

# A summary of business impacts of climate change

Altered weather patterns with more frequent & severe extremes of flood; drought; cyclone intensity; heat.

- Increased business interruption across company operations & supply chains with consequence for asset values, revenues and input costs
- Potential to impact compliance with regulation and service standards

Physical Impacts

An evolving patchwork of compliance requirements, at international, national and state level around the world, for GHG/climate.

- Risk of fines for non-compliance
- Difficulties in securing social licence to operate for operations with highest GHG emissions

Regulatory Compliance

Product and Market

National policies to deliver low carbon economies, such as carbon tax / trading and subsidy reform.

- Increased costs and reduced market demand for providers of high carbon commodities
- Increased demand for energy-efficient, lower carbon energy (e.g. renewables and gas)
- Impact on availability of finance

Brand and Reputation

Growing expectations for responsible conduct on climate change from investors, customers, lenders, host countries.

- Failure to meet these leads to a loss of trust and confidence
- Proactive leadership enhances reputation, brand value, influence and opportunities to partner and secure investment etc.

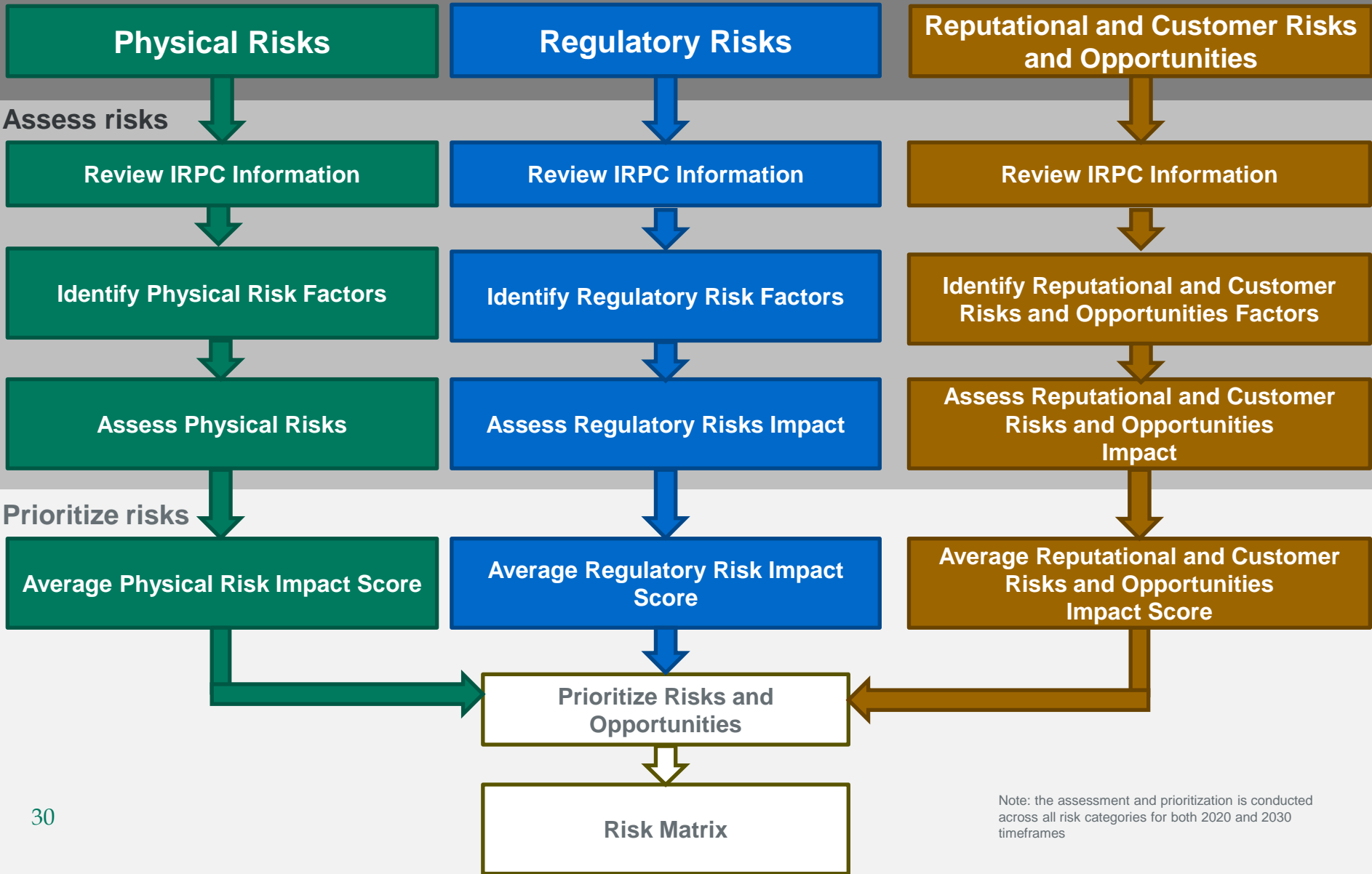
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# Analysis and Results



# Overview risks and opportunities process

Review research and IRPC information



Note: the assessment and prioritization is conducted across all risk categories for both 2020 and 2030 timeframes

# Assessment: physical and regulatory

*Physical climate change risk assessment is more meaningful when examining impacts to IRPC operations (people, assets, and supply chain) against core physical risk factors (increased weather extremes, flooding, drought, increased mean temperature, sea level rise)*

Physical	People (employees, communities)	Assets (operations, buildings, infrastructure)	Supply Chain
Increased weather extremes			
Flooding			
Drought			
Increased mean temperature			
Sea level rise			

Regulatory	Are IRPC facilities covered or likely to be covered?	Potential financial impacts
Carbon Tax		
Cap-and-Trade		
Renewable Policy/Targets		



# Assessment: reputational and consumer/market

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Reputational Risk Factors	Perception as sustainability leader/laggard within industry	Climate change mitigation activities
Public and media		
Community		
Investor		
Customer		

Customer Risk Factors	Labelling regulations and standards	Changing customer behavior
Petroleum Business		
Petrochemical Business		



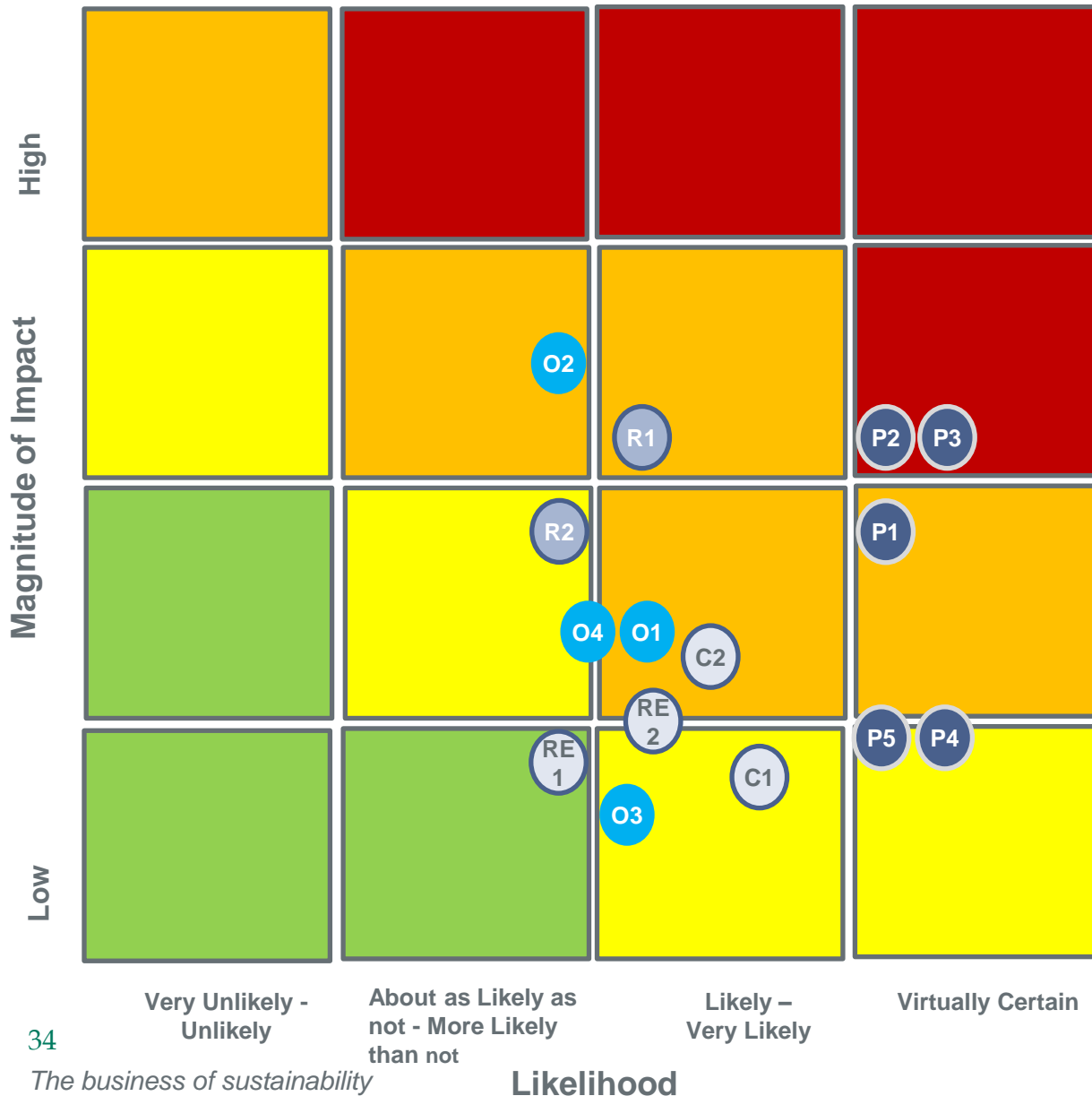
# Risk matrix

Prioritize risks and opportunities in the risk matrix for year 2020 and 2030 by using

- I. Risk and opportunities impact score of each risk and opportunities factors and,
- II. Risk likelihood criteria

Risk Criteria: Likelihood				
	4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Probability of occurrence	≥ 50%	50% > prob. ≥ 20%	20% > prob. ≥ 5%	< 5%
Past Incidents	Risk is always imminent in work and operation	Risk is imminent several times in work and operation	Risk is occasional in work and operation	No chance of risk in work and operation
Procedure	Working procedure is complex with minimal review and control than expected	Working procedure is complex with moderate review and control than expected	Working procedure is not complex with reasonable review and control	Working procedure is simplistic with small chance of errors due to rigorous control
Period	Incidents of risk in the past 2 years ( $x \leq T-2$ )	No incidents of risk in the past 2 years ( $T-2 < x \leq T-5$ )	No incidents of risk in the past 5 years ( $T-5 < x \leq T-20$ )	No incidents of risk in the past 20 years ( $x > T-20$ )

# Risk & opportunity matrix-2020 IRPC



- Physical Risks**
- P1 Increased Weather Extremes
  - P2 Flooding
  - P3 Droughts
  - P4 Increased Mean Temperature
  - P5 Sea Level Rise

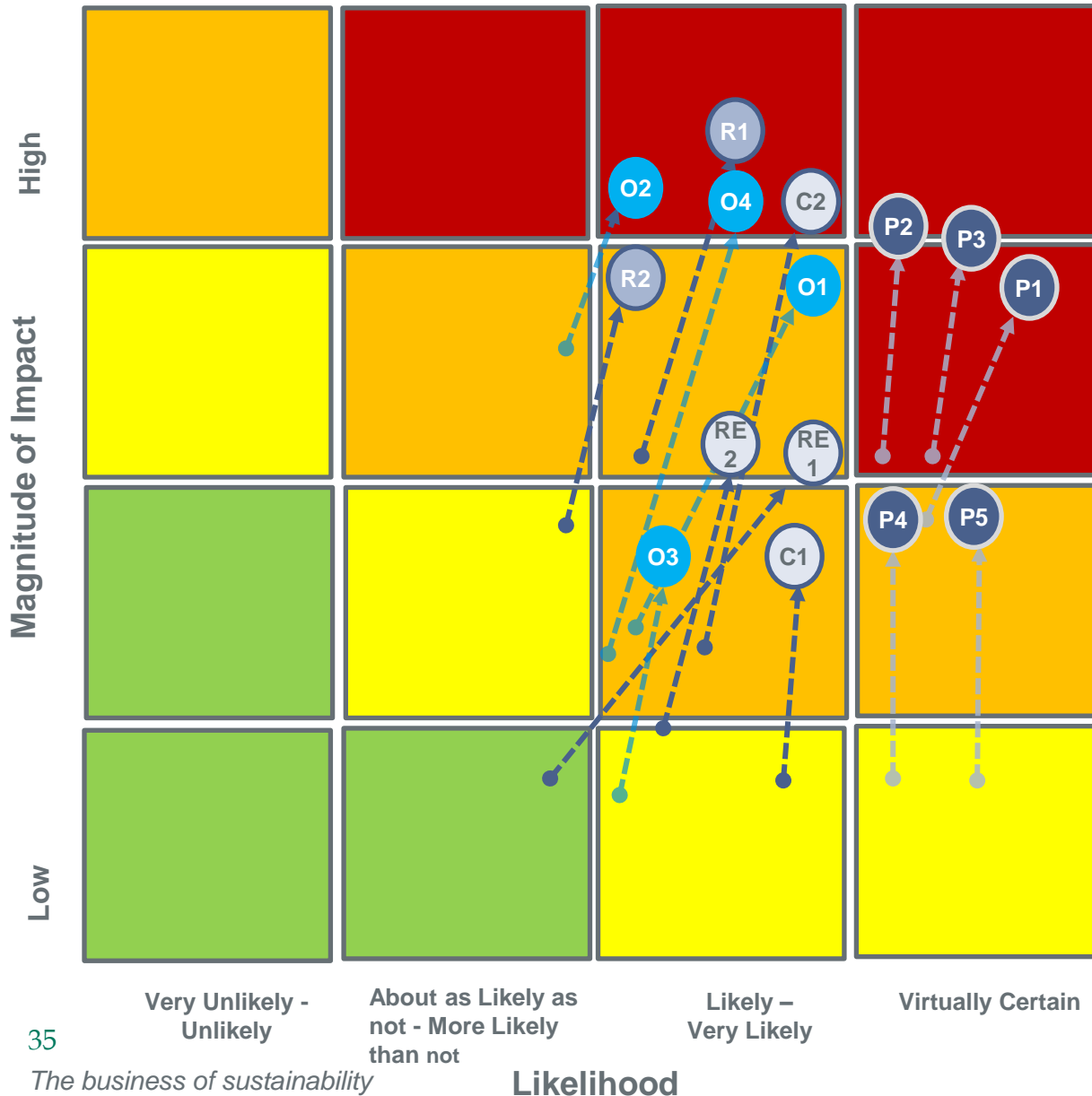
- Regulatory Risks**
- R1 Cap & Trade
  - R2 Carbon Tax

- Reputational Risks**
- RE1 Perception within Industry
  - RE2 Climate Change Mitigation Activities

- Customer Risks**
- C1 Labeling Regulations and Standards
  - C2 Changing Customer Behavior

- Opportunities**
- O1 Perception as Sustainability Leader/Laggard within Industry
  - O2 Climate Change Mitigation Activities
  - O3 Labeling Regulatory and Standards
  - O4 Changing Customer Behavior

# Risk & opportunity matrix-2030 IRPC



- Physical Risks**
- P1 Increased Weather Extremes
  - P2 Flooding
  - P3 Droughts
  - P4 Increased Mean Temperature
  - P5 Sea Level Rise

- Regulatory Risks**
- R1 Cap & Trade
  - R2 Carbon Tax

- Reputational Risks**
- RE1 Perception within Industry
  - RE2 Climate Change Mitigation Activities

- Customer Risks**
- C1 Labeling Regulations and Standards
  - C2 Changing Customer Behavior

- Opportunities**
- O1 Perception as Sustainability Leader/Laggard within Industry
  - O2 Climate Change Mitigation Activities
  - O3 Labeling Regulatory and Standards
  - O4 Changing Customer Behavior



# Conclusion IRPC risks and opportunities-2020

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- Physical risk events are listed in the virtually certain column as the scientific consensus on climate change and its physical impact correlations are well-documented. The level of impact to IRPC varies, with droughts and flooding presenting more near term risk than extreme weather events, rising sea levels and increased mean temperature.
- Regulatory risk are less certain (carbon tax=as likely as not; cap-and-trade= likely). The projected impacts to IRPC are moderate by 2020 assuming a relatively soft carbon price introduction to carbon markets in Thailand.
- Customer risks/opportunities are all listed as moderate level of likelihood and low to moderate impact to IRPC. Given the integration and ownership structure of IRPC, ERM does not project significant customer risk, but does see overall market risk beginning to be a factor.
- Industry and other stakeholder reputational risks/opportunities are emerging but the certainty and impact are more challenging to gauge.

# Conclusion IRPC risks and opportunities-2030

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- In essence, all risks increase in likelihood and potential impact to IRPC.
- **Regulatory:** ERM anticipates that both a carbon tax and cap-and-trade system are fully in place by 2030. Potential impacts, especially when considering the forecasted range of prices (\$30-50/ton), appear high.
- **Physical:** IPCC assessments are constant in their increasing attribution confidence between climate change and physical impacts; as a result, ERM anticipates both increasing likelihood and potential impacts.
- **Consumer and Market:** acknowledging the difficulty of forecasting oil and gas prices and markets, ERM nonetheless anticipates significant market demand changes by 2030. Likewise, we anticipate additional market requirements for low-carbon feedstock in petrochemical space.
- **Reputation:** market expectations of companies in both oil/gas and petrochemical space will have hardened by 2030 and it is anticipated that current leadership positions (Statoil, BASF—see peer analysis) will be minimal expectations by 2030. The reputational opportunities of being a fast mover seem likely and of high impact to IRPC.

# Recommendations

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- Regulatory
  - Consider implementation of internal carbon pricing to create organizational understanding of GHG issues and potential exposure; assists with preparing for eventual program
- Physical
  - Confirm understanding of physical risks at site level and develop climate change mitigation and action plans
- Reputational
  - Begin reporting to CDP
  - Engage with corporate and community stakeholders to exhibit leadership
  - Develop a science-based target
- Consumer/Market
  - Develop scenario analysis/ stress-test of IRPC financial health in various 2-degree scenarios
  - Continue to develop low-carbon products

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# Appendix 1: Methodology



# Risk Impact Criteria: Physical

## Risk Criteria: Impact (Business Process and Operation)

	4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Business Operation/ Strategy	Impact to <u>targets</u> according to <u>organizational strategy</u>	Impact to <u>targets</u> according to <u>business unit's strategy</u>	Impact to <u>work plan</u> according to <u>organizational strategy</u>	Impact to <u>work plan</u> according to <u>business unit's strategy</u>
Production Operation	Stop due to <u>emergency</u> and <u>severe impact</u> to property	Stop due to <u>emergency</u> and but no <u>severe impact</u> to property	Stop according to <u>the plan</u>	<u>Reduce</u> production capacity
Product and Management	Unable to deliver	Unable to control quality	Unable to deliver on time	
Compliance to laws, regulations/ rules/ and standards	Not comply with laws/ regulations both public sector and independent organizations	Not comply with laws/ regulations of the company	Not comply with organizational standards	Not convenient to comply with organizational standards

## Risk Criteria: Impact (Safety and Environment)

	4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Environment	Environmental impact at <u>provincial level</u> or taking more than 5 years to recover	Environmental impact at <u>community level</u> or taking not more than 5 years to recover	Environmental impact in <u>areas of operation</u> or taking not more than a year to recover	Environmental impact in <u>areas of operation</u>

# Risk Impact Criteria: Regulatory

## Risk criteria: Impact (Status)

4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Province/country has regulations and carbon pricing mechanisms in place and directly related with IRPC	Province/country has regulations and carbon pricing mechanisms in place and directly related with IRPC in 3-5 years	Province/country has regulations and carbon pricing mechanisms in place but not directly related with IRPC  Province/country has planned to regulations and carbon pricing mechanisms in the future 3-5 year.	Province/country has unplanned to regulations and carbon pricing mechanisms.  Province/country has planned to regulations and carbon pricing mechanisms in the future more than 5 year.

## Risk criteria: Impact (Relevency)

4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
IRPC has not planned to develop carbon pricing, calculate corporate GHG emissions, and set target for reduce GHG emissions in the future more than 5 years  IRPC did not calculate corporate GHG emissions  GHG emissions of IRPC are exceed the benchmarking analysis more than 15% (0.44 kgCO <sub>2</sub> e/USD)	IRPC has not planned to develop carbon pricing, calculate corporate GHG emissions, and set target for reduce GHG emissions in the future 3-5 years  IRPC calculate partial corporate GHG emissions lower 70% coverage  GHG emissions of IRPC are exceed the benchmarking analysis lower than or equal 15% (< 0.44 kgCO <sub>2</sub> e/USD)	IRPC has planned to develop carbon pricing, calculate corporate GHG emissions, and set target for reduce GHG emissions in the future 3-5 years  IRPC calculate partial corporate GHG emissions 70-90% coverage  GHG emissions of IRPC are at the benchmarking analysis (0.29-0.38 kgCO <sub>2</sub> e/USD)	IRPC has current corporate carbon pricing, calculate corporate GHG emissions, and set target for reduce GHG emissions  IRPC calculate corporate GHG emissions 90-100% coverage  GHG emissions of IRPC are below the benchmarking analysis (< 0.29 kgCO <sub>2</sub> e/USD)

## Risk criteria: Impact (Price risk and mitigation options)

4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Highest price of GHG emissions from site exceeding theshold (more than or equal to 5% of EBITDA)  No or few mitigation options	High price of GHG emissions from site exceeding theshold (more than or equal to 2.5% but not over 5% of EBITDA)  Few mitigation options	Medium price of GHG emissions from site exceeding theshold (more than or equal to 1.25% but not over 2.5% of EBITDA)  Medium mitigation options	Low price of GHG emissions from site exceeding threshold (less than 1.25% of EBITDA)  High mitigation options

# Risk Impact Criteria: Reputation and Customer

## Risk Criteria: Impact (Image and Reputation)

	4 (Critical)	3 (High)	2 (Moderate)	1 (Low)
Image to public and media	Report negatively on IRPC to <u>international media</u>	Report negativel on IRPC to <u>national media</u>	Report negatively on IRPC to <u>local media</u>	Report negatively on IRPC
Image to surrounding communities	<u>Strongly oppose/</u> demonstration	<u>Strongly dissatisfied/</u> oppose through given media channels	<u>Dissatisfied/ complaints</u> and critiques through articles	<u>Criticize/</u> not collaborate with IRPC activities
Image to investors	IRPC shares marked <u>SP (Suspension)</u> or key investors/ funds/ institutions immensely trade IRPC shares in continuous manner	IRPC shares marked <u>H (Trading Halt)</u> or key investors/ funds/ institutions trade IRPC shares in continuous manner	IRPC shares marked <u>NP (Notice Pending)</u> or key investors/ funds/ institutions trade IRPC shares in acceptable manner	Key investors/ funds/ institutions are not interested in trading IRPC shares.
Image to customer	Customers lawsuits	Customers express dissatisfaction through media	Complaints from key customers (good customers)	Complaints from customers (good customers)

## Risk Criteria: Impact (Customer)

Customer change behavior	EBITDA from Low-carbon or Green Products increase less than 1.25% of total EBITDA  Key customer request IRPC to conduct climate change labelling	EBITDA from Low-carbon or Green Products increase more than or equal to 1.25% but not over 2.5% of total EBITDA  Customer request IRPC to conduct climate change labelling	EBITDA from Low-carbon or Green Products increase more than or equal to 2.5% but not over 5% of total EBITDA  Key customers interest to climate change labelling e.g. CFP, CFR, EPD etc.	EBITDA from Low-carbon or Green Products increase more than or equal to 5% of total EBITDA  Customer interest to climate change labelling e.g. CFP, CFR, EPD etc.
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## Opportunity Criteria: Impact (Reputation & Customer)

	4 (Highest)	3 (High)	2 (Moderate)	1 (Low)
Image to public and media	Report positively on IRPC to <u>international media</u>	Report positively on IRPC to <u>national media</u>	Report positively on IRPC to <u>local media</u>	Report positively on IRPC
Image to investors	Key investors/ funds/ institutions immensely buy IRPC shares in continuous manner	Key investors/ funds/ institutions buy IRPC shares in continuous manner	Key investors/ funds/ institutions buy IRPC shares in acceptable manner	Key investors/ funds/ institutions are interested in trading IRPC shares.
Customer change behavior	EBITDA from Low-carbon or Green Products increase more than or equal to 5% of total EBITDA	EBITDA from Low-carbon or Green Products increase more than or equal to 2.5% but not over 5% of total EBITDA	EBITDA from Low-carbon or Green Products increase more than or equal to 1.25% but not over 2.5% of total EBITDA	EBITDA from Low-carbon or Green Products increase less than 1.25% of total EBITDA