Access
QL2.2 Encourage Sustainable Transportation
QL2.3 Improve Access & Wayfinding

COMMUNITY
QL2.1 Advance Equity & Social Justice
QL2.2 Preserve Historic & Cultural Resources
QL2.3 Enhance Views & Local Character
QL2.4 Enhance Public Space & Amenities

QL0.0 Innovate or Exceed Credit Requirements

Leadership
12 Credits

COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Foster Collaboration & Teamwork
LD1.3 Provide for Stakeholder Involvement
LD1.4 Pursue Byproduct Synergies

PLANNING
LD2.1 Establish a Sustainability Management Plan
LD2.2 Plan for Sustainable Communities
LD2.3 Plan for Long-Term Monitoring & Maintenance
LD2.4 Plan for End-of-Life

ECONOMY
LD3.1 Stimulate Economic Prosperity & Development
LD3.2 Develop Local Skills & Capabilities
LD3.3 Conduct a Life-Cycle Economic Evaluation

LD0.0 Innovate or Exceed Credit Requirements

Resource Allocation
14 Credits

MATERIALS
RA1.1 Support Sustainable Procurement Practices
RA1.2 Use Recycled Materials
RA1.3 Reduce Operational Waste
RA1.4 Reduce Construction Waste
RA1.5 Balance Earthwork On Site

ENERGY
RA2.1 Reduce Operational Energy Consumption
RA2.2 Reduce Construction Energy Consumption
RA2.3 Use Renewable Energy
RA2.4 Commission & Monitor Energy Systems

WATER
RA3.1 Preserve Water Resources
RA3.2 Reduce Operational Water Consumption
RA3.3 Reduce Construction Water Consumption
RA3.4 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements

Natural World
14 Credits

SITING
NW1.1 Preserve Sites of High Ecological Value
NW1.2 Provide Wetland & Surface Water Buffers
NW1.3 Preserve Prime Farmland
NW1.4 Preserve Undeveloped Land

CONSERVATION
NW2.1 Reclaim Brownfields
NW2.2 Manage Stormwater
NW2.3 Reduce Pesticide & Fertilizer Impacts
NW2.4 Protect Surface & Groundwater Quality

ECOLOGY
NW3.1 Enhance Functional Habitats
NW3.2 Enhance Wetland & Surface Water Functions
NW3.3 Maintain Floodplain Functions
NW3.4 Control Invasive Species
NW3.5 Protect Soil Health

NW0.0 Innovate or Exceed Credit Requirements

Climate and Resilience
10 Credits

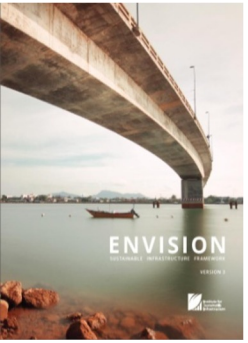
EMISSIONS
CR1.1 Reduce Net Embodied Carbon
CR1.2 Reduce Greenhouse Gas Emissions
CR1.3 Reduce Air Pollutant Emissions

RESILIENCE
CR2.1 Avoid Unsuitable Development
CR2.2 Assess Climate Change Vulnerability
CR2.3 Evaluate Risk & Resilience
CR2.4 Establish Resilience Goals and Strategies
CR2.5 Maximize Resilience
CR2.6 Improve Infrastructure Integration

CR0.0 Innovate or Exceed Credit Requirements

each credit depends on criteria to calculate the points to be awarded

Use of the Envision Framework



The Envision® framework **assesses infrastructure project performance in climate change mitigation and adaptation.**

Six Envision credits **explicitly refer and assess** climate change **mitigation strategies**

Resource Allocation	RA2.1	Reduce Operational Energy Consumption
	RA2.2	Reduce Construction Energy Consumption
	RA2.3	Use Renewable Energy
	RA2.4	Commission & Monitor Energy Systems
Climate and Resilience	CR1.1	Reduce Net Embodied Carbon
	CR1.2	Reduce Greenhouse Emissions

Six Envision credits **explicitly refer and assess** climate change **adaptation strategies**

Climate and Resilience	CR2.1	Avoid Unsuitable Development
	CR2.2	Assess Climate Change Vulnerability
	CR2.3	Evaluate Risk & Resilience
	CR2.4	Establish Resilience Goals & Strategies
	CR2.5	Maximize Resilience
	CR2.6	Improve Infrastructure Integration

High-Priority Criteria for Climate Change Action

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B. GHG emissions reduction strategies

1. Energy efficiency
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2 assessment of physical risks (adaptation)

C. Alignment with TCFD recommended disclosures

1. Report risk evaluation process
2. Report risk management process

D. Exposure to climate-related risks

1. service continuity risk
2. physical asset risk
3. resource availability risk
   - water
   - materials
   - land
   - workforce
4. supply chain continuity risk

Review based on the High-Priority Criteria

1 Criteria for assessment of transition risks (mitigation)

GHG emissions reduction targets & progress against targets (GHG accounting)

36 of the 63 Envision credits contribute to GHG reductions

8/13 credits QUALITY OF LIFE **8**

10/13 credits RESOURCE ALLOCATION **10**

4/9 credits CLIMATE & RESILIENCE **4**

5/11 credits LEADERSHIP **5**

7/13 credits NATURAL WORLD **7**

	CLIMATE TRANSITION RISKS (mitigation)			
ENVISION CREDITS	GHG scope 1	GHG scope 2	GHG scope 3	GHG scope 3 user
QL1.3 Improve Construction Safety				
QL1.4 Minimize Noise and Vibration				
QL1.5 Minimize Light Pollution				
QL1.6 Minimize Construction Impacts				
QL2.1 Improve Community Mobility & Access				
QL2.2. Encourage Sustainable Transportation				
QL2.3. Improve Access & Wayfinding				
QL3.4 Enhance Public Space and Amenities				
LD1.4 Pursue Byproduct Synergies				
LD2.3 Plan for Long-Term Monitoring and Maintenance				
LD2.4 Plan for end-of-life				
LD3.1 Stimulate Economic Prosperity & Development				
LD3.3 Conduct a Life-Cycle Economic Evaluation				
RA1.1 Support Sustainable Procurement Practices				
RA1.2 Use Recycled Materials				
RA1.3 Reduce Operational Waste				
RA1.4 Reduce Construction Waste				
RA1.5 Balance Earthwork On Site				
RA2.1 Reduce Operational Energy Consumption				
RA2.2 Reduce Construction Energy Consumption				
RA2.3 Use Renewable Energy				
RA2.4 Commission & Monitor Energy Systems				
RA3.2 Reduce Operational Water Consumption				
NW2.1 Reclaim Brownfields				
NW2.2 Manage Stormwater				
NW2.3 Reduce Pesticide & Fertilizer Impacts				
NW2.4 Protect Surface and Groundwater Quality				
NW3.3 Maintain Floodplain Functions				
NW3.4 Control Invasive Species				
NW3.5 Protect Soil Health				
CR1.1 Reduce Net Embodied Carbon				
CR1.2 Reduce Greenhouse Gas Emissions				
CR2.5 Maximize Resilience				
CR2.6 Improve Infrastructure Integration				

1 Criteria for assessment of transition risks (mitigation)

GHG emissions reduction strategies

Four strategies for achieving net zero projects

1. *Energy efficiency*
2. *Electricity decarbonization using renewable energy sources*
3. *Electrification the process of replacing use of fossil fuels with electricity*
4. *Carbon capture and sequestration for the hard-to-electrify portions of systems*

ENVISION CREDITS	CLIMATE TRANSITION RISKS			
	energy efficiency	decarbonization	electrification	carbon capture & storage
QL1.5 Minimize Light Pollution	■			
QL2.2. Encourage Sustainable Transportation		■	■	
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■
RA2.1 Reduce Operational Energy Consumption	■			
RA2.2 Reduce Construction Energy Consumption	■	■	■	
RA2.3 Use Renewable Energy		■	■	
RA2.4 Commission & Monitor Energy Systems	■			
RA3.2 Reduce Operational Water Consumption	■			
NW1.1 Preserve Sites of High Ecological Value				■
NW1.3 Preserve Prime Farmland				■
NW2.3 Reduce Pesticide & Fertilizer Impacts		■		
NW3.1 Enhance Functional Habitats				■
NW3.5 Protect Soil Health				■
CR1.2 Reduce Greenhouse Gas Emissions	■	■	■	■

2/13 credits QUALITY OF LIFE **2**

5/13 credits RESOURCE ALLOCATION **5**

1/9 credits CLIMATE & RESILIENCE **1**

1/11 credits LEADERSHIP **1**

5/13 credits NATURAL WORLD **5**

14 of the 63 credits relate to GHG emission reduction strategies

2 Criteria for assessment of physical risks (adaptation)

Alignment with TCFD recommended disclosures for adaptation

TCFD Recommendations and Supporting Recommended Disclosures			ENVISION
STRATEGY	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	Covered by credits CR2.1-CR2.3
		b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	
		c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Partially covered by credits CR2.4- CR2.6
RISK MANAGEMENT	Disclose how the organization identifies, assesses, and manages climate-related risks	a) Describe the organization's processes for identifying and assessing climate-related risks.	Covered by CR2.1-CR2.3
		b) Describe the organization's processes for managing climate-related risks.	Covered by CR2.4- CR2.6
		c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	Not covered

Envision is **highly aligned** with the TCFD recommendations for physical risk management, however, full alignment requires addressing identified gaps. Envision includes metrics recommended by TCFD, to assess exposure to:

- physical asset risk
- service continuity risk
- resource availability risk (water, materials, land, workforce)
- supply chain continuity risk

Gaps:

- Consideration of climate-related scenarios including a Paris-aligned scenario of 2°C or lower
- Integration of climate risks in overall risk management

2 Criteria for assessment of physical risks (adaptation):

Exposure to climate-related risks

1. *Service continuity risk*
2. *Physical asset risk*
3. *Resource availability risk (water, materials, land, workforce)*
4. *Supply chain continuity risk*

38 of the 63 credits relate to exposure to climate risk

8/13 credits QUALITY OF LIFE **8**

13/13 credits RESOURCE ALLOCATION **13**

8/9 credits CLIMATE & RESILIENCE **8**

6/11 credits LEADERSHIP **6**

13/13 credits NATURAL WORLD **13**

ENVISION CREDITS	CLIMATE PHYSICAL RISKS						
	service continuity	physical asset	resource availability				supply chain continuity
			water	materials	land	workforce	
QL1.3 Improve Construction Safety				■		■	
QL1.4 Minimize Noise and Vibration				■			
QL1.5 Minimize Light Pollution				■			
QL1.6 Minimize Construction Impacts				■		■	
QL2.1 Improve Community Mobility & Access	■			■	■		
QL2.2. Encourage Sustainable Transportation	■			■	■		
QL2.3. Improve Access & Way-finding	■	■		■			
QL3.4 Enhance Public Space and Amenities				■			
LD1.4 Pursue Byproduct Synergies			■	■	■		■
LD2.3 Plan for Long-Term Monitoring and Maintenance	■	■	■	■	■	■	■
LD2.4 Plan for end-of-life			■	■	■		■
LD3.1 Stimulate Economic Prosperity & Development						■	■
LD3.2 Develop Local Skills & Capabilities							■
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■	■	■	■
RA1.1 Support Sustainable Procurement Practices			■	■			■
RA1.2 Use Recycled Materials			■	■			■
RA1.3 Reduce Operational Waste			■		■		
RA1.4 Reduce Construction Waste			■		■		
RA1.5 Balance Earthwork On Site				■			■
RA2.1 Reduce Operational Energy Consumption	■						■
RA2.2 Reduce Construction Energy Consumption						■	
RA2.3 Use Renewable Energy	■						■
RA2.4 Commission & Monitor Energy Systems	■			■			
RA3.1 Preserve Water Resources			■				
RA3.2 Reduce Operational Water Consumption			■				
RA3.3 Reduce Construction Water Consumption			■				
RA3.4 Monitor Water Systems			■				
NW1.1 Preserve Sites of High Ecological Value		■					
NW1.2 Provide Wetland & Surface Water Buffers			■				
NW1.3 Preserve Prime Farmland					■		
NW1.4 Preserve Undeveloped Land					■		
NW2.1 Reclaim Brownfields				■	■		
NW2.2 Manage Stormwater		■	■	■			
NW2.3 Reduce Pesticide & Fertilizer Impacts			■	■	■		■
NW2.4 Protect Surface and Groundwater Quality			■				
NW3.1 Enhance Functional Habitats		■					
NW3.2 Enhance Wetland & Surface Water Functions			■				
NW3.3 Maintain Floodplain Functions	■	■	■	■			■
NW3.4 Control Invasive Species					■		
NW3.5 Protect Soil Health			■	■	■		■
CR1.1 Reduce Net Embodied Carbon				■			■
CR1.2 Reduce Greenhouse Gas Emissions						■	■
CR2.1 Avoid Unsuitable Development		■		■			
CR2.2 Assess Climate Change Vulnerability	■	■	■	■	■	■	■
CR2.3 Evaluate Risk and Resilience	■	■	■	■	■	■	■
CR2.4 Establish Resilience Goals and Strategies	■	■	■	■	■	■	■
CR2.5 Maximize Resilience	■	■	■	■	■	■	■
CR2.6 Improve Infrastructure Integration	■						

Climate opportunities at the project level

The Envision review highlighted
some additional criteria relevant to the project level that **represent climate-related opportunities**

Climate and Resilience

CR2.5 'Maximize Resilience' credit explores project resilience through the 7 core principles (qualities) of resilient systems," as defined by the Rockefeller Foundation's City Resilience Framework

+

Climate physical opportunities:

Core principles of resilient systems

1. **Resource efficient**
2. **Durable**
3. **Adaptable**
4. **Redundant**
5. **Integrated**
6. **Reflective**
7. **Inclusive**

Review based on the high-priority criteria

3 Criteria for assessment of climate physical opportunities

Core principles of resilient systems

1. *Resource efficient (creative use of existing resources)*
2. *Durable (robust, well constructed)*
3. *Adaptable (flexible, changeable)*
4. *Redundant (diverse, fault tolerant)*
5. *Integrated (diverse systems, institutions, people)*
6. *Reflective (learning and improving)*
7. *Inclusive (shared action and responsibilities)*

ENVISION CREDITS	CLIMATE PHYSICAL OPPORTUNITIES						
	resource efficiency	durability	adaptability	redundancy	integration	reflective capability	inclusivity
QL1.1 Improve Community Quality of Life					■	■	■
QL1.4 Minimize Noise and Vibration	■						
QL1.5 Minimize Light Pollution	■						
QL2.1 Improve Community Mobility & Access		■	■	■			
QL2.2. Encourage Sustainable Transportation		■		■			
QL2.3. Improve Access & Wayfinding		■					
QL3.1 Advance Equity and Social Justice							■
LD1.2 Foster Collaboration & Teamwork	■	■	■	■	■	■	■
LD1.3 Provide for Stakeholder Involvement	■	■	■	■	■	■	■
LD1.4 Pursue Byproduct Synergies	■						
LD2.1 Establish a Sustainability Management Plan	■	■	■	■	■	■	
LD2.2 Plan for Sustainable Communities							
LD2.3 Plan for Long-Term Monitoring and Maintenance	■	■	■	■	■	■	
LD2.4 Plan for end-of-life	■	■	■	■			■
LD3.2 Develop Local Skills & Capabilities							■
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■	■	■	■
RA1.1 Support Sustainable Procurement Practices	■						
RA1.2 Use Recycled Materials	■	■					
RA1.3 Reduce Operational Waste	■						
RA1.4 Reduce Construction Waste	■						
RA1.5 Balance Earthwork On Site	■						
RA2.4 Commission & Monitor Energy Systems	■	■	■	■	■	■	
RA3.1 Preserve Water Resources	■						
RA3.2 Reduce Operational Water Consumption	■						
RA3.3 Reduce Construction Water Consumption	■						
RA3.4 Monitor Water Systems	■	■	■	■	■	■	
NW1.1 Preserve Sites of High Ecological Value			■				
NW2.2 Manage Stormwater	■						
NW2.3 Reduce Pesticide & Fertilizer Impacts	■						
NW3.3 Maintain Floodplain Functions	■						
CR1.1 Reduce Net Embodied Carbon	■	■					
CR2.3 Evaluate Risk and Resilience	■	■	■	■	■	■	■
CR2.5 Maximize Resilience	■	■	■	■	■	■	■
CR2.6 Improve Infrastructure Integration	■		■	■	■		

7/13 credits QUALITY OF LIFE **7**

10/13 credits RESOURCE ALLOCATION **10**

4/9 credits CLIMATE & RESILIENCE **4**

9/11 credits LEADERSHIP **9**

4/13 credits NATURAL WORLD **4**

34 of the 63 Envision credits relate to core principles of resilient systems

■ Credits that can potentially address criteria

'HIGH PRIORITY CRITERIA'

1 assessment of transition risks (mitigation)

A. GHG emissions reduction targets & progress against targets (GHG accounting)

B. GHG emissions reduction strategies

2 assessment of physical risks (adaptation)

C. Alignment with TCFD recommended disclosures

D. Exposure to climate-related risks

3 climate physical opportunities

E. Core principles of resilient systems

Envision Credits & High-priority Criteria

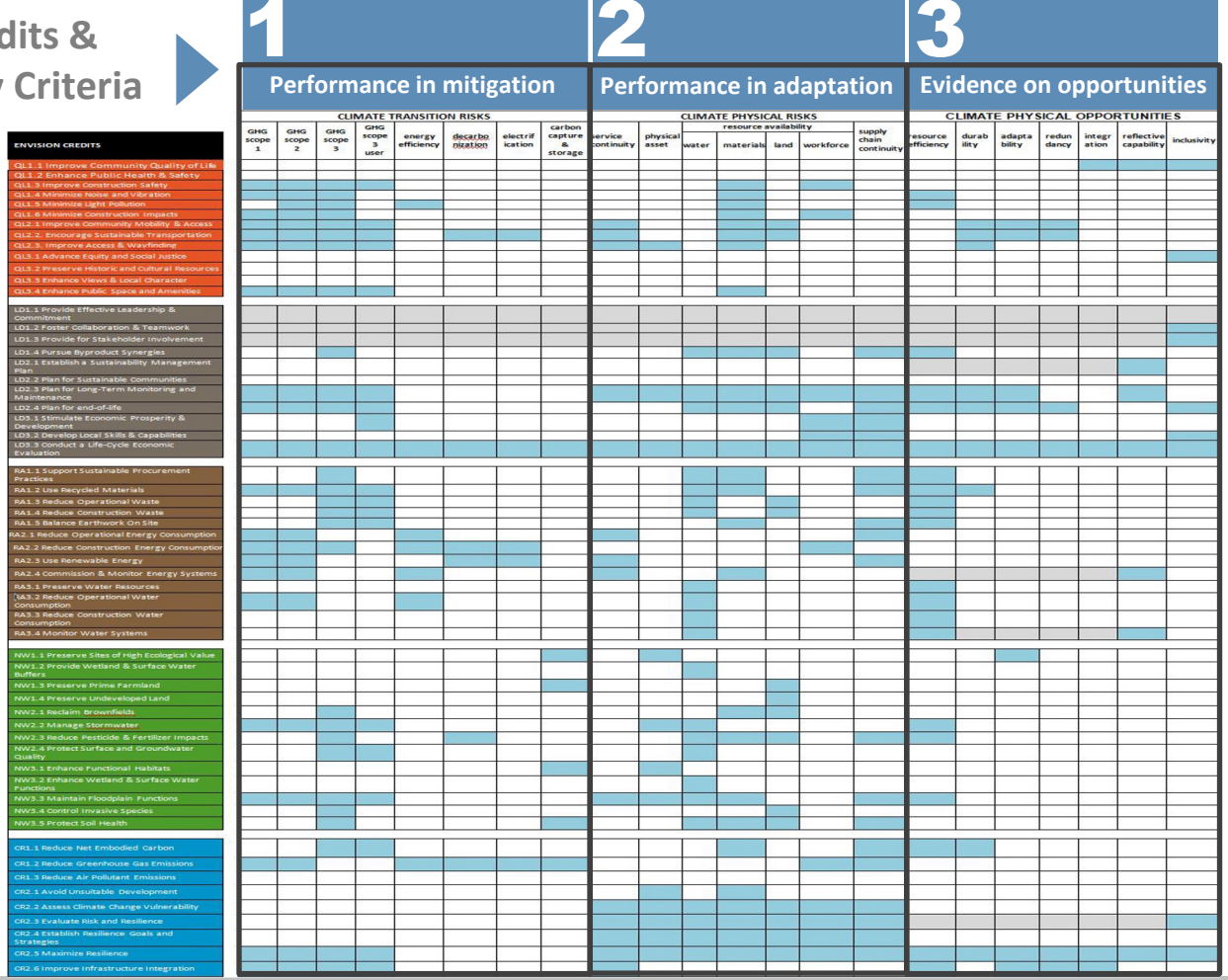
ENVISION

Envision Credits

and their relation to the

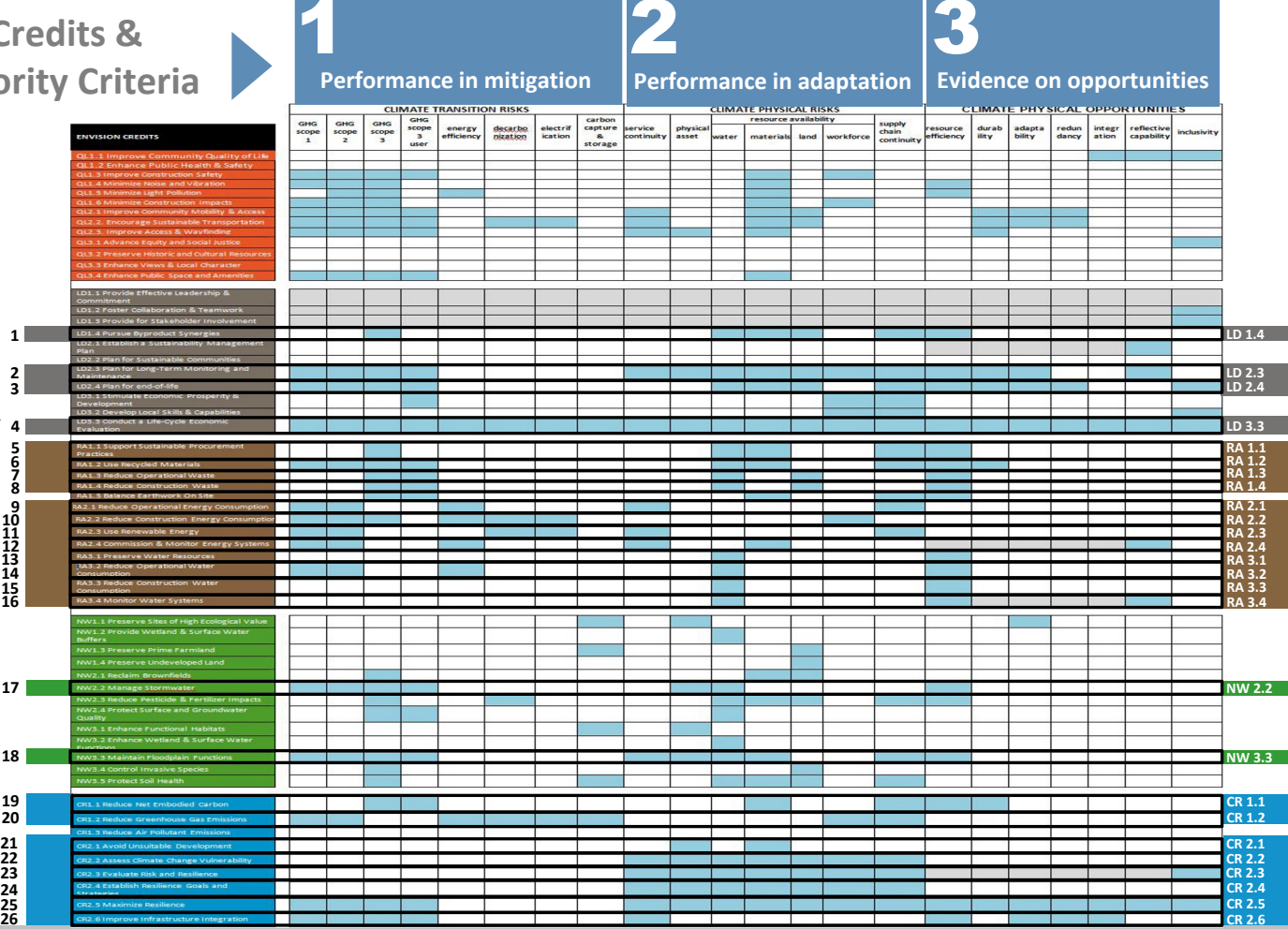
'HIGH PRIORITY CRITERIA'

for assessing climate action.



Priority Credits & High-priority Criteria

26 of the 63 **credits** were identified as **'PRIORITY CREDITS'** because they address **multiple key criteria for climate change mitigation and adaptation** for all types of projects.



26 + 4 Priority Credits

CATEGORY	SUBCATEGORY		CREDIT
LEADERSHIP	Collaboration	1	LD1.4 Pursue Byproduct Synergies
	Planning	2	LD2.3 Plan for Long-Term Monitoring and Maintenance
		3	LD2.4 Plan for end-of-life
	Economy	4	LD3.3 Conduct a Life-Cycle Economic Evaluation
RESOURCE ALLOCATION	Materials	5	RA1.1 Support Sustainable Procurement Practices
		6	RA1.2 Use Recycled Materials
		7	RA1.3 Reduce Operational Waste
		8	RA1.4 Reduce Construction Waste
	Energy	9	RA2.1 Reduce Operational Energy Consumption
		10	RA2.2 Reduce Construction Energy Consumption
		11	RA2.3 Use Renewable Energy
		12	RA2.4 Commission & Monitor Energy Systems
	Water	13	RA3.1 Preserve Water Resources
		14	RA3.2 Reduce Operational Water Consumption
		15	RA3.3 Reduce Construction Water Consumption
		16	RA3.4 Monitor Water Systems
NATURAL WORLD	Conservation	17	NW2.2 Manage Stormwater
	Ecology	18	NW3.3 Maintain Floodplain Functions
CLIMATE & RESILIENCE	Emissions	19	CR1.1 Reduce Net Embodied Carbon
		20	CR1.2 Reduce Greenhouse Gas Emissions
	Resilience	21	CR2.1 Avoid Unsuitable Development
		22	CR2.2 Assess Climate Change Vulnerability
		23	CR2.3 Evaluate Risk and Resilience
		24	CR2.4 Establish Resilience Goals and Strategies
		25	CR2.5 Maximize Resilience
		26	CR2.6 Improve Infrastructure Integration

26 credits from
Leadership
Resource Allocation
Natural World and
Climate & Resilience
can be used for identifying the 'right climate action' projects

+

CATEGORY	SUBCATEGORY		CREDIT
QUALITY OF LIFE	Purpose	1	QL1.6 Minimize Construction Impacts
	Wellbeing	2	QL2.1 Improve Community Mobility
		3	QL2.2 Encourage Sustainable Transportation
		4	QL2.3 Improve Access & Wayfinding

4 credits from
Quality of Life
also cover multiple key criteria for climate change mitigation and adaptation and
serve as priority credits for transportation projects

Scoring of Priority Credits

- **10 of the 26 priority credits** are **among the most highly weighted credits (20-26 points)**
- Impacts during construction are less weighed than impacts during operation, due to the shorter duration of impact

10 of 26 credits

ENVISION CREDITS	SCORE PER LEVEL OF ACHIEVEMENT				
	Improved	Enhanced	Superior	Conserving	Restorative
CR2.3 Evaluate Risk and Resilience	**11**	**18**	**24**	**26**	
CR2.5 Maximize Resilience	**11**	**15**	**20**	**26**	
CR1.2 Reduce Greenhouse Gas Emissions	**8**	**13**	**18**	**22**	**26**
RA2.1 Reduce Operational Energy Consumption	**6**	**12**	**18**	**26**	
RA2.3 Use Renewable Energy	5	10	15	20	**24**
NW2.2 Manage Stormwater	2	4	9	17	**24**
RA3.2 Reduce Operational Water Consumption	4	9	13	17	**22**
CR2.2 Assess Climate Change Vulnerability	8	14	18	20	
CR1.1 Reduce Net Embodied Carbon	5	10	15	20	
CR2.4 Establish Resilience Goals and Strategies		8	14	20	
LD1.4 Pursue Byproduct Synergies	3	6	12	14	18
CR2.6 Improve Infrastructure Integration	2	5	9	13	18
RA1.4 Reduce Construction Waste	4	7	10	16	
RA1.2 Use Recycled Materials	4	6	9	16	
CR2.1 Avoid Unsuitable Development	3	6	8	12	16
LD3.3 Conduct a Life-Cycle Economic Evaluation	5	7	10	12	14
RA1.3 Reduce Operational Waste	4	7	10	14	
RA2.4 Commission & Monitor Energy Systems	3	6	12	14	
LD2.4 Plan for end-of-life	2	5	8	14	
NW3.3 Maintain Floodplain Functions	1	3	7	11	14
RA1.1 Support Sustainable Procurement Practices	3	6	9	12	
RA3.1 Preserve Water Resources	3	5	7	9	12
LD2.3 Plan for Long-Term Monitoring and Maintenance	2	5	8	12	
RA2.2 Reduce Construction Energy Consumption	1	4	8	12	
RA3.4 Monitor Water Systems	1	3	6	12	
RA3.3 Reduce Construction Water Consumption	1	3	5	8	

Envision Review

(completed)

Envision review based on identified high-priority criteria for climate action

Linked **Envision credits** with the **criteria for climate change performance** and highlighted certain credits that address multiple criteria at a time,

the 'Envision Priority Credits'

Priority credits - Gaps and Recommendations

	CRITERIA	Risk type	IDENTIFIED GAPS	RECOMMENDATIONS
1. PERFORMANCE IN MITIGATION	A. GHG emissions reduction targets & progress against targets (GHG accounting)	Scope 1 & 2 GHG emissions	Where are construction-related scope 1 & 2 emissions reported?	For RA2.2 credit Request the overall reduction of scope 1&2 emissions during construction result of the implemented strategies
		Scope 1 & 2 GHG emissions	Where are maintenance-related scope 1 & 2 emissions reported?	For LD2.3 credit Request an estimate of the overall reduction of scope 1&2 emissions during the expected minor and major rehabilitation works over the project's estimated service life
		User-related scope 3 emissions	User-related scope 3 emissions are not accounted as part of the Envision assessment.	In credits QL2.1, QL2.2 and QL2.3 Consideration of extending Envision's boundary of assessment to account for end-user's scope 3 emissions, particularly in the case of transportation projects
			User-related scope 3 emissions are also produced during construction & maintenance stages	For Credits QL1.6 and LD2.3 Consider if requesting estimations of end-user's scope 3 emissions due to construction works -related closures, detouring, or avoided end-user's scope 3 emissions through accelerated construction duration etc.
	B. GHG emissions reduction strategies in credits	Energy efficiency	-	Revisit 'targets' in evaluation criteria in credits RA2.1 and RA2.2
		De-carbonization of electricity through use of renewable energy sources	The management of renewables production capacity risk.	RA2.3 credit could account for the risk of renewable energy production and request evidence on risk management such as provision of energy storage solutions.
		Electrification	-	-
		Carbon Capture & storage	Carbon capture & storage	Envision could refer more on carbon removal and request more information on the adopted carbon-removal approaches both for operations and construction.
2. PERFORMANCE IN ADAPTATION	C. Envision's alignment with TCFD disclosures	Risk Evaluation process	Reference to physical risk scenarios and associated time horizon(s) considered.	Envision should request reference to physical risk scenarios for anticipated physical impacts in the project's specific locality in higher or lower temperature limits, as part of climate-related risk evaluation.
		Risk management process	Assessment of how infrastructure companies' processes for identifying, assessing, and managing climate-related risks are integrated into their overall risk management.	guide projects teams to integrate climate change risk into their overall risk management plans, such as Safety and Security management plans or Health and Safety Plans, Risk assessments.
3. EVIDENCE ON CLIMATE OPPORTUNITIES	E. Core principles of resilient systems	1. Resource efficiency (materials) 2. Durability	Use of substitute materials	In the Resource Allocation category, Envision apart from suggesting recycled-content materials as alternative to the of use primary resources should assess the use of innovative resources such as substitute materials
		1. Resource efficiency (materials) 2. Durability 3. Adaptability	Credit LD1.4 'Pursue Byproduct synergies' presents the potential of resource efficiencies; however, circularity can potentially present more opportunities.	Credit LD1.4 could make reference to materials passport as an opportunity for a company to identify the value of its own excess materials and/or identify opportunities in the excess materials of other companies.
		1. Durability	Provide more examples of strategies that contribute to durability quality as guidance for project teams.	Examples of strategies that could be added for increased durability(1)Use of materials with crack healing properties(2)Improved construction quality through increased use of prefabrication, modular assembly, and offsite construction(3)Use of intelligent construction systems (4) Pre-stressed concrete slab technology
			Enhancing durability definition within credit CR2.5 'Maximize Resilience'	Durability also includes resistance to extreme heat waves, increased anti-corrosion protection due to increased flooding.(e.g. materials that withstand extreme weather conditions)

Priority credits - Gaps and Recommendations

1. Align terms (direct/indirect emissions and embodied carbon) **with the GHG protocol classification Scope 1, 2, and 3 GHG emissions**
2. Envision could request evidence on commitment to GHG emissions targets that are in line with the goals of the Paris Agreement (well below 2°C and 1.5°C) and net-zero emissions before 2050
3. Incorporate **transition risk as part of climate-related risk** assessment and management, along with physical risk
4. **Consider TCFD suggestions for use of various transition and physical scenario analysis** for an appropriate evaluation of the climate-related impacts in a project
5. **Revisit 'targets' in evaluation criteria in credits RA2.1, RA2.2 & RA2.3** for operational & construction energy consumption, percentage of renewables
6. **Update examples of potential project strategies** to reflect active areas of research, such as **on substitute materials** and technologies to optimize recycled-content material properties, etc.
7. Given the core role of innovation in achieving the aggressive GHG reduction targets –necessary for transition to a low-carbon paradigm–**should Envision incorporate innovation in its guidance and requirements within relevant credits** (in Resource Allocation and Climate & Resilience) to underline their significance and **not as 'bonus points' in innovation credits?**

Use of Case studies

Use of Envision® verified projects as case studies

Links **specific project strategies** with **high-priority criteria** and provides **examples** of how these criteria can be met **at a project level**

The California High-Speed Rail Phase 1

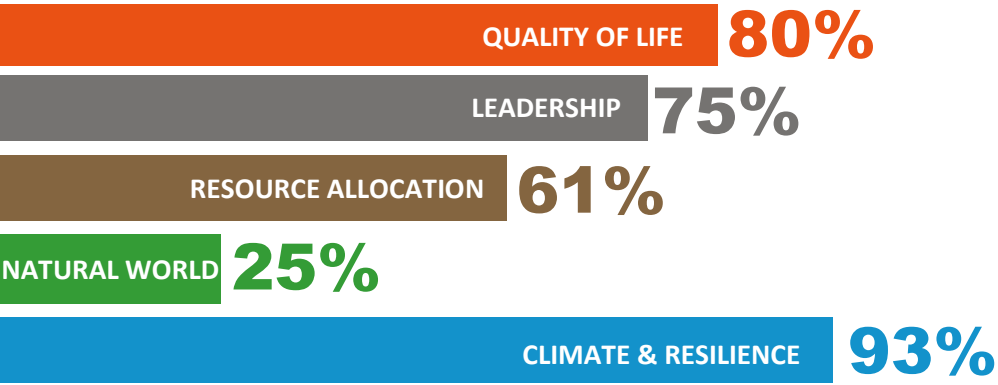
CALIFORNIA
High-Speed Rail Authority

The 520 mile (837 km) San Francisco/Merced – Los Angeles/Anaheim section

The California High Speed Rail (CHSR), Phase 1

- **An Envision Platinum award project**
- **An exemplary climate change mitigation project**
- **The largest scale project ever been rated by Envision**

Project score by Envision Category



Alignment and contribution to California's climate action targets

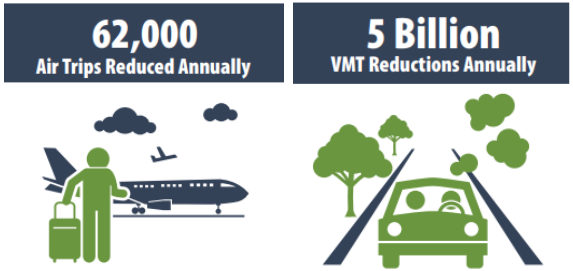
The high-speed rail project is part of California's climate targets

- **decarbonization of the transportation sector, and**
- **a net-zero emission mobility system before 2050**

Highlights of CHSR project GHG emission reduction targets

Up to 102,000,000 $MTCO_2e$ GHG emissions to be reduced,

because of **mode shift** from automobiles and planes to electrified high-speed rail



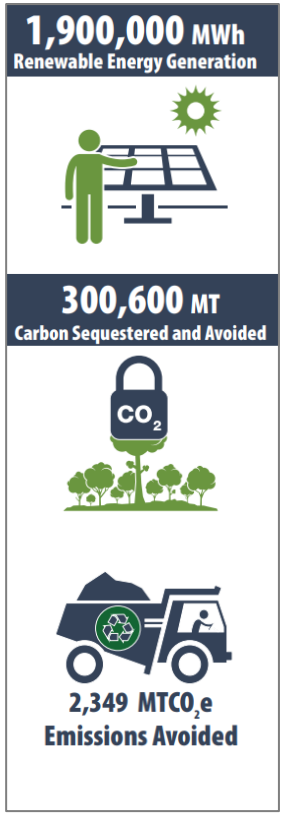
VMT: Vehicles Miles Traveled

GHG EMISSIONS BY SCOPE: 2015-2079

	INDIRECT - Upstream		DIRECT - System	INDIRECT - Downstream and Avoided Emissions	
CONSTRUCTION	Scope 3 **SUPPLY CHAIN** Sustainable procurement requirements and baseline setting	Scope 3 **CONTRACTOR FLEET** Mobile equipment emissions during rail construction: .52 $MMTCO_2e$* **to be revised with draft EIR data.*	Scope 1 Zero Emissions **AUTHORITY RAIL DEVELOPMENT** Net-zero direct emissions from rail construction	Scope 3 **DISPOSAL/ RECYCLING** 146,200 $MTCO_2e$ avoided emissions through recycling and reuse to date	OFFSET/AVOIDED EMISSIONS **TREE PLANTING** 143,000 $MTCO_2e$ program balancing fuel-based emissions from construction: .52 $MMTCO_2e$ target
OPERATIONS	Scope 3 **SUPPLY CHAIN** Sustainable procurement of rolling stock and operations supply	Scope 2 **RENEWABLE POWER** 100% renewable power for train operations	Scope 1 Zero Emissions **AUTHORITY RAIL OPERATIONS** Zero emissions generated from electric powered operations	OFFSET/AVOIDED EMISSIONS CO_2 83-102 $MMTCO_2e$ **VMT + AIRTRIPS SAVED** 83-102 $MMTCO_2e$ avoided from vehicle and shorthaul airtrips	OFFSET/AVOIDED EMISSIONS CO_2 **ADDITIONAL SAVINGS** Savings from Compact Land Use

source: High-speed Rail Authority, 2021 Sustainability Report

Highlights of CHSR project GHG emission reduction strategies



- **Zero emission operations** - 100% powered by electricity generated from renewables
- **Net-zero emission construction** through reducing tailpipe GHG emissions and offsetting the remaining emissions through carbon capture
- **Reduced scope 3 emissions** through optimized design, material sourcing and 95% recycling of construction waste

source: High-speed Rail Authority, 2021 Sustainability Report

CHSR Project Strategies & High-Priority Criteria

CLIMATE-RELATED PROJECT STRATEGIES	CLIMATE TRANSITION RISKS								CLIMATE PHYSICAL RISKS							CLIMATE PHYSICAL OPPORTUNITIES						
	GHG emissions reduction targets & progress against targets				GHG emissions reduction strategies				Service Continuity	Physical Asset	Resource availability				Supply chain continuity	Resource Efficiency	Durability	Adaptability	Redundancy	Integration	Reflective Capability	Inclusivity
	GHG Scope 1	GHG Scope 2	GHG Scope 3	GHG Scope 3 user	Energy Efficiency	Decarbonization	Electrification	Carbon Capture & Storage			Water	Materials	Land	Workforce								
LIFECYCLE GHG EMISSIONS REDUCTION																						
Avoided emissions through modal shift from airplane and car travel to high-speed rail				■			■												■			
Decarbonization Strategies																						
100% decarbonization of project electricity needs through renewable energy generation (on site & from CA)		■				■																
Mitigation of renewable energy production risk through battery electric storage		■				■			■						■			■	■			
Promoting zero emission vehicles through collaboration with state partners to streamline electric-vehicle charging & hydrogen-fueling infrastructure at rail stations.				■		■														■		■
Electrification strategies																						
100% electric fleet	■						■															
Electrification of the Caltrain line committing $713 million of funding & replacing 75% of Caltrain's diesel service.	■						■															
Carbon Sequestration Strategies																						
Partnership with the Department of Conservation (DOC) for the Agricultural Land Mitigation Program (ALMP).								■					■									■
Partnership with the Department of Conservation (DOC) for the California Farmland Conservancy Program (CFCP).								■					■									■
Reforestation efforts through partnership with the California Department of Forestry & Fire Protection for the Urban Forestry program.								■					■									■
Construction Emissions Reduction Strategies																						
Minimizing GHG emissions through design requirements	■	■	■														■					
Net-zero tailpipe GHG emissions through carbon sequestration			■					■														
Requiring Environmental Product Declarations (EPD) for construction materials			■								■				■							■
Requiring performance thresholds for global warming potential for major materials			■																			
Adapting existing structures and facilities for reuse whenever feasible			■									■				■	■	■				
Tracking, Reporting & Mitigating Construction Emissions	■	■	■																		■	
Energy efficiency Strategies																						
Net-zero energy facilities (stations)		■			■																	
Energy efficient offices		■			■																	
Monitoring fuels & electricity consumed during construction	■	■	■		■																■	

CHSR project score at priority credits

CATEGORY	SUBCATEGORY		PRIORITY CREDITS (ENVISION VERSION 3)	MAXIMUM CREDIT SCORE	CHSR PROJECT SCORE	
LEADERSHIP	Collaboration	1	LD1.4 Pursue Byproduct Synergies	18	N/A*	
	Planning	2	LD2.3 Plan for Long-Term Monitoring and Maintenance	12	N/A	
		3	LD2.4 Plan for end-of-life	14	N/A	
	Economy	4	LD3.3 Conduct a Life-Cycle Economic Evaluation	14	N/A	
RESOURCE ALLOCATION	Materials	5	RA1.1 Support Sustainable Procurement Practices	12	N/A	
		6	RA1.2 Use Recycled Materials	16	N/A	
		7	RA1.3 Reduce Operational Waste	14	N/A	
		8	RA1.4 Reduce Construction Waste	16	N/A	
	Energy	9	RA2.1 Reduce Operational Energy Consumption	26	N/A	
		10	RA2.2 Reduce Construction Energy Consumption	12	N/A	
		11	RA2.3 Use Renewable Energy	24	N/A	
		12	RA2.4 Commission & Monitor Energy Systems	14	N/A	
	Water	13	RA3.1 Preserve Water Resources	12	N/A	
		14	RA3.2 Reduce Operational Water Consumption	22	N/A	
		15	RA3.3 Reduce Construction Water Consumption	8	N/A	
		16	RA3.4 Monitor Water Systems	12	N/A	
NATURAL WORLD	Conservation	17	NW2.2 Manage Stormwater	24	N/A	
	Ecology	18	NW3.3 Maintain Floodplain Functions	14	N/A	
CLIMATE & RESILIENCE	Emissions	19	CR1.1 Reduce Net Embodied Carbon	20	10	
		20	CR1.2 Reduce Greenhouse Gas Emissions	26	26	Highest possible score
	Resilience	21	CR2.1 Avoid Unsuitable Development	16	6	
		22	CR2.2 Assess Climate Change Vulnerability	20	20	Highest possible score
		23	CR2.3 Evaluate Risk and Resilience	26	24	
		24	CR2.4 Establish Resilience Goals and Strategies	20	20	Highest possible score
		25	CR2.5 Maximize Resilience	26	26	Highest possible score
		26	CR2.6 Improve Infrastructure Integration	18	18	Highest possible score
QUALITY OF LIFE	Purpose	+	QL1.6 Minimize Construction Impacts	8	N/A	
	Wellbeing	+	QL2.1 Improve Community Mobility	14	N/A	
		+	QL2.2 Encourage Sustainable Transportation	16	N/A	
		+	QL2.3 Improve Access & Wayfinding	14	N/A	

CHSR achieved the highest possible score in 5 of the 8 Climate & Resilience priority credits

Moreover, the project achieved the **maximum bonus points** (10 pts) in the CR Innovation credit

* Scores per credit are not available to the research team for the other categories

Selected Projects Scores of Envision Priority Credits (version 2*)

					WATER PROJECTS		ENERGY PROJECTS			TRANSPORTATION PROJECTS	
CATEGORY	SUBCATEGORY		PRIORITY CREDITS (ENVISION VERSION 2)	MAXIMUM CREDIT SCORE	Santa Monica Clean Beaches	TIWRP	Dubuque Solar Park	English Farms Wind	Hyperion DGUP	Gordie Howe Bridge	Garage Côte-Vertu
LEADERSHIP	management	1	LD2.1 Pursue By-Product Synergy Opportunities	15	0	0	0	3	15	0	15
		2	LD2.2 Improve Infrastructure Integration	16	16	7	1	3	3	16	16
	planning	3	LD3.1 Plan for Long-Term Monitoring and Maintenance	10	10	10	10	10	10	10	10
		4	LD3.3 Extend Useful Life	12	3	12	3	12	6	12	12
RESOURCE ALLOCATION	materials	5	RA1.1 Reduce Net Embodied Energy	18	0	0	0	2	0	0	6
		6	RA1.2 Support Sustainable Procurement Practices	9	3	0	6	3	3	2	9
		7	RA1.3 Use Recycled Materials	14	2	0	0	5	0	5	5
		8	RA1.4 Use Regional Materials	10	10	0	10	10	10	3	6
		9	RA1.5 Divert Waste From landfills	11	8	11	N/A	0	N/A	N/A	8
		10	RA1.7 Provide for Deconstruction and Recycling	12	1	8	8	4	0	0	0
	energy	11	RA2.1 Reduce Energy Consumption	18	18	0	18	3	0	7	7
		12	RA2.2 Use Renewable Energy	20	0	6	20	20	16	0	16
		13	RA2.3 Commission & Monitor Energy Systems	11	11	3	11	11	11	11	0
	water	14	RA3.1 Protect Fresh Water Availability	21	21	21	N/A	2	17	N/A	21
		15	RA3.2 Reduce Potable Water Consumption	21	9	21	N/A	13	17	17	17
		16	RA3.3 Monitor Water Systems	11	6	11	N/A	0	11	N/A	3
NATURAL WORLD	siting	17	NW1.4 Avoid Adverse Geology	5	3	3	5	N/A	3	3	1
		18	NW1.5 Preserve Floodplain Functions	14	5	N/A	5	5	N/A	2	N/A
		19	NW1.6 Avoid unsuitable Development on Steep Slopes	6	N/A	N/A	N/A	N/A	N/A	1	N/A
	Land & water	20	NW2.1 Manage Stormwater	21	21	21	0	21	21	21	9
CLIMATE & RISK	emissions	21	CR1.1 Reduce Greenhouse Gas Emissions	25	0	0	13	21	0	0	7
	resilience	22	CR2.1 Assess Climate Threat	15	15	15	15	15	15	15	15
		23	CR2.2 Avoid traps and Vulnerabilities	20	6	16	16	6	16	20	0
		24	CR2.3 Prepare for Long-Term Adaptability	20	16	16	16	16	16	20	16
		25	CR2.4 Prepare for Short-Term Hazards	21	3	17	21	17	0	21	17
		26	CR2.5 Manage Heat Island Effects	6	0	4	0	6	6	0	4
QUALITY OF LIFE	wellbeing	+	QL2.4 Improve Community Mobility and Access	14	0	1	4	4	4	14	14
		+	QL2.5 Encourage Alternative Modes of Transportation	15	3	0	12	N/A	0	15	15
		+	QL2.6 Improve Site Accessibility, Safety and Wayfinding	15	0	3	6	0	3	15	12
					50%.	56%	57%	58%	56%	60%.	64%

* The priority credits have been adapted for Envision V2 since many projects used as case studies have been verified with this version

Note: QL Envision priority credits are considered only for transportation projects

Climate – Biodiversity Nexus

(on-going research)

Climate Change

completed

1. Literature review
2. Analysis of ESG (Environmental, Social & Governance) reporting
3. Analysis of TCFD (Task Force on Climate-related Financial Disclosures)

Climate – Biodiversity

in progress

1. Literature review
2. Analysis of Ecosystem service-based assessment and accounting frameworks and their classification systems
3. Analysis of ESG and TNFD (Taskforce on Nature-related Financial Disclosures)

High-Priority Criteria for CLIMATE ACTION*

&

High-Priority Criteria for BIODIVERSITY ACTION

are used for

applied & tested

* Based on the literature review, the analysis of TCFD and selected ESG systems

Envision Review

completed for climate action,
in progress for climate-biodiversity

The high-priority criteria for integrated climate change & biodiversity action are used for a review of Envision to identify Envision priority credits and identify gaps

Use of Case Studies

in progress

The high-priority criteria for integrated climate change & biodiversity action are applied and tested on selected Envision verified projects to assess the project performance on climate & biodiversity

Setting Biodiversity Targets

1988 — **ipcc** Inter-governmental Panel on Climate Change

1992 — United Nations Framework Convention on Climate Change (UNFCCC)

1992 — Convention on Biological Diversity / CBD secretariat under UNEP (CBD)

2000 — **Cartagena Protocol** on Biosafety. CBD supplementary agreement.

2000 — MDGs

2005 — **Millennium Ecosystem Assessment (MA)**

2010 — COP10/MOP5 AICHI-NAGOYA JAPAN 2010

2010 — **2010 International Year of Biodiversity**

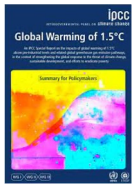
2011 - 2020 — **UN DECADE ON BIODIVERSITY**
Strategic Plan for Biodiversity & the **Aichi Biodiversity Targets**

2012 — **ipbes** Inter-governmental Science-Policy Platform on Biodiversity & Ecosystem Services

2015 — PARIS2015 UN CLIMATE CHANGE CONFERENCE COP21·CMP11

2015 — SDGs SUSTAINABLE DEVELOPMENT GOALS AGENDA 2030

2018 — **ipcc** **Special Report (SR1.5)** **net zero CO_2 emissions by 2050**



2018 — **ipbes** The Global Assessment Report on Biodiversity and Ecosystem Services

2019 — **ipbes** **Global Assessment report** on biodiversity & ecosystem services

2020 — Global Biodiversity Outlook 5

2020 — **5th Global Biodiversity Outlook** The flagship publication of the CBD

2020 — GLOBAL BIODIVERSITY FRAMEWORK

2020 — **Post-2020 Global Biodiversity Framework** (builds on the Strategic Plan for Biodiversity 2011-2020)

2021 — ipbes ipcc workshop Biodiversity & Climate Change

2021 — 2020 UN BIODIVERSITY CONFERENCE
COP 15 - CP/MOP10 - NP/MOP4
Ecological Civilization-Building a Shared Future for All Life on Earth
KUNMING · CHINA

2021 — **PART 1**

2021 — **ipcc** **6th Report (AR6)** material for UNFCCC COP26

2021 — **UNFCCC COP26** the Paris Agreement first major test

2021 — COP26 UN CLIMATE CHANGE CONFERENCE UK 2021

2022 — **PART 2**

2022 — CBD Parties' second round of negotiations towards **the adoption of the new and transformative global deal to halt biodiversity loss by 2030 "the Post-2020 Global Biodiversity Framework"**

2021 - 2030 — UN DECADE ON ECOSYSTEM RESTORATION 2021-2030

Call for integrated climate-biodiversity action

“There is no climate solution without the full contribution of nature.”

Nature can provide **about one-third of the** mitigation to meet the goal of the Paris climate agreement.

> Campaign for Nature. “COP26: A Chance to Address the Interconnected Crises of Climate Change and Biodiversity Loss”

	Climate Change	Biodiversity
Global scale issues integral to sustainable development recognized as crises	An issue of global attention as a top global threat	Awareness of biodiversity loss as a threat is gaining global momentum; recognized as one of top global threats.
International Conventions & COPs	United Nations Framework Convention on Climate Change	Convention on Biological Diversity / CBD secretariat under UNEP
Intergovernmental panels which assesses available knowledge	**Inter-governmental Panel on Climate Change**	**Inter- governmental Science-Policy Platform on Biodiversity & Ecosystem Services**
Development of national plans under commitment to Convention agreements	Nationally Determined Contributions (NDCs) and long-term strategies (LTS)	National Biodiversity Strategies and Action Plans (NBSAPs)
Time-bound goals: 2030, 2050 critical years	**Limit global warming to 1.5° C by 2030** **Net zero emissions by 2050** for climate action	**Nature positive by 2030** to halt and reverse biodiversity loss **'living in harmony with nature'** by 2050
Integration in ESG Reporting		On-going update of ESG systems' biodiversity-related disclosures
Taskforces established to develop guidance for businesses	TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES	TNFD Taskforce on Nature-related Financial Disclosures

	Climate Change	Biodiversity
Indicators / Metrics	GHG emissions are used as a universally agreed indicator, a meaningful metric to demonstrate exposure to risks.	• standardized indicators do not exist yet. • location-specific data from corporations will be required. • difficult to select a shortlist of useful and feasible indicators to monitor everywhere.

A common comment is the challenge of measuring biodiversity as compared to climate change.

"When it comes to data, metrics and methodologies,
there are critical differences between climate and nature.
Unlike climate, it is **not just your activities that matter**
but also **where the activities are**."

Craig, D. (September 2021). "Expanding the E in ESG"

(a) **Sustainability and Lifecycle Assessment**

(a.1) “Integrating Sustainability and LCA: Pilot Application on transportation infrastructure projects.” in collaboration with the National Research Council of Canada (NRCC) and with the contribution of the Ontario Ministry of Transportation (MTO’s) West Region.

(a.2) The Sustainability Lifecycle Tool (in Excel)

(a.3) Bayfield River Bridge Replacement project Envision Pre-assessment using the Envision Checklist. A project of the MTO’s West Region served as a case study for the research.

(b) **Sustainability Project Indicators and ESG Systems**

(b.1) Pollalis S.N., E. Chatzistavrou and O. Tzioti (April 2021). “Mapping of the Aligned Indicators for Sustainable Infrastructure (AISI) against Established ESG Systems.” Report developed for the Public-Private Infrastructure Advisory Facility (PPIAF) of the World Bank.

(c) **On Climate Change Action**

(c.1) Pollalis, S.N., E. Chatzistavrou, A. Kouveli (January 2021). "2020-2021 Zofnass Program Research Framework."

(c.2) Pollalis, S.N., E. Chatzistavrou, A. Kouveli, E. Marinou, J. Rodriguez and O. Tzioti (June 2021). "Assessment of projects for (a) mitigation and adaptation to climate change, and (b) attractiveness to investments"

(d) **Integrated Climate Change- Biodiversity Action**

(d.1) "2021-2022 Research Framework of the assessment of projects for (i) integrated climate-biodiversity action and (ii) attractiveness to investments"

(d.2) Pollalis, S.N., E. Chatzistavrou, A. Kouveli, E. Marinou, J. Rodriguez and O. Tzioti (March 2022). "Assessment of projects for (a) integrated climate-biodiversity action and (b) attractiveness to investments" Interim Report.

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